PROTECTRAIL WHITE PAPER DISCUSSION

Where we are and where we want to get to
BACKGROUND

• **Objective**
  – Collect the main findings of PROTECTRAIL
  – Summarise them in an accessible manner for stakeholders with technical background
  – Provide guidelines for implementation of PROTECTRAIL Interoperability Framework
• PROTECTRAIL designed and tested an *interoperability framework* built on a system-of-systems approach which allows to plug new solutions into a security system

• PROTECTRAIL will help make security systems interoperable and future-proof

• A security system must be built on a security master plan integrating security and ICT
1. The PROTECTRAIL approach and its reusability
2. Network Communication
3. Modern and practical approaches to video and video-based analytics
4. Levels of interoperability
THE PROTECTRAIL APPROACH

- A reusable **Service-Oriented Architecture** (SOA)
- An **Event-Based** Architecture for data exchange between various security components
- Reusing of well-established and **proven standards**
- Planning of an **extendable architecture** for the future to extend the framework with upcoming standards
- Building **modular components with web services**
- Supporting **discoverable components** to reduce the configuration effort and improve the reusability
- Building on an **IP network (cabled or wireless)** which is dimensioned to support consistently the video surveillance streams
THE PROTECTRAIL APPROACH

Interoperability Framework:
A design pattern to integrate the capacities
THE PROTECTRAIL APPROACH
STAKEHOLDERS

Event producer

- Devices
  - CBRNE Sensors, Video Surveillance, Video Analytics, Scanners

- Operational
  - Solutions for Operation and Control Centers

- Crisis Management
  - Managing a Crisis with various responders and stakeholders

- Public Announcement
  - Passenger Information & Announcement Systems, News Feeds, Google Public Alerts

Event consumers
THE PROTECTRAIL APPROACH
TECHNOLOGY STACK

- Event Format: Common Alerting Protocol
- Event framework: WS-Notification
- Shared map representation
- Decision-making and complex event processing: graphical Business Process Modelling and Notation (BPMN)
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• **Open Standard**: Especially in an international environment, shared and opened interfaces are required. Legacy systems should gradually be replaced by standard-based systems (also for on-board broadband railway digital network)

• **On-Board Network Manager**: The integration and configuration phase can be optimised when a standardised on-board middleware is introduced

• **Security**: IP/MPLS technology means a *higher data* flow and connectivity, but also increases the exposure to *possible attacks*
• **Differentiated Services Code Point:** To cope with specific devices that were unable to mark traffic according to different mission-critical priority levels.

• **Virtual routing and forwarding:** This solution was adopted because as it was unclear how many switches (and their capabilities to support QoS classes) will be involved in the architecture.

• **Independent frequency and network:** since the 2.4 GHz channels (used in 802.11g) are very busy and also overlapping each other, it is important to use wireless bands which are freer (i.e. 5 GHz as used for the 802.11n).
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The sole implementation of the video-surveillance industry standards (IEC 62676-1&2, ONVIF) is not enough.

A generalised use of RTP/RTSP streams carrying video H264 compressed (or metadata) time stamped at the frame level.

Full modularity of the basic services associated with video, independently of their physical implementation.

Digital video, especially when live information with low latency is required, has stringent needs for communications channels (no buffering is allowed) → trade off between UNICAST and MULTICAST.

The systems must preserve full consistency between time and metadata associated with the streams.
MODERN AND PRACTICAL APPROACHES TO VIDEO AND VIDEO-BASED ANALYTICS
MODERN AND PRACTICAL APPROACHES VIDEO-BASED ANALYTICS

• Using analytics for decision support and **not as fully-automated security solution**

• **Metadata standardisation**: Full consistency for video analytics remains an **open issue**; there are no established industry standards

• Wider system (e.g. Storage/Playback/GUI/other) **requirements**: Video analytics usually need more performance or have wider requirements than basic video solutions

• ISO 22311 is a helpful standard
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Levels of Interoperability

• Technical interoperability is achieved using standardised common communication protocols in order to exchange data between the participating systems,

• Syntactic interoperability is achieved using a common data model such as the Common Alerting Protocol (CAP)

• Semantic interoperability is achieved by defining the content of the information exchanged in restricting the data model used.
COMMENTS WELCOME!

Open discussion among stakeholders