

Mobile Social Service Design for Large-Scale Exhibition

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Abstract. In order to improve the exhibition service, technology enhanced visitor experience is gradually gaining more attention. In this paper, we follow user-centered design to explore the possibility of building a mobile social service for a large-scale exhibition. User data from interviews, questionnaires and field studies have been analyzed. Five factors influencing visitor's social engagement are analyzed and implications for new mobile social service designs in large-scale exhibitions are discussed: personal requirement on the knowledge of exhibits, time cost of social interaction, exhibitor's requirement on information distribution and collection, the maintenance of a temporary social network and coordination with the exhibition environment.

Keywords: user-centered design, social awareness, mobile social service, exhibition service.

1 Background

The exhibition industry in China has witnessed a rapid increase in the last few years. From 2006 to 2007, the annual growth rate of the Chinese exhibition industry is around 20%, and the figure in the European exhibition industry is 2%-3% [8]. In order to improve the effects of the exhibition, a technology enhanced visitor experience has started to gain more attention. For example, Expo 2010 Shanghai plans to provide an interactive Internet platform to support visitor's remote experience.

Social software has seen a tremendous growth in user penetration over the past few years and social software has already been integrated into mobile devices [5]. Many studies have been done on the utilization of mobile technologies to enhance social interaction among visitors in the museum context.

O. Stock et al (2007) proposed to design technologies to construct a structured group and foster their social activities [12]. Groupware is then used. In 'The Fire and The Mountain' exhibition, hybrid interactive artifacts (i.e. installations that support visitors manipulating and interacting with physical and digital exhibits) are utilized to enhance social interaction [7]. Some researchers use social awareness to help visitors create social experiences. For example, in the Imprints system [1], visitors are supported to leave personalized marks at exhibits. They use an icon to represent themselves and attach that icon to museum exhibits so that each can seek out the traces of other visitors. In Artlinks system [4], visitors are allowed to see other visitors, their reactions to an exhibit, and connections among visitors through these reactions. It's supposed that providing demographic and museum-going information allows people

to make connections based on similarity of circumstance. People might, for instance, feel closer to someone who is about the same age, or who have visited the museum for similar reasons [4]. Awareness of social cues in physical information space enables 'social navigation.' The benefits of social navigation not only give users a sense of social presence and of not being alone in the space, but also provide users a relative guide based on the knowledge accumulation [13]. Generally, there are two main types of social navigation [6]. Direct social navigation takes the form of recommendations and guides, enabling people to search for information/products based on their criteria, or based on content. Indirect social navigation instead focuses on aggregating information of an entire community of users.

Compared with the museum context, the exhibition is more complex and it would be interesting to explore and see if mobile technologies can be applied to promote social interactions in such a context and how to make it. Moreover, mobile technologies provide a good platform for the further development of social interactions because of their high penetration in end users.

There are different kinds of exhibitions. In this paper, we mainly discussed those that are open to the public, large in scale and organized systematically so that exhibitors can promote their products or services. Social contexts in exhibitions are more complex than those in the museum. Exhibitors would like to attract the attention of visitors by various means, which, on the other hand, might distract visitors in the surrounding people. Whether the social interactions among visitors in exhibitions are valuable for all visitors, exhibitors and organizers is still an open question. A mobile social interaction service may not be accepted and used by end users if it only facilitates social interactions without being aware of its user's context.

The user-centered design process emphasizes user and task analysis before the concept design. We followed the process in the study and tried to analyze and understand social activities in the exhibitions first, and then consider the possibility of social technology design for exhibitions.

2 User Study Procedure

We firstly conducted individual interview with participants to collect narratives through open questions, and evaluations on social service requirements through interview-guided questionnaire. Then shadowing method was carried out in exhibition context. Participant's real exhibition experiences were observed.

For recruiting we asked help from a marketing research firm. 29 participants were recruited and interviewed in this study. Among the interviewees, 2 are exhibition staff working in a professional exhibition design company, 4 are exhibitors, 4 are exhibition organizers and 19 are visitors who have visited at least two open-to-public exhibitions in a recent half year and at least one exhibition exceeded 100,000 visitors.

3 categories of exhibition are covered in this user study: culture exhibition, like travel exhibition or tea expo; industrial exhibition, like Moto exhibition; and trade exhibition like import & export trade show. All the participants come from Beijing and Shanghai, two major exhibition cities in Mainland of China.

Before interview procedure, 19 visitors filled in the pre-questionnaire so that the demographic characters and the general issues relative to exhibition visit could be known. Among the 19 visitors, 10 are male and 9 are female, aged between 17 and 60

years (mean=36, median=33). Then the visitors were asked several open questions mainly designed to explore their real exhibition experiences. After the open interview, a 5 point questionnaire was filled in by all the interviewees to collect their both qualitative and quantitative remarks on the necessity of various social interaction features.

7 of 19 visitors agreed that researchers would observe them in one exhibition which they selected according to their own personal needs. Not only the 7 visitors and their company were observed, but also other social activities happened on site and were recorded by researchers. After the ethnographic participant observation, researchers asked several questions mainly intended to let the participant clarify their behavior and purposes. The data analysis mainly focuses on how people make sense of their social world in an exhibition environment.

3 Exhibition Visitor's Social Experience

For exhibition visitors, there are generally three roles to interact with: exhibitors, mates, and unfamiliar visitors. The following three kinds of connections were analyzed based on the qualitative and quantitative data.

3.1 Connection with Exhibitors

Obviously, the connection between visitors and exhibitors is the most important link. People come to the exhibition mainly to know the exhibits or be known by some interested exhibitor. For exhibitors, knowing visitors and being known by visitors is their main target.

When visitors are asked to describe their visiting experiences, most of them mentioned the activities related to exhibitors. For example, business card exchange, printed brochures distribution, gift distribution, discussion with the responsible interpreter on some exhibits or possible cooperation, and photos taken of the exhibits or even with exhibitors. In order to promote brands or advertise their exhibits, exhibitors manage to attract as much of the visitors' attention as possible. They usually do a lot of preparation work before the exhibition, for example, designing an exhibit booth, displaying the product introduction poster, brochure and videos or interactive media, and so on. Except for this design work, exhibitors also hold some on-site activities like gift distribution, on-site lectures or performance shows, etc. to access a group of approaching visitors. Exhibitors tend to gather people to enhance the promotional effects, but they have problems categorizing people. When asked about on-site gift distribution issues, exhibitors during the interview explained their embarrassments: *"We'd like to distribute good gifts to those potential customers...However we don't know whether they are potential customers before we meet them..."* *"Of course gifts are small...Could you imagine a visitor carrying big pieces and going around the exhibition?"*

3.2 Connection with Companions

Petrelli and Not (2005) reports that only 5% of visitors come to a museum alone while 45% come in organized groups, 20% with friends and 30% with children [11]. Our questionnaire survey reached similar findings. 19 participants who have attended

exhibitions at least twice in a recent half a year reported 44 exhibition visits all together, 79% visits have been with company.

Based on the interview and observation result, we can generally categorize visitor groups into three main categories according to their on-site activities:

- The “always together” group in which members would like to go everywhere together
- The “linked group” in which members may have some parting during the visiting procedure, but try to have each other in the field of vision or be aware of each other’s location from time to time.
- The “leave-together group” in which members visit the exhibition separately and make an appointment to leave together

When they are asked why they go to an exhibition with someone else, 2 main reasons can be deducted:

- better effects, such as better memory and a better impression can be achieved from an exhibition

A visitor of an ordinary supplies exhibition said: *“We discussed the various exhibits, compared their strong points and weak points during the visiting procedure...A wiser decision could be made based on a full discussion of different opinions.”*

- The exhibition itself could be a social platform for visitors and their companions

A visitor of an auto exhibition mentioned: *“It won’t be lonely if someone comes with you to attend an exhibition...It’s also a good opportunity to talk about common interests...”*

However, these connections to companions are not encouraged by the exhibition environment. Firstly, crowding is a major problem for most exhibitions in China. It’s not easy to maintain the “always together” group. Once the group members are separated by the flood of people, it will be difficult to ‘see’ where each other is. So “the linked group” may find that they have lost the link to their company. Even worse, making a phone call in the crowded and noisy environment to connect with friends is absolutely not an easy task. Secondly, as for ‘leave together group,’ although they are supposed to interact with the exhibits or exhibitors individually, they still would like to share the visiting experience with their mates from time to time, even to discovery more about exhibits together under some condition. For example, one visitor mentioned *“when I saw something really outstanding, I would like to recommend this to my mates immediately, even to friends who didn’t come...If I know my mate is also interested in my recommendation, I may wait for him and exchange comments on site, then visit individually....”*

In the questionnaire survey session, we designed four questions related to the requirements of the connection with their friends.

- Is it necessary to provide you a special service/device so that you can locate your friend(s) on the exhibition map?
- Is it necessary to provide you a special service/device so that you can recommend an exhibit/exhibition stall to your friend(s) on site?
- Is it necessary to provide you with a special service/device so that you can send appointment (including venue, time) to your friend(s) on site?

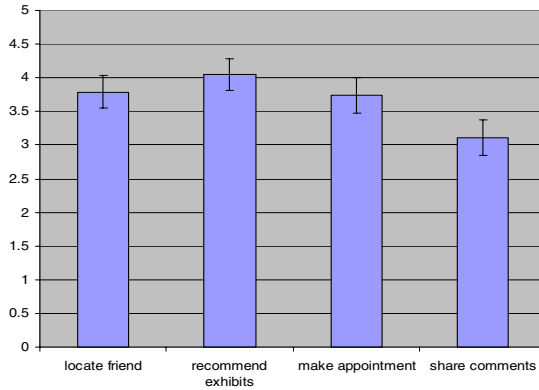


Fig. 1. Visitor remark on the necessity of ‘connection with mates’

- Is it necessary to provide you a special service/device so that you can exchange comments or impressions with your friend(s) on site?

Participants described the necessity on five-point scale. Fig 1 showed the average requirement level of 19 visitors on the above 4 aspects.

People tend to accept the designs to enhance the connections with their mates in an exhibition environment if the cost of interaction is not very high. As to ‘locate friend’, ‘recommend friends exhibits’, ‘make appointment with friends in the exhibition’, all of the three average scores of necessity are higher than 3.5, participants can easily point out the use scenarios and described the benefits that the technology may bring them. For example, one male visitor described: “*with the service (locate friend), I can find my mates in the crowded exhibition... I could be very relaxed during the whole exposition since I know where my friend is and we can meet somewhere if we want to visit together in the midway... If I find something interesting, I can recommend it to my friend or let him join in my visit...*”

At the same time, they also showed concerns about the usability and feasibility, especially on the ‘share comments with friends’ aspect. Most participants have difficulty in imagining the use scenario of ‘sharing comments with friends under the help of technologies in exhibition.’ Some visitors expressed: “*Why not share comments face-to-face? We come to the exhibition together... We can find plenty of opportunities to discuss together.*” Some of them even require the researchers to describe the solution in a much detailed way. “*What kind of comments are you talking about? ... How can I take these comments down? ... It’s too boring if it needs a lot of input...*”

3.3 Connection with Surrounding People

According to social learning theory, people can learn by observing the behavior of others and the outcome of those behaviors [10]. In an exhibition environment, visitors are absolutely influenced by the unfamiliar people around them. They may imitate other’s behavior; modify their visiting plan based on the observation results. For example, visitors observed that some take photos of some exhibit, and they were motivated to take a photo of that exhibit also. If they saw that some exhibition booth was

surrounded by people, even if they could not push in through the crowd, they were curious and eager to know what happened at the popular place.

Although there are quite a lot of implicit interactions happening among unfamiliar visitors besides observing what others do, like overhearing what others say, feeling other people's moods and the whole atmosphere of an exhibition booth, etc, visitors think that an exhibition visit is mainly a personal experience rather than a social activity. During the interview session, they expressed that exhibits are their visiting focuses and they have no interests in the unfamiliar people surrounding them. Actually, our observations proved that they told us one aspect of truth. Visitors seldom discussed with each other on a specific exhibit on site. And they usually have no idea of other people walking around them or looking at similar things around them.

A male visitor said: *"I buy the entrance ticket to see the exhibits, not the visitors like us...Why should I know what they are doing, what they are thinking? They have nothing to do with us...If I need more knowledge about the exhibits, I could ask the exhibitors there."*

A female visitor told us: *"...No, I would like to share my impressions with others...but not on the scene...After an exhibition, I may write something on my blog or post some remarks on an online forum..."*

In the questionnaire survey session, we designed five questions relative to the requirement of the connection with unfamiliar people.

- Is it necessary to provide you a special service/device so that you can chat with other visitors on site?
- Is it necessary to provide you a special service/device so that you can exchange exhibit's introduction files with other visitors on site?
- Is it necessary to provide you a special service/device so that you can exchange business cards or profile information like interests with other visitors on site?
- Is it necessary to provide you a special service/device so that you can exchange criticisms or remarks relative to exhibits/exhibitors on site?
- Is it necessary to provide you with a special service/device so that you can share your visiting-experiences, like visiting routes, with other visitors?

Participants described the necessity in five-point scale. Fig 2 showed the average requirement level of 19 visitors on the above 5 aspects.

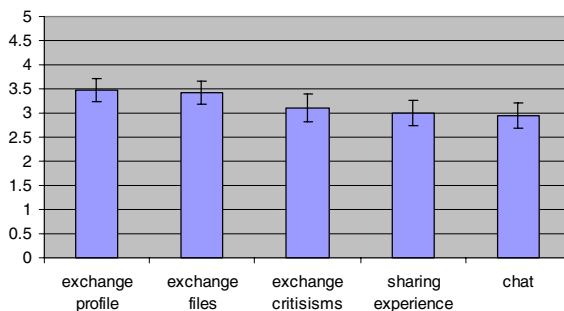


Fig. 2. Visitor remark on the necessity of 'connection with other visitors'

The average scores of the necessity on the five social features are between 2.5 and 3.5; which means social interaction among visitors in an exhibition situation is an uncertain demand. Some visitors may think it would be ok to have such kind of support but some think it is useless, or most people feel it's difficult to make a judgment on the necessity since they can't imagine the use scenario once the supporting technology is there. However, participants respond differently to the 5 questions. If the social interaction requirement is described in a more detailed way or the social activity is exhibit/exhibitor oriented, it seems people are more likely to accept it.

4 Concept Design Implications

Exhibition visitors do have some motivation to use mobile social services, but at the same time, the barriers of adoptions are obvious also. Factors influencing visitors' social engagement are analyzed and implications for new mobile social service designs in exhibitions are presented in this section.

4.1 Relate the Social Interaction with the Personal Requirement on the Knowledge of Exhibits

For general visitors, knowing where, what, and how is their main exhibition visit target. Any technology designed for exhibition use, should be adapted to assist visitors in reaching this target. As we have discussed earlier, if users are more affirmative, they can get valuable information about the exhibits and they are more likely to accept the social feature of our designed technology.

4.2 Satisfy Exhibitor's Requirement on Information Distribution and Collection

As the designer and organizer of an exhibition, exhibitors would like to dominate and foster mutual communication with visiting customers so that they can spread and promote their products/techniques. In order to improve the communication effect, they need to classify visitors. Meanwhile, similar groups of visitors could be organized and various on-site social activities for different categories of visitors could be held to expand or strengthen exhibition influence.

4.3 Reduce Time Cost of Social Interaction to the Least

'Time critical' is important for exhibition visitors. If the information consumption based on social interaction is time-consuming, there is no real advantage of having access to surrounding people and get information through mobile technology, because they are already located in an information-rich environment.

To reduce time cost of social interaction among visitors, context-aware UI is required. Explicit input from visitors may interrupt the relationship with the physical world. Context could reduce the input cost and make the communication much more efficient [9]. With the help of context aware computing, the ways that people engage in social interaction in exhibitions could adapt to several situations involving user's locations, nearby exhibits, personal interests, and social activity history, etc.

4.4 Extend the Temporary Social Network to the Real, Long-Term Based Social Network

The social network we are going to build in the exhibition context is a kind of rapidly formed network based on a short-term goal since the service is exhibition scenario oriented. In order to attract more users participating in this temporary social network and the relationship with “real,” it is suggested that along-term based social network be built.

Compared to being connected to people they do not know, visitors show more interest in being connected with their mates and remote friends. As we discussed above, before going to an exhibition, some visitors may communicate with people online to get some information, or contact people who possibly have similar interests and also go there. After the exhibition, visitors may talk about what’s interesting within their social network; publish comments, photos on Facebook, WebBlog or BBS; which means the sociality is mainly experienced by visitors before and after the exhibition. In the exhibition, visitors required more of the connection with their mates or remote friends than the unfamiliar people surrounding them. Incentive or reputation structures should be built toward the transformation from temporary social gathering to real, long-term based social networking.

4.5 Encourage Multi-channel Social Interaction

According to our observations, visitors keep interacting with various physical tools like indoor signs, product brochures, printed posters, public displays, touch sensitive screen and so on. Among these physical tools, the printed brochure is the most important communication medium between visitors and exhibitor. Exhibitors may write down the supplementary information on the printed leaf according to a visitor’s requirement. Exhibitors and visitors may exchange information face-to-face based on the printed material. Visitors can take notes in the printed leaf and keep it as long as they like.

These direct interactions that happen in an exhibition should not be interrupted by the technology supported social interactions and should not be an obstruction to social interaction, which could be a big challenge for designers. Use environmental design is required. It would be a way that the newly designed mobile social service could be coordinated with other exhibition facilities, which means the new design is a component of the whole exhibition service ecosystem rather than take the place of all existing facilities like a printed visiting guide, guiding signs, public digital display, products brochures on exhibition site, etc.

The following concept description gives an example on how to make a mobile social service coordinate with the exhibition environment.

Public displays in the exhibition show the popularity of each exhibition booth (number of tagged times) and the crowding status. John sometimes changes his visiting route according to the information (Fig 3). Sometimes the public display shows a game registration ad which encourages visitors to vote for something or compete with other participants using mobile handhelds. John wins a digital lunch coupon because he posts an advertising slogan for a car model and gets the most votes.

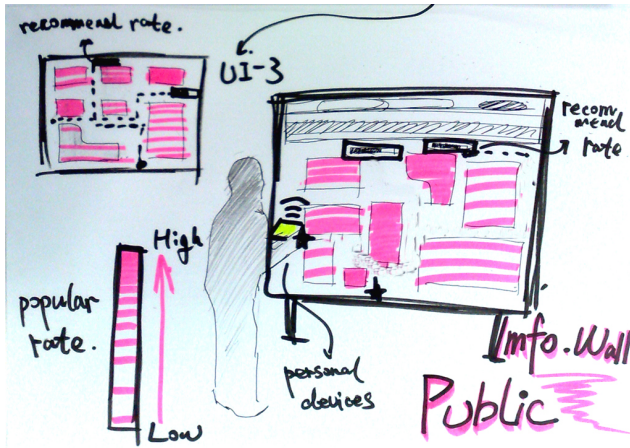


Fig. 3. Public display as another platform for social interaction

5 Conclusion and Future Work

People gathering to visit exhibitions are a kind of temporary social network. Whether it is possible to involve mobile social services in this context is the main research focus of this paper. In order to provide background material and find design opportunities, we collected data from interviews, questionnaires and field studies to understand visitor's visiting experience and corresponding social features. Based on the user research results, we identified some design implications for social technology use in the exhibition environment and proposed a brief concept based on visiting route sharing. For exhibitors, they could utilize the service as a platform to collect visitors' information. For visitors, they are allowed to move easily and be supported by a dynamic group of people. Anyway it's a high risk job of designing the social technology for exhibition visitors since people have limited time during an exhibition visit and they don't want to be interrupted by bad learnable or unusable services.

Future work will be dedicated to the concept development. Several design and implementation challenges need to be overcome, especially sensor networking architecture in the exhibition hall and a context-aware UI for the client application.

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