

u-2010 project

Final Demonstration

Luxembourg, 22 October 2009

“Fire in a Tunnel”





Final Demo at Grouft Tunnel

The 'Grouft' Tunnel is the masterpiece of the motorway linking the city of Luxembourg to the North of the Grand Duchy. It is composed of two parallel tubes, of 2 966m each, with a maximum inclination of 4,63% from the 'Alzette Valley'.



Ubiquitous IP Centric Government & Enterprise Next Generation Networks
Vision 2010

Integrated Project funded by the European Commission 6th Research Framework Program
15 partners from 7 European countries

Led by the University of Luxembourg

Four 'live' demonstrations in Luxembourg ('Fire in a tunnel' in 2007), in Slovakia ('Terrorist nuclear attack' in 2007 and 2008) and in Slovenia ('Mountain Rescue' in 2009)

U-2010 stands for "ubiquitous IP centric Government & Enterprise Next Generation Networks Vision 2010" and its overall objective is to provide the most capable means of communication and the most effective access to information to everybody required to act in case of accident, incident, catastrophe or crisis, while using existing or future telecommunication infrastructures.

Recent large catastrophes and crisis situations like the Tsunami at the end of 2004 and the Katrina hurricane of September 2005 dramatically showed the importance of communication to prevent the deaths of thousands of people. The u-2010 project addresses the public safety issues by researching new emergency and crisis management solutions investigating on innovative and state-of-the-art communication technologies based on the current and new Internet technologies (i.e. Internet Protocol version 6 – IPv6) that could be put to use and realize this vision.

The integrated research project is coordinated by the University of Luxembourg and constitutes the first ever integrated research project awarded to the young Luxembourg academic institution. This project shows the interest of the Information and Communications Technology (ICT) community outside of Luxembourg to team up with Luxembourg based public and private ICT actors for joining them in an international research project.

U-2010 demonstrates well the potential for public private partnerships in Europe and in Luxembourg in a growing economic sector, namely the ICT sector and confirms the strategic priorities of the University of Luxembourg over the next years.

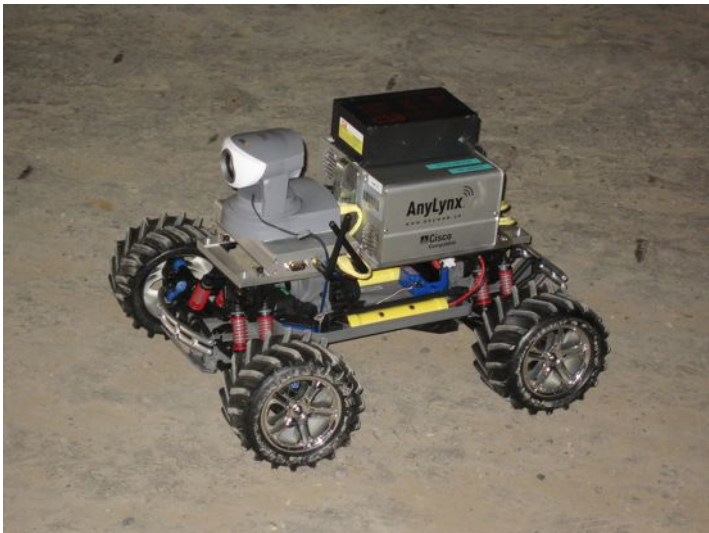
The demonstration “Fire in a Tunnel” on 22 October 2009

This final demonstration shows the solutions developed by the u-2010 project in a real emergency scenario, supported by the Luxembourg emergency services.

The demonstration simulates an accident in a tunnel and shows how the new technologies developed in u-2010 will help first responders to resolve the problems that arise because of the remote location and the resulting unavailability of legacy communications infrastructure.

The demonstration shows:

- 1) A car accident, followed by a fire, in the middle of a three-kilometre long two-tube highway tunnel.
- 2) How Luxembourg's first responders support the rescue operation using the advanced technologies of the u-2010 project.
- 3) Ad hoc broadband voice communication in the tunnel over long distances and between the two tubes (North and South) using:
 - Wi-Fi
 - Ad hoc networking
 - TETRA
- 4) The transmission of important information to Headquarters (HQ), via a nomadic satellite communication system and UMTS connection that includes:
 - Wireless sensor technology for transmitting sensor and video information.
 - Body sensors for monitoring rescue staff and victims.
 - Localisation services of people and equipment.
- 5) The increased response capacity of rescue forces by the use of:
 - Communication between the rescue team in the tunnel, the Mobile Command Centre outside the tunnel and the HQs of the various rescue agencies.
 - Tactical devices and a web portal for access to the video and sensor information on-site and in the HQs.
 - An alarm application to manage the alerting as well as the global behaviour of the crisis procedure.



The u-2010 final demo involves the 15 project partners and also the Luxembourg Police, the Luxembourg Civil Protection, and the Administration des Ponts-et-Chaussées Grand-Duché du Luxembourg.

Their support was crucial in the organization of this event.



About the u-2010 project

Modern society has reached a high dependability on ubiquitous services and networks. Especially in crisis or emergency situations the availability of these services is crucial. Today, governmental and rescue entity communication services are characterized by a strong technical compartmentalization; the interworking and availability of crisis communication resources is not assured.

This project highlights and deploys concepts to enhance the availability of these services and the existing networks by leveraging redundant communication channels wherever possible and using automatic redirection in the case of network failures. In crisis situations, rescue teams have to be assembled fast and flexibly; mobile and ad-hoc networks are one possible solution. Additional research on these networks has been conducted in this project to fulfill the requirements of crisis intervention teams.

The problem of identification will be resolved using new research results in wireless and ad-hoc networks, where especially the integration of distributed knowledge of the current network environment (location information, RFID messages, recommended trust relations, etc.) into the protocols is a key issue for context adaptable recognition. The project takes advantage of IPv6 features for many of the ICT aspects related to crisis scenarios.

With Luxembourg as the first test bed and the Luxembourg Government as a partner in the project, u-2010 provides the ideal possibility to show the feasibility and usability of the results in a real environment and provide the basis for all European countries.

The results of this project will be usable not only for governments' risk- and crisis- management but will also become an integral part of enterprise and public networks, thereby fulfilling the vision of the consortium regarding a next generation for ubiquitous networks in 2010 - "u-2010".

The institutions and enterprises participating in the u-2010 project are:

- Université du Luxembourg (L)
- Ministère d'Etat – Centre de Communications du Gouvernement (L)
- HITEC Luxembourg S.A (L)
- Telindus S.A. (L)
- University College London (UK)
- Cisco Systems International BV (B)
- France Telecom (F)
- IABG (D)
- SES ASTRA S.A. (L)
- M-PLIFY (L)
- Entreprise des Postes et Télécommunications (L)
- KORAK (SK)
- Siemens NV/SA (L)
- Lancaster University (UK)
- Administration for Civil Protection and Disaster Relief of the Republic of Slovenia – Ministry of Defense (SLO)

The project started May 1st, 2006 and ends October 31st, 2009.

More info on:
<http://www.u2010.eu>

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www.u-2010.eu

U-2010 FINAL DEMONSTRATION

Fire in a tunnel scenario

22nd October 2009

Kate Yeadon (P&TLuxembourg)
Harold Linke (HITEC Luxembourg)

ABOUT U-2010

- Ubiquitous IP centric Government & Enterprise Next Generation Networks Vision 2010
 - Integrated Research Project
 - 5th Call of the 6th European Research Frame Program
 - Start May 2006
 - Budget 6,5 M €



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CONSORTIUM

15 Partners

7 European Countries



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WHAT COUNTS?

- Enabling rescue forces to act in time in case of accident, incident, catastrophe or crisis
- Rescue teams have to be assembled quickly and flexibly
- Rescue teams need access to information



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How?

- Provide the most capable means of communication
 - Offer the most effective access to information
 - Basis: Internet Protocol IPv6



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CORE CONCEPTS

- I. Interconnecting existing services and networks
- II. Leveraging redundant communication channels
- III. Using automatic redirection and/or service transformation
- IV. Using new research results in wireless ad-hoc networks



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DEMONSTRATION

- Accident in a tunnel with fire
 - Scenario shows how u-2010 technologies and concepts can support the emergency services



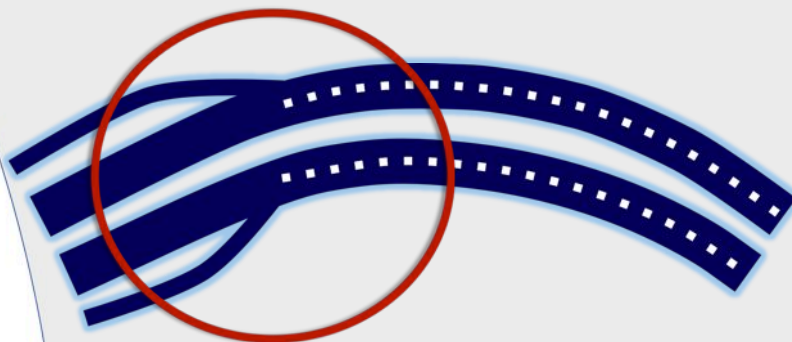
8

LOCATION



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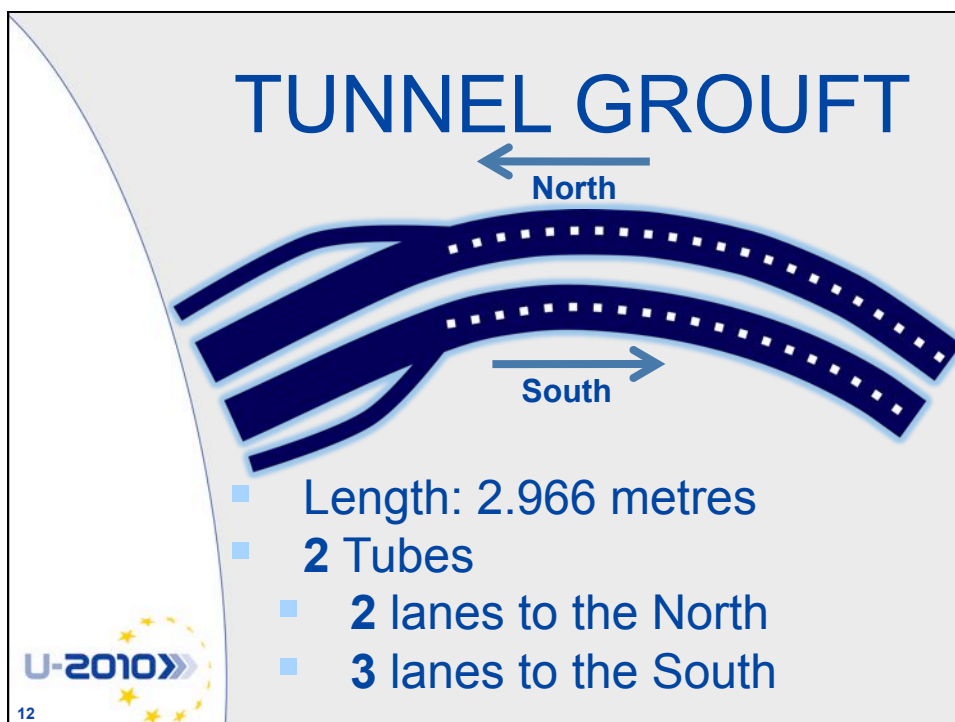
LOCATION



- Tunnel Grouft – North of Luxembourg
- Part of the Highway to the North



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TUNNEL GROUFT



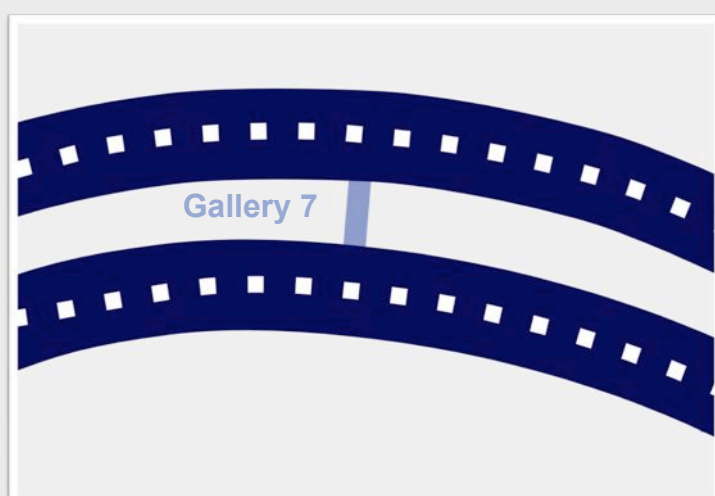
■ Security galleries between the two tubes (every 300m)

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The diagram shows two parallel, curved tunnel tubes. Between the tubes, there are several vertical lines representing security galleries. The tubes are dark blue with white dashed lines along their inner edges. The galleries are represented by thin vertical lines connecting the two tubes.

TUNNEL GROUFT



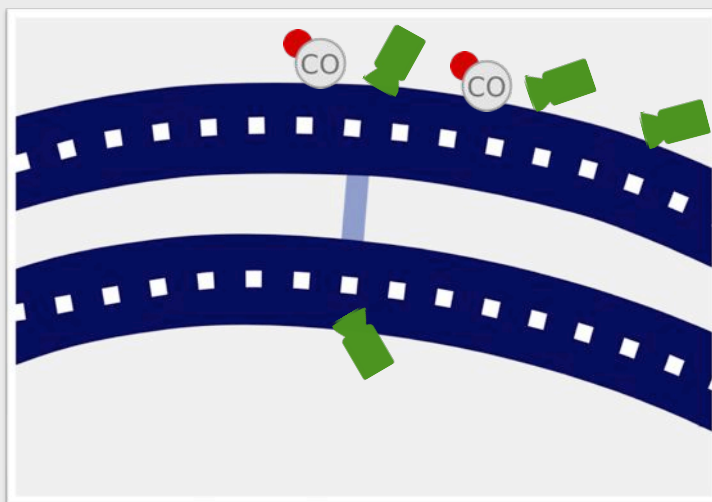
Gallery 7

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This diagram provides a closer look at one of the security galleries. It shows two curved tunnel tubes with a single vertical line between them labeled 'Gallery 7'. The tubes are dark blue with white dashed lines. The gallery is a thin vertical line connecting the two tubes.

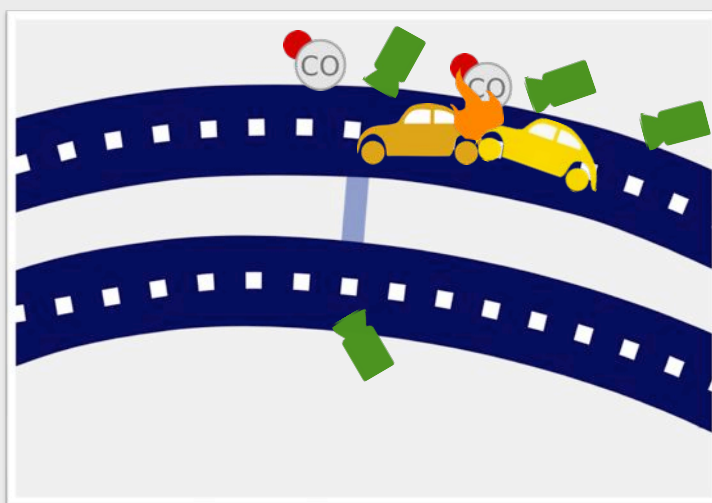
TUNNEL GROUFT



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SCENARIO



Phase 1:
Incident & detection

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SCENARIO

Phase 2:
Alerting & Assembling

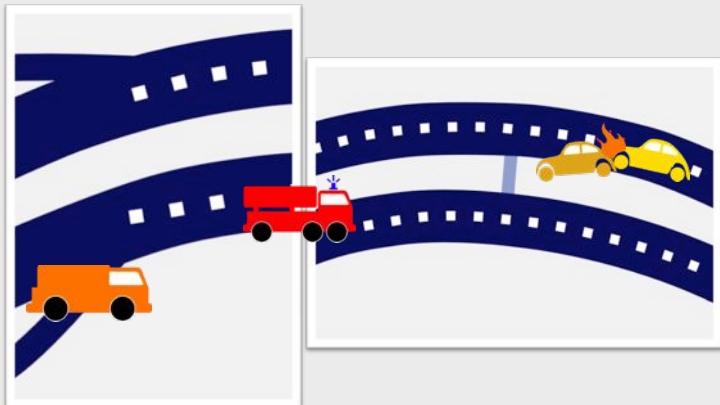
- Alerting of emergency services
 - 112
 - Police
 - Civil Protection
 - Volunteer fire fighters
 - Ambulance

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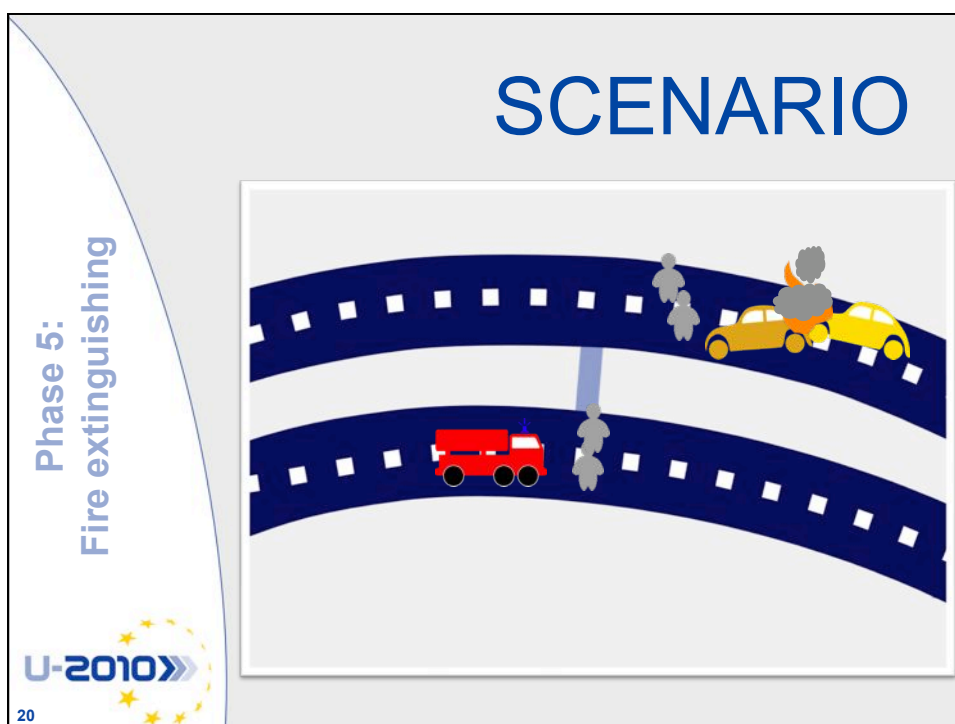
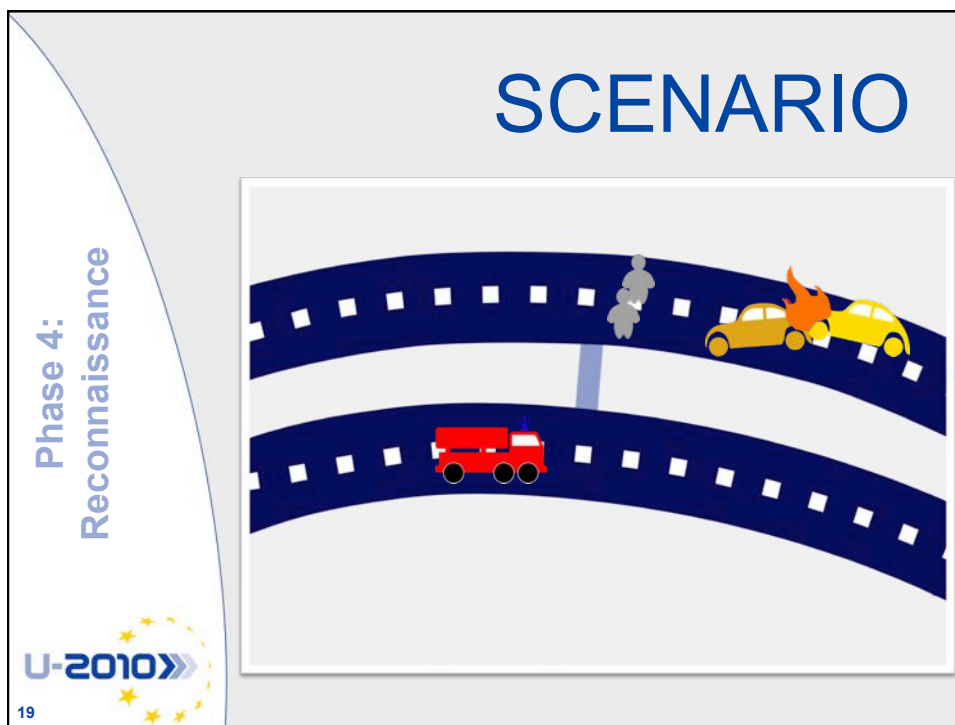
SCENARIO

Phase 3:
Arriving at tunnel



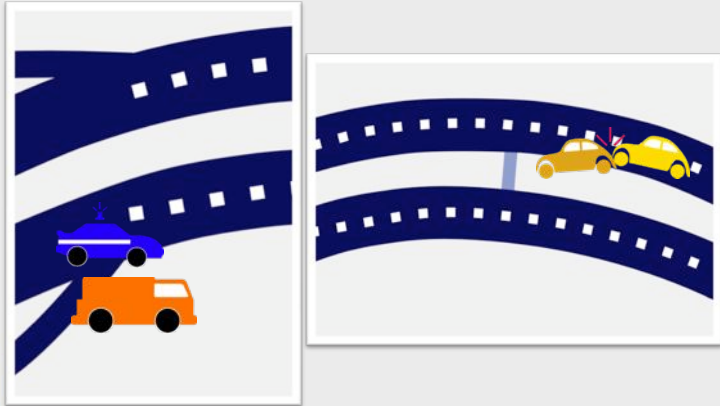
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SCENARIO

Phase 6:
Police secures Highway

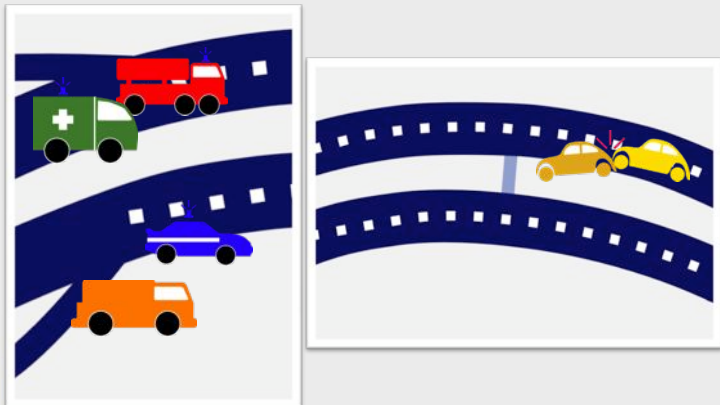


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SCENARIO

Phase 6:
Rescue & Evacuation

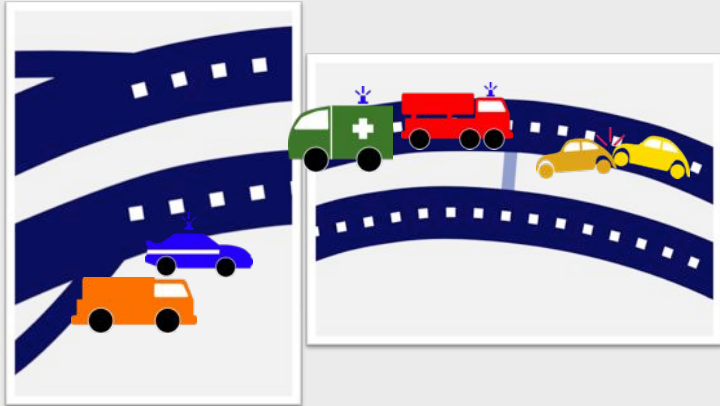


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SCENARIO

Phase 7:
Transport to hospital



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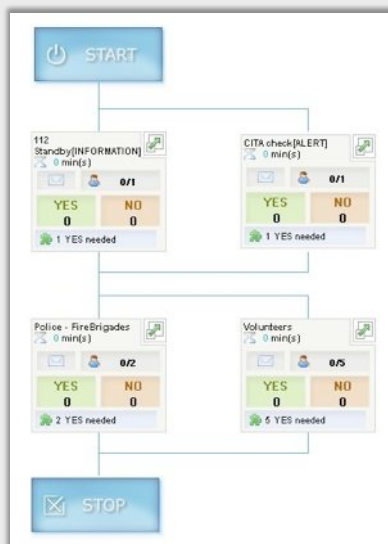
PREPARATION PHASE

- Risk assessment
- Scenario definition
- Directories maintenance
- Eloquent procedures
- Prepared with AlarmTilt

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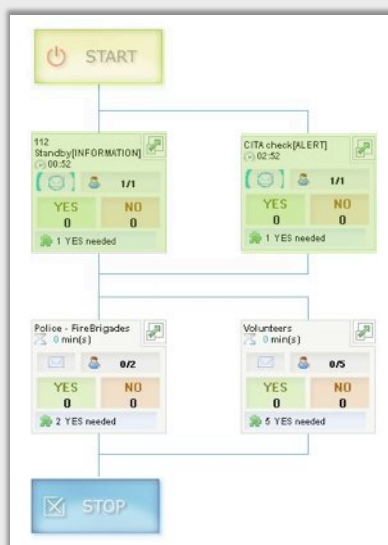
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PREPARATION PHASE



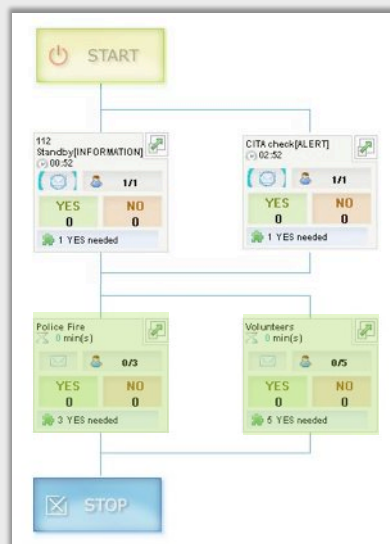
25

PREPARATION PHASE



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PREPARATION PHASE



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PREPARATION PHASE

The screenshot shows the U-2010 web application interface. At the top, there are tabs for 'Procédure', '112 Standby', 'CITA Check', '112 Alert', 'Police Fire', and 'Volunteers'. The '112 Alert' tab is selected. Below the tabs, the 'RESULTATS PAR PERSONNE' section displays a table with columns for 'total', 'répondu', 'répondu', 'oui', 'non', and 'autre'. The table shows 1 total, 1 répondu, 0 oui, 0 non, and 1 autre. A 'Rechercher' button and an 'Effacer filtre' button are also present. Below the table, there is a 'Confirming launch?' button. On the right side, the 'MESSAGE' section contains a message from AlarmTILT: 'Incident in tunnel confirmed. Please confirm to launch notifications.' Below the message, there is an 'ACTIONS' section with buttons for 'Rapport Excel', 'Rapport PDF', and 'Envoyer rapport'.

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PREPARATION PHASE

Procédure 112 Standby CITA Check 112 Alert Police Fire Volunteers

RESULTATS PAR PERSONNE

Rechercher Effacer filtres

total	répondu	répondu	oui	non	autre
1	1	0	1	0	0

Confirming launch? ☐

MESSAGE

This is a message from AlarmTILT. Incident in tunnel confirmed. Please confirm to launch notifications.

ACTIONS

- Rapport Excel
- Rapport PDF
- Envoyer rapport

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PORTAL

Events Crises Communication ? Help Settings Management Logout

Home CRISIS CAMERAS SENSORS USERS

BE PREPARED
ENABLING RESCUE FORCES TO REACT IN TIME

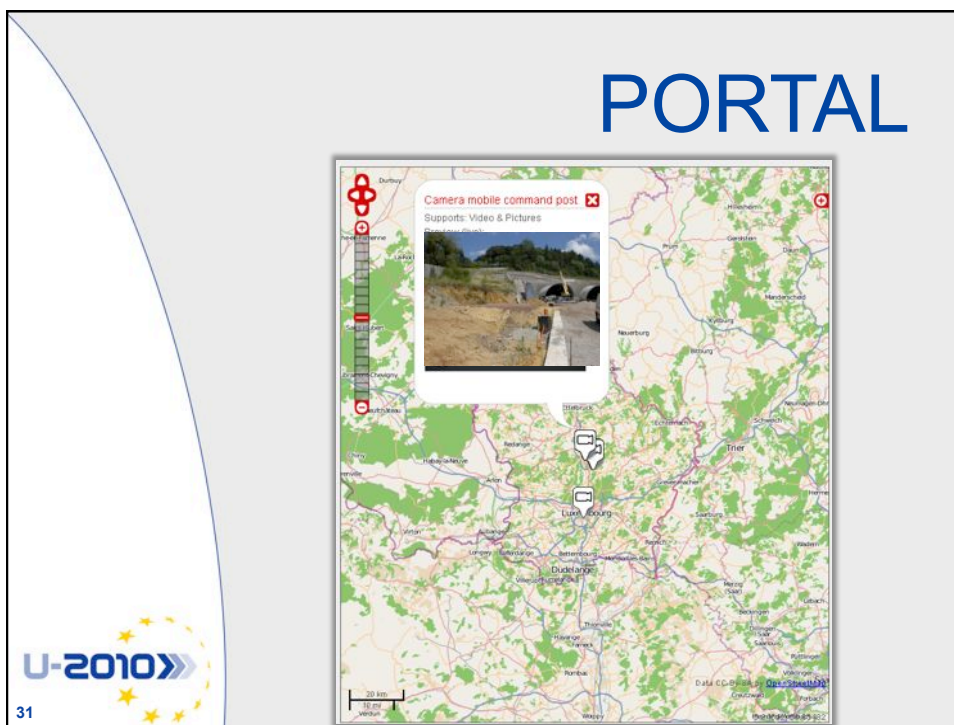
Name	Type	Last update	Conn.	Location	Trace	Details
Camera ambulance ardennes		13:43	X			
Camera fire engine		14:19	✓			
Camera fire truck		13:10	✓			
Camera mobile command post		14:19	✓			
Camera police car		13:10	X			
Camera road accident fire engine		14:10	X			
Reco Car 01		14:19				
Reco Car 02		14:19				
Reco Car 03		14:19				
Reco Car 04		14:19				
camera 1 tunnel Groult		13:10				
camera 2 tunnel Groult		13:10				
camera 3 tunnel Groult		13:10				
camera 4 tunnel Groult		13:10				

Trace limit: 1 hour Width: 5 px

Map showing location of cameras and sensors.

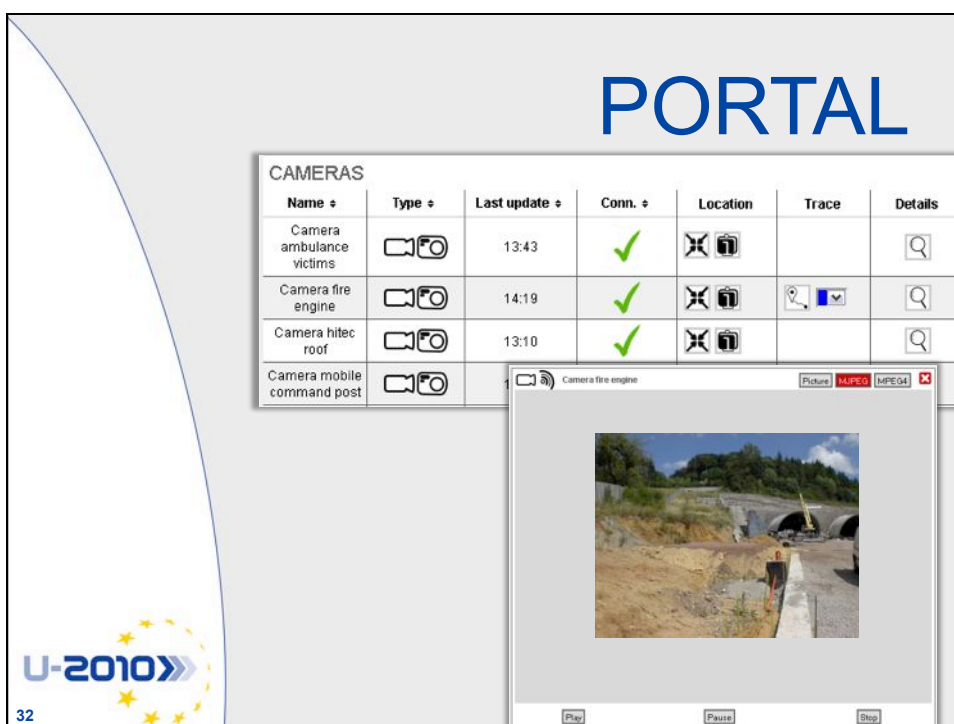
30

PORTAL







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PORTAL



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PORTAL























Fire engine  11:30 ✓   


Events Users Communication Help Settings Management Logout

BE PREPARED
ENABLING RESCUE FORCES TO REACT IN TIME





Home CRISIS CAMERAS SENSORS USERS

USERS & UNITS

Name	Type	Last update	Comm.	Status	Location	Trace	Details
Ambulance victims		- unknown -	✗				
Ben McCarthy		- unknown -	✗				
Benjamin Houle		- unknown -	✗				
Chris Edwards		- unknown -	✗				
Dan Jungers		- unknown -	✗				
Fire engine		14:30	✓				
Harold Link		- unknown -	✗				
Laurant Ouellet		- unknown -	✗				
Martin Dumais		- unknown -	✗				
Mobile command post		14:30	✓				
Paraglider Desjardins		- unknown -	✗				
Police car		- unknown -	✗				
Plaque Weiss		- unknown -	✗				
Road accident the engine		- unknown -	✗				
Simon Massart		- unknown -	✗				
Thomas Ouellet		- unknown -	✗				



PORTAL


































































Fire engine  11:30 ✓   

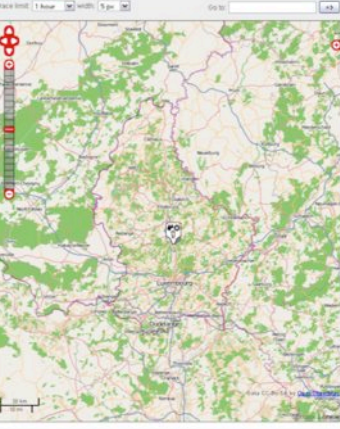
Events Users Communication Help Settings Management Logout

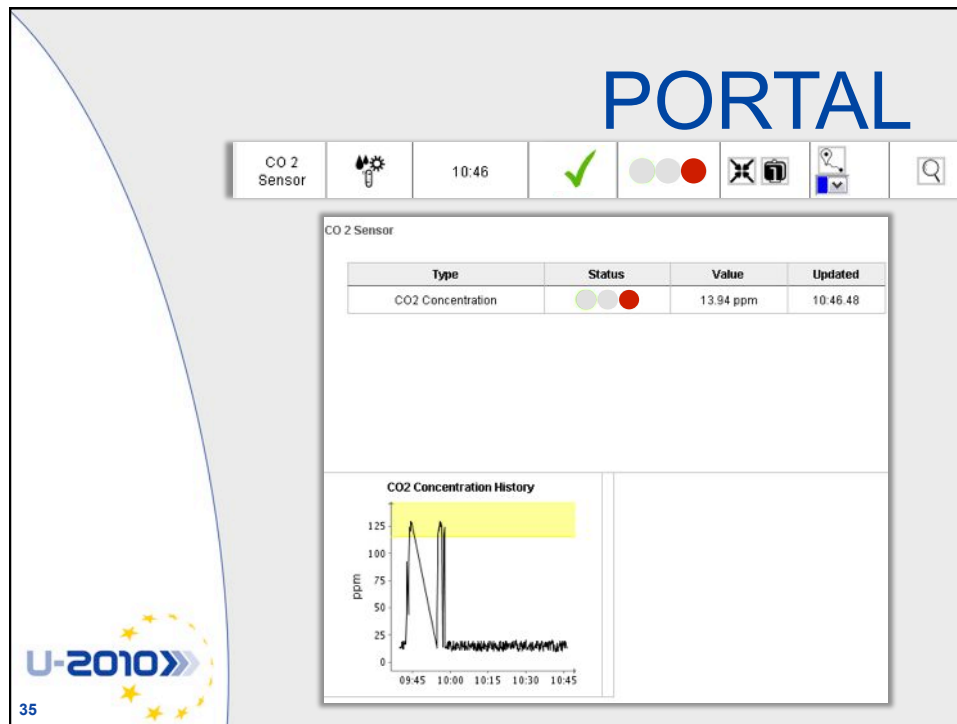
BE PREPARED
ENABLING RESCUE FORCES TO REACT IN TIME

Home CRISIS CAMERAS SENSORS USERS

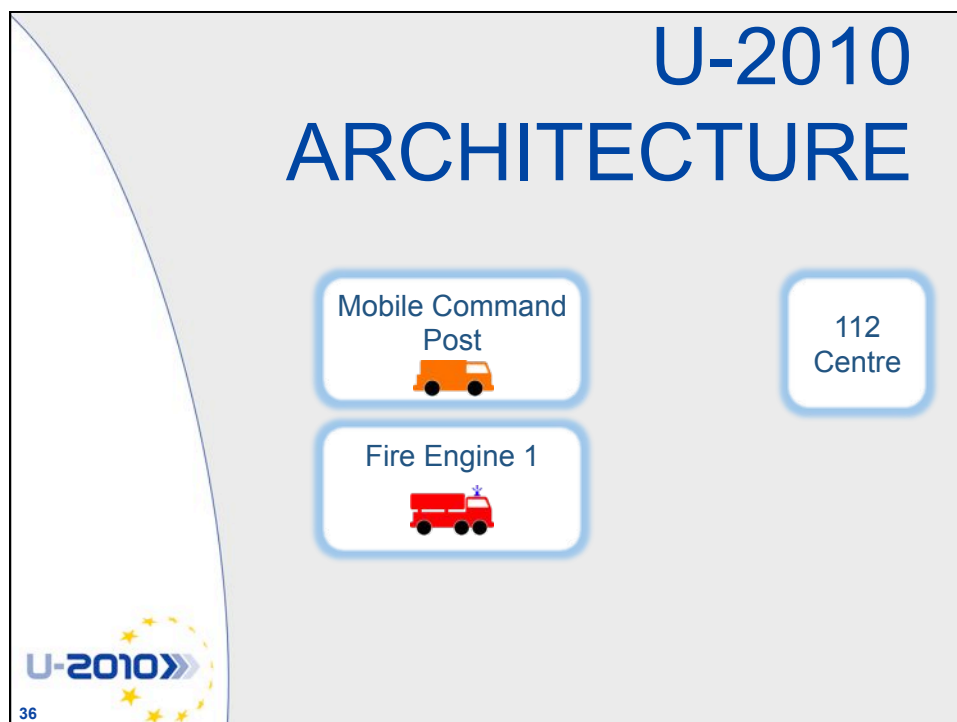
SENSORS

Name	Type	Last update	Comm.	Status	Location	Trace	Details
CO 2 Sensor		10:40	✗				
Hiker HLT Sensor 1		14:10	✓				
Ranger Sensor 01		14:14	✓				
Ranger Sensor 02		14:14	✓				
UCL Archibuck Sensor 4		14:10	✓				
UCL Archibuck Sensor 5		14:10	✓				
UCL Archibuck Sensor 6		14:10	✓				
UCL Archibuck Sensor 7		14:10	✓				
UCL Archibuck Sensors 14		14:10	✓				
UCL Archibuck Sensors 15		14:10	✓				
UCL Archibuck Sensor 20		14:10	✓				
UCL Archibuck Sensor 22		14:12	✓				
UCL Archibuck Sensor 23		14:10	✓				
UCL							

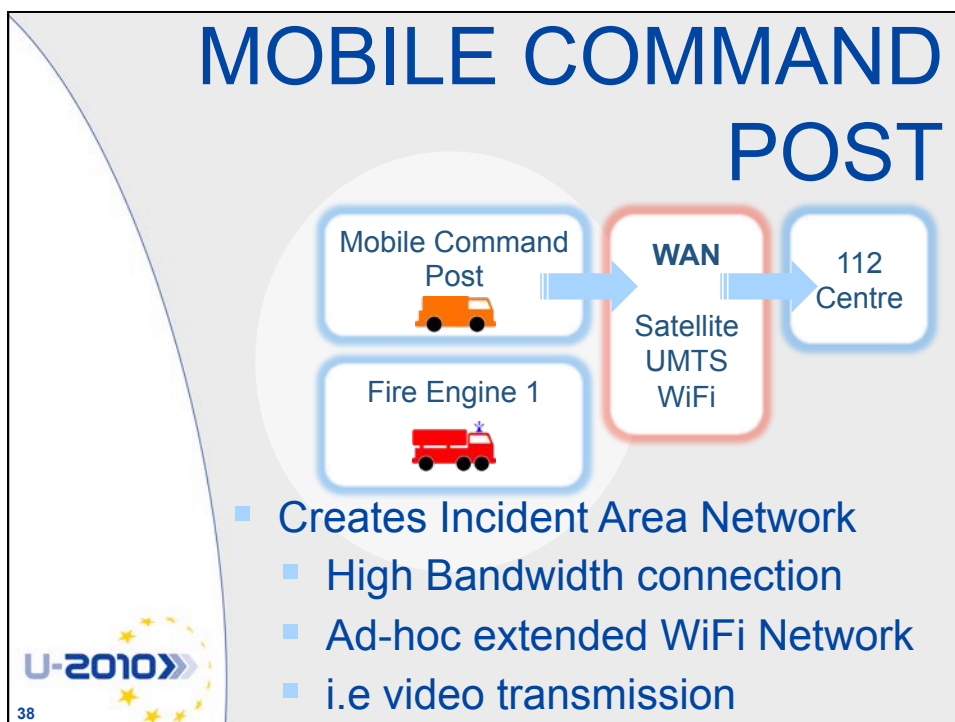
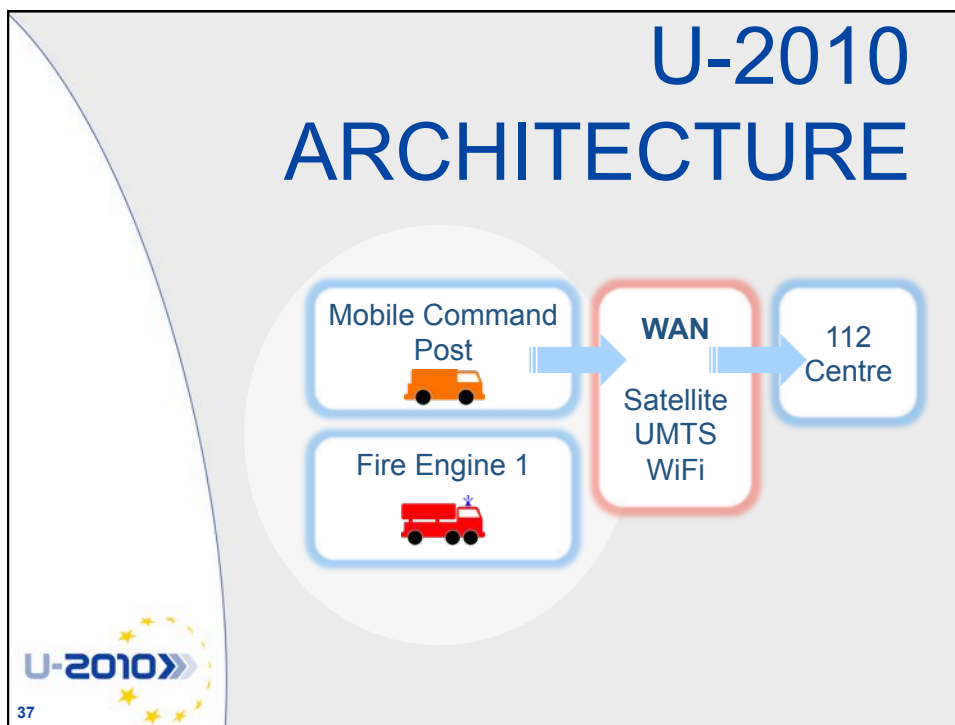


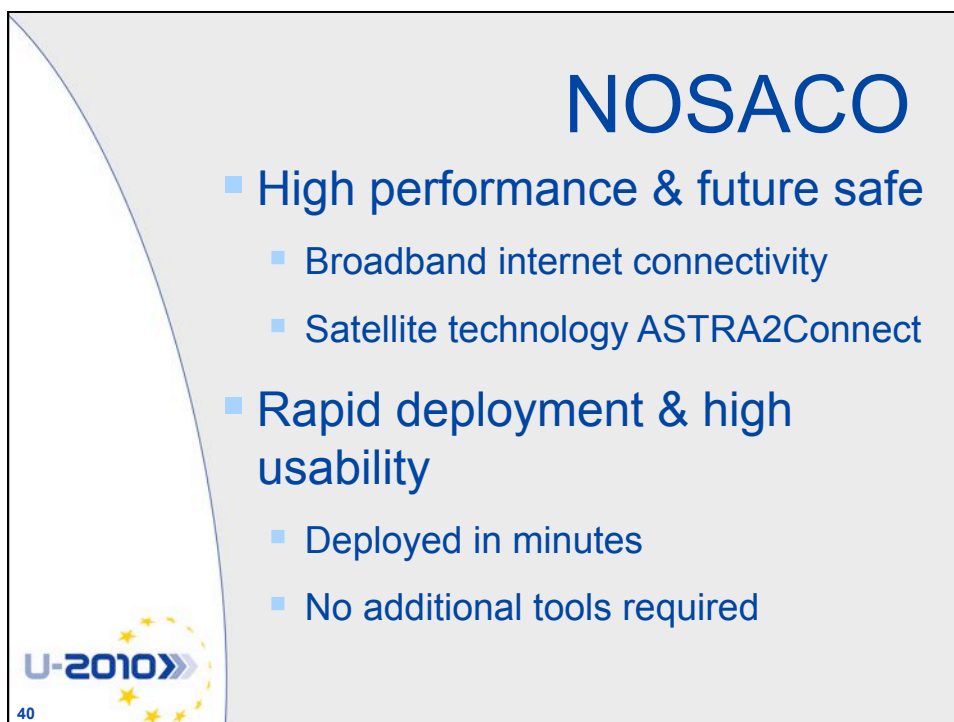
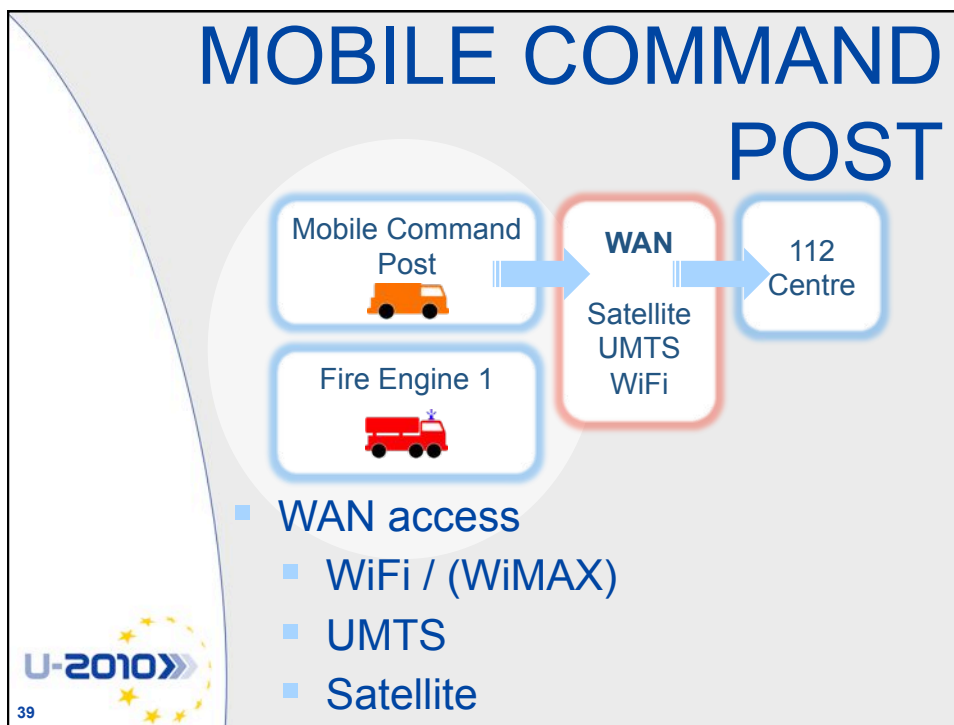


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NOSACO

- Security & Authentication
 - Security and authentication mechanisms
 - High priority of data protection with sensible information
- Portability & Robustness



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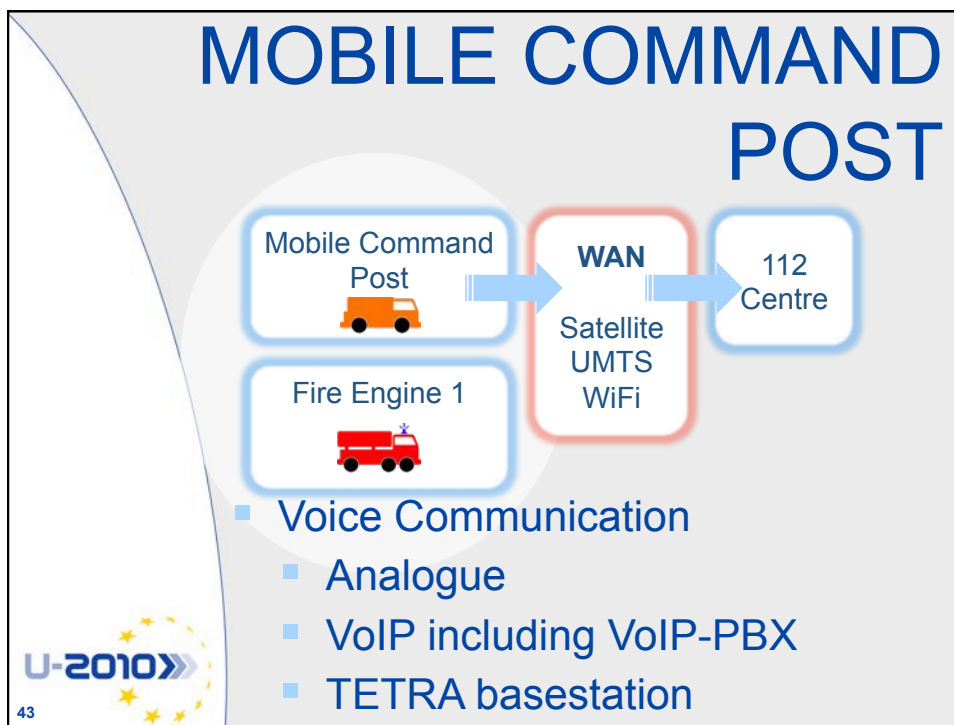
NOSACO

Six simple steps for a high performance internet connectivity: mounting and installation of NoSaCo takes about 5-8 minutes only.

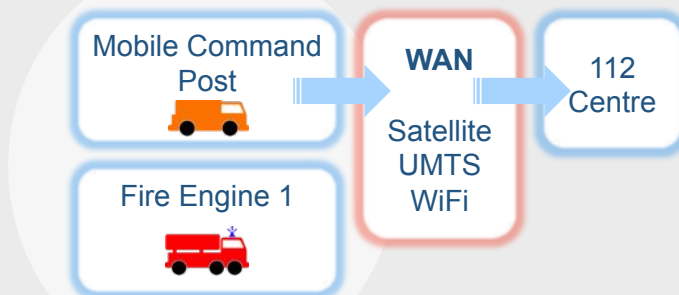
- 1 Transport & Mounting
- 2 Leveraging
- 3 Cabling & Power
- 4 Pointing
- 5 Transmission
- 6 WiFi Connection

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MOBILE COMMAND POST

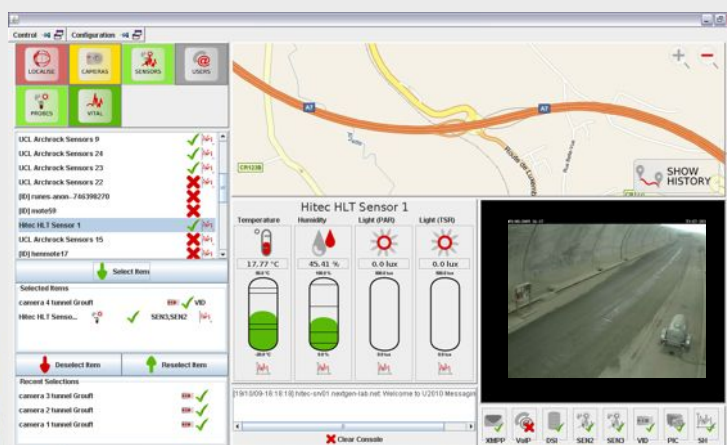


- Coordination
 - Chief in command
 - Mobile Client to access all information



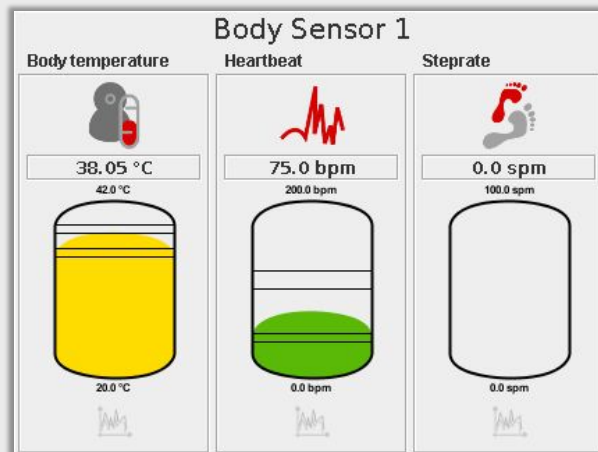
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MOBILE CLIENT



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MOBILE CLIENT



U-2010»

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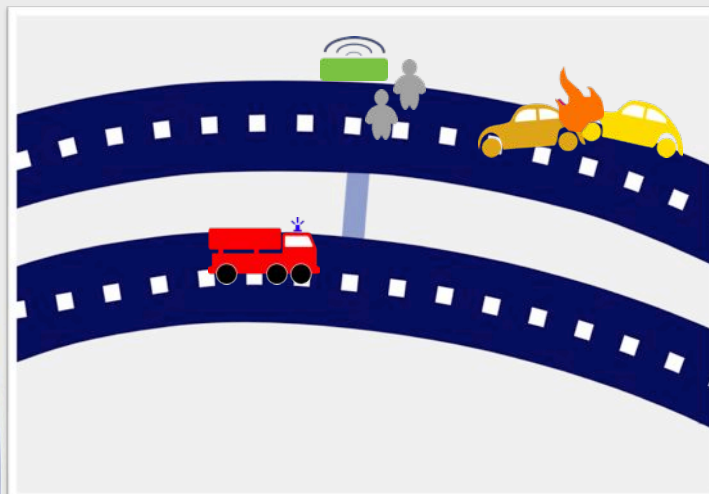
MOBILE CLIENT



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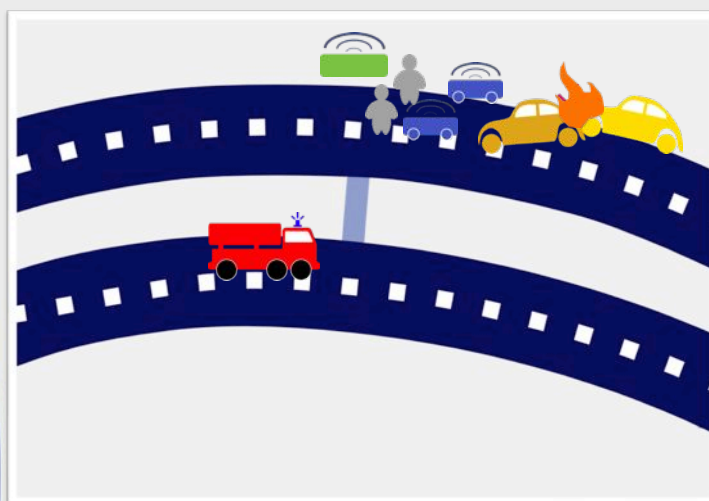
SETUP OF NETWORK IN THE TUNNEL



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SETUP OF NETWORK IN THE TUNNEL



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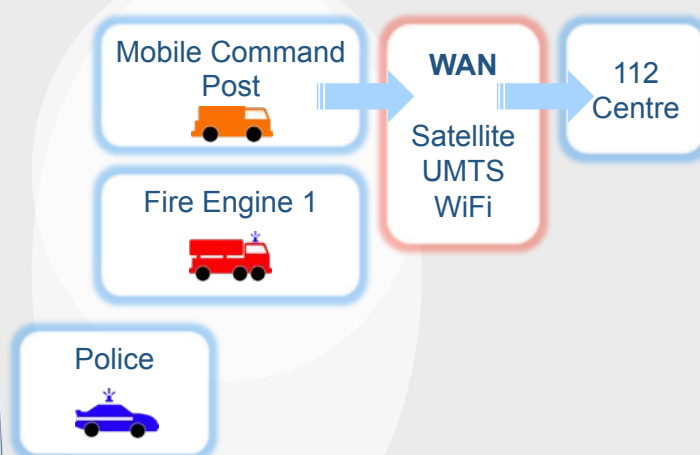
BODY & FOOT SENSOR

- Monitoring of specific parameters:
 - Heartbeat & Temperature
 - Foot pressure force

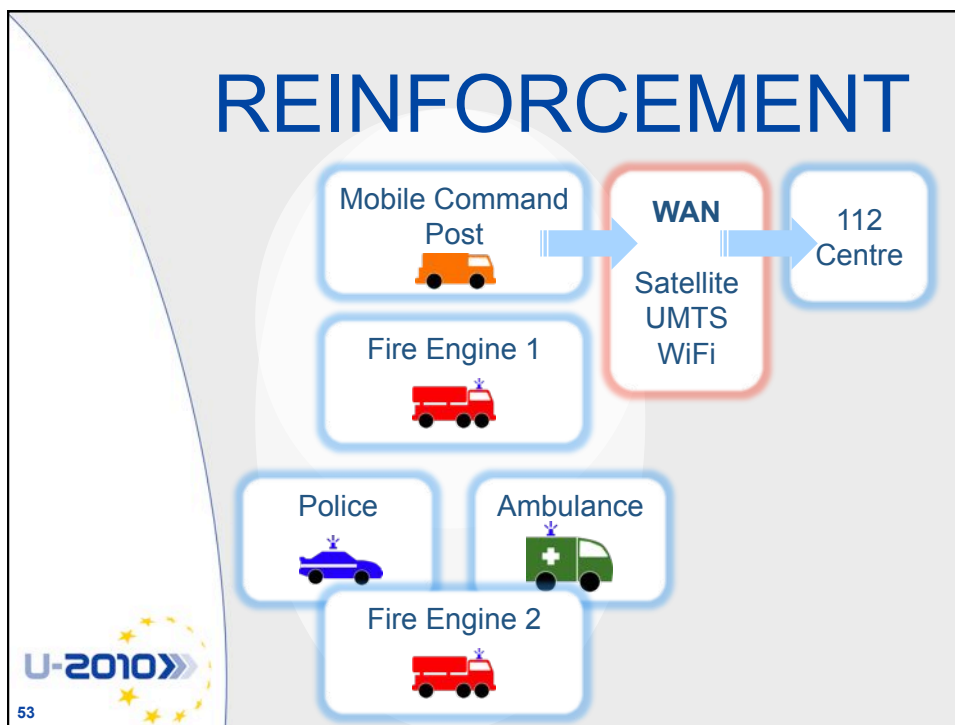


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POLICE ARRIVING



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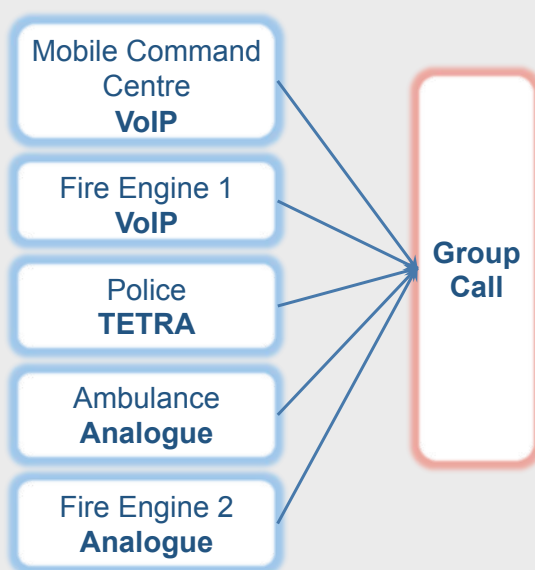


VOICE COMMUNICATION

- Integration of existing voice communication systems is a must:
 - PSTN
 - Analogue Radio
 - TETRA
 - VoIP



U-2010 ARCHITECTURE



VICTIM RESCUE

- Victims are locked in their cars
- Special tools to cut the roof of the cars



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REPORT & DEBRIEF

- Quality and safety assurance for rescue forces
- Playback of missions and analysis of operations using history

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REPORT & DEBRIEF

Procédure		
112 Standby	CITA Check	112 Alert
Police Fire	Volunteers	

MESSAGE	DESTINATAIRES	RESULTATS
<p>This is a message from 112. Fire in tunnel Grouff. Please join on site rescue forces asap.</p> <p>Français</p>	<ul style="list-style-type: none"> Alexandrine Alex Anton Anca Chalifour Stéphane Ciglar Izidor Thinus Alexa 	<p>5 personnes contactées</p> <p> </p> <p> oui: 3 non: 2 </p>
<p>ACTIONS</p> <ul style="list-style-type: none"> Rapport Excel Rapport PDF Envoyer rapport 		



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EXHIBITION

Exhibition / Tent ● ● Tribune



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