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D4.4 - QROC Workshop results on capabilities, technology availability and innovative use cases

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Definitions, Acronyms and Abbreviations

ACRONYMS / ABBREVIATIONS	DESCRIPTION
QROC	Quick Response for Operational Centres
OC	Operational Centre
WP	Work package
TRL	Technology Readiness Level
LEA	Law Enforcement Agency
SA	Situational Awareness
COP	Common Operational Picture
RFI	Request for Information
OSINT	Open Source Intelligence
CCTV	Closed-circuit television
UGV	Unmanned Ground Vehicle
ANPR	Automatic Number Plate Recognition
CBRN-E	Chemical, Biological, Radiological, Nuclear, and Explosives

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Executive Summary

This report describes the results of task T4.4 "QROC Workshop on capabilities, technology availability and innovative use cases" within the research project Quick Response for Operation Centers (QROC).

When an operational centre (OC) has assessed the current state of their capabilities and their capacity for change, they need to be informed on the realistic possibilities of new technologies. Guided by the outcome of these assessments D4.1 and D4.2 ([1][3]), and of the market scan D4.3 ([4]), this task specifies innovative OC use cases for 5G, autonomous drones and for video and data management systems, in the context of improved international communication.

In this report we describe the methods we used to define the innovative use cases and we present an overview of the use cases selected and developed by the LEAs, based on their user needs. The goal of the use cases is to specify the needs of the LEAs and envision what the impact of new technologies could be.

A series of online workshops was performed to gather input for the use cases from the participation of about 30 OC representatives. The contribution of, and interaction between, the OC representatives is a valuable input for the innovative use cases. Due to the limitations caused by COVID-19, an alternative for the originally planned two-day face-to-face workshop was found in a first online workshop with all OC representatives, followed by several smaller online workshops (e.g., workshops 2 and 3). The three workshops (series) all have separate results, and each of these results contributed to the final result, six elaborated innovative use cases for OCs:

1. Intel analysis start incident at OC
2. Verification and validation of first information at the scene
3. Local threat assessment
4. Decision making process at the OC
5. Pursuit of a suspect
6. Secure the safety in a specific area

The presented use cases provide a picture of the added value of innovative technology for use cases and can be used to further assess the added value for innovative technology.

A selection of the specified use cases will be built into demonstrators (TRL 6). These demonstration tools will focus on their relevance for OCs of these technologies. The demonstrators can be used to further simulate the impact of technology on the OC's. During the table top exercises the LEAs will perform different exercises. Some of the use cases will be integrated in the table top in a way in which the LEAs can experience the added value of the use cases. Either by a description of the use case in a scenario or in a demonstration.

1 Introduction

1.1 Goal

This report is the product of task WP4.4 “QROC Workshop on capabilities, technology availability and innovative use cases” within the research project Quick Response for Operational Centers (QROC).

OCs rely on a combination of multiple capabilities, often provided by supporting services, many of which are affected by the data tsunami. Examples of these capabilities are related to situational awareness (e.g., monitoring of complex situations, localization, manhunt, identification), and the management of CBRN incidents (detection, containment, evacuation, etc.). This gained knowledge will be used to identify relevant available technologies, and to specify and develop innovative use cases based on relevant technologies for OC’s (TRL 6).

When an OC has assessed the current state of their capabilities and their capacity for change, they need to be informed on the realistic possibilities of new technologies. Guided by the outcome of these assessments, and of the market scan, this task will specify innovative OC use cases for 5G, autonomous drones and for video and data management systems, in the context of improved international communication.

In this report we describe the methods we used to define the innovative use cases and we present an overview of the use cases selected and developed by the LEAs, based on their user needs. The goal of the use cases is to specify the needs of the LEAs and envision what the impact of new technologies could be.

1.2 Relation to other work packages

This task has close relations to other activities and work packages in the QROC project. The relations are described in this paragraph and visualized in Figure 1.

1.2.1 Input

As input for this task the results of T4.2, T4.3, T5.1 provide inspiration and input for the use cases to be developed:

User needs (T4.2)

The results of T4.1 and T4.2 ([2],[3]) provides us with information on the operational context and current state of OCs capabilities to build situational awareness (SA). The user needs identified with the LEAs, concerning improving the following situational awareness capabilities, are on:

- Information gathering
- Information sharing
- Information storage
- Information integration
- Information interpretation
- Information projection

The user needs are the needs that are addressed in the use cases to be developed.

Market scan (T4.3)

The Market Scan of T4.3 ([4]) provides a structured overview of the emerging technologies and prioritized solutions currently available on the market to improve the situational awareness capabilities of OCs. The use cases will show possible implementations of these solutions (example products) in the context of OCs and the specific scenarios. The following technologies are envisioned for the QROC project:

- 5G-based technology,
- Intelligent data management technology
- Drone-based technology

These technologies have 'capabilities', which can meet the user needs. For example, a drone provides the functional capability to have 'eye's from the air' at a specific location. These functionalities of the technologies are opportunities to meet the desired user needs. However, introducing new technologies will also introduce new risks, e.g., possible downsides of the technology (for example limited airtime of a drone due to limitations on the battery life) or even introduce new user needs. In preparation of, and during the tabletop exercises, the new technologies will be presented and demonstrated to the LEAs in different ways. This can be in written form, illustrated in use cases, or can be presentations or demonstrations of the different technologies.

The 'capabilities' identified in the market scan provide possible solutions to be implemented in the use cases in order to meet the user needs.

QROC Scenarios (T5.1)

The three QROC scenarios from T5.1 (QROC Deliverable D5.1 "QROC Training scenarios"[5]) define the context in which the use cases could take place. These are a Manhunt scenario, a CBRNE scenario and a Crowd Management scenario. These scenarios can be used for inspiration for this task.

1.2.2 Output

The output of this task provides inspiration for, and can be used in, the table top exercises 2 and 3 and for the development of the demonstrators of T4.5:

Table top exercises (TTX 2 and 3)

During the table top exercises the LEAs perform different exercises. Some of the use cases will be integrated in the table top in a way in which the LEAs can experience the added value of the use cases. Either by a description of the use case in a scenario or in a demonstration.

Demonstrators (T4.5)

A selection of the specified use cases from T4.4 will provide input for T4.5 – Develop demonstration means. In this task some use cases will be built into demonstrators (TRL 6) based on the existing results of Union funded projects. These demonstration tools will focus on their relevance for OCs of these technologies. Using the output of the assessments of national OCs (T4.2), they will be built in such a way that they are highly transferable to other member states. Hardware and software (TRL 6).

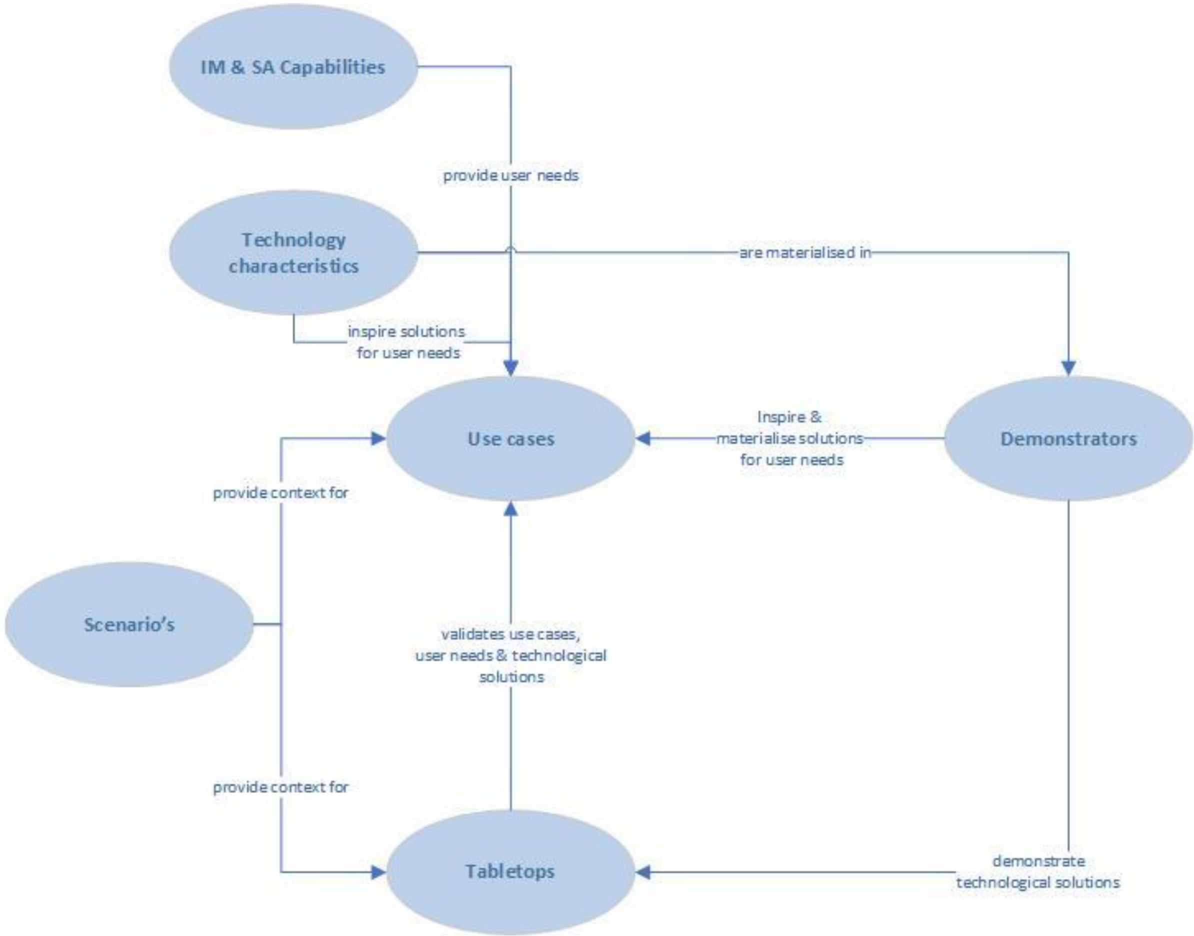

Figure 1: Schematic overview of relations to other tasks or work packages.

2 Approach

This chapter describes the approach we used to define and write the use cases in interaction with the LEAs. First is described how we define a use case, followed by the description of the workshops in which we worked in interaction with the LEAs to define and write the use cases.

2.1 QROC use case definition

A use case is a written description of how users will perform tasks with a system. It outlines, from a user's point of view, a system's behaviour as it responds to a request. Each use case is represented as a sequence of simple steps, beginning with a user's goal, and ending when that goal is fulfilled [1].

The benefits of use cases are that they help explain how a system should behave and, in the process, they also help brainstorm what could go wrong. They provide a list of goals and this list can be used to establish specifics of the system. Use cases help to envision what new technology can bring for the user. For end-users it is a means to formulate their needs towards (new) technology. Use cases can help technology developers to better understand the context, goals, tasks, and needs of end users, therefore resulting in a better match between the user needs and supporting technology.

A common format in which a use case can be described is shown in

Figure 2. A use cases provides information on who is using the system (the actor), the users goal (what the user wants to do), the steps the user takes to accomplish this goal and how the system should respond to a user action. Note: the use case does not include implementation specific details of technologies or user interfaces of the system (technology).

[UC_Nr]	Number used to link requirements and claims to use case.
Goal	What is achieved by carrying out the use case.
Actor	Main human (or possibly machine) actors.
Precondition	The state of the system or user just before using the function.
Post condition	The state of the system or user just after the function was used.
Trigger	Defines the event (e.g., time, alarm) when a user needs the functionality or how the system knows that the function needs to be carried out.
Action Sequence	A top-to-bottom description of an easy to understand and fairly typical action sequence in which the actor's goal is accomplished.
Alternative AS	Other ways to succeed, and the handling of the most important failures
Requirements	List of requirement-numbers that link to this use case

Figure 2: Format of a use case

A use case in the context of the QROC project takes into account the user needs of the LEAs (including results from T4.2 and table top exercises). The use cases are inspired by and can take place in the context of the three QROC scenarios (T5.1). The future systems described in the use cases are also inspired by the input of the market scan (T4.3).

Therefore, a use case = user need + technical capability, and takes place in the context of / as a detailed part of a scenario.

A selection of the specified use cases from task T4.4 will be built into demonstrations (T4.5). These demonstration tools will focus on their relevance for OCs of these technologies.

2.2 Workshop approach

The original approach was a two-day workshop to gather input for the use cases from the participation of about 30 OC representatives. The contribution of, and interaction between, the OC representatives is a valuable input for the innovative use cases. However, due to the limitations caused by COVID-19, alternative ways for the workshop were explored, resulting in the following approach: a first online workshop with all OC representatives, followed by several smaller online workshops (e.g., workshops 2 and 3).

Because of the switch from face-to-face to an online setting, the number of participants per session is limited, in order to better facilitate the desired interaction between participants, and participants and facilitators. This meant repeating the same session more than once to gather information from all OC representatives. The duration of a session is also limited in time, because of the expected smaller span of attention in online meetings.

The three workshops (see Figure 3) all have separate results, and each of these results contributed to the final results; the defined use cases in chapter 3. In the series of creative online sessions, we incorporated the following activities with the workshop participants:

1. Learning about use cases and exercise with writing use cases together.
2. Sharing and exploring the envisioned technologies, example products and demonstrators in order to identify interesting technical capabilities that could address the users' needs.
3. Sharing and exploring scenarios in order to identify and prioritizing relevant use cases.
4. Writing first drafts of prioritized use cases.
5. Elaborate on and refine the prioritized use cases.

Figure 3: Overview of workshop series

2.2.1 Workshop 1

2.2.1.1 Goal

This online workshop was conducted in July 2020, as part of the General Assembly Meeting. The duration of the workshop was half a day, and we conducted this workshop twice with two different groups of around twelve participants each. The goal of this workshop was to get acquainted with each other, with the concept of use cases, and to gain experience in writing a use case together.

2.2.1.2 Method

The workshop consisted of three parts, the first one containing an introduction and some icebreaker exercises, followed by two rounds of use case writing.

During the introduction we did some exercises to warm up and to get to know each other better. Participants had to change their online username to the location where they were (name and country) and then they had to change it to the company they work for (name and company). Followed by answering several statements by answering with yes or no. Everybody had to stick a post-it on their camera. If the answer to the statements was *'yes'*, they had to take of the post-it from the camera. If the answer was *'no'*, they had to leave the post-it on the camera. Examples of the statements: *"Today I work from my home office", "I have operational OC experience"; "I have a technical background".*

After the warm-up exercises, we explained how to write a use case and we gave them an assignment to write a use case by using the use case template (see Figure 2). Because the goal was to get acquainted with writing a use case, we decided to use the 'fishbowl technique'. With this technique a part of the group participates in the exercise and discussion (e.g., the 'inner circle'). The inner circle leaves their camera on and unmutes their microphone. The rest (e.g., the 'outer circle') listens in and adds insights and questions in the chat. The 'outer circle' turns their camera off and mutes their microphone. The ''inner circle' can use the input from the 'outer circle' in the chat for their discussion. This way you can activate a bigger group. During the second round of use case writing, the inner and outer circle switches for both groups having both learning experiences.

2.2.1.3 Results

These first workshops resulted in four preliminary use cases. The experience gave the participants a picture of what a use case is and insight in the challenges of how to write it. It gave us also a good idea of how to set up the next online workshops.

2.2.2 Workshop 2

2.2.2.1 Goal

The second online workshop was conducted in January 2021 with consortium partners from T4.4, T4.5 and T5.1. This workshop was online and supported with an online brainstorming tool. The goal of this second workshop was to identify a first list of possible relevant use cases. This first list would be the starting point for the following workshops with the LEAs.

2.2.2.2 Method

For this workshop we set up a program of three parts. After an introduction and experiencing the online brainstorm tool, we started with a brainstorm on possible technical capabilities of technologies, inspired by drones, 5G, intelligent video management or communication systems. Some examples of technical capabilities are: following people or vehicles, detecting details (e.g. text, images, people, postures, tattoos, objects), behaviour detection or sharing a COP (Common Operational Picture).

After the brainstorm on the technical capabilities, the second part was to identify the user challenges inspired by the scenario for the second table top exercise, being the CBRN-E scenario. Examples of user challenges for this scenario are: search for the identity of a driver, look inside a car (remotely at a safe distance) or redirect the public to ensure safety.

The third part of the brainstorm was to combine the identified user challenges with interesting technical capabilities, and thereby defining the first ingredients for several use cases. Based on these combinations, we could identify seven possibly interesting use cases. During the workshop one of these use cases was elaborated into more detail.

2.2.2.3 Results

This workshop resulted in a first list of user challenges (e.g. needs), a list of possibly interesting technical capabilities, a list of possibly interesting use cases (see paragraph 3.2) and one use case elaborated into more detail. The results provided a good starting point for the sessions with the LEAs (see Workshop 3).

2.2.3 Workshop 3

2.2.3.1 Goal

In February and March 2021 five separate online workshops were held to elaborate on the use cases with the LEAs. The goal was to write innovative OC use cases for emerging technologies.

2.2.3.2 Method

In preparation of the use cases, the first list of possibly interesting use cases identified in the second workshop, was shared with the LEAs, for a first prioritisation of these use cases from their own operational point of view; what use case they perceived as most interesting, or important to elaborate. The participants for the workshop were invited based on their availability and their preference for one of the use cases.

The number of participants per session was limited due to the desired interaction between the participants, and participants and facilitators. In each session three or four LEAs from two different organizations participated. This means that we had several sessions in order to gather information from all OC representatives. In total 10 different LEAs participated.

Each session started with a warm-up exercise to stimulate the creative thinking process. The participants had to find an object in their surroundings that represented the "OC of the future" for them. This gave us a first impression of their view on a future OC and what would be important in such a future scenario. For the participants, it was a first step to change their mindset out of their daily work and into out-of-the-box thinking.

The second part of the session was a brainstorm of capabilities that could be used in the use case of their choice. We did this in three rounds. First a general brainstorm, then zooming in on ideas for using specific technologies (e.g., drones, video management system). For example:

a. *What are ways to verify and validate information?*
b. *With drones?*
c. *With video management systems?*

Based on this brainstorm output, the participants selected the most interesting capabilities for their use case. These capabilities had to be included in the use case.

Finally, with these ingredients the participants wrote a use case together using the predefined template that is presented in Figure 2.

2.2.3.3 Results

The result of each workshop was one use case that was elaborated by the participants conform the template (Figure 2). In total five use cases were defined. After the workshops, these use cases, and the use case from Workshop 2, are finalized by the project team and presented in Chapter **Error! Reference source not found. Error! Reference source not found.**.

3 Use cases

3.1 Introduction

This chapter gives an overview of the use cases selected and developed together with the LEAs, based on their user needs. Paragraph 3.2 provides an overview of the six identified relevant use cases. In paragraph 3.3 the use cases are described and elaborated in the use case format shown in Figure 2.

The use cases are scenario-non-specific and can be applied in the context of different scenarios (e.g., Manhunt, CBRN-E and Crowd management). The use cases appear to be time-sequential but can be treated as independent descriptions of actor-system interactions.

3.2 Overview of identified relevant use cases

Title	Description
1. Intel analysis start incident at OC	This use case focuses on the first information gathering, prioritizing and analyses at the start of an incident at the OC.
2. Verification and validation of first information at the scene	This use case focuses on additional information gathering and the interpretation of an incident at the scene.
3. Local threat assessment	This use case focuses on gathering detailed information at a possibly dangerous location (e.g., about vehicles, objects, or dangerous infrastructures), for example in order to identify or assess a possible threat (e.g. bomb, guns, explosives, …).
4. Decision making process at the OC	This use case focuses on the decision-making process (scenarios, interpretation) and command and control at the OC.
5. Pursuit of a suspect	This use case focuses on gathering cross border detailed information on a suspect and (the localization and) pursuit of possible suspects (e.g., by car or foot), while maintaining the safety of the public and police.
6. Secure the safety in a specific area	This use case focuses on managing the crowd at the scene (e.g., people, traffic, evict houses) in order to ensure safety (and reduce panic) and allowing emergency services to take measures to mitigate the threat (e.g. letting through approaching emergency services)

Table 1: Overview of identified relevant use cases

3.3 Use cases

3.3.1 Intel analysis start incident at OC

Intel analysis start incident at OC	
Actor	Dispatcher
Goal	The goal is to obtain as quickly as possible a first picture of the situation at hand in the first minutes of the incident (e.g., what, where, when, how many, details of suspects)
Precondition	There has been an incident and first eyewitness call(s) to the OC.
Postcondition	We have enough information to make a first decision and sent the right (human) resources to the scene.
Action sequence	1. The dispatcher at the OC receives a videocall from an eyewitness about the incident. Cross database search 2. Automatically, a smart system performs a cross database search (e.g., police databases, OSINT, Google) by using the information distilled from the call. It searches for information on the caller, known knowledge or history on the caller and incident location (for example content on previous calls to the OC). a. The system can 'read' information from the dispatch system (e.g., keyword recognition). b. The system can 'hear' the conversation between the dispatcher and the caller (e.g., text-to-speech, emotion detection). c. The system can 'see' the images (e.g., video) shared by the dispatcher and the caller (e.g. facial recognition, emotion detection). d. The system 'knows' the location of the caller. 3. The system presents the search results next to the main workspace of the dispatcher, in short notifications, as secondary information. 4. The dispatcher sees the information next to the other relevant information, which helps for better interpretation of the incident, of the call and getting a better picture of the caller. For example: a. The dispatcher sees the emotional state or stress level of the caller indicated by the system. b. The dispatcher sees that the caller is a local citizen and might be able to provide some inside information on the neighbourhood. Incident location 5. The system also shows information about the incident location and caller's position. a. The system searches for current and relevant historical calls in the vicinity of the incident. Based on the content of the call (type of incident), the system can decide which calls are possibly relevant for this incident. b. The system searches for recent images of the incident location (e.g., recent pictures and videos, maps, knowledge on infrastructure, …) c. The system searches for live CCTV availability at the incident location.

	6. The system returns its search results to the user interface of the dispatcher in a geographical view. 7. The dispatcher sees all relevant information in one integrated geographical overview of the area of the incident. a. The map shows the position of the incident and the caller(s). b. The dispatcher sees all other relevant current and historical calls presented on the same map-view. c. Based on the type of incident, analysed by the system and confirmed by the dispatcher, relevant additional map-layers are shown (e.g., critical infrastructure, traffic information) d. The map also shows the police units in the vicinity, their available capabilities (for example: a drone on the backbench) and CCTV availability. 8. Next to the geographical overview, other non-geographical information is presented to the dispatcher. a. The by the system identified relevant pictures and videos are presented. b. Next to the map-view the system provides the information about the historical and recent calls. Live view 9. Based on this first information gathering, the dispatcher informs the commander of the OC. 10. After short deliberation with the commander, the dispatcher activates via the map the surveillance drone nearby visualized as available. 11. The dispatcher gives the assignment to the drone, by indicating the destination on the map, to fly to the incident location and obtain live images to obtain a better current picture and monitor the situation until the first police units arrive at the scene. 12. The drone quickly flies to the incident location and has no troubles from traffic or inhospitable areas such as crossing water or forests. 13. Arrived at the location, the drone provides the OC the live picture of the situation.

3.3.2 Verification and validation of first information at the scene

	Verification and validation of first information at the scene
Actor	Analyst at the OC
Goal	The goal is to obtain an accurate picture of the scene of the incident and verify and validate the first information.
Precondition	The first information gathering at the start of an incident at the OC is done (e.g., incoming calls of eyewitnesses at the OC). Emergency units are on their way to the scene of the incident. There is a need for reliable information.
Postcondition	The first information of the scene of the incident is verified and validated.
Action sequence	1. The analyst at the OC wants to have a clear verified and validated picture of the situation at the scene.

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2. At the same time, police units are approaching the incident location. To obtain a broader orientation of the surroundings of the incident they sent their pocket-size drones (available in their police cars) ahead.
3. Several smaller drones scan the area and provide the OC with images.
4. The OC can form an impression of the incident spot and its surroundings. With the images of the drones, the OC provides areal support to the approaching units in the field.

Information analysis
5. Meanwhile at the OC, the analyst starts with the analysis of the information provided by the eyewitness calls and cross database searches.
6. The system has translated the call via speech-to-text to the system. A smart algorithm compares the eyewitnesses’ statements and indicates the analyst on similarities or contradictive information by highlighting this information (green is similar information, red is contradictive).
7. The dispatcher scans the search results and decides, based on the reliability and relevance (e.g., based on topic, topicality and place) to hide or dismiss some of the information.
8. The analyst sends the information to the local units and asks them to verify the contradictive information.

Video analysis
9. The system has gathered based on the type of incident scenario-specific information. The system tries to identify and validate the scenario specific information with available images and video feeds; The system for example looks for:
a. People present (e.g., numbers, alive/dead/injured, ...)
b. Behaviour of people or vehicles (e.g., running, walking, directions, panic, …)
c. Information about the surroundings (infrastructure, traffic, possible fleeing routes of perpetrators)
10. The analyst receives the information from the video analysis system. Combined with the eyewitness analysis, this helps him to understand what has happened and still is happening at the incident spot.
11. The commander at the OC shares these findings with the police units at the scene of the incident.
12. As soon as the OC and police units in the field establish the surroundings of the incident as safe, the police units in the field start securing the spot and existing tracks.
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3.3.3 Local threat assessment

Local threat assessment	
Actor	Operator OC
Goal	The goal is to identify and assess a possible threat (e.g., bomb).
Precondition	There has been a notification to the OC of a possible threat (e.g., a suspicious vehicle or object, or possibly unstable infrastructure)
Postcondition	The threat assessment has been performed.
Action sequence	1. A call arrives at the OC notifying the operator about a suspicious vehicle left nearby the train station. 2. To obtain situational awareness of the situation and area, the operator gathers, with the support from the smart search system, geographical information from OSINT (e.g. map, pictures). 3. Based on this information, the operator decides to send a drone to the spot for a first inspection of the situation. 4. Very easily the operator clicks on the location on the map and sends the drone to the specific space. 5. The drone reports its ETA to the operator and activates a high-quality live feed when it arrives within the vicinity of the area. 6. The operator receives a notification that the drone is nearby and takes over the drone with manual control. 7. The operator looks at the images and checks for indications of heavy load or other suspicious signs. 8. The video analysis system meanwhile detects the license plate of the vehicle and tries to reidentification the vehicle from historical images available from CCTV. 9. The system returns to the operator that the vehicle has been notified as stolen and parked at the specific location for 3 days. There is no information on where the car came from before arriving at the spot. 10. Based on the risk assessment of the information gathered by the drone, the operator informs the commander of the OC. 11. The commander decides that it might be too dangerous to get close to the vehicle and decides to approach the vehicle with a UGV (unmanned ground vehicle) for further inspection. 12. The operator at the OC controls the UGV which takes a closer look, providing a different perspective then the drone and uses sniffers (sensors) on the UGV to identify substances as gas or fertilizer. 13. The UGV sends the results to the OC, where next decisions are taken.

3.3.4 Decision making process at the OC

	Decision making process at the OC
Actor	Commander OC
Goal	The goal is to take all relevant decisions that contribute to apprehend a perpetrator, prevent further casualties, and ensure public safety.
Precondition	The duty officer(s) at the OC received information and created the first view of the information. First responders are in place.
Postcondition	The commander OC has a clear picture of the possible interventions, including corresponding advantages and disadvantages of the interventions, and they are ready to take the next decision.
Action sequence	1. The commander OC (and OC team) look at the common operational picture, where the first incident information is displayed. a. They see a geographical map of the incident location and surrounding environment. b. On the map they can see an icon of the incident and the location, the units in the field and available and active drones and CCTV. c. Based on the type of incident, all relevant information, such as critical infrastructure, is presented in layers on the map. d. Next to the geographical view they see all relevant information for their situational awareness presented. 2. The system provides an overview of possible scenarios and risks, based on the available information. 3. They click on the 'look ahead' symbol on the geographical map and - based on the speed of the target, the incident location, the information of the eyewitnesses, - a prediction of different fled routes is displayed on the screen. 4. The team is interested in the prediction of possible routes of the perpetrator to be able to take measures and apprehend the person. 5. The commander OC (and OC team) select the drone capability (multiple drones) via the map and three points on the different routes that have their interest. 6. The commander sends the drones to these spots to gather additional information of these routes. 7. With the help of the live feed of the drones, the commander checks what blocking options there are for each of the routes. The team discusses the risk and advantages of these options (e.g., safety of public, surrounding critical infrastructure, traffic information). 8. The commander checks on the map what units are close-by these possible routes and sends them an update (COP) about the perpetrator and ask them to go in position.

3.3.5 Pursuit of a suspect

Intel analysis start incident at OC	
Actor	Commander OC
Goal	The goal is to identify, track and trace a suspect in a cross-border collaboration setting.
Precondition	There has been an incident. First calls and first information arrived at the OC. Emergency units are at the crime scene. Suspect(s) fled heading across the border.
Postcondition	The pursuit is under control and the neighbouring country is informed and prepared for action when needed.
Action sequence	1. Commander OC of country A receives information about the flight of one or more suspects from the scene of an incident, possibly heading in the direction of the border of country B. Identification suspect 2. Video analysis of available CCTV and eyewitness statements, indicate that the suspects are possibly of foreign nationality (e.g. country B). 3. The commander OC-A reaches out to the NOC of country B with a request for information (RFI) on the suspect and shares visual information about the suspect and the incident at hand. 4. With the information an analyst at OC-B performs a cross-database search including all historical and real-time sensors, e.g., facial recognition on the images received from country A. 5. The system returns several hits to the analyst. 6. The analyst of country B decides to do an advanced search on these possible suspects: where might they go (e.g., family in country A or B, friends, prior convictions, modus operandi/backlogging). 7. Country B found as an answer via OSINT on the RFI: a recent posted manifest from one of the suspects. 8. The system B returns the information including a red flag with a warning for police officers to OC of country A, including the history of the main suspect using violence against public or police. The warning is also sent automatically to all involved parties. Tracking & tracing 9. Based on the information of the main suspect and the vicinity of the border, there is a possibility the suspects are heading cross border. 10. The predictive algorithm shows possible, and the likelihood of flight routes based on geographical information in a heatmap visualization. 11. There is new incoming information: an incoming call from an eyewitness about a car accident, also providing a license plate of the car that crashed into his car but fled the scene with high velocity. 12. The system relates the crashed car to the modus operandi of fleeing suspects and eyewitness statements of scene (e.g., a blue car spotted fleeing the scene with high velocity). Based on this information, the position of the crash, the algorithm recalculates the prediction of possible routes.

	13. Via ANPR the license plate is tracked, and the latest position is shared with both OCs. 14. A drone fitted with powerful zoom lens is sent to the highway to read car license plates from a distance. The right car has been tracked and a decision can be made on how and when to stop the car.

3.3.6 Secure the safety in a specific area

	Secure the safety in a specific area
Actor	Operator OC
Goal	The goal is to monitor a demonstration and ensure the safety of the people of the demonstration, the public and close infrastructure.
Precondition	There is a demonstration in place, which has been announced on a very short notice. The demonstration is about a politically sensitive subject, there is a serious risk of escalation.
Postcondition	The demonstration ended well and safe. The rioters are identified.
Action sequence	Monitoring 1. The operator sends a swarm of drones from a police station to monitor the crowd over a longer time. 2. The drones send streaming live video to the OC. 3. The video analytics system receives the images and estimates over time how many people are present, what the sentiment of the crowd is and monitors whether people in the crowd are using of alarming symbols (e.g., flags) or show deviant behaviour. 4. The video analytics system presents the results on a geographical interface (e.g., map), where the operator can monitor the results. 5. The update is visualized in a way that the operator can see the development in time and space. 6. The system will provide a warning to the operator when the situation suddenly changes. 7. Meanwhile outside, the battery of one of the drones is low. It automatically signals another drone to come over to the site of the demonstration with the assignment to monitor the crowd. The drone receives the assignment and takes off from the OC platform to fly to the site. 8. At the demonstration site, the drones observe the crowd by using audio and video. 9. The sentiment of the crowd is measured by analysing sounds (e.g. volume and intensity) and the type of conversations (e.g. certain words that are labelled indicating threats/aggression). Changing situation 10. The operator receives a notification from the video analytics systems. He sees on the map with added information that the amount of people and the sentiment of the crowd changes.

	11. The images from one of the drones show increasing aggressive behaviour based on all the perimeters. The operator takes a closer look at the images from the drone. 12. The operator decides to give the drone an additional assignment to receive more details to be able to estimate the situation, namely, to use facial recognition to identify possible suspects. 13. The drone starts sending snapshots to OC of possible suspects. 14. At the OC the operator performs a cross database search on the snapshots in the police databases. 15. The system returns some recognized usual suspects combined with a risk assessment. 16. The system performs a recent OSINT search on the by the operator selected suspects in order to gain intel on possible plans of the suspects. 17. Based on the results of the analysis, police units are directed to the spot as well. The system sends the approaching units the snapshots with a summary of the OSINT information. 18. An additional drone provided with a hailer is now tasked to address the public in the vicinity to stay away from the crowd, to maintain safety.

4 Conclusions

Even though it was a challenge to change a two-day workshop to different smaller online workshops, the workshops provided valuable input for the use cases. Because of the small groups, there was enough interaction between the LEAs, and they all contributed to the results.

The presented use cases provide a picture of the added value of innovative technology for use cases and can be used to further assess the added value for innovative technology.

A selection of the specified use cases will be built into demonstrators (TRL 6). These demonstration tools will focus on their relevance for OCs of these technologies. The demonstrators can be used to further simulate the impact of technology on the OC's.

During the table top exercises the LEAs perform different exercises. Some of the use cases will be integrated in the table top in a way in which the LEAs can experience the added value of the use cases. Either by a description of the use case in a scenario or in a demonstration.

5 References

[1] https://www.usability.gov/how-to-and-tools/methods/use-cases.html

[2] QROC Deliverable D4.1 "Self-assessment tool for OC-capabilities"

[3] QROC Deliverable D4.2 "Self-assessments for participating OCs"

[4] QROC Deliverable D4.3 "Market scan"

[5] QROC Deliverable D5.1 "QROC Training scenarios"

[6] QROC Deliverable D5.6 "QROC table top 1 exercise report "

[7] QROC Deliverable D5.7 "QROC table top 1 exercise validation and lessons learnt"

[8] QROC Deliverable D5.8 "QROC table top 2 exercise report "

[9] QROC Deliverable D5.9 "QROC table top 2 exercise validation and lessons learnt"