UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

Ingegneria Modena
Dipartimento di Ingegneria "Enzo Ferrari"

International Cooperation for *Public Protection, Disaster Relief and Risk Reduction*

Maurizio Casoni

Outline

- Introduction and Background
- International Cooperation at United Nations
- International Cooperation at EU: Research Projects
  - Operational scenario
  - End user requirements
  - First Responder Equipment
  - On-field test-beds
- Conclusions

Introduction (some reasons for cooperation)

- Natural, CBRN (Chemical, Biological, Radiological, Nuclear) and man-made disasters can cause massive destruction, high mortality and many casualties not only in urban areas but also in critical infrastructures, usually, without warning; this is particularly true for earthquakes.

- Earthquakes involve more than 30% of the total fatalities from natural disasters in the last 20 years. On average, about 7 lethal earthquakes were occurring each year in the 20th century.

- Entrapment is also the result of collapsed structures due to accidental or deliberate explosions (e.g. collapsed mines, technical failures, confined spaces).

- Disaster impacts are high in Critical Infrastructures for a number of reasons; CIs are positioned over large regions, are overpopulated, have very tall and extended building blocks with complicated street patterns

Background

- Current large crises → Transboundary crises
  - Multiple jurisdictions, multiple policy sectors
  - Multiple infrastructures
  - Multiple levels of response
  - Rapid evolution & escalation
    (Boin, 2009; Kagadec, 2009; Roe, 2009; Ansell et al, 2010)

- Necessity to improve large-crisis management
  → Efficiency
  - *Ex: Sept 11th 2001 (Zelikow et al, 2004)*
    Partial pick up of radio transmissions (difficulties in high-rises), leading to incomplete COP (common operational picture) & improvisation
  - High pressure upon crisis communication & response networks
  - Failures in communication, information sharing & coordination, mainly during the 1st phase *(Boin & Hart, 2010)*

Background

- Existing barriers for effective use of an emergency management system *(Millar & Heath, 2004)*
  - Culture
  - Trans-border crises
  - Language, definitions

→ **Not technical**
→ **Ambiguity**

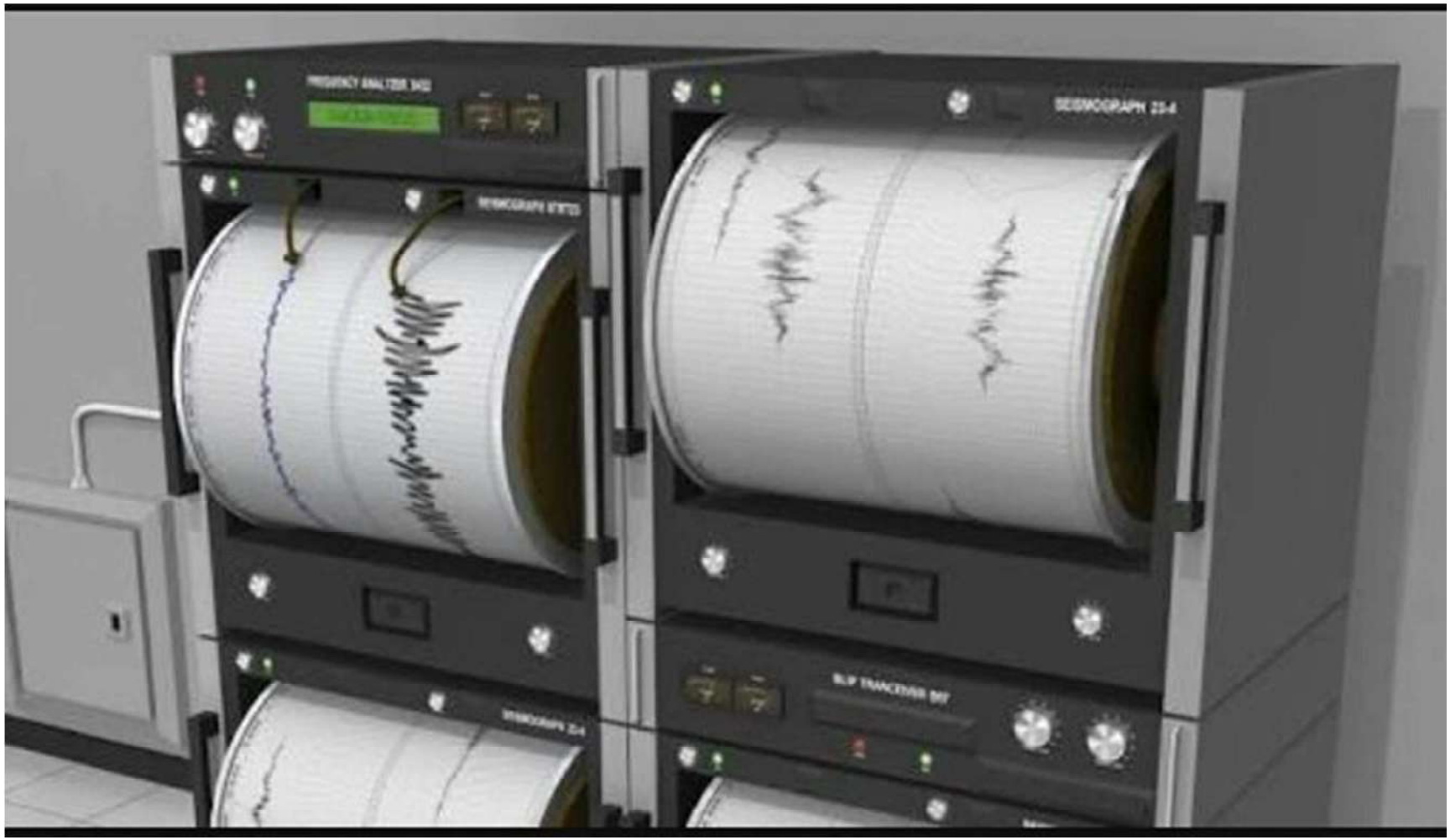
- Integrated information
  - Culturally neutral system
  - Collaborative tools
  - Better coordination of actions of diverse organizations
  - Multi-faceted crisis response mechanism

FIRE ON FACTORY

FUKUSHIMA

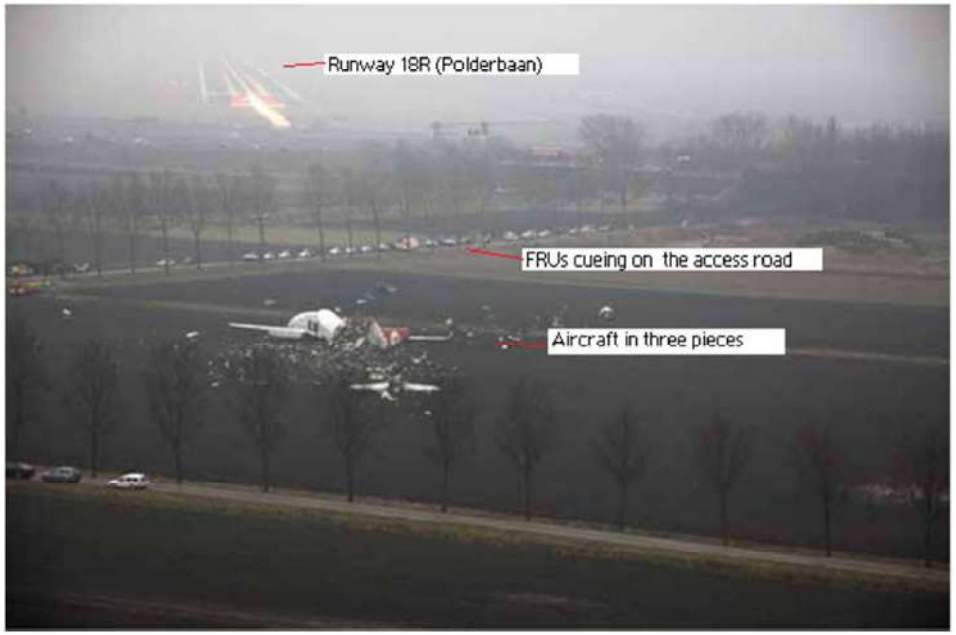
EARTHQUAKE

SEISMOMETERS



TRAIN ACCIDENT

AIRCRAFT CRASH at SCHIPHOL AIRPORT (NL)



VESSEL FIRE

Emergency Networks: past experience

Lack of interoperability among systems of different organizations:

- Lack of specific standards;
- Proprietary solutions often not compatible;
- E.g.: World Trade Center, 9/11/01

Lack or limited data service and applications:

- Compared to recent wideband wireless networks;
- E.g.: important data such as maps, building plants, videostreaming systems

Excessive trust in fixed infrastructures:

- Communications towards hit by destructive events;
- E.g.: Katrina, New Orleans, 2005

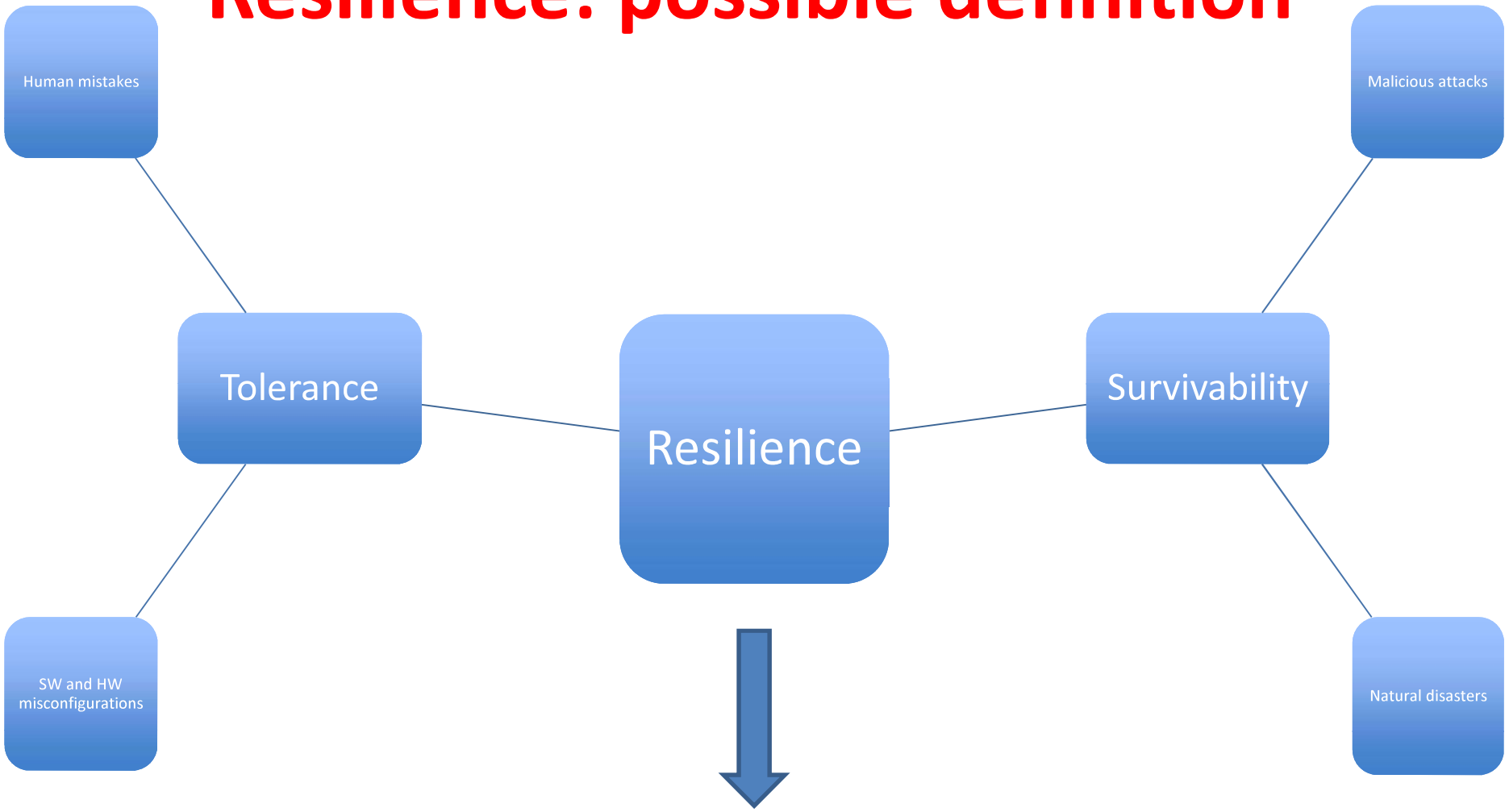
Definitions (some)

- **Danger**: intrinsec feature of an event, object, action (etc.) to potentially cause damages

- **Risk**: when the source of damage exists together with a possibility it causes damages; it is a probabilistic concept given by probability of occurrence of an event capable to cause damages to (e.g.) people

- **Resilience**: ability to absorb or avoid damage without suffering *complete* failure

Resilience: possible definition



PERSISTENCE OF SERVICE

Public Protection and Disaster Relief (PPDR):

- *"PPDR services are provided by a service or agency, recognised as such by the national administrations, that provides immediate and rapid assistance in situations where there is a direct risk to life or limb, individual or public health or safety, to private or public property, or the environment but not necessarily limited to these situations" (Source: Commission Recommendation C (2003)2657).*

- PPDR radio communications refers to radio applications designed for public safety, security and defence;

- National authorities or relevant operators use the applications to respond to emergency situations;

- The European Commission, in co-operation with Member States, seeks to ensure that sufficient spectrum is made available for public safety and protection, civil protection and disaster relief, under harmonised conditions, to:
  - support the development of safety services;
  - the free circulation of related devices;
  - the development of innovative interoperable solutions.

United Nations Office for Disaster Risk Reduction (UNDRR)

- UNDRR is the focal point of the United Nations system for disaster risk reduction and the custodian of the Sendai Framework, supporting countries and societies in its implementation, monitoring and review of progress.
- Disaster risk reduction (DRR) aims to prevent new and reduce existing disaster risk, strengthening the resilience of people, systems and approaches.
- DRR sits at the heart of the world's most pressing concerns: climate change, displacement, urbanization, pandemics, protracted crises and financial systems collapse.
- Extreme change is taking place in planetary systems, and we must act now to secure a safe, healthy and prosperous future.

- https://www.unisdr.org/

Sendai Framework for Disaster Risk Reduction

- The Sendai Framework was adopted by UN Member States on 18 March 2015 at the Third UN World Conference on Disaster Risk Reduction in Sendai City, Miyagi Prefecture, Japan.
- Stimulating awareness on the need of more resilient communities with reference to Sendai Framework for Disaster Risk Reduction 2015-2030
- The Sendai Framework for Disaster Risk Reduction 2015-2030 outlines seven clear targets and four priorities for action to prevent new and reduce existing disaster risks: (i) Understanding disaster risk; (ii) Strengthening disaster risk governance to manage disaster risk; (iii) Investing in disaster reduction for resilience and; (iv) Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation and reconstruction.
- It aims to achieve the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries over the next 15 years.

- **https://www.unisdr.org/we/coordinate/sendai-framework**

Emergency: main actors

After a disaster event, some forces react:

1. Police: arrive and isolate the affected area;
2. Fire brigades (first responders): operate on fires, vehicles, buildings and define the real situation;
3. Ambulance service: comes into play soon after to take care of victims (triage, on-field help, transportation, …)
4. Civil Protection: assist affected people, organize areas with camping tends, setup radio communications,…
5. NGOs

End users

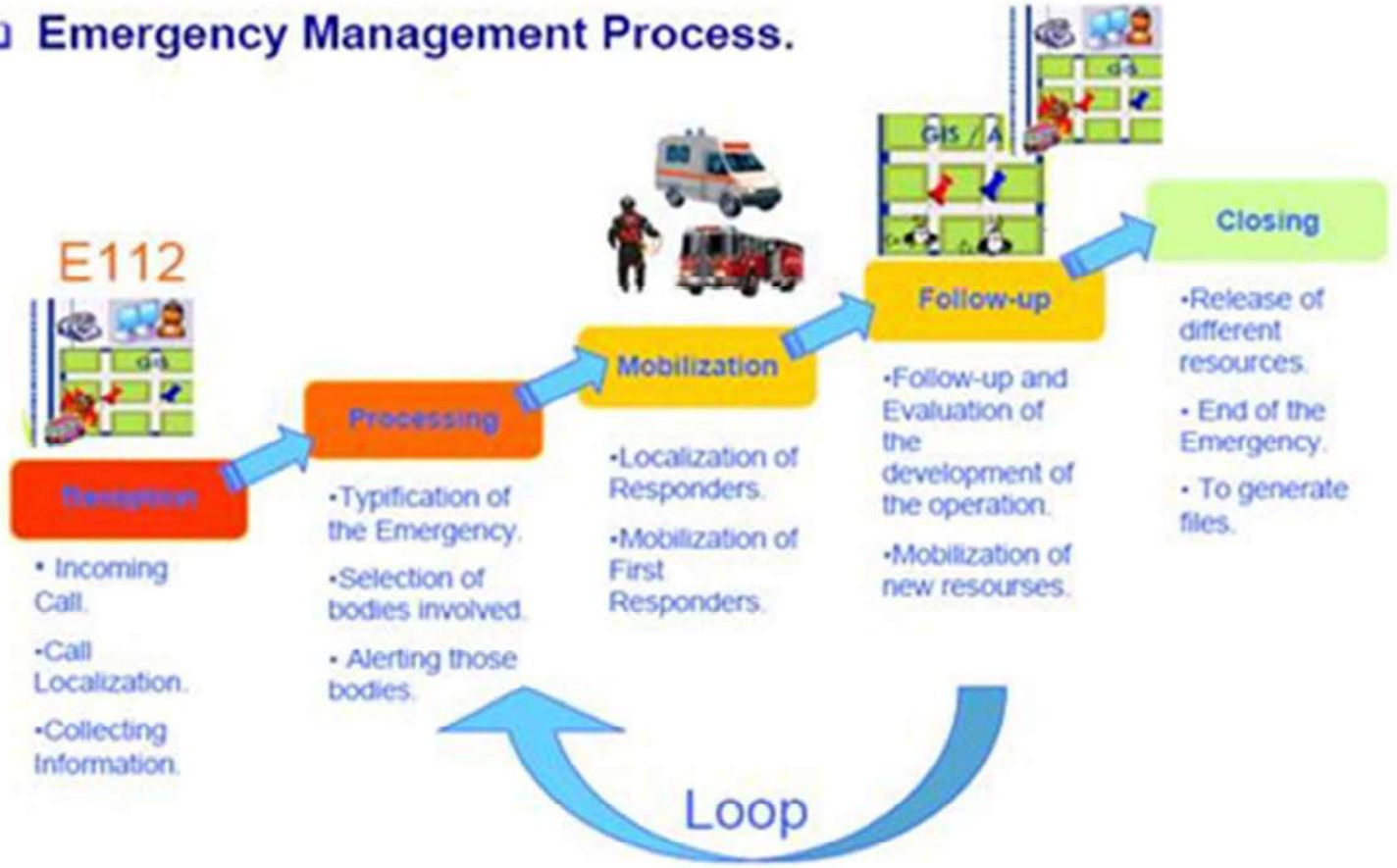
Emergency staff, operating in harsh environment

- **Primary core**: fire services, police, medical services
  → Rescue forces
- Secondary core: all actors involved in the crisis resolution (on the field & out-of-theatre)
  - Forensics, CBRN
  - Municipalities, regional authorities
  - Crisis management organizations
  - Weather services
  - Public health care, environmental care
  - Private companies with necessary expertise
  - Etc.

Key issues: ***MODULARITY***

- on the field → *mobile units*
- at the back offices → *applications, systems, services*

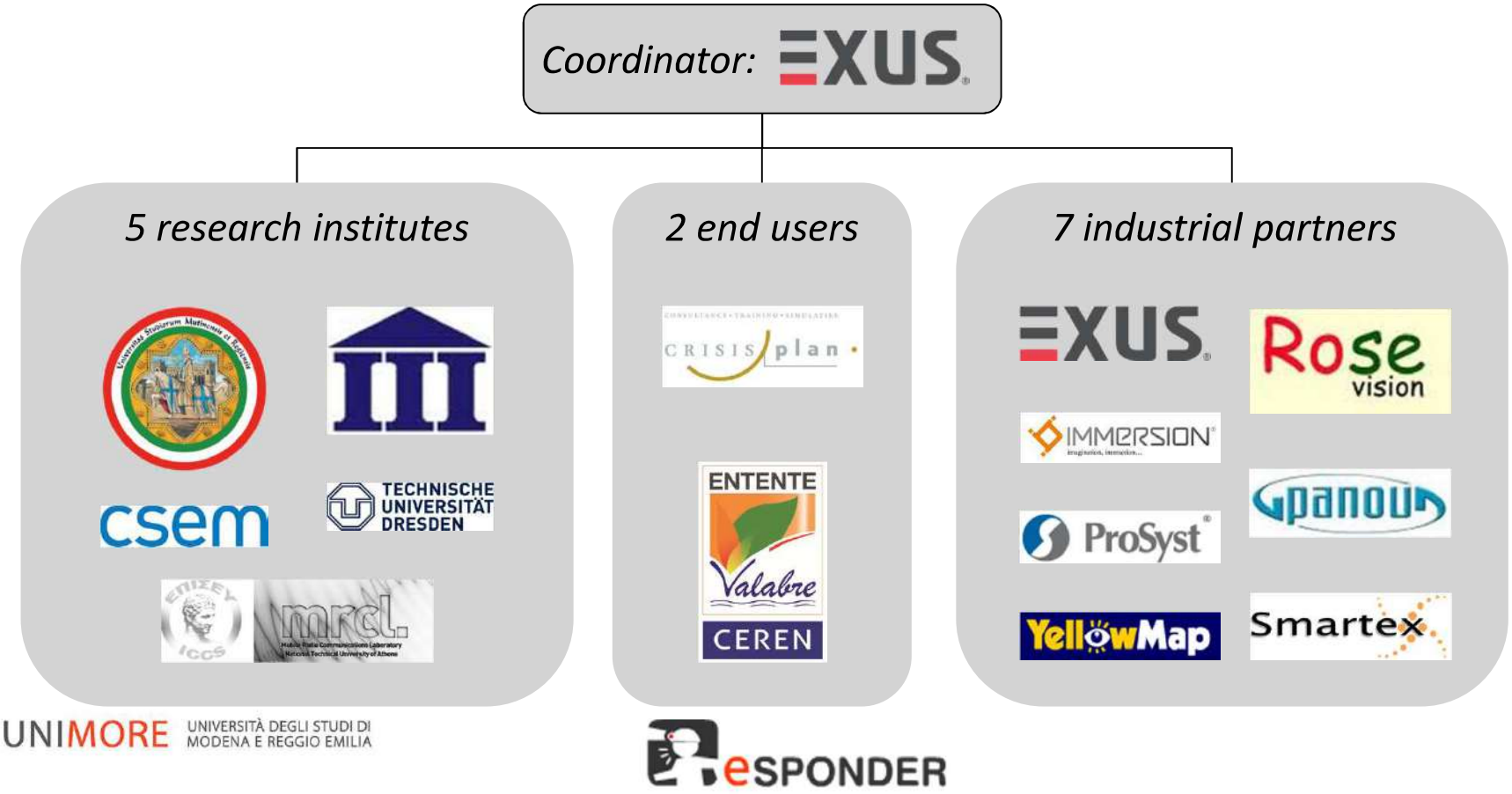
Emergency Management Process.



INTERNATIONAL COOPERATION
EU RESEARCH PROJECTS

FP7 Project ESPONDER

- 4.5-year project (01/07/2010 – 31/12/2014)
- Framework: FP7, SEC-2009.4.2.1: First Responder of the future
- 14 partners from 8 countries
- Budget: € 12,538,704.30 / EC funding: € 8,790,044



The ESPONDER project scope

- Enhance the effectiveness of FRs operations
  - Building an *independent* and *open*, *adaptable*, and *extensible* **platform** with components put together in a loosely coupled way
    - *Communications* (voice, video)
    - Data (information)
  - Logistics of FR operations
    - Real Time (on-line)
    - Simulations (off-line)
  - Pilot demonstrations (proof-of-concept)

Holistic approach

- Technology integration & development
- Logistics
- Regulation
- Training

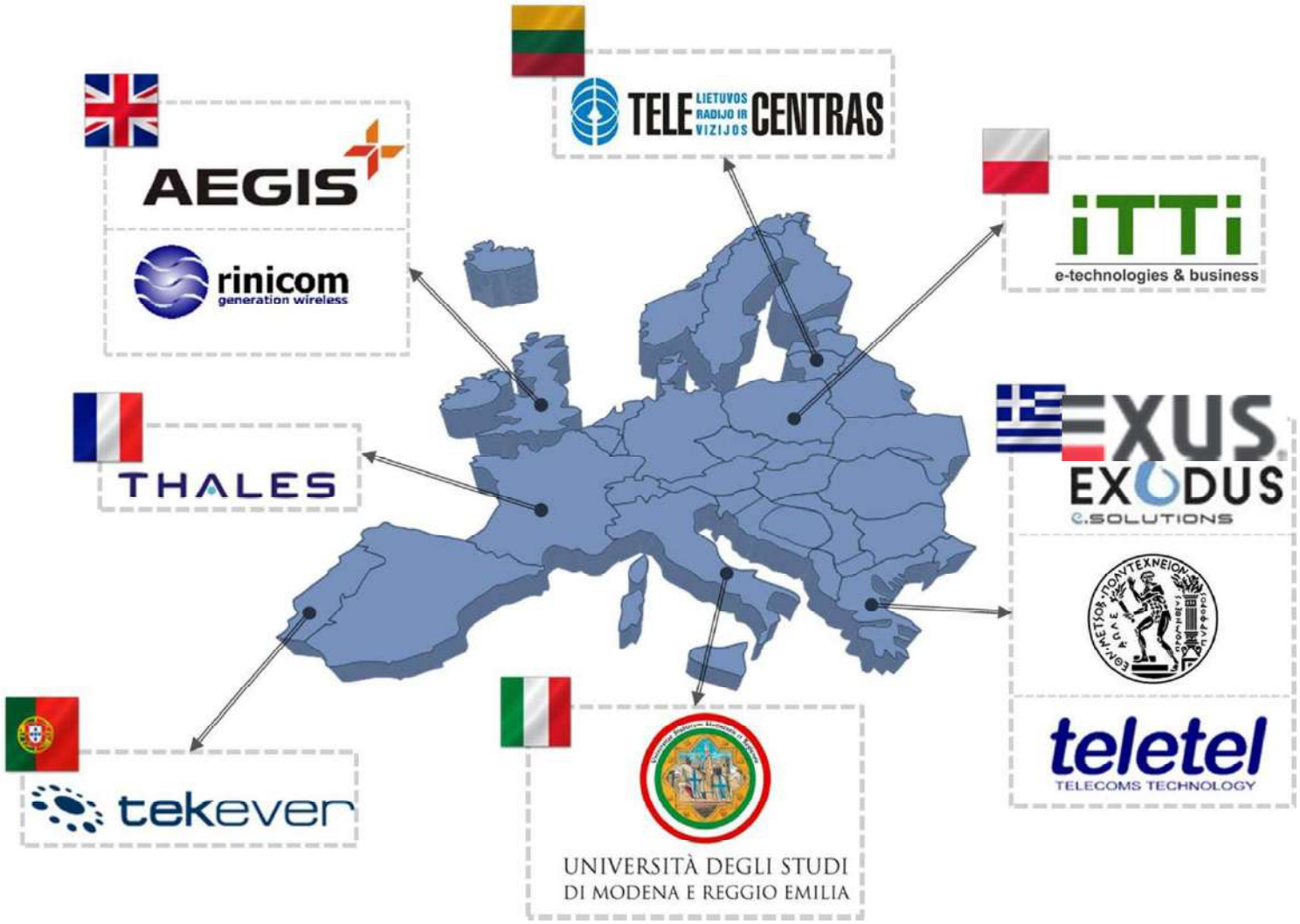
- Ensure the safety
  - of any FR
  - during all stages of an operation

- Recognition of the *socio-economic context* & its *impact*
  - Emerging training needs
  - Standardization & regulation issues
    - Research of current standardisation framework in Europe

FP7 Project PPDR-TC

Project full title:	Public Protection and Disaster Relief - Transformation Center
Call identifier:	FP7-SEC-2012.5.2-1
Programme Objective:	SEC-2012.5.2-1: Preparation of the next generation of PPDR communication network
Grant agreement no:	313015
Total budget:	€ 3,962,239.68
Funding:	€ 2,890,684.20
Start date:	April 1st, 2013
Duration:	30 months
Coordinator:	EXUS S.A.

CONSORTIUM


TELE LIETUVOS RADIJO IR VIZIJOS CENTRAS
AEGIS
rinicom generation wireless
iTTi e-technologies & business
THALES
EXUS EXODUS e.SOLUTIONS
teletel TELECOMS TECHNOLOGY
tekever
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

Main outcomes-Study basis

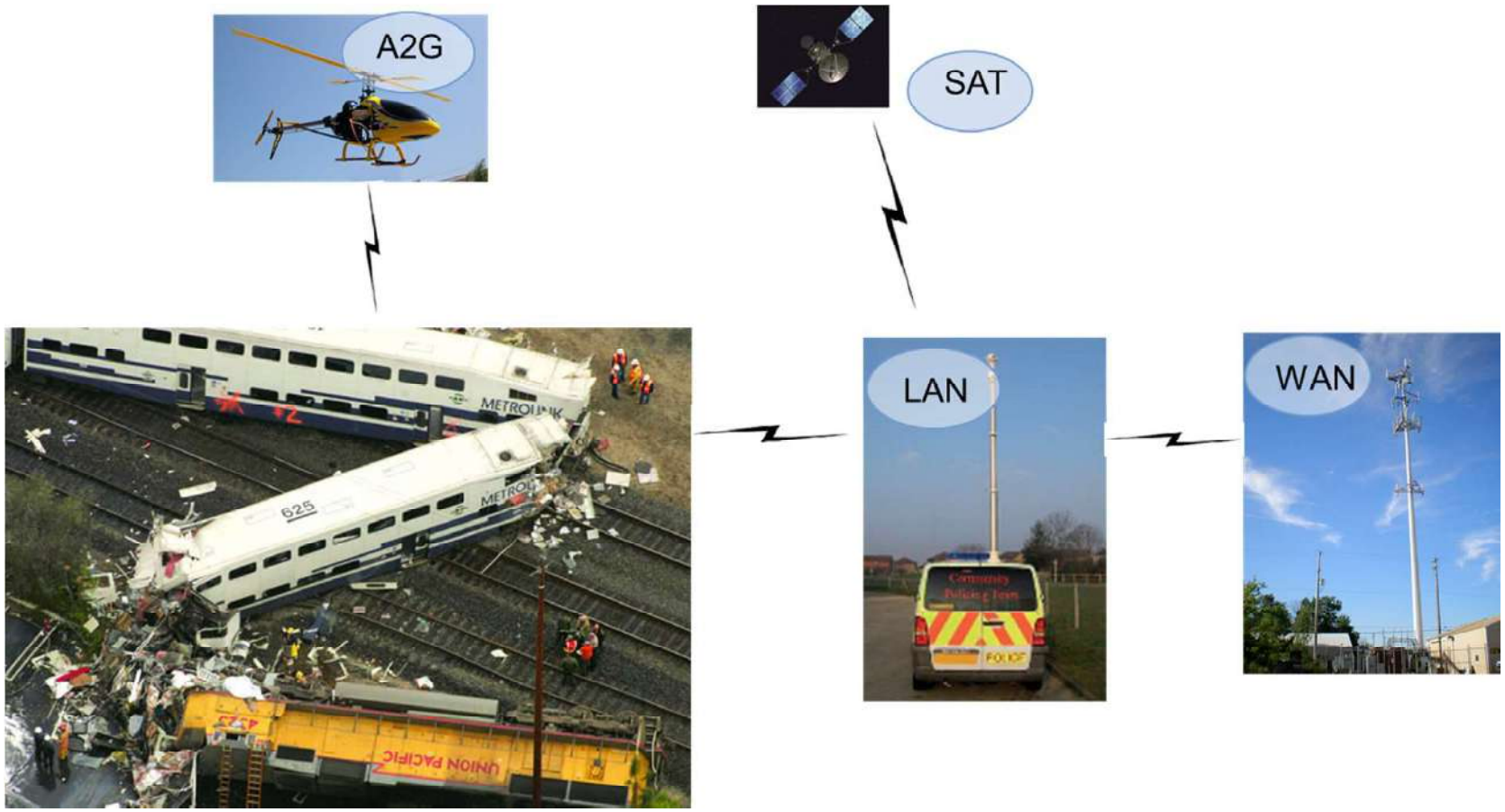
- Analysis of collected questionnaires from 24 PPDR organizations around Europe
- Analysis of major incidents and events (eg. 2012 Emilia earthquake, Northern Italy, 2011 Great East Japan Earthquake and Tsunami, 2005 London Underground Bombings, 2012 London Olympics)
- 2011 studies for German government by BMWI, WIK and Aegis
- ECC Report 199, prepared by CEPT Project Team 49
- Hypothetical major incident scenario submitted to the US Federal Communications Commission by the New York City PPDR Authorities
- 2011 Canadian Centre for Security Science study to identify 700 MHz spectrum requirements for PPDR Mobile Broadband Communications
- Other EU Framework Studies:
  - HIT GATE (FP7-284940) - Heterogeneous Interoperable Transportable Gateway For First Responders
  - E-SPONDER (FP7-242411) - A Holistic Approach Towards The Development Of The First Responder Of The Future
  - ISITEP (FP7 - 312484) - Inter System Interoperability for Tetra-TetraPol Networks

Disasters: operational scenarios

1. **“Day to Day”/routine operations**: include normal and regular types of incidents that PPDR users handle on a daily basis. e.g. Road traffic accident in which two cars are severely crashed. From one of the cars the fuel tank is damaged causing a leakage that sets a fire on its rear side. In addition drivers and passengers suffer different types of injuries and some of them are trapped inside the vehicles.
2. **“Large Planned”** : Planned event that cannot be considered as routine operations. E.g. G7 summit, the visit of the Pope, the EU football champions’ league final,… With respect to telecommunications, additional capacity to existing infrastructure could be added by mean of portable antenna towers.
3. **“Disasters /unplanned major events”:** Addressing situations that are usually associated with a crisis, such as flooding, earthquake, airplane accident, terrorist acts, upheavals, etc.; permanent damage of the majority of the telecommunication infrastructure while the FRs have to organise the appropriate actions for survivors evacuation and research actions

Possible approach for major incidents

A flexible, layered approach is likely to be necessary



Operational Communications Scenarios for PPDR Users

1. between a central control station and field personnel at an incident location;
2. between PPDR vehicles and an incident location or control station;
3. between individuals at an incident location;
4. between different PPDR entities (e.g. police, fire, ambulance);
5. accessing information from the Internet or other external data sources (including corporate intranets);
6. communications in enclosed spaces (e.g., tunnels or basements);
7. communications with remote locations (e.g., mountains or at sea);
8. communications with or between machines (e.g., remotely controlled vehicles).

PPDR user requirements

- Distinct communication requirements identified:
  - Mission-critical Voice
  - Narrow Band Data (e.g. for messaging)
  - Broad Band Data (e.g. images or large files)
  - Video
  - Use of repeater stations to extend coverage or provide air-to-ground communication
- Video and Image transmission identified as important in various scenarios
  - Surveillance
  - Maintaining public order / safety at large events
  - Assisting treatment of casualties
  - Identification of suspects or vehicles
  - Situational awareness (e.g. during rioting or high speed pursuits)

Key deficiencies

- Coverage
  - Incomplete with significant black spots, especially indoors, underground or in remote areas.
  - Worse for data services
- Lack of Interoperability
  - At the technology, at agency level
- Resilience:
  - At the network level (uninterruptable power supplies etc.) and terminals (e.g. need to be rugged and waterproof)
- Reliance on public networks:
  - Often unusable after major incidents due to congestion.

Main outcomes -*Future requirements*

- Video
  - Applications include automatic number plate recognition, body worn cameras, portable CCTV deployments, surveillance, suspect identification, telemedicine and thermal imaging
- Other data applications
  - Breathing apparatus telemetry, vital signs monitoring, access to on-line forms and databases
- Location services:
  - Tracking of personnel, vehicles and other assets. Also electronic mapping services are increasingly used
- Resilience and Backup:
  - Multiple networks preferred (e.g. voice and data) to provide fall back if one fails.
- Flexibility:
  - Rapid provision of extra coverage or capacity when needed
- Better interoperability between different agencies and ICT systems

Relevant communication needs identified

- **Reliable voice and data communications** are vital for almost all PPDR operations. PPDR agencies value (and pay for) **coverage**, **availability** (existence of dedicated frequency bands) and **security** (existence of dedicated frequency bands, possibly using special encryption schemes);

- **Existing PPDR communication infrastructures** vary among EU countries and, in some cases, even within the same country between agencies, but all suffer from shortfalls in domains such as **coverage**, **interoperability**, the ability to **convey non-voice traffic** or the **availability of radio spectrum**;

- Although the highest priority is reliable voice communications, the capability to send and receive broadband data such as images or video has a significant impact on the efficiency and effectiveness of PPDR operations. Other services such as **improved localisation** were also considered of interest;

- **Reliance on public communication networks** for data transmission is currently widespread and can be effective in many situations, but these networks generally have limited coverage and often become unavailable under severe conditions such as in the immediate aftermath of a major event or disaster.

Service Availability (required by PPDR users)

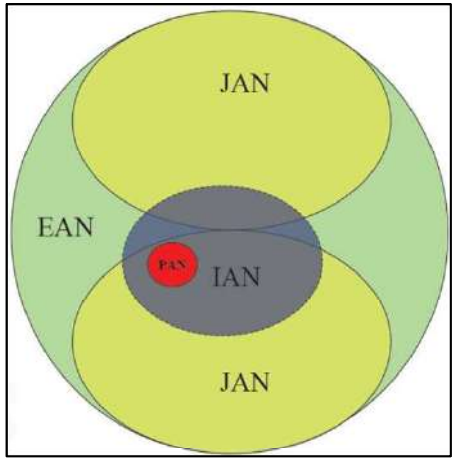
Three main categories of required availability:

- **Mission-critical applications** (e.g., transmission of status information, data and images), in which the ability to receive up-to-date situational awareness information is of primary importance to provide a successful response. Low network start-up times and an operational availability above 99.5 % are often requested;
- **Medium critical applications** with moderate availability requirements (e.g., download of maps), since alternatives such as satellite navigation, paper maps or voice guidance may be used in the event of failure. The required availability levels are strongly influenced by the specific type of application or service.
- **Non-critical applications** with longer start-up times allowed and lower availability requirements (e.g., PDA and workspace synchronisation), but with no packet loss tolerance to avoid data corruption.

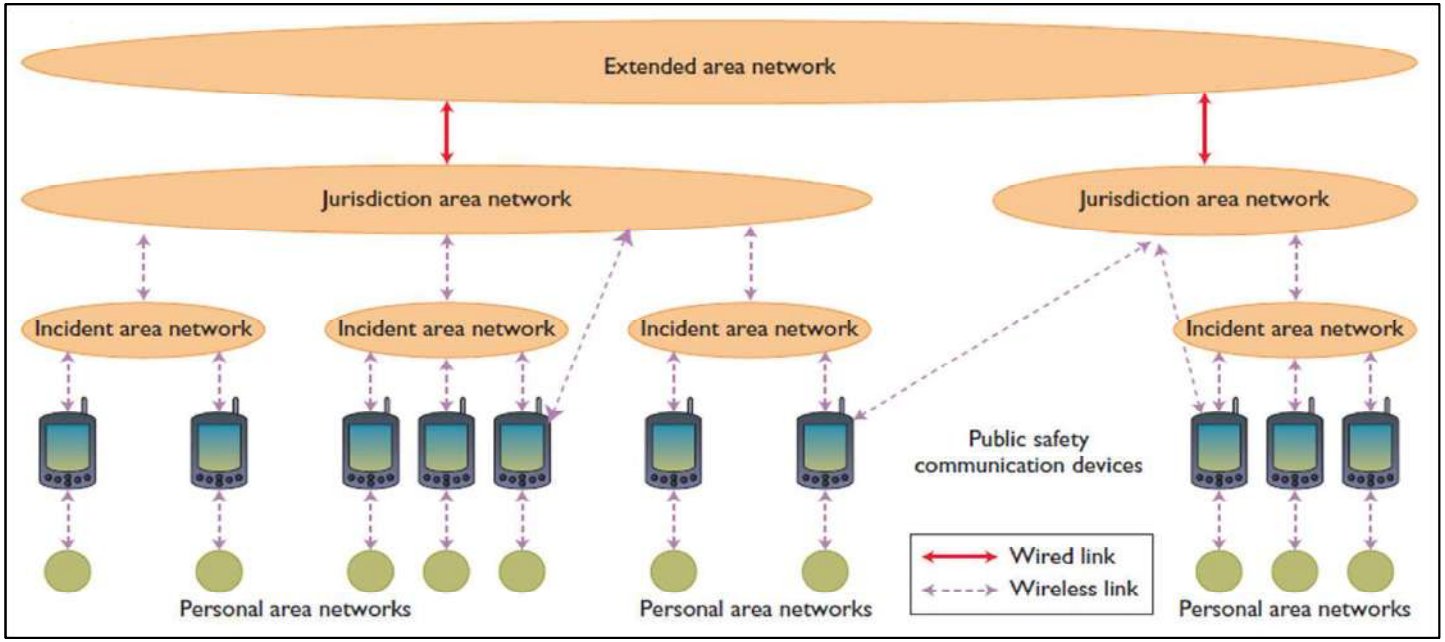
Security

- Security and data integrity requirements are highly dependent upon the nature of the data exchanged (critical security levels are required to preserve sensitive and personal information and protect it from malicious attackers) and the users involved (more demanding requirements for police and security forces, for example)
- Using frequency bands exclusive to security agencies is, in itself, a security measure but, in most cases, not enough to provide the security levels required. For police, for example, **end-to-end encryption** and the **use of secure device operating systems** are key requirements. Also, if PPDR end-users are hosted by external base stations, virtual networks may have to be set up to separate PPDR and additional traffic.
- The implementation of data encryption algorithms and user authentication methods is therefore essential to comply with the security level of each specific PPDR application,

Public Safety System Architecture



"system of systems" architecture

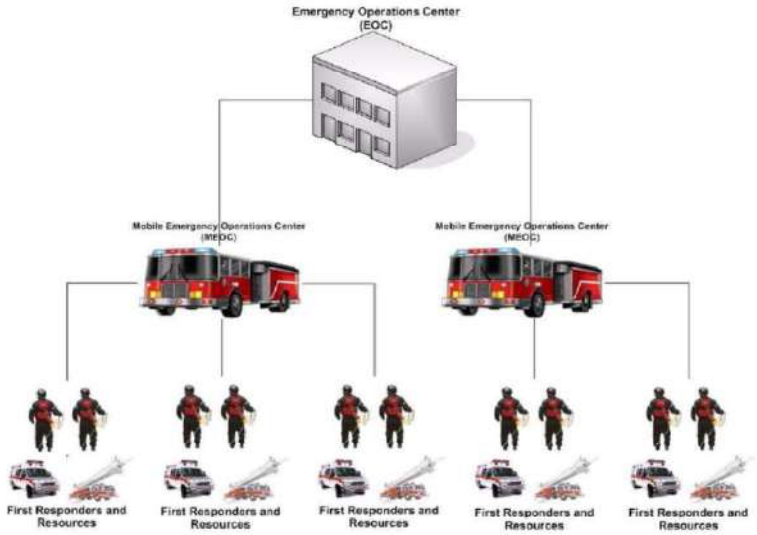


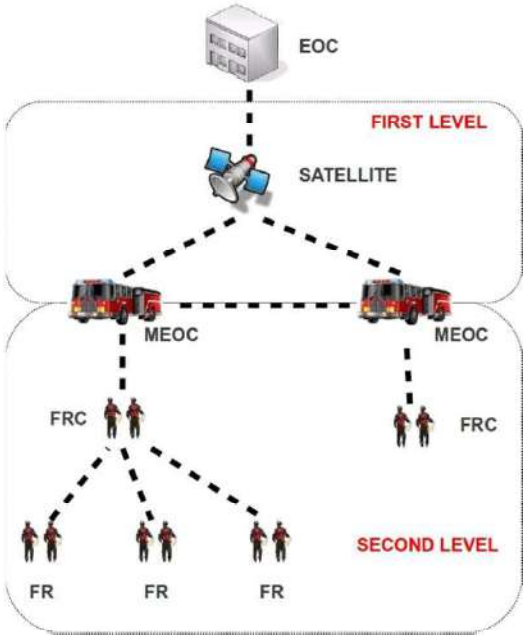
Personal Area Network	Incident Area Network	Jurisdiction Area Network	Extended Area Network
▪ First responder personal network; ▪ interconnects terminals, sensors,…	▪ Temporary network; ▪ Set up by MEOC; ▪ Dati between users and MEOC;	▪ Main Emergency net; ▪ Fixed infrastructures; ▪ IAN traffic managmnt;	▪ Nation wide optical fibre network ▪ Backbone for First responders, IAN, JAN

General Architecture

- FRs normally act either in remotely located areas with limited or disrupted communication infrastructures.

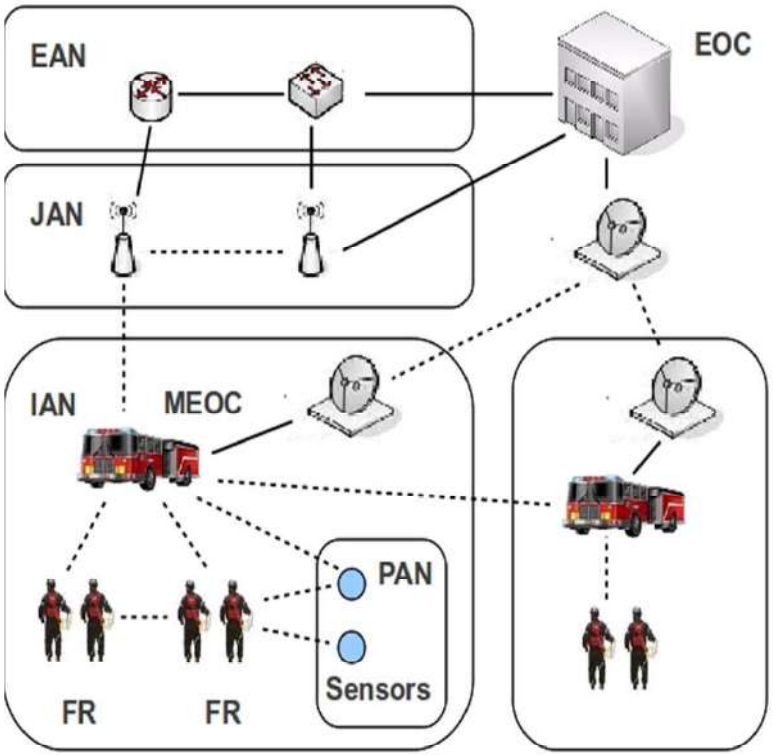
- They need to exchange information with the Mobile Emergency Operation Centre (MEOC) and with the remote Emergency Operation Centre (EOC), to enable cooperation at all levels with the target to minimize the uncertainty typical of crisis events.



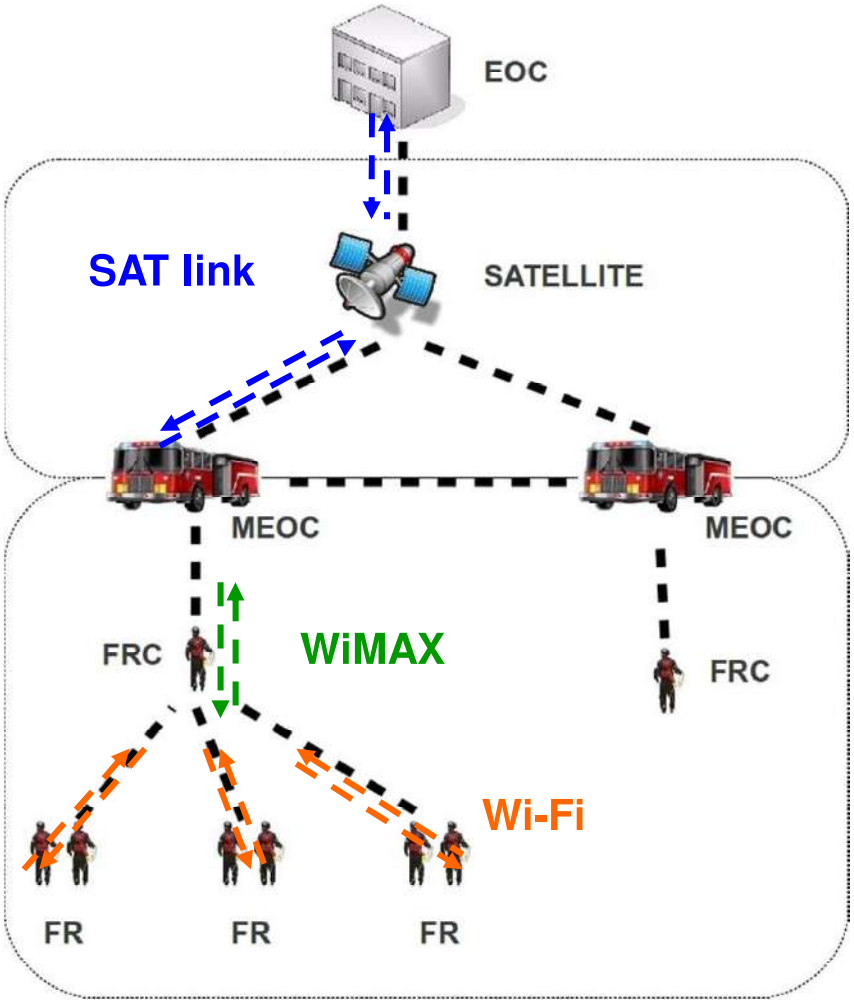


Network Architecture

- Main backhaul link via satellite
- Extended area network (EAN), acts as a backbone for JANs
- Jurisdiction area network (JAN), fixed infrastructures, eventually used as backup backhaul links
- Incident area network (IAN), mesh network serving on-field FRs
- Personal area network (PAN), wireless sensors collecting environmental information

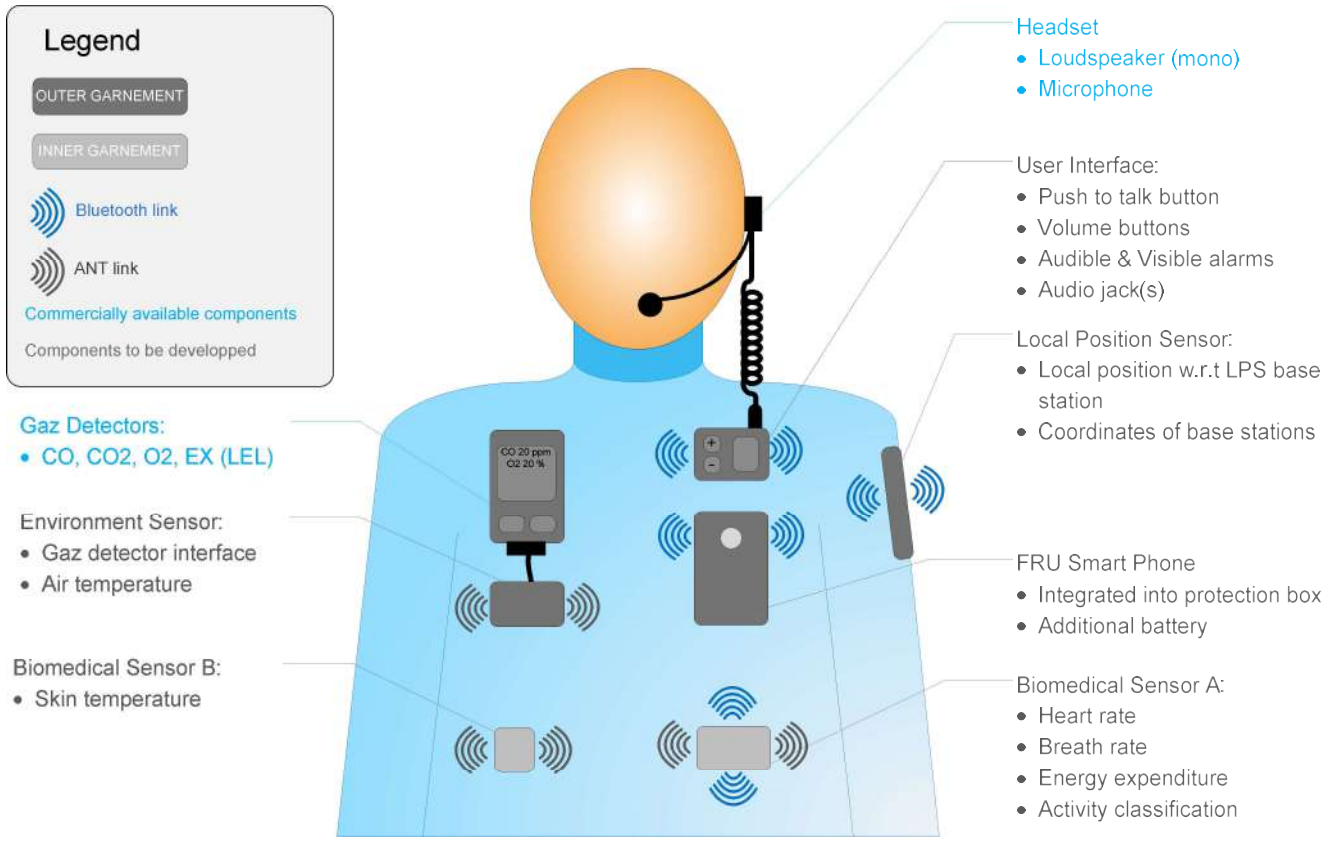


Communication Technologies



- MEOC – EOC link: SAT link
  - DVB-RCS terminal and VSAT system mounted on the MEOC
  - EOC equipped with satellite antennas and a satellite hub
- FRC – MEOC link: WiMAX (IEEE 802.16)
  - provide full coverage mounted on the roof of the MEOC
  - fully functional cellular network with scalable superposition of multiple MEOCs
- FR Team: Wi-Fi (IEEE 802.11)
  - Wi-Fi APs in the proximity of the FR team, providing SIP server functionality too

First Responder Equipment



Communication Services

- The main services that have to be supported are:
  - **Voice**: voice calls among the FRs and between the FRs and MEOC/EOC (e.g., VoIP)
  - **Video**: video streaming between FR chief and MEOC/EOC (e.g., VIP)
  - **Sensors**: transfer of information about temperature, heartbeat, breath, etc., from each FR to the FR chief, to the MEOC and to the EOC
  - **Data**: generic file transfer (e.g., picture or map of the incident area) from a FR/FR chief to the MEOC/EOC (and viceversa)

The First Responder Unit - FRU

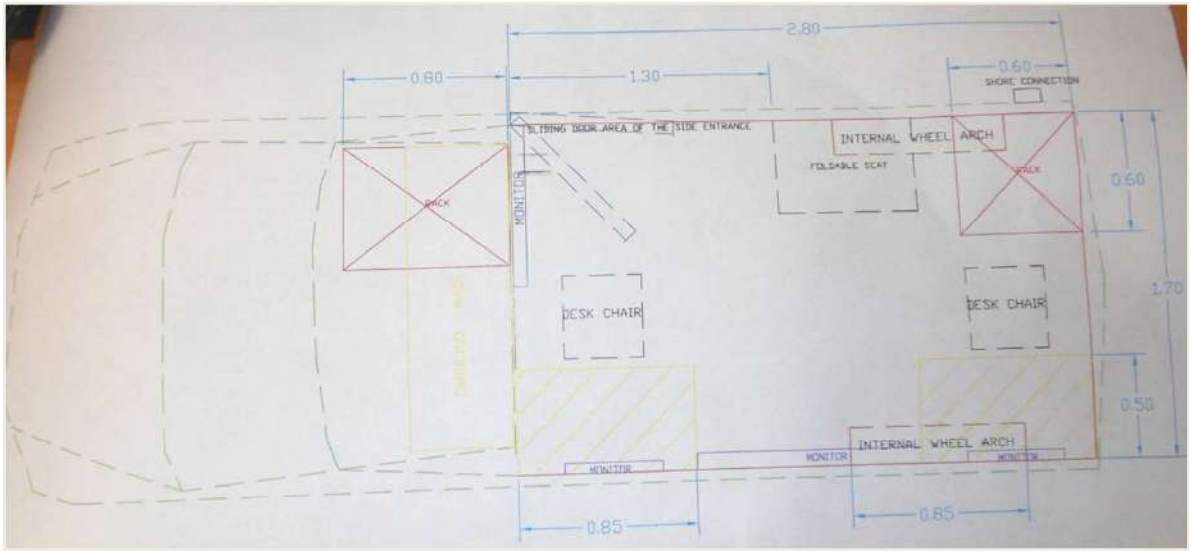
- Set of physiological & environmental sensors for real-time measurements of FR safety
  - Embedded in underwear
  - Adapted to the outer garment (jacket)
  - 'Wearable computer'

- Dedicated functionalities – FR & FR chief
  - Group communication
    - Wi-Fi
    - WiMax
    - 3G/4G
  - Precise positioning (GPS / LPS)
  - Alerting & messages
  - Emergency geolocalization

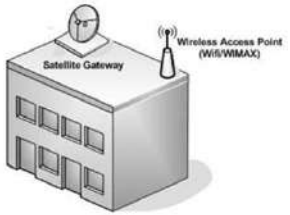
The Mobile Emerceny Operation Centre

- Base of operations on field → partial replica of EOC
  - Mobile vehicle “all-in-1”
  - 3D interface – Sharing of information
  - Environment monitoring (video, weather)
  - FRs monitoring

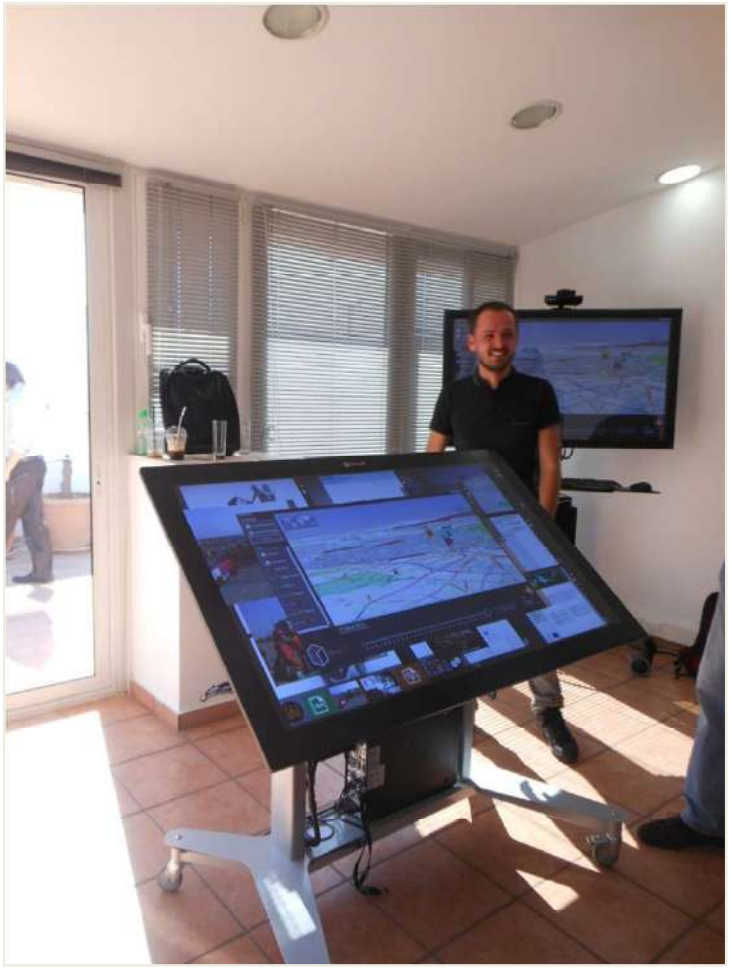
- Communication interoperability
  Autonomous system
  - Satellite
  - WiMax
  - Wi-Fi
  - 3G/4G
  - VHF/UHF



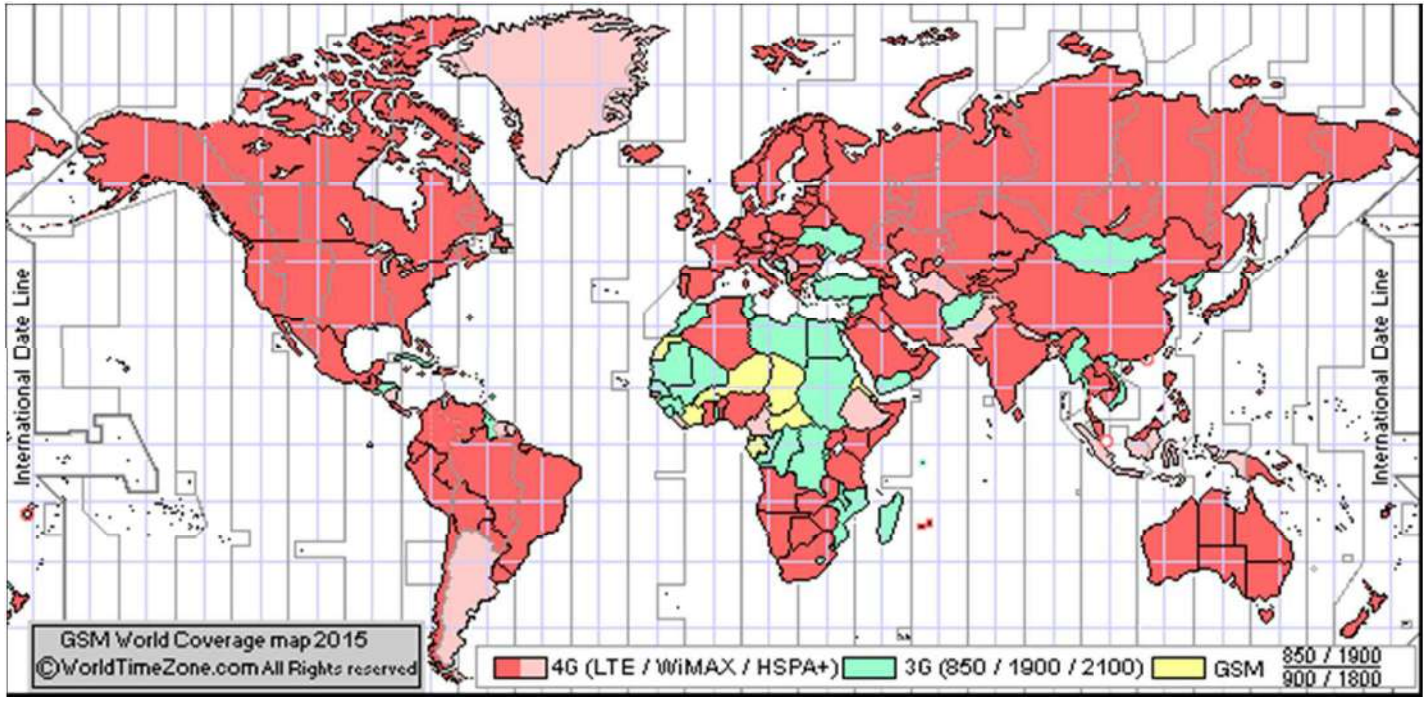
The Emercency Operation Centre (EOC)



- Base of operations *out of field*
  - Integration of necessary ICT components
  - Servers
- Communication
  - Satellite
  - 3G/4G
  - Wi-Fi
  - WiMax
  - VHF/UHF
- Specific tools
  - 3D collaborative table
  - Communication interoperability



FUTURE MISSION CRITICAL SYSTEMS – LTE DEPLOYMENT

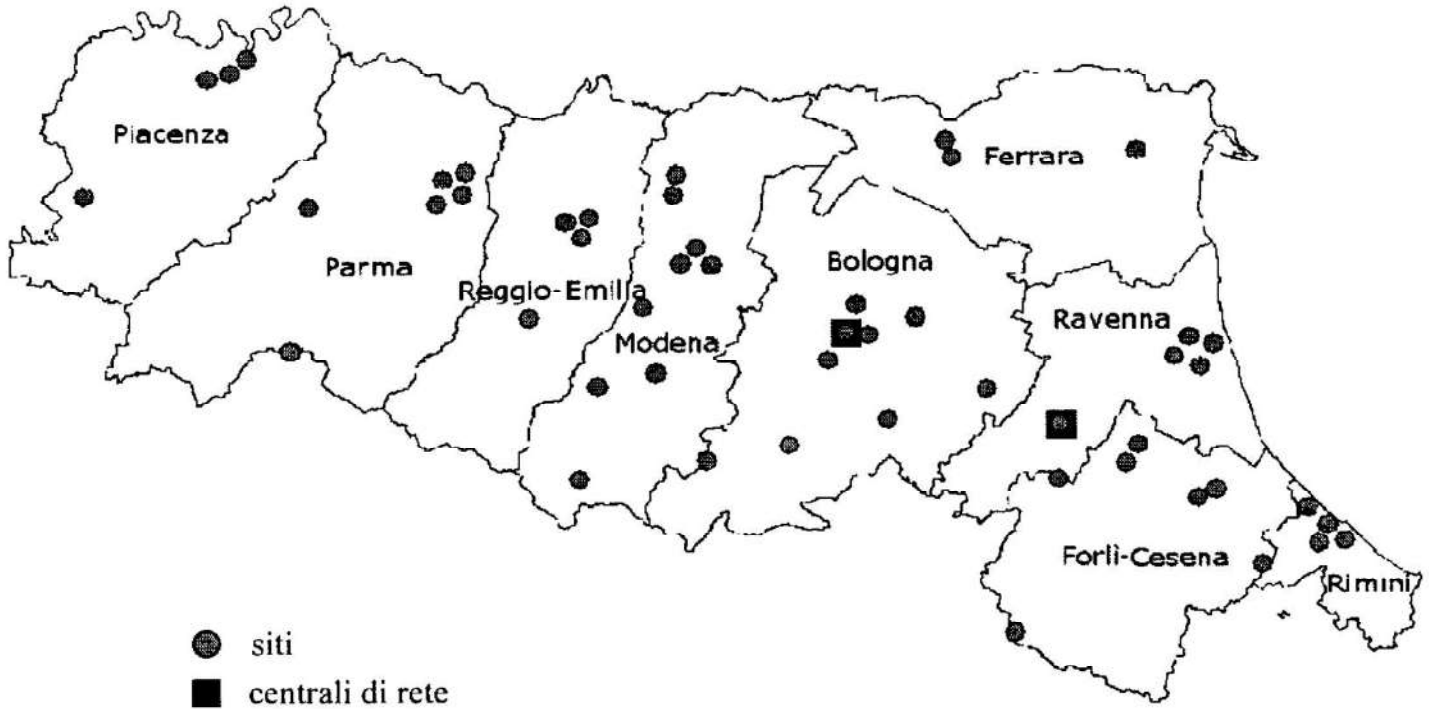


- By far LTE is the most promising technology not only from a technological point of view but also from a business point of view as it is currently being adopted by several public communication provider companies. This potentiates the option for the PPDR communities to lease a publicly operated LTE infra-structure, instead of managing their own private infra-structure.

TETRA (TErrestrial Trunked Radio) Technology

- It is a ETSI standard (https://www.etsi.org/technologies/tetra)
- It is a digital trunked mobile radio standard developed to meet the needs of traditional Professional Mobile Radio (PMR) user organizations such as Public Safety, Transportation, Utilities, etc.
- Some typical services: wide area fast call set-up "all informed net" group calls Direct Mode Operation (DMO) allowing "back to back" communications between radio terminals independent of the network; high level voice encryption to meet the security needs of public safety organizations; an Emergency Call facility that gets through even if the system is busy;
- TETRA Release 2: it includes the TETRA Enhanced Data Service (TEDS) that provides wideband high speed data communication services;
- TETRAPOL (https://www.tetrapol.com/): used in France, variant of TETRA.

TETRA NETWORK INFRASTRUCTURE: EMILIA ROMAGNA



- Two NOCs and many base-stations;
- Currently it is mainly used by the Ambulance Service

Spectrum Requirements

- What spectrum is required for PPDR?
- Current Situation in Europe and Elsewhere
- Why is additional spectrum required?
- Preferred new PPDR frequency bands in Europe

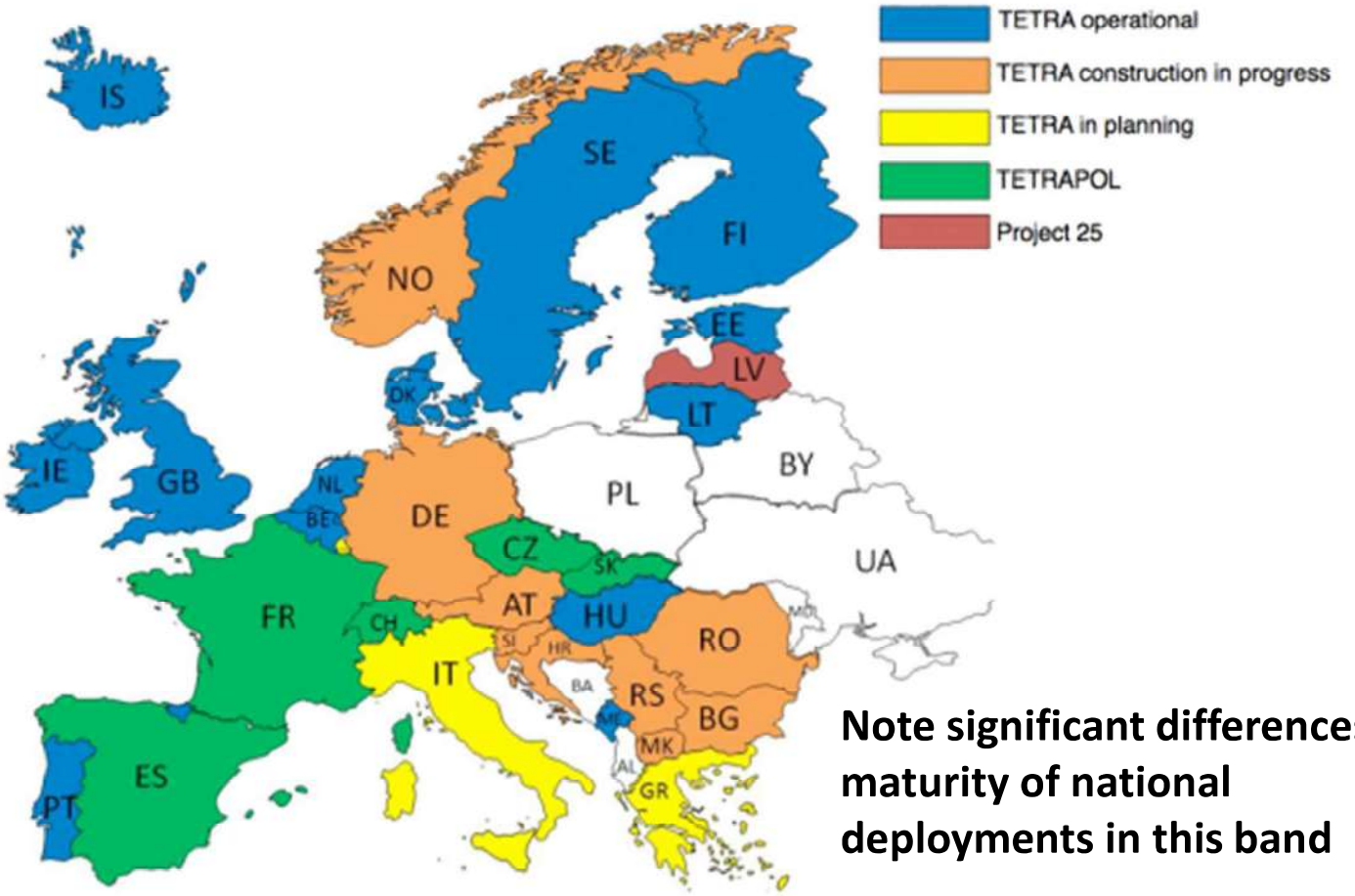
What spectrum is required for PPDR?

- Wide area voice and messaging, e.g. TETRA
- Wide area broadband, e.g. video
- Local area communication, including:
  - Extending coverage of wide area networks
  - Direct communication between terminals (DMO)
  - Ad-hoc local area networks
- Air to ground communications (A2G), e.g. helicopters
- Satellite communications, e.g. for remote areas and disaster recovery
- Fixed links, e.g. network backhaul or temporary links

Current PPDR spectrum in Europe

- Only fully harmonised band is 380-400 MHz – only half of this is available (2x5 MHz) and is used mainly by TETRA/TETRAPOL
- Some specific frequencies in this band set aside for DMO and A2G
- Many countries still have analogue systems operating in a variety of VHF and UHF bands (68 – 470 MHz)
- Some countries already have specific bands identified for broadband PPDR (e.g. video links) – main bands are 2.3 GHz and 3.5 GHz but precise frequencies vary
- CEPT has attempted to harmonise spectrum around 5 GHz (4940-4990 MHz and 5150-5250 MHz) for local area broadband PPDR, but few countries have taken this up
- Existing international bands used for satellite and fixed links (generally shared with other users)

Current status of 380-400 MHz



Source: PSRG - Public Safety Radio Group. Status as from April 2013

Note significant differences in maturity of national deployments in this band

National broadband PPDR bands

(Source: EFIS / national regulatory authorities)

Country	Frequency Band	Application
Austria	2300-2400 MHz	Cordless cameras
France	2310-2400 MHz	Video links
Germany	2347-2385 MHz	Analogue and digital video links
Greece	2300-2400 MHz	Public safety networks (used in five largest cities)
Hungary	2025-2070 MHz, 2200-2245 MHz	Digital broadband video
Ireland	3435-3475 MHz	Airborne video links
Poland	2250-2265 MHz	Digital video
UK	2320-2360 MHz	Wideband mobile emergency services (terrestrial)
	2360-2389 MHz	Wideband mobile emergency services (aeronautical)
	3442-3475 MHz	Airborne video links

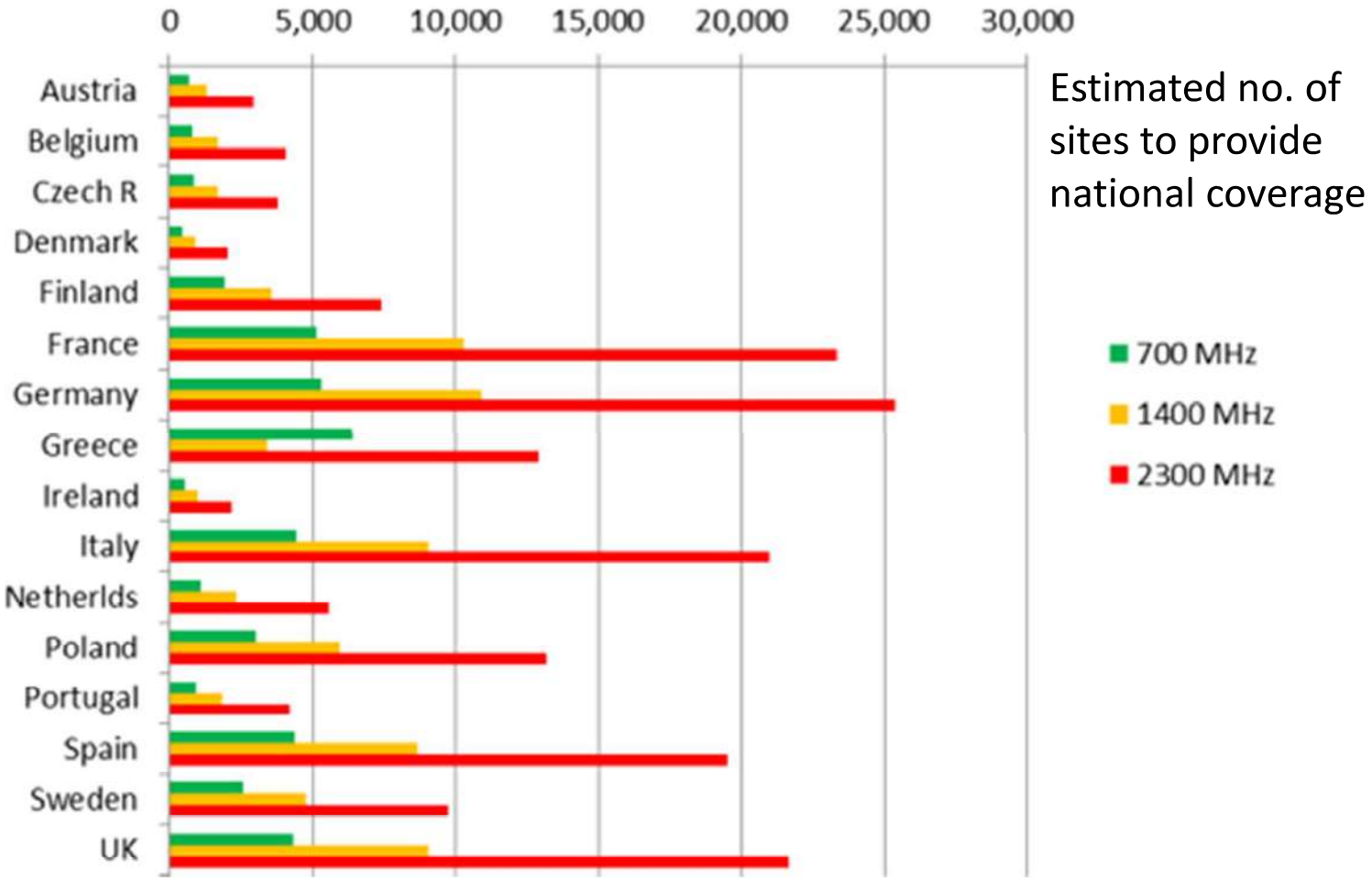
Note lack of harmonisation for such use

PRINCIPAL SATELLITE FREQUENCY BANDS

Band	MHz	Service	Main uses
UHF	406–406.1	MSS	EPIRBs
RNSS	1164–1300/ 1559–1610	RNSS	GPS, GLONASS, GALILEO (satellite navigation services)
L Band	1525–1559/ 1626.5-1660.5	MSS	Principal Mobile Satellite band, used by Inmarsat, Thuraya and others. 1544-1545 MHz and 1645.5-1646.5 MHz reserved for distress and safety communications
	1613.8-1621.35 2483.5- 2500	MSS	Globalstar mobile satellite band
	1621.35-1626.5	MSS	Iridium mobile satellite band
C Band	3600–4200/ 5925-6425	FSS	Mainly used by large fixed earth stations. Shared with fixed links. 3600-3800 may be used by mobile in the future
Ku Band	12500-12750/ 14000-14250	FSS	Mainly VSATs and portable earth stations, including PPDR apps e.g. traffic monitoring and emergency links.
Ka Band	19700-20200/ 29500-30000	FSS	Increasingly used for broadband connectivity or backhaul in remote areas

Why is new PPDR spectrum required?

- Need to support new applications and services – especially wide area mobile broadband
- Need sufficient low frequency (sub – 1 GHz) spectrum to ensure cost effective national coverage



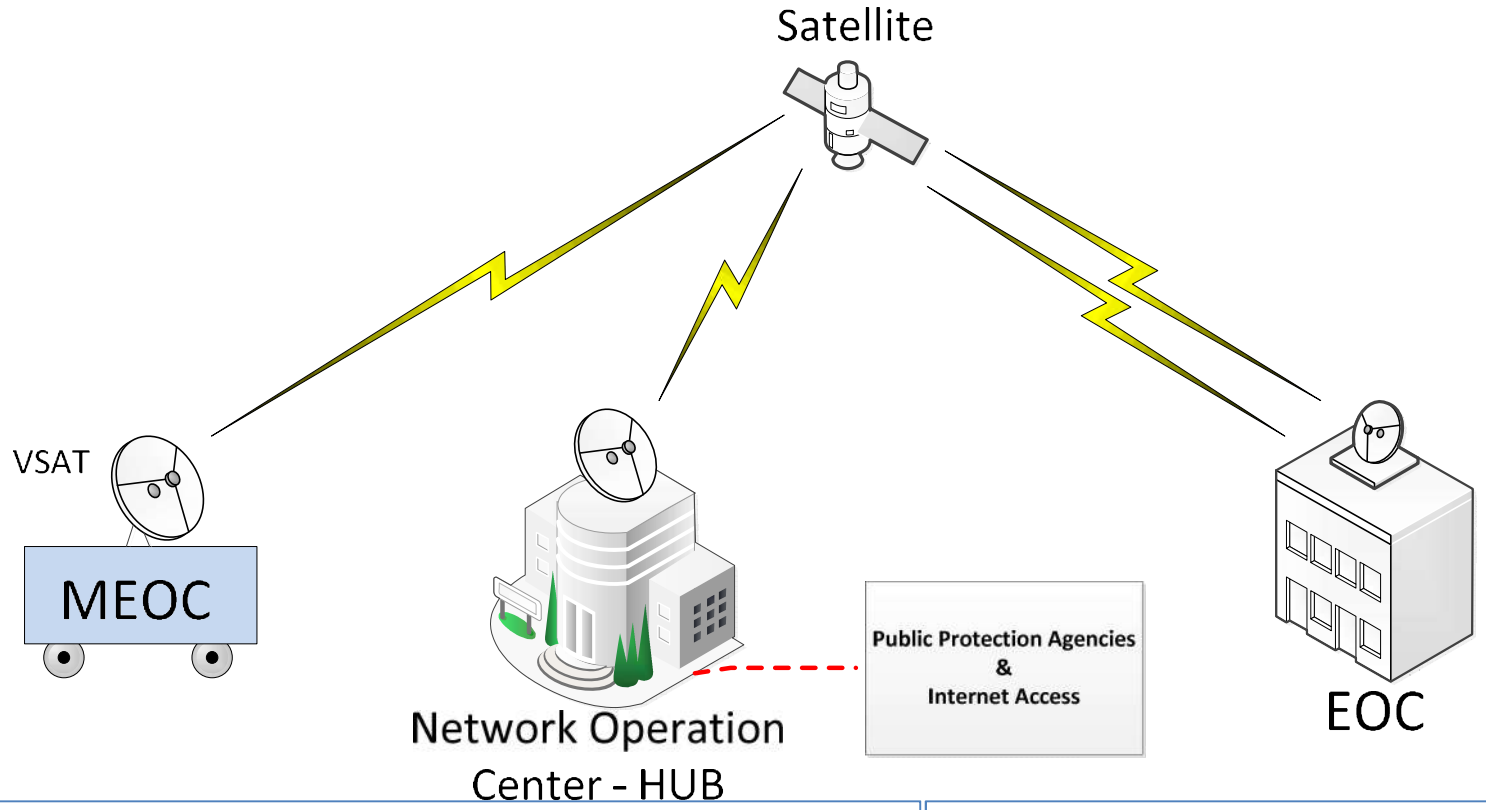
Current European (PT49)proposal

- Proposes concept of “flexible harmonisation”
  - Common technical standard (LTE) but national flexibility on amount of spectrum and implementation model (dedicated, commercial or hybrid)
- 700 MHz band favoured, with possible downwards extension to support dedicated PPDR band
- 400 MHz offers national flexibility for additional spectrum
- Terminals should support both dedicated band and commercial LTE bands
- Centre gap could also potentially support PPDR

PPDR spectrum: conclusions

- Growing global consensus that additional spectrum required for BB PPDR (already implemented in some countries)
- Should comprise low frequency (<1 GHz) for WAN and higher (e.g. 4940-4990 MHz) for WLANs
- Also need spectrum for specialist apps like DMO and A2G
- 700 MHz strongly favoured for BB WAN – ECC PT49 has proposed various options based on dedicated networks, commercial networks or hybrid approaches
- 400 MHz could provide additional capacity on a country by country basis
- BB WLANs should use existing allocations around 5 GHz
- Satellite and Backhaul can use existing harmonised bands

Satellite Sub-network EOC to MEOC Connectivity



- Demo sites (Athens-Greece: 43.2 deg., Marseille-France: 29.1 deg., Amsterdam-Holland: 22.2 deg.)
- The footprint of the satellite covers all Europe efficiently
- Technical Specifications
  - Guaranteed throughput 4 Mbps per direction with a DVB-RCS implementation
  - 1.2m dish antenna and 8Watt transmitted power
  - The selected Satellite operator has a geosynchronous satellite operating at Ku-band frequencies (12-18GHz)

- Satellite capability to EOC
  - Connectivity of EOC-MEOCs
  - Connection of EOC to internet and public protection authorities
- EOC-MEOC Satellite bidirectional link
  - Independent of terrestrial infrastructure networks
  - IP based communication between the edges
  - Full connectivity to support ESPONDER services/applications

Field Trial 1

Aircraft crash (NL)

- **Practical details**
  - Exercise aircraft of Schiphol Airport fire department, June 2014
- **Scenario**
  - Crash of Turkish Airlines flight TK-1951 (02/2009)
  - STARTEX: Alarm about a plane crash and
  - small fire inside
  - **Challenge**
    - Communication about victims
    - Possible hazardous material aboard
    - Coordination of emergency activities

- **Presentation of all elements**
  - Demonstration of FR support platform
  - Enhanced communication infrastructure for MEOC and EOC as a stand-alone system in a delicate communication environment

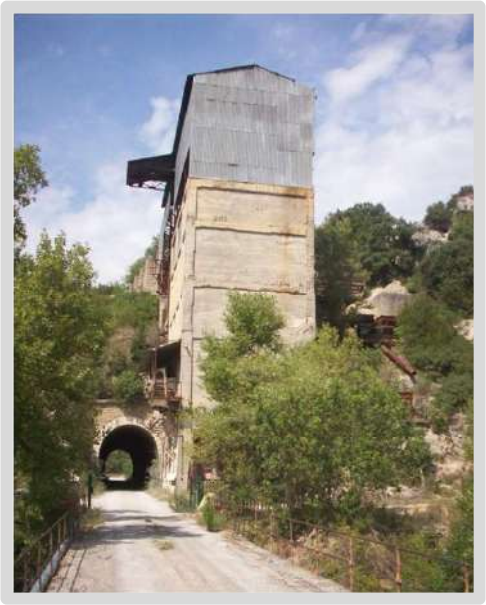
Field Trial 1 Aircraft crash (NL)

Field Trial 1 Aircraft crash (NL)

Field Trial 2

Building collapse (FR)

- **Practical details**
  - Villeneuve, France, September 2014
- **Scenario**
  - Search and rescue activities (Middle-Durance fault, last large earthquake in 1913)
  - STARTEX: Alarm about tremors felt by walkers + collapsing of a building seen by witnesses



- **Challenges**
  - Isolated location
  - CBRN materials
  - Victims evacuation

First Responder Training in Manosque

Alpes de Haute Provence: Collapsed office building. This field test includes users from SDIS04 (Departmental Fire and Rescue Centre – Service Départemental d'Incendie et de Secours), namely firefighters, an SaR team, a CBRN team, a Medical team for victim evacuation on the field, as well as a firefighter commander, municipality representative, prefecture representative, seismologist and civil engineer in the command and control center.

First Responder Training in Manosque

MEOC and EOC in FRANCE

Field Trial 3

Vessel fire (FR)

- **Practical details**
  - Marseille harbor (13), training centre of BMPM (Marseille French Navy Firefighters)
  - November 2014

- **Scenario**
  - Vessel fire provoking a large and dense
  - plume of opaque smoke
  - Paralysis of the north side city
  - Closing off highways, mass evacuations
  - **STARTEX:** Notification about an
  - incident in the harbor

- **Challenges**
  - Communication in a large & densely populated area
  - Possible CBRN material, explosion risk
  - Maintaining of public order
  - Communication with the public

L'Estaque Marseille: Large Vessel Fire. This test involves users from BMPM (Marseille firefighters Battalion – Bataillon des Marins Pompiers de Marseille), namely firefighters, an SaR team, a CBRN team, a Medical team, police in the field, as well as a firefighter commander, police commander, municipality representative, prefecture representative, road management representative, and weather expert in the command and control center.

Field Trial 3

Field Trial 3

Other EU Projects: relationships

- **ABSOLUTE**: Aerial Base Stations with Opportunistic Links for Unexpected & Temporary Events (*http://www.absolute-project.eu*)
  - Project Coordinator: Thales Communications (F)
- **6inAction**: system for emergency response and disaster relief communications (*http://www.6inaction.net*)
  - Project leader: University of Lubiana (SLO)
- **Concerto**: Content and cOntext aware delivery for iNteraCtive multimedia healthcaRe applications (*http://ict-concerto.eu/twiki/bin/view/Concerto*)
- **Rescuer**: (*http://www.rescuer-project.org*)
- **SALUS**: Security and interoperability in next generation PPDR communication infrastructures (*http://www.sec-salus.eu*)
- **HITGATE**: Heterogeneous Interoperable Transportable Gateway for First Responders (*http://www.hit-gate.eu/*)
  - Project Coordinator: Thales Communications (F)

Thank you!
Questions?

Maurizio Casoni

Department of Engineering “Enzo Ferrari”
University of Modena and Reggio Emilia - Italy
Email: maurizio.casoni@unimore.it