Playing with mobile augmented reality for fostering informal learning

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Abstract

 Our contribution is based on our experience with crisis management and the development of CroMAR, a mobile augmented reality system for supporting reflective learning. The system is intended to promote reflection after an event has taken place and support learning. After a first evaluation of the system, we think there is a potential to extend it as a game to promote learning also among people who have not been involved in the event. In the workshop we are interested in discussing challenges connected to the development of augmented reality games aiming at supporting situated reflective learning.

Author Keywords

Reflection; mobile augmented reality; emergency work; crowd management

Introduction: setting the scene

In our research we explore the usage of collaborative technologies for supporting informal learning. In particular, we are interested in learning that is based on experience and that is highly situated in specific social and physical contexts.

With this research focus we have developed CroMAR [1], a mobile augmented reality tool that supports reflection on past events (Figure 1). Computer based support to reflection generally relies on the

visualization of information connected to the experience one is reflecting upon. Different metaphors have been adopted to support easy access to relevant information within the reflection process, e.g. timelines [2] and word clouds [3]. In this context, Mobile Augmented Reality represents an interesting alternative because it can be used to promote reflection in the specific location of the event by augmenting it with relevant information. In this way, we can expect the reflection process to be grounded in a context that helps to make sense of the information and reflect on alternative paths of action. Though the system has functionalities that might be relevant for reflecting on any working experience with a strong physical nature, the system has been specifically developed for reflection on emergency work, in particular in relation to crowd management.

Figure 1. A mock-up of CroMAR.

The system supports collection of information from different sources, e.g. text and multimedia tweets from citizens/volunteers and sensor data. It then allows layering this information on the video feed from the

devices camera, supporting different forms of navigation (by time, space, and keywords). Functionalities for cooperation during the reflection process are provided, e.g. for communicating with other actors involved in the process. The system runs on iPAD2. (A detailed description of the system is beyond the scope of this paper and more information can be found at
http://www.idi.ntnu.no/~simonem/CroMAR/.)

Towards a game: scenarios of usage

Initial evaluation of CroMAR pointed out some challenges to the usage of the system. It is clear that finding time for reflection is challenging because of the very nature of the work and the workforce. The motivation to reflect is also not high. In some cases, getting back on the spot might be challenging, for example in case of flooding or earthquakes.

Though in our work we have focused on supporting reflection on experience for the actors involved in an event, we have also identified a potential to support training. Experience-based training is critical in emergency work and it is often requiring setting up expensive simulations of events.

Considering problems with the deployment of our systems and potential to extend it for training, we are considering to use CroMAR as starting point for building a mobile augmented reality game for experience-based learning in emergency work. This will leverage on the strengths of mobile games in fostering learning that is situated and collaborative [4]. Possible scenarios of usage include:

- **Promoting reflection on an actual emergency work experience**. Here the main question is whether adding a game component to CroMAR can (1) help to promote exploration of the information and (2) motivate emergency workers at different levels to reflect on their experiences beyond the organizational debriefing

- **Supporting training of emergency workers**. Here the main question is whether a mobile augmented reality game à la CroMAR can provide simulated experiences that promote learning and become a form of training complementing the costly simulation of events.

- **Supporting preparedness of the population**. Here the main question is whether a mobile augmented reality game à la CroMAR can help citizens to learn about emergencies. In particular, we are not focusing only on the game as a way to increase the capability of citizens to cope with emergency, but also as a form of training to foster their capability to become active information providers during an emergency. Social media are already recognized as an important source of information during emergencies. We think that training of citizens, with focus on understanding how the work is done and the perspective of emergency workers, can improve the relevance and quality of the information that is provided.

Challenges

In developing these three scenarios of usage we have identified some challenges that have to be addressed in the design of the game concept.

- **Mapping cooperation in emergency work into the game**. All the three scenarios of usage are characterized by a high degree of cooperation for the creation of the information relative to an event as well as for promoting reflection and learning, that requires taking into account different roles and perspectives. To what extent different forms of cooperation should be mapped into the game? What other forms of cooperation (and competition) should be included for the sake of the game?

- **Leveraging on different roles and competence levels**. Management of emergencies is highly distributed in terms of competencies, ranging from simple citizens to disasters managers. Involved workers do not only have different specializations, e.g. fire department vs. medical services, but also within the same specialization they have different degrees of competencies, ranging from low trained volunteers to highly qualified professionals. To what extent this difference can and should be exploited in the game to promote learning through cooperation? Is it possible to think about a game where people can play together, possibly playing a coaching role for each others? Or should games rather be designed for players with similar profiles?

- **Understanding the role of place**. CSCW research has largely investigated the role of place, studying how places shape cooperative work and how they are collaborative constructed. We are interested in investigating how this understanding can inform the design of the mobile augmented game, particularly looking at how the place for working and the place for playing relate. Also, in CroMAR the place is used as a way to organize information that is relevant for reflection. When moving to the game, the place also

becomes an element of fun. We are interested in understanding how these two aspects relate.

▪ **Populating the game**. The information that is used in CroMAR is very specific to a geographic location. We see a challenge in populating the game with enough information to make it interesting, considering that the information that is used in one place might or might not be relevant if the game is played in another location. Which mechanisms should be included in the game for populating it with information? This should include the possibility to get information about real emergency events as well as from previous players.

In the workshop we would like to discuss our scenarios, including identified challenges and game concepts. We are also interested in discussing the possible generalization of the approach to design games that are useful for promoting reflection and informal learning in other domains.

Our main objective with the participation to the workshop is to exchange ideas with other participants and identify possible areas of cooperation.

References
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