

Understand Mobility and Transport AI Digital Twin + SnapAdvisor Co-Pilot



SNAP4MOBILITY



Value for buyers and delivery partners

City and enterprise teams



A shared operational view

Combine information across departments and connect it to daily decisions.

Developers



A reusable application toolbox

Use visual flows and APIs while keeping the flexibility of custom code.

System integrators



A foundation for differentiated services

Build domain applications and connect customer systems on a common platform.



MONITOR & PREDICT

Network intelligence



Availability forecasts



SIMULATE & OPTIMIZE

Current network



Alternative scenario



Compare mobility KPIs



DECIDE & ACT



SnapAdvisor Copilot



What is causing congestion here?



Review traffic, affected services and alternative scenarios.



Live data



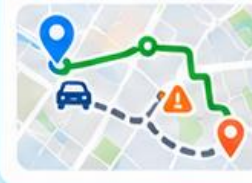
Predictions



Simulations

Workflows depend on configured tools.

Dynamic routing



Fleet & sharing operations



Traffic • Public transport • Parking • Sharing



What-if scenarios • Signal priority • Multimodal planning



Maps & insights • Operator decision support



One operational view of mobility, transport and city context.
Open integration: DATEX II • GTFS • OSM • MQTT • NGSI • REST APIs

01

MONITOR

Unified real-time view of traffic, public transport, parking, shared mobility, people flows, events, weather and environmental conditions.



02

PREDICT

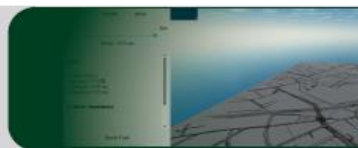
Forecast congestion, parking availability, public-transport delays, demand, pedestrian peaks, emissions and other KPIs.



03

PLAN & SIMULATE

Run scenarios and what-if analyses for road changes, traffic-light plans, routing policies and transport-service alternatives.



04

OPTIMIZE

Use decision-support and AI/DRL approaches to improve traffic signals, infrastructure and public-transport offer against measurable objectives.



05

ACT

Support dynamic routing, control-room interventions, digital signage, permissions, fleet operations and authorised workflows through APIs.



06

ASSIST

Use SnapAdvisor Copilot as a natural-language interface to data, analytics, routing, simulation, optimisation, RAG knowledge and visualisation.



- **Parking: on-road and off-road**
- **Flexible Business Models by area**
 - Any kind of parking slots
 - Any kind of vehicles
- **Mobile App for city users**
 - Parking
 - Notifications
 - Permissions and subscriptions
 - Multiservices
 - Payments
- **Mobile App for Enforcement, onroad operators, fines**
- **Integrated with**
 - Traffic intelligence
 - Public Transportation
 - Sharing mobility
 - Routing and MaaS



Decarbonization



Safety



Accessibility



Decongestion



Cost Reduction



Traffic flow reconstruction: infers the roads without sensors

The core data problem: cities can measure a few links, but mobility decisions need every road segment.

01

MONITOR

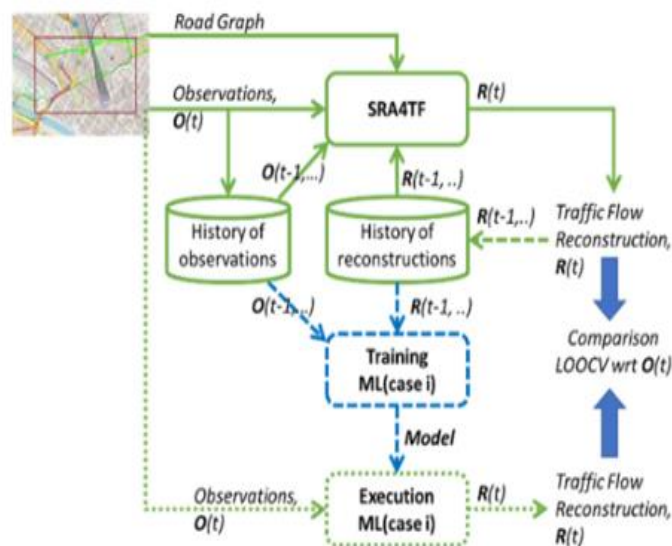
Unified real-time view of traffic, public transport, parking, shared mobility, people flows, events, weather and environmental conditions.



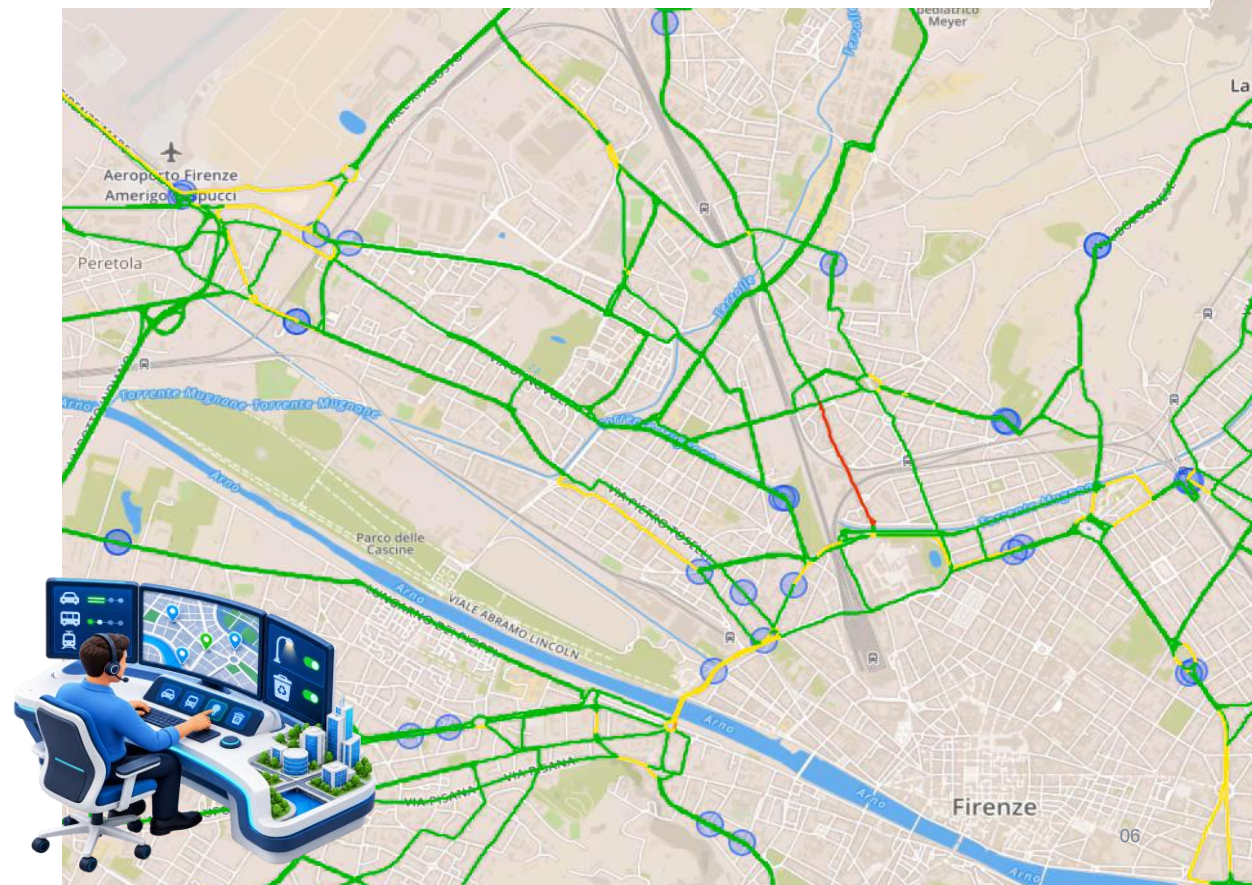
Few fixed sensors
counts + density +
speed

Hybrid PDE + ML
or lightweight GNN

Dense network state
for operations



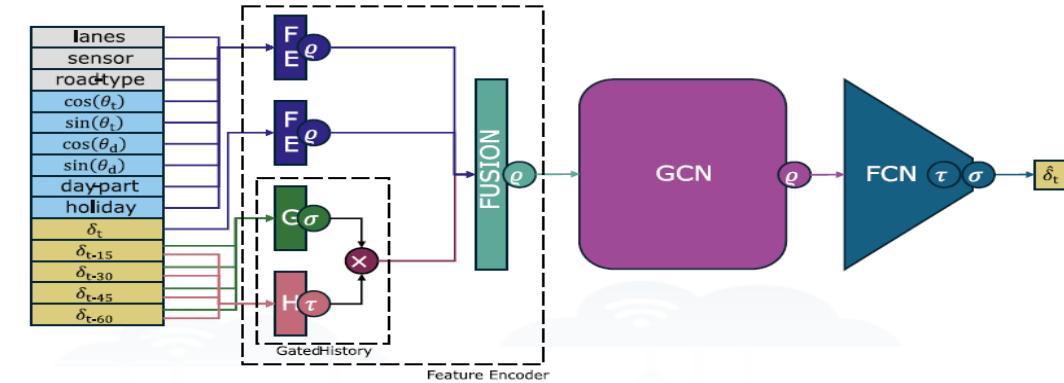
Evidence point: one GNN reconstructs a 20775-segment road network from 96 sensors, with a RMSE 0.33 #veh/20m at sensor measurements and mean of RMSE 0.05 #veh/20m network-wide.



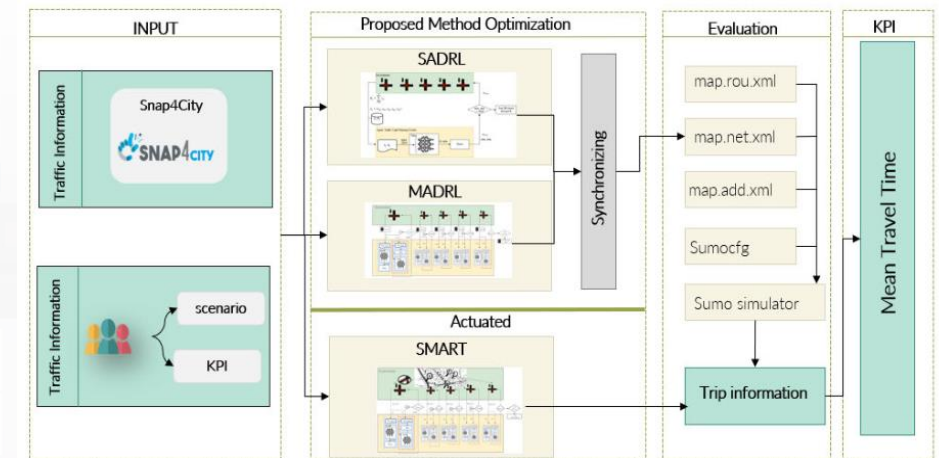


Technique vs solved problems

Technique	What	Mobility application
Deep learning on Time Series	Forecast temporal patterns	Free parking slots and short/mid-term demand
Hybrid physics + ML Neuro-Symbolic	Fill gaps in sparse sensing	Dense traffic flow reconstruction
Graph neural networks, GNN	Learn on road topology	Continuous density on unmonitored roads, traffic flow reconstruction
GA and DRL optimization	Choose actions under constraints. Optimized viability	1) Traffic light plans for tramway/BRT priority and compromise 2) Traffic infrastructure optimisation
Agent-based digital twins + XAI	Test scenarios and explain drivers	Demand-offer matching and CO2 levers



Road graphs + sensor data make modern AI spatial



A connected view of daily operations

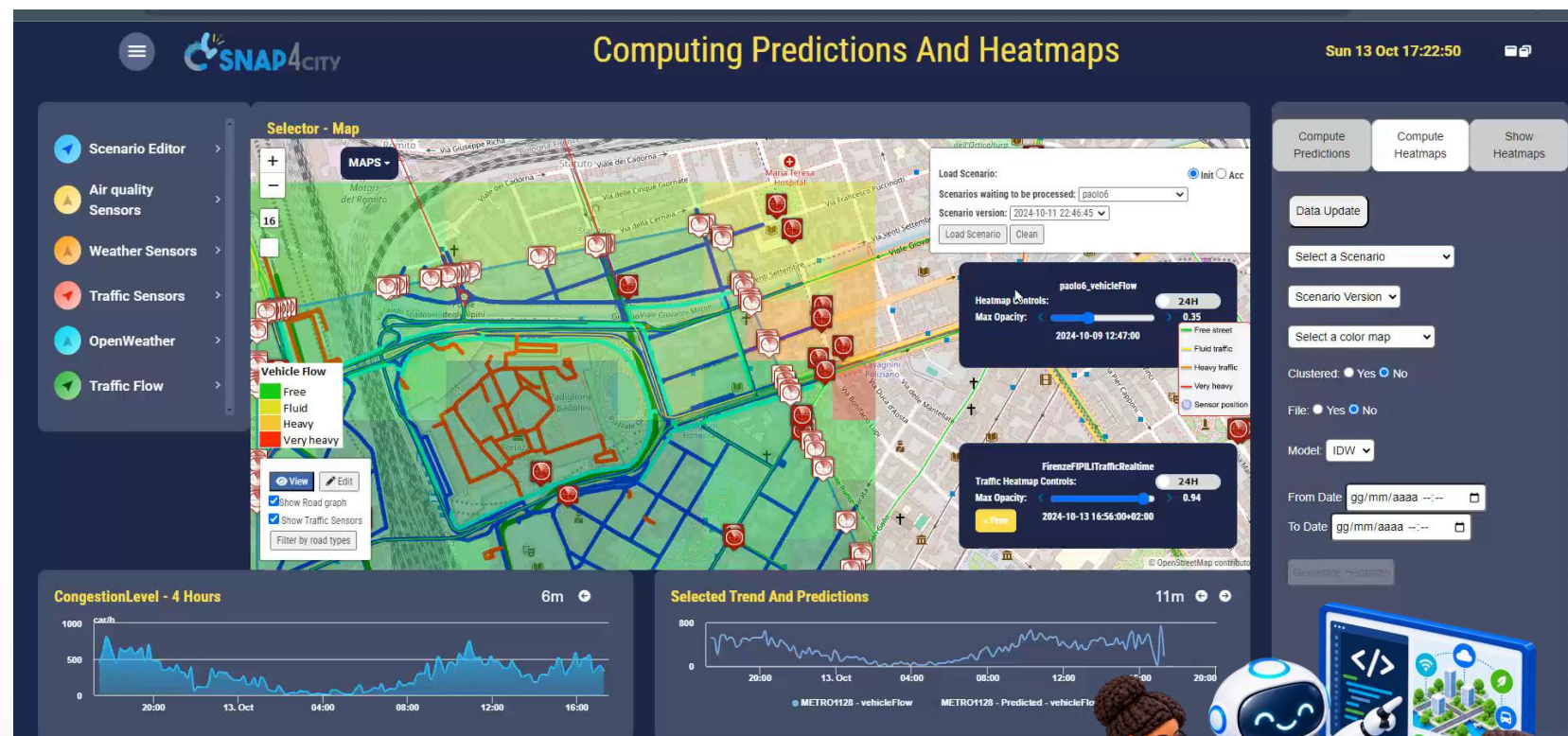
Shared context

Combine mobility conditions with roadworks, events, weather and air quality.

Early detection

Monitor queues, vehicle delays, parking occupancy and restricted-zone access.

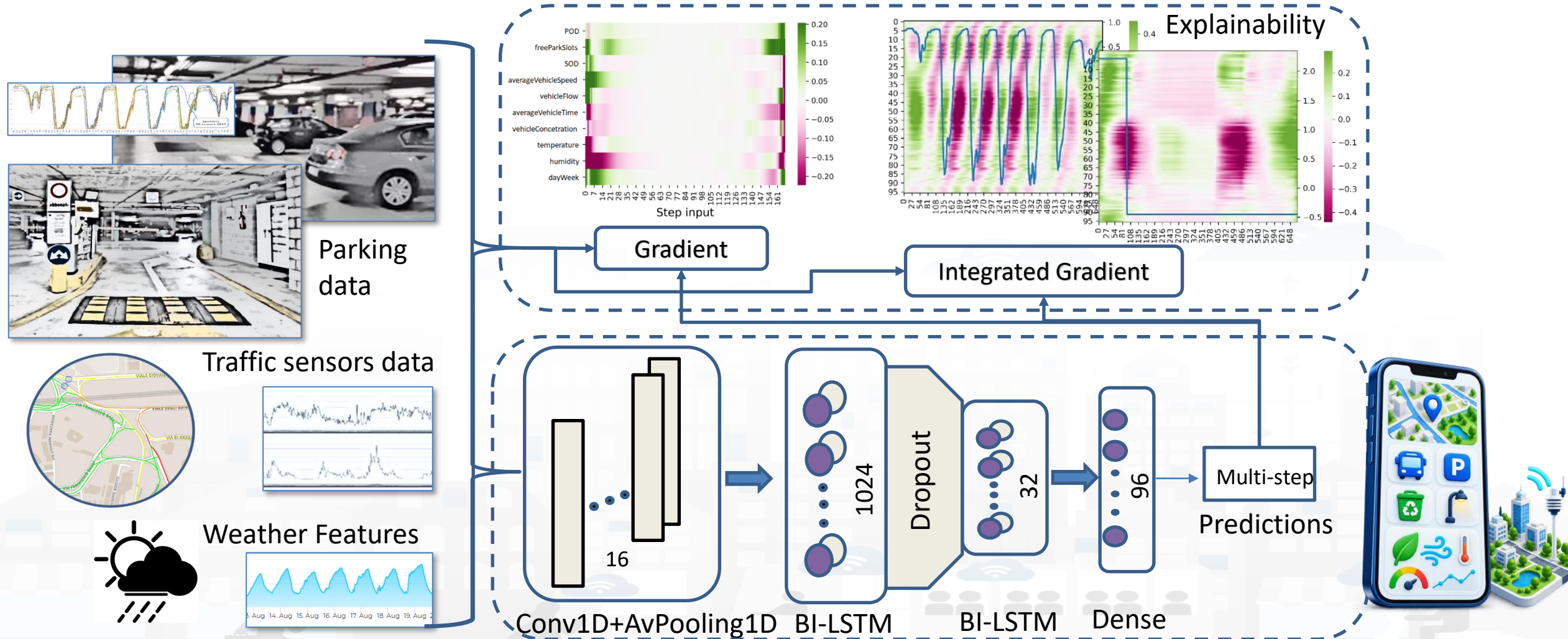
Traffic prediction and heatmap interface



02 PREDICT
Forecast congestion, parking availability, public-transport delays, demand, pedestrian peaks, emissions and other KPIs.



Precise Parking Predictions





Parking predict slot availability before drivers start searching

AI technique

Convolutional Bidirectional LSTM forecasts free spaces 24 hours ahead at 15-minute resolution.

Explainability of the effects of variables over time to the predictions

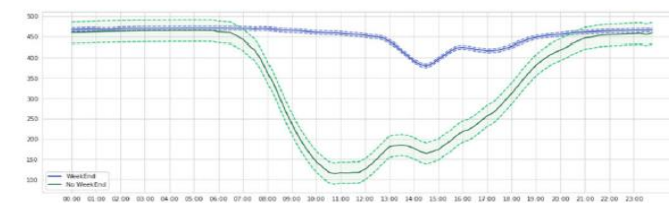
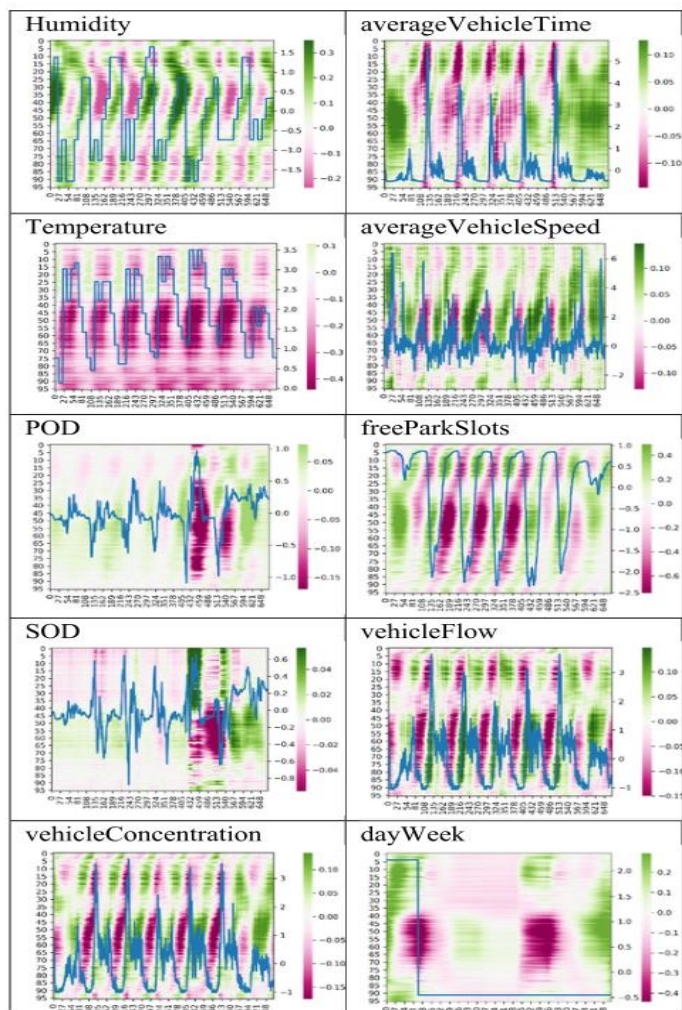
What it solves

Reduces cruising for parking and lets users plan trips one day ahead; the articles stress critical conditions when free slots approach zero.

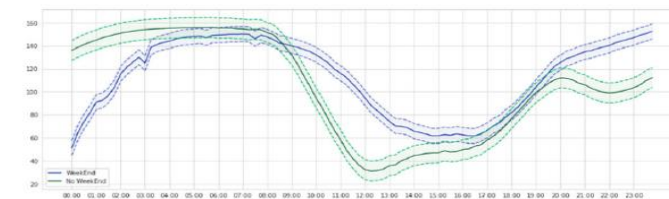
Reduce costs for predictions.

Mean Average Error 9.6-14.8

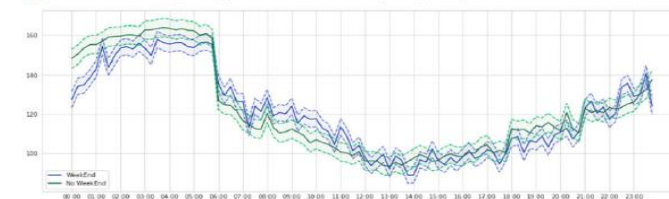
In predicting free slots for 1-hour forecast
Careggi / Beccaria / S. Lorenzo



(a) Careggi car park (hospital), capacity: 514

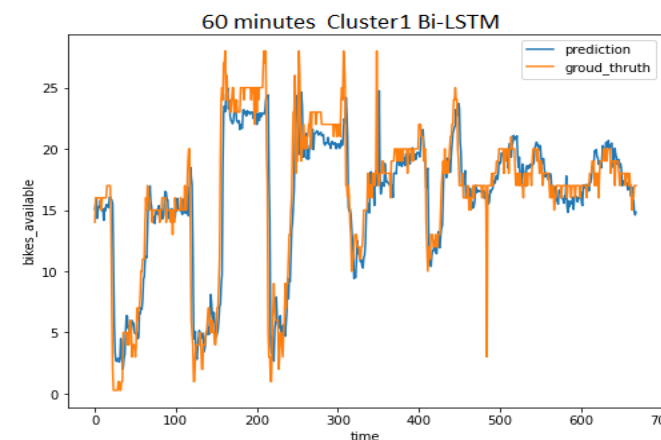
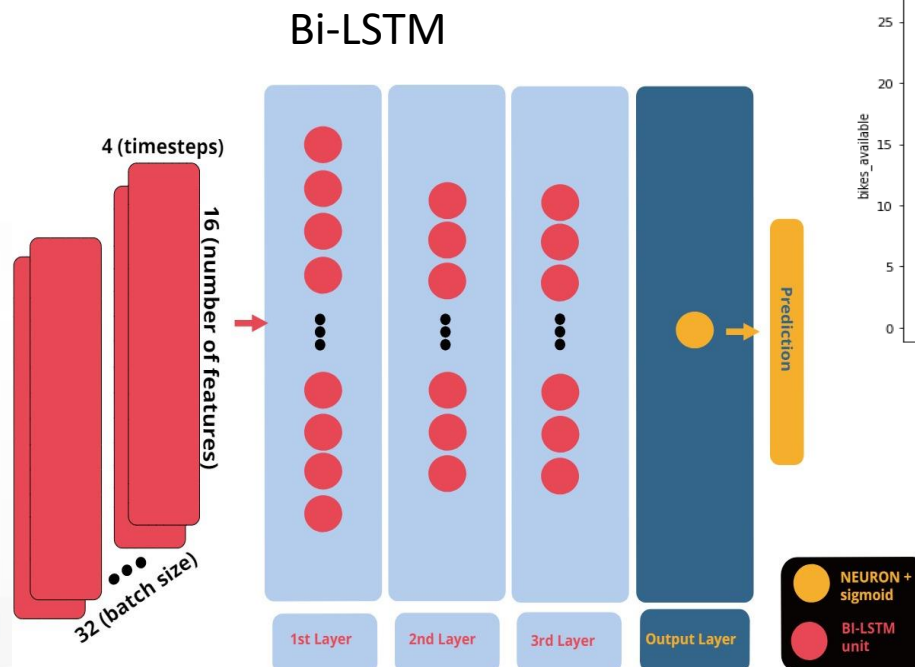


(b) Beccaria car park (downtown access), capacity: 203



(c) S. Lorenzo car park (old town access), capacity: 179

Deep Learning for Short-Term Prediction of Available Bikes on Bike-Sharing Stations



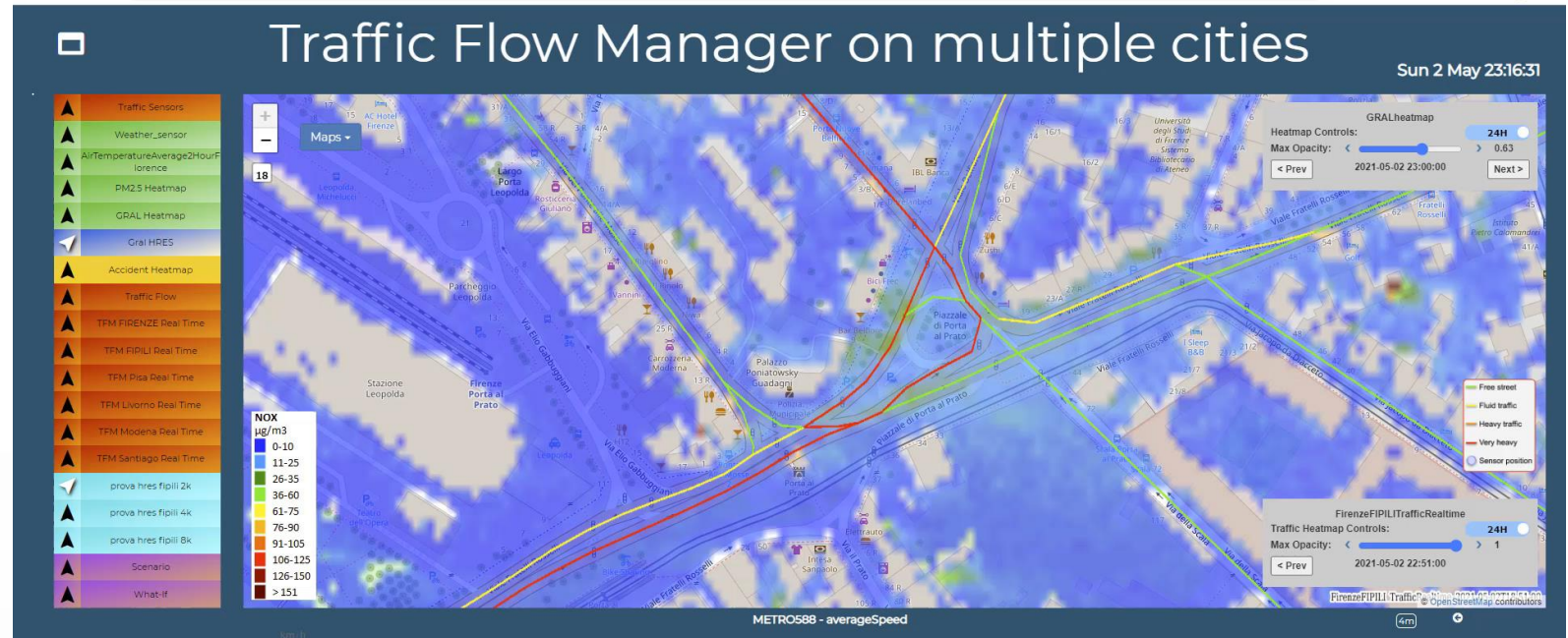
02

PREDICT

Forecast congestion, parking availability, public-transport delays, demand, pedestrian peaks, emissions and other KPIs.

Pollutant Predictions

- **Prediction**
 - **NOX Pollutant** diffusion on the basis of Traffic Flow (prediction), weather and 3D structure
 - **NO2 progressive average** (Long term)
- **Project:**
 - Trafair CEF EC
 - Mixed solutions of Fluidinamics modeling and AI



SNAP4CITY

Traffic Simulation-K8S

Sun 22 Jun 11:53:30

Ext

STOP PAUSE HELP

slowfast

Delay: 30.0 ms

Stats

time: 0.000 s
payload: 0.0 KB
simulate: 0.00 ms
snapshot: 0.00 ms

Vehicle Summary

Quick Find

03

PLAN & SIMULATE

Run scenarios and what-if analyses for road changes, traffic-light plans, routing policies and transport-service alternatives.

CAR

BIKE

TRAIN

TRAM

PERSON

BUS

04

OPTIMIZE

Use decision-support and AI/DRL approaches to improve traffic signals, infrastructure and public-transport offer against measurable objectives.

26 FPS (17-26)

Lights

Effects

SSAO

Scene

Close Controls

Wid

Prepare Simulation

Execute Simulation

KPI Simulation

Simulation:

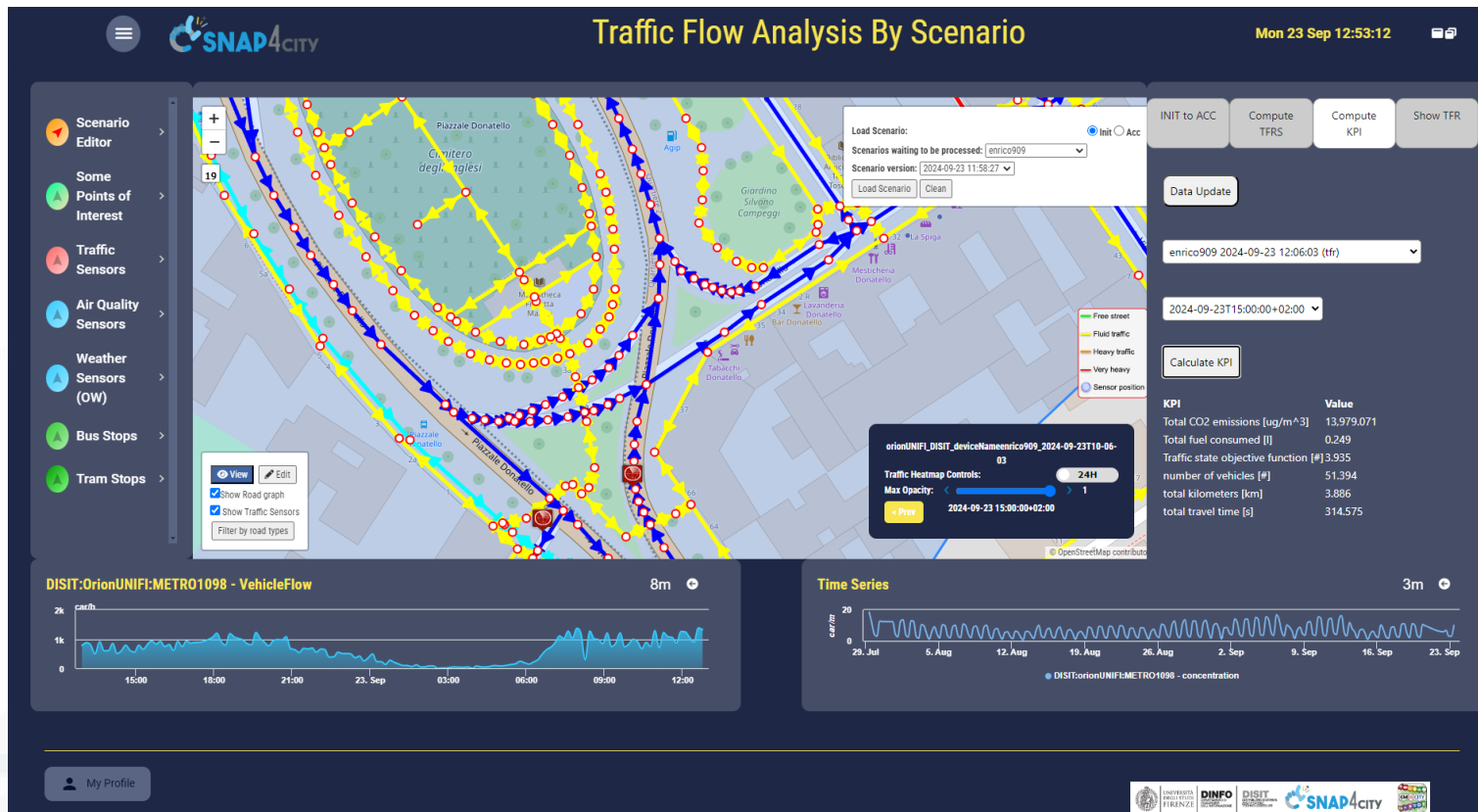
firenzeodbus

Execute

Simulation: 2025/06/22 11:53:27

Snap4City, Nov. 2026

Scenario testing before implementation



Road scenarios

Explore closures, traffic-light plans and alternative routing policies.

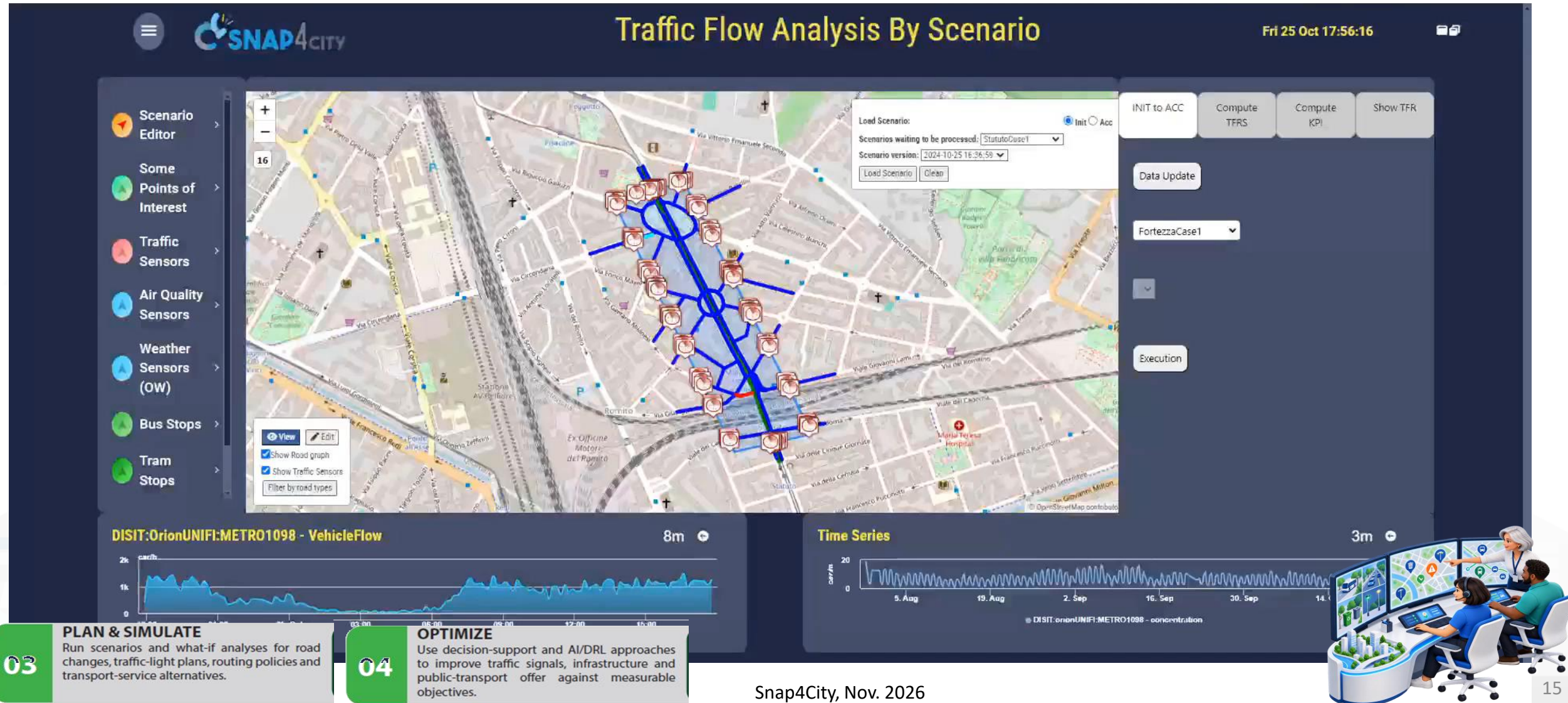
Service alternatives

Assess public transport, sharing and micromobility against demand.

Mobility KPIs

Compare travel time, queues, emissions and accessibility.

Optimization of Traffic Light Plan



Optimisation for transport priorities

Traffic signals

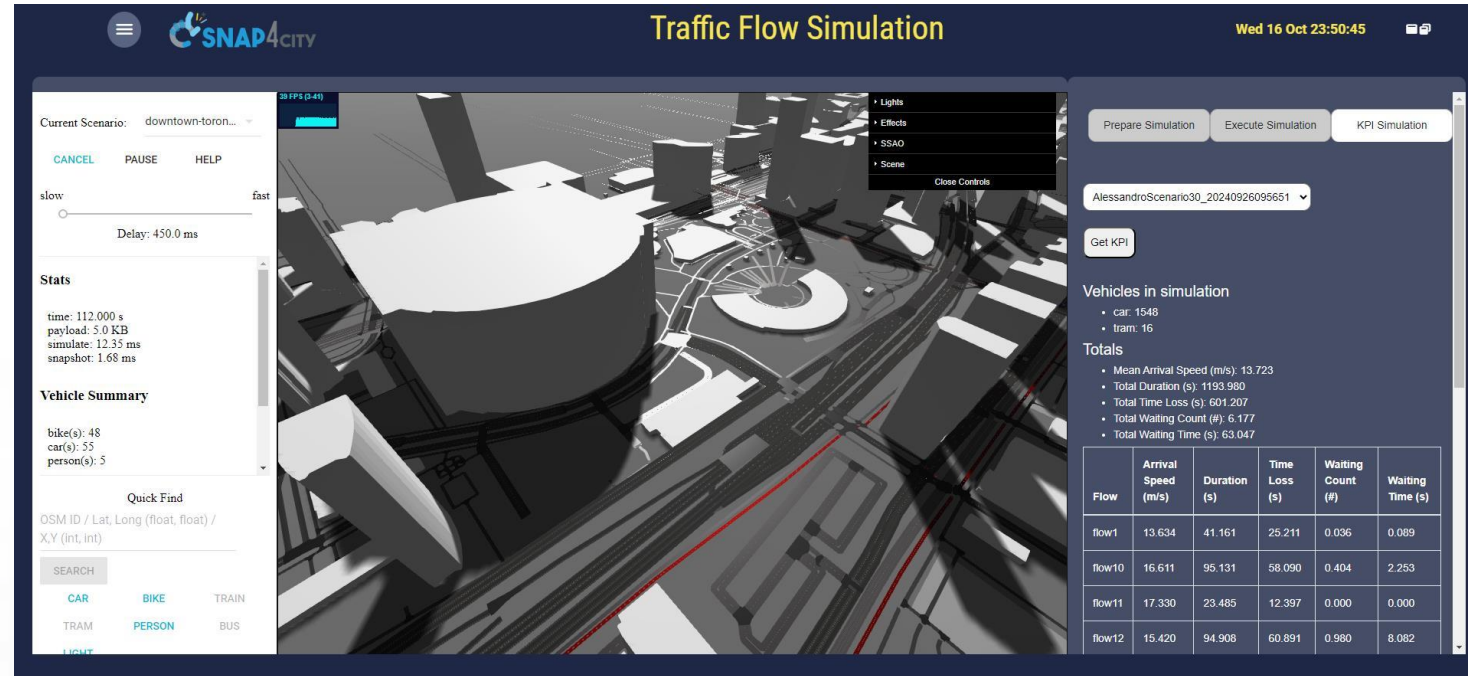
Evaluate green waves and priority for public transport or emergency vehicles.

Road infrastructure

Explore alternatives against congestion, travel time and emissions objectives.

Public transport

Assess demand versus offer to support route, timetable and dispatch decisions.



- 03 **PLAN & SIMULATE**
Run scenarios and what-if analyses for road changes, traffic-light plans, routing policies and transport-service alternatives.
- 04 **OPTIMIZE**
Use decision-support and AI/DRL approaches to improve traffic signals, infrastructure and public-transport offer against measurable objectives.






Traffic Simulation-K8S

Sun 22 Jun 11:52:15

Ext

STOP

PAUSE

HELP

slow

fast

Delay: 30.0 ms

Stats

time: 342.000 s
payload: 6.5 KB
simulate: 11.50 ms
snapshot: 2.38 ms

Vehicle Summary

car(s): 152
tram(s): 2

Quick Find

ID Edge / Lat, Long (float, float) / X,Y (int, int)

SEARCH

CAR

BIKE

TRAIN

TRAM

PERSON

BUS

LIGHT

33 FPS (8-37)

Lights

Effects

SSAO

Scene

Close Controls



Wid

Prepare Simulation

Execute Simulation

KPI Simulation

Simulation:

mamotlo15

Execute

Simulation: 2025/06/22 11:51:56

03

PLAN & SIMULATE

Run scenarios and what-if analyses for road changes, traffic-light plans, routing policies and transport-service alternatives.

04

OPTIMIZE

Use decision-support and AI/DRL approaches to improve traffic signals, infrastructure and public-transport offer against measurable objectives.

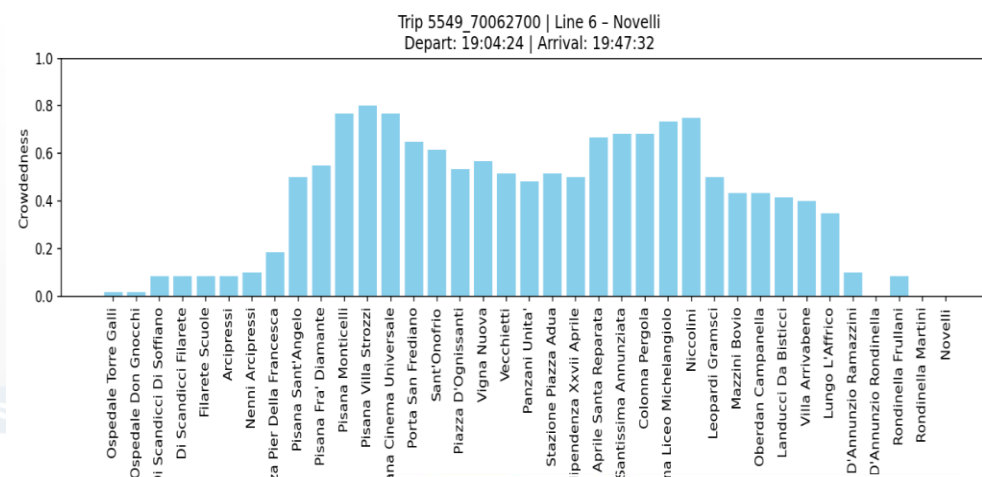
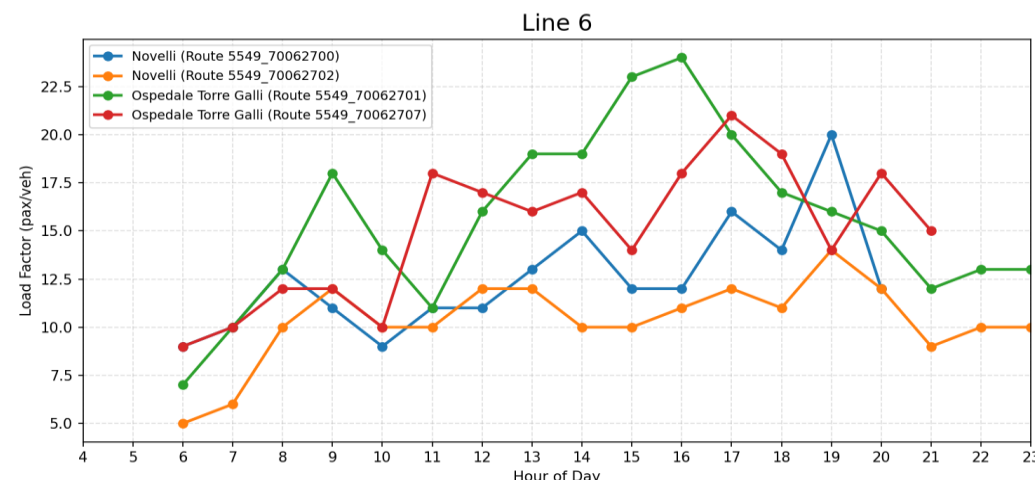
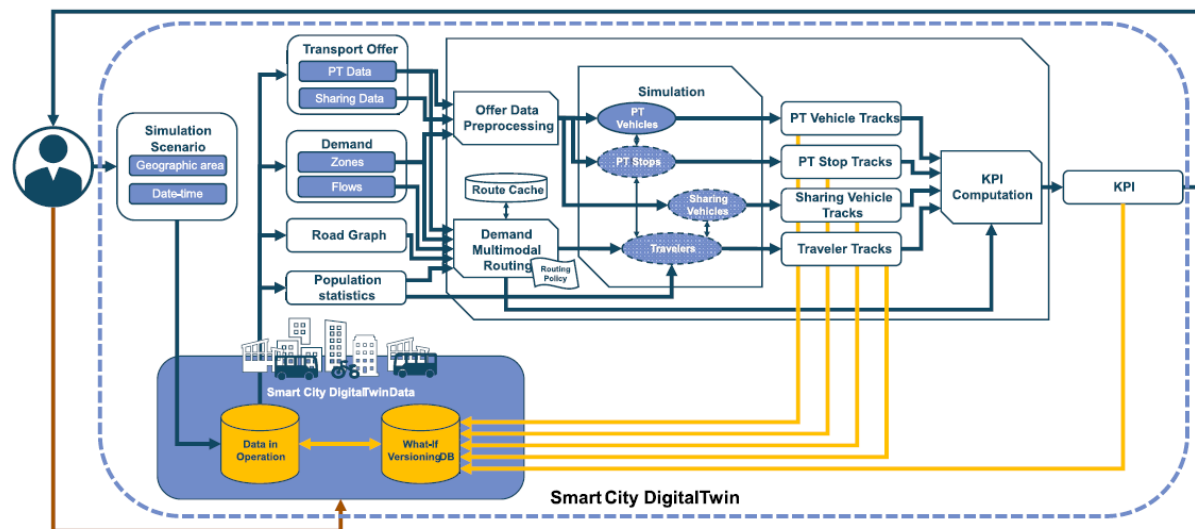


Snap4City, Nov. 2026

17

Demand vs offer matching: simulate multimodal alternatives, KPIs

MODOM evaluates how public transport, sharing services, and micro-mobility satisfy city users' demand. It is built for what-if planning inside a smart city digital twin.



~4 min

city-wide full-day
simulation

GTFS

directly instantiates
public transport offer

KPIs

tracks PT, stops, sharing,
and traveler events

03

PLAN & SIMULATE

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OPTIMIZE

Use decision-support and AI/DRL approaches to improve traffic signals, infrastructure and public-transport offer against measurable objectives.

Traffic Infrastructure Optimization

Traffic Infrastructure Optimization

Mon 14 Oct 19:45:10

- Scenario Editor
- Some Points of Interest
- Traffic Sensors
- Air Quality Sensors
- Weather Sensors (OW)

Load Scenario: Init Acc

Scenarios waiting to be processed: AlessandroScenario30

Scenario version: 2024-09-26 11:52:20

Load Scenario Clean

Road Types:

Select All	Unselect All
☒ abandoned	☒ bus_guideway
☒ corridor	☒ cycleway
☒ emergency_access_point	☒ emergency_bay
☒ motorway	☒ motorway_link
☒ primary	☒ primary_link
☒ residential	☒ rest_area
☒ services	☒ shops
☒ traffic_island	☒ tram
☒ secondary	☒ yes
☐ Select All	☐ Unselect All
☒ bus_guideway	☒ bus_stop
☒ cycleway	☒ disused
☒ highway	☒ island
☒ no	☒ path
☒ private	☒ raceway
☒ road	☒ secondary_link
☒ tertiary	☒ tertiary_link
☒ trunk_link	☒ unclassified
☒ yes	☒ bus_guideway
☐ road	☒ construction
☐ road	☒ elevator
☐ road	☒ living_street
☐ road	☒ platform
☐ road	☒ razed
☐ road	☒ service
☐ road	☒ track
☐ road	☒ via_ferrata
☐ road	☒ ohm.military.Trench

INIT to ACC
Optimize Scenario
Optimization results

Data Update

deviceNameAlessandroScenario30_2024-09-26 09:56:51

v1

Fetch Data

Optimization completed!

Objective	Before	After
Traffic State	5.28	5.1610000000000005
Fuel	0.6710494492002909	0.34912404634400
CO2	17002.113327545154	13283.97922376

Before

After

OPTIMIZE

Use decision-support and AI/DRL approaches to improve traffic signals, infrastructure and public-transport offer against measurable objectives.

04

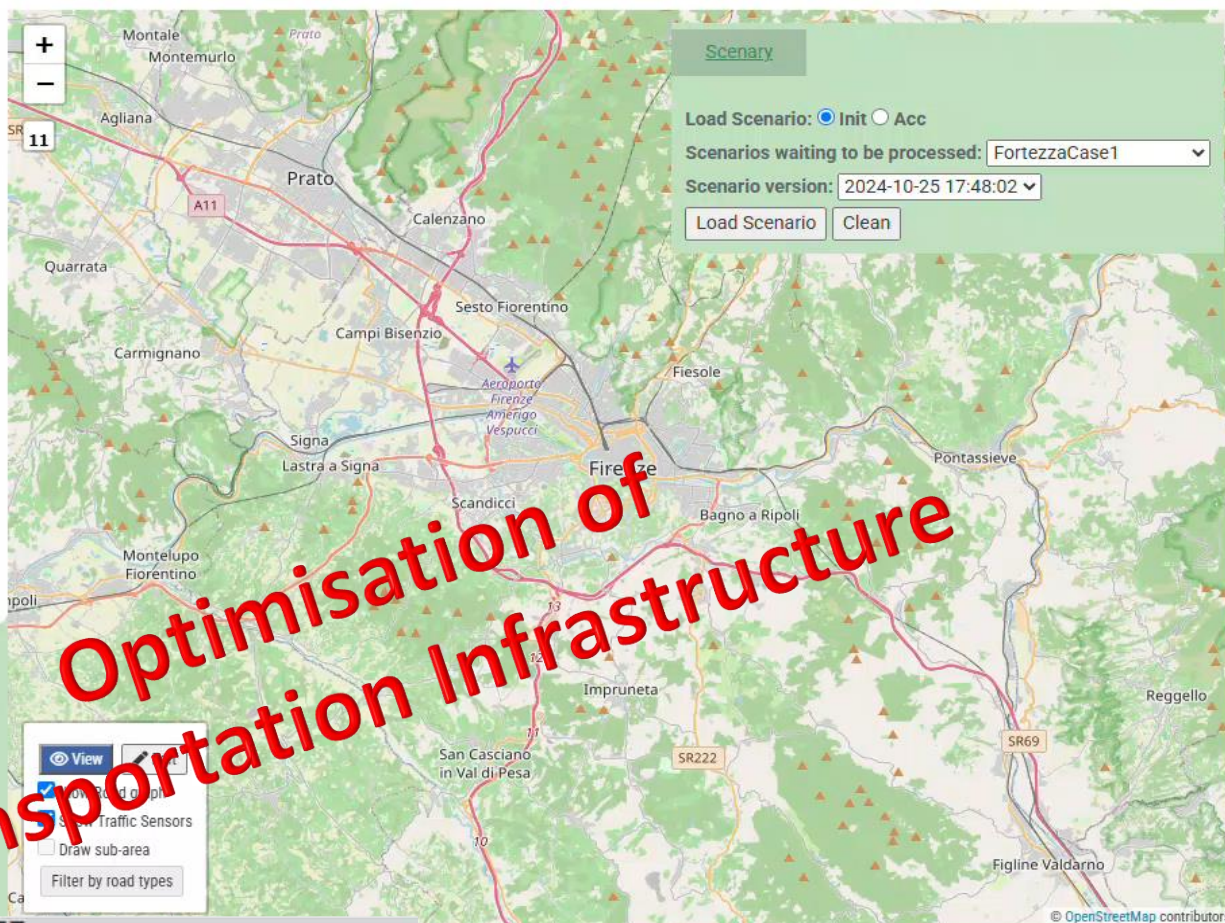


Traffic Infrastructure Optimization

Tue 8 Sep 14:10:57



- Scenario Editor
- Some Points of Interest
- Traffic Sensors
- Air Quality Sensors
- Weather Sensors (OW)



TABS

INIT to ACC

Optimize Scenario

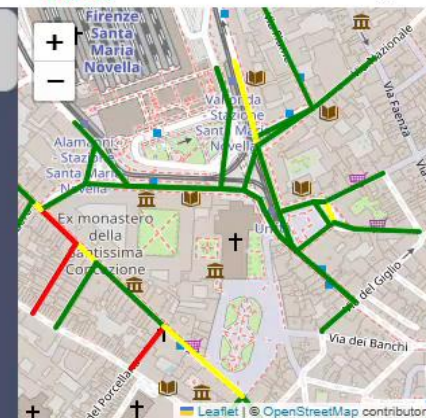
Optimization results

Data Update

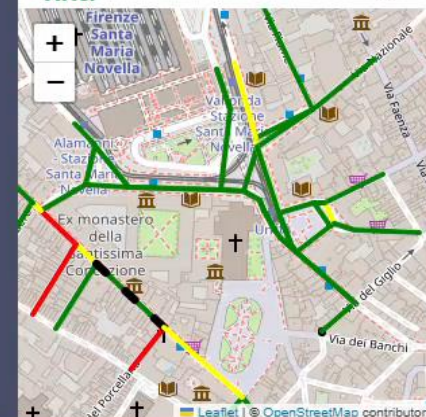
FortezzaCase1

Execution

Before



After

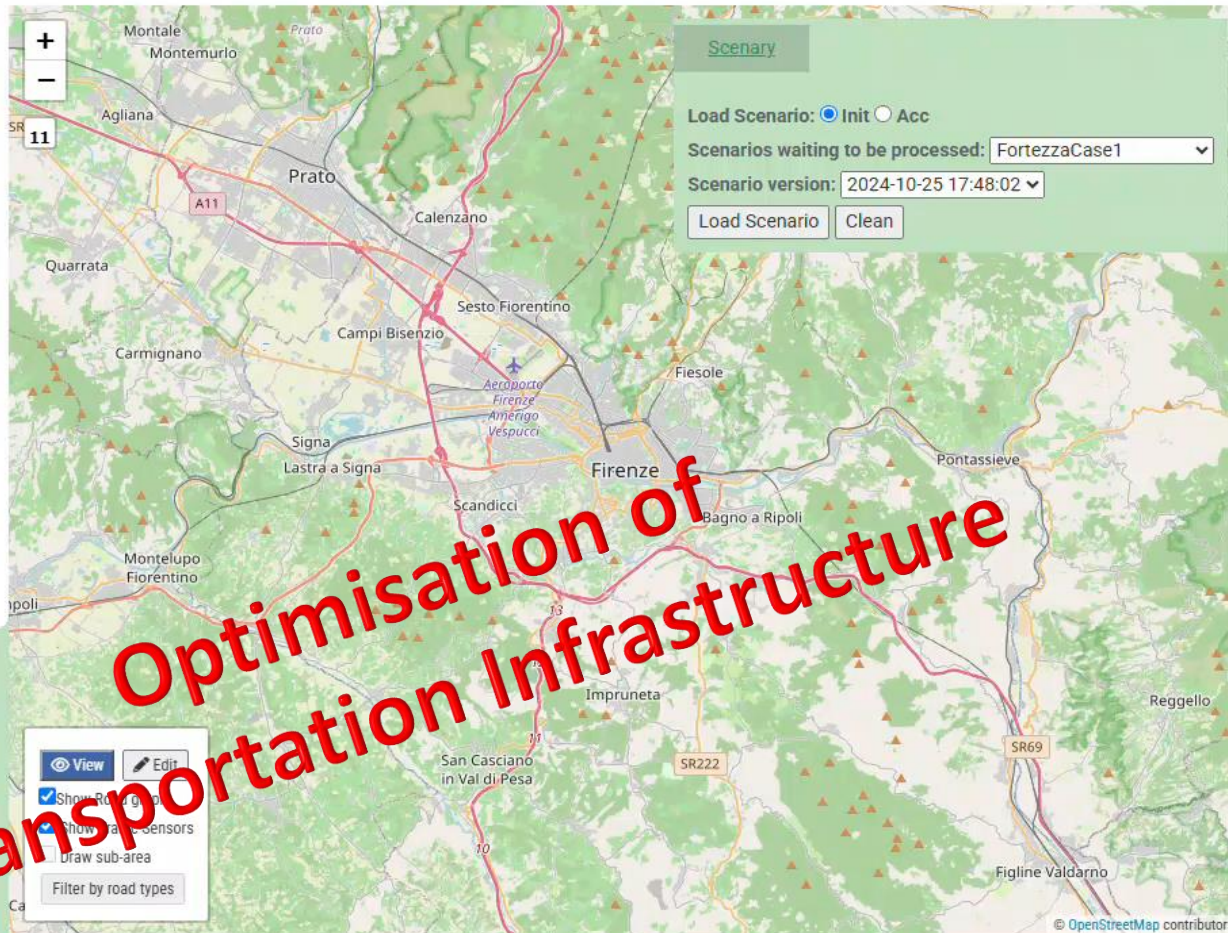


04

OPTIMIZE

Use decision-support and AI/DRL approaches to improve traffic signals, infrastructure and public-transport offer against measurable objectives.

- Scenario Editor
- Some Points of Interest
- Traffic Sensors
- Air Quality Sensors
- Weather Sensors (OW)



TABS

INIT to ACC

Optimize
Scenario

Optimization
results

Data Update

FortezzaCase1 2024-10-25 17:53:25 (acc)

Objective Function:

- ☒ Traffic State
- ☐ CO2
- ☐ Fuel

Max changes to be performed:

- ☒ 4
- ☐ 8
- ☐ 16

[Launch Optimization](#)

[Launch Optimization via GNN](#)

Before



After



OPTIMIZE

Use decision-support and AI/DRL approaches to improve traffic signals, infrastructure and public-transport offer against measurable objectives.

Routing, fleets and shared mobility

Dynamic routing

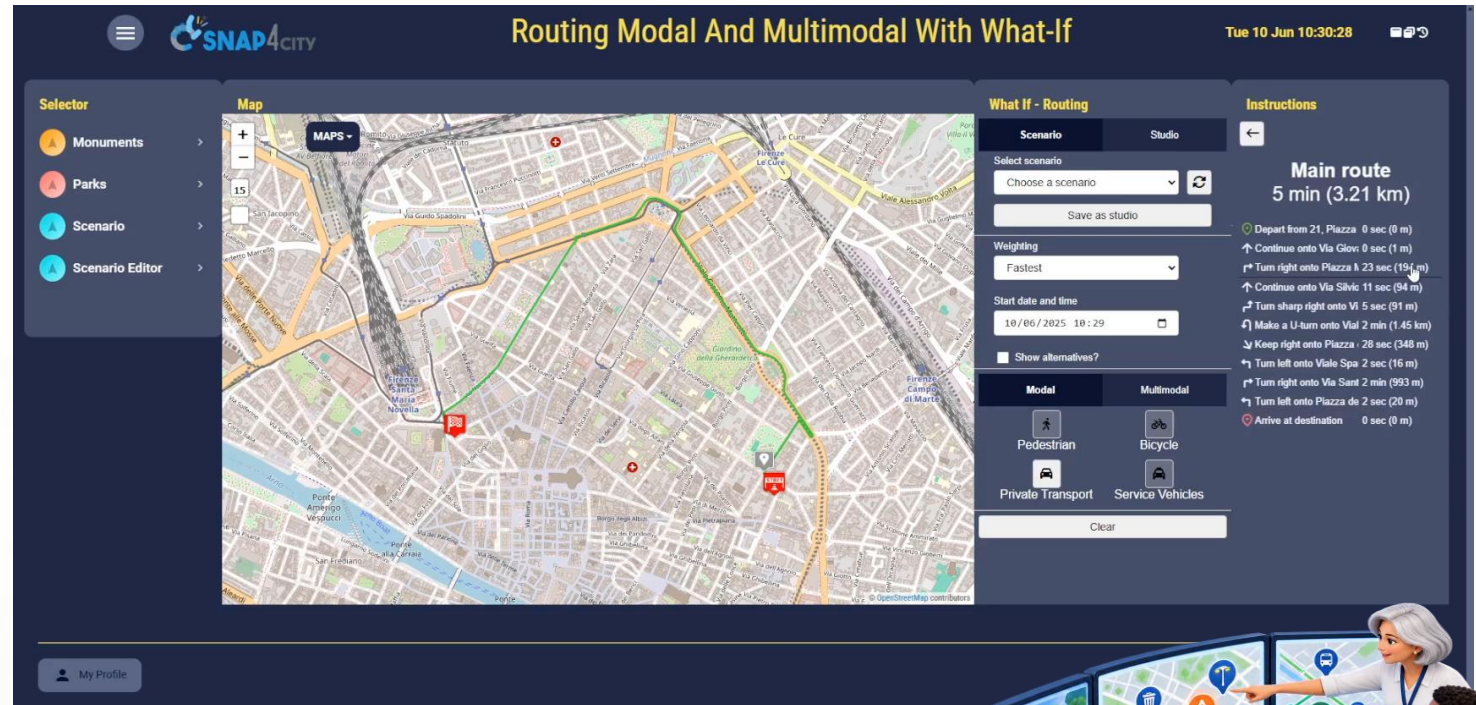
Consider current traffic, closures, restrictions and service-specific constraints.

More ways to travel

Support driving, walking, cycling and public transport within multimodal journeys.

eShare

Manage sharing, pooling and fleet operations, including electric mobility.



- 03 PLAN & SIMULATE**
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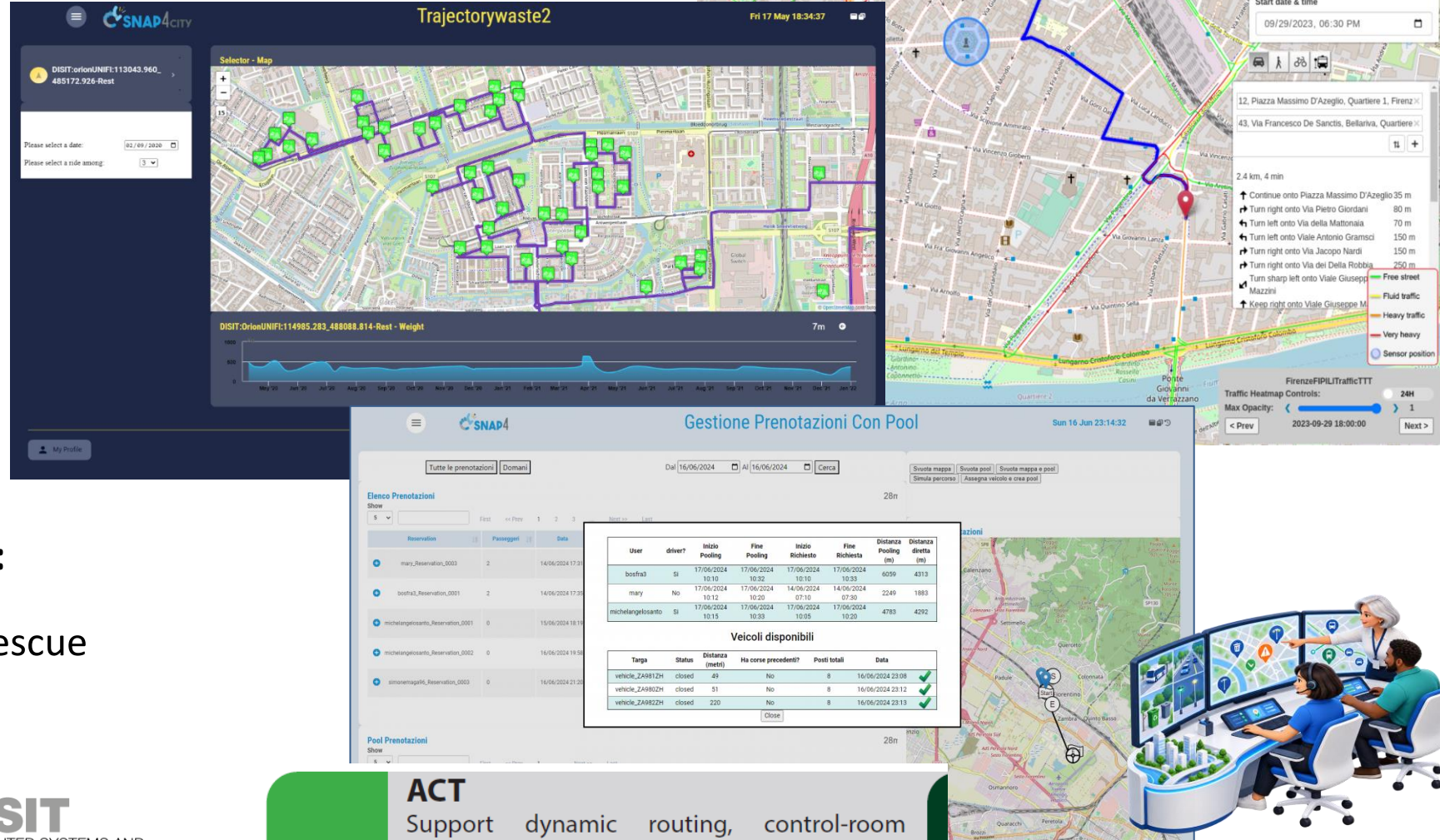
Routing Optimization

Goals on planning:

- Reduction of costs on plan
- **waste collection** optimization, Reduction of Km
- **car pooling trajectories** optimization for maximize the pool usage
- **delivering optimization**, reduction of travel time, reduction of Km
- etc.

Dynamic Routing on operation:

- React in operation to define immediate routing solutions: rescue teams, ambulance, etc.
- Recovery from failure



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DISTRIBUTED SYSTEMS AND
INTERNET TECHNOLOGIES LAB
DISTRIBUTED DATA INTELLIGENCE
AND TECHNOLOGIES LAB

05

ACT

Support dynamic routing, control-room interventions, digital signage, permissions, fleet operations and authorised workflows through APIs.





SnapAdvisor Copilot

An operator can start with a question

**“What is causing congestion here,
and which bus lines could be affected
in the next 30 minutes?”**

The Copilot selects configured tools, analyses their results and explains findings through text, maps, charts or dashboard content.

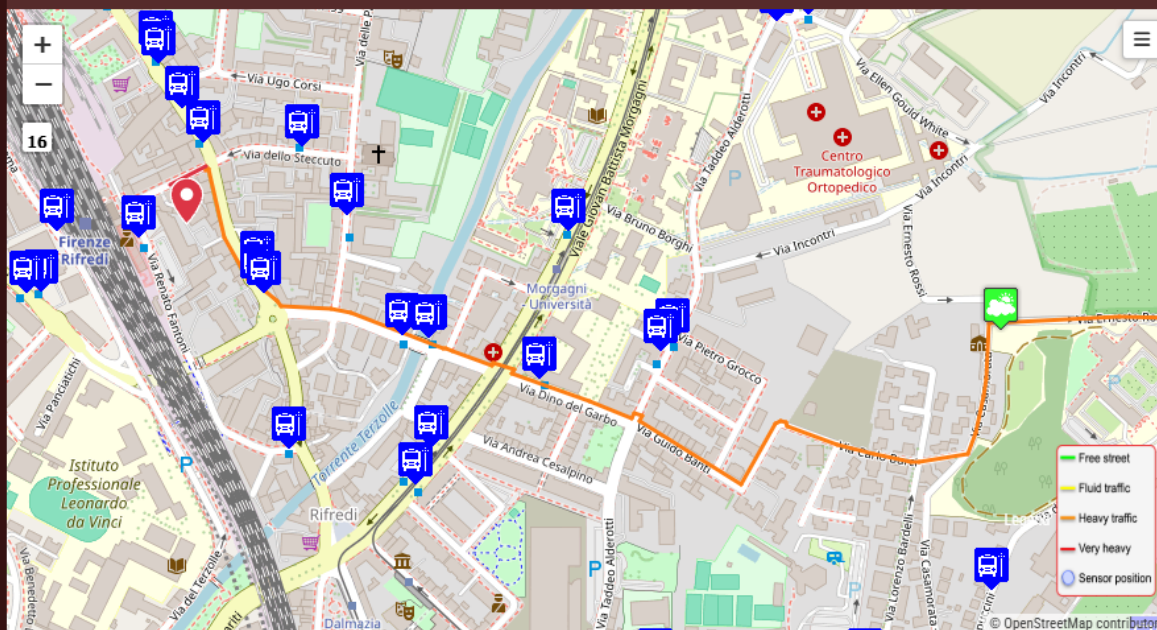
Available workflows depend on the tools and services configured for the deployment.



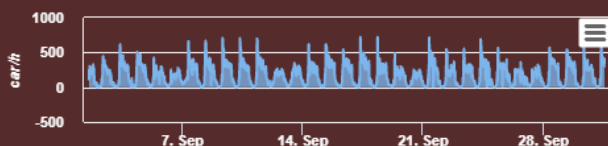


SnapAdvisor And CoPilot

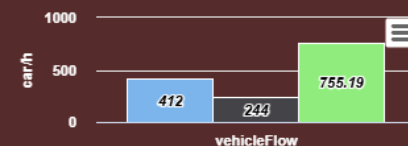
Thu 1 Oct 14:02:33



Time Trend



Bar Series



ASSIST

Use SnapAdvisor Copilot as a natural-language interface to data, analytics, routing, simulation, optimisation, RAG knowledge and visualisation.

06

ACT

Support dynamic routing, control-room interventions, digital signage, permissions, fleet operations and authorised workflows through APIs.

05

Chat

New Chat

verification

Test

Prod

Clear Map

Clear Bars

Clear Time-Trend



PDF chat

verification

Recommendations

- Conduct thorough market research to understand the demand for pizzerias in the area.
- Analyze the competitive landscape by gathering data on existing pizzerias and their popularity.
- Evaluate the financial viability by detailed financial data and projections.
- Assess the location's suitability by gathering data on foot traffic, nearby businesses, and accessibility.

By addressing these uncertainties, a more informed decision can be made regarding the advisability of opening a pizzeria in Via dello Steccuto, Florence.

Is it advisable to open a pizzeria in via dello steccuto, florence?

P 0%

N 100%

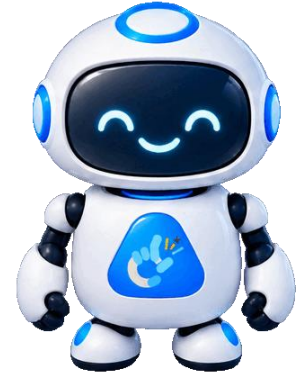
Neg 0%

Location

Peso 20%

please produce a decision support graph to open a pizzeria in via dello steccuto, florence





State the objective

Investigate a corridor, disruption or service issue.

Collect and analyse evidence

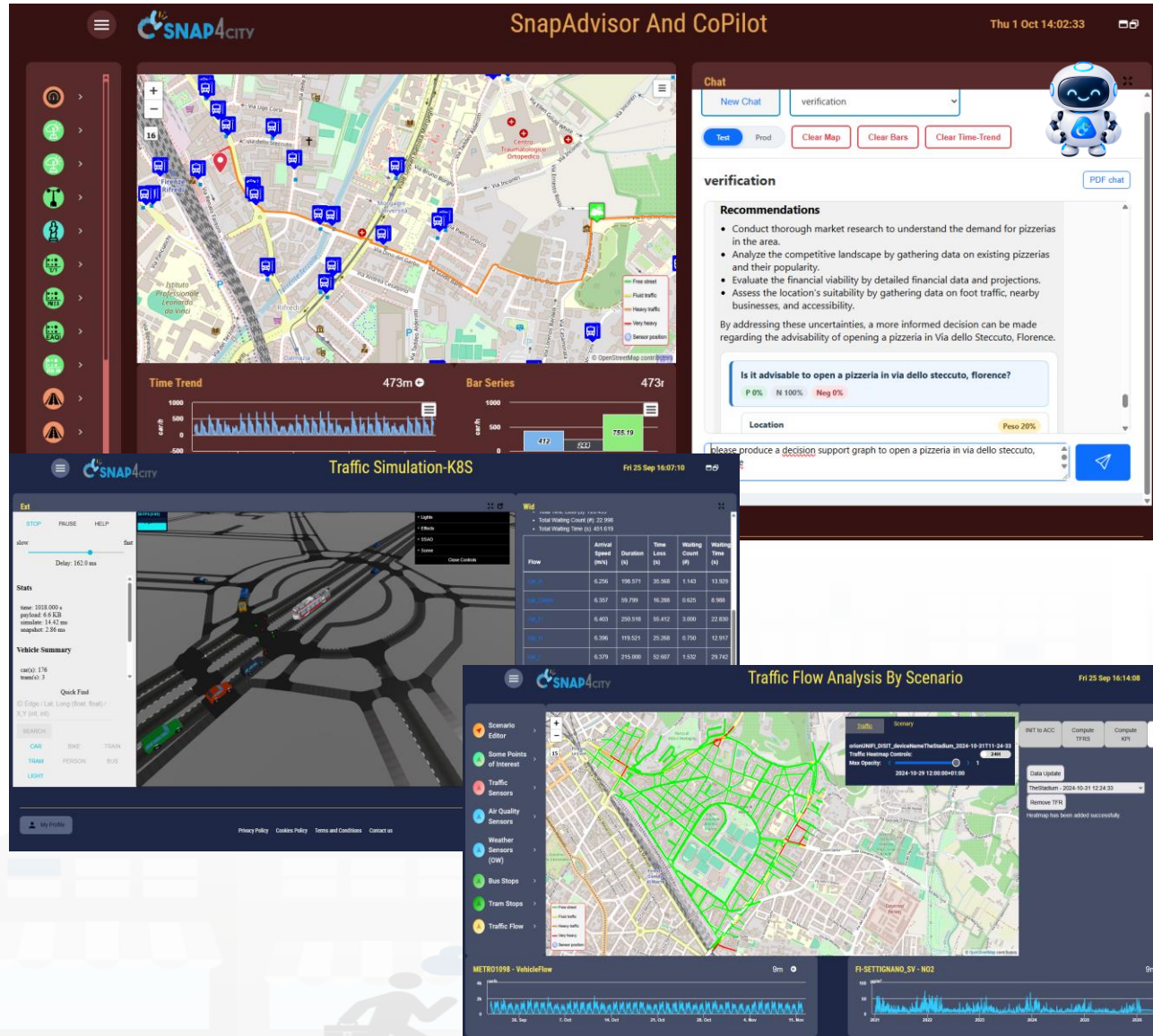
Retrieve data and invoke configured prediction or simulation tools.

Compare the options

Explain assumptions and assess relevant mobility KPIs.

Support the operator's decision

Return maps, charts and proposed actions for authorized workflows.



Built to connect with existing systems

Open integration

APIs connect GIS, IoT, ERP, billing, municipal CRM and legacy services.

City-scale configuration

Multiple cities, tenants and vertical applications on a shared platform.

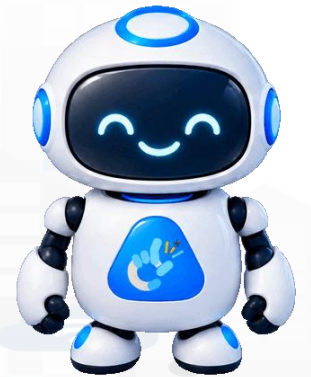
Flexible deployment

Cloud, SaaS or on premise, with field gateways and third-party data sources.

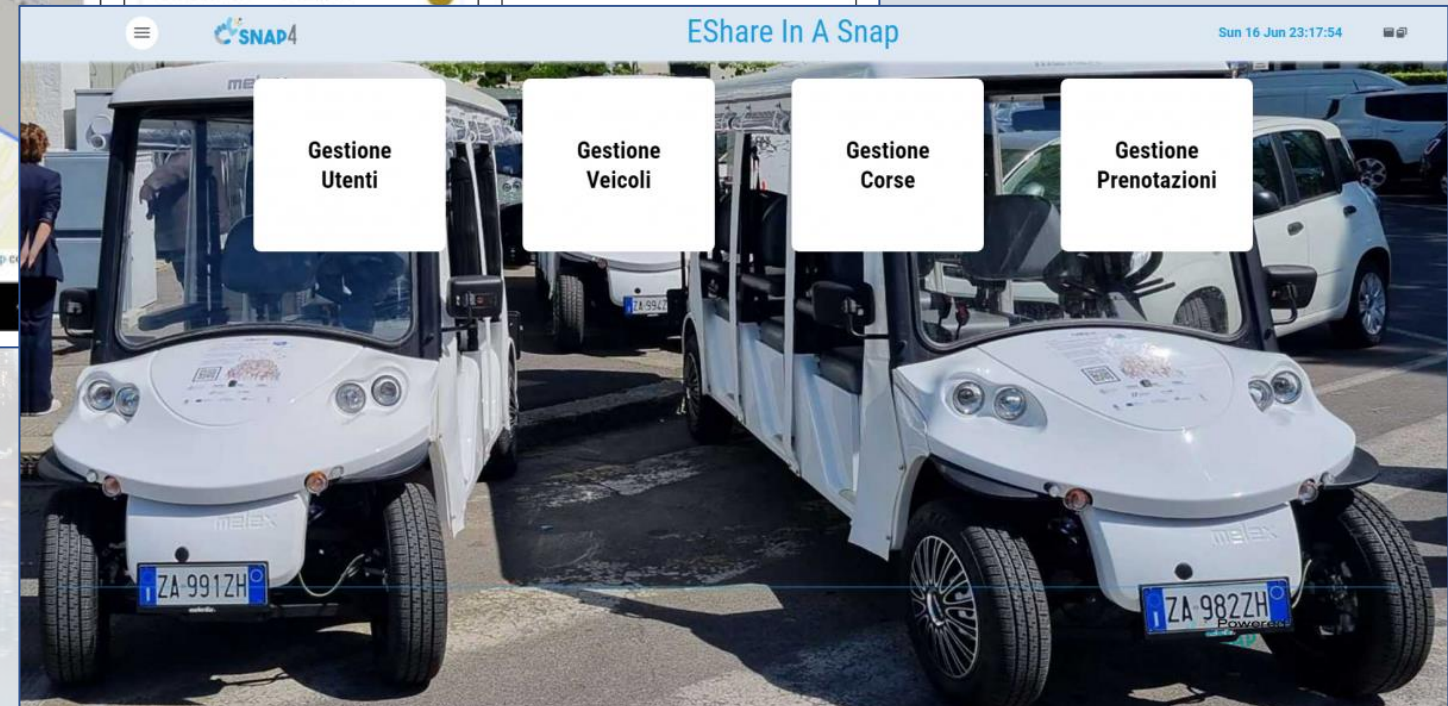
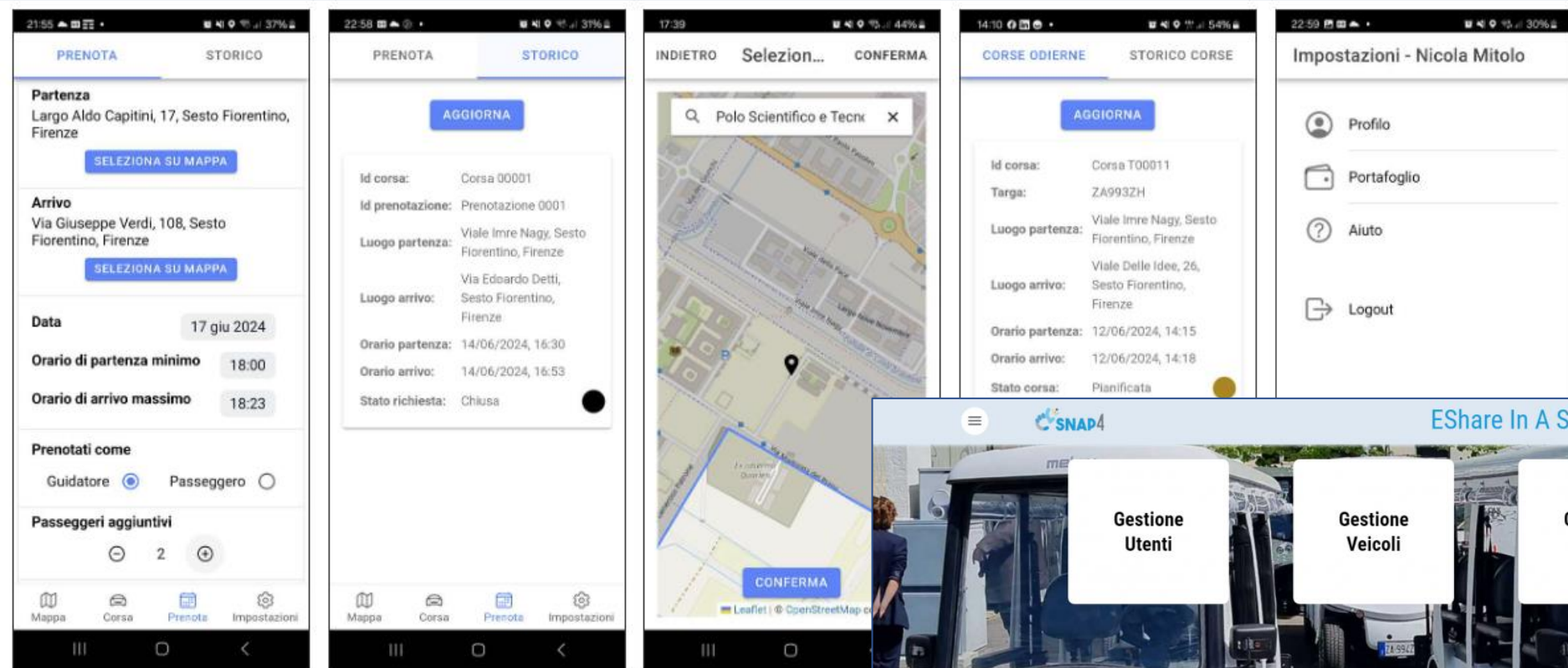
Controlled access

Role-based access, OAuth and directory integration, with cybersecurity controls.

Example standards: DATEX II, GTFS, OSM, MQTT, NGSI and REST APIs

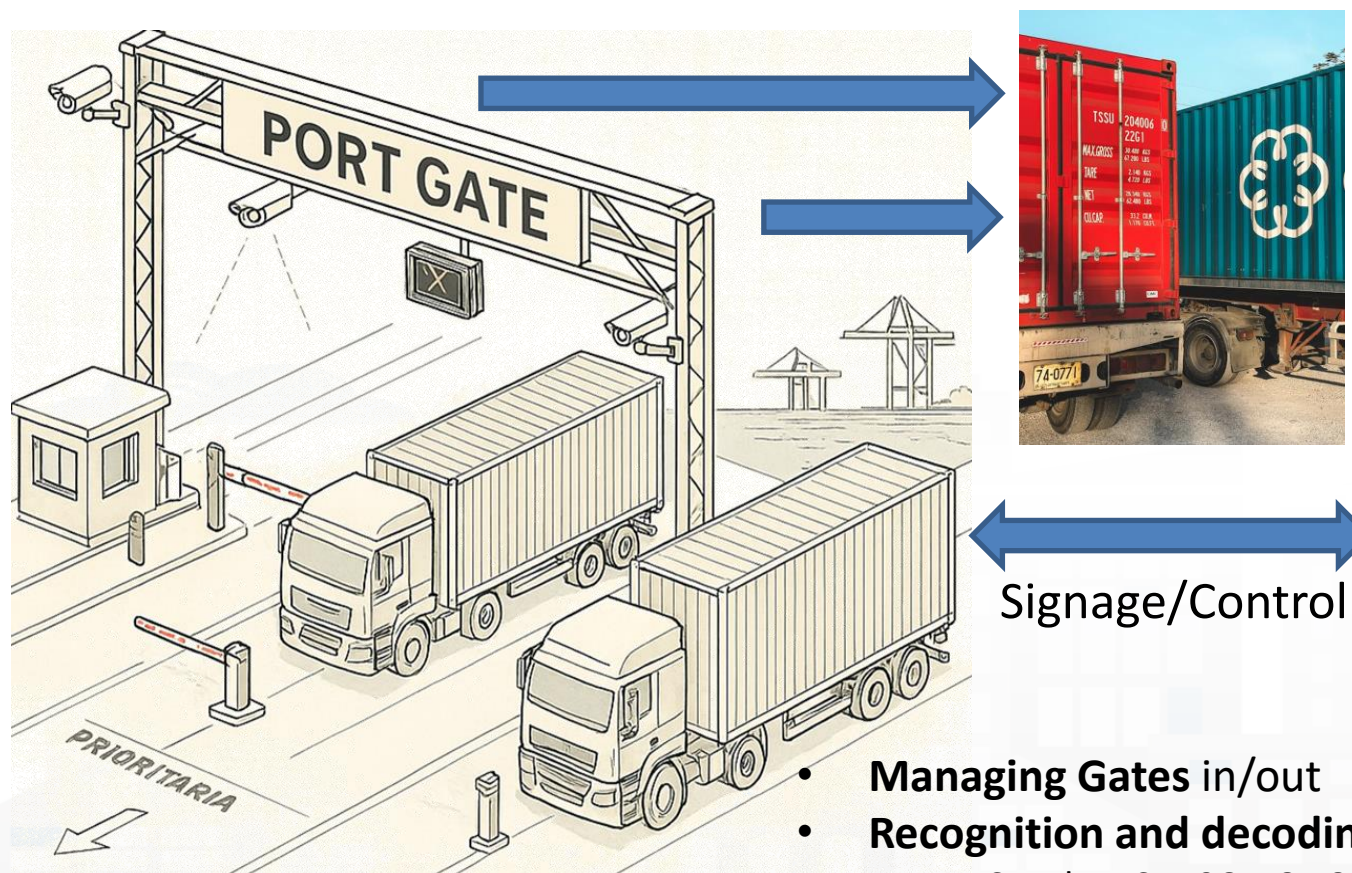


eShare in a Snap, by Snap4



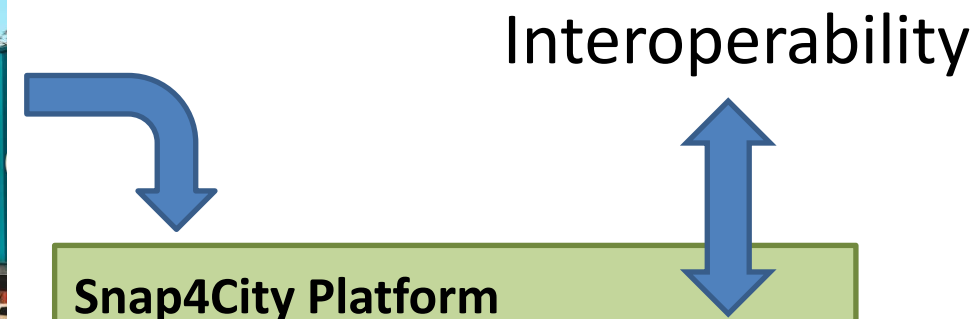
Integrated car sharing and pooling
Multiple drivers on the same means
Dynamic pooling and e-sharing

Trucks' Plates and Container IDs Recognition



- **Managing Gates in/out**
- **Recognition and decoding**

- BIC code: FCIU 964484 8
- ISO code: 45G1
- Seal status: on/off
- Multi-national Plates: EX 398AE



Value for buyers and delivery partners

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Combine information across departments and connect it to daily decisions.

Developers



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Use visual flows and APIs while keeping the flexibility of custom code.

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