



System-of-Systems Demonstration & Experimentation for Mass Transport Security

DEMASST Presentation at Workshop to
discuss the scope of Call for Demonstration
Project Security of Mass Transportation
(Phase 2)

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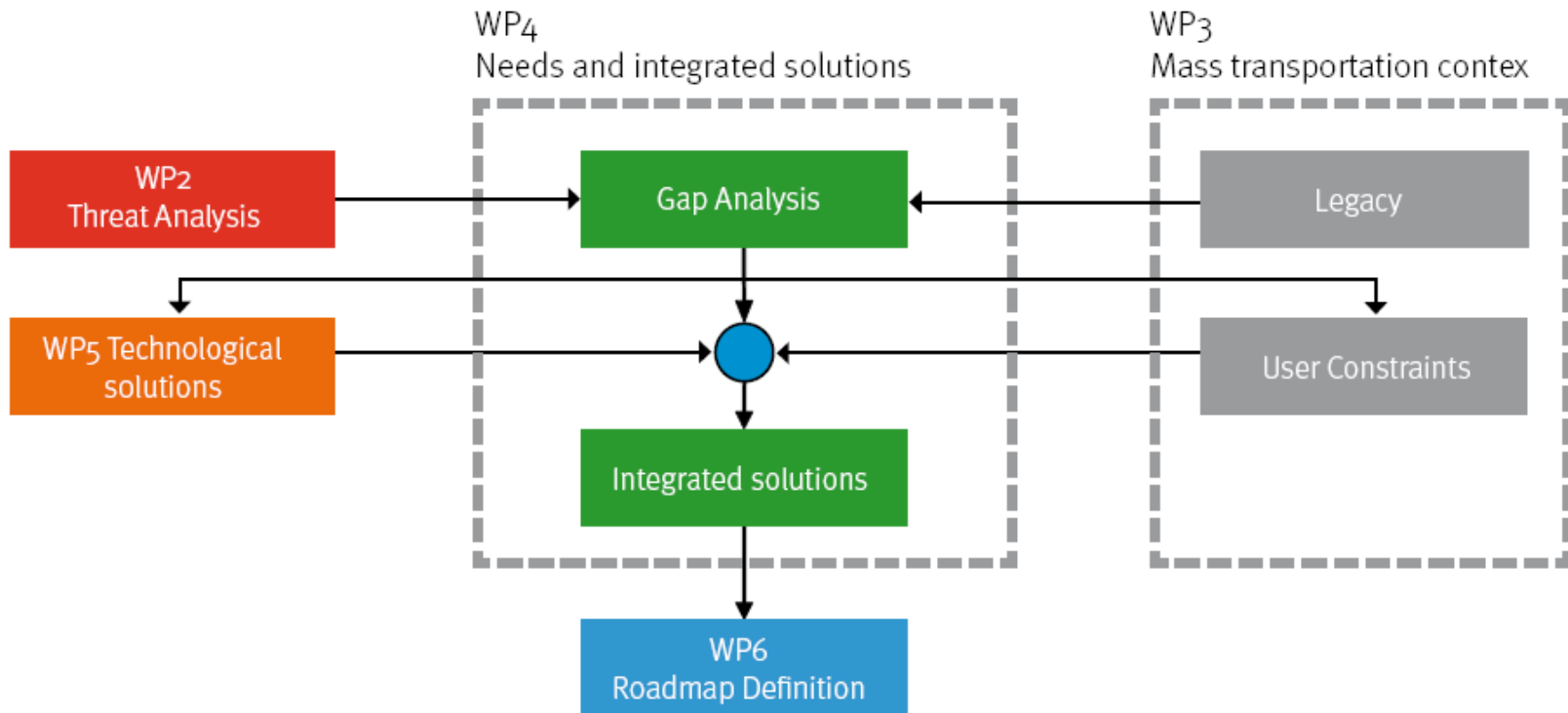


VTT (FI)

DEMASST – the phase I study of the FP7-SEC Mass Transportation Security programme

- Started late due to security scrutiny procedure – January 2009, ends May 2010
- Strives to inform phase II as it evolves
 - Input to European Commission
 - Input to prospective phase II consortia (most deliverables and workshops are public)
 - Input to the selected phase II project(s)
 - Berlin workshop first step
- But also to identify “low-hanging fruit” and future research needs
- Strong partnership with much knowledge in house
 - but also important to learn from others via interviews and workshops
- DEMASST members keen to participate in phase II with mass transportation key players
 - but also in helping to develop the DP instrument for European security innovation in general
- See also www.demasst.eu and poster!

DEMASST Work package structure



A first version of DEMASST's roadmap

- Outline of rest of presentation:
 - Focus of phase II
 - Demonstration (& Experimentation) methodology
 - System-of-system architecture for Mass Transport Security
 - Proposed design for phase II (and subsequent deployment)
- Caveat:
 - This is DEMASST's first attempt at a phase II roadmap...
 - ...predominantly based on the consortium's own knowledge
- ...more to come:
 - Working document (hopefully) now on website
 - D6.1 in April
 - etc.

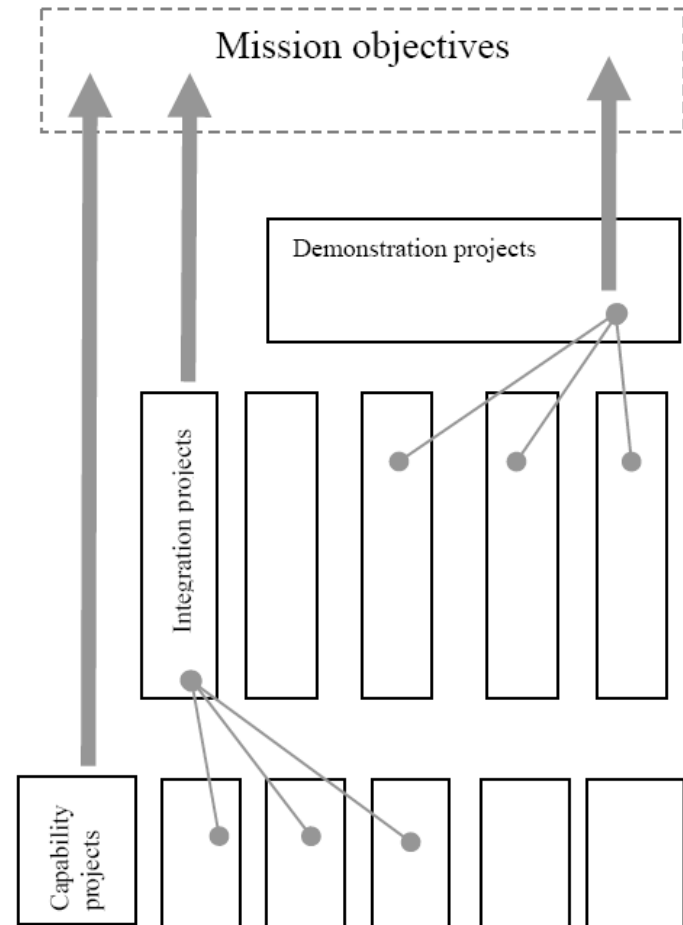
Focus of phase II – definition and rationale for Mass transport

- Good reasons for urban public transport focus, stressing rail, as suggested in the “non-paper”
 - A very demanding challenge where successes will be transferable also to other application areas
 - Extreme passenger and infrastructure densities
 - High sensitivity to cost
 - High sensitivity to delay and disruption of services
 - Direct linkages to all other types of person transport
 - A few critical remarks though:
 - Include event-related travelling, not only daily commute
 - Include intra-regional ferries, water-buses, etc.
 - European added value mainly due to similarity of problem – and possibly simultaneity of attacks
 - cross-border agglomerations and cross-border travellers are a minor part of the problem!

Focus of phase II – threats and target cities

- All hazards approach including the worst threats (catastrophic incidents)
 - Exploit the economies of scope
 - Demo a few select scenarios and use Modelling & Simulation (M&S) to generalise results
- Develop solutions for mega, big and medium cities
 - Exploit modular approaches to address full scope
 - Demo a few select cases in demanding multi-modal settings and use M&S to generalise results

- Does demonstration project mean mainly demonstration activities?
 - First RTD is needed to get something to demonstrate!
 - Particularly considering the limited efforts so far in MT system integration
 - System-of-system integration RTD requires extensive large-scale experimentation
 - Demonstration programme (DP)
 - **Demonstration & experimentation programme (DEP)**



Demonstration & Experimentation methodology

- D&E needs combination of real systems and *in silico* work. Simulation needed when tasks are:
 - Difficult – typically complex interfaces
 - Dull – typically very many possible parameter combinations
 - Dangerous – including ethically problematic
- ...and for transfer/generalising of results
- Exploit the full range of D&E methods:
 - “Live” experiments under conditions of ongoing real operations
 - Experiments in real operational setting but not under conditions of real operation
 - Experiments in dedicated facilities emulating real operational settings
 - “System-in-the-loop” simulation test-beds
 - Man-in-the-loop simulation (including Virtual Reality applications)
 - All computer simulation.
- ...and also “non-experiments”:
 - “natural experiments”
 - “discursive experiments”

System-of-systems architecture: identifying operational systems

- A. The whole urban/intra-regional transport system including also private means of transport inasmuch as there are opportunities for substitution between private and public transport (network level)
- B. The major interchanges (typically intermodal), with
 - big passenger flow densities
 - services for passengers
 - transport platforms passing on different lines – high density of infrastructure
- C. Passenger information systems
 - system-to-customer
 - peer-to-peer
- D. Lines and roads including smaller stations and other entry points, tunnels, bridges, etc.
- E. Vehicles/transport platforms
- F. Vehicle parking areas, repair and maintenance shops, etc.
- G. Technical support systems (control, power supply, ventilation, etc.) including SCADA systems.

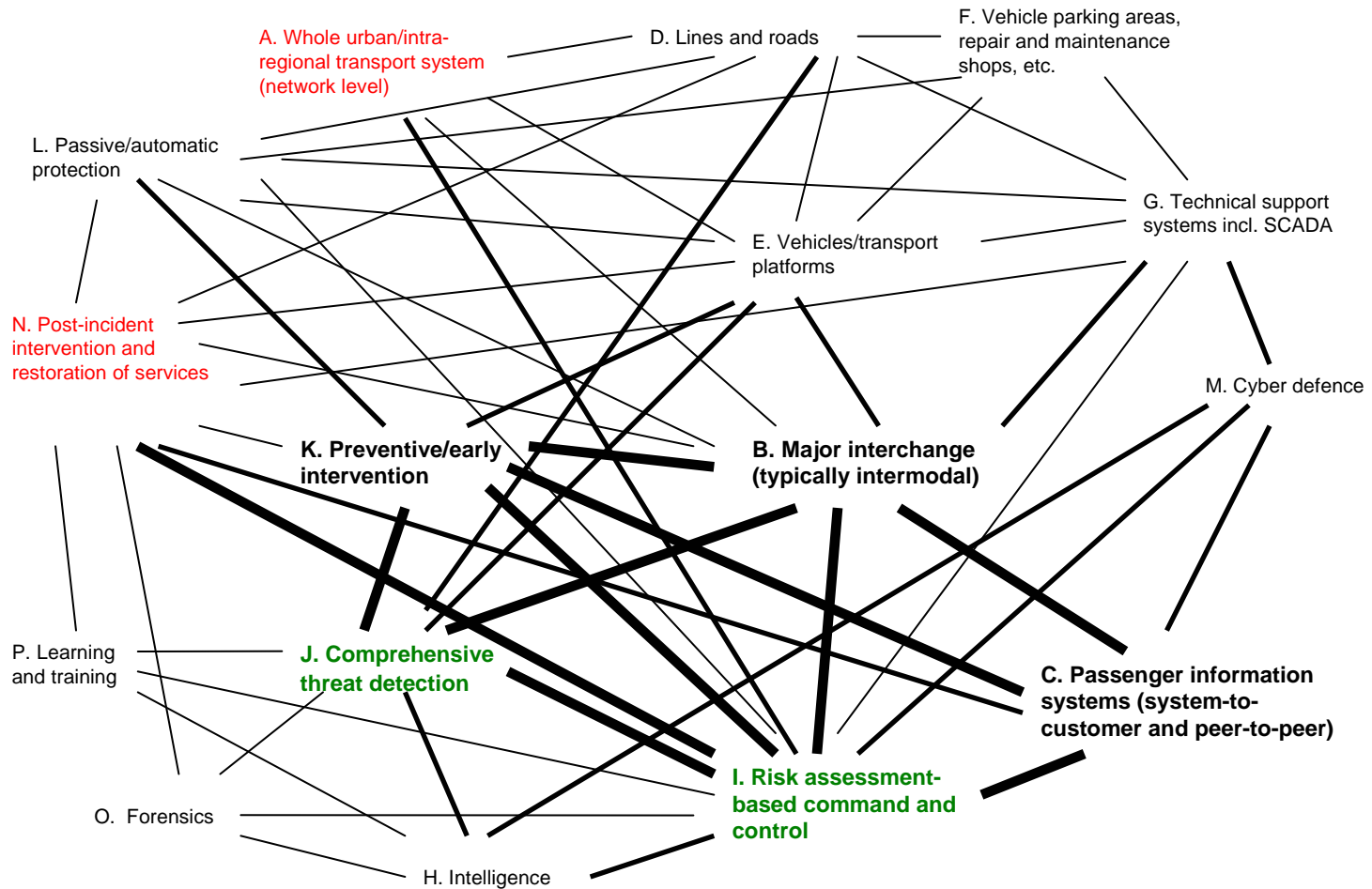
System-of-systems architecture: identifying security systems

- H. Intelligence
 - provision of background information for setting alert levels and help contextualise threat detection systems
- I. Risk assessment-based command and control
- J. Comprehensive threat detection
- K. Preventive and early intervention,
 - i.e. intervention before many passengers have noticed a (potential) attack
- L. Passive and automatic protection
- M. Cyber defence
- N. Post-incident intervention and restoration of services
- O. Forensics
- P. Learning and training

Demonstration & Experimentation Programme design

- Consider coupling within the operational and security system-of-systems
 - which are the links requiring high information flows?
 - for which links are these information flows time critical?
 - which are the nodes possible to engage in D&E activities performed in real operational systems (in particular not too dangerous)?
- Match Mass Transportation complexity in programme design
 - handle tightly coupled systems in a tightly managed federation of sub-projects
- Other systems can be dealt with in a more off-line fashion
 - pre-existing knowledge
 - separate projects in parallel
 - information added afterwards
 - simulation models to integrate knowledge off-line

System-of-Systems Map for Mass Transport Security Demonstration & Experimentation



Proposed core for a Mass Transport Security Demonstration & Experimentation Programme

- Five systems form a strongly connected core representing high requirements on time critical info exchange, while being reasonably amenable to live experimentation:
 - B. Major interchange (typically intermodal)
 - C. Passenger information systems (system-to-customer and peer-to-peer)
 - I. Risk assessment-based command and control
 - J. Comprehensive threat detection
 - K. Preventive/early intervention
- It is important for the success of phase II to keep these five systems within a single project or a tightly managed federation.
- Live experimentation needs to be complemented by test-beds and simulators for tasks that are too difficult, dull, or dangerous to do in real life.

The societal context – some thoughts

- Massive identification, investigation and tracking of individuals cannot be considered for obvious ethical reasons
- Obvious ideas, like preventive interruption of traffic, can increase crisis severity by preventing hospital and rescue staff to reach their workplace
- In most cities, public transportation relies extensively on public money and struggles for improved quality of service: priorities are likely to be decided on commuter (voting citizen) perceived benefit
- Citizens' perceptions of and attitudes to security and insecurity important to understand:
 - Gender and age group differences
 - Several major cities in Europe already suffered from terrorist bombings in the past... and recovered without taking dramatic measures

Implementation issues

- Business models
 - Broad involvement of stakeholders (operators, solution providers) – but focused effort!
 - Fair and rational criteria for selecting what needs to be experimented (not what consortium partners happen to have on their shelves!)
 - Standardisation
 - Supporting interfacing with broad range of legacy systems
 - Supporting sustained innovation
 - Legal aspects
 - Need for exchange of information between cities and MS
 - The usefulness of maintaining useful Mass Transport Security DEP infrastructure also after the end of programme
 - European Reference Network for Critical Infrastructure Protection (ERN-CIP)?
- In the end solutions must be realistically acceptable and affordable for the potential final implementers