Technologies & Capabilities for Rail Industry Innovation

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Stakeholder Hearing on an EU coordinated approach to R&I in the rail sector
The Company

ELECTRONIC and INFORMATION TECHNOLOGIES for
DEFENCE SYSTEMS - AEROSPACE - DATA - INFRASTRUCTURES - LAND SECURITY & PROTECTION - SMART SOLUTIONS

Entrusted to deliver technology-enabled systems and solutions for a safer, smarter and more secure society

Key facts
- 17,900 people
- Revenues in excess of 3.5 billion Euros
- Italy and UK as domestic markets
- Strong footprint in
  - US
  - Germany
  - Romania
  - Brazil
  - Saudia Arabia
  - India
  - Turkey

The Divisions
- Airborne & Space Systems
- Land & Naval Systems
- Security & Smart Systems

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Selex ES’s leading position in the civil market leverages our knowledge of customers’ processes to deliver digital platforms based upon dual use/state-of-the-art technologies.

We offer high technology solutions tailored to specific domains:

- government
- public safety and law enforcement
- critical infrastructures
- utilities
- transportation
- postal operators and express couriers
- telco operators
- large enterprises

We promote convergence in the market by harvesting synergies across IT, communications, automation, physical and cyber security.
Smart, “net centric” integration of national platforms, design & implementation of integrated ICT architectures and Infrastructures to provide advanced solutions in core areas: Government, Education, Economy, Welfare, Energy Stock Exchange, Governance of Networks for Telco Service Provider.

Particularly for Public Sector, according to European and Italian Digital Agenda, S&SS division builds ICT Application Platforms for digital services promoting innovation and social inclusion and improving the relationship with citizens.

Global Solution Provider of Secure & Integrated Digital Platforms, addressed to major national, European and global programmes including Smart Cities, Smart Grid and City Logistics.

ICT Service Provider and Technology Partner of Finmeccanica Group, owning a deep process consultancy expertise in the manufacturing sector, for ERP solution delivery, Application Management and ICT Managed Services, meeting the strict reliability and security requirements of a major group belonging to the aerospace and defense sector.

Cross-platform integration with special “smart devices” - sensors, hand-held palms, smartphone, tablet - as elements of value added in applications architecture.

Services delivered in Secure Cloud model, include Data Center, remote management or distributed workplace management, monitoring and maintenance of TLC secure networks, Network Operations Center (NOC) & Contact Center (inbound, outbound).
ICT OUTSOURCING CONTRACT: Ferrovie dello Stato (Italian Railways)

ICT & Networking Capabilities & Rail Operator Solutions:
- Broadband access IP based communications for voice, data, video, signalling applications, as an evolution of LTE, WiFi and Satellite basic technologies
- Information Technology solutions for **travels and customers management**
- IT solutions for **Control Rooms** and Secure Data Storage, and related Web Portals
- IT Systems for logistics tracing/integration (RFID) and information (ERP-SAP)
- Passenger Information & Entertainment systems in stations and onboard
- **Asset Management** of physical elements and ICT devices
- Web based Customer Intelligence solutions (Social CRM, Sales Portals, Contact Centers)
- **Paper Less Mobile Workforce Automation** (electronic documents and process related to traveling goods and personnel, with full availability of apps in mobility)
- Management Systems for **intermodal terminals** and nodes
- City Logistics with multilevel integration of railway transportation and intelligent distribution of goods
• Selex ES started its activity in the field of telecommunications for transportation as manufacturer of GSM-R mobile terminals, being part of the GSM-R Industry Group since its early stages (year 2000)
  • In this period Selex ES developed a full product catalog of mobile terminals, ranging from handhelds to CAB radio for voice and data (non-vital) and CAB radio EDOR for ERTMS signalling
  • Selex ES equipment is currently in commercial operation on thousand of trains, including the latest generation of Italian HS train Frecciarossa 1000, integrated with ASTS vital signaling

• Leveraging the experience acquired on QoS for signalling, strictly related also to network architecture and optimization, radio and TLC network system competence SES has become a provider of turn-key solution for railway telecom, including trackside and on-board systems
  • Selex ES is currently involved in development of next generation Italian High Speed Train on-board infotainment solution and in the deployment of first phase of ERTMS/ETCS signalling system UAE nationwide railway project (Etihad Rail)
In the meanwhile, thanks to SES expertise on almost all Professional Mobile Radio technologies, lead the way to provide broadband all IP Wi-Fi solution for CBTC metro signaling solution, together with ASTS, fully integrated with the TETRA system, mainly used for voice and SDS transmission. At the same time SES is experimenting the use of TETRA for railway signalling.

Today Selex ES is provider of TETRA/TETRA+WiFi and On-Board System for Driverless Metro in the following cities: Naples, Milan, Genoa, Singapore (NEL & CCL), Riyadh APM
Selex ES with ASTS is deploying TETRA in Australia (Roy-Hill Mine project) to realize ERTMS-like signalling systems for freight trains.

The current evolitional trend in signalling is the migration to IP protocol and the integration of heterogeneous radio bearers (GSM-R, Tetra, Satellite, etc.) maintaining end-to-end QoS parameter to predefined levels, in order to reduce infrastructural costs related to dedicated radio networks, like GSM-R, in low speed-low traffic lines.
Selex ES is in the right position to acquire a good role in this evolitional phase thanks to its current involvement in EU TEN-T initiative addressing the evolution of ETCS over GPRS, seen as fist step towards ETCS over IP
• **Selex ES** will support S2R-IP2 on the following themes/aspects:
  
  • **Future communication system for train control applications (ETCS and CBTC)** leveraging communications technology evolution towards IP (GPRS, LTE, Satellite,…).
    
    → **Selex ES** will develop, test and validate algorithms to address QoS and resilience requirements of future signalling system over heterogeneous access networks, also taking into account OPEX/CAPEX cost constraints. This activity will allow Selex ES to develop its product portfolio and strengthen its position as turn-key solution provider for railway and metro telecommunications.

  • **On-board train integrity** solution to provide SIL-4 fail-safe information on train length and train completeness and eliminate conventional track-side train detection equipment (track circuits, axle counters, treadles, etc).
    
    → **Selex ES** aims at developing a “fully on-board” solution exploiting train head-tail radio comms, cheaper and simpler compared to conventional products on the market. This solution, targeting mainly regional and freight lines, will allow Selex to extend its product in portfolio in a market with high growth potential.

  • **Cyber system security** to achieve the highest level of cyber-security against any significant threat for the signalling systems is essential for the operational safety SIL4 level combined with high availability of next generation railway system.
    
    → **Selex ES** will support the definition of the Security Framework for Future communication system for train control applications leveraging its consolidated experience in the field of secure communications (IPsec, Key Management, Crypto).
• Providing a **common business intelligence foundation** for all Shift2Rail transport product/service providers

• Improving continuously the **S2R Service lifecycle** of rail-centric travel experience of european travellers

• Monitoring **S2R target strategic KPIs (**) , structured in operational KPIs within IP4

  (*) S2R KPI (BA framework extended and applied at systems level for all other IPs)
  - **System capacity** / increase of passenger (+100%)
  - **System reliability** / quality of service (+50%)
  - **System Cost** / increase of revenue (-/+ 50%)

• Supporting rail and **multi-transport operators** (and all S2R eco-system service providers) with **decision tools** to build Mobility&Traffic Management Control Rooms

• Assuring Quality & Revenues for Rail Business Executive applications, processing **Big Data as Travel-Transport Analytics** over multisource channels

• Promoting Rail & Green Mobility with **Social Travellers Relationships**
The Business Analytics Platform (TD6) is a set of applications on top of the Interoperability Framework (TD1).

It will take advantage of the Interoperability Framework in order to:
- Collect useful data (indicators) from different railway/transport provider’s systems
- Correctly understand them and elaborate KPIs
- Calculate higher level KPIs climbing the KPI tree up
- Present KPIs in suitable graphical formats
- Provide Transport Intelligence tools for plan, monitor, simulate, decide, and further, drive command & control operations.

The Business Analytics Platform can be used to:
- Monitor the performance of the railway/transport systems or any part of them
- Identify trends, deviations or critical cases
- Suggest operative actions/changes to services, based on the business needs and on the transportation status knowledge, extracted by real context informations
- Support management decisions by simulating different scenarios with «what if» techniques
Selex ES participation in S2R-IP4
TD 6 - Business Analytics Platform IP4 Applications

Travel&Transport Intelligence
Rail & Transport Service Provider decision tools, open channels monitoring (web, press, forum, blog, tweets,...), demand/offers planning/forecast, customer experience improvement, fidelization and revenues assurance by consumer/business segments.

Social CRM/TRM
Mobile & web solutions and services to manage direct relationships channels (portals, blog, social media,..) and made available «social web» tools to build relationships based on online conversations of S2R service users.

Customers /Travellers Relationship Management
Contact management solutions and services for customer interactions and service-product sales, service management, maintenance and rail attractiveness performance measurement.

Travel&Transport Analytics
Rail & Transport Big Data integration, Data Warehouse, Data Mart, Business Intelligence, Dashboarding for S2R transactions data collection and analysis.
Shift2Rail global strategic targets (+100% Capacity, +50% Reliability, -50% Lifecycle costs) could be reached only by an common strategy with performance management solutions to orchestrate all single IPx business objectives.

Energy & Mass Efficient for High Capacity Trains, Advanced Traffic Management Systems, Cost Efficient High Capacity Infrastructure, Seamless Attractive Railways-centric multimodal travels and Freigth Sustainability, and all their specific operational KPIs will be globally related and optimized by a unifiying Technology Interoperability & Rail/Transport Business Analytics Frameworks

Business Analytics will lead toward better S2R services by deep knowledge and conversation intimacy with customers (consumer-travellers, business-enterprises)

All Shift2Rail transport product/service providers will benefit from a Travel&Transport Intelligence framework, with S2R KPI Dashboard for Marketing & Sales and Customer Services multi-tenant and multi-operator.

Enabler of command, control and decision tools for rail and multi-transport operators (and all S2R eco-system service providers), with planning, monitoring and reporting capabilities from data collection, filtering, and analysis of Big & Open Data as Travel-Transport Business Analytics
Selex ES participation in S2R-IP4

TD 6 - Business Analytics Platform for IPs & S2R global KPI optimizations

Global S2R KPI optimization

- Energy / Mass Efficiency KPIs Dashboard
- Traffic Management Efficiency KPIs dashboard
- Infrastructure Operation Efficiency KPIs, dashboard
- Global Capacity optimization (common, cross modal,..)
- Travel & Transport Intelligence
- Freight operation Sustainability KPIs dashboard, B2B cross modal operation efficiency
- Energy Efficiency & Integrated Mobility Management system KPIs dashboard (common, cross Modal Policy Optimization, multimodal control rooms,..)

Travel&Transport Analytics (higher dataset than embedded / specific data)

Interoperability Framework