EXCES-EKC
Explosives Community of Experts
Explosives Knowledge Center

The objectives of our Community are to help identify and counter explosive threats in a timely manner by the development of a European Explosive Knowledge Centre (EKC) that is open to Public and Private security Stake-Holders, informed and used by Operators (Practitioners), and that prioritises the industrial development of the most appropriate counter-Hazardous Explosive tools and procedures.

These objectives will be achieved by:

- analysing the current threats, surveying promising technologies for surveillance and intervention; analysing the TRL of technologies from precursor projects;
- proposing common procedures, standards and certification of Explosive Hazard detection and neutralisation tools;
- developing guidance documents, manuals or recommendations; and
- providing a comprehensive toolbox of training tools related to the identification and treatment of HE threats.

Through a ‘Research and Innovation Action’ proposed by the European DG HOME/SECURITY, our Community also aim to achieve innovation in detection techniques on explosives to counter an explosive threat across the timeline of a plot, by team up top current technologies and their best combinations, categorise, authenticate and test them.
Improve/Create Cooperation Agreements
DOES THE IED DANGER EXIST?
Oklahoma City Bombing

April 19, 1995
✓ Truck bomb
✓ Alfred P. Murrah Federal Building in Oklahoma City, Oklahoma
✓ IED: Ammonium nitrate (fertilizer) and nitromethane
✓ 169 killed
✓ Timothy McVeigh: executed
   His accomplice, Terry Nichols: life sentence
Madrid Train Attacks

March 11, 2004
✓ **Ten** explosions → **4 commuter trains**
✓ IED: explosives (Goma-2 ECO) + **metal fragments**; cell phones with timers were used to initiate the explosive devices.
✓ **191 killed**: > 1,800 injured.
July 2005 London Bombings

July 7, **2005**
- **4 suicide** bombers
- London transportation system
- IED: **TATP** on the basis of finding TATP in the London apartment of the biochemist arrested in Cairo
- **52 killed**
Detecting IEDs
Detection of IEDs presents a real challenge for security screeners, employees, first responders, and military personnel. Training security guards, airport staff, and other personnel to be alert for suspicious behavior and IED indicators is the most common and best defense.

Various bomb detection technologies continue to be developed for use in high-risk areas or situations such as airports and high profile events:

- “trace detectors” that identify trace amounts of commonly used explosives in the air, and
- “millimeter-wave technology” that detects dense objects, hidden under clothes.

Explosives-detection dogs, trained to detect and locate chemical explosives, are used in many security scenarios.
CURRENT TECHNOLOGY
A. TRL

4. Technology component and/or basic technology sub-system validation in laboratory environment.
5. Technology component and/or basic sub-system validation in relevant environment.
6. Technology system/ subsystem model or prototype demonstration in a relevant environment.
7. Technology system prototype demonstration in an operational environment.
8. Current technology system completed and qualified through test and demonstration.
# Technology Watch - GAPS

<table>
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<th>Nº</th>
<th>Tools/Methods</th>
<th>Current TRL</th>
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<th>INHIBIT-DETECT-IDENTIFY (2)</th>
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<td>Efficiency of the General ‘crisis’ management</td>
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<td>Others (in current use, a.o)</td>
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</table>
SOME CURRENT PARTNER’S R&D
FROM National, European FP7-HORIZON Projects and EDA projects

SUMIRAD (EDA)
ROTOs (Spanish C-IEDRobotics)
BURMIN (EDA)
ICARUS (FP7)
ATIX (EDA, NATO)
EDEN (FP7, CBRNE)
EMPHASIS (FP7)
HECTOS (FP7)
NATO NIAG SG188 (UAV-C-IED)
SAIVET (EDA)
INTEGRA (Spain- COMM)
D-BOX (FP7)
SAFESHORE (HORIZON)
ACES (HORIZON)

www.fp7-tiramisu.eu
NATO C-IED CoE

Information on IED (Service)

Facing IED threats, C-IED Strategy

Main Charge
Military explosives (TNT, SEMTEX, C4, PETN, RDX...)
Commercial explosives (Wabox, Dynamite...)
Military ammunition (Projectiles, rockets...)
HME (Potassium Chlorate, Ammonium Nitrate, TATP).

Oxidizers + Fuels = HME

- Aluminum Shavings
- Washing Soda
- Fertilizer
- Fingernail Polish Remover
- Benzene
- Charcoal
- Rubbing Alcohol
- Thermometer
- Bateries
- Fuel Tablets
- Saw Dust
- Body Lotion
- Aspirin
- Hydrogen Peroxide
Types of IEDs:

NATO terminology (official):

By mean of initiation:

- Victim Operated (VOIED)
- Command Wire (CWIED)
- Pull Wire
- Radio Controlled (RCIED)
- Time operated

By mean of employment (non official):

- Vehicle Borne (L/S/U-VBIED)
- Person Borne (PBIED)
- Animal Borne (AnBIED)
- Water Borne (WBIED)
- Air Borne (ABIED)
- Projected (IPIED)

POC: jyenes@ciedcoe.org
GICHD and HIU Experts

From IRAK, SYRIA
FRAUNHOFER (Germany)
Detection of Explosives/Precursors (products)

- **FP7-EMPHASIS** (detection of illicit production of explosives and IED in Urban areas – monitoring of sewages by a network of sensors)

Detection of TNT in industrial contaminated soils, (sea) water (on ROV, AUV underwater vehicles)

**FP7- BURMIN:** Detection of TNT in...

POC: Peter.rabenecker@ict.fraunhofer.de
SEADM (Spain) (product)

- HORIZON-SME, ACES Project
- Detection of explosives in a flow of people

Currently under certification stage (H2020 SME PROJECT «ACES») for air cargo
- Works for European Agencies in Air security

POC: rafael.cuesta@seadm.es
Identification of Explosives/Forensic (product)
Contaminated Evidence collection Equipment

Description: http://serstech.com/our-offer/serstech-indicator-kit/
POC: oliver.terzic@hotzonesolutions.com
• **FP7-TIRAMISU**: SAR detection of ED

• **EDA SUM**: SUMIRAD millimeter-wave imaging radiometer (threat detection)

• **POC**: Markus.peichl@dlr.de
Detection of explosives in a flow of vehicles is very challenging.
Direct methods rather not applicable.
Indirect methods only deliver indicators.
Hence other sensor types additionally required – use of multi-sensor concept mandatory.
MW sensors have potential as primary sensors – detection of anomalies.
Detection of driving behavior maybe useful – driver being in stress situation.
Comprehensive research necessary
Current results

Heterogeneous load
CSIC (Spain)
(service)

• Dynamical analysis of behaviours

POC: Manuel.armada@csic.es
SUPPORT OF UV
(Services)

- IN-NOVA Spain
  RS2000 River Shadow

- E&Q Spain
  RASS MAV IED
  Detection (and mapping) in complex scenarios (Nuclear Plant, Harbour)
RMA (Belgium)

Protection-PPE (Service)

- **FP7-TIRAMISU**: Triple launcher (accredited tests)

  
  ![Image of triple launcher](image)

  
  - Description: [www.fp7-tiramisu.eu](http://www.fp7-tiramisu.eu) and on request by
  - POC: Marc.pirlot@rma.ac.be
THE FRAGMENT PROTECTIVE TEXTILE (FPT) TECHNOLOGY

This multifunctional, lightweight, compressible and flexible knit fabric is based on the UHMWPE fibre material. The fibres’ unique characteristics produce a highly resistant and durable textile that is stable against most environmental influences. The protective performance remains stable over long-wear durations, under high moisture conditions, UV radiation and against alkaline and acidic chemicals (e.g. sweat, urine) without any loss in performance.

The high strength and highly dense textile structure provides an ideal IED fragment protection. It prevents micro fragments such as dirt, sand and debris from penetration. The number of penetrating fragments is minimized and the penetration depth is reduced. The performance has successfully been tested according to STANAG 2920, and with The Triple Impact Technique, a new ballistic testing technique, with velocities of up to 410m/sec.
AMARANTE (France)

Building Protection (Service)

Blast and counter-weapon engineering

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AMARANTE - Specific tools

- Shock wave development (free air and complex environment)
- Progressive Collapse calculations – Finite Elements calculations and large deformations
- Human comprehensive damages (lungs, eardrums)
- Blast and impact high fidelity analysis capabilities
- Glazing Systems Analysis
- Threat scenario and operational means analysis
- Research & Development


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