HOW TO DEVELOP A MOBILE 2.0 APPLICATION

Greet Jans and Licia Calvi *IBBT – CUO, K.U.Leuven E. Van Evenstraat 2A – B3000 Leuven* {greet.jans; licia.calvi}@ soc.kuleuven.be

ABSTRACT

The idea that technologies can (help to) generate communities is not new. Still, we believe that new media (like Web 2.0 technologies) are more suitable for this social interaction than more traditional 'channels,' which gave users very limited opportunity to participate. This suitability is related to the sociability concept and the communication possibilities these new media entail. To this end, we focused on an analysis of blogging practices, YouTube, games and other mobile devices on which communities can be built by means of research. The goal of this study is to examine which ways exist to interact on a mobile device in the near future with particular attention to the interface design of a city application.

KEYWORDS

Interactive technologies, Social function of mobile communities, (Mobile) Web 2.0 and User-centered interface design.

1. INTRODUCTION

As we all know, online (or virtual) communities are groups of people that primarily or initially interact with each other over the Internet. People who are active in the same social spaces on a regular basis will probably start to recognize other visitors after a while [Wolf, 2006]. With some of them, they will interact by sharing or exchanging information or thoughts. Communication plays an important role in everybody's life, professionally as well as personally. Lately, the demand for efficient communication 'tools' has steadily increased. Most newly developed technologies have resulted from this trend. The main drivers involved are users' mobility and their continuous need for ubiquitous communication: mobile applications make it possible to communicate whenever and wherever people want [Jaokar & Fish, 2006; Lacohée, Wakeford & Pearson, 2003].

The A4MC³ project (Architecture for Mobile Community Content Creation), involves the development of a mobile application used within a city context to allow users, i.e. (mainly) city inhabitants, to communicate and share information with one another. This application aims to connect users and to serve a variety of heterogeneous goals, ranging from maintaining social contacts to sharing content, from publishing in an online newsletter (like a city blog or forum) to advertising a business in a user-tailored way. In the context of this project, an empirical study was conducted on the use of mobile technologies by people in a city context and on their impact on the formation of the community by the exchange of content in the form of photos and recommendations [Calvi & Jans, 2007; Jans & Calvi, 2006]. In Figure 1, the functionalities of this mobile city application are shown. In this paper, we describe the role that interaction can play in the future, when there will be an even bigger need to communicate anywhere and at any time: It will be argued that mobile technologies can be used to achieve this goal. The technical aspects, related to the development of this client application that will be done by EDM and Androme, are described in detail in Jehaes *et al* (2007), but will not be mentioned here.

The paper is structured as follows: In Section 2, we examine the social aspects and other success criteria related to Web 2.0 technologies, with a special focus on the sociability, usability and accessibility of Mobile 2.0. Section 3 discusses some possible elements that are needed to build a community within a city context. Finally in Section 4, we will give conclusions and recommendations.



Figure 1. The three major functions of this mobile application [Jans & Calvi, 2006].

2. SOCIAL ASPECTS AND SUCCESS CRITERIA RELATED TO WEB 2.0.

Some HCI-researchers, like Kollock (1996), focus on the key sociological challenges involved in building online communities. Kollock argues that technological and user interface challenges already exist, but that sociological challenges are greater because of the poor understanding of how these have an impact on a successful online community. Numerous studies have explored up to how people can successfully build a community [Girgensohn & Lee, 2002; Link, 2005; Nielson, 2006], but not much research has been conducted on the redesign of mobile interfaces related to these interactive technologies. How can we translate all these aspects into developing usable and accessible interfaces for mobile applications? Are there features of other community-based applications that can be adopted for 'our' goal? To answer these questions, we will take a look at some current Web 2.0 technologies.

2.1 General social trends related to Web 2.0 and the mobile revolution.

While some researchers are trying to explore the future characteristics of Web 3.0/4.0, we want to investigate patterns in the current Web 2.0 technologies to see possible alternative uses of it. Web 2.0 is the buzzword to describe new interactive technologies like (web)logs, podcasts, wiki's, flickr accounts, Google Maps and so on, in which 'everyday' (virtual) users create 'content' on the web [Dybwad, 2006]. These interactive systems give us the opportunity to interact with others socially. They change (1) our conception of design(see the rise of both personal and 'shared' publishing platforms), (2) the way in which members want to participate in social (software) systems and (3) the level of social behaviour within such systems [Matthys, 2006]. It is already emerging that the web is moving from a read-only system to a system that involves both reading and writing, and once everyone has the tools to create his or her own content, people will no longer limit themselves to consuming content, but will provide it as well. This phenomenon will tilt the balance from power-related to user-generated content.

In recent years, many people have started to see mobile devices, providing universally accessible content, as 'the next big thing', but not that many people currently use the World Wide Web on their mobiles. Therefore, the real question is: "Is the future of the web really mobile?" Like every device, mobile applications have advantages as well as limitations. In addition to the high cost and the fact that at this moment only one fifth of the population has a smart phone or palmtop computer, many of these problems are related to basic accessibility and usability aspects, like the tendency of pages to load too slowly or the difficulties involved in navigating through these pages, etc. If the costs decrease and some of the more technical barriers i.e., processing, memory, bandwidth and connectivity, can be removed, mobile use will probably rise exponentially [Jaokar and Fish, 2006; Fling, 2007]. The fact that it will rise exponentially is

partly related to the fact that the PC-based Web is not completely compatible with the mobile web. It would be ideal if the content on the web was device-agnostic, i.e. if content was not specifically adapted to a particular device. The problem with this "one web" idea is that people are not able to take advantage of the benefits related to being mobile, which is totally different from accessing the web from a desktop environment [Fling, 2007]. Applications that are limited to a single device are less valuable than those that are connected.

Furthermore, if we accept the importance of user-generated content as described in Jaokar and Fish (2006), the balance between the screens shift, so Mobile Web 2.0 devices will drive the capture at the moment of inspiration ranging from pictures, notes and reminders, to news reports by citizens. This content can be stored in the private web space of the user and will include explicit tags (related to user annotations) as well as implicit tags (like location information, which again involves privacy issues beyond the scope of this paper). When we compare this with PC Web 2.0, we notice that this device can provide powerful tools for editing, configuration and cache (related to local storage). From this point of view, a holistic approach emerges that will drive a converged media experience, as illustrated in Figure 2. Will creation be driven by mobile devices and consumption by PCs [Jaokar and Fish, 2006]? The mobile community (in which we develop mobile web applications) is looking at the Web 2.0 revolution for inspiration, because Mobile 2.0 is just a part of the Web where the actual processing takes place.



Figure 2. Connecting people via mobile technology (Fling, 2007).

2.2 Some case studies of successful community-based applications¹

2.2.1 Weblog and related applications

Currently, access to high-speed Internet is getting easier and do-it-yourself publishing software abounds, so Weblogs and forums are cyberspace's quick-moving, multilinked, interactive venues of choice for millions of people wanting to share information and opinions, commentary and news [Blood, 2000]. One of the most highly touted features of the Web 2.0 era is the rise of blogging. Blogs give users the opportunity to seek and create (personal) network effects, which is one of the important aspects for them. Most weblogs share a common format, which makes them easy to create and to maintain on the computer. Without this framework, which is often a universal format, there is no differentiation between content created for the Web and for a blog. This uniformity facilitates usability by allowing readers to quickly skim a blog for interesting information and to enable social interactions that we associate with blogging [Blood, 2000]. Thanks to features that allow readers to comment directly on specific posts, they can start an interactive conversation. The current blogs can also be combined with other technologies, like Moblogging (a mobile weblog that consists of content posted on the Internet from a mobile or portable device); MoVlogging (which is a mobile video blog); etc. By offering bloggers the opportunity to post instantly to (their own) city blogs, these applications become an interesting tool for documenting bloggers' city-related lives and for keeping friends (and other city inhabitants, who share certain interests and therefore belong to the same community) up-todate via a social network.

2.2.2 YouTube

According to Petitjean (2006), there are three key elements that make YouTube a gigantic success. The first is that this application is easy to use. This is partly related to the second element, namely the technology used. YouTube was one of the first sites in which videos could be uploaded in a common format (Flash-player of Adobe, in this case), which is installed on almost every computer. Because this type of software is so common, every user who wants to participate can easily do so. This makes users more eager to explore all the possibilities of the application, and when more content is put on the site, more people will look at it. As a result of this process, YouTube gets more than 100 million hits a day. Another advantage of this software, compared to RealPlayer, Quicktime or Windows Media Player is that users no longer have to worry whether their version of the software is compatible with the video-format of the movie they want to watch. Providing all files in the same format makes it easier for bloggers and users of other websites to put clips from YouTube on their own website and the other way around. As a result, the potential audience that sees a movie on YouTube is bigger than the actual number of visitors of this application. This brings us to the final element: YouTube encourages users to build communities or social networks by giving them the opportunity to comment on the movies of others, and to rate videos that they consider worth watching. In File Sharing tools (like, MySpace and YouTube) it is easy for users who share similar interests to become 'friends' and in some cases real user groups can be formed from this [Petitiean, 2006].

2.2.3 What can we learn from existing mobile applications?

So far, we have looked at success factors for 'normally' working communities, but there are also some mobile interactive applications on the market. We will enumerate the three most interesting ones with regard to the A4MC³ mobile city application. The first is the Mike, which is the mobile variant of the Wiki, a program released in 2006 by the company Social Text. Through a simplified user interface, the Mike allows users to keep their Wiki continuously on their mobiles, enabling them to quickly take notes that they can access and edit anywhere. The second is the Sony Ericson phone with built-in camera, which makes it possible to place the pictures users have just made with their phone on Flickr. Currently, it is not possible to label these pictures or add a caption, but still this product is worth mentioning, because so far we have only discussed text and video content, but sharing pictures is also an interesting way of sharing content. The third example is the new Nintendo DS or portable Play Station. Developers invented a game console to build communities between gamers, who have similar interests, which makes it easier to interact. The PSP

¹ We are aware of the fact that there are more interesting community-based technologies but mainly decided to focus on some that are especially interesting for the mobile point of view.

(Passport to...) includes city maps, so tourists do not need to consult paper guides anymore when visiting a city for the first time. This project is related to Google Maps and the latest portable TomTom Navigator, but focuses on another user group than A4MC³ and users cannot provide their own content in this PSP. These examples prove that it is possible to build communities by using mobile devices.

3. PREVIOUS LESSONS LEARNED FROM THIS PROJECT

3.1 Some issues of forming an online community within this project.

In this project, city inhabitants are clustered into different sub-classes on the basis of their interests and the tasks they need to accomplish in a city setting. In Table 1, we give an overview of the characteristics of each group and review what implications this has on the A4MC³ application [Jans & Calvi, 2006].

USER GROUP CHARACTERISTICS	CONSEQUENCES FOR FUNCTIONS OF THE APPLICATION
(1) People who will use the application only	a) Standard mobile phone function, i.e. the possibility to call someone,
to communicate with others and to find their	leave a message or listen to your voicemail & send/read text messages.
way in new places. Communication for these	b) A GPS function which is combined with the option to get more
uses can be limited to a call/mail function and	information about specific city aspects.
a content sharing system.	\rightarrow (a & b): Basic mobile phone combined with a GPS.
(2) The next user group can be subdivided	a) The communication & navigation/info function.
into three subgroups.	b) A read comments option (enabling users to download items that
2.1. People who will read the comments of	others have posted), but without any pressure to contribute personally
others, take a look at the uploaded pictures	(~ 2.1).
and reviews, and possibly follow	c) An up-/download possibility to add pictures (taken with the device)
suggestions, but who will not contribute	and text to the virtual city map, with the opportunity to give ratings to
content themselves.	places, events, etc. to write a if users have insufficient time to write
2.2. People who will read the comments of	summary (~ 2.2).
others, react to some of them and place new	d) The option to react to comments of others (for example, if the
<i>posts</i> on the forum.	content is inaccurate) (~ 2.3).
2.3. People who are acting as a kind of	\rightarrow (a, b, c & d): The possibility to look at pictures, leave comments,
moderator: they can check posts and feel	react to others' the posts. This proves that our mobile city application
involved enough to change mistakes or	has got enough features to become an interactive tool, if users are
indicate inappropriate content.	ready and willing to use it.

Table 1. High-level tasks for the application based on the characteristics of the community.

The most striking result emerging from Table 1 is the difference between a group whose users are not interested in the contributions of mobile communities² (~ see group 1) and a smaller group of users who are curious enough to look at comments of people they barely know (~ group 2.1), who take the time and effort to write comments (~ group 2.2) or even try to moderate the whole system (~ group 2.3). It is important to see that users that belong to group 2.3 only act as moderators because they are very involved, but remain 'normal' users with the distinction of being more involved (within this context). As predicted by many theories (for instance, by Link (2005)), individuals contribute more readily when they are reminded of their uniqueness and when they are given specific and challenging goals. Otherwise, they might merely read comments of others out of curiosity or not look at the interaction function at all.

From this, we can conclude that people gain social recognition if they post contributions that others may read and benefit from. Mobile communication provides them with a forum, which brings great personal satisfaction. However, they also achieve a sense of fulfillment: they mean something for their city and for

² A mobile community is an extension of an online community to allow interaction through a range of mobile devices (for example, mobile phones, PDA's, etc.) and not just a computer [Tasch and Brackel, 2004]. Although it is important to mention that people don't divide their world into people they meet and see in person, people they contact online and whom they contact online using mobile devices.

others by sharing ideas and information [Jans & Calvi, 2006]. In this paragraph, we have summarized only a few of the values that reveal the deeper meaning related to the use of a mobile city application.³

3.2 General lessons learned with regard to building mobile communities.

The subdivision into different 'user groups' and the values that are related to these user groups, as mentioned in Section 3.1, have been translated into some general principles that could be used in the design of mobile city applications. In this paragraph, we will mention two of those summarized in Calvi & Jans (2007), which are important within this particular part of the present study. A first principle is that *mobile technologies are still a tool*, because most people see the use of these technologies as a practical way to achieve a concrete result, i.e., a mobile technology is considered useful if users can gain practical information from it (e.g. to find information about a place or an event in the city). According to the respondents in our research study, this is the main purpose. But secondly, these *mobile technologies can easily become a medium*, because the step towards a more pervasive and holistic use of such technologies is small. A number of values related to this mobile city application. This suggests that people assign a personal meaning to the use of a mobile application, which they perceive as a way to distinguish themselves but also to expand their social contacts. At this stage of the research, however, it does not seem clear whether these new social contacts will remain superficial, at the level of acquaintances, or will become more intimate [Calvi & Jans, 2007].

On the basis of these two principles, we strongly believe that mobile applications are very suitable to let people interact. People can already mail each other and read external information on their mobile devices (e.g. with Blackberry), but currently it is not possible yet to 'communicate' in a very communicative way.

3.3 Some possible interactive interfaces specific for this mobile city application

Users may want to query the mobile city application for generic information about the city or about events taking place in the city or they may use the system as a kind of mobile guide, providing information on interesting or unusual locations while walking through the city. Therefore, the development of this mobile city application is twofold: building a platform with allows the sharing of personalized content that is generated to establish and maintain an online community.

A few of the different elements that need to be present when building a community are: (1) In addition to content we need to include file sharing tools. By using a mobile device to show off new purchases, users can ask for instant opinions on the posted items. So, we enable community members to discuss events, shared experiences, and other information. Many modern mobile devices have a built-in-camera, which gives users the opportunity to take pictures, make short movies and other broadcasts, as text need no longer be the main content on a mobile device. Including photos, reviews, and the opinions of other members is very useful to stimulate more interaction between 'all community members'. (2) Our results indicate that users should be treated as content providers, so an important aspect is the ease of use [Petitjean, 2006]. For instance, people are unable to write long comments on the posts of others while walking on the street (ref. the A4MC³-project). But we believe that there are other ways to stimulate interactivity between users, like providing the ability to leave comments (in the form of a rating or a written review). Simple rating systems such as stars are a convenient way to comment quickly on somebody else's video, picture, article (a method often used in blogs and also referred to by Nielsen (2006)⁴). This rating system can also be combined with a small drop-

³ With the combination of both the laddering method and the association technique, we tried to reveal the users' expectations and preferences (or 'values') with regard to this application, based on the associations that users made. By looking for the 'attributes' of this product (see Figure 1; communicating, navigating and looking for information, and interacting) and their 'effects' or consequences (see Table 1, into the second column), we tried to find what is important for this specific application (see Jans and Calvi (2006) for more details about both the methods and the results).

⁴ In online communities a small minority of users contribute content, while the great majority lurks in the background (see also above). In the literature (e.g. Nielsen (2006)) 95% of users are lurkers who never contribute, 5% of users contribute a little, and 0,1% of users account for almost all the action on blogs which is less than the participation that characterizes most online communities. Jakob Nielsen also has some advice on how to encourage more users to contribute: (1) make it easy to contribute, by providing rating systems with stars; (2) make users' actions add to the

down box for those users who want to explain their given score, but do not want to type a long comment on their mobile device. Therefore, a very important aspect of this mobile city application is that users must be able to collect and combine content easily. In general, it is very important to keep the overall information architecture simple and focused. That is why information on such devices should be limited to what the user needs or wants [Fling, 2007]. In Figure 3, we show a first draft of what a future interactive mobile interface could look like, with a minimum of interactive elements.

Figure 3. A possible mobile Web 2.0 interface.



4. CONCLUSION

The goal of this paper was to explore possible ways of interacting on a mobile device in the near future. Developments in ICT have increased the opportunities and means for coupling technology with certain social practices that would influence people's ability to act together [Girgenshohn & Lee, 2002]. In the future, mobile applications will be among the most important contact devices on Web 2.0. But, just like other interesting applications, they can fail for lack of interest, participation, usability or sociability. Instead of letting the user search for the content (as when a user navigates to a web site), the content should address the user through the technology. The problems that must be solved (and on which future research must be focused) are, first, how usable and accessible both the interface and the overall mobile applications are if they are more interactive, second, how these new (mobile Web 2.0) possibilities change the role of these users, because people who carry devices with them all the time have more opportunities to become content providers (of user-generated content) rather than just consumers, and third, how people can get more social

contribution by modifying existing templates instead of having to face a blank page; and (3) reward them for their contributing, but don't encourage people to dominate the community.

recognition from others by using these many new, interactive possibilities provided by mobile technologies that are driven by the web, but not necessarily based on these web protocols.

ACKNOWLEDGEMENTS

The A4MC³ project (<u>https://a4mc3.ibbt.be</u>) is co-funded by the Interdisciplinary institute for Broad Band Technology (IBBT) and the following companies: Alcatel Bell NV, Androme, and Concentra Media NV. Other research partners in the consortium are the following: Expertise Centre for Digital Media (EDM - Hasselt University), Centre for Usability Research (CUO - K.U.Leuven), Interdisciplinary Centre for Law and Information Technology (ICRI - K.U.Leuven), Multimedia Lab (MMLab - Ghent University), IMEC/DESICS, Centre for Studies on Media, Information and Telecommunication (SMIT - Free University of Brussels) and Lab for Digital Speech and Audio Processing (DSSP - Free University of Brussels). Many thanks also go to Kenny Verbeke for his useful comments during the preparation of this paper and to Kristin Blanpain and Hilde Jans for reviewing the text.

REFERENCES

- Bausch, P., Haughey, M., & Hourihan, M., 2002. We blog: Publishing online with weblogs. Hoboken, NJ: John Wiley & Sons. <u>http://www.unc.edu/~zuiker/blogging101/</u>.
- Blood, R., 2000. *Weblogs: A History and Perspective. Rebecca's Pocket*, September 7, available at http://www.rebeccablood.net/essays/weblog history.html.
- Calvi, L. and Jans, G., submitted (2007). A Case Study in Designing Mobile Technologies. In Jo Lumsden. Handbook of Research on User-Interface Design and Evaluation for Mobile Technology, Idea Group Reference.
- Dybwad, B., 2006. Approaching a definition of Web 2.0. The Social Software Weblog. <u>http://socialsoftware.weblogsinc.com/</u>
- Fling, B., 2007. Join the mobile revolution, Net magazine, Issue 158, January 2007, pp. 44 50.
- Girgensohn, A. and Lee, A., 2002. *Making Web Sites be places for Social Interaction*, In Proceedings of ACM 2002 Conference on Computer Supported Cooperative Work, New Orleans, Louisiana, USA, pp. 136-145.
- Jans, G. and Calvi, L., 2006. Using laddering and association techniques to develop a user-friendly mobile (city) application. In R. Meersman, Z. Tari, P. Herrero et al., Springer, LNCS 4278, OTM Workshops, pp. 1956-1965.
- Jehaes T. et al, 2007. Comparing Local and Remote Rendering of a Virtual Interactive City Community on Mobile Devices, Submitted to International Conference on Advances in Computer Entertainment Technology (ACE2007), June 15-17, Salzburg, Austria
- Jaoker, A., and Fish, T., 2006. Mobile Web 2.0, Futuretext LTD, p. 335.
- Kollock, P., 1996. *Design principles for online communities*. Harvard conference on the Internet and Society, available at: <u>http://www.sscnet.ucla.edu/soc/faculty/kollock/papers/design.htm</u>.
- Lacohée, H., Wakeford, N. and Pearson, I., 2003. A Social History of the Mobile Telephone with a View of its Future. BT Technology Journal, Vol. 21, No. 3, pp. 203 211.
- Link K. et al, 2005. Using social psychology to motivate contributions to online communities. Journal of Computer-Mediated Communication 10 (4).
- Petitjean, F., 2006. Waarom YouTube wel een succes is. De Standaard, Economie & Financiën, October 11, pp. 28-29.
- Matthys, E., 2006. Practical examples of things happening in social software system. Knosos (Knowledge Sharing over Social Software), <u>http://www.knosos.be/?q=node/1460</u>.
- Nielsen, J., 2006. *Participation Inequality in Social Design*. Jakob Nielsen's Alertbox, October 9, <u>http://www.useit.com/alertbox/participation_inequality.html</u>.
- Tasch, A. and Brackel, O., 2004. *Location based community services new services for a new type of web communities*, IADIS Web Based Communities 2004 Conference proceedings, Lisbon, Portugal, pp. 294 302.
- Wolf, H., 2006. Distributed virtual presence systems for the Web. IADIS Web Based Communities 2006 Conference proceedings, San Sebastian, Spain, pp. 97 – 104.