

Innovative technologies for secure transport systems



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Ministry of Environment, Energy and Sea**

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Ministère de l'Environnement, de l'Énergie et de la Mer



Ministry of Environment, Energy and Sea

Secretariat of State for Transport

Directorate for Maritime Affairs



General Directorate for Civil Aviation



Directorate for Transport Services



Introduction

- **A context of permanent terrorist threats : public mass transit are at risk**
 - ✓ The Thalys, Paris and Brussels attacks have highlighted a need for new measures in order to ensure mass transports security.
- **A challenge / Issue : reconciling fluidity and security of transports**
 - ✓ Innovative technologies may allow both a fluid and secure public mass transit
- **What is an innovative technology ?**
 - ✓ It is a technical device that brings a new service, or even a pre-existing technology or technique used in a new environment.
- **State Response :**
 - ✓ Public authorities can impulse development of new technologies to secure transports, that must be well integrated to a transport security chain



Impulsing innovation to secure transports : a role for public authorities

Working groups :

A working group conducted by a specialized Prime Minister service : the National Security and Defence General Secretariat (SGDSN).

- Looking out **new technologies and innovative devices** in land transports.
- Public mass transit undertakings and public authorities are implied.

Studies :

A study piloted by the Transports Security Department (DSUT) .

- Looking out **tools and methods to detect prohibited items** (weapons, ammunition)



Innovative devices for secure transport systems

Security gates and X-ray scanners

- **Innovation is a new use of these technologies in the land transport field**
 - **Security gates and X-ray machines** to check passengers and their luggages prior to access to **Thalys** trains has been implemented in the Paris stations “Gare du Nord” and in the Lille-Europe station in the north of France since 20 decembre 2015.
- **Feedback of experience :**
 - This system works quite well : fast and positive device for a critical situation **but** it's not designed to be implemented in every station.
 - This device causes a longer travel (about 20 minutes, which can be an issue for business clients) and thus reduces Thalys' competitiveness.



Innovative devices for secure transport systems

Canine units

- Canine units are useful to find out explosives in trains (detection dogs) and stations, and not only for dissuasion (guard dogs)
 - Tests are currently under way to assess dogs efficiency to find out explosives in trains and stations, as a complement or as a substitute of technological means.
 - Example : At the Lille-Europe station, dog units are deployed to inspect luggages.
- Feedback of experience :
 - Experiments have shown a greater rapidity of dogs than scanners
 - Possible graduated response for suspicious packages/abandoned
 - Remaining problem : risk resolution



Innovative technologies for secure transport systems

Smart videosurveillance

- “Video patrolling” : a device that uses CCTV systems to track automatically a person spotted by a video operator.
 - Tests are currently conducted by SNCF.
- Behavioral detection based on learning algorithms



- 37,000 cameras in SNCF’s stations and trains.
 - 38,000 cameras in RATP’s stations and trains.
- dissuasion/intervention/inquiries

Innovative technological projects

MILLIPRISM (1/5)

MILLIPRISM is a project launched in 2013 that aims at using millimetre-wavelength sensors to detect hidden prohibited items through clothes.

- This device detects heat radiation from a human body with ultra-sensitive sensors.
- A cooperative project between several public and private entities.
- Funding is provided by French Defence Ministry and the National Research Agency (ANR).



Innovative technological projects

MILLIPRISM (2/5)

Advantages :

- No radiation emission.
- Avoid pat-down inspection.
- Avoid false alarm : fast.

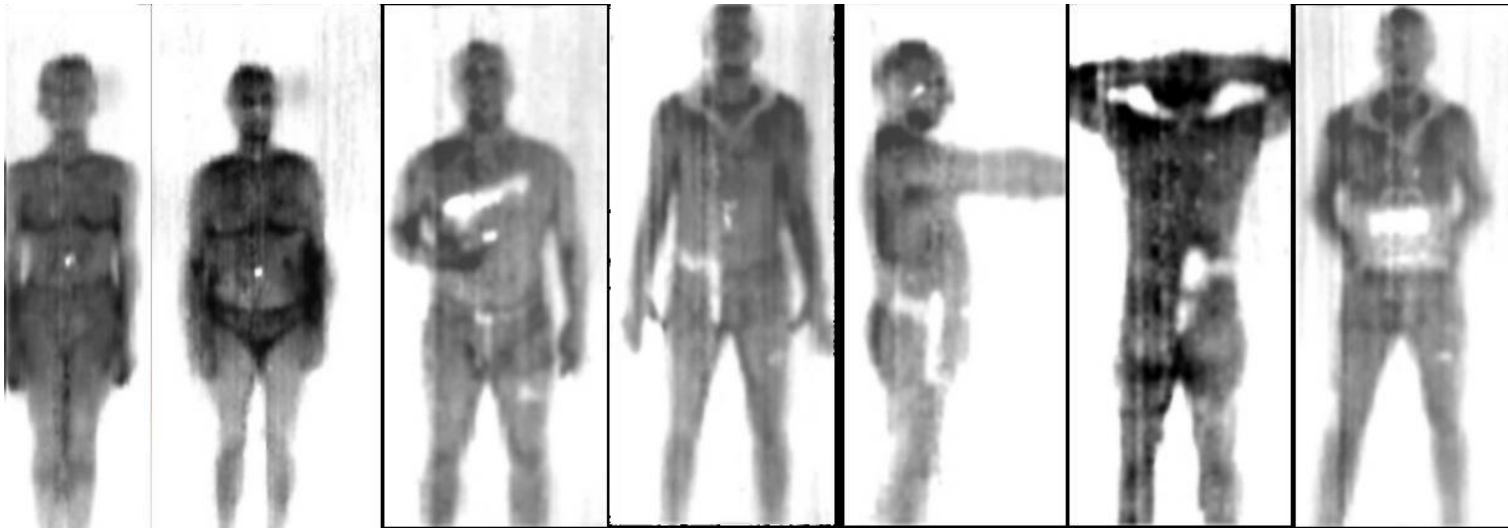


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Innovative technological projects

MILLIPRISM (3/5)

Typical radiometric images on persons :



Radiometric images can put in evidence anatomic details.

Thus, they are not displayed to avoid ethical issues.



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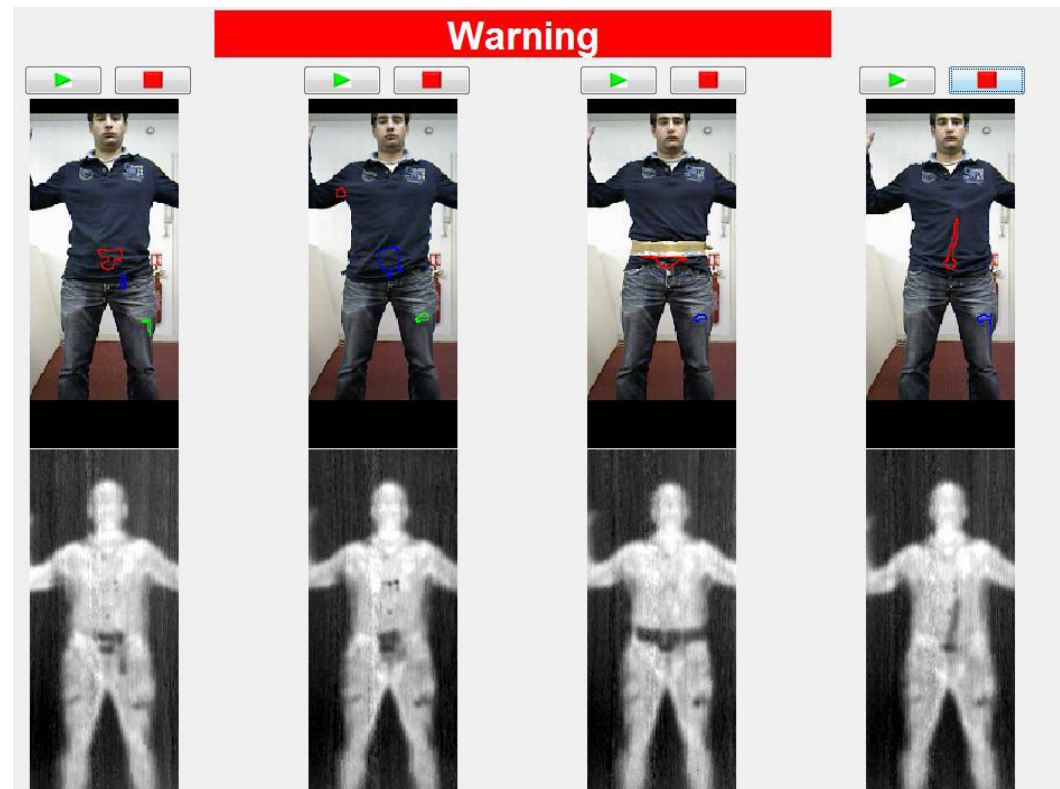
Innovative technological projects

MILLIPRISM (4/5)

In operating condition, prohibited items are automatically detected and radiometric

People who monitor the device shall only see the video part

The radiometric images are not displayed



Innovative technological projects

MILLIPRISM (5/5)

The technology should be ready in June 2017

Several improvements are required :

- Reducing size and weight
- Reducing acquisition time
- Reducing cost



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Innovative technological projects

DIRTACOS (1/5)

- Dispositif d'Imagerie en Rétrodiffusion et Transmission pour l'Analyse de COLIS Suspect (DIRTACOS).
- Device for Backscatter and Transmission Imaging for the Analysis of Suspicious Package.
- A cooperative project also launched in 2013 between public and private entities.



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Innovative technological projects

DIRTACOS (2/5)

- An industrial prototype of a **polyvalent X-ray imaging system**, portable and self-sufficient in energy for **non-intrusive inspections and suspicious packages analysis**.
- For customs services and mine clearance experts.
- To **fill the gap of conventional X-ray imaging** (in transmission) that can not deal with all situations.



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DIRTACOS (3/5)



electronic part

mobile phone

explosives

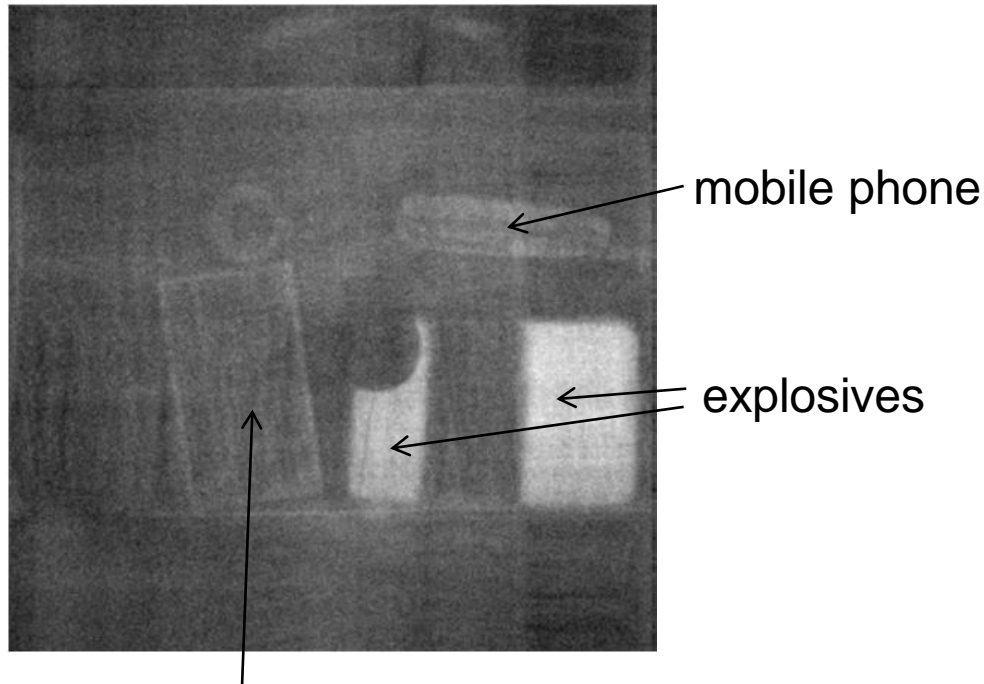


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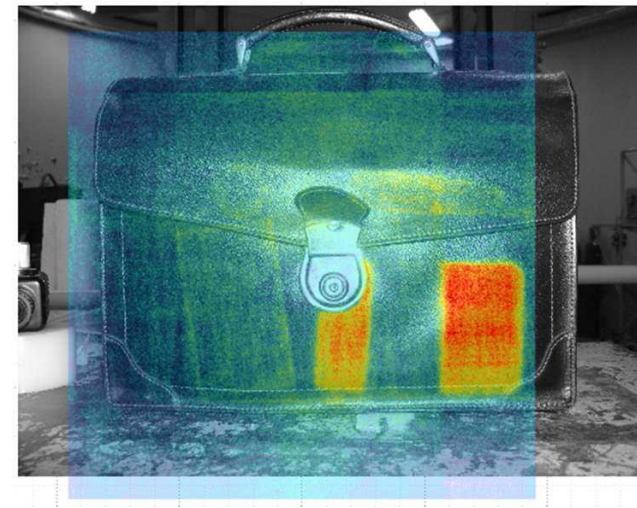
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DIRTACOS (4/5)

Backscattered image



Superposition of backscattered and visible images



electronic part



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DIRTACOS (5/5)

Improvements required :

- Finalizing the device
- Working on radiation protection aspects
- Reducing weight
- Increasing compactness



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Innovative technological projects

Surveillance drones

- Drone can be used to monitor railways and infrastructures (safety).
 - ✓ A research partnership has been signed for 5 years between SNCF and the French Aerospace Lab (ONERA) to build new drone-based solutions for railways surveillance.
- 2 kind of security drones have been designed :
 - ✓ A « plane-drone » (the 2 images on the right) for detecting intrusions on a site or on railways, particularly to prevent copper thefts.
 - ✓ A « nano-drone » for close surveillance, which can be deployed in 5 minutes (image on the left).



Innovative technological projects

Satellite-based monitoring

SNCF and the National Space Studies Centre (Cnes) will work together to develop satellite based devices for monitoring trains and railways.

- Railways obstacles detection
- Accurate trains location and monitoring



State of thinking : holistic approach for an efficient security system

- A robust system should be a cumulative one rather than an alternative system (“and “vs « or »).
- Integrating well all devices and actors in a security chain (interdependence and interactions)
- Training staff in using equipments, due vigilance of passengers and public/consumers
- Role of the state : coordination, funding, stimulus.



Conclusion

- Transport security should be based on **holistic solutions** that involve both **human** (staff presence and due vigilance of the public “transport’s eyes”), **technical devices** and **technologies**.
- Keeping the paradigm of an **open system and fluid transport** (different from aerial and maritime transport systems).
- **Transport security is an international issue** and should require a cooperation between all the countries to be really effective.



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**Thank you for your
attention !**



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