G7 Transport Academic Workshop

**A Pathway to resilience:
the FS Group approach**

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Politecnico di Milano, Bovisa Campus, Milan (Italy)

FS Group at glance

100% Ministry of Economics **MEF** ▶▶▶

▶▶▶ **Over 120 subsidiaries**

FERROVIE DELLO STATO ITALIANE

ITALCERTIFER
GRUPPO FERROVIE DELLO STATO ITALIANE

FS FONDAZIONE FS ITALIANE

INFRASTRUCTURE HUB
The backbone of economic and social development throughout the territory

PASSENGER HUB
Integrated solutions for sustainable mobility

LOGISTICS HUB
The entire supply chain of digitised freight

URBAN HUB
The sustainable regeneration of cities

FERSERVIZI
GRUPPO FERROVIE DELLO STATO ITALIANE

TECHNOLOGY
GRUPPO FERROVIE DELLO STATO ITALIANE

FERCREDIT
GRUPPO FERROVIE DELLO STATO ITALIANE

SECURITY
GRUPPO FERROVIE DELLO STATO ITALIANE

FS INTERNATIONAL
A COMPANY OF THE FS GROUP

Sector's Group Leaders ┈┈▶

RFI RETE FERROVIARIA ITALIANA
GRUPPO FERROVIE DELLO STATO ITALIANE ⊕

TRENITALIA
GRUPPO FERROVIE DELLO STATO ITALIANE ⊕

MERCITALIA LOGISTICS
GRUPPO FERROVIE DELLO STATO ITALIANE ⊕

SISTEMI URBANI
GRUPPO FERROVIE DELLO STATO ITALIANE ⊕

Sectoral parent companies ┈

anas GRUPPO FS ITALIANE ⊕

BUSITALIA
GRUPPO FERROVIE DELLO STATO ITALIANE ⊕

GrandiStazioni
GRUPPO FERROVIE DELLO STATO ITALIANE

FERROVIE DEL SUD EST
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FERROVIE DEL SUD EST
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ITALFERR
GRUPPO FERROVIE DELLO STATO ITALIANE ⊕

+ Presence of Subsidiaries

Strategic FS initiatives for resilience of transport

Investments aimed to **strengthen and monitor the safety and resilience** of road and rail infrastructure, also by upgrading, electrifying and boosting the resilience of railway lines, and including a **Digital Resilience Platform** for monitoring road and railway infrastructure.

Research and innovation on automation and digitalization of railway operations, sustainable and resilient systems, freight rail transport and regional lines (within the public-private partnership **Europe's Rail**, of which the FS Group is a founding member).

Significant **investments** (within the scope of **National Recovery and Resilience Plan**) for developing and upgrading the national and regional railway network, as well as for digitalization, innovation, competitiveness, ecological transition, inclusion and cohesion.

The governance and implementation of the **Group's climate resilience framework** supporting the climate change Transition and Adaptation Plans.

Physical Risk Assessment

The technical process for the Physical Risk Assessment implemented by FS Group is inspired by "The Adaptation Support Tool" of the **EU Climate-Adapt** platform:

"Hazard and Asset Identification": FS mapped the meaningful asset cluster with the hazard (according to EU Taxonomy Regulation's list of climate events) exposed to.

"Risk Modelling and Assessment": FS developed a "Climate risk & vulnerability assessment" and a "Climate Scenario Planning" in order to classify the assets most vulnerable to climate hazard and to quantify the economic impact related to climate hazard in RCP 4.5 and RCP 8.5 in the next years.

"Identification adaptation options": FS create a catalogue of relevant adaptation options, build on the output of the risk modelling and assessment step.

Climate change mitigation strategies

Direct actions
Decreasing own GHG emissions

SCOPE 1 — Increasing own energy efficiency

SCOPE 1 — Adopting low/zero GHG traction systems

SCOPE 2 — Reducing GHG intensity of energy sources
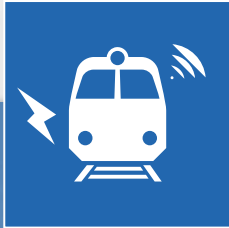
SCOPE 1 — Direct production of renewable energy

SCOPE 3 — Mobility and supply chain management

Indirect actions
Decreasing overall GHG emissions

**Modal shift from modes more affecting imate change**

research within

Rail Transportation

✓ Increase of railway transport capacity

✓ Decarbonisation and energy efficiency

✓ Digitalization of railway transport

✓ Innovation in freight transportation

CCAM Connected Networks and Smart Infrastructure

✓ Smart infrastructures for CCAM

✓ Resilience of networks and asset management

✓ Zero-carbon refuelling/recharging infrastructures
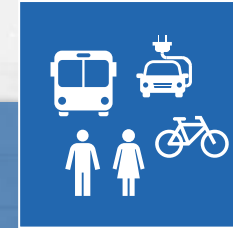
Urban Mobility

✓ Smart Urban Mobility Management

✓ Sustainable Urban Mobility Services

✓ infrastructures and terminals for mobility

FS Group Projects for Infrastructure Resilience
Rail Transportation

Use of **BVTOL/VLOS** (Beyond Visual Line of Sight – Vertical Take Off and Landing) Drone in order to prevent, protect and mitigate incidental events (according to the EU Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Eco-System in Europe).

New Algorithms for train routing optimization to solve problems due to a small and large disruption affecting railway traffic and with an impact in delay on trains time-table approaching/leaving railway stations.

Cybersecurity algorithms to protect data transmission related to energy consumption (from train to ground) against threats targeting the mission of **UIC/CER Sustainability Strategy.**

FS Group Projects for infrastructure Resilience
## CCAM, Connected Network and Smart Infrastructure

Use of **rain radar** (integrated with additional sensors) to measure and localize the impacts of pouring rain (high intensity and short duration) on transport infrastructure to identify protocols for nowcasting management (weather forecast based on provided data in real time and with high precision degree).

Acoustic technology innovative monitoring system to evaluate progressive road infrastructure deterioration concerning materials (e.g. structural anomalies). Acoustic signals related to the progressive release of energy transmitted to the structure as elastic waves (due to structural stress) are applied.

# FS Group Projects for infrastructure Resilience
Urban Mobility
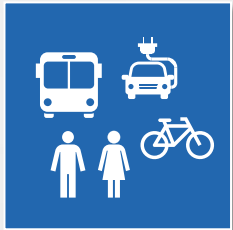
Mobility Digital Twin: a new national urban mobility modeling platform integrated with the existing FS Group platform and its national transportation simulation model.
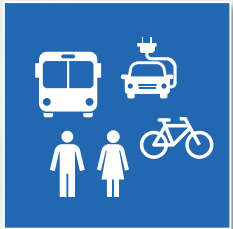
Demonstrate the scalability of the ultimate sharing mobility service in a small Town (Sesto Fiorentino) and beyond and test the user willingness to share a vehicle driven by another customer and her willingness to pay the service. **TUSS Project (The Ultimate Sharing Service)** addresses the scalability of a mobility service for urban peripheries combining, car-sharing, ridesharing and automation-aided vehicle-repositioning to and from local hubs

FS Group Projects for infrastructure Resilience
Integrated Projects
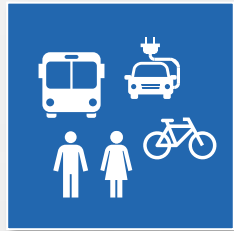
Definition of methodological references, modeling configuration and IT architecture of a digital platform for the **analysis, management and planning of urban mobility**, able to exploit both the **new CCAM technologies** and the data from different sources, including big data (mobile phones, floating car data, public transport, etc.)

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