



SNAP4CITY

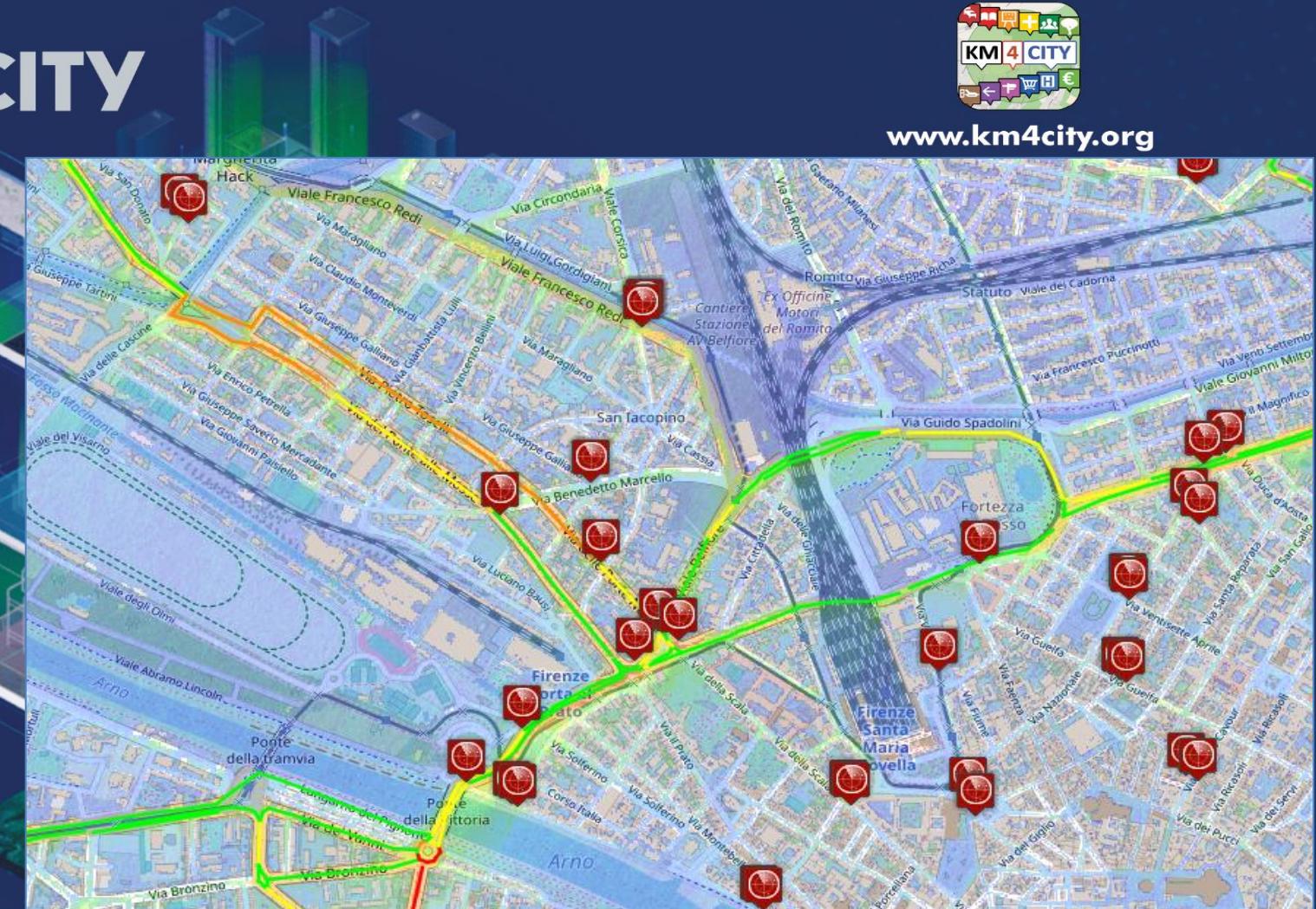
www.snap4city.org

www.snap4solutions.org



www.km4city.org

Environmental overview



DIGITAL TWIN SOLUTIONS TO SETUP SUSTAINABLE DECISON SUPPORT SYSTEMS AND BUSINESS INTELLIGENCE



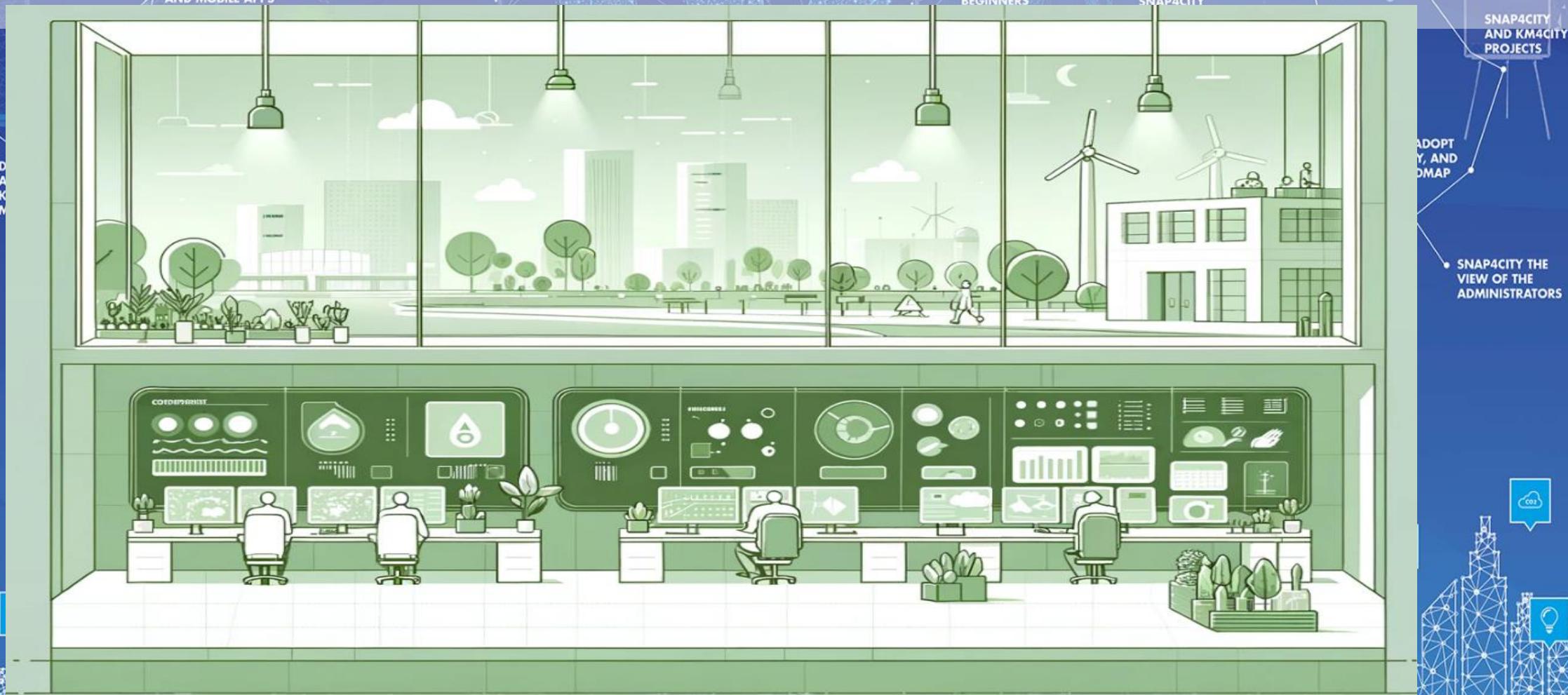
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DEGLI STUDI
FIRENZE

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DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

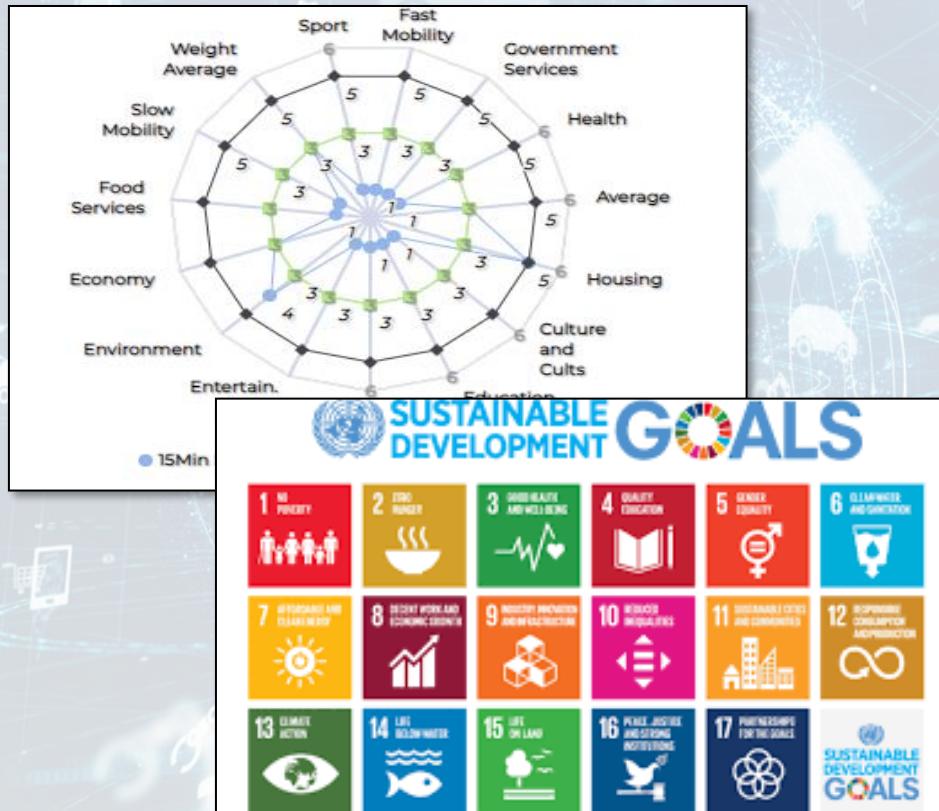
DISIT
DISTRIBUTED SYSTEMS
AND INFORMATION TECHNOLOGIES LAB



Environmental Monitoring and Control



Key Performance Indicators, KPI



Air Quality Directive			WHO guidelines	
Pollutant	Averaging period	Objective and legal nature and concentration	Comments	Concentration
PM _{2.5}	One day			25 µg/m ³ (*) 99 th percentile (3 days/year)
PM _{2.5}	Calendar year	Target value, 25 µg/m ³	The target value has become a limit value since 1 January 2015	10 µg/m ³
PM ₁₀	One day	Limit value, 50 µg/m ³	Not to be exceeded on more than 35 days per year.	50 µg/m ³ (*) 99 th percentile (3 days/year)
PM ₁₀	Calendar year	Limit value, 40 µg/m ³ (*)		20 µg/m ³
O ₃	Maximum daily 8-hour mean	Target value, 120 µg/m ³	Not to be exceeded on more than 25 days per year, averaged over three years	100 µg/m ³
NO ₂	One hour	Limit value, 200 µg/m ³ (*)	Not to be exceeded more than 18 times a calendar year	200 µg/m ³ (*)
NO ₂	Calendar year	Limit value, 40 µg/m ³		40 µg/m ³

- United Nations Sustainable Development Goals, SDGs (for which cities can do more to achieve some of the 17 SDGs, <https://sdgs.un.org/goals>);

- 15 minutes cities (where primary services must be accessible within 15 minutes on foot);

- objectives of the European Commission in terms of pollutant emissions for: NO₂, PM10, PM2.5 (https://environment.ec.europa.eu/topics/air_en);

- SUMI: mobility and transport vs env

• <https://www.snap4city.org/951>

- SUMP/PUMS: mobility and transport vs env.

- ISO indicators: city smartness, digitization, tech level.

- Low Level/Real Time: global traffic, quality of service, betweenness, centrality, queue, time to travel, etc.

Global
&
Local

Periodic
&
Realtime



• 15 Minute City Index:

- 13 subindexes: energy, slow mobility, fast mobility, housing, economy education, culture and arts, health, entertainment, government, food, security...

10/22



- Monitoring and Prediction of energy consumption
- Stimulating: Bike sharing, e-bikes, car charge, etc.
- Community of Energy, planning energy plant



- Industry 4.0 integrated solutions
- Decisions Support Systems
- Process optimization, control
- Predictive maintenance



- Smart City infrastructure: monitoring and resilience, long term predictions
- Effective and Low cost smart solutions
- What-if analysis, Simulations
- Origin Destination matrices computation



- business intelligence tools for decision makers
- Reduction production costs
- Monitoring resource consumption
- Optimization of Waste Collection



- Monitoring and Predicting: NO₂, NO_X, CO₂, Traffic flow, pollutant, landslide, waste, etc.
- Traffic flow reconstruction
- Demand vs Offer of Mobility analysis



- Shortening justice time
- Anonymization and indexing legal docs.
- Prediction of mediation proneness
- Ethical Explainable Artificial Intelligence

Data Driven Decision Support

- Decision Support system
- Assessment / Strategies
- Data Rendering,
 - visual analytics, business intel..
- Data Analytics, ML, AI
- Data aggregation, Storage, indexing
- Data Ingestion



Public Spaces as Critical Infrastructures

- The City is a system of systems for city users
 - Cascading effects
- **Transport** networks
 - Main means for rescue teams, food, water, etc.
- **Communication**, ICT infrastructure
 - TV cam, switches, cyber,
- **Energy** networks
 - power supply for health, cyber systems, etc.
- **Hospitals** networks
- Aggregation areas



https://www.snap4city.org/download/video/DPL_SNAP4SOLU.pdf

15MinCityIndex

What would support my neighborhood to become a 15-Minute City?

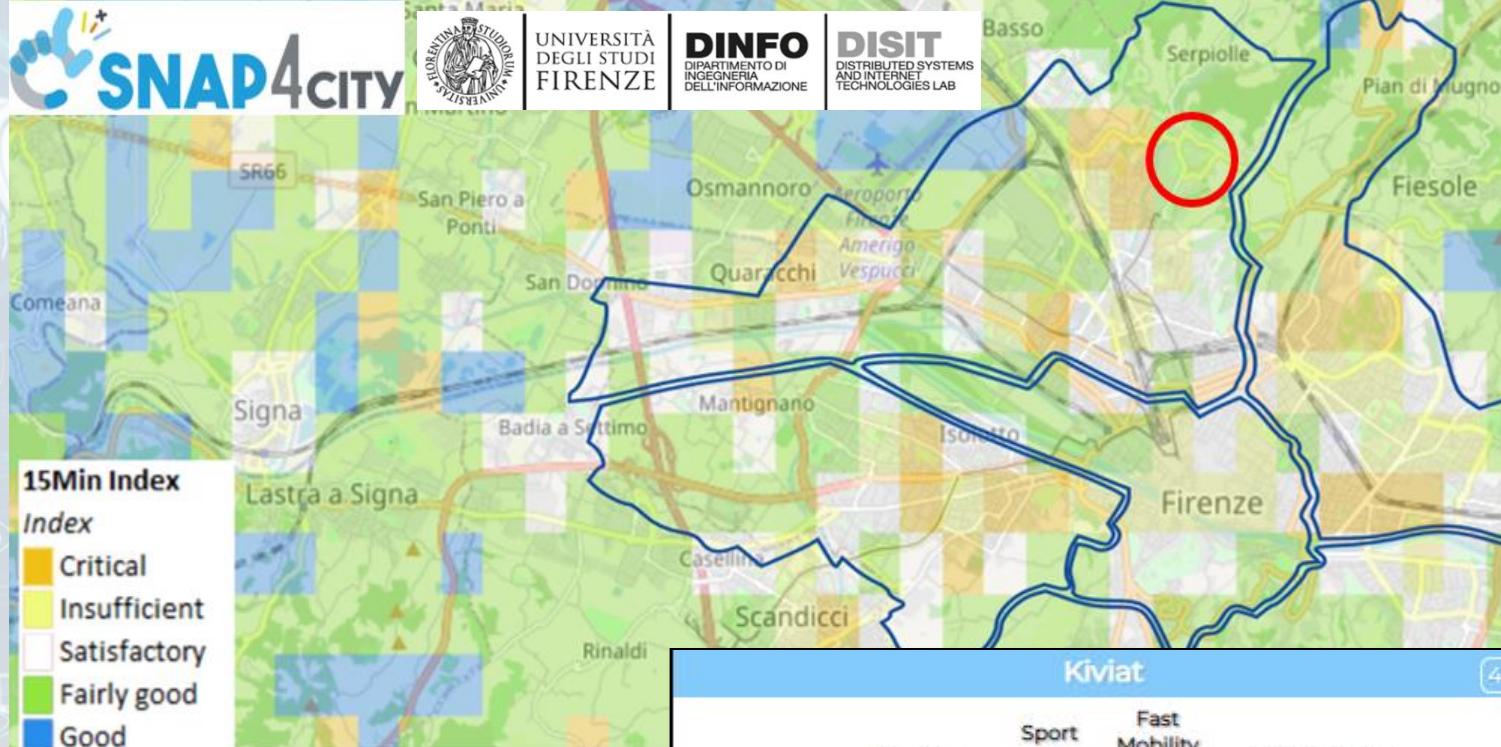
Using the Open Data:

We developed a data analytic tool based on municipal and national open data to assess services adequacy for people living in each 15 minutes areas of the city.

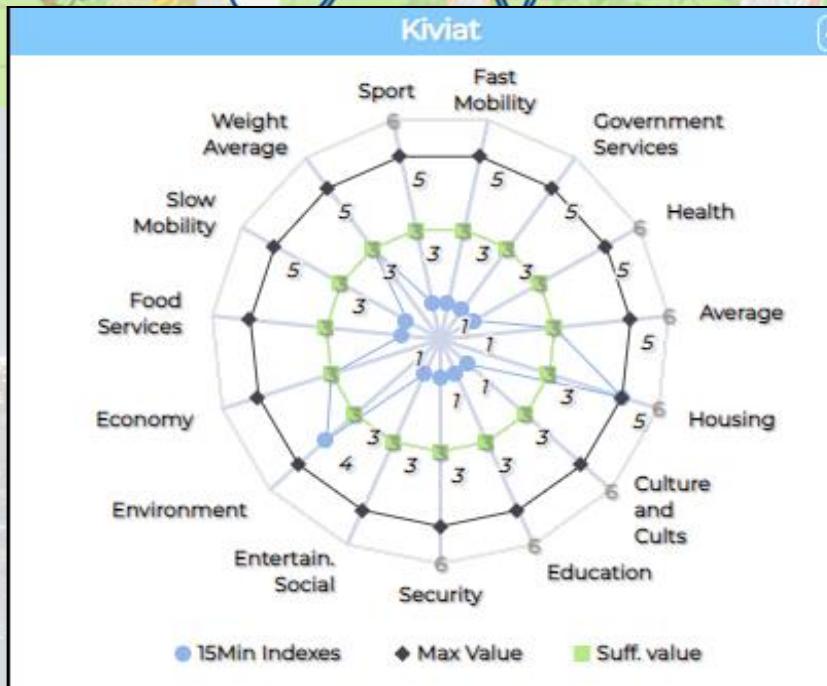
Good public transport services: bus, new tram line, train stations, cycle paths.



Careggi/Rifredi is a relevant district in Florence because of hosting the main Florence/Tuscany hospitals Careggi and Meyer, but also university headquarters and many other workplaces.



The tool supports the becoming of a 15-Minute city evaluating the service level in various domains.



<https://www.snap4city.org/dashboardSmartCity/view/index.php?idashboard=MjkzOA==>



15MinCityIndex on Bologna

Ciao rootooladmin1

Tue 3 May 20:14:59

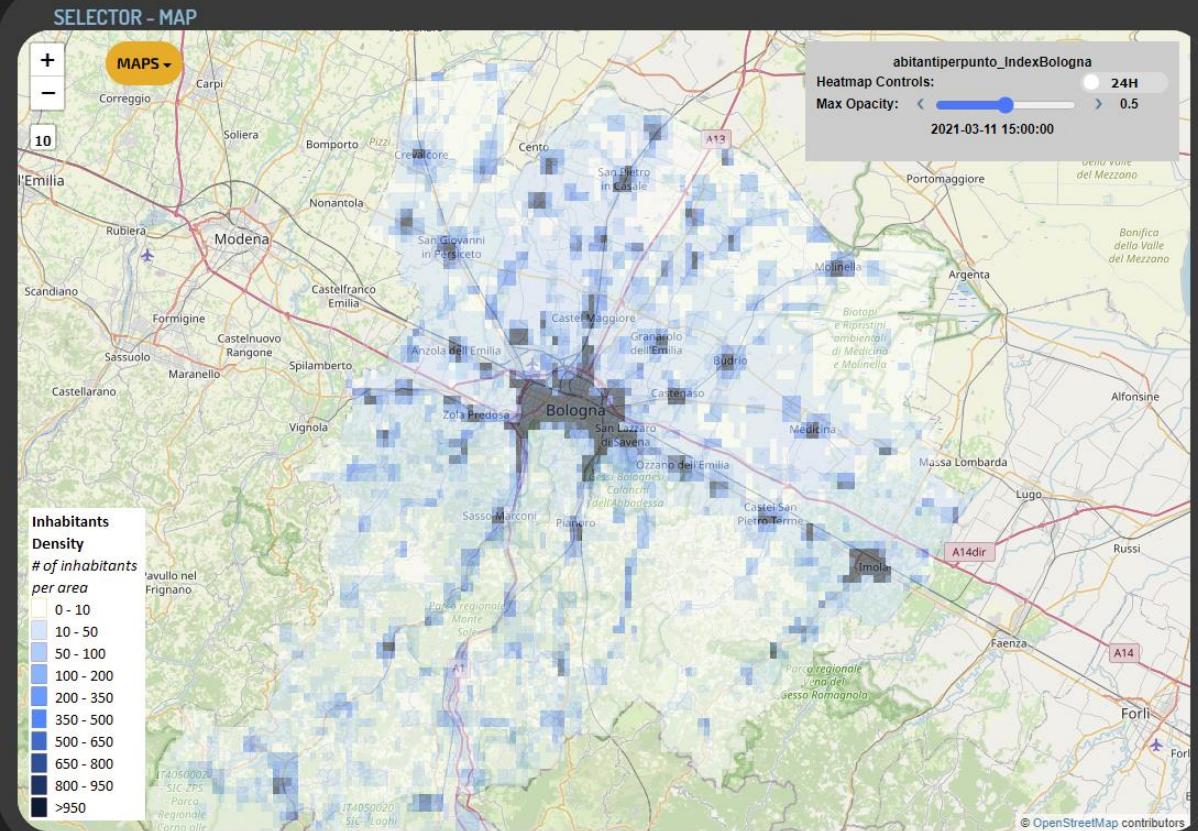
15 MINUTI INDEX BOLOGNA CITTÀ METROPOLITANA - NEWGUI

enel x



- # of Inhabitants >
- Green factor >
- Civil factor >
- Industrialization factor >
- Environment Index >
- 15Min Economy Index >
- 15Min Housing Index >
- 15Min Health Index >
- 15Min Food Index >
- 15Min Education Index >
- 15Min Slow Mob Index >

THE PICKED POINT 9m
City: Argelato
Address: Via Casadio N. 1
Lat,lon: 44.61882,11.35437





Powered by

FREE
TRIAL

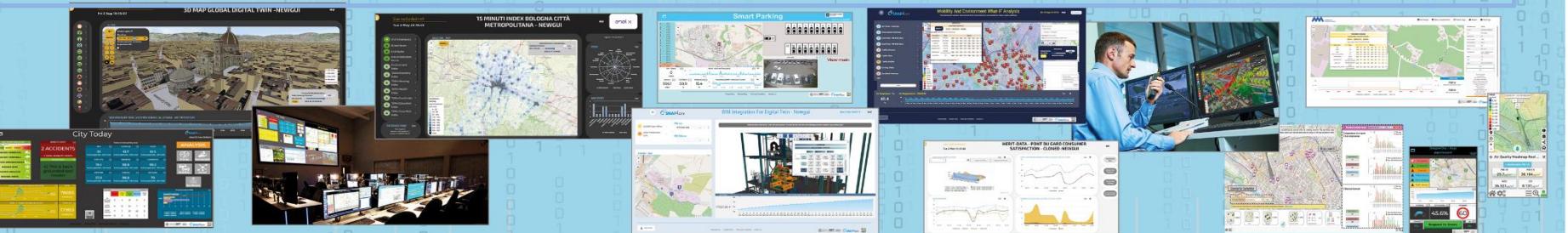
PEN Test
Passed

EU GDPR
Compliant

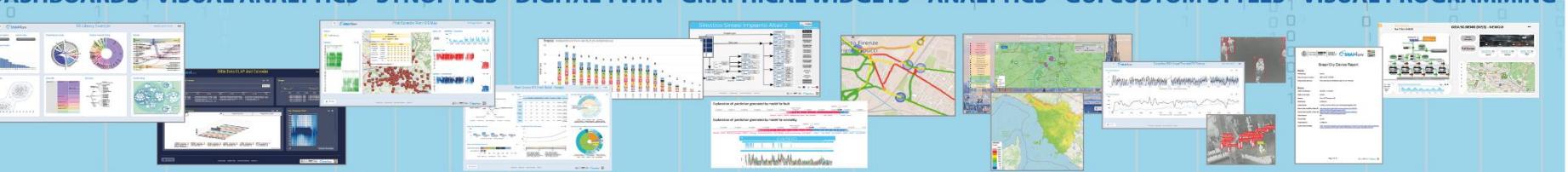
Appliances and Dockers
Installations

digital ecosystem

CONTROL ROOMS - DECISION SUPPORT SYSTEMS - WHAT-IF ANALYSIS - BUSINESS INTELLIGENCE - SIMULATIONS - SMART APPLICATIONS



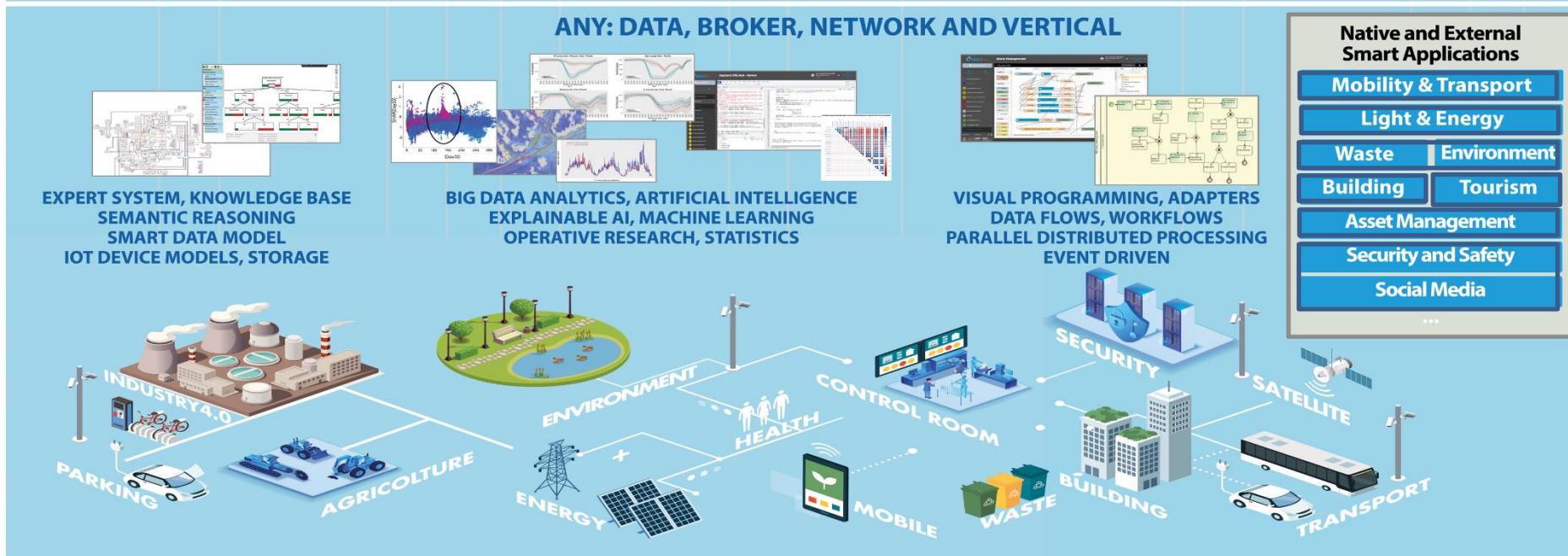
DASHBOARDS - VISUAL ANALYTICS - SYNOPTICS - DIGITAL TWIN - GRAPHICAL WIDGETS - ANALYTICS - GUI CUSTOM STYLES - VISUAL PROGRAMMING



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 ...**

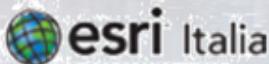
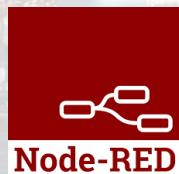


Standards and Interoperability (6/2023)

Compliant with:

- **IoT**: NGSI V2/LD, LoRa, LoRaWan, MQTT, AMQP, COAP, OneM2M, TheThingsNetwork, SigFOX, Libelium, IBIMET/IBE, Enocean, Zigbee, DALI, ISEMC, Alexa, Sonoff, HUE Philips, Tplink, BACnet, TALQ, Protocol Buffer, KNX, OBD2, Proximus, ..
- **IoT model**: FIWARE Smart Data Model, Snap4City IoT Device Models
- **General**: HTTP, HTTPS, TLS, Rest Call, SMTP, TCP, UDP, SOAP, WSDL, FTP, FTPS, WebSocket, WebSocket Secure, GML, WFS, WMS, RTSP, ONVIF, AXIS TVCam, CISCO Meraki, OSM, Copernicus, The Weather Channel, Open Weather, OLAP, VMS,
- **Formats**: JSON, GeoJSON, XML, CSV, GeoTIFF, OWL, WKT, KML, SHP, db, XLS, XLSX, TXT, HTML, CSS, SVG, IFC, XPDL, OSM, Enfuser FMI, Lidar, gITF, GLB, DTM, GDAL, Satellite, D3 JSON, ...
- **Database**: Open Search, MySQL, Mongo, HBASE, SOLR, SPARQL, ODBC, JDBC, Elastic Search, Phoenix, PostGres, MS Azure, ..
- **Industry**: OPC/OPC-UA, OLAP, ModBUS, RS485, RS232,..
- **Mobility**: DATEX, GTFS, Transmodel, ETSI, NeTEx, ..
- **Social**: Twitter, FaceBook, Telegram, ..
- **Events**: SMS, EMAIL, CAP, RSS Feed, ..
- **OS**: Linux, Windows, Android, Raspberry Pi, Local File System, AXIS, ESP32, etc.

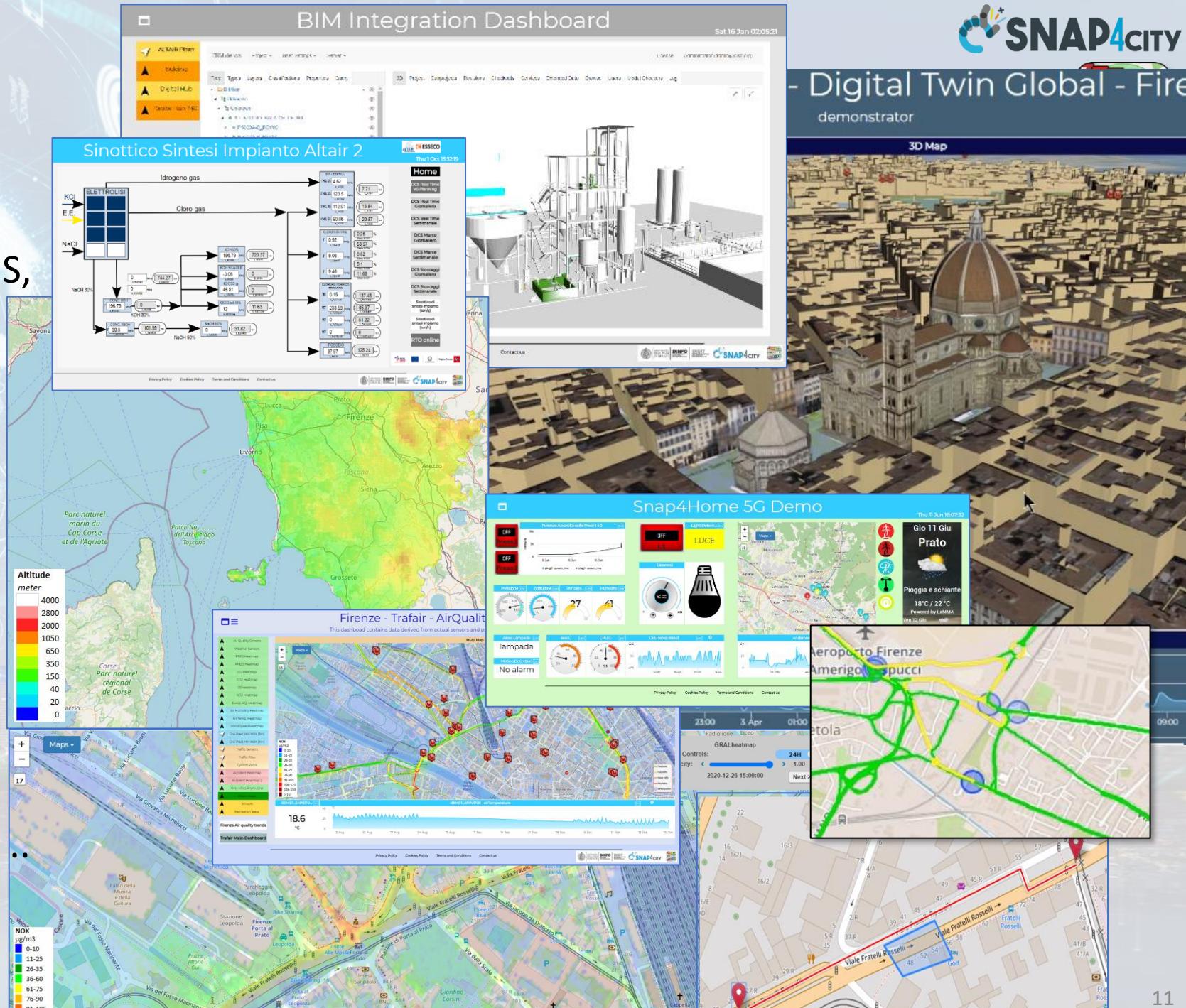
<https://www.snap4city.org/65>



High Level Types

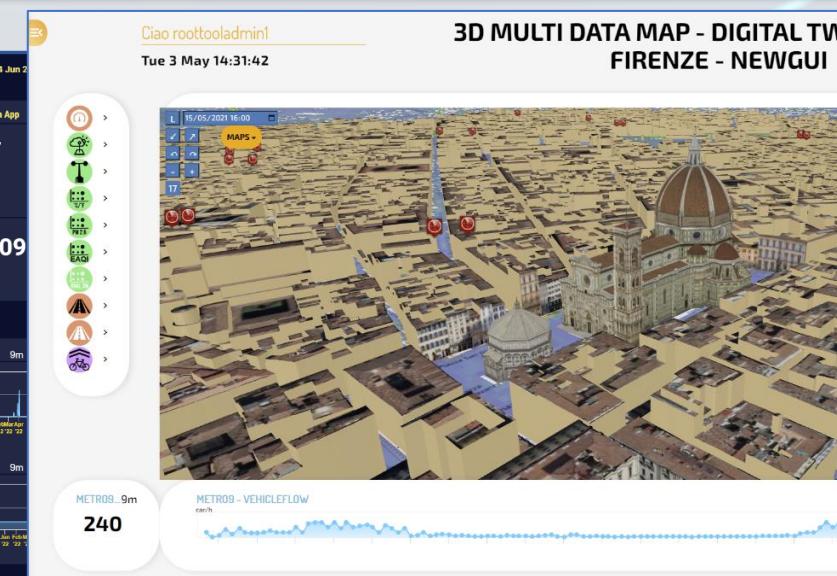
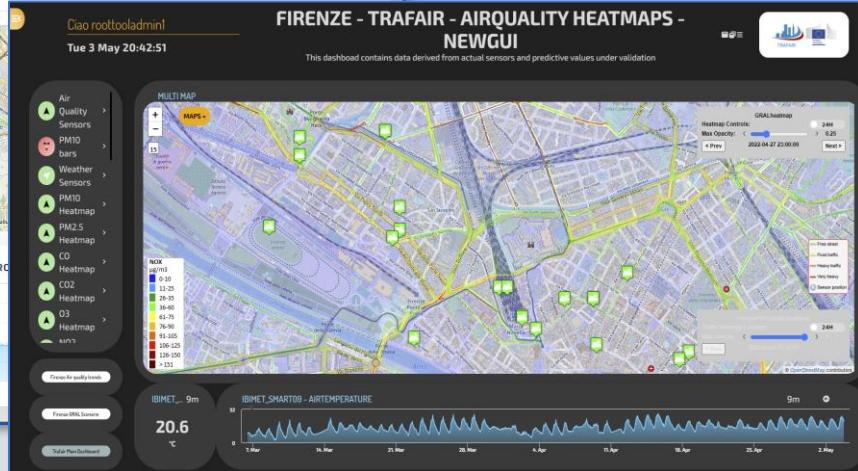
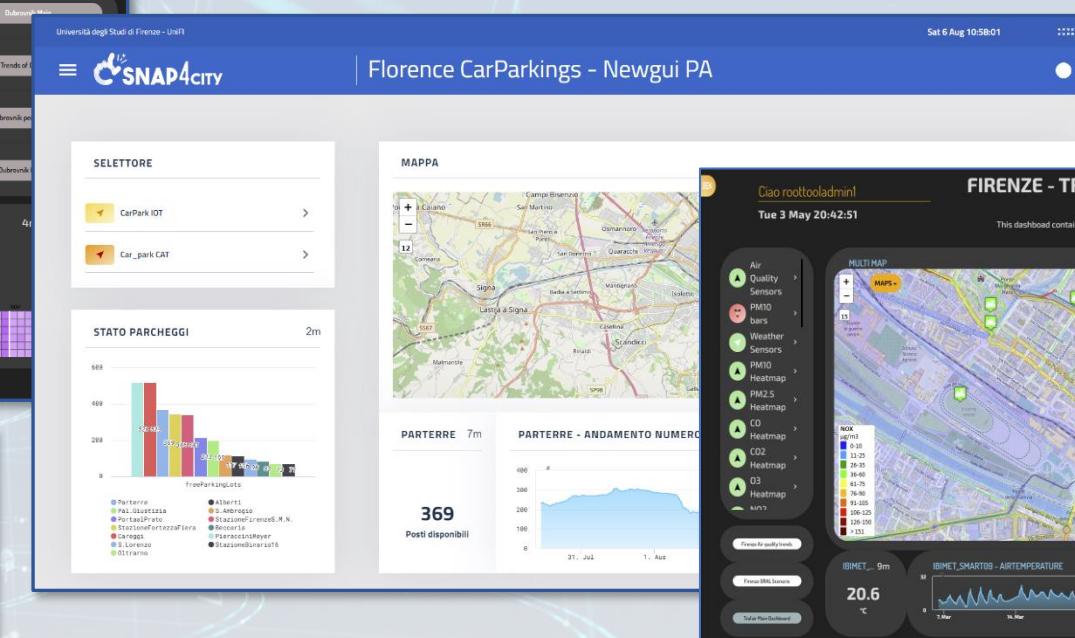
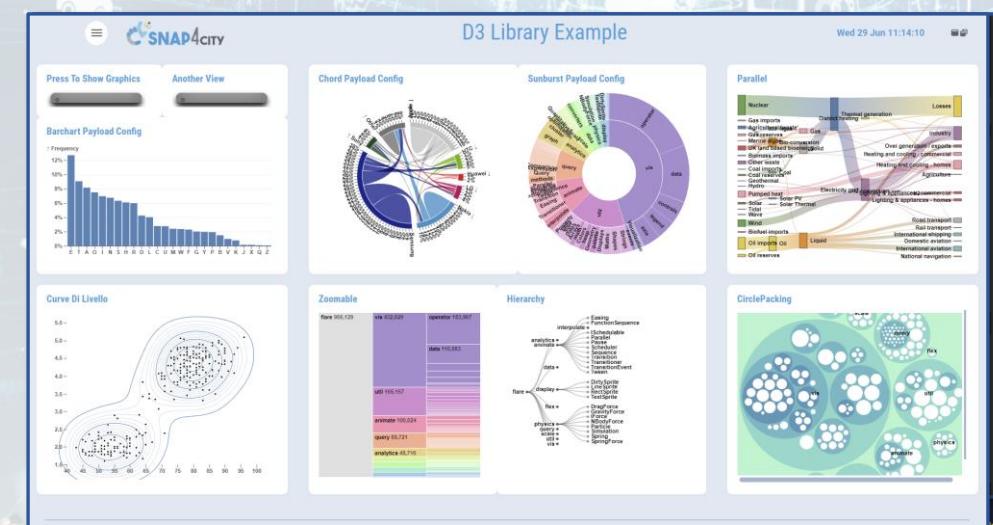
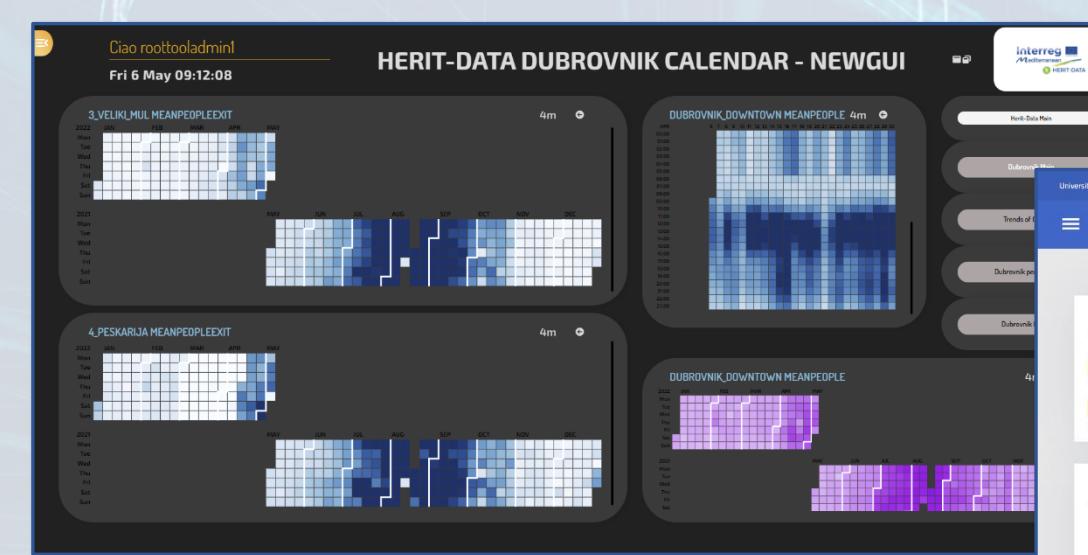
Snap4City (C), January 2024

- POI, IOT Devices, shapes,..
 - FIWARE Smart Data Models,
 - IoT Device Models
- GIS, maps, orthomaps, WFS/WMS, GeoTiff, calibrated heatmaps, ..
- Satellite data, ..
- 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,
- etc.





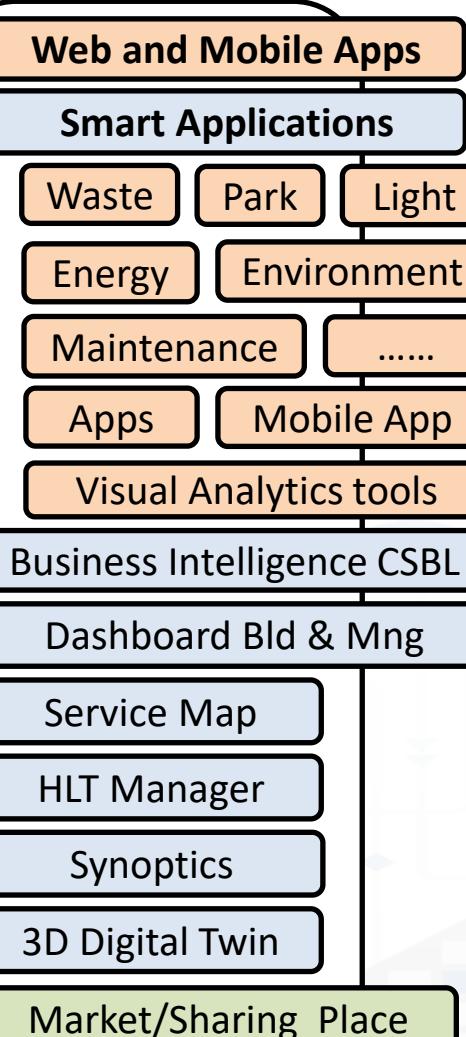
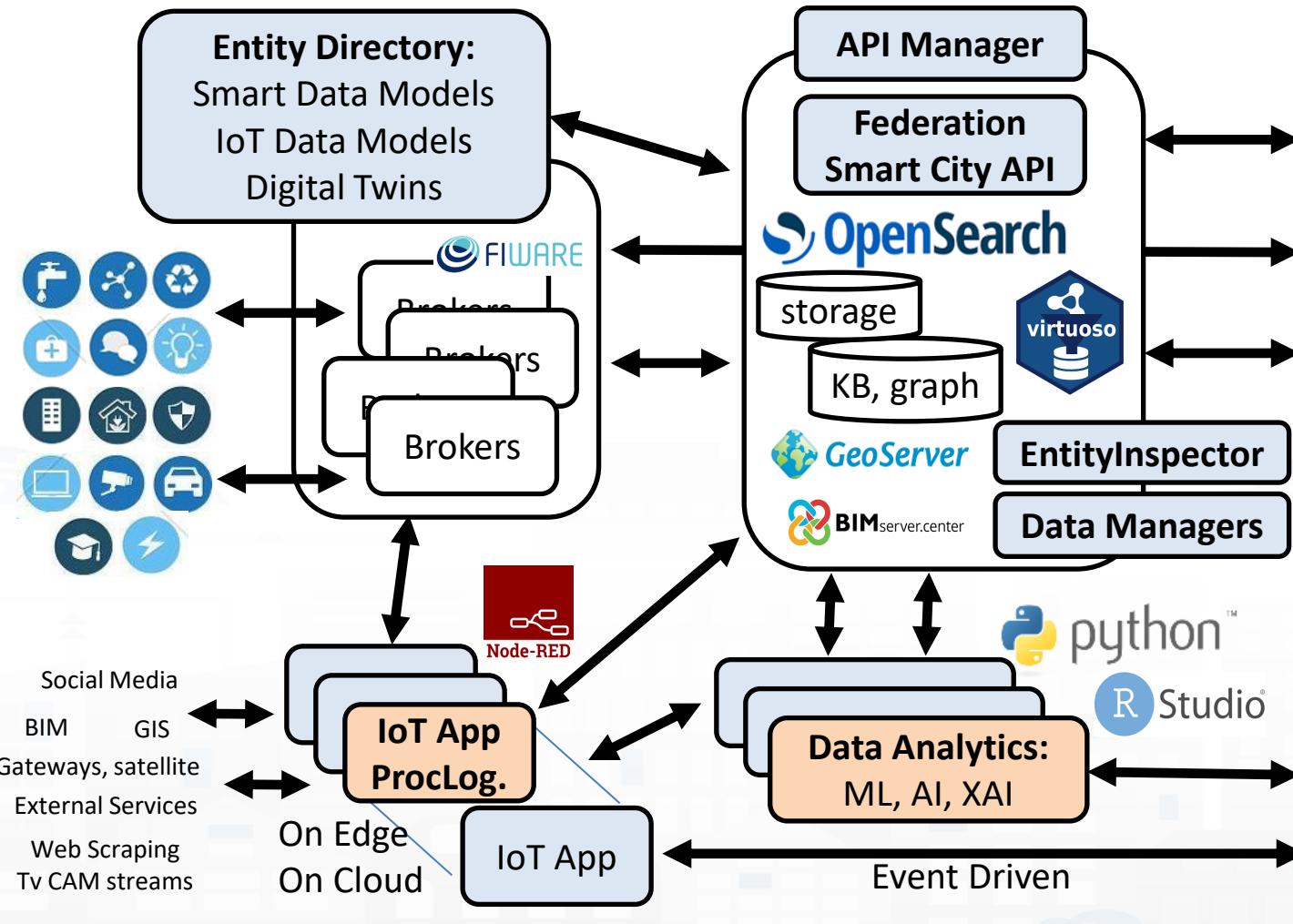
Different Themes



New styles/themes can be developed by specializing a few files from open source

<https://www.snap4city.org/793>

Tech Arch



A&A, SSO, Blockchain, Resource Managers and Sharing: IoT App, Data Analytics, ...

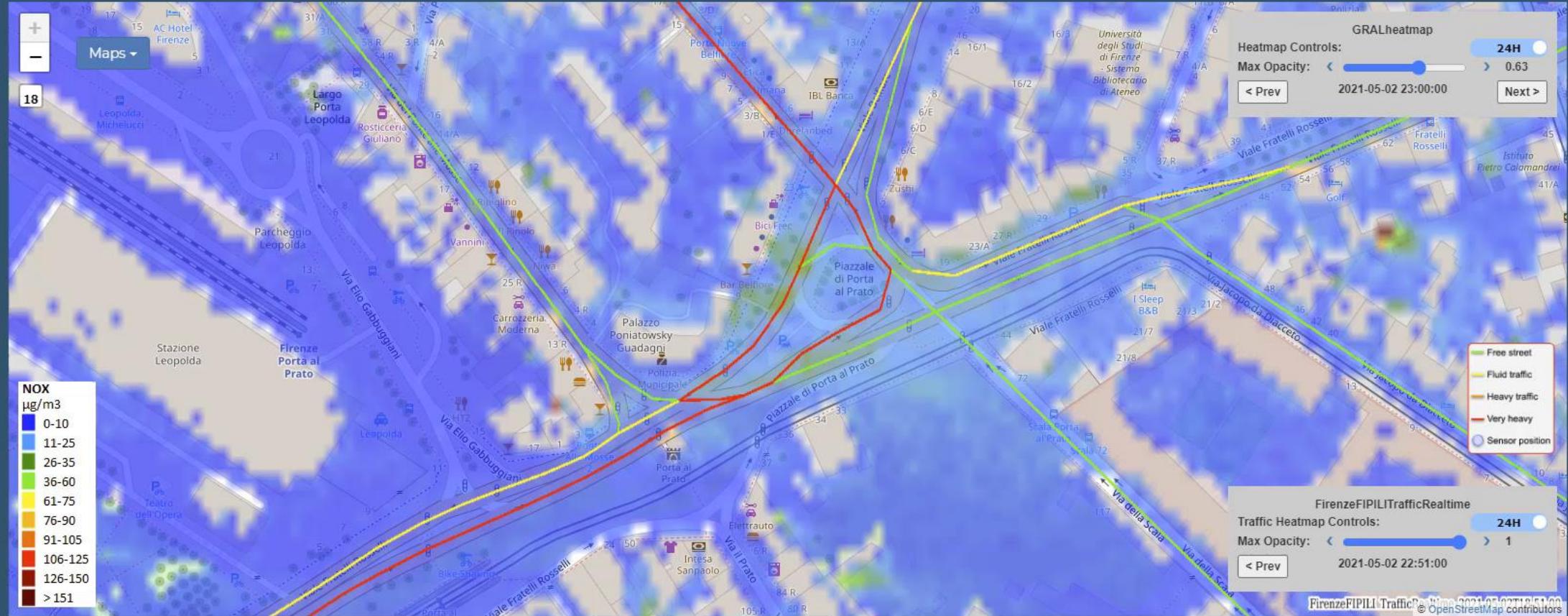
TOP

Monitoring and control short/long term predictions



Traffic Flow Manager on multiple cities

Sun 2 May 23:16:31



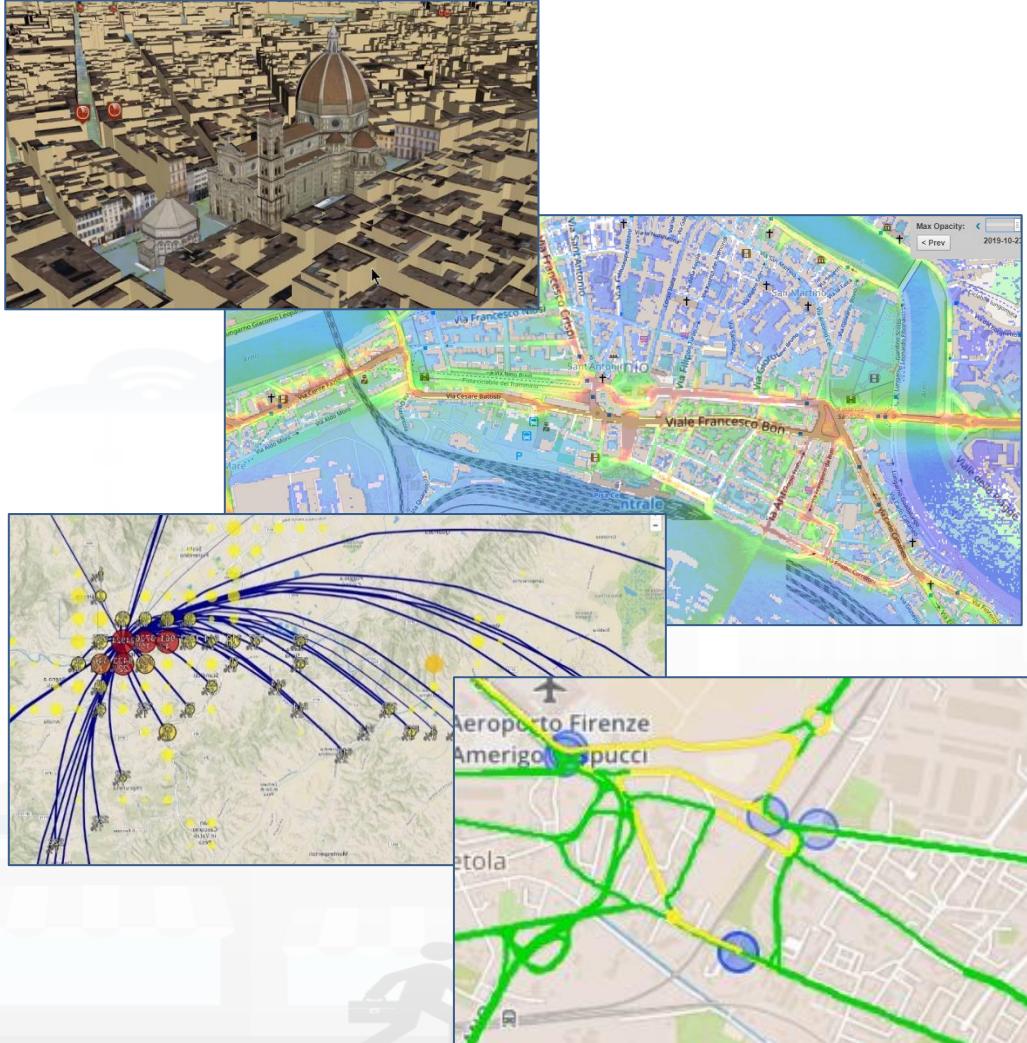
11 SUSTAINABLE CITIES AND COMMUNITIES

13 CLIMATE ACTION



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Smart City Digital Twin



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
- 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
- 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

Ciao roottooladmin1

Fri 2 Sep 19:13:07

3D MAP GLOBAL DIGITAL TWIN -NEWGUI



3D MAP

- Enable Lights
- Datetime: 02/08/2022 10:11
- Enable dynamic shadows (experimental)

Traffic Heatmap Controls: 24H Max Opacity: < 1 > 1

2022-09-02 18:56:00

OpenStreetMap contributor

DISIT:ORIONUNIFI:TUSC_WEATHER_SENSOR_OW_3176959 - AIRTEMPERATURE

8m

30

6

20:00 21:00 22:00 23:00 2. Sep 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00

Snap4CityDocker x Dashboard Management System +

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

Snap4City dashlocal | Tavole preferiti

Ciao

Fri 13 Oct 18:29:18

FLORENCE SCDT

SELECT... DOUBLE MAP

<https://www.youtube.com/watch?v=le2XNF8Ftxo>

Snap4City (C), October 2023

© OpenStreetMap contributors 20

TOP

Decision Support Tactic and Strategic Plans What-if Analysis



100%
OPEN
SOURCE

SNAP4CITY
LIVING LAB FOR
COLLABORATIVE
WORK



Available AI Solutions on Snap4City

- Mobility and Transport
- Environment, Weather, Waste, Water
- City Users Behaviour and Social analysis
- Energy and Control, Security,
- Tourism and People
- Security and Safety
- High Level Decision Support Solutions
 - Asset management
 - Resilience and Risks Analysis
- Low level Techniques

<https://www.snap4city.org/download/video/course/p4/>



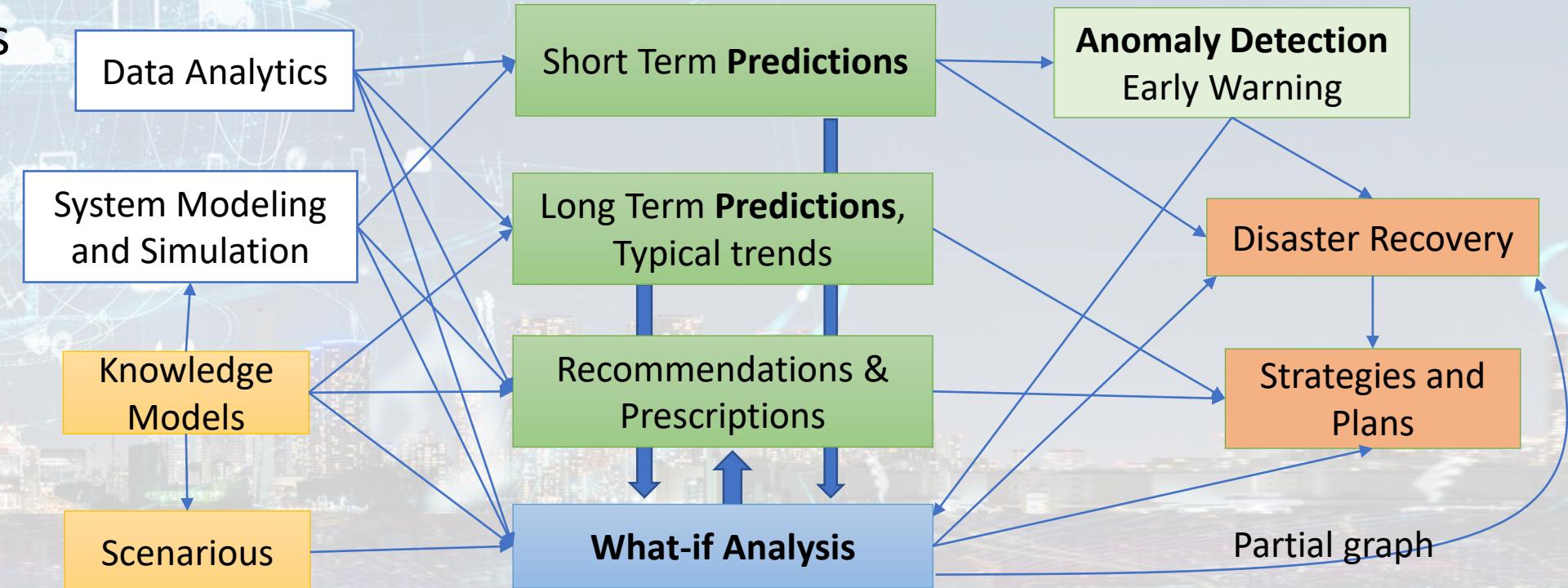
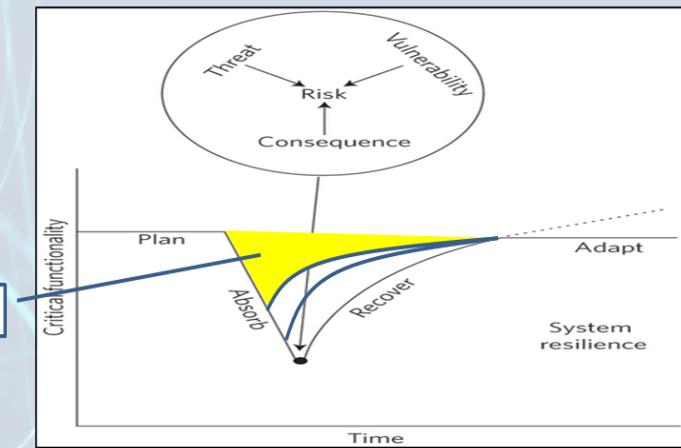
https://www.snap4city.org/download/video/DPL_SNAP4SOLU.pdf

Snap4City What-If

- Decision support systems
- Improvement of life quality
- Sustainable Solutions
- Reduction of costs
- Risk Assessment
- Resilience

Prepare
Asorb
Recover
Adapt

damage



Decision Support System: neuro-symbolic reasoning
targeting Indicators: Quality of Life, PUMS, SUMI, KPI, SDG, 15MinIndex,...

TOP

Data Analytic Artificial Intelligence, XAI, Machine and Deep Learning

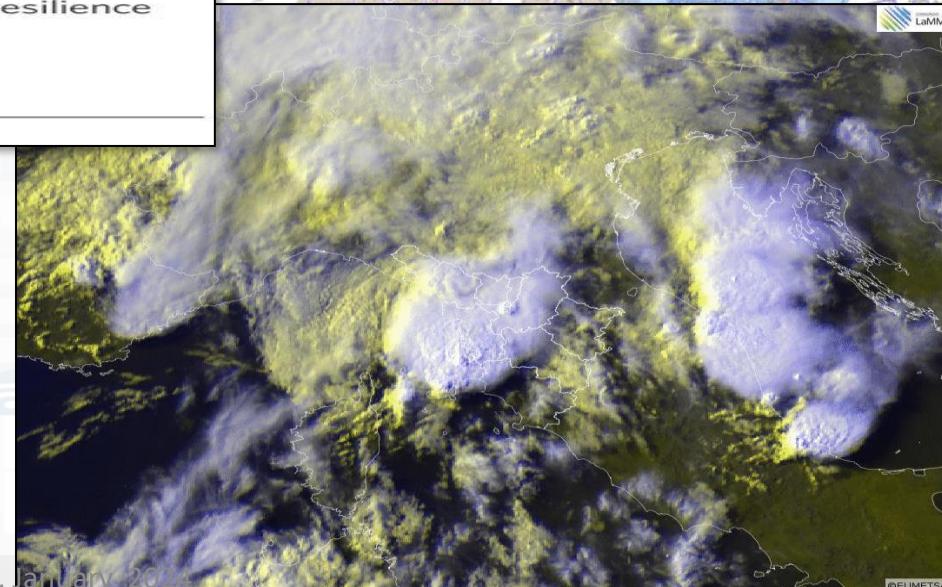
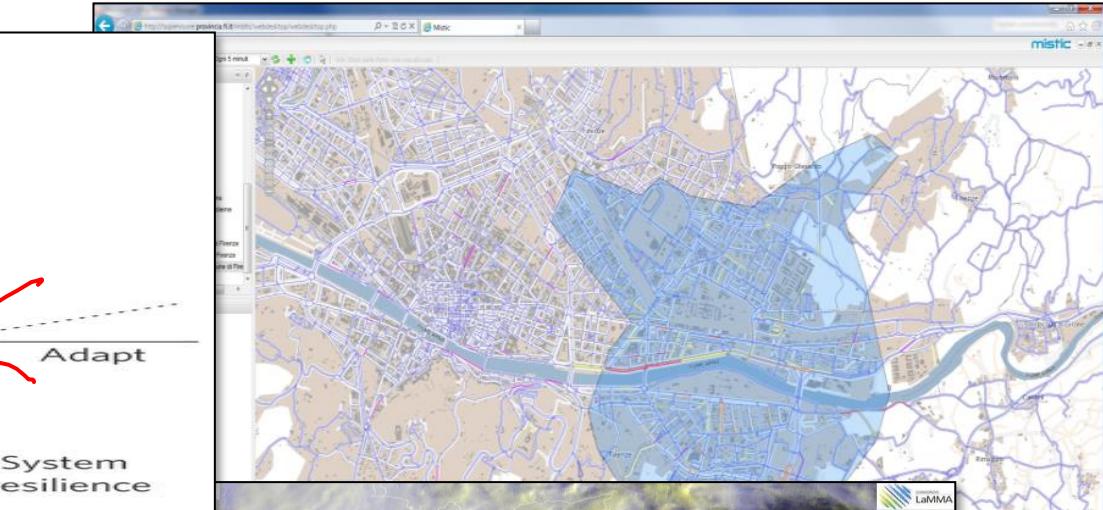
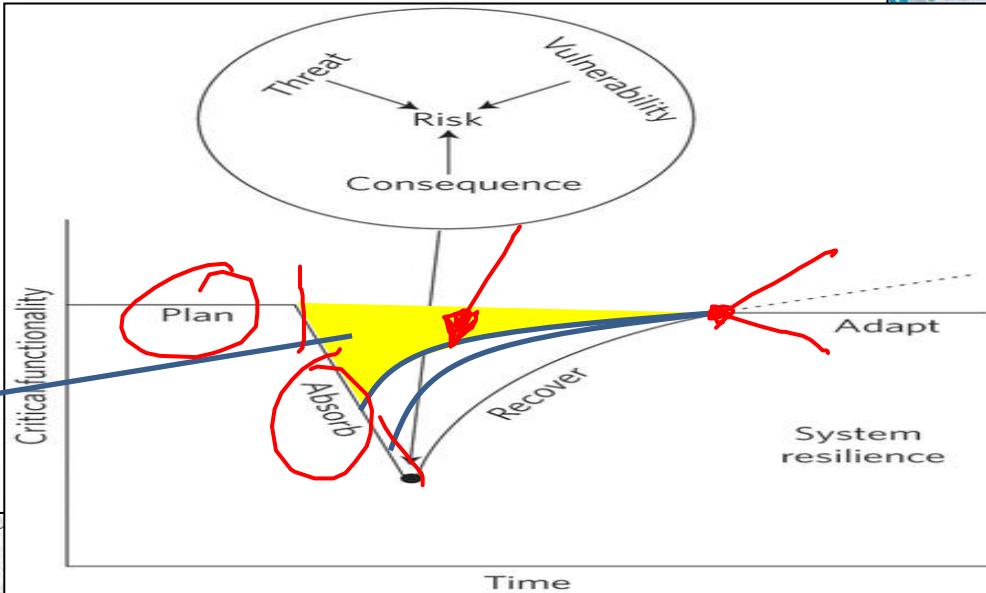
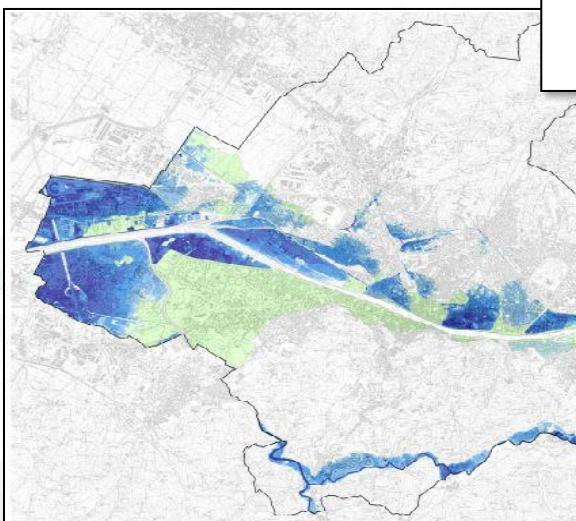


Environment and Weather

- Pollutant Predictions: short, long and very long term European Commission KPIs
 - NOX, PM10 pollution on the basis of traffic flow, 48 hours (ML, AI, DL)
 - Cumulated NO2 average value over the year, (ML, AI, DL)
- Computation of CO2 on the basis of traffic flows (DP), computing emission factor (DA)
 - each road for each time slot of the day
- Prediction of MicroClimate conditions for diffusion (ML, AI)
 - NO2, PM10, PM2.5, etc.
- Prediction of landslides, 24 hours in advance (AI, DL)
- Heatmaps production, dense data interpolation (DP) for
 - Weather conditions: temperature, humidity, wind, DEW
 - Pollutants and Aerosol: NO, NO2, CO2, PM10, PM2.5, etc.
- Impact of COVID-19 on Environmental aspects (DP)
- Optimisation of waste collection schedule and paths (DP, ML)
- Computing SDG, SUMI, PUMS, .. (mainly DP)
- Etc.

Prepare
Asorb
Recover
Adapt

Early Warning, Detection



Environment and Quality of Life Air Quality Predictions

Cities of:
Firenze, Pisa, Livorno
reference
SNAP4CITY
KM4CITY

• Multiple Domain Data

- Traffic Flow data, Pollutant: NOX, CO2, PM10, PM2.5, O₃,
- 3D City structure, weather, ...

• Multiple Decision Makers

- Pollutant Predictions: NOX, NO2, ..
- City officers, energy industries
- Dashboards, What-IF analysis
- Traffic Flow Reconstruction

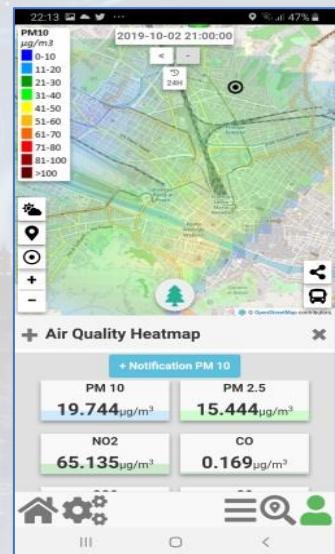
• Historical and Real Time data

- Billions of Data

• Services Exploited on:

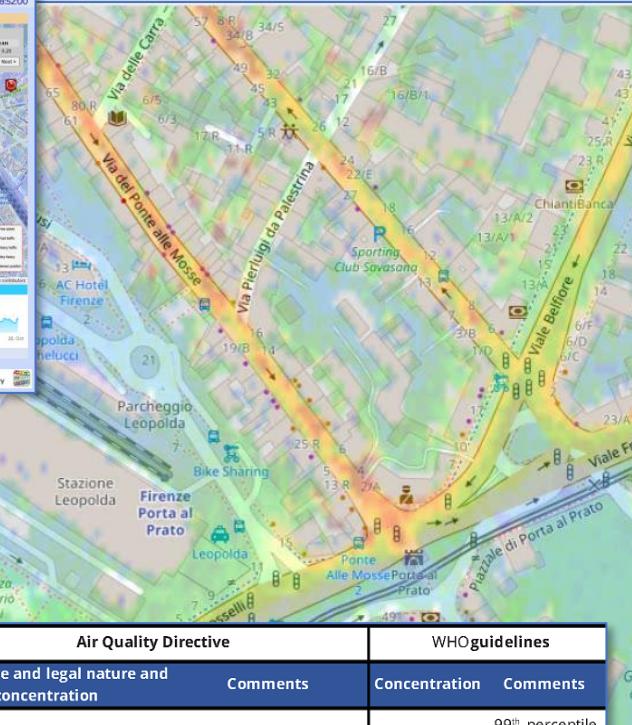
- Dashboards, Mobile App

• Since 2020



KPI of EC

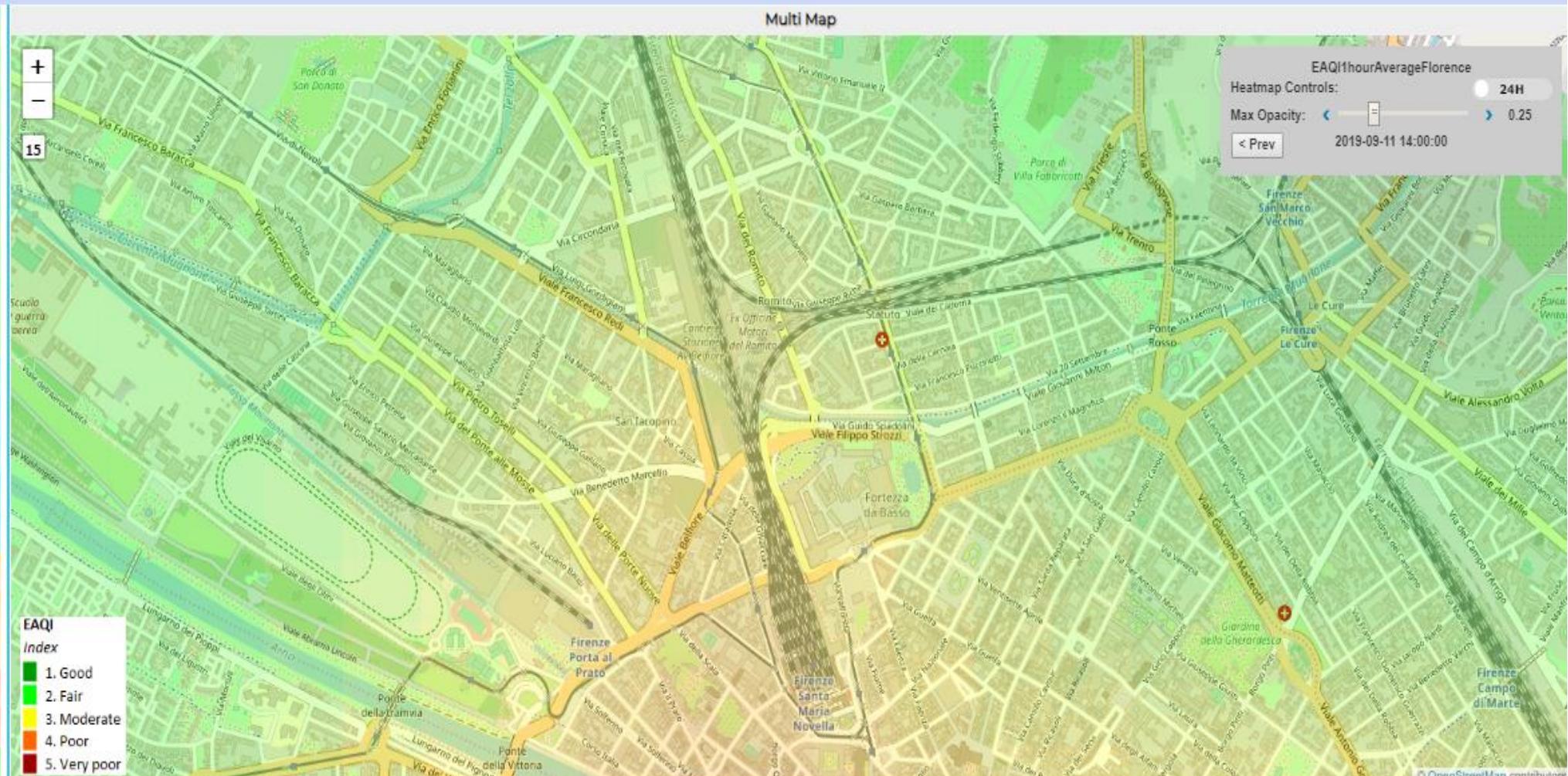
Air Quality Directive		WHO guidelines			
Pollutant	Averaging period	Objective and legal nature and concentration	Comments	Concentration	Comments
PM _{2.5}	One day			25 µg/m³ (*)	99 th percentile (3 days/year)
PM _{2.5}	Calendar year	Target value, 25 µg/m³	The target value will come a year 2015	10 µg/m³	
PM ₁₀	One day	Limit value, 50 µg/m³ to be exceeded on more than 35 days per year.		50 µg/m³ (*)	99 th percentile (3 days/year)
PM ₁₀	Calendar year	Target value, 40 µg/m³ (*)		20 µg/m³	
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NO ₂	One hour	Limit value, 200 µg/m³ (*) Not to be exceeded more than 18 times a calendar year		200 µg/m³ (*)	
NO ₂	Calendar year	Limit value, 40 µg/m³		40 µg/m³	





EAQI Heatmap and sequence

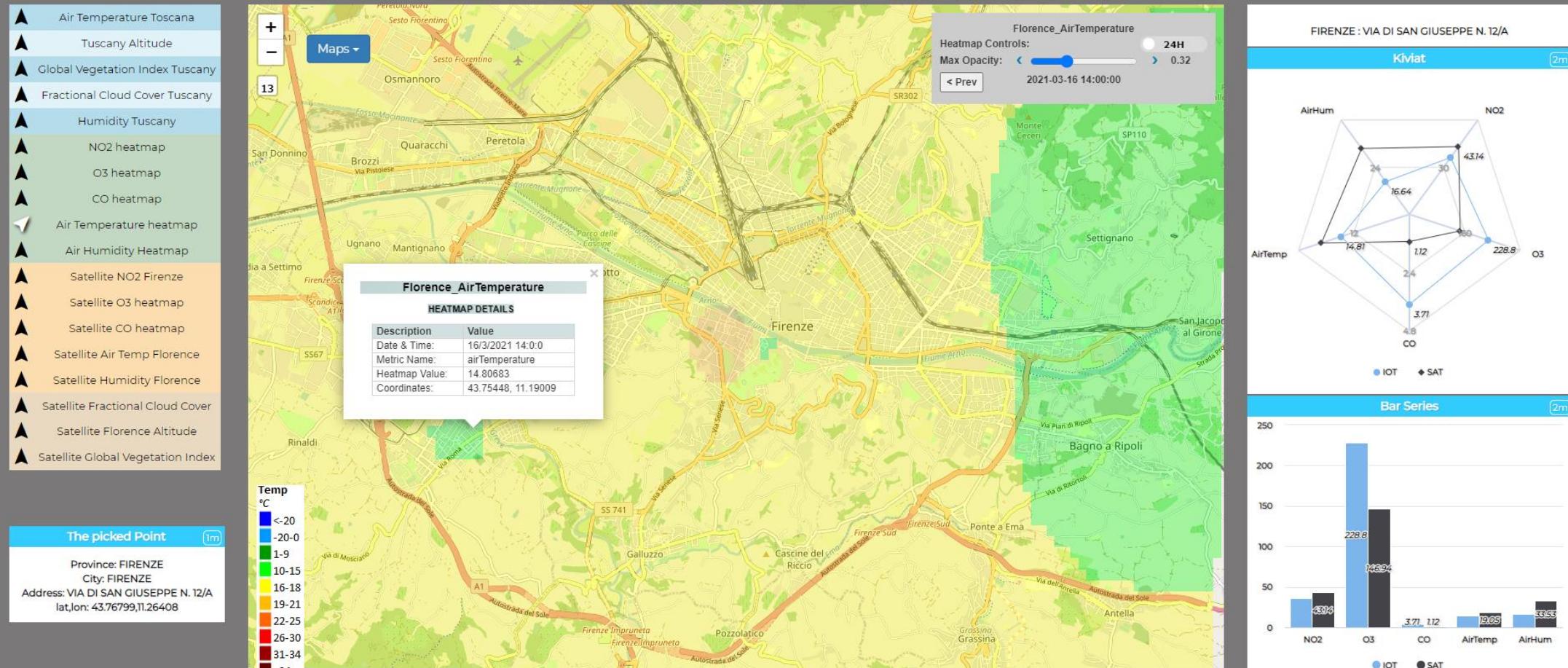
- ◀ Air Quality Sensors
- ◀ Weather Sensors
- ◀ PM10 Heatmap
- ◀ PM2.5 Heatmap
- ◀ CO Heatmap
- ◀ CO2 Heatmap
- ◀ O3 Heatmap
- ◀ NO2 Heatmap
- ◀ Europ. AQI Heatmap
- ◀ Air Humidity Heatmap
- ◀ Air Temp. Heatmap
- ◀ Wind Speed Heatmap
- ◀ Gral Pred. HM NOX (3m)
- ◀ Gral Pred. HM NOX (6m)
- ◀ Traffic Sensors
- ◀ Traffic Flow
- ◀ Cycling Paths
- ◀ Accident Heatmap
- ◀ Accident Heatmap 2
- ◀ Only HRes Anonym. Gral





Satellite (Copernicus) vs IOT Data

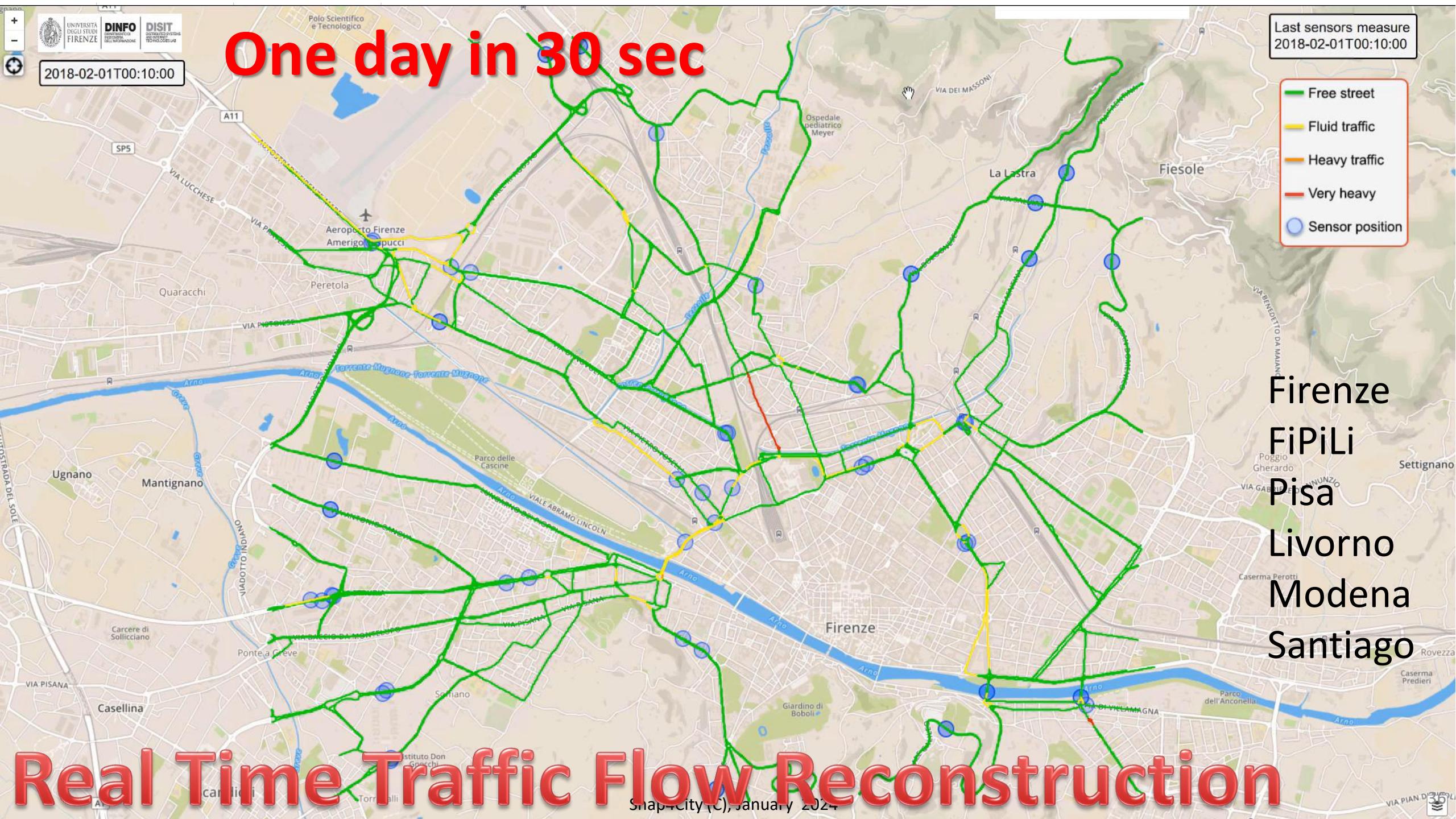
Thu 1 Apr 22:09:45



2018-02-01T00:10:00

Last sensors measure
2018-02-01T00:10:00

One day in 30 sec

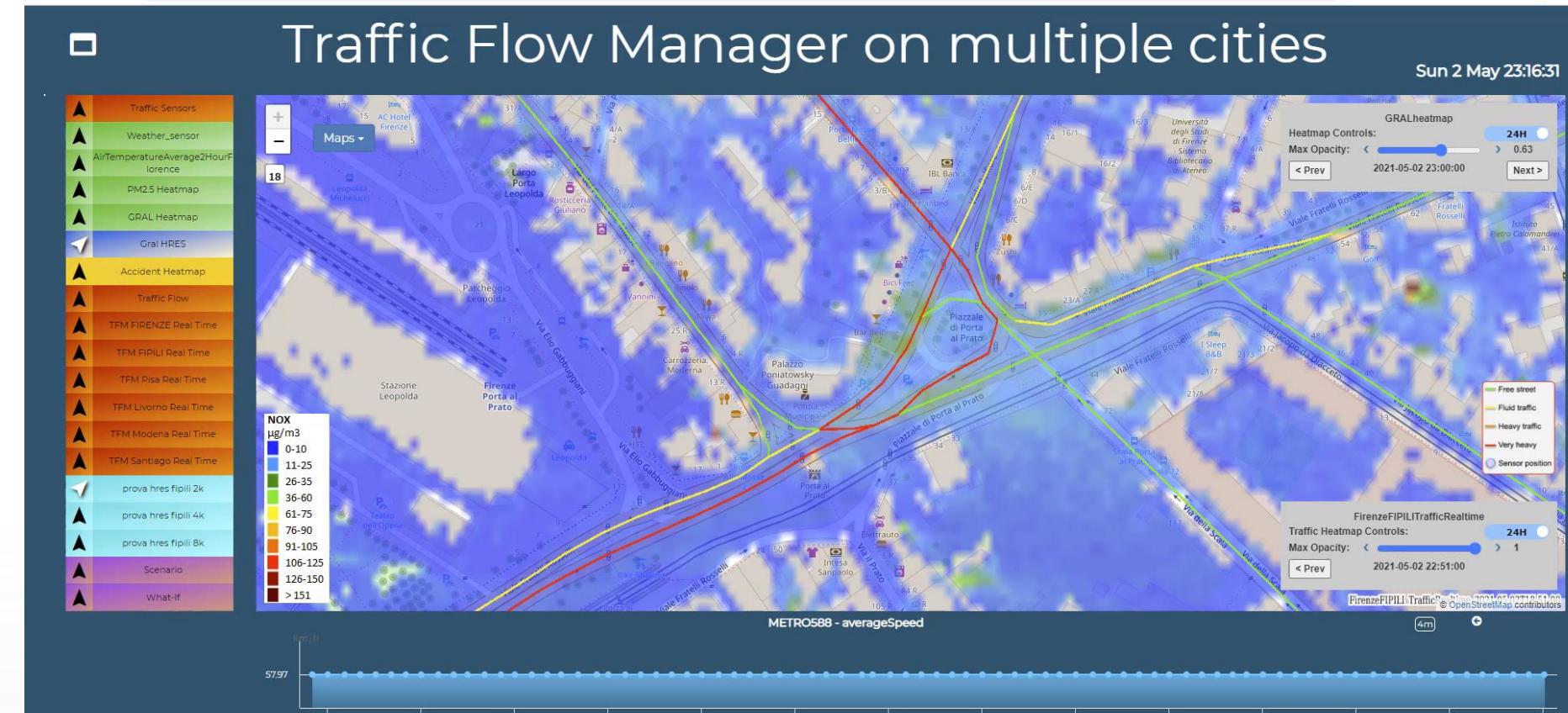


Real Time Traffic Flow Reconstruction

1-48 Hour prediction of NOx



- **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

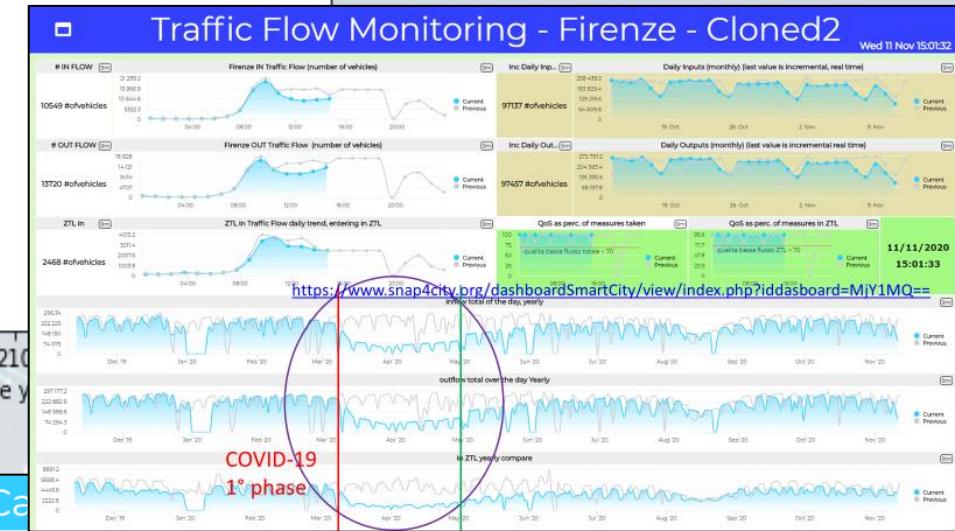
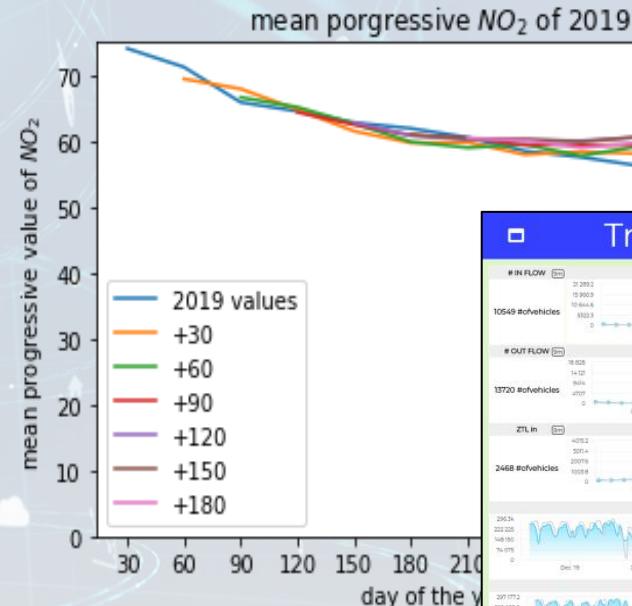


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Impact of COVID-19

- Multiple Domains Data
 - Traffic, environment, People, parking, stock options, Twitter, tc.
- Decision Makers Multiple Locations
 - NO₂ long term predictions
 - Twitter analysis
- Historical and Real Time data
- Services Exploited on:
 - Dashboards
 - Social media,
 - Sentiment Analysis
- Since 2019, 2020

Cities: Firenze, Pisa, Livorno, Toscana

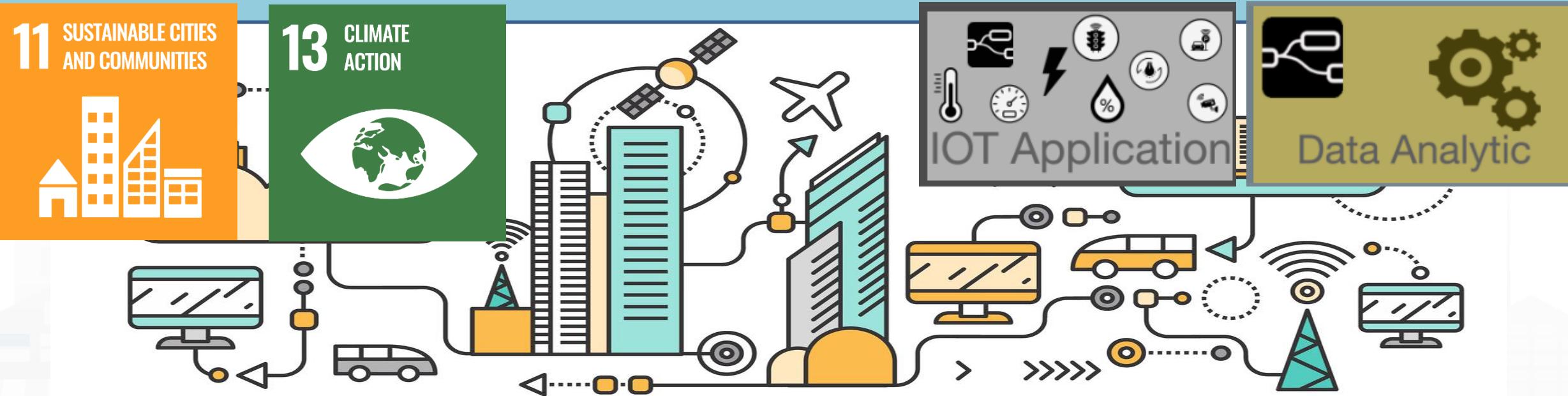


metric	model30	model60	model90	model120	model150	model180
MAE	1.21	1.31	1.52	2.04	2.31	2.37
RMSE	2.16	2.61	4.18	6.77	7.83	7.93
MAPE	1.99	2.20	2.65	3.57	4.07	4.18
R2	0.91	0.83	0.80	0.54	0.45	0.14

Table 4. Assessment of the predictive models with respect to the actual values of the 2019.

TOP

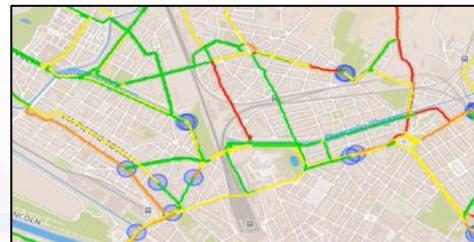
Computing CO₂ from traffic Data



Estimating City Local CO₂ from Traffic Flow Data



Computing Traffic Flow
into CO₂ sensor area



- Traffic Flow is one the main source of CO₂
 - K1: Fluid Flow
 - K2: Stop and Go
- **Dense estimation of CO₂ into the city is very useful to know to target EC's KPIs**

Computing CO₂ on the basis of
traffic flow data



Traffic Flow data

S. Bilotta, P. Nesi, "Estimating CO₂ Emissions from IoT Traffic Flow Sensors and Reconstruction", Sensors, MDPI, 2022. <https://www.mdpi.com/1424-8220/22/9/3382/>

Long Term Prediction of Annual Mean of NO₂ index of EC

11 SUSTAINABLE CITIES
AND COMMUNITIES



13 CLIMATE ACTION



15 LIFE ON LAND

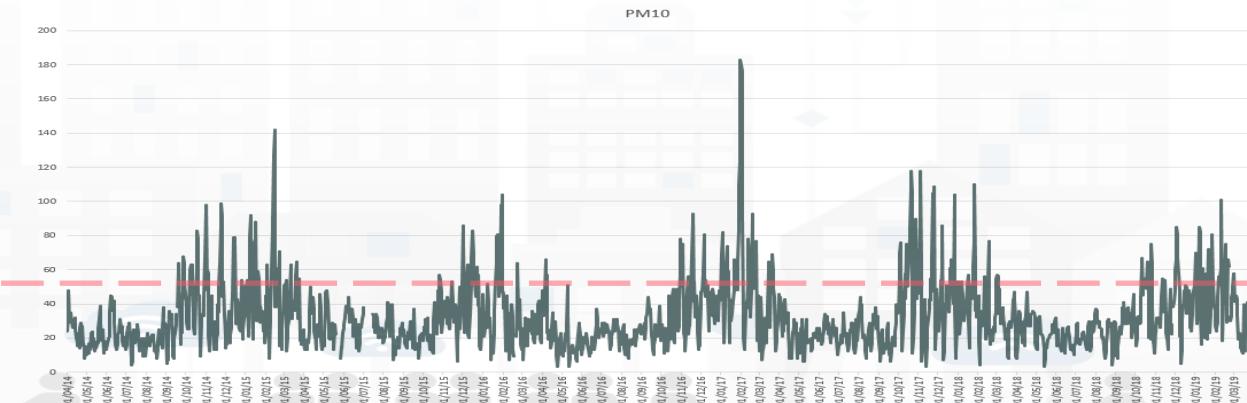


Data Analytic

Predicting Air Quality

- European Air Quality Directive
- Predicting critical days
 - PM10 with an accuracy of more than 90% and precision of 85%;
 - PM2.5 with an accuracy of 90% and precision greater than the 95%.
- Simulating Long terms values
 - For long terms predictions

Air Quality Directive				WHO guidelines	
Pollutant	Averaging period	Objective and legal nature and concentration	Comments	Concentration	Comments
PM _{2.5}	One day			25 µg/m ³ (*)	99 th percentile (3 days/year)
PM _{2.5}	Calendar year	Target value, 25 µg/m ³	The target value has become a limit value since 1 January 2015	10 µg/m ³	
PM ₁₀	One day	Limit value, 50 µg/m ³	Not to be exceeded on more than 35 days per year.	50 µg/m ³ (*)	99 th percentile (3 days/year)
PM ₁₀	Calendar year	Limit value, 40 µg/m ³ (*)		20 µg/m ³	
O ₃	Maximum daily 8-hour mean	Target value, 120 µg/m ³	Not to be exceeded on more than 25 days per year, averaged over three years	100 µg/m ³	
NO ₂	One hour	Limit value, 200 µg/m ³ (*)	Not to be exceeded more than 18 times a calendar year	200 µg/m ³ (*)	
NO ₂	Calendar year	Limit value, 40 µg/m ³		40 µg/m ³	



Predicting EC's KPI on NO₂ months in advance

Deep Learning Long Terms Predictions of NO₂ mean values, From 30 to 180 days in advance

- The features used as input for the predictive models are:

Month
dayOfTheYear

NO2

Tmean

Humidity

windMean

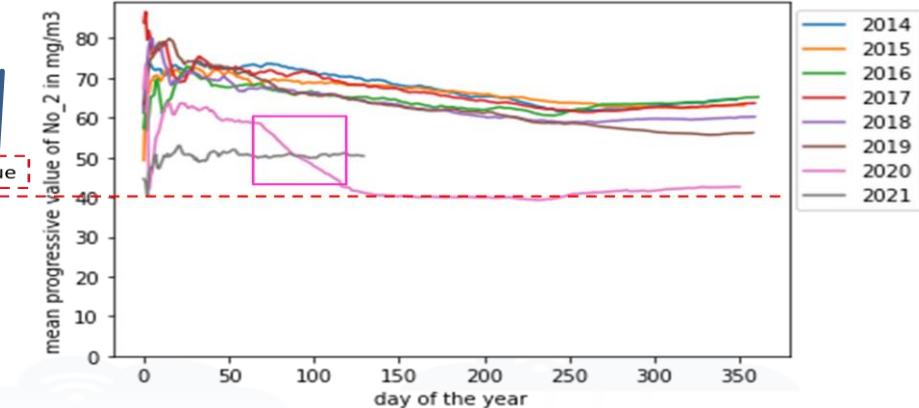
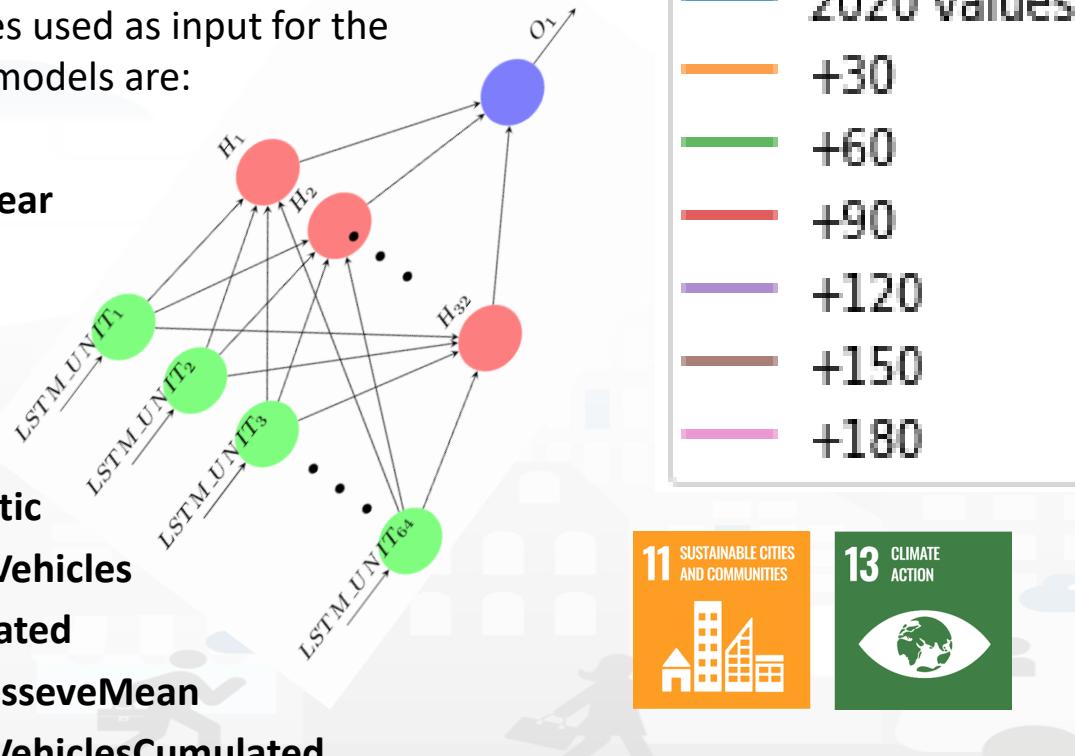
NoxDomestic

numberOfVehicles

NO2cumulated

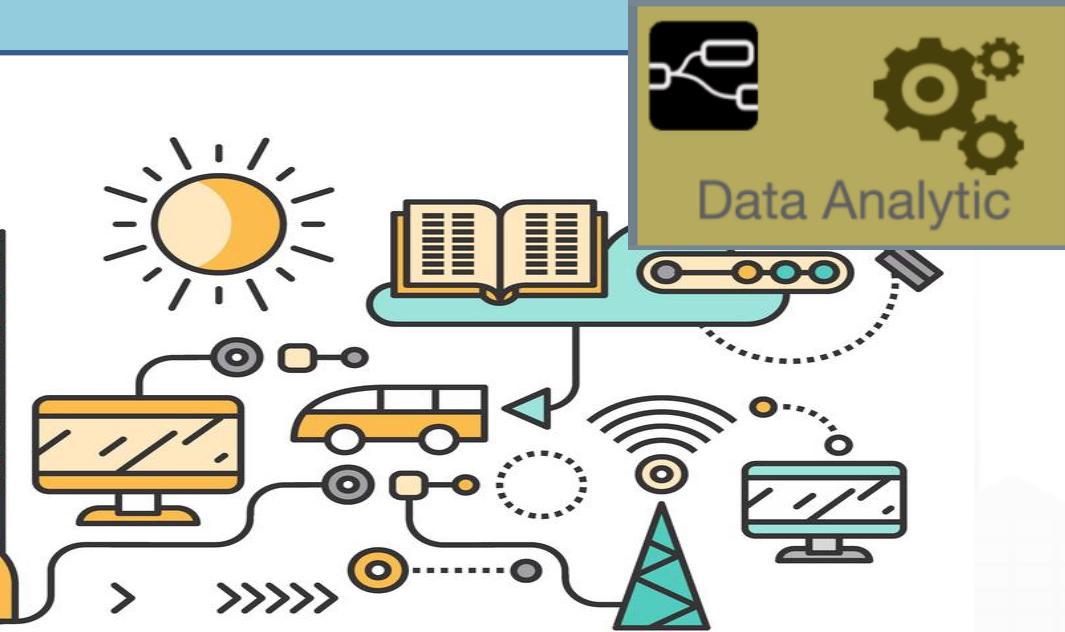
NO2progressiveMean

numberOfVehiclesCumulated



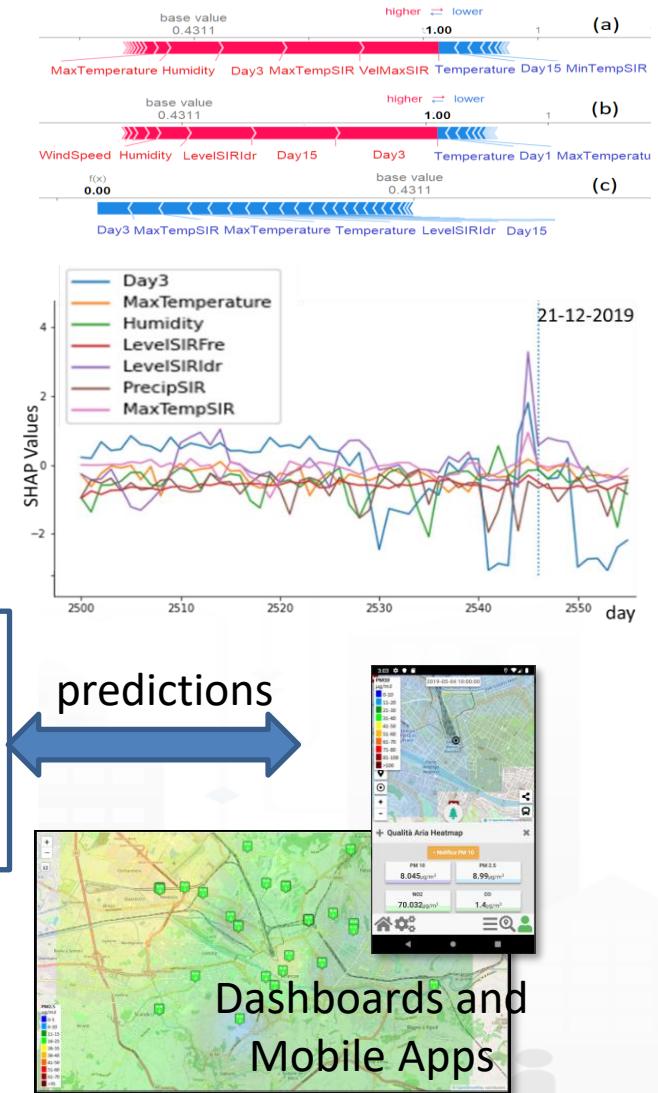
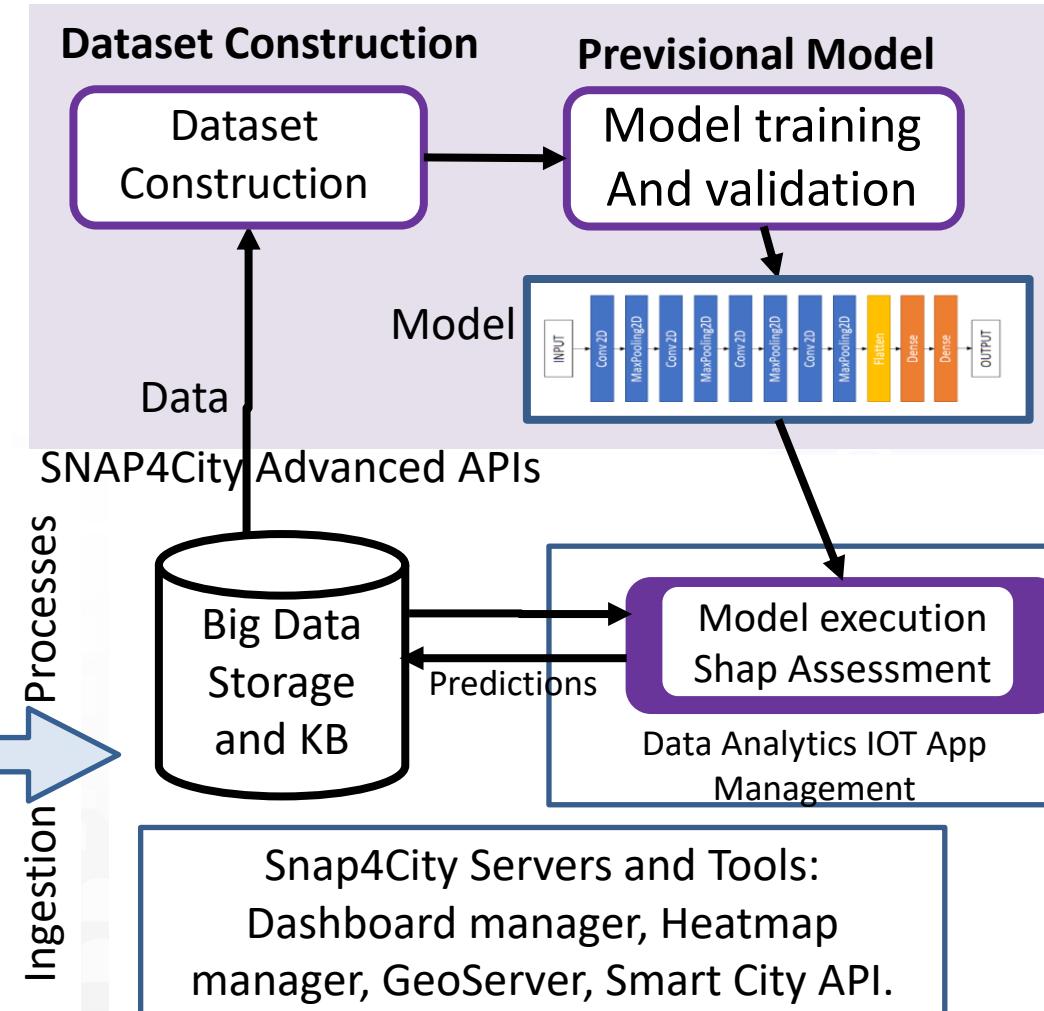
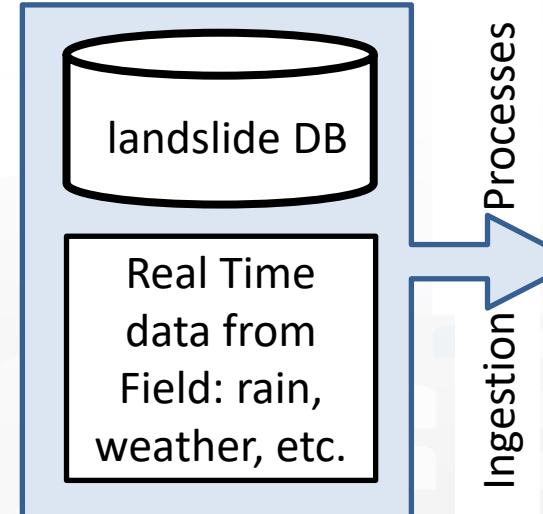
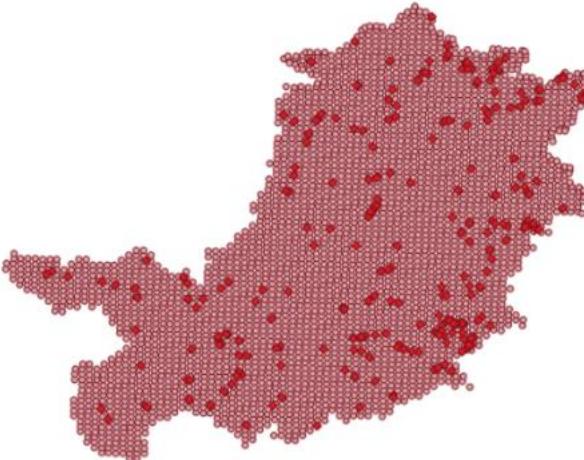
Pollutant	Averaging period	Air Quality Directive		WHO guidelines	
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NO ₂	Calendar year	Limit value, 40 µg/m ³		40 µg/m ³	

Predicting Land sliding





Predicting Land slides



Local Explainable AI - understanding the single event

- The local explanation puts in evidence the features which provided major contribution to the prediction
- For example considering Figure 10a, the value of VelMaxSIR, MaxTempSIR, Day3 and Humidity contributed significantly to the classification of the observation as a **landslide event**



FIGURE 10. Local feature relevance via SHAP, as interpretation of events in terms of feature values: (a) and (b) are events with predictions of landslide, (c) a no landslide event.

TOP

others



Smart Waste – Map view



Smart Waste Management

Thu 5 May 11:14:28

Select the bins Kind, Fullness and Status from the dropdown below and press SUBMIT to see the results on the map.

Kind	Status
Group	All
Fullness	All

Address
Address: via dei medici

Group ID
GroupID: FI67898

Table view

Smart waste bins status

- ORGANIC: 89 %
- PAPER: 100 %
- METAL: 100 %
- PLASTIC: 62 %
- GLASS: 83 %
- GENERIC: 65 %

VALUE NAME: FI67898

DETAILS DESCRIPTION RT DATA

Last update: 2022-02-28 12:46:12.899Z

Description	Value	Buttons
dateObserved	2022-02-28T12:46:12.899Z	Last value Last 4 hours Last 24 hour 7 days Last 30 days Last 6 month Last 1 year
generic	[SURI id]	Last value Last 4 hours Last 24 hour 7 days Last 30 days Last 6 month Last 1 year
glass	[SURI id]	Last value Last 4 hours Last 24 hour 7 days Last 30 days Last 6 month Last 1 year
metal	[SURI id]	Last value Last 4 hours Last 24 hour 7 days Last 30 days Last 6 month Last 1 year
organic	[SURI id]	Last value Last 4 hours Last 24 hour 7 days Last 30 days Last 6 month Last 1 year
paper	[SURI id]	Last value Last 4 hours Last 24 hour 7 days Last 30 days Last 6 month Last 1 year
plastic	[SURI id]	Last value Last 4 hours Last 24 hour 7 days Last 30 days Last 6 month Last 1 year

Via_Dei_Medici: ORGANIC fullness

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- Refine a search by using the filters on the left side
- Click on a waste bin pin on the map:
- A popup with real time data is shown
- The fullness status of the selected group of bins is shown in the synoptic below the map
- Specific fullness weekly trends are shown below the map
- Chick on the «Table view» button to access the other dashboard

11 SUSTAINABLE CITIES AND COMMUNITIES



3 GOOD HEALTH AND WELL-BEING

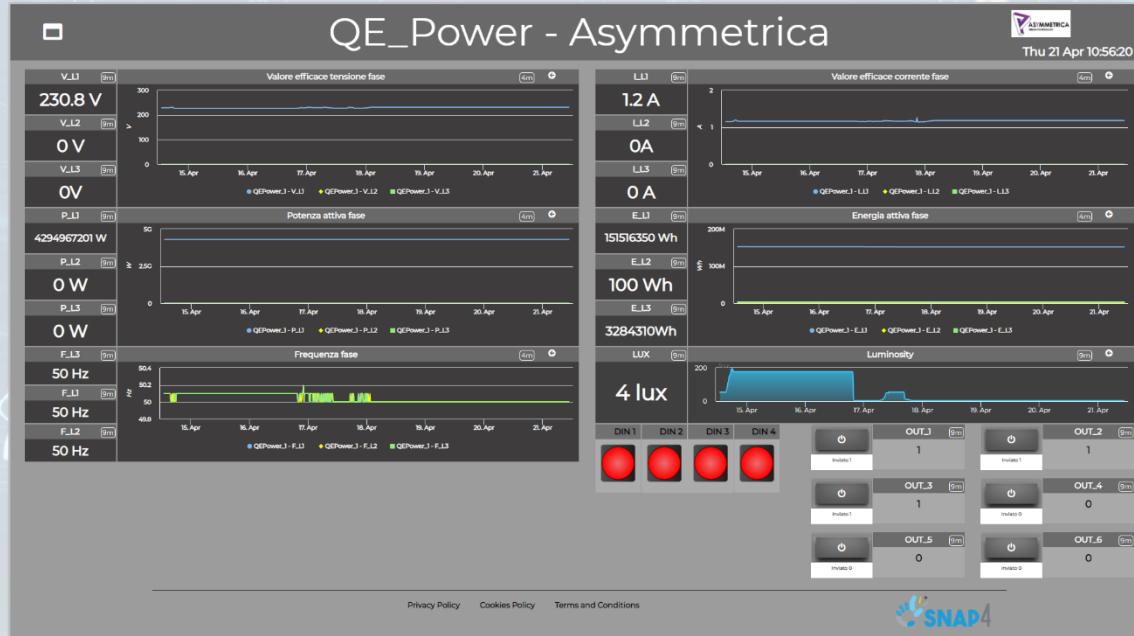


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7 AFFORDABLE AND CLEAN ENERGY



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



13 CLIMATE ACTION



Asymmetrica Alarms

Thu 21 Apr 10:56:49

Alarms

Variable	Status	Device	Date and Time
DIN_4	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:24:40
DIN_3	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:24:38
DIN_2	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:24:35
DIN_2	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:22:20
DIN_4	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:19:39
DIN_3	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:19:38
DIN_2	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:19:37
DIN_4	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:17:10
DIN_3	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:17:07
DIN_2	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:17:05
DIN_4	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:14:40
DIN_3	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:14:38
DIN_2	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:14:36
DIN_4	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:12:09
DIN_3	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:12:08
DIN_2	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:12:05
DIN_4	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:09:39
DIN_3	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:09:38
DIN_2	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:09:37
DIN_4	ALERT_H	DIGITAL_IN_Alarm_1	18/04/2022 3:07:10

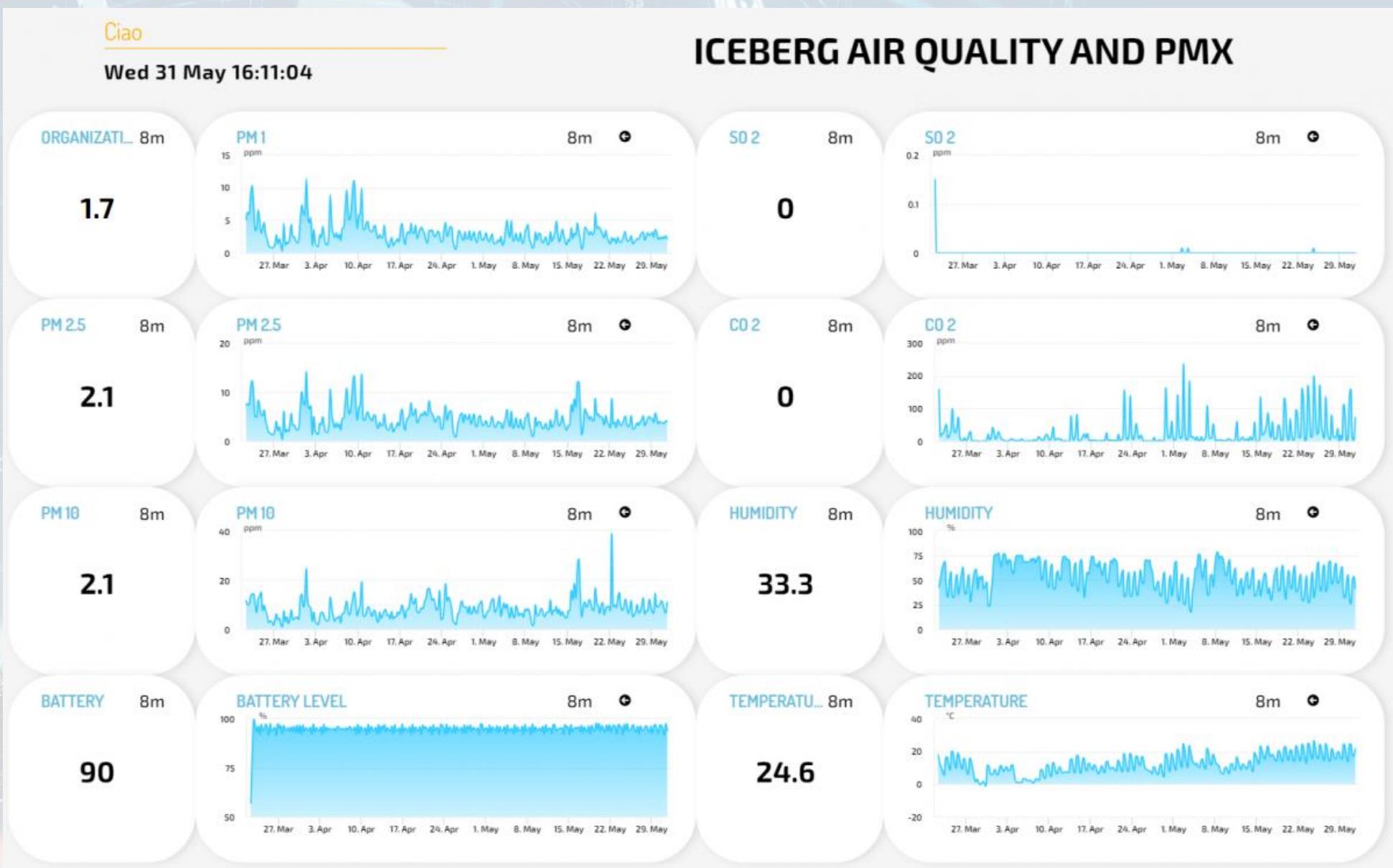
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Previous 1 2 3 4 5 ... 170 Next

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- Airquality
- Urban planning
- Parking
- Waste
- Etc.

<https://thelab.city/>

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References



SNAP4
Appliances and Dockers
Installations



2023 booklets

- Smart City



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/download/video/DPL_SNAP4CITY.pdf](https://www.snap4city.org/download/video/DPL_SNAP4CITY.pdf)

- Industry

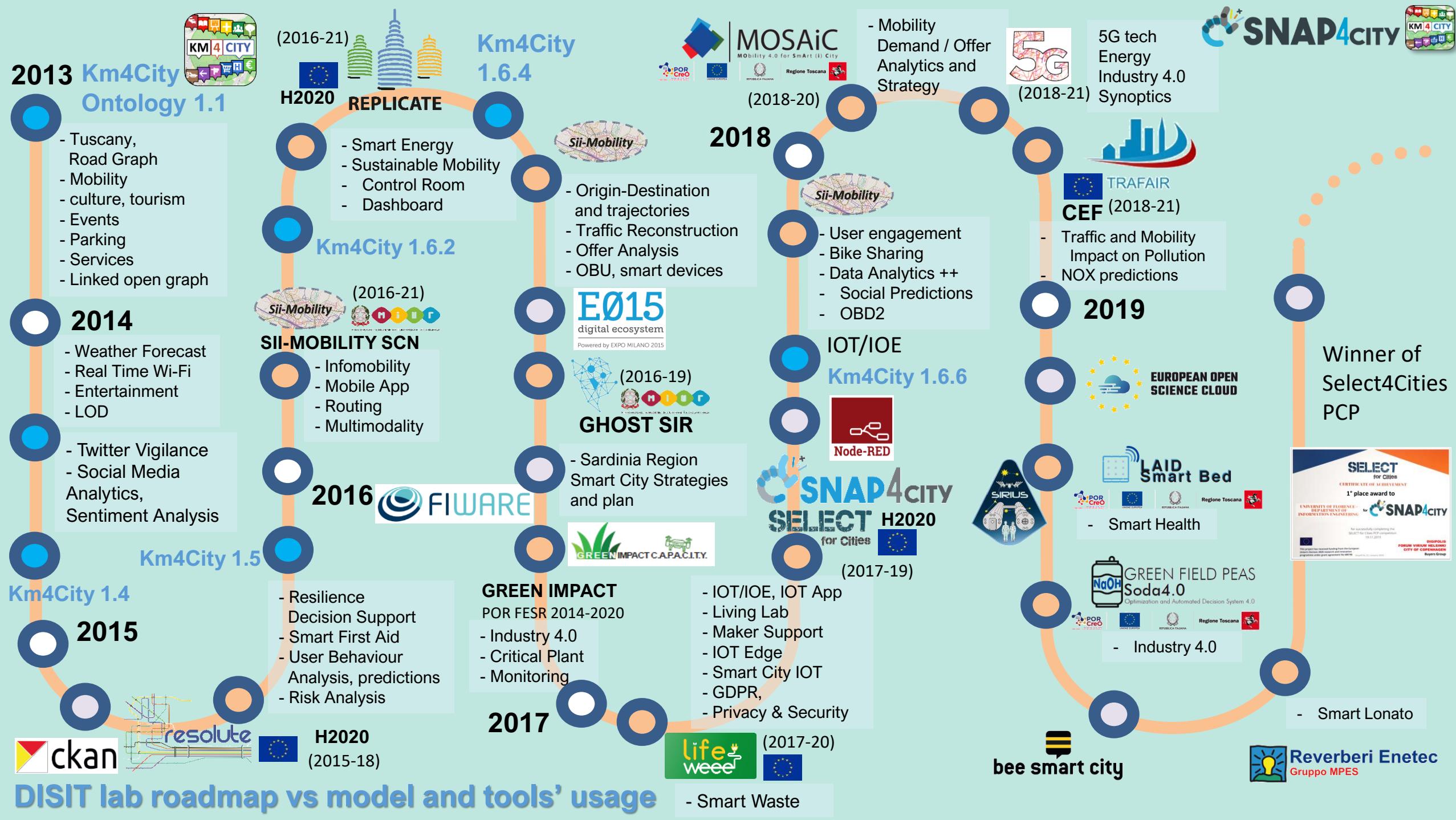


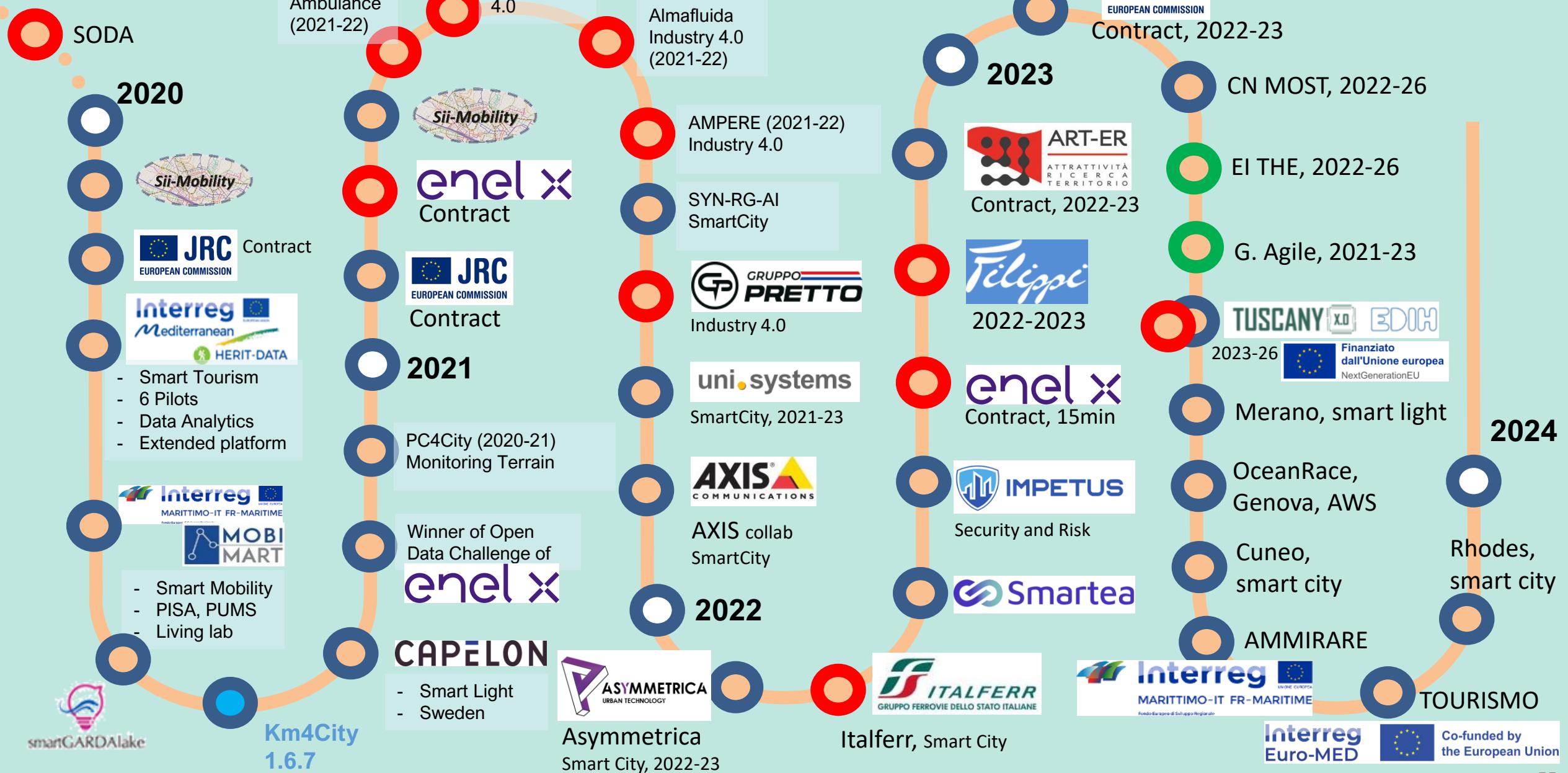
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- Artificial Intelligence



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