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Considering the Design of Mobile Applications for City-wide Learning

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Abstract. This paper outlines a number of open issues to be considered for the design of mobile, collaborative technologies for informal learning. The design reflections presented stem from a central concern to envision technological support for long-term visitors' experience of learning a city by living it.

1 Introduction

It seems that the whole world is on the move (Urry, 2007). On the one hand, complex, organizational factors – i.e. outsourcing, dislocation of production, movements of information and capital – have determined the emergence of different type of mobilities. On the other hand, being physically mobile has become a way of life adopted by various individuals and heterogeneous social groups (e.g. business people, commuters, but also sport stars, travellers, international students, asylum seekers, holidaymakers, etc.). It is against this social backdrop that understanding, learning, making sense of, and appropriating different locations and cities might become a central concern for the people involved. On a technological level, this opens up a space of opportunities for the

role that mobile technologies could play to support the exploration of cities, and the possibility to share with others related stories and experiences.

This paper explores the potential of mobile and ubiquitous technologies to enable new-comers and long-term visitors – as opposite to tourists – to learn a city by living and dwelling in it. The city is here regarded as a network of places, whose granularity might change depending on individuals' experience and appropriation of it. Moreover, it is considered as the intertwinement of cultural, social historical and spatial aspects. Thus to learn a city entails to understand and internalize various issues related to the above-mentioned dimensions.

The mobile setting discussed in this paper concerns an informal, collaborative, learning context. Nevertheless, we believe the design of technologies for such settings draws attention to a number of issues (i.e. tension between the use of applications for private and work-related purposes, managing ensembles of technologies) that are also relevant to the latest wave of CSCW research (Pipek et al., 2007).

2 The Fabula Project

The work presented herein is being carried out within the FABULA Project (http://fabula.idi.ntnu.no/). FABULA aims at developing novel principles and technical solutions for a platform of services supporting city-wide collaborative learning. We envision a dynamic city that, with the support of wireless networks and portable technologies, becomes a learning place for its inhabitants, with services and applications that enable them to explore its social, cultural, historical and spatial dimensions. More specifically, we intend to investigate how new-comers and long-term visitors learn and make sense of a city by being there, by exploring its different places and actively participating in the life of its various communities. The research will, thus, seek to understand and explore the main concerns and needs of these heterogeneous cohorts of people, and to identify the most common practices whereby individuals seek to learn a new city. This analysis is instrumental to the design of mobile technologies and services enabling the type of mobile learning we are interested in.

Through the adoption of qualitative studies, we are now investigating: (a) the techniques and personal strategies people adopt in order to get to know a city, and feel part of a specific social context and community; (b) what technological artifacts and other type of resources support the experience of learning a city and becoming part of it (both on a social and cultural level); (c) what events can be regarded as learning moments, where do they occur, and who are the people involved in it; (d) what are the aspects of the learning activities and experience we want to design for, and what type of mobile technologies and applications better support it.

The learning situations considered are informal, thus neither specific learning activities nor pre-defined educational curricula are investigated within the project. This means that rather than supporting a range of pre-defined learning tasks, we seek to foster exploration and interactions that could lead to serendipitous and informal learning experiences. A main challenge inherent in this approach regards the definition of what constitutes learning. It becomes, in fact, problematic to identify a priori a set of learning moments, the people involved in them and the artefacts used. Moreover, it is difficult to predict where they will occur, and how they will unfold.

On a design level, this aspect underlies the decision to shift attention from the design of applications supporting specific tasks, towards a service-oriented architecture enabling the development and the adoption of applications for multiple, interleaved and dynamic learning experiences. Concerning this point, the exploration of possible design spaces raises a number of interesting challenges. On the one hand, designing new applications draws attention to issues of appropriation and integration of the technology under design into the constellation of artefacts people might already be using. On the other hand, re-designing and adapting applications already available (i.e. social media and Web 2.0) bring to the fore issues of overlapping functionalities, or of integration and communication between different devices and applications.

3 Issues for analysis

Within the city-wide context we have set out to explore, we are particularly interested in 'third places' for learning (Oldenburg, 1999) – i.e. places other than home, work or school, like, for instance a public square. Such places, enhanced by in situ resources and technologies, may provide augmented learning opportunities and interactions. They may support people's active participation in the life of a community, offer multiple opportunities for interaction, and serendipitous occasions for situated and informal, learning experience (Lave et al., 1991). However, before exploring the potential offered by such locales, we will seek to understand what constitutes learning within these locations. More specifically, what is actually learned through the informal, serendipitous situations afforded by these places? As Vavoula and Sharples (Vavoula et al., 2008) outline:

> "Mobile, informal learning can be both personal and elusive […] it is not possible to determine in advance where the learning may occur, nor how it progresses or what outcomes it produces. It may also be difficult to track the progress of learning if it occurs across multiple settings and technologies."(Ibidem, 297).

Furthermore, the focus on collaboration draws attention to aspects such as: (a) meaningful and persisting shared interactions in public space, (b) awareness of shared, learning experiences, (c) visibility of learning – that is how to make other people and their activities visible to others (Willis et al., 2010). Another issue we

regard as central to our current investigation relates to *ephemeral interactions*. As people dwell in various places, different and changing configurations of individuals might be involved in their learning experiences at hand. While some interactions might come to an end as participants move to other locations, other ones might continue, or start anew.

3.1 Open questions

The following are a number of questions raising from the analytical issues introduced above.

What are the main issues involved in learning a city? What aspects of this informal learning could be enhanced by technological artefacts? How do people share their knowledge and experiences? How is it possible to create a sense of continuity between different groups of new-comers and visitors? What makes a shared experience meaningful for people (i.e. a common interest, a shared place, a community)? What trails of experience are relevant and how should they be supported? What type of knowledge and experience do people share with each other?

4 Issues for design

The recent proliferation of portable and broadband technologies (e.g. multifunctional phones, PDAs, pocket PCs, WLAN, Bluetooth, etc.) and related data services has contributed to a partial migration of work outside of traditional workplaces and working hours. The increasing interest in *nomadic work* (Brodie et al., 2001; Brown et al., 2003; Kakihara et al., 2002; Su et al., 2008; Wiberg, 2001) has revealed a shift of focus towards settings that do not assume stable working hours or working places, but still retain essential, collaborative aspects. The panel discussion (Pipek et al., 2007) at the 2007 European Conference on Computer Supported Cooperative Work (ECSCW) – tackling issues such as the usage of mobile devices, work-life balance and the blurry barriers between private and working hours or private and working usage of technologies – reflects the partial, ongoing migration of work outside traditional, well-defined workplaces that have traditionally been analyzed by CSCW research (Hughes et al., 1995). Research on mobility is also broadening analytical and design concerns from one technology–one user (or group of users) to ecologies of interactive artefacts, and to how to design for humans-computers interactions (Oulasvirta et al., 2008).

In past work (Rossitto, 2009; Rossitto et al., 2007), we have explored how the use of constellations of technologies is orchestrated in the context of university student engaged in group work. The research concentrated on the spatial, social, cultural and contextual factors that reflected on the situated use of mobile technologies. In so doing, particular attention was devoted to the interactions

between individuals, the use of specific technological artefacts, activities involved and particular places at which they occur. A few issues stemming from the data analysis are introduced below, since they constitute a background to start thinking of the design of mobile technologies for non-professional settings.

The same technology can be used for different purposes within different groups. Within some of the groups studied, for instance, mobile phones were seldom used for communicative purposes. When participants were asked about this issue, they explained it was too expensive and that, because of this reason, they preferred to use instant messaging or email if they needed to talk to each other. Nevertheless, other groups strongly relied on it. Some of the workshop participants, for instance, considered communicating by mobile phone as more reliable, because one can almost be certain that messages, both verbal and textual, reach other people at once. This concern becomes particularly central as deadlines approach, or the closer one gets to a meeting.

Appropriating technologies. There seems to be a fundamental difference between student nomadic settings and professional nomadic workers, whose technological artifacts (e.g. smart phones, PDAs, etc.) are often provided by the companies they work for. This point bears important consequences for students' work practices, as an essential concern for the groups is to agree, implicitly or explicitly, on the technologies and tools to be used throughout the project. Different persons have different personal preferences with respect to the use of particular technologies, and they often seek to convince other peers to adopt the ones they are fond of. However, several episodes observed also illustrated that the same enthusiasm is not always shared by all of the group members, for a number of different reasons. Students, like other people, certainly have their own preferences and range of choices, so that they may choose certain technologies rather than others. Another possible reason is that the short life of a group hinders a comprehensive appropriation within the group's practices. To get acquainted with new technologies may, in fact, require efforts that are not necessarily worthwhile, especially if an application is going to be used only in the context of one course. The analysis also showed that the same student may use different technologies and applications within different groups, both with regard to past and present projects. One of the informants explained, for instance, that it would be hard to convince new project peers to use a micro-blogging application such as Jaiku. As it was explained, it is not enough to use a certain tool, but it is important to use it in the *"right way"*. Specifically to this case, "the right way": (i) is a way commonly acknowledged by all the group members; (ii) it encompasses both working and, like in this case, non-working practices; (iii) it concerns the student's experience of himself in relation to the social groups he belongs to. For all these reasons, it is not enough to update someone's own status every now and then, but it is also important that others can rely on the fact that this is done regularly.

Difficulties in keeping track of every tool. Another issue to be addressed here are the difficulties in keeping track of every tool. One of the consequences of using various tools to collaborate and communicate with each other often resulted in the fact that working files were scattered all over, and *this made it problematic to keep track of where resources were stored.* This issue is also related to the appropriation of a given technology within the individual and the group practices.

Supporting integration of information and applications. As also discussed elsewhere (Rossitto et al., 2010), a central design issue concerns the integration of existing technological artefacts in order to make different type of information – e.g. comments, notes, working documents, pictures, sketches, stories, etc. – shareable among different technologies and applications. Because of the ever-increasing number of new technologies, physical devices and applications continuously made available, the problems of managing multiple devices are unlikely to disappear.

4.1 Open questions

The following are a number of questions regarding design we would like to further discuss at the workshop.

How is it possible to integrate new technologies and devices into the existing constellation of the tools already adopted by people? How do we address issues related to overlapping functionalities available in different applications? How can we support discontinuity between technologies and places? How is it possible to support the changing configuration of people who might participate in different learning experiences, at a number of different locations? Is it possible to establish a correlation between a given service and a certain location? Should a system proactively provide such correlation? What actions should be delegated to the system and what has to be actively performed by the user?

Contextual Relevance. A starting point to answer the questions introduced above is to consider the design of mobile devices as tools to be used *here* and *now,* rather than *anywhere* at *anytime*. This brings into the picture, an understanding of contextual and situated aspects such as: (a) how to take advantage of the environments people inhabit temporarily; (b) how the physical resources available in there may support a particular experience; (c) how the people present there could provide unforeseen opportunities for collaboration; (d) how relevant digital resources supplied by technologies can be accessed and used.

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