European Commission, Horizon 2020

D4.1 Cue Repository for Personalization and Customization of VR Training Scenarios

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Deliverable Lead	AIT
Related work package	WP4
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Versions

Vers.	Date	Author	Description
V0.1	19/05/2020	Helmut Schrom-Feiertag (AIT), Sebastian Egger-Lampl (AIT)	Initial Draft
V0.2	28/05/2020	Helmut Schrom-Feiertag (AIT), Sebastian Egger-Lampl (AIT)	Integrating feedback from partners
V1.0	29/05/2020	Valerie Schlagenhaufen (USE)	Finalisation
V1.1	18/01/2021	Helmut Schrom-Feiertag	Revision of the document according to the EC half time report • Text and illustrations from D2.2 have been revised to clearly highlight what is relevant to and included in this deliverable. • Addition of outdoor scenario and assignment of the stress cues • Adding an introduction of the VR prototype
V1.2	27/01/2021	Helmut Schrom-Feiertag (AIT), Sebastian Egger-Lampl (AIT), Raimund Schatz (AIT)	Integrated feedback from AIT, VUA and USE. Added clarification of training domains, indoor/outdoor environment and domestic violence/vehicle control as example suggestions.
V1.3	28/01/2021	Helmut Schrom-Feiertag (AIT)	Integrated feedback from the final review cycle and aligned terminology and references between deliverables.
V2.0	30/01/2021	Gerhard Helletzgruber (USE)	Finalisation and submission

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V2.1	25/02/2021	Helmut Schrom-Feiertag (AIT)	Revision of Executive Summary, restructuring the document and making clarifications about the VR research prototype. Adding several important stress cues not covered in the requirement workshops with the LEAs. Version for review by the partners.
V2.2	01/03/2021	Markus Murtinger (USE)	Feedback on the revision
V2.3	03/03/2021	Helmut Schrom-Feiertag (AIT)	Incorporation of feedback
V3.0	07/03/2021	Valerie Schlagenhaufen (USE)	Finalisation and formatting

List of Acronyms and Abbreviations

Acronym / Abbreviation	
VR	Virtual Reality
DMA-SR	Decision making and acting in stressful and high-risk situations
LEA	Law Enforcement Agency

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Revisions based on EC Half-time Review

Section	Revisions
1. Executive Summary	• Added key points about environments, cues and study • Included references to results build on and where results will be used • Revision of the executive summary
2. Cue Repository for Personalization and Customization of VR Training Scenarios	• Revision of diagrams from D2.2 to clearly highlight what is relevant to and included in this deliverable. • Addition of outdoor environment and assignment of the stress cues to indoor and outdoor environment. • Alignment of terminology and references to other deliverables.
3. Research method	• Restructuring of this chapter • Adding description and justification of the VR research prototype • Added clarifications about collection methods, data collected and procedure • Added clarifications about measurements for endogenous parameters
4. Current status due to COVID-19 situation	• Adapted description to current situation.
5. Conclusions	• Added a conclusion section

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1 Executive Summary

To design training scenarios for decision making and acting in stressful and high-risk situations (DMA-SR) in VR, suitable stress cues must be incorporated. For this purpose, it is necessary to know which cues induce stress and how strong the effect is in VR.

The aim of this deliverable and the work outlined is to **assess and validate the ability of individual stress cues, a mixture or a sequence of cues to induce a certain level of stress in VR training scenarios.**

In general, stress cues are external stimuli that trigger a stress reaction in people. Specifically, for VR training, these are audio-visual stimuli that are integrated into VR scenarios to trigger stress responses by the trainees. A collection of these stress cues was compiled in requirements workshops with the LEAs and are described in section 2.

The assessment and validation of cues is done in a study with experiments involving the LEA partners. In order to **conduct the studies at an early stage of the project** and to have the necessary flexibility in handling and transporting the VR system, a **simple VR research prototype** was developed. This prototype includes a simple **indoor and outdoor scenario** that can be augmented with the stress cues.

In the study, police personnel are exposed to the scenarios with different stress cues in the VR research prototype and the reaction of the subjects to the stress cues is recorded by **psychophysiological measurements**. Stress cues are tested individually, simultaneously and sequentially in order to gain a better understand of the interaction. The planned study and the research methodology to validate their stress inducing abilities in VR are described in section 3. Through a statistical and qualitative analysis of the data, the stress cues are evaluated in terms of their ability to trigger stress as single triggers, in simultaneous combination or of certain sequences. For the determination of the stress levels triggered by the stress cues, suitable intervals are determined from the measurement data (e.g. low, medium, high; or range from 1 to 10, etc.). The stress cues (single, simultaneous combinations and sequences) are thus assigned to the corresponding stress levels and **compiled in a repository** that can be utilised for creating and personalising **VR training scenarios with adjusted stress levels**.

This repository forms a basis for the selection of stress cues for the training scenarios in the final RE-liON VR training system in WP5. For this purpose, the repository is included to the backlog and used to prioritise the stress cues in the agile development process based on the stress level and effort required for implementation.

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Due to the COVID-19 lockdown in the European countries the subjective studies have been delayed, and the finalisation of the repository had to be postponed. The extensive validation will be done in WP6 in the HF studies as separate study

This work builds on the results of other deliverables and Table 1 shows the list of deliverables and the information on which they are based.

Table 2 gives an outlook where the results of this deliverable will be incorporated.

No.	Title	Information on which to build
D2.2	Requirements Report on LEA workshops	• Factors influencing human decision making and acting in stressful situations • Relevant stress cues
D3.1	Current training, best practices & scenario input	• Training domains • Training methods in current practice • Essential environment
D3.2	A Conceptual Human Factors Model of Decision-Making and Acting under Stress and in High-Risk Situation	• Definition of stress • Triggers and stimuli

Table 1: The work and the document builds on results from the following deliverables.

No.	Title	Basis for
T5.1	VR System Design for Human Factors Studies based on identified LEA Requirements and Research Needs and for the Field Tests	Stress cues from the repository will be implemented for HF studies based on the selection in the agile development process.
T5.2	Development VR Test-Scenarios, VR Live Editor and Sensorics Integration for Human Factors Measurement	Most effective stress cues will be included in the final VR training scenarios, based on the results of the HF Studies and selection in the agile development process

Table 2: The results of this work will be incorporated into following work and developments.

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2 Cue Repository for Personalization and Customization of VR Training Scenarios

2.1 Definition and identification of stress cues

In the SHOTPROS project, stress cues are based on the shared **understanding of "stress"** defined in D3.2 (M12), where the term stress is defined as the emotional response of a police officer to an event that is appraised as threatening (as opposed to irrelevant or benign) to well-being and in which the officer perceives limited coping possibilities or control.

Stress cues therefore are events or **triggers** that lead to **increased stress** for police officers in the VR scenario. For the training in VR this means **primarily audio-visual stimuli**. Beyond audio-visual stimuli the ability of (additional) stress inducement through smell and / or pain as additional stimuli will be considered in the later studies within this task cf. Figure 8). Due to the fact, that ecologically valid VR scenarios will often need more than one individual cue to be meaningful, stress cues will often appear in simultaneous combination or as a sequence of individual cues in a progression of a scenario. Essential elements here are conflict situations, alarm reactions, surprise or unexpected development of action or behaviour. To evoke a reaction through these stress cues, the response of the person is important and must therefore be well embedded in the overall training scenario progress.

According to D2.2, the factors influencing human decision making and acting in stressful situations are categorised into four main categories:

1. **Personal** factors are individual factors that differentiate between different first responders and the way they make decisions.
2. **Contextual** factors are those factors dealing with the situation of the police intervention as such, and the environment in which it takes place.
3. **Organizational** factors concern elements specific to their institution that might influence their stress levels and decision-making processes.
4. **Societal** factors deal with the opinions citizens have about the police institution and how these opinions can also indirectly influence decision-making processes of police officers during interventions.

The selection of relevant cues to be included in the scenarios to simulate stressful situations in VR is based on the following results of D2.2: a) contextual factors (Figure 1), b) the possible intervention scenarios (Figure 2), and c) all categories of stress-inducing factors for a VR

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training of DMA mentioned in the requirement workshops (Figure 3). To this end, a selection was made from the given factors in accordance with the partners.

In Figure 1 the contextual factors and sub elements identified in the requirement workshops. A main element that was mentioned in every workshop was the element "**The unexpected**" and has a huge contributing factor to immediately becoming stressed. The factors under consideration for the stress cues are highlighted in green in the figure.

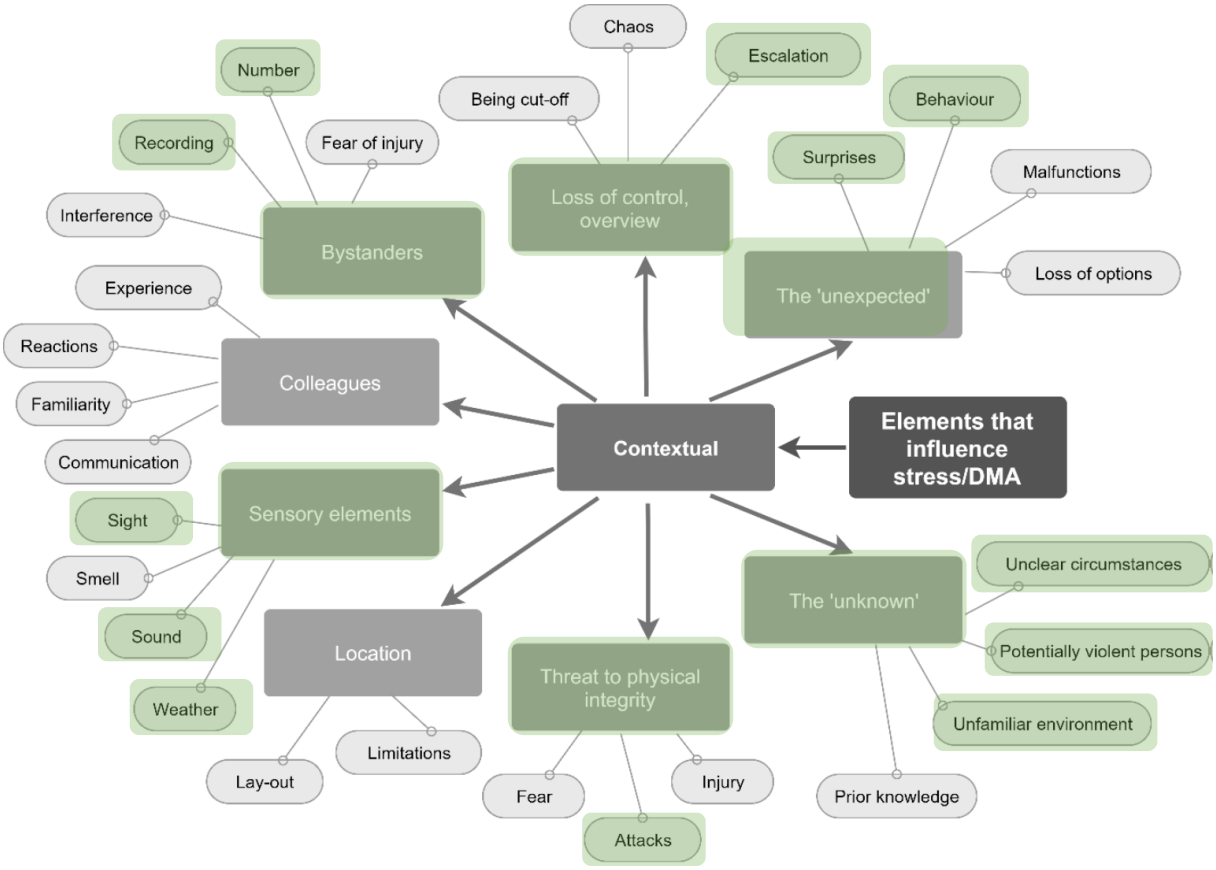

Figure 1. Contextual elements influencing DMA-SR[1], relevant factors are highlighted in green.

Based on the discussions and co-creation workshops with the LEAs in WP2 a mind map was created showing intervention scenarios (Figure 2). In Figure 2 below the main distinguishing dimensions are indoor vs. outdoor scenarios and **routine vs. non-routine** scenarios. Naturally, these two main dimensions are not mutually exclusive and coincide. Additionally, it was reported that a routine intervention can easily evolve into a more dangerous situation than initially anticipated.

[1] (D2.2 Requirements Report, Figure 9)

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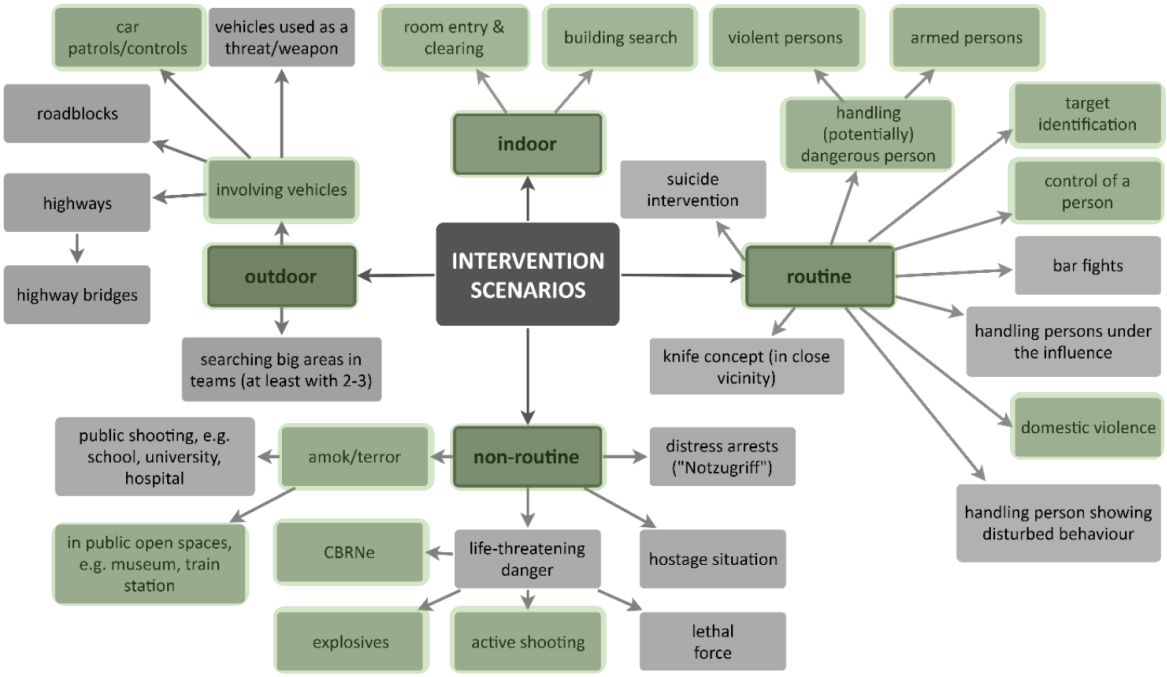

Figure 2. Mind map of intervention scenarios from co-creation discussion[2], relevant factors are highlighted in green.

The types of scenarios mentioned most frequently in the user workshops were vehicle control, amok (school shooting, terrorist attack, CBRNe), building search, handling a violent and possibly armed person, hostile situations, fights, brawls, domestic violence and hostage situations, active shooting and lethal force.

To create stressful situations, **environmental factors** that affect perception of the situation were mentioned. For example, weather conditions limiting visibility like rain or fog, poor or changing lighting conditions; or, noisiness and loudness such as screaming or explosions. All these examples may contribute to increased levels of stress (cf. Figure 3).

Considering characters in VR, stressful elements are variability in people, the number of people, and their behaviour, especially behaviour of people not speaking the same language, being aggressive, or hostile.

Based on the different factors and intervention scenarios, all stress-inducing factors mentioned in the discussions were structured and categorised as shown in Figure 3. The factors can be split up into seven categories which are also at **interplay with each other**, visualised through the arrows. These aspects, be it one singular or a combination of several factors, are all perceived

[2] (D2.2 Requirements Report, Figure 13)

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to be stress-inducing by the participants of the end-user workshops. The two themes that were most prevalent across workshops were **'the unknown'** as well as any **'unexpected'** elements.

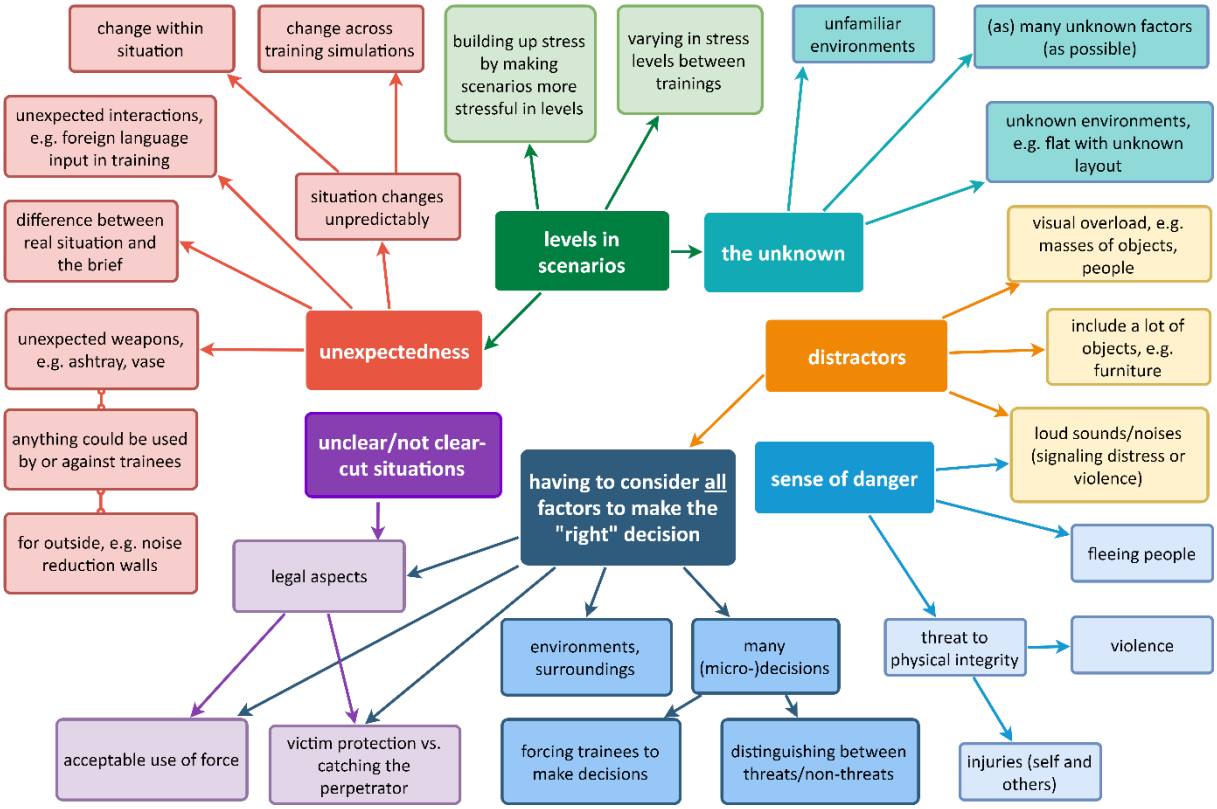

Figure 3. Mind map showing categorisation of stress-inducing factors in VR training for DMA-SR as mentioned by the involved LEA officers[3], relevant factors used for stress cues are in green.

For the participants in the requirements workshops, it was difficult to determine the exact aspects, characteristics and features that lead them to perceive a situation as high stress and/or high risk, and how strong their influence is. In order to examine this more closely, a set of stress cues for VR were developed on the basis of the categorised factors (Figure 3) and described in the following.

2.2 Selected stress cues

The stress cues described in Figure 3 were jointly defined with the LEAs based on the requirement workshops conducted in WP2 and described in D2.2. The selection of the stress cues was made according to the previously described aspects: The contextual factors, the intervention scenarios and the overall categories defined to cover stress-inducing factors

[3] (D2.2 Requirements Report, Figure 15)

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(Figure 4). The different aspects were combined and suitable stress cues for the various categories were developed for indoor and outdoor environments.

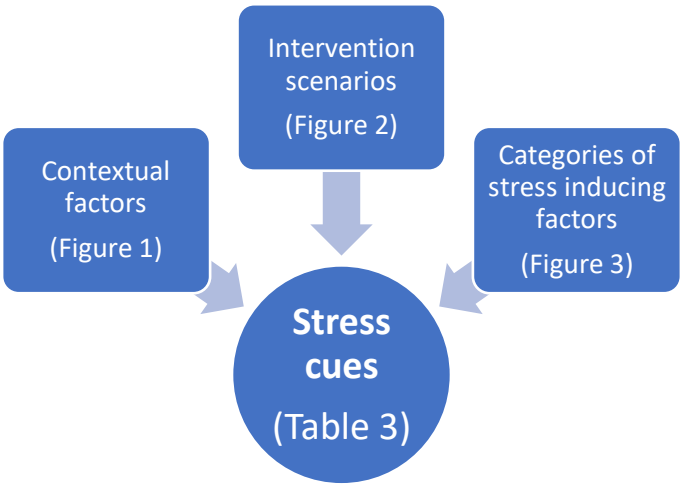

Figure 4. Selection and creation of stress cues based on the requirements.

The stress cues, listed in Table 3, are briefly described and assigned to the two scenarios according to suitability for indoor and outdoor environment. In addition, several discussions with LEA partners, as well as with the development and scientific partners have led to further important stress cues with respect to their ecological validity in police trainings scenarios and their technical feasibility to be transferred to VR environments. This selection was further supported by the training methods that LEAs effectively employ in current practice (see D3.1, M8).

The blue stress cues in the table are the **selected stress cues** that will be implemented as individual stress cue, simultaneous combination or sequences of stress cues within scenarios and are alphabetically ordered. The green marked stress cues will be used as moderating stress cues for the later phases in the stress cue study (StCue2, StCue3) and will be used in addition to audio-visual stress cues in order to identify how well they are able to further increase stress levels. They are grouped according to their modality (audio-visual in blue vs. smell in green).

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Stress cues	Description	Scenario Indoor	Scenario Outdoor
Aggressive dog	Dog barks and runs at trainee.	x	x
Being filmed	Unknown person stands nearby and points a camera at the trainee.	x	x
Blood	In room are traces of blood.	x	
Building facades	Operating under buildings outdoor and heavy objects thrown at police officers out of the window or from the top of the building.		x
Bullets	In room are bullets spread on the ground.	x	
Car traffic	Surrounding car traffic when operating along streets, roads or highways.		x
Child crying	Child sits in room (e.g. crying).	x	
Cluelessness	Trainee is not given any information.	x	x
Collapsing building or building parts	As threat to physical integrity.		x
Crazy and unresponsive behaviour	Unknown person sits in room/vehicle and laughs uncontrollably	x	x
Crowd (approx. 30 people)	Trainee stands in front of a crowd of people (multiple crowd behaviours possible)		x
Darkness	Closed room (or street) with no or very little light.	x	x
Fatigued people	Fatigued people showing apathy, exhaustion or delayed reaction.	x	x
Getting asked by bystanders	Unknown person approaches trainee and bombards him with question without waiting for answers.	x	x
Injured people	Showing people seriously injured.	x	x
Loss of communication to colleague	Sudden loss of communication to colleague that entered flat / street with the trainee together	x	x
Loud unexplained noise	Door is banged shut after trainee walked inside the room / In closed room TV is running and producing loud sudden sounds.	x	
Not understanding person talking to you	Unknown person sits in room/vehicle and talks to trainee, but in unknown language.	x	x
Person just starring at you	Unknown person sits in room/vehicle and does not say anything.	x	x

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Possibly aggressive dog	Dog barks at trainee and does not approach.	x	x
Scream	Scream audible while inside a closed room.	x	
Sick people (special focus on Covid19)	People in the scene coughing, not wearing a mask and not respecting distance.	x	x
Strain	People under strain showing restlessness, hyperactivity or increased arousal level.	x	x
Unexpected person	Unknown person walks into room from behind.	x	
Unexpected silence	After the police officers opens the door there is no noise at all, even after asking for a response from expected inhabitants there is nothing to hear.	x	
Unexpected weapons	Unknown person stands in the room and uses ashtray, vase as weapon.	x	
Unknown origin of smoke	Closed room gets filled with smoke.	x	
Unresponsive person	Unknown person sits in room/vehicle and is unresponsive.	x	x
Visual overload	Room/vehicle/area is full of objects (e.g. furniture).	x	x
Weapon (knife/gun)	Trainee looks into a room/vehicle and sees a knife / gun and a hand holding it.	x	x
Wind	Strong wind creates interference when talking on radios.		x
Fog	Area is foggy.		x
Limited visibility	Indoors due to multiple doors and rooms or flickering light, outdoors strong surrounding vegetation, dense crowds, parked cars or trucks obscuring the view.	x	x
Weather	Weather is bad, and it rains.		x
Odour / Smell	Trainee opens trunk and body odour comes out of it.	x	x
Gas smell	Closed room smells of gas.	x	

Table 3: Description of identified stress cues and allocation to scenarios indoor and outdoor

These stress cues will be studied and also visual metaphors will researched as some of the identified stress cues are not obvious to “materialise” in the VR environment in a way that is suitable for the envisaged DMA-SR training.

The stressors “sick people” from the above list are included based on the qualitative analysis of the SHOTCOVID study (see D1.1 and D6.1) and will be further investigated during the planned validation process.

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As already described above, these stress cues will be compiled into combinations and sequences of stress cues that are meaningfully combined in a scenario the trainee will be exposed.

In this chapter stress cues are explained and a basic understanding of influencal factors in human decision making and acting in stressful situations is described. The relevant stress cues identified in several requirement workshops are listed in Table 3 and their suitability for indoor and outdoor scenarios is given. These stress cues are selected for further investigations in VR scenarios about their effectiveness. The following chapter describes how these investigations will be carried out.

3 Research method to study effects of stress cues in VR

The selected stress cues will be assessed and validated with respect to their ability for inducing stress and creating respective immersion through user studies with LEA end users and subsequent statistical analysis. Figure 5 shows an overview and the sequence of steps necessary to study effects of stress cues in VR.

Figure 5. Overview of the research method to study effects of stress cues in VR.

This requires prototyping VR scenarios and incorporating the stressful cues. In addition to the simple prototypical implementation of the scenarios and the implementation of the audio-visual cues, it is important to have a flexible, mobile and simple test setup to be able to carry out investigations with participants from all LEAs quickly and directly at the partners' locations. Since the scenarios are only in the definition phase, they have not yet been implemented with the RE-liON system, which also requires more and special hardware components and is more complex to set up. The RE-liON system offers a lot more features that are not needed for the study. Therefore, a simple research prototype was implemented supporting the minimal set of features required for the studies. With this research prototype the stress cues will be investigated in studies and a stress cue repository will be compiled, describing the stress-inducing abilities of the stress cues. This repository is included to the backlog for the agile development of the final training system.

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3.1 VR research prototype

To study the effect of stressful cues a simple VR prototype as a research platform was developed in which the scenario can be augmented with stress cues and sequences of them by adding objects, avatars, behaviours, environmental factors and other stress cues. The research prototype was implemented using Unreal Engine (UE), a game engine for rapid prototyping without programming which makes it easy to create game-like scenarios and to add features without code. The prototype was developed to run on a gaming notebook in combination with the HTC VIVE Pro Eye to have eye-tracking data available as an additional data source for examining the stress condition. The VR prototype covers a base indoor and outdoor environment and for each cue sequence a script was formulated and implemented as a short simulation.

Example script for the indoor scenario with audio-visual cues:

1. User opens door
2. User steps inside
3. User enters further into the room
4. Door is banged shut

Example script for the outdoor scenario with visual cues:

1. User walks along a street
2. It is foggy and barely anything to see

3.2 VR environment

For the creation of the VR environment, available models were used, combined and animated to create an appealing 3D environment. As already described in D3.1, section 4.2.1 for the VR scenario selection, it is important to be able to cover a variety of training domains. In the requirements analysis D2.2, D3.1 and D3.2 training domains were identified and suitable environments for VR training were proposed. On the one hand, an indoor environment in which a scenario for domestic violence is elaborated (see D4.2) and, as a supplement, an outdoor environment of an urban setting in which a non-routine intervention is suggested as a scenario template. Here a routine intervention will be used as basis that will escalate into an AMOK situation. This scenario template will be further detailed with the LEA partners, scenario vignettes and a decision tree will be elaborated and implemented as a training scenario in an agile development process (WP5) in several evaluation rounds (WP6) with the LEA partners.

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Sample screenshots showing the base indoor environment with a room can be seen Figure 6 and the base outdoor environment with an urban street in Figure 7.

Figure 6. Screenshot of the VR prototype showing a room of the indoor environment.

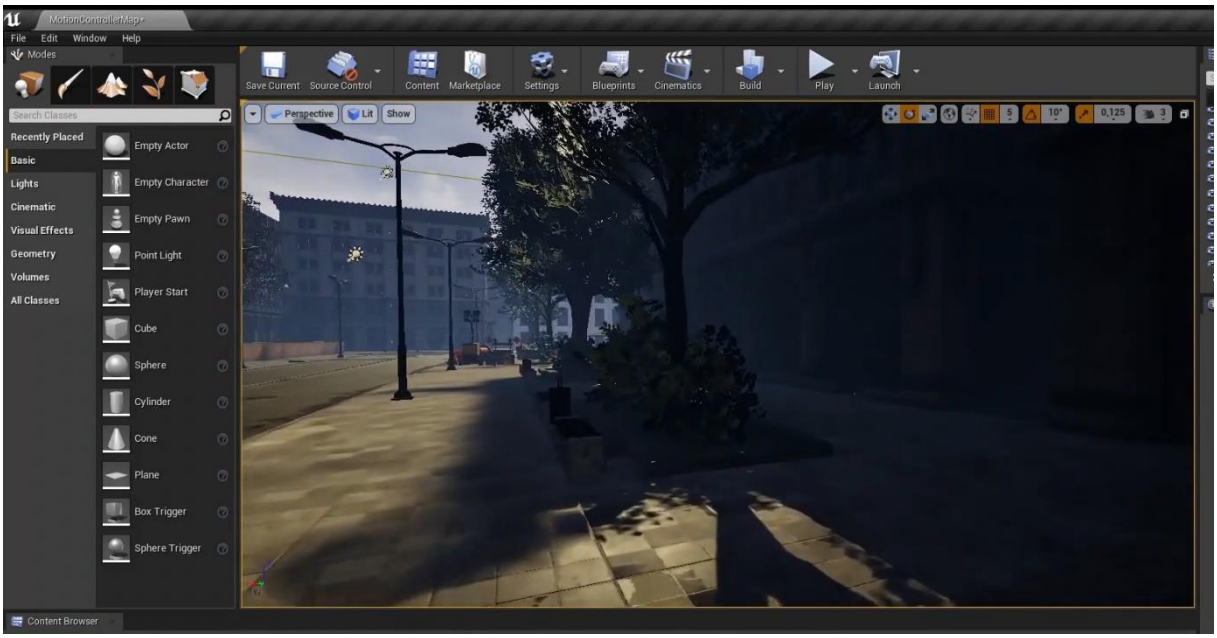

Figure 7. Screenshot of the VR prototype in Unreal, showing the outdoor environment.

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These two environments provide a good framework for developing training scenarios that cover the training domains identified in D3.1 with vehicle controls, approaching a building, scanning a space, entering a room, preparation for AMOK situations, weapons handling, and security/identity checks.

Following, several variations of the scenarios will be described and created that contain either individual cues or sequences of cues. These variations of scenarios will then be tested with respect to their ability to induces stress and create immersion.

Furthermore, the following contextual factors will be tested as additional or moderating stress cues in the later studies:

- Indoor: lightning conditions and noise levels
- Indoor (e.g. flat) vs outdoor (e.g. urban street)
- Outdoor: weather conditions and lightning conditions

In addition, a **combination of certain relevant stress cues and / or virtual human subjects** in the scenario should be analysed with respect to their stress inducement as well based on the requirement analysis (in D2.2), namely:

- Calling a police officer to a scene of action
  - The level of stress that is experienced depends on the type of situation to which a police officer is called, and the anxiety or stress can also be passed on by the operator to the first responder. A nervous phone hotline operator will trigger nervousness in the police officer. (using pre-recorded audio)
- Limited knowledge
  - Also limited knowledge about the situation, not really knowing what is happening or who is involved makes it more difficult to mentally prepare for the intervention and to already think about possible ways to solve the situation.
- Gender / age / appearance of humans in the scenarios (suspects and victims)
  - The level of stress that is experienced by the trainee might depend on characteristics of either the perpetrator (e.g. big, muscular men) or the victim (e.g. small child).

However, these human factors and / or scenarios rely on a more complex interaction of the trainee with the context and the contained human subjects / avatars in the scenarios and result in more complex scenarios. These scenarios will be covered by the human factors studies within Task 6.3 (‘Quantitative Analysis of the impact of (simulated) human influence factors on user behaviour, decision- making and user experience’).

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3.3 Study design

The identified cues (see section 2.2) as well as sequences of cues will be shown in the VR scenarios and assessed and validated with respect to their ability to induce stress and create respective immersion. This selection will comprise a repository of cues or sequences of cues that can be utilised for creating and personalising a broad range of training scenarios beyond the chosen scenarios.

Research Questions:

- What are stressful cues?
- Which stress levels do they induce?
- How well are they suited to induce stress in VR scenarios for police training?

Approach of the study

- Controlled User Studies with police officers
  - 20 participants (M/W)
- Users have to perform tasks in VR and rate their experience afterwards
  - Task duration: 2- 5 minutes

Tasks

- The participants must react in different scenarios according to their prior training
  - Scenarios showing stressful cues with different stimuli (single and sequences)

Data collection methods

- Task Load Index (TLX) questionnaire (AIT)
- Physiological measurements (UHEI)
- Visual analogue scales (VUA)

Data gathered

Measurement of several endogenous parameters such as heart rate (variability), movement parameters (accelerometer), psychological stress response, and investment of mental effort.

The investigation of inadequate physical condition or sickness is not subject of the study. The studies are conducted with police officers in a healthy and fit condition.

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3.4 Procedure

Study execution using VR and psychophysiological measurement suite:

Task	Description
Introduction	• Project and study • Informed consent
Introduction to the VR System and Tutorial	• Putting on VR headset (HTC VIVE Pro Eye) • Calibration of the eye tracking • Putting on equipment for physiological measurements • Controller handling & locomotion
VR scenario execution	• Information about situation • Target orientated approach in the scenario • Performing several scenarios
Post Experience Assessment	• Questionnaires (stress experienced, physical strain, fatigue, cyber sickness, UX) • Rating of different cues • Interview about perception (perceiving - thinking - feeling - acting) • Saliva samples
Qualitative feedback	• Self-reflection • Stress cues

Table 4: Description of tasks for study execution

3.5 Roadmap

- Design and description of short training scenarios containing individual or sequences of cues (approx. 3-4), partners involved: AIT, VUA, UHEI, LEA partners
- Preparing the VR demonstrators, compiling the cue repository and cue sequences and integrating them into the VR prototype. Partners involved: AIT
- Recruiting, done by VESTA with LEA partners.
- Study Execution using VR and psychophysiological measurement suite, partners involved: AIT, UHEI, VUA.
- Analysis of measurements (recorded movements, behaviour, physiological data, subjective answers to questionnaires etc.), identification and quantification of stressful cues or sequences of cues. Partners involved: AIT, UHEI, VUA.
- Assemble stress cue repository

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Figure 6 below depicts the content of the three planned observation and data acquisition phases (including the approximate number of stress cues used in each phase and the planned quantitative measures for each phase) for the stress inducement abilities of the basic stress cues. The three mentioned phases will be conducted rapidly upon relaxation of COVID-19 and travel restrictions and approval to conduct studies with VR headsets (cf. section 4 below). Physiological measures will be aligned with Task 4.2.

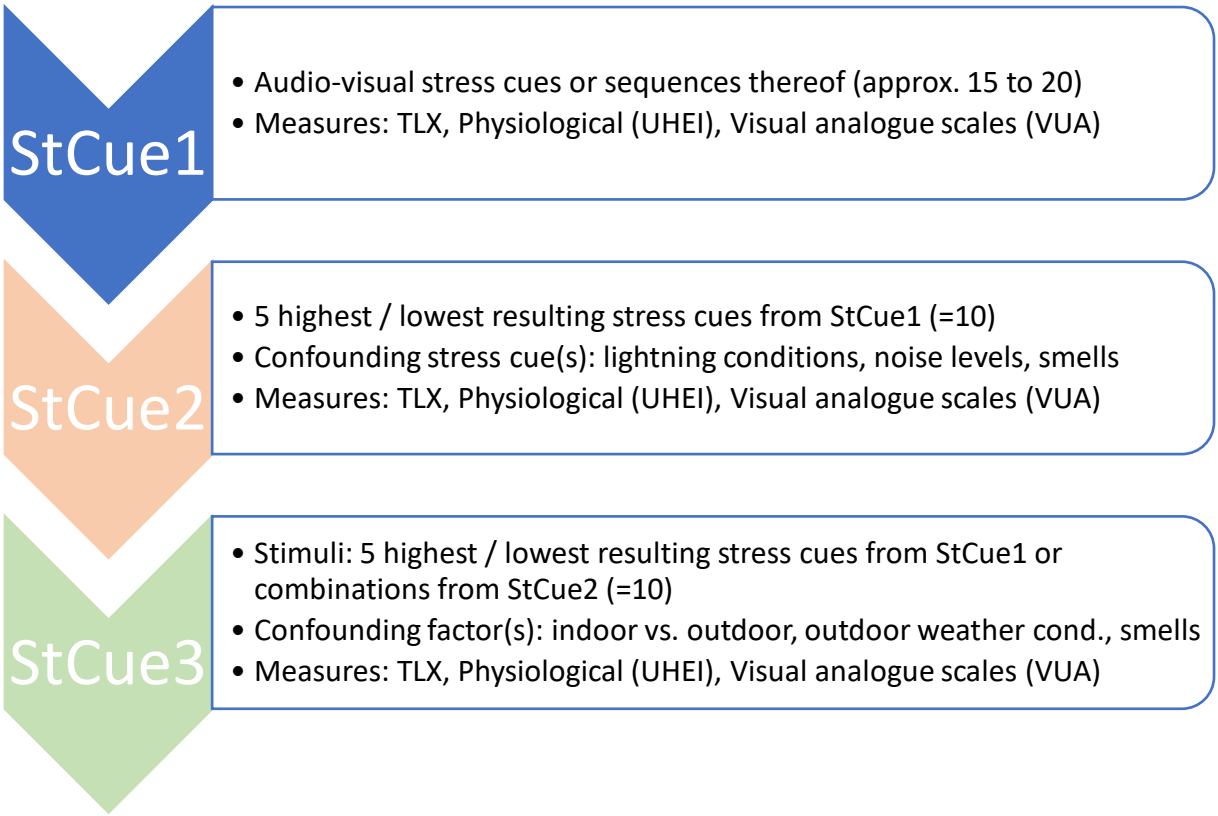

Figure 8: Overview of planned sessions and stress cues

These studies are aligned with the **D6.1 Human Factors Study Plan (M20)** and are scheduled in HFWeek1, where the study execution of initial stress cues and stress cues in training scenarios is planned and will investigate the potential of single cues and sequences of cues to induce stress.

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4 Current status due to the COVID-19 situation

Due to the COVID-19 lockdown in the European countries the final validation studies could not yet be conducted, and the finalisation of the VR training scenarios was behind schedule. A fully functional assessment setup is near completion and subjective experiments can be conducted.

Furthermore, the options to parallelise StCue2 and StCue3 are proven with respect to study content as well as technical equipment necessary in order to mitigate risks of project delays due to long study execution times.

According to the contingency plan for barriers affecting the collaboration with LEAs (see D1.4), if the activities cannot take place as planned (Level 0) measures will be taken that the activities can take place at least in a reduced manner, like using hand sanitizers, wearing masks or a negative test result of a COVID-19 quick test must be provided.

If travel is not possible, a remote study will be considered. This would require porting the VR research prototype to a simple VR system (e.g. Oculus Quest) and sending the hardware to the partners. Through an online instruction, people from the LEAs are then prepared to conduct the study, return hardware and the collected study data.

5 Conclusions

The aim of this deliverable was to investigate the suitability and effectiveness of audio-visual stress cues for use in VR training. Suitable stress cues were elaborated with the LEAs during the requirement analysis reported in D2.2 and some important stress cues were added to form the starting point from which the most effective ones are to be identified and selected by conducting a study. In order to conduct the studies at an early stage of the project and to have the necessary flexibility in handling and transporting the VR system, a simple VR research prototype was developed. This prototype includes a simple indoor and outdoor scenario that can be augmented with the stress cues.

The stress cues will be investigated in studies with police staff. For this purpose, people will be exposed to the scenarios with the VR prototype with various stress cues. The response of the persons to the respective stress cues will be evaluated by psychophysiological measurements and a repository of effective stress cues will be created. This repository serves as the basis for further developments and implementation of the training scenarios for the RE-liON system in WP5.

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