i-LEAD
innovation - law enforcement agency's dialogue

PUBLIC ORDER

MARKET & RESEARCH SCAN

2019-2020

This project has received funding from the European Union's Horizon 2020 - Research and Innovation Framework Programme, H2020-SEC-2016-2017-1, under grant agreement no 740685.

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PUBLIC ORDER

It is recognised that across Europe and elsewhere the scrutiny placed upon law enforcement when policing public events and dealing with disorder is increasing. This is particularly true for large gatherings that are held under the gaze of the media, whether that is via traditional means such as televisions, or via the internet (including social media).

Traditional "public order" styles of policing are ostensibly reliant on control of an event or a crowd and are increasingly being seen as inappropriate, unaffordable, or not in accordance with an evolving ethical approach to policing that seeks to further minimize risks of harm and/or privacy to persons. In some countries, this has coincided with significant reductions in funding to policing that has in turn reduced the capacity of the police to undertake significant and prolonged public order deployments.

Consequently, police and other law enforcement agencies need to consider how they might better use science and technology to support them to provide public safety. Several key areas for consideration for public order are:

- Development of information on the event
- Crowd size and dynamics
- Numbers, training and equipment of police resources
- Briefing and deployment of police resources
- Information channels to / from individuals, groups, and the crowd in general
- Dynamic direction and control of police resources
- Dynamic monitoring of the event for operational purposes
- Enabling dynamic public scrutiny of the event and the police response to it.

PUBLIC ORDER

Given these factors, what can current and future developments in science and technology bring to enhance the police's understanding of the crowd, its intent, capacity, and capability and how this understanding can be translated to more effective operational effort?

In particular:

- What technical assistance would improve the police's intelligence on, including perception of, the crowd and inform the graded use of available tactical options with a view on maximising engagement and mutual understanding and minimising the use of force?

- How could technology assist in building and maintaining legitimacy for public order policing actions?

- How could social science or technology and training, alongside evolving insights in the psychology of crowds, better empower policing to promote the self-regulation of crowds and / or bring about early detection and de-escalation of tension or "flashpoint" issues?

- How could technology assist with the tracking and understanding of the actual / current capacity and capability of policing assets at a public order event?

PUBLIC ORDER

Establishing potential benefits and how these might be realised is a major part of any such forward thinking strategy, although in parallel it is equally important to identify potential risks and how these might be mitigated. It is also important to recognise that there needs to be a will to work toward a greater level of integration and interoperability between agencies to maximise efficiency and reduce costs. This may for example take the form of systems and processes that are shared between agencies or that have wider uses than simply in public order or protest situations.

In considering novel approaches, it should also be recognised that there may be some requirement of leaders to have more of a science and technology mindset. This requires them to approach the issues from less traditional perspectives to bring about a “paradigm shift” in the future policing of public order and protest. Simply using technology to undertake existing processes without driving for better ways of working and improved outcomes would be a missed opportunity for effective change. Similarly, industry requires the harnessing of innovative research and development that not only fulfils end user requirements, but is fit for purpose, future proof and provides a market place across policing that would make investment in new technologies worthwhile.

I-LEAD PUBLIC ORDER PRACTITIONER GROUP – SCENARIO FOR CALLS

You are a police officer with a responsibility of maintaining public order during major events. You are preparing for a tournament final football match in your city, with neither of the competing teams being from your own country. Due to the importance of the match you are expecting a larger than usual number of fans, due to the fact that both teams are famous for having a large fanbase, that travel to the hosting country. Within both sets of supporters, there are groups who have a history and a reputation for inciting violence and have instigated violence against the police and property.

The official ticket allocation for each team is 5,000 but the game will be held in the national stadium which has a capacity of 49,000. You therefore expect that more than 5,000 supporters from each country will attend the match by attaining tickets either via the black market or via business or social connections. Due to this there is a high potential that opposing fans will be in close proximity of each other within the stadium, and additionally you will not know in which sections they will be.

SCENARIO 1

Backgound

You receive intelligence from one of the country's police force that supporters, who are thought to be connected to previous football hooligan incidents have booked flights to your city and are planning to travel a couple of days before the match. No such intelligence has come from the police from the other country, however the railway system across Europe means that it is easy for these supporters to buy train tickets at short notice and avoid the eye of the police intelligence gathering services.

The Requirement

1. To identify, track and monitor those persons of interest that you have already received intelligence on as soon as they arrive in your country and their subsequent movements.

2. Be able to communicate with all supporters in real-time when they arrive in your country, to ensure they are kept updated about the event including; routes to the stadium, 'no-go' areas, what to do in an emergency, whom to contact if they feel threatened etc.

SCENARIO 2

Background

Both sets of supporters have, in the past, had known links with infamous hooligan clubs which have gained notoriety in certain circles around Europe. An attack from either of the teams supporting fans could be seen as prestigious and a way of gaining respect from hooligans or ultras groups within their own country.

There are rumors of such an attack on social media and you are required to plan the response to this which will include interaction with fans prior to any operational responses whilst minimizing the risks to the public and property. Direct confrontation with fans is a last resort. However, consideration must be given to the use of tactics, technology, vehicles and protective equipment in order to successfully manage any escalations.

The Requirement

1. Be able to identify quickly, any changes that occur in the pattern of crowd behaviour that indicates a potential violent surge.
2. To consider how to improve and speed up the real time decision making and tasking process.
3. Be able to deploy resources and equipment to a potential incident to de-escalate and diffuse the situation.
4. To consider how current protective equipment for police officers can be improved

The above requirements in Scenarios 1 & 2 should consider the use of Artificial Intelligence and Machine Learning as potential novel solutions as well as improved equipment for use by policing.

MINDMAPPING

- Mobile command and control centers for monitoring and decision making, equipped with tools such as: intelligence layers (e.g. OSINT, AI), video analytics (e.g. AI, body, face and voice recognition, ANPR, mass behavior patterns recognition), GIS for tracking police and monitoring sets of supporters, and robust secure communication.

- Public order police equipment for health and safety purposes, such as: built in tracking devices in uniforms, fireproof protection, noise cancelling systems for high noise situations, and automatic vehicle protection.

- Tracking systems to monitor sets of supporters before and during the event: before the event easily portable technologies could monitor relevant positions of groups on a voluntary basis, like apps or bracelets.

1	TITLE OF SOLUTION
	DYNAMIC ACTION PLAN

DESCRIPTION & USE OF THE SOLUTION

The Dynamic Action Plan is an operational intelligence application to support decision making of command teams responsible for public order and safety during large events. In the preparation phase threats, risks and mitigation measures can be identified and prepared by making use of knowledge models and experience from previous events. In the execution phase models for crowd analysis can support decision making. The application contains a dynamic overview of risks identified, their estimated chance and potential impact based on real-time risk variables. This oversight contributes to monitor and anticipate on possible scenarios in a dynamic geographic and timeline-oriented mobile environment. Command teams are able to efficiently use all information prepared, coordinate with stakeholders and interact with police officers and other security services on the street.

TECHNOLOGICAL GAPS & CHALLENGES

- Currently lacking real time operational support, mostly focused on anticipation.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	TNO https://www.tno.nl/en/
	TECHNOLOGY READINESS LEVEL (1-9)
	6

2	TITLE OF SOLUTION
	RAVEN

DESCRIPTION & USE OF THE SOLUTION

Raven is a software package. It includes machine learning algorithms to analyze video content and recognize faces, signs and weapons. It includes a social media crawler and possibility to transcribe audio into written text. The software can be trained to broaden the recognition range.

TECHNOLOGICAL GAPS & CHALLENGES

- Raven is currently designed for forensic investigation of (downloaded) videos, but it can be extended to real-time surveillance applications. This includes training the system on recognizing public order signs and weapons.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	Raven Science Ltd https://ravenscience.com
	TECHNOLOGY READINESS LEVEL (1-9)
	4

3	TITLE OF SOLUTION
	TAILOR MADE BRIEFING

DESCRIPTION & USE OF THE SOLUTION

The tailor-made briefing is an application for a community police officer. The app contains up-to-date information, based on public sources and social media. The police officer can use the app to get real time information on developments in a certain community and can use the app to stay up to date with information about potentially wanted persons in the community.

TECHNOLOGICAL GAPS & CHALLENGES

- When using the mobile application, it is necessary to have a secured phone.
- Made for individual use.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	Dutch National Police www.politie.nl
	TECHNOLOGY READINESS LEVEL (1-9)
	8

4	TITLE OF SOLUTION
	KOPS

DESCRIPTION & USE OF THE SOLUTION
KOPS is an application for police officers that trains police officers in getting to know the relevant persons of interest to the police and why they are interesting. The app uses multiple choice to test the recognition of subjects and/or objects. The answer can be selected by tapping one or more possibilities. If the answer is correct, the screen will turn green. If the answer is wrong, the screen will turn red and an explanation will pop up. The app also works for symbols, vehicles, groups, et cetera.

TECHNOLOGICAL GAPS & CHALLENGES
• When using the mobile application, it is necessary to have a secured phone. • Can mainly be used in preparation of public order events, not real time operation.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	**Dutch National Police & Studio 575** https://www.politie.nl/ https://www.studio575.nl/
	TECHNOLOGY READINESS LEVEL (1-9)
	7/8

5	TITLE OF SOLUTION
	RUMOR DEBUNKER

DESCRIPTION & USE OF THE SOLUTION
The Rumor Debunker offers a solution for internet news analytics. It is developed to counteract mis- or disinformation campaigns. The technology can help promote the capability to efficiently tackle crisis in large scale, long-term manmade disasters. It does so by preparing reliable data sets of media communication for unexpected events. This means it can classify (news/social media) messages as true, doubtfully true, confirmed and deception.

TECHNOLOGICAL GAPS & CHALLENGES
• Possibly subject to bias.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	Austrian Institute of Technology https://www.ait.ac.at/en/
	TECHNOLOGY READINESS LEVEL (1-9)
	6

6	TITLE OF SOLUTION
	3D IN EAR PROTECTION DEVICES

DESCRIPTION & USE OF THE SOLUTION
The 3D in ear protection devices are tailor made active ear protection for high noise situations. The devices are being researched for Defense personnel, since they might be involved in high noise situations, leading to hearing loss. People's ears are scanned and their equipment is then printed in 3D, so the fit matches the individual personally. The ear protection devices do not only protect against high noise levels, they also enable the possibility of communication and directional awareness through 3D hearing.

TECHNOLOGICAL GAPS & CHALLENGES
• The product is not developed for the police and therefore not tested in police public order situations/focused on public order needs (e.g. fireworks).

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
N/A	TNO https://www.tno.nl/nl/aandachtsgebieden/defensie-veiligheid/expertisegroepen/training-performance-innovations/
	TECHNOLOGY READINESS LEVEL (1-9)
	4

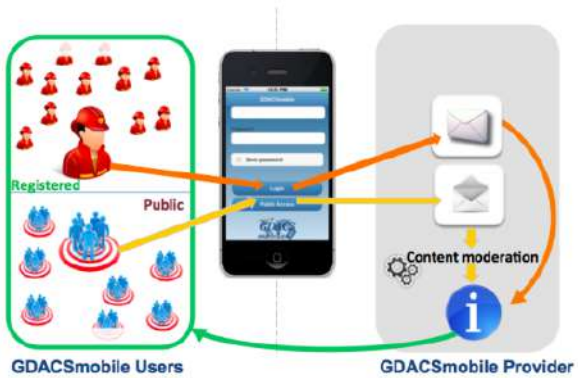
7	TITLE OF SOLUTION
	GDACS - GLOBAL DISASTER ALERT AND COORDINATION SYSTEM

DESCRIPTION & USE OF THE SOLUTION

GDCACS is a solution to exchange information by letting users (professionals and/or public) submit reports to create a situational awareness overview. It is focused on the improvement of information processing and coordination directly after sudden disasters.

TECHNOLOGICAL GAPS & CHALLENGES

- Citizen participation is an advantage, but may lead to information overload, disinformation or bias.
- The focus of the project is on the exchange of information and coordination in the first phase of sudden-onset disasters.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	GDACS https://www.gdacs.org/About/app.aspx
	TECHNOLOGY READINESS LEVEL (1-9)
	7

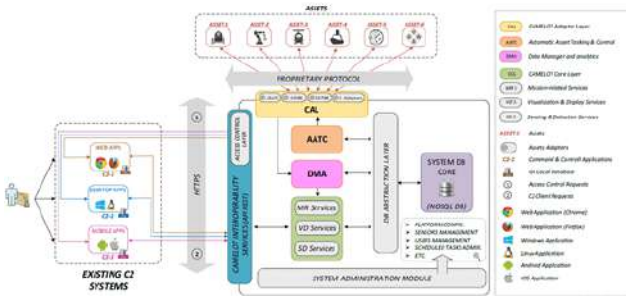
8	TITLE OF SOLUTION
	CAMELOT

DESCRIPTION & USE OF THE SOLUTION

It is essential for end-users to develop the ability of commanding and controlling multiple unmanned vehicles as well as other sensors and delivering complex services using the same systems and environments. The CAMELOT platform architecture is based on a distributed system that will offer 1) scalability, 2) availability and 3) security capabilities. Project CAMELOT seeks to implement a standardized Multi-Service Multi-Domain Command and Control architecture, in line with recent NATO efforts, composed of six core components: (1) Automatic Asset Tasking and Control Block, (2) Mission Related Service Modules, (3) Visualization and Display Service Modules, (4) Sensing and Detection Service Modules, (5) Data Manager and Analytics Block, and (6) Communications and Networking Block.

TECHNOLOGICAL GAPS & CHALLENGES

- CAMELOT is a platform architecture and might therefore be less suitable for individual use cases.
- CAMELOT is a platform aimed at controlling multiple unmanned vehicles. Mutliple drone use in a public order setting might not be the intervention with the highest impact and might raise ethical/societal concers.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	CAMELOT https://www.camelot-project.eu/
	TECHNOLOGY READINESS LEVEL (1-9)
	5/6

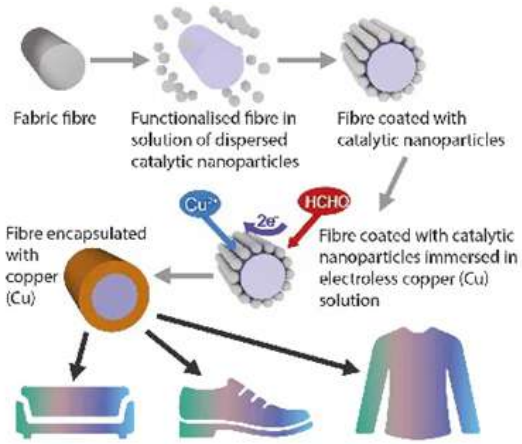
9	TITLE OF SOLUTION
	MATUROLIFE

DESCRIPTION & USE OF THE SOLUTION

The overall objective of the MATUROLIFE project is to produce three Assistive Technology prototypes that will make urban living for older adults easier, more independent, fashionable and comfortable, e.g. alarms and tracking devices. The project will build on existing technological advances in materials which have produced a highly innovative selective metallisation process that utilises nanotechnology, electrochemistry and materials science to encapsulate fibres in textiles with metal and thereby provide conductivity and electronic connectivity. In this way, better integration of electronics and sensors into fabrics and textiles will be possible. This project is relevant for the public order domain since it might be used to produce body-worn trackers for crowd management during events.

TECHNOLOGICAL GAPS & CHALLENGES

- In development for different target group.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	MATUROLIFE http://www.maturolife.eu
	TECHNOLOGY READINESS LEVEL (1-9)
	7

10	TITLE OF SOLUTION
	MONICA

DESCRIPTION & USE OF THE SOLUTION

The MONICA project is a large-scale demonstration of new and existing IoT applications for smarter living. Focus is on one of the key aspects of European society: the cultural performances in open-air settings which create challenges in terms of crowd safety, security and noise pollution.
To demonstrate how these challenges can be met through the use of technology, MONICA will develop, deploy and demonstrate three IoT ecosystems on security, acoustics and innovation, addressing real user needs. Within these systems, several applications are deployed, using IoT-enabled devices such as smart wristbands, video cameras, loudspeakers and mobile phones.

TECHNOLOGICAL GAPS & CHALLENGES

- Demonstration of IoT application(s) ecosystem, not tool development.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	MONICA https://www.monica-project.eu/
	TECHNOLOGY READINESS LEVEL (1-9)
	7

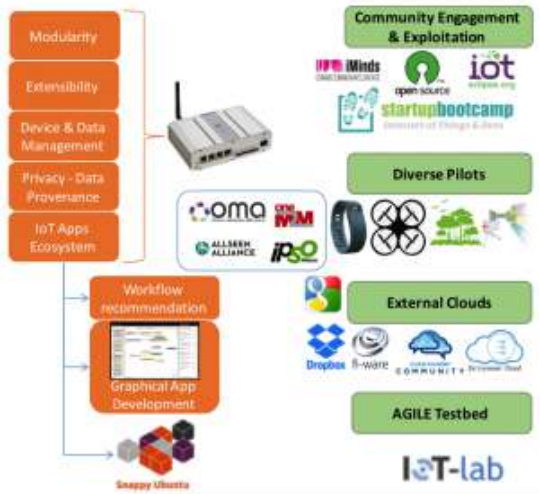
11	TITLE OF SOLUTION
	AGILE

DESCRIPTION & USE OF THE SOLUTION

The AGILE project aims to create an open, flexible and widely usable IoT solution at disposal of industries (start-ups, SMEs, tech companies) and individuals (researchers, makers, entrepreneurs) as a framework. AGILE aims to offer tools to overcome limitations imposed by closed and vertical walled gardens for IoT apps development, offering a fully open platform for integration and adaptation with 3rd parties enabling a new marketplace for IoT apps.

TECHNOLOGICAL GAPS & CHALLENGES

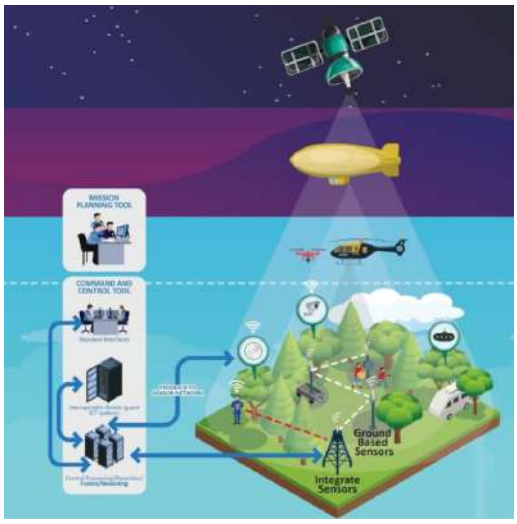
- AGILE will be developed as a framework/platform, not specifically for tool development.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	AGILE https://agile-iot.eu/
	TECHNOLOGY READINESS LEVEL (1-9)
	7

12	TITLE OF SOLUTION
	FOLDOUT

DESCRIPTION & USE OF THE SOLUTION
FOLDOUT aims to create rapid detection of illegal activity at borders and trace the movement and routes prior to arrival at the border-crossing points and areas via its four-tier platform (short-, medium-, long-, and very long-range coverage). Its technical concept is based on combining several sensor technologies on the ground and on special high altitude platforms with data fusion algorithms into a single, seamlessly integrated system. This will allow for the real-time detection of critical events (e.g. illegal migration, lost persons) even through dense foliage. Alarms will be relayed to border guard operators via a common operational picture that fuses data from all sensors.

TECHNOLOGICAL GAPS & CHALLENGES
• Focused on illegal activity at borders, and may therefore have legal implications/restrictions within the public order domain.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	FOLDOUT https://foldout.eu/
	TECHNOLOGY READINESS LEVEL (1-9)
	5-6

13	TITLE OF SOLUTION
	CONNEXIONS

DESCRIPTION & USE OF THE SOLUTION

CONNEXIONs is targeting the development and demonstration of next-generation of detection, prediction, prevention, and investigation services. The proposed services will be based on multidimensional integration and correlation of heterogeneous multimodal data, and delivery of pertinent information to various stakeholders in an interactive manner tailored to their needs, through augmented and virtual reality environments. The CONNEXIONs solution will encompass the entire lifecycle of law enforcement operations including:

- Pre-occurrence crime prediction and prevention;
- During-occurrence LEA operations;
- Post-occurrence investigation, and crime-scene simulation and 3D reconstruction.

TECHNOLOGICAL GAPS & CHALLENGES

NOT REPORTED

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	CONNEXIONS https://www.connexions-project.eu/
	TECHNOLOGY READINESS LEVEL (1-9)
	2-7

14	TITLE OF SOLUTION
	LETS-CROWD

DESCRIPTION & USE OF THE SOLUTION

LETS–CROWD will overcome challenges preventing the effective implementation of the European Security Model (ESM) with regards to mass gatherings. The project will develop a data analysis and visualization tool. Identification of abnormal behaviors that may indicate threats, dynamic risk assessment in cases of changing circumstances, sensors to detect weak signals of suspicious events or patterns, mitigation measures, and innovative communications procedures.

TECHNOLOGICAL GAPS & CHALLENGES

- Focused om effective implementation (of European Security Model) with regards to mass gatherings.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
 	LETSCROWD https://letscrowd.eu/
	TECHNOLOGY READINESS LEVEL (1-9)
	6

15	TITLE OF SOLUTION
	CITY.RISKS

DESCRIPTION & USE OF THE SOLUTION

City.Risks will leverage a set of innovative technologies, city infrastructures as well as Web and social media technologies aiming to increase the security level of citizens in large cities. Through City.Risks solution the citizens in modern smart cities will be actively contributing to the fight against crime and the increase of security level in their daily activities. Citizens can also use their mobile devices to report about incidents, riot and public unrest.

TECHNOLOGICAL GAPS & CHALLENGES

- Scoped on 'city' risks.
- Verification needed for citizen information.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	City.Risks http://project.cityrisks.eu/
	TECHNOLOGY READINESS LEVEL (1-9)
	7-8

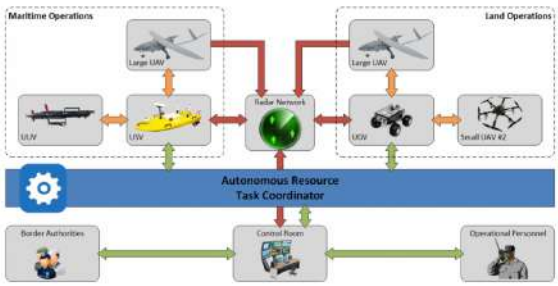
16	TITLE OF SOLUTION
	ROBORDER

DESCRIPTION & USE OF THE SOLUTION

ROBORDER aims at developing and demonstrating a fully-functional autonomous border surveillance system with unmanned mobile robots including aerial, water surface, underwater and ground vehicles which will incorporate multimodal sensors as part of an interoperable network. Our intention is to implement a heterogenous robot system and enhance it with detection capabilities for early identification of criminal activities at border and coastal areas along with marine pollution events.

TECHNOLOGICAL GAPS & CHALLENGES

- System in development, for other primary purpose (criminal activities at boarder and coaster areas).

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	ROBORDER https://roborder.eu/
	TECHNOLOGY READINESS LEVEL (1-9)
	2-7

17	TITLE OF SOLUTION
	CREST

DESCRIPTION & USE OF THE SOLUTION
Fighting Crime and TerroRism with an IoT-enabled Autonomous Platform based on an Ecosystem of Advanced IntelligEnce, Operations, and InveStigation Technologies. CREST's overall objective is to improve the effectiveness and efficiency of LEAs intelligence, operation, and investigation capabilities, through the automated detection, identification, assessment, fusion, and correlation of evidence acquired from heterogeneous multimodal data streams. Such data streams include (but are not limited to) Surface/Deep/Dark Web and social media sources and interactions, IoT-enabled devices (including wearable sensors), surveillance cameras (static, wearable, or mounted on UxVs), and seized devices and hard disks.

TECHNOLOGICAL GAPS & CHALLENGES
• System in development, primary for fighting crime and terrorism.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	CREST https://project-crest.eu/
	TECHNOLOGY READINESS LEVEL (1-9)
	2-7

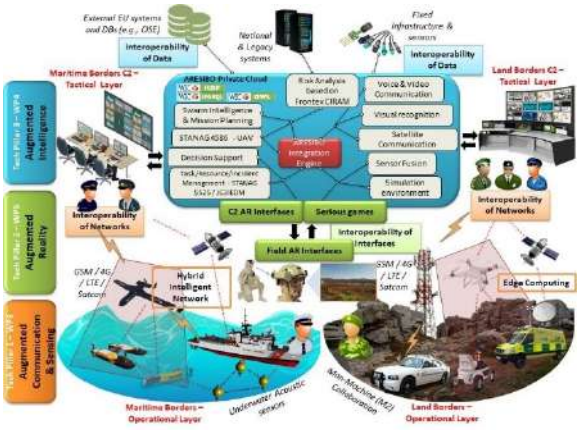
18	TITLE OF SOLUTION
	ARESIBO

DESCRIPTION & USE OF THE SOLUTION

ARESIBO is an innovative system for improved situation awareness in the border security domain. ARESIBO focuses on the operational and tactical layers by covering a wide range of multipurpose borderland operational tasks and coast guard functions including border surveillance and area examination, patrolling and tasking, situational awareness, analysis of potential threats, search and rescue activities, and joint planning of field operations. The envisaged platform addresses the problem of providing enhanced and integrated situation awareness to the operational personnel by developing (a) intuitive and user-friendly interfaces for border security tools, (b) cloud-based decision-support services and tools for field and C2 operators, and (c) the needed communication infrastructure to accomplish border control and security tasks.

TECHNOLOGICAL GAPS & CHALLENGES

- System in development with primary focus on border security.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	ARESIBO https://www.aresibo.eu/
	TECHNOLOGY READINESS LEVEL (1-9)
	2-7

19	TITLE OF SOLUTION
	E-TEX

DESCRIPTION & USE OF THE SOLUTION
E-TEX aims at building electronic devices directly on textile fibres which can be woven into fabrics. This could for example transform clothing into mobile phones and GPS-activated maps. The foundations of the project are essential for other societal needs, such as communication and personal security. Two types of key electronic devices will be targeted, field-effect transistors and loudspeakers. The incorporation of current technological items, such as communication or tracking devices on fabrics would certainly be a game-changer in modern technology.

TECHNOLOGICAL GAPS & CHALLENGES
• During the project the focus was on field-effect transistors and loudspeakers. • Project finished in 2018.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
N.A.	E-TEX https://cordis.europa.eu/project/id/704963
	TECHNOLOGY READINESS LEVEL (1-9)
	2-7

20	TITLE OF SOLUTION
	MESMERISE

DESCRIPTION & USE OF THE SOLUTION

The aim is to develop and validate an integrated and modular body-scan system able to automatically detect internally and externally concealed commodities that are prohibited or restricted such as narcotics, explosives, ampoules, weapons or currency and to distinguish them from natural body tissues, food waste or benign materials. Two complementary technologies will be developed: ultra-low-dose multispectral x-ray transmission and infrasonic interrogation. Prototypes of both technologies are being developed and tested. Automatic recognition algorithms will be created, trained and tested. Tools for improved detection of illicit goods will be developed.

TECHNOLOGICAL GAPS & CHALLENGES

- Time consuming.
- Developed for a more controlled setting.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	MESMERISE http://h2020mesmerise.eu/
	TECHNOLOGY READINESS LEVEL (1-9)
	7-8

1	TITLE OF SOLUTION
	MEOS (“MOBILE EFFECTIVITY ON STREET [TRANSLATE ED])

DESCRIPTION & USE OF THE SOLUTION
MEOS is an application for police-issued (common brand) smartphones. It has a high impact potential in the Dutch police services. Operational officers have been issued a personal smartphone, which they can use for fast data sharing and queries into various police databases and systems. Amongst others, it’s main functions are: 1. Quickly accessing relevant databases for all relevant information 2. The issuing of warnings and fines, and assisting in the legal framework needed to write a ticket 3. The verification of identity and identity documents Extra features can be developed and are in development for the MEOS ecosystem. Other systems and applications can be and are being integrated.

TECHNOLOGICAL GAPS & CHALLENGES
• Needs to be compatible with the police databases back-end. • Investment in personal police phone with the right security measures.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	Dutch National Police www.politie.nl
	TECHNOLOGY READINESS LEVEL (1-9)
	9

2	TITLE OF SOLUTION
	NSC3™ SA PLATFORM

DESCRIPTION & USE OF THE SOLUTION

NSC3™ is a software platform for effective operations (mission based system). Live (video) data can be streamed to and from office and all field operators. This data can be originating from drones, body cams, mobile phones and surveillance cameras. NSC3™ enables intelligent data algorithms for threat and abnormality detection, and may include integrated multispectral and millimeter wave cameras for hidden object detection. The platform includes secure geospatial service with location tracking, annotation and geotagging.

TECHNOLOGICAL GAPS & CHALLENGES

- System seems to be developed for different missions than 'public order'.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	NSION Ltd https://www.nsion.fi/
	TECHNOLOGY READINESS LEVEL (1-9)
	9

3	TITLE OF SOLUTION
	SCIMON

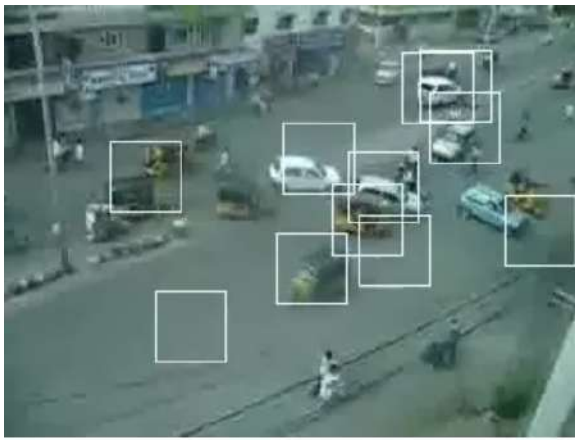
DESCRIPTION & USE OF THE SOLUTION

SCIMON is a software solution. It tracks changes, moving objects, trends, signatures, identifies unknown terrain types via machine learning, etc. It works with facial recognition software in crowds, which can be combined with other recognizable factors.

The system is easy to learn and upgrade. It integrates into any environment. Most of the analytics can be automated within 12 months.

TECHNOLOGICAL GAPS & CHALLENGES

- Need integrating analysts before the system has automated the functions.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	Chris Butler Associates Ltd https://chrisbutlerassociates.co.uk/
	TECHNOLOGY READINESS LEVEL (1-9)
	9

4	TITLE OF SOLUTION
	TERRA 4D

DESCRIPTION & USE OF THE SOLUTION

TERRA 4D is a software solution. It provides real time data to C2-centers. TERRA 4D integrates data from multiple sources and enables real time actionable intelligence. It uses the latest AI techniques in processing large amounts of information. It includes correlated geo-referenced safety and security data, which gives command & control centers real time awareness and perception, enables faster response times, and visualizes information of multiple sensors and disparate systems in one simple context screen. This enhances comprehension and enables effective response.

TECHNOLOGICAL GAPS & CHALLENGES

- 3D geographic information is not necessary in every use case

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	FAST PROTECT GmbH *www.fastprotect.net*
	TECHNOLOGY READINESS LEVEL (1-9)
	9

5	TITLE OF SOLUTION
	AUTOMATIC TEAR GAS GRENADE LAUNCHER

DESCRIPTION & USE OF THE SOLUTION

The launcher is a less-lethal launcher system. It is a single-launcher configuration, which can be operated as a stand-alone weapon, or as crew-served system. The launcher is intended to be mounted to a vehicle and fired when stationary. Also, the individual launchers can be detached from the mounting system, to be used as individual weapons. The launcher is intended to control "groups of people who behave aggressively and larger groups... violating the legal order".

TECHNOLOGICAL GAPS & CHALLENGES

- Maximum range of 180 m.
- Design might not be ethical in public order settings.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	AWGŁ https://armamentresearch.com/polish-awgl-3-riot-control-system/
	TECHNOLOGY READINESS LEVEL (1-9)
	9

6	TITLE OF SOLUTION
	ADDITESS MOBILE CC-CENTER & UAS REMOTE PILOT STATION

DESCRIPTION & USE OF THE SOLUTION

ADDITESS Mobile Command and Control Centre & Remote Pilot Station for UAS (Unmanned Aerial Systems) consists of three work stations equipped with dual 24" displays, an integrated air conditioning unit and an electrical power system comprising of a generator, an inverter and four 12V 100Ah batteries. The Command and Control Centre was developed on a Nissan NV400 L3H3 high roof van and was designed by a specialised Automotive Design Studio with an optimized interior layout that provides additional storage space.

TECHNOLOGICAL GAPS & CHALLENGES

- Already designed mobile CC, for UAS.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	Additess Ltd. www.additess.com
	TECHNOLOGY READINESS LEVEL (1-9)
	9

7	TITLE OF SOLUTION
	NEC NEOFACE WATCH & ENHANCED VIDEO ANALYTICS

DESCRIPTION & USE OF THE SOLUTION

NEC NeoFace Watch and NEC EVA are software products. Capabilities include real-time face recognition and behavior analytics, including people counting, crowd estimation and object detection to inform security services and enable response. Persons of interest can be detected, individuals can be tracked and traced with geotagging and mapping features and unusual crowd behavior can be identified. The system can be trained to recognize new analytics. After the event, data can be used for future planning. NeoFace also has built in safeguards that support privacy and proportionate use, such as easy removal of false hits and auto deletion of non-matching data. The system operates on Windows and Linux and databases including Postgres and MongoDB and makes use of Docker for application scalability.

TECHNOLOGICAL GAPS & CHALLENGES

- As with all facial recognition technology, the use of face masks (i.e. COVID masks) and scarfs (such as soccer scarfs with the brand of the soccer club) will inhibit the functioning of live facial recognition

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	Northgate Public Services (UK) Limited – part of the NEC Group http://www.northgateps.com
	TECHNOLOGY READINESS LEVEL (1-9)
	9

8	TITLE OF SOLUTION
	BRIEFCAM® COMPLETE VIDEO CONTENT ANALYTICS PLATFORM

DESCRIPTION & USE OF THE SOLUTION

Advanced video analytics: The **Briefcam**® complete Video Content Analytics platform focuses on the analysis of data. Videos can be searched with queries to a specific level and based on patterns. It includes a quick analysis of large amounts of video data, and e.g. identify movement patterns. Next to that, queries can be used for searching specifics within videos (i.e. all red cars on this road in this time frame). Highly specific queries are also available (i.e. woman dressed in blue carrying a bag).

TECHNOLOGICAL GAPS & CHALLENGES

- Specific capabilities only enabled for LEA's.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
 *Picture taken during S&P Conference, march 2020, U.K.*	Briefcam® http://www.briefcam.com/
	TECHNOLOGY READINESS LEVEL (1-9)
	9

9	TITLE OF SOLUTION
	TACTICAL HEADSETS

DESCRIPTION & USE OF THE SOLUTION

Tactical Headsets is a solution to combine a throat microphone with HiFi quality noise reducing in-ear speakers. This enables a person to hear and communicate, regardless of surrounding noises. It is a patented design. The in-ear headset with throat-microphone limits noise exposure and increases two way understandability over radio communication. The design is waterproof.

TECHNOLOGICAL GAPS & CHALLENGES

- It uses 3.5 mm plug in. Not all communication sets use a 3.5 mm plug in.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	Tactical headsets https://www.tacticalheadsets.com/
	TECHNOLOGY READINESS LEVEL (1-9)
	9

10	TITLE OF SOLUTION
	BOZENA RIOT SYSTEM

DESCRIPTION & USE OF THE SOLUTION

The BOZENA RIOT SYSTEM is a motorized vehicle designed to control riots in urbanized areas and to protect operational law-enforcement units to maintain peace. The system has primarily been developed for crowd control by specific military and police units. The system is relatively simple to integrate with other existing riot control technologies.

TECHNOLOGICAL GAPS & CHALLENGES

- ELSI-implications (ethical, legal and societal implications) come to mind: might raise ethical concerns due to the nature of the product.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	Bozena https://www.bozena.eu/riot-new/
	TECHNOLOGY READINESS LEVEL (1-9)
	9

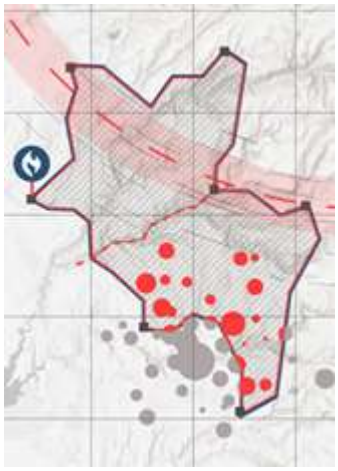
11	TITLE OF SOLUTION
	GIS: GEOGRAPHICAL INORMATION SOFTWARE

DESCRIPTION & USE OF THE SOLUTION

ArcGIS is used for spatial analytics / mapping. The solution can be used for the geographical profiling of offenders and creating actionable information for operational LEAs. This can be used for intelligence purposes, crisis control, optimal operational insights and planning. The geographic information system (GIS) can be used for analyzing and sharing data that creates actionable information. The ArcGIS app enables conversion of ArcGIS data into different formats.

TECHNOLOGICAL GAPS & CHALLENGES

- Unknown how ArcGIS is able to interact with GIS software used by operational centres (OC's).

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	ESRI https://www.esri.com/en-us/industries/law-enforcement/overview
	TECHNOLOGY READINESS LEVEL (1-9)
	9

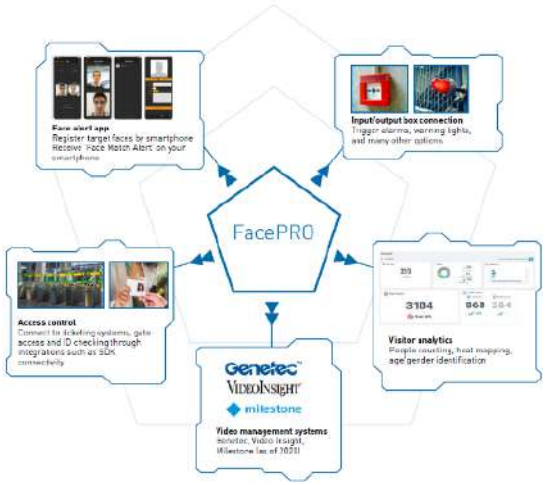
12	TITLE OF SOLUTION
	FACEPRO™ FACIAL RECOGNITION SOLUTION

DESCRIPTION & USE OF THE SOLUTION

The FacePRO™ Facial Recognition Solution is a facial recognition technology: faces on the Panasonic i-PRO cameras are automatically matched real time to a database. The systems notifies in case of a match. The processing capacity is up to 20 cameras per server and up to a total of 30,000 reference faces. The technology can quickly identify faces and matching identities in groups of people, identify unwanted visitors and has a function for people counting and heat mapping.

TECHNOLOGICAL GAPS & CHALLENGES

- Facial recognition system up to 20 cameras per server and up to 30,000 reference faces.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	Panasonic https://business.panasonic.co.uk/security-solutions/face-recognition
	TECHNOLOGY READINESS LEVEL (1-9)
	9

13	TITLE OF SOLUTION
	WATER CANNON

DESCRIPTION & USE OF THE SOLUTION

The water cannon be used to control riots. The water cannon can use different types of munition, namely water, water + gas, water + gas/ paint.

TECHNOLOGICAL GAPS & CHALLENGES

- The maximum range of the cannon is 120 m.
- Can raise ethical concerns.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
 **Picture by Polish Police**	Polish police https://www.policja.pl/pol/english-version/4889,Polish-National-Police.html
	TECHNOLOGY READINESS LEVEL (1-9)
	9

14	TITLE OF SOLUTION
	AXON BODYCAM

DESCRIPTION & USE OF THE SOLUTION

Axon enables an ecosystem that gives public safety leaders tools to protect life. The Axon body is a body worn camera (bodycam). Axon's body-worn cameras are used by more major law enforcement agencies than any other brand in the world. The cameras provide a clear account of their situations. There are several bodycams available with different features, including full shift batteries, pre event buffer, comfortable and secure mount, durability against extreme weather conditions and sharing.

TECHNOLOGICAL GAPS & CHALLENGES

- Axon has a software system available and Axon products can be combined (ecosystem).

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	AXON https://www.axon.com/products?productCategory=cameras
	TECHNOLOGY READINESS LEVEL (1-9)
	9

15	TITLE OF SOLUTION
	SKEYETECH

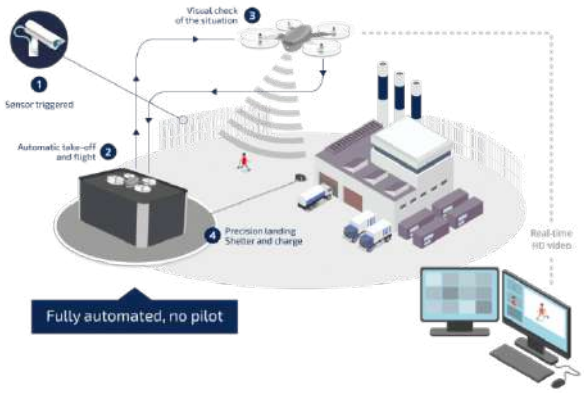
DESCRIPTION & USE OF THE SOLUTION

Skeyetech is a drone solution designed to strengthen security over sensitive sites. Fully autonomous, it provides around-the-clock service and security, without human supervision. This system can be connected to any security network to provide real-time HD video to security HQ. It allows situational assessments in a matter of seconds, without jeopardizing operators safety.

Skeyetech systems are 100 % automated. Powered by a proprietary AI, Skeyetech drones can conduct automated take-off, safe navigation based on live calculations functions and very precise landing.

TECHNOLOGICAL GAPS & CHALLENGES

- Skeyetech solution requires no pilot training for security guards and no flying skills. The security teams can follow automatic missions or order live missions, directly through their Video Management System.
- Scope seems to be on sensitive sites.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	AZURDRONES https://www.azurdrones.com/product/skeyetech/
	TECHNOLOGY READINESS LEVEL (1-9)
	9

16	TITLE OF SOLUTION
	CT-24 PERSONAL TRACKING DEVICE

DESCRIPTION & USE OF THE SOLUTION

The Sanav CT-24 is a compact, battery efficient, easy to use personal GPS Tracker with motion tracking and SOS alerts. A built in accelerometer allows for the tracking of motion while an 1800 mAh battery ensures that this personal tracker operates for 150 hours. Position Logic's software can track the device while also monitoring motion and even when the battery is low.

TECHNOLOGICAL GAPS & CHALLENGES

- Must be worn voluntarily or placed without consent if the legal framework allows for this.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	SANAV http://www.sanav.com/product.htm
	TECHNOLOGY READINESS LEVEL (1-9)
	9

17	TITLE OF SOLUTION
	TCI 850 BLACKBIRD NEXTGEN

DESCRIPTION & USE OF THE SOLUTION

The TCI model 850 Blackbird NextGen system is an RF signal search and acquisition system. The client/server architecture supports multiple simultaneous remote or local clients (or unattended operation). It has fully integrated signal search, visualization, collection, wideband recording, DF/geolocation, analysis and reporting. It also includes advanced signal detection, with optional modulation classifier automatically identifies specific signals of interest. The powerful search and lookback visualization allows users to quickly find signals of interest, whether live or previously detected. The TCI's DF First® technology provides search by direction and/or geolocation when configured with TCI DF/ Geolocation options. Furthermore, is has integrated DDCs with delay memory provide multichannel realtime collection.

TECHNOLOGICAL GAPS & CHALLENGES

- Easy-to-use automation facility triggers automated actions (collection, alarming, analysis, etc.) when signals of interest are detected.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	SORAC https://www.sorrac.fr/en/product/850-blackbird-nextgen.php
	TECHNOLOGY READINESS LEVEL (1-9)
	9

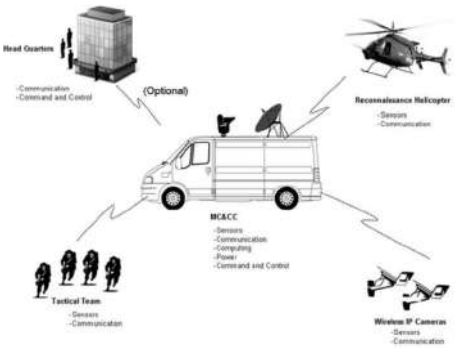
18	TITLE OF SOLUTION
	MOBILE COMMAND AND CONTROL CENTER (MC&CC) SOLUTION

DESCRIPTION & USE OF THE SOLUTION

The MC&CC receives feed from a variety of sensors, including video feeds from different types of cameras, audio feeds from monitoring equipment and automatic vehicle locator information (GPS-based position of information of response teams). In the monitoring station diverse information is displayed. It includes a command and control application as well, for decision making and communication.

TECHNOLOGICAL GAPS & CHALLENGES

- Requirements differ per situation. Mistral can deploy application specific MC&CC solutions ranging for Mobile Surveillance Vans with 3-5 large monitoring stations that can seat multiple surveillance personnel, to compact mobile command and control centers that are built on a small platform and can be transported on an aircraft to the tactical operation location.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	MISTRAL https://www.mistralsolutions.com/articles/mobile-command-control-center-mccc-solution/
	TECHNOLOGY READINESS LEVEL (1-9)
	9

19	TITLE OF SOLUTION
	F-18 MOBILE BARRIER

DESCRIPTION & USE OF THE SOLUTION

The F-18 is a certified modular mobile barrier. It is a unique, mobile solution against ram vehicles. The function has been tested with high load capacity vehicles, such as trucks. It has a fast assembly, and does not require any tools. The technology has an easy storage and transport, delivered with its Rack included. It has a long life cycle, with minimal maintenance needed. The model enables energy and lateral shock absorption. It is adjustable with two widths and has an easy assembly by one person. By the nature of its design it can stop a moving vehicle much quicker than comparable system, which focus on tire function can. It is therefore beneficial during events to prevent or reduce the impact of vehicle-as-a-weapon based attacks.

TECHNOLOGICAL GAPS & CHALLENGES

- The assembled weight is 39 kg.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	PITAGONE https://www.pitagone.com/en/home/f18
	TECHNOLOGY READINESS LEVEL (1-9)
	9

20	TITLE OF SOLUTION
	RUBBER BULLET SHOTGUN

DESCRIPTION & USE OF THE SOLUTION

The rubber bullet shotgun is a less lethal weapon. Instead of real bullets, rubber bullets can be used during riots.

TECHNOLOGICAL GAPS & CHALLENGES

- The maximum range is limited.
- Even using rubber bullets, a lot of damage can be done.

ILLUSTRATION	NAME OF ORGANISATION(S) OR PROJECT(S) OR DEVELOPER(S)
	
	TECHNOLOGY READINESS LEVEL (1-9)
	9

ABOUT I-LEAD

i-LEAD's focus is on the incapability of groups of operational Law Enforcement Agencies (LEA) practitioners defining their needs for innovation. This will be done in a methodological way, also with the help of the research & industrial partners supplemented by a broad range of committed stakeholders. i-LEAD will build the capacity to monitor the security research and technology market in order to ensure a better matching and uptake of innovations by law enforcement agencies with the overarching aim to make it a sustainable Pan-Europan LEA network.

i-LEAD
innovation - law enforcement agency's dialogue

Earlier funded European research with a high technology readiness level as well as pipeline technologies will be closely monitored and assessed on its usefulness. Where possible, a strong dissemination towards the ENLETS and ENFSI members will take place to enable them to take up the actions from this research. i-LEAD will indicate priorities in five practitioner groups as well as aspects that needs (more) standardization and formulate recommendations how to incorporate these in procedures. As a final step, i-LEAD will make recommendations to LEA members on how to use Pre-Commercial Procurement PCP) and Public Procurement of Innovation (PPI) instruments.

Authors:

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Contributors:

ENLETS European Organisation for Security
Polish Platform for Homeland Security
Ελληνική Αστυνομία
L3CE Lithuanian Cybercrime Center of Excellence for Training, Research & Education
TNO innovation for life
Gobierno de España Ministerio del Interior
list ceatech
NICC INCC

This project has received funding from the European Union's Horizon 2020 - Research and Innovation Framework Programme, H2020-SEC-2016-2017-1, under grant agreement no 740685.