



*PROTECTRAIL (242270) - The Railway-Industry Partnership  
for Integrated Security of Rail Transport*

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# **Track Protection**

## **The vision in the UIC Security Platform and PROTECTRAIL Project**



# PROTECTRAIL Project

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## Approach:

Enhancing the railway security by splitting the problem into smaller asset-specific security problems (sub-missions) for which it is easier to reach satisfactory solutions applicable and usable in different threat scenarios. For each sub-mission it is easier to define, research and develop solutions in terms of architectures, technology deployment, as well as the necessary procedures, organizations to manage any specific issue.

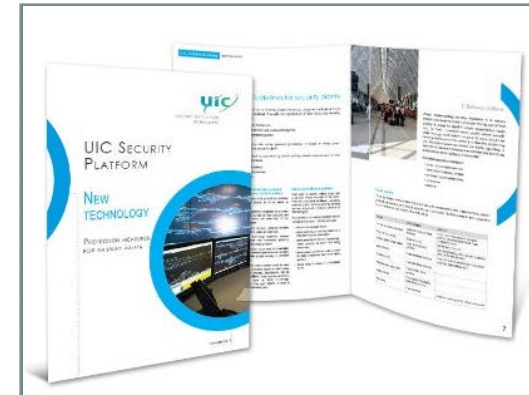
## Objective:

PROTECTRAIL challenge is to make interoperable the single asset-specific solutions and to conceive and design a modular architectural framework where each asset-specific solution can be “plugged”, in order to assure the integration and interoperability of respective solutions.

# The New Technology Group

“New Technology Group” is a working-group within the UIC Security Platform, which objectives are:

- Investigate new technological solutions presented by industry can offer advantages to enhance the security of people, goods and premises;
- Verify their compliancy to the rail sector requirements;
- Consider two specific aspects:
  - **protection of stations**, using “intelligent” CCTV systems, intrusion detection and control access systems, and security by design philosophy;
  - **protection of tracks**, in respect of prevention of unauthorized access, metal theft and detection of suspicious objects near tracks, especially relating to high speed lines.





# The New Technology Group

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Within the Group, investigating new technologies considers different aspects:

- Integration of different technological systems;
- Application of SOA architecture;
- Common User Interface;
- Costs – Benefits analysis;
- Organization behind technology (Human Factors);
- Legislation.



# NTG vs ProtectRail members

New Technology Group

## Railway Operators



SNCF - FRANCE



DB - GERMANY



FS - ITALY



JR – JAPAN



PKP POLSKIE LINIE KOLEJOWE S.A.

PKP PLK - POLAND



CP - PORTUGAL



RZHD - RUSSIA

## PROTECTRAIL

Railway Operators, Industry and Research Institutes

| No. | Beneficiary organisation name   | Country | Acronym |
|-----|---|---------|---------|
| 1   | Ansaldo STS S.p.A.  | IT      | ASTS    |
| 2   | <a href="#">Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO</a> | NL      | TNO     |
| 3   | Selex ES S.p.A. (formerly <a href="#">SelexElsag S.p.A.</a> )                               | IT      | SES     |
| 4   | Union Internationale Des Chemins De Fer   | FR      | UIC     |
| 5   | Selex ES S.p.A. (formerly <a href="#">Selex Sistemi Integrati S.p.A.</a> )                  | IT      | SES     |
| 6   | <a href="#">Bombardier Transportation GMBH</a>  | DE      | BT      |
| 7   | Alstom Transport SA   | FR      | ALS     |
| 8   | Thales Communication and Security SA  | FR      | TCS     |
| 9   | <a href="#">Sarad GmbH</a>  | DE      | SARAD   |
| 10  | UNIFE – The European Rail Industry  | BE      | UNIFE   |
| 11  | <a href="#">Morpho SA</a>   | FR      | MOR     |
| 12  | Ductis GmbH   | DE      | DUCTIS  |
| 13  | <a href="#">Železničná spoločnosť Slovensko a.s.</a>  | SK      | ZSSK    |
| 14  | Joint Stock Company Lithuanian Railways   | LT      | LITRAIL |
| 15  | RFI Rete Ferroviaria Italiana S.p.A.  | IT      | RFI     |
| 16  | <a href="#">PKP Polskie Linie Kolejowe SA</a>   | PL      | PKPPLK  |
| 17  | <a href="#">D'Appolonia S.p.A.</a>  | IT      | DAPP    |
| 18  | <a href="#">Elbit Systems Ltd.</a>  | IL      | ESL     |
| 19  | Facultés Universitaires Notre-Dame de la Paix   | BE      | FUNDP   |
| 20  | EPPRA   | FR      | EPPRA   |
| 21  | Kingston University Higher Education Corporation  | UK      | KU      |
| 22  | SODERN S.A.   | FR      | SODERN  |
| 23  | <a href="#">Smiths Heimann S.A.S.</a>   | FR      | SMITHS  |
| 24  | <a href="#">Instytut Kolejnictwa</a>  | PL      | IK      |
| 25  | CEA Commissariat à l'Energie Atomique   | FR      | CEA     |
| 26  | <a href="#">Institut Franco-Allemand de Recherches de Saint-Louis</a>                       | FR      | ISL     |
| 27  | TCDD - Turkish State Railways   | TR      | TCDD    |
| 28  | MER MEC S.p.A.  | IT      | MERMEC  |
| 29  | Société Nationale des Chemins de Fer  | FR      | SNCF    |



# NTG vs ProtectRail identified threats

## New Technology Group

- Metal theft
- Other thefts
- Robberies
- Unattended luggage
- Aggressions to rail staff
- Aggressions to customers
- Suicides
- Graffitis
- Vandalism/glass scratching
- Intentional fire attacks
- Obstacles on the line
- Stone throwing
- Squatting
- Sabotage
- Terrorism/CBRN
- Shooting on board trains
- Letter bombs
- Bombs
- Cyber crime
- Fraud

## PROTECTRAIL

| Threats   | Priority | .... | Results |
|---|----------|------|---------|
| <b>Terrorist attacks</b><br>•Explosive<br>•CBRN<br>•Fire<br>•Hijacking of trains/cars<br>•Sabotage of tracks/equipment<br>•Black mail | <b>1</b> | .... | 1,5     |
| <b>Thieves attacks</b><br>•Theft of copper<br>•Theft of equipment<br>•Theft of technology<br>•Theft of passenger's properties         | <b>2</b> | .... | 1,8     |
| <b>Vandalism attacks</b><br>•Graffiti<br>•Equipment damaging<br>•Interiors of trains damaging<br>•Stone throwing                      | <b>3</b> | .... | 2,5     |

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# NTG vs PROTECTRAIL identified assets

## New Technology Group

- Stations
- Tunnels
- Bridge
- Power Substations
- Tracks
- Trains



For any asset there were identified Best Practices and Technological innovations in order to counteract railway threats.

## PROTECTRAIL

| N. | Asset  | Code | Priority |
|----|--|------|----------|
| 1  | Stations and buildings                       | SB   | 1        |
| 3  | Tunnels                                      | TNL  | 2        |
| 4  | Viaducts / Bridges                           | VB   | 3        |
| 7  | Rolling stocks                               | RS   | 3        |
| 5  | Yards and depots                             | YD   | 3        |
| 2  | Open Air Track (Viaduct and Tunnel excluded) | TCK  | 4        |
| 6  | Plants, signalling and ITT systems           | PSI  | 5        |
| 8  | Power supply systems                         | PSS  | 5        |



# Why track protection ?

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Within the New Technology Group, track protection is particularly important for the high frequency of events that even if with their low impact are leading to a yearly relevant economical damage.



**HPLI (High Frequency Low Impact)**

We then defined the suitable best practices to cope with such a threat.



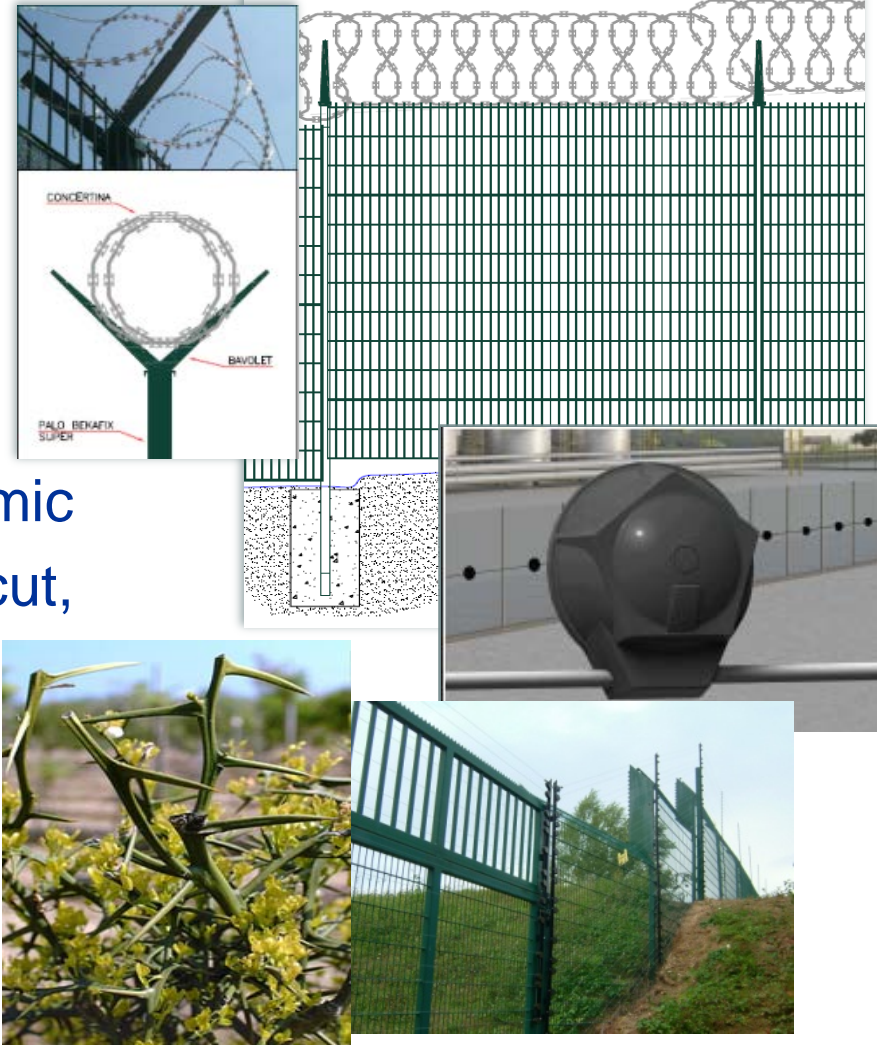
# Track protection: Fencing

## Best Practices:

- Fencing (welded mesh panel);

## Possible Innovative solutions:

- Active fencing: use of piezodynamic sensors to detect attempts to cut, climbing and breakthrough.
- Other types of fencing such as:
  - vegetable fencing,
  - electric fencing.



Useful technical innovations:

➤ Up-to-date technology cameras:

- High Resolution or megapixel;
- ONVIF Protocol for ease of integration;
- WDR (Wide Dynamic Range);
- DNR (Digital Noise Reduction);
- DIS (Digital Imaging Stabilization) or OIS (Optical Imaging Stabilization).

➤ Video Content Analysis

- Motion detection;
- Abandoned object;
- Line or area crossing.



## THERMAL CAMERAS

- Able to detect the temperature gradient with great accuracy.
- Capable of “viewing” in night-time or anomalous conditions such as fog, smoke, rain, etc...
- Compliant to Video Content Analysis with a grater effectiveness.





# Track protection: cables theft

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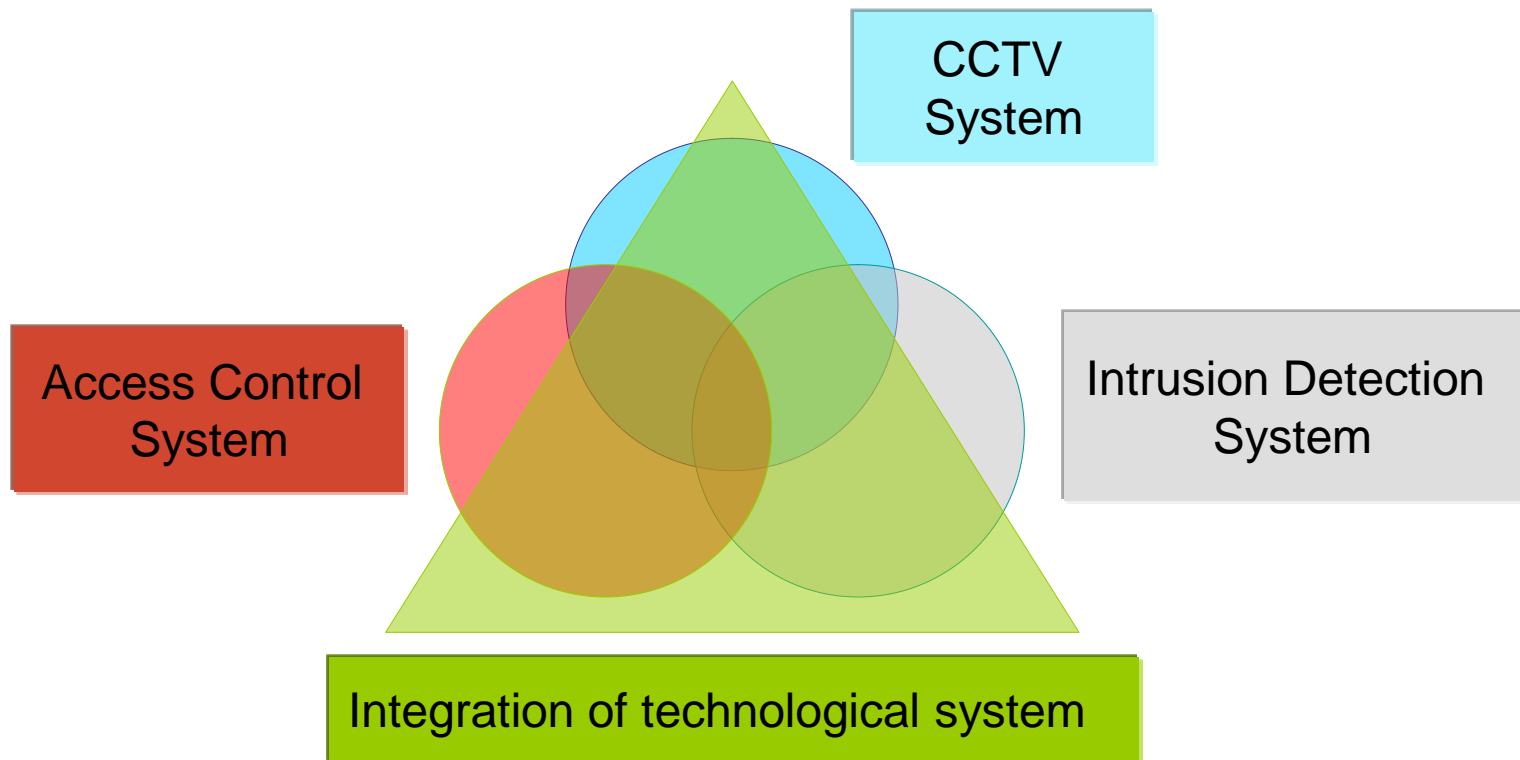
## Helpful innovations:

- Optical Fiber Alarm systems (generating alarms when a change of the light path is detected) laid together with the cables to be protected;
- Use of special reinforced Ducts;
- Labeling systems (marking systems that allow to trace the owner of the cable).



# PROTECTRAIL and UIC Security Platform

ProtectRail Project has managed to improve the effectiveness of the identified technologies in UIC Security Platform through the study of integrated solutions between the various security systems





# ProtectRail – Track protection

## Purpose and target

- Identification of main threats for railway tracks;
- Development of a modular architectural framework able to integrate different technologies in order to assure the interoperability of each respective solutions for the protection of railway tracks;
- Test of suitable technologies:
  - Installation of a “Demo Site” nearby Palermo Brancaccio Electric Power sub-station (Sicily – Italy)