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Master's Thesis  
Academic Year 2021

Today, Belongs to You: Special Day Celebration  
Service on Urban Public Facilities that Promote  
Communication



Keio University  
Graduate School of Media Design

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A Master's Thesis  
submitted to Keio University Graduate School of Media Design  
in partial fulfillment of the requirements for the degree of  
Master of Media Design

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Abstract of Master's Thesis of Academic Year 2021

Today, Belongs to You: Special Day Celebration  
Service on Urban Public Facilities that Promote  
Communication

Category: Design

Summary

With the rapid pace of life and higher incomes, more and more people choose to live alone for adjusting arrangements and reducing the stress of face-to-face social activities. However, the two issues including the mental problem of loneliness and increased requirements for services in public spaces caused by the world trend of living alone need to be solved urgently in the future. On the other hand, With the continuous improvement of modernization, the public facilities as the media of interaction between people and public space. are providing more interactive self-services and becoming more and more popular in daily life.

As a combination, this research aims to introduce how to design a special day celebration service named “Today, Belongs to You” on urban public facilities through the process of the user survey, function design, prototype making, and user testing, to make celebration feedback differs from each person according to the special day he or she sets on the mobile application, so as to promote communication between individuals and the outside world.

The data and analysis obtained from this research not only achieve the above design purpose but also contain real user feedback inspiring the development of subsequent related research.

Keywords:

service design, urban public facility, celebration activity, communication

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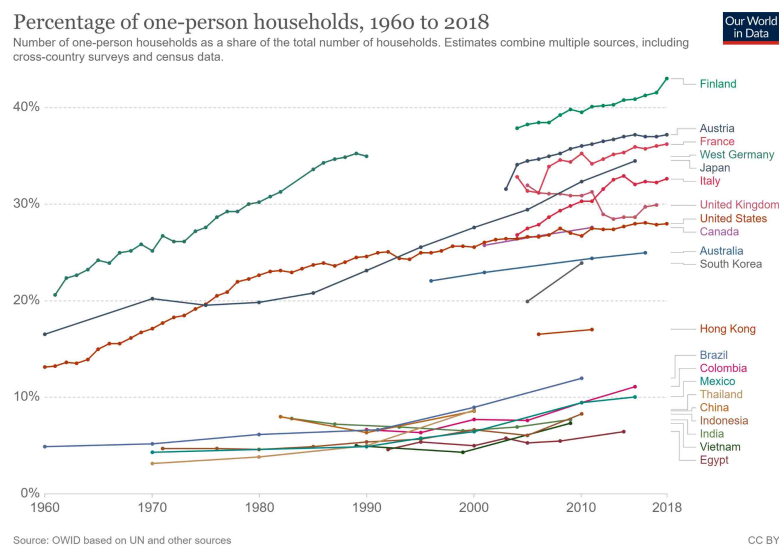
Last my thanks would go to my beloved parents for their unfailing support and great confidence in me all through these years of study and through the process of researching. I also owe my sincere thank to my friends and fellow classmates who helped me out of difficulties when writing the thesis.

# Chapter 1

## Introduction

### 1.1. Background

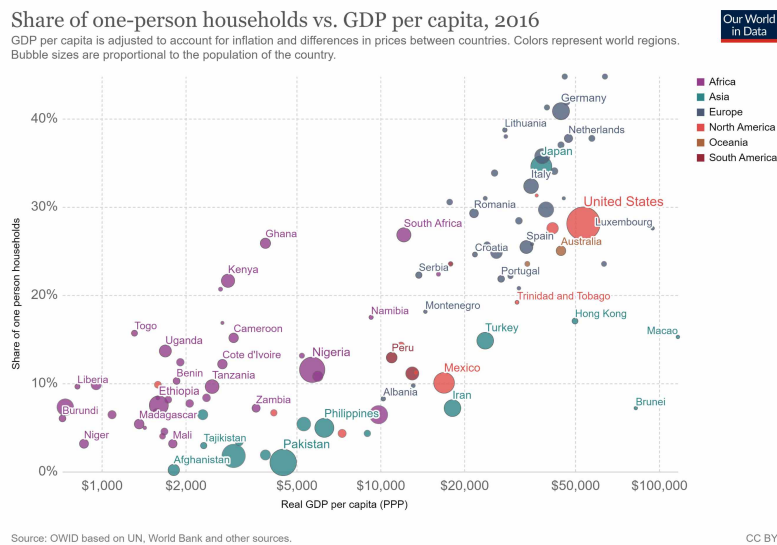
One-person households are becoming increasingly common around the world. According to a chart produced by the data and research website Our World in Data, the percentage of adults living alone in many countries around the world increased in varying proportions from 1960 to 2018 (Figure 1.1). Looking back to 1960, the percentage of one-person households in Japan and the United States was 16.51% and 13.1%. While in 2018, the number of people living alone doubled in both countries, growing to 34.53% and 28.01%, respectively.



(Source: <https://ourworldindata.org/living-alone>, accessed in June, 2021)

Figure 1.1 Percentage of one-person households, 1960 to 2018

This is not only happening in Japan and the US, living alone is becoming a worldwide trend, especially in countries with higher per capita incomes. Excluding specific cultural and historical factors, wealthier countries tend to offer a wider range of services and facilities, and higher per capita incomes can make it possible to reduce the risks associated with living alone [1]. According to another chart, also from this website, we can see a clearer positive relationship between the share of one-person households and the level of GDP of each country (Figure 1.2). In most cases, countries with higher levels of GDP will also have higher rates of living alone.



(Source: <https://ourworldindata.org/living-alone>, accessed in June, 2021)

Figure 1.2 Share of one-person households vs. GDP per capita, 2016

The advantages of freer consumption, a more personalized lifestyle, and a more relaxed psychological state are driving more and more people to join the party of living alone. However, the increase in the proportion of people living alone has brought about two major social problems:

First, the demand for public space among people living alone is increasing. For example, if there are more people choose to live alone, the demand for “eating alone” will increase, and so will the demand for public spaces that incorporate related services and facilities. Although cities with a higher proportion of solitary

residents tend to have higher economic levels and more and better public facilities to support the peripheral needs of the solitary population, as discussed above, people's needs are constantly changing and therefore require a more humane and diverse design of facilities. As part of the organic composition of a city, urban public facilities serve as a link between people and the urban space, connecting the two and forming a "human-object-environment" system. With the development of digital media, they are transmitting more and more information and people are also receiving the information in more and more ways [2].

Another problem is the impact of living alone on people's mental and psychological state. "Emotional loneliness" is the challenge. Take the example of Sweden, a country with a large population of living alone, the number of young adults aged 16 to 24 given treatment for psychiatric illness in Sweden has risen by nearly 70% over the past decade, according to figures released by Sweden's National Board of Health and Welfare in 2018 [3]. The reason for this may be found in a study by Statistics Sweden in 2017, that more than 55% of 16-to-24-year-olds don't socialize with any close, which may because living alone blocks verbal communication and makes it more difficult for people to really talk about their lives and emotions to close friends or relatives.

## 1.2. Motivation

As a new trend in the future, "living alone" may change the relationship between individuals and groups or society, and the two major social problems also need to be solved. As mentioned above, with the continuous improvement of the level of modernization and the increase of living alone, public facilities that provide interactive and multiple self-services is becoming more and more common in people's life, on the other hand, people need to communicate more with the outside world. Therefore, I am trying to combine the two and explore in this research how to design a future service based on public urban facilities that can become a platform for people, especially those who live alone and feel lonely, to communicate and interact with the outside world.

According to a survey I conducted on 268 respondents who were living alone, 71.64% of them have ever had the experience that one day is special to them

- Have you ever had the experience that one day is special to you (birthday, anniversary, etc.) but no one shares your feelings, and finally you spend that day alone by yourself?
- 
- How did you feel at that time?

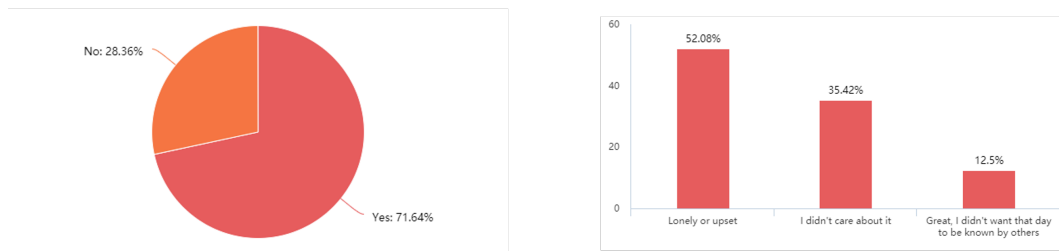


Figure 1.3 User survey: spending a special day alone and its feeling

- How do you feel when you get other's feedback surprisingly at your special day (e.g. "Happy birthday" at your birthday; blessings at your anniversaries)?

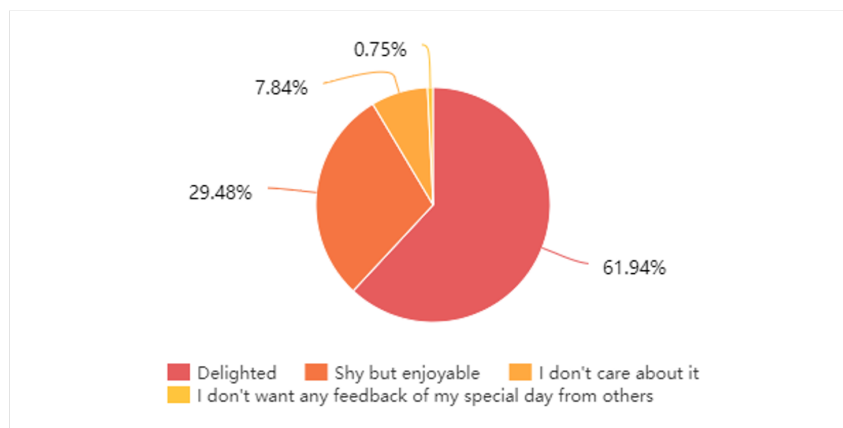


Figure 1.4 User survey: how it feels when being celebrated surprisingly

(birthday, anniversary, etc.) but no one shares their feelings, and finally they had to spend that day alone by themselves, 52.08% of these people feel lonely about it (Figure 1.3). Meanwhile, another piece of data from the study shows that most people enjoy being celebrated in their special days: 61.94% of the respondents checked “delighted” or “shy but enjoyable” when asked about how do they feel when they get other’s feedback surprisingly at their special days (Figure 1.4). Special days that are not celebrated can make people feel lonelier, while conversely, most people feel less lonely when they are celebrated in these days.

Therefore, I decide to use the “special day” as the breakthrough of this design research. If every special day for lonely people can be celebrated, by which they are given more opportunities to communicate with acquaintances, make friends with strangers, and be healed by the warmth of the outside world, the social problems associated with the trend of living alone may be solved to a large extent.

### 1.3. Future Vision

The light of the dream-driven future with this service will be that the whole city will be able to share a different personalized special day with each ordinary person on each day. Just take birthday as one of the special days as example(Figure 1.5):

*Today is your birthday.*

*You just finished today’s work and heading home.*

*As soon as you step into the bus station, the image inside the advertising screen there turns to the short video for celebrating your birthday.*

*People around start to bless you.*

*You are not alone anymore.*

and

*You got off the bus.*

*You go to the convenience store near your home to buy dinner.*

*When you pass by the store, the holographic advertisement at the door shows the animation of the birthday cake sold inside.*

*You take your dinner out of the shop, hesitating to buy a piece of birthday cake for yourself.*

More specifically, by combining the celebration of special days with urban public



Figure 1.5 The dream-driven future

facilities, this study aims to create a special-day celebration service called “Today, Belongs to You” in public urban space, to make celebration feedback from public facilities differ from each person according to the special day he or she sets on the mobile phone. My practical purpose is to create a new service with new techniques in the future, including but not limited to smart glass or hologram required less equipment, by making urban public facilities more interactive and easier-to-use with more personal service to encourage people to use more, thus improve the communication between people and the outside world. On the other hand, my essential purpose is to create a new value and lifestyle by making every day special and letting people know that every day is worth sharing and celebrating, everyone can be the leader of his or her own everyday life.

## Chapter 2

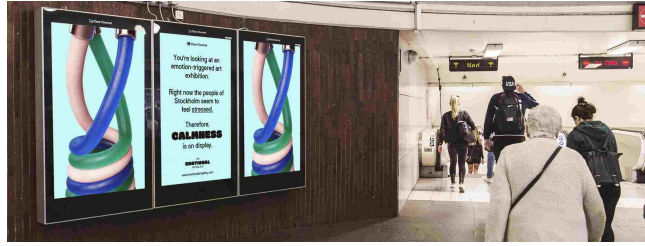
# Literature Review and Related Works

The main related topics of this research include urban public facilities and celebration activities. As an important part of urban construction, the former is not only a “business card” to show the image of a city, but also a material bearer of people from private space to public space and a medium of interaction between people and space [4]. Therefore, researches related to this topic are booming nowadays. The celebration activities, on the other hand, have been very common in various cultures around the world since ancient times, and the study of it has never stopped. I selected from these studies and related works that are relevant to this research and categorized them into three categories as shown below.

### 2.1. Design of Urban Public Facilities or Service

User needs are key to any design works, and the same is true for the design of urban public facilities. Related research by Huilan, W., and Binzhou, H. pointed out that the functional design of intelligent urban public facilities based on human-computer interaction needs to involve multi-sensory perception such as vision, touch, and hearing [5]. “Virtual Studio” [6] by Yenliang, W., and Chor-Kheng, L., et al, is a project integrating various digital media to explore how people would interact with the spaces in future city life.

Based on theoretical foundation research, there are already some related works that attempted to make urban public facilities interact with people’s psychological state. Clear Channel and design studio Affairs have created “The Emotional Art Gallery” [7], which extracts real-time data from search engines, news social media to assess people’s mood in the city and show it on the public digital screen



(Source: <https://www.dezeen.com/2019/03/25/emotional-art-gallery-stockholm/>, accessed in July, 2021)

Figure 2.1 “The Emotional Art Gallery”

(Figure 2.1). “Feel-O-Meter” [8] created by Julius ’ von, B., Benjamin, M., and Richard, W. is another interactive art installation of a giant face that mirrors the mood of nearby pedestrians (Figure 2.2).



(Source: <https://laughingsquid.com/feel-o-meter-a-giant-face-that-reflects-the-mood-of-a-city/>, accessed in July, 2021)

Figure 2.2 “Feel-O-Meter”

We can see that public space is able to demonstrate the psychological state of urban people in addition to addressing the function of living or traveling. However, displaying psychological states is only the first step, the design of public facilities in urban space is expected to incorporate more interactive functions to affect or

even guide user behavior and psychology. At the same time, there is a large gap in research on the interactive functions associated with celebrations in urban public facilities.

## 2.2. Celebration in Public Space

Designers can create a sustainable urban environment with the joy of living by redesigning the celebration activities [9]. To design a public service related to celebration, it is important to understand users' feelings of being celebrated in public or joining in public celebration activities. Related works such as “Living Connections” (Figure 2.3) [10], the lighting project of the tower of the bridge in Montreal, demonstrate the interaction between public facility with group celebration that the theme light of the bridge changes based on the most popular news event in Montreal at present. In addition, John, S. concluded that festive ritual (celebration) is necessary to the sustained well-being of the social body [11].



(Source: <https://www.mtl.org/en/what-to-do/heritage-and-architecture/jacques-cartier-bridge>, accessed in July, 2021)

Figure 2.3 “Living Connections”

Conversely, few studies or projects have explored the experience of individuals being celebrated in public spaces. Therefore, it is necessary to explore whether making the individual celebration a function of urban public service facilities can

improve individuals' interaction and communication with other people and the outside world, and thus achieve an improvement in their psychological state by reducing loneliness and increasing the feeling of being surprised, healed or warmed.

## 2.3. Celebration Activities

There are also studies that replenish other aspects of celebratory behavior, providing references for sorting out the history, traditions, and habits of people's celebratory behavior. Julie, O. divided the reasons people celebrate into three categories: Historical events (e.g., national celebrations, Christmas, etc.), achievements in the present, (e.g., birthdays, weddings, etc.), and recognition of particular beliefs or values, (e.g., Olympics, Mothers' or Fathers' Day, etc.). She also listed six ways people usually do when celebrating: giving gifts, preparing special food, making and doing activities that are unique to that celebration, wearing special clothing, enjoying music and sharing stories and recognizing symbols [12]. Other more researches focus on the celebration activities of specific groups of people. Take the research of Tjerk, M. et al, for instance, it explores the role of individual emotional expressions on team performance by analyzing the different ways players celebrate in penalty shootouts held in World Cups [13].

However, there is still a lack of researches on celebration activities for ordinary individuals. My goal is to explore a new way in which each individual can be celebrated for his or her own special meaning of everyday in public, ameliorating the multi functionalities of public space and the increased loneliness brought about by the future trend of living alone.

# Chapter 3

## Design Concept

The design project started in March 2020 with the name “Today, Belongs to You”, which means everyone can be the main role of his or her own everyday life.

This chapter will define the differences between the celebration approach of the special day celebration service “Today, Belongs to You” and the traditional situation, then analyze the distribution and effectiveness of the celebration messages of the service, and finally discuss the using scenarios, equipment, and materials suitable for the service design based on the actual possible using situation. The concepts presented in this chapter are at a theoretical and ideal state; the specific implementation and the expected results generated by this service will be shown in the subsequent chapters.

### 3.1. Celebration Approaches

#### 3.1.1 Traditional situation

There are always four key elements that make up a celebration: time (why or what to celebrate), place (occasion), people (participants), and celebration effect or goal. Traditionally, or in more widely known situations, celebrations can be broadly divided into two main approaches according to the way these four elements are combined: group celebrations in public spaces, and personal celebrations in private spaces.

The former always refers to a larger group of people celebrating at the same time period or in the same place for a common reason, which is mostly historical or particular cultural beliefs. The effect or goal it achieves tends to be more focused on the common atmosphere of the whole group or related to some well-known

people. For example, Chinese people always have similar celebration activities such as making dumplings and setting off firecrackers during the Chinese New Year, in order to participate in the joyful atmosphere of the whole country; people who seek to reduce racial discrimination and promote racial equality commemorate the great man on every Martin Luther King Day. The advantage of this type of celebration is that it creates more common topics for people to talk about, and it may go some way to increasing opportunities for strangers to interact and communicate with each other.

The second approach of traditional celebration is a smaller number of people, often acquaintances, celebrating in a more private space for an event that exists in a smaller social circle, often for a more personal and varied reason. Examples include celebrating birthdays, wedding anniversaries, pay raises, etc. The effect or goal achieved by this approach of celebration places the focus on the subject being celebrated, which means that their positive emotions are reinforced and their negative emotions are diminished. And this undoubtedly has a positive effect on promoting communication between acquaintances.

### **3.1.2 New situation for “Today, Belongs to You”**

The task of this research is to try to break through the boundaries of the two celebration approaches in the traditional situation, that is, to combine the group celebration for group events in public places with the personal celebration of personal events in private places, and to realize the personal celebration of personal events in public places within the acceptable range of individual users. For the special day celebration service “Today, Belongs to You”, urban public facilities assume the material carrier of public space celebration, while individual users’ willingness to share their own special days in public is especially crucial, which is the most important basis for subsequent progress and optimization.

Such a celebration will inherit the advantages of the two traditional celebration approaches, i.e., each individual user is able to get feedback on their special day from not only their loved ones and friends but also from strangers.

### 3.1.3 Definition of "special days"

In view of the individuality and variability of personal celebration events, the concept of "special day" is also not limited. It can be positive (e.g., birthday, wedding anniversary, etc.) or even negative (e.g., break-up day, out-of-work day, etc.). The "celebration" activity also changes (in the case of negative special days, it can be an encouragement, comfort, etc.). They can also be related to sudden unexpected events that happened recently or even on the day, such as the sudden acquisition of something precious, or a sudden memorable or celebratory event, etc.

Therefore, except for birthdays, anniversaries, etc. in the traditional sense, each user's special days cannot be predicted by the service or the developer, which is different from the personalized services based on customer information that already exist in some hotel or airline services. The only thing that can be determined in "Today, Belongs to You" is that all special days are set only depending on whether the celebration receiver, i.e., the user of the service, wants to make the special meaning of the day public, or whether he or she has a preference for how to be celebrated, etc. In other words, the new approach of celebration that I am trying to create will refine the privacy settings and leave it entirely to users based on their wishes. The specific types of privacy settings are described in detail in subsequent chapters.

## 3.2. Distribution of Celebration Message

Based on the concept mentioned above, I will explain the specific implementation of this service according to how the content of the celebration message is delivered.

### 3.2.1 Content input

Before holding a celebration, people need to know why they are celebrating, and then they need to plan and prepare for the specific celebration content and activities, which is also the case in the special day celebration service proposed in this research. The celebration receiver (the target user) is the first content inputter, who needs to determine what day is special to him, or input the name of a special

day for a specific date he is willing to share in public in advance. The celebration sender (the designer of the celebration corresponding to the special day set by the receiver) is the second content inputter, who needs to design and prepare the celebration content according to the special day set by the celebration receiver and present it to him. Each person can set his or her own special day, and can also design and send celebration content for other people's special days, which means, each user can be both a celebration receiver and a sender for each day. In the process of receiving "celebrations" from others and designing or sending "celebrations" to others, people in the future can find an outlet for their negative emotions such as loneliness or stress due to living alone and lack of communication with the outside world.

To sum up, the celebration content input device that can be used for this service needs to have the following qualities: is able to input content such as text and images; is able to display dates; is able to connect to the internet; is wearable. The networking function is to enable the information of each user's special day to be uploaded and shared to the celebration senders, and to transmit information such as user's identity, the special day, and the corresponding celebration content received from the sender to the content output located in the public space. The wearable feature is needed because users will receive celebration content in public places, which means the content input or content storage device needs to be portable in order to connect with the content output in public spaces.

Currently, I designed a mobile application that can be installed on smartphones, smartwatches, and other electronic devices as the input terminal of the celebration content. Its detailed functions can be optimized and refined based on the following prototyping and user testing, which will be explained in detail in subsequent chapters.

### 3.2.2 Content output

As mentioned in the previous chapters, public facilities have been equipped with more and more services or functions, with more and more humanized and convenient operating systems, which can meet more needs of users and thus are playing the role of a bridge between people and the public space.

In this research, I designed the content output of the special day celebration

service as part of an urban public facility in the future. On the one hand, people are already accustomed to using public facilities, so it will not be very difficult for them to accept the added new services or functions; on the other hand, the form of public facilities can be changed according to its location and function, so that it will be easier to achieve the effect of “ubiquitous”, which also allows users to view the service as a daily activity, increasing participation and alleviating the discomfort such as embarrassment or anxiety when adapting to this new celebration approach.

There was a clip in the American drama “Maniac”: when the main character passed a billboard located on the street, the content on it changed as she approached and moved away (Figure 3.1). This inspired me to design “Today, Belongs to You”, the special day celebration service. It works by combining the content output and input, specifically by enabling public service facilities in urban space to be connected to users’ wearable electronic devices via the Internet or Bluetooth, so that when users pass by, the public facility can obtain the users’ identity information, and be informed of the special day they have set for that day, and also the celebration content they have received from others.



Figure 3.1 Clips of “Maniac”

Service design needs to pay attention to the user’s using experience. This research intends to involve visual, auditory, and tactile functions in the special day celebration service. In normal times, the public facilities installed with this service display commercial advertising or other usual contents, when a user comes close, its visual output (e.g., electronic screen, holographic projection, etc.) will display the special day celebrations to the user, while initiating corresponding voice announcements and generating more interactive functions (e.g., opening gifts, playing games, etc.) when the user stays and touches the facility screen. The celebration contents and more elements related to the interactive functions

such as the gifts can be designed by the user ' s friends (Figure 3.2).



Figure 3.2 Simulation model: how the service works

However, it is worth mentioning that as technology continues to evolve, the existence of the content input and output terminals that are more suitable than mobile application and urban public facilities cannot be ruled out. This research only presents a conceptual design and conducts tests to examine whether the service can achieve the expected goal of promoting communication to a certain extent.

### 3.3. Scenario Selection

#### 3.3.1 Using situation

According to real life, there are two conditions of being personally celebrated in the public: there should only be one user connected to the public facility with the service installed each time to avoid several users connecting at the same time, which I would like to call it “ONE-ON-ONE”; the other condition is “PEOPLE AROUND” which requires facilities with the service installed in public with people around. In addition, we can also divide the using situations of interaction with

Crossing	Staying
Entering a store	At the public transport station
Entering an office building	At the window of a bus/taxi/subway
Entering an elevator	At the mirror in a public bathroom
Entering a room in public	At the dressing mirror in a clothing store
...	...

Table 3.1 Using Occasions of Special Day Celebration System

public facilities in urban space into two different types according to common sense (Table 3.1): CROSSING and STAYING. CROSSING means when a user passes through an entrance (e.g., a gate or door of a building/store/...), there can be a voice celebration for his or her special day. STAYING: When a user stops and stays somewhere with equipment that can be fitted with a visual display (e.g., mirrors, windows, billboards...), there can be visual and voice celebration on it.

By integrating this new service, which uses a new approach of celebrating, into people's natural travel lives, it is possible to argue that it can help people feel the connection with the outside world more frequently and surprisingly.

### 3.3.2 Materials and equipment

I would like the public facilities used in this special day celebration service, which is the content output mentioned above, to have visual displays made by reflective or refractive materials. Such materials are not only found in various electronic displays that are mostly seen nowadays, but are also mostly used in glass, holographic (air), and other medium in public spaces. In other words, not only when passing by the street billboard as shown in the American drama "Maniac", but users can also receive "celebration" from others on their special day in glass (such as car windows, mirrors, etc.), holographic projections in the air and other new type displays with strong reflective ability when passing by these materials or facilities that can be seen everywhere. This may make the user's using experience of this service more natural and make it a part of people's daily lives imperceptibly, thus promoting spontaneous communication.

It is important to emphasize here that the special day celebration service "

Today, Belongs to You ”, this research only highlights and tests the use of glass in daily life (e.g., windows, mirrors, etc.) as the display of the public facilities. There are more materials with light reflection and refraction in public spaces, such as walls, fabrics, metals, etc., which may also be used as content output for this special day celebration service in the future.

### 3.3.3 Scenario sketch

Based on the above description of using situations, materials, and equipment, I made sketches for clearer specific scenarios (Figure 3.3). In this group of sketches, each small scenario illustrates an example. If the characters in these 5 images are named A, B, C, D, and E from left to right, then the using scenarios depicted in the drawings are as follows:

**TODAY is A ’ s second wedding anniversary.** When she stays at the public transport station (like the bus station drawn in the sketch), the electronic screen displays a congratulatory message “ *Do you still remember? You have been married for 2 years!!* ” from A ’ s husband, accompanied by a short, personalized background sound effect. At the same time, if A stays longer and has a desire to use the service further, the screen at the station will also display more related services, such as offering restaurants with higher scores or closer that are suitable for the wedding anniversary.

**TODAY is the coming day of B’s high exam score result.** When she gets on public transport (like the bus drawn in the sketch) and sits at the window, the glass maps out her family’s congratulations “ *You really worked hard* ” to her, as well as some relevant celebratory elements such as gift cones and exam paper with high scores.

**TODAY is C ’ s birthday.** When she enters the entrance of a store, the voice system equipped with this service at the door automatically announces not only congratulates from her friend “ *Happy birthday, dear C san!* ”, but also targeted advertising “ *We have cake for you!* ”.

**TODAY is D ’ s payday.** When she goes shopping and stays at the mirror of a dressing store, the mirror displays the special effects of “floating money” designed by D ’ s friends and broadcasts “ *Congratulations, D! Today is your payday, buy something you like!* ” with some short music.

**TODAY is the day of D's onboarding interview.** When she stays at the mirror of a public bathroom, there are dynamic visual displays on the mirror that indicates “*You are the best!*” and voice broadcasts “*Don't be nervous about today's interview*” from her friends.

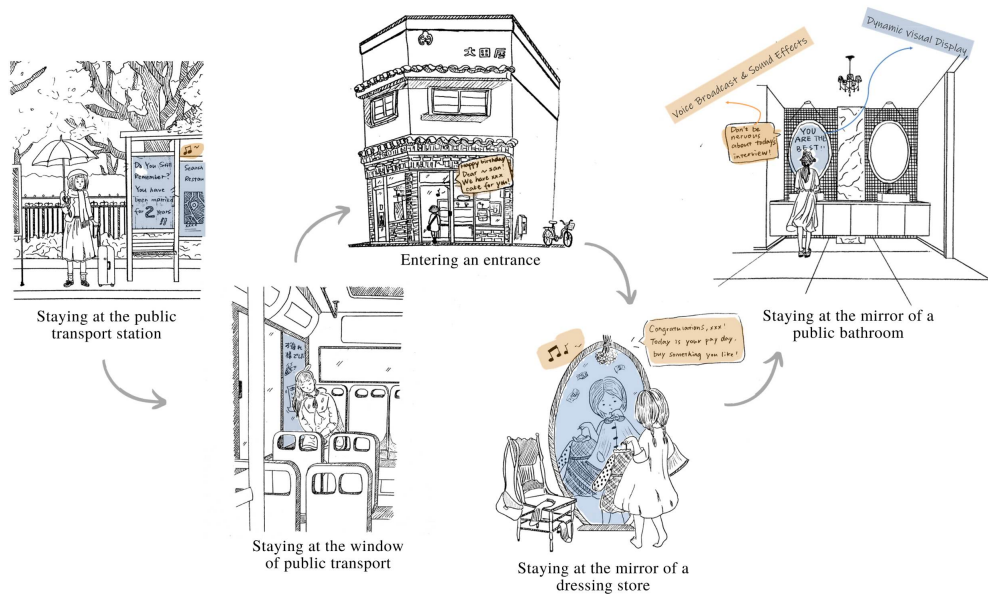


Figure 3.3 Scenario sketches

In addition to explaining the meaning of each small image one by one, they can also be linked together to form a story line of a particular user's usage throughout the day. The story line illustrated in these sketches is as followed: a user can connect to the system several times in a day, and be celebrated one by one, according to the order of all the public facilities she passes through that day, the contents of which are all related to the special meaning of her day. Among them, for the “Entering an entrance” which belongs to the “CROSSING” situation, including entering a building as shown in the sketch, or entering an elevator, the output form of the celebration content is mainly by making the unified voice broadcast personalized.

### 3.3.4 Interaction zone

In order to avoid problems such as users passing by a public facility with this special day celebration service while sticking on their cell phones and cannot be connected, or multiple people passing by the same facility at the same time and waiting for the connection, the scope of the service, i.e., the interaction zone, needs to be defined, which should be classified according to the real using scenarios. In public areas like bus or railway stations, mirrors at clothes stores, or public bathrooms, the system will only display celebration content of users in the interaction zone, first come first served. People around in spectator zones give their feedbacks when seeing celebration messages on the display (Figure 3.4).

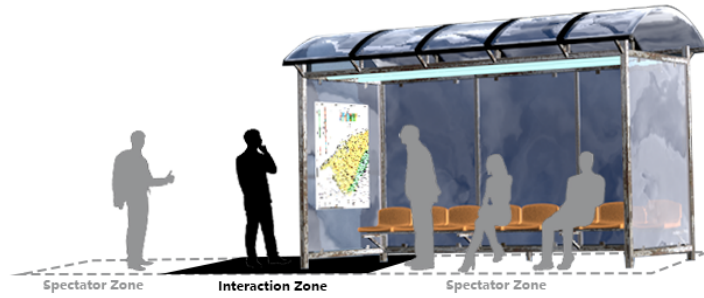


Figure 3.4 Interaction zone at public area

As for some narrower or special scenarios like in public vehicles, interaction zones also change (Figure 3.5). As soon as the user sits on seats, the system starts identifying the mobile personal device of the user and begin connecting. For users who are on mobile phones, the system determines they give up connection this time, and they can wait for the next facility's connection when entering its related interaction zone.

In summary, as an attempt to develop a new approach of celebrating, the special day celebration service “Today, Belongs to You” is consists of two main terminals: the celebration content input, which is also the mobile application terminal in this research; and the celebration content output, which is also the urban public facility terminal with reflective or refractive materials as the screen displaying the



Figure 3.5 Interaction zone at transport area

celebration content. Users are able to experience the service several times on one special day and select their own special days they are willing to share with the public according to their own preference. In addition to being the celebration receivers, users can also design their own celebration for their friends' special days as celebration senders at the same time.

### 3.4. User Survey

In order to verify the significance of this research and find out the main problems to solve or improve about the design concept as well as the following research, I did a user survey for 268 people who are living alone as mentioned in the first chapter. I set questions about special days, celebrations, etc. related to the design purpose of this service in its first half. While in the second half, I gave a brief description of the design concept, using methods and scenarios of this service, based on which I set questions related to users' intention and preference to use it. The specific questions and results are as follows.

#### 3.4.1 Results and analysis

After giving a brief introduction to this project, the survey asks respondents to rank some of the "special days" they prefer choosing to set in this service and get

feedback from strangers around them on that day. This question is set to find out the most acceptable special day for the first prototype. As for the result, “users’ birthdays” seem to be the target (Figure 3.6). For the answers of “other days”, respondents give different choices such as pet’s birthdays, which also inspires me on the types of special days.

- Which of the following "special days" will you choose to set in this service and get the feedback from strangers around you on that day?

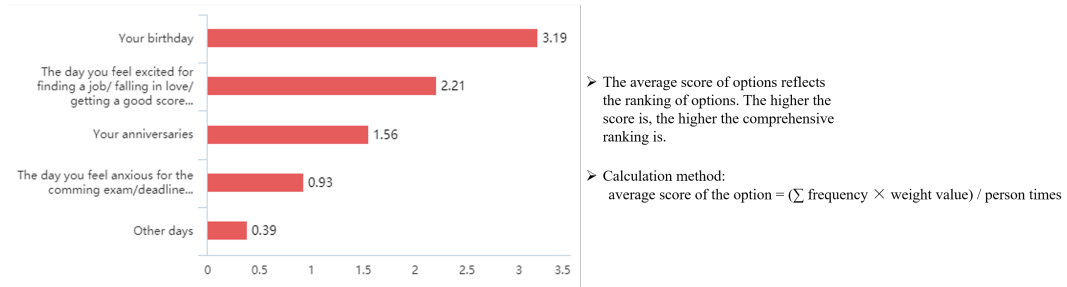


Figure 3.6 Ranking of the acceptable “special days”

Similar to the first question, the second question comes to the most acceptable using scenario. The results show a preference for the scenarios related to public transport (Figure 3.7), but this may be related to the fact that the survey itself only gives the five scenarios drawn in the sketch, as in the follow-up question “suggestions for this survey”, many respondents give more possible using scenarios, such as in elevators, or on commercial advertising screens in pedestrian streets.

The next is a more critical question, that is, after introducing the concept and design purpose of this service, the first time to check if users are willing to use it. In this regard, about 73% of the respondents voted that they are willing to try this system (Figure 3.8), which may mean most people accept to share their feelings with the public and to be celebrated by strangers on their special days.

But this is far from enough. I also need to know the confusions or expectations people have about my service. Therefore, I set questions for the respondents to dig out the reasons they voted yes or no. Here are the main reasons people support this service (Figure 3.9): the idea itself is creative; they feel a little lonely on some days when there is no one to share their feelings; sometimes they want to share their feelings, but they don’t want to share with acquaintances. In addition, I

- Which of the following "special days" will you choose to set in this system and get the feedback from strangers around you on that day?

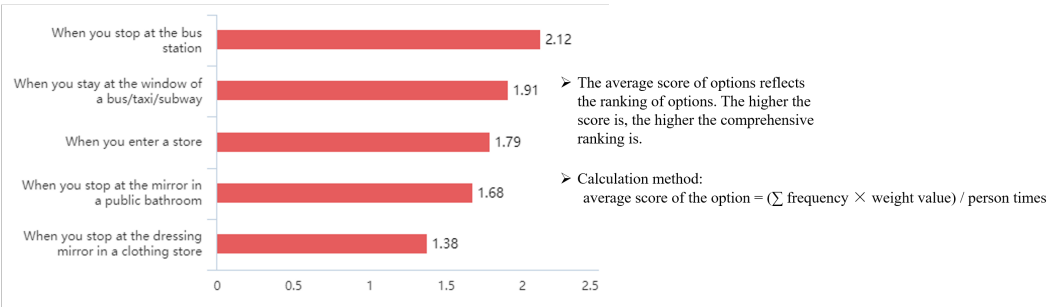


Figure 3.7 Ranking of the acceptable using scenarios

also received some interesting answers like “*I can feel like I’ m sharing these days with myself with a sense of ritual*”; “*I need encouragement and warmth from the outside world when I’ m alone*”; “*I just think it would be excited to have someone or something I’ ve never expected to celebrate for me*”. These supporting reasons can enlighten me on what functions should be maintained, enhanced, and designed.

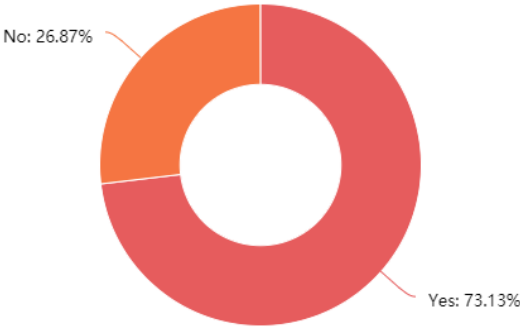


Figure 3.8 Whether users are willing to use the special day celebration service

For the other 27% of respondents who are not willing to try this system, most of them voted that they don’ t want to share any of their special days with the public and strangers and they are afraid their personal information will be leaked. Some also mentioned that his personality made him easier to feel embarrassed or that

- Why you are willing to try this system?

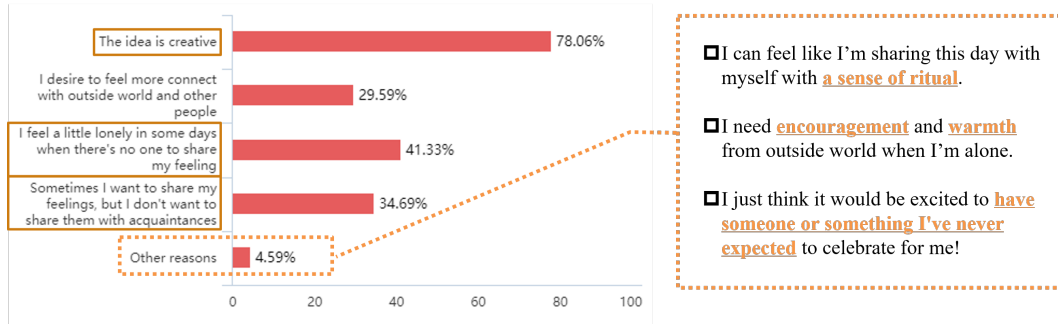


Figure 3.9 Reasons why people are willing to use the service

he is more concerned about the feedback from his acquaintances (Figure 3.10). These sounds are the keys for optimizing and adding some more functions for the service in the next step.

- Why you are not willing to try this system?

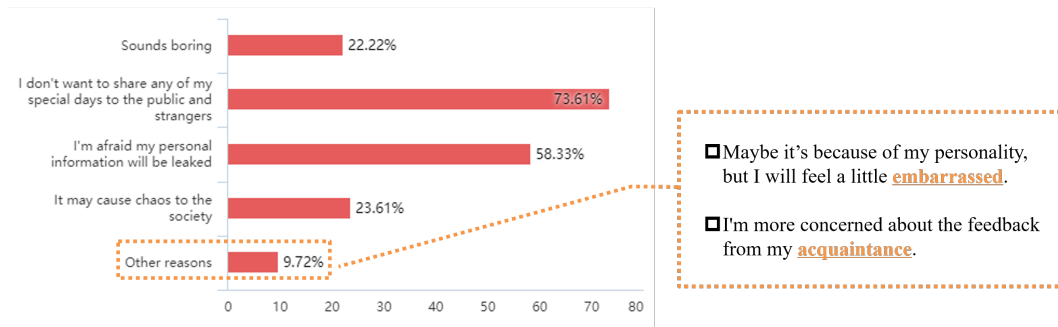


Figure 3.10 Reasons why people are not willing to use the service

### 3.4.2 Inspirations for follow-up work

The result of the user survey revealed an overall positive attitude toward the design and development of this special day celebration service, which supports the value of the design concept and purpose of this research. Based on some of

the results, especially the reasons why people are willing and not willing to use the service, it is possible to obtain some inspiration on more design ideas. In summary, there are three senses of using experience that need to be taken into account in the following design process.

**The sense of ritual:**

There is a keyword mentioned by one respondent that the reason she likes this design concept is that she “*feels like she is sharing the special days with herself with a sense of ritual*”, so that the first inspiration is that the sense of ritual should be kept or even increase, two related functions play an important role here. Typically, celebratory elements such as gifts and greeting cards tend to bring a sense of ritual, functions related to these two should be the core of the special day celebration service and be integrated into the subsequent prototyping. The gift element can be reflected in the function of adding a scene of gifts for users to open it by themselves by touching the screen; while the greeting cards element is similar to the celebration contents, so that it is significant to let users design parts of the celebration contents by themselves.

**The sense of familiarity:**

At the same time, many respondents emphasized that they valued the participation of acquaintances in the celebration. This can be interpreted from the reasons why people have a negative attitude toward the service, with most saying that they “*don't want to share any of their special days to the public and strangers*” that it might be embarrassing to share with people they do not know well, or that they are only concerned about whether acquaintances would give celebration feedback on the special days. These all indicate users' need for a sense of familiarity. To solve this problem, a social platform in the mobile application for people to check and assign “friends” they allow to give celebration feedbacks should be designed. The “friends” here can be their real friends, family members, or other acquaintances. In addition, if a user receives the celebration messages designed by more than one “friend” in one day, the user can meet different celebrations when he or she passes through different facilities equipped with the service.

**The sense of surprise:**

The sense of surprise was mentioned by most respondents, especially among the reasons for supporting the service, with many citing “*I just think it would*

*be excited to have someone or something I've never expected to celebrate for me*". This highlights that the sense of surprise can increase users' expectations and experience of using this service. The current design concept allows users to imagine and feel a sense of surprise when the service is implemented in the future, but it also inspires me to protect this feeling when designing the prototype and conducting user tests, especially when designing and arranging the testing procedures.

## 3.5. The First Prototype

### 3.5.1 Purpose of creating the first prototype

Based on the survey results, I made some brief revisions of the design concept. And to simulate the real using scene, I designed the first prototype by PowerPoint, one of the basic software of Microsoft Office. From the user research, it is clear that the main negative opinion about the special day celebration service is focused on the concept of "being celebrated in a public space and exposed to strangers". The first prototype will be designed and created accordingly.

This prototype will mainly present the overall appearance of the service in terms of content output, i.e., the public facility terminal. First of all, it will give users the best possible images of what I really wanted to achieve when I designed the service, avoiding some of the negative attitudes caused by misunderstanding the concept. Secondly, the focus of this first prototype is on public facility terminal because public facilities are the most important medium for the "new celebration approach" proposed in this research, a new concept that is almost completely absent from people's daily lives now and is the most difficult for users to understand and familiarize.

The purpose of creating this prototype is to maximize the information that users know about the service, to guarantee the subsequent user tests of the first prototype are as targeted and completed as possible, and to avoid the design falling into the "designer's trap" (design flaws that are clouded by the designer's own inherent thinking about his or her own work).

### 3.5.2 Design Process

Inspired by VR games, RPG (Role Play Games), and other games where the players can operate the interface from the first view, I made slides by PowerPoint into a simple experience-based game as the first prototype (Figure 3.11).



Figure 3.11 The first prototype

In this slide file, there are three main real-life scenes: the subway station, bus station, and clothes store, which are further subdivided into a total of 20 small scenes, including the interior of the subway station, the interior of its carriage, the nearby toilet of the clothes store, etc. They are logically arranged (Figure 3.12), and each page is switched with the corresponding real sound effects (for example, you can hear the sound of the vehicle engine running in the scene of the bus coming, you can hear the doorbell ringing when you enter the scene of the clothes store, you can hear the sound of water when you are near the faucet in the toilet, etc.) to simulate what people see and hear when they travel in the real life.

PowerPoint was chosen for making the first prototype because it is a commonly used, low-entry-barrier, and popular application. In the subsequent user tests of the first prototype, users basically do not need to relearn to use then are able to perceive how the special day celebration service works easily. To use this prototype, users simply open the file and select "Slide Show" on the first page to enter a full-screen mode for an immersive experience of "Today, Belongs to You". The first four pages are the covers and tutorials of the whole prototype,

by pressing the button “START”, users enter the “main menu” of the three main scenes, the subway station, bus station, and clothes store, where they are able to choose for their travel destination. In each scene, there are arrows and text prompts for “back” and “closer” or “going to other scenes”. Pressing the “back” button returns the user to the previous page, while pressing the “closer” button jumps to the next page, where public facilities “installed” with the special day celebration services (such as billboards at the subway station, bus windows next to seats, etc.) will display different dynamic celebration content, including text slogans and illustrations, and will also play the corresponding voice message such as “Happy birthday” (according to the result of the previous user survey, birthday is the most acceptable special day at that time, the setting of this prototype is on birthday and the celebration contents on the virtual public facilities of the prototype are also for birthdays).

Inspired by the results of the previous user survey that the sense of ritual and surprise should be valued, I also put the function of “opening gifts” in this prototype. After entering the page showing the basic celebration content, the user continues to click the “closer” button to see a dynamic gift pattern, and click the left mouse button to open the virtual gift to view the content.

All the above operations can be done in the full-screen “slide show” state, no need to exit the full-screen mode, users can just click the button on each page to make the page jump automatically. At the same time, the transitions of slide pages are all designed to be “morph”, which allows users to animate smooth movement from one page to the next. With “morph” transitions, the same elements in every two pages can move without needing individual motion paths or animations to be applied to them, which ensures that the scene transitions to be more natural and closer to what people see when they walk or approach objects in reality.

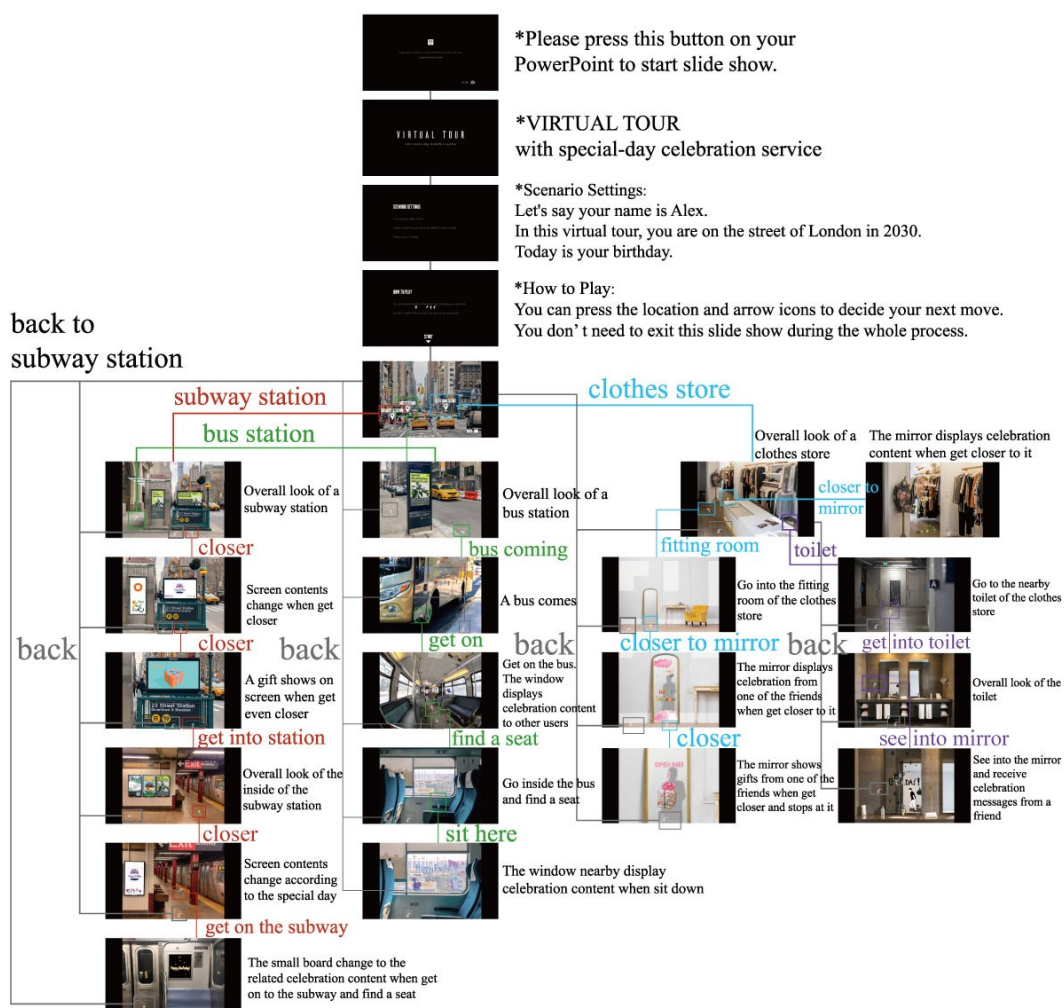


Figure 3.12 Logic script of the first prototype

## 3.6. User Test for The First Prototype

### 3.6.1 Testing process

Since the first prototype is only a simple simulation of how the service will look like when implemented, but not a functional prototype that can be used in a real environment, its user tests were conducted to get feedback on the service design concept. The test objects of the first prototype should be a small group who really want to have this service, then they could be the most important influencers to enlarge this movement.

I invited four people who showed the strongest interest in the service “Today, Belongs to You” from the 268 respondents of the previous user survey to be the subjects of this user test. They each completed the test at their own residence after receiving the first prototype. The steps for the test are: open the prototype file on their computers, turn on the computer speakers or put on headphones, follow the instructions on the pages of the prototype file, and receive an interview after reaching the last page of the file.

In order to make the test environment as uniform as possible with the design environment, i.e., to increase the sense of surprise when using it, two of the test subjects received the prototype and completed the test on their birthdays. Unfortunately, the test was unable to be conducted offline due to the impact of the Covid-19 epidemic at that time, the results of the test were all answers from users of the interview after they using the prototype, however, there is no data on the facial expressions, body movements, and words of the four subjects during the using (testing) process.

### 3.6.2 Testing results and analysis

The detailed results of what users said after using the first prototype are as shown in the following table (Figure 3.13). The results of each user’s interview were divided into three parts: an evaluation of the first prototype itself, an evaluation of the project as a whole (that is, of the special day celebration service), and the doubts or problems that arose during usage of the prototype, i.e., the pain points of the service.

	USER 1	USER 2	USER 3	USER 4
User Description	Female 54 Education/Editor	Male 24 Office Worker/Game Enthusiasts	Male 25 Programmer <u>Took the test on birthday</u>	Female 27 New Media/Fashion <u>Took the test on birthday</u>
About Prototype	"It's very <b>creative</b> to use PowerPoint to simulate the product."	"I feel like I'm playing a <b>RPG (Role Play Game)</b> when trying this prototype. Very cool!"	"It's really <b>surprised</b> to try this on my birthday! I can <b>immerse</b> myself into this prototype but I have to say there's still some problems of the operation."	"It's very <b>convenient</b> that I don't need to install any other software or learn how to operate. The scenes in the prototype are so <b>natural</b> !"
About Project	The concept is very creative, looking forward to its coming out	"As a poor office worker <b>alone in an unfamiliar city</b> , I would feel <b>cured</b> if I can have interaction with the world on my way home."	It would be a big surprise to have this in the future, but you have to solve <b>privacy problem</b>	I feel like <b>being cheered by fans as a star</b> !
Pain Point	<u>How to provide service to disabled people like the blind or deaf?</u>	<u>What if I don't go out on the special day?</u>	<u>Privacy Problem;</u> <u>Worry that no one give me celebration</u>	<u>Maybe it would be a little bit embarrassed if there's too many people nearby</u>

Figure 3.13 Testing results of the first prototype

As for the comments of the prototype and the project, User 1 gives positive feedbacks towards both the prototype itself and the design concept of the service that she commented “*it's very creative to use PowerPoint to simulate the product*” and “*the concept is very creative [⋯]*”. User 2 also responded affirmatively that he said the prototype is like a role-play game, it would be cool and cured to people who are working in an unfamiliar city like him. User 3 and 4 were both surprised and happy to try this prototype on their birthdays. They both love the immersive experience, user 4 even said she felt like being celebrated by fans as a star. Through these evaluations, it can be learned that all users can understand the design purpose and working procedures of the special day celebration service by using this prototype, which affirms the extent to which this prototype restores the original appearance and concept of the service. In addition, they all initially affirm the design concept of this service, which proves its value and design significance to some extent.

And apparently, they all raised the problems or shortcomings of the service in the process of using it, which can be interpreted as the pain points of the service. In order to show the specifics of the pain points and their relevance to this service more visually, I made a user experience map to restore the steps and

emotions, as well as the pain points associated with each step when they using the service (Figure 3.14). The pain points raised by User 1 are not included in this map because the disabled people she mentioned do not currently belong to the target users of this service, and solutions for them are not part of this research for the time being. It must be considered that in the future, with the continuous development of technology and service concepts, better service solutions will be developed for disabled people if this service is popularized.

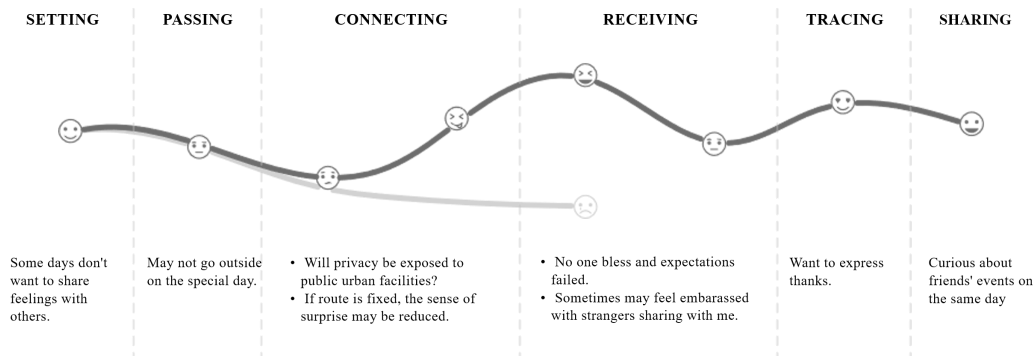


Figure 3.14 User experience map

In the beginning, users set what special days they would like to share, then they pass by the public facilities. The pain point here is that users may not go outside on special days. The third step is users' mobile terminals (content inputs) connecting with the public facilities. The pain point here is privacy problem and like "*if route is fixed, the sense of surprise may be reduced*". As for the privacy problem, the sharing scale of each special day can be set by users themselves, and all special days they want to share with the public are also selected by themselves. The next step is users receiving celebration feedback. This will be the climax point of the whole using procedure. The only pain point here is that users may worry there's no friend bless them. The fifth step is tracing, users calm down and want to express their gratitude to the celebration designer. For the last step "sharing", it might be better to create a community on a mobile terminal for users who are curious if someone is enjoying the same special day as him or her somewhere.

Collating all the pain points mentioned above, the main pain points mentioned in this user experience map can be classified into four categories: PRIVACY,

SURPRISE, SHARING, and APPRECIATION.

By collating the existing functions or features of the service, such as design and public facilities, and by targeting some new function ideas, we can obtain the minimum viable product for this service (Figure 3.15) to partly solve these pain points. The entire service will have five main functions or features: SETTING, COMMUNITY, DESIGN, FRIENDS, and PUBLIC FACILITIES.

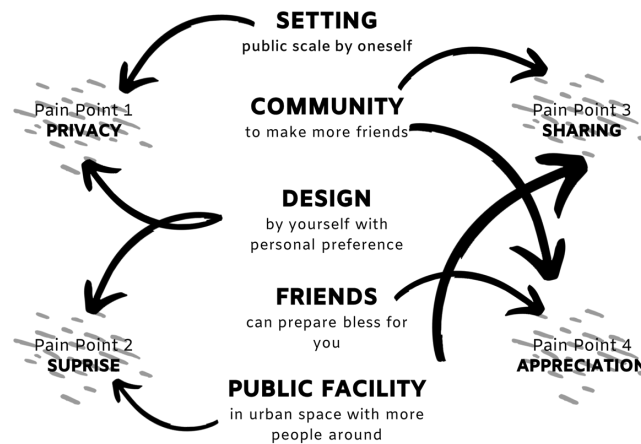


Figure 3.15 Minimum Viable Product (MVP)

The main function of SETTING is to allow users to set their own public scale for their special days, including what special days can be shared with the public, what types of public facilities to interact with, and how often to interact with them. This feature mainly addresses the PRIVACY pain point.

COMMUNITY is a new feature that was born after the user test for the first prototype, it is a social platform that exists on the mobile application terminal of the service. Similar to Facebook or Twitter, the COMMUNITY function allows users to identify friends they know (address book friends or friends from social media apps), meet new friends (strangers who enjoy the same special day, etc.), share their special days and celebrations they receive or other related striking events, browse daily news of friends or in public circles, and interact with friends in private messages. This function is designed for solving the SHARING and APPRECIATION pain points by allowing users to post their own stories and be informed of their friends' updates through this virtual social platform, and to

say thank you to their friends who have designed celebrations through the private message feature of the platform.

The DESIGN function has existed since the very beginning when the special day celebration service was designed, that is, it allows users to design their own celebration content for their friends. This function has a positive effect on solving the PRIVACY pain point, because the designed content is sent to the service system by the friend, and when the user passes by the public facility, it only reads the data set by the user on the mobile application terminal that is publicly available, and does not need to read the more private user information including name or account number. Meanwhile, this function also ensures the sense of SURPRISE when using the service. Friends design the celebration contents and send them directly to the service system, and the user who receives the celebration content will not be informed in advance before the special day.

FRIENDS, as the name implies, is one of the main features of the service that it ' s users ' friends in the system who can prepare a celebration for them. The friends that are allowed to design celebration content are chosen by users themselves with the community platform. This feature is the foundation of solving the APPRECIATION pain point.

The PUBLIC FACILITY in public space with more people around is also an original feature of the service. The purpose for designing this feature is always to increase the sense of SHARING and SURPRISE thus promoting communication.

It is worth mentioning that in addition to the four main pain points mentioned in the minimum viable product, some more detailed pain points have not to be resolved yet. An aggregated analysis of these detailed pain points leads to two general problems:

1. What if there are too many people who send me celebrations?

This problem is led from the pain points such as “ *can all celebrations from my friends be shown* ” .

2. What if there is no person send me celebrations?

This problem is led by the pain points such as “ *I may not go outside on the special day* ” Or “ *I ' m worried that no one gives me celebration on that day* ” .

These two problems are the keys to subsequent improvements to the service, and the following development of new functions and the production of the second

prototype will be aimed primarily at addressing these two issues.

## 3.7. Problem Solving and Upgrades

To address the two main issues concluded at the end of the previous chapter from the user test results of the first prototype, this chapter proposes solutions for each of them, i.e., two new functions to improve the conceptual setup of the whole service.

### 3.7.1 “Blessing Cards”

For the first problem: What if there are too many people send me celebrations? This research puts forward the “Blessing Cards” function or interface for users to browse all the celebration contents from their “friends” in the service system (Figure 3.16).

When users open the mobile application terminal, it shows opened and unopened friends’ celebrations. After interacting with the public celebration, users can open the celebration cards on the mobile phone to see details and message their friends to say “thank you”. For example, it’s the graduation day of the character in the image, the main page of the application shows the exact date, the name of the special day the user set in advance, the opened and unopened blessing cards from users’ friends in this application. The cards she is able to open and use further functions like chat with the sender of the cards online are those which have already been connected and displayed on the public facilities she passed by that day. If there are too many people who send celebrations or if the user does not go outside that day, there will be unopened messages that are not connected with any public device, then they will show up on the user’s phone at fixed night time. Then the user can see all the celebration messages at the end of the day and won’t miss any of the celebrations even if there are too many people who send him or her celebration messages.

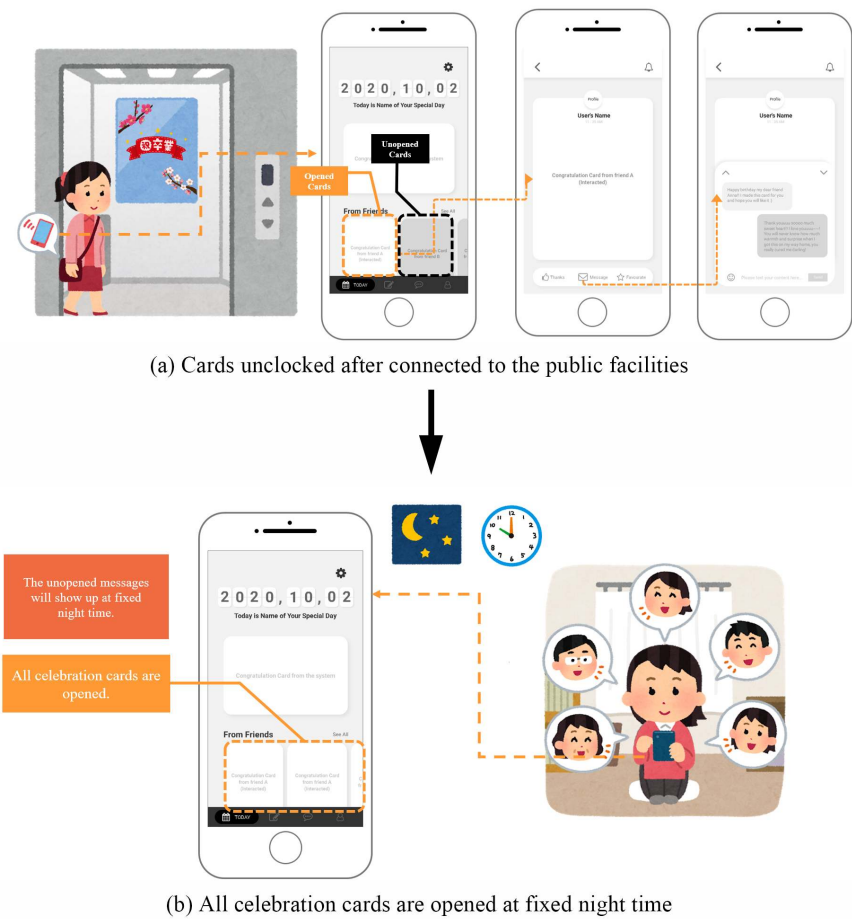


Figure 3.16 “Blessing Cards”

### 3.7.2 “Drifting Bottle”

The solution of the second problem: What if there is no person send me celebration? is inspired by “drifting bottle”. In the nineteenth century, literary works such as Edgar Allan Poe’s 1833 “MS. Found in a Bottle” and Charles Dickens’ 1860 “A Message from the Sea” inspired an enduring popular passion for sending bottled messages [14]. After that, people have launched bottled messages to find pen pals, propaganda-bearing bottles have been directed at foreign shores [15], and survivors have sent poetic loving tributes to departed loved ones [16]. The drifting bottle is a symbol of human cross-cultural communication in the age of navigation, and is one of the limited means of communication across the vast ocean. The drifting bottle cast into the sea is full of mystery because its owner will never know where it will float to and who will pick it up. If borrow the function of the drifting bottle online, we can still expect it to have the effect of promoting communication.

For the special day celebration service “Today, Belongs to You”, the new function “drifting bottle” means that every user can design celebration for specific days and send them to the system and make them be drifting bottles. This function is similar to the way of designing and sending celebration content to “friends”, users design the celebration cards on the design page, then click the “Drifting Bottle” button when choosing whom to send it to, and select the special day corresponding to the celebration content in the menu provided by the service system, or customize a new special day by themselves. In this way, this celebration card designed by the user enters the public pool for all users (including the user’s friends and also strangers) of the whole system. Besides friends’ messages, the service system selects drifting bottles randomly for users according to his or her special days. In other words, on special days, users will not only receive celebrations from their acquaintances, but also from strangers randomly selected by the service system according to the special day. Then it can be guaranteed that every user can receive a celebration message on their special days (Figure 3.17).

By preparing and designing celebrations for strangers, as well as receiving celebrations from strangers on users’ own special days, it not only relieves the embarrassment of not receiving celebrations from friends or family members, but



Figure 3.17 “Drifting Bottle”

also allows people to communicate with strangers they have never met in the online world heart by heart, and to feel love and warmth from the outside world.

### 3.8. Ideal Model of Mobile Application Terminal

According to the description in Chapter 3, the whole special day celebration service is divided into two parts: content input and content output, which are mainly defined as the mobile application terminal and the public facility terminal in this research. The celebration contents displayed on the public facility terminal are determined by what users input on their mobile application terminal, and other information such as the interaction zones and the basic working method of the public facility terminal have been explained in the previous conceptual discussion. Also, the two new functions “blessing card” and “drifting bottle”, which are based on the results of the user tests of the first prototype, are also improvements to the mobile application terminal. Therefore, this chapter focuses on the complete functionality, appearance, and interaction of the optimized mobile application terminal of the special day celebration service “Today, Belongs to You”.

### 3.8.1 Main functions

Based on the above description of the minimum viable product for this service, combined with the new functions of “Blessing Card” and “Drifting Bottle”, a complete integration of all the functions on the mobile application can be described. This is the ideal model for the mobile application terminal if the whole service comes true (Figure 3.18).

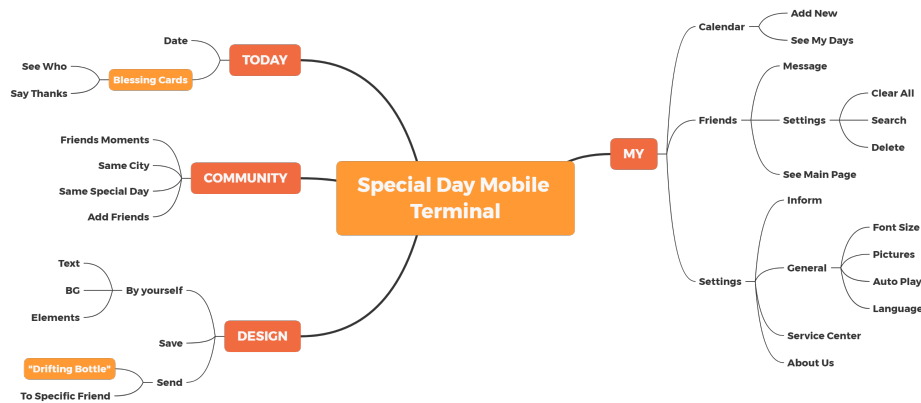


Figure 3.18 Ideal model for the mobile application terminal

The application will have four main pages: TODAY page is the homepage for users to see what days is today, what special day is set today and see the “blessing cards” received from their friends or strangers, on which is able to see who sent them the celebration and express appreciation by clicking the avatar of the sender. COMMUNITY page is basically for instructions related to friends, such as adding new friends, browsing friends’ moments, or finding people in the same city with the same special days. It’s quite similar to the existing social media such as WeChat moments or Facebook. DESIGN page is like an art workshop for users to produce the celebration message, they can choose documents such as photos, images, videos, or animations from their own mobile phone album. Users can also design totally a new celebration work by themselves on the application, where provides pen brushes of different colors and styles, or dynamic stickers or text library, background images, and music for them to choose from. After

designing a celebration card, users have three choices of how to deal with it: save to their mobile albums, send to a specific friend, or to strangers (as “drifting bottles”) whose special day is related to the celebration card. Finally, MY page is comprehensive. The largest part of this page is devoted to the user’s personal information, friends’ information, and a list of all the special days that the user has set for himself. Users can delete, add or search for friends and special days. Also, this page contains all the settings, including the most basic notification settings, general settings for the software (such as font size, image clarity, auto play, language, etc.), service centers (such as privacy settings, cache settings, version settings, etc.), and “About Us”. The detailed operation will be explained in the next subsection.

### 3.8.2 UI/UX design

Based on above, I made the UI and UX design of the application to restore the effect of it in the hands of users. The software used to create this UX design is Axure, a professional application development software, which provides a standard library of components for device appearances, logical connections, and simple motion design functions.

The interface of this application will be mainly designed of a Flat UI design style, mostly be filled with interactive elements in the form of cards. The application will also be named as the same name “Today, Belongs to You” as the service itself. Figure 3.19 illustrates the usage of it in a left-to-right and top-to-bottom manner, with the blue arrows starting and ending at the points where a new interface will be reached after clicking a button or element.

When opening the mobile application, the starting page is the logo and title of “Today, Belongs to You”, and after a few seconds, it will automatically go to the TODAY page, which is also the homepage, displaying the date, the name of the special day, and the thumbnails of the openable and not yet openable celebration cards. Click on the openable celebration card, the complete content will be presented on a bigger image. The name and avatar of the sender will be displayed at the top, the likes, favorites, and message icons are showed at the bottom of the card. Among them, the message function is to chat with the sender privately. Click on the bell icon in the upper right corner of this page to view all



Figure 3.19 UI and UX design of TODAY page

historical chats, which can be viewed, topped, and deleted (Figure 3.19).

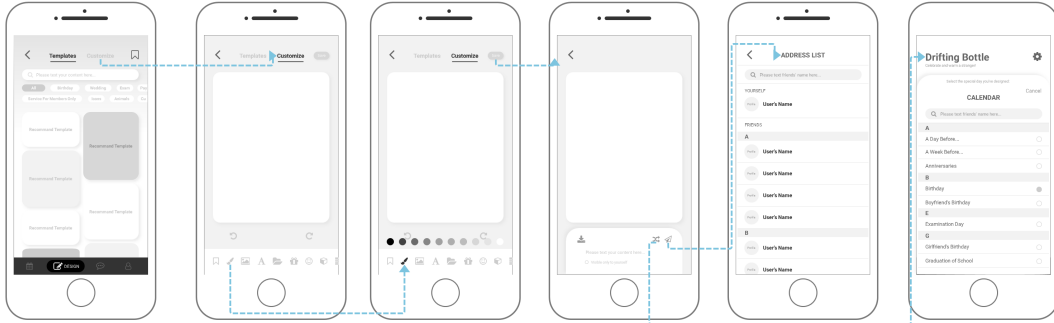


Figure 3.20 UI and UX design of DESIGN page

The bottom menu bar is the entrance to all the four main pages of the mobile application. The first icon indicates the home page TODAY, and the second icon is clicked to enter the DESIGN page (Figure 3.20). By default, this page first displays the celebration templates uploaded by the system and users. Users can choose their favorite templates for easy design by searching keywords or popular special day tags by themselves; in the customizing menu, users can draw, text, insert pictures, emojis, etc. in the blank space to create the celebration content. When finished, users can select “save” to choose whether to download the celebration card to local or send it to others, where the receiver can be a friend in the address book or a stranger in the “drift bottle” as introduced in the previous chapters.

Select COMMUNITY in the bottom menu bar, the page displays thumbnails post by users' friends and "similarities" (strangers who enjoy the same special days or in the same urban areas) about their special day on the current date. Click on the image to view details, including the publisher's accompanying text, comments from other users, etc. The last icon in the bottom menu bar represents the MY page, which, as mentioned above, allows users to view and edit personal and special day information, as well as various privacy settings (Figure 3.21).

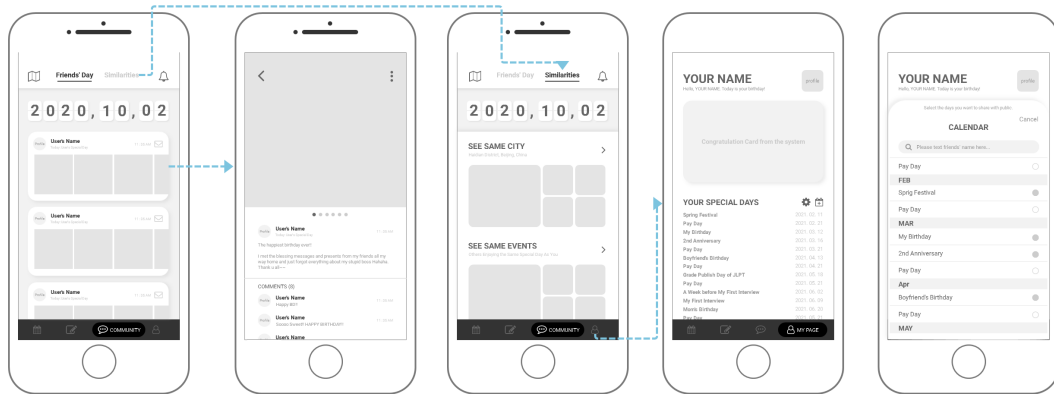


Figure 3.21 UI and UX design of COMMUNITY and MY pages

# Chapter 4

## Validation

To verify whether the above design concept as well as the improvements inspired from the user survey, the first prototype and its test results are valid for improving communication, bringing positive using feedback, and improving the social problems caused by the increasing proportion of people living alone in the future, this chapter explains how to conduct the final prototype and corresponding experiments to obtain valid data and findings, derived from which the unexpected charming points and shortcomings are highlighted.

### 4.1. The Final Prototype

The second as well as the final prototype was completed later in December 2020 with two complete terminals, so that it could be used as a functional prototype for real using experience and get richer and more detailed user feedback than the first prototype in subsequent user testing or experiments. Due to the impact of the Covid-19 epidemic, offline meetings were limited, the user tests for the first prototype were conducted online, while for the final prototype was conducted offline in Beijing, China after the epidemic was under control.

#### 4.1.1 Purpose of creating the final prototype

From the initial user testing results, it was clear that the first PowerPoint prototype was able to simulate how the service system works, but since it's an electronic file, it was not able to involve the important group of “surrounding people” in the tests. The first purpose of creating the final prototype is intended to fill in this gap. At first, I tried to make a 3D modeling city with the bus stop billboard and vehicles (Figure 4.1). However, I realized that 3D modeling might be able to tell

how the whole service works just like the first prototype, but unable to let users participate in it so that it would be difficult to get data from users, neither to get data from surrounding people since they cannot involve in at all. Given up the 3D modeling, I realized that the final prototype needed to have both terminals of the service, which means the mobile application and the “public facility” should be built separately, and are available for information connection.



Figure 4.1 The 3D modeling city with "Today, Belongs to You"

And at the same time, when creating the final prototype, it is necessary to implement some of the key improvements derived from the first user test, including customizing special days and designing celebrating content by users themselves.

#### 4.1.2 Principle and composing

Combining the above two purposes, I decided to make a Bluetooth LED Display that can be connected to the mobile application as the second prototype (Figure 4.2). The whole prototype concludes three main parts: the mobile application for designing the celebration contents and controlling on-off switch of the LED display or switching between different celebration cards; the Bluetooth module for transmitting images, text or animation information and the switch controlling command from the mobile application to the LED display, the LED display for outputting all the visual messages and following the controlling demand from the mobile application.

When testing this prototype, since the LED display can be installed in any public space under permission, there will sure be surrounding people to watch

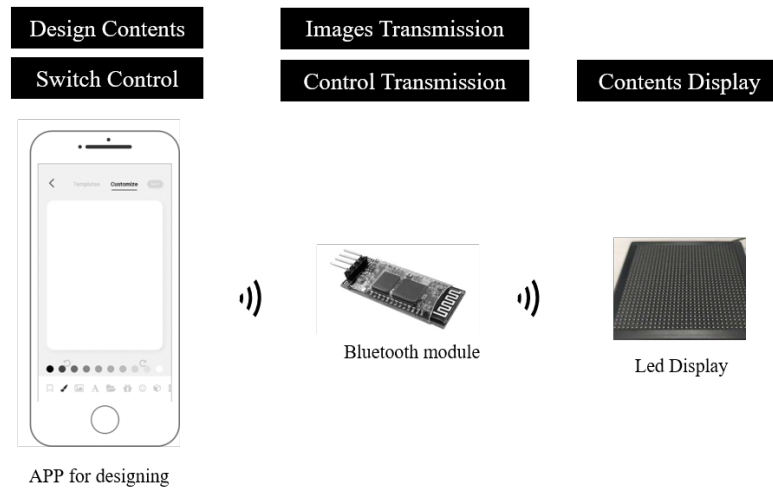


Figure 4.2 Composing of the second prototype

the celebration on the display and give feedback during the test. Users can also actually use this mobile application installed in advance on their cell phones and see the personalized celebration content displayed.

### 4.1.3 Content input: the mobile application terminal

In the previous UI and UX design of the mobile application, the online and offline functions including the four pages were shown, but due to the limitation of professional ability, the mobile application of the second prototype fails to have the appearance as drawn in the design above, neither the online function such as "COMMUNITY". In order to focus on the added new function of designing the celebration content by users themselves, the mobile application part in the second prototype only implemented the two functions of customizing and providing templates for celebration design and sending the design work to the public facility terminal. On the application of the second prototype, users are able to pick up images, animations from their phone albums, text celebration messages, and make celebration-related graffiti by themselves. They are also able to select celebration elements related to the different special days they like from the template library provided on the application.

The specific visual effects and usage will be explained in detail in subsection

4.7.5.

#### **4.1.4 Content output: the LED display with Bluetooth as the public facility terminal**

The main body of this part is a full-color LED screen with a size of 215\*195\*17 (mm), which has a screen point count of 64\*64, a rated power of 30 watts, and a rated voltage of 12 volts. It is converted from an in-car display with a Bluetooth module, thus supporting receiving and playing the JPG, GIF (automatically converting video files to GIF format) formatted graphic information, and plain text by Bluetooth. Bluetooth is used as the communication method for information transmission in the final prototype instead of the wireless network (Wi-Fi) because Bluetooth consumes lower power and low bandwidth though its radio signal range is only ten meters [17], which means it is cheaper and more suitable for this LED screen. As long as connected to the power, the LED display can be switched on or off manually or related to the controlling demand from the mobile application or play images and animations sent from the application on the phone. The transmission delay is imperceptible to the naked eye. In addition, the display is thin enough to be easily attached or installed with adhesive tools such as tape or suction cups on transparent glass and mirrors in public spaces, where the special day celebration service “Today, Belongs to You” was proposed to be set at the beginning of this research.

The specific visual effects and usage will also be explained in detail in subsection 4.7.5.

#### **4.1.5 Usage method**

Since the final prototype is composed of a mobile application and an LED display equipped with a Bluetooth module, which also needs to be combined when using. After powering on the display (the power cord length and plug can be changed as appropriate) and opening the mobile application, the page will prompt for a Bluetooth connection, select the name of the Bluetooth device of the display and start creating a new celebration program. The next step is to design a celebration pattern. In the design interface, users can choose the background color, the thick-

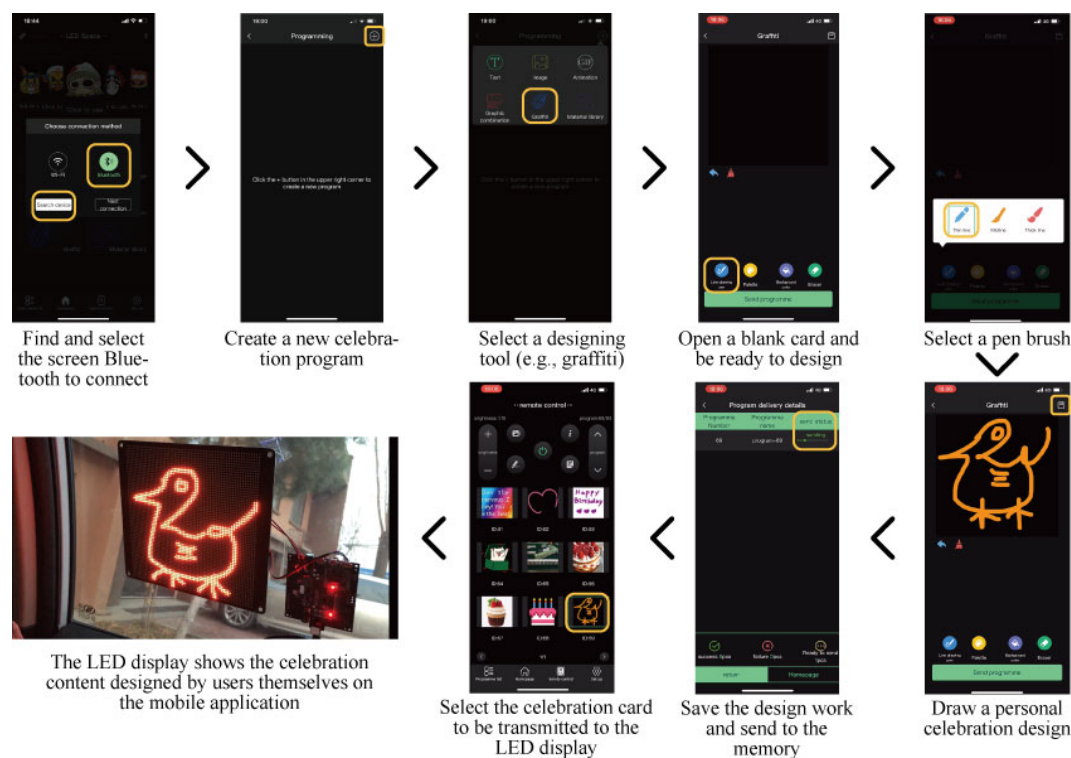


Figure 4.3 Usage method of the second prototype

ness, color and texture of the brush, and undo or use the eraser tool to partially erase the pattern. The pattern is saved and will be temporarily stored in the mobile app. Select the designed celebration card pattern in the repository and the nearby LED display will pick it up and display it (Figure 4.3).

In the subsequent experiment for the second prototype, the invited participants will also be tested according to this usage method.

## 4.2. Experiment for the Final Prototype

### 4.2.1 Goal and objective of the experiment

Since the final prototype is finished and is able to simulate the working state of the service, the purpose of this experiment is to verify the usability and playfulness of this prototype as well as its reduction degree of the project concept, then to verify whether the project can be regarded as a good service that improves the communication between people and urban space.

### 4.2.2 Site selection

For the selection of the experimental site, firstly, it should be based on the five main usage scenarios depicted in the scenario sketch stage of the special day celebration service “Today, Belongs to You” (Figure 3.3 in Chapter 3). Secondly, we have to consider the characteristics and limitations of the second prototype, i.e., the voltage of the power supply, the radio signal range of the Bluetooth, etc. Finally, it should also take into account the practical operation of the experiment and data collection. Under the premise of ensuring that all the required data types can be collected, the smaller the space required for the experiment, the easier the data collection. And certainly, the most important thing is that the experimental site must be somewhere typical to demonstrate the effectiveness of the overall service design. In particular, the user may be more in need of a sense of surprise or playful while on that site, and will not be repelled by having communication and interaction with other people.

Based on the above considerations, the experimental site is selected in taxis, or more specifically, the LED display of the second prototype is installed on the

window of the taxis. This experiment site is conducted in the “windows of public transport” scenario mentioned in Chapter 3 of this research. The reason why the taxi is elected is that people always feel bored when they get on a taxi and wait for it to take them to the destination. Especially those who have just finished a day’s work, if they can get a celebration according to their special days when they get on a taxi, they may feel cured by the warmth from not only people including acquaintances or strangers, and public facility service system in the outside world. Also, the feedback data of taxi drivers as surrounding people is easy to get.

The actual experiment was carried out in random taxis, which were ordered according to the users’ departure and destination. During the experiment, participants’ gender, age, number of people, character relationship, simple body movements, and facial expressions were recorded and used as important research data. The experiment was carried out on March 16, March 17, March 20, and March 22, 2021.

### 4.2.3 Hypothesis and experimental design

The hypothesis of this experiment is as followed:

- (1) A special-day celebration service can encourage more communication between users and surrounding strangers;
- (2) A special-day celebration service can enhance the emotional connection between users and acquaintances;
- (3) Users feel surprised, cured and playful after using the service.

As for the experimental design, based on the future using scenario, this experiment is going to be conducted by two Research Methods of Communications: Observation Method and Interviewing Method. In the real taxis, the second prototype will be installed in advance for me to directly observe and record the behavior of target users, i.e., celebration receivers, and other main related stakeholders including celebration senders and surrounding people like drivers, then conduct interviews so as to obtain the psychological changes of the involved participants and even the corresponding future development trend of the special-day celebration service.

#### 4.2.4 Experimental procedure

For the actual test, I performed the following steps to experiment with the second prototype:

(1) Select four groups of participants according to four kinds of gender combination and determine the senders and receivers of each group:

A married couple: the husband (sender) – the wife (receiver);

An unmarried couple: the girl (sender) – the boy (receiver);

A pair of female friends of similar age: girl A (sender) – girl B (receiver);

A father and son: the father (sender) – the son (receiver);

(2) Make a control group of the experiment: Take a taxi without the prototype installed with the four experimental groups separately. The facial expressions and body movements of the participants, and the communication times between the receiver, the driver (stranger), and acquaintances of each group will be recorded under the normal condition without special-day celebration service.

(3) Invite the sender of each group to design the celebration for the receiver 's special day of the experiment day on the mobile application of the second prototype and keep it secret to the receiver (to keep the whole experiment should be conducted with a sense of surprise): The special day of receivers will be based on the spontaneous words of receivers or the travel activities of the experimental groups on that day.

(4) The researcher (myself) book and get on another taxi on Didi on the same day after step (2) of each group: Get in touch with the driver in advance before booking to guarantee that the LED display of the second prototype could be installed in the taxi vehicle (with vehicle-mounted power supply) and the driver agreed to carry out the experiment, also their voice will be recorded during the experiment.

(5) The researcher (myself) sits in the back seat on the left side for better observation and installs the LED display of the prototype on the taxi (Figure 4.4).

(6) Pick up the sender and receiver of each group. The receiver also sits in the back seat for better observation.

(7) Observe and record the reactions of the receiver, the sender and the driver when the LED screen of the prototype begins to display the celebration message designed by the sender: The LED screen will begin to display as soon as the

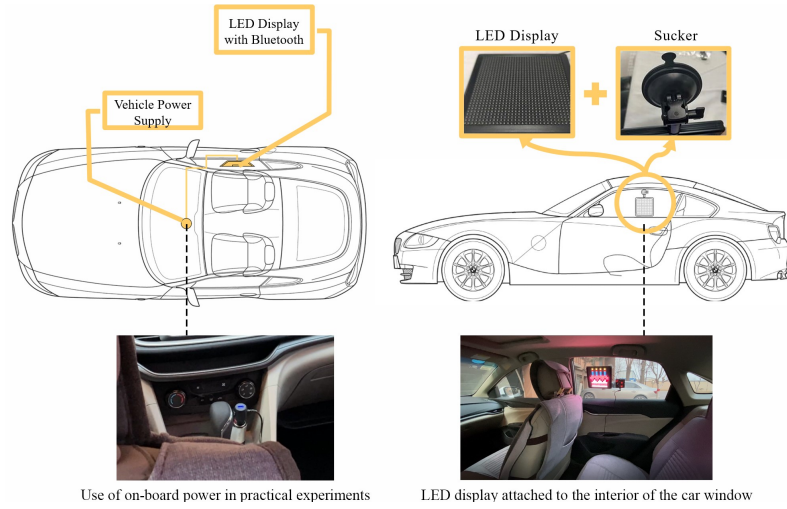


Figure 4.4 Installation method of the LED display

sender gets on the taxi.

- (8) Record the communication times, facial expressions and body movements of the participants during the journey.
- (9) Interview the driver, the sender and the receiver separately of each group.
- (10) Compare and analyze data results.

#### 4.2.5 Data collection and analysis

The contents of the voice recordings obtained during the experiment implementation were recorded verbatim, including all the participants' recordable expressions (e.g., laughing, smiling, sighing, etc.). At the end of the experiment, all participants were interviewed, and details of the specific interview questions and participants' answers are provided in the Appendix. The data and findings obtained from the experiment of the second prototype can be basically classified into three types: demographic of participants, numerical analysis, interview analysis of the prototype or the special day celebration service "Today, Belongs to You" itself.

##### Demographics of participants

The participants' demographics are shown on Table 4.1.

<b>Participants</b>		8	8
		Users	Drivers
<b>Age Group</b>	16-26	3	0
	27-37	2	2
	38-48	0	3
	49-59	1	3
	60-70	2	0
<b>Gender</b>	Female	4	0
	Male	4	8
<b>Familiarity with each other</b>	Familiar	8	0
	Stranger	0	8

Table 4.1 Demographics of the participants

Celebration senders and receivers as core users totaled eight, and drivers as surrounding people also totaled eight, ranging from 16 to 70 years old, in age groups of 10 years each, with a relatively even distribution of participants across age groups. The gender distribution of the core users is balanced, ensuring the occurrence of all permutations of the gender classification by senders and receivers, which is also the reason why to set four different experimental groups. The numbers in parentheses represent group order (Figure 4.5). However, all drivers were male, which is one of the shortcomings of this experiment, i.e., no feedback data was obtained from female surrounding people. The senders and receivers of each core user group were familiar with each other, and it was ensured that the drivers and core users in each group did not know each other.

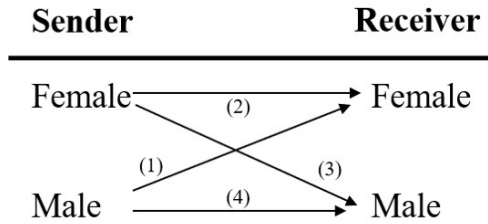


Figure 4.5 Permutations of gender classification by senders and receivers

During the experiment, the special days set by the participants of each group were all different (Table 4.2). The special day for the first group was the day the receiver finished the cross-stitch work she had been busy with recently; the special day for the second group was the day when the receiver put on makeup for the first time in the last 12 days; the special day for the third group was the day when the receiver got a rare character in the game; and the special day for the fourth group was the day when the receiver was six days before his holiday and meeting his long-distance girlfriend. It is confirmed that all special days are unique and true, which means, they are indeed the receivers' own special days and the particularity is in line with receivers' actual situation. Therefore, it can be said that all participants of this experiment correctly understood the design purpose of the special day celebration service and correctly used one of the most critical features of the second prototype (setting special days by themselves), thus it can be proved that the procedure design of this experiment and the data collected are valid.

Group	Special Day	Relevance	Uniqueness	Factuality
1	Completion Day of a Cross-stitch Work	✓	✓	✓
2	First Make-up Day in 12 Days	✓	✓	✓
3	The Day of Getting the Rare Character in Game	✓	✓	✓
4	Six Days before Taking Holidays and Meeting LDR Girlfriend	✓	✓	✓

Table 4.2 Special days set by each group

### Numerical analysis of the recordings and observation data

Based on the voice recordings made by each group of participants during the experiment, there are increases both in the duration and times of conversations, the types and times of facial expressions and body movements during the journey on taxis generated by each group of participants without and with the second prototype installed. In the following, the control group without the second prototype installed will be abbreviated as “normal state”, while the experimental group

with the prototype installed will be called “experimental state”.

(1) Conversations

By timing all conversations of participants in both states during the experiment and combining the total duration of the journey from the departure to destination for each group of participants, the proportion of participants spent generating conversations in the taxis could be obtained (Table 4.3). It should be noted that the conversation duration here includes when all participants, both the core users and the drivers, spoke out for communication. All groups showed different increases in the proportion of duration of conversation generation in both the normal and experimental states, with the first group showing the largest percentage increase, reaching an increase of over 50%.

Group	Normal			Experimental			Increase
	Conversation Duration	Journey Duration	Proportion	Conversation Duration	Journey Duration	Proportion	
1	0:01:58	0:16:46	11.73%	0:07:03	0:11:24	61.84%	50.11%
2	0:16:12	0:27:31	58.87%	0:20:43	0:29:28	70.31%	11.44%
3	0:11:19	0:18:24	61.50%	0:13:48	0:17:15	80.00%	18.50%
4	0:09:49	0:20:17	48.40%	0:10:27	0:21:06	49.53%	1.13%

Table 4.3 Duration proportion of conversation

The increase in the proportion of conversation duration before and after using the final prototype cannot entirely prove that a special day celebration service can promote communication. In order to exclude cases where participants spent more time on a topic that was not relevant to this research, the total times of conversations carried out by each group of participants in both states is also need to be counted (Table 4.4). Each conversation started and ended with the start and end of a topic. Similar to the duration of conversations, the times of conversations include both those within the core users, i.e., between the celebration sender and receiver, and those between the driver and the core users.

The conversations between the drivers (as surrounding people) and the celebration senders should be removed from the total times of conversations, because for this service, the communication between the two will not be generated in public space, or rather, the communication between the two is not in the scope of this

Group	Normal	Experimental
1	5	14
2	6	22
3	7	20
4	7	11

Table 4.4 Total times of conversation

research, which focuses on whether the people celebrated by this service can get more opportunities to communicate with the outside world through this new approach of celebration, thus reducing their negative emotions such as loneliness or tiredness. The times of conversations in the two states between the celebration sender and receiver, and the driver and receiver are counted separately, and the increases are still obtained (Figure 4.6). Among them, the increased times of conversations between drivers and receivers are more prevalent (in the conversations between celebration senders and receivers, there exist the same number of conversations in the two states as indicated in (b) of Figure 4.6), proving that the second prototype as a functional simulation of this service can actually promote communication between the core users and unfamiliar surrounding people when being celebrated their special days.

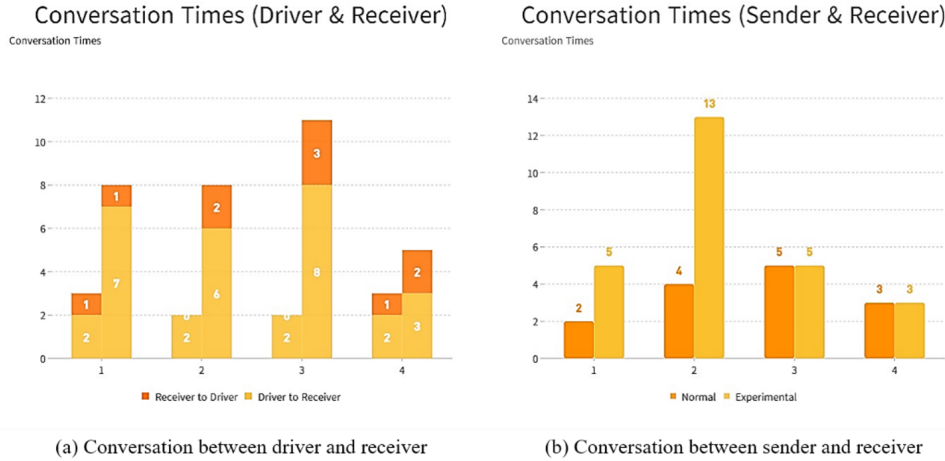


Figure 4.6 Conversation times of two valid type

In addition, the topics changed in both the two valid conversation types in the two states, with the experimental state in which the second prototype was installed creating apparently more diverse and service-related conversation topics. This increase in the diversity of conversation topics is more evident in the communication between drivers and the celebration receiver. Figure 4.7 classifies and includes the conversation topics between the two for all groups in the experiment, with the topics that appear more having a larger font size in the figure. In the usual state, all drivers greeted the receivers when they got in the taxi and said goodbye when they got out, respectively, a total of four times, plus the topics about traffic jams once and about the Covid-19 once, a total of four topics. While in the experimental state, in addition to greeting and saying goodbye four times each, three times were talking about the celebration content (e.g., in group2, the driver asked “*I heard that you girls often do not wear makeup when you go to work, but why you make up for parties?*”), the receivers’ personal information (e.g., in group1, the driver asked “*I feel that you two have really good taste at art, are you teachers or artists?*”) and the drivers’ own experience or stories surprisingly mentioned by themselves (e.g., in group4, the driver mentioned “*My daughter is still single, I’m so worried about that.*”), two times for other topics related to the celebration content (e.g., in group3, the receiver talked about why and how much young people pay for games: “*I am financially independent now and I just feel excited and free to spend some of my regular expenses in games.*”) and the drivers’ congratulations to the receivers (e.g., in group1, the driver congratulated “*[...] I wish you the best of luck in completing your work and putting it on the wall!*”), and one time about traffic jam, the drivers’ gratitude (e.g., in group3, the driver said “*Thank you for telling me so much about the game today, I have a better understanding of what my son is playing.*”) and whether the driver was able to see the LED screen clearly, a total of 10 topics.

Contrary to previous expectations, core users seemed natural and relaxed in conversations with strangers, they did not refuse to answer questions about their personal information (e.g., age and occupation) asked by drivers, and there was no apparent resistance to conversations between users and strangers across age groups and genders.

## (2) Facial expressions and body movements



Figure 4.7 Topics of conversations between drivers and receivers

From the changes of the facial expressions and body movements, we can see how the service affects the user ’ s emotions and feelings. By the facial expressions of each participant manually recorded in the normal times (without audio and video recording, because the conversations, facial expressions, and body movements produced by participants in normal times were no more than 10 times and can be easily recorded manually) and the facial expressions recorded in the experimental times with a combination of audio and manual recording, it was found that the diversity of users ’ facial expressions has increased significantly when the second prototype was used. In Figure 4.8, the data columns on the left side of each group represent facial expressions in the normal times, while the right side represents that in the experimental times. Each color represents a type of facial expression, and the number in the color grid indicates the times that every expression appears. During the experiment, all the facial expressions made by users can be subdivided into 6 types in total: smiling, laughing, roaring with laughter, smirking, chuckling and sighing. Except for sighing, the other five types show users ’ pleasant and positive emotions. And the increase in the diversity of facial expressions for each group can be known by the increase in the types and total numbers, with “ laughing ” being the facial expression with the highest number of increases per group on average, which proves that the special day celebration service does bring positive feelings and emotions to people.

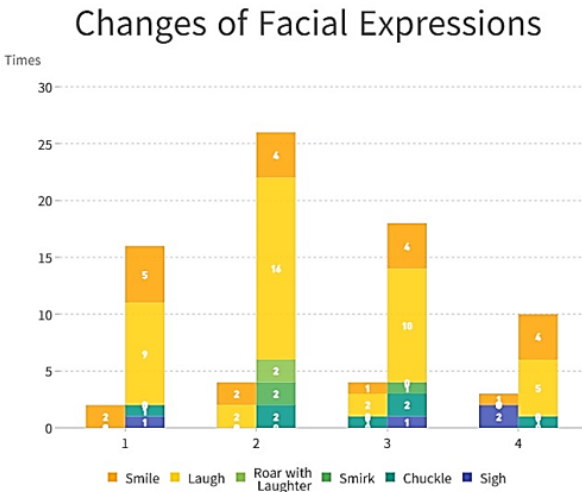


Figure 4.8 Changes of users’ facial expressions in the two states

Group	Interaction with the screen	
1	Read the text	
2	Look at the screen carefully	
3	Look at the screen carefully	Lean back and squint at the screen
4	Take a photo of the celebration	Send the photo to girlfriend

Table 4.5 Body movements of receivers in experimental times

The body movements of users also showed their willingness of interacting with this facility and their interest in this service. During the experiment, the body movements generated by the celebration receivers in each group with the LED display of the second prototype are shown in Table 4.5. All core users had one or two benign interactions with it, portraying that they did not reject the prototype itself and even the whole service, and developed a certain curiosity.

(3) Sender’s use of celebration methods

The data of what kind of celebration message designing is most used and how many kinds of design tools did most sender use during the experiment is also important to be the reference for the further optimization and popularization of the project in the future (Figure 4.9). Unexpectedly, no one used the material

library provided by the system, and 75% of senders used more than one design method, indicating that users are more willing to design the celebration for others' special days by themselves. Text and image methods were more used, which suggests more attention to be paid in future development and optimization.

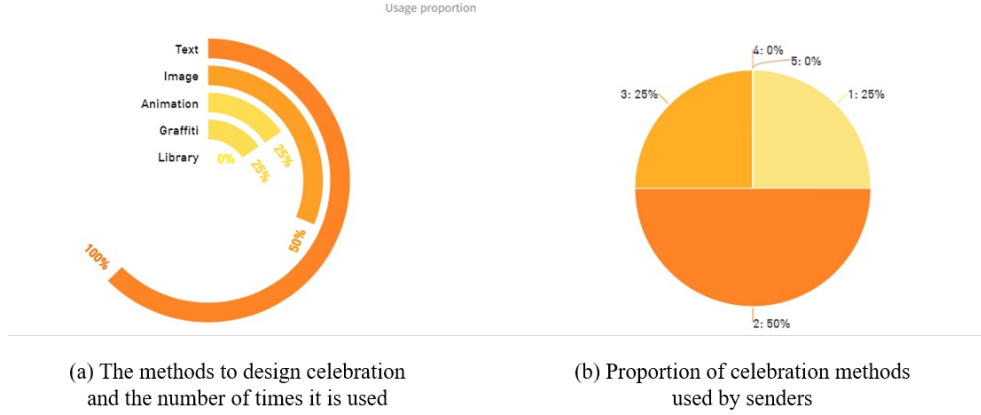


Figure 4.9 Senders' use of celebration methods

All the celebration senders used text effects in their own designs. Although the colors and font size and other cosmetic designs of the texts were different, all the contents included the names of receivers' special days (Figure 4.10) lists in Table 4.2. The sender of group1 texted “*Wish my beauty can finish the cross-stitch work today!*” to the receiver, his wife; the sender of group2 texted “*Congratulations to my dear friend who finally makes up in 12 days!!!*” to the receiver, her friend; the sender of group3 texted “*Today is so lucky! Congratulations to my husband for getting ASH*” to her boyfriend; the sender of group4 texted “*Six days before taking holidays and meet Miss. Zhao*” to his son. The senders of two groups indicated in the follow-up interviews that the appearance of their text celebrations was designed deliberately, as the sender of group2 mentioned “[...] *I just wanted to make a prank for her, so that I deliberately designed the text celebration to be very colorful and countrified*” and who in group3 “*designed the text celebration in black and white since they are the favorite colors of him (the receiver)*”.

In the four experimental groups, only the 65-year-old male celebration senders of the first group used the graffiti function, where he drew the receiver's cross-

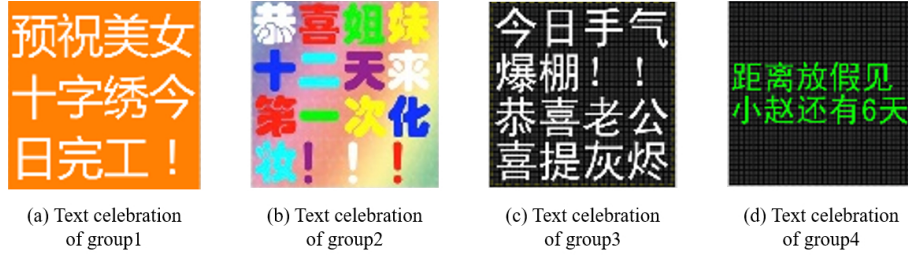


Figure 4.10 Text celebration designs of each group

stitch work as part of the celebration message (Figure 4.11). The graffiti function, which was designed with the expectation of more use by younger users, turned out not to be the case, but this may also be due to the small scale of participants involved in this experiment, which prevents a general conclusion.



Figure 4.11 Graffiti celebration of group1

### Interview analysis

Finally, the results of the offline interviews received by all participants on the taxis at the end of their experimental journey were analyzed. This part focuses more on participants' own personalized understanding and suggestions for the second prototype and even for the special day celebration service "Today, Belongs to You". Therefore, the analysis will start with association and novelty [18], the users' real feelings and the users' suggestions, the first two aspects being derived from the unexpected statements in some participants' answers, and the last aspect coming mainly from answers of the last question in the interview session.

#### (1) Association and novelty

The first unexpected finding comes to that some of the celebration receivers mentioned in their interviews that this experiment for celebrating special days changed the stereotypes they had about their own celebration senders and had a new understanding that the senders were not as strict or serious as they thought before. The receiver of group1 reported “*[...] what surprised me most was that he actually knew that I will finish my work today. He seldom talks about cross-stitch with me and doesn't seem interested in it when I talk to him about it. I feel that he is more sweet than usual.*” It's not the only case, the receiver of group4 also proved this finding “*I really didn't expect that it was my dad who wrote that celebration message. Although he was not very serious or strict, he never joked about things like my intimate relationships. [...]*” In response, there is credible evidence to suggest that senders can regard the service as a platform to promote communication with receivers or to reflect on their usual communication style. The sender of group1 point out “*I think in the future, this service will give people like me who are not good at expressing a euphemistic and natural opportunity to express themselves. It can create many opportunities to enhance their relationship with each other especially by some trivial things that are not easy to say or don't need to say in daily life.*” Meanwhile, the sender of group4 responded he should rethink his usual way of dealing with his receiver through the disappointment that the receiver failed to pointed out it was he who designed the celebration in the first place: “*[...] I think I should also reflect on myself whether it was my own attitude or my way of speaking to him made him misunderstood me.*” This may prove that one of the achievements of the service in improving interpersonal communication is to reduce misunderstandings caused by lack of communication.

The effect of this service on promoting communication is also seen between users and strangers. Drivers saw it as a way to connect themselves with their passengers. “*[...] I'm afraid that it's impolite to cut in people's conversations, [...] however, I think this service can connect passengers and the taxi car. If it's realized, I think it will make us start to communicate more naturally*” and “*it can be a good service to motivate drivers and build a bridge to drivers and passengers if it becomes widespread in the future*”.

The above statements serve as good proof for the first hypothesis of the experiment that this service can indeed encourage more communication between users

and surrounding strangers or acquaintances. And the following expressions from the participants prove the validity of the second hypothesis to some extent, that is a special-day celebration service can enhance the emotional connection between users and acquaintances.

By designing a celebration message, senders can show how much they care about the receivers. “ [...] *She’s pretty no matter if she makes up or not. I hope her every day can be as happy as today* ”, “ *I fully understand how he felt at that time* [...] ” or “ *I just want him to know that his mother and I just wish him happy every day and we also like his girlfriend very much. We will support him at all times* ” were what the sender of group2, 3 and 4 respectively wanted to express when designing a celebration for their receivers.

In addition, many participants offered their own ideas for the effectiveness and future development of this service. After the sender of group2 understood the design purpose and use of this service, the first time she thought it could be a prop for doing pranks on friends. “ *At the beginning, I just wanted to make a prank for her, [...] then I was going to put her selfie on the screen, but I gave up that idea since there were strangers around, and basically, it should be a celebration but not a joke* [...] ”. A driver stood up for his personal perspective and suggested that the service could perhaps be dedicated as one of the taxi-only services: “ [...] *your service can also become a reward to drivers who perform better with fewer complaints or fewer accidents if the service is not available for every taxi* ”. Further, one participant stated “ the service can be a new fashion or lifestyle if it becomes widespread in the future ”, he emphasized at the same time that “ *some middle-aged or elder people will begin to try it only when it has become a habit among young people* ”.

#### (2) Real feelings

In this part, I focus on the statements related to “ sharing own special days with strangers ” and “ feeling of surprise ” in the participants’ interview answers about their real using feelings.

Of the four celebration receivers, two said they “ *didn’t realize that there was a stranger at first* ” or that the sense of shame and embarrassment of sharing with strangers was overshadowed by the sense of surprise, because they were “ *too shocked to realize there was still a stranger around* ”. One of them found it

intriguing to learn about a stranger ’ s experience or story related to him or her: “ *It was really a coincidence that the driver’s son plays the same game with us [...]* ” . While another receiver said that the open information about special days with strangers should be further regulated: “ *If my privacy like some selfies or life photos is posted and shared with the driver, I will feel very embarrassed and shy* ” .

As to whether this service can bring a sense of surprise or other positive feelings to the users, the receiver of group3 believed “ *No one will say no to a surprise from someone you love* ” , or as the receiver of group2 mentioned, “ *It’s really interesting and unexpected to see that the content could be changed* ” . As for other positive feelings, the receiver of group1 said “ *I feel that the sense of achievement has been magnified and I feel prouder of myself* ” .

This suggests that sharing one ’ s special day with strangers in a public space is less awkward when users can gain a sufficient sense of surprise and when not only themselves but also others are likely to be celebration receivers on their own special days. Moreover, it clearly has a proof implication for the third hypothesis of the experiment, that is users feel surprised or other positive feelings after using the service.

### (3) Suggestions and shortcomings

The suggested descriptions and shortcomings mentioned in the interviews by all experimental participants, including the celebration senders, receivers and drivers, were collated could be divided into those directed at the second prototype itself, and those directed at the special day celebration service as a whole (Figure 4.12). The suggestions for the prototype can be further categorized into those for the LED screen and the mobile application. The participants felt that the installation method, appearance, screen definition, and power supply of the LED screen could be further improved, and accordingly, the preliminary improvements are listed (as shown in the dashed box in Figure 4.12):

- ① The service will be applied with better materials or techniques;
- ② The service on vehicles will be directly integrated with the vehicle.

They also gave suggestions towards the mobile application of the second prototype that the social function should be achieved and the UI design can be more user friendly.

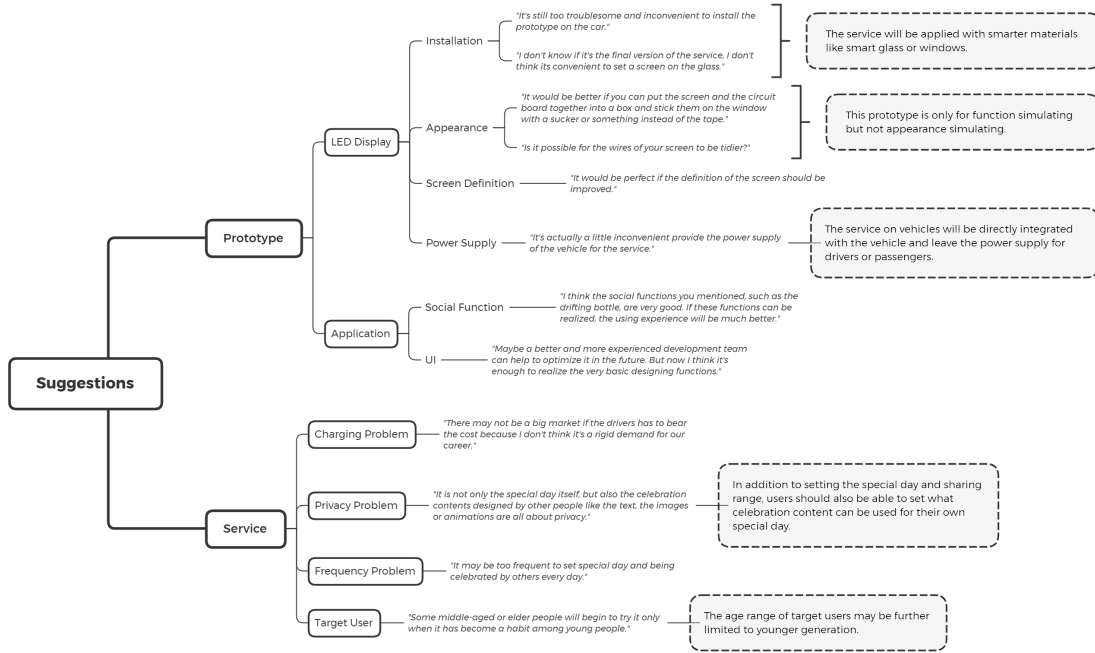


Figure 4.12 Suggestions from the experiment

These evaluations and suggestions for the prototype itself are largely predictable, as the prototype is only a simple model of the service and has its own limitations. The following suggestions about the service, especially those about its current shortcomings are more informative as many of them are the inconveniences or incompleteness caused by my failure to think outside my inherent mindset.

For the service as a whole, the suggestions of the experiment participants centered on charging problems, policy problems, frequency problems, and target users. Two participants pointed out that this service may not be a rigid demand so that the question of whether to charge and how to charge needs to be discussed further: if the charges are too high or the cost of developing this service is mainly borne by users, the market may not be very good. Similar to the previous user survey and the result of the user test for the first prototype, the privacy problem is raised again. But this time the feedback becomes more detailed, the participants believe “*it is not only the special day itself, but also the celebration contents designed by other people like the text, the images or animations are all*

*about privacy. Maybe all of these can have a sharing range setting”*. The frequency problem can be solved by letting users set by themselves as mentioned in Chapter 4.6, and the reason it was raised perhaps because it was not sufficiently explained to the participants before the experiment. Meanwhile, this is also the first time that users pointed out that the target users of this service could be adjusted, that is to promote the service among the younger generation first and then gradually spread to other age groups, because “*some middle-aged or elder people will begin to try it only when it has become a habit among young people*”.

To sum up, all the data collected in the experiment for the final prototype can be divided into three categories: the demographics of participants, which proves that the gender and age distribution of participants is almost balanced and that the special days participants set in the experiment are valid; the numerical analysis of the voice recording and observations, including the times, duration and topics of the conversations, the facial expressions and body movements and participants’ use of celebration methods like what types of methods did they used and how much times each method was used; and finally the interview analysis including the association and novelty from some unique quotes of participants, real feelings of sharing with strangers and surprise, and also suggestions towards both the prototype itself and the service as a whole. These results seem to have gathered enough evidence to support the three hypotheses put forward before the experiment was conducted, i.e., the special day celebration service is able to encourage more communication between users and surrounding strangers; enhance the emotional connection between users and acquaintances; bring users a sense of surprise, playfulness or other positive emotions. The unexpected charms and shortcomings derived from participants’ quotes also inspire future work.

# Chapter 5

## Conclusion

### 5.1. Summarize

By creating a special day celebration service “Today, Belongs to You” on urban public facilities, this research aims to provide a new future celebration approach that individuals celebrate in public spaces, to promote communication with strangers, increase emotional connections with acquaintances, and provide people with more positive emotions, thus to alleviate two major social problems, the increased loneliness and increased demand for services in public spaces, that are gradually revealed by the increasing number of people living alone.

Rooted in the design concept of the way celebration messages are distributed, the choice of using scenarios, and the results of the preliminary user survey, I made two prototypes, focusing on appearance mockups and functional mockups, and did user tests or experiments for each. The data and conclusions obtained are on the one hand an important reference for further research, and on the other hand, they effectively prove that the original design intention of the special day celebration service can be accepted by users and can achieve the three design purposes mentioned in the above paragraph to a certain extent. In addition, there is also feedback that goes beyond what was originally thought, both in terms of unexpected positive feedback or other scenarios in which the service could be used, and also in terms of the shortcomings of the service that were not previously thought of.

### 5.2. Limitations

“Today, Belongs to You” was designed to be universally available to people in public spaces to celebrate their own special days, to make it a new habit for

people to celebrate in the future is the ultimate design purpose. However, the two prototypes produced in this research, especially the second prototype for functional simulation, and their corresponding user tests, still have limitations in the following four aspects:

(1) The sample size of participants was small and the conclusions from numerical analysis obtained from the experiment might not be general;

(2) The drivers who participated in the experiment for the second prototype were all male and there is a lack of feedback when surrounding people are female;

(3) The choice of the experimental site was rather homogeneous, and it is hard to determine whether the user feedback and findings in the taxi scenario are equally applicable to other scenarios;

(4) Due to professional capacity and resource constraints, the mobile application in the second prototype was not networked, so that the social function, one of the four major functions, was not represented, which may be an important solution towards the confusion or dissatisfaction of many users who participated in the tests and experiments.

I envision better development for the future prototypes and more participants are involved in the user tests.

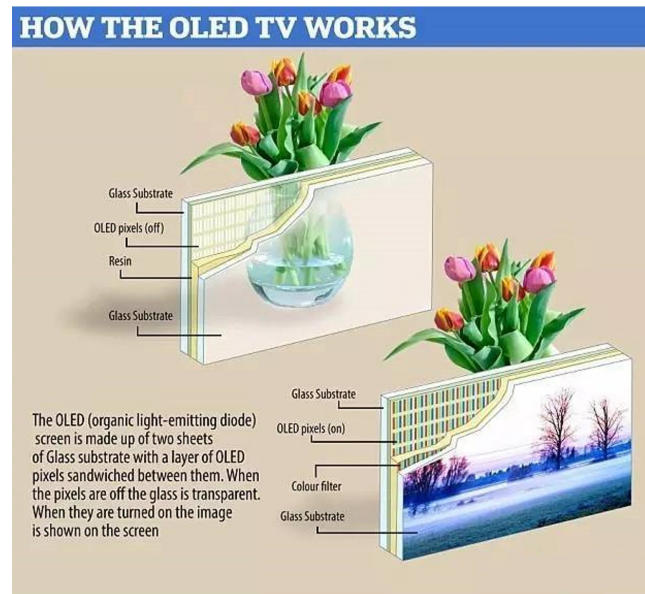
## 5.3. Future Work

### 5.3.1 Embellish and improve the mobile application

According to the suggestion results of the second and also the final user experiment so far in this research, there are still significant gaps in both the implementation of the social function and UI design in the mobile applications available for users to use. The future optimization of this terminal will focus first on the implementation of networking, complemented by the better appearance of the interface, the expansion of the celebration elements library, the simplification of the operations, and the increase of the available storage space.

### 5.3.2 Explore more technique on urban public facilities

In the future, facilities that can display dynamic images may no longer be limited to ordinary displays nowadays. The OLED (Organic Light Emitting Diodes), for example, is one of flat light emitting technologies developing rapidly in recent years, which is made by placing a series of organic thin films between two conductors, making the displays not just thin and efficient but also provide better image quality when being made transparent, flexible, foldable and even rollable and stretchable in the future [19]. Panasonic has now shown a transparent TV based on an OLED display (Figure 5.1): the best image quality is still obtained when the transparent TV is used in a dim environment. In the transparent state, the TV is now described as being “as clear as a glass panel” [20].



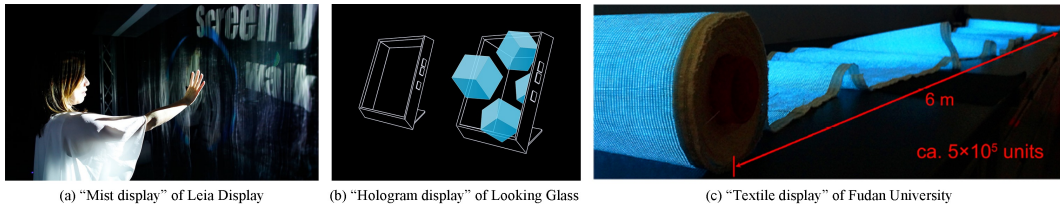
(Source:

<https://www.displaydaily.com/article/display-daily/panasonic-tests-oled-based-transparent-tv>,  
accessed in July, 2021)

Figure 5.1 How the OLED TV of Panasonic works

In addition to organic materials like those used in windows, mirrors or OLEDs, new display solutions are constantly being explored (Figure 5.2). For example,

Leia Display of Poland has realized the evolution of “mist display” that displays images by dropping mist (fog) vertically while keeping it in a thin flat shape [21]; the hologram display by Looking Glass has a reworked optical system so that the holograms can project in front of and behind the physical display, meaning users can literally “touch” these holograms [22]; research team from Fudan University make efforts to integrate displays into textiles, offering opportunities for smart electronic textiles – the ultimate form of wearables poised to change the way we interact with electronic devices [23].



(Source: <https://bae.dentsutec.co.jp/articles/mist-screen/>, <https://lookingglassfactory.com/tech>, Large-area display textiles integrated with functional systems [23], accessed in July, 2021)

Figure 5.2 Display solutions in future

### 5.3.3 Provide cooperation between government and enterprises

The stakeholders involving in the service include the customers (C), the government (G), and the business (B) sides. The C side is consisting of the users in the urban space including celebration senders, receivers, and surrounding people, the G side is basically the city ’ s construction department from the government and the B side is the manufacturers of the urban public facilities (Figure 5.3). The core target users are the celebration receivers, especially those who are working in an unfamiliar city lacking warmth and surprise from the outside world.

It is not difficult to foresee that in the future, with the continuous refreshing of the design concept of the special day celebration service and the continuous upgrading of the technology used, more related enterprises will undoubtedly be invited to the joint development with the related government departments such as construction and welfare.

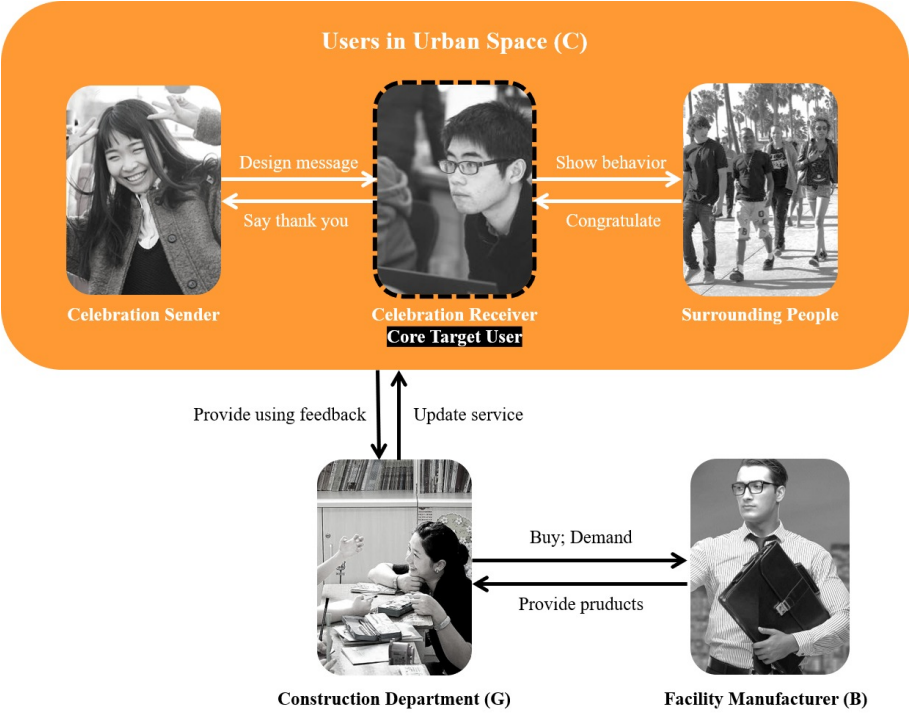


Figure 5.3 Stakeholders

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# Appendices

## A. Questions and Answers in the Interview

### A.1 Interview questions

#### **To Senders:**

1. Why did you design the celebration like this?
2. What do you want to express to the receiver through this design?
3. How did you feel when seeing receiver ' s response to your celebration?

#### **To Receivers:**

1. How did you feel when seeing the celebration designed by the sender?
2. How did you feel when share your special day with other people especially with strangers (taxi drivers)?

#### **To all participants:**

1. Would you like to try this service if it becomes general in the future?
2. Do you think there is any improvement in this service?

### A.2 Answers in each group

#### 1. Group 1

##### **To Senders:**

1. She's always talking about this. Yesterday she told me her cross-stitch work is expected to be finished today. I think the particularity for her today is probably this. Moreover, it doesn't matter whether to be known by strangers.

2. I just want to congratulate on her completion. It's been hard for more than three weeks.

3. It's almost as I expected, but I'm still very happy to see her response. I know that she will like a surprise like this.

##### **To Receivers:**

1. It was really amazing to see the screen content, but what surprised me most was that he actually knew that I will finish my work today. He seldom talks about cross-stitch with me and doesn't seem interested in this theme when I talk to him about it. I feel that he is more sweet than usual.

2. To be honest, I didn't realize that there was a stranger at first, since the moment I saw the celebration was very surprised. I feel that the sense of achievement has been magnified and I feel prouder of myself. It's natural and relaxed when the driver talked about cross-stitch with me. But it may be because the content of this special day does not involve any privacy.

**To all participants:**

1. **Driver:** Yes, but it will be a very huge project to replace the smart glass or windows on the facilities or vehicles you mentioned. Anyway, I really like the idea that as soon as the passengers get on the car, they can have some personal interaction with not only the device but also with surrounding people. **Receiver:** Yes, of course, I was really surprised by the celebration. I like what you said, "every day is special and worth celebrating". **Sender:** Yes. I was very looking forward to seeing her response when seeing my celebration, I also want to experience be celebrated someday. I think in the future, this service will give people like me who are not good at expressing a euphemistic and natural opportunity to express themselves. It can create many opportunities to enhance their relationship with each other especially by some trivial things that are not easy to say or don't need to say in daily life.

2. **Driver:** The service itself seems creative and interesting, but it's still too troublesome and inconvenient to install your prototype on the car that you need to get on the taxi first, plug in the power supply, and stick the screen on the window. I believe that it will be better if the service becomes general with smarter materials like smart glass or windows. **Receiver:** It's amazing! I like it. **Sender:** The application terminal should be more user-friendly. I think the social functions you mentioned, such as the drifting bottle, are very good. If these functions can be realized, the using experience will be much better.

2. Group 2

**To Senders:**

1. In the beginning, I just wanted to make a prank for her, so that I deliberately designed the text celebration to be very colorful and countrified. Then I was going to put her selfie on the screen, but I gave up that idea since there were strangers around, and basically, it should be a celebration but not a joke, so that I decided to use some cute images and animations instead.

2. As her friend, I really care about her and I want to tell her that she's pretty no matter if she makes up or not. I hope her every day can be as happy as today.

3. It's like playing a prank or joking with my best friends when I was a kid. The moment I saw her response, I felt like I successfully made a prank as a kid.

**To Receivers:**

1. I was really surprised to see it at the beginning, but then I immediately realized that it must be B who made it for me because of the celebration content and design. It's really interesting and unexpected to see that the content could be changed. I was a little worried about if she would put my ugly photos on the screen, but I was relieved finally.

2. If my privacy like some selfies or life photos is posted and shared with the driver, I will feel very embarrassed and shy, but fortunately, she didn't do that, or I'll be mad at her. I think it's good to put some interesting or funny images or stickers, which can liven things up.

**To all participants:**

1. **Driver:** I may not use it if I need to pay for this service facility by myself, because I don't think it's a rigid demand for my career. But if the whole industry or society has formed such a trend, like Weibo, Wechat or some other social media, which has become a phenomenon for everyone to use, I don't think I will refuse to try it. **Receiver:** I think I will if privacy problems can be avoided. **Sender:** Yes, I like your idea which gives us more opportunities to communicate and interact with friends. It's childlike. I hope it can better and really become widespread in the future.

2. **Driver:** What worries me most is the charging problem. Although this service really brings more fun to our daily work and the journey of passengers, there may not be a big market if the drivers have to bear the cost. **Receiver:** People like to be celebrated, but no one likes to make a fool of himself. I think it is not only the special day itself, but also the celebration contents designed by other

people like the text, the images or animations are all about privacy. Maybe all of these can have a sharing range setting. **Sender:** It's still a long way to go for the mobile application part. Maybe a better and more experienced development team can help to optimize it in the future. But now I think it's enough to realize the very basic designing functions.

### 3. Group 3

#### **To Senders:**

1. I thought about this special day immediately when you introduced how to experiment with me because we were very surprised and excited that A got that character this morning. I also designed the text celebration in black and white since they are the favorite colors of A. But to be honest, the definition of the screen has not lived up to my expectation so that I have to put 2 images on the screen to make it clear what he got in the game.

2. That I was really excited to see that he got the very rare character in the game. As a game player of the same taste as him, I fully understand how he felt at that time. I'm really happy for him.

3. His reaction was not as exciting as I thought, I think it was because we just discussed it several times in the day.

#### **To Receivers:**

1. When I first saw the screen, I thought it was very novel and believed it must be the new equipment or service of the taxi driver. I didn't realize it was designed by my girlfriend until I read the text. I was not very surprised to see it because she always makes some surprises. But even so, I was very happy to see her celebration. No one will say no to a surprise from someone you love.

2. It was really a coincidence that the driver's son plays the same game as us. I was happy to give some suggestions to him as an experienced player.

#### **To all participants:**

1. **Driver:** I think I will. From my own perspective, the service is not only creative, but useful to our drivers. Usually, I don't join in the communication between passengers, because on the one hand, I'm afraid that it's impolite to cut in people's conversations, or maybe they don't want to chat with us at all, especially when the passengers are couples; on the other hand, it seems weird for

a stranger to join in a conversation. The passengers are from all walks of life, people always block themselves and keep silent during the journey. However, I think this service can connect passengers and the taxi car. If it's realized, I think it will make us start to communicate more naturally. **Receiver:** I'm not sure. I can only regard this service as another method of making a surprise. Maybe it was because I'm always a pragmatic person, I'm more interested in new services or products that can meet the rigid demand. **Sender:** Yes! Even though A didn't seem as excited as I expected, I still enjoy the whole process of designing and making surprises for others. Personally, the reason why I enjoy making surprises is that I also enjoy being surprised by others. It must be interesting and exciting to wait for a surprise and make a surprise every day.

2. **Driver:** Is it possible to change the resource of its power? It's actually a little inconvenient to provide the power supply of the vehicle for the service. In the future, I hope it can be directly integrated with the vehicle and leave the power supply for drivers or passengers. **Receiver:** Maybe the privacy problem? In addition, I don't know if it's the final version of the service, I don't think it's convenient to set a screen on the glass. **Sender:** It would be perfect if the definition of the screen can be improved.

#### 4. Group 4

##### **To Senders:**

1. Since the purpose is to surprise him, I considered a lot about what content would make him happy. Seeing his girlfriend seems to be the most important event for him this week, because his mobile phone will remind him every day how many days before they meet each other. That's why I decided to celebrate him on this special day.

2. Nothing special. I just want him to know that his mother and I just wish him happy every day and we also like his girlfriend very much. We will support him at all times.

3. Actually, I was a little disappointed that he didn't think it was me who prepared the celebration for him. But at the same time, I think I should also reflect on myself whether it was my attitude or my way of speaking to him that made him misunderstood me.

**To Receivers:**

1. I really didn't expect that it was my dad who wrote that celebration message. Although he was not a very serious and strict person, he never joked about things like my intimate relationships. I was really shocked at that time also my girlfriend was also as shocked as me when I told her about it.

2. My mental journey was like: Shocked, very shocked, eager to tell my girlfriend about this, then I started to feel a little shy. I was too shocked at first to realize there was still a stranger around. But I didn't feel uncomfortable because I have told my dad that my girlfriend would be back soon. I won't tell him if I don't want others to know.

**To all participants:**

1. **Driver:** Uh yes. Just as I mentioned during the journey, from my own perspective, your service can also become a reward to drivers who perform better with fewer complaints or fewer accidents if the service is not available for every taxi. On the other hand, I also believe it can be a good service to motivate drivers and build a bridge to drivers and passengers if it becomes widespread in the future. **Receiver:** Yes. I think the service can be a new fashion or lifestyle if it becomes widespread in the future as you expected, just like the emerging social phenomena such as live broadcasting or social media. **Sender:** I think I will if I can still catch up with the young generations' minds. Even though you said your service can be used for all ages, I personally think that its popularity will begin among young people. Young people are faster and more capable of accepting new things. Some middle-aged or elder people will begin to try it only when it has become a habit among young people.

2. **Driver:** I haven't figured out anything that should be improved. Wish you success! **Receiver:** Maybe the appearance of the screen can be improved? It would be better if you can put the screen and the circuit board together into a box and stick them on the window with a sucker or something instead of the tape. I was worried about shaking the screen off the window when I closed the door. **Sender:** Is it possible for the wires of your screen to be tidier? A that he was almost tripped. And for the service itself, in my own opinion, it's too frequent to set special day and being celebrated by others every day.