D4.2 Description of VR Training Scenarios

SHOTPROS

Deliverable	D4.2
Deliverable Lead	AIT
Related work package	WP4
Author(s)	Helmut Schrom-Feiertag
Dissemination level	PUBLIC
Due submission date	31.10.2020
Actual submission	30.10.2020
Project number	833672
Instrument	RIA
Start date of project	01.05.2020
Duration	36 months
Version log	V1.0

HORIZON 2020

Versions

Vers.	Date	Author	Description
V0.1	08/10/2020	Helmut Schrom-Feiertag (AIT)	First Draft
V0.2	16/10/2020	Helmut Schrom-Feiertag (AIT)	Additions to first draft, feedback
V0.3	20/10/2020	Helmut Schrom-Feiertag (AIT)	Scenario flow charts
V0.4	27/10/2020	Helmut Schrom-Feiertag (AIT)	Finalizing Sections, version for final feedback
V0.5	30/10/2020	Helmut Schrom-Feiertag (AIT)	Minor additions.
V1.0	30/10/2020	Valerie Schlagenhaufen (USE)	Finalization

List of Acronyms and Abbreviations

Acronym / Abbreviation	
VR	Virtual Reality
LEA	Law enforcement agencies
DMA-SR	Decision Making and Acting under high Stress and Risk
AO	Action Option
WP	Work Package

Table of Contents

Table of Figures

Tables

1 Executive Summary

This deliverable utilizes the results from the requirement analysis (WP2) and the training concept (WP3) for the definition of training scenarios for the training of LEAs. In WP2 and WP3 the training content, relevant skills to be trained and training objectives for VR were identified together with the LEA end user partners of SHOTPROS and consolidated for further scenario development and refinement. Based on the information and the conceptual DMA-SR model in WP3, a first version of an operational scenario for a domestic violence call has been described (D2.3).

With this Deliverable we aim to present our flowchart as well-suited method for the further development and description of VR training scenarios. To further develop and refine the basic scenario, it is transformed in a flow chart and visual components were designed for the scenario vignettes. With this method, the basic scenario is described visually and can be further developed with additional vignettes. The course of the scenario can be created simply by joining scenario vignettes together. This can be done electronically with a flowchart software or as a design game in paper form by designing the individual elements as playing cards to be laid together. The basic scenario and examples of variations are elaborated in this document and an overview of the 30 vignettes is given. However, the extensions of a scenario can very quickly result in complex flow diagrams, which are difficult to implement in their full extent and difficult for the trainer to control interactively on the fly. Therefore, fewer and simpler variations should be aimed at, which cover the essential aspects of DMA-SR training.

The next steps will be to further refine the scenario using this visual method in an iterative design process involving LEA end users and development partner RE-liON. This iterative process requires an ongoing alignment between the requirements and expectations of the LEA end users and the development of the scenario-based VR training in order to match the training objectives with the technical possibilities. The best performing scenarios will then be refined with the evaluation results for further implementation in T5.2.

2 Visual scenario description

We present flowchart as method for the further development and description of VR training scenarios. A scenario is described by a sequence of so-called scenario vignettes. Scenario vignettes can be considered as a DMA-SR segment that describes the occurrence of an event (E) in the scenario, which requires decision-making and acting abilities to react with suitable motor heuristics and embodied choices.

2.1 Scenario vignettes

Scenario vignettes include an event description and several action options (AO) that are to be seen as triggers for subsequent vignettes and that cause an adequate reaction to the preceding vignette, as shown in Figure 1.
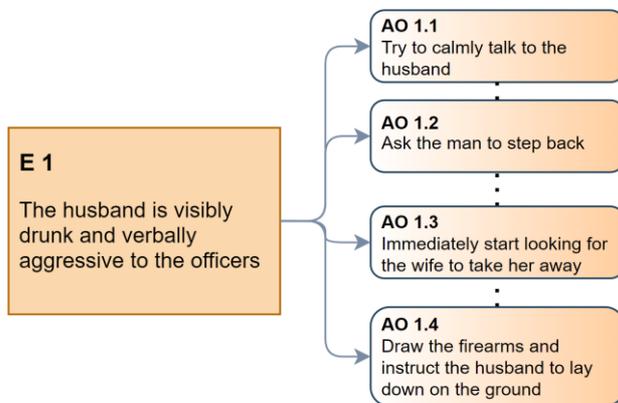

Figure 1: Example of a scenario vignette describing an event (E1) and action options (AO).

From these options, none is selected, and they do not describe all choices. Rather, they serve as guidelines for developers and trainers on how an option could lead to the next decision point or how a particular option could trigger additional stressors. The trainer alone determines how the further process in the training scenario develops depending on the options for action.

2.2 Scenario flow chart

To further develop and refine the basic scenario, a scenario is described in a flow chart with visual components representing the scenario vignettes. The DMA-SR training sequence starts at a certain starting point and develops through the events and respective decision points to an end state (see Figure 2). The action options taken at each of these decision points

determine the end state of the scenario. Ideally, the trainees reach the desired end state (e.g. arrest of a suspect, full control over the situation, de-escalation of a threatening situation).
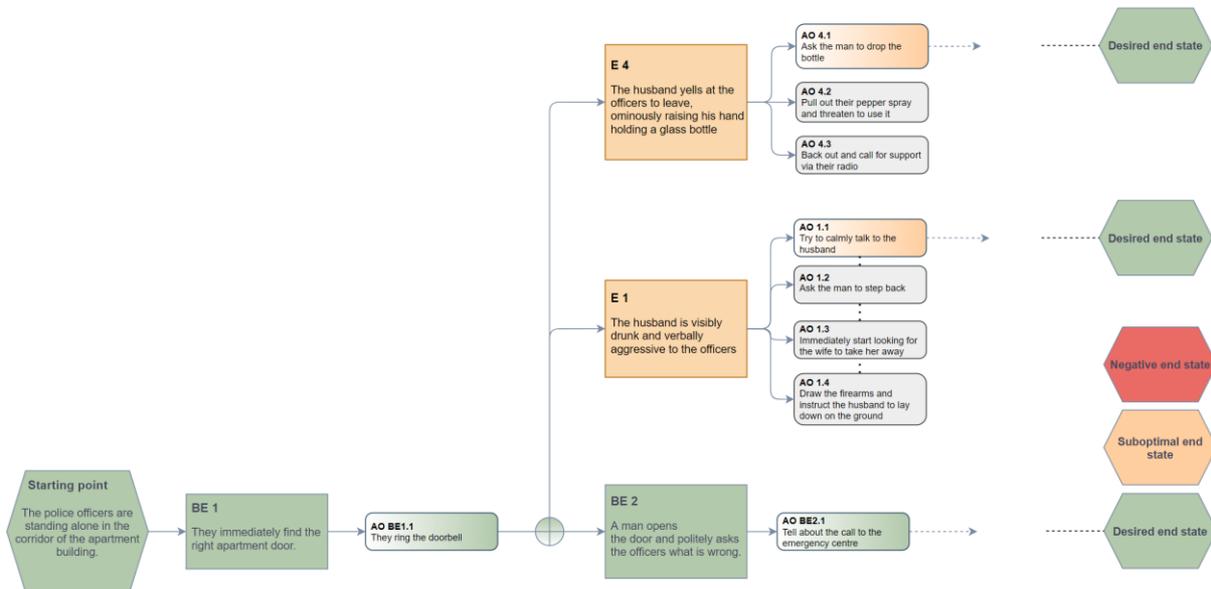

Figure 2: Flow chart example of a DMA-SR training scenario with alternative courses (BE … Baseline Event, E … Event, Action Option … AO).

Based on the action option performed by the trainee, instructors can decide on the most relevant (and consistent) scenario vignette to use as a response to the action choice.

3 Baseline scenario – domestic violence

The baseline scenario is described for a domestic violence case (D2.3) and represents the ideal course from initial situation to desired outcome and has little to no stress. It does not yet include unexpected events or other stressors. The baseline scenario is described based on the decision trees filled out by the LEA partners of SHOTPROS and represent a combination of the decision trees.

3.1 Baseline scenario description

The scenario can be described as follows: (a) the information that trainees receive from their 'dispatch' prior to the start of the training; (b) information about the environment, both outside and inside; and (c) information about the characters involved in the scenario.

Information given from dispatch

Two officers get an incoming call from dispatch at around 3pm. Dispatch received several complaints from residents from an apartment building about noise in their apartment building. Loud and repeated screaming and crying can be heard from an apartment on the first floor, where the Campson family lives. The two officers are requested to go check out the situation.

Possible augmentations:

- *Switch from daytime to nighttime (e.g., 1am)*

- *Dispatch mentions husband of the Campson family is known by the police and in the community for aggressive behavior (against his family members and others) -   Dispatch mentions that a resident has seen the husband holding a knife.*

Static environment

The apartment building is located in the center of the city, in a big street.

As you enter the apartment building, you enter a hallway with a staircase leading up to the first floor. The apartment itself is located with 3 other small apartments on the first floor, with all the doors to the apartments entering onto a long corridor. The apartment door is the last door on the right.

Behind the entrance door of the apartment, there is a small corridor from which four other rooms lead off to (1) the living room and kitchen, (2) a separate toilet, (3) a small bathroom, and (4) a bedroom.

Possible augmentations:

- *The apartment building is located in one of the more dangerous, crime-prone areas of the city; violence and drugs are common here.*
- *The streets in this area are dirty (with a lot of litter and graffiti) and consists mainly of old apartment buildings in poor condition.*
- *The apartment building itself is also old and not well maintained.*

- *The hallway and corridor of the apartment building smell bad*

- *The lights in the hallway and/or corridor are flickering*

- *The staircase and corridor are very narrow*

- *There is an empty baby bed in the corridor*

- *There are empty alcohol bottles/cans in every room.*

- *Strong smell of alcohol inside the apartment*

- *Loud music playing*

- *There is broken glass everywhere in the living room/kitchen*

- *Garbage and clothes on the floor, many things thrown around the house*

- *The light is out inside the apartment when the police arrives -   There is a dog bench in the kitchen*

Persons involved

Man:

- 35 years old

- Dressed in sweatpants and t-shirt

- About 1.80m tall

- Solid build

- Lots of tattoos on arms

Possible augmentations:

- *Clear signs of alcohol intoxication*

- *Under the influence of drugs*

- *Bleeding on his hand*

- *Is in a very agitated state and verbally aggressive*

Woman:

- 30 years old

- Dressed in jeans and a t-shirt

- About 1.70m tall

- Small build

Possible augmentations:

- *T-shirt is torn*

- *Shows visible signs of blows to the face*

- *Shows signs of withdrawal*

- *Has injuries to the face (bleeding)*

- *Looks scared and is screaming and crying*

Possible augmentations:

- *Adding a character: 5-year old child (girl)*

- *Adding a character: family dog, Rottweiler*

- *Adding characters: There are three bystanders (neighbours) standing in the corridor when the police arrives*

- *Screaming inside the apartment upon arrival*

Table 1: Context of baseline scenario and possible augmentations.

Baseline scenario: Course of events
The police officers are standing alone in the corridor of the apartment building. They immediately find the right apartment door. They ring the doorbell. A man opens the door and politely asks the officers what is wrong. The officers explain that there has been a call about a possible fight between him and his wife, and ask the man if they can come in. The man lets the officers in and leads them to the living room where his wife is sitting on the sofa. There are no signs of other people or animals living in the apartment. One officer is talking to the wife, while the other officer talks to the husband on the other side of the living room, near the kitchen table. Both the wife and the husband appear sober and calm. None of them show visible signs of a fight. They both cooperate well, explaining what happened and answering questions of the officers. They both give a similar account of what has happened: just an argument that got a bit heated, but without physical aggression. The police officers check with each other and decide that the situation appears to be under control and that there is no need to take one or both of the partners to the police station. They confirm one last time whether both parties feel safe and tell them they can always decide to file a complaint. They leave the apartment and return to their car.

Table 2: Course of events of baseline scenario.

3.2 Baseline scenario flow chart

In Figure 3 the flow chart of the baseline scenario is shown. It represents the ideal course and does not yet include unexpected events or other stressors. Accordingly, there is only a sequential sequence of events with only one action option.
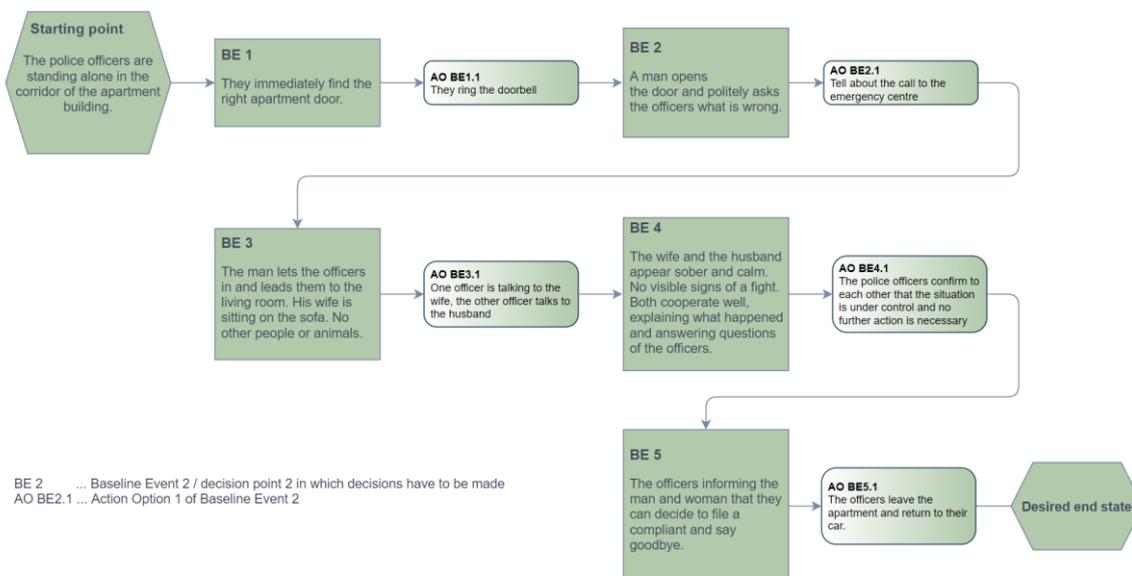

Figure 3: Flow chart of the baseline scenario consisting of a sequence of scenario vignettes with events (Baseline Event BE) and action option (AO) leading from the starting point to the end state.

3.3 Baseline scenario flow chart with variations

The basic scenario can be further developed with additional vignettes. The course of the scenario can be created simply by joining scenario vignettes together. This can be done electronically with a flow chart software or as a design game in paper form by designing the individual elements as playing cards to be laid together.

The following Figure 4 shows the baseline scenario with several variations. However, the variations of a scenario can very quickly result in complex flow charts, which are difficult to implement in their full extent and difficult for the trainer to control interactively on the fly. Therefore, fewer and simpler variations should be aimed at, which cover the essential aspects of DMA-SR training for LEAs.

Figure 4: Example of the baseline scenario with several variations.

In D2.3 already 30 scenario vignettes were identified taken from the decision-trees from the LEA partners. These 30 vignettes were grouped into 1) 0general scenario vignettes, 2) location-bound and 3) situation-bound scenario vignettes. The following figures shows these scenario vignettes with the events and the action options.
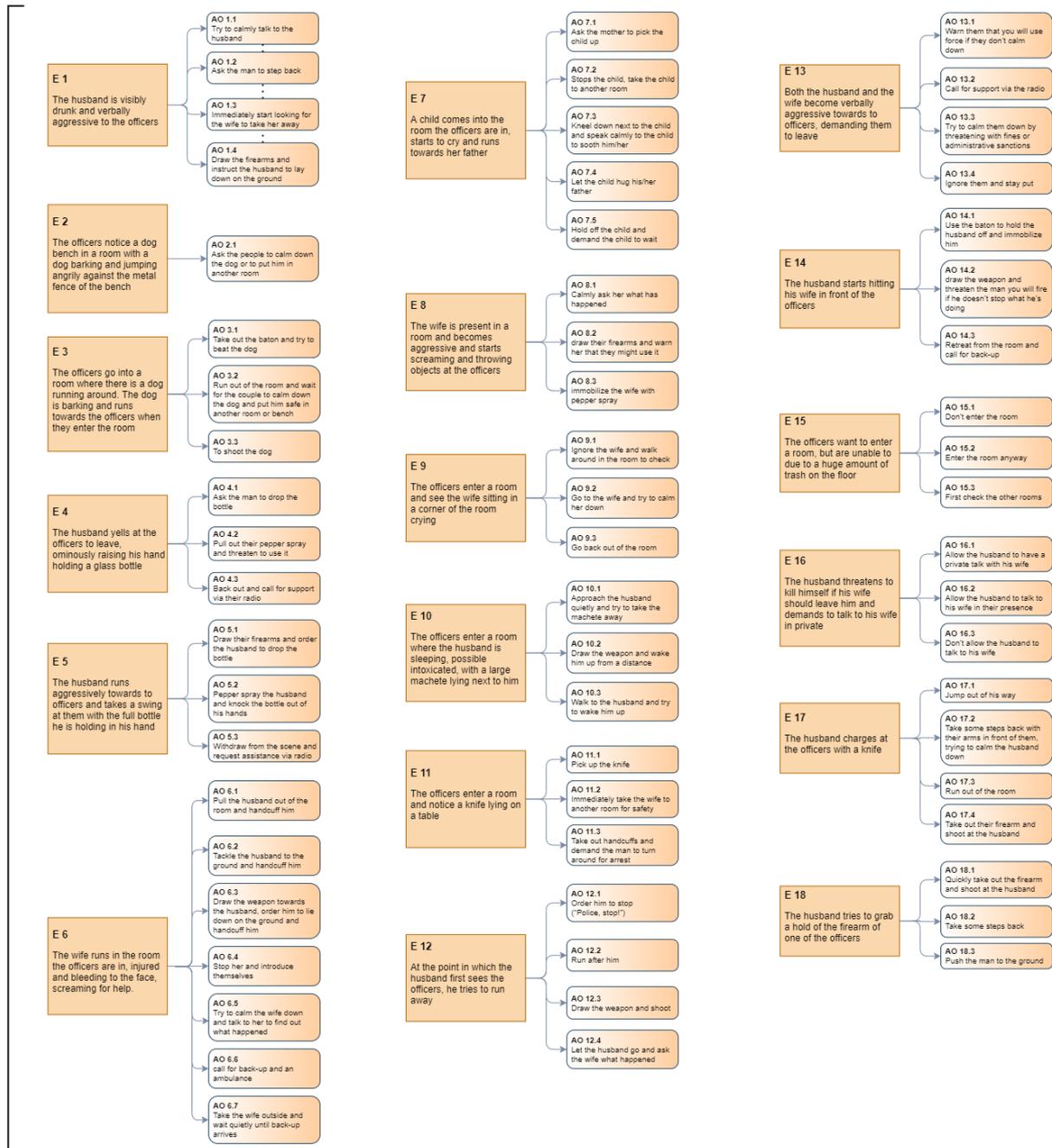
Figure 5: General scenario vignettes.
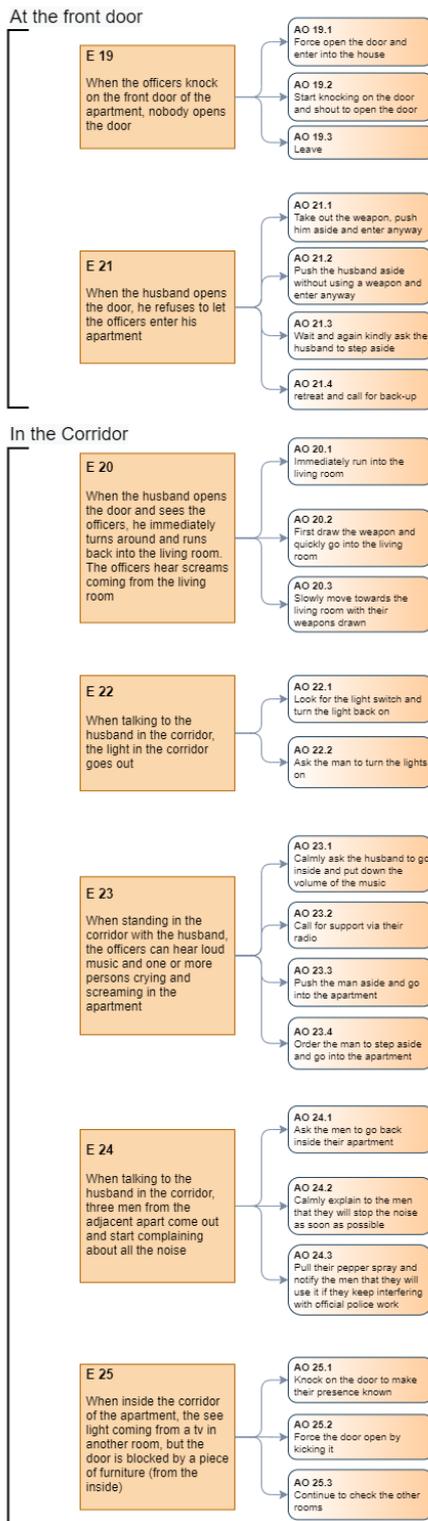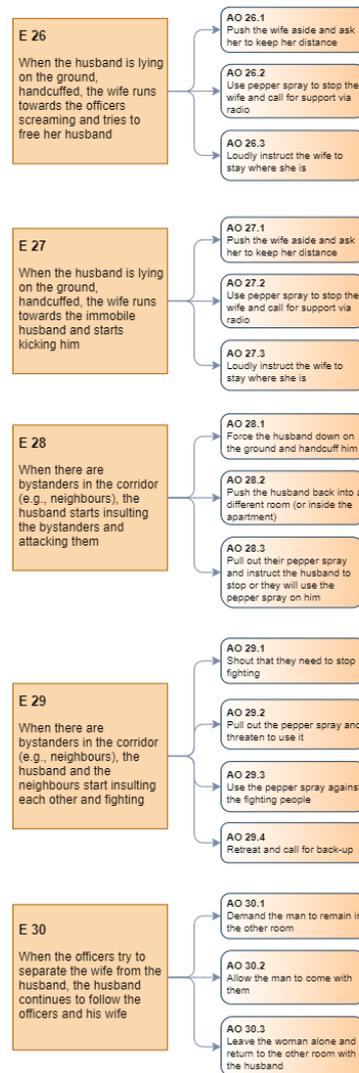
Figure 6: Location-bound and situation-bound scenario vignettes.

All 30 scenario vignettes are described textually in a table form in D2.3.

3.4 Additional components for scenario augmentation

It is possible to increase the level of complexity of a baseline scenario by adding augmentations and stressors. For SHOTPROS, a relevant pool of assets has been described in WP4 and shown in in Table 1: Description of identified stressors. Table 1, which is based on the requirement workshops conducted in WP2 and described in D2.2. For proper police training in VR, a content pool of the VR training system should be made available.

The blue stressors in the table are the relevant stressors that will be implemented as individual stressors or sequences of stressors within scenarios and are alphabetically ordered. The green marked stressors will be used as moderating stressors and will be used in addition to aforementioned stressors or sequences of stressors in order to identify how well they are able to further increase stress levels. They are grouped according to their modality (visual vs. smell).

Stressors	Description
Aggressive dog	Dog barks and runs at user
Being filmed	Unknown person stands inside a closed room and points a camera at the user
blood	In room are traces of blood
bullets	In room are bullets spread on the ground
Child crying	Child sits in room (e.g. crying)
Cluelessness	User is not given any information
Collapsing building or building parts	as threat to physical integrity
Crazy and unresponsive behaviour	Unknown person sits in room and laughs uncontrollably
Crowd (approx. 30 people)	Trainee stands in front of a crowd of people (multiple crowd behaviours possible)
Darkness	Closed room (or street) with no or very little light
Filmed by bystanders	Unknown person stands outside and points a camera at the user
Getting asked by bystanders	Unknown person approaches user and bombards him with question without waiting for answers
Loss of communication to colleague	Sudden loss of communication to colleague that entered flat / street with the trainee together
Loud unexplained noise	Door is banged shut after user walked inside the room / In closed room TV is running and producing loud sudden sounds.

Not understanding person talking to you	Unknown person sits in room and talks to user, but in unknown language
Person just starring at you	Unknown person sits in room and does not say anything
Possibly aggressive dog	Dog is stationary but barks at user
Scream	Scream audible while inside a closed room
Unexpected person	Unknown person walks into room from behind
Unexpected silence	After the police officers opens the door there's no noise at all, even after asking for a response from expected inhabitants there is nothing to hear.
Unexpected weapons	Unknown person stands in the room and uses ashtray, vase as weapon
Unknown origin of smoke	Closed room gets filled with smoke.
Unresponsive person	Unknown person sits in room and is unresponsive / Unknown person sits in room and laughs uncontrollably
Visual overload	Room is full of objects (e.g. furniture)
Weapon (knife/gun)	Trainee looks into a room and sees a knife / gun and a hand holding it

Fog	Weather is foggy
Limited visibility	In hall with several doors and light starts flickering.
Weather	Weather is bad and it rains
Odour / Smell	User opens trunk and body odour comes out of it
Gas smell	Closed room smells of gas

Table 3: Description of identified stressors.

These stressors will be evaluated and validated with respect to their ability to induce stress and to produce appropriate immersion under a range of situational and dispositional influences by user studies with LEA end users and subsequent statistical analysis. These studies should already have been conducted, but due to the COVID-19 situation the studies had to be postponed and will be conducted as soon as possible.

4 Outlook

The next steps will be to further refine the scenario using this visual method in an iterative design process involving LEA end users and development partner RE-liON. This iterative process requires an ongoing alignment between the requirements and expectations of the LEA end users and the development of the scenario-based VR training in order to match the training objectives with the technical possibilities. The results of the evaluation of possible stressors are also included in the finalization of the scenario vignettes. The extensions of a

scenario can very quickly result in complex flow diagrams, which are difficult to implement in their full extent and difficult for the trainer to control interactively on the fly. Therefore, fewer and simpler variations should be aimed at, which cover the essential aspects of DMA-SR training. The best performing scenarios will then be refined with the evaluation results for further implementation in T5.2. It is planned to carry out this scenario development with the LEA partners in the next 6 months to complete the implementation on time.

5 Conclusion

The presentation of the scenarios with flowcharts provides a good overview of the scenario sequence and is well suited to elaborate on the scenarios with the LEA partners. In the following scenario design process, the baseline scenario description is continuously refined and augmented, in close collaboration between LEA partners, developers and scientists and should provide all necessary information for the development as well as for the operation of the simulation environment. This scenario refinement can be done electronically with a flowchart software or as a design game in paper form by designing the individual elements as playing cards to be laid together. Already 30 scenario vignettes are defined and deliver an extensive pool of augmentations. Close cooperation in scenario development will ensure that the training scenarios are effective in achieving predefined DMA-SR training goals.