Games for Learning Cooperation at Work: the case of crisis preparedness

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Abstract. In order to achieve crisis preparedness a number of approaches are combined including traditional training through courses and training material, coaching, simulated emergencies to recreate realistic working experiences, and structured debriefings to learn by reflecting on specific work experiences. Recently, Serious Games have also been proposed for this domain and experiments on their usage show that games can help to address some of traditional training limitations. In this paper we describe the first steps towards the creation of a system for supporting crisis preparedness through games. In particular, based on our experience with this domain, we reflect on the use of serious games for learning cooperation at work. A set of questions for guiding further research are identified.

Keywords. Serious Games, Crisis Management, Cooperation

1 Introduction

Work in crisis situations, like earthquakes and floods, is highly cooperative [1]. First, cooperation might take place ***inter sectors/agencies*** [2]. A crisis in fact requires the orchestrated action of a myriad of actors, e.g., firefighters and medical units. It is therefore very important that the different agencies communicate and coordinate in order to achieve a common goal, within the specific areas of responsibility. Cooperation at this level is taking place both in coordination rooms and in the field. Second, cooperation takes place ***intra sector*** [2]. Within workers of any given involved sector, work is generally organized in teams. These teams in many cases involve people with different levels of competencies who do not share experience on a continuous basis, as for example volunteers who are called in only when a major crises strikes. In addition, providing optimal response requires cooperation between the agency coordinators and workers in the field as well as, if needed, cooperation across teams of the same agency. Finally, cooperation is required ***between crisis workers and citizens***. Citizens might provide an essential contribution e.g., by sharing updated local information or by cooperating to process high amounts of data [6,7]. Cooperation strate-

gies to be adopted at the three levels might be very different and involve different actors.

Training of crisis workers has to take into account the cooperative nature of the work. Therefore, training is not only addressing learning of operational procedures and use of specific equipment, but also the development of cooperation skills, like appropriate communication styles, information sharing, and coordination [3]**.** Some of the required cooperation skills are general, while others are deeply intertwined with procedures for specific situations.

A number of approaches are combined for training for crisis preparedness, including traditional training through courses and training material, coaching, simulated emergencies to recreate realistic working experiences [4], and structured debriefings to learn by reflecting on specific work experiences [5]. Serious games, i.e. games designed for a primary learning purpose other than pure entertainment, have also been proposed for this domain [8]. Games for crisis management offer an interesting complement to traditional training as they support players in exploring a set of possibilities and playing with different solutions, fulfilling goals in a variety of unique, sometimes, unanticipated ways. Experiments on their usage show that games can be promising tools able to address some of the limitations of traditional training.

In this paper we briefly present the work that we have done in the area of serious games for crisis preparedness, with focus on training of cooperation skills. The main purpose is to share this experience at the workshop in order to discuss strengths and challenges connected to the use of serious games to support learning of cooperation skills in the workplace.

2 State of the art

To understand the current state of the art in the crisis management field we analyzed how cooperation was taken into account in 10 serious games for crisis management training [16]. Hereafter we present a summary of the results.

Communication: All the analyzed works put communication between the team members at the core of the learning experience. However we can distinguish two approaches. From one hand the system generates a task environment in which a group of people co-operate to deal with a crisis with an inter-sector approach [9]. Other works use a more hierarchical approach. In [10] one player assumes the role of the incident commander (again with an inter-sector approach) and establishes a decontamination zone. The others players communicate over radios and respond to the situation accordingly.

Roles and Coordination: The way teams coordinate is generally dependent on how specific game sessions evolve, but coordination generally plays an important role in training games. For example, in [9] the task of the staff is to get an overview of the situation and to co-ordinate and schedule the fire-fighting units so that they can extinguish the fire and save the houses. Most of the analyzed works take into consideration different roles inside the game. For example, [11] places its users in a crisis management team that is dealing with an evolving emergency (e.g. a huge fire close to a chem-

ical park). Each member is assigned a specific role that has unique abilities. These roles (e.g. leader of the team) are based on the roles of members of crisis units in reality. An interesting approach used by few works is cross training – i.e., shifting to different roles - to provide learners with a more elaborate perspective of the situation or problem. Using role switching requires the learner to learn a variety of skills and provide a broader, more detailed understanding of the processes and roles of a team. [8, 12] and [13] are interesting examples about how to use role switching to teach different skills.

For what concern citizens training, in the domain of serious games we were only able to find games aimed at sensitizing the population, not at training communication and coordination skills (see e.g., FloodSim [14] and Levee Patroller [15]).

3 Towards a game ecology

Because of the importance of cooperation skill training underlined in previous sections we have designed 3 serious games for crisis training which explicitly train different kinds of cooperation skills: *Don't Panic* [17], *Modo* [18], and *Flooded*.

Don't Panic is a cooperative board game addressing ***inter sectors/agencies cooperation.*** The game is mainly targeting the leaders of different agencies involved in crisis management. The game has multiple aims linked to soft skills teaching and learning, but in particular wants to teach communication styles useful to manage crisis events and foster team building.

MoDo is a mobile game to be played in teams in a physical environment through the usage of mobile devices and technology-augmented objects. With this game we targeted crisis workers, focusing at ***intra-team coordination***.

Flooded is a location-based mobile game to be played in the player's local territory aimed at sensitizing citizens to the risks linked to flooding. Because of the target, the dynamics are less strict and the game focuses on showing ***the impact of bad coordination and communication in a crisis***. Fig. 1 shows the different interaction modalities used in the games.

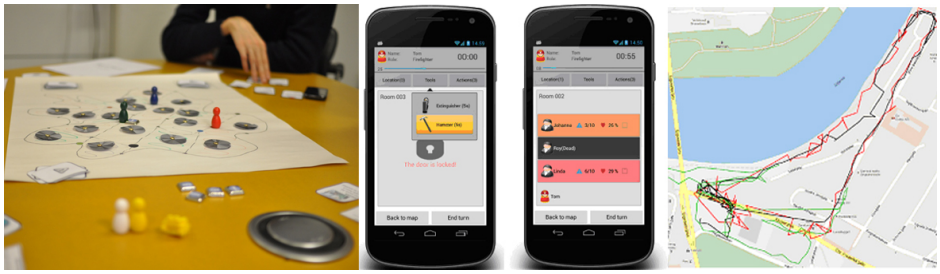

Fig. 1. Different interaction modalities for Don't Panic, MoDo and Flooded

Our first assessments [16] show that these games can be useful for soft skills teaching in crisis management, even having low development cost as a requirement.

The games we conceived until now address in a separate way the three identified cooperation levels. Our next step will be to bring these games together. For example, we want to link *Don't Panic* and *MoDo*, so that players of the first can create missions to be completed by the players of the second. In this way we can create a more holistic approach to crisis management teaching and learning problem.

4 Issues for discussion at the workshop

Basing on our experience, at the workshop we are interested in discussing issues connected to the usage of games for training cooperation skills.

Issues of relevance are:

- What are the strengths and weaknesses of games for learning cooperation skills? Our initial results are positive, showing the development of relevant skills, even if we have not yet conducted a large-scale evaluation. At the same time, it is difficult to evaluate the actual learning impact of these tools, especially in relation to cooperation skills, which are intrinsically difficult to measure.
- Are games for learning cooperation equally suitable in different work domains? I.e., is it possible to reuse the game dynamics in a different domain?
- To what extent cooperation skills can be developed with games that are independent by specific work practices? For example, the games that we have developed refer to specific crisis situations, e.g. panic management and floods. Research is needed to understand the advantages of integrating the learning of cooperation skills with other work-related skills and evaluate them against cost. In fact, more generic games not connected to specific work practices could have the advantage of being usable across domains.
- How do game dynamics strengthen or weaken the training of certain cooperation skills? The games that we have developed are all cooperative, requiring a team to work together towards a common objective, winning or loosing together. This reflects reality. At the same time, it is known that competition across teams can act as a strong motivator to playing (and therefore learning). Could competition be adopted as motivator without negatively impacting on the learning objective of the game?
- How are different modalities of interaction promoting or hindering cooperation? For example, in *Don´t Panic* the physical configuration of the game recreates, to a certain extent, a situation similar to the one in a control room and it seems to promote team building and co-located communication. A mobile game, with players physically distributed, promotes completely different styles of communication and information sharing.

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