



Shiguang Time Machine

Final Master Project
Fan Chen

Fan Chen
M2.2 S122501
f.chen.l@student.tue.nl

Out of Control
Department of Industrial Design
Eindhoven University of Technology

Coach:
dr. Jun Hu PDEng MEng

Client:
Biyong Zhang, Mobile Taobao

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Abstract

This paper explores some related work about utilizing recorded data to reflect past experiences and maintain relationships. The first iteration was carried out in the university and a growing collective memories album service named Shiguang Time Machine was developed. With the input of client, Mobile Taobao, a second iteration was carried out focusing on the photo merging. Shiguang Time Machine is a mobile social application that brings past memories to present and merges photos together based on the location. The service aims at (1)making recorded data easily accessed in the right situation and (2)bringing touched moments and joy to the user. Finally, after the evaluation of the project, further development directions were discussed.



BACKGROUND

1.1 Recorded data serves everyday life

Memory is an important aspect of our lives that serves our everyday functions. We use memories to create personal identities and accept our pasts, to reflect past experiences, to solve current problems, to start and maintain relationships[1]. Human beings never stop exploring this area. People enjoyed recording and sharing memories with friends, families and themselves through storytelling, writing and painting. As the development of photography and electronic technology, it became cheaper, easier and even more vivid to record memories in digital ways. For instance, a tiny wearable camera called Narrative Clip is emerging to record life moments automatically[2]. It may promote the notion of “total recall”. Such kinds of emerging technologies are getting mature. How to utilize the recorded data through the emerging technology to serve our everyday life? This is the starting point of the project.



[1-1] Narrative Clip



[1-2] Photos for reflecting memories

1.2 Context-related data helps reflect past experiences

Large amounts of data about the past moments could be posted on Facebook or stored in the cloud. It seemed that all the past moments could be kept forever. However, in fact, most of the data were shared once and hard to be retrieved months later even no longer be remembered. So making recorded data easily access can be meaningful. A tool supports everyday, spontaneous, individual reminiscing through memory triggers was described by Cosley et al[3]. The results of a 6-month public deployment showed that the tool did help people recall past moments but sometimes the information was not meaningful because the recalled information was not context related.

Doherty et al described multiple sensory routes on which recorded moments can be associated in terms of time, places, people and activities[4]. When the data were evoked in related context(time/ places/ people/ activities/ emotions[5]), it would be helpful to reflect past experiences.

1.3 Context-related data helps maintain relationships

LBS can be a great technology which can evoke data in location related scenario. Location-based services (LBS) are a subset of web services meant to provide functions that are location-aware, where the use of such services is predicated on knowledge of where the services are engaged[6]. Currently enjoying the speculative potential of their commercial viability, LBS, such as Facebook Places[7] and Foursquare[8], are used for enhancing web search algorithms, for navigation and traffic information, for locating goods and services, as well as for locating other LBS users (or rather, their devices)[6]. Sarwat et al described that Foursquare and Facebook Places only allow users to receive messages about the whereabouts of their friends. Through Sindbad [9], user will see an incoming location-aware news feed posted by the user friends, location-aware recommendation and location-aware ranking.

In this project, I expect that the location-based services can be great triggers to share related recorded moments for the users. The interaction with past data can help the user evoke past memories and maintain relationships with friends.



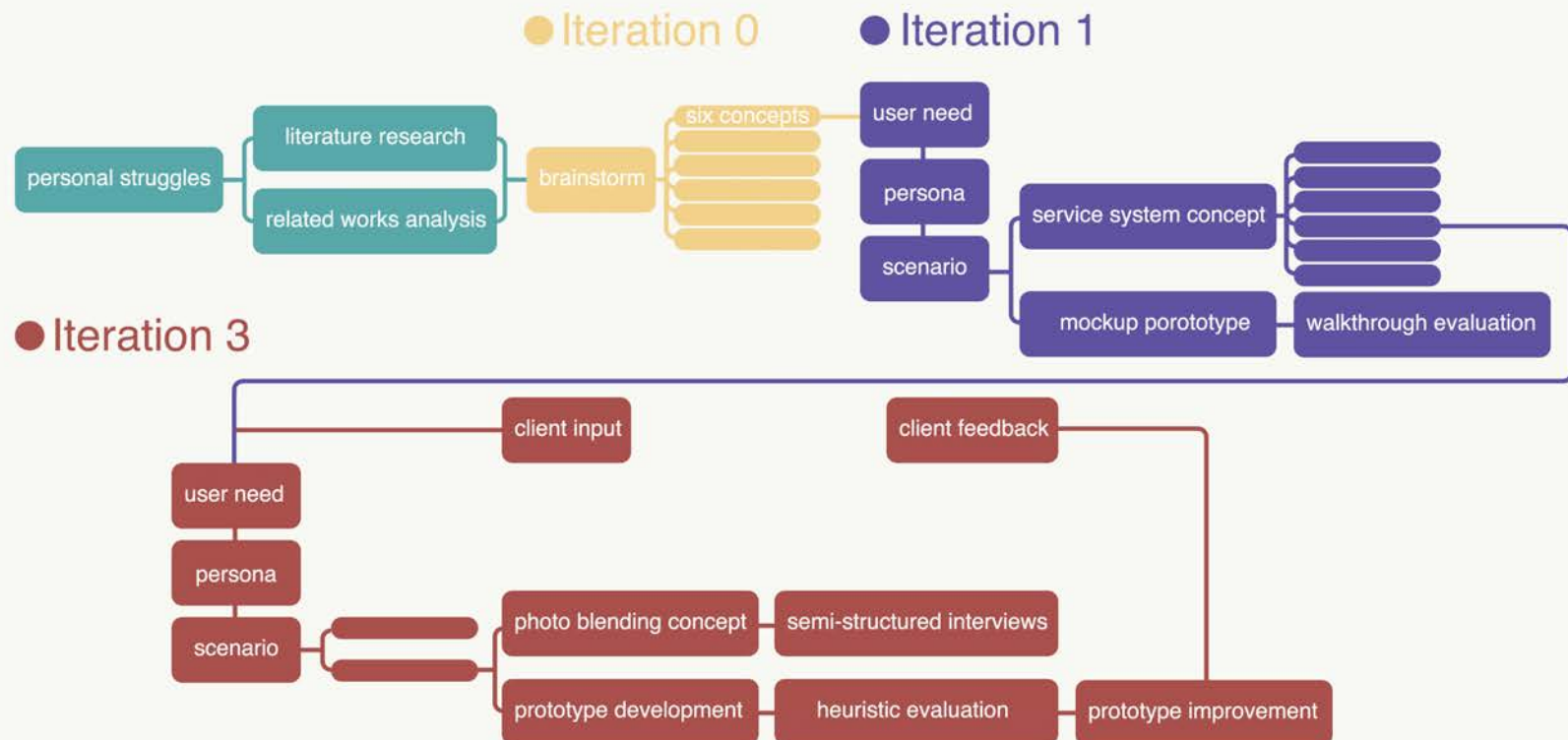
Facebook Places

Who. What. When. And now **where.**

[1-3] Foursquare and Facebook Places

2

DESIGN
PROCESS



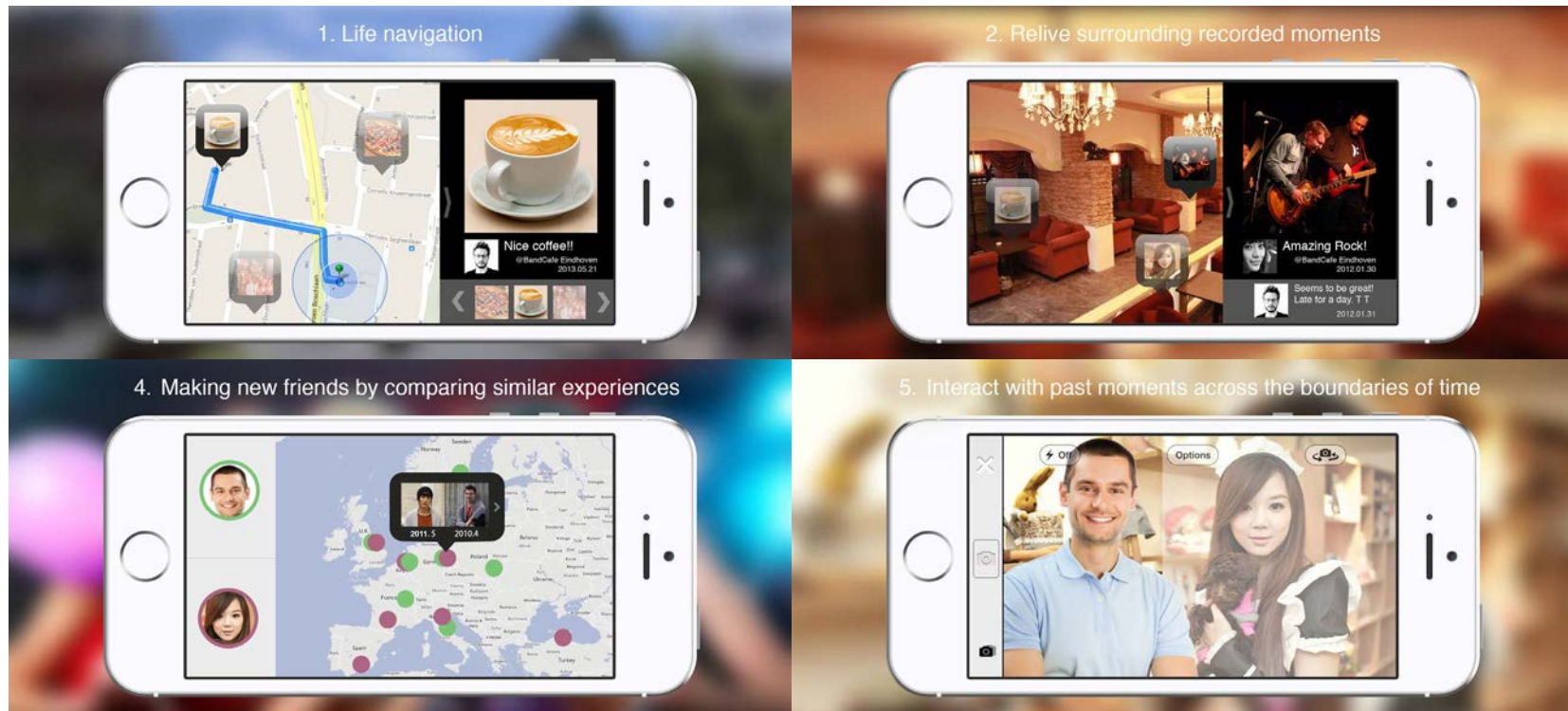
[2-1] Design Process

The idea of project came from the author's personal struggles. After the literature research about memories and analysis of related products, a brainstorm was carried out to generate a series of concepts about "recorded data servers everyday life". According to the expert's feedback, one direction was chosen. The iteration I started with exploring the need of the target group. Then personas and scenarios were generated. After prototyping and evaluation, Mobile Taobao became the client of the project. According to the need of the client, a

new iteration 2 started a further research about the photo merging part of the original system on new target group and scenario. Then a field research on target group was carried out in Zhejiang, China. Through co-constructing stories, the concept was generated and prototypes were developed. The heuristic evaluation was carried out for the usability. User experience questionnaire and semi-structured interviews were held to evaluate the experience. Finally, a number of directions for further development were generated.

3

THE
BRAINSTORM



[3-1] Parts concepts of the brainstorm

A brainstorm about “recorded data servers everyday life” was carried out at the early stage. The target group is the young aged from 20 to 35 who likes recording and sharing. By exploring the daily life of the target user, a series of concepts were generated during the discussion. Finally the concept: “encounter with past moment across the boundaries of time” stood out.

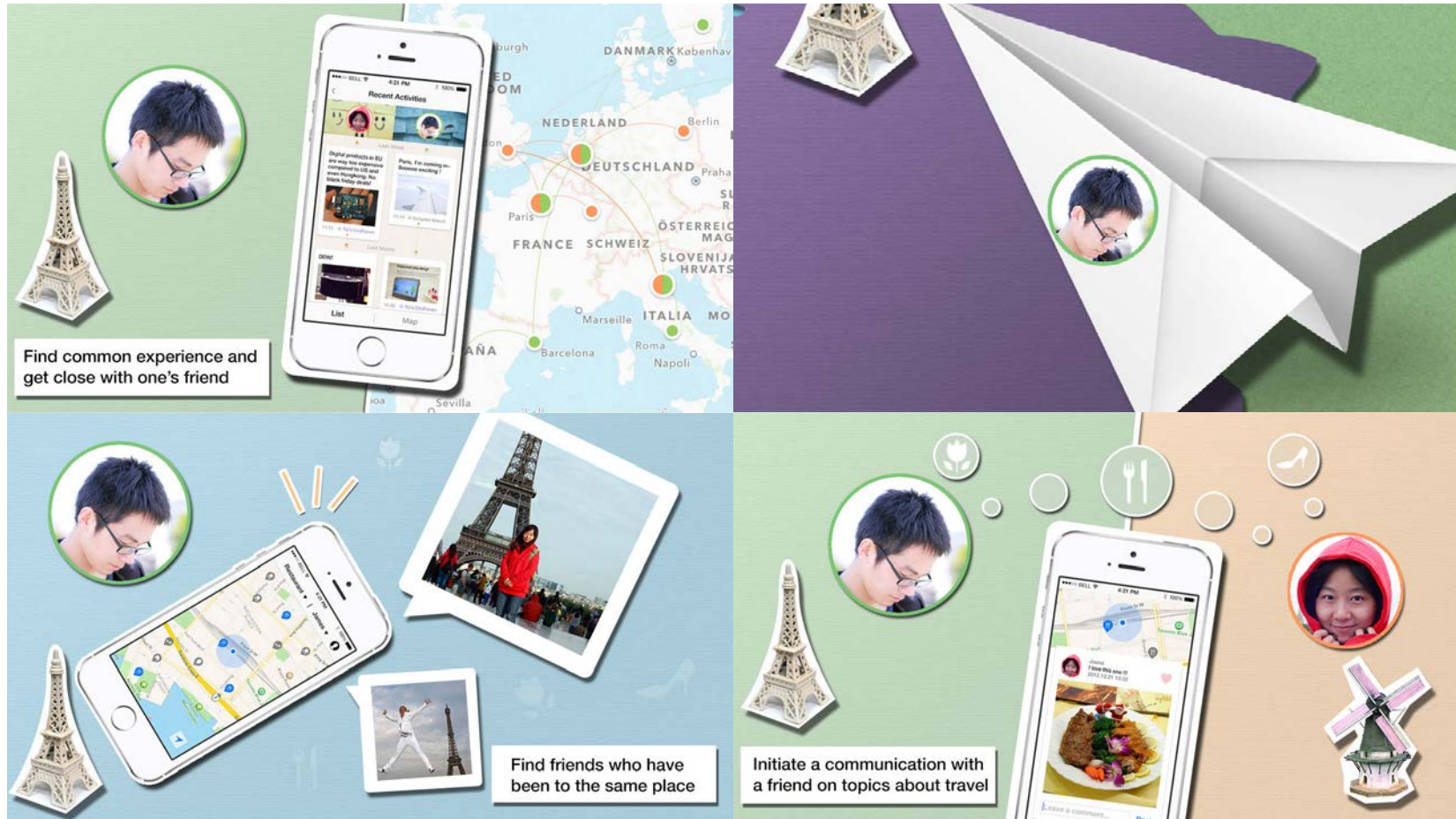
The concept described a photography and social networking service. Users are allowed to browse photos taken by himself,

friends or famous photographers at the same location. Based on this, users can photo in the same place to compare or mix photos between present and past, and even make cooperative photos across the boundaries of time and photographer.

After integrating the feedback from students and experts in the Mid-demo day, I saw its potential of playful interaction and humane care. Then, two iterations were carried out based on the direction.

4

ITERATION I:
GROWING
COLLECTIVE EMORIES



[4-1] The Travel Scenario

4.1 Focus Group

In order to have an in-depth understanding about users' real need and expectation when reviewing context related photos, I held a mini focus group with six participants.

Firstly, participants were encouraged to talking about their daily recording and sharing experiences and the problems they might meet. Then, after the engagement questions, a prepared travel scenario was described to the user. And the participants were asked to discuss about their opinions in the scenario.

4.2 Results Analysis

I reviewed the audio recording of the focus group, and then I made data analysis and priori coding. The results were positive. Users like recording life, especially by photo. It's hard to generate a frequency of reviewing past photos. While most of users reviewed historical photos because of some context-related reasons, such as sharing a similar party moment with friends surrounding. Five of the participants mentioned that sometimes they had to spend lots of time to search past photos.

In the travel scenario, participants showed great interests in receiving context-related photos. However, one of them mentioned the scenario was more specific than daily. It was too hard to imagine the experience. Besides, users all mentioned the service was good for them to keep in touch with friends. Regarding the further action after reviewing the photo, most people preferred to give a "like" on the photo rather than give a comment. One of the interviewers said, she would modify several times before sending the comment in case of misunderstanding. Users tended to express their feelings and keep in touch with friends in an easy way. When talking about merging photos interaction, the female showed great interests, while some male participants expressed concern on the photo effect.

Overall, users tend to record and share their lives in an easy and colorful way. And they want to express their feelings and keep in touch with friends. They interest in receiving context-related memories. Merging photos function could be a playful interaction to attract users.

4.3 Persona

A persona was generated after the focus group: Joanna is a 25 years old designer who works in Hangzhou, China. She enjoys social activities and likes sharing her recorded nice moments with friends. However she has problems to find the related photos and she feels sad when some memories she treasured are forgotten.

One day, Joanna was invited to have a group party. The party atmosphere evoked her birthday party last year. Joanna wanted to share the moments with her friends. However, she couldn't find the photos about her birthday party. Finally she found some photos in her Facebook, but there were only two photos. She remembered the photos were mainly taken by one of her friend. So she had to search her friend's Facebook to reach the birthday memory.

4.4 Concept Generation

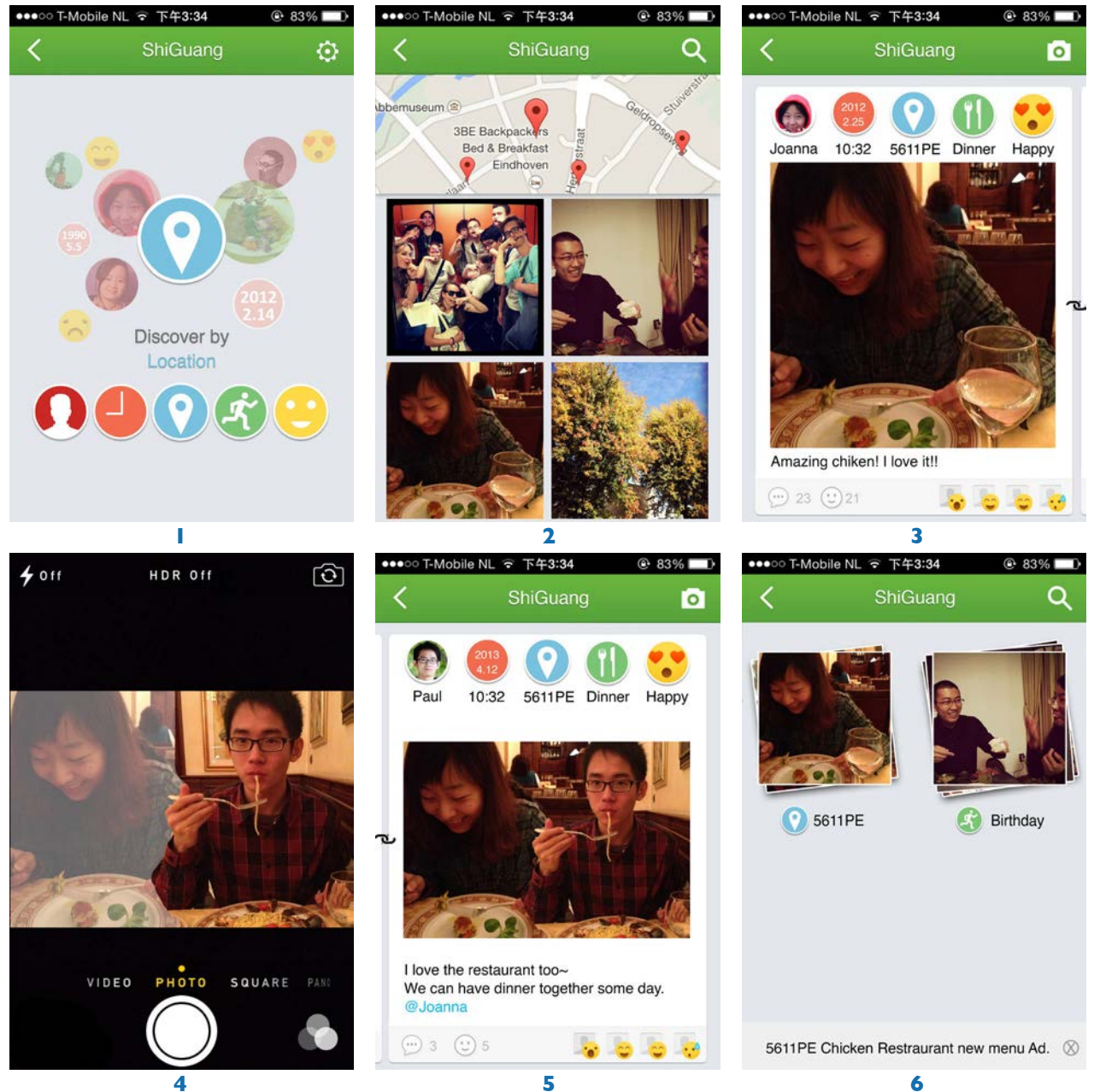
ShiGuang Time Machine is a growing collective memories album service. (1) The service will import all the published photos from users' existing social network. And all photos will be tagged with time, place, people, activity and emotion five attributes. (2) Based on users' current situation (e.g. location), the system can provide context-related past photos according to the five attributes above. (3) From one photo, users can easily find other photos taken in the same location or at the same time. All the related photos can be linked by the five attributes. (4) Several playful interactions with past photos (e.g. merging photos) will be provided for the users to create new memories when reviewing past photos. (5) Users can upload new photos to enrich the memories album about the similar experiences. (6) Through offering context-related information (e.g. nearby restaurant and hotel information before the anniversary), the service expects to build a platform for cooperation with offline store to provide additional services to the user.



[4-2] Mockup Prototype

4.5 Prototype

A mockup prototype was made to evaluate the concept. In image [4-3], Picture 1 was the searching interface. Normally, photos would be pushed by the system automatically. Users could also search context-related photos manually. In the Picture 2, the application showed the nearby photos taken by himself based on his current location. The Picture 3, 4 and 5 are interfaces about photo merging and sharing. Picture 6 showed the related photos could be stored on a growing collective memories album. Besides, some context-related advertisements would be included to recommend local additional services.



[4-3] Mockup Interface

4.6 Evaluation

Because of the limitation of my evaluation skills, I held an informal evaluation in this iteration. A formal evaluation will be carried out in the next iteration.

Two expert participants were invited to the evaluation. They were provided with the introduction about the concept and tasks for them to perform in a provided scenario. A smartphone with prepared prototype was provided to participants at the beginning of evaluation. Firstly, users would receive the automatic memory photos when he passed the same location where their graduation party was held years ago. Users could review related photos and comments with the mockup prototype. Secondly, users were asked to take group photos with past. Then, a merged photo (prepared by the moderator) were presented to users. Finally, the users were showed that the past photo and the new merged photo were sorted into one album. After all the tasks were finished, a following interview was carried out.

Users showed great interests in receiving memory photos. The photos did evoke their memories of the past experience. And they didn't feel annoying because photos were pushed in the right time. However they confused about the interface, especially the icon above the photos. It just took too much attention. When talking about the merging photos function, all participants wanted to have a try. Although the results were not as good as they expected, they thought it was still playful and funny. Participants thought it was nice to sort similar photos together, however the growing collective memories

album is not necessary. Too much album would make them uncomfortable. Overall, they thought the service did bring surprises and joy. And the past photo could help them keep relationship with their friends.

4.7 Input from the Client



[4-4] Mobile Taobao, Alibaba Group

I introduced my design proposal to several companies, and finally I found Mobile Taobao (Alibaba China) to be my client. Taobao is a Chinese website for online shopping similar to eBay and Amazon that is operated in China by Alibaba Group [10]. Mobile Taobao currently is China's top mobile-shopping application. The company is looking to make online-to-offline (O2O) consumer behavior mainstream in China.

My client thought it's a cool idea to see past photos taken nearby and the interaction of merging with past photos could be playful. While, he expected the interaction could bring fun to the user when he consumed in a restaurant or a shopping mall. Because the company has its own end users. In order to have a deep understanding about the target group, I visited the company in China for three weeks. In the following iteration, I mainly started my research and design on the photo merging interaction.

5

ITERATION 2:
MERGING WITH
PAST PHOTOS



[5-1] Focus Group in a Factory

5.1 New Target Group Needs Assessment

One of the goals of Mobile Taobao is to attract more users to use the service to make O2O consumer. Currently, more than 85% officers use the application. There is little room for growth in this user group. Around 45% students use the Mobile Taobao and there is still some room for growth. Only 15% laborers use the application and they can be a potential target.

Together with the UED team of Mobile Taobao, we did

focus group and questionnaires during the field research in universities and factories. Finally, we compared the needs of potential target group between students and laborers.

A focus group was carried out with 12 bachelor and master students in a university in Hangzhou. Then, the questionnaire was designed based on the feedback of the focus group. We sent 3019 pieces of questionnaires and received 2320 pieces of valid questionnaires. After coding, a report about the target group was presented. Similar work also have been done in a factory with laborers.

Because the data is confidential, I can't list it in my report. The result shows that the students are skilled to use the smartphone and can be easily attracted by new things and benefits. Most of them interested in the O2O service, especially the 3.8 Life Festival[11] held by Mobile Taobao. The restaurant, shopping mall, KTV and cinema are most welcomed offline consumption places. On the other side, the smartphone becomes cheaper and most of the laborers have their own smartphones. However, only a part of them are willing to shop through mobile devices. Around half users don't know how to install applications. They can be the potential target for Mobile Taobao to increase the user penetration. However they are not my target group. Overall, the university students can be the suitable target group of my project.

5.2 Client Need

The client expected the my project could focus on the two scenarios (restaurant and shopping mall) because it could be connected with one of their undergoing projects. In the restaurant scenario, they expected the service could bring fun to the user and attract user to consume in the restaurant. And in the shopping mall scenario, they expected the service could guide the user to play clothes matching with her friends.



[5-2] Visiting Mobile Taobao

5.3 Personas

Based on the conclusion above, I create two personas for different scenarios through the Fluid Persona Format[12].

Persona
(Fluid Persona Format)

| | |
|--|--|
| <p>Joanna (Female)</p> <p>Background Age: 26 Occupation: Master Student School: Zhejiang University, China</p> <p>Goals Shares daily experiences with friends and vice versa Maintains friend relationships</p> <p>Frustrations The photos she shared appeared to very common and only a few friends comment them.</p> | <p>Main Points</p> <p>Lives in the campus with classmates A member of Student Council in the University Likes tasting different food and sharing experience Enjoys playing Facebook and other social network</p> <p>Description One day afternoon, she was having a dinner in a restaurant near school with her friends. As usual, they ordered some food and talked with each other. When the atmosphere became quiet, she landed the Facebook trying to look for some interesting photos as a discussing topic. However, the news feed were boring.</p> <p>She suggested to take group photos together with the delicious dinner. Then she shared the photo to her Facebook and recommended the restaurant. Later, from the comments, Marry found Joanna, one of her friends used to been there before. She also posted similar photos before and recommended some delicious dishes. Marry thought, if she saw her friend's photo posted about the restaurant before, she might took photos in the same way for fun. Moreover, she could discuss with her friend about the dishes in the restaurant.</p> |
|--|--|

Persona
(Fluid Persona Format)

| | |
|---|--|
| <p>Lucy (Female)</p> <p>Background Age: 23 Occupation: Master Student School: Zhejiang University, China</p> <p>Goals needs some ideas for the dress's arrange in different occasions</p> <p>Frustrations she likes buying clothes online, while some nice-looking clothes don't fit her or hard to be matched.</p> | <p>Main Points</p> <p>Lives in the campus with classmates a member of Student Council in the University Very involved in various parties Likes online shopping especially about clothes Enjoys playing Facebook and other social network</p> <p>Description Joanna is in her 2nd year at Zhejiang University, studying Industrial Design. She lives with her classmates in YuQuan Campus. She is a member of Student Council in Zhejiang University. In her free time she will involve in various parties with her friends. When she is free at dormitory, she prefers to shopping online and discuss with her roommates about new clothes. She also likes to take photos and share her experiences on the social network. She plays WeChart, Weibo and Facebook at the same time.</p> <p>She cares about clothes matching. She wants to leave good impression to others and share nice photos in her social network. She is interested in how her friends will dress in a occasion and whether her clothes can match her friends' or not.</p> |
|---|--|

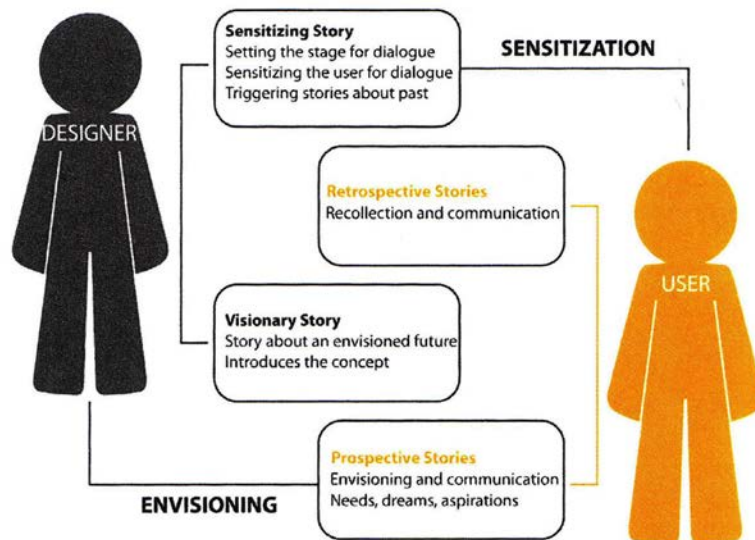
[5-3] Fluid Personas

5.4 Co-constructing Stories

In order to get more input from users to improve my concept, I did 5 individual co-constructing stories[13]. Based on the above personas, three active Facebook users who like sharing party photos and two college students who like shopping were invited.

5.4.1 Procedure

Take the restaurant scenario as an example. The sessions started with a story constructed by the moderator about a student who is having dinner with friends in a restaurant. The story stopped when the student started to play the Facebook on his mobile phone. Then the participant was asked what will he do if he was the student. After the participant described his story, a second scenario was presented to him: an application on the smartphone could display his friend's past photo taken in the same restaurant. The user was told that he could search for more photos taken nearby about his friends and himself. Then he was asked what he liked or disliked about the story if he was the student. He was told that he could merge himself with the past photo and comment it in anyway he wanted. Finally he was asked to described the story he expected. The whole session would last about 30 minutes and would be audio recorded. After the session, all the recorded data will be annotation to create affinity diagram.



[5-4] Co-constructing Stories

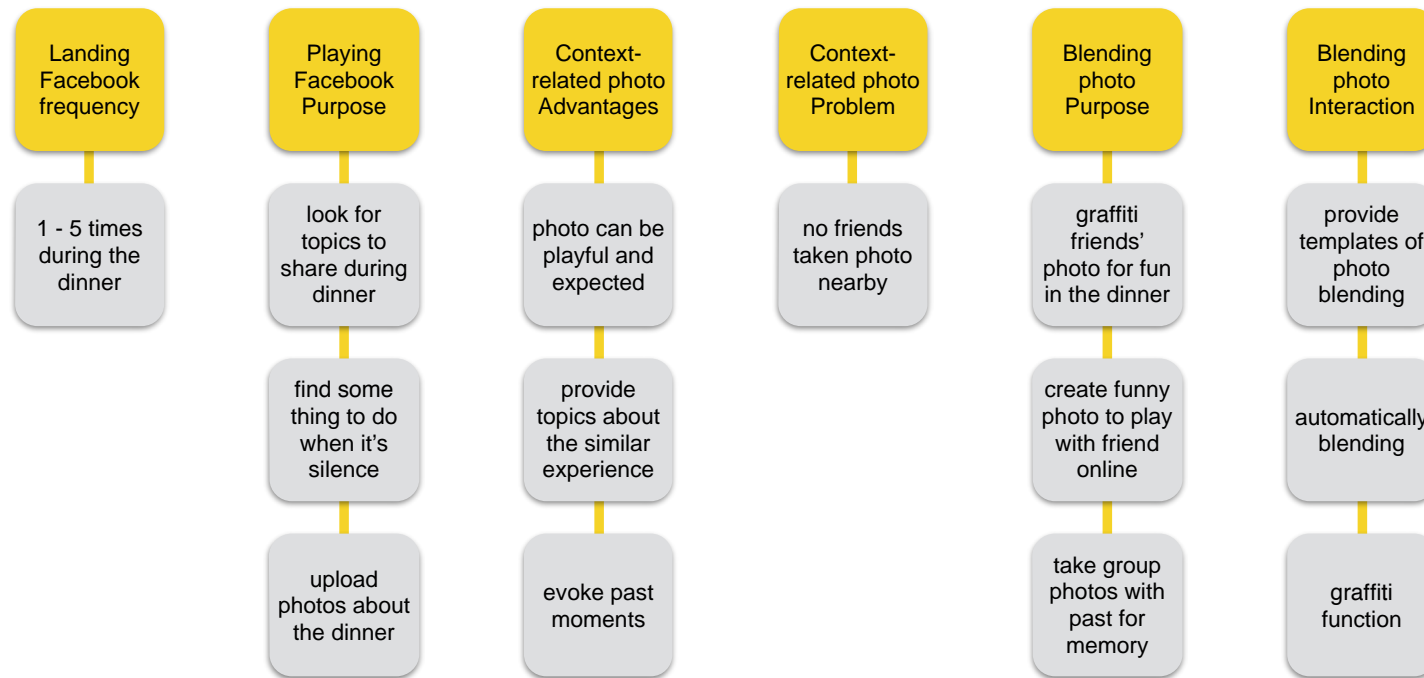
5.5 Co-constructing Stories Data Analysis

5.5.1 The Shopping Mall Scenario

The two female users in the shopping mall group, mentioned that usually they would like to go shopping with female friends. Although they liked shopping online, they enjoyed the experience shopping in the real store. They showed their interests about clothes matching. They liked browsing clothes matching images for dressing inspiration. However, they won't deliberately pay too much attention on the clothes matching with her friends unless when she attended an important ceremony. In their daily life, they preferred to dress freely. Overall, users liked the clothes matching concept while it's not an urgent need in their daily lives.

5.5.2 The Restaurant Scenario

All the participants in the restaurant group described that they would play the Facebook in the restaurant, especially when nothing to talk with friends. They preferred to read some interesting news and photos for fun. Some users mentioned they would like to look for interesting topics from the Facebook and share them with friends. Two of the female participants said that they would like to take photos about the food and friends. Then they would share them to the social network. When talking about the second scenario, participants were interested in the past photos nearby. One of them mentioned that it would be very interesting to see friend's photo taken there and he could shared his current experience to his friend and discuss about the restaurant. While, one participant mentioned that the past photo could be browsed before, and she might not interested in it. However, if photos were taken years ago, the memories would make her feel warm. When I mentioned they could merge photos in anyway they liked, they gave me a lot of possibilities. The first thing came into their mind was to graffiti friends' photos. They expected to create some funny photos and share with their friends. Some participants also mentioned the service might help them to take group photos with the past memory. They expected the merging function can be easily operated and not as difficult as photoshop.



[5-5] Affinity Diagram Analysis

Based on the feedback from the restaurant scenario, affinity diagram was created.

Although users liked the clothes matching concept, it's not an urgent need in their daily lives. On another hand, participants showed great interests about the concept of merging images with past photos. It would work well not only in the restaurant scenario, but also in everyday life.

5.6 Improved Concept

Shiguang Time Machine is a social application that brings

past memories to present and merges photos together in the same place. Based on user's current location, the system will provide selected context-related photos from the social network of his friends and himself. The user can merge himself with past photos to create pictures and share with friends.

The service aims at (1) making recorded data easily accessed in the right situation and (2) bringing touched moment and joy to the user.



Touch the memory nearby.

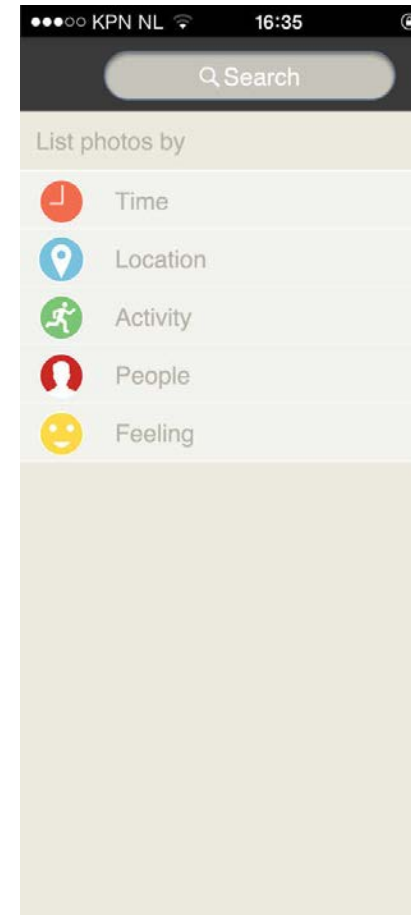
5.7 Prototype

Users could login the application with their existing social network such as Facebook. The application will search user and his friends' public photos from the Facebook and present the photos taken near user's current location.

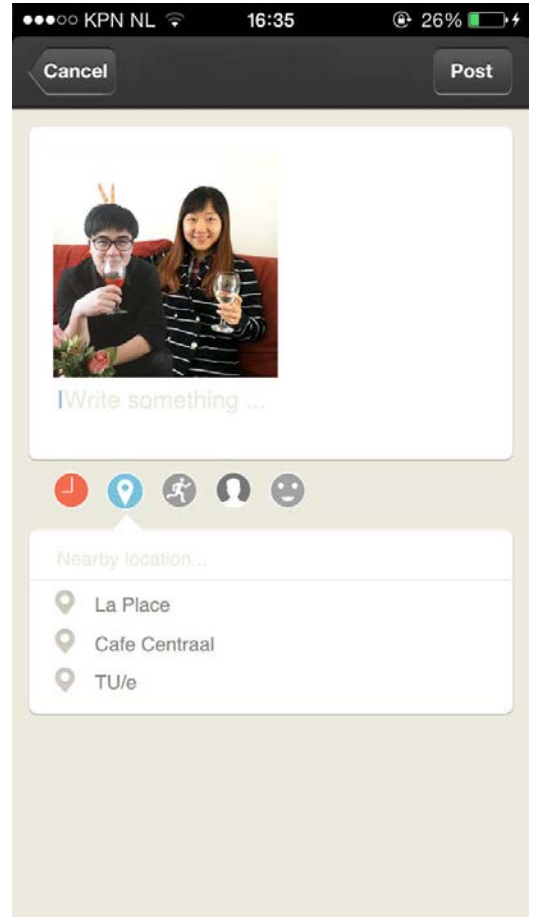
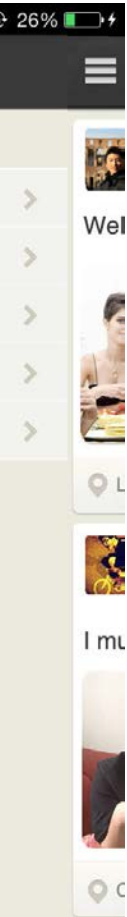
Browsing the context related photo list, user can enlarge any interested photo for detail. The camera button will lead the use to the photo merging function.

When use decides to merge image with a selected photo, the system will leave the selected photo translucent on the viewfinder to help use find suitable direction and angle. After the photo was taken, use can wipe off the unneeded part with his finger. Then, the two photos will be merged automatically.

Finally, after the blending photo is completed. User can share it with his friends. Besides, the photo will be linked with the original photo so that they can be reviewed together.



[5-6] Prototype



5.8 Heuristic Evaluation

The goal of this heuristic evaluation is to improve the prototype's usability and enhance end user experiences for the coming experience evaluation.

A heuristic evaluation [14] is a systematic inspection of a user interface to uncover as many of the problems users might have as time allows. The people doing the inspection perform typical tasks that users would want to do with the product and record the problems that they expect users will have. The problems are violations of the ten heuristics that form the basis of the inspection.

The ten heuristics that are most commonly used in user interface inspections were developed from research conducted in the 1990s. They are:

- Visibility of feedback
- Complexity of the application
- Task navigation and user controls
- Consistency and standards
- Error prevention and correction

- Recognition rather than memory overload
- Efficient to use
- Simplicity and appeal
- Be tolerant and reduce cost of errors
- Help Support.

5.8.1 Procedure

- 1) The evaluators are briefed about the project and the characteristics of the users who will be using the product. They review the list of ten heuristics and examples to ensure that they understand them.
- 2) The evaluators then independently work through the tasks selected for the inspection.
- 3) The evaluators record problems and solutions on the form.
- 4) Finally, the evaluators get together and go over their problem sheets and solutions, combining their problems and eliminating duplicate problems.

Shiguang Time Machine Project

Heuristics Evaluation

Project Introduction

Shiguang Time Machine is an application that brings past memories to present and merge photos together in the same place. Based on users' current location, the system will provide selected context-related photos from the social network of their friends and themselves. The user can merge himself with past photos to create pictures and share with friends.

Persona

| Joanna | |
|---|---|
| Background Age: 26 Occupation: Master Student School: Zhejiang University, China | Main Points Lives in the campus with classmates a member of Student Council in the University Likes tasting different food and sharing experience Enjoys playing Facebook and other social network |
| Goals Share daily life experiences with friends and vice versa Maintain friend relationships | Description Marry is in her 2nd year at Zhejiang University, studying Industrial Design. She lives with her classmates in YuQuan Campus. She is a member of Student Council in Zhejiang University. In her free time she will involve in various parties with her friends. She likes tasting different food and she will share her experiences on the social network. She plays WeChart, Weibo and Facebook at the same time. One day afternoon, she was having a dinner in a restaurant near school with her friends. As usual, they ordered some food and talked with each other. When the atmosphere became quiet, she landed the Facebook trying to look for some interesting photos as a discussing topic. However, the news feed were boring. She suggested to take group photos together with the delicious dinner. Then she shared the photo to her Facebook and recommended the restaurant. Later, from the comments, Marry found Joanna, one of her friends used to been there before. She also posted similar photos before and recommended some delicious dishes. Marry thought, if she saw her friend's photo posted about the restaurant before, she might took photos in the same way for fun. Moreover, she could discuss with her friend about the dishes in the restaurant. |
| Frustrations the photos she shared appeared to very common and only a few friends comment them. | |

Task List

Task

1. refresh and browse through the photo list
2. select and open one party photo
3. take a new photo in the same place based on the past photo
4. merge two photos together
5. enter text and share it to the social network.

10 Heuristics

Visibility of feedback
 Complexity of the application
 Task navigation and user controls
 Consistency and standards
 Error prevention and correction
 Recognition rather than memory overload
 Efficient to use
 Simplicity and appeal
 Be tolerant and reduce cost of errors
 Help Support

Evaluator's Form

| | |
|---|--|
| Describe the usability problem | |
| What task and step was being attempted when the problem occurred? | |
| Where in the product did the problem arise? | |
| What solution will solve the problem? | |

| Heuristic Evaluation Form | | | | |
|----------------------------------|--|---|--|---|
| No. | Describe the usability problem. | What task and step was being attempted when the problem occurred? | Where in the product did the problem arise? | What solution will solve the problem? |
| 1 | Visibility of system feedback | There is no clear feedback about the location of the photo. And it will be difficult for the user to find the photo to take merging photo. | the home page | Add map page: shows the nearby photos on the map directly. On the right corner of top bar, users can switch from list page to the map page. |
| 2 | complexity of the application | The brush and eraser buttons are confused. Firstly, the buttons are difficult to understand which one is active right now. Secondly, the two buttons can not be used at same time. There is no need to use two buttons on the page. | the image merging page | 1. Use a switch button on the page. 2. Make the button looks as if it have been pushed when it is clicked. |
| 3 | Visibility of system feedback | When users are merging photos, they need a timely feedback about the merging effects. | the image merging page | A preview button to compare original photo with merging image. |
| 4 | Help support | The image merging might be new to the user. There should be a guidance for the first time user. | the image merging page | A guide interface only for the first time user. |
| 6 | Consistency and standards | The back button is "Back", while the merging photo button is an icon. | the photo page | Unified text and icon. |
| 7 | Visibility of system feedback | The picture is more important than text and the user. The picture should be full size. | the home page | Make the image full size. |
| 8 | Visibility of system feedback | The user may have no idea where the original photos came from. | the home page | Show the original social network platform of the image. |
| 9 | Efficient to use | The past photos can be dragged on the viewfinder. The gesture will conflict the "zoom in" and "zoom out" gesture of camera. | the taking photo page | Create a new button which can hide and show the translucent past photo. |
| 10 | Error prevention and correction | When user select unneeded part of the photo, the selected part will be orange. If the color of the photo background is orange, it can be difficult to recognize it. | the image merging page | Make the edge of the selected part visible. |
| 11 | Efficient to use | If in the home page, there were one original photo and several merging photos, it will occupy the whole screen with similar photos. | the home page | Organize original photo and merging photos in one album. |

[5-8] Heuristic Evaluation Results

6

FINAL EVALUATION

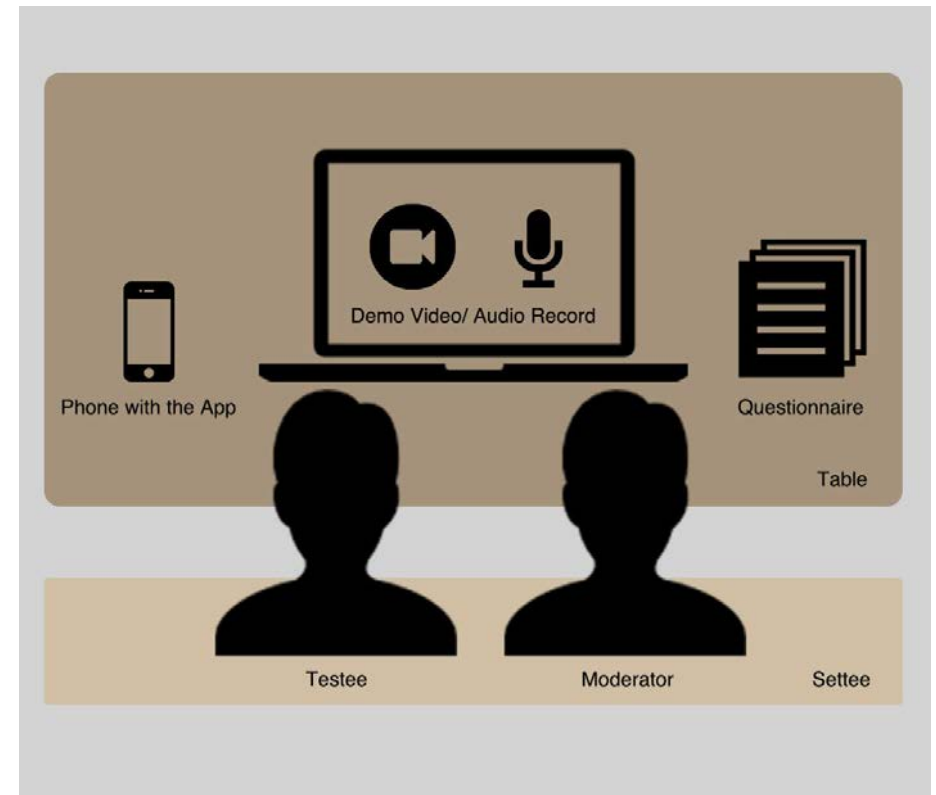
6.1 Pilots

The pilot evaluation was conducted before the real evaluation. Two users performed the pilot evaluation. They followed a draft of the semi-interview process. The interview questions were then revised because some are not related to experience of evoking past memories and I didn't receive needed data. In order to evaluate the experience comprehensively, a method called "User Experience Questionnaire" was added in the real evaluation.

6.2 Experiment Environment Setup

The evaluation was conducted in a meeting room in the MetaForum of TU/e, with a desk and a chair. The environment was designed as shown in image [6-1]. The moderator sat next to the user in a semi-behind position, trying not to distract the user.

The moderator started with the introduction of the scenario and tasks. Assisted the user if needed during the evaluation by answering questions and gradually guiding so that the user could succeed and proceed to the next task if the user were not able to complete a task in a reasonable amount of time. The moderator was responsible for setting up and monitoring the audio recording as well.



[6-1] Experiment Environment Setup

6.3 Procedure

1. Introduction to the test - 3 min(by Moderator)
2. Demo video[15] to the test - 2 min
3. Performing tasks - 5-15 min(Moderator measures the task time)
4. Guiding to complete task (due to time constraints). See more information in the 6.4 below.
5. Fill in the Questionnaire - 5-10 min(by Interviewer)
6. Follow-up interview - 5-10 min(by Interviewer)

6.4 Guidances

The participant gradually received hints to complete the task since the time slot for each participant was limited. The moderator usually prompted the hints in the following way and order:

General hints: “take your time”, “maybe you can push different things in the interface”, “maybe there is a button somewhere”, “maybe there is something that doesn’t look like a button that is actually a button” (assuming that hotter is understood as closer to the target).

Specific hints: “do you see the “...”?”, “do you see the “+”?”

The moderator tried to prompt the hints at approximately the same amount of time, first letting the user try on her/his own.

6.5 Samplings

The end user of the project is the university student. A hallway sampling was used in the university library among the randomized potential user group. The participant would be rewarded with candies after the evaluation. Finally, 15 users (7 male and 8 female students) participated the evaluation .

6.6 Tasks and Interview Questions

Firstly, the moderator would introduce the core concept of the project and the purpose of the evaluation to the participant. After watching the introduction video, the participant was asked to performing tasks in the following steps.

Scenario:

You are having a dinner in a restaurant. The photos taken in the restaurant by yourself and your fiends are listed in the application. You find a series of photos about your high school graduation party held in the restaurant.

Tasks:

1. Refresh and browse through the photo list
2. Select and open one party photo
3. Take a new photo in the same place based on the past photo
4. Merge two photos together
5. Enter text and share it to the social network

By going through the application, participants could have in-depth experience of the application and then they would be asked to fill in the prepared User Experience Questionnaire in the image[6-2].

The User Experience Questionnaire (UEQ) allows a quick assessment of the user experience of interactive products. [16] The format of the questionnaire supports users to immediately express feelings, impressions, and attitudes that arise when they use a product. The scales of the questionnaire cover a comprehensive impression of user experience. The 26 questions are designed to measure both classical usability aspects (efficiency, perspicuity, dependability) and user experience aspects (novelty, stimulation).

After the questionnaire, a following semi-interview would be carried out. The moderator would ask several questions about the questionnaire participant completed and some other questions about the experience.

Questions:

Why do you give (7) point for the (annoying/enjoyable) option?

How would you introduce the application to your friends?

If it were available today, in which situation will you use it?

Which kinds of memories do you expect to see? How do you think the application will help you evoke past memories?

Anything would you like to add or see before we stop?

Please assess the product now by ticking one circle per line.

How do you think about the way that helps you evoke past memories?

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
|--------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------------|----|
| annoying | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | enjoyable | 1 |
| not understandable | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | understandable | 2 |
| creative | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | dull | 3 |
| easy to learn | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | difficult to learn | 4 |
| valuable | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | inferior | 5 |
| boring | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | exciting | 6 |
| not interesting | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | interesting | 7 |
| unpredictable | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | predictable | 8 |
| fast | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | slow | 9 |
| inventive | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | conventional | 10 |
| obstructive | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | supportive | 11 |
| good | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | bad | 12 |
| complicated | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | easy | 13 |
| unlikable | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | pleasing | 14 |
| usual | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | leading edge | 15 |
| unpleasant | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | pleasant | 16 |
| secure | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | not secure | 17 |
| motivating | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | demotivating | 18 |
| meets expectations | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | does not meet expectations | 19 |
| inefficient | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | efficient | 20 |
| clear | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | confusing | 21 |
| impractical | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | practical | 22 |
| organized | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | cluttered | 23 |
| attractive | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | unattractive | 24 |
| friendly | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | unfriendly | 25 |
| conservative | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | innovative | 26 |

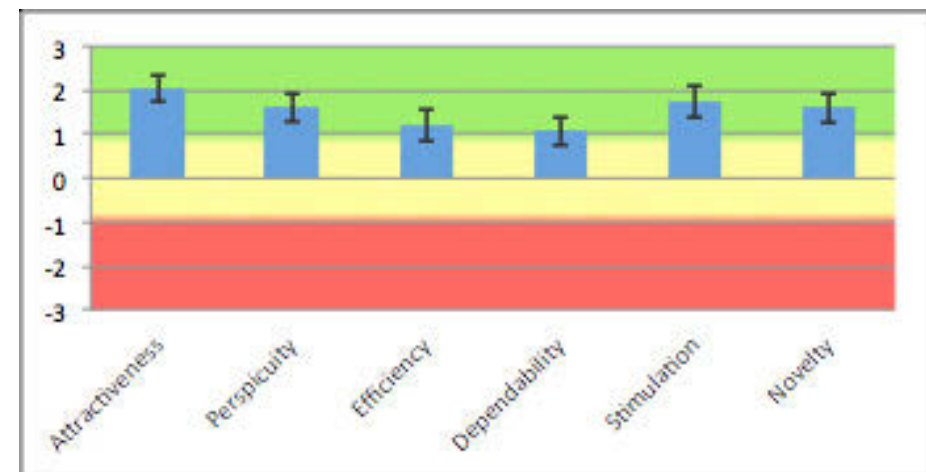
The Q1 was designed to have a better understanding about why the participant gave a score to an option. The Q2 was designed to evaluate which features of the application users valued. The Q3 was designed to explore users' ideal scenarios to use the application and their expected photos to review. Finally, the Q4 was designed to get additional feedback from users.

6.7 Results

All (15) participants completed the questionnaire and semi-interview. The questionnaire data was collected and summarized in image [6-3].

The data showed the options related to attractiveness and design quality (stimulation and novelty) received high scores. In the use quality, the scores were lower than others. The lowest score came from the "secure" option. Participants had significant different opinions on the question and it would be discussed in the "Discussion" section.

| Item | Mean | Variance | Std. Dev. | No. | Left | Right | Scale |
|------|-------|----------|-----------|-----|--------------------|----------------------------|----------------|
| 1 | ↑ 2.1 | 0.6 | 0.7 | 15 | annoying | enjoyable | Attractiveness |
| 2 | ↑ 1.6 | 0.8 | 0.9 | 15 | not understandable | understandable | Perspicuity |
| 3 | ↑ 1.3 | 0.5 | 0.7 | 15 | creative | dull | Novelty |
| 4 | ↑ 1.5 | 1.6 | 1.2 | 15 | easy to learn | difficult to learn | Perspicuity |
| 5 | ↑ 1.8 | 1.6 | 1.3 | 15 | valuable | inferior | Stimulation |
| 6 | ↑ 1.3 | 1.4 | 1.2 | 15 | boring | exciting | Stimulation |
| 7 | ↑ 2.0 | 0.6 | 0.8 | 15 | not interesting | interesting | Stimulation |
| 8 | ↑ 1.4 | 2.0 | 1.4 | 15 | unpredictable | predictable | Dependability |
| 9 | → 0.5 | 2.3 | 1.5 | 15 | fast | slow | Efficiency |
| 10 | ↑ 1.5 | 2.1 | 1.5 | 15 | inventive | conventional | Novelty |
| 11 | ↑ 1.3 | 0.8 | 0.9 | 15 | obstructive | supportive | Dependability |
| 12 | ↑ 2.3 | 0.5 | 0.7 | 15 | good | bad | Attractiveness |
| 13 | ↑ 1.5 | 0.6 | 0.7 | 15 | complicated | easy | Perspicuity |
| 14 | ↑ 1.9 | 0.6 | 0.8 | 15 | unlikable | pleasing | Attractiveness |
| 15 | ↑ 1.9 | 0.7 | 0.8 | 15 | usual | leading edge | Novelty |
| 16 | ↑ 1.9 | 0.9 | 1.0 | 15 | unpleasant | pleasant | Attractiveness |
| 17 | → 0.1 | 2.2 | 1.5 | 15 | secure | not secure | Dependability |
| 18 | ↑ 1.9 | 0.8 | 0.9 | 15 | motivating | demotivating | Stimulation |
| 19 | ↑ 1.6 | 0.7 | 0.8 | 15 | meets expectations | does not meet expectations | Dependability |
| 20 | ↑ 1.7 | 0.7 | 0.8 | 15 | inefficient | efficient | Efficiency |
| 21 | ↑ 1.8 | 1.2 | 1.1 | 15 | clear | confusing | Perspicuity |
| 22 | ↑ 1.5 | 1.6 | 1.2 | 15 | impractical | practical | Efficiency |
| 23 | ↑ 1.1 | 1.0 | 1.0 | 15 | organized | cluttered | Efficiency |
| 24 | ↑ 2.0 | 0.7 | 0.8 | 15 | attractive | unattractive | Attractiveness |
| 25 | ↑ 1.9 | 0.5 | 0.7 | 15 | friendly | unfriendly | Attractiveness |
| 26 | ↑ 1.7 | 1.3 | 1.1 | 14 | conservative | innovative | Novelty |



[6-3] User Experience Questionnaire Data

| How the users introduce the application | | | | | | |
|---|--------------------|--------------------------------------|------------------------|--------------------------|--------------------|--------------------------------------|
| User | review past photos | discover photos in the same location | merge with past photos | share similar experience | provide new topics | classify the photos to be accessible |
| 1 | X | X | X | | | |
| 2 | X | | X | | | |
| 3 | X | X | X | X | X | |
| 4 | X | X | | | | X |
| 5 | X | | X | X | X | |
| 6 | X | | X | | X | |
| 7 | X | | X | | | |
| 8 | X | X | X | X | | |
| 9 | X | X | | | | X |
| 10 | X | X | X | | | |
| 11 | X | | X | X | X | |
| 12 | X | X | | | | |
| 13 | X | | X | X | | |
| 14 | X | X | | | | X |
| 15 | X | | X | X | | |

| Which kinds of photos the users expect to review | | | | | |
|--|----------------------|--------|-------------|-----------|--|
| User | parties with friends | travel | campus life | childhood | the moments with some important person |
| 1 | X | | | X | |
| 2 | X | | X | | |
| 3 | | X | | | X |
| 4 | X | X | | | |
| 5 | | | X | X | |
| 6 | | X | | | X |
| 7 | X | | X | X | |
| 8 | X | | | X | |
| 9 | X | X | | | |
| 10 | X | | X | | |
| 11 | | | | | X |
| 12 | | X | | X | |
| 13 | X | | X | | |
| 14 | | X | | | |
| 15 | X | | | X | |

[6-4] Semi-interview Data

In the semi-interview, users described the features of the application they valued and their ideal scenarios and photos. After reviewing the audio record and coding, I generated six main features participants mentioned frequently to describe the application in the image [6-4].

All the participants would like to introduce to their friends starting with that the application could review past photos. 66% participants would mentioned the photos are location based. 11 users would highlight the image merging with past photos function. Around half of the participants mentioned

the application would help share similar experiences with friends and families. Four of them said the app could provide new topics for talking in the party and three of them said the service could classify their photos by location and make past memories accessible.

When talking about the scenario and the photos users expected to review, people mainly talked about parties with friends, travel, campus life, childhood and the moments with some important person.

6.8 Discussion

6.8.1 Reasons of Attraction

The questionnaire data showed a positive result about users' attitude towards the experience of evoking past memories. Some users described that application would let their "dead" photos reborn in a pleasantly unexpected way. The charm of memory itself attracted the users. The application made the memory accessed in the right situation. Besides, it also provided photo merging for the user to touch and talk with past photos. These features made it different from other existing social networking applications.

6.8.2 Privacy Problems

However, participants had significant different opinions on the secure question. Some participants thought it's unsecure because some photos could be related to personal privacy. Although the source of the photos are coming from their published photos in other social networking, they didn't expect some photos been seen by others years later. On the other hand, some participants thought it didn't matter. People likes to share their everyday experience. They had their own judgments to share their photos to interact with friends or

not. And the application just provided a convenient platform for users.

6.8.3 Social or Individual

The majorities of participants mentioned that they would like to use the application in the party with their friends. From the past photos, they could found a lot of topics to discuss. The second welcomed scenario is the travel. The unexpected "encounter" is amazing. Users enjoyed merging photos with friends and expected to see their friend comments on the merging photo.

Besides the social photos, more than half users talked about the photos about their personal meaningful memories. When the application pushed the important past photo, the past photo could tell stories itself. Users could be thankful to the application for evoking such a meaningful memories. On the other hand, they could be sad because the application might evoke the memories they didn't want to remember.

The application could be a playful social application and it could also become a reminiscence trigger. In the future steps, it is worth to explore the two aspects respectively.

6.8.4 Users' Expectations and Suggestions

Most users defined the application that could show past photos in the same location and merge image with past photos. Several users who didn't mention the location based feature said that sometimes a photo taken in one place would evoke their memories in another place. Although the location based photo evoking was good, they wanted to access the activity related memories or time related memories. The same opinions were also pointed out by the users who thought the application could help classify the photos. Because of the limitation of my technological knowledge and project time, I only studied on the location related aspects. Their opinions were valuable and helpful for the further research.

7

CONCLUSIONS

Two iterations have been completed in the project. In the first iteration, a systematic service system about triggering past photos in related situation, was generated from a raw concept. In the second iteration, an in-depth exploration about the experience of merging image with past photos was carried out in a business environment. The whole process used solid user research methods step by step. The experience of evoking past memories was evaluated to be highly attractive and valuable among the target group. Besides, a prototype application based on Android platform was developed during the iteration.

Limitations

The evaluations in the first iteration were done in a more ad-hoc style. During the second iteration, I paid more attention to the research process and applied solid user research methods to collect data and make evaluation. The results turned to be more visible and reliable.

The outcome was still a prototype rather than a published application. Although it could achieve most functions, there was a long way to become a real application. However, the heuristic evaluation did collect a lot of improvement suggestions. These suggestions could be helpful for the further improvement.

Prospects

The project presented a potential social application that brings past memories to present. It was new and attractive among the existing social applications in the market. Although the project didn't quite meet the company's vision, my client thought it was a meaningful project. He suggested me to seek for cooperation opportunities with some companies of social networking service, such as Tencent China.

8

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