



METHODOLOGY FOR CONTEXTUAL ENQUIRY AND DESIGN

DR. ROD MCCALL⁺, NICOLAS LOUVETON⁺, MIKE PICKNETT[◇], RAY KHALIQ[◇]

⁺Interdisciplinary Centre for Security, Reliability and Trust, University of Luxembourg (Luxembourg)

[◇]Cleveland Fire Authority (United Kingdom)

TRAINING AUGMENTED REALITY GENERALISED ENVIRONMENT TOOLKIT

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INTRODUCTION

This document presents the approach, which will be used to capture the requirements for the TARGET training scenarios. It is complementary to the training needs analysis approaches outlined in D1.02 and D1.03 and the work in D5.01 on technical requirements. The primary objective of this document is to explain the procedures, steps and processes, which will be used to elicit the elements, which will be deemed to meet the training objectives of the TCs. While it will no doubt include references to technical aspects, the focus is on the following elements:

- ⊞ Fulfilling the training needs of each TC
- ⊞ Immersive experiences, supporting realistic scenarios and systems
- ⊞ A sense of presence and flow once in these experiences

The deliverable provides an overview of the requirements capture and design process involved which will be used within the TARGET project. It then provides a brief summary of issues relating to presence and flow, from there it then provides a summary of a recent visit to Cleveland Fire Brigade which allowed WP1 partners to explore some early issues with the contextual enquiry approach when used within TARGET scenarios. From there it provides a summary of the 6 TARGET training scenarios then provides a conclusion.

AN OVERVIEW OF CONTEXTUAL INQUIRY/DESIGN

Contextual Inquiry and design [1] [2] is a methodology designed to derive requirements and subsequently the overall system from an embedded analysis of how people currently work. The emphasis is on observation and understanding of a work practice within a given context rather than starting

EXECUTIVE SUMMARY

This deliverable outlines the contextual design and inquiry process that will be used to uncover the requirements for the various training scenarios in the TARGET project and also provides background on sense of presence, mixed realities and serious and pervasive gaming. The methodology places an emphasis on understanding not only what is required but also the work context in which it will be used. The document starts by providing a review of key areas such as presence, mixed realities and serious gaming and concludes that the scenarios must support the pervasive nature of such experiences and engender a sense of presence so that trainees respond as they would as if it were real. Building on this viewpoint it then explores the contextual inquiry and design process, with the emphasis on supporting the training requirements of each site given their particular working contexts. Key areas include not only supporting graphical realism but also the objectives and key parts of the training scenarios.

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from an underlying technological perspective and enforcing that upon the target group. The emphasis during the inquiry phase is on the following parts:

- ⊞ Context – interviews and observations are carried out within the workplace
- ⊞ Partnership – the end user and the research conducting the work undertake the process jointly with an emphasis on mutual understanding
- ⊞ Interpretation – the interpretation of the workplace is shared with those being interviewed as the process takes place
- ⊞ Focus – the process focuses on a particular teams scope of work

The underlying part of contextual inquiry are the interviews which take place “on-location” while the real work task is on-going. While the work task being observed may be the one that is replicated in the new system it should be noted that the process can also be used to develop new systems, although the chosen work context should be related to the one where the end system will be used. Following the inquiry phase a context design approach is used to create the early prototypes of the new system and to share these as early as possible with the end users.

MIXED REALITY AND SERIOUS GAMES

MIXED REALITY, PRESENCE AND FLOW

Within TARGET the objective is to develop a set of mixed reality serious games to train security operatives under a range of settings. The term mixed reality in this context draws heavily from the one devised by Migram and Kishino [3] who define a spectrum. For example, they argue that on one end of the spectrum there is reality and on the opposite end of the spectrum there is pure virtual reality. Augmented reality (when virtual content is localised with the real space) and augmented virtuality (when real objects are added to a virtual reality world) exists in between. Within TARGET the consortium is essentially dealing with training environments located within this spectrum, with the added issue that there are many potential viewpoints on to the same environment. For example, in an augmented reality training scenario it is also likely that trainers (based at PCs) will be able to change the flow of the scenario or input content. In some cases they must also interact directly with the trainees and be able to sense the stress that the trainees are under such that they respond in an appropriate way. Additionally control rooms and a range of IT devices and other artefacts are used which may or may not also be connected to the mixed reality environments. As a result the project also embraces the idea of blended spaces where a new experience is created from the fusion of real and virtual [4].

Regardless if one or more types of environment are used the challenge is to develop a set of serious games that are realistic enough to engender the same or similar sense of presence that a person would feel under the real equivalent. Indeed taking the view espoused by Lombard and Ditton [5] an environment should support the following elements in order to engender a sense of presence: transportation, immersion, realism, social richness, social actor within a medium and medium as social actor. However, it should be noted that while their model refers to purely synthetic (e.g. virtual environments) many facets are relevant to mixed reality spaces. Transportation refers to the feeling of being physically transported to another place, e.g. the person feels as if

they are in a virtual fire training scenario and not the office suite where it is taking place. Immersion refers to the degree to which a person's perceptual information is substituted by virtual equivalents i.e. audio headphones, 3D graphics or vibrotactile feedback devices and Realism refers to how realistic the virtual content feels. The social nature of the medium must also support belief in the idea that virtual characters are real and should engender psychological and physical responses from the user with them ignoring the fact that it is a mediated experience. In contrast social richness refers to how the medium supports a sense of social warmth towards others, e.g. through eye contact.

The underlying determinants proposed by Lombard and Ditton [5] led them to develop three primary forms of presence physical, social or co-presence (for a summary see bullet list later), although these and their underlying interpretations are subject to much debate. In addition Sheridan [6] indicated that in order for people to feel present in a mediated experience the following "form" aspects must be supported (1) the extent of sensory information presented to the participant (2) the level of control the participant has over their interaction (3) the participants ability to modify the environment. In addition to the aspects relating to form e.g. the physical representation of the environment, the content must also support the experience. Content can include narrative, characters, locations and other related aspects which improve the sense of being somewhere or with someone else.

- ⊕ Physical: the feeling of being physically located somewhere else via the use (normally) of virtual reality
- ⊕ Social: the feeling of being present with someone else in the same electronic environment
- ⊕ Co-presence: the feeling of being present with someone who is located elsewhere, a classic example feeling as if you are with someone who is on the other end of a phone call or Skype

Within TARGET all three forms of presence become relevant, although it is open to debate whether they apply in augmented reality spaces. For example, in a fire training scenario it becomes important for the fire fighters to feel as if they are in a burning building. They should also feel as if the avatars representing the potential victims are real and they should feel co-present with the person who is giving orders but who is located far away. This should in turn allow them to feel involved, engaged and ultimately immersed in the experience. It should be noted however the immersion is not the same as a feeling of being present and that TARGET is not aiming to substitute all senses with electronic equivalents – as it is seeking to blend real and virtual aspects to create a believable experience.

Flow [7] is another relevant concept to TARGET as it deals specifically with the idea of a person being fully immersed and focussed on a particular activity such that they largely ignore aspects not related to that task. It should be noted however that often a sense of flow is related to positive feelings, in that the task in hand should lead to a sense of enjoyment. In the case of the TARGET training scenarios it is debatable whether this should be an objective or whether the full definition of flow should be adopted. Excluding this issue, the concept of flow provides a set of underlying themes, which are highly relevant to TARGET such as:

- ⊕ Intense concentration and focus on the present task in hand
- ⊕ Merging of action and awareness
- ⊕ Loss of reflective self-consciousness
- ⊕ A sense of control over the situation

- ⊕ A feeling that time (or temporality) has been changed or distorted
- ⊕ A sense that the activity is in itself the reward

In addition to the underlying theory of flow several authors [8] [9] have extended it specifically to the area of games. They identified a range of issues including: player skills, challenges, clear goals, concentration, feedback, immersion and social interaction.

GAMES

Serious games are ones that have a purpose outside of pure entertainment and they are often used for training or educational purposes (as is the case in this project). Another approach relevant within TARGET may be to consider the use of gamification [10], which is the adding of game-like elements to non-game environments, these can include for example the use of points, badges and leaderboards. Although it should be noted that systems that make scores public (e.g. leaderboards) are not always well received within certain work contexts. They may also encourage user behaviour which would not normally occur had such incentives not been provided.

Serious games and gamification are high level definitions, under which a range of game types can exist. Within TARGET for example while the game or training scenario may be relatively tightly defined both in terms of content and location, there may be instances where the boundaries of the game become unclear. The boundary of a game is traditionally referred to as the magic circle, and refers to a game existing within certain social, spatial and temporal boundaries. When a game breaks such boundaries it is said to be pervasive [11] [12].

In conclusion the requirements capture phase must allow for an assessment of which elements contribute to effective game design through exploring which factors can influence the sense of presence and flow of the participants. Drawing on the elements identified within the flow categories it should be possible to devise scenarios with the associated mixed reality environments that can support this objective. For example, providing tasks that are challenging and test the skills of the participants.

ETHICS, PRIVACY AND TRUST IMPLICATIONS

As noted in [13] serious games, in particular those that bring together pervasive elements within work contexts are prone to ethical, privacy and trust issues. For example, in the TARGET scenarios, training to shoot people could increase the likelihood of this event occurring in real life even when that outcome would not be appropriate. There is also a work risk that poor performance under simulated conditions could lead to the participant being penalised in their future career. While a full description of ethics is beyond the scope of this report they should play an important role in the requirements capture process and work by [14] [15] [16] will be taken into account.

VISIT TO CLEVELAND FIRE BRIGADE

OVERVIEW

The visit to partner Cleveland Fire Brigade (CFB) training centre consisted of two main aspects, the first was a visit to their training suites which consists of operational (bronze) tactical (silver) and strategic (gold) level command. The second element was a live demonstration of two fire appliance vehicles rescuing a person (actor, fellow fireman) from a road traffic collision (RTC). The objective of visiting was to gain a better understanding of how such incidents are handled and more importantly how to observe these two different environments with the aim of being able to further refine the contextual design/enquiry process.

TRAINING SUITES

Strategic Command Room



Figure 1: Gold Level Command Training Suite.

The strategic command room (Figure 1) consists of a large table and multiple screens which display current incident information and media /news feeds, the ability to hold teleconferences and Skype links. During the time of the visit the scenario playing was that of a plane crash at a local airport. The newsfeeds provided information about the crash site and issues regarding civil unrest. The room is used by senior commanders from multiple agencies (when appropriate). They also bring laptops and notepads into the room.

Pods



Figure 2: Video of air accident as played in one of the training pods.

The operational training suite consists of four rooms (pods see Figure 1). Each pod consisted of a different view onto the same incident (sectors of intervention). Each room consists of a TV screen, audio equipment and a table. The trainee stands in front of the screen and receives initially a briefing of the scenario, they also see a video (inject) which shows the fire and information is provided via audio relating to the current status of the fire (which is also visible). The trainee then has to respond to the events and talk out loud to indicate the course of action that they would take. Although not illustrated during the visit it is possible for all four pods to be occupied simultaneously so that the offers at each locations around the incident can communicate and take decisions. During this time if they are the onsite commander they are also provided with a note board (see Figure 3) that they can then use to take notes about the current status. The trainer takes notes and provides an assessment at the end.

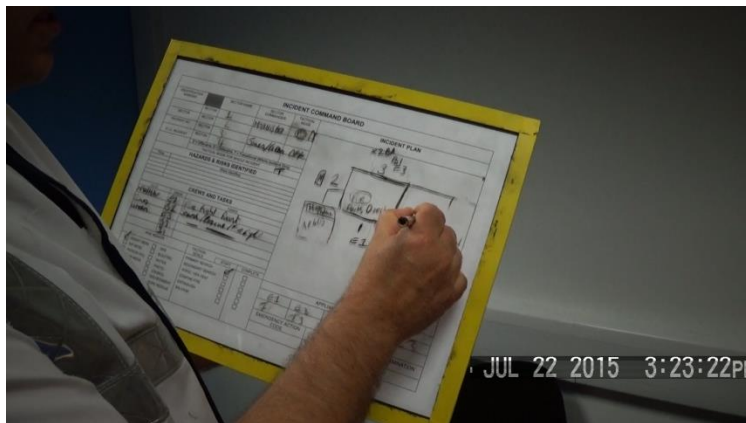


Figure 3: The Noteboard.

Incident Command Vehicle



Figure 4: Exterior of the Mobile Command post training vehicle.

The Incident command vehicle is an exact replica of the actual vehicle that would be deployed to the real incident. It is operated by a command team and is the base of the tactical Commander (silver) at any incident along with commanders or specialists from other agencies. The environment consists of a command area with a number of screens that display the current status of the incident and supporting information and importantly the current command and control structure. Any changes made to any information are permanently stored within the command software for record and recall for debriefs. In front of the screens is a small table where the team can discuss the issues and upon which sits a telephone. There are also a number of workstations comprised of a PC and telephone for the command team to maintain up to date incident information on the software system used by the command team.

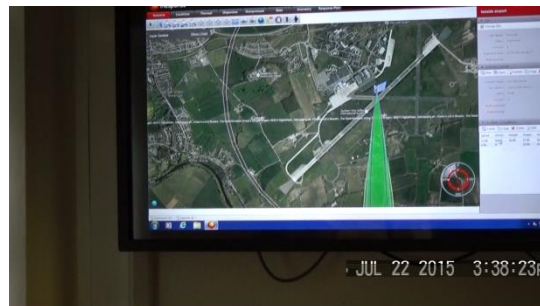


Figure 5: Map view screen from Mobile Command Post

The officer in charge is expected to operate on the decision making level with the supporting team members providing information and interacting with the relevant systems. It was made specifically clear that the officer in charge is not expected to know how to use the IT equipment but should be able to understand its purpose and what it can contribute to during the decision making process.

Training Suite Observation

The objective of the observation was to see the facilities in use rather than to conduct a full contextual inquiry design process. Observers from the project observed a training scenario, which involved one trainee taking on the role of a site commander at a building fire. This took place in the pods mentioned earlier. During this time he was presented with a video of an on-going fire at retail site consisting of multiple premises. The objective was not only to put out the fire but avoid it spreading to neighbouring buildings and to ensure that no people were at risk. The scenario took the form of the officer standing in front of a screen and explaining his actions out loud, which were in response to a number of inserts (multimedia content) which were played. During this time he

would use the noteboard (which is standard issue) to record the current status and their actions. During the scenario observers were able to visit the various rooms, which represented the different views on the burning building and the trainer's room.

Throughout the scenario it became clear that even the relatively low sense of immersion (this was not a 3D environment) led to the trainee being fully engaged in the scenario. They also showed a lack of self-consciousness when undertaking the task, despite being observed by a large number of people. In addition, this was a command and control task and was not hands-on in the sense that it required interaction with fire appliance devices. It was therefore clear that even in the relatively low fidelity simulator that an appropriate narrative and range of relevant tasks to respond to provide a strong experience for the trainee.

ROAD TRAFFIC COLLISION TRAINING EXERCISE

Scenario Overview

The scenario took place on the outdoor training area at CFB, which also includes camera capable of recording events.



Figure 6: Mock Road Traffic Collision.

Two cars collided on a busy motorway, the passengers in one have ran off as they stole the vehicle while one passenger in the other vehicle is injured and is unable to exit the vehicle. His wife has escaped the vehicle and has called for help, she appears ok but is agitated and distressed (See Figure 7).



Figure 7: A Fire Engine Arrives near the scene of the Road Traffic Collision

Two fire appliances arrive and secure the road so that other traffic cannot pass through. The first senior officer to arrive obtains an overview of the scene and tries to understand what has happened with the wife of the injured man. When the commanding officer arrives he briefs him on the status of the scene before the commanding officer takes over. The commanding officer has to calm the wife of the passenger down while observing the overall scene and giving instructions to the appliance crews. Leading the wife far from the central point of the accident is one of the first actions- this is so that he can not only obtain a circular view of vehicles but also ensure she does not see the most harrowing aspects of the accident. Eight crewmembers are deployed in the space of the accident scene. During this time crewmembers placed a mat on the ground (see Figure 8) that contained various tools for rescuing the injured person. All tools and equipment were stored on this mat when not in use. This allowed for the fire crews to know exactly where all relevant equipment was rather than leaving it where it was last used. Two members were inside the car talking to the victim and maintaining him in a secure position. In the meantime, some of the members (one to four) are handling equipment (e.g., stabilisation and rescue tools).



Figure 8: Image of one crashed car (left), rescue equipment (centre left) and green mat (top centre) on which the equipment was placed and removed.

Two crewmembers are directly focused on the removal of the car doors, protection of the victim (windshield breakage) and eventually extraction from the car. There were few communications between the crew members around the scene of the accident, however a high quantity of verbal communication arose close to the victim during the whole training unfolding. A significant amount of this dialogue amounted to explaining to the

accident victim what was happening and to remain calm, while also discussing and deciding on the procedure to extract them from the vehicle. The scenario ended successfully with the injured person being removed from the vehicle. Under normal circumstances the injured person(s) would have been handed over to the ambulance crews, also throughout the event the police would normally have taken on the role cordoning off the accident area.

Observation Procedure & Methods Used

A lightweight contextual inquiry process was used which also included ethical procedures. The first phase took place in a standard layout lecture theatre.

1. The evaluation team and staff from Cleveland Fire Brigade introduced themselves and the objectives of the evaluation, stating clearly that no data would be used to assess the actual fire fighters performance
2. The ethical procedures were explained to the fire fighters during which time they were able to read over the information sheets and consent forms. It was made clear that they have a cooling off period where they have the chance to ask for their data to be removed
3. The fire fighters were asked to sign the consent form, all of them completed the form and gave consent for collection and use

Next the training scenario started. There were three primary approaches used while observing the scenario:

1. Video data collection with a mobile camera. In this case one evaluator recorded the scene as it unfolded. Recordings of the overall context of the accident were taken, e.g. location of fire trucks and people, as well as recordings of the crashed cars and the rescue of the injured passenger
2. Video data from cameras located around the training site. These cameras are placed so as to provide an overview of the scene
3. An observer taking notes. They could move around freely and were able to observe any actions

Following on from the training scenario all fire fighters returned to the lecture theatre, data from this session was recorded using a video camera and notes were taken.

1. The fire fighters undertook their standard post-incident debriefing session. During the debrief each step of the incident was revisited and discussed. Particular areas of interest included decisions, for example why the car door was removed to rescue the injured person and the roof was not removed. There were also discussions on the tactics used to manage the distressed wife and the use and location of tools
2. During the debrief, a number of possible questions were noted by the observers. Subsequently these questions were asked. As the observers are not familiar with fire fighter procedures this often took the form of asking about command and control structures and reasons for particular decisions
3. Finally the participants were again reminded of the purpose of the study and to ask if they have any questions. They were then asked to complete the study feedback forms

Lessons Learned from the Data Collection

The purpose of this study was to uncover aspects relevant to future requirements capture (primarily) and evaluation of the future mixed reality environments (secondary). Based on the observations a number of issues were identified:

- # Organisation: it is clear that a team of fire fighters is highly organised with each member having a specific role and defined set of tasks. It is therefore essential to have access to the organisational hierarchy at the outset
- # Procedure: the actions undertaken far from the critical point of the accident were done with little communication and appeared “automated”. It is therefore essential to know exactly what tasks each person is meant to undertake
- # Capturing of communication between crew member: while observing the overall environment was easy, acquiring verbal or even non-verbal communication close to the victim was hard as this space is quite narrow, and it would be difficult to penetrate this space without disturbing the training, let alone questions of safety. Thus, placing microphones on crewmember suits would ensure the acquisition of verbal communication. The use of go-pro mobile cameras may also be useful
- # Study content: it is clear that the scenarios are tightly defined by the partner. It is therefore important to have a clear understanding as to what the purpose, steps and criteria for success of a particular scenario may be
- # Tools and objects: while the use of some tools and objects is clear, special care should be taken to ensure that the evaluators are aware of the purpose of each item used and its relevant to the given scenario. This will aid in the development of any “smart” objects such as weapons or equipment equipped with sensors that should be used in the mixed reality environments
- # Sufficient time for interviews/debrief: sufficient time is required to debrief the team involved and also to interview selected individuals. In this study no individuals were interviewed. Related to this is the need for a thorough pre-briefing of the study so that appropriate interview questions or semi-structured interviews can be devised

CONTEXTUAL INQUIRY AND DESIGN

The requirements capture procedure will be undertaken using a Contextual Inquiry (CI) based procedure presented later within the context of the training needs analysis that will be conducted at each site. The proposed procedure is intended to be generic and given the diverse nature, time constraints and security limitations at each partner training site they may need to be modified for each TC.

The following section outlines the requirements capture team, the possible range of activities to observe at each site (including those who could be observed), areas of particular interest, data collection methods and analysis. The following sections also reflect the steps involved in the process. It is intended to be applicable to all training content scenarios. The emphasis is on the training aspects at each location including people, technologies and structures in place.

Contextual inquiry has been used often for more traditional applications such as websites or office software, where although people may work together in teams to complete certain activities it is possible to observe an individual one-on-one. Therefore a contextual inquiry interview was often seen as observing the work and during this time conducting a set interview. The TARGET process however is different as within the training scenarios it is likely that a large team of people will need to collaborate and that interruptions by interviewers during the training event would hinder the outcomes and also be seen as invasive. Therefore the TARGET

approach has been modified so that the training event is observed in real time and that as quickly as possible afterwards the interviewee will be interviewed. Given the nature of some scenarios the normal two-hour period recommended by CI may be too short to include both observing the scenario and conducting the interviews. The process of contextual design may also be modified, as the CI team will only have limited access to the trainees at most locations. Additionally, although it has been noted that video cameras are of debatable value in the CI process they will be used for larger scale interactions e.g. to observe training rooms, running outdoor scenarios and large group debriefs etc. However, the CI team will examine whether they are useful for individual sessions.

The contextual inquiry/requirements capture process can be broken down into the following overall steps.

- # Setting up Requirement CI Team
- # Identification of Activities
- # Identification of Key Stakeholders
- # Observation of Activities
- # Training Debriefing Session (including first CI exit debrief)
- # Individual Interviews (followed by CI debrief)
- # Focus Groups (plus debrief)

After each key process in the CI/CD the participants who are not taking part in the next stage will be debriefed on the study.

CI TEAM

Number of people required: 2-4

A team of two people from the requirements capture team plus a minimum of one from each partner site will be involved in capturing the requirements. The team will broadly consist of the following people:

- # Computer Science and Human-Computer Interaction Expert with a background in mixed and augmented reality
- # Cognitive Psychology (HCI) with a background in user tests and trials with requirements capture
- # At least one domain Specific expert, each site will provide at least one person to assist in the data requirements capture and analysis. The domain expert must be able to impact knowledge of the organisational structure and existing training techniques

IDENTIFICATION OF ACTIVITIES

The domain specific expert(s) will be expected to provide a detailed account in advance of any site visit about training objectives, organisational structures, relevant people to interview and existing approaches to training. The domain specific expert will also be asked to provide regular feedback on the progress of the requirements capture data analysis and results as it progresses, although depending on project resource available it is up to the partner institution as to how much time they can devote to the task.

IDENTIFICATION OF STAKEHOLDERS

Number of people: 3-4 per key role

Prior to visiting each site the key user stakeholders will be identified, with an emphasis on those that are key to the particular training scenario. It is likely that the training scenarios will involve a range of participants, for example senior officers at command centres, on the ground teams (with various roles) and trainers. It is therefore important that a representative sample of people involved are interviewed.

Given the complexity of the training scenarios the CI team needs to explore not just the individual tasks of the particular person but also their degree of collaboration and types of collaboration with others in addition to the artefacts that they use. Key areas of concern both when evaluating data and in selecting the stakeholders include:

- ⊞ Relationship to overall workflow within the team
- ⊞ Identification of work teams either within overall scenario, or parts of it for example gold, silver, bronze command
- ⊞ Formal and informal collaboration structures
- ⊞ The job role, not the job title. For participants may have varying job titles but undertake similar roles or be part of the same work flow

OBSERVATION

Live Scenario Observation

The objective is to observe a training session which is as near as possible to the ones likely to be created within TARGET. Under traditional CI approaches it is more likely that observation will take place within a more traditional workplace environment. In TARGET training and its associated workflows are more often than not conducted as isolated events repeated on a number of different occasions with/without the same participants. Therefore in these studies the focus will be on the training events and the aspects surrounding them.

Training Briefing Session

During this set up the CI team will observe the participants using video cameras, audio and by taking notes. Critical issues regarding the scenario will be noted for example roles, stress points etc.

Observation of the Training Session

Based on prior experience at CFB it is clear that the scenarios are often spread over multiple locations simultaneously. For these sessions the CI team will explore the use of multiple time stamped camera and audio feeds, along with microphones and cameras attached to the participants (trainers and trainees). It should be noted that observation should not just focus on the training space (e.g. a location of the crashed vehicle) but also any associated rooms and locations where the trainers monitor or influence the event.

Debriefing

The visit to Cleveland Fire Brigade indicated that a key part of training is often the briefing session afterwards. During this session particular decisions or actions are often discussed and it is an opportunity for the trainers and the observers to ask questions of the whole group. It should be noted that this session is normally part of the procedure and should be viewed as part of work practice and is not simply an event tagged on which exists outside of the training scenario itself. It is also extremely useful for the observers as they gain a better understanding of the event they have just observed. It may be that providing tools to support the debriefing session may be a useful part of the TARGET platform, this will however need to be discussed.

INTERVIEWS

Two forms of interview will be used: *in-situ* and *real-time* and *immediately after the event*. The first form of interview will be used when the participant is able to provide answers to questions and where this will not have an impact on the running event, for example a trainer who does not need to undertake many actions. The second form will be used when the training event and/or scenario would be undermined if interviews were to be conducted in real-time (*post-event*).

The second form of interview will be undertaken as soon as possible after the training event (including any formal debriefing has taken place). The interviewer will use a semi-structured approach drawn from areas of interest to the project (e.g. command and control structure) and events observed during the training session to stimulate discussion. In addition artefacts from the training event and video playback may be used to further stimulate discussion. For example, if the scenario took place in a mobile command unit the interview may be conducted there as well.

FOCUS GROUPS

Following the training session, a selection of people from the event may be asked to take part in a prototyping workshop. The precise number of people cannot be defined at this stage but will be based on the roles and command and control structure used within the training scenarios (this will vary for each scenario). These workshops will take the form of storyboarding, which is a training scenario using paper prototyping approaches to encourage discussion about which particular tools they would see as beneficial within training scenarios. Taking into account aspects such as ergonomics, user interface design and communication patterns. At no time will they be asked to build functioning or semi-functioning prototypes. It should be noted that the objective is to brainstorm ideas rather than to lockdown particular requirements at this stage.

It should be noted that this stage is not normally conducted this early within a contextual design process, however given the limited access we have to the full teams involved in the scenarios we feel that it would be beneficial to start discussions on key issues at this stage. They can then be incorporated into future findings.

Interview and Focus Group Analysis

After the raw data has been collected from the interviews and focus groups the CI team will develop (depending on time restrictions) one or more of the following models:

4. Sequence Model: the steps users go through
5. Flow model: represents co-ordination and communication with the work group
6. Cultural Model: represents documented or implicit cultural issues e.g. influences
7. Artefact model: what objects are used and how they are used
8. Physical model: the locations used e.g. offices or outdoor locations

Following the modelling of the various interviews and final focus group the data will be synthesised to provide an overall model of the scenario that was observed.

VISIONING

At this stage the team of researchers, domain experts and other relevant members of the TARGET consortium will draw on the early data collected to design the overall vision of the particular platform. As noted in D5.01 many of the TC partners have already provided detailed accounts of what they would like from the TARGET platform. Therefore this phase will focus on bringing the contextual information and the specific requirements together.

STORYBOARDING

Based on the agreed vision for the particular training scenario a storyboard or set of storyboards will be developed for each scenario. At this stage the emphasis will be on the people, workflows involved, solving problems or contradictions in the requirements and tools to support such workflows. Such a storyboard consists of images (similar to what is used in animation studios) to outline the overall system.

USER ENVIRONMENT MODELLING

User environment modelling is the process of capturing the floor plan of the work process area(s) and examining how people move around between spaces in order to complete their tasks. The tasks within TARGET require this aspect to be modelled in detail. For example, many of the scenarios take place in distributed command rooms so it becomes important to understand the layout of these spaces and in addition the flows of people between them.

PROTOTYPING

As noted in section 0 some prototyping will have been conducted during an earlier phase, however at this stage the intention is to reach more concrete either paper or semi-working prototypes drawn from work in the earlier stages. Once again the domain experts and potential end-users will be involved from each site. The prototyping phase will be conducted on an iterative basis with relevant partners until there is a broad agreement on the final structure.

Given the limitations on obtaining access to certain categories of staff the CI team may have to rely on assistance from those at different levels but who have experience of the issues involved. This is particularly true of obtaining access to the highest ranking Police Officers or large teams of people who train under particular scenarios.

TRAINING SCENARIOS

The following summaries focus on the objectives and relevant contextual elements of the various scenarios within the TARGET platform. The intention is to provide an overview of areas to be considered. It may be that many of the sites do not already have such a system in place to support these incidents where this is the case the CI team will observe relevant existing training scenarios which contain similar key features e.g. command structure or locations used.

TC1 HAZARDOUS MATERIALS INCIDENT

This scenario involves the uncovering of a hazardous materials incident through to the subsequent evidence gathering at another location and the strategic and tactical decisions taken by the relevant teams. It is a multisite scenario consisting of strategic and tactical level command and firearms officers on the ground. The partner site does not currently have a similar training facility.

TC2 PROTECTING CRITICAL INFRASTRUCTURE WHEN DEALING WITH CROWDS DURING A MASS DEMONSTRATION

This scenario involves the management of police teams via a command post during a serious public disorder incident near critical infrastructure. The aim is to disperse or manage the crowd and protect the infrastructure. A command post facility is available at the partner site.

TC3 RESPONSE TO A MASSIVE CYBER-ATTACK ON THE INFRASTRUCTURE OF AN ENERGY GRID

This is a six-hour scenario (although time shifting is permitted), which takes place in the strategic, tactical, and operational command units. A key aspect of this scenarios is that time critical stressful events should be handled by operational level staff. The physical environment for the training already exists at Cleveland Fire Brigade Training Centre in Middlesbrough, UK.

TC 4 PERSONAL FIRE ARMS TRAINING FOR TACTICAL RESPONSE

This is a SWAT team hostage rescue training scenario taking place in an arbitrary building using mixed reality and real guns. In addition to the SWAT team there are also two police officers that arrive earlier and provide information on the scene plus a SWAT team command post (also the trainer). Key elements include the use of standard clothing (possibly including recoil vests) and communication devices. This is a high stress environment and it is these elements that need to be captured and understood along with the command and control structure and scene awareness elements. A building is available for the scenario.

TC5 ROAD TRAFFIC EVENT INVOLVING CASUALTIES WITH AN OFFENSIVE WEAPON

This is an operational level firearms tactical response scenario, which lasts about six minutes. The objective is for the police officers to apprehend the perpetrators preferably by not using force, although firearms should be used without hesitation if required under a highly stressful environment. One main problem is that at present the police are very reluctant to use their firearms in reality and this is likely to be reflected in training scenarios. This scenario therefore must be designed to allow them to make quick decisions to use firearms if required. There are two officers on the ground in a vehicle and the perpetrators are presented using augmented reality. Different contextual scenarios e.g. busy vs. quiet street, school areas etc. should be considered. No training environment for this currently exists.

TC6 MAJOR ROAD ACCIDENT

This is a large-scale road incident involving multiple vehicles. The scenario takes place with a commander in a mobile command post who has an overview of the situation and is able to give orders and manage the situation to those on the ground. There is also a commanding officer site that handles media relations and general gold level decisions. The overall process is known as a “special organisational structure” which is used in such cases. The on-site commander is also able to visit the site using augmented reality glasses and walk around in order to assess the situation. There is no current infrastructure for this particular scenario available but procedures and practices are in place for similar “special” events, which will have similar ad-hoc structures and training aspects.

SUMMARY

Across all the scenarios outlined earlier the objective is to examine a number of core elements these are outlined below so that the CI team can correctly identify what is relevant when the mixed reality serious games are developed. In particular what kind of IT solutions should be used or if they should be used at all for certain elements.

✚ Areas of interest:

- People and their roles in the scenario – including multiagency aspects
- Rules and social norms
- Procedures and processes related to interpreting data and taking decisions
- Information and communication flow within and between teams and impact of social/group dynamics
- Understanding the division of work between different command and operational levels
- Use of general artefacts e.g. computers, notebooks, screens, flipcharts
- Locations and spaces used for training, either physical rooms or simulation type environments

CONCLUSIONS

The TARGET training scenarios take place within a rich, diverse, and relatively fast moving context. Furthermore, they do not exist in isolation and are part of a wider training environment, which comprises of the organisations

themselves as well as the trainers. This led to the decision to use a contextual inquiry/design methodology as this can be used to specifically capture not only the training scenario information but also the wider work processes and contexts in which they take place. In addition, as the end-users and contextual inquiry/design team work together from an early stage and continually throughout the process it should be possible to minimise the risk of failure when capturing the requirements. Such a contextual and observational approach when coupled with the background highlighted in the brief summary of games, presence and flow should allow us to understand precisely the elements which will provide for realistic, relevant and immersive training experiences.

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