

**Interreg**  
Euro-MED



Co-funded by  
the European Union



# TOURISMO

TOURism Innovative and Sustainable Management  
of flows

## Open Day on Valencia Pilot

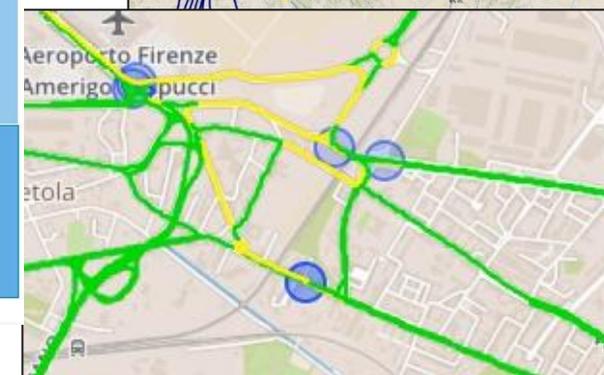
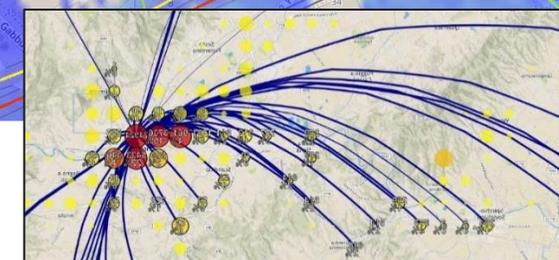
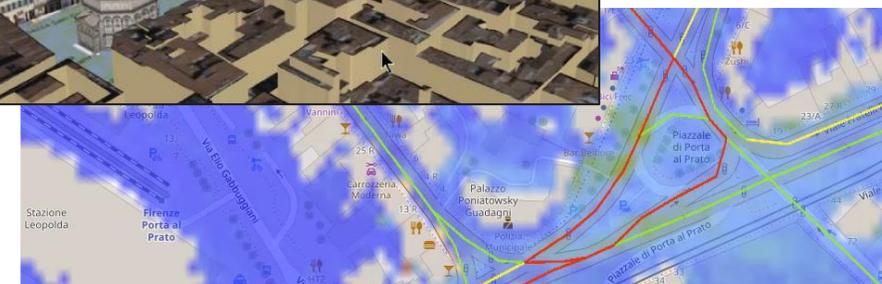
Paolo Nesi, DISIT Lab/Snap4City  
*Università degli Studi di Firenze*  
[info@snap4city.org](mailto:info@snap4city.org)





# Main Tasks di un sistema cittadino

- **Controlling Status:** management, and operational
  - Monitoring via KPI
  - Computing predictions data from the field and KPI
  - Anomaly detection
  - Early warning on critical conditions
- **Making plan: tactic and strategic,** medium and long range
  - Optimisation: Prescriptions, suggestions
  - Risk assessment
  - What-if analysis on scenarios
    - Simulation and predictions
  - Resilience
- **Be ready for Unexpected Unknowns**





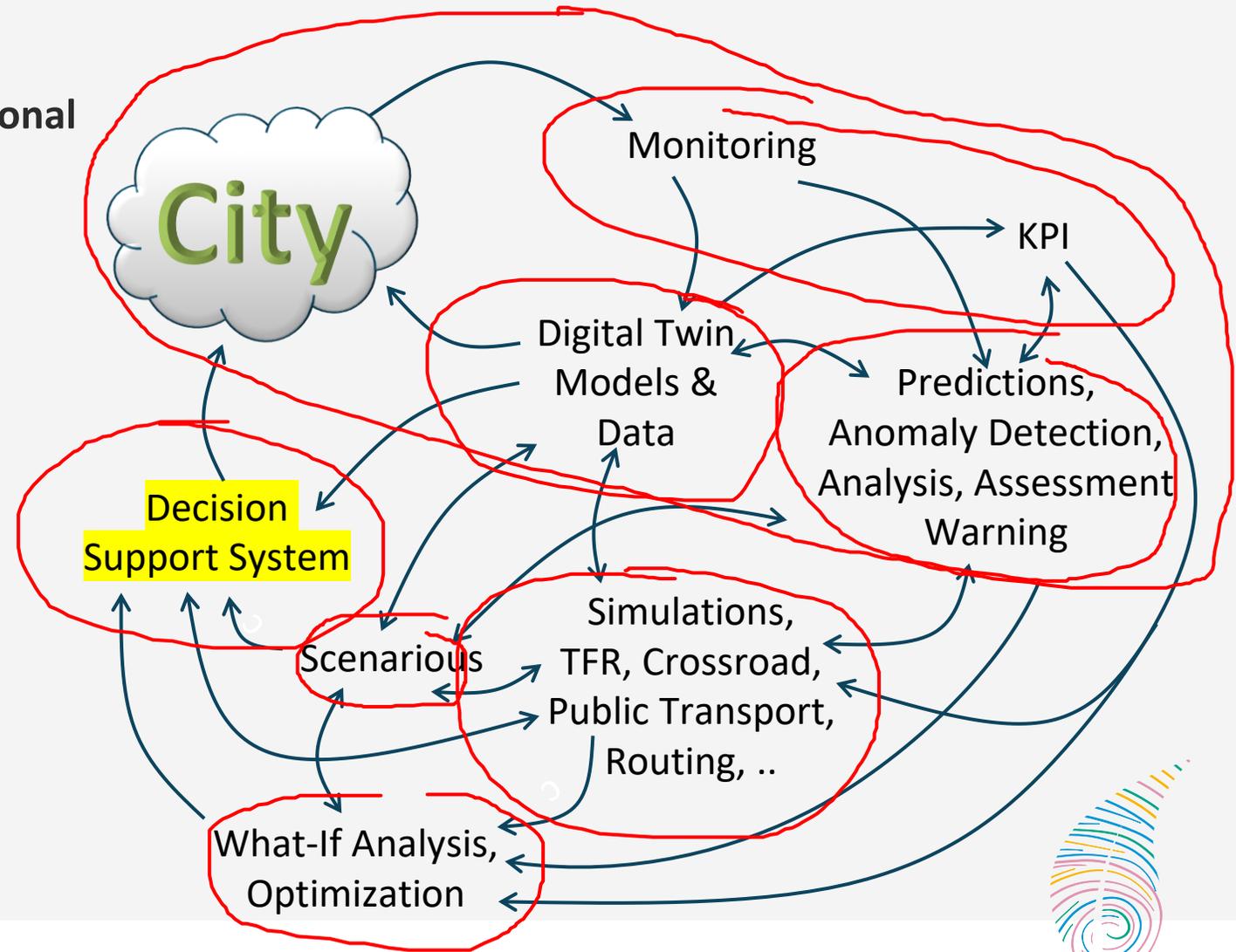
# Main tasks di un sistema cittadino

- **Controlling Status:** management, and operational

- Monitoring via KPI
- Predictions vs KPI
- Anomaly detection
- Neuro-Symbolic analysis
- Risk assessment
- Early warning on critical conditions
- Fast What-if analysis

- **Making plan:** tactic and strategic, medium and long range, micro/macro

- Simulation & optimization
- Generative AI Prescriptions, scenarios
- Resilience to Unexpected unknowns
- What-if analysis wrt scenarios
- Collaboration with stakeholders





# Digital Twin

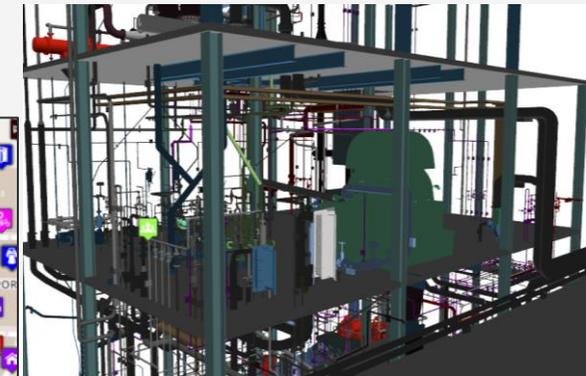
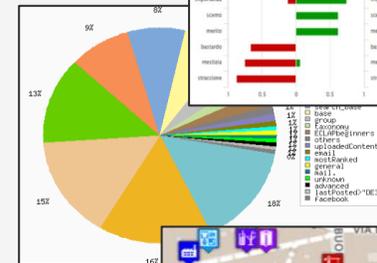
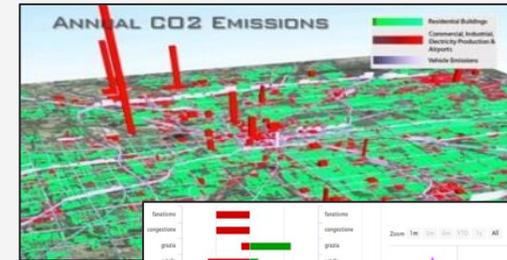
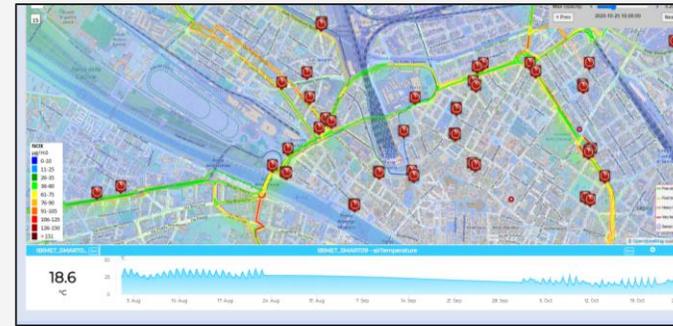
## • Digital Twin

- **Connected** with real systems
- **Modelling** aspects: structural, visual, informative, real time data sensors (context), POI, functional, resources, etc.
- **Analytics:** AI/XAI techniques, simulations, users' needs, etc.

## • Easier to understand the context, review from multiple points of view

## • Useful to perform

- Discussion with city users
- Support decision makers
- By Case Experiments for analysing
  - New solutions, impact of disaster (natural and provoked)
  - Reduction of costs in the analysis, in reduction of mistakes





# Digital Twin Solutions for Sustainability

OPERATION AND PLAN - CONTROL ROOMS - DECISION SUPPORT SYSTEMS - WHAT-IF ANALYSIS - OPTIMIZATION - APPLICATIONS

**HORIZONTAL AI PLATFORM**

**MOBILITY AND TRANSPORT**

**SMART ENERGY AND SMART BUILDING**

**ENVIRONMENT AND WASTE MANAGEMENT**

**CITY USER'S SERVICES AND TOURISM MANAGEMENT**

- DEVELOPMENT ENVIRONMENT AND METHODOLOGY
- VISUAL PROGRAMMING, ML, AI, HPC
- TRAINING COURSES
- LIVING LABS
- GUI CUSTOM STYLES
- FULL APPLICATIONS, DASHBOARDS AND VIEWS
- MOBILE APPS



**VISUAL ANALYTICS - SYNOPTICS - GRAPHICAL WIDGETS - ANALYTICS - BUSINESS INTELLIGENCE - SIMULATIONS**

**DASHBOARDS, WIDGETS TEMPLATES**

**PREDICTION - ANOMALY DETECTION - CLUSTERING - ROUTING - SENTIMENT NLP - TRAFFIC FLOW - PEOPLE FLOWS - SDG**  
**15 MIN CITY INDEX - KPI - HEATMAPS - ORIGIN DESTINATION - ETC...**

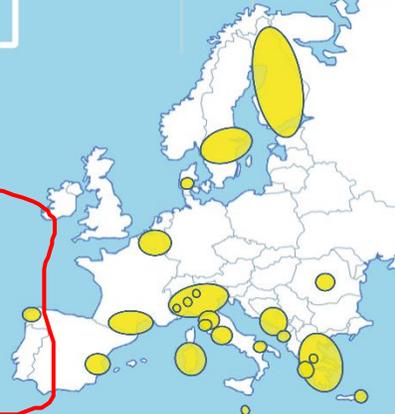
**API - MICROSERVICES - GIS - BPM**  
**VIDEO - REPORTS - MAPS - 3D ...**

**EXPERT SYSTEM, KNOWLEDGE BASE SEMANTIC REASONING**  
**SMART DATA MODEL**  
**IOT DEVICE MODELS, STORAGE**

**BIG DATA ANALYTICS, ARTIFICIAL INTELLIGENCE**  
**EXPLAINABLE AI, MACHINE LEARNING, GENERATIVE AI**  
**OPERATIVE RESEARCH, STATISTICS**

**VISUAL PROGRAMMING, ADAPTERS**  
**DATA FLOWS, WORKFLOWS**  
**PARALLEL DISTRIBUTED PROCESSING**  
**DATA DRIVEN**

FULL INTEROPERABILITY, ANY: DATA, BROKERS, NETWORKS AND VERTICALS



Powered by **FIWARE**

FREE TRIAL

PEN Test Passed

EU GDPR COMPLIANT

SNAP4 Appliances and Dockers Installations

EUROPEAN OPEN SCIENCE CLOUD

Node-RED

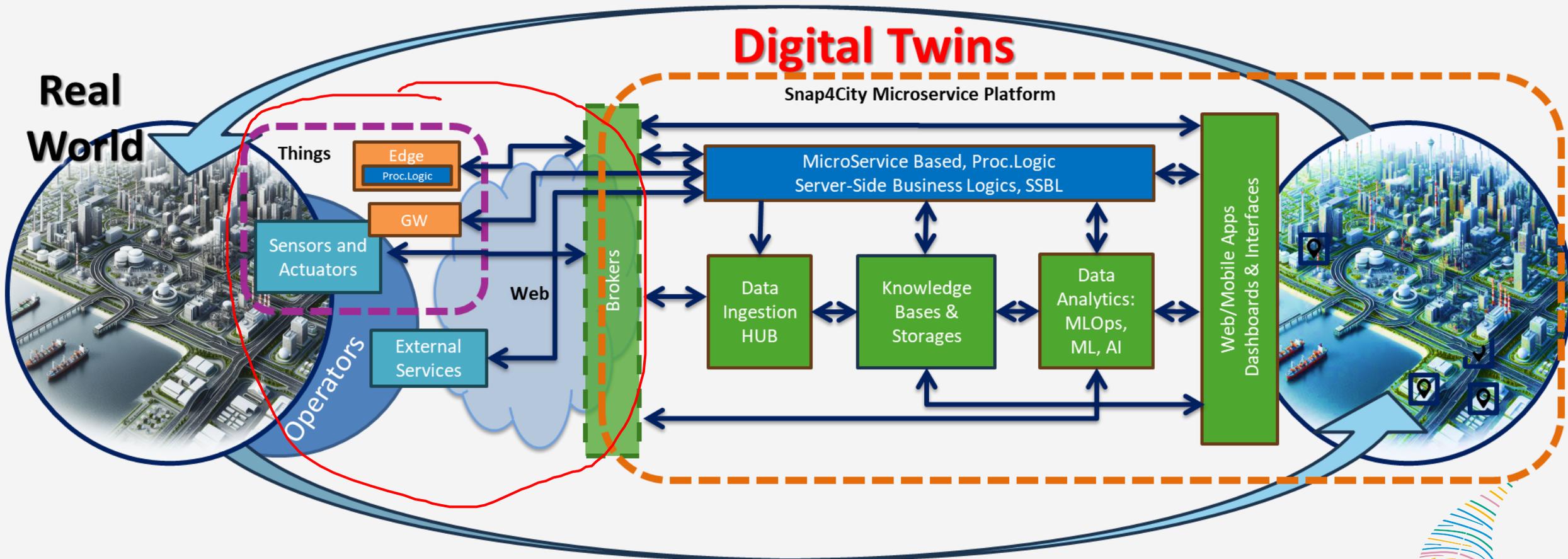
JS Foundation

E015 digital ecosystem

NVIDIA



# Digital Twin Development Platform





# Snap4City



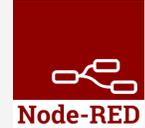
<https://www.Snap4City.org>



**PEN Test  
Passed**



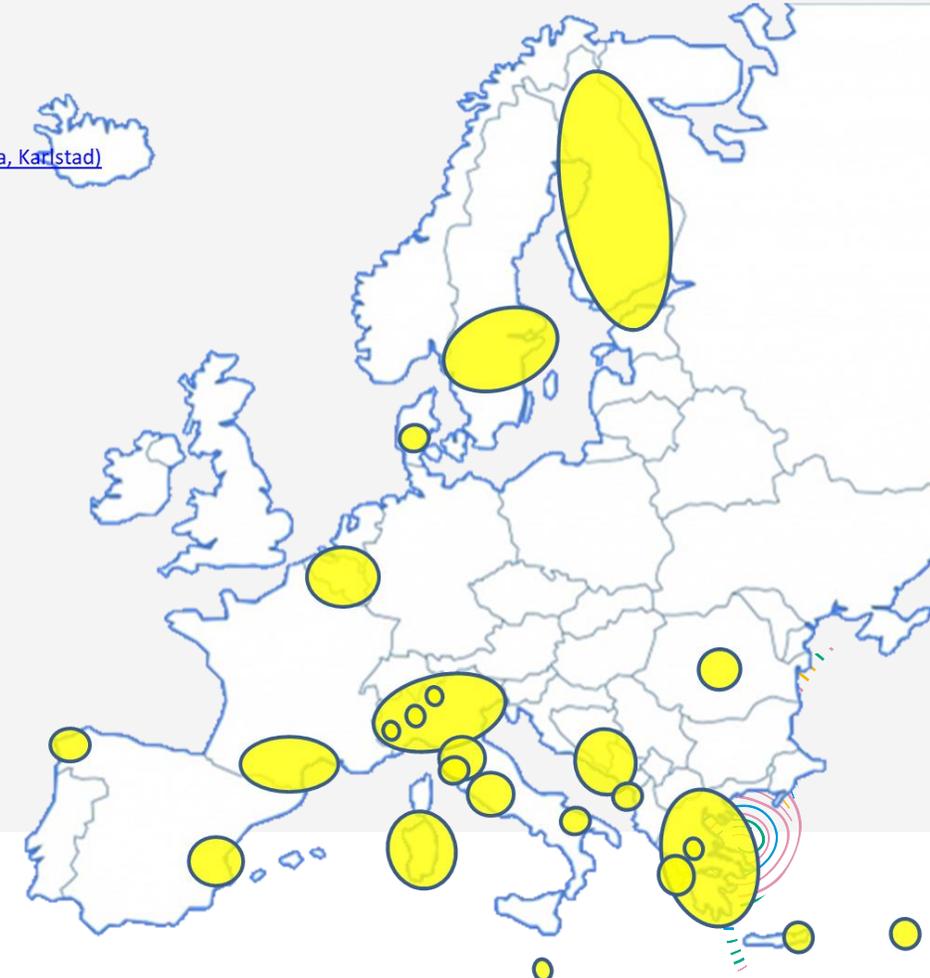
**EU GDPR  
COMPLIANT**



- 11 running installations in Europe
  - Snap4.city.org, Greece, Merano, Cuneo, ...
  - Toscana, Pisa, Sweden, ISPRA, Snap4.eu,
  - Altair, Italmatic, Romania, ....
- 18 projects, 12 pilots on 10 Countries
  - >40 cities/area
- **Widest MULTI-tenant deploy has**
  - 26 Organizations / tenant
  - > 9200 users
  - > 1800 Dashboards and applications
  - > 17 mobile Apps
  - **> 2.4 Million of structured data per day**
  - > 600 IoT Applications/node-RED
  - > 750 web pages with training
  - > 75 videos, training videos

#### Main Organizations/areas

- [Antwerp area \(Be\)](#)
- [Bari \(I\)](#)
- [Bisevo, Croatia](#)
- [Bologna \(I\)](#)
- [Brasov \(Ro\)](#), by ICEBERG
- [Capelon \(Sweden: Västerås, Eskilstuna, Karlstad\)](#)
- [Cuneo \(I\)](#)
- [DISIT demo \(multiple\)](#)
- [Dubrovnik, Croatia](#)
- [Firenze area \(I\)](#)
- [Garda Lake area \(I\)](#)
- [Greece \(Gr\)](#)
- [Helsinki area \(Fin\)](#)
- [Limassol \(Cy\)](#)
- [Livorno area \(I\)](#)
- [Lonato del Garda \(I\)](#)
- [Malta \(Malta\)](#)
- [Merano \(I\)](#)
- [Modena \(I\)](#)
- [Mostar, Bosnia-Herzegovina](#)
- [Oslo & Padova \(Impetus\)](#)
- [Pisa area \(I\)](#)
- [Pistoia \(I\)](#)
- [Pont du Gard, Occitanie \(Fr\)](#)
- [Prato \(I\)](#)
- [Rhodes \(Gr\)](#)
- [Roma \(I\)](#)
- [Santiago de Compostela \(S\)](#)
- [Sardegna Region \(I\)](#)
- [Siena \(I\)](#)
- [SmartBed \(multiple\)](#)
- [Toscana Region \(I\), SM](#)
- [Valencia \(S\)](#)
- [Venezia area \(I\)](#)
- [WestGreece area \(Gr\)](#)



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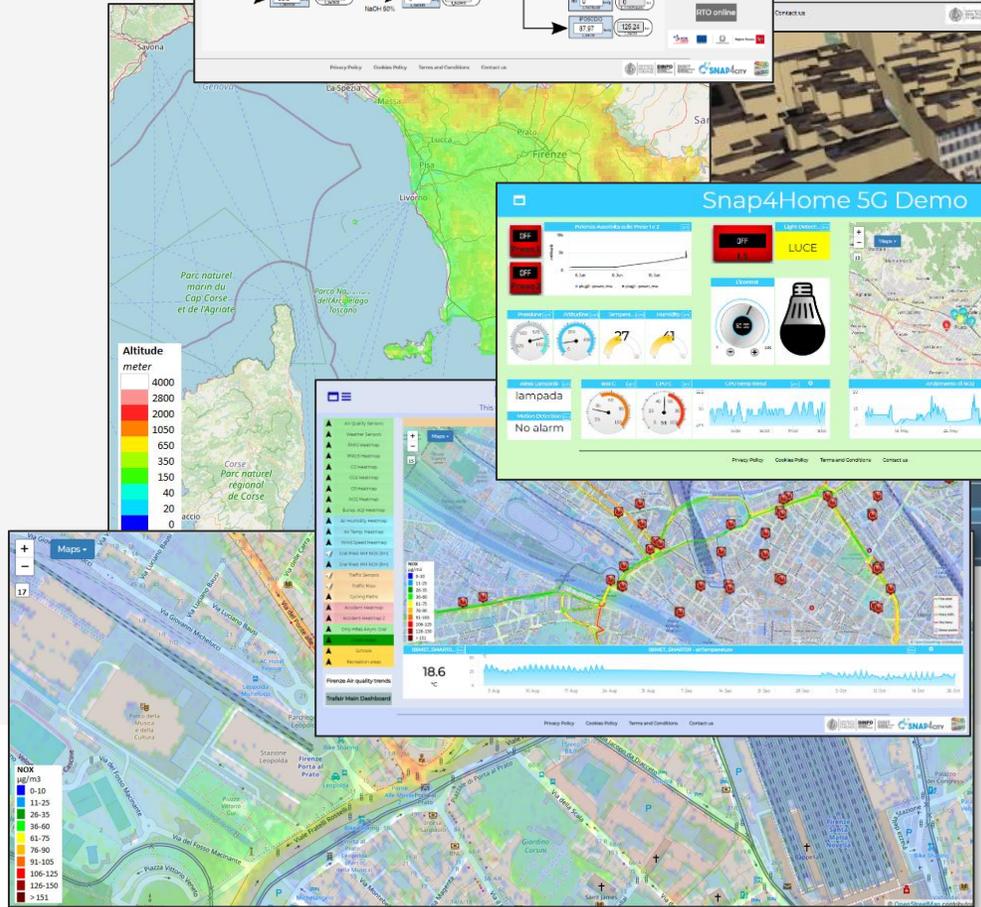
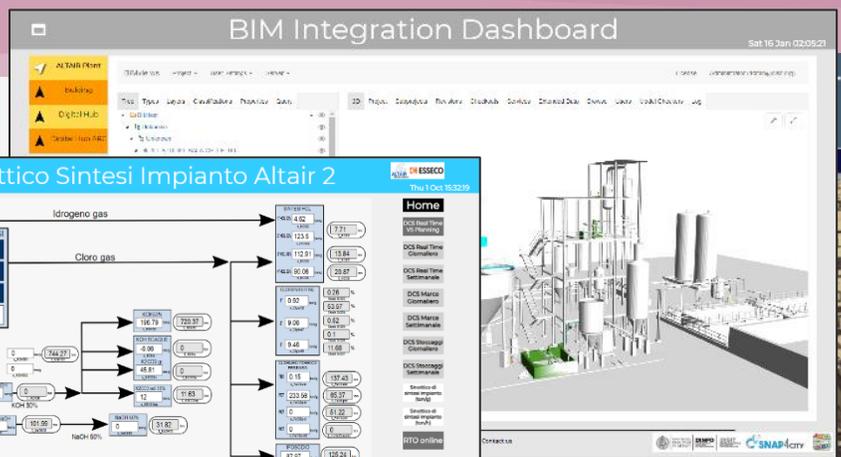


# High Level Types



Digital Twin Global - Fire demonstrator

- POI, IOT Devices, shapes, ...
  - FIWARE Smart Data Models,
  - IoT Device Models
- GIS, maps, orthomaps, WFS/WMS, GeoTiff, calibrated heatmaps, Satellite data, any kind
- traffic flow, typical trends, ..
- trajectories, events, Workflow, ..
- 3D Models, BIM, Digital Twins, ..
- OD Matrices of several kinds, ..
- Dynamic icons/pins, ..
- Synoptics, animations, ..
- KPI, personal KPI, ..
- social media data, TV Stream,
- routing, multimodal, constraints, ..
- decision scenarios, ....



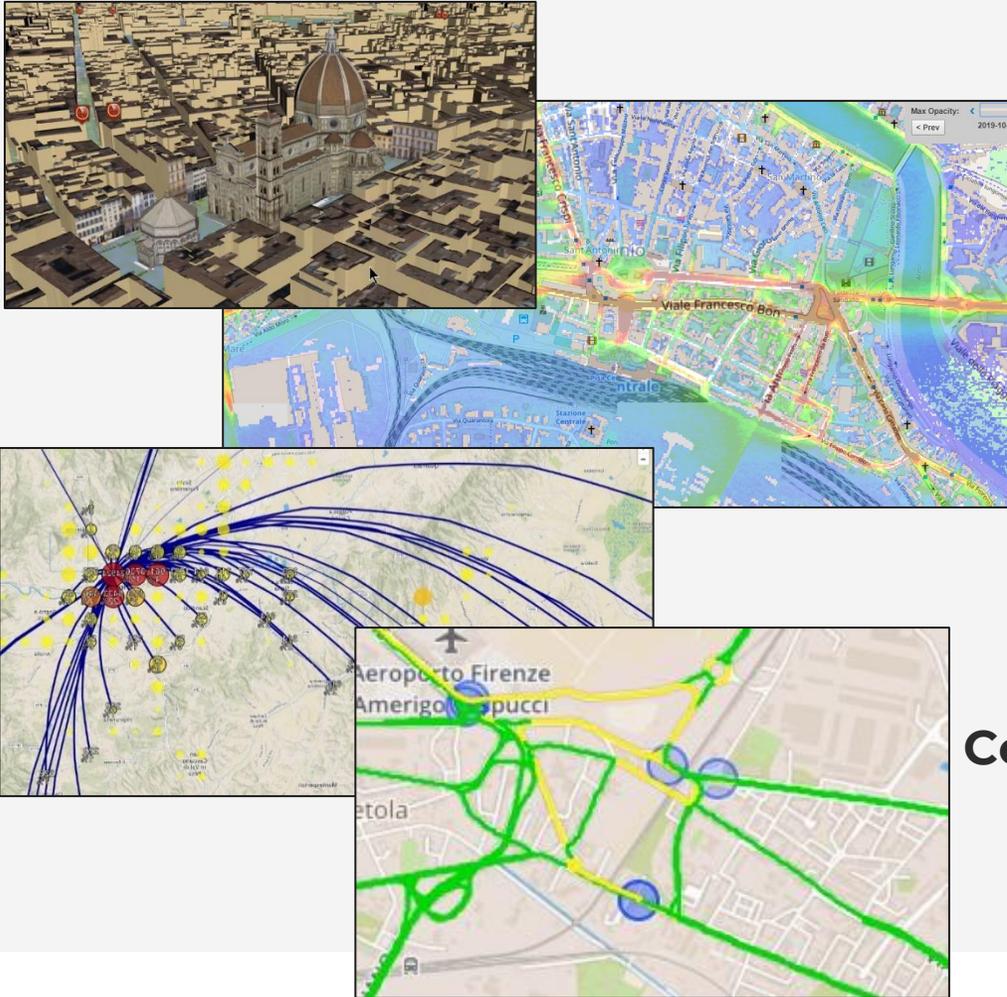


## City Digital Model with...

- Intuitive platform
- Any Data TYPE, any data source, any protocol
- Data storage seamless
- Data analytics → artificial intelligence, AI/XAI
- Data Ethics, AI Ethics, GDPR
- Interactive Data Representation, any kind
- Key Performance Indicators, any kind
- What-IF analysis – Simulation, prediction, 2D/3D
- Micro, Meso e macro scales
- Operation, planning tactic and strategic / optimization
- Collaborative and shared representation
- Sustainable, shared, open source 100%

## Complex and heterogeneous information, interoperability

- GIS, ITS, AVM, IoT, BIM, CKAN, etc.
- Satellite services
- MaaS, last-mile delivery HUBs
- etc.





# 3D Digital Twin



Snap4CityDockler x Dashboard Management System x +

Non sicuro | dashboard/dashboardSmartCity/view/Baloon-Dark.php?iddasboard=Ng==#

Snap4City dashlocal | Tutti i preferiti

Ciao

Fri 13 Oct 18:29:18

## FLORENCE SCDT

SELECT...

- GRAC HD
- NO 7
- Mobile
- Bar chart
- Highway
- Highway
- Bus
- WHAT-IF
- Car
- Person
- Bicycle

DOUBLE MAP

15.5

© Snap4City (C), October, 2023

© OpenStreetMap contributors

Int Euro-n <https://www.youtube.com/watch?v=le2XNF8Ftxo>

# Control Planning

# Goals

## Control

**Management and Operational**  
(monitoring, KPI, anomaly detection, early warning)

## Planning

**Tactic and strategic, medium and long range, micro/macro**  
(simulations and predictions, what-if analysis)

# Control Horizontal Platform

- **Goals:**
  - Increasing quality of Life, quality of services,
  - Decongestion, Decarbonization, Sustainability
  - increase efficiency and production optimization
  - Improve accessibility to services: citizens, Tourists, commuters, etc.
  - Improve security/Safety of city users, risk reduction
  - Costs reduction of services, energy consumption reduction
  - Reduction of emissions and EC taxations
- **Horizontal homogeneous platform Uniform Technology for**
  - **Any Vertical operation/plan:** mobility, energy, environment, security, tourism, infrastructure and assets control, buildings, etc.
  - **AI Solutions:** early warning, predictions, simulations, what-if, optimization; Deep Learning, ML, BERT, LLM, XAI (Shap/Lime),
  - **Development Environment for any vertical, Digital Twin:** City Global and Local, IoT, VR, Visual Programming, business intelligence, CSBL, SSBL, etc.
  - **Interoperability:** any format, any protocol, any video management system, any sensor, any device, etc.
- **KPI:** multidomain KPI, general management, early warning, early detection of critical conditions, 15 Min City Index, SDG
- **Mobile App:** modular applications, operators' modules, multiple cities, etc.
- **Participatory:** problem reporting, ticketing, etc.
- **Integration of any kind**



# Mobility and Transport

# Goals



Decongestion



Safety



Accessibility

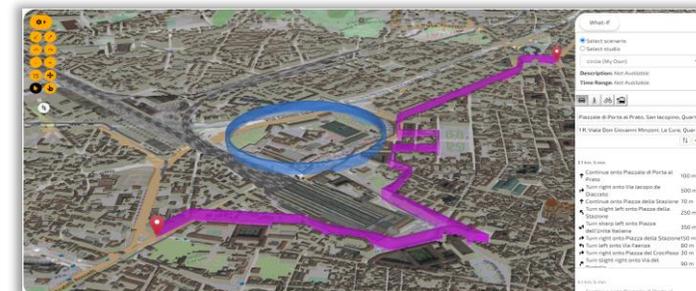


Cost Reduction



Decarbonization

# Mobility & Transport

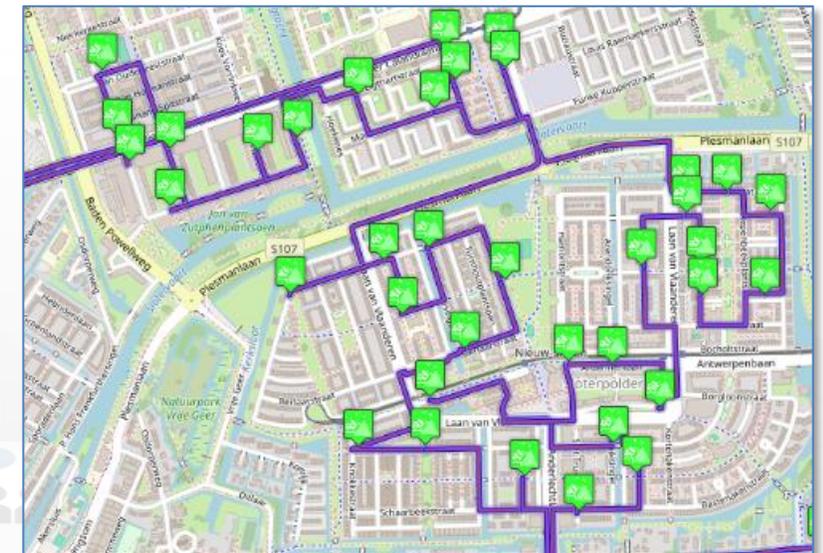
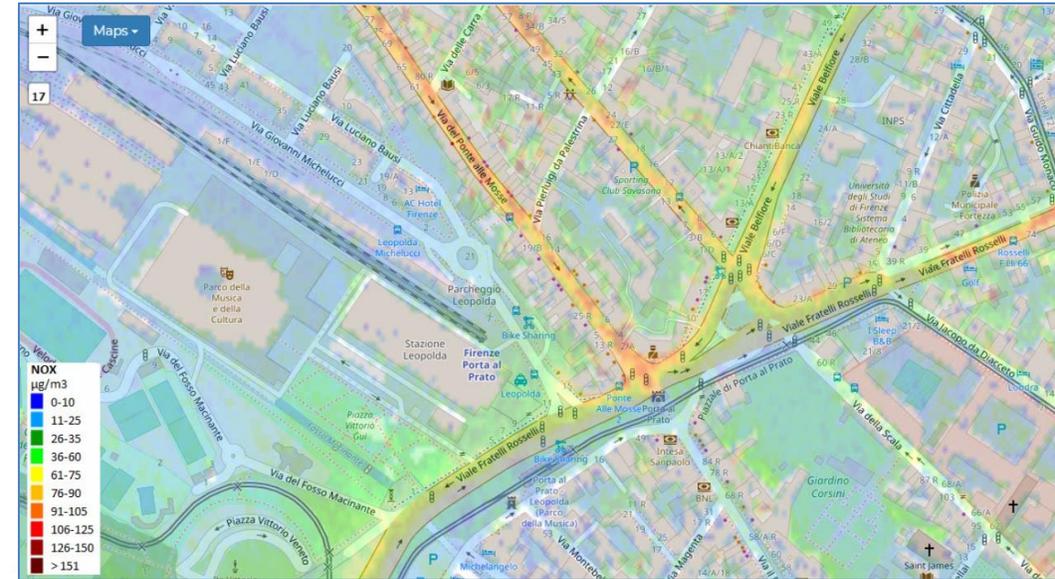


- **Goals:**
  - Decongestion, Decarbonization, costs reductions
  - Improve Accessibility to services
  - Improve Security/Safety of city users
- **Operation and Plan:**
  - Traffic monitoring, prediction, reconstruction, identification of critical conditions (early warning), fleet management, dynamic routing, multimodal routing, city user behaviour analysis
- **Optimization and what-if analysis traffic light, infrastructure**
  - **Reduction:** travel time, waiting time, stops, CO2 emissions, consume fuel, travel time for tramways
- **Public Transport:** analysis of Mobility Demand vs Offer of Transportation
- **Parking Management:** monitoring, prediction, any payments, on/off-road
- **Sharing / Pooling Management:** eShare and mobile app, bikesharing, smart bike, fleet management
- **KPI:** SUMI/SUMP, travel time, emissions, traffic status, accessibility, ..
- **Mobile App:** final users and operators
  - Info Mobility, traffic reconstruction, charging, participation,
  - Parking, payments, overparking, fine reporting, ..
- **Participatory:** problem reporting, ticketing, etc.
- **Data Integration of any kind:** env, weather. Tickets, presences, POI, sat, etc.



# Environment and Waste

- **Goals:**
  - Reduction of emissions and EC taxations
  - Cost reduction for waste collection,
  - reduction of waste collection impact on mobility
- **AIR quality (Indexes) monitoring and warning**
- **Environment Management & producing prescriptions:**
  - Monitoring, long and short-term predictions, warning for:
    - GHG, emissions, pollutants, aerosol, chemical plants analysis
  - Traffic Flow impact emissions, predictions
  - Sea conditions, UV conditions, etc.
- **Land slide prediction warning**
- **Coastal erosion monitoring and analysis**
- **Smart Waste Management and Optimisation:**
  - costs reduction, optimal routing production, pay as you throw,
  - avoiding out of bins, predictions of waste production on bins, alarms
- **KPI:** SDG, 15MinCityIndex, QOS, costs, Km, collecting time, EC KPI, emissions
- **Mobile App:** final users services/informing and operators
  - Info Waste for operators, participation, optimal routing, RAEE Collection, ..
- **Participatory:** problem reporting, ticketing, etc.
- **Integration of any kind: env/weather, mobility, ticketing, presences, POI, ..**



# City Users' Services and Tourism Management

# Goals

## *Actions:*

- *TOURISMO Interreg*
- Herit-Data Interreg
- *SADI-MIAC, regional on retail*
- Feedback, regional on retail



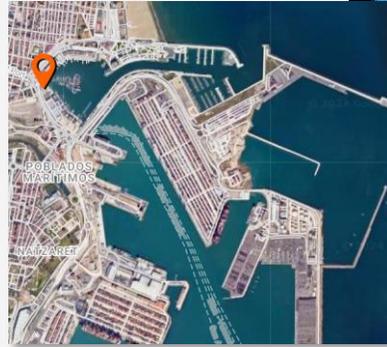
# TOURISMO data integration into Snap4City



## Snap4City is the reference platform for TOURISMO

Integration of different technologies and data source from 8 pilots:

- Bisevo, Croatia
  - Florence, Italy
  - Limassol, Cyprus
  - Golden Bay, Malta
  - Rhodes, Greece
  - Valencia La Lonja and City Museum, Spain
  - Port of Valencia, Spain Varna, Bulgaria
- Greater differentiation in pilot sites compared to Herit-Data
  - The spectrum of technologies implemented has increased





# TOURISMO data integration into Snap4City



- Decision support applications
- AI solutions for predictions, causality, suggestions and recommendations
- Data acquisition and aggregation from different sources, in Digital Twin:
  - Context and evaluations
    - Road graph, networks, POI, Points of interest
    - Sentiment analysis from questionnaires and other services
    - Historical data of different types
  - Counting and flows,
    - people and vehicles
    - Pax counter/Wi-Fi Sniffer, radar
    - Data from thermal cameras
    - CCTV for counting people and vehicles
    - Data from drones with high-resolution thermal cameras
    - Parking
  - Environment
    - Open weather, Open pollution, Tides
    - Data from indoor and outdoor environmental sensors
    - Context data: OpenWeather, Open Pollution, Tides.....





# Expected results for TOURISMO

The tested solutions and the use of AI in the various pilots will be able to produce a valid and transferable method in other contexts. Including in the best practice:

- Comparison between types of sensors
- Efficiency and effectiveness of the various solutions
- Acquisition models and processes
- Predictive, causal, and management models
- Correlations and causes for reputation and evaluations, of services and structures
- Applications and dashboards





# On Line Training Material (free of charge)

Course: <https://www.snap4city.org/944> (ENG)

Introductionary course to Snap4City technology

In Italiano: <https://www.snap4city.org/1068>



1st part	2nd part	3rd part	4th part	5th part	6th part	7th part	8th
Overview	Dashboards	IOT App, IOT Network	Data Analytics	Data Ingestion processes	System and Deploy Install	Smart City API: Web & Mob. App	Design and Develop Smart Solutions






Smart Ambulance (2021-22)

Enterprise (2021-22)  
Industry 4.0

Almafluida Industry 4.0 (2021-22)

Contract, 2022-23

CN MOST, 2022-26

ELLIE IA 2025-2027

**2020**



Contract



- Smart Tourism
- 6 Pilots
- Data Analytics
- Extended platform



- Smart Mobility
- PISA, PUMS
- Living lab



**2021**

PC4City (2020-21)  
Monitoring Terrain



**CAPĒLON**

- Smart Light
- Sweden

**Km4City 1.6.7**



AMPERE (2021-22)  
Industry 4.0

SYN-RG-AI  
SmartCity



Industry 4.0

uni.systems

SmartCity, 2021-23



AXIS collab  
SmartCity

**2022**



Asymmetrica  
Smart City, 2022-23



Contract, 2022-23



2022-2023



Contract, 15min



Security and Risk



Italferr, Smart City



**2023**

EI THE, 2022-26

G. Agile, 2021-23



2023-26



Merano, smart light

OceanRace,  
Genova, AWS

Cuneo,  
smart city

**2024**

Km4City 1.6.8

TOURISMO



UrbanDT4TF



Contract, 2024-25

CAI4DSA



Rhodes,  
smart city

eShare  
UNIFI TUSS  
MOST



**++2024/25**

- **UrbanDT4TF**, CN HPC: Digital Twin mobility, <https://www.snap4city.org/drupal/node/1057>
  - **DI-DTPlatform**, CN HPC: Digital Twin, mobility, environment, <https://www.snap4city.org/drupal/node/1097>
  - **Sasuum**, CN MOST, PNRR: AI, mobility, <https://www.snap4city.org/drupal/node/999>
  - **OPTIFaaS**, CN MOST, PNRR: AI, mobility, DSS, <https://www.snap4city.org/drupal/node/1008>
  - **LeverageOPTIFaaS**, CN MOST: PNRR, mobility, <https://www.snap4city.org/drupal/node/1064>
  - **TOURISMO**, Interreg, EC: Tourism, NLP, DSS, <https://www.snap4city.org/drupal/node/1001>
  - **ELLIE**, Horizon Europe, EC: AI, VR, <https://www.snap4city.org/drupal/node/1056>
  - **CN MOST**, PNRR: sustainable mobility, platform, <https://www.snap4city.org/drupal/node/1050>
  - **ISPRA JRC contract**, EC: DSS, SOC, control room, energy, <https://www.snap4city.org/drupal/node/970>
  - **AMMIRARE**, Interreg, EC: AI, environment, Big Data, <https://www.snap4city.org/drupal/node/1002>
  - **CAI4DSA**, FAIR PE1, PNRR: AI, Neuro-Symbolic, PINN, NG-DSS, <https://www.snap4city.org/drupal/node/1016>
  - **SADI-MIAC**, RT, partner: AI, Tourism, Retail, Computer Vision, <https://www.snap4city.org/drupal/node/1055>
  - **PRIN UNICagliari**, **SMART3R**: mobility, DSS, <https://www.snap4city.org/drupal/node/1087>
  - **Tuscany X.0**, **EDIH**, TestBeforeInvest, Training on AI, Big Data, Security, HPC: <https://www.tuscanyx.eu/>
  - **The IE**, PNRR: AI, NLP, Legal Aspects
  - **Energia**, RT, conv: AI, PINN, DSS
  - **RFI contract**: mobility, AI, DSS
  - **Salerno Port**: for container ID recognition
  - **Talent Hub**, ECRF, conv: NLP, match demand vs offer
- + currently: Merano, Salerno, Cuneo, Rhodes, Reverberi, Florence, IDTS, ALTAIR, etc.

<https://www.snap4city.org/dashboardSmartCity/view/newTheme.php?iddashboard=NDMzNg==>

TOURISMO
INTELLIGENT
DATA
ANALYTICS

# TOURISMO Valencia

Tue 1 Jul 13:21:44

- ▶ parkingValencia
- ▶ Open Weather
- ▶ Sea Conditions
- ▶ Air Pollution
- ▶ UV Index Forecast
- ▶ Indoor People Counting
- ▶ Indoor Env. CO2 Noise
- ▶ Indoor Env.
- ▶ Indoor CO2
- ▶ Indoor Noise
- ▶ Outdoor People Counting

**PEOPLE\_CITYMUSEUM\_GENERALACCESS**

VALUE NAME: PEOPLE\_CITYMUSEUM\_GENERALACCESS

DETAILS
DESCRIPTION
RT DATA

Last update: 2025-07-01 13:30:00.000+02:00

Description	Value	Butt				
dateObserved	2025-07-01T11:30:00.000Z	Last	4h	24h	7d	30d
inPeople	46	Last	4h	24h	7d	30d
outPeople	54	Last	4h	24h	7d	30d
peopleOccupancy	0	Last	4h	24h	7d	30d
peopleOccupancyPerc	0	Last	4h	24h	7d	30d

Keep data on target widget(s) after popup close:

VALENCIA

DAY	UV Index	Ozone Column
TODAY	10.7	267.8
2025-06-06T08:00:00.000Z	10.9	263.8
2025-06-07T08:00:00.000Z	10.6	268.2
2025-06-08T08:00:00.000Z	10.8	264.6
2025-06-09T08:00:00.000Z	11.1	259.8
2025-06-10T08:00:00.000Z	10.4	270.9

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11

LOW MODERATE HIGH EXTREME

Air Temperature

33 °C

VALENCIA - Air Temperature - Weekly trend

Sunday, 29 Jun 2025, 02:54  
airTemperature: 24.67

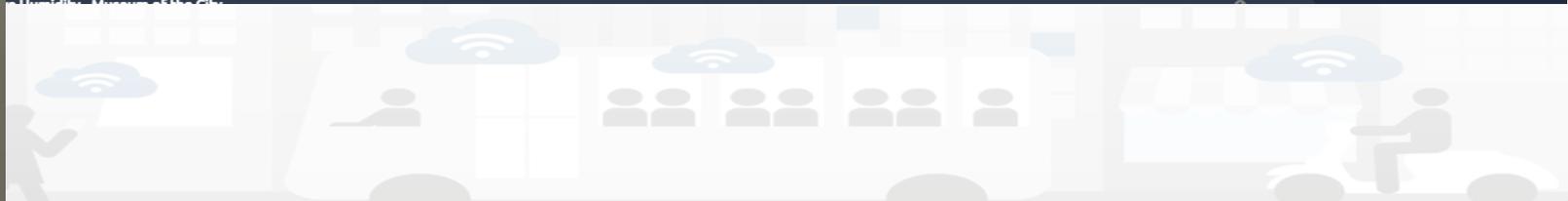
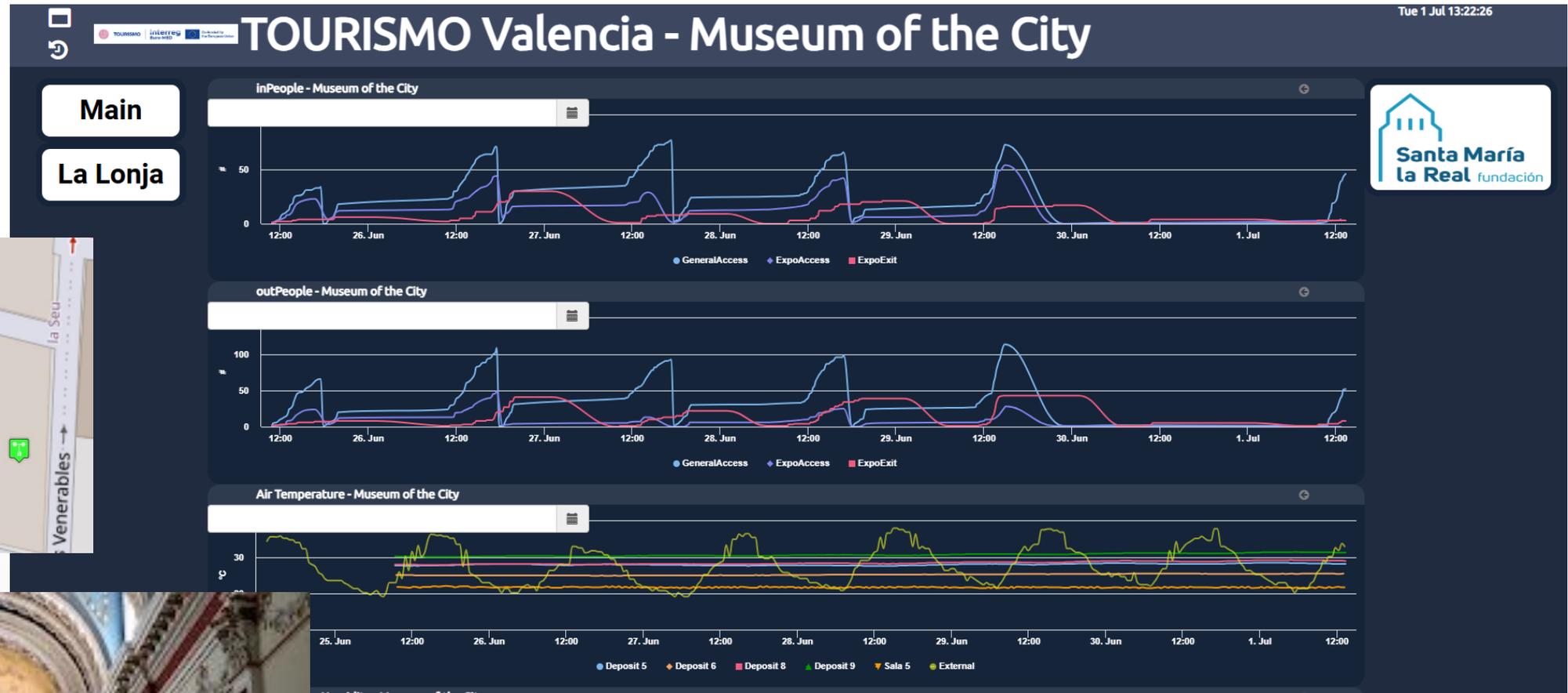
Privacy Policy

Cookies Policy

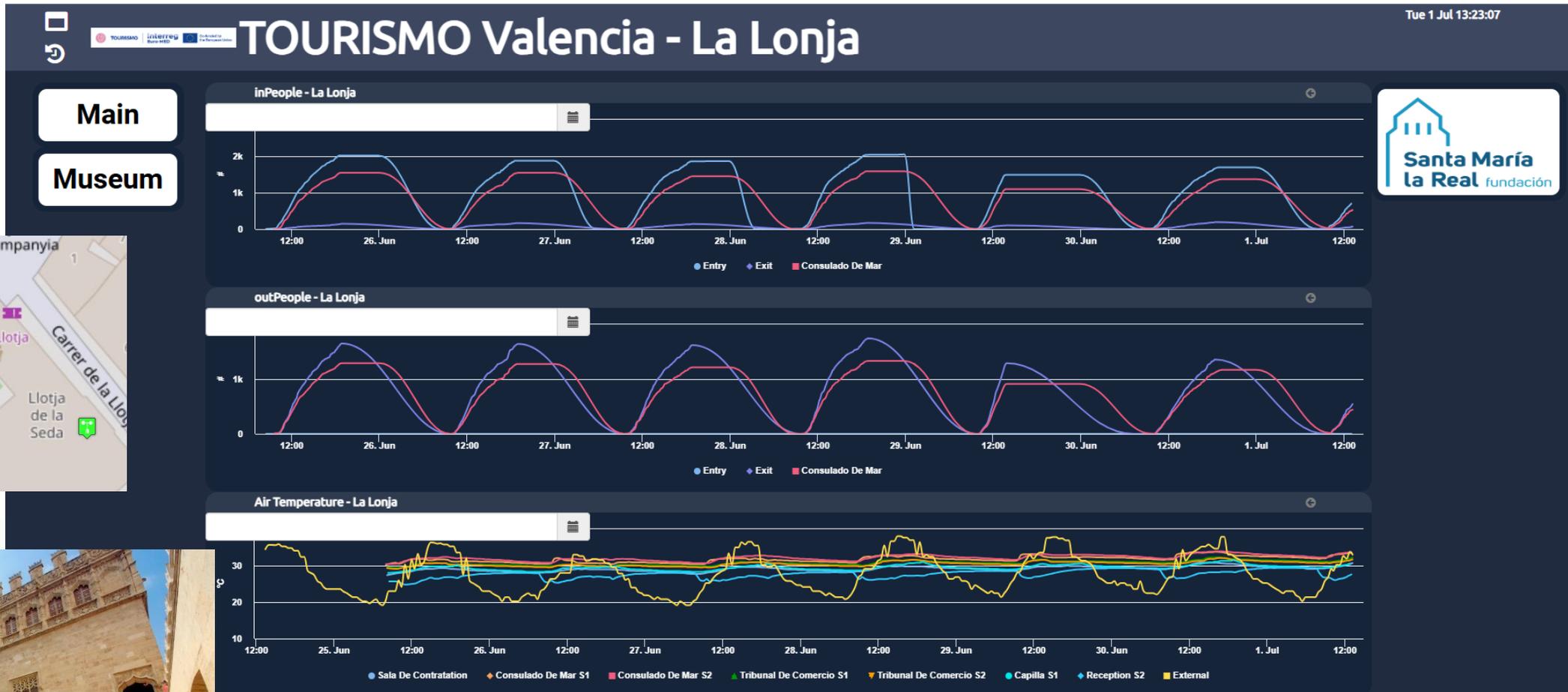
Terms and Conditions

Contact us

<https://www.snap4city.org/dashboardSmartCity/view/newTheme.php?iddashboard=NDYyMQ==>



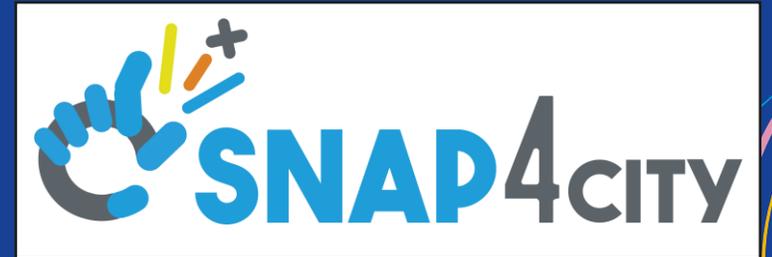
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**Interreg**  
Euro-MED



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# Making the **Mediterranean** **Green Transition** happen

Nicola Mitolo, DISIT Lab/Snap4City  
*Università degli Studi di Firenze*  
[info@snap4city.org](mailto:info@snap4city.org)

