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Applying Serious Gaming To Humanitarian Security
A Framework For Mixed-Reality Training

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Introduction

Humanitarian agencies make use of new technologies in a variety of ways, although up till now this has usually been oriented towards information sharing and programme coordination. This article looks at how emerging technology can also be used for training humanitarian staff to respond effectively to the increasingly complex needs that arise following disasters. Training topics range from the legal principles of humanitarian response to shelter management and staff safety. Some of these topics can be delivered through simple online learning methodologies such as self-study e-learning modules and live webinars. However, training staff for more complex tasks, like responding to security incidents and executing emergency plans, requires more immersive and participatory simulation exercises and role-plays. Creating realistic exercises during the training is crucial to ensure that participants respond effectively in similar real-life scenarios.

Mobile devices can play an important role in crisis situations involving role-playing. Although they don't match the immersive feeling a participant gets when entering a real-world simulation, mobile devices are well suited to orchestrate a flow of events through a 'mixed-reality' environment, allowing the learners to move between virtual tasks assigned on the device and the physical environment. So-called 'serious games' have a pedagogical function rather than being pure entertainment, and are currently used in fields such as education, health care and emergency planning. In a serious game, the mobile device acts both as a remote control and a display. The device offers each participant an individual perspective, adapted to their role and context. At the same time the

device is used to provide the game with input. Users record audio and video with their smartphone, provide answers to open or multiple-choice question or make the game controller aware of their current context (e.g. their current location).

Organising security simulations often involves the extensive use of messengers and props. The use of virtual activities blended together with real-world exercises can help to replace some of these resources, making it more flexible and easier to implement. In many environments in which humanitarian aid agencies operate, a real-life simulation is impractical or impossible to carry out due to the high risk it would present to staff. In some cases, it is simply not safe to conduct large-scale simulations (e.g. training staff on how to respond to the threat of Improvised Explosive Devices (IEDs) close to a field office). Using simulations with mobile devices saves time and money, and ultimately can help save lives.

With these objectives in mind, a serious game was developed by the United Nations Refugee Agency (UNHCR) in collaboration with the Open University of the Netherlands (OUNL) using ARLearn, a toolkit for mobile and virtual reality serious games.[1] ARLearn was originally developed as a toolkit for audio augmented reality,[2] but was customised to support the serious gaming needs of the UNHCR.

UNHCR serious gaming pilot

The UNHCR operates in over 120 countries, and its staff often work in hazardous locations. The agency conducts security management trainings worldwide. The security training team uses scenario simulations to evaluate the effectiveness of plans and procedures designed to respond to security threats.

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1   Gonsalves, A., Ternier, S., De Vries, F., and Specht, M. (2012). Serious games at the UNHCR with ARLearn, a toolkit for mobile and virtual reality applications. In M. Specht, M. Sharples, & J. Multisilta (Eds.), *Proceedings of 11th World Conference on Mobile and Contextual Learning* (mLearn 2012) (pp. 244-247). October, 16-18, 2012, Helsinki, Finland. Available from: http://ceur-ws.org/Vol-955/ [Accessed 23 September].
2   http://portal.ou.nl/web/arlearn [Accessed 23 September].

The typical approach to security training is a workshop organised over three to five days in which different aspects of security risk management are addressed. These workshops cover policy-based information such as standard operating procedures, and are delivered through e-learning modules for self-study followed by instructor-led sessions. The workshops may also include immersive simulation exercises on topics such as hostage taking, bomb threat and other security-related scenarios.

Workshop on Emergency Management (WEM) at UNHCR. Gonsalves, A. (2012)

For many years a role-playing game has been part of these workshops. Learners are split into groups representing the different roles that are present in an actual security situation. The groups have to implement and carry out procedures that have been introduced during the pre-e-learning modules and the instructor-led sessions. In the case of the hostage-taking scenario, a role-playing game is a highly immersive experience for the learners, in which they have to deal with stress, act quickly, collaborate and negotiate in order to save the hostage.

Running the game turns out to be an intensive exercise, not only for the participants, but also for the organisers and facilitators. It requires a lot of concentration and effort by a facilitator to encourage the whole team to engage in the chaotic development of a hostage situation, with the limitation that there is a maximum number of participants that can effectively join a game. As the game is carried out at a rapid pace it can be difficult to have an all-inclusive debriefing in which all roles in all teams receive appropriate feedback.

The debriefing and reflection phase of the activity is a major learning point. Debriefing allows learners to reflect on what they have learned, the challenges and risks associated with hostage taking situations and their personal capabilities. Facilitators recognise that

this is one of the key learning moments; however, it is difficult to capture all the important points from the simulation due to the speed at which events occur. The development of this project is an effort to address this shortcoming.

Mobile game design

As an alternative to immersive simulation exercises, UNHCR and the OUNL developed a pilot mobile game using the ARLearn toolkit. The game was first implemented by UNHCR at a Security Management Learning Programme (SMLP) workshop in December 2011. The game was designed to prepare participants to implement the response procedures that are initiated as soon as a staff member is taken hostage. A Hostage Incident Management (HIM) team is deployed in such situations, but it can take time until this team arrives and staff need to know how to respond in the interim.

The 17 participants in the 2011 workshop were senior staff members, including heads of offices, who were responsible for managing operations and the security of the staff members in their country offices. The pilot workshop took place in a training venue in Entebbe, Uganda. Internet connectivity was limited and sporadic. The game was played using nine smartphones simultaneously. Three teams were created for the same game, with three roles in each team: head of office, security officer and staff welfare member. Each role was assigned one smartphone and two players. The hostage-taking simulation was designed such that players in all roles played the same game but had to react differently based on their roles. All instructions were sent to the participants through mobile notifications. The game was organised in five phases.

Phase 1: notification of the incident

The game started with a plea for help from 'Jerry', a fictitious UNHCR employee who had been taken hostage. The video message from Jerry featured a blindfolded actor, creating an authentic context. This message was broadcast to all the roles. Players then decided what to do next, choosing from a pre-set list of options, depending on their specific role. The head of office for instance could decide to 'notify the Designated Officer (DO)', while a staff welfare officer could select the option to 'contact senior management'. Depending on the decision taken, they received automated feedback on whether this was a good choice.

Phase 2: assembling the team

In the next phase, the head of office was informed by the DO through a notification that a hostage incident management team was to be dispatched. In the meantime, they needed to contact the security advisor and staff welfare officer in real life and ask them to assemble in headquarters for a planning session.

Phase 3: planning

When the facilitator observed that the team had assembled, an audio recording of the DO was sent out as a notification. The team was asked to work out a reception plan in preparation for the arrival of the incident management team, to write it flip chart and to submit a photograph of it through their device.

Capturing the results. Gonsalves, A. (2012)

Phase 4: responding

In this phase, head of office and staff welfare participants needed to respond to calls from a journalist and a distressed family member respectively. The security officer in the meantime received a message from the DO with the task to prepare a list of Proof of Life (POL) questions.

Phase 5: negotiating

In this last phase, all roles gathered together again. This was triggered by a message from the hostage-takers. In this phase, a negotiation with the hostage-takers was simulated through multiple-choice questions and the submission of an audio message to the hostage-takers. The game ended with the message that the Hostage Incident Management (HIM) team had arrived and was ready to take over the negotiations.

Learning outcomes

While the ARLearn toolkit was originally developed for educators to organise field trips, in this pilot UNHCR was able to effectively adapt it for supporting simulation exercises. Overall, the game was well received and the participants were able to complete all phases successfully. They found the ARLearn simulation very useful, and once they got over initial technical obstacles they were able to respond to the notification, assembling, planning, responding and negotiating exercises. The participants also understood the criticality of the exercise and the tasks associated with an immediate response to a hostage-taking scenario. They learned the importance of coordination, a key aspect in responding to a security incident; this was enabled and assessed through the game.
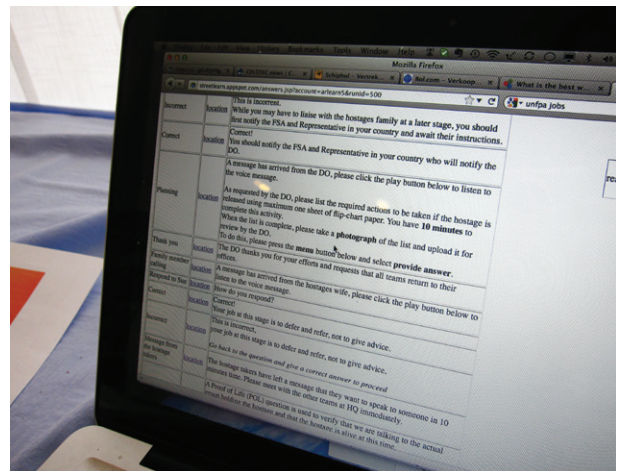
Monitoring the results. Gonsalves, A. (2012)

The game added more realism through the video of the hostage 'Jerry', calls from distressed family members, and the pressure that was applied by the demands of the hostage-takers. The facilitators played a role in moderating and pacing the game through the use of the manual triggers. It created good role inter-dependencies and showed that the leadership of the head of office plays a key role in ensuring that the team delivers. Participants found the exercise highly stimulating, as they played the game within the device, moved around, interacted with each other and responded to the various assessments. The learning from the pilot exercise was later referred to in the workshop, for example on the formation of the proof of life (POL) questions.

Conclusion

New technologies can be used for training humanitarian staff to respond effectively to the increasingly complex needs of disasters. Mobile devices can be used to simulate 'mixed-reality' environments, allowing the learners to move between virtual tasks assigned on the device and the physical environment. To this end, an application framework, authoring tool and mobile app are currently under development by Mobilize.life with an aim to go live in early 2016.

Mobilize.life
A framework for mixed-reality games

Since the initial ARLearn pilots, a number of organisations including UNICEF, UNHCR and the International Training Centre of the International Labour Organization (ITC-ILO) have expressed interest in collaborating on the development of a mixed-reality gaming framework aimed specifically at their training needs. Based on their needs and the results of the previous pilots, Mobilize.life is developing the framework and application that will enable trainers to build and deploy mixed-reality serious games. These games will still need in-person or virtual facilitators but are easier to organise in high-risk environments, require fewer props and can be implemented in places without an internet connection.

Solution overview

The Mobilize.life framework will define the architecture under which the games can be developed, while the application will allow organisations to build and deploy games on the fly through a cloud-based web platform and device-based mobile apps. The overall objective of the Mobilize.life solution is to:

- Build an application framework which will help humanitarian trainers create mixed-reality games for mobile devices and will enable a marketplace of reusable game variations.

- Provide a user-friendly, web-based authoring tool for trainers to build their own training exercises.

- Develop a mobile app that is cross-platform and will be used by learners to play the games in both online and offline modes.

Application modules

The web-based application of the framework will enable the creation and management of the games, and will consist of the following modules:

1. **Game management.** This module will contain the 'game builder' which will allow the trainers to create games and save them as reusable entities within the system. These can also be shared with other trainers through a marketplace. The output of each game from the game builder will be a package that will be pushed to the mobile app.

2. **Game authoring.** The game authoring module will enable trainers to create games using a pre-defined set of building blocks: *notifications* to be automatically sent out (alert, audio, video, text/images), *triggers* of scenarios (time, location), and choice of *responses* (real-world tasks recorded by completing a checkbox, taking a photo, recording audio or submitting a response to a quiz). The trainer will define the roles, and then for each building block will define who participates, when and where (providing a distance threshold), how long is allowed to complete the task, and various pre and post conditions based on triggers, responses and inter-role dependencies. The authoring interface will provide trainers with a user-friendly way of pre-configuring the building blocks, triggers and responses.

WEB GAME DESIGN	WEB GAME ASSIGNMENT	MOBILE GAME PLAY	WEB GAME RESULTS
The game designer (trainer) defines the rules and flow	The game master (facilitator) assigns roles to different players	The game begins and players interact with the devices and each other	The results are analysed and announced

Application workflow

3. Reporting. The reporting module will allow the trainer to track games in real time and debrief participants on the completion of the exercises. Subjective responses such as audio, images and video submitted during the game will also be available for review.

The device-based mobile app will run the games developed by the web-based game authoring modules and will include the following functionality:

a. **Online and offline access.** Since the game launches only after being fully downloaded, the user will be able to continue playing the game even while offline. The exception to this is when a server response is required to proceed with the next step. For example, a role-dependent notification will require that the team member's device notifies the server of a task completion before the player can proceed to the next step.

b. **Voice, image and video capture.** The app will have the ability to record a player's voice, or submit an image or video with the device's camera. The media assets can be stored on the device till sufficient bandwidth is available to transmit the content.

c. **Push notifications.** The learners will be able to receive instructions as push notifications from the server at any point in time, provided that they have an internet connection.

d. **GPS data transmission.** The app will have the ability to transmit the user's GPS coordinates to the server at regular intervals. This will enable the trainer to track each user's location on a map. For indoor training, due to the limitations of GPS technology, the completion of location-based tasks will be achieved by scanning QR codes posted at indoor sites.

e. **Communication with other players.** At any point in time during the course of a game, a player will be able to view the details of other players within the same team. They can message each other to coordinate their team response if an internet connection is available.

f. **Integration with wearable technology.** For quick access to notifications, each player will be able to use wearable devices (e.g. Android and Apple watches) to view the notifications they receive during game-play. This will make it easier for the player to act on instructions while on the move.

European Interagency Security Forum (EISF)

EISF is an independent network of Security Focal Points who currently represent 75 Europe-based humanitarian NGOs operating internationally. EISF is committed to improving the security of relief operations and staff. It aims to increase safe access by humanitarian agencies to people affected by emergencies. Key to its work is the development of research and tools which promote awareness, preparedness and good practice.

EISF was created to establish a more prominent role for security risk management in international humanitarian operations. It facilitates exchange between member organisations and other bodies such as the UN, institutional donors, academic and research institutions, the private sector, and a broad range of international NGOs. EISF's vision is to become a global reference point for applied practice and collective knowledge, and key to its work is the development of practical research for security risk management in the humanitarian sector.

EISF is an independent entity currently funded by the US Office of Foreign Disaster Assistance (OFDA), the Swiss Agency for Development and Cooperation (SDC), the Department for International Development (DFID) and member contributions.

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About the Communications Technology and Security Risk Management Hub

The Communications Technology and Security Risk Management Hub is a project by EISF that was launched in October 2014. The project aims to begin a conversation towards a better understanding of the specific nature of the security threats created by the digital revolution, and the implications for the security risk management of humanitarian staff and programmes.

The first publication of this project (October 2014) brought together 17 authors who analysed in 11 articles how communications technology is changing the operational environment, the ways in which communications technology is creating new opportunities for humanitarian agencies to respond to emergencies, and the impact that new programmes have on how we manage security.

The hub aims to provide an outlet for researchers and practitioners to make original and policy-relevant research available to the humanitarian community. Each article is reviewed by at least two experts. If you would like to contribute please contact the editor of the series at eisf-research@eisf.eu.

http://commstech-hub.eisf.eu