

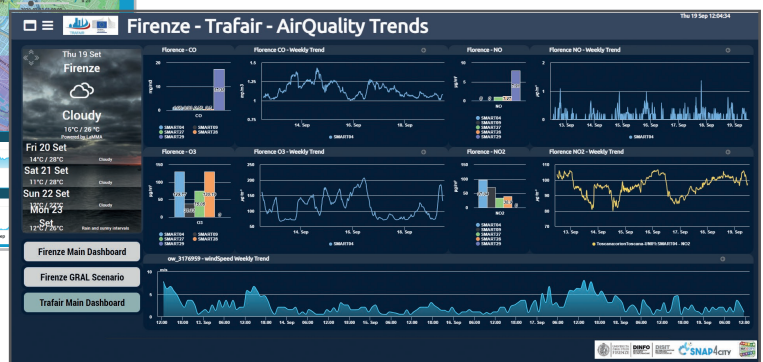
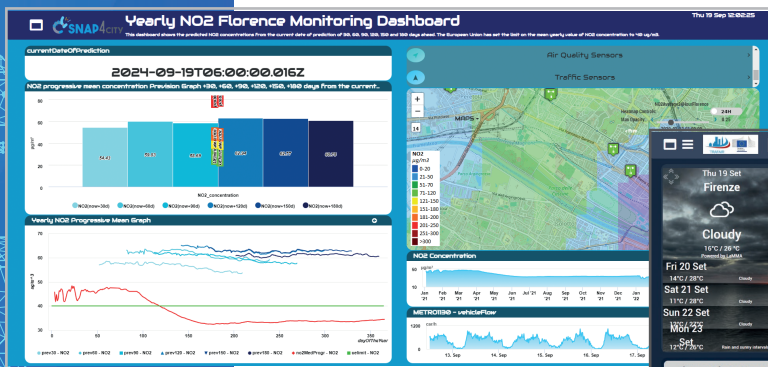
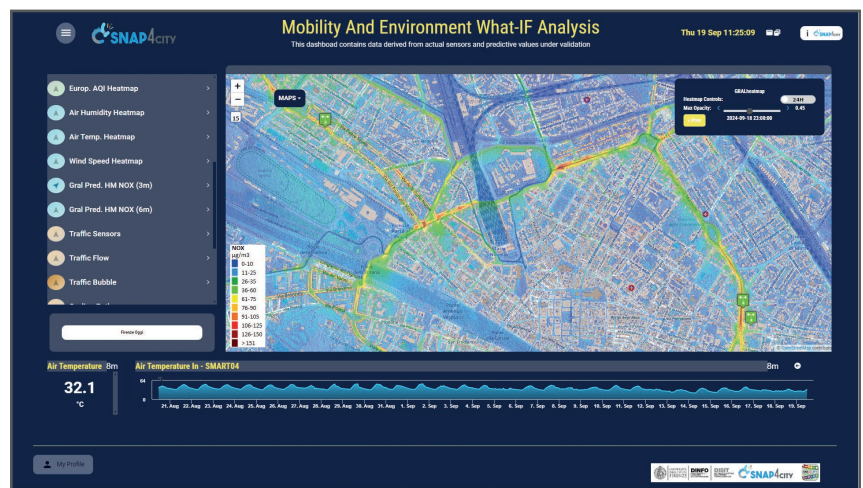


Environment Control, Predictions and Prescriptions

Smart Cities need to understand how much pollution affects the quality of the air that citizens breath, and the general conditions of the emissions and their evolution over time and with respect to the city activities. The city operators may regulate urban mobility and other activities, and may change the infrastructures, to keep under control their city, predicting the overruns of limits. To this end, specific sensors and solutions become fundamental, such as: air quality sensors for the emissions, but also traffic flow sensors for monitoring urban mobility, traffic flow reconstruction, parking, traffic and RTZ sensors, weather forecasts, etc., together with the knowledge of the city structure, prediction model for environmental variables.

In order to assess the air quality in each part of the city, the level of pollution aspects have to be measured, for example: SO₂, NO, NO₂, O₃, CO, CO₂, PM₁₀, PM_{2.5}, etc. and derived Air Quality Indexes. Most of the environmental pollutants are influenced by relevant traffic flows in different manners, while others are influenced by house heating, industries, boats, etc. Specific measures may depend on the sensor position and location context, on calibration, on the time of the measure, season, etc. A measure performed along a primary street in terms of traffic may strongly differ with respect to the actual values just in the garden of the house behind the primary street. To this end, mathematical methods have been set up to perform predictions of pollution diffusion and deductions.

Snap4City has developed a large range of solutions for the **Environment Management** by monitoring, reduction of emissions and EC taxations, cost reduction for waste collection, production of early warning, production prescriptions and what-if analysis.



Monitoring reporting them on control room, estimating KPI and

- GHG, emissions, pollutants, aerosol, chemical plants, etc., and
- producing Early Warning, alarms via different channels (SMS, Twitter, Skype, Telegram, email, etc.) to different teams, and ticketing systems.

Computing via AI Predictions in real time (short and long term) of:

- GHG, emissions, pollutants, aerosol, chemical plants analysis
- land slide, coastal erosion (blue economy)
- CO2 and NO2 emission on the basis of Traffic Flow, on microscale and for the whole city
- 15 Min City index and 13 different subindexes

Computing KPI:

- Emissions, SUMI, SUMP, EC KPI, air quality index, etc.
- SDG, 15MinCityIndex, QOS, costs,

Providing immediate visual AI tools for:

- **Rendering** conditions and forecasts
- **Providing suggestions** for the reduction of emissions
- **What-If analysis** on the effective impact of changes
- **Optimisation tools** for the computation of changes to be performed

Mobile App: final users services/informing and operators, Information about emissions level and weather.

Participatory: problem reporting, ticketing, etc.

To get more of the several solutions you can go on:

- Air quality indexes:
 - <https://www.snap4city.org/413>
- Long Term Prediction of NO2 KPI of European Commission reference values
 - <https://www.snap4city.org/804>
- Artificial Intelligence Predicts Landslides in Florence Area
 - <https://www.snap4city.org/803>
- SOLUTION: Traffic Infrastructure Optimisation: reducing travel time and emissions
 - <https://www.snap4city.org/1014>
- CO2 computation from traffic: "Estimating CO2 Emissions from IoT Traffic Flow Sensors and Reconstruction", Sensors, MDPI, 2022.
 - <https://www.mdpi.com/1424-8220/22/9/3382/>
- Scenario: City of Roma case, mobility and environmental data
 - <https://www.snap4city.org/628>
- Scenario: High Resolution Prediction of Environmental Data
 - <https://www.snap4city.org/530>
- Scenario: Antwerp Pilot on Environmental Data:
 - <https://www.snap4city.org/526>
- Scenario: Helsinki Pilot on Environmental Data:
 - <https://www.snap4city.org/528>
- 15MinCityIndex: understanding city areas by means of 13 different aspects
 - <https://www.snap4city.org/652>
- AMPERE Project - Furniture, art and fashion in an innovative electrochemical process with remote control and circular eco-friendly
 - <https://www.snap4city.org/707>
- Chemical plant control: monitoring and early warning on the production line
 - <https://www.snap4.eu/products/smart-production-process-control.html>



SOLUTIONS

Extended version accessible from: <https://www.snap4city.org/1037>

Contact: <https://www.snap4city.org>

Partners: Snap4City, DISIT Lab