European Commission, Horizon 2020

FACTSHEET

Implementation considerations for VR Training

SHOTPROS

based on the D3.3 - European Framework for Training and Assessment (using VR) of DMA-SR Behaviour of Professionals

TARGET GROUP: policy makers & police academy management

WHAT TO EXPECT: Recommendations and guiding questions to make decisions regarding the implementation of VR training into existing training structures.

SOURCES: based on empirical and experiential findings of the research studies and feedback meetings of the SHOTPROS project

Note: There are separate available factsheets for policy considerations (outlining important areas to consider in the decision to implement VR training) and on didactical guidelines for VR training.

Which training areas are useful to train with VR?

VR is particularly useful for tactical training and perception and action training, such as exposure to armed perpetrators, tactical approach, room scanning, etc. VR is less useful for physical training, such as combat and fitness training. Below different training areas and the usefulness of VR for each area are outlined.

Training Area	Useful ness	Observation and recommendation
Tactical training	*****	The possibility of quickly varying location and scenario context in VR creates the groundwork for the training of tactical strategies in many different situations, from training tactical basics to applying these basics in a car procedure scenario or AMOK situations.
Perception and action	*****	In real-life, trainers are bound to the training location's infrastructure. VR offers different environments where a trainer can adjust and create cues quickly and on the spot, such as breaking a window, adding a door or an extra bystander walking in from behind. The trainees must perceive and respond to the changes that the trainer makes.
Law and regulations training	****	The after-action review (AAR) can be used to provide feedback regarding law and regulation that cannot be monitored and reviewed in real-life training (e.g., correct decisions on weapon use and how many civilians were endangered).
Communication training	***	VR is helpful for communication training because it allows quick customisation of the avatar's appearance (gender, skin, cultural aspects) and show how trainees respond to avatars. Expression of emotions by avatars is (currently) limited in VR. Trainees may make a different assessment of the situation if they cannot perceive subtleties such as facial expressions, eye movements and human features. Emotional expression of role-player avatars and non-playing characters (NPCs) is a work in progress and this limitation may be resolved in the near future and depending on the system of choice.
Shooting and weapon handling training	**	The AAR provides information about hit rates, shooting lines, cross-fire and other performance measures that cannot be monitored easily in real-life, and makes VR useful for training positioning in reference to the suspect and colleagues when using weapons.

		VR and its current technology has shortcomings for training the technique/action of shooting. Exact tracking (which would be necessary for exact shooting like in a shooting range) is a trade-off regarding mobility, size of the training field and size and power of the VR backpacks. Pistol aiming is therefore often not precise, there is a delay in movement, and reloading the weapon is not completely realistic. Again this depends on developments and system of choice. Within SHOTPROS we do not see VR as a subsitute for detailed technique training but as a training where different skills are combined, sometimes abstracted (e.g., less exact aiming) to follow the higher goal of scenario-based model learning and a focus on decision-making.
Physical training (combat, fitness training)	*	All actions involving physical contact (e.g., handcuffing, controlling and restraining of suspect, use of weapon) are not suitable for VR training due to safety for trainees and fragility of materials. They can only be a symbolic part of the VR training and have to be trained separately for gaining expertise.

VR training for whom? How to match VR training to the trainee?

Gender

The results from the SHOTPROS project so far showed that VR is equally suitable for men and women. There are no notable gender differences in VR activities, (stress) experience and quality of learning.

The VR training can further contribute to gender equality by:

- Using scenarios focusing on gender-discrimination to reduce officers' implicit gender-biased behaviours
- Using proper suits and a versatility of material sizes, available in sizes suitable for men and women
- Providing trainees with the ability to select their own avatar (that is the way they look in VR) during the calibration phase instead of the trainer selecting it for them

Level of experience/training:

Quality of learning in VR was higher for students with more practical experience as officers than trainees with mostly theoretical work experience. When planning to integrate VR training into existing practice, VR training is recommended for more experienced trainees who already possess basic skills, such as handcuffing and weapon use, to enable them to use the skills in

an integrated fashion in scenarios and not practice segmented skills only. Learning experience and engagement with the VR training tool was highest for more experienced police students who received closed training instructions compared to less experienced students or more open instruction. Clear and directive instructions seem particularly helpful for experienced trainees.

How much VR training is needed?

Because training practices across LEAs in Europe differ in volume (duration, frequency, and components), this question cannot be answered unequivocally. There are, however, indications to implement VR training more frequently at the end of an existing training program, as more experienced trainees are more engaged and have a higher learning transfer. Furthermore, it is easier for already experienced officers to combine different skills in scenario-based approaches like in the VR.

Should VR training be given before or after real-life training?

There is currently no substantial evidence that it is better to do VR training before or after real-life training. When planning to set-up a training day, police practitioners can develop a training block of VR- and real-life training independent of order and based on the availability of training spaces and resources.

How long should the VR training session last?

The duration of a high-quality and effective VR training session should be a minimum of 1.5 hours to ensure sufficient training of DMA-SR behaviours and allow for sufficient execution time in VR. To make extensive use of the VR after action review (AAR) tool, the duration of a VR session should be extended to a minimum of 2 hours.

What do trainees do in a typical VR training?

Based on experiments, a VR training typically comprises of the following training activities:

- Preparation (putting gear on, calibrating, VR tutorial, material check)
- Instruction (instruction of exercise, role-player and officer, tutorial scenario)
- Execution (actively engaged in a training scenario as a role-player or officer)
- Feedback (from the trainer, from other trainees, self-reflection, AAR).
- Waiting (trainer is busy, operator is busy, social time)

In the table below, we summarise for each training activity what we observed in SHOTPROS studies and try-outs, and we provide recommendations based on these observations.

Observation	Recommendation
Preparation: Time spent on preparation was higher in VR than in real-life. Trainers who had previous experience with the VR system and training had up to 10 minutes shorter preparation time than less experienced colleagues. So, with experience with VR, preparation time will decrease. There is evidence that the longer the preparation time and waiting time in VR, the less stress and mental effort trainees experienced, which is undesirable for realistic training for stressful and high risk situations. A tutorial scenario proofed to be very valuable.	Be aware of the higher preparation time that VR training requires at the beginning. The duration of a session should be a minimum of 1.5 hours to ensure sufficient training of DMA-SR behaviours. Trainers should familiarise themselves with the VR set-up beforehand to reduce preparation time in a VR session. Use a strict protocol to reduce preparation time and waiting time of trainees. Consider using a tutorial scenario to enhance trainees' focus on execution instead of novelty of the VR material and habituation.
Instruction: Time spent on instruction was lower in VR than in real-life. Trainers indicated that a relatively large amount of instruction was part of VR-specific instruction (how to use VR, risk of gamification, etc.) and less time was spent on task-oriented instruction (instructing task). Learning experience and engagement with the VR training tool was highest for more experienced police students who received closed training instructions.	Time spent on VR-specific instruction should remain short and should not impede execution time. It will decrease with the increase of experience by the trainees. Provide very specific training-instructions to trainees containing what the VR scenarios will look like (e.g., estimation of the number of repetitions, insights into the VR scenario environments, etc.) and what level of difficulty they will train at (e.g., the level of threat that will be encountered). This is particularly important when training with more experienced trainees.
Execution: Frequency and time spent on execution was higher in VR than in real-life, indicating that in VR, trainers were able to achieve more practice in the available time than real-life. The higher the number of variations, the higher trainees evaluated their quality of learning and perceived the quality of feedback.	Training time is precious, so it is essential to achieve as much execution time as possible within the available time. Consider VR as training tool for suitable training areas (see above) and for which learning is mainly grounded in action and less in instruction or reflection (i.e., cognition). The trainee's experience seems strongly related to the amount of scenario variation. Hence, focus on as much variation as possible.
Feedback: AAR is time-consuming. In time-pressed training situations this can reduce execution or repetition time. The higher the number of repetitions and variations, the less time was spent on feedback. But trainers referred to VR as a superior tool for providing objective and accurate feedback. Thus, making use of AAR requires specific attention and enough time.	VR offers unique feedback opportunities (playback from different perspectives, pausing critical moments and reviewing performance indicators). Trainers should become competent in using the AAR options, so they are confident in using the system as they see fit and are not held back by insecurity or lack of competence. Include time for it in the training session. (min. 30 min)

What are the tasks of the trainer in VR?

Evidence within SHOTPROS suggests that the influence a trainer has on training is even more prominent in VR compared to real-life training. A trainer should be experienced in providing scenario-based trainings, and possess some level of technological skill. Some of the tasks of the trainer are similar to real-life training, other tasks are specific to VR. Both tasks are summarised in the table below. VR specific tasks may require additional training of trainers to be able to conduct VR training sessions.

Trainers' tasks in VR that are similar to real-life training
Providing clear assignment of the training: learning objective
Providing instruction for the exercise and scenario instruction to officer(s) and role-player(s)
Checking material and equipment, such as weapon change and personal property of trainees
Providing a clear start and end point of a scenario
Monitoring trainee execution and progress of scenarios
Providing feedback after scenario execution

Trainers' tasks that are specific to VR training
Providing guidance and support to the operator while trainees put VR gear on
Providing guidance through the tutorial scenario
Selecting a training environment and scenario that fit the learning objective: make use of the risk assessment tool (see D4.7) and provide information material before the training to the trainees, role-players or fellow trainers
Cooperating with VR system operator and/or using the Stress Cue Control Panel (see D4.5) to adjust scenario, stress level, and tools
Changing the behaviour of the role-player during the scenario through adjusting their movements by guiding them directly via headset without trainees being able to notice. NPCs that are animated and controlled automatically need to react more realistically according to feedback from LEAs. Therefore, also direct reactions executed by the trainer in the Executive Control Station are a necessary requirement towards a VR solution and offer the trainer direct and indirect steering of the scenario by changing the NPC reactions (see D4.6)
Operating and analysing with AAR system