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FS Group Projects for the National Centre for Sustainable Mobility (MOST)

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Session: Sustainable urban mobility in MOST. Strategies and tools

FS Group participation in Spoke 9 of MOST - Urban mobility



WP 1 - Smart Urban Mobility Management and Governance

- **Upgrading of the FS digital mobility data platform.** The development is being finalized as part of the **CCAM&MODE4Italy Flagship** to create a **Telematics platform for the integration, analysis and processing of data on mobility** and transport system performance.
- **Intelligent Path for Electric Vehicle** - AI system for optimizing electric vehicle rides.



WP 2 - Infrastructures and Terminals for mobility

- Testing and validation of algorithms for the **sizing of multimodal spaces and services** of the urban Hubs.
- Models for the evaluation of **Wider Economic Impacts** (WEIs) with reference to **urban areas** and the effects related to investments in railway stations/stops.



WP 3 - Sustainable Urban Mobility Services

- **Walkability/bikeability index** for the sustainable design of urban mobility spaces.

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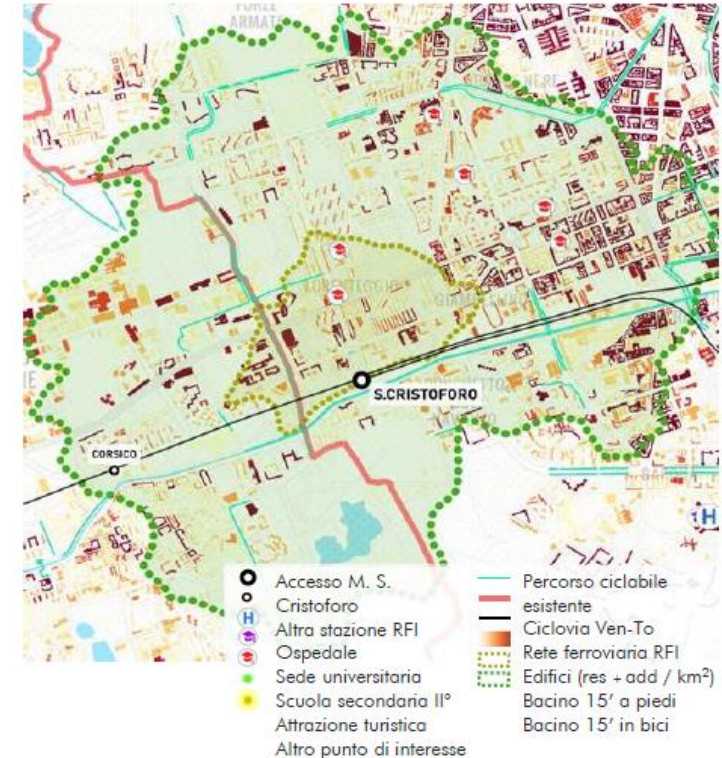


Models for the sizing of Multimodal HUB services

Testing and validation of algorithms and Models for the sizing of the **spaces and services of the Multimodal HUB** related to:

- bike parking,
- car parking,
- Kiss & ride spaces,
- spaces for Sharing Mobility services,
- charging stations for electric vehicles.

The models have been tested in the case study of Milan San Cristoforo. The results of the RFI Aggregate Models are tested through the application of macroscopic and microscopic simulation models developed by Politecnico di Milano, which simulate the spatio-temporal distribution of passenger flows in the Hub.



Models for the analysis of Wider Economic Impacts

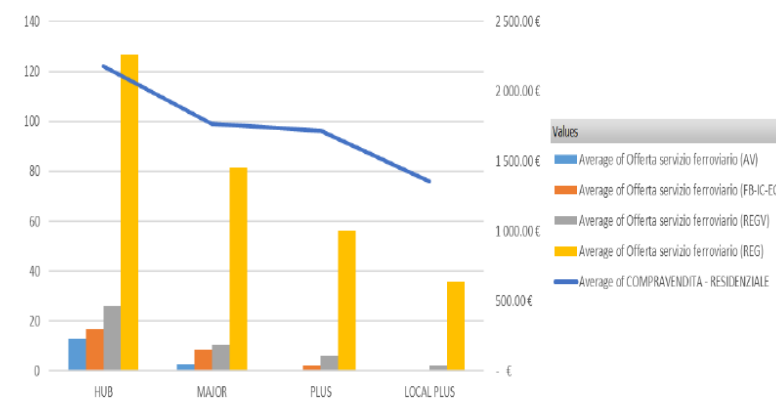
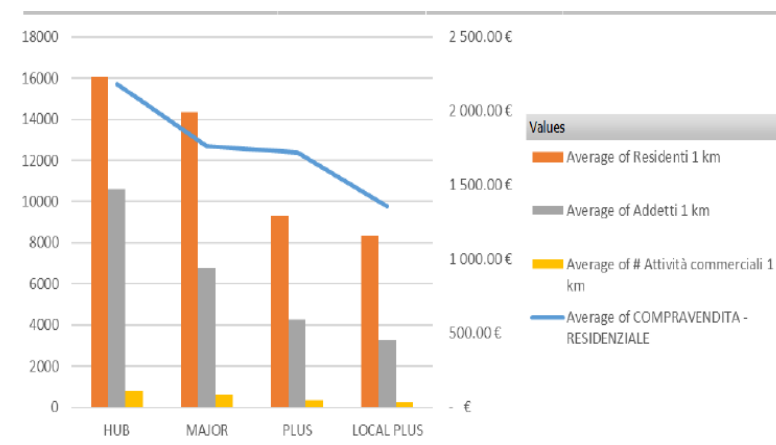
Study of models for the assessment of **Wider Economic Impacts (WEIs)** with reference to **urban areas** and the effects related to **investments in railway stations/stops**, with a prevalent focus on issues related to:

- **Residential Real estate prices**
- **Business activities location choices**
- **Residential location choices**

through the application of multivariate cross-sectional regressions.

The analysis took into account different classes of stations according to the RFI classification: Hub, Major, Plus, Local Plus.

The study was conducted using a **database of more than 2,000 railway stations**.



Models for the analysis of Wider Economic Impacts

Variables included in the Residential Real Estate Prices model

ATTRATTIVITA_RESIDENZIALE = 0.041 * res + 0.844 * school + 0.968 * commerce + 0.959 * services,		
Nome Indicatore	Tipologia	Significato
res	Number	Numero residenti nell'intorno di stazione
school	Number	Numero di scuole
commerce	Number	Numero di attività commerciali
services	Number	Numero di attività servizi

CENTRALITA_E_CONNETTIVITA_FERROVIARIA = 1.001 * train_reg + 0.675 * catchment_train,		
Nome Indicatore	Tipologia	Significato
train_reg	Number	Numero treni Regionali
catchment_train	Number	Catchment train (numero stazioni treno)

OFFERTA_FERROVIARIA_DI_LUNGO_RAGGIO = 0.686 * treni_longhaul + 0.565 * train_regv,		
Nome Indicatore	Tipologia	Significato
train_longhaul	Number	Numero treni Alta Velocità e Intercity
train_regv	Number	Numero treni Regionali Veloci

SERVIZI_SHARING = 0.536 * taxi_parking + 0.655 * sharing_car + 0.561 * parking_bike_sharing + 0.44 * sharing_bike + 0.599 * bike_lanes,		
Nome Indicatore	Tipologia	Significato
taxi_parking	Dummy	Presenza di parcheggi taxi (1/0)
sharing_car	Dummy	Presenza di servizi sharing automobili (1/0)
parking_bike_sharing	Dummy	Presenza di parcheggi bici (1/0)
sharing_bike	Dummy	Presenza di servizi bike sharing (1/0)
bike_lanes	Number	Km di piste ciclabili dedicate in un intorno di stazione

DISTANZA_POLI_ATTR = 0.546 * dist_to_hospital_pro_data_m + 0.684 * dist_to_edu_m		
Nome Indicatore	Tipologia	Significato
dist_to_hospital_pro_data_m	Number	Distanza dall'Ospedale [m]
dist_to_edu_m	Number	Distanza dall'Università [m]

Intelligent Path for Electric Vehicle (IPE4EV)

The **IP4EV (Intelligent Path for Electric Vehicle)** project aims to develop an advanced optimisation system dedicated to electric buses. Using artificial intelligence (AI), the system will propose **energy-efficient routes**, keeping mandatory stops at scheduled times and minimizing battery consumption, while optimizing self-charging opportunities such as regenerative braking. The system also provides an intelligent agent that assists the driver with targeted driving suggestions.



The project's architecture is based on the **integration of real-time data** from vehicles and navigation platforms, combined with predictive models that estimate energy consumption as a function of variables such as gradient, traffic and speed. The **AI algorithm uses advanced optimization techniques** to suggest the best routes, ensuring maximum energy efficiency.

IP4EV aims to **reduce the operating costs of electric fleets, increase electric vehicle range** and **contribute to sustainable mobility**. The system has the goal to represent an innovative solution for cities that wish to adopt a **virtuous management of electric buses**.



Flagship Model4Italy - Digital platform for mobility

Through the development of the **Model4Italy digital platform**, jointly promoted by the **University of Rome La Sapienza** and the **Italian State Railways**, the aim is to provide **Public Administrations** with information and functionality support for **decisions on mobility policies** and evaluation of interventions.

For some functions, the same platform may be available to citizens in order to improve awareness of **mobility phenomena** and their effects on the environment and the territory.

The Model4Italy digital platform will extend the functionalities of the and the scope of application of the Strategic Information Management System (**SIMS**) of the State Railways, currently used for analysis of mobility demand and the transport.



The great opportunities provided by the huge **individual databases** allow for a **new modelling** approach to mobility analysis.

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The SIMS is a platform that includes a **geographical database** fed by numerous automated flows of data on mobility, economy, environment, territory, etc. from numerous sources.

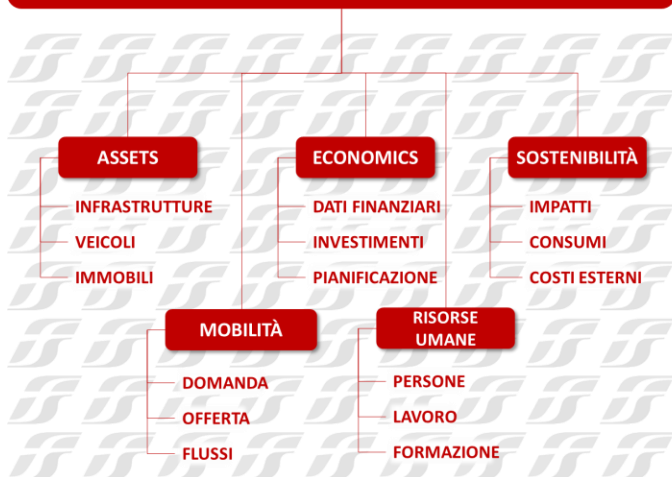


Data and sources

DATI DEL GRUPPO FS

7000+ KPI

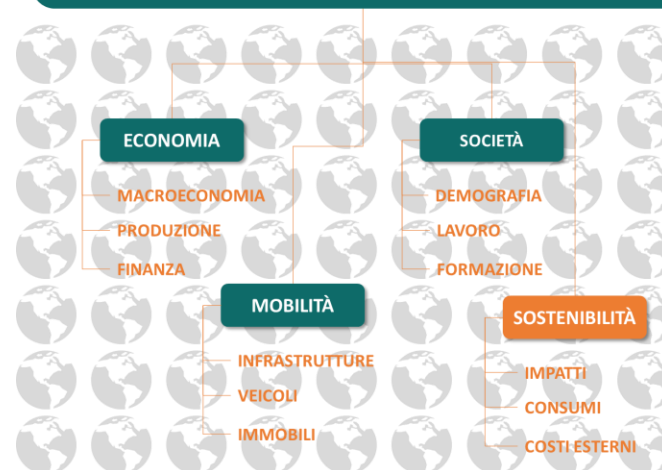
ACQUISIZIONE AUTOMATICA DEI DATI UFFICIALI
CERTIFICATI DAI SISTEMI SOCIETARI DEL GRUPPO



DATI ESTERNI

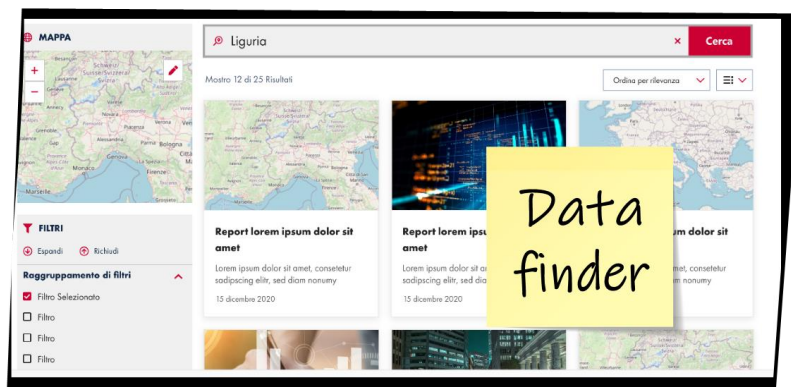
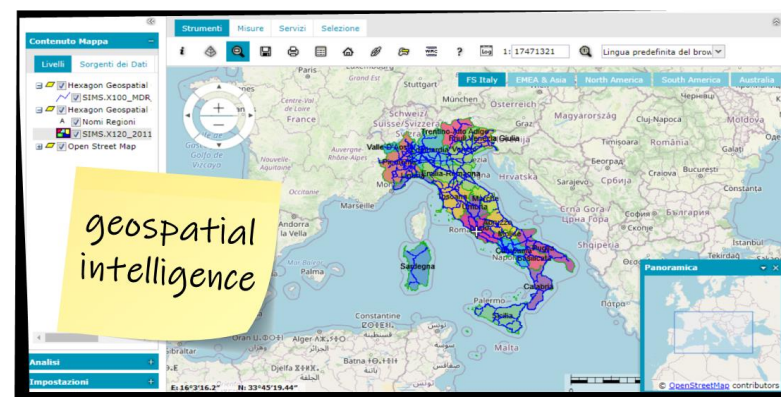
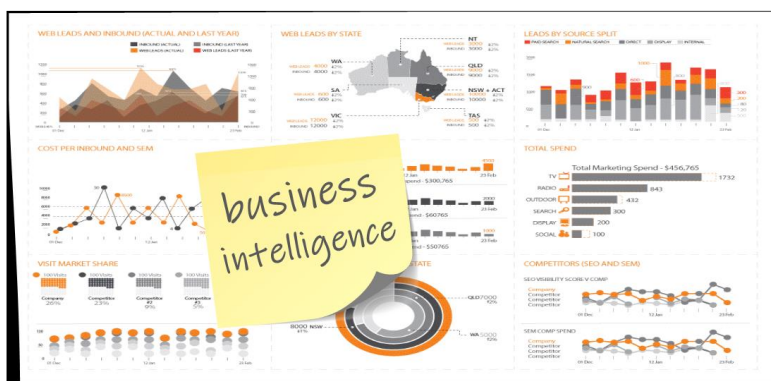
5000+ KPI

ACQUISIZIONE DI DATI UFFICIALI DA OPEN DATA
OPPURE DA FORNITORI DATI CONTRATTUALIZZATI



Data intelligence tools

The SIMS is equipped with advanced analysis systems ranging from **geo business intelligence** for the development of advanced dashboards, to **GIS systems**, to **economic and transport modeling**, including a 4-stage multimodal model (train, road, bus, air) calibrated for the simulation of the Italian national transport system.



Evolution of the digital platform within the MOST Flagship project

The evolution of the digital platform being finalized will offer:

- A highly interoperable **geospatial framework**.
- **Interoperability** between the application components of the **geospatial framework** and the **business intelligence** and transport modeling engines, in order to use the cartographic mode as the input/output interface of the system.
- Possibility of **interfacing with any database** and data source.
- A **web portal** with a public area and a reserved area that offers multimedia content, GeoBI dashboards, GIS apps and transport models whose contents are customized according to user profiles.
- Two mobility models:
 - a **multimodal national transport model** designed to estimate medium, long and short distance journeys made by residents in Italy
 - an **urban transport model**, which allows the analysis of mobility at different scales, from the level of a large area to specific urban corridors.

The two models are **integrated** and "complementary". In fact, a key strength of this initiative is its multi-level modelling approach, which combines national demand models with urban-scale simulations.



SH+LH TRAIN PASSENGERS

Outputs in progress and future developments of the platform

- **Synthetic mobility indicators** for area analysis at **the aggregate level**.
- Network simulation in **urban areas**, optimization, scenario evaluation, ex post analysis, using **models calibrated** on data collected **ad hoc** for specific needs.
- Integration between the Urban Mobility Model and the National FS Model.
- Public Administrations will be able to have a service for the **monitoring** and **simulation** of mobility and the estimation of its impacts, as quantitative support for the drafting of planning tools (SUMP, PUT, Traffic Studies).
- In the **future, the integration** of the simulation platform with **CCAM systems** is planned: cooperation between vehicles with information exchange and self-regulation of traffic.

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