100% OPEN SOURCE

EU GDPR COMPLIANT

PEN Test Passed

Powered by FIWARE

SNAP4CITY on EUROPEAN OPEN SCIENCE CLOUD MARKETPLACE

Node-RED

SNAP4CITY

KM4CITY

SNAP4 Appliances and Dockers Installations

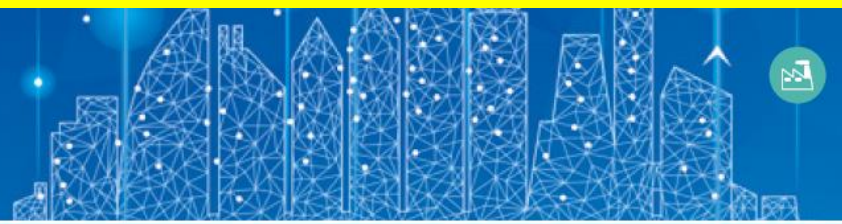
Be smart in a SNAP!

LIVING LAB

A Framework for rapid implementation of
- Sustainable Smart Solutions
- Decision Support Systems
as a no-coding, low-coding

Training
for Pont Du Gard
13-12-2021

Interreg Mediterranean HERIT-DATA



SCALABLE SMART ANALYTIC APPLICATION BUILDER FOR SENTIENT CITIES

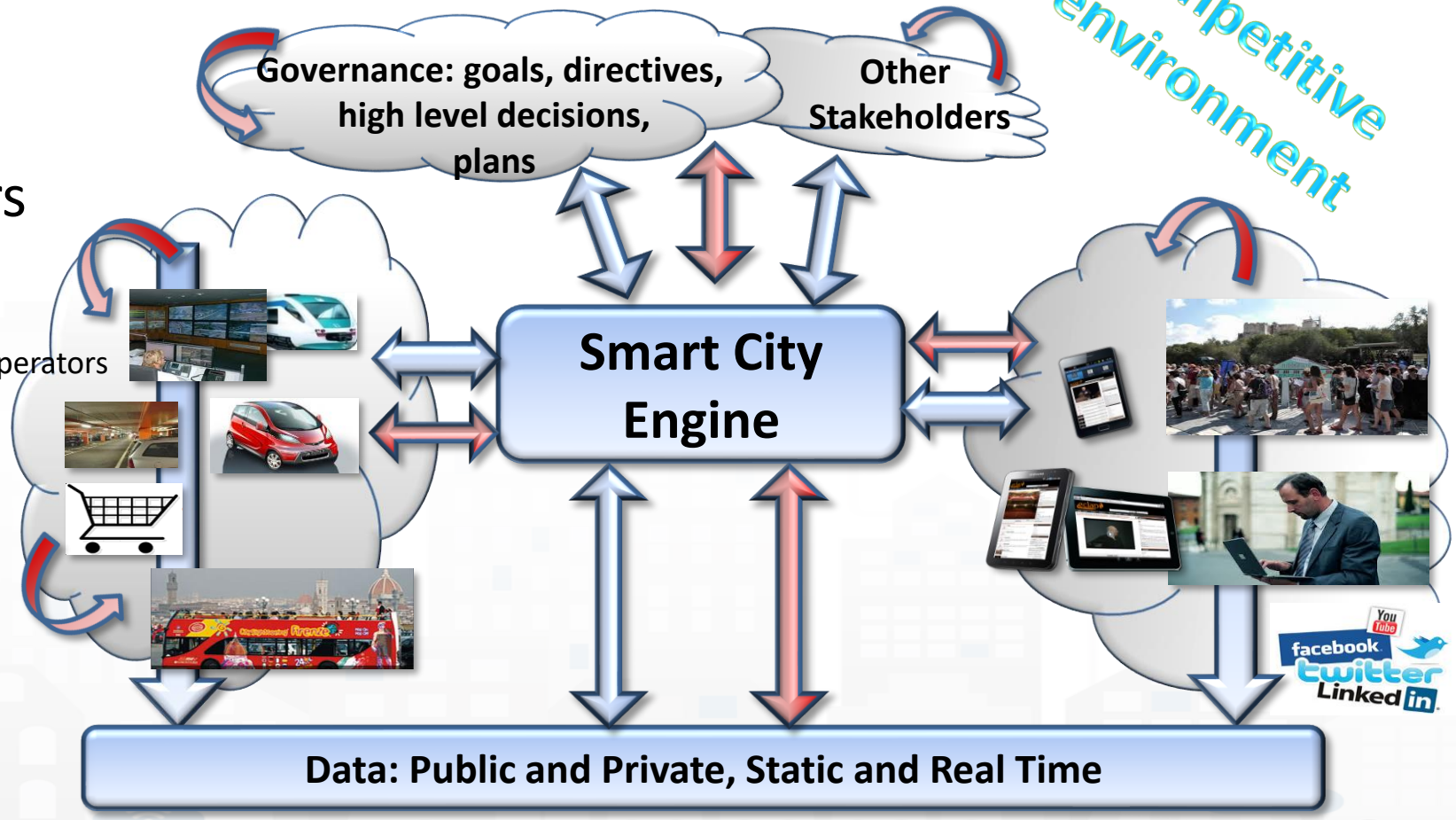
UNIVERSITÀ DEGLI STUDI FIRENZE | DINFO | DISIT

Agenda

- **Process Overview**
- **Some Examples**
- *Aims of Solutions Development*
- **Your questions?**
- **Overview on Dashboard Production**
- **Dashboards by Selecting Data vs Widgets**
- **Dashboards with Business Logic/Intelligence**
- *Overview of Data Ingestion*
- *Just to start ! - See many other features*

From Strategies to (re-)Actions

- Analyze
- Alerting, Early Warning
- Support Decision makers
- Plans
- Prescriptions
- Inform
- Suggest
- Engage
- Research



Data Driven Decision Support

- Decision Support system
- Assessment / Strategies
- Data Rendering, visual analytics
- Data Processing
- Data aggregation, Storage, indexing
- Data Ingestion

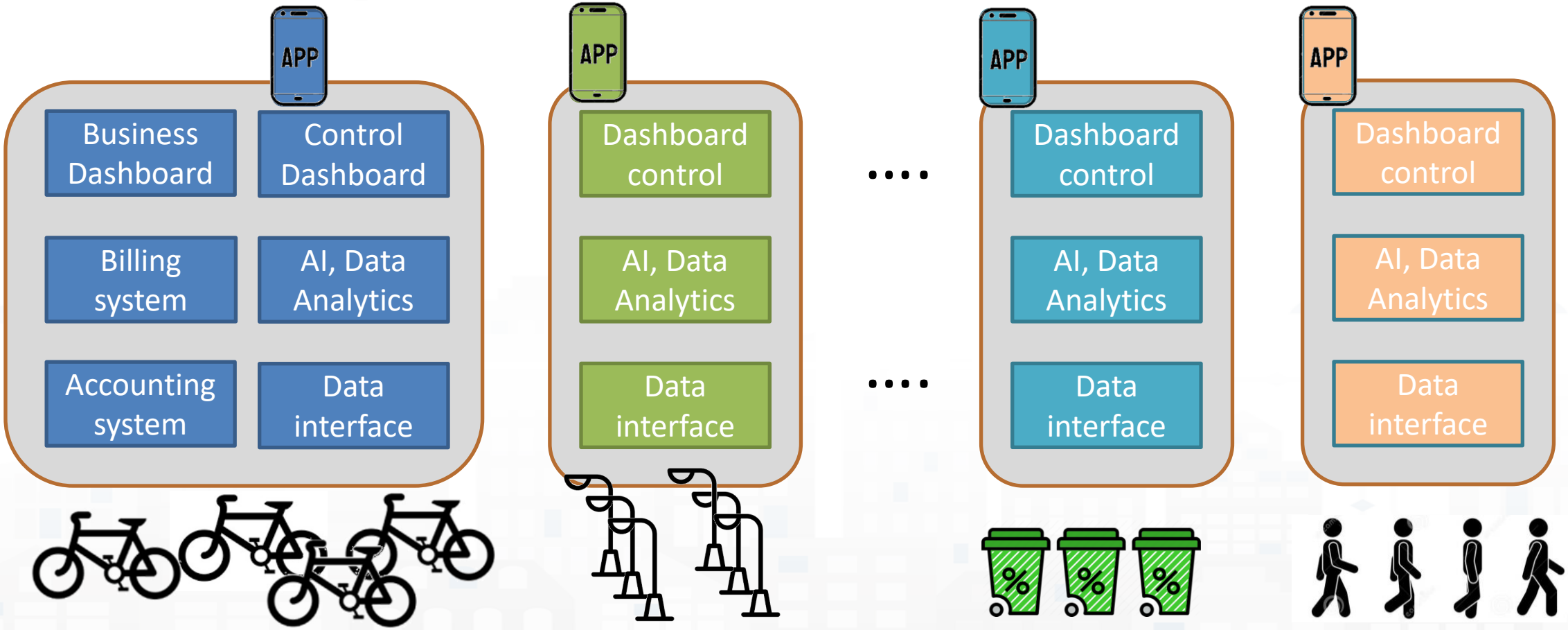
Requirements and Objectives

- Serve as a **City Dashboard**, **App User Interface**, etc.
  - Real time and historical data, any device, sensors and actuators
  - Sensors, KPI, maps, data trends, real time data, charts, etc.
  - Multi domain, smart city + industry 4.0 scenarious
- **Data Analytics**: Machine Learning, statistics, reasoning, optimization, …
- **Data Driven Real Time communication &** processing:
  - IOT Applications, IOT edge, multiple operating systems, embedded systems, **MicroServices**
  - in/out data driven from/to the field into: applications, notifications, etc.
- Referral / **historical data, Open/private Data**:
  - shadow, access (API, storage, any protocol), production of OD, export
- **Serve as Living Lab**: open innovation, co-working; collaborative work; sharing: data, processes, dashboard, experiences, solutions, ….
- From **small** to **large scale cases**

Non functional requirements

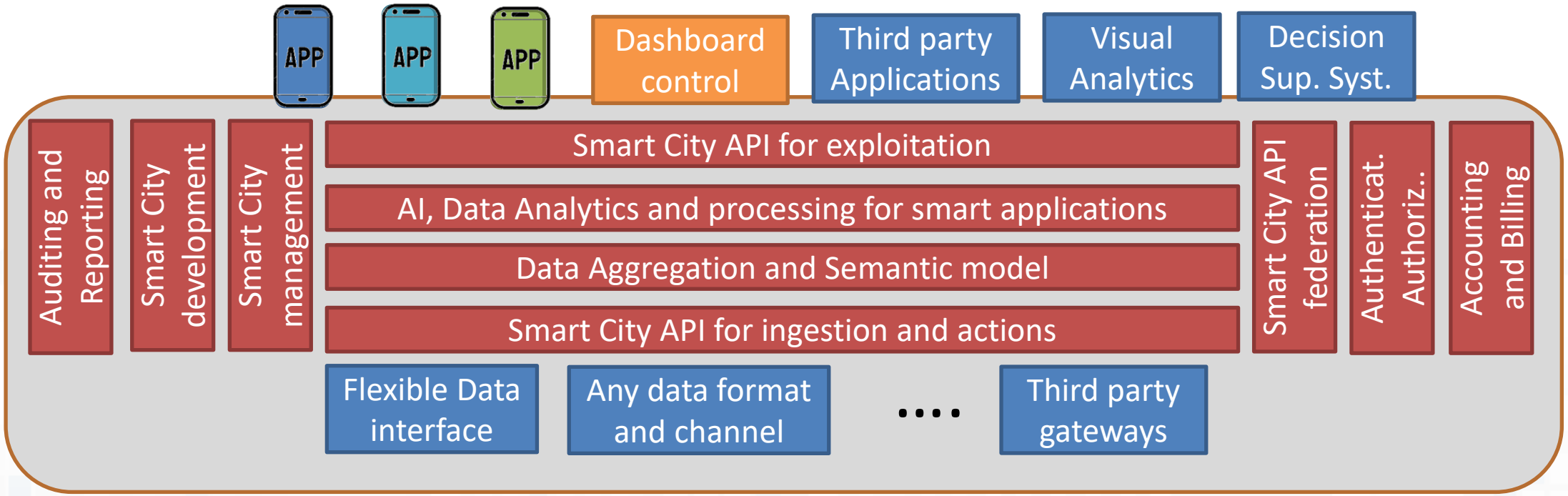
- **Open**
  - any **Standard, fully modular and interoperable**
  - **Open Source** based 100%
  - **Heterogeneous**: any device, any format, private and public, custom and..
- **Multi tenant:**
  - to cope with multiple organization with a single installation
- **Scalable, Robust, Distributed** and Decoupled, modular, Service Oriented, open to external services and data sets, big data
- **Security** by Design: PENTest, HTTPS, TLS, … compliant with EC
- **User Centric** Design: respect privacy by Design (and **GDPR**), personalized, personal data management, ...

Avoiding to have a collection of verticals



Simplifying the development and integration of verticals

Integrated Platform



Tools for rapid implementation of sustainable Smart Solutions and Decision Support Systems

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www.snap4city.org

100% OPEN SOURCE

Powered by FIWARE

FREE TRIAL

PEN Test Passed

EU GDPR COMPLIANT

SNAP4 Appliances and Dockers Installations

EUROPEAN OPEN SCIENCE CLOUD

Node-RED

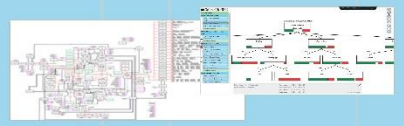
JS Foundation

EØ15 digital ecosystem

NVIDIA

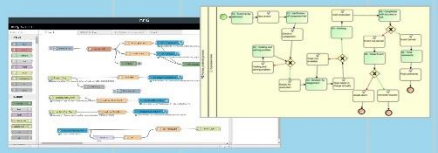
DASHBOARDS AND APPS - CONTROL ROOMS - DECISION SUPPORT SYSTEMS - WHAT-IF ANALYSIS - VISUAL ANALYTICS

PREDICTION - ANOMALY DETECTION - ENVIRONMENTAL MODEL - 3D MODEL
KPI - SIMULATION - EARLY WARNING - SYNOPTIC - DIGITAL TWIN - VIRTUAL REALITY



EXPERT SYSTEM
KNOWLEDGE BASE
STORAGE

BIG DATA ANALYTICS
EXPLAINABLE ARTIFICIAL INTELLIGENCE
BUSINESS INTELLIGENCE
MACHINE LEARNING

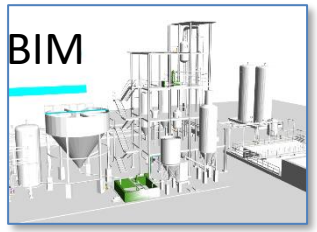


DATA FLOWS, DATA DRIVEN
WORKFLOWS, MICROSERVICES
PARALLEL DISTRIBUTED PROCESSING

METHODOLOGIES
COURSES AND COMMUNITY
LIVING LABS
DEVELOPMENT TOOLS

Concept

BIM

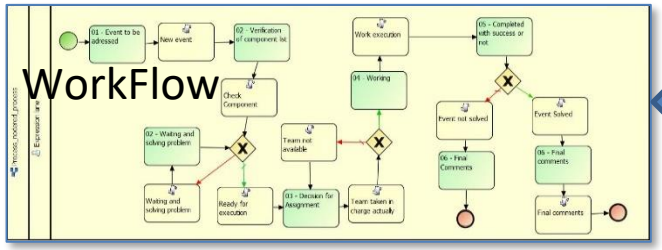


KPI, POI, MyKPI, …

API, External Services

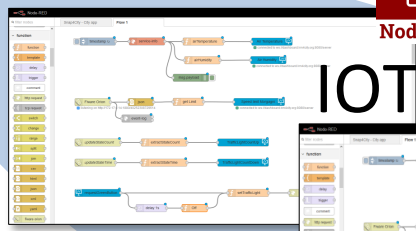
Web Scraping

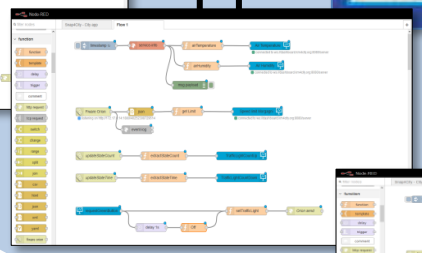
WorkFlow



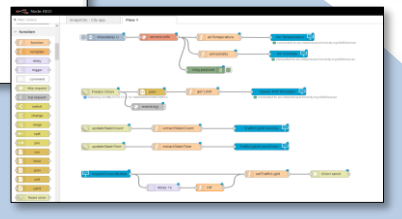
IOT Apps

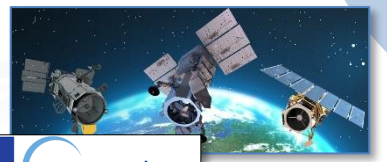
Node-RED





Data Analytics,
Artificial Intelligence





IOT Brokers

IOT Broker

IOT Broker

FIWARE

GIS

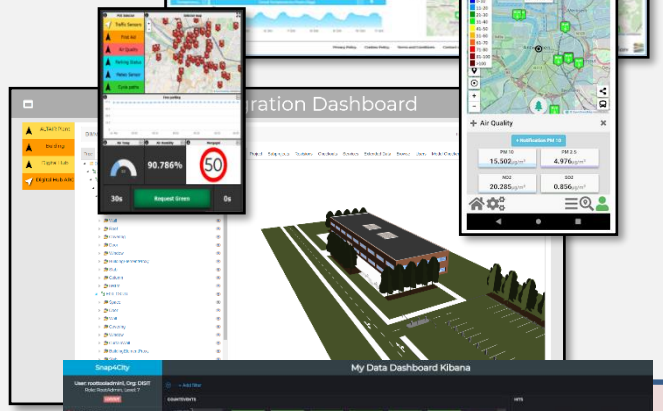
Big Data

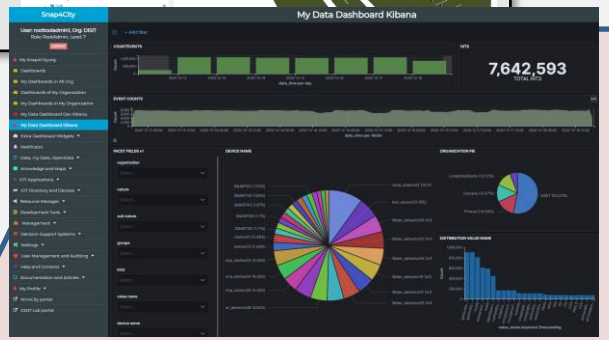
KB

LD, LOD

ckan

FI-WARE

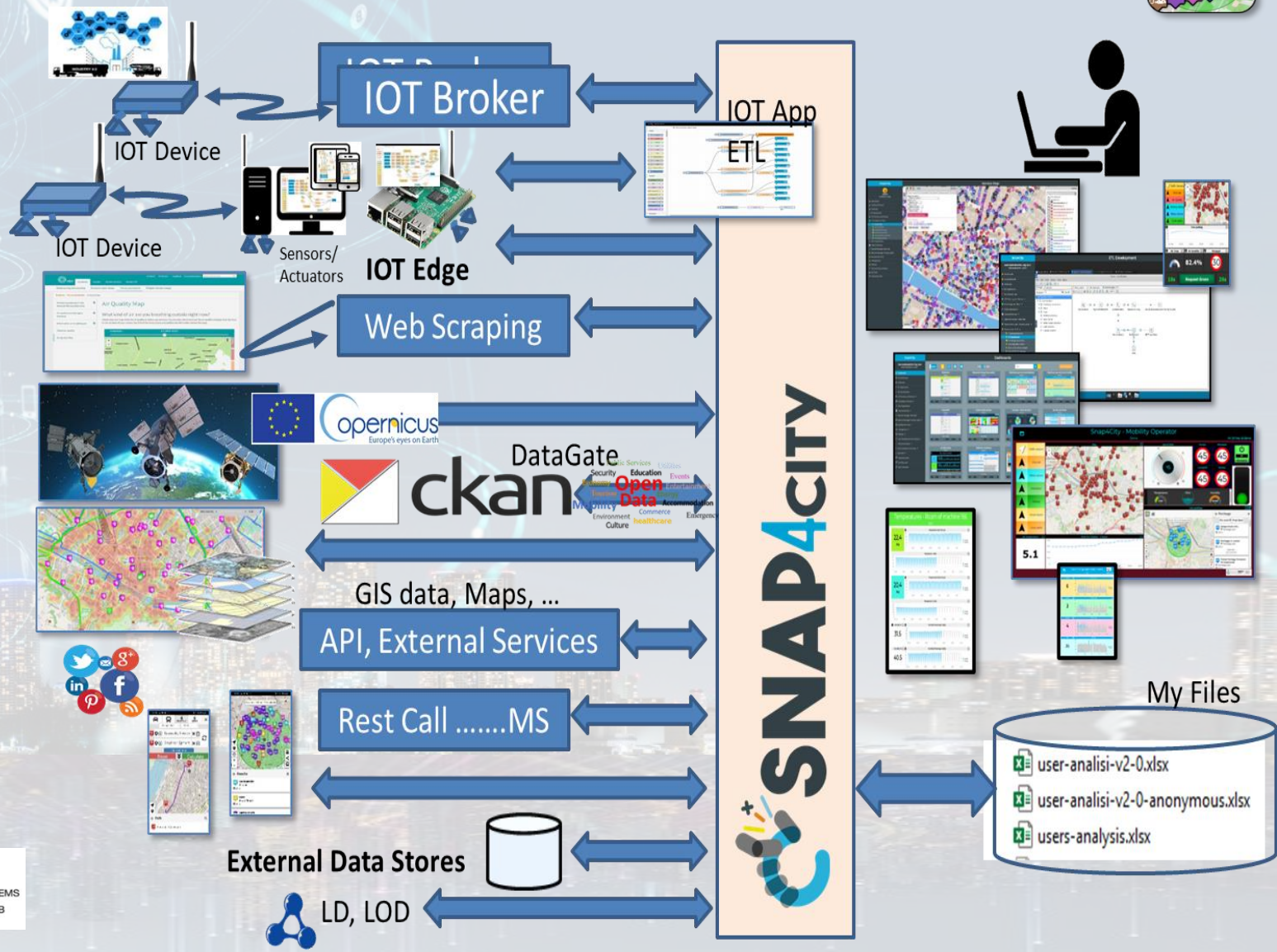




Dashboards and Apps

Ingestion, aggregation → exploitation

- **Snap4City efficient tools for**
  - Bidirectional data channels
  - Any format, any channel, any data, any broker, any protocol, …
  - **Km4City** Knowledge base Ontology reasoning on geo, space, time, relationships



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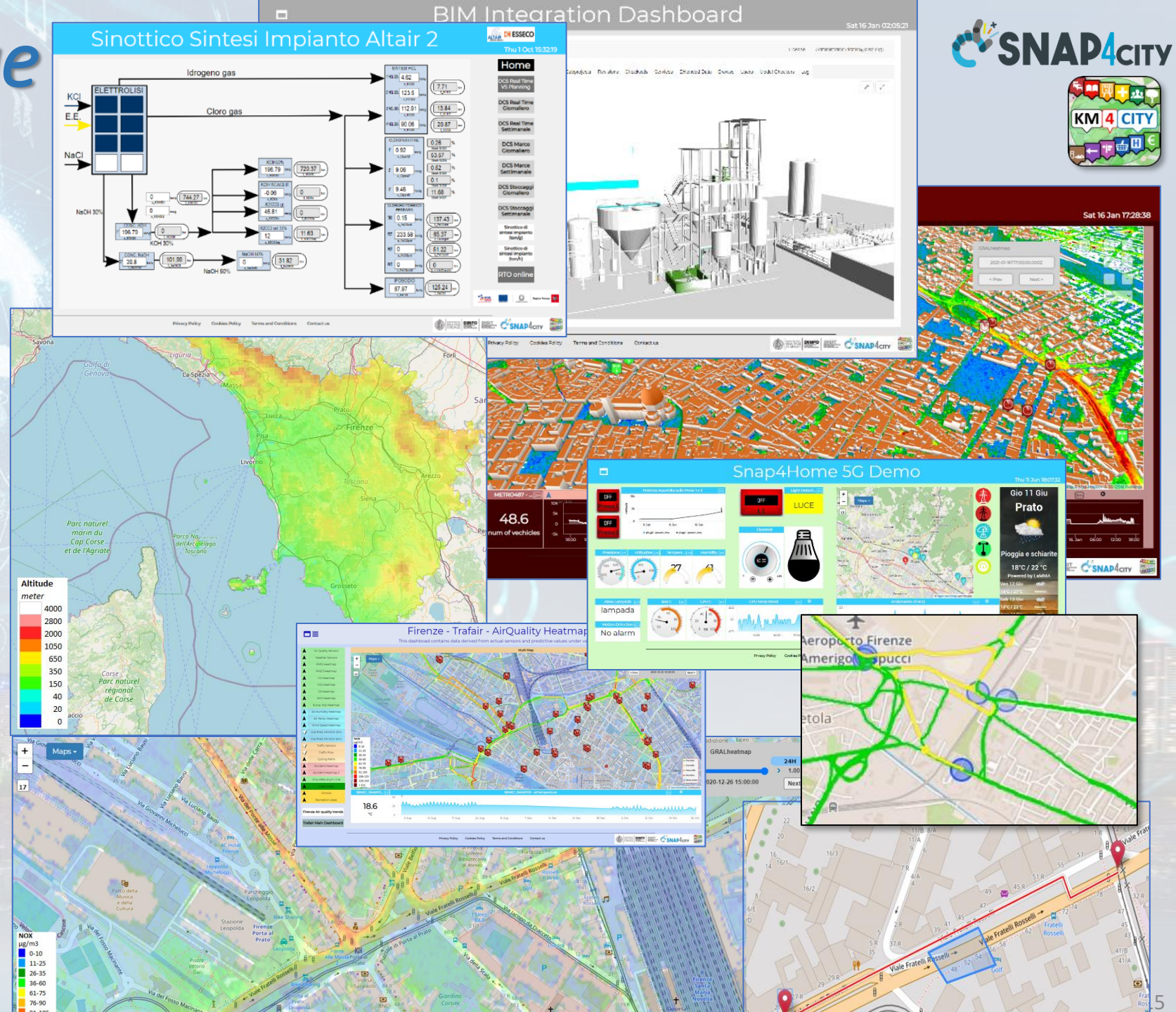
Data Type Coverage

- POI, IOT, shapes,..
- maps, orthomaps, GTFS, GIS WFS/WMS, GeoTiff, ..
- calibrated heatmaps, ..
- traffic flow, typical trends, ..
- trajectories, events, ..
- 3D, BIM, Workflow, ..
- Dynamic icons/pins, ..
- OD Matrices, scenarios, ..
- prediction models, ….
- decision support, ….
- Synoptics, animations, ..
- social media, Routing, ..
- Satellite data, ..
- KPI, personal KPI,..
- etc.



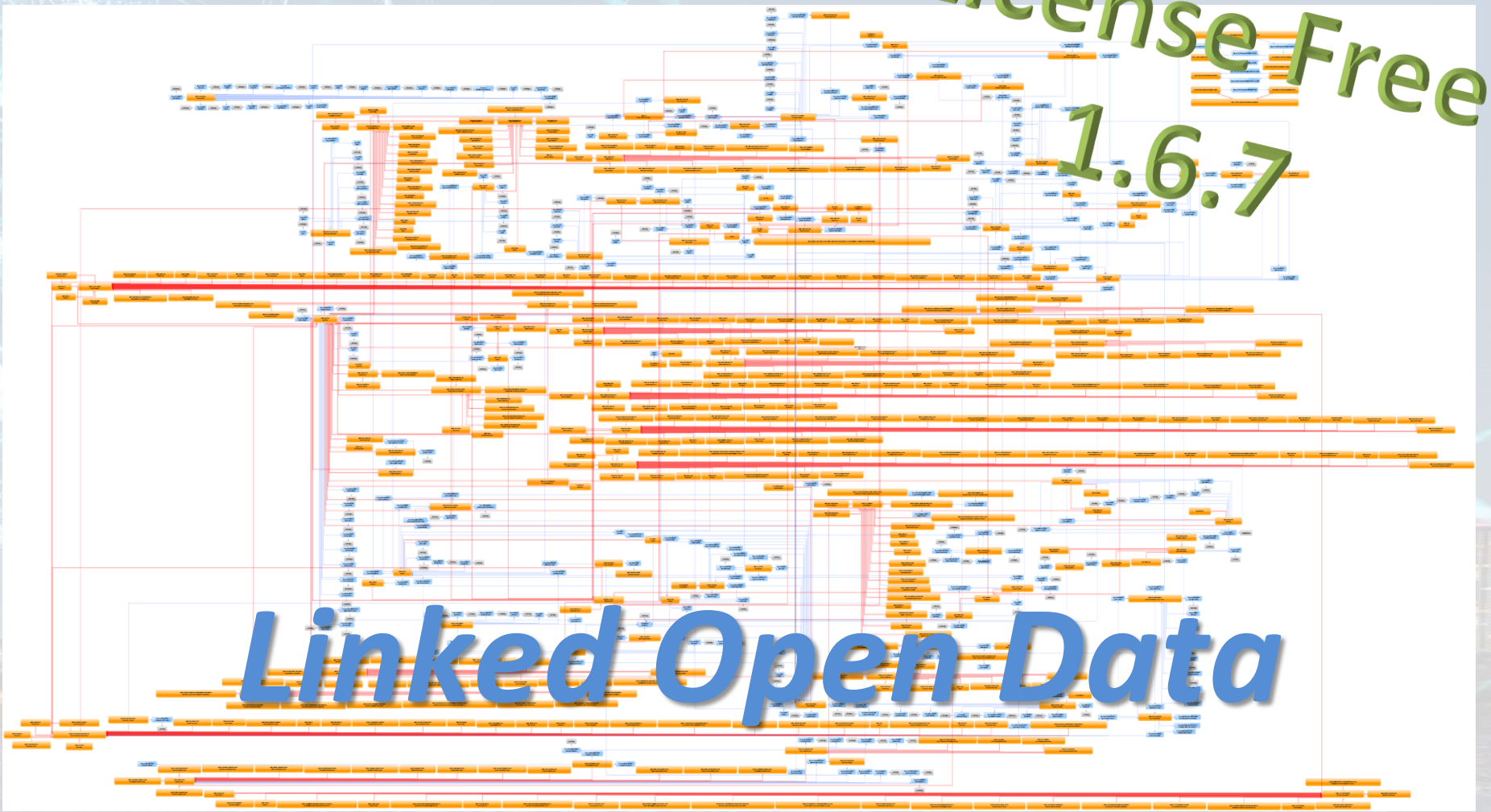
Standards and Interoperability (2021)

Compliant with: AMQP, COAP, MQTT, OneM2M, HTTP, HTTPS, TLS, Rest Call, SMTP, TCP, UDP, NGSI, LoRa, LoRaWan, TheThingsNetwork, SigFOX, DATEX II, SOAP, WSDL, Twitter, FaceBook, Telegram, SMS, OLAP, MySQL, Mongo, HBASE, SOLR, SPARQL, EMAIL, FTP, FTPS, WebSocket, WebSocket Secure, ModBUS, OPC/OPC-UA, GML, RS485, RS232, WFS, WMS, ODBC, JDBC, Elastic Search, Phoenix, XML, JSON, CSV, GeoTIFF, OWL, WKT, KML, SHP, db, GeoJSON, Enfuser FMI, Android, Raspberry Pi, Local File System, ESP32, Libelium, IBIMET/IBE, OBD2, SVG, XLS, XLSX, TXT, HTML, CSS, KNX, Enocean, Zigbee, DALI, ISEMC, Alexa, Sonoff, HUE Philips, Tplink, BACnet, TALQ, Copernicus, Protocol Buffer, IFC, XPDL, etc.

https://www.snap4city.org/65

Expert System semantic queries

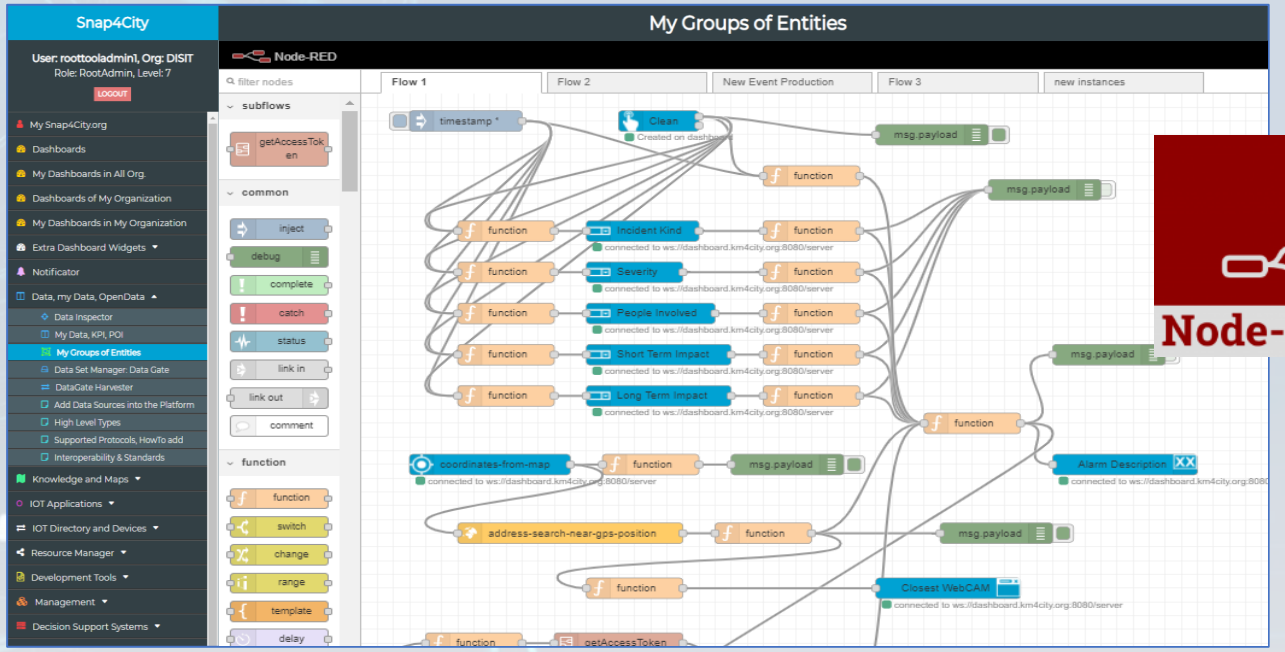
- **via**:
- **Smart City API** for Apps and third party
- **MicroServices** data driven develop via visual language Node-RED

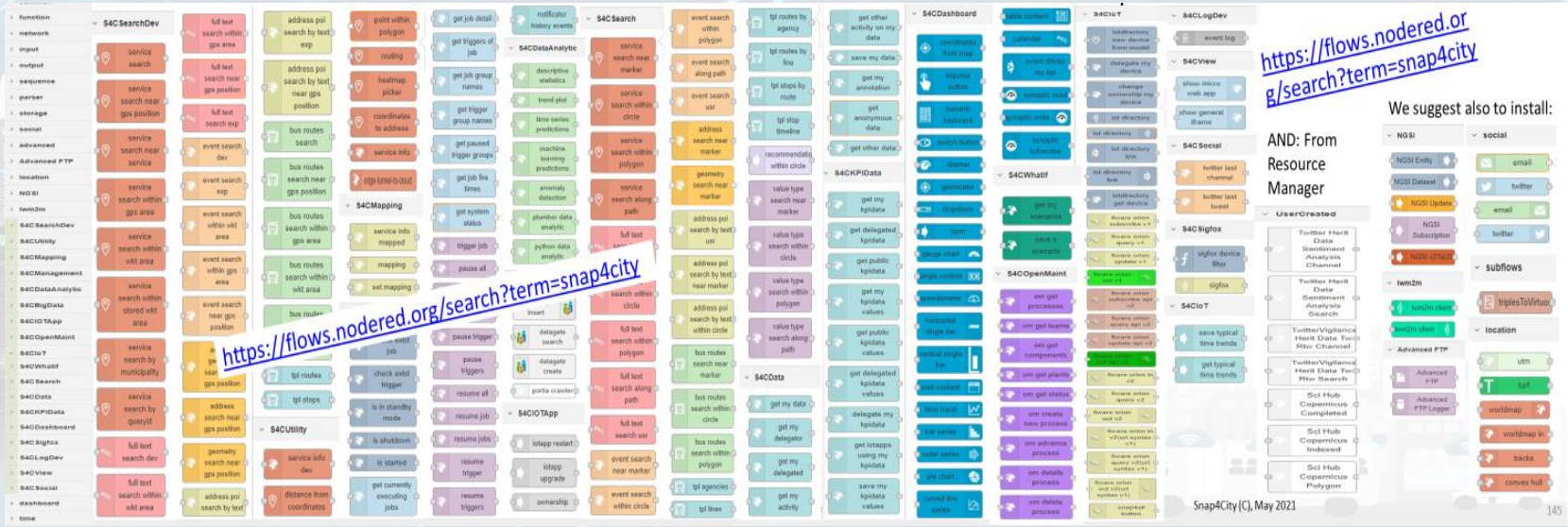


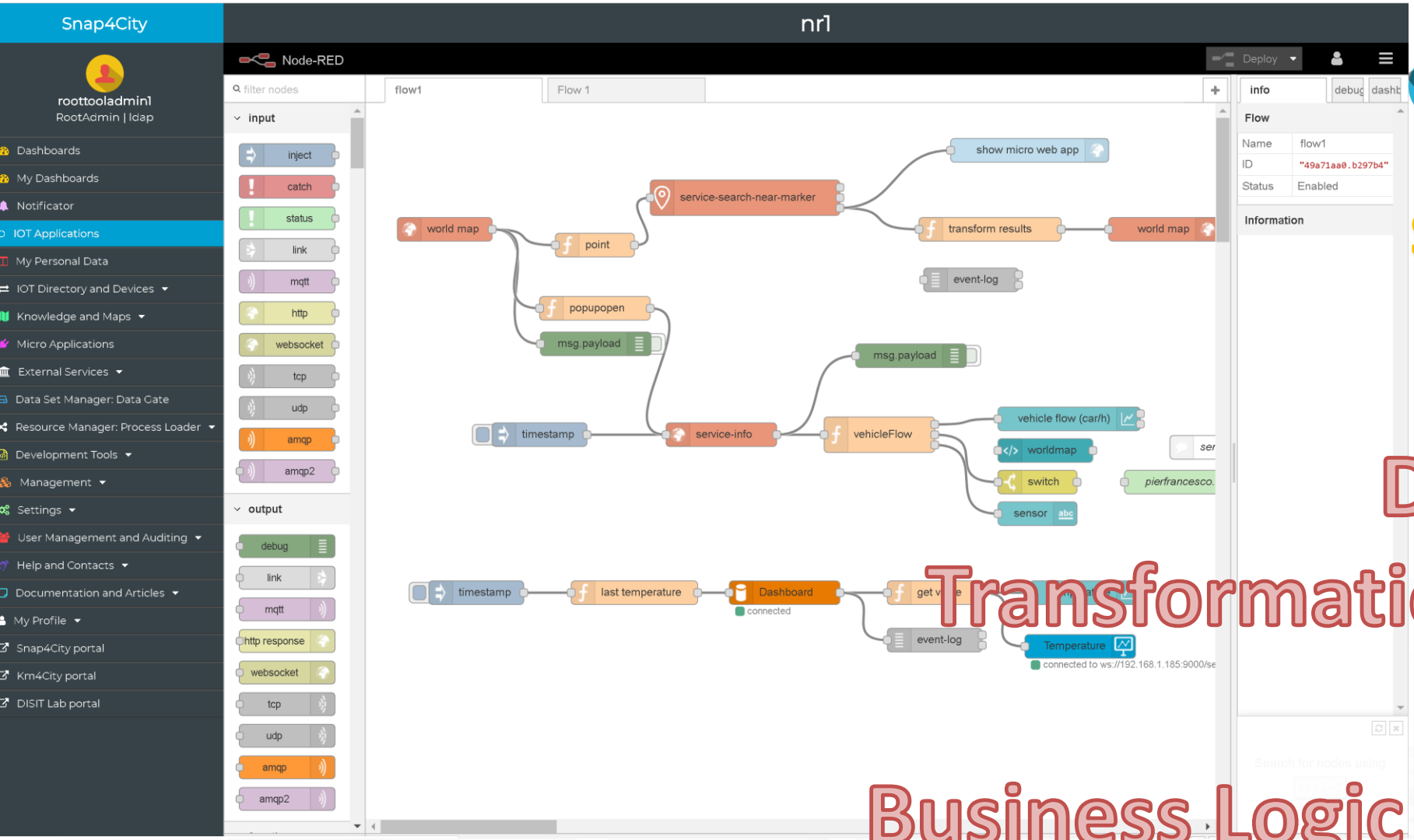
https://www.snap4city.org/19

Ingestion, aggreg. → exploitation

- **IoT App Visual Programming, no coding**
  - **Data transformation**
  - **Integration**
  - **Scripting Data Analytics**
  - **Data ingestion**
  - **Business logic**
- **MicroServices** data driven develop via visual language Node-RED







Data Adapation
Transformation, Conversion
Integration
Business Logic vs Dashboards
Data Analytics control
Everywhere: Cloud, on IoT Edge Devices

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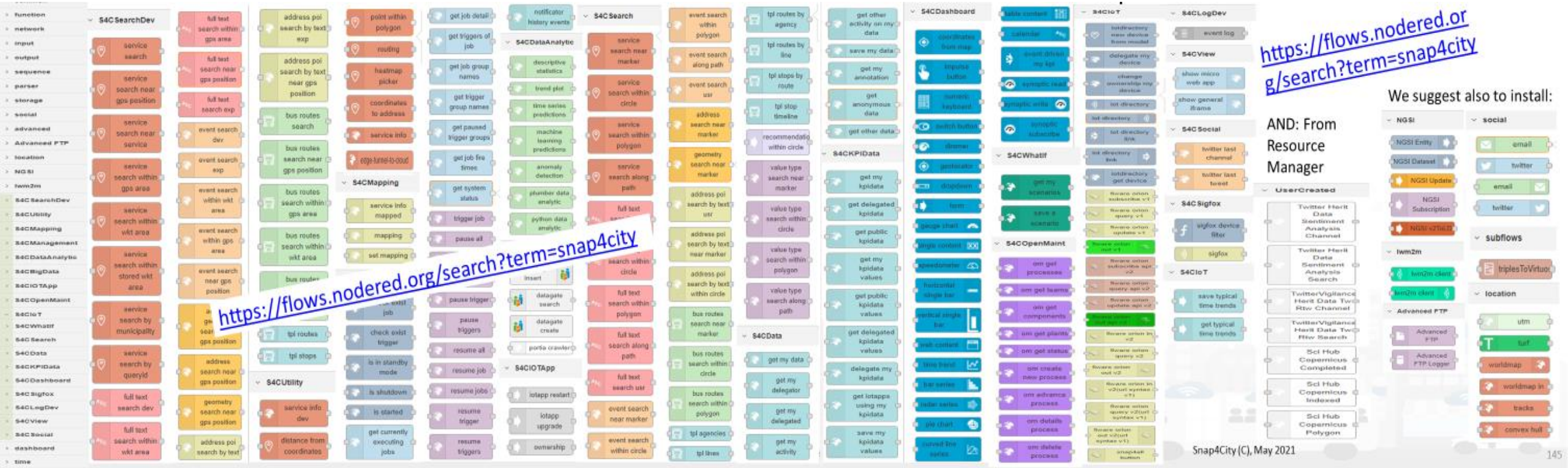
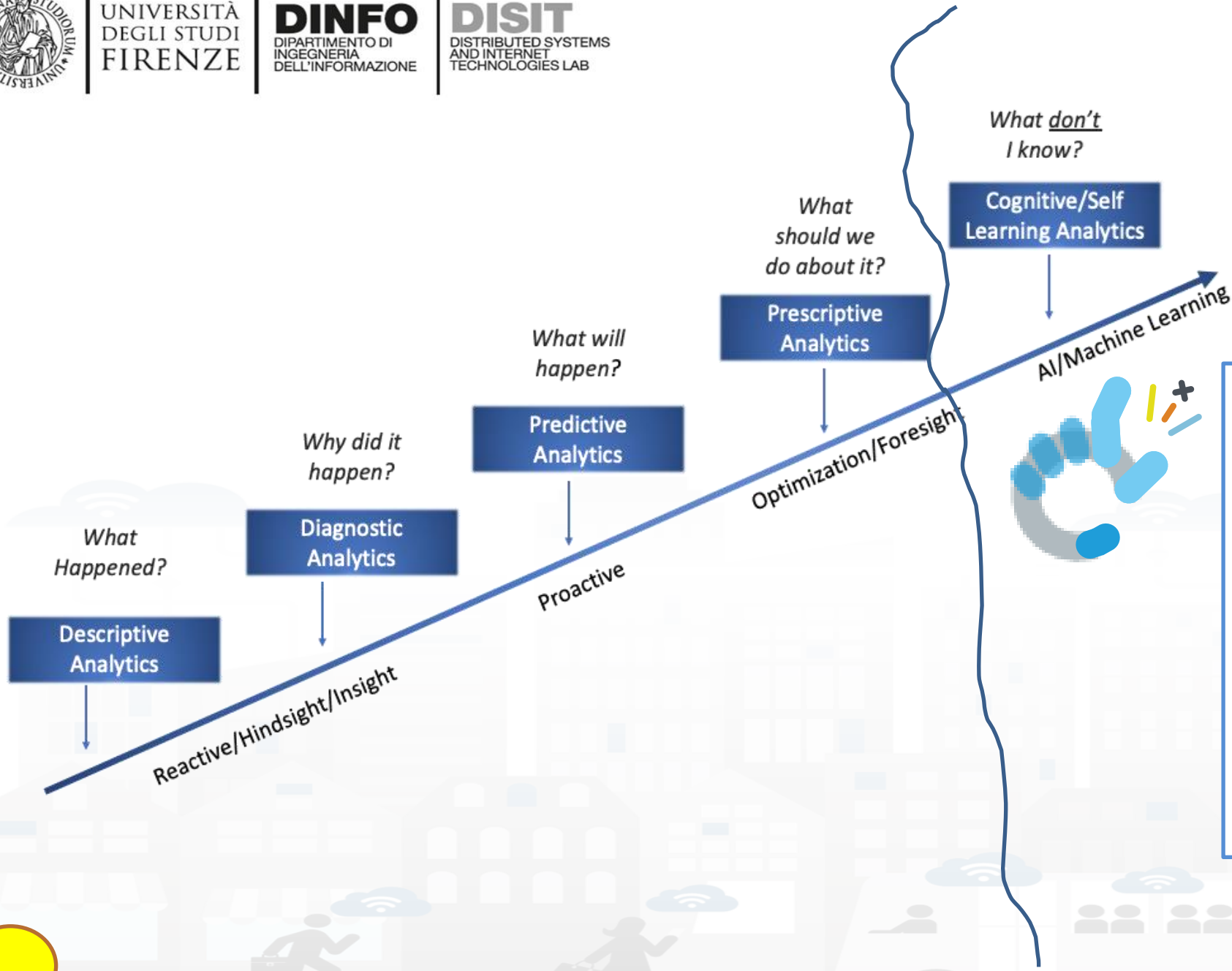
SNAP4CITY KM4CITY

Snap4City Libraries of MicroServices on Node-RED

Node-RED





Sentient and active processes

- Big Data Analytics
- Semantic Computing
- Machine Learning
- Explainable Artificial Intelligence
- Deep Learning
- Geo Spatial Reasoning
- Text Analysis, Sentiment Analysis
- What If Analysis
- Simulations
- Visual Analytics
- Engagement Analysis
- ….

Big Data Analytics + Artificial Intelligence

- **Decision support**
  - **Early warning, City Indexes, etc.**
  - **What-IF analysis** (simulation + AI + data)
- **Predictions**
  - **Short and Long terms predictive models on:**
    - traffic, parking, people flow, maintenance, land sliding, NO2
  - **3D Flow prediction:** Pollutant (NOX, NO2, …)
- **Suggestions and recommendations**
- **Modeling, simulation, routing**
  - **Traffic Flow reconstruction**
  - **Constrained Routing**

AI & XAI:

- RF, XGBoost, BRNN, RNN, SVR, DNN, LSTM, CNN-LSTM, Autoencoders, …
- Clustering: K-means, K-Medoid, …
- XAI: Shap, variations,

Computational processes:

- Heatmaps, ..
- trajectories,
- OD matrices,
- Typical Time Trends, etc.

https://www.snap4city.org/download/video/course2020/da/Snap4City-4th-slot-Data-Analytic-v4-6.pdf

Data Analytics on Snap4City platform

Swagger

Ontology Schema

LOG.disit.org

Knowledge Base, Km4City

Big Data Store Facility

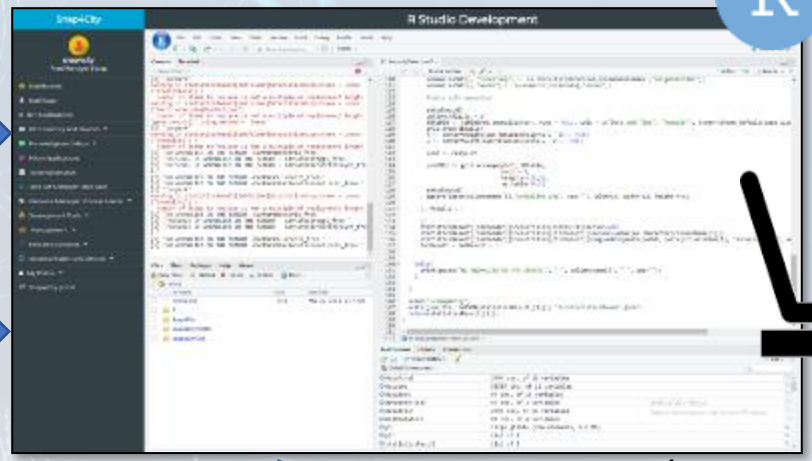
Smart City API from Knowledge Base and other tools

TensorFlow

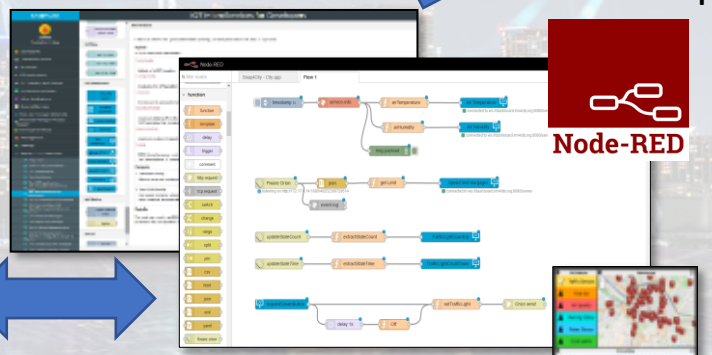
NVIDIA CUDA

python

R Studio



Creating MicroServices



Using them into IOT Applications

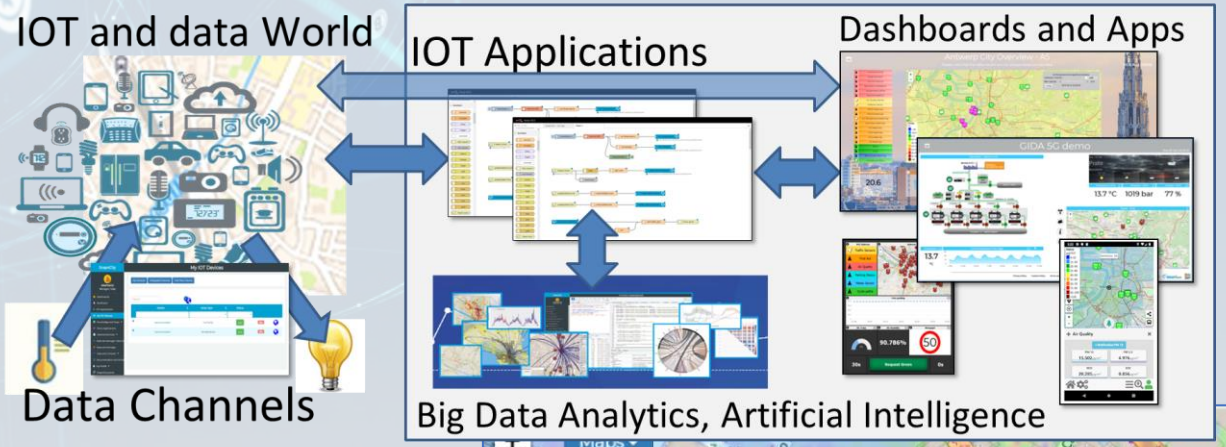
Saving / Sharing reusing

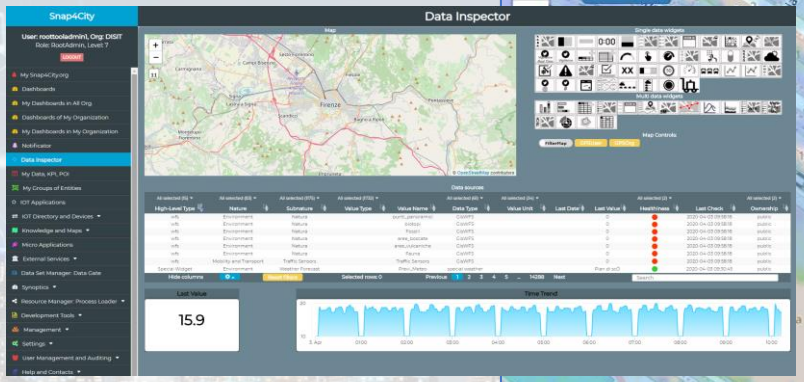
Resource Manager

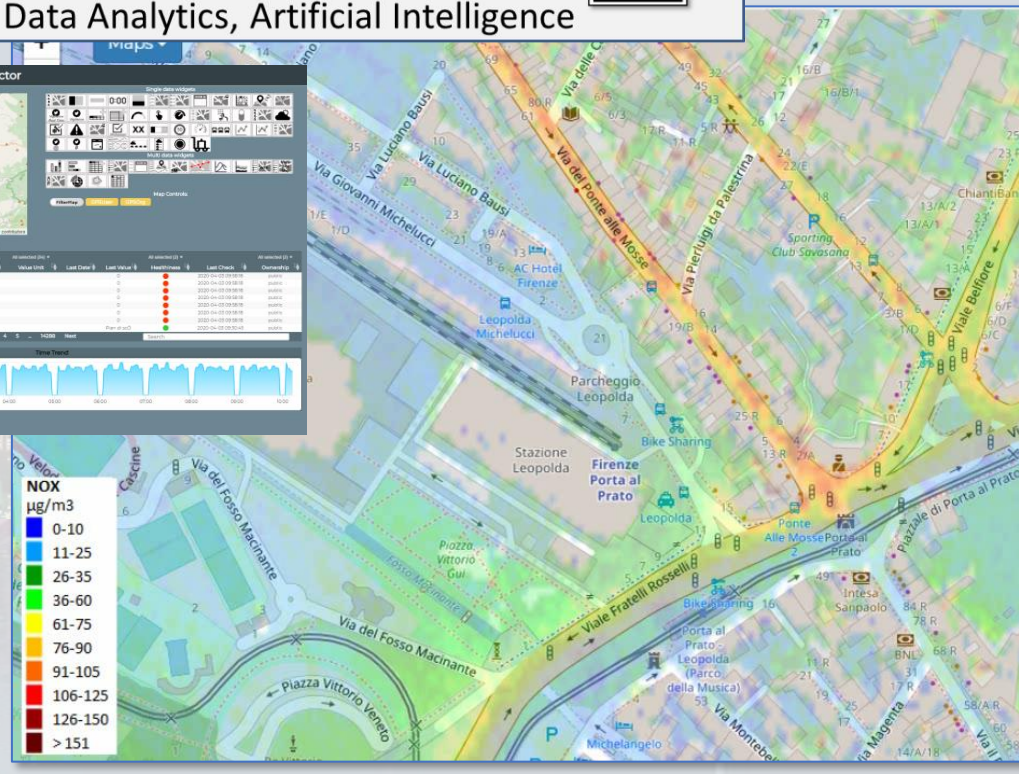
Solutions: reliable, secure and fast to realize

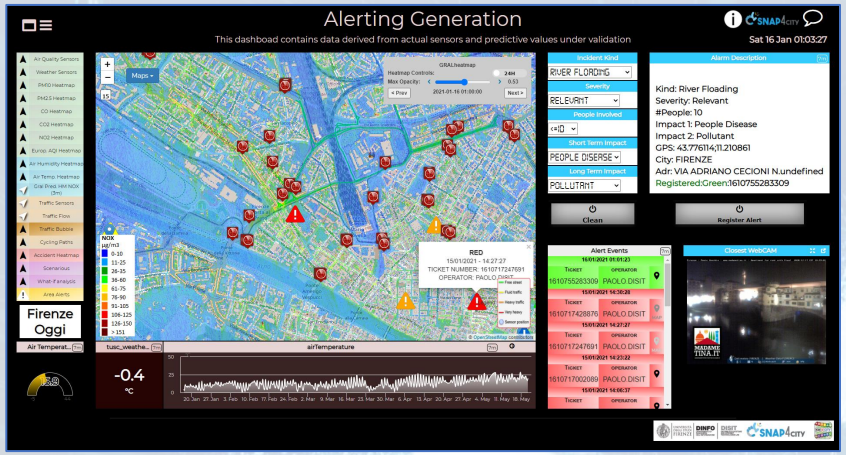
- **Via Snap4City tools**
  - **Dashboard Wizard**
  - **Dashboard Builder**
  - **Data/Visual Analytic**

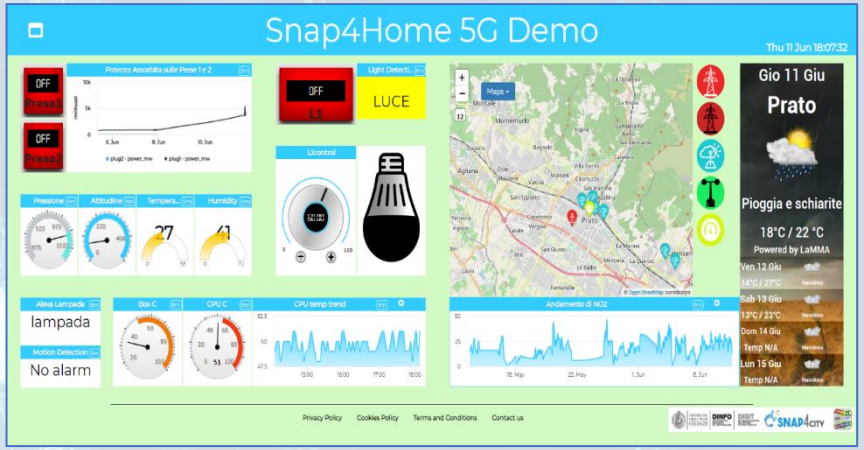
- **Smart Solutions results to be**
  - **Real time data drive**
  - **Secure end-to-end**
  - **GDPR compliant**
  - **Reliable, interoperable**
  - **Auditable, marketable**

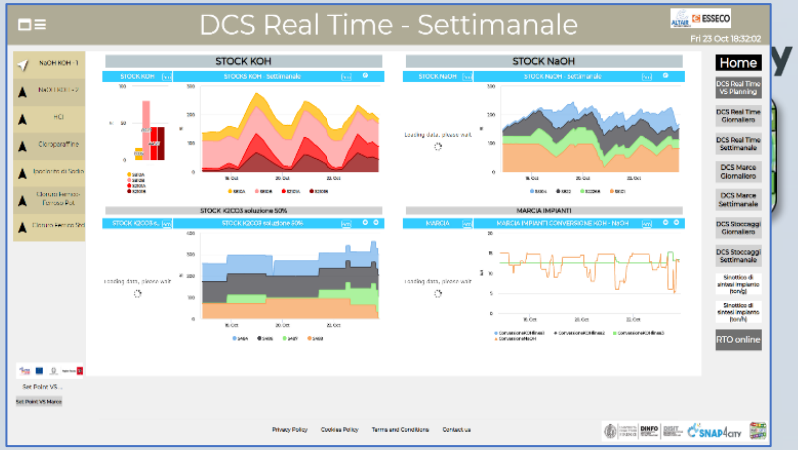


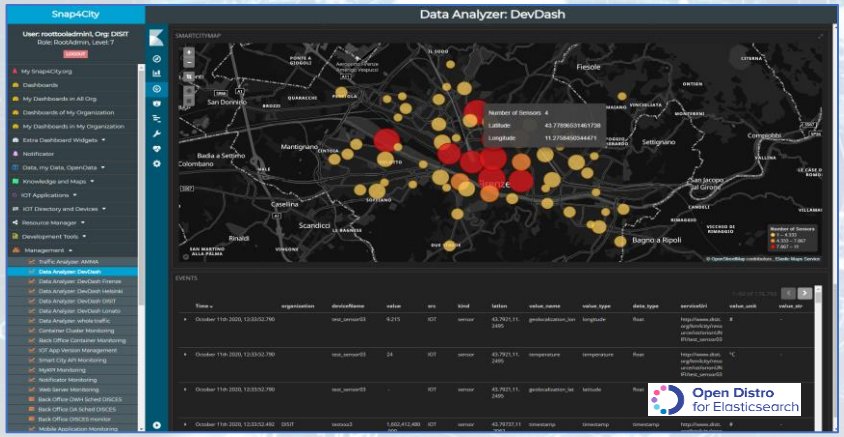


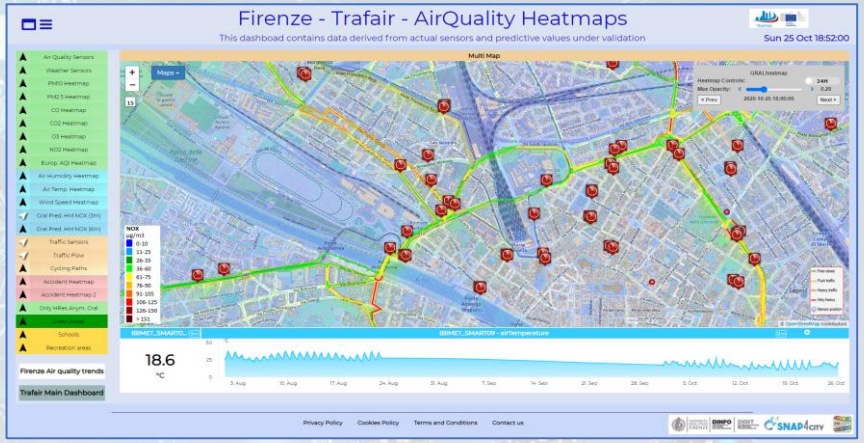


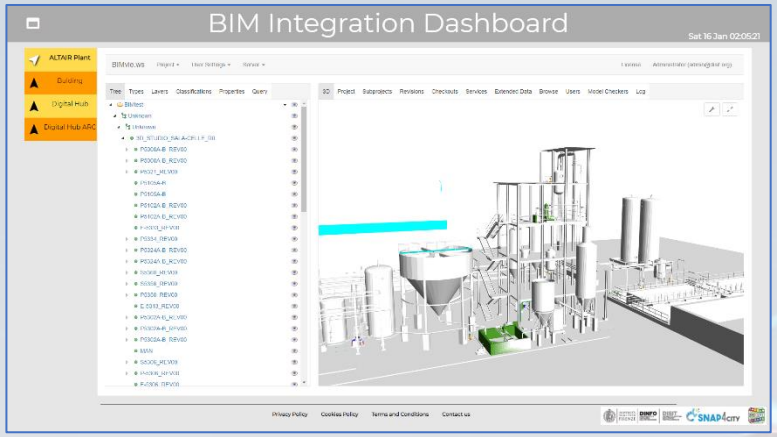

Alerting Generation
This dashboad contains data derived from actual sensors and predictive values under validation
Sat 16 Jan 01:03:27
Firenze Oggi
-0.4

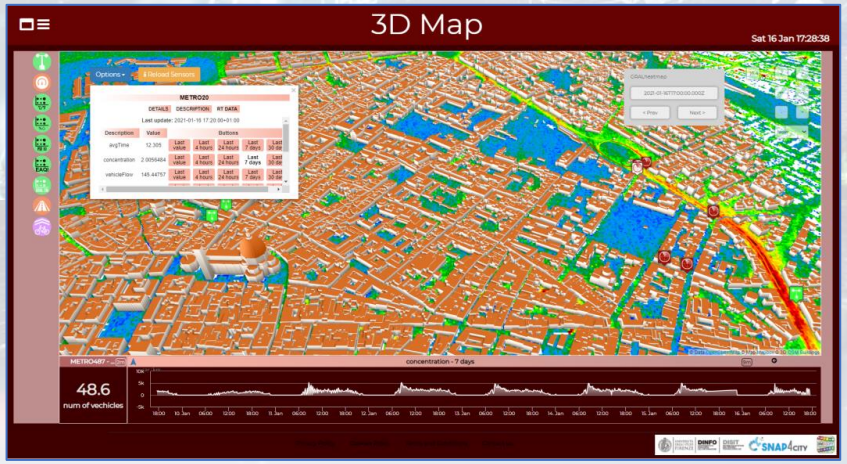

Snap4Home 5G Demo
Thu 11 Jun 18:07:32
LUCE
lampada
No alarm
Gio 11 Giu
Prato
Pioggia e schiarite
18°C / 22 °C
Powered by LaMMA

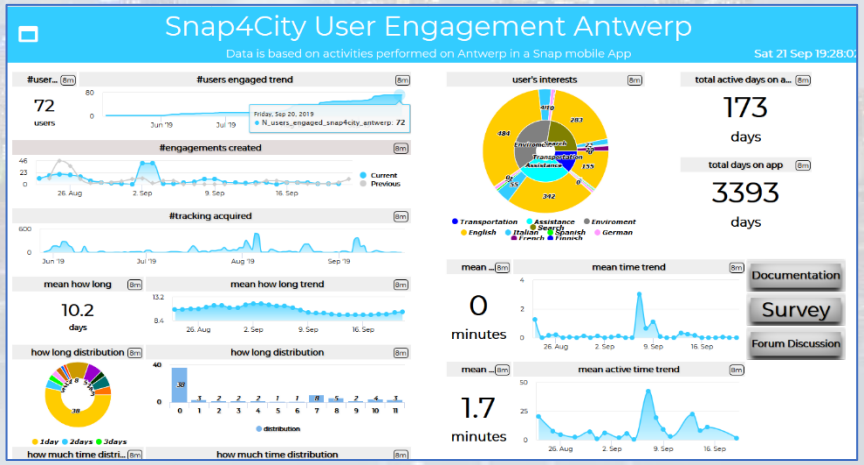

DCS Real Time - Settimanale
Fri 23 Oct 18:32:02
STOCK KOH
STOCK NaOH
Home

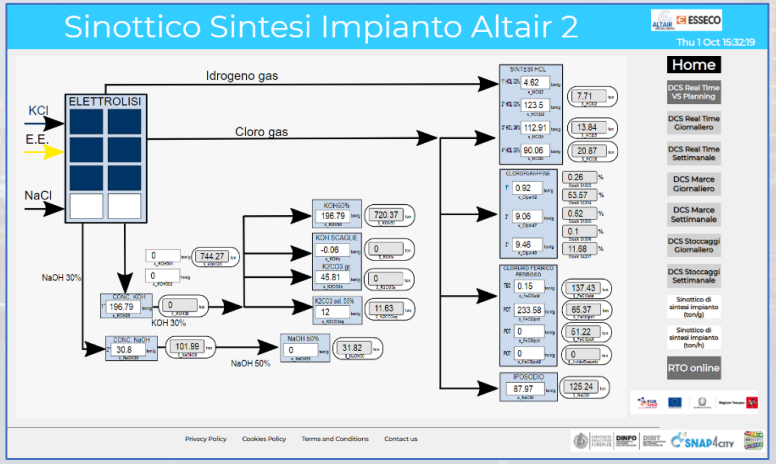

Snap4City
Data Analyzer: DevDash
Open Distro for Elasticsearch


Firenze - Trafair - AirQuality Heatmaps
This dashboad contains data derived from actual sensors and predictive values under validation
Sun 25 Oct 18:52:00
18.6


BIM Integration Dashboard
Sat 16 Jan 02:05:21


3D Map
Sat 16 Jan 17:28:38
48.6
num of vechicles


Snap4City User Engagement Antwerp
Data is based on activities performed on Antwerp in a Snap mobile App
Sat 21 Sep 19:28:0
72
users
173
days
3393
days
10.2
days
0
minutes
1.7
minutes
Documentation
Survey
Forum Discussion

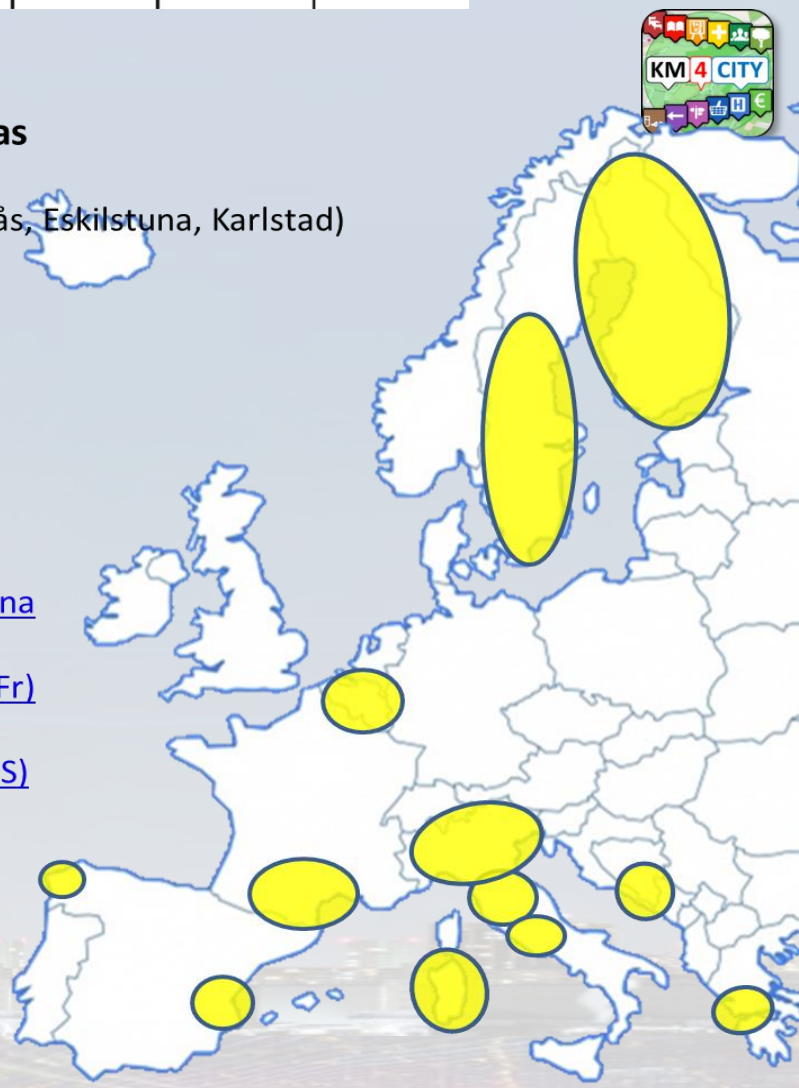

Sinottico Sintesi Impianto Altair 2
Thu 1 Oct 15:32:19
Home
Idrogeno gas
Cloro gas
ELETTROLISI
KCl
E.E.
NaCl
NaOH 30%
KOH 30%
NaOH 50%

2021/10: Snap4City Numbers

- > 120 Protocols
- *Mobility, energy, people flow, environment, Industry 4.0, tracking, smartbed, smart ambulance, Tourism, smart light, culture, etc…*
  - 6 running installations
  - 13 projects, 12 pilots on 9 Countries
- **On the largest deploy**
  - 17 Organizations / tenant
  - > 4800 users on https://www.Snap4City.org
  - > 1300 Dashboards
  - > 15 mobile Apps
  - > 2 Million of structured data per day
  - > 550 IoT Applications/node-RED /Docker
  - > 680 web pages with training
  - > 140 videos, training videos

Main Organizations/areas

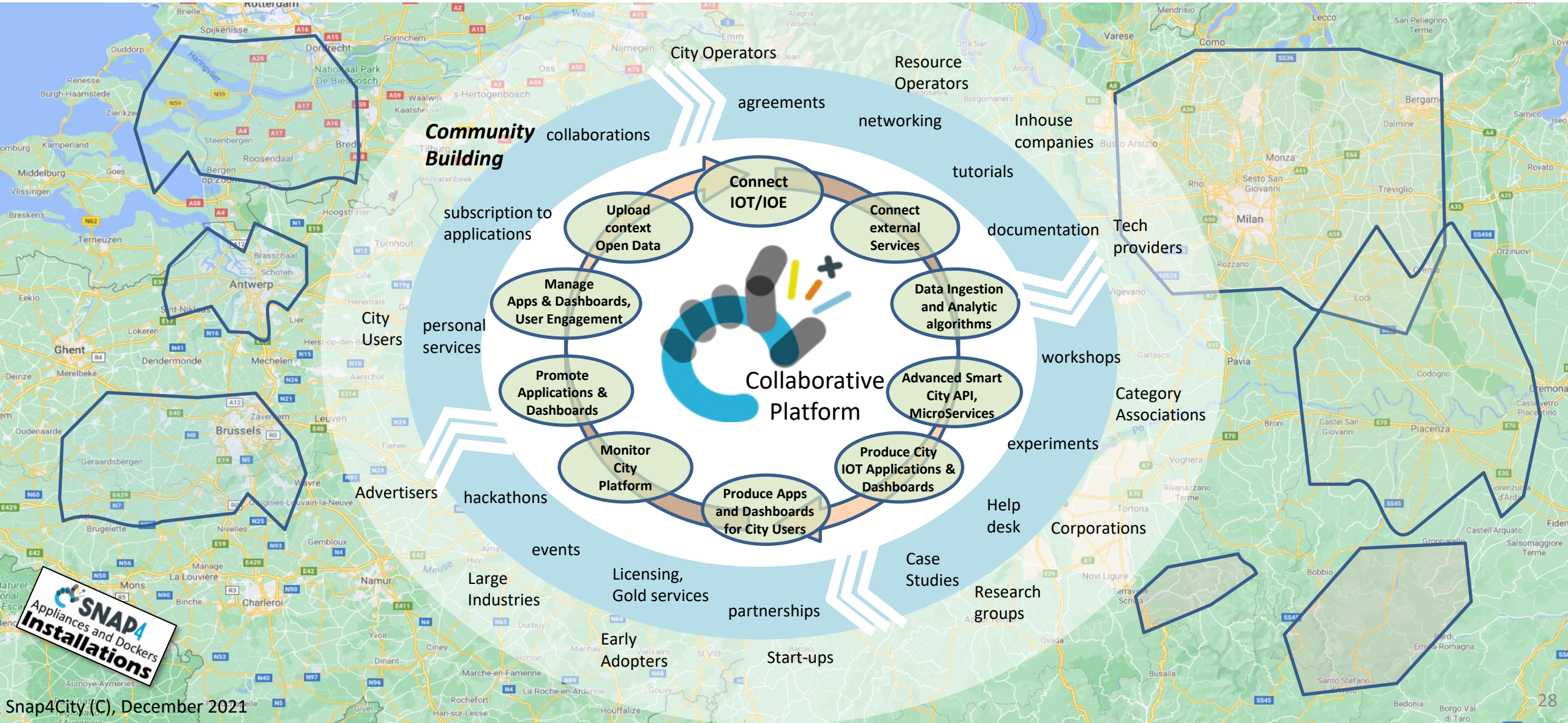
- Antwerp area (Be)
- Capelon (Sweden: Västerås, Eskilstuna, Karlstad)
- DISIT demo (multiple)
- Dubrovnik, Croatia
- Firenze area (I)
- Garda Lake area (I)
- Helsinki area (Fin)
- Livorno area (I)
- Lonato del Garda (I)
- Modena (I)
- Mostar, Bosnia-Herzegovina
- Pisa area (I)
- Pont du Gard, Occitanie (Fr)
- Roma (I)
- Santiago de Compostela (S)
- Sardegna Region (I)
- SmartBed (multiple)
- Toscana Region (I), SM
- Valencia (S)
- Venezia area (I)
- WestGreece area (Gr)



Last minute:

- Installation in Israel
- Coverage of all Greece is coming

One Snap4City Platform may serve Multiple Cities



TOP

Some examples

FROM CITY DASHBOARD TO APPLICATIONS

DATA GATHERING AND CITY DATA KNOWLEDGE MANAGEMENT

FORGING & MANAGING OPEN AND FLEXIBLE WEB AND MOBILE APPS

IOT APPLICATIONS VS IOT EDGE DEVICES

IOT APPLICATIONS, THE LOGIC AND THE SMARTNESS

ADVANCED SMART CITY API, MICROSERVICES, SNAP4CITY API

SNAP4CITY LIVING LAB FOR COLLABORATIVE WORK

SNAP4CITY FOR BEGINNERS

SNAP4CITY ARCHITECTURE AND ECOSYSTEM. OPENED TO DEVELOPERS AND STAKEHOLDERS

TWITTER VIGILANCE: SOCIAL MEDIA ANALYSIS

DECISION SUPPORT SYSTEM AND CITY RESILIENCE

HOW TO ADOPT SNAP4CITY, AND OUR ROADMAP

SNAP4CITY AND KM4CITY PROJECTS

SNAP4CITY THE VIEW OF THE ADMINISTRATORS

100% OPEN SOURCE

SNAP4 Appliances and Dockers **Installations**

Florence

Smart City Control Room
Florence Metropolitan City

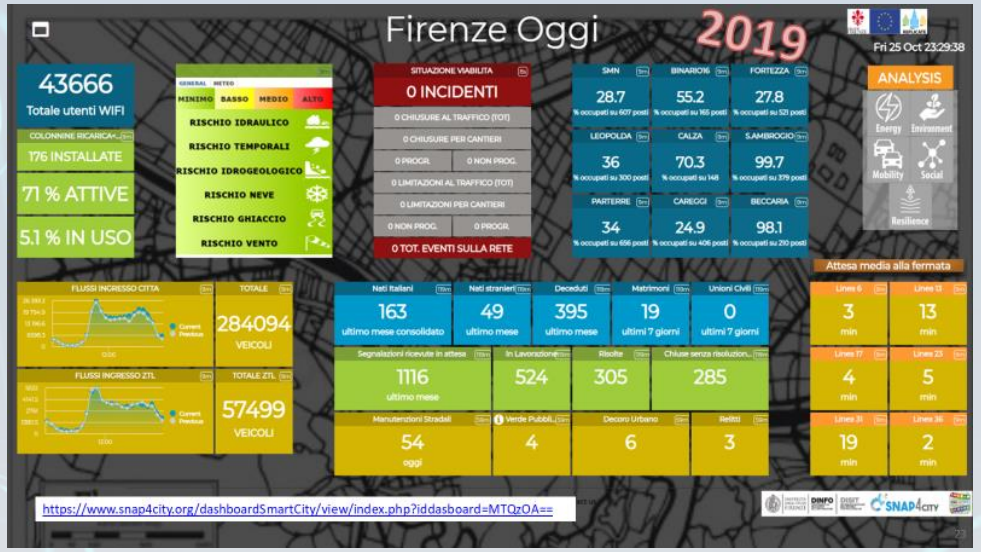
COMUNE DI FIRENZE

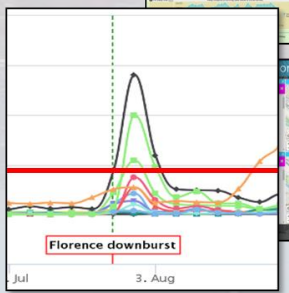
reference

SNAP4CITY

KM 4 CITY

- **Multiple Domain Data**
  - Thousands of Open/Private data, POI, IOT, etc.
  - ***mobility and transport***: accidents, public transport, parking, traffic flow, Traffic Reconstruction, KPI, …
  - ***AND***: environment, civil protection, gov KPI, covid-19, social & social media, people flow, tourism, energy, culture, …
- **Multiple dash/tool Levels & Decision Makers**
  - Real Time monitoring, Alerting, quality assess.
  - Predictions, KPI, DSS, what-if analysis
- **Historical and Real Time data**
  - Billions of Data
- **Services Exploited on:**
  - Multiple Levels, Mobile Apps, API
- **Since 2017**





https://www.snap4city.org/747

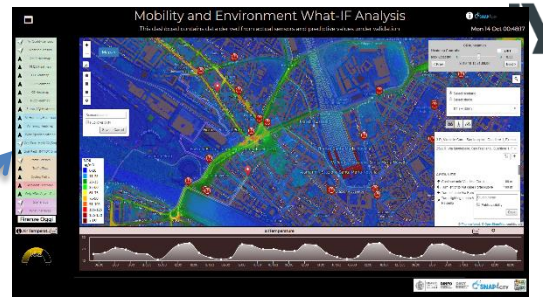
UNIVERSITÀ DEGLI STUDI FIRENZE

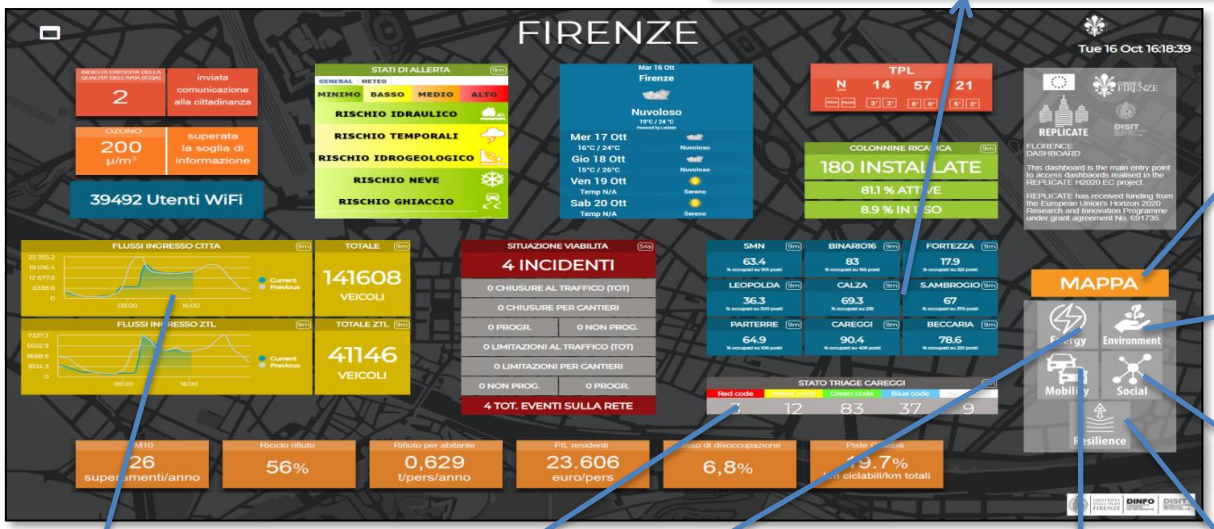
DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE

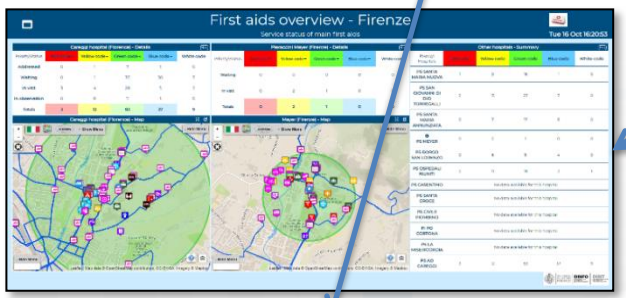
DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB

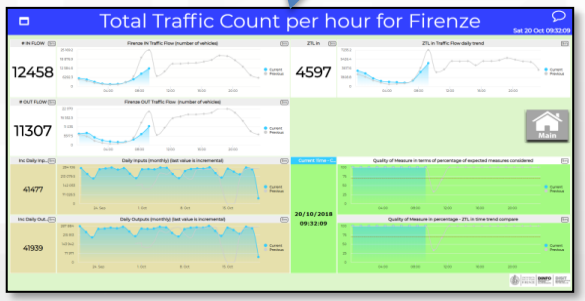
REPLICATE

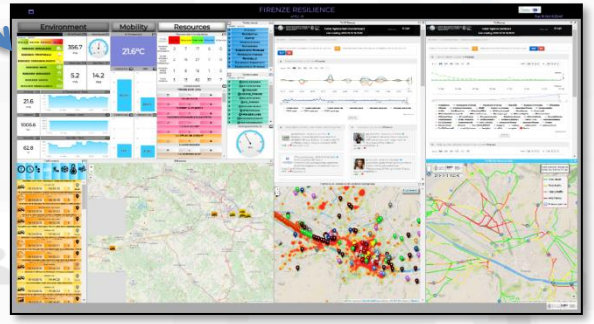
KM4CITY



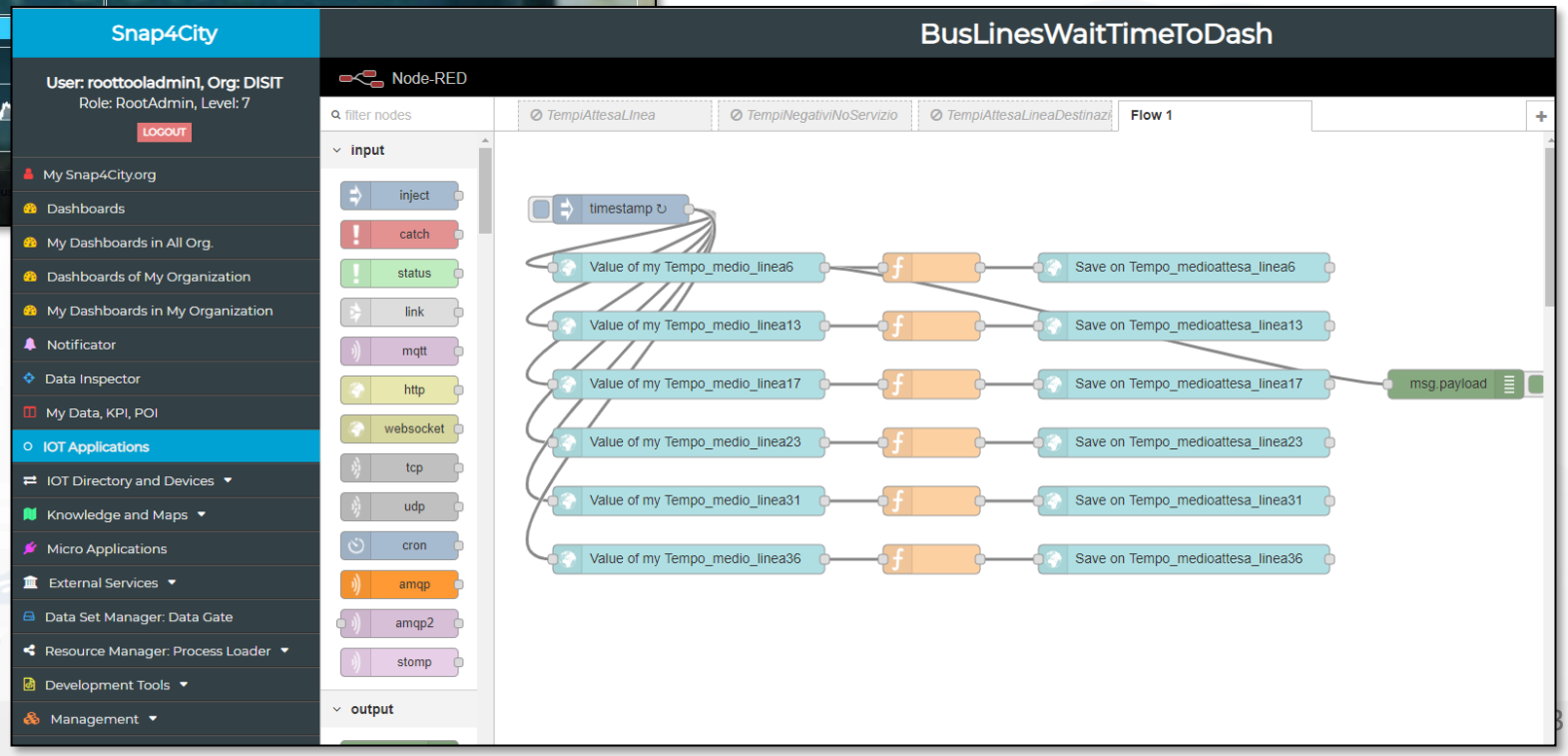




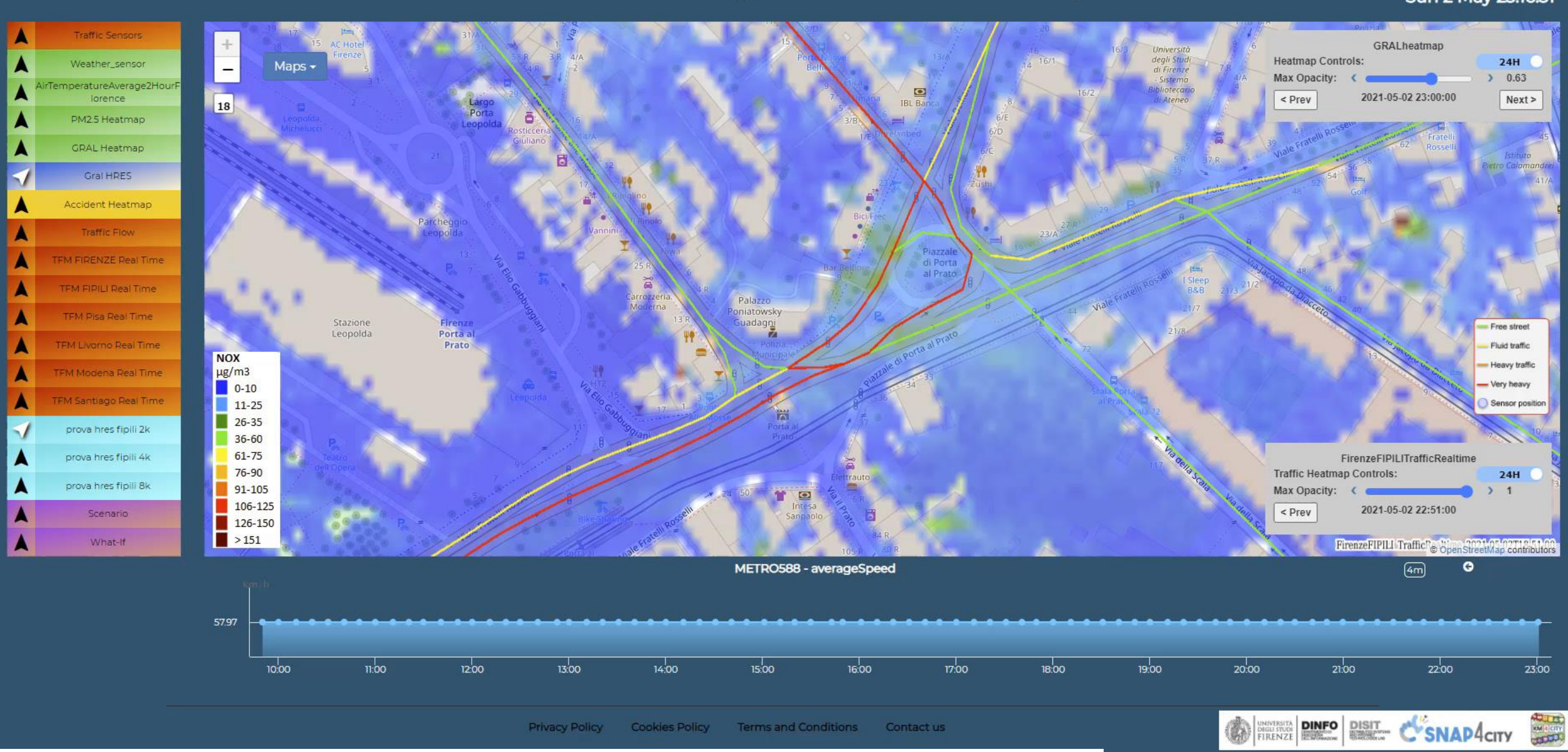




Estimation of the mean waiting time at bus stops



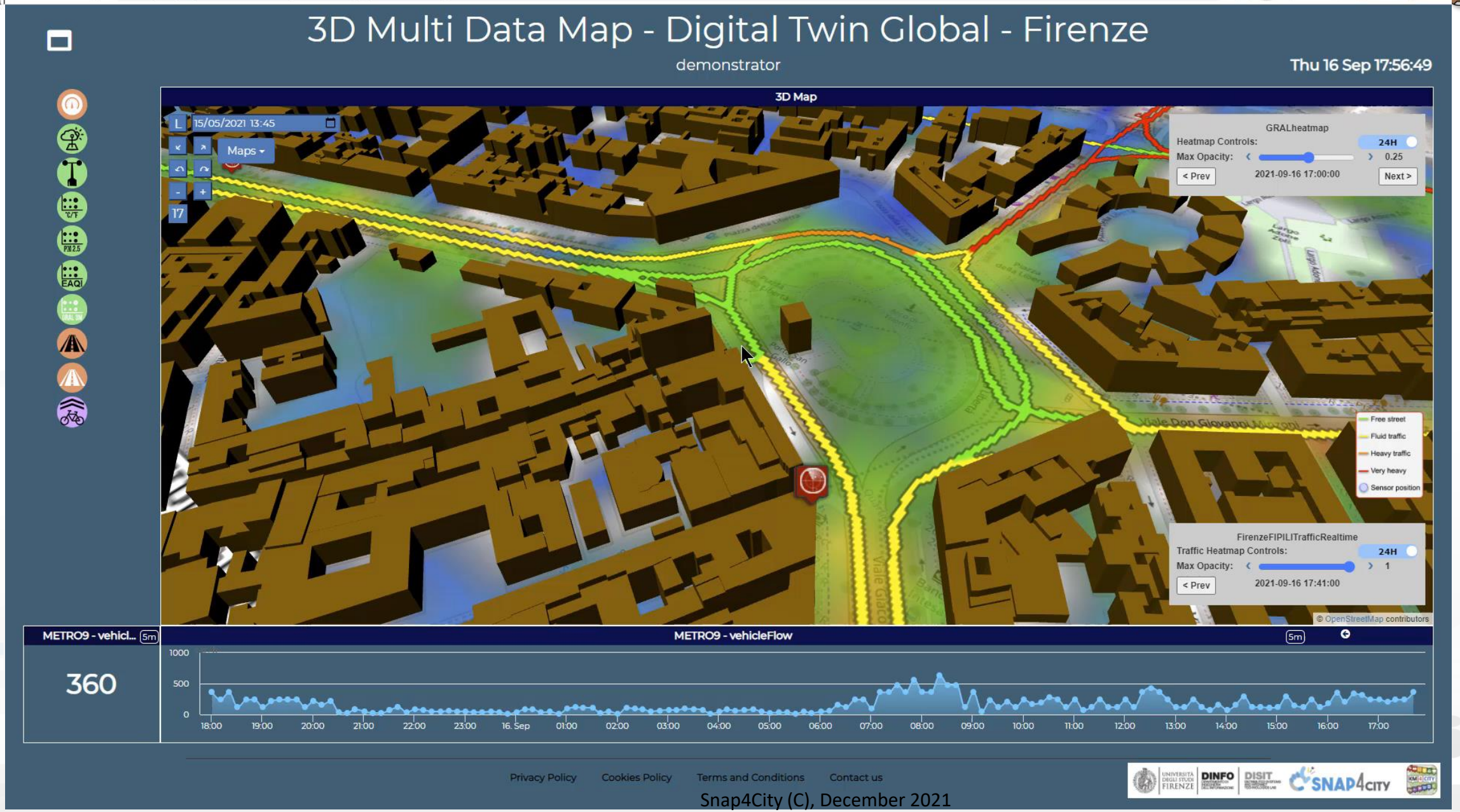
Traffic Flow Manager on multiple cities



https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzEyNg==

3D views

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjUxMA==


3D Multi Data Map - Digital Twin Global - Firenze
demonstrator
Thu 16 Sep 17:56:49
3D Map
15/05/2021 13:45
Maps
GRALheatmap
Heatmap Controls:
24H
Max Opacity:
0.25
< Prev
2021-09-16 17:00:00
Next >
Free street
Fluid traffic
Heavy traffic
Very heavy
Sensor position
FirenzeFIPILITrafficRealtime
Traffic Heatmap Controls:
24H
Max Opacity:
1
< Prev
2021-09-16 17:41:00
© OpenStreetMap contributors
METRO9 - vehicl... 5m
360
METRO9 - vehicleFlow
5m
1000
500
0
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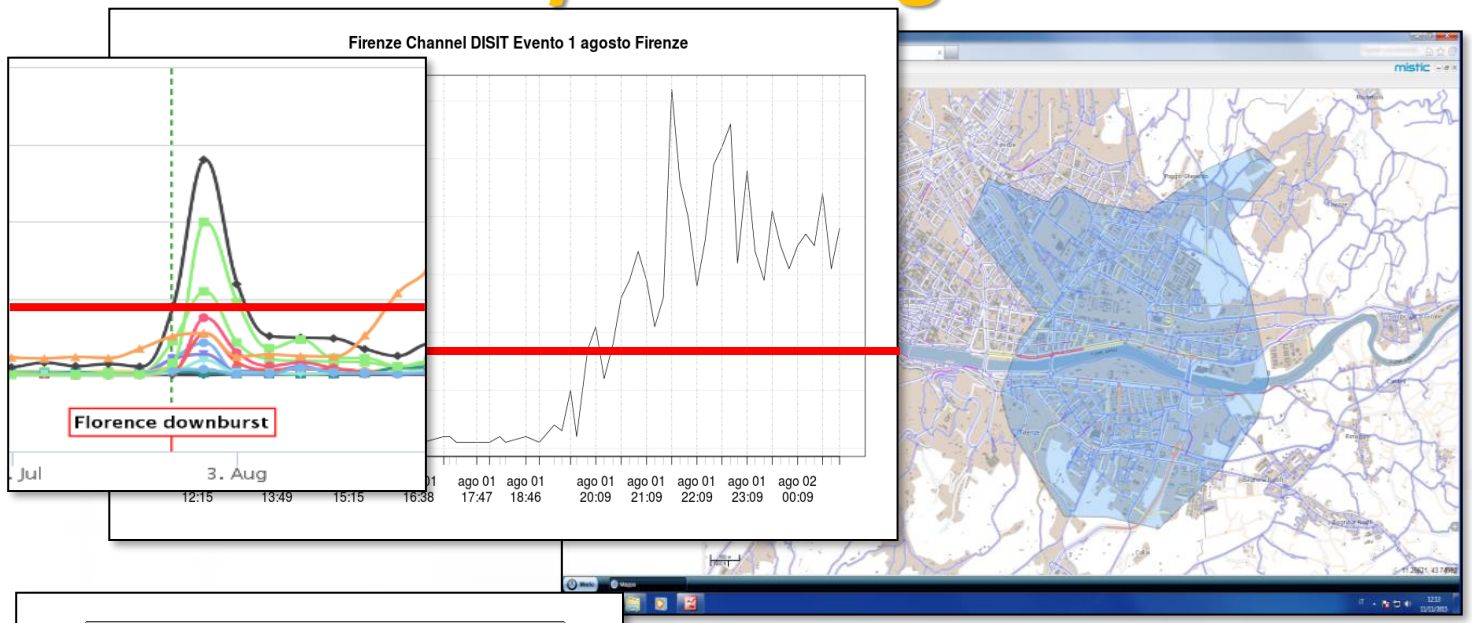
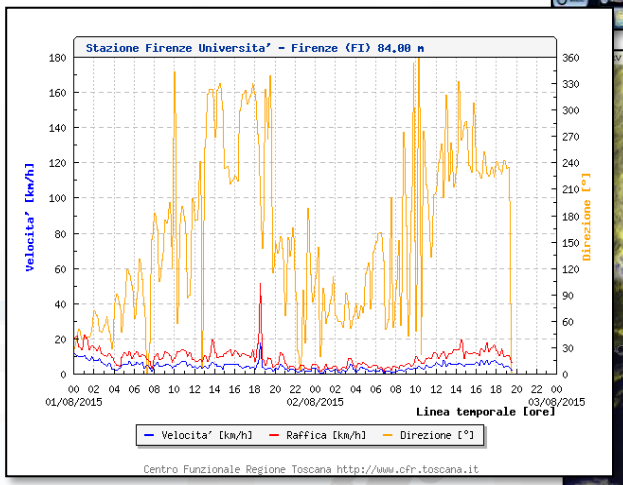
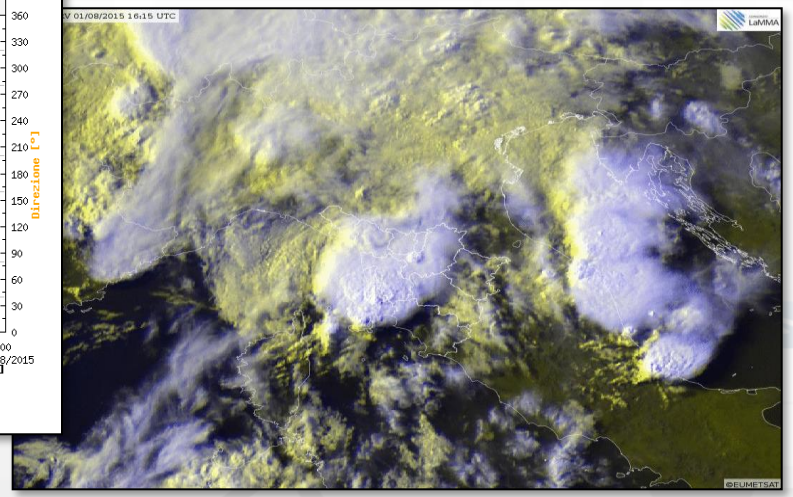
Twitter Vigilance

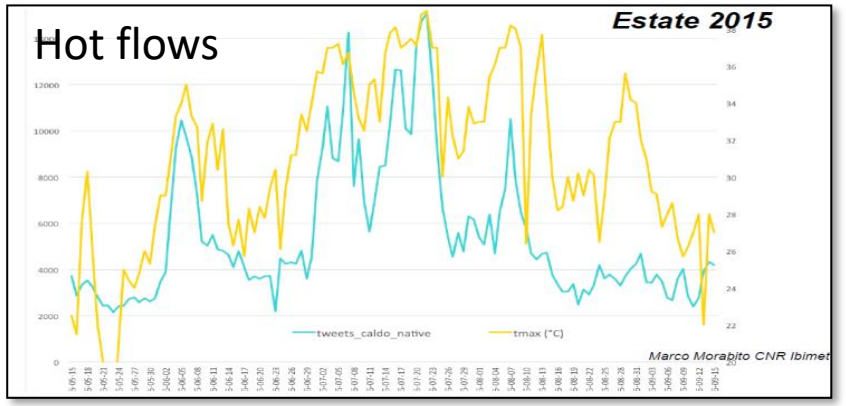
Early Warning







Predictive models



Attendance at long lasting events: EXPO2015

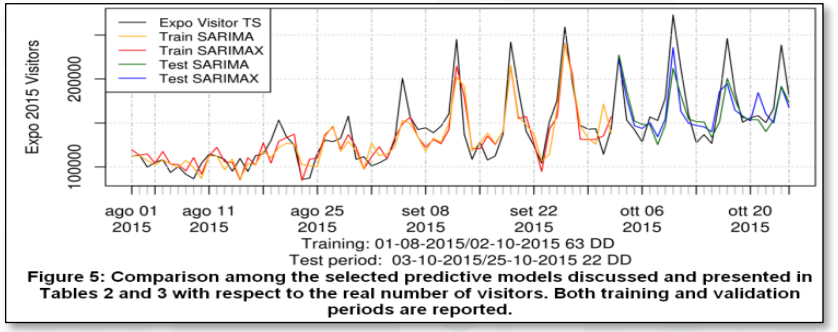
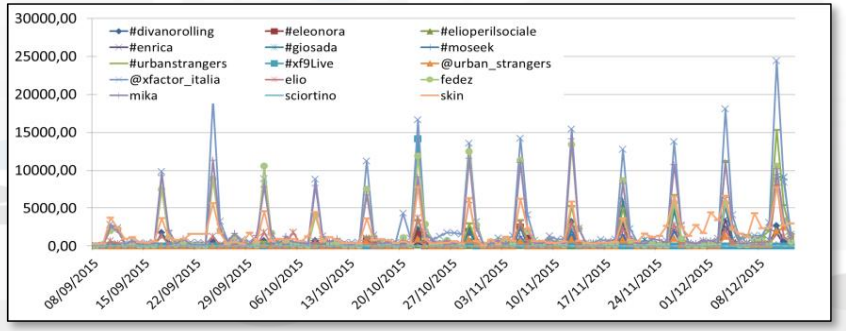


Figure 5: Comparison among the selected predictive models discussed and presented in Tables 2 and 3 with respect to the real number of visitors. Both training and validation periods are reported.

Attendance at recurrent events: TV, footbal



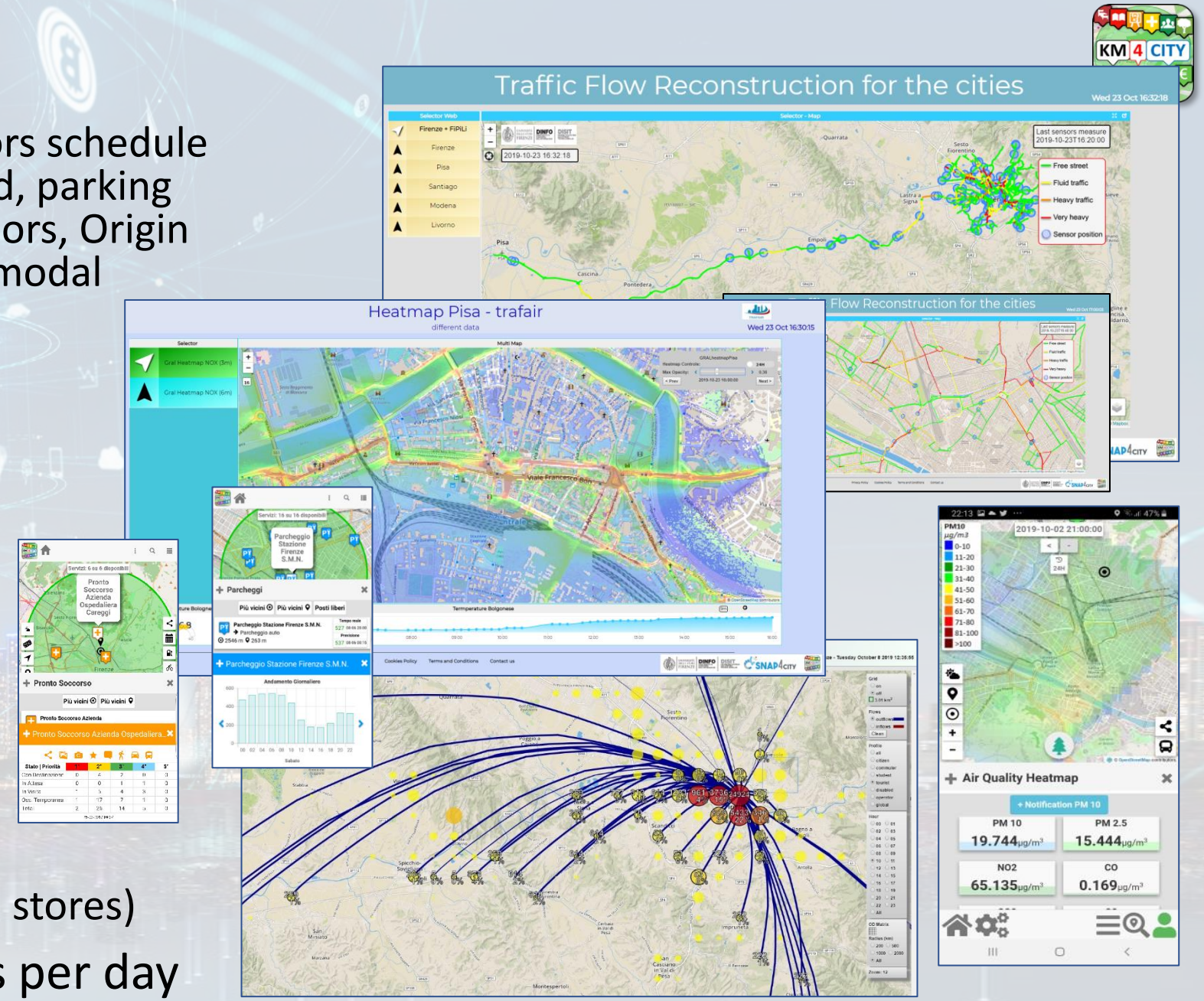
Tuscany Region

https://www.snap4city.org/760

Firenze, Pisa, Livorno, Prato, etc.

Tuscany Region

- **Dashboards & Services**:
  - **Mobility**: public transport operators schedule and paths, traffic Fi-Pi-Li main road, parking status and predictions, traffic sensors, Origin Destination matrix, routing, multimodal routing, etc.
  - **Social**: Hospitals and triage, etc.
  - **Environment**: sensors, heatmaps,
  - alerting,
    - **Pollution** Forecast: NOX, NO2
    - **Weather** Forecast,
  - **Culture** and **Tourisms**
  - Etc.
- **Mobile App and MicroApplications:**
  - Tuscany in a Snap (all stores)
  - Tuscany where what… km4city (all stores)
- **Numbers**: 1.5 M complex events per day

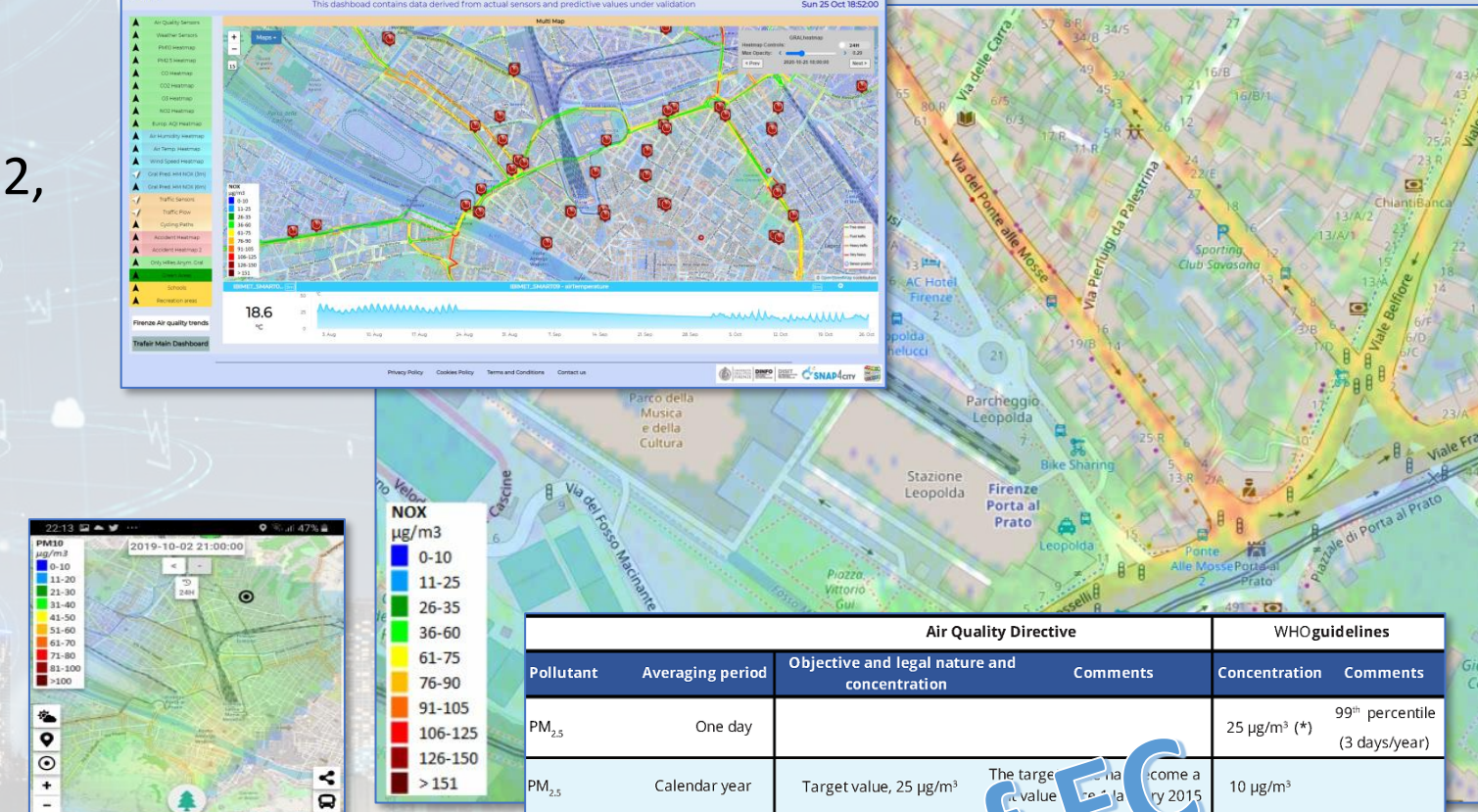


Environment and Quality of Life
Air Quality Predictions

Cities of: Firenze, Pisa, Livorno

reference

- **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**



		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 (*)	99th percentile (3 days/year)
$PM_{2.5}$	Calendar year	Target value, 25 µg/m³	The targe… …come a …value …ry 2015	10 µg/m³	
PM_{10}	One day	Limit …e, 50 µ…	…t to be e…ed on more …han 35 d…s per year.	50 µg/m³ (*)	99th percentile (3 days/year)
PM_{10}	Calend…	…va… 40 µg/m… (*)		20 µg/m³	
O_3	Maximum …ly 8-hour m…an	Target value, 120 µg/m³	Not to be exceeded on more than 25 days per year, averaged over three years	100 µg/m³	
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	

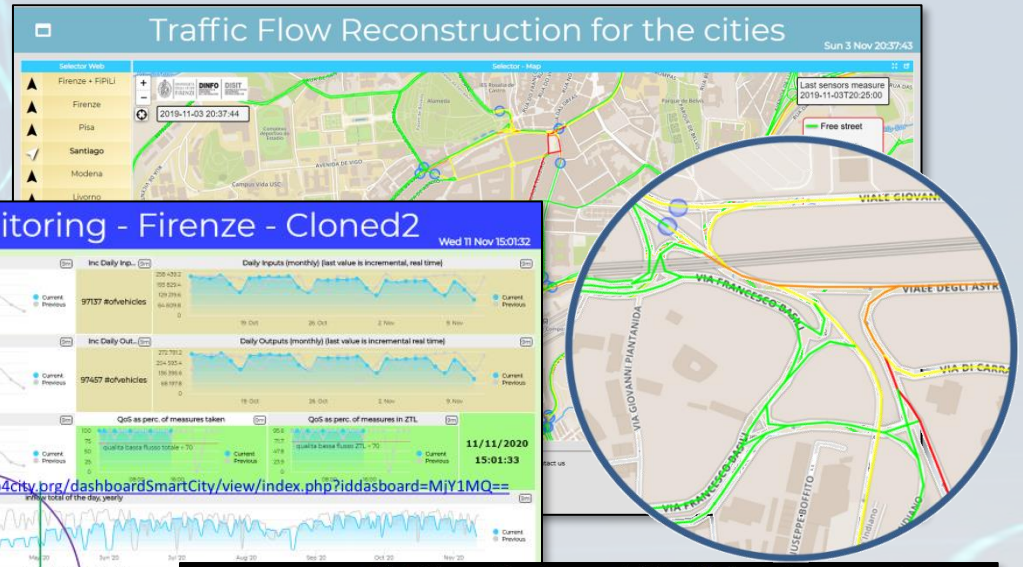
KPI of EC

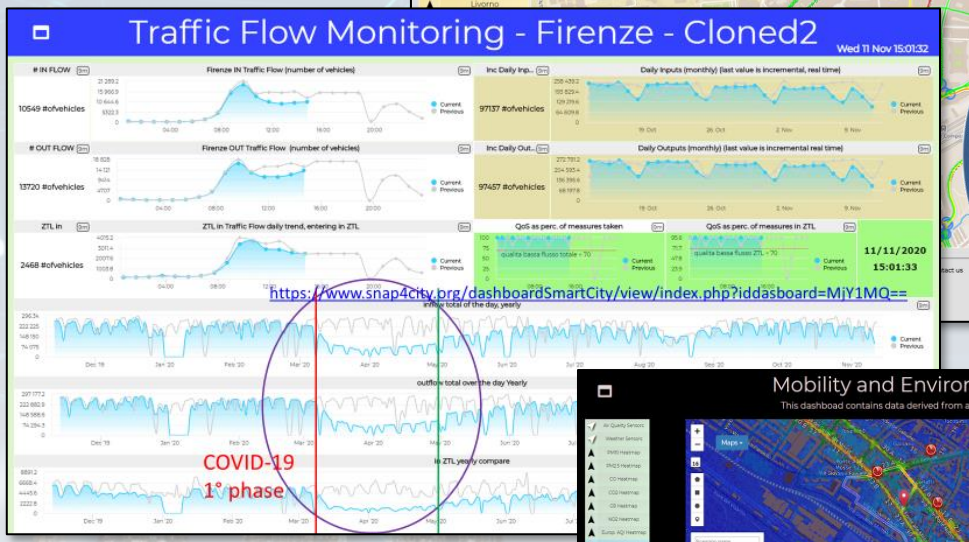
Mobility and Transport Traffic Flow Analysis

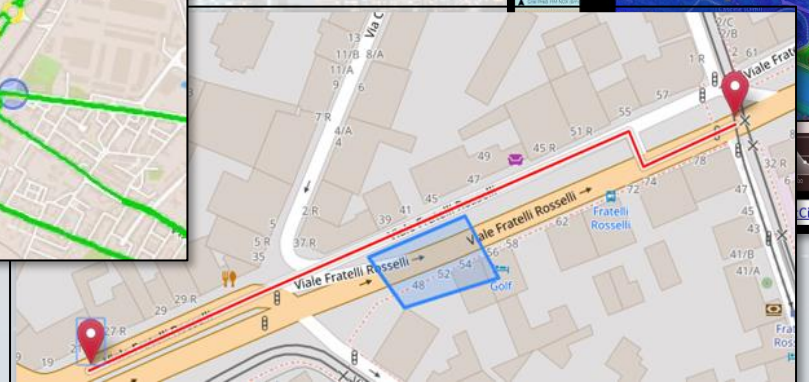
Cities: Firenze, Pisa, Livorno, Modena, Santiago di Compostela

reference

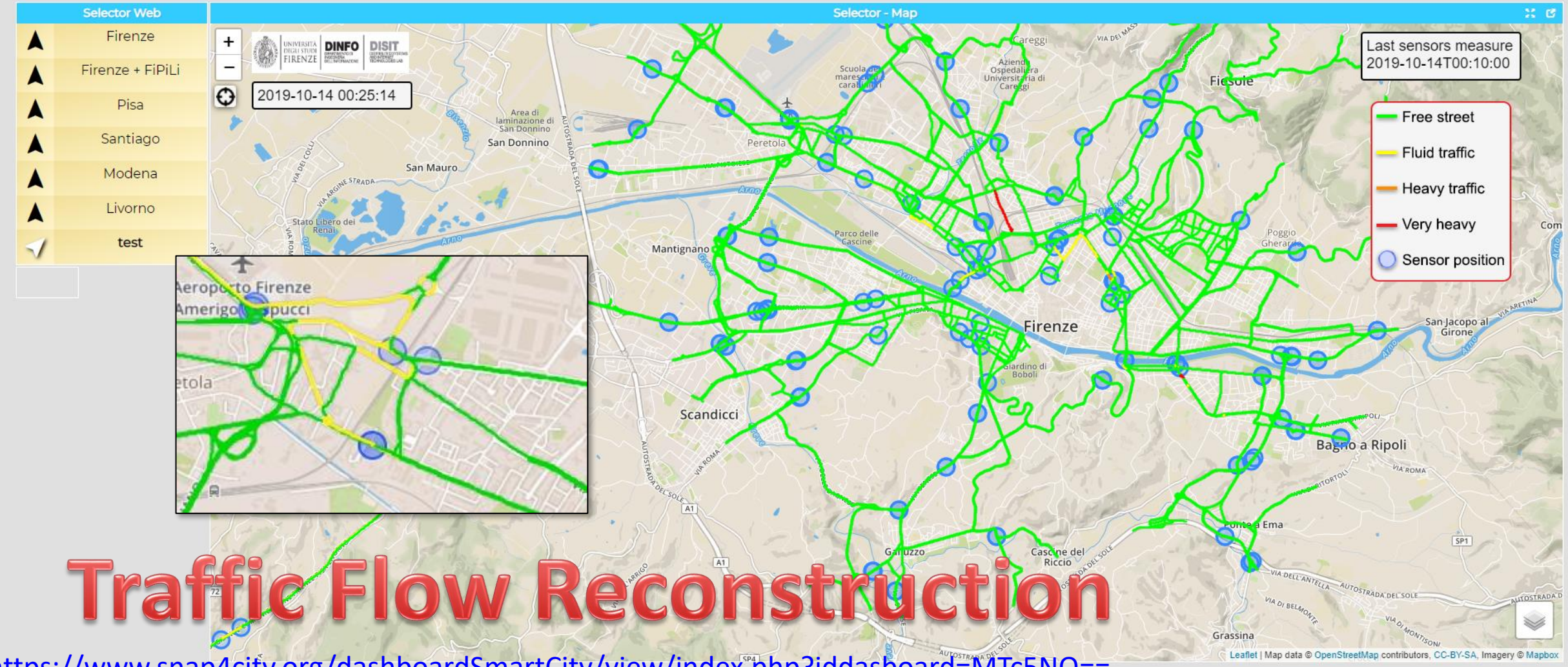
- **Multiple Domain Data**
  - Traffic Flow sensors, city structure, weather
- **Decision Makers Multiple Locations**
  - Real time Monitoring, predictions
  - Traffic Flow Predictions,
  - Traffic Reconstructions, routing
  - Dashboards, What-IF analysis
  - Mobile App, people flows
- **Historical and Real Time data**
- **Services Exploited on:**
  - Dashboards, Mobile App
- **Since 2017, 2019**







Traffic Flow Reconstruction for the cities



Traffic Flow Reconstruction

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTc5NQ==

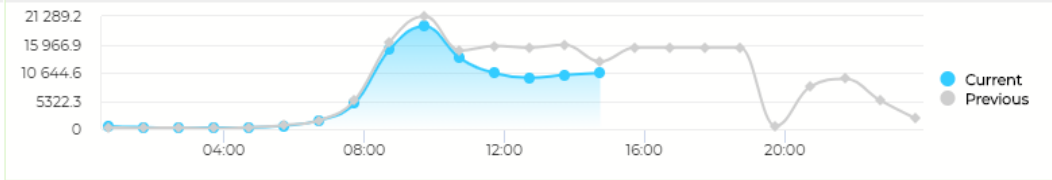
Traffic Flow Monitoring - Firenze - Cloned2

Wed 11 Nov 15:01:32

 # IN FLOW 9m

10549 #ofvehicles

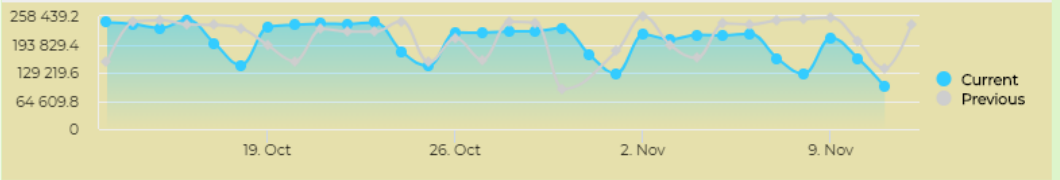
Firenze IN Traffic Flow (number of vehicles) 9m



Inc Daily Inp... 9m

97137 #ofvehicles

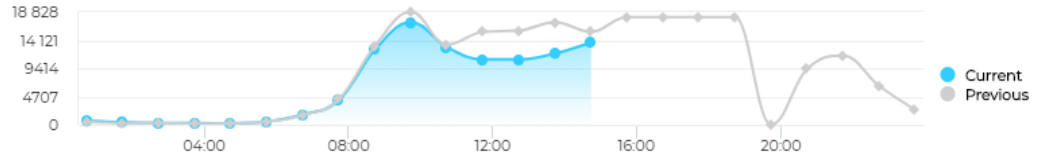
Daily Inputs (monthly) (last value is incremental, real time) 9m



 # OUT FLOW 9m

13720 #ofvehicles

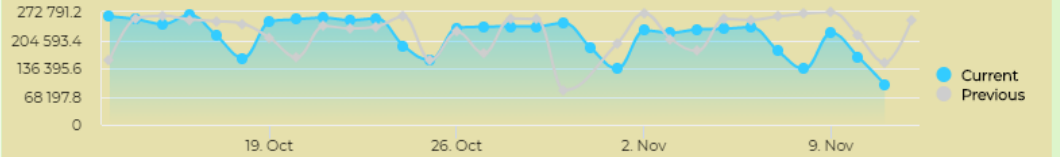
Firenze OUT Traffic Flow (number of vehicles) 9m



Inc Daily Out... 9m

97457 #ofvehicles

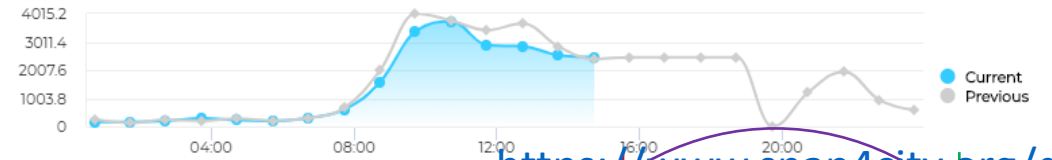
Daily Outputs (monthly) (last value is incremental real time) 9m



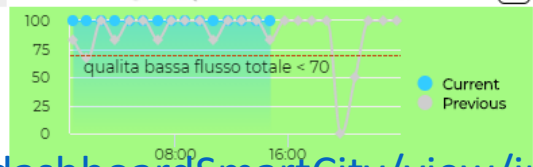
ZTL in 9m

2468 #ofvehicles

ZTL in Traffic Flow daily trend, entering in ZTL 9m



QoS as perc. of measures taken 9m



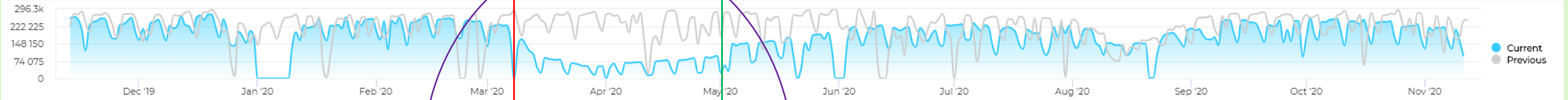
QoS as perc. of measures in ZTL 9m

11/11/2020

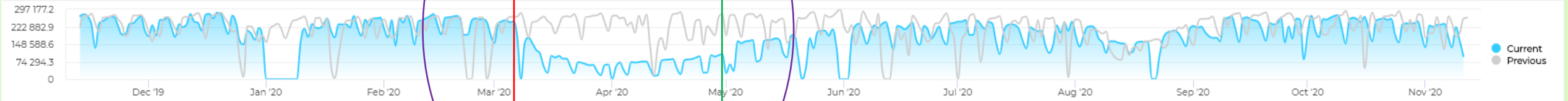
15:01:33

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjY1MQ==

inflow total of the day, yearly 9m



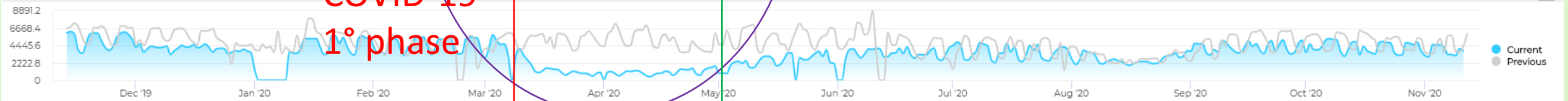
outflow total over the day Yearly 9m



COVID-19

1° phase

in ZTL yearly compare 9m



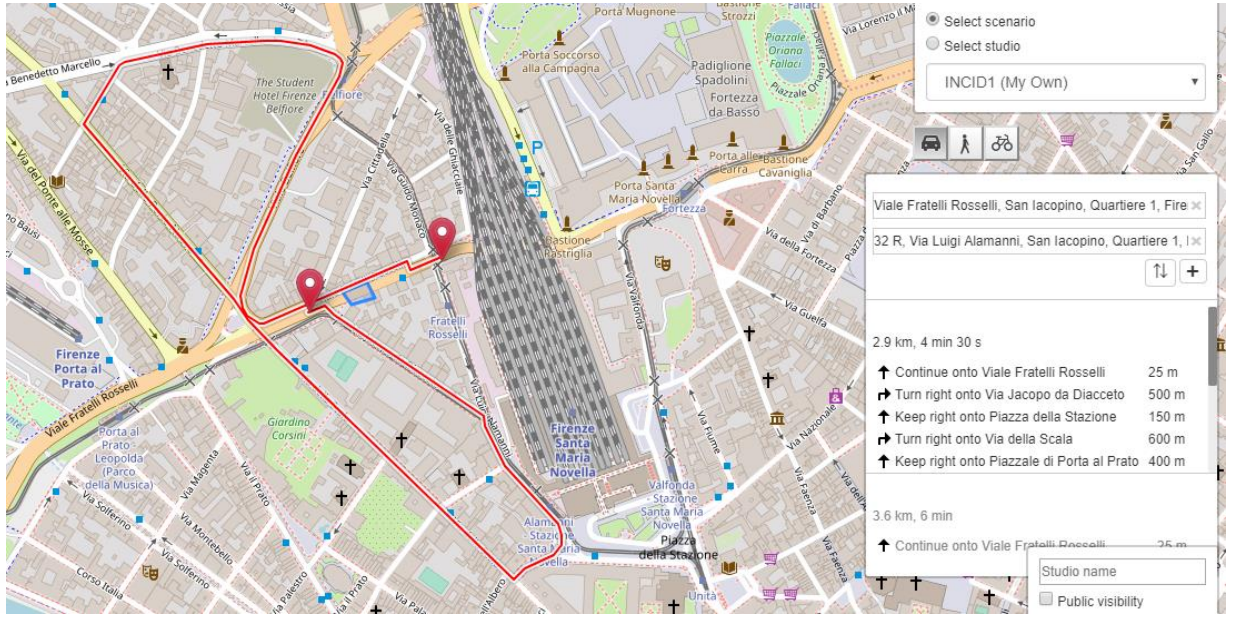
What-If Analysis

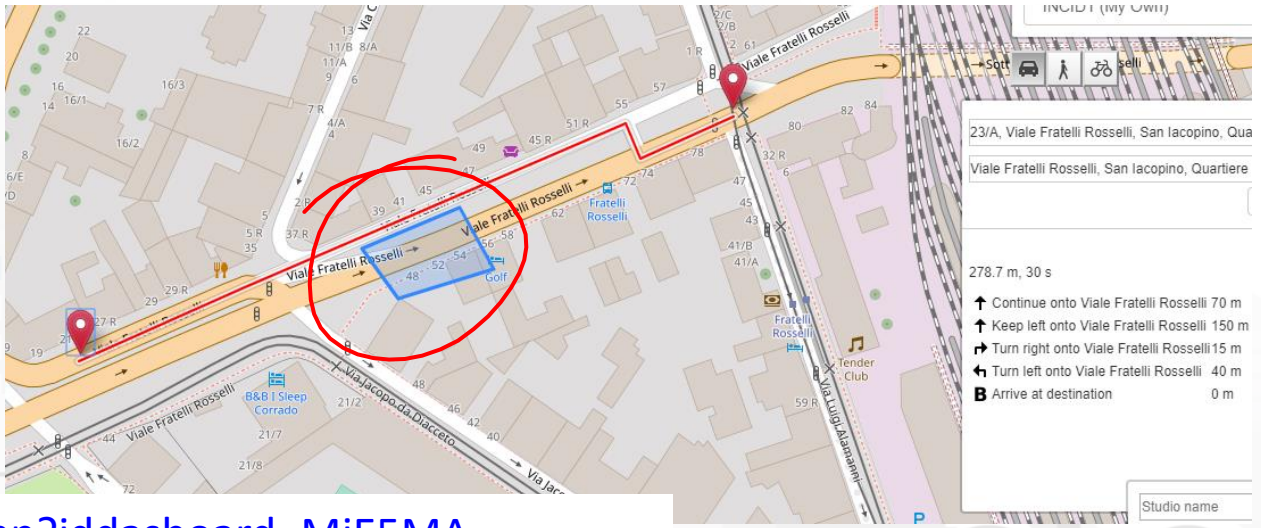
Accidents and elements blocking Points and Shapes taken into account for:

- Routing
- Traffic Flow reconstruction
- Evacuation paths
- Rescue team paths

Assessment on the basis of changes:

- Mobility demand assessment
- Mobility Offer assessment





https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjE5MA==

The App is a Bidirectional Device

- GPS Positions
- Selections on menus
- Views of POI
- Access to Dashboards
- searched information
- Routing
- Ranks, votes
- Comments
- Images
- Subscriptions to notifications
- ….

Produced information

- Viewed ?
- Accepted ?
- Performed ?
- …

Users

Derived information

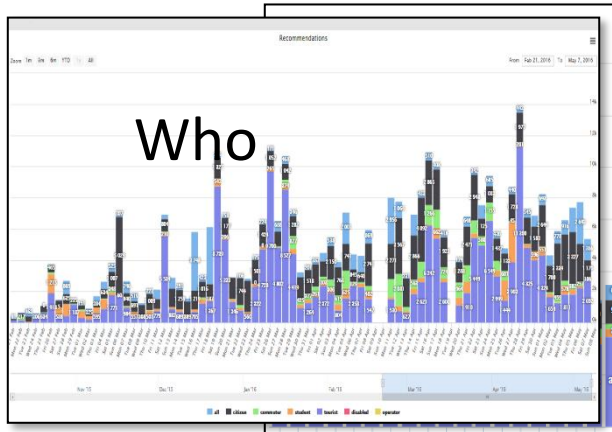
- Trajectories
- Hot Places by click and by move
- Origin destination matrices
- Most interested topics
- Most interested POI
- Delegation and relationships
- Accesses to Dashboards
- **Cumulated Scores from Actions**
- Requested information
- Routing performed
- …..

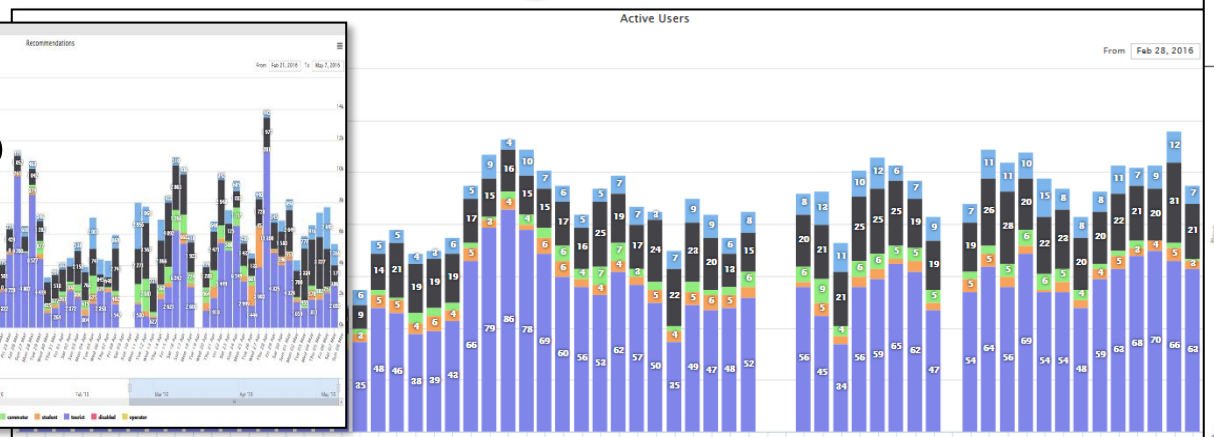
Produced information

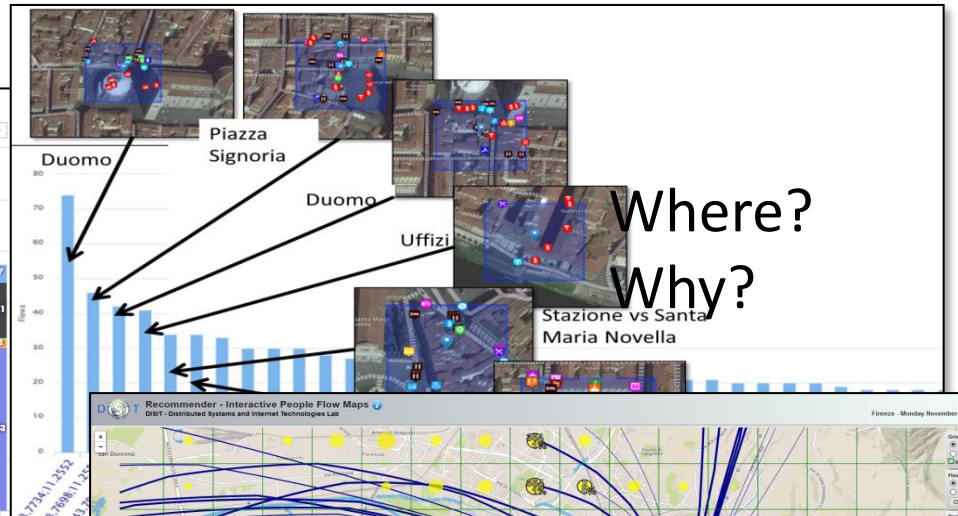
- Suggestions
- Engagements
- Notifications
- …

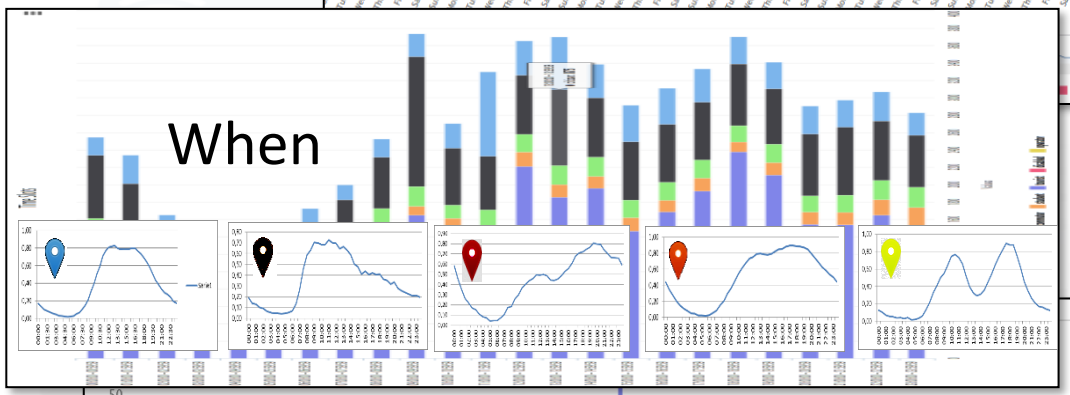
System

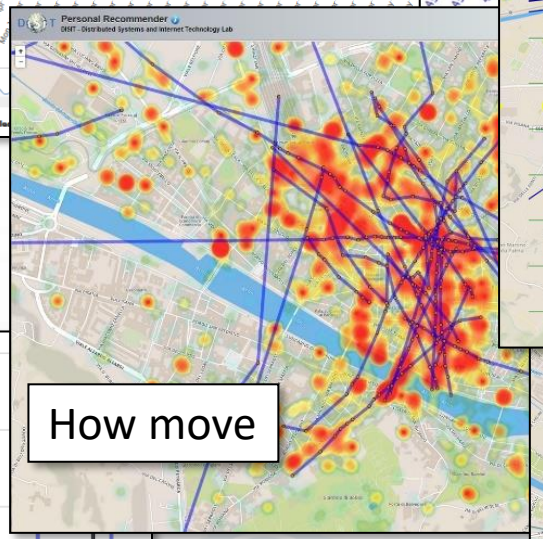
User Behavior Analyser for Collective Profiling

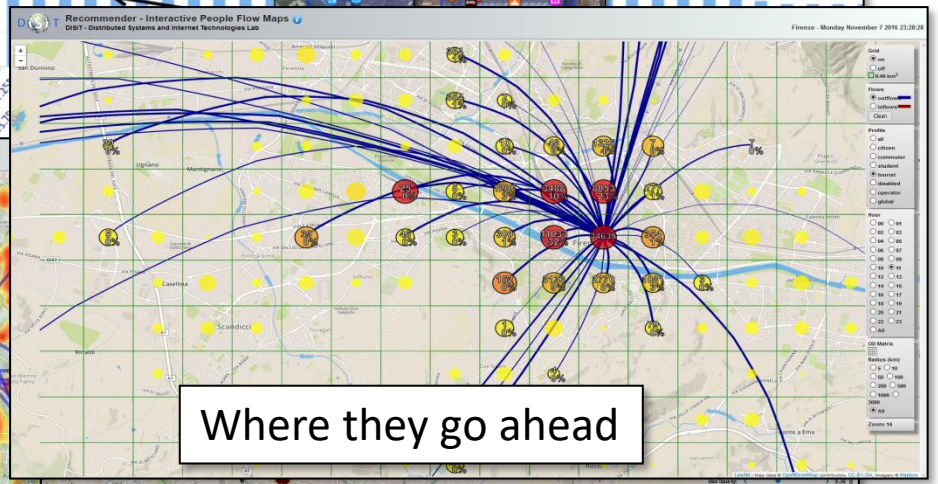


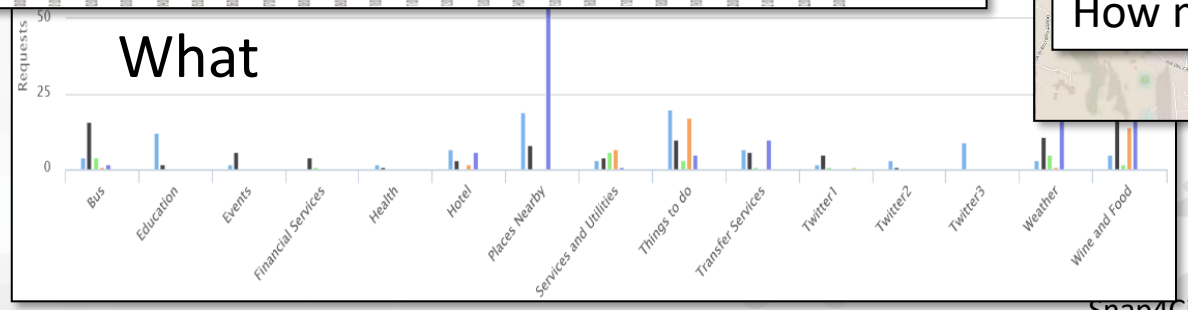


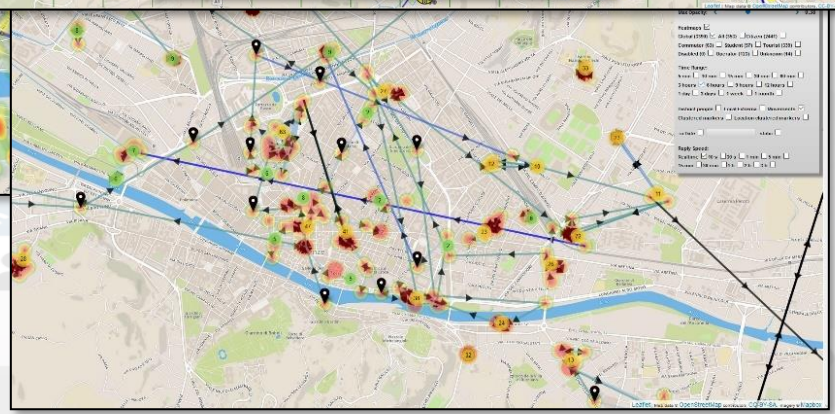




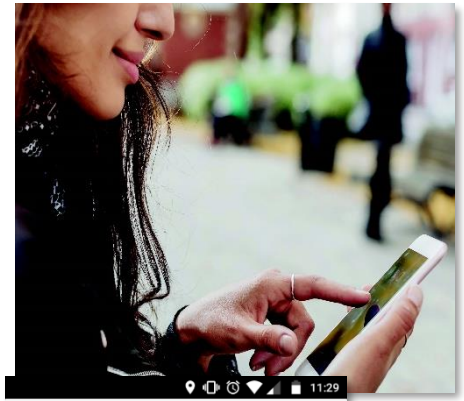


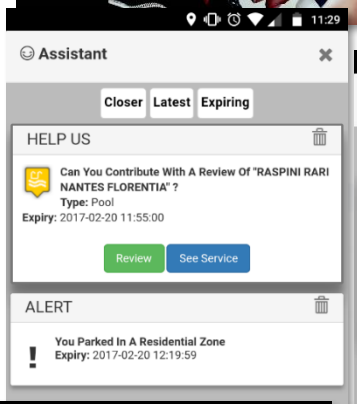


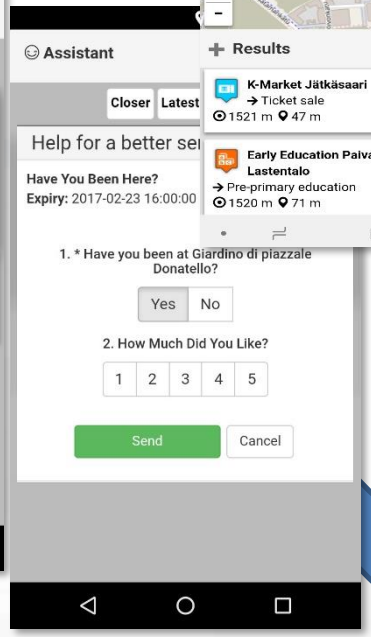


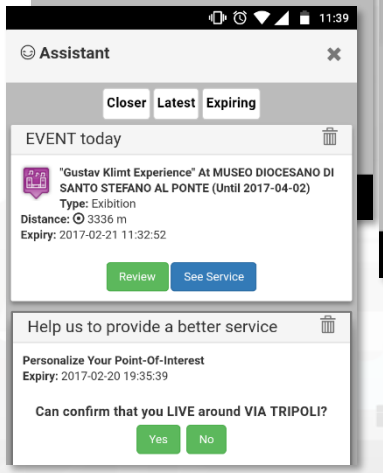


Users' Engagement

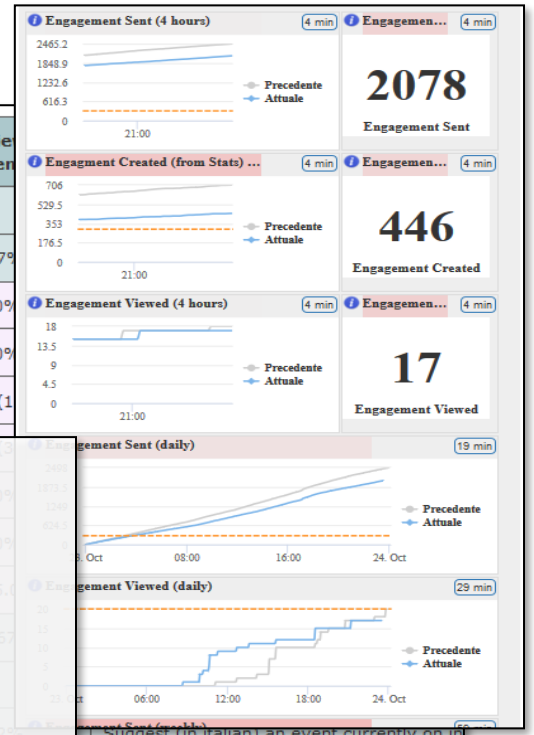








Rule name	Type	#sent	#viewed	#vie #sen
daily_event_de	ENGAGEMENT	1 (0%)	0 (0%)	0%
daily_event_en	ENGAGEMENT	1720 (2.12%)	70 (7.1%)	4.07%
	- commuter	5 (0.29%)	0 (0%)	0 (0%
	- student	14 (0.81%)	0 (0%)	0 (0%
	- tourist	1462 (85%)	25 (35.71%)	25 (1



Suggest (in italian) an event currently on in
Alert (in english) if the user parked in a res
Alert (in spanish) if the user parked in a res
Alert (in italian) if the user parked in a resid
Ask (in german) a contribution for a nearby

Inform
- Air Quality forecast is not very nice
- You have parked out of your residential parking zone
- The Road cleaning is this night
- The waste in S.Andreas Road is full

Engage
- Provide a comment, a score, etc.

Stimulate / recommend
- Events in the city, services you may be interested, etc..

Provide Bonus, rewards if needed
- you get a bonus since you parked here
- We suggest: leave the car out of the city, this bonus can be used to buy a bus ticket

Rules

User context

City context

Campaing on Sustainable Mobility

Sii smart.
Sii-Mobility!
Scarica, viaggia, vinci!

Dal 15 aprile al 15 luglio scegliere il trasporto pubblico ti premia!
Scarica l'app "Toscana dove, cosa", guadagna punti viaggiando in autobus e vinci tanti fantastici premi.
Per maggiori informazioni visita il sito info.sii-mobility.org
TOSCANA
ataf
BUSITALIA
GRUPPO FERROVIE DELLO STATO ITALIANE
MIUR
UNIVERSITÀ DEGLI STUDI FIRENZE
DINFO
DISIT

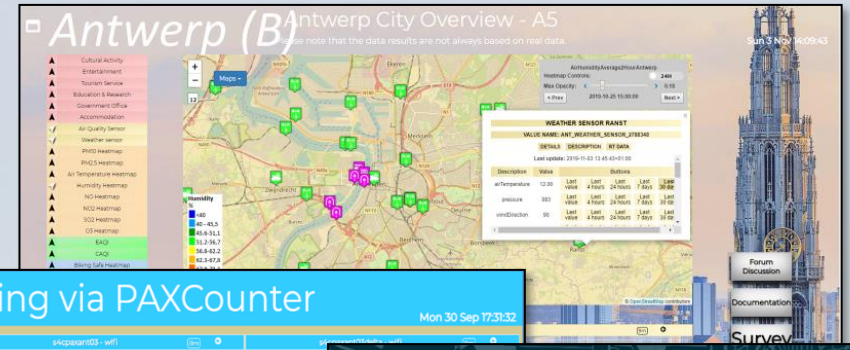
Antwerp, Belgium

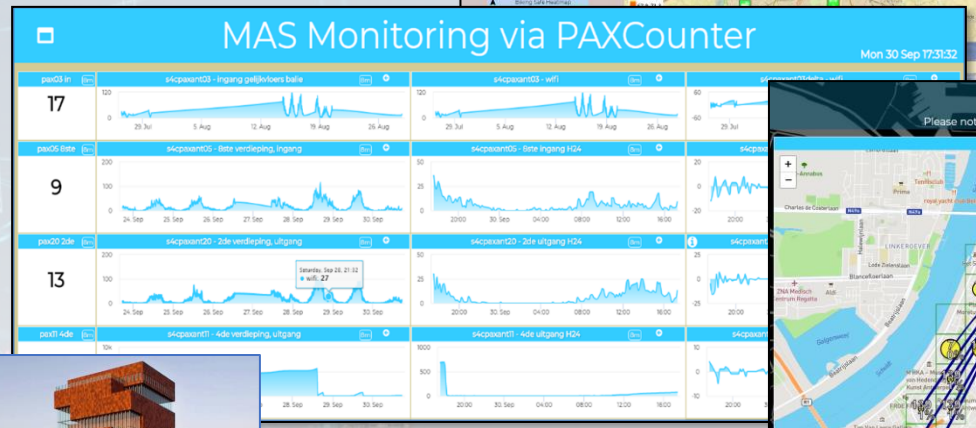
https://www.snap4city.org/526

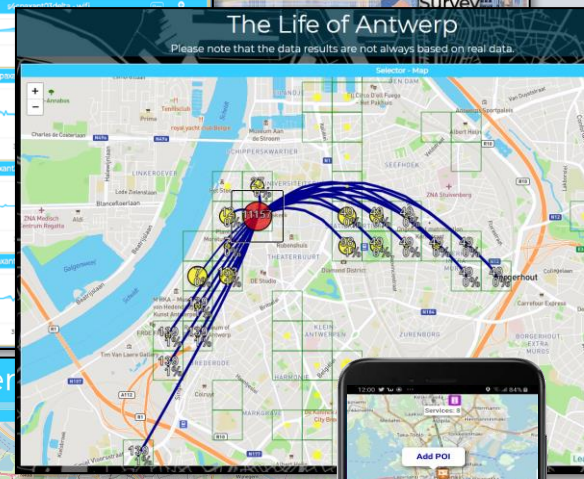
People Monitoring on Pub Services DIGIPOLIS Antwerp

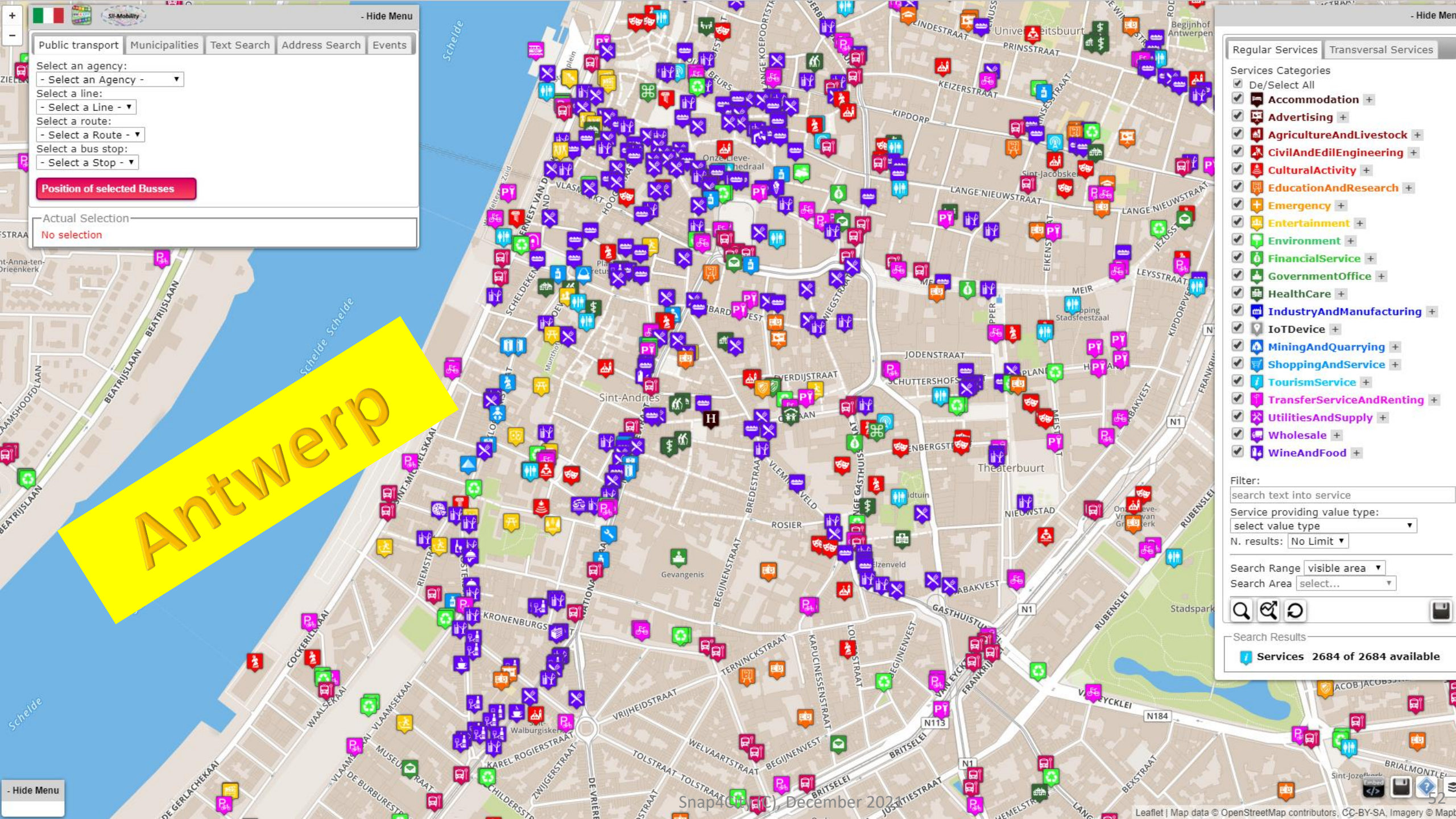
reference

- **Multiple Domain Data**
  - PAX Counters: museum, pub services, COVID-19
- **Multiple Levels & Decision Makers**
  - Business Intelligence Dashboards
  - People flow, OD flows
  - Detection of critical conditions
- **Historical and Real Time data**
  - 20 fixed PaxCounters
  - 2 Mobile PaxCounters
- **Services Exploited on:**
  - Dashboards, Mobile Apps, API/data
  - Fully Controlled Devices by Digipolis
- **Since 2019**







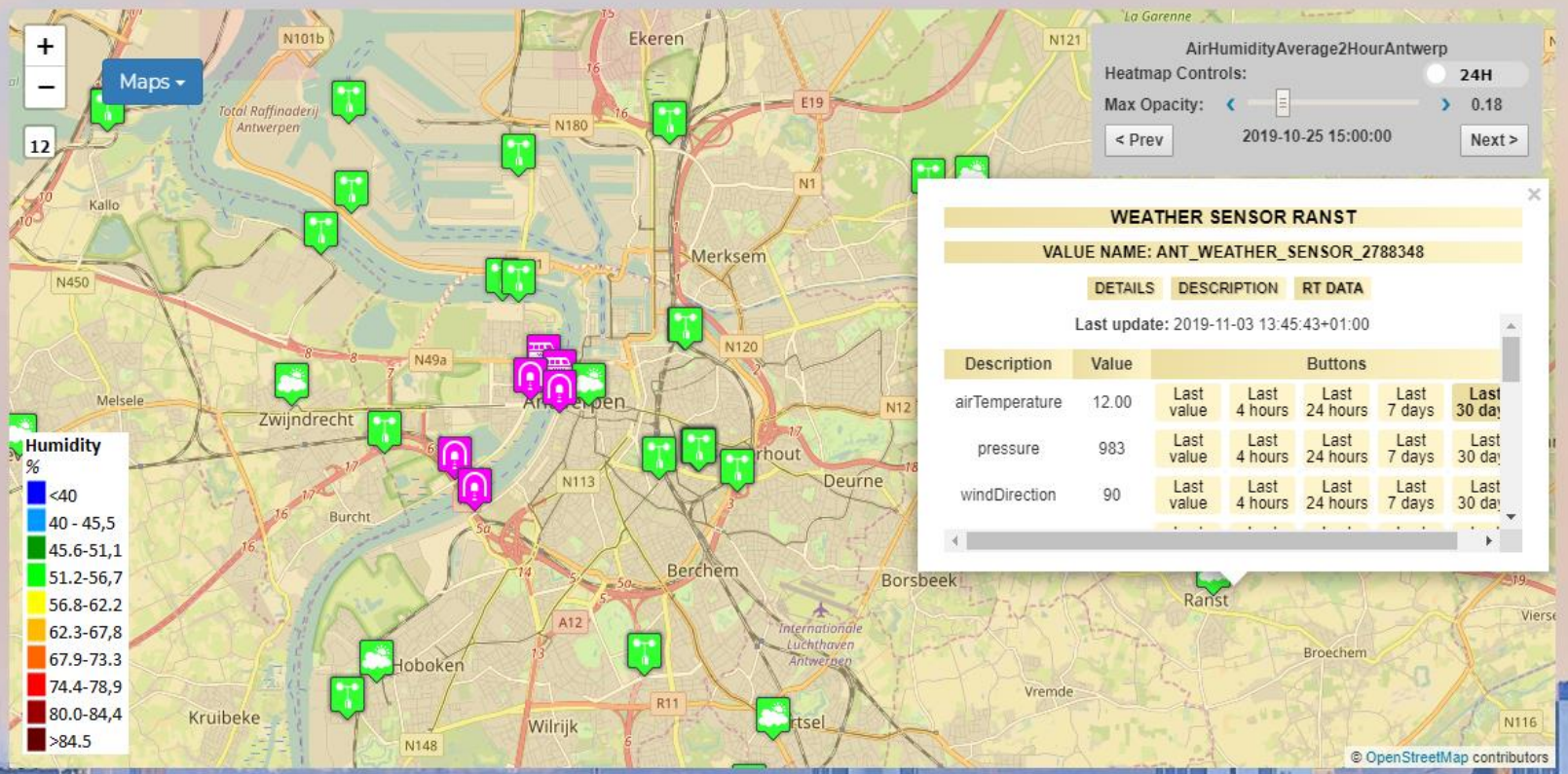

- Hide Menu
Public transport
Municipalities
Text Search
Address Search
Events
Select an agency:
- Select an Agency -
Select a line:
- Select a Line -
Select a route:
- Select a Route -
Select a bus stop:
- Select a Stop -
Position of selected Busses
Actual Selection
No selection
Antwerp
- Hide Menu
Regular Services
Transversal Services
Services Categories
De/Select All
Accommodation
Advertising
AgricultureAndLivestock
CivilAndEdilEngineering
CulturalActivity
EducationAndResearch
Emergency
Entertainment
Environment
FinancialService
GovernmentOffice
HealthCare
IndustryAndManufacturing
IoTDevice
MiningAndQuarrying
ShoppingAndService
TourismService
TransferServiceAndRenting
UtilitiesAndSupply
Wholesale
WineAndFood
Filter:
search text into service
Service providing value type:
select value type
N. results:
No Limit
Search Range
visible area
Search Area
select...
Search Results
Services 2684 of 2684 available
- Hide Menu
Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapb

Antwerp City Overview - A5

Please note that the data results are not always based on real data.

Sun 3 Nov 14:09:43

- Cultural Activity
- Entertainment
- Tourism Service
- Education & Research
- Government Office
- Accommodation
- Air Quality Sensor
- Weather sensor
- PM10 Heatmap
- PM2.5 Heatmap
- Air Temperature Heatmap
- Humidity Heatmap
- NO Heatmap
- NO2 Heatmap
- SO2 Heatmap
- O3 Heatmap
- EAQI
- CAQI
- Biking Safe Heatmap
- Tunnels and Ferry
- Routing Scenario
- What-IF Routing



Weather sensor Zwijndr... 8m

11.9

Forum Discussion

Documentation

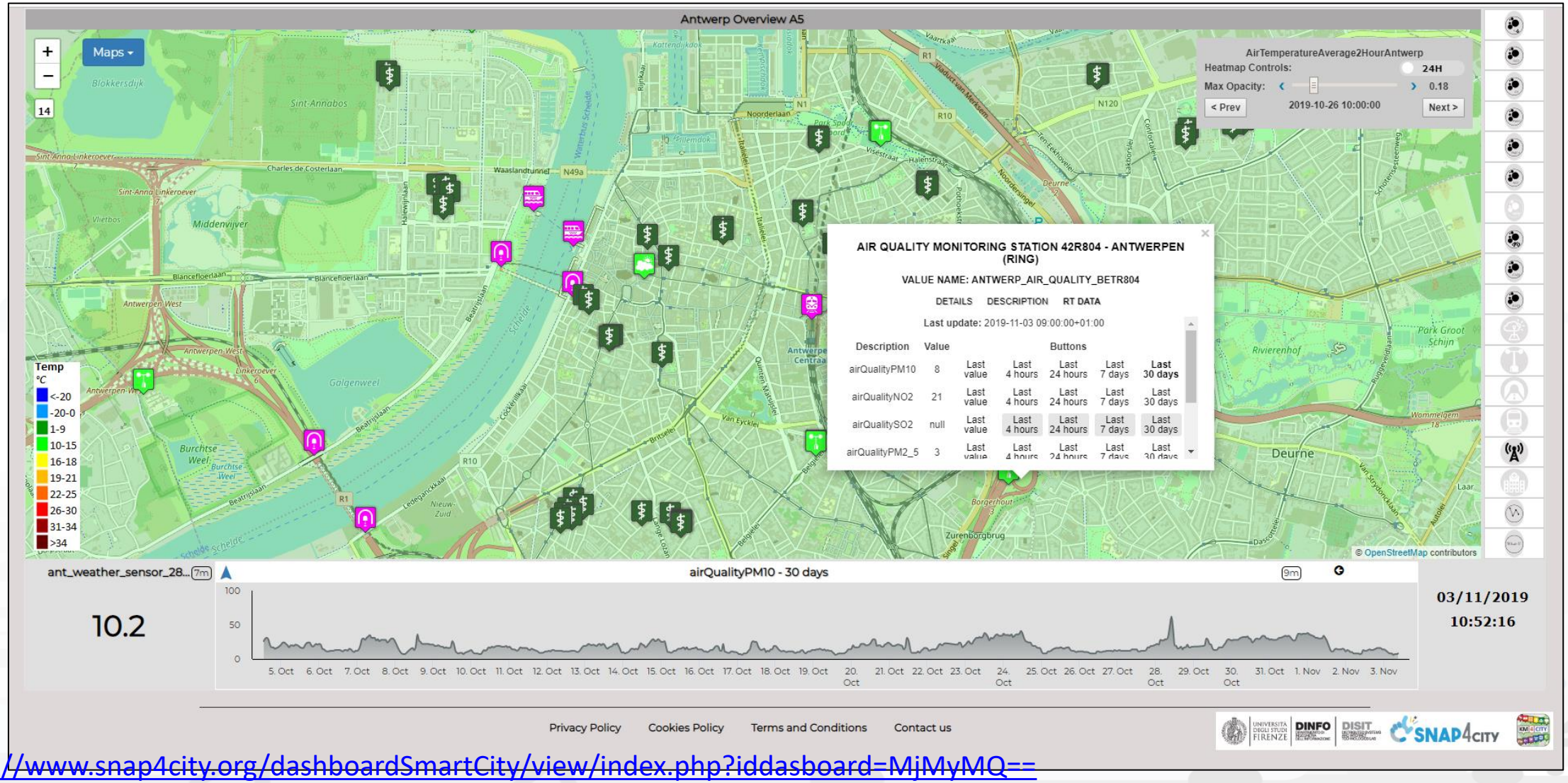
Survey

The Life of Antwerp

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTQwNw==

Antwerp

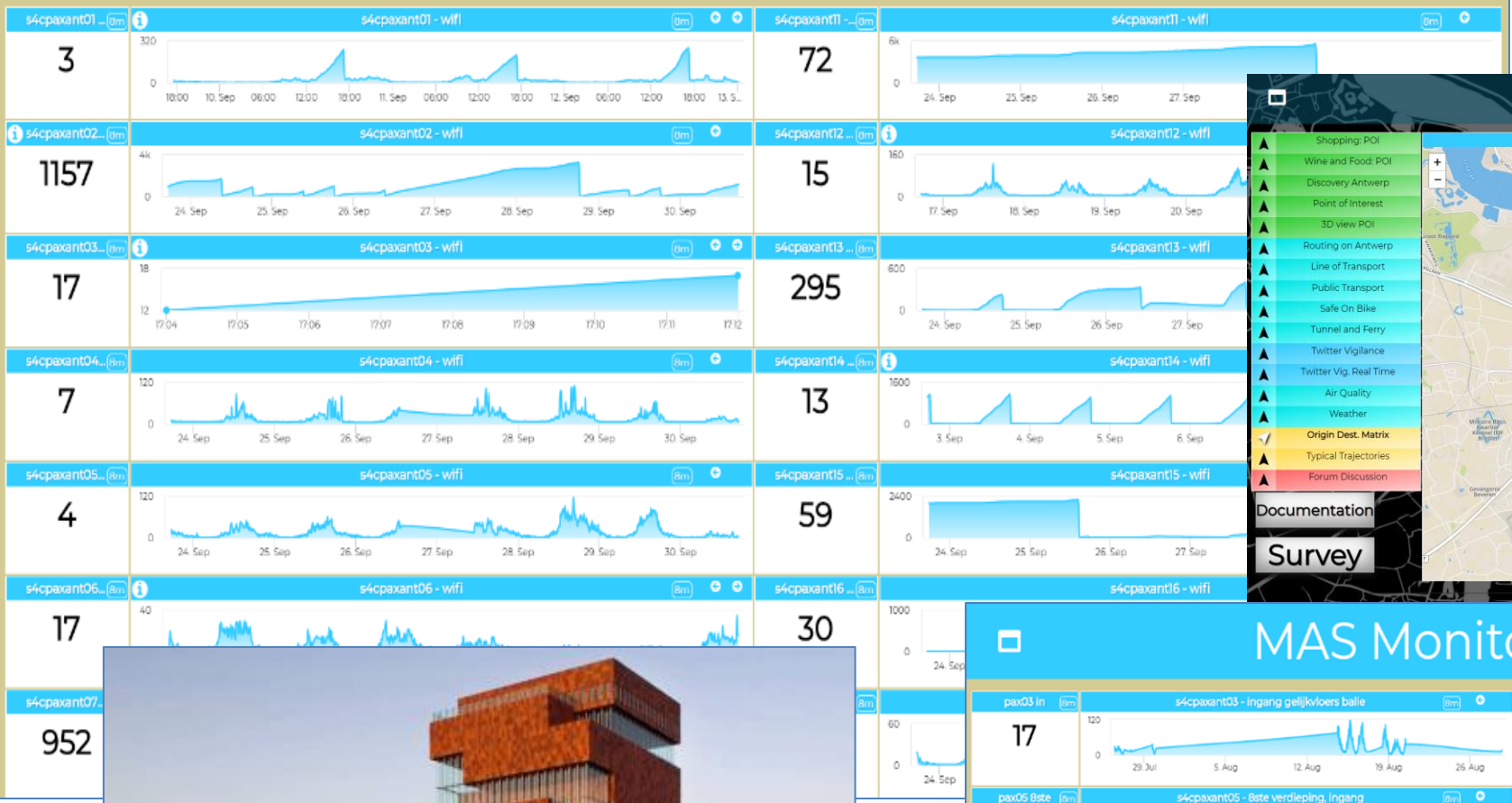
Unique Dashboard builder Multiple Styles

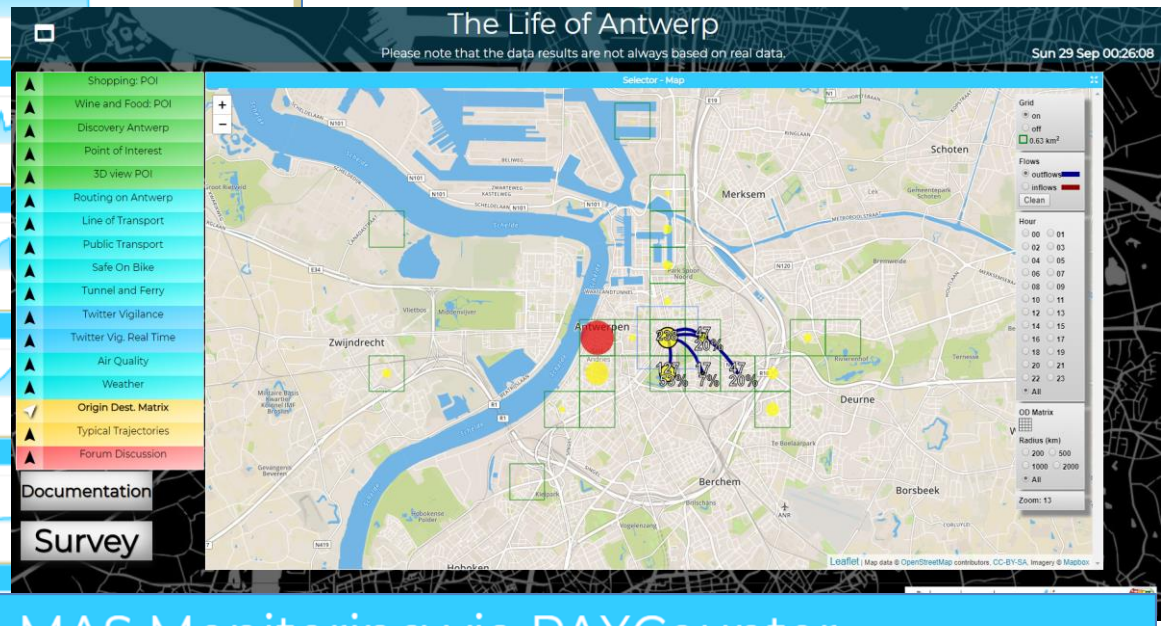


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjMyMQ==

PAXCounter real time and trend

Mon 30 Sep 17:18:48

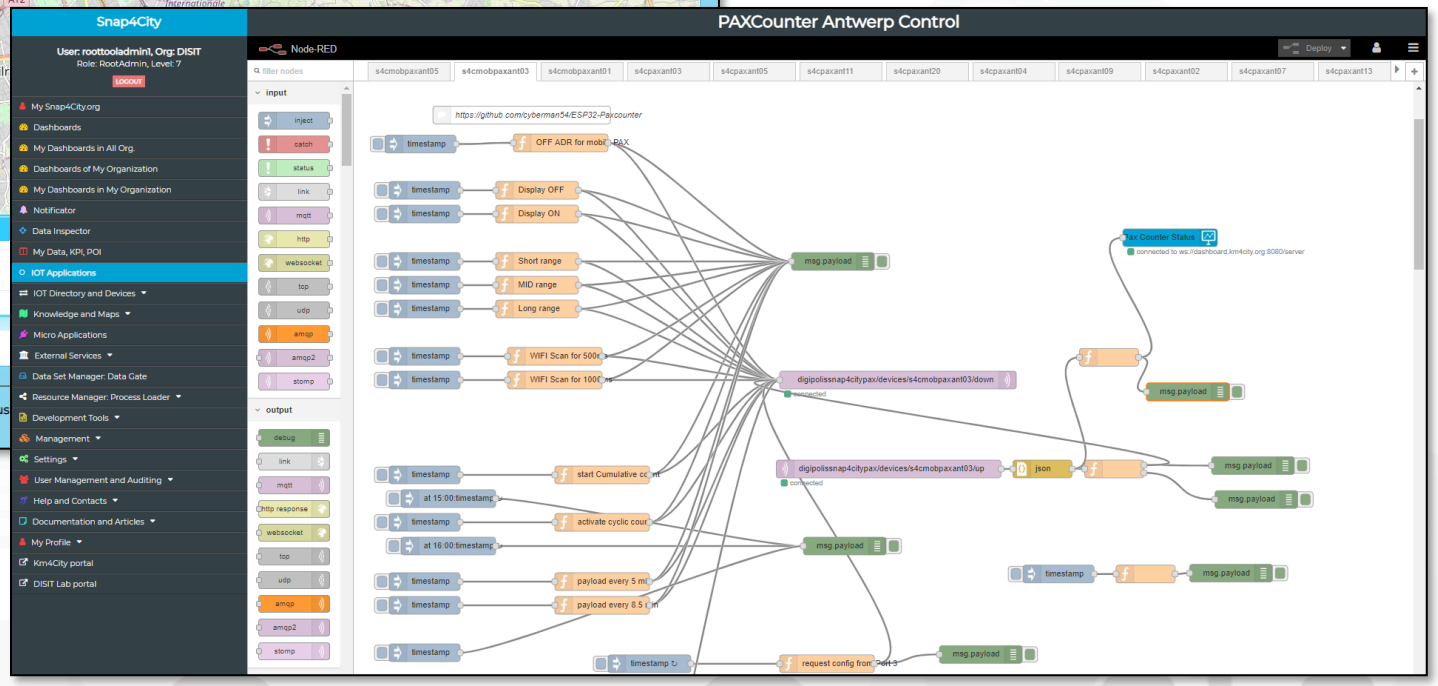




MAS Monitoring via PAXCounter

Mon 30 Sep 17:31:32

Programmable PAX counting

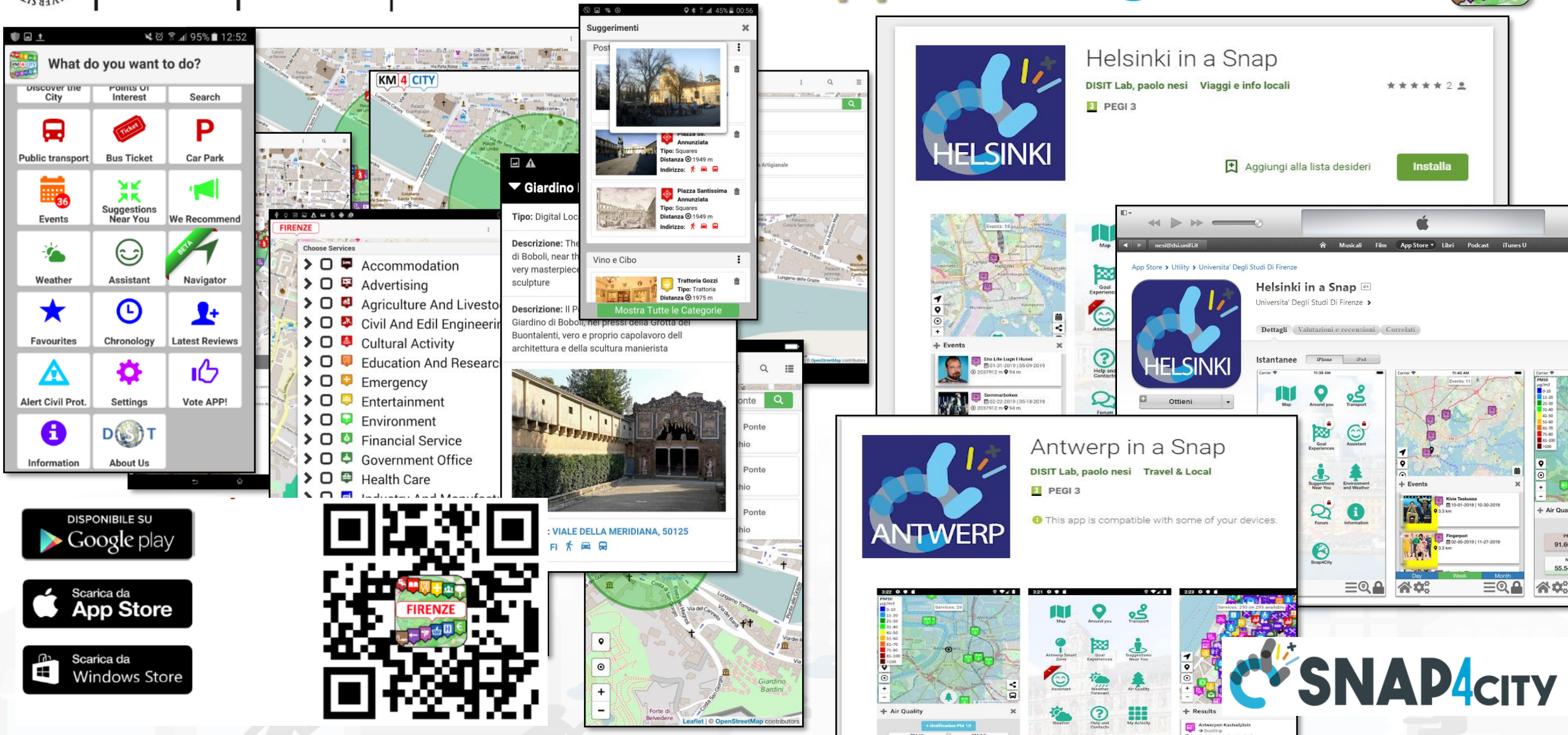


Antwerp

UNIVERSITÀ DEGLI STUDI FIRENZE | DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE | DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB

Mobile Apps

SNAP4CITY KM 4 CITY



DISPONIBILE SU Google play

Scarica da App Store

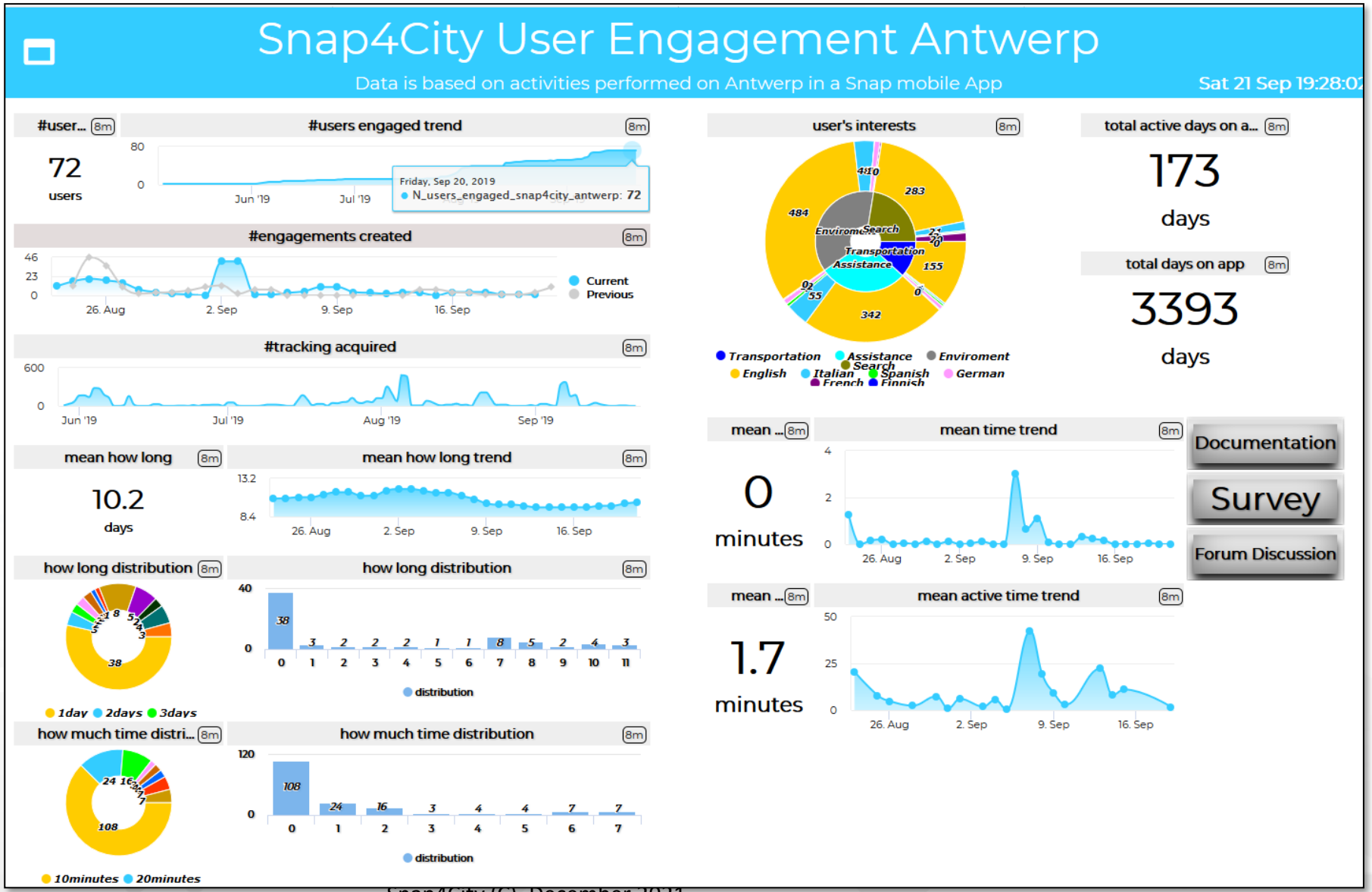
Scarica da Windows Store

SNAP4CITY

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTc1OQ==

Dashboard monitoring the Mobile App:

- Collecting the clicks
- Describing the community of users in terms of the profile aspects
- Measuring the time spend, and topics of interest of the users, etc.

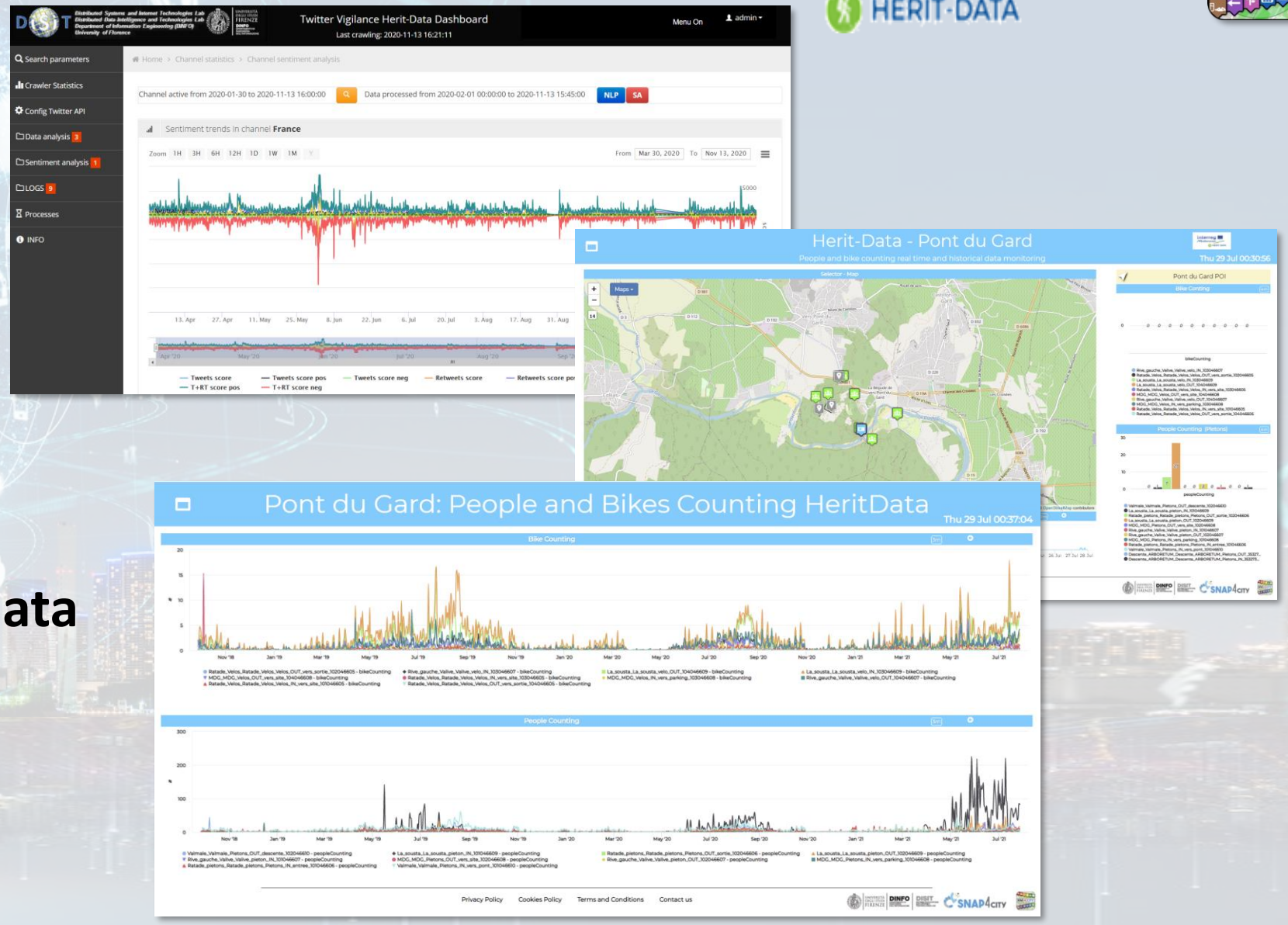


Antwerp


Interreg
Mediterranean
HERIT-DATA
Pont du Gard, France
https://www.snap4city.org/740

Pont du Gard

- **Tourism Domain**
  - KPIs
  - Social Media
  - People Flows
  - Bike Flows
- **Dashboards**
  - Monitoring KPI
  - People and bikes flows
  - Twitter Vigilance
- **Historical and updated data**
- **Services Exploited on:**
  - Dashboard
- **Since 2020**

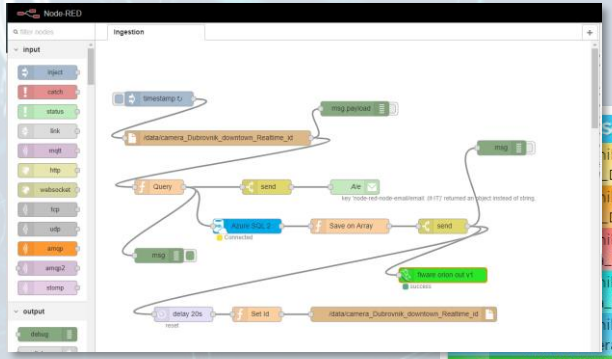


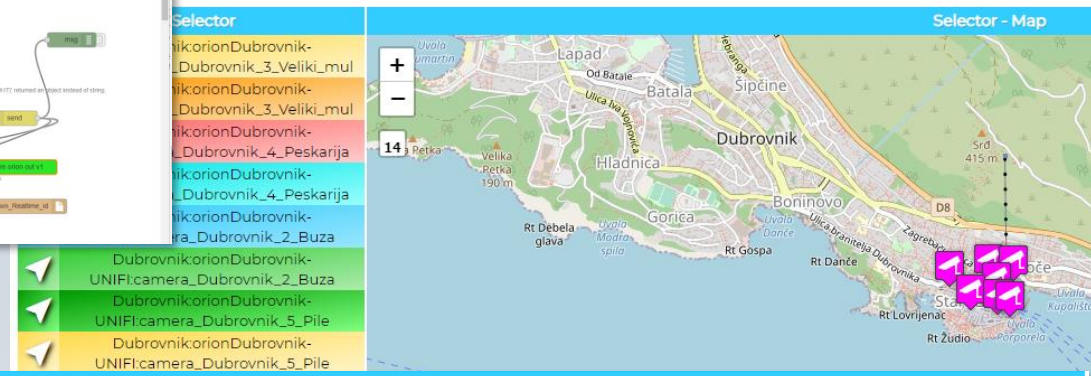
Dubrovnik, Croatia

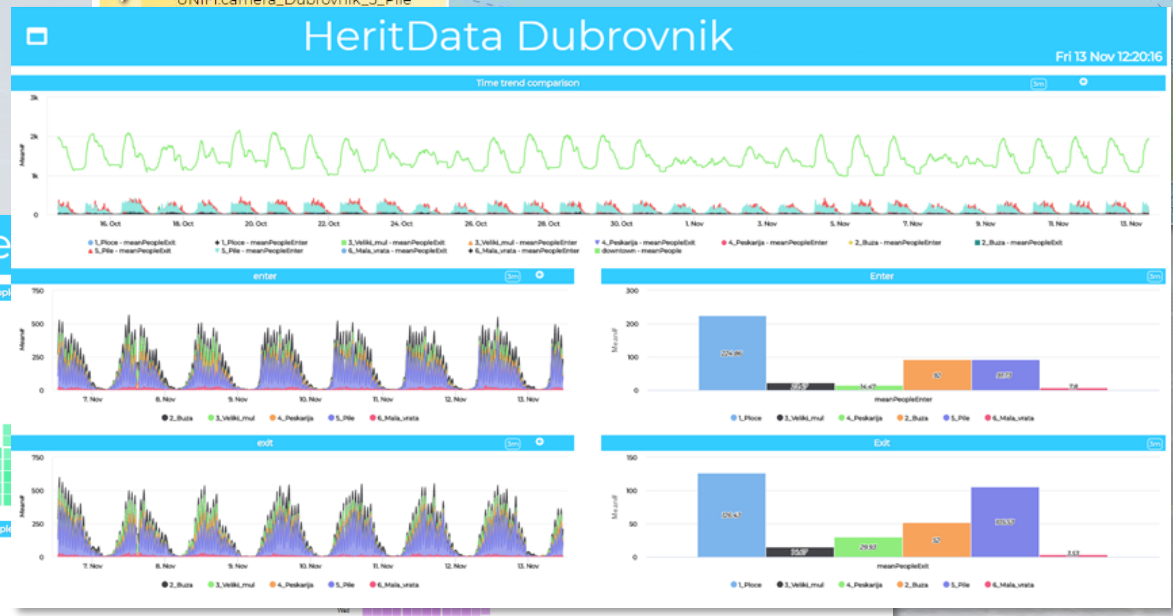
https://www.snap4city.org/741

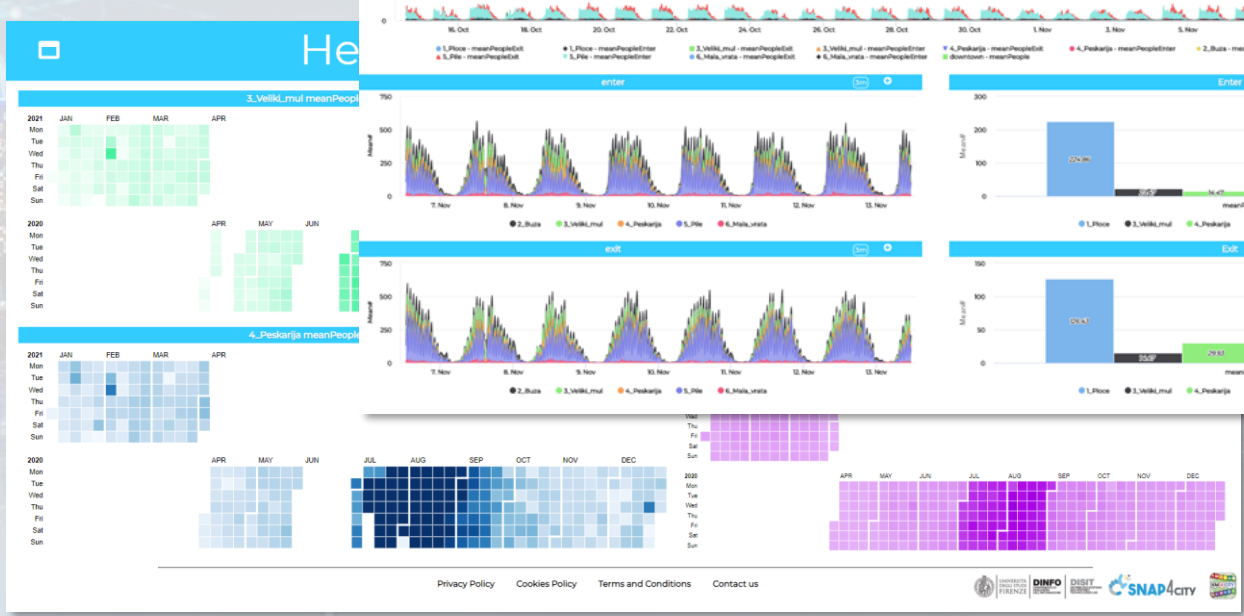
Dubrovnik

- **Tourism Domain**
  - Counting People
  - TV Cameras and WiFi
  - Social Media
- **Dashboards**
  - Monitoring and real time control
  - People flow
  - Twitter Vigilance
- **Historical and Real Time data**
- **Services Exploited on:**
  - Dashboard
- **Since 2020**





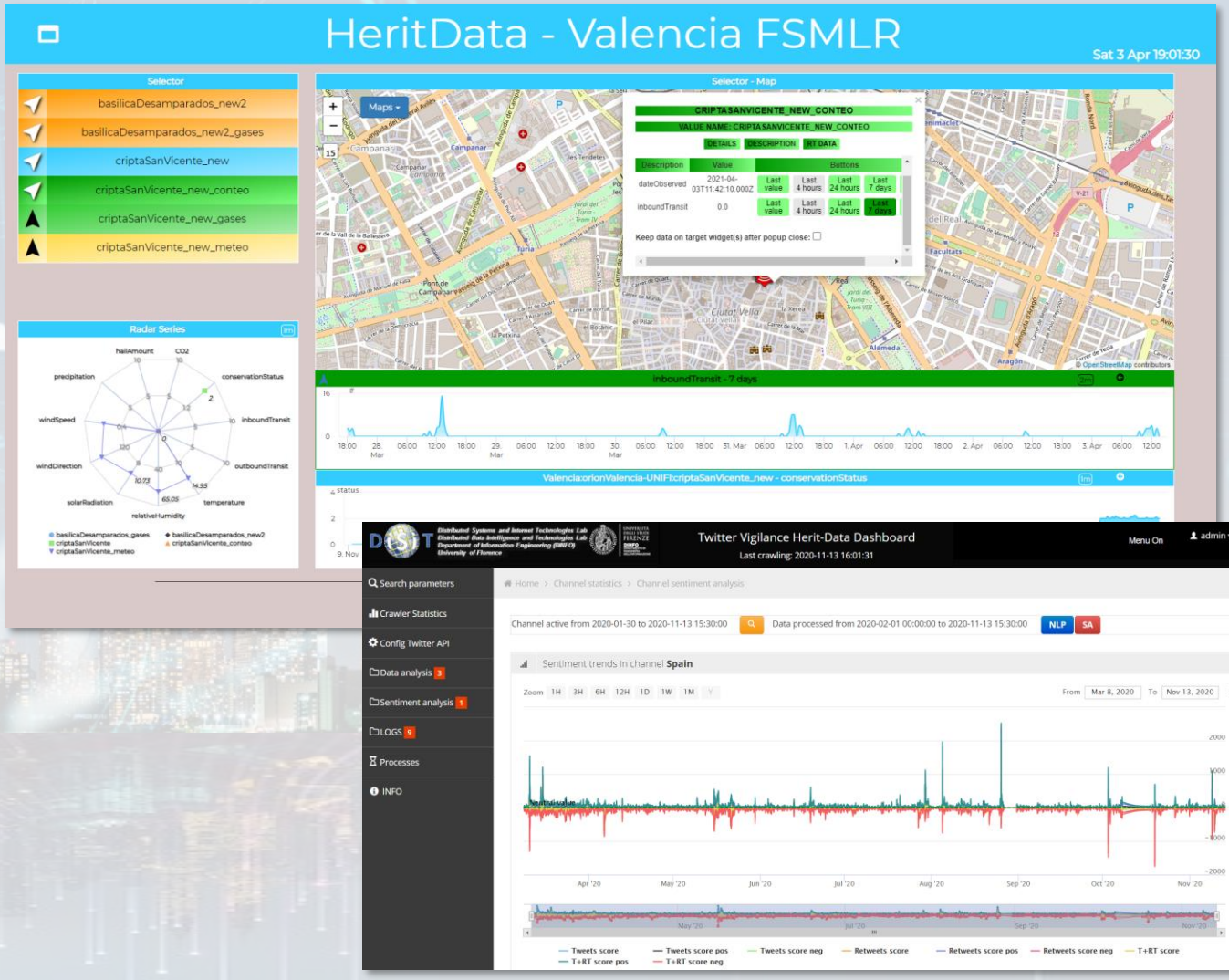





Interreg
Mediterranean
HERIT-DATA
Valencia, Spain
https://www.snap4city.org/742

Valencia, FSMLR

- **Tourism Domain**
  - Counting People
  - Environmental data
  - Social Media
- **Dashboards**
  - Monitoring and real time control
  - People flow
  - Twitter Vigilance
- **Historical and Real Time data**
- **Services Exploited on:**
  - Dashboard
- **Since 2020**

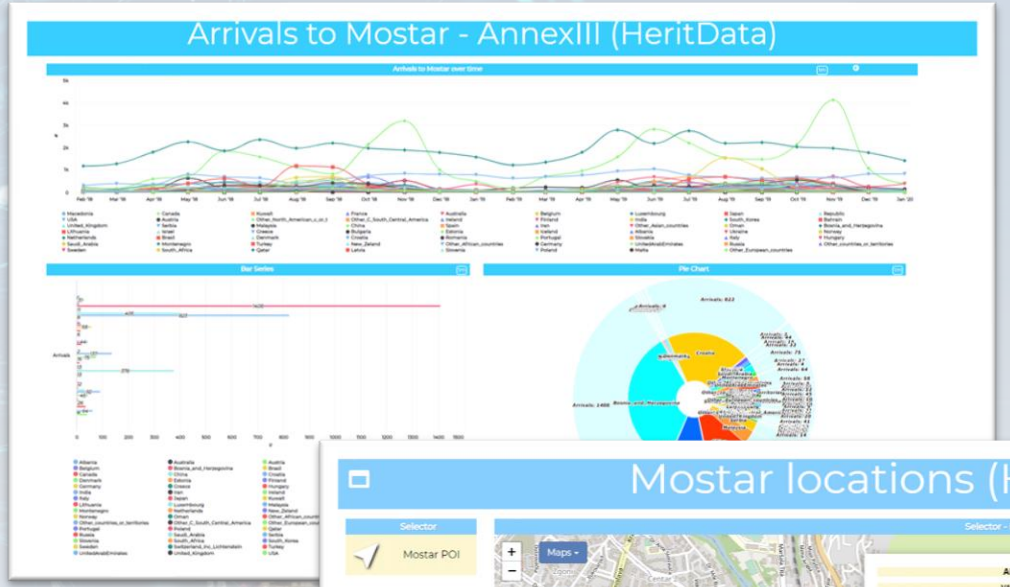


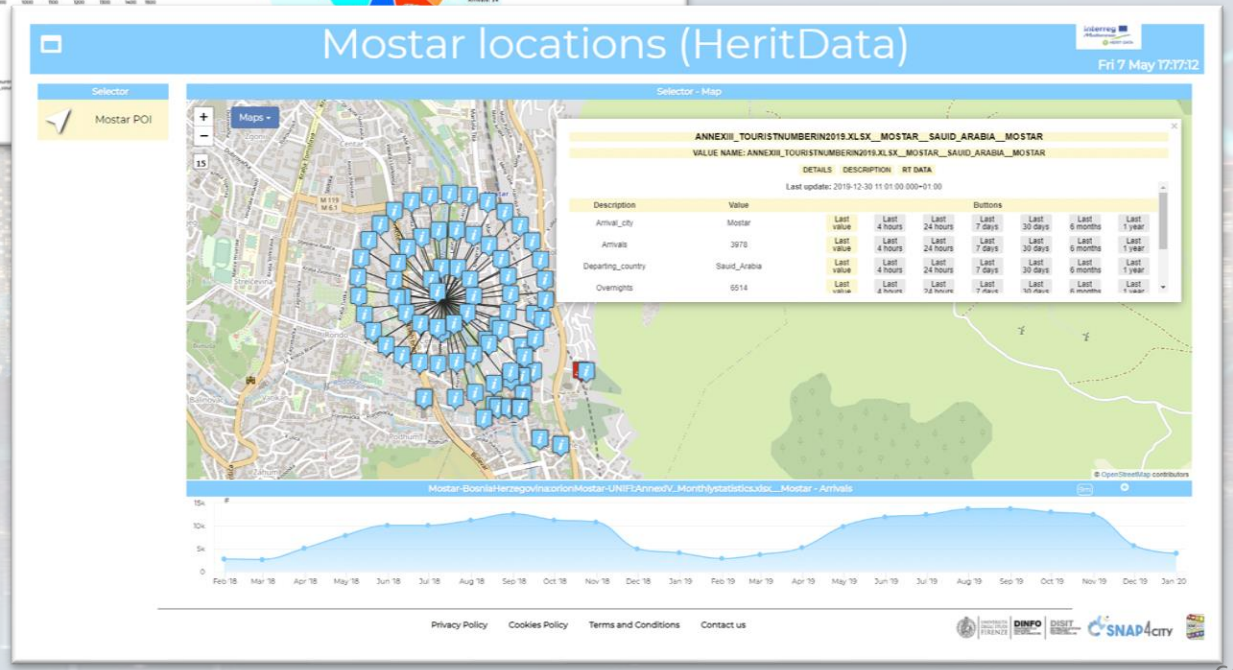
Mostar, Bosnia-Herzegovina

https://www.snap4city.org/744

Mostar, Bosnia Herzegovina

- **Tourism Domain**
  - KPIs
  - People flows
  - POI
- **Dashboards**
  - Monitoring KPI
  - POI, flows
- **Historical and updated data**
- **Services Exploited on:**
  - Dashboard
- **Since 2020**



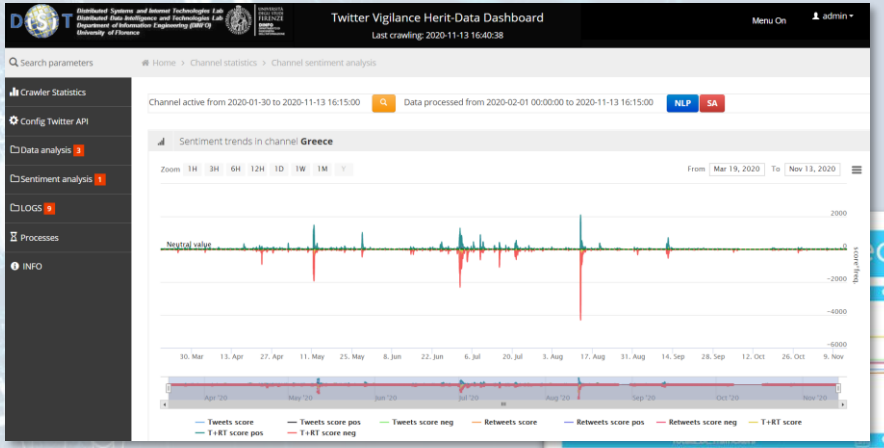


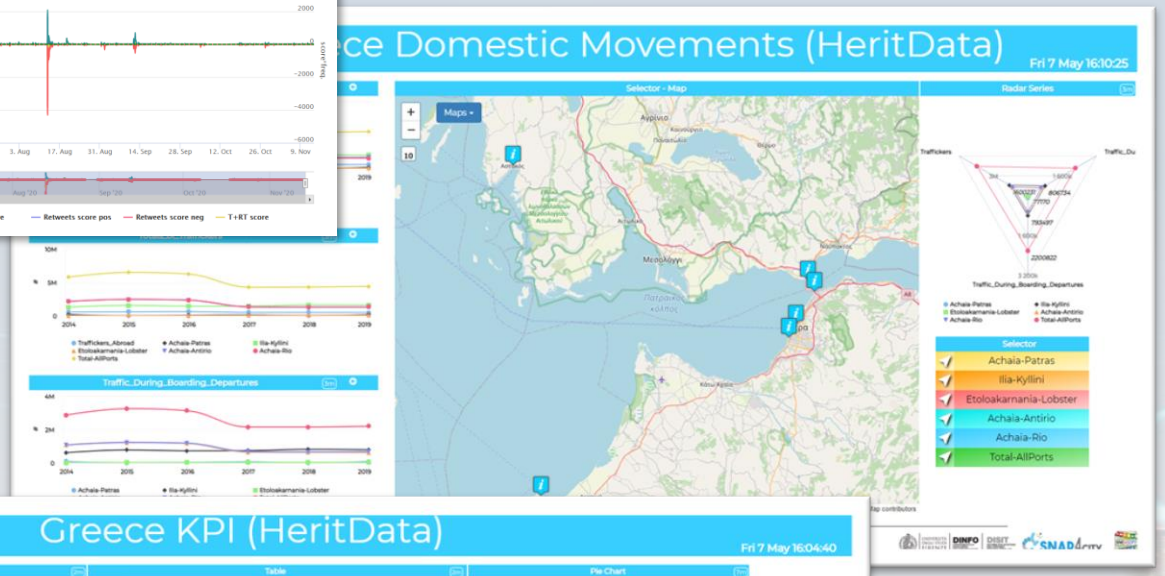
West Greece (Patra)

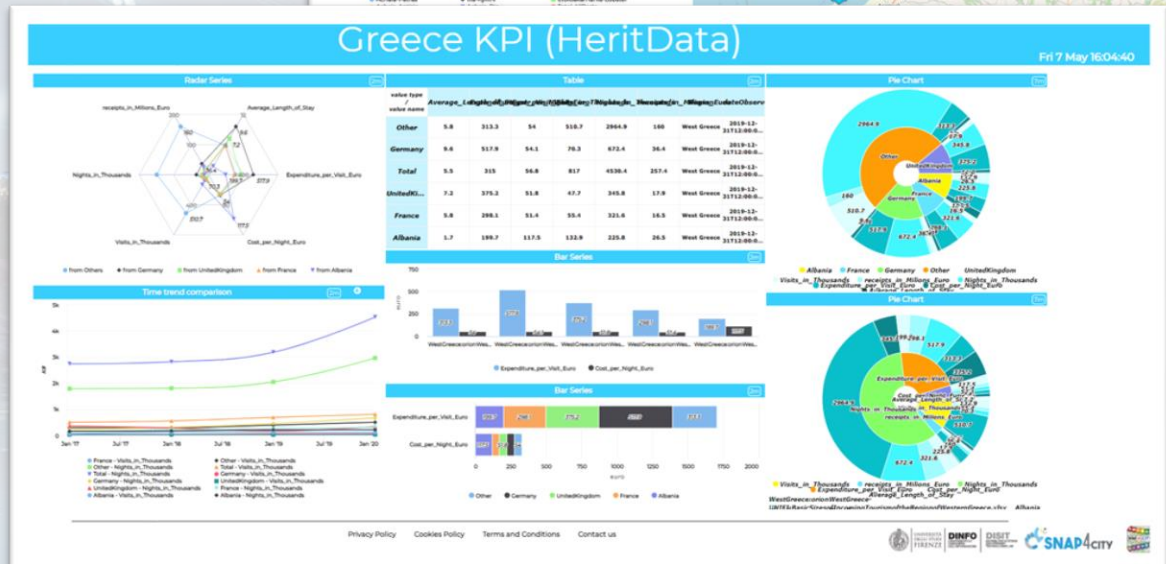
https://www.snap4city.org/743

West Greece

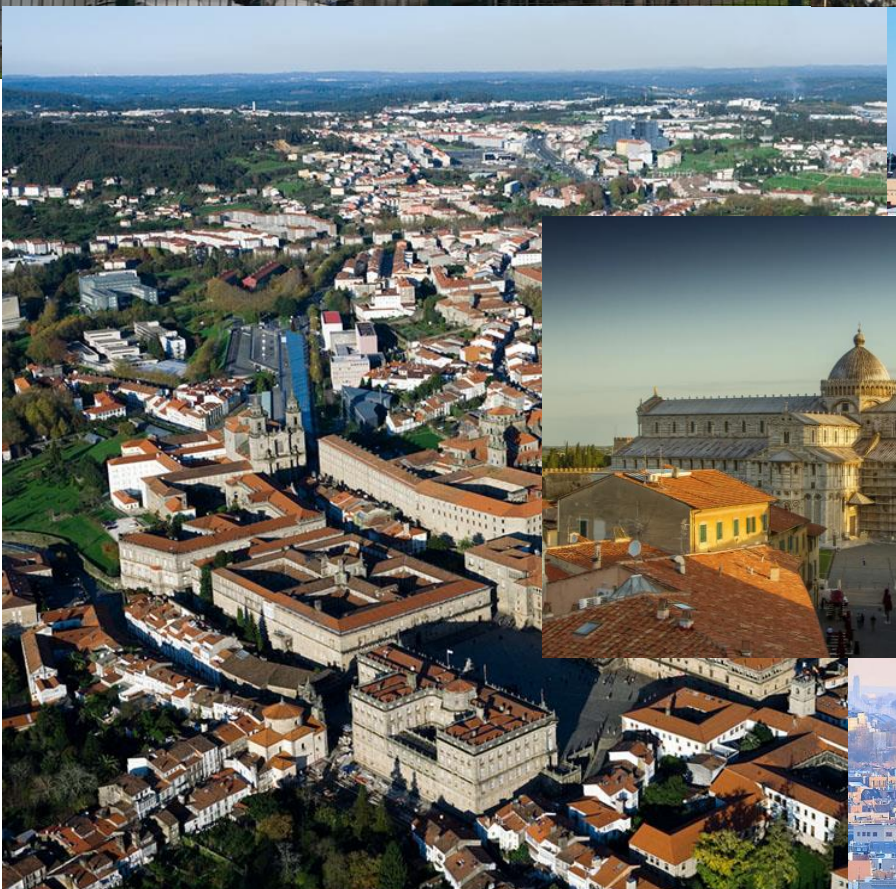
- **Tourism Domain**
  - KPIs: ODM, Flows, …
  - Social Media
  - People Flows
- **Dashboards**
  - Monitoring KPI
  - People flows
  - Twitter Vigilance
- **Historical and updated data**
- **Services Exploited on:**
  - Dashboard
- **Since 2020**



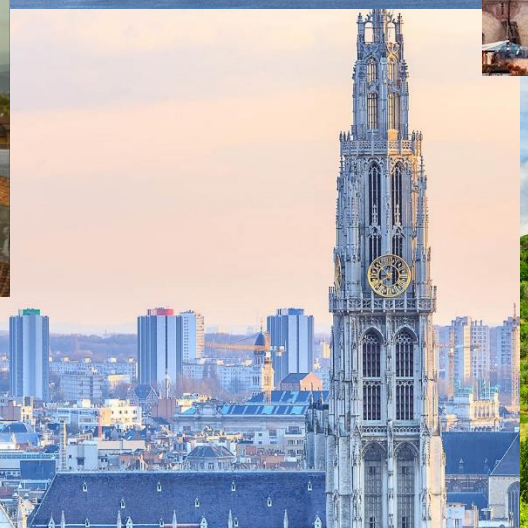










Traffic Flow Reconstruction for the cities

Sun 3 Nov 20:37:43

Santiago di Compostela

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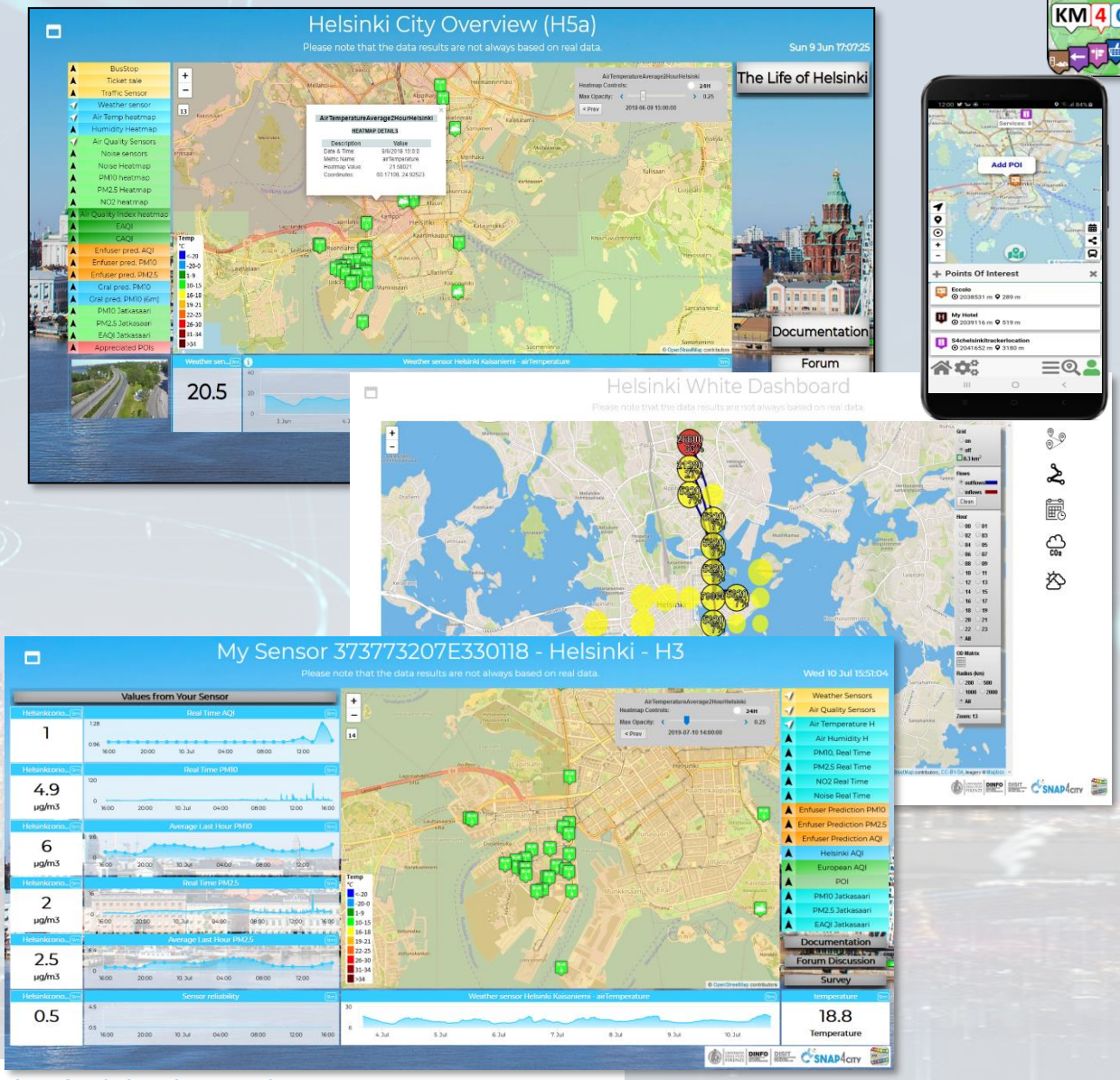
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTc5NQ==

Helsinki, Finland

- **Dashboards & Services**:
  - **Environment** & **Weather**, PM10, PM2.5,NO, SO2, CO, noise, etc.
    - Sensors values, Heatmap & **Alerts** on critical
    - FMI Enfuser prediction: PM10, PM2.5, ..
    - GRAL predictions PM10, validations
    - Private sensors in Jätkäsaari area (personal dashboards)
  - **Mobility**: Traffic Sensors, Operators, routing, multimodal routing, whatif
  - **Social**: Twitter Vigilance, early warning
  - **Life in Helsinki**: OD matrix people flow, Twitter Vigilance SA, hot places, etc.
  - **Tourism and Culture**
- **Mobile App and MicroApplications:**
  - Helsinki in a Snap (all stores)



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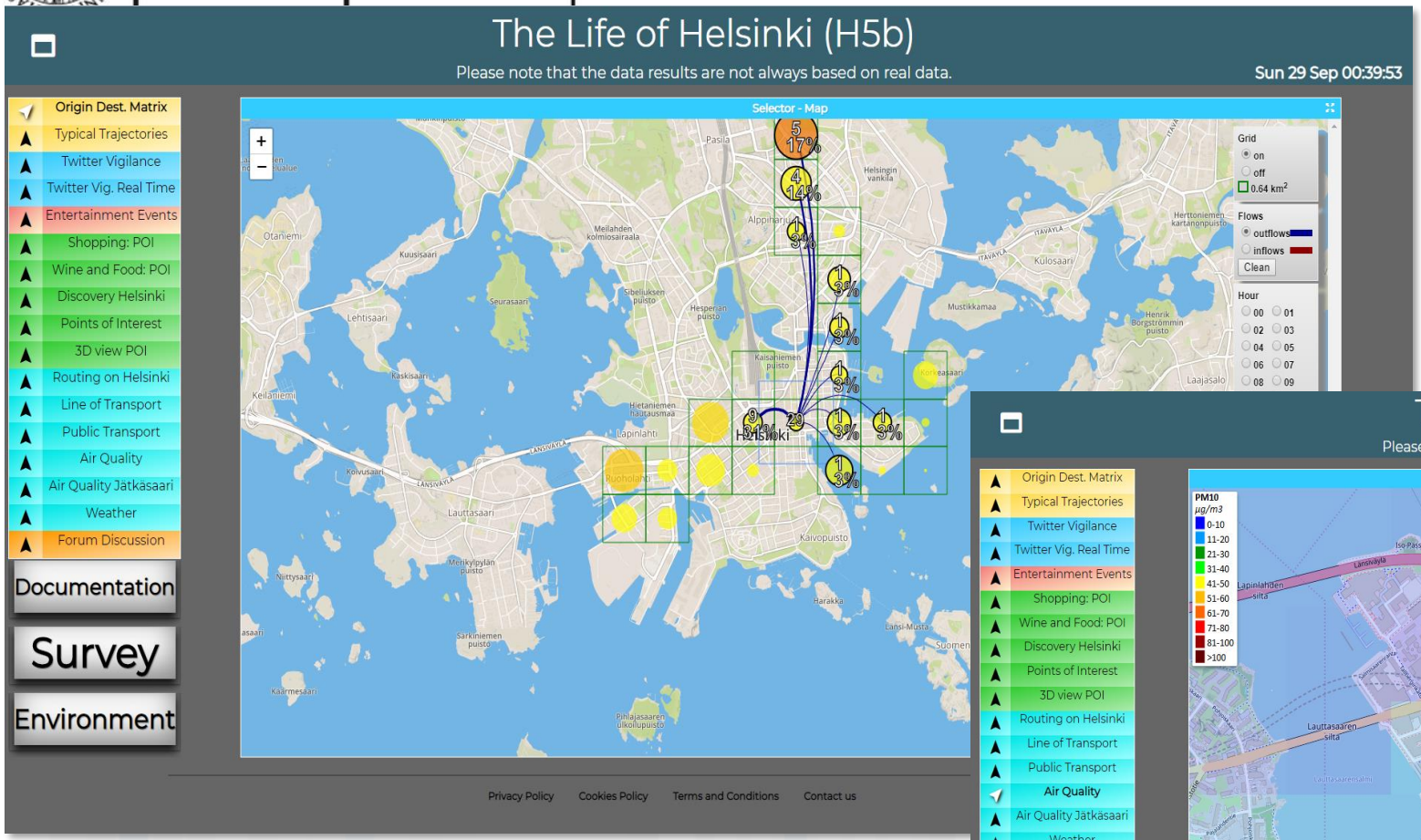
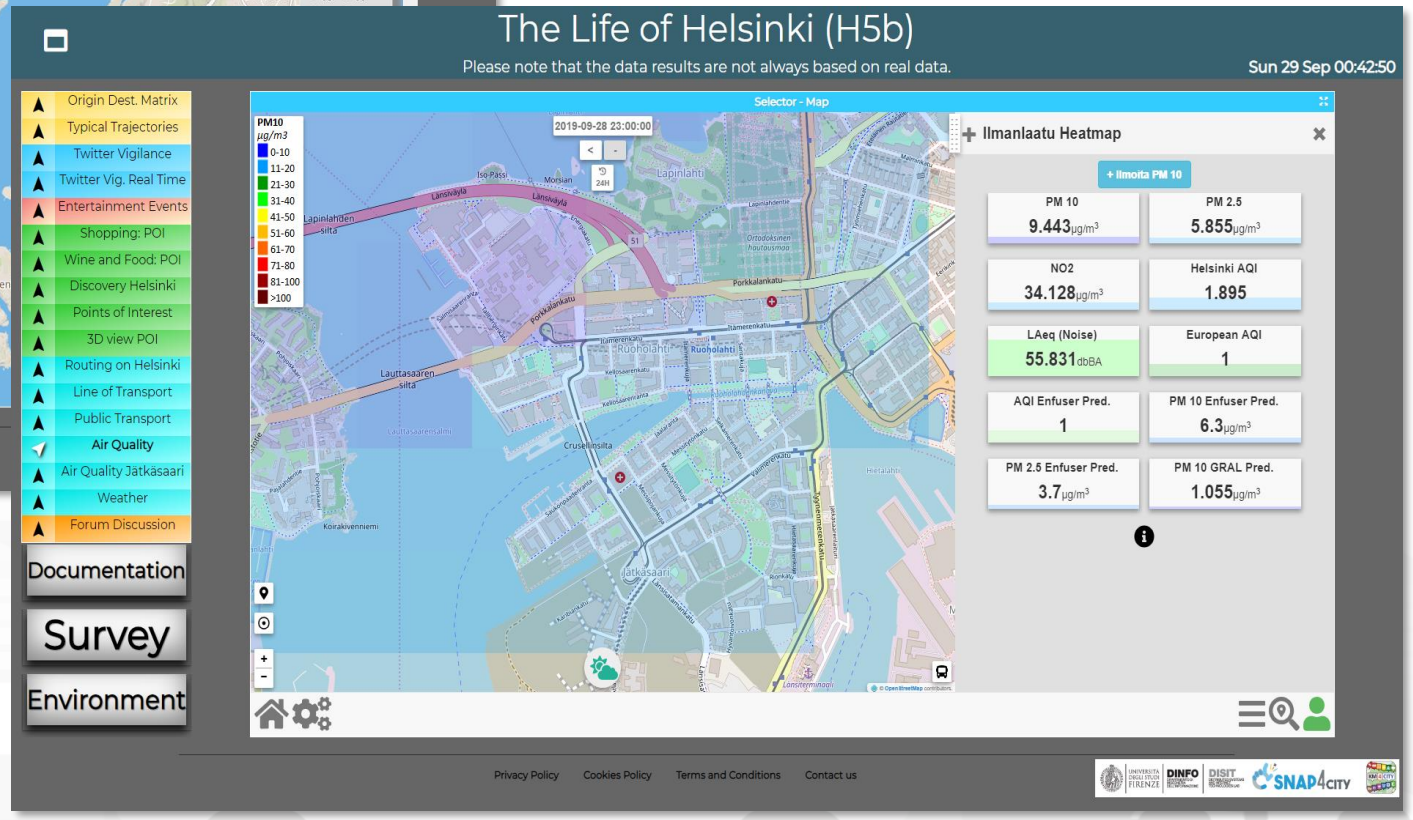
Helsinki



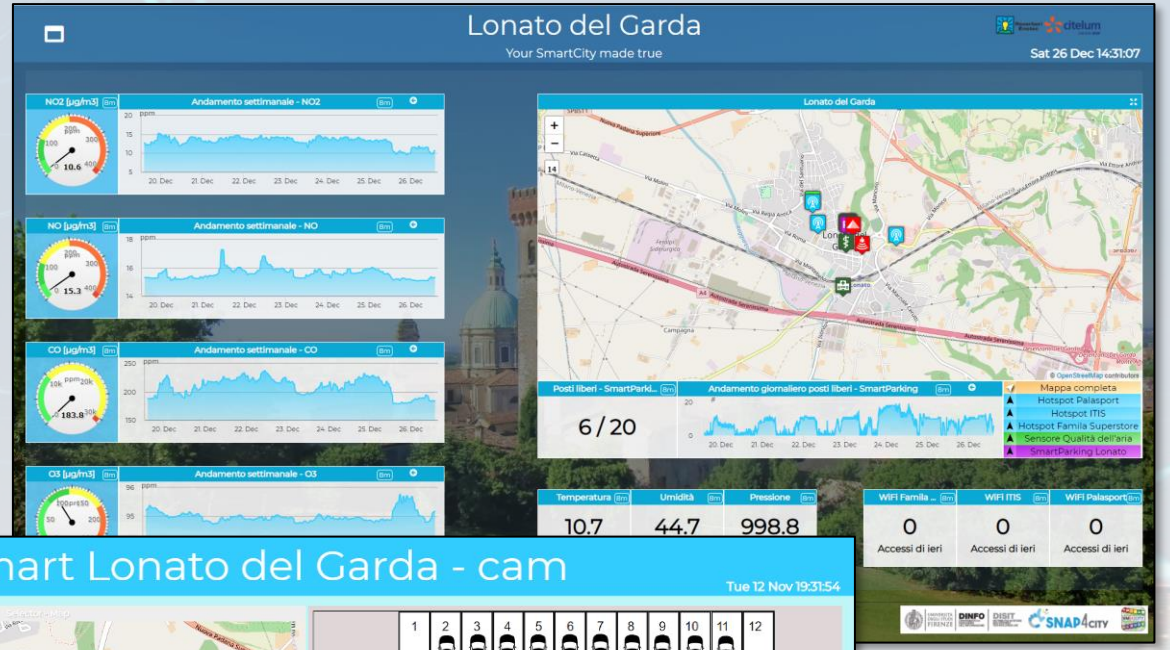


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTc1Mg==

Smart City / Smart Parking + Environment Reverberi, Lonato del Garda

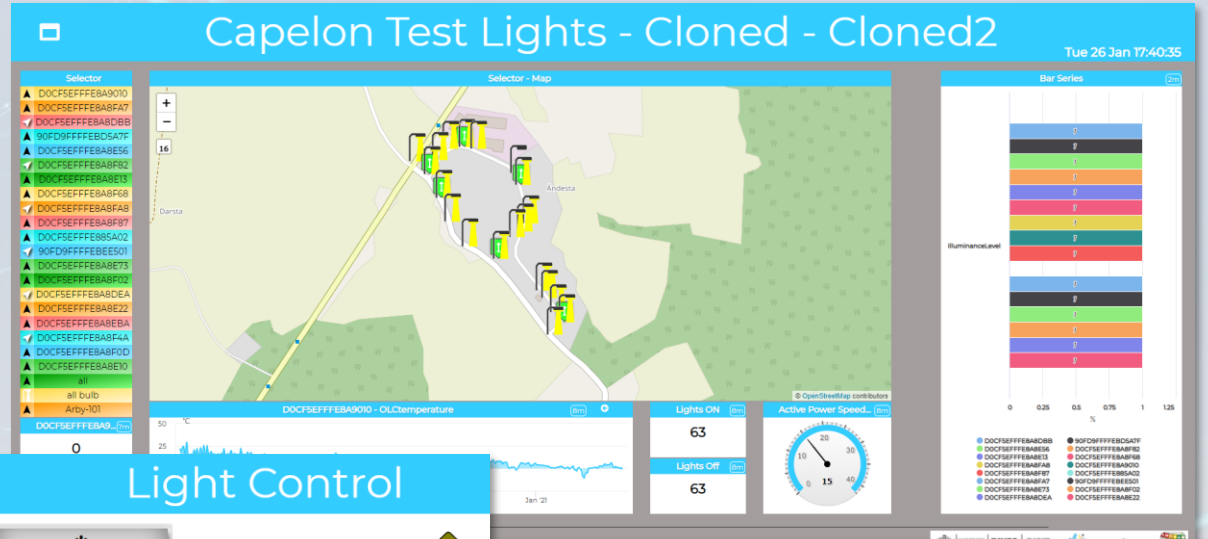
Reverberi Enetec · citelum GROUPE EDF · reference

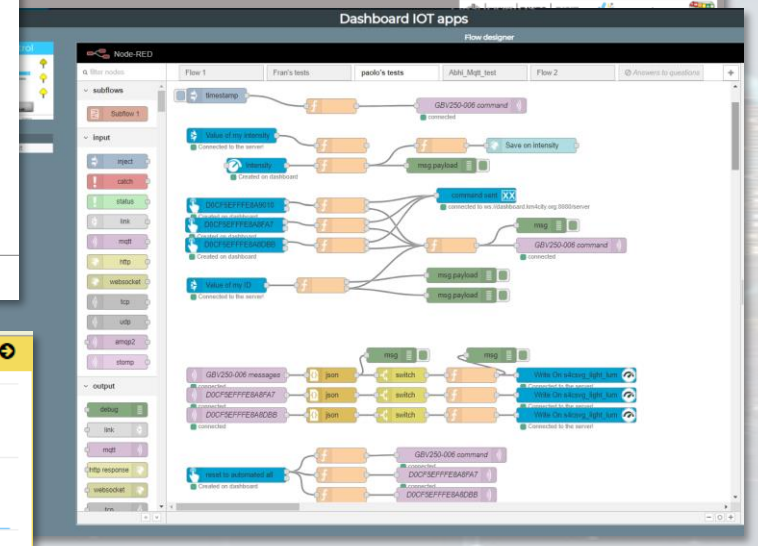
- **Multiple Domain Data**
  - Smart Parking, Environment, Wi-Fi
- **Multiple Decision Makers**
  - City Officer, operators
  - Data monitoring, alerting
  - analytics
- **Historical and Real Time data**
  - Dashboards
- **Services Exploited on:**
  - Dashboards, API
- **Since 2019**

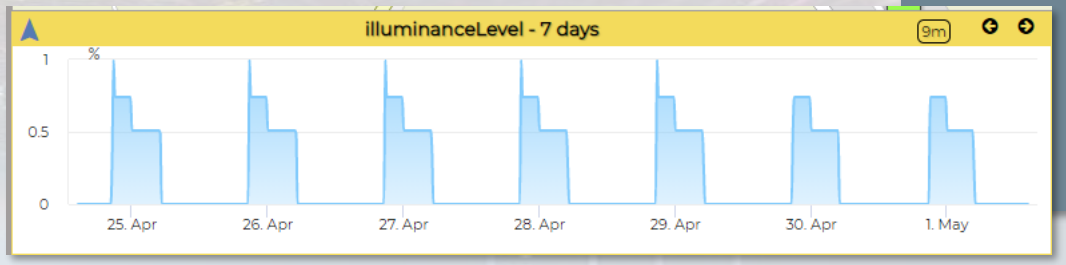


Smart Light Control of CAPELON *reference*

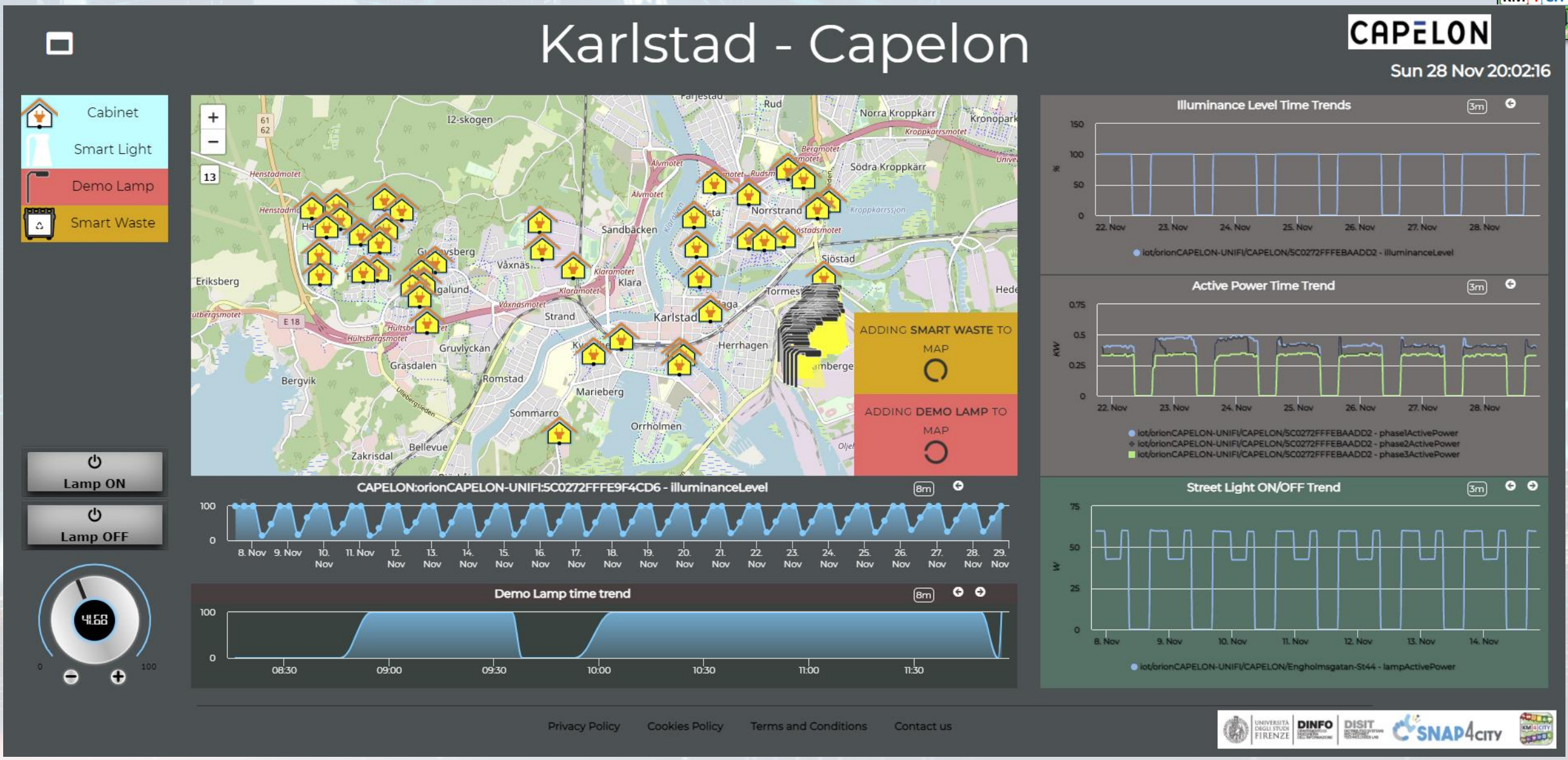
- **Energy Domain**
  - Smart Light, MQTT, ….
  - IoT Orion Broker FIWARE
- **Dashboards**
  - Map coverage on Sweden
  - Monitoring and real time control
  - Energy control, analytics
  - Direct control
- **Historical and Real Time data**
- **Services Exploited on:**
  - Multiple Levels, API
  - Dashboards
- **Since 2020**







Karlstad Street Lights



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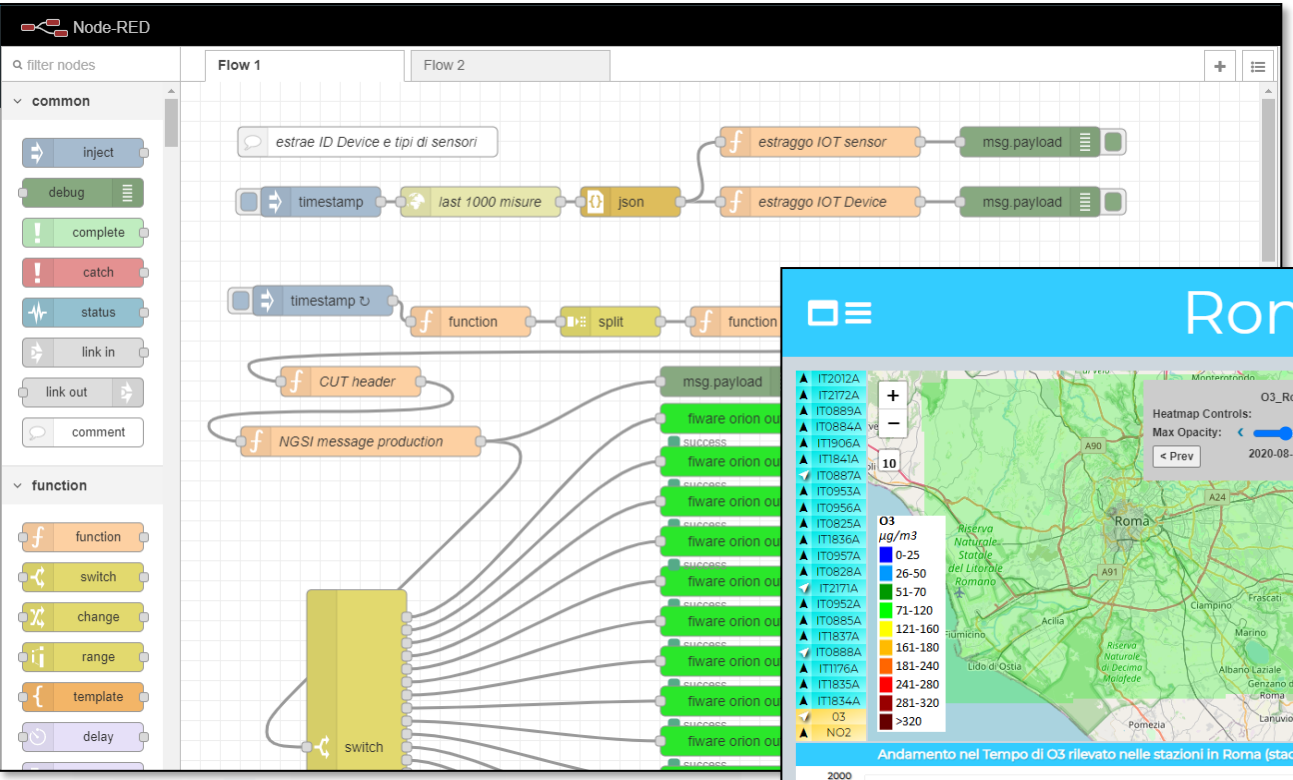
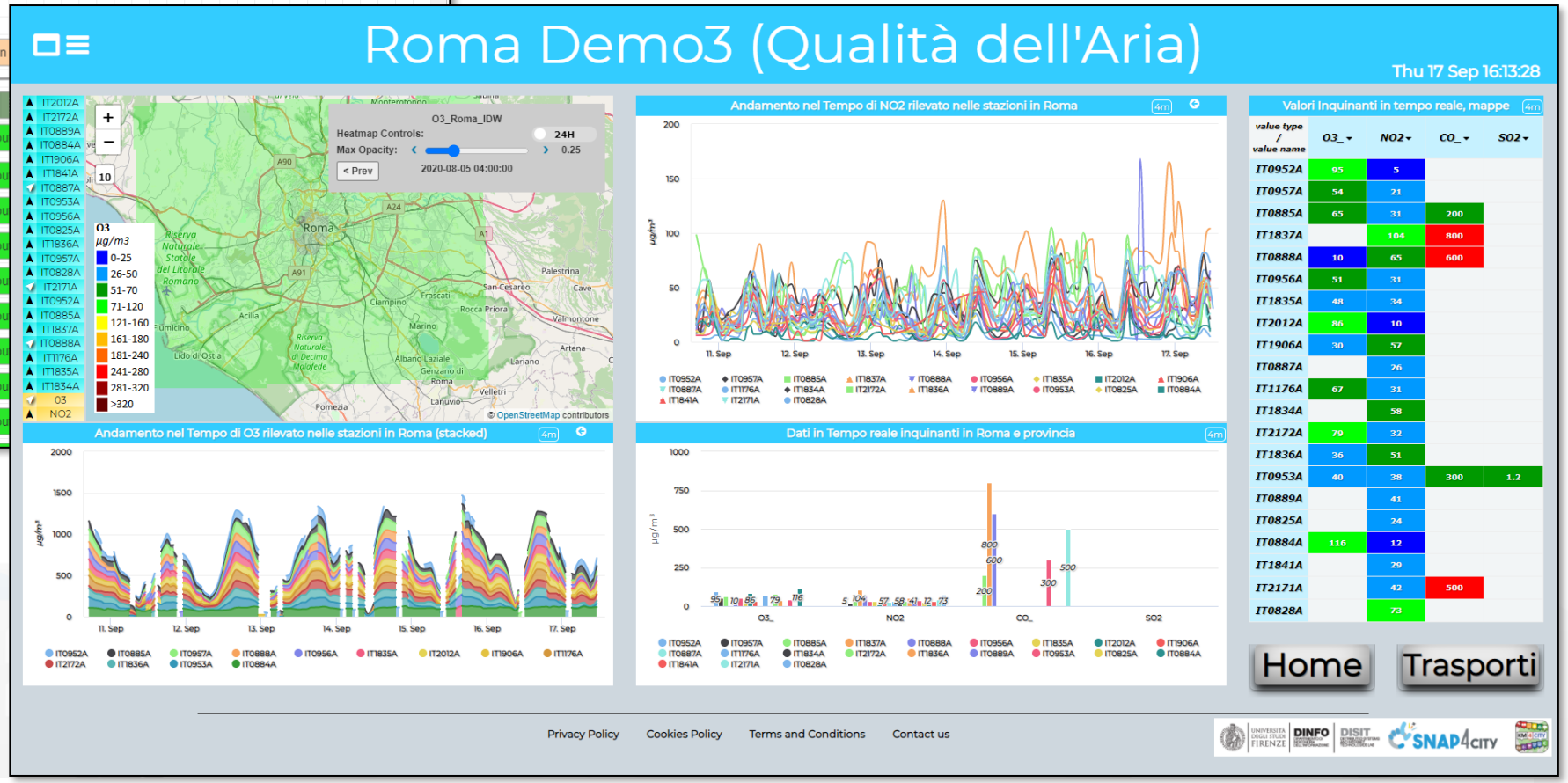


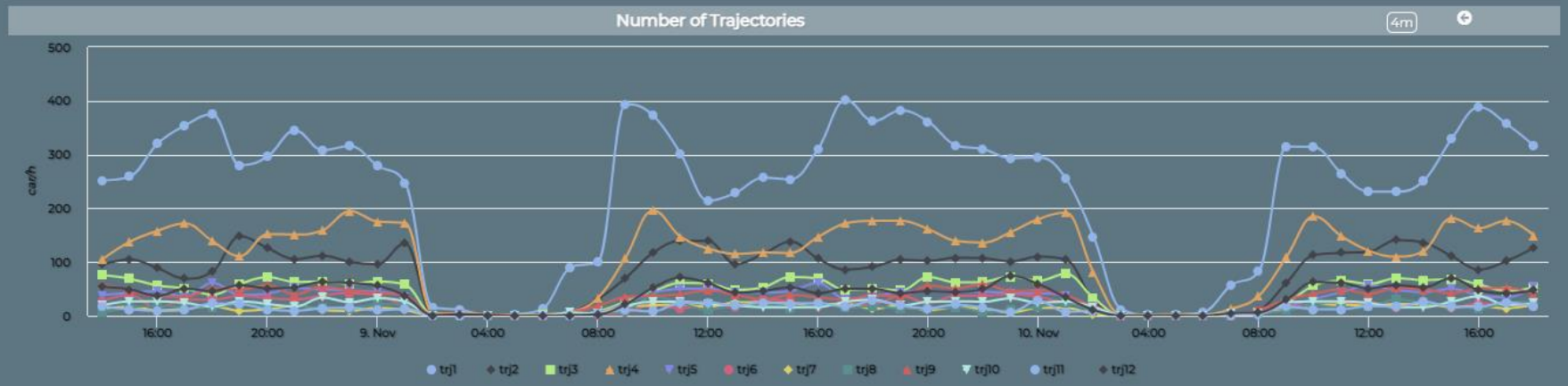


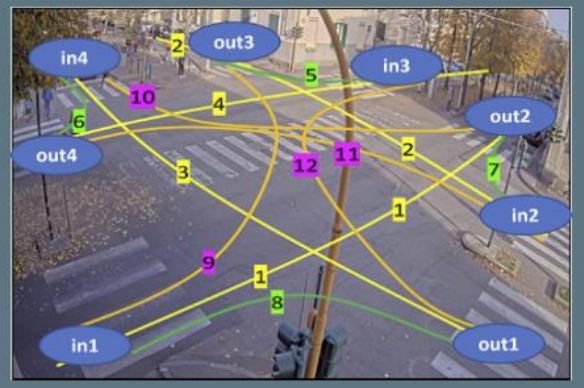
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjcyNg==

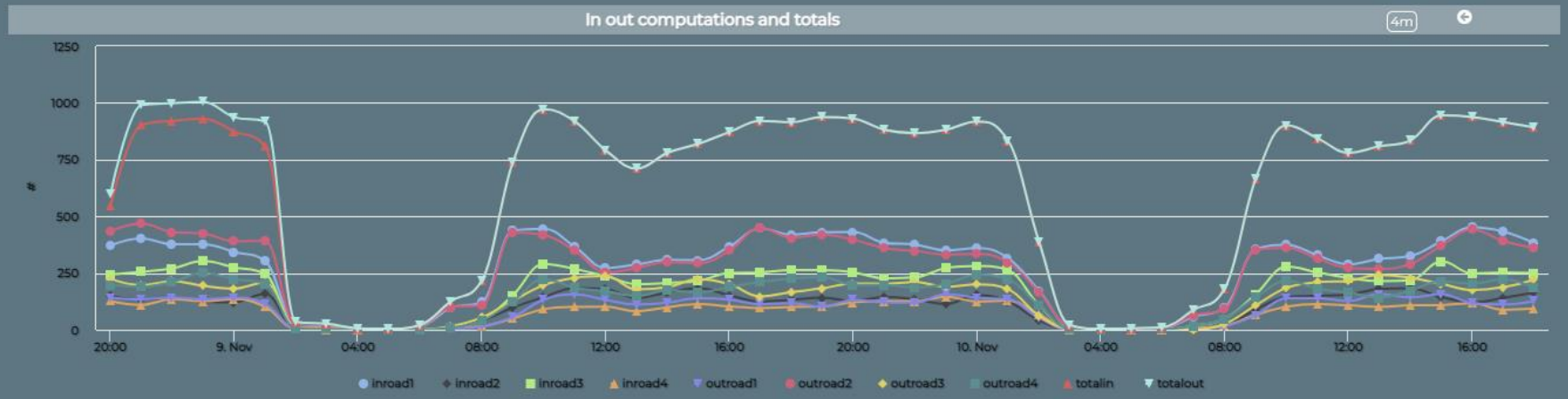
Venaria Reale

Monitoring Cross Road Venaria - (AXIS Camera)

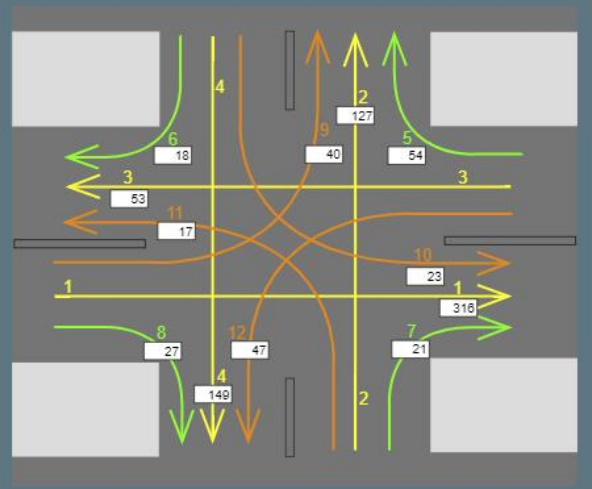
Wed 10 Nov 18:50:53







Venaria Street Cross - Synoptic



https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzI5Ng==

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IoT Health Scenarios

- **1) Smart Ambulance:**
  Collecting and managing local data from tools and sensors inside the ambulance, IoT Devices, Tablets, Drones etc.

- **2) Personal Health devices:**
  e.g.: glucometers, etc.

- **3) Smart Bed:**
  Collecting and managing data from smart bed sensors, monitoring parameters in real-time

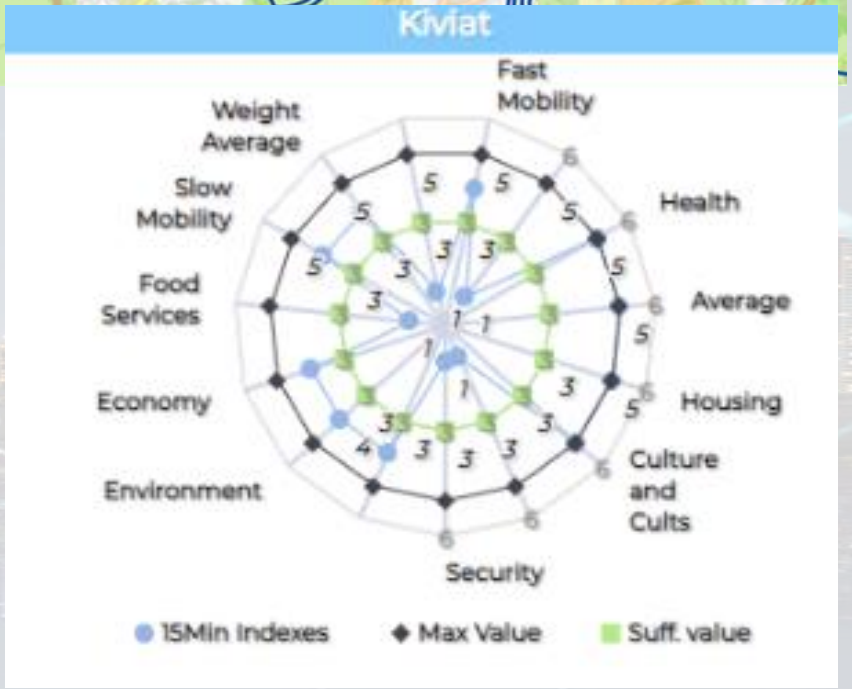
15MinCityIndex

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.

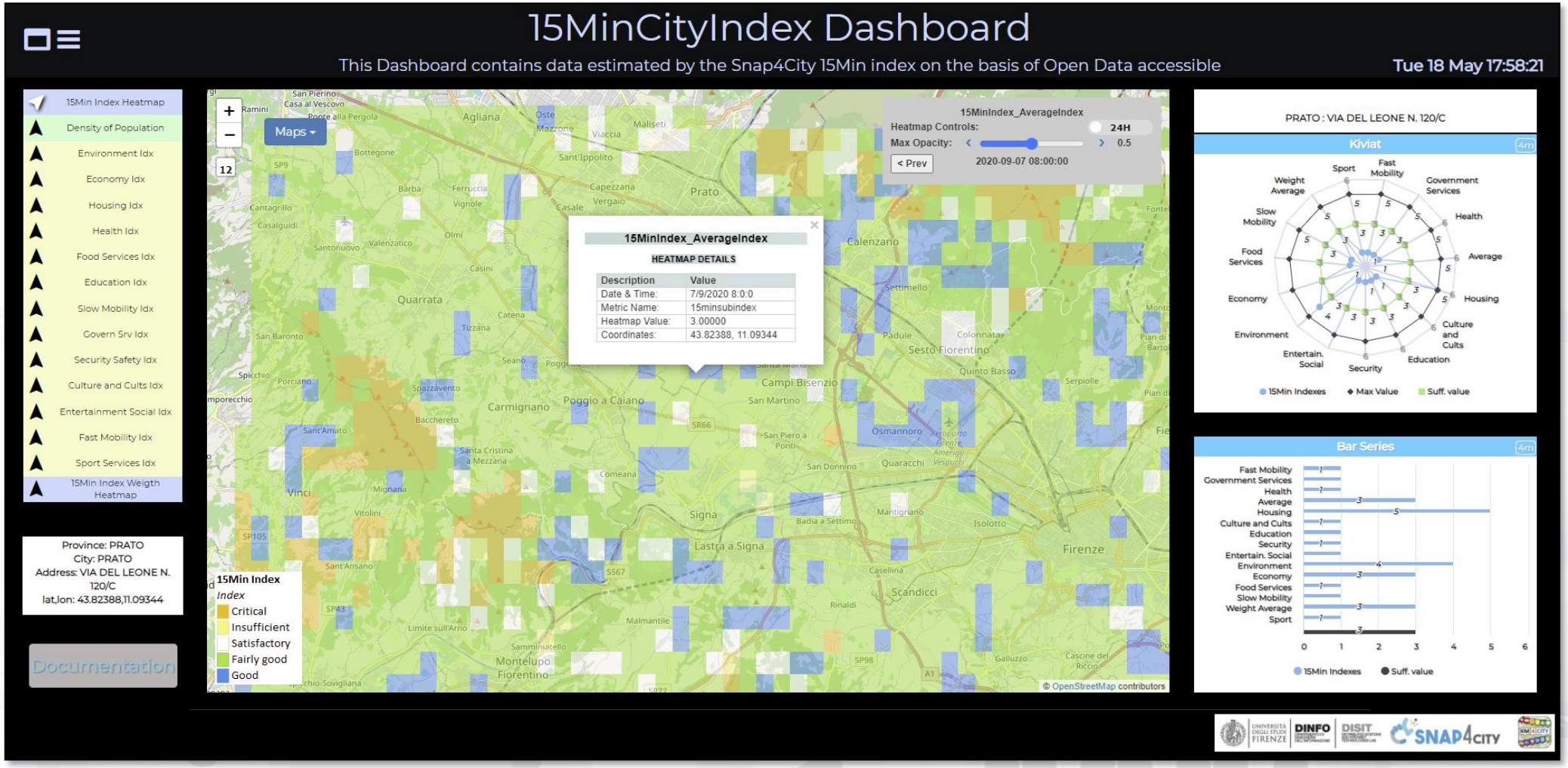
The tool supports the becoming of a 15-Minute city evaluating the service level in various domains.



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.

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjkzOA==

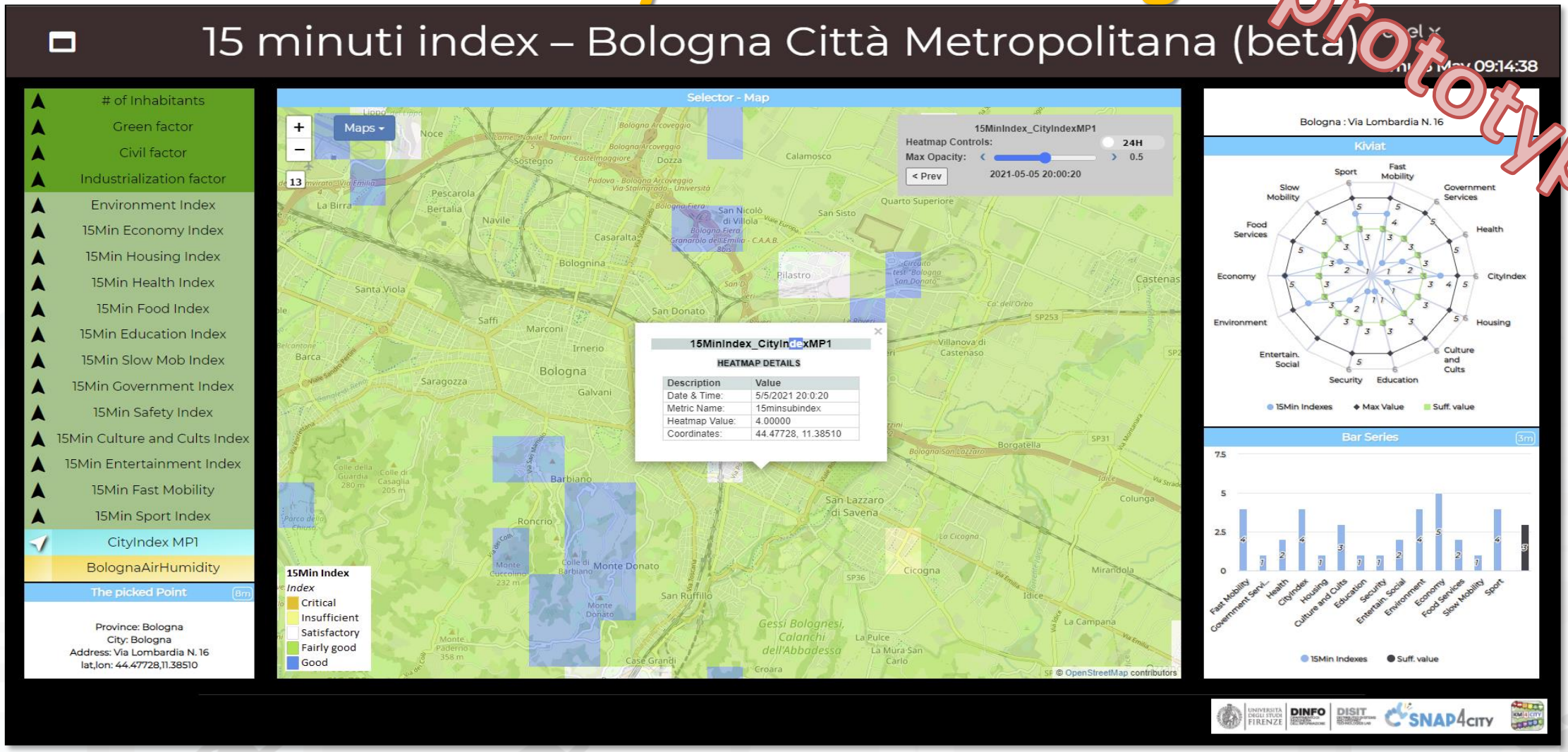
15MinCityIndex Firenze



- https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjkzOA==

15MinCityIndex on Bologna

prototype

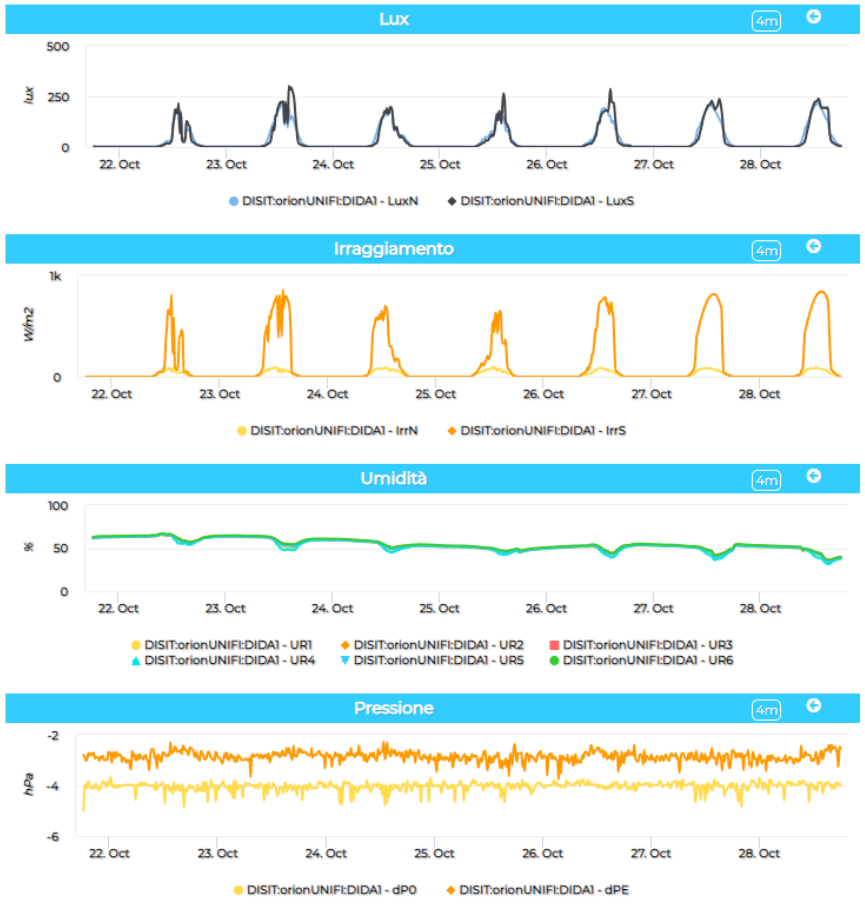


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzA1OQ==

Smart Building

DIDA data 2

Thu 28 Oct 18:17:39



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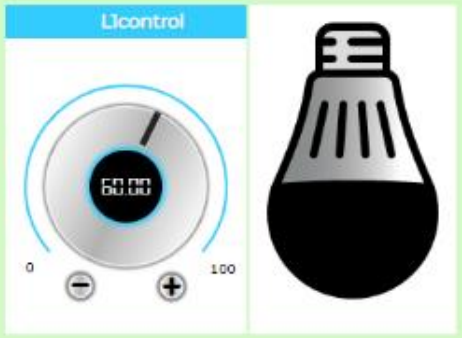
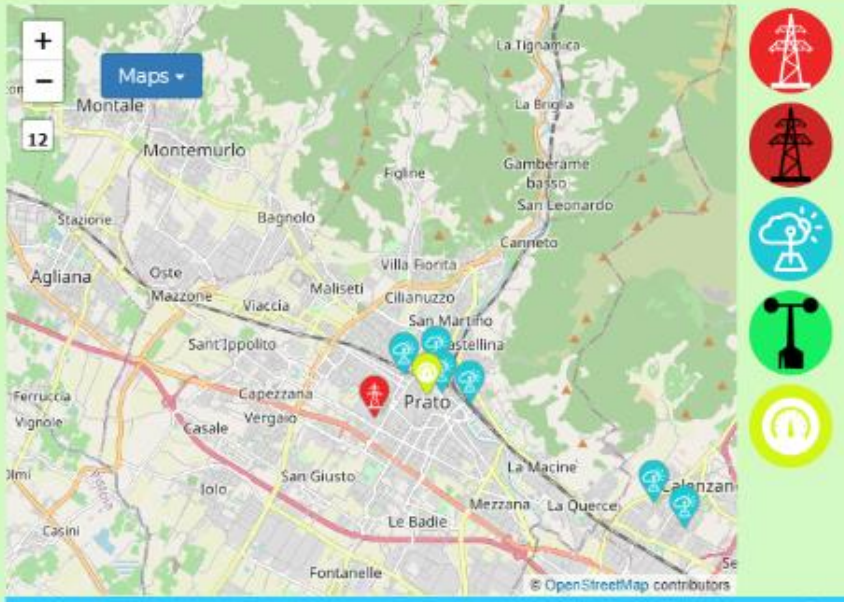
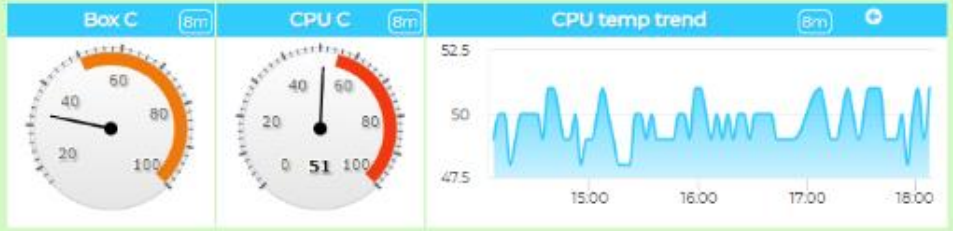
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzI4OA==

Snap4Home 5G Demo

Thu 11 Jun 18:07:32

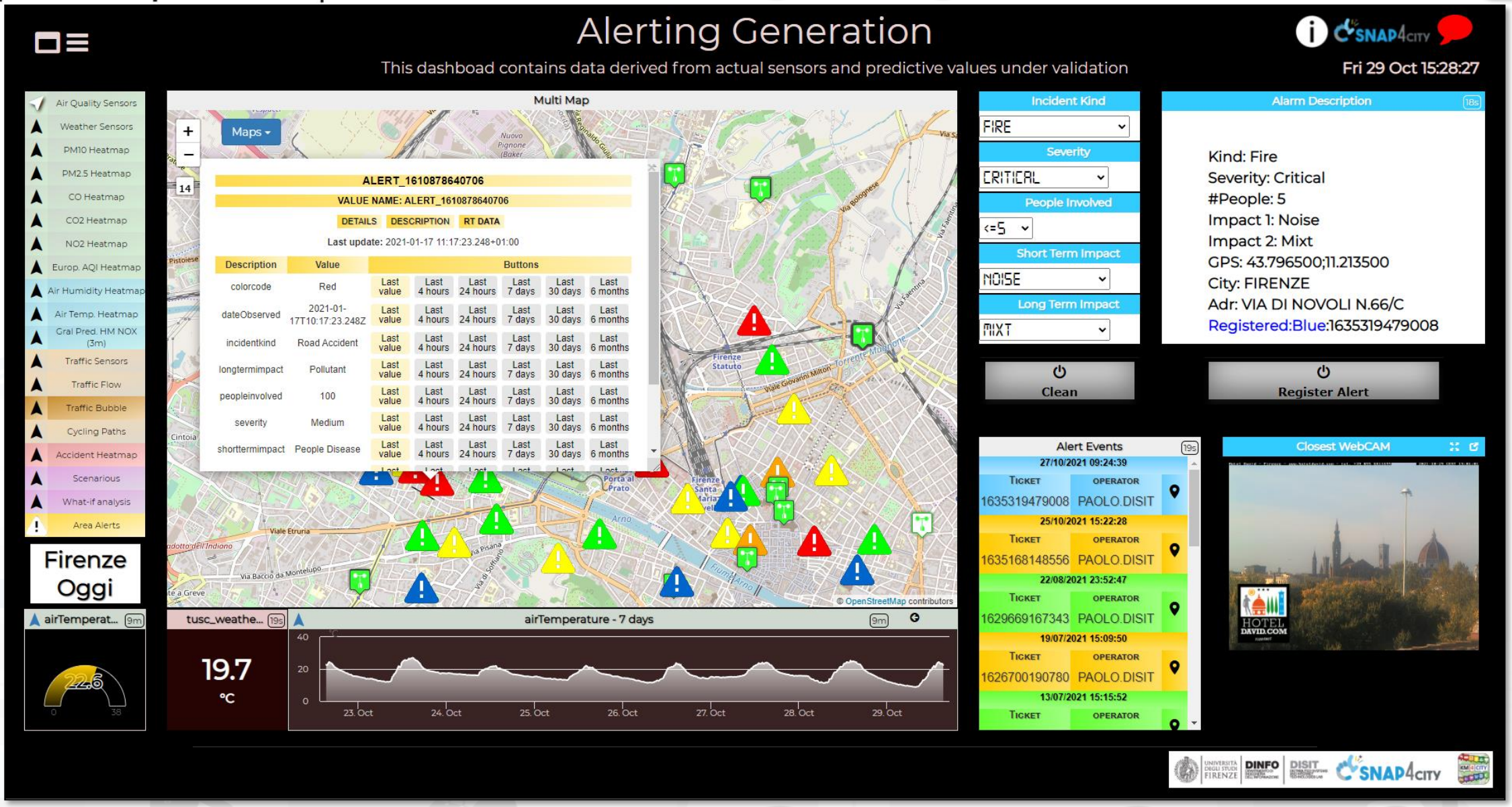






open fiber WIND 3 ZTE estra

Alerting Mng



https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzA0OQ==

TOP

Aims of Solutions Development

100% OPEN SOURCE

SNAP4 Appliances and Dockers **Installations**

User: paolo.disit, Org: DISIT
Role: AreaManager, Level: 3
LOGOUT

- My Snap4City.org
- Tour Again
- Dashboards (Public)
- Dashboards of My Organization
- My Dashboards in My Organization
- My Data Dashboard Dev Kibana
- Extra Dashboard Widgets
- Data, my Data, OpenData
- Knowledge and Maps
- IOT Applications
- IOT Directory and Devices
- Resource Manager
- Development Tools
- Management
- Decision Support Systems
- Deploy and Installation
- Help and Contacts
- Documentation and Articles
- My Profile
- Km4City portal
- DISIT Lab portal

Home / Tutorials and Videos / Welcome: how to start using Snap4City for beginners

Welcome: how to start using Snap4City for beginners

We suggest you:

Congratulations! You have really contributed to Snap4City and successfully passed all first levels!

You have reached a level in which you can contribute with competence to the city improvement and smartness. We hope you interested in helping other users in conquering higher levels on the city smartness ranking, and provising of smart services to all city users!
So that we could be interested in engaging and elevating your role in the Snap4City community, as coordinator of thematic groups, for example on **Mobile APP development**, **Dashboard** on Mobility, **IOT Application** Development, etc., according to your preferences.

Please contact **paonesi@gmail.com** !

Please start a fully guided training cases:

- HOW TO: create a Dashboard in Snap4City
- HOW TO: add a device to the Snap4City Platform
- HOW TO: add data sources to the Snap4City Platform
- HOW TO: define privacy rules for personal data, produced by the end-users own device
- HOW TO: Develop Smart Applications, Snap4City development Life Cycle
- HOW TO: HLT vs Ingestion, and HLT vs Widgets
- HOW TO: Develop an IOT Application for Data Ingestion

Username: paolo.disit

Search

Search
-Any-

Snap4City Training on Tools and Platform

Powered by www.km4city.org

FIWARE Node-RED

Organization Groups

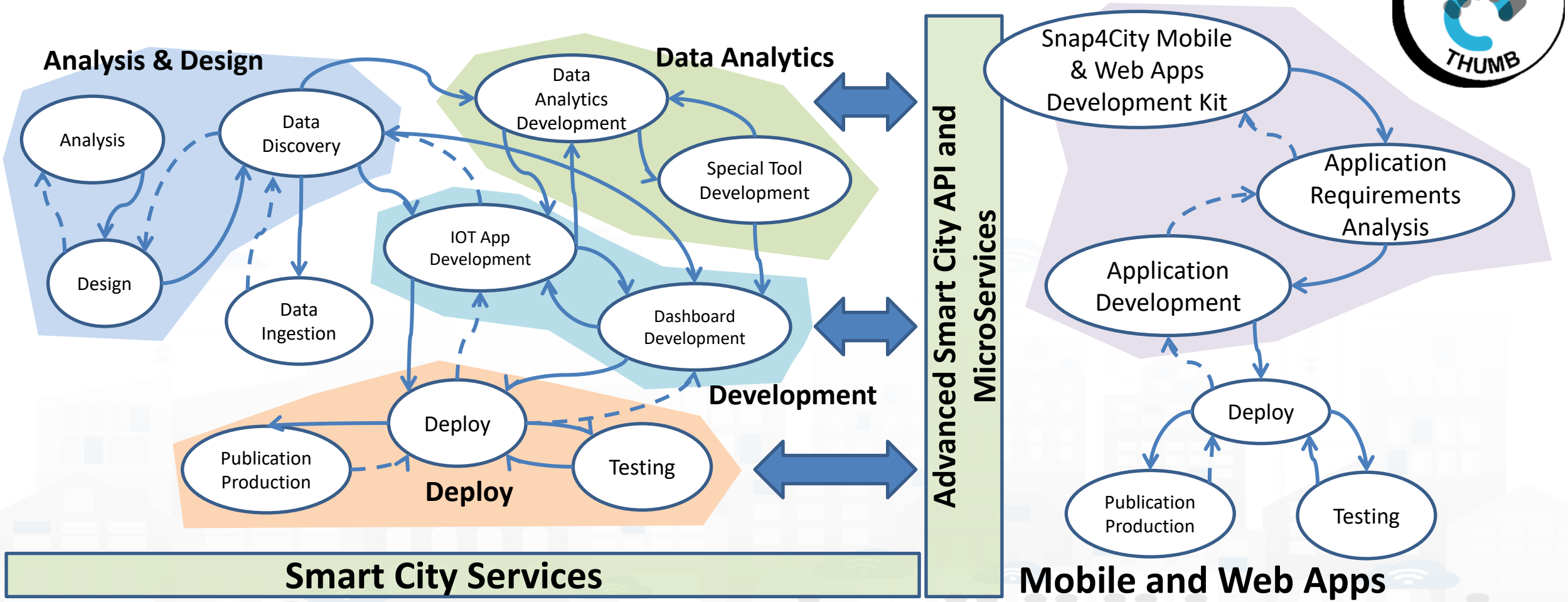
DISIT
- Developer
- Operativo

Updates on Tools

News from Snap4City & slides, Where to Meet Snap4City experts
updated
roottooladmin1

HOWTO: FIWARE Orion

Develop Mobile & Web Applications Exploiting Snap4City Smart City Services



https://www.snap4city.org/577

On Line Training Material (free of charge)

	1st part (*)	2nd part (*)	3rd part (*)	4th part (*)	5th part (*)	6th part (*)	7th part (*)
what	General	Dashboards	IOT App, IOT Network	Data Analytics	Data Ingestion processes	System and Deploy Install	Smart City API: Web & Mob. App
PDF							
Inter active							
Video1							
Video2							
Video3							
Video4				none		none	none
duration	2:55	3:16	3:41	2:00	2:48	2:35	1:47


SNAP4CITY
Be smart in a SNAP!
LIVING LAB
9 July 2019, 2° Training day of 3 Florence
Coll@bora
Welcome: how to start using Snap4City for beginners
We suggest you:
Search
Organization Groups
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UNIVERSITÀ DEGLI STUDI FIRENZE | DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE | DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB

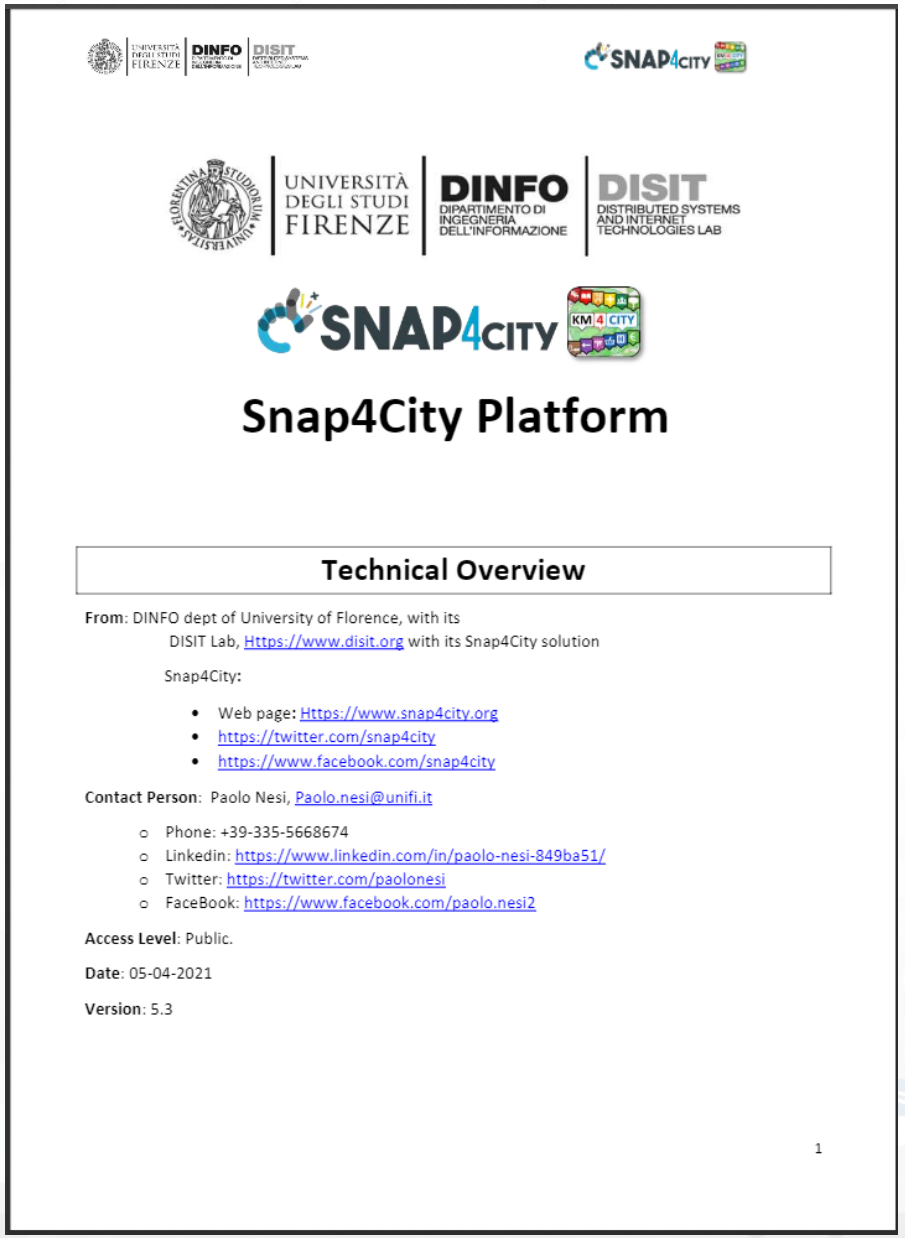
SNAP4CITY | KM 4 CITY

SMART CITY EXPO WORLD CONGRESS

19-21 November 2019 - Barcelona

See you at Snap4City Stand A118

Overview



Snap4City Platform

Technical Overview

From: DINFO dept of University of Florence, with its
DISIT Lab, Https://www.disit.org with its Snap4City solution

Snap4City:

- Web page: Https://www.snap4city.org
- https://twitter.com/snap4city
- https://www.facebook.com/snap4city

Contact Person: Paolo Nesi, Paolo.nesi@unifi.it

- Phone: +39-335-5668674
- Linkedin: https://www.linkedin.com/in/paolo-nesi-849ba51/
- Twitter: https://twitter.com/paolonesi
- FaceBook: https://www.facebook.com/paolo.nesi2

Access Level: Public.

Date: 05-04-2021

Version: 5.3

1

- **2021**
- **https://www.snap4city.org/drupal/sites/default/files/files/Snap4City-PlatformOverview.pdf**

Overview

- https://fiware-foundation.medium.com/snap4city-fiware-powered-smart-app-builder-for-sentient-cities-acfe24df49d5
- https://www.snap4city.org/drupal/sites/default/files/files/FF_ImpactStories_Snap4City.pdf

TOP

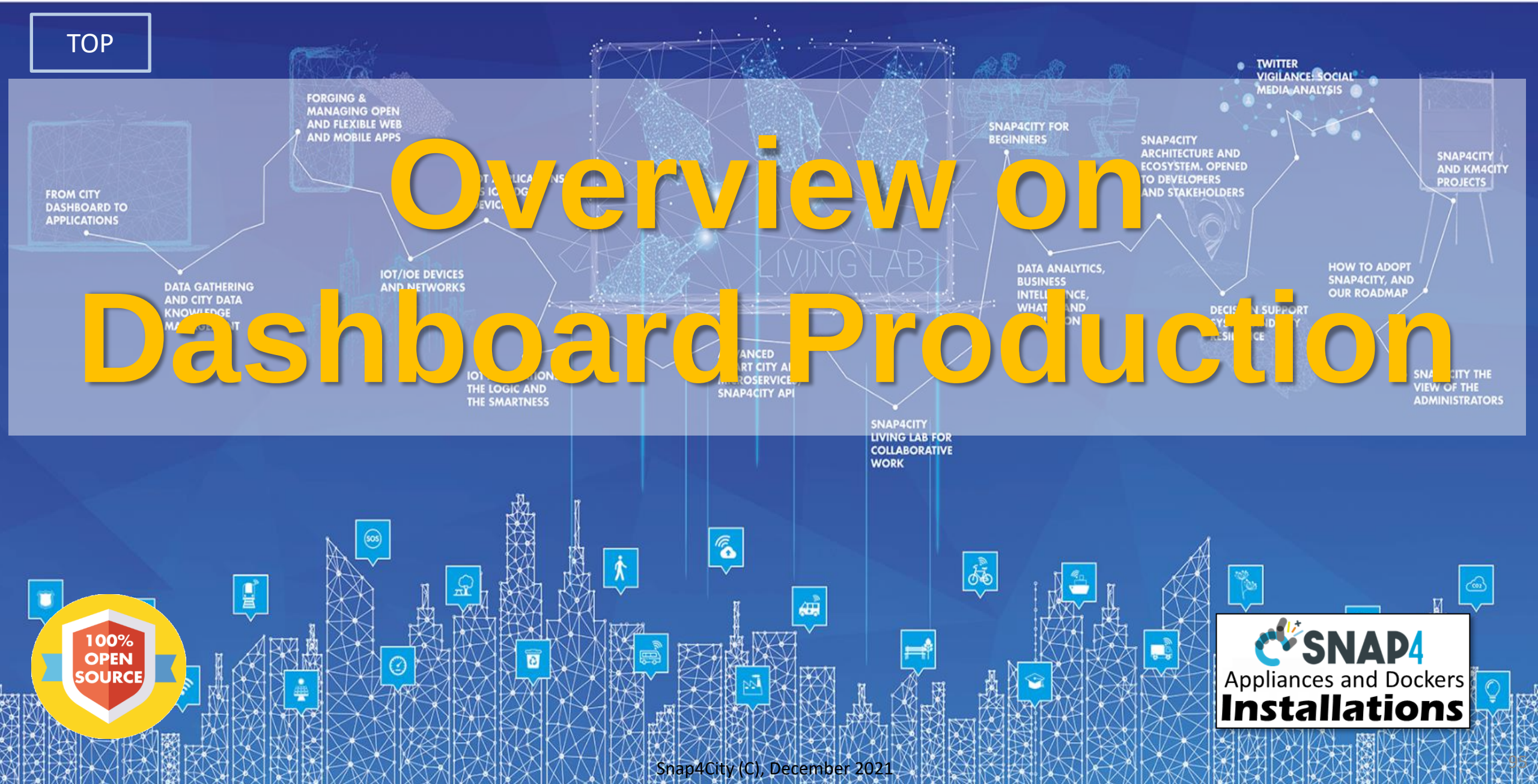
Your Questions?

100% OPEN SOURCE

SNAP4 Appliances and Dockers **Installations**

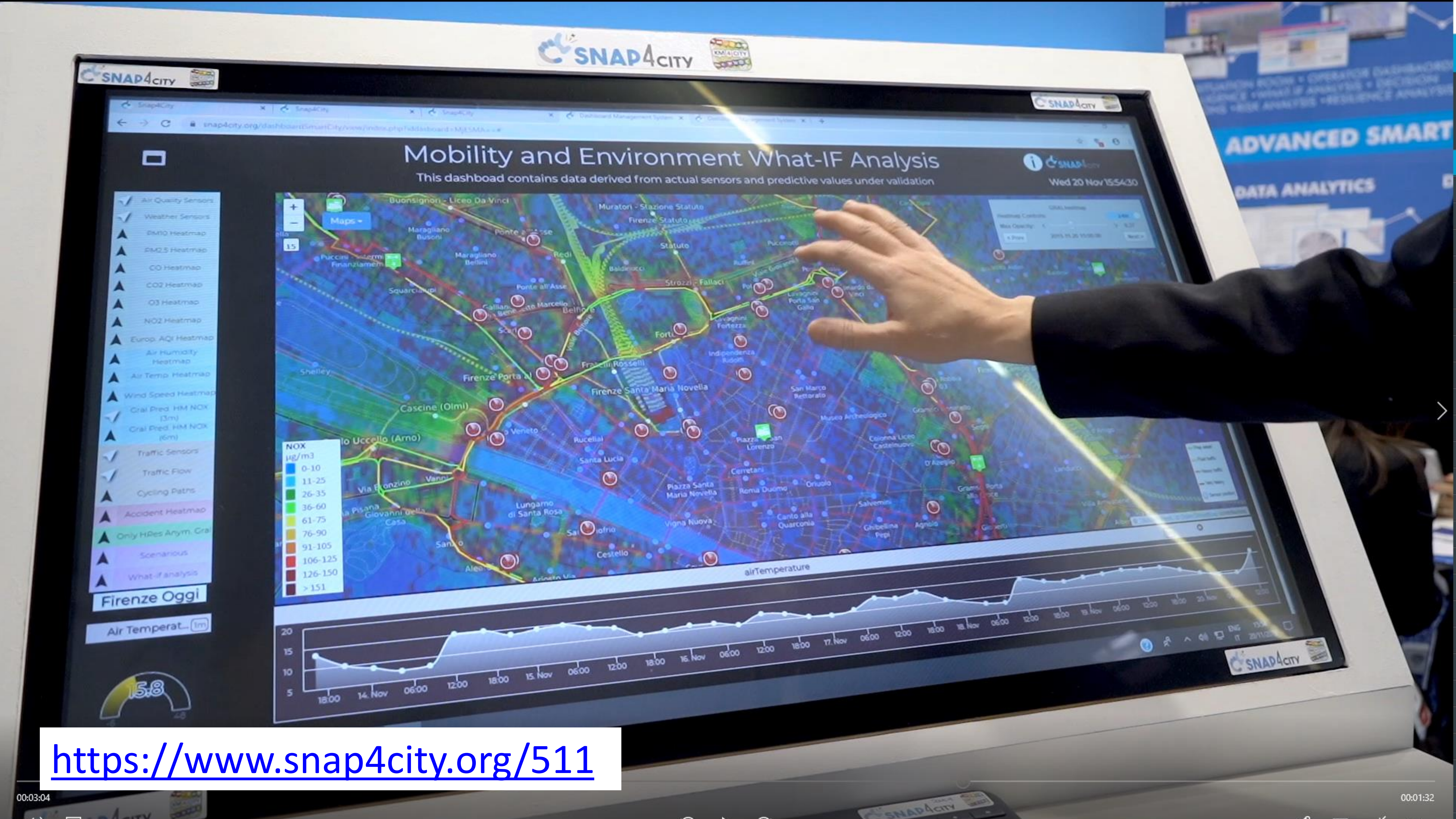
TOP

Overview on Dashboard Production



Control Room

https://www.snap4city.org/621

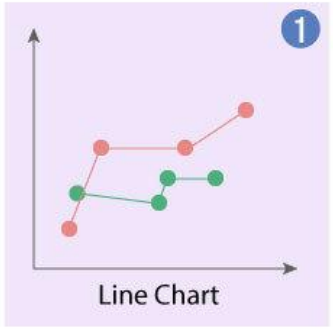


https://www.snap4city.org/511


MAPPA FIRENZE
Fri 19 Oct 17:24:39
Colonnine Ricarica
Colonnine ricarica Fast
Pannelli a Messaggio Variabile
Parcheggi
Piste Ciclabili
Sensori del Traffico
Stazioni ambientali
Stazioni meteo
Traffico Real Time
Varchi ZTL
Wi-Fi
Eventi Traffico a Firenze
Concentration - 7 days
Main

From Data to Visualization

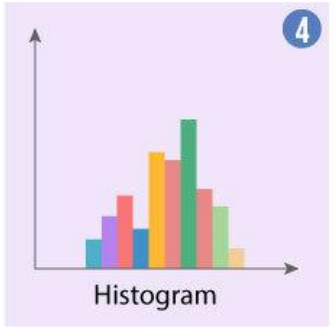
TYPES OF DATA VISUALIZATION CHARTS



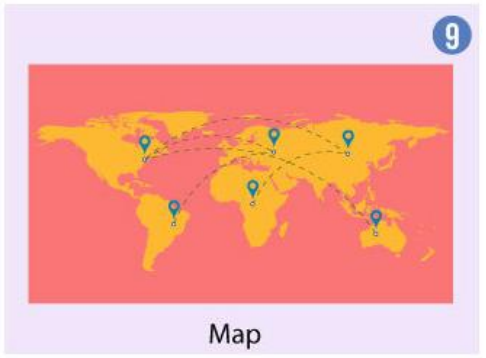
Display trends over time

A line chart with areas below the lines filled with colors

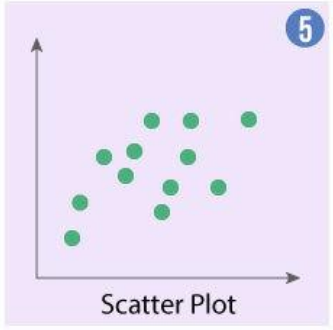
Display trends with multiple variables



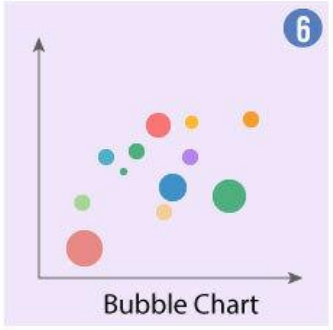
Display the shape and spread of continuous dataset samples



Show data with location as a variable

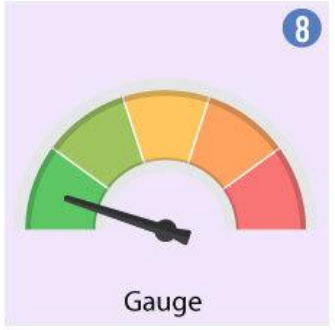


Show correlation in a dataset

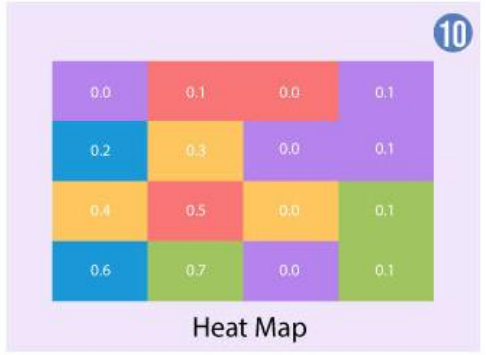


Show and compare the relationship between the labelled circles

Show the contribution of data point inside a whole dataset



Visualize the distance between intervals



Show magnitude of a phenomenon

Two Main Lines for Dashboarding

- **Kibana (DevDash, My Dashboard (Dev) Kibana)**

Ready to use

You can customize

Limited details

- **Dashboard Builder of Snap4City**

You need to create / customize

Full Control

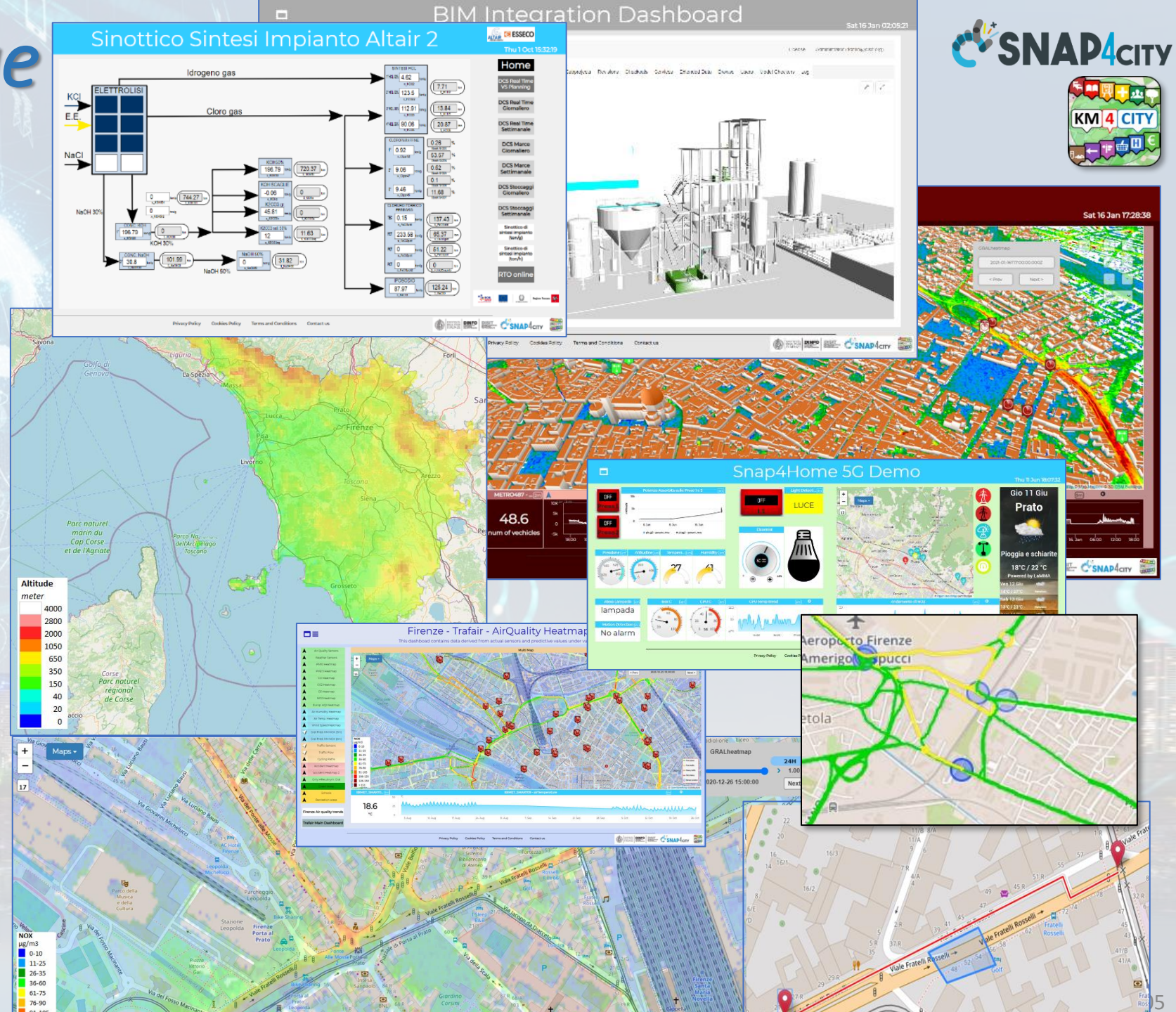
Professional details

Snap4City Dashboard Builder vs Kibana

Features	Snap4City Dashboard Builder	Kibana, Grafana
Large Collection of Widgets	YES	Nothing
Custom Widgets SVG of any kind, full defined process for customization	YES	Nothing
Real time event driven widgets and data	YES	Nothing
Business Logic for data transformation with visual programming: Node-RED	YES: visual/coding	coding
Maps with custom PIN, bubbles, animated and moving, etc.	YES	Nothing
Maps with paths, shapes, traffic flow, scenarios, routing, heatmaps, what-if, …	YES	Nothing
Maps with Orthomaps from WFS, WMS, GIS connection, etc.	YES	Nothing
TV camera integration and selection	YES	Nothing
Widgets for business logic integration on real time: buttons, selector, switch, etc.	YES	Nothing
Kiviat, Spider net, Calendar	YES	Nothing
Typical Time Trends: day hours, month week, month days, …..	YES	Nothing
Time Trend Compare: day, eek, month, year	YES	Nothing
Selectors/Menus: text, icons, etc., also in connection with IOT APP, Node-RED	YES	Nothing
Full control of graphic layout, font, colours, refresh per widget, etc.	YES	Nothing
Iframe integration of third party widgets and web pages, nesting dashboards, embedding Kibana	YES	Nothing
Connection among multiple Dashboards and Widgets	YES	Nothing
Synchronization with Video Wall, and Operators Views	YES	Nothing
Multiseries, bar lines, charts, pie, donut, simple selectors, trends, etc., also from business logic	YES	Limited
Single content, string, html, any data, etc.	YES	Limited
Special widgets: Weather forecast, civil protection, road plates, Twitter, etc…	YES	Nothing
Digital Twin Local and Global	YES	Nothing
Faceted search	YES: selectors, forms, buttons	YES

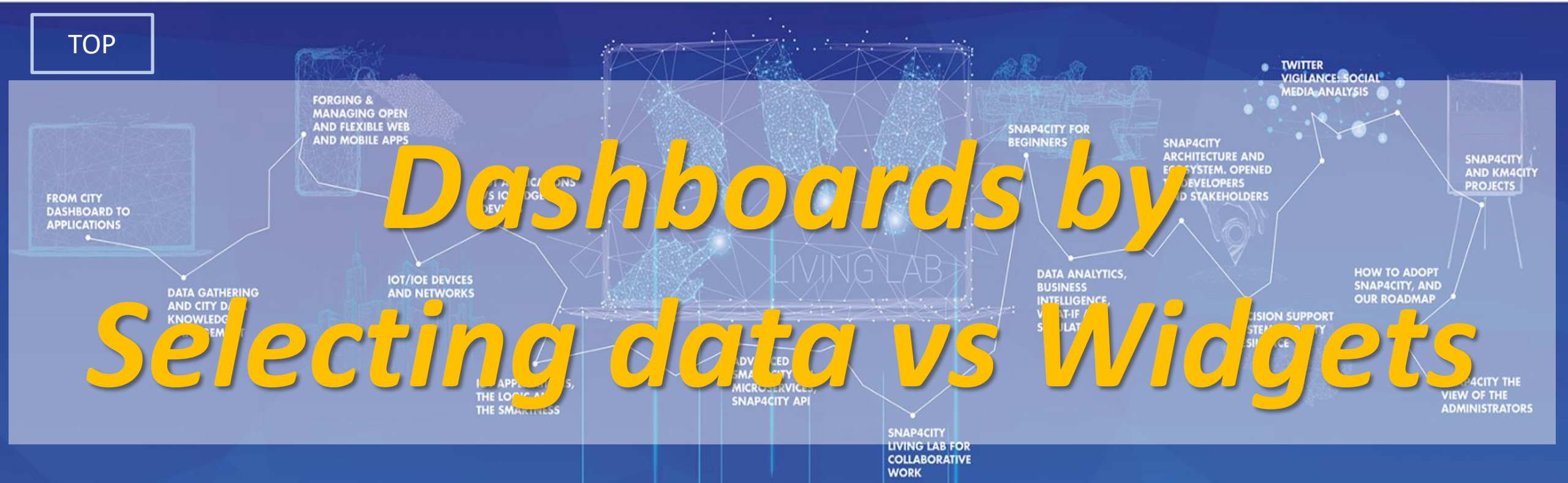
Data Type Coverage

- POI, IOT, shapes,..
- maps, orthomaps, GTFS, GIS WFS/WMS, GeoTiff, ..
- calibrated heatmaps, ..
- traffic flow, typical trends, ..
- trajectories, events, ..
- 3D, BIM, Workflow, ..
- Dynamic icons/pins, ..
- OD Matrices, scenarios, ..
- prediction models, ….
- decision support, ….
- Synoptics, animations, ..
- social media, Routing, ..
- Satellite data, ..
- KPI, personal KPI,..
- etc.



TOP

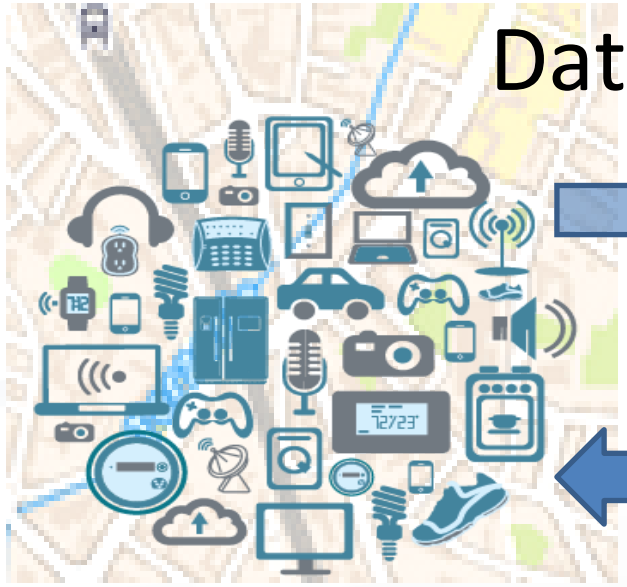
Dashboards by Selecting data vs Widgets



SNAP4
Appliances and Dockers
Installations

Simple Dashboards

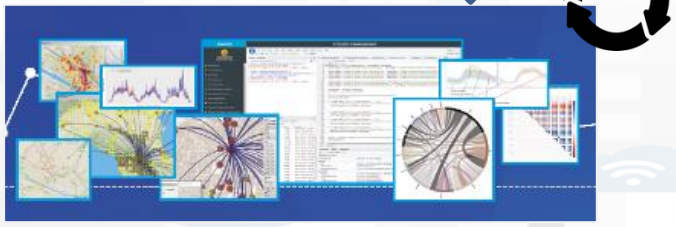
Data and relationships



Storage

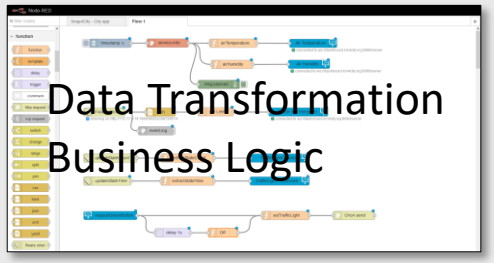
Data gather,producion

Big Data Analytics,
Artificial Intelligence



Dashboards and Apps

Dashboard Builder: Development



Data Transformation
Business Logic

IOT Applications

Knowledge and Storage
Data from the Field and
City + MyKPI ++

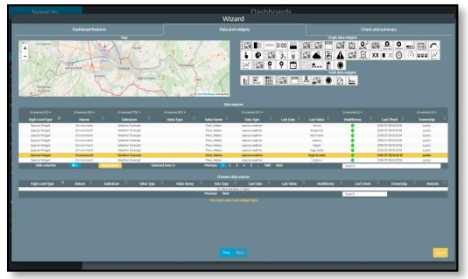
Widget Collection

Micro
Applicat
ions

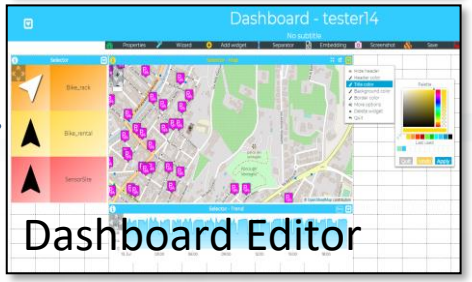
External
Services

Custom
Widgets/
Synoptics

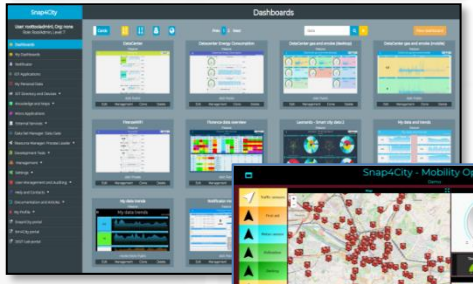
Dashboard Wizard



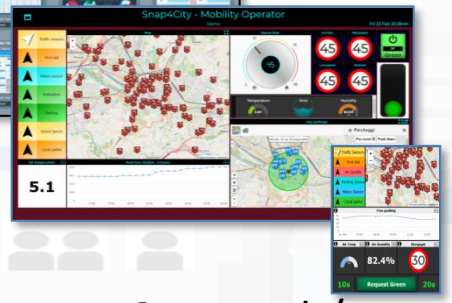
Create, save, load,
delegate, grant access,
change ownership



Dashboard Editor



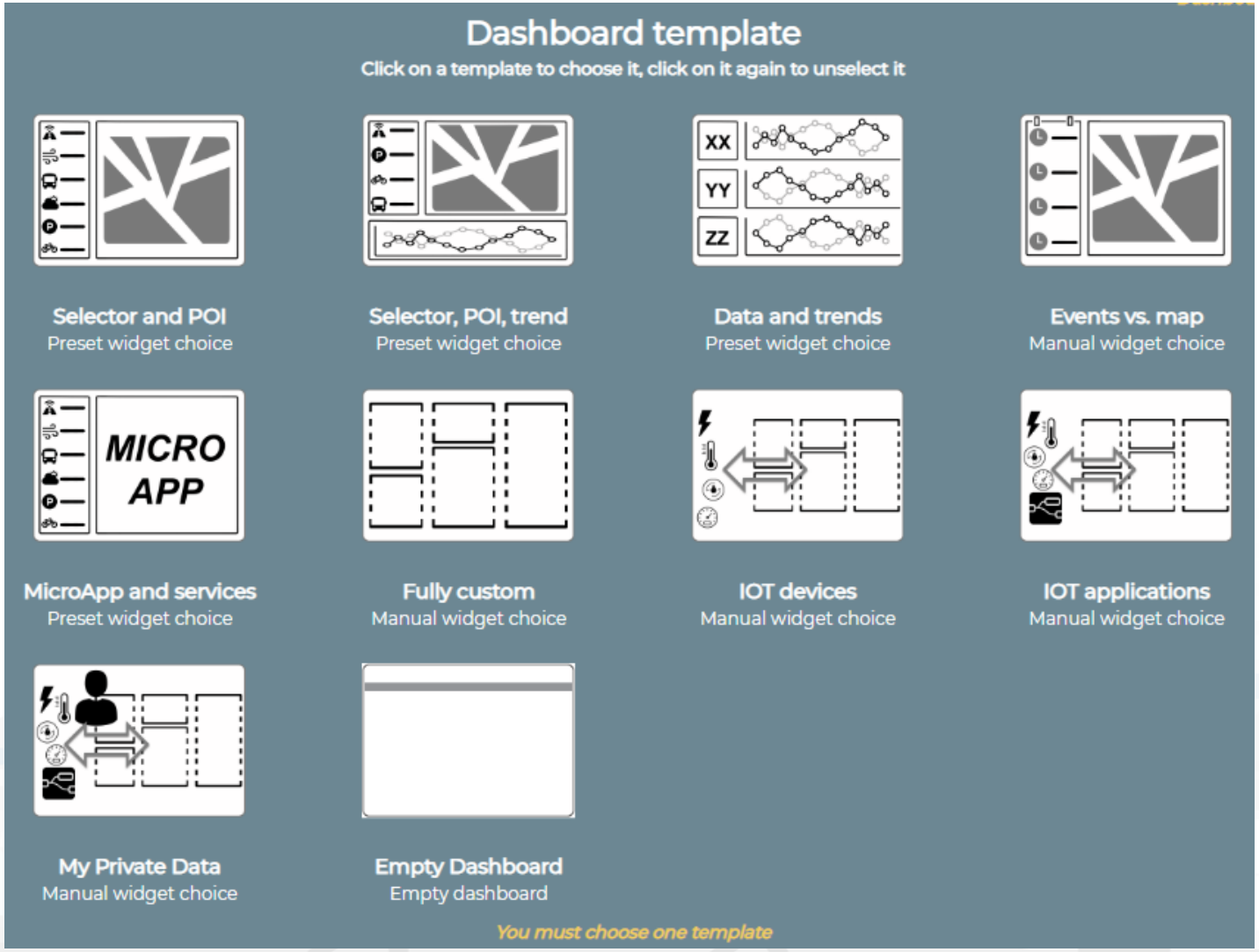
Public
Dashboard
Collection



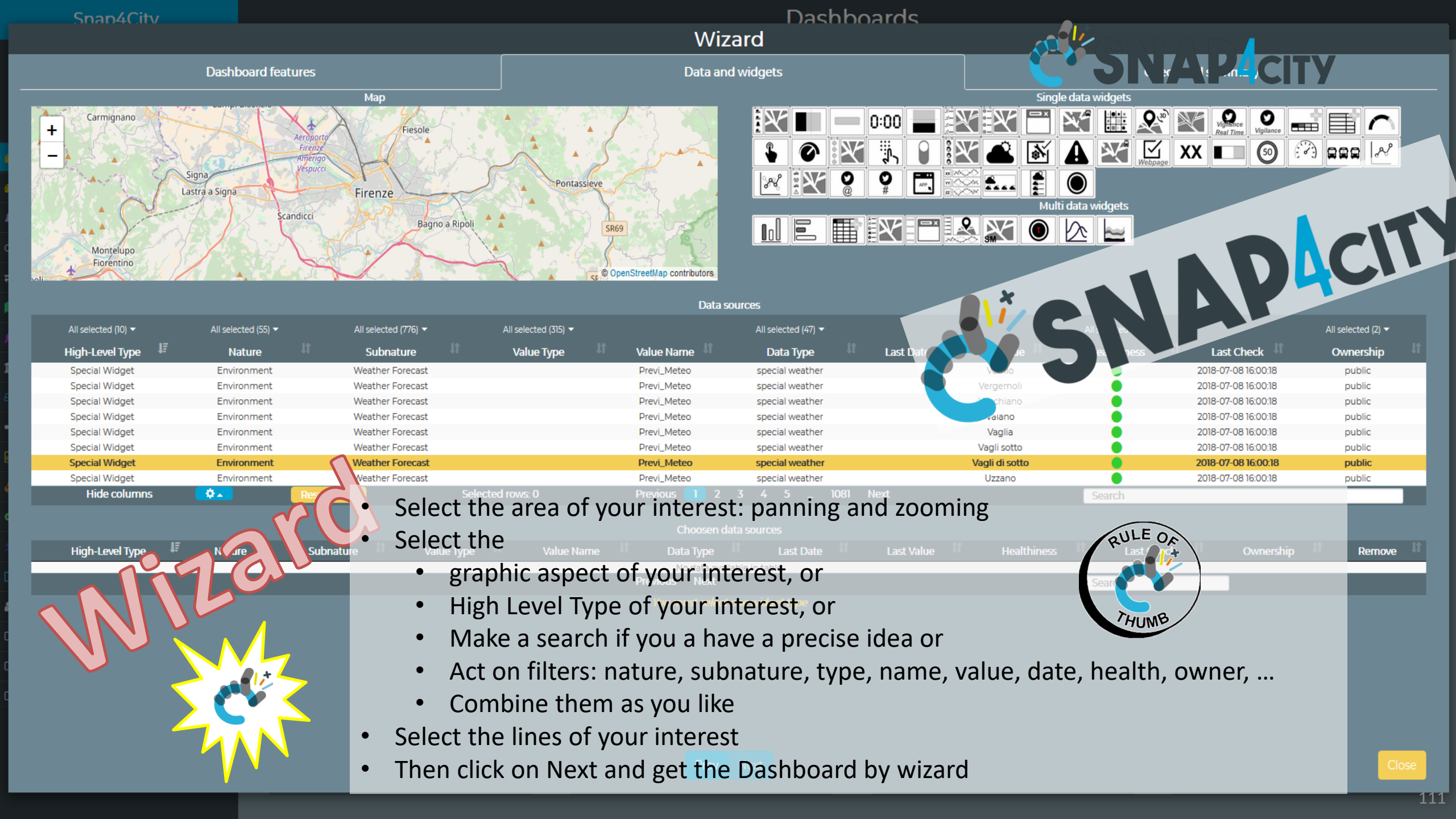
My Own Dash/App

Dashboard List and Editor

From Templates to Wizard and Dashboards

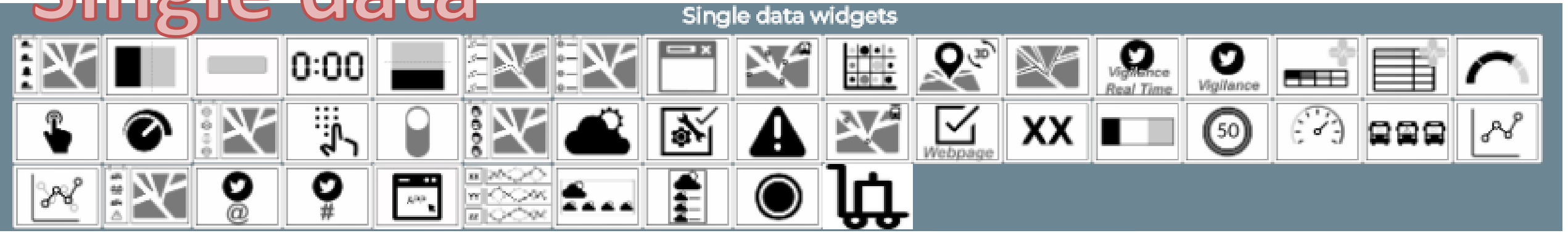


- to create a new Dashboard
- to add widgets and/or groups of them on any Dashboard

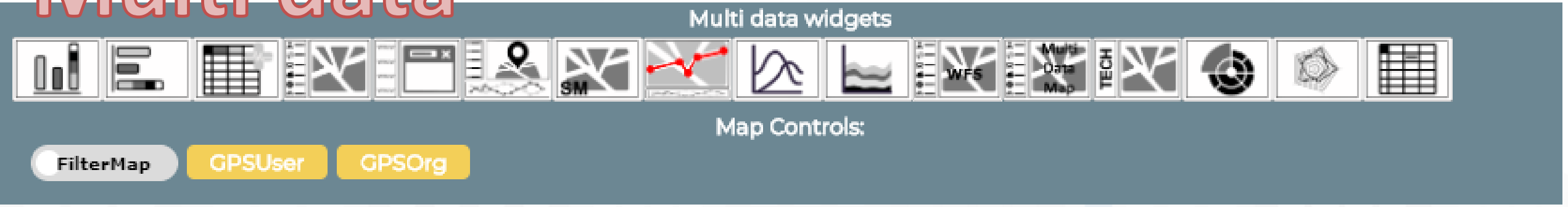

Wizard
Dashboard features
Data and widgets
Map
Carmignano
Fiesole
Aeroporto Firenze Amerigo Vespucci
Signa
Lastra a Signa
Firenze
Pontassieve
Scandicci
Bagno a Ripoli
SR69
Montelupo Fiorentino
© OpenStreetMap contributors
Single data widgets
Multi data widgets
Data sources
All selected (10)
All selected (55)
All selected (776)
All selected (315)
All selected (47)
All selected (2)
High-Level Type
Nature
Subnature
Value Type
Value Name
Data Type
Last Check
Ownership
Special Widget Environment Weather Forecast Previ_Meteo special weather 2018-07-08 16:00:18 public
Vergemoli
Vaglia
Vagli sotto
Vagli di sotto
Uzzano
Hide columns
Selected rows: 0
Previous 1 2 3 4 5 1081 Next
Search
Choosen data sources
Remove
Close
Wizard
Select the area of your interest: panning and zooming
Select the
graphic aspect of your interest, or
High Level Type of your interest, or
Make a search if you a have a precise idea or
Act on filters: nature, subnature, type, name, value, date, health, owner, …
Combine them as you like
Select the lines of your interest
Then click on Next and get the Dashboard by wizard
RULE OF THUMB
SNAP4CITY

ICONS of Widgets

Single data

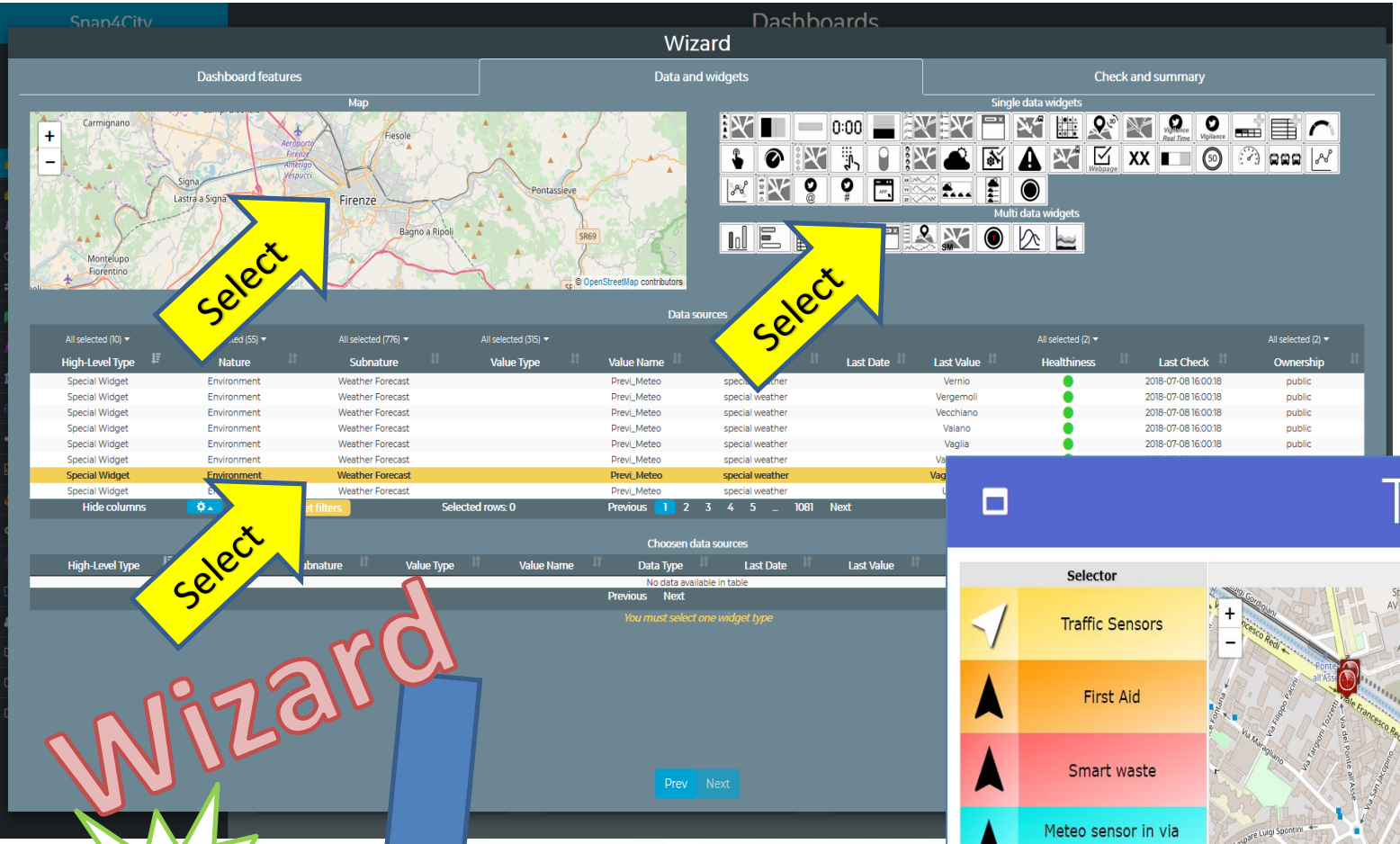


Multi data

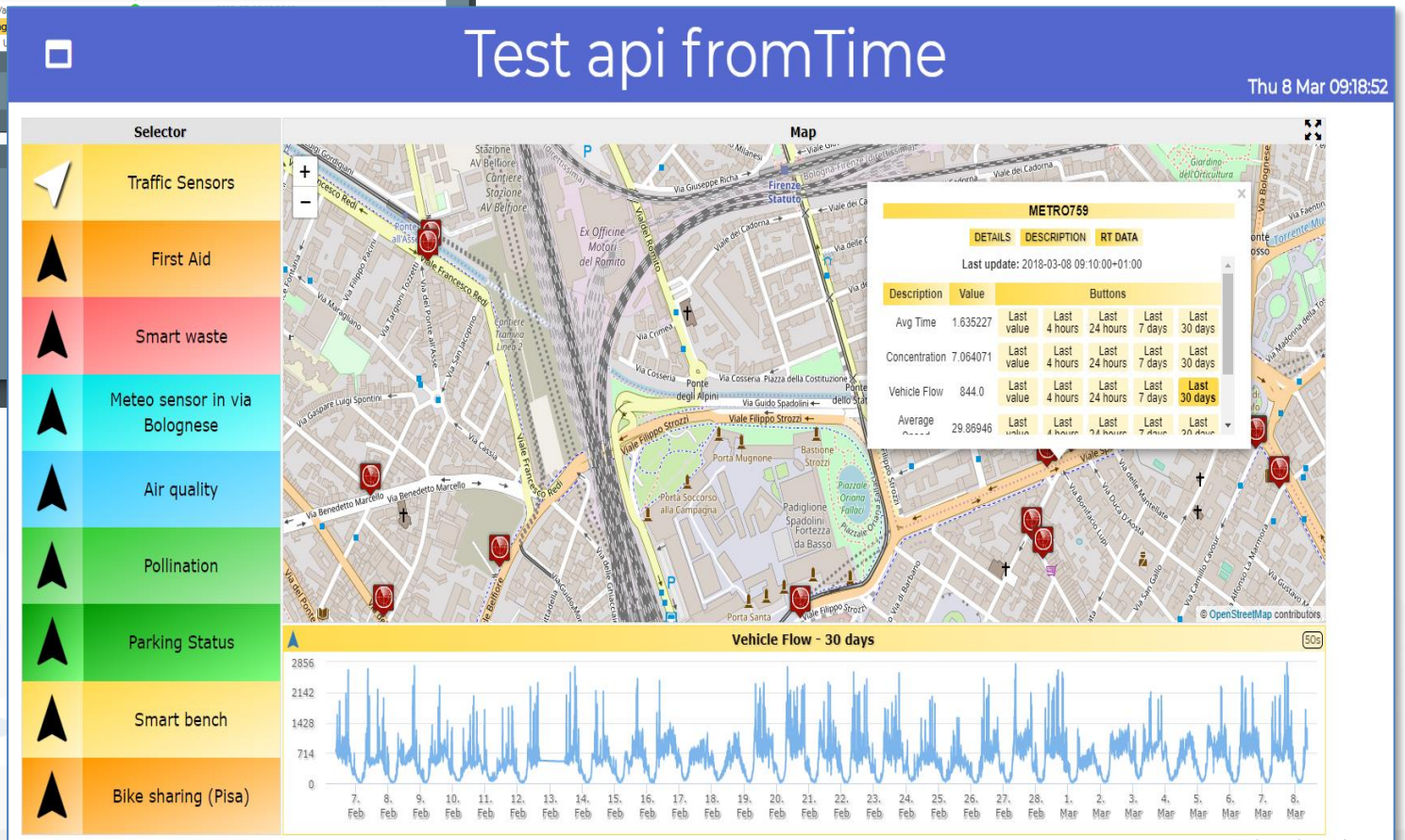


Map Controls

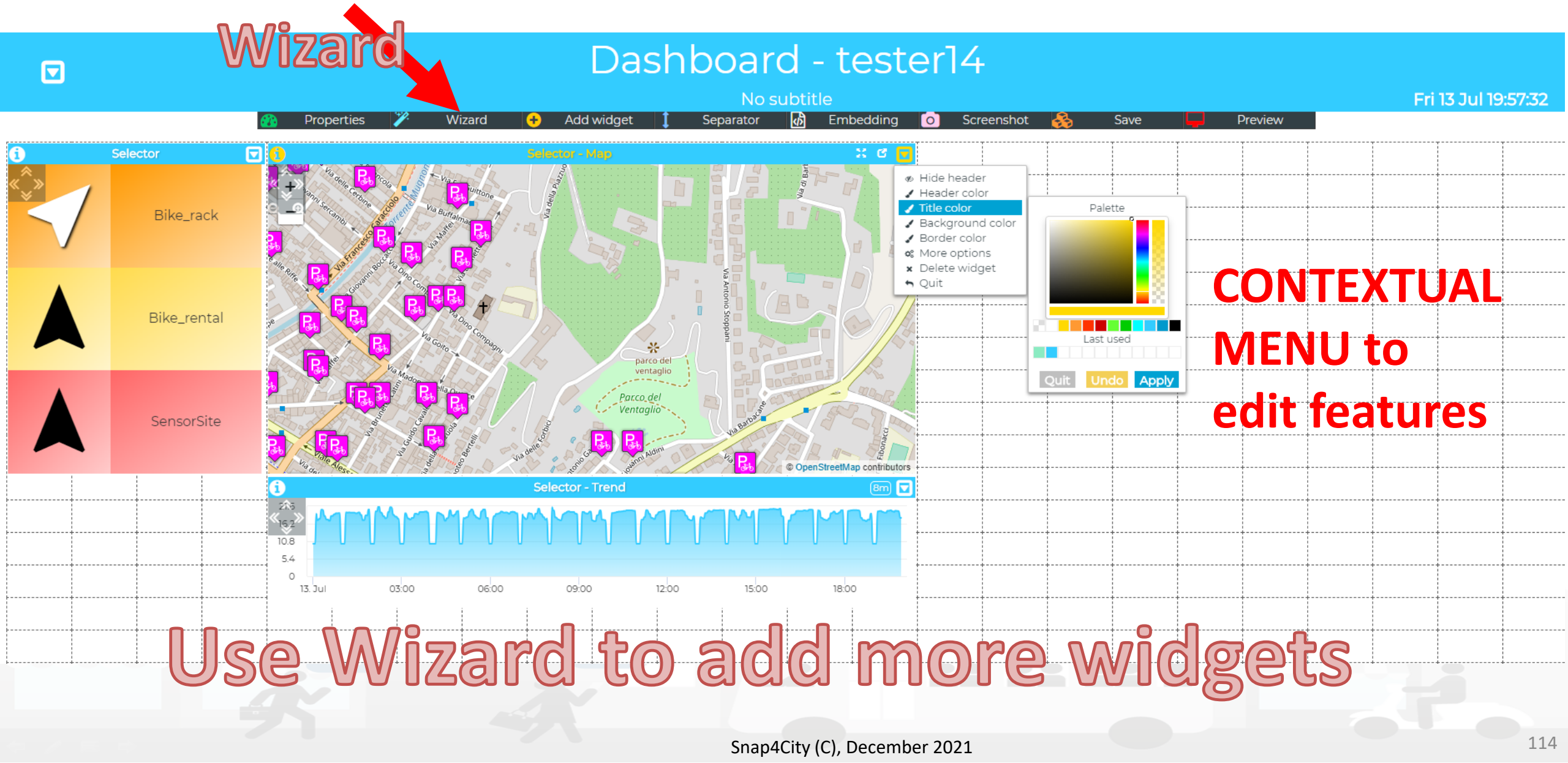
Dashboard Wizard



The Wizard helps you in selecting only possible combinations of data and graphic representations



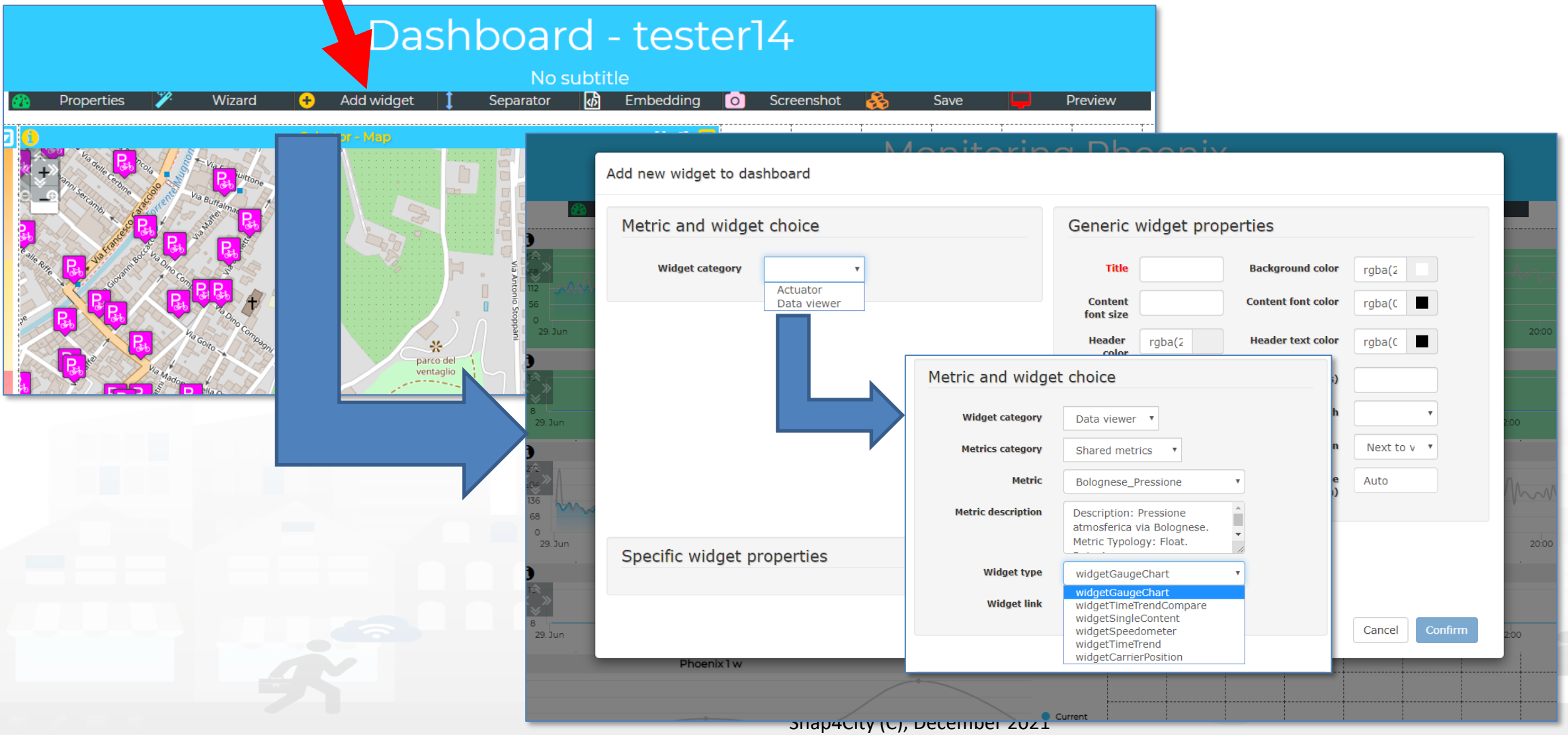
Wizard



CONTEXTUAL MENU to edit features

Use Wizard to add more widgets

Manual Addition of Widgets



HLT: Unified Classification for Data and Services

IoT Device Variable, Sensor Device	All selected (15)	All selected (48)	All selected (27)		All selected (1499)	All selected (159)	All selected (15)	All selected (63)		All selected (2)		All selected (2)
High-Level Type	Nature	Subnature	Device/Model	Broker	Value Name	Value Type	Data Type	Value Unit	Last Date Last Value	Healthiness	Last Check	Ownership
IoT Device Variable	IoTDevice	IoTSensor	devicetest1	orionUNIFI	temperature	temperature	float	°C			2021-10-15 10:01:02	private (My Own)
IoT Device Variable	IoTDevice	IoTSensor	devicetest1	orionUNIFI	humidity	humidity	float	#			2021-10-15 10:01:02	private (My Own)
IoT Device Variable	IoTDevice	IoTSensor	MyThermometer_001	orionUNIFI	temperature	temperature	float	°C			2021-10-15 10:01:01	private
IoT Device Variable	IoTDevice	IoTSensor	MyThermometer_001	orionUNIFI	humidity	humidity	float	#			2021-10-15 10:01:01	private
IoT Device Variable	IoTDevice	IoTSensor	adminTest1	orionUNIFI	temperature	temperature	string	°C	2018-05-31 19:16:05		2021-10-15 10:01:00	private (My Own)
IoT Device Variable	IoTDevice	IoTSensor	adminTest1	orionUNIFI	humidity	humidity	string	%	2018-05-31 19:16:05		2021-10-15 10:01:00	private (My Own)
IoT Device Variable	IoTDevice	IoTSensor	newmarcodev1	orionUNIFI	temperature	temperature	float	°C			2021-10-15 10:00:59	private
IoT Device Variable	IoTDevice	IoTSensor	newmarcodev1	orionUNIFI	humidity	humidity	float	%			2021-10-15 10:00:59	private

Hide columns | Reset filters | Selected rows: 1 | Previous 1 2 3 4 5 ... 2466 Next | Search

High Level Types

Nature

SubNature

Semantic Classific.

Dev/Model name

Broker name

Technical Source

Value Name

Value Type

Data Type

Value Unit

Variables, names

Last Date/Time

Last Value

Real Time

Healthiness

Last Check

Status

Ownership

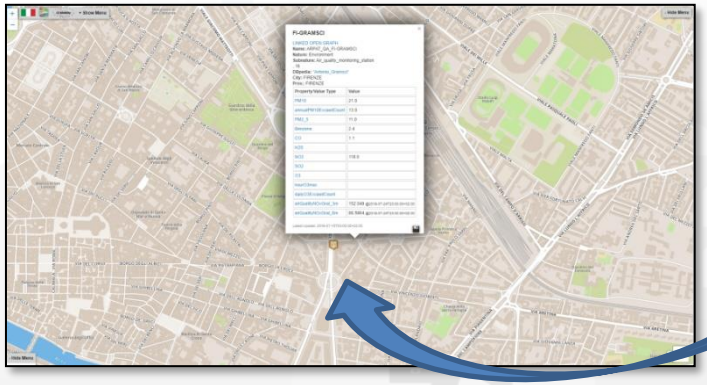
Organization

For Admin

- Click with the mouse on it

HLT: Sensor

Knowledge Base view



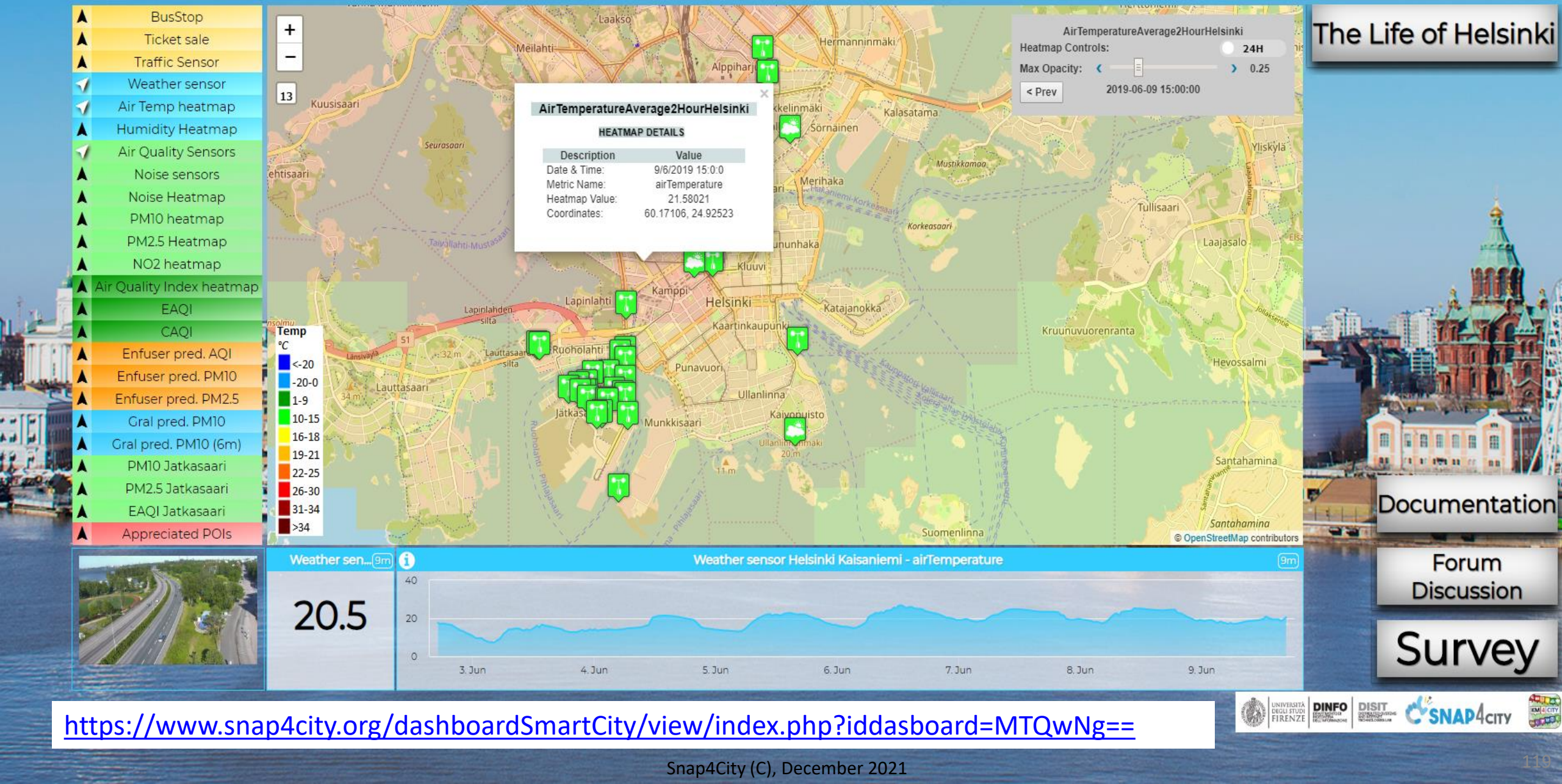
Advanced Features of the Data Inspector

- Some features accessible only for the Owner and *Admin, such as:
  - Specific information on the basis of the High Level Type
  - Values connected to the data (structure of the single data)
  - Details regarding the ingestion process
  - Eventual image representing the City Entity, for example the sensor
  - Ownership (licensing) details regarding the data owner
- So that you can access on all of them in the Snap4City version if you install on premise.
- A part of these features can be activated for the Organization Managers, namely: «ToolAdmin» roles.

Helsinki City Overview (H5a)

Please note that the data results are not always based on real data.

Sun 9 Jun 17:07:25



https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTQwNg==

Helsinki City Overview (H5a)

Please note that the data results are not always based on real data.

Sun 9 Jun 17:07:25

Selection

- Bus stop
- Ticket sale
- Traffic sensor
- Weather sensor
- Air Temp heatmap
- Humidity Heatmap
- Air Quality Sensors
- Noise sensors
- Noise Heatmap
- PM10 heatmap
- PM2.5 Heatmap
- NO2 heatmap
- Air Quality Index heatmap
- EAQI
- CAQI
- Enfuser pred. AQI
- Enfuser pred. PM10
- Enfuser pred. PM2.5
- Gral pred. PM10
- Gral pred. PM10 (6m)
- PM10 Jatkasaari
- PM2.5 Jatkasaari
- EAQI Jatkasaari
- Appreciated POIs

Widget Map (multi data map)

AirTemperatureAverage2HourHelsinki

HEATMAP DETAILS

Description	Value
Date & Time:	9/6/2019 15:0:0
Metric Name:	airTemperature
Heatmap Value:	21.58021
Coordinates:	60.17106, 24.92523

AirTemperatureAverage2HourHelsinki

Heatmap Controls: 24H

Max Opacity: 0.25

< Prev 2019-06-09 15:00:00

Temp °C

<-20
-20-0
1-9
10-15
16-18
19-21
22-25
26-30
31-34
>34

© OpenStreetMap contributors

The Life of Helsinki Button

Documentation

Forum Discussion

Survey

Buttons

External Content

Single Content

Weather sen... 9m

20.5

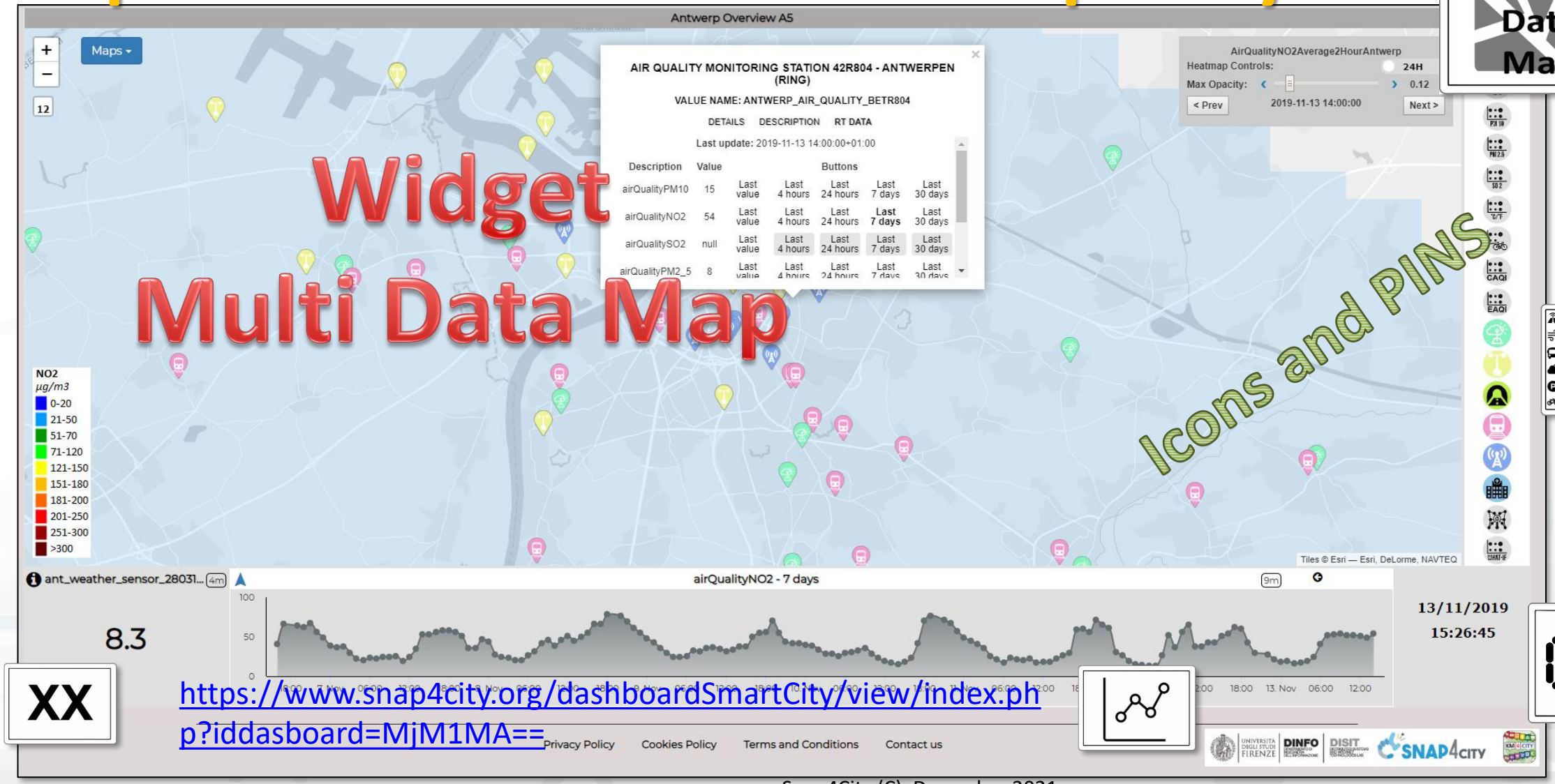
Weather sensor Helsinki Kaisaniemi - airTemperature 9m

Time Trend

3. Jun 4. Jun 5. Jun 6. Jun 7. Jun 8. Jun 9. Jun

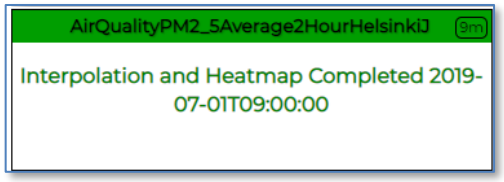
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTQwNg==

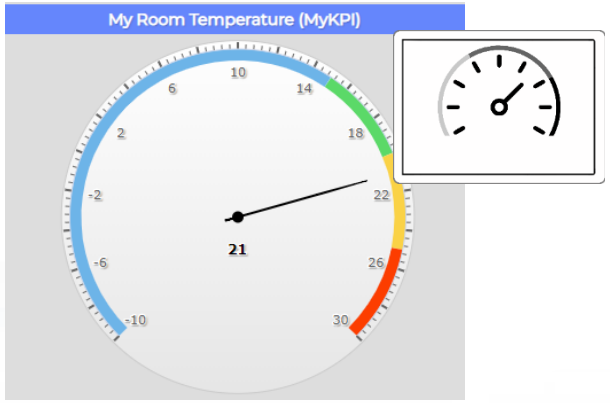
Unique Dashboard builder Multiple Styles

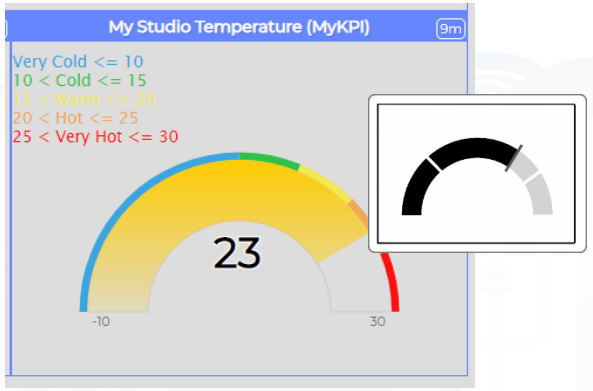


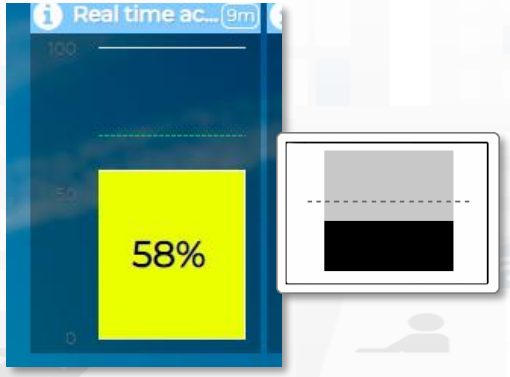
Single values

- Single Content
- Speedometer
- Gauge
- Single Bar





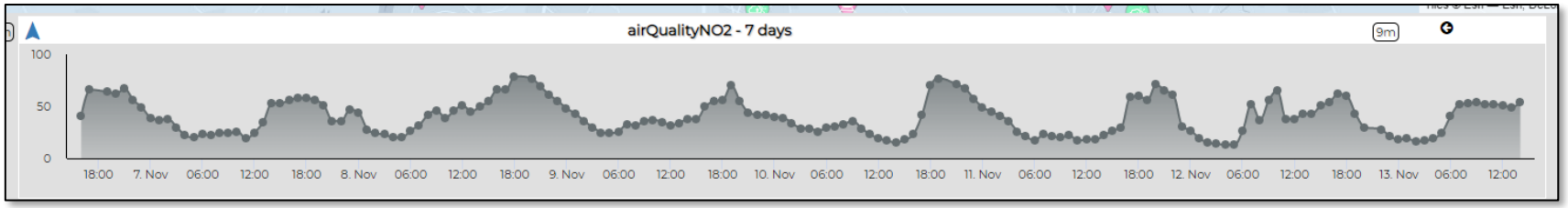




Most of the multi xxxx widgets can show also single values

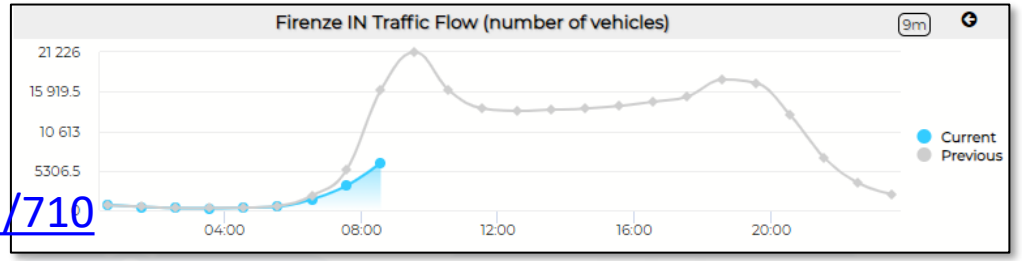
Time Series

- **Time Trend**

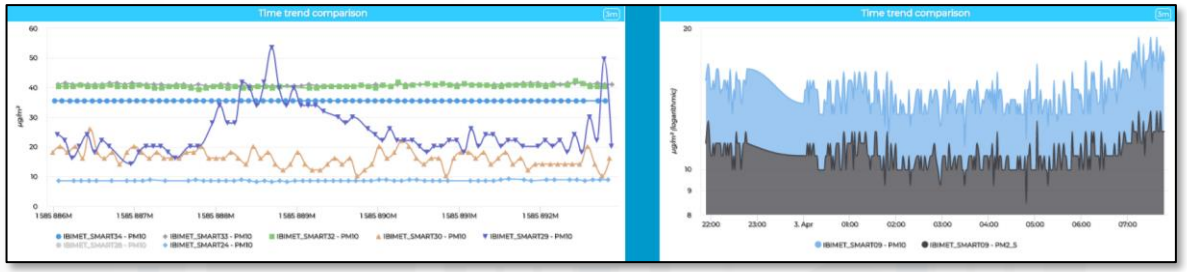


- **Time Trend Compare**
  - Comparing trends of the same time series

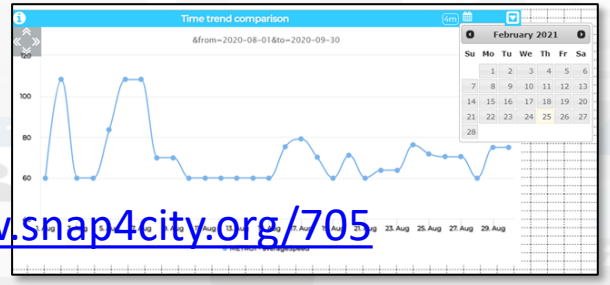
https://www.snap4city.org/710



- **Multi Series**
  - Showing multiple trends of multiple time series with same unit



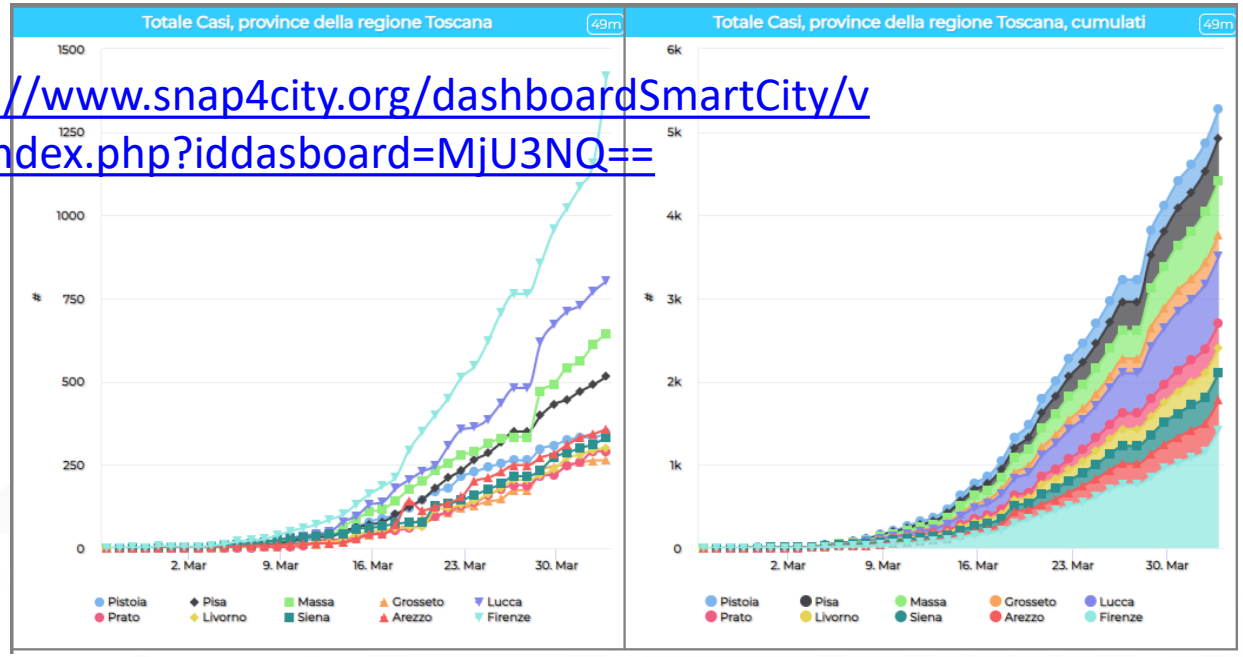
- **Typical Time Trend**
  - Showing the typical trend of a time serie: multiple modalities

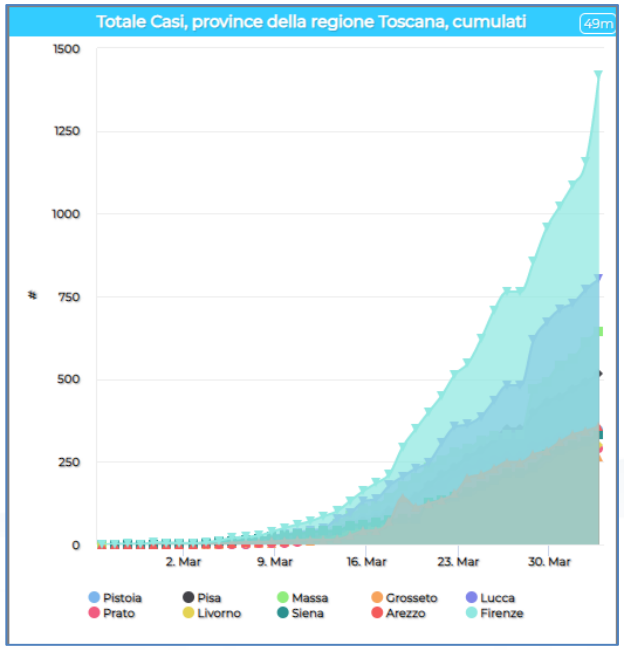


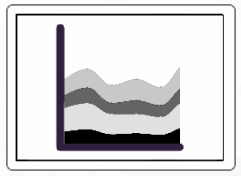
https://www.snap4city.org/705

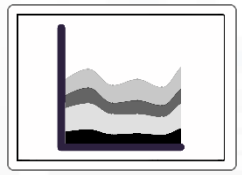
MultiSeries

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjU3NQ==





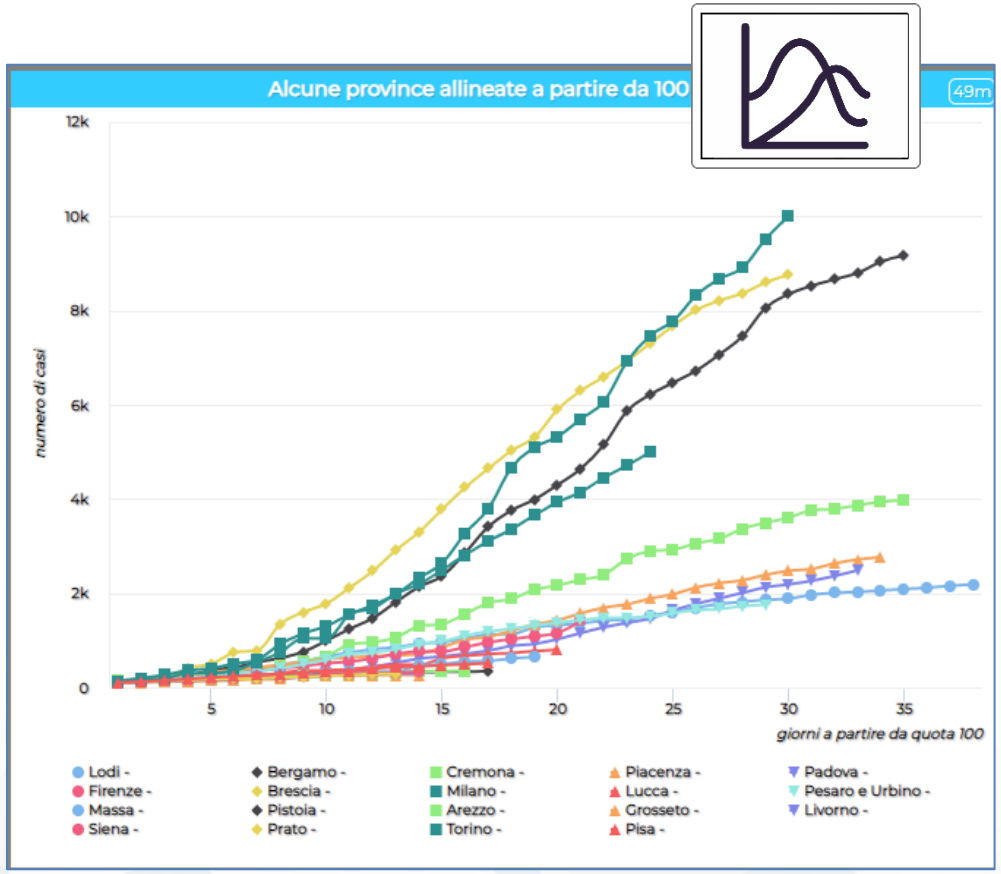


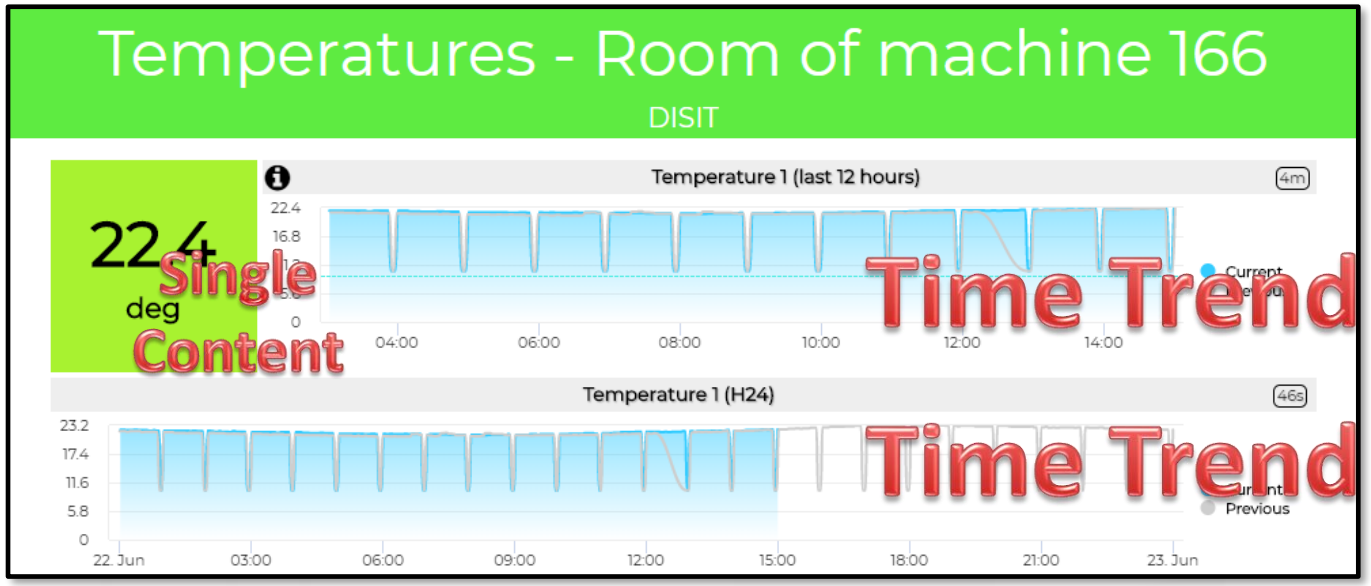


- **Staked, shaded or regular**,
- Grouped by Value_unit, **linear** or **Logarithmic**
- From historical data and/or **dynamic** data from IOT Applications

Ordered Data Series

- A series or multiple series which are ordered by a number:
  - E.g., 1,2,3,4,5,……N
- For each number (position over X axis, a value on Y axis is provided)
- It is provided from the multiseries widget with setting parameters from MoreOptions
- Series can be also provided from IOT Apps

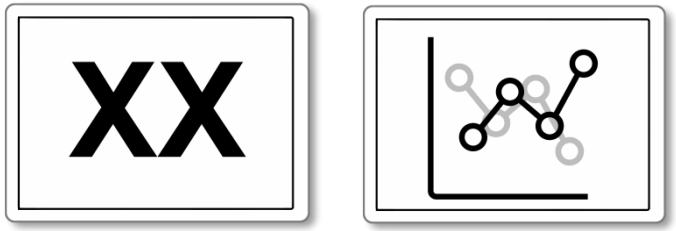


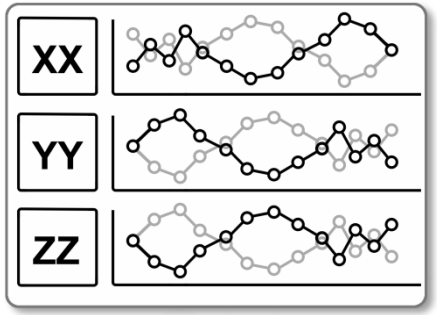


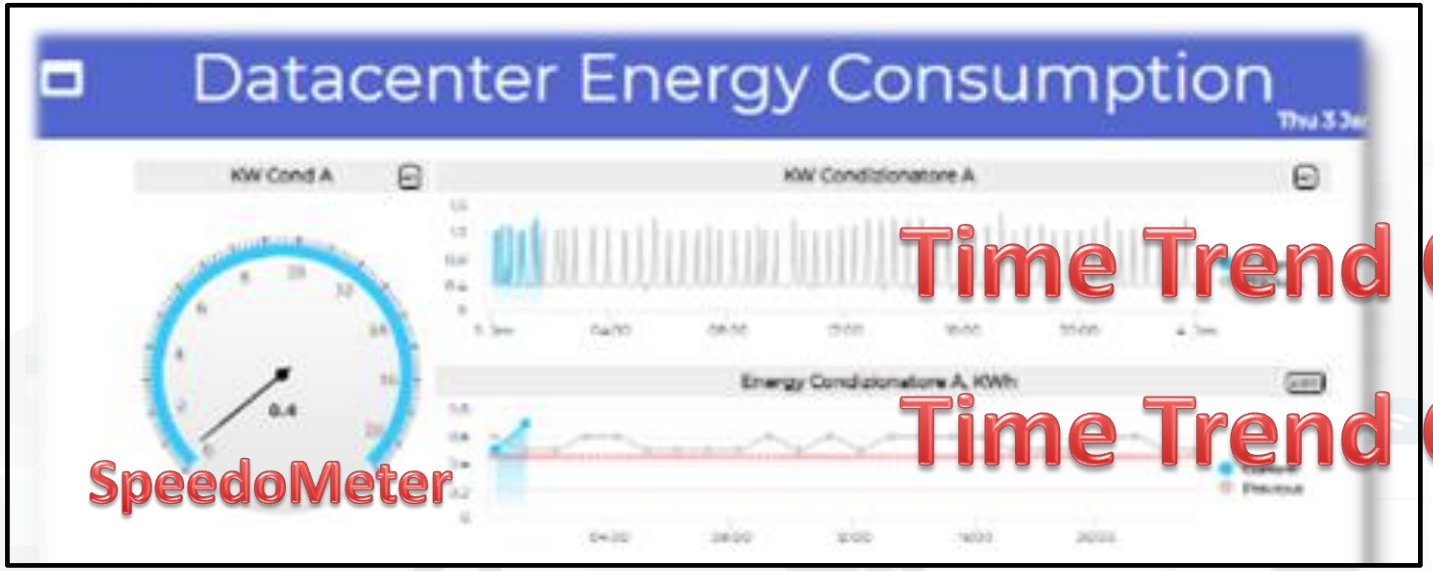
Single Content

Time Trend Compare

Time Trend Compare



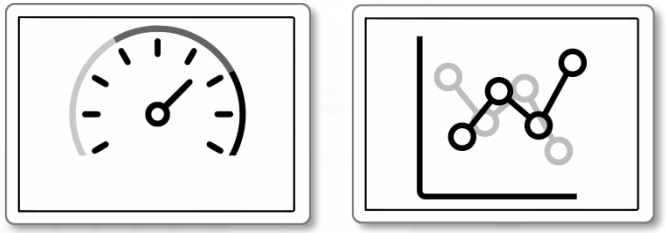




SpeedoMeter

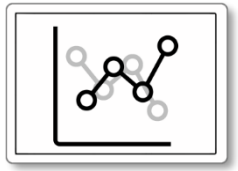
Time Trend Compare

Time Trend Compare

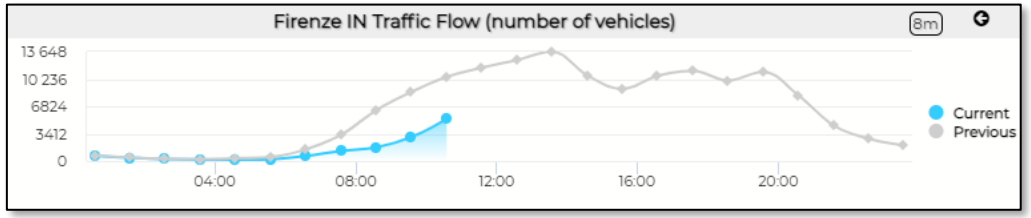


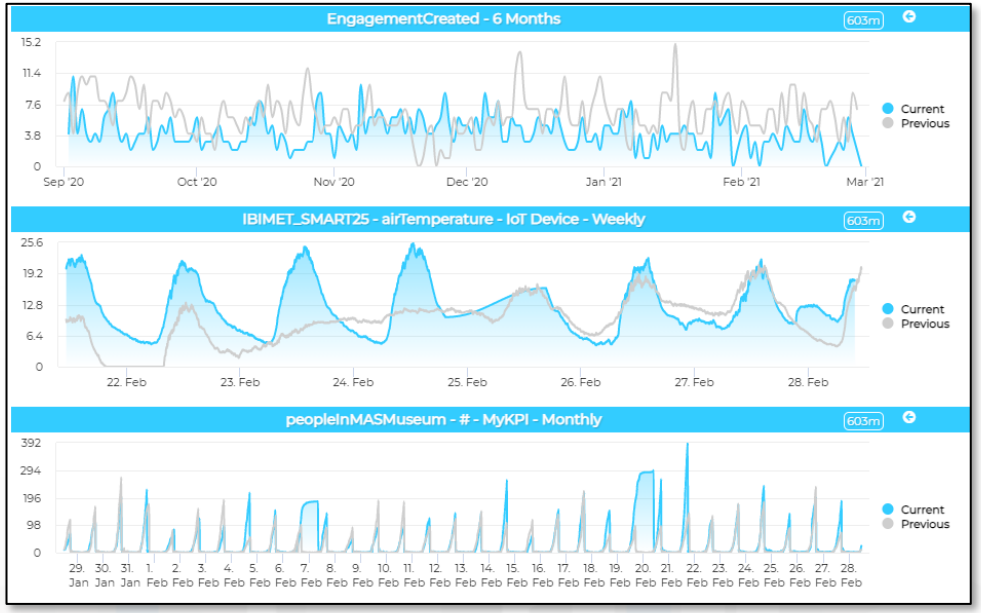
Time Trend Compare

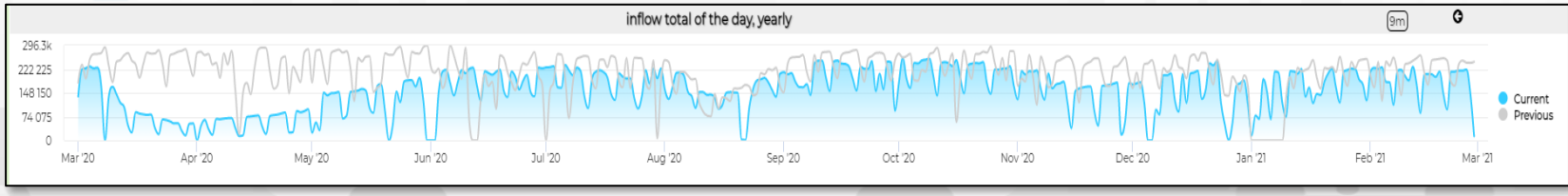
A tool for visual Analytics, Comparing



- **4 hours** wrt those before, or same hours of previous day
- **12 hours** wrt those before, or same hours of previous day
- **Day** wrt day before, or same day of previous week or month
- **Week** wrt to previous week, or
  - week starting on Monday
- **Month** wrt to previous month, or
  - previous month starting 1st day, or
  - same month of the previous year
- **6 Months** wrt to previous 6 months, or
  - Aligned day 1 or same 6 months previous year day 1 or
  - 6 months previous year day 1 aligned 1st or 2nd semester
- **Year** wrt to previous year, or
  - previous year starting 1st day, or
  - previous year starting same month





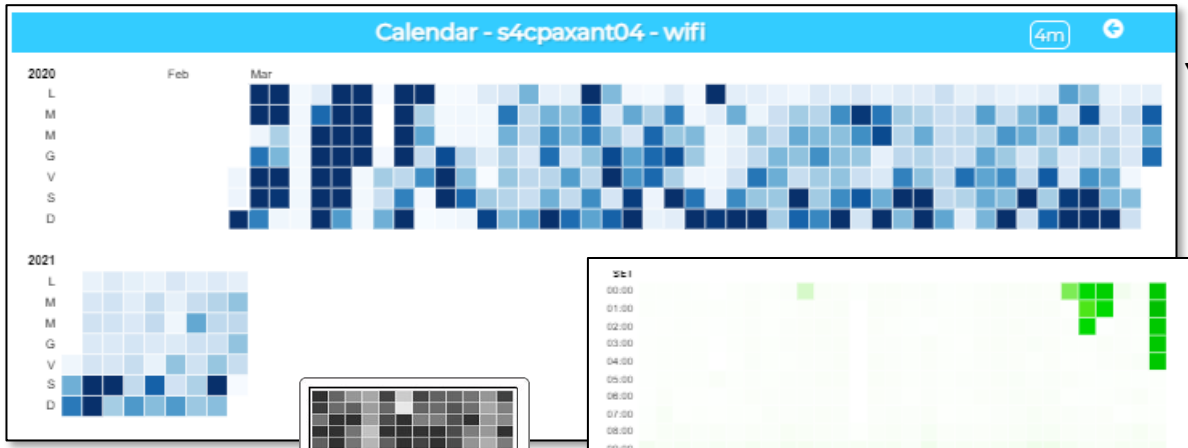


Calendar

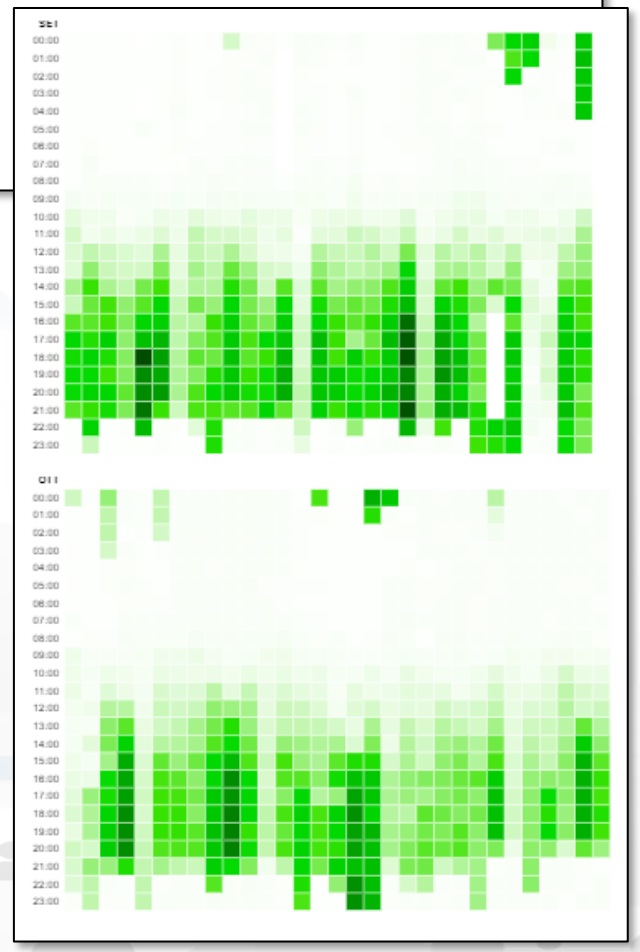
https://www.snap4city.org/706

Showing: **Sum, Average or Median** value of a variable as a colored calendar:

- **Year**
  - 1 Year, 12 months, by weeks, per days
  - Time Range: 1D, 7D, 1M, 6M, 1Y
- **Month**
  - 30 days, 24 hours
  - Time Range: 1D, 7D, 1M, 6M, 1Y
- **You can scroll in history**
- **They manage HLT: Sensor, MyKPI and work receiving Dynamic data from IOT App**



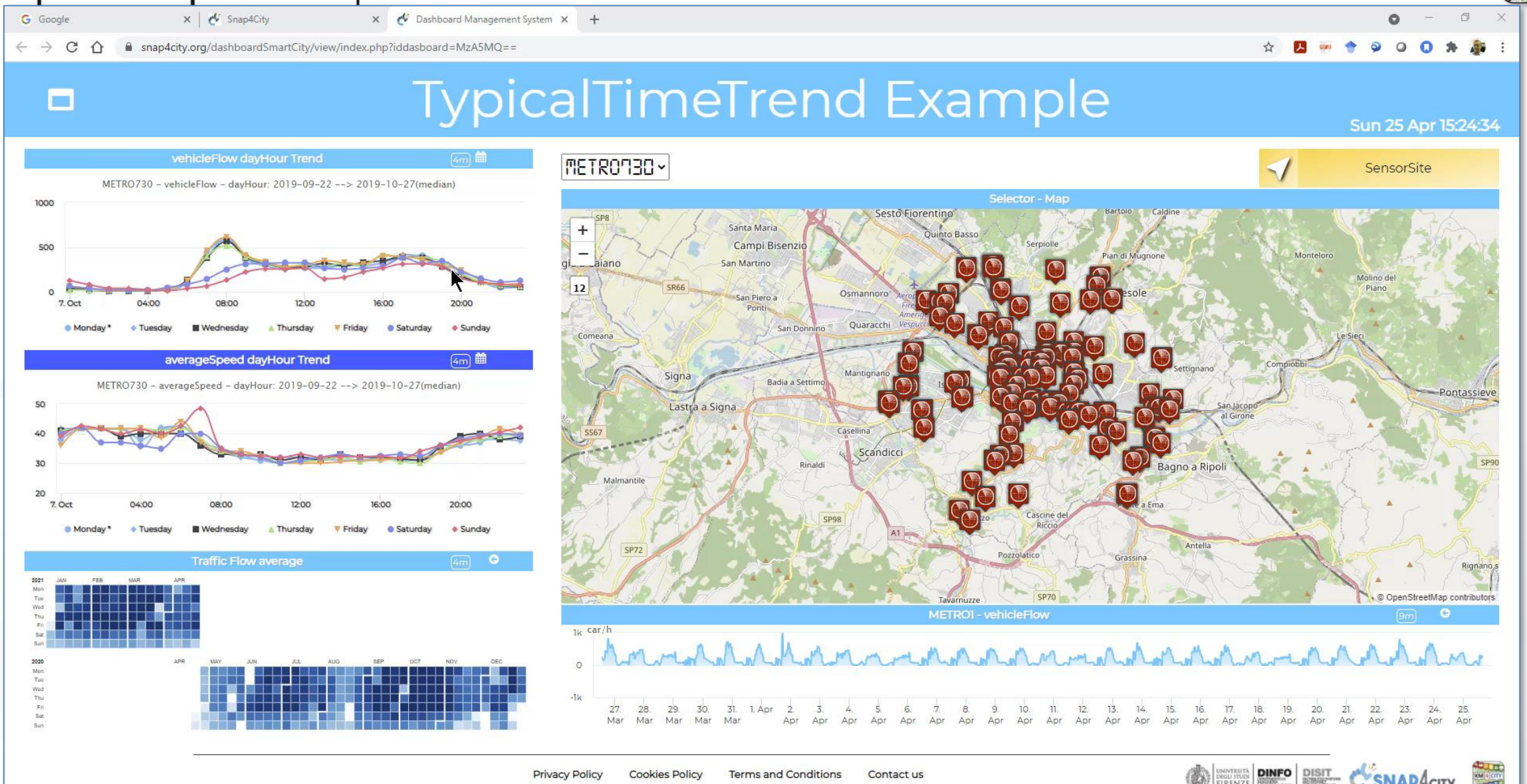
Year, 1Y



Month, 6M

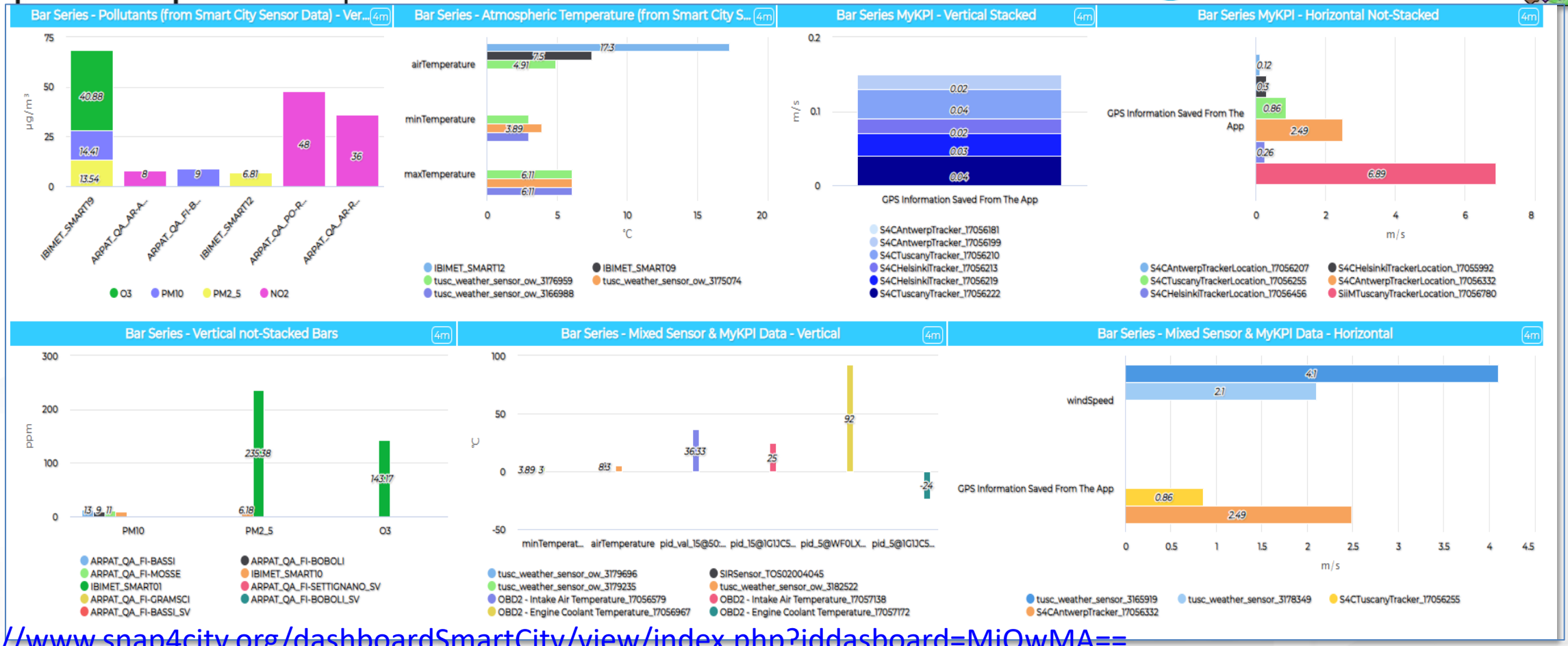
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzA4MA==

Typical Time Trends



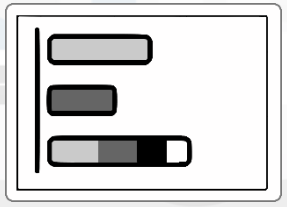
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzA5MQ==

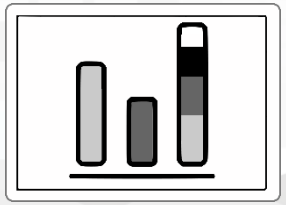
Barseries



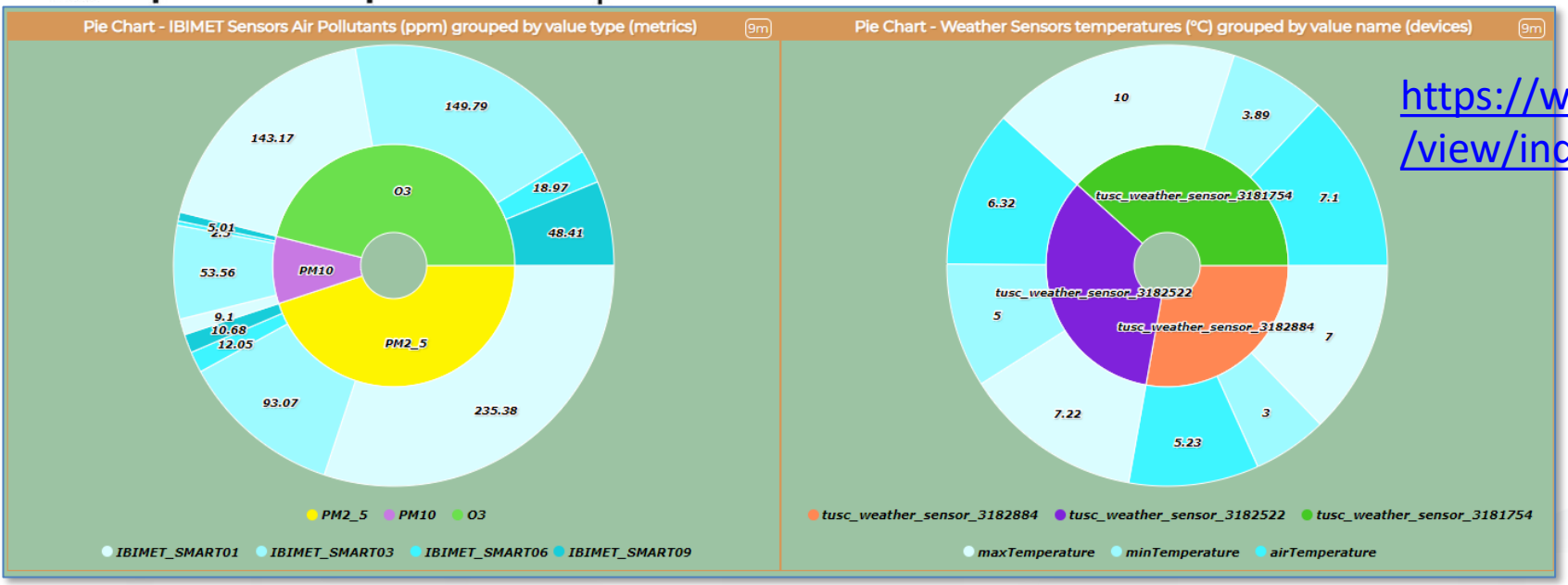
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjQwMA==

- **Staked and grouped** by Value_Name / Value_Type
- **Oriented**: Vertical and Orizontal
- **ordered** by value: crescent, descendent
- From historical data and/or dynamic data from IOT Applications





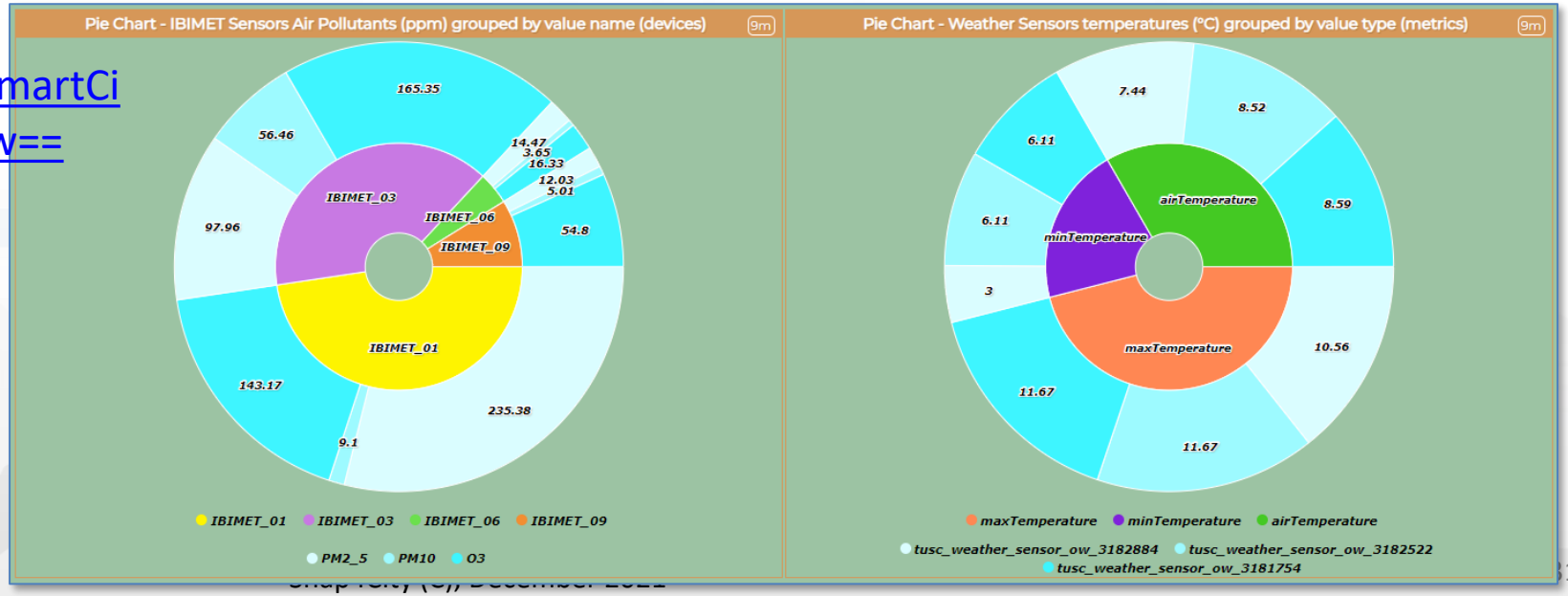
Pie & Donut



https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjUxNw==

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjUyNw==

- Single level Pie and two levels as Donut
- Grouped ValueType, ValueUnit



Tables

Table - Weather Metrics and Pollutants

value type / value name	airHumidity	airTemperature	PM2_5	PM10	O3	CO
IBIMET_SMART_01	39.9	19	235.38		143.17	0.19
IBIMET_SMART_03	48	13.3	97.96		165.35	0.16
IBIMET_SMART_04	56.6	13.4	0		300	0.17
IBIMET_SMART_06	61.4	10.8	14.47		16.33	0.16
IBIMET_SMART_07	84	10.6	13.32	4.41	244.88	0.15
IBIMET_SMART_08	0	21.9	2.7	2.47		0.14
IBIMET_SMART_09	53.3	9.6	12.03	5.01	54.8	0.12

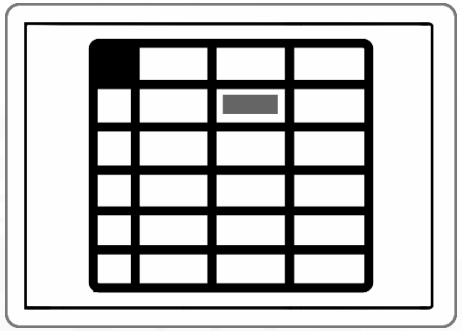
< 10
10 ⟷ 20
20 ⟷ 30
30 ⟷ 40
40 ⟷ 50
50 ⟷ 60
60 ⟷ 70
70 ⟷ 80
80 ⟷ 90
> 90

Table

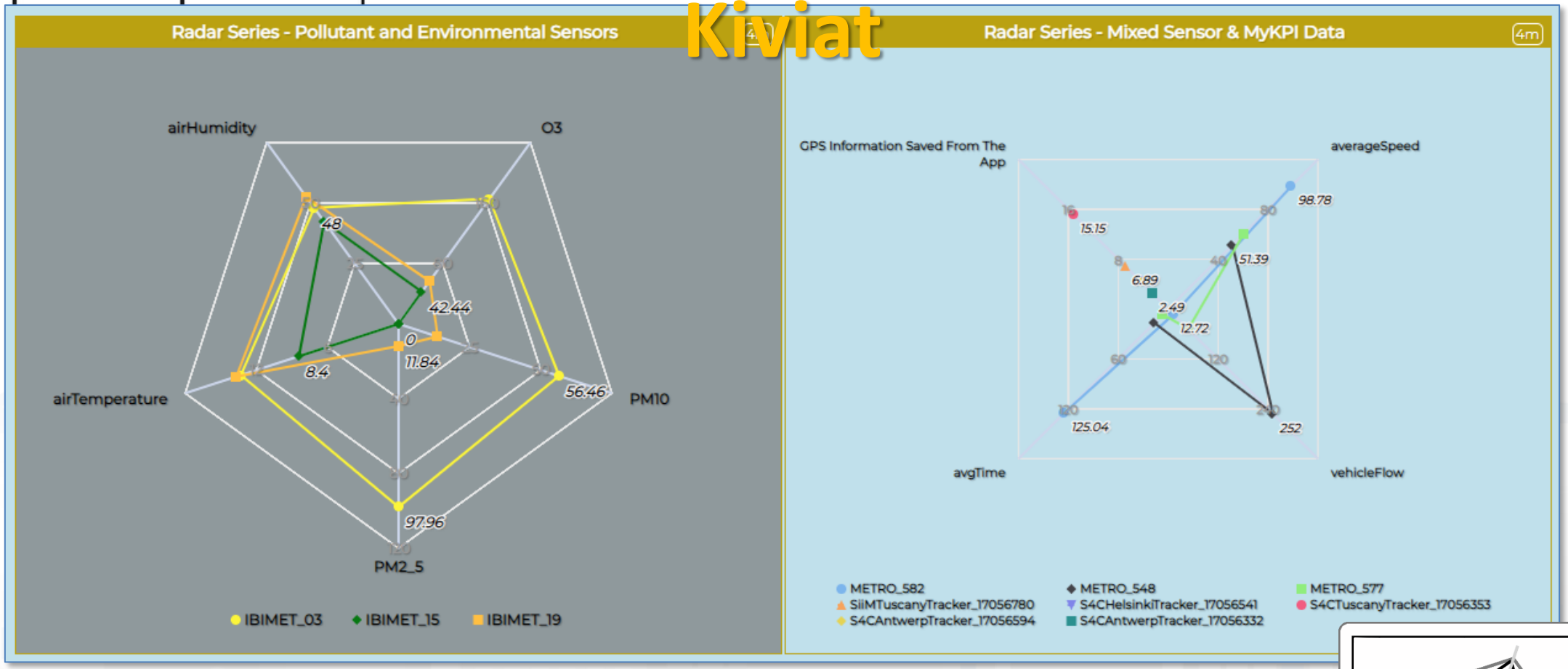
value type / value name	chargingState	stationState
eCharging_15EP22T2AA1S000001	AVAILABLE	ACTIVE
eCharging_15EP22T2AA1S000002	FAULT	MAINTENANCE
eCharging_15EP22T2AA1S000003	AVAILABLE	ACTIVE
eCharging_15EP22T2AA1S000004	AVAILABLE	ACTIVE
eCharging_15EP22T2AA1S000006	FAULT	MAINTENANCE
eCharging_15EP22T2AA1S000007	AVAILABLE	ACTIVE
eCharging_15EP22T2AA1S000008	AVAILABLE	ACTIVE
eCharging_15EP22T2AA1S000009	AVAILABLE	ACTIVE

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjUzMw==

- Neutral or Colormapped, the same of heatmaps
- Number/text



Radar, SpiderNet Kiviat



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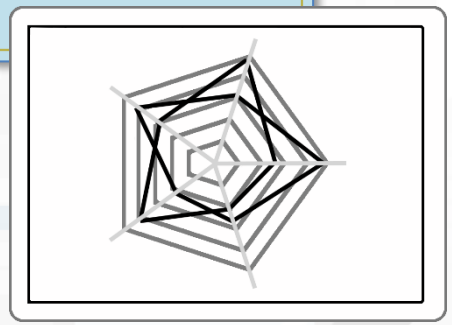
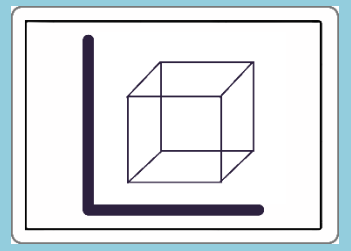
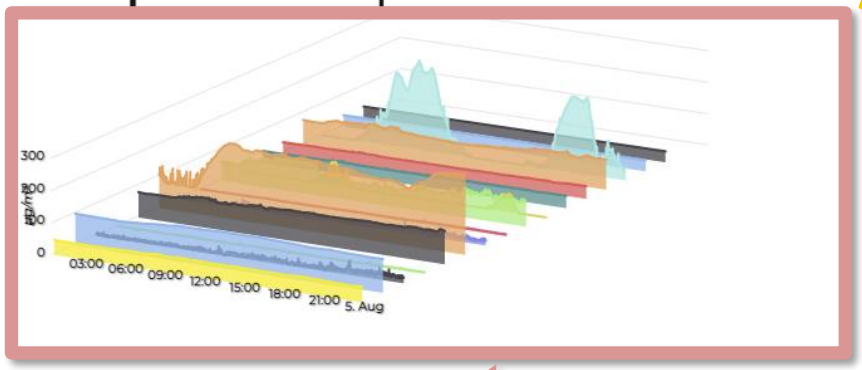


- Normalized, multiple value units
- Hystorical, KPI and Dynamic from IOT App

OLAP Data Cubes



Hypercube



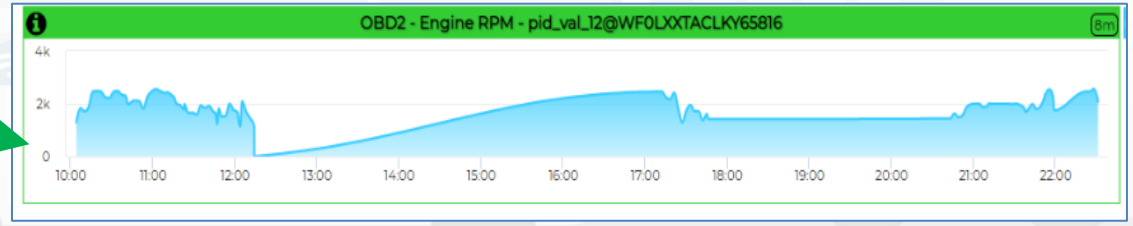
Longitude

Latitude

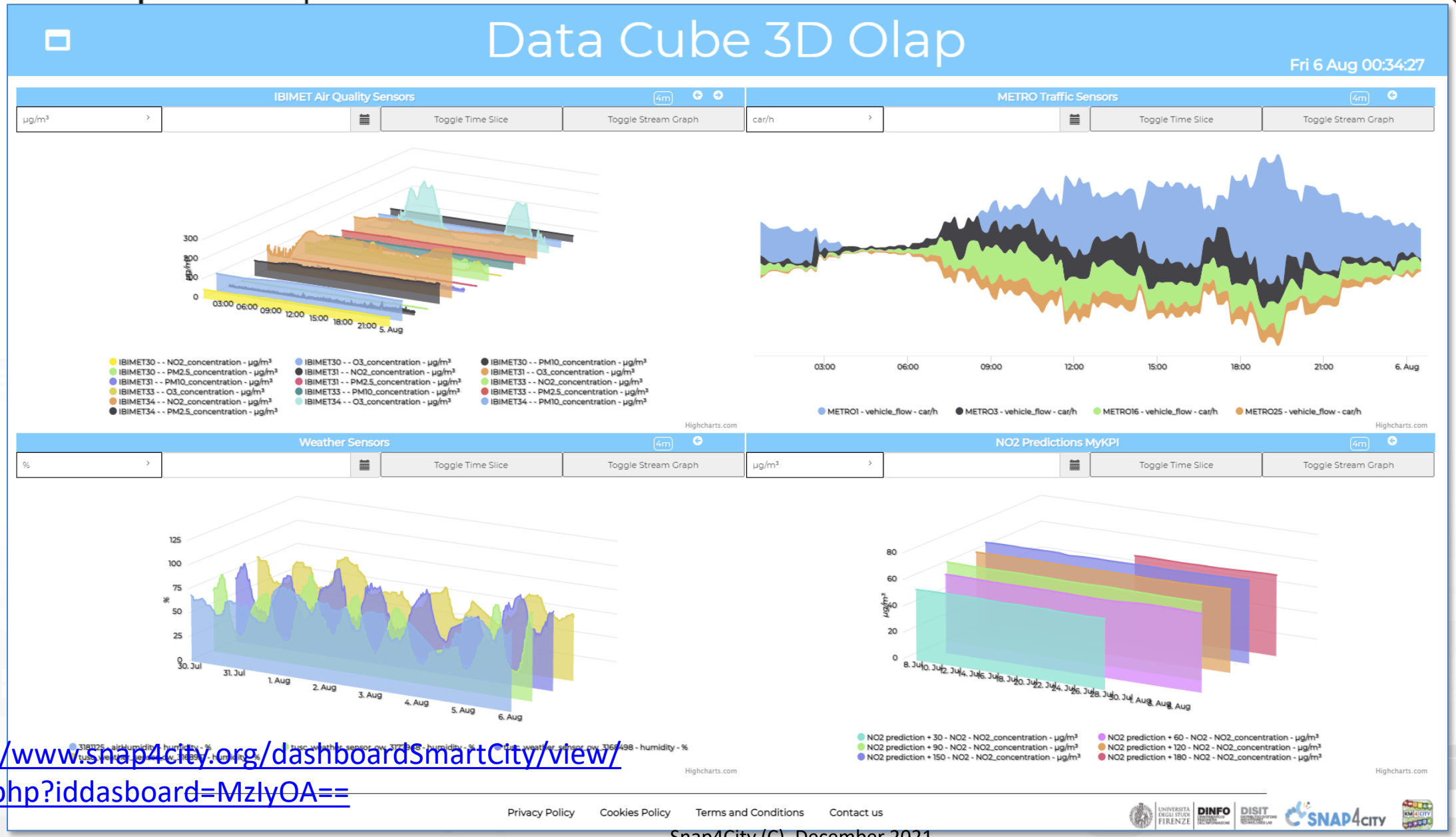
Values

Sensors of Devices, KPI, etc.

time



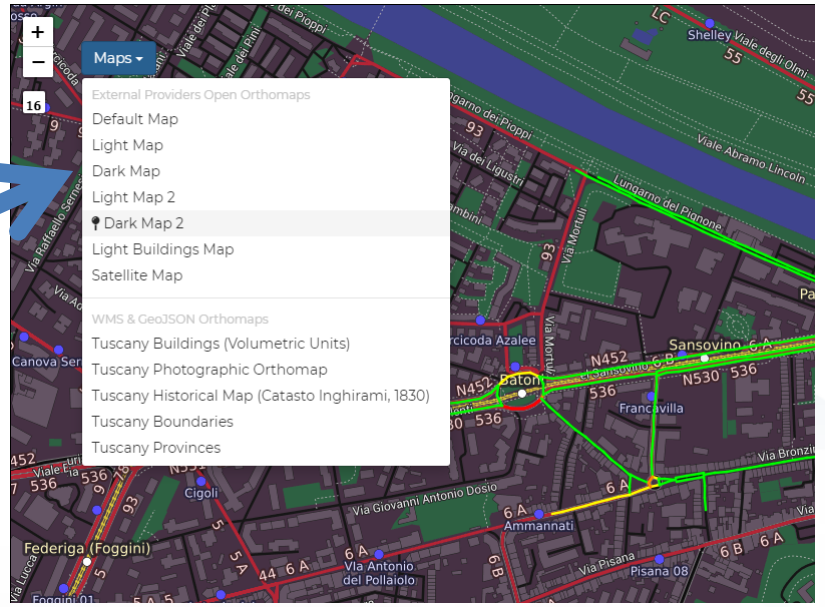
Data Cube 3D Olap

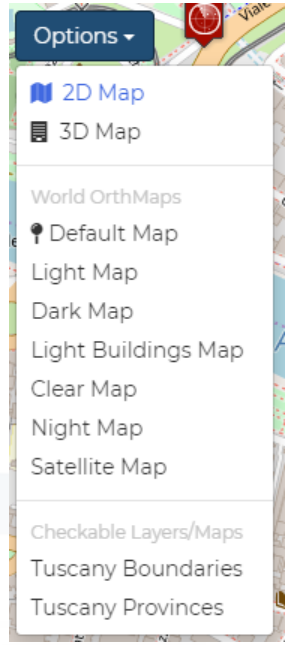


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzIyOA==

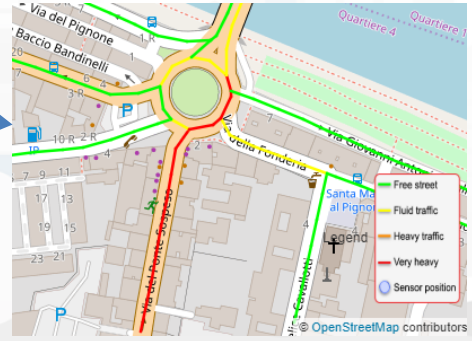
Multi Data Map Widget

- The most powerful Data Map rendering tool, it supports:
  - **KB Sensor data**: POI, sensors, actuators, etc. (see in the following), moving devices
  - **WFS data** (see in the following)
  - **WMS background maps**
    - Ask to a **RootAdmin** for activating this feature on your MultiDataMap widgets once created the dashboard
    - Maps can come from GIS servers, and WMS
  - **WMS Heatmaps GeoTiFF**
  - **WMS Traffic Flow GeoTIFF**
  - **GTFS data from Public Transport**
  - **Special tools**
    - Scenario (see in the following)
    - What-IF (see in the following)

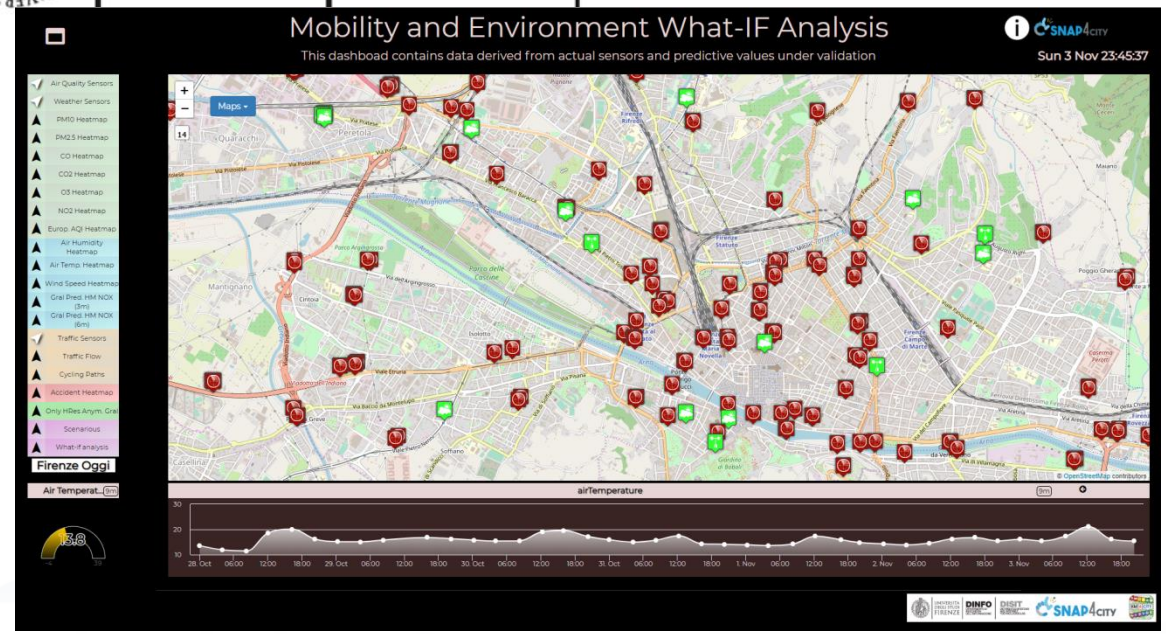


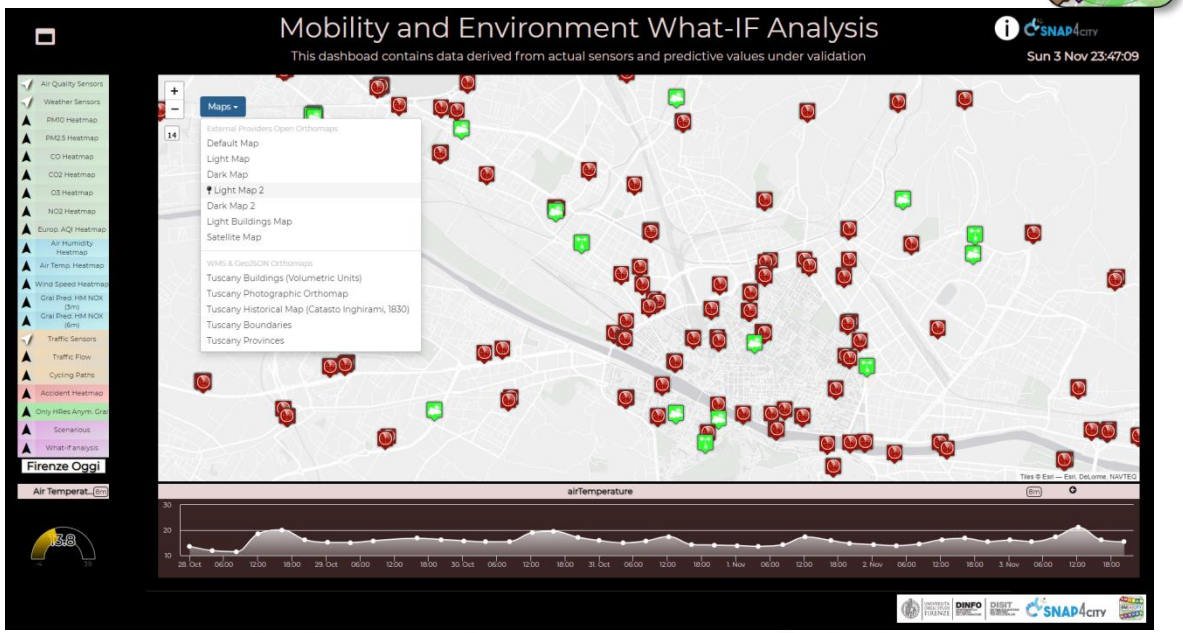


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjE5MA==#

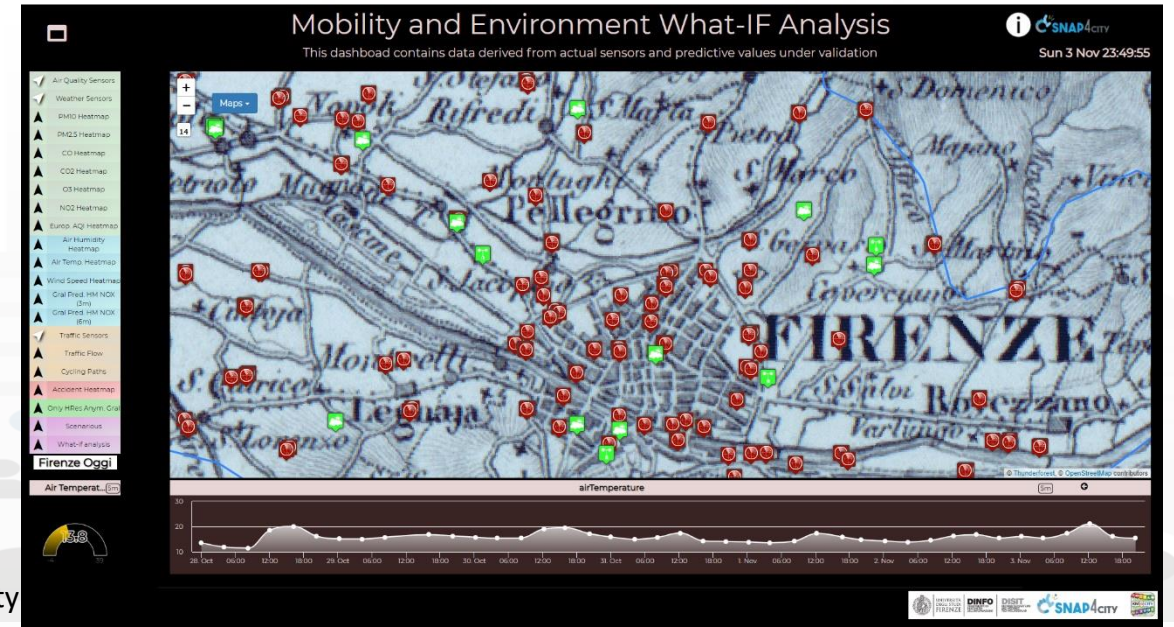


Orthomaps

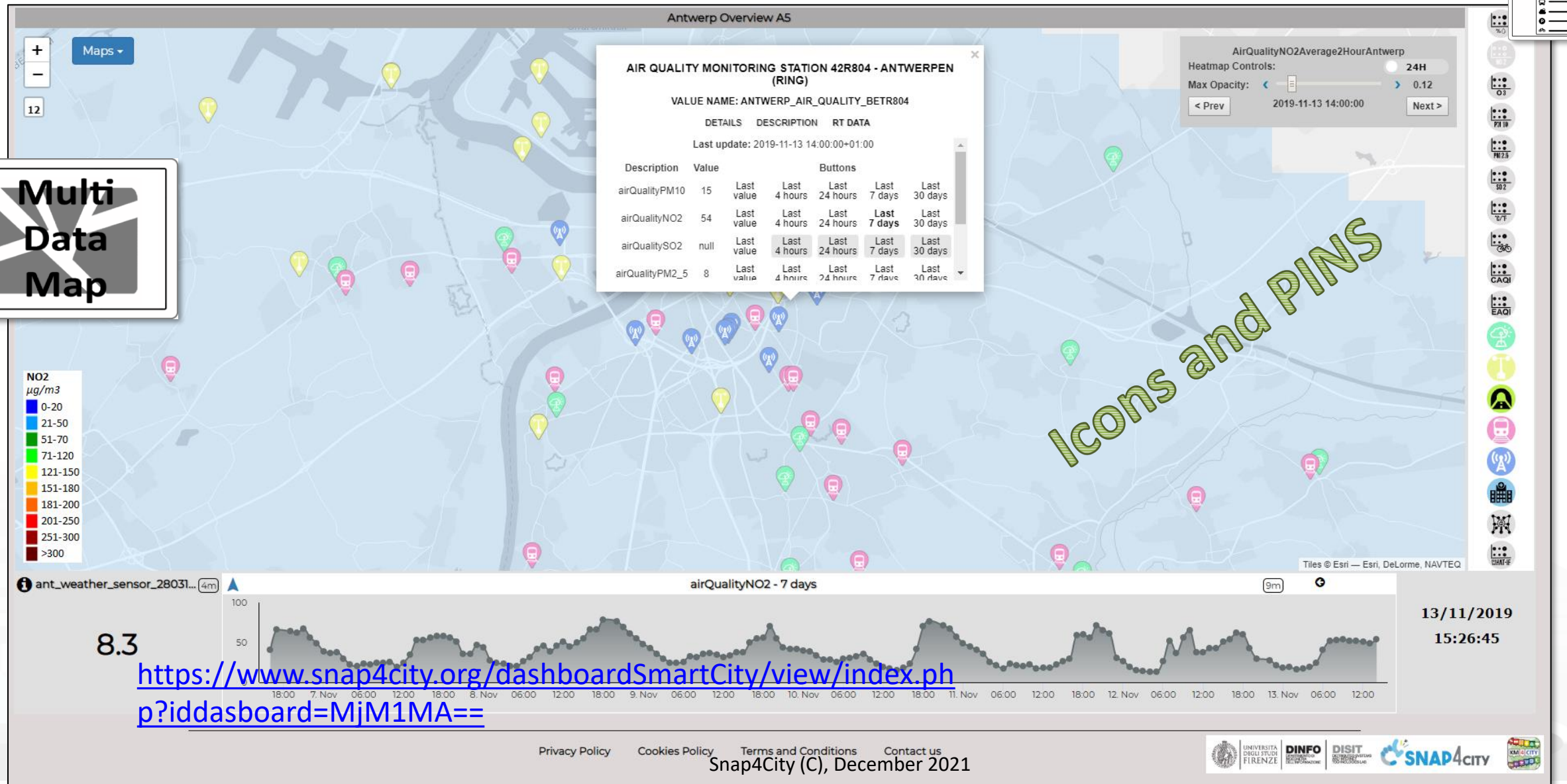

Mobility and Environment What-IF Analysis
This dashboad contains data derived from actual sensors and predictive values under validation
Sun 3 Nov 23:45:37
Maps
airTemperature


Mobility and Environment What-IF Analysis
This dashboad contains data derived from actual sensors and predictive values under validation
Sun 3 Nov 23:47:09
Maps
Default Map
Light Map
Dark Map
Light Map 2
Dark Map 2
Light Buildings Map
Satellite Map
Tuscany Buildings (Volumetric Units)
Tuscany Photographic Orthomap
Tuscany Historical Map (Catasto Inghirami, 1830)
Tuscany Boundaries
Tuscany Provinces
airTemperature


Mobility and Environment What-IF Analysis
This dashboad contains data derived from actual sensors and predictive values under validation
Sun 3 Nov 23:48:22
Maps
airTemperature

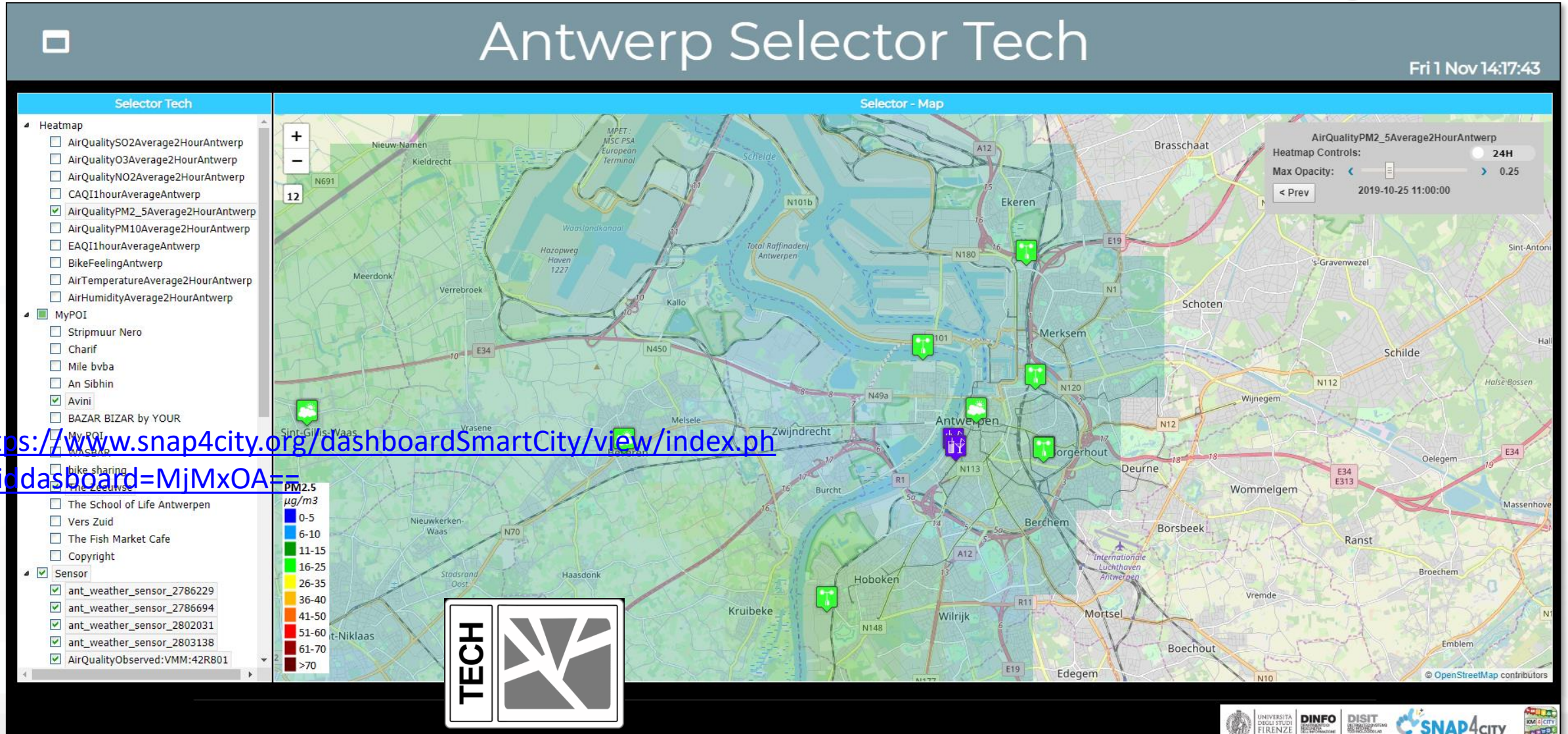

Mobility and Environment What-IF Analysis
This dashboad contains data derived from actual sensors and predictive values under validation
Sun 3 Nov 23:49:55
Maps
FIRENZE
airTemperature

Menu Icon and PINs as Icons



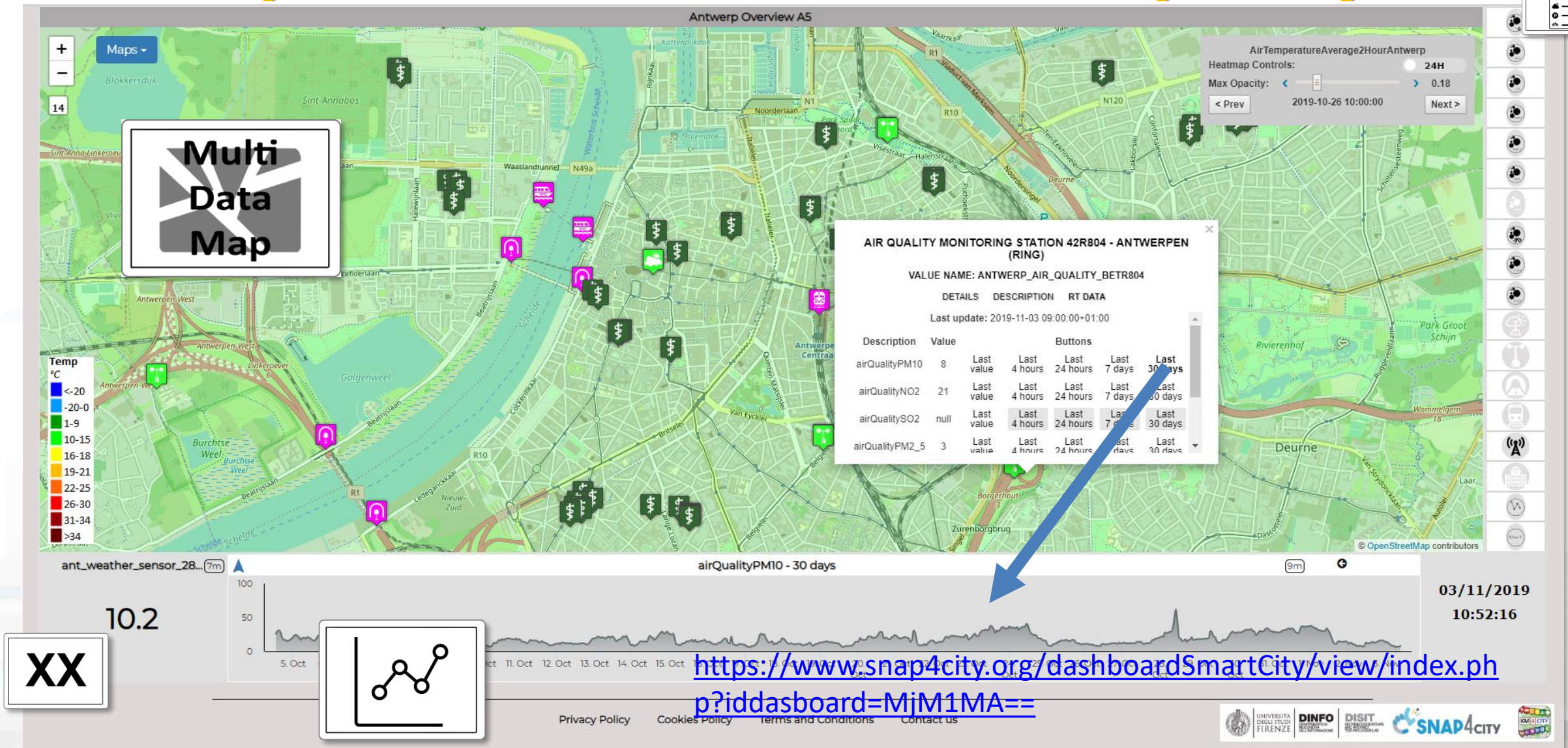
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjM1MA==

Technical Selector: TECH MultiDataMap



https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjMxOA==

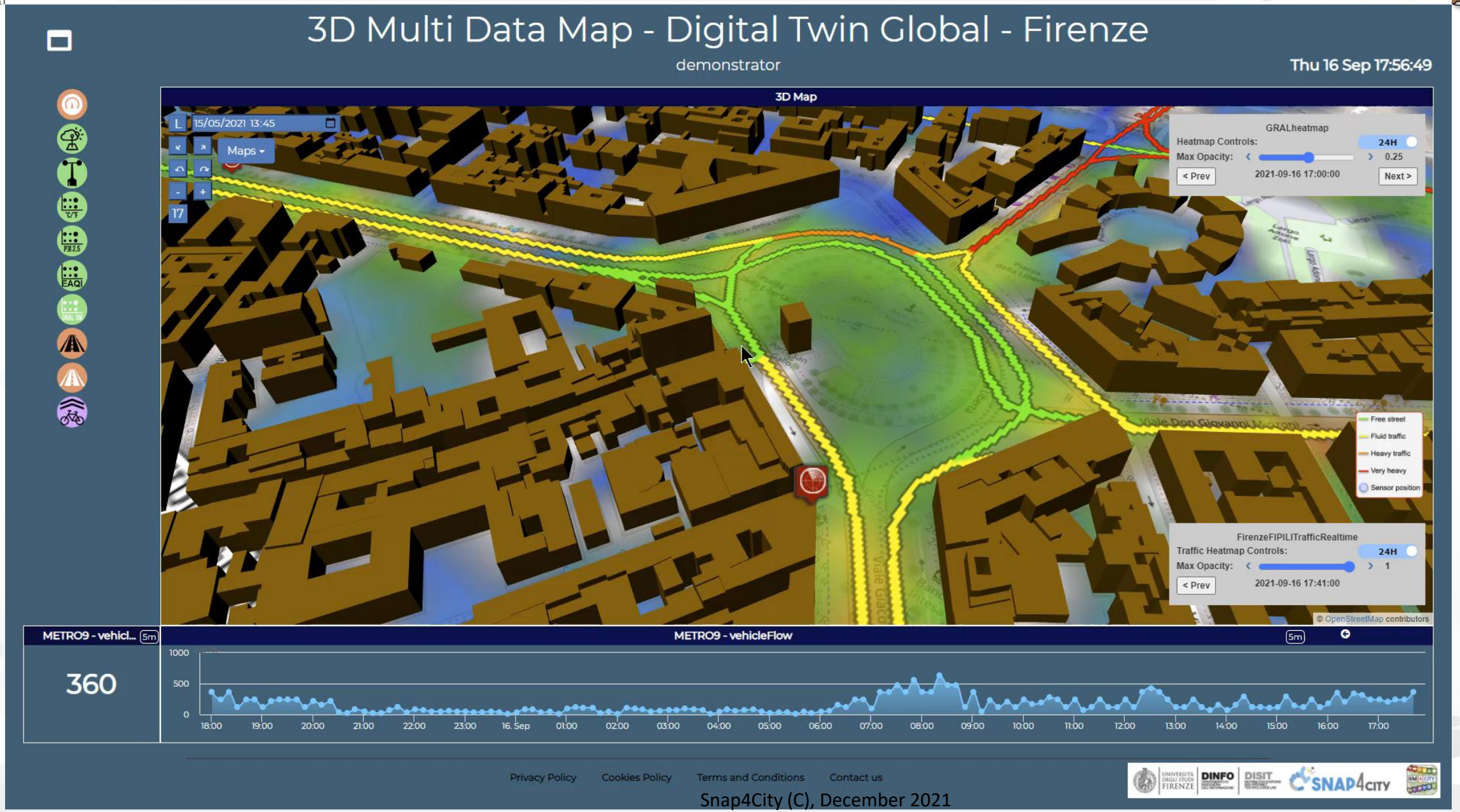
Unique Dashboard builder Multiple Styles



https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjM1MA==

3D views

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjUxMA==


3D Multi Data Map - Digital Twin Global - Firenze
demonstrator
Thu 16 Sep 17:56:49
3D Map
15/05/2021 13:45
Maps
GRALheatmap
Heatmap Controls:
24H
Max Opacity:
0.25
< Prev
2021-09-16 17:00:00
Next >
Free street
Fluid traffic
Heavy traffic
Very heavy
Sensor position
FirenzeFIPILITrafficRealtime
Traffic Heatmap Controls:
24H
Max Opacity:
1
< Prev
2021-09-16 17:41:00
© OpenStreetMap contributors
METRO9 - vehicl... 5m
360
METRO9 - vehicleFlow
5m
1000
500
0
18:00
19:00
20:00
21:00
22:00
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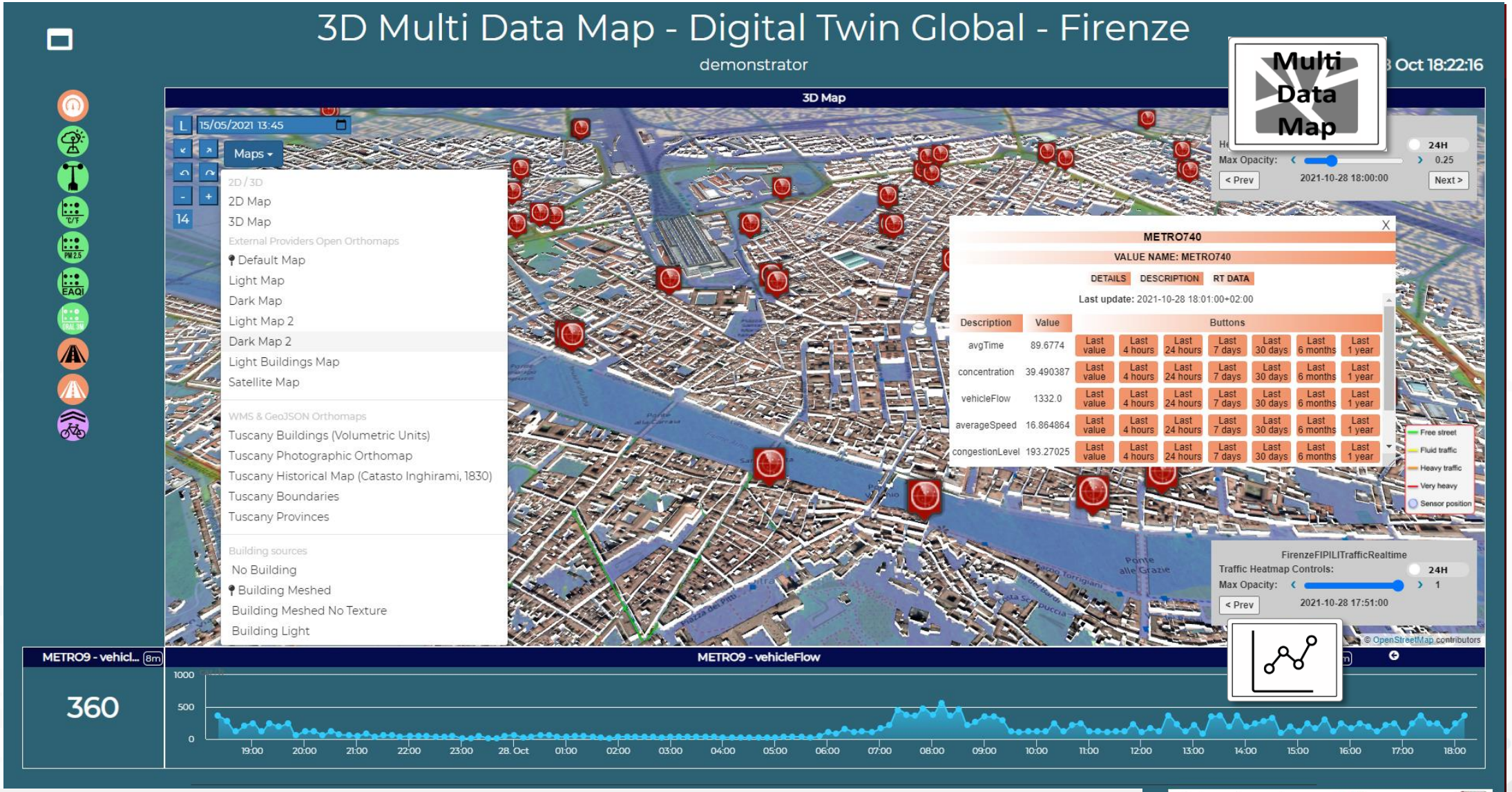
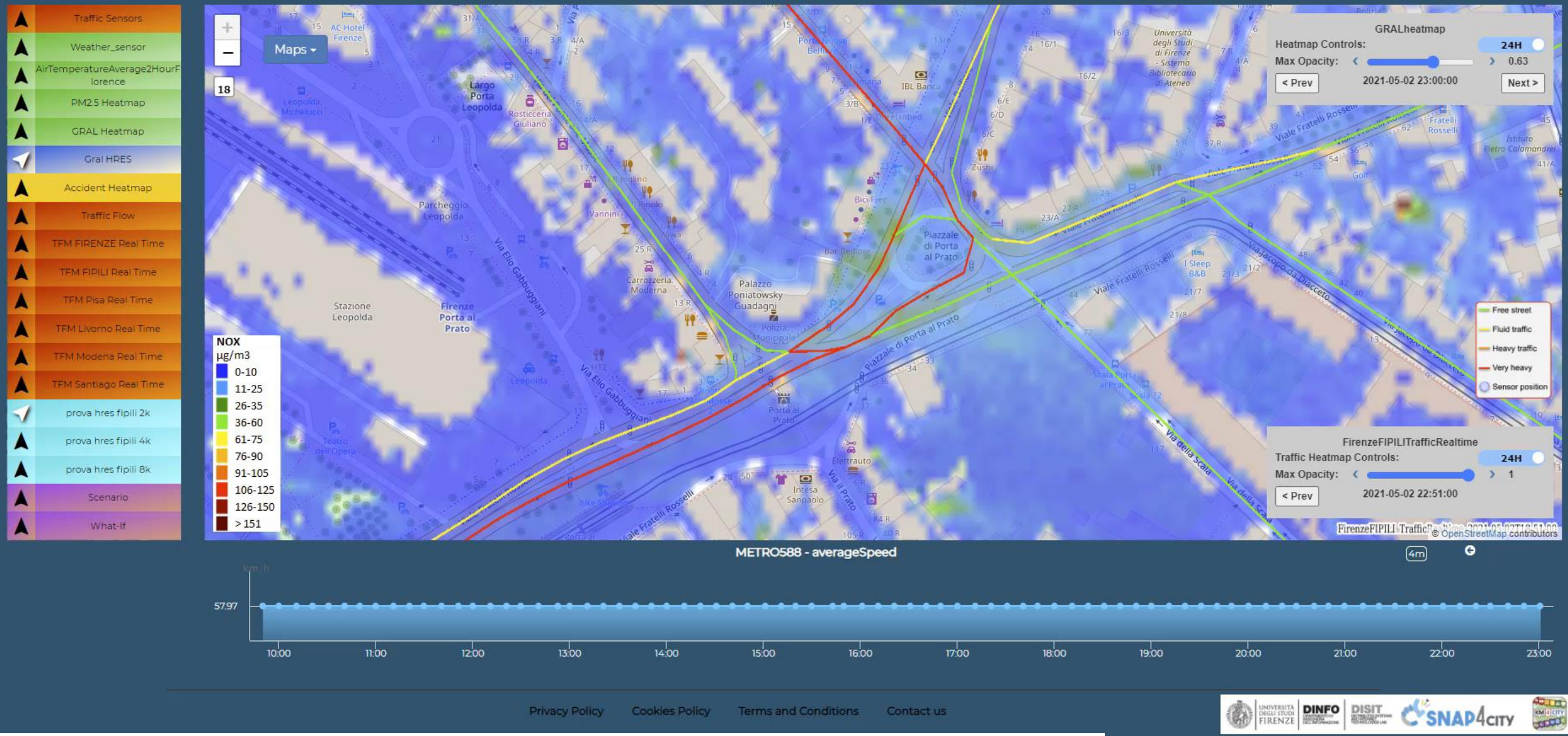
3D views



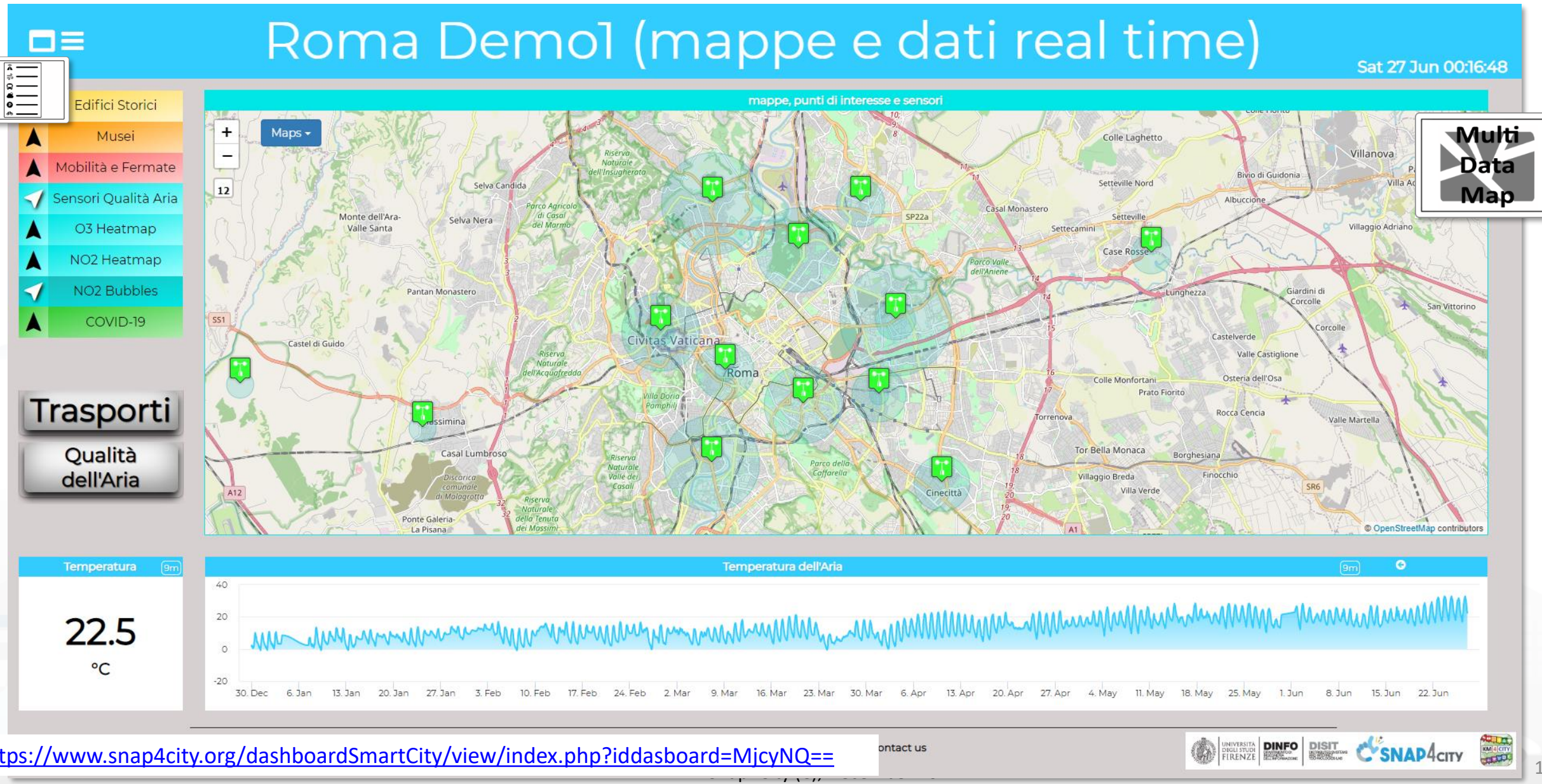
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjUxMA==

Traffic Flow Manager on multiple cities



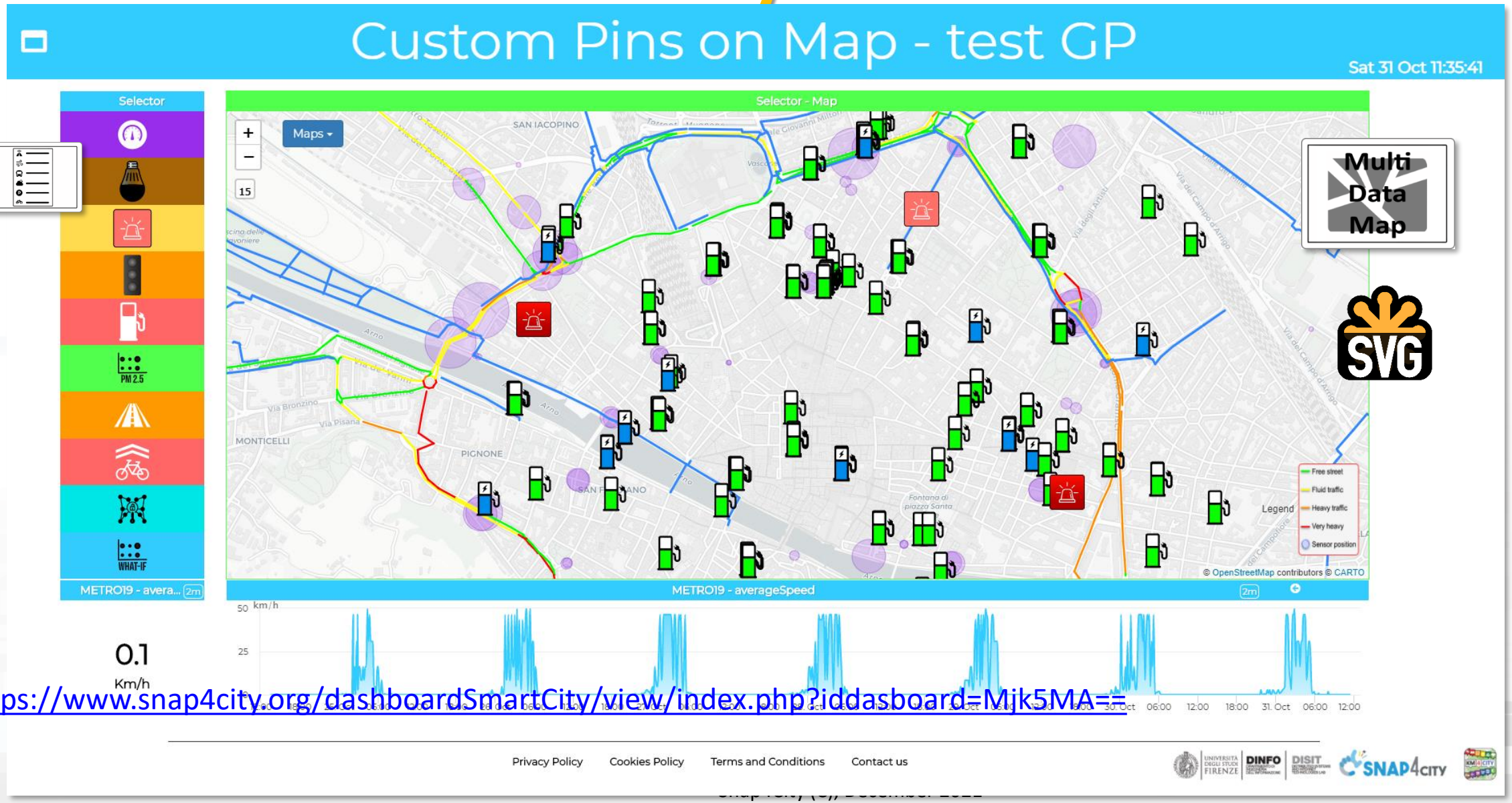
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzEyNg==

Weighted Bubbles



https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjcyNQ==

Custom Dynamic Pins



https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=Mjk5MA==

TOP

Dashboards with Business Logic/Intelligence

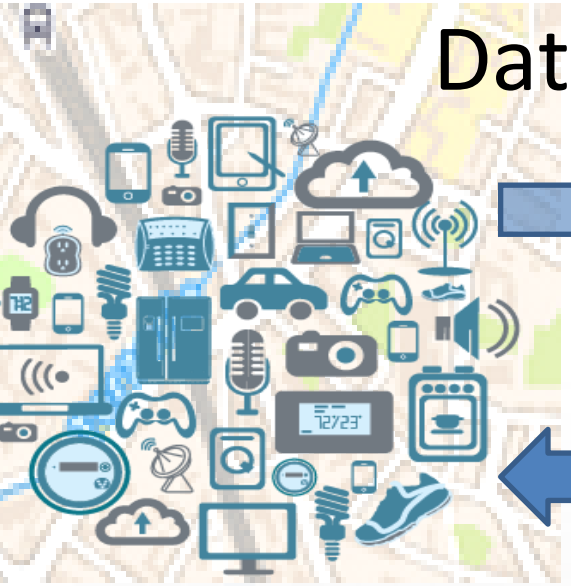
Business Logic/Visual Analytics

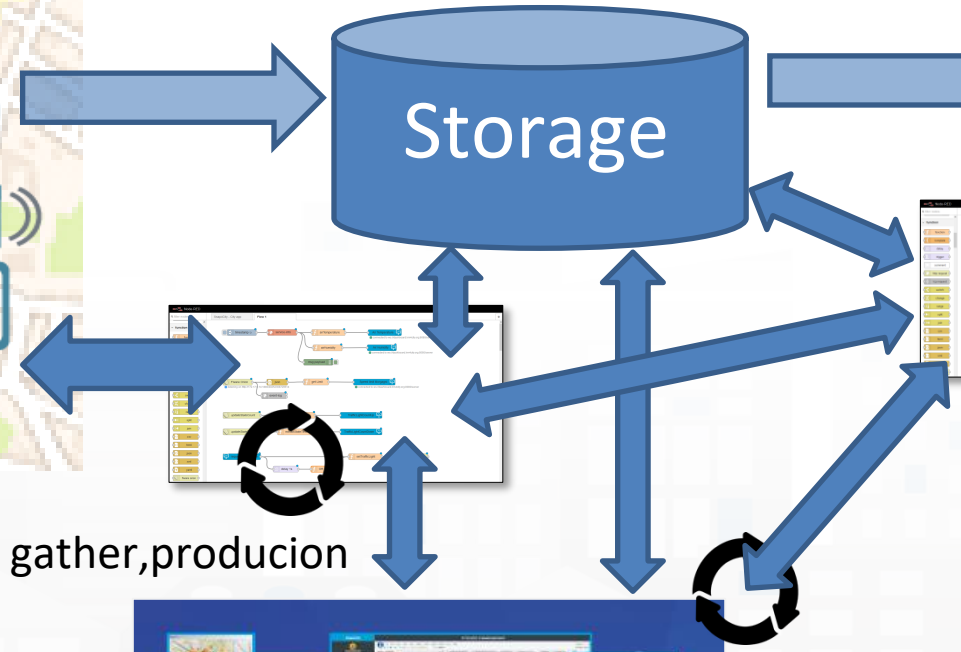
1. increasing cognitive resources, using a visual resource to ***expand human working memory***,
2. reducing search, r**epresenting a large amount of data in a small space**,
3. enhancing the recognition of patterns, **organize in space and time by relationships**,
4. make **easy perceptual inference of relationships** that are otherwise more difficult to induce,
5. perceptual **monitoring large number of potential events**, and
6. Way to **real time manipulation to explore data space in time and relationships.**

Visual Analytics: Business Logic/intelligence

Dashboards and Apps

Data and relationships



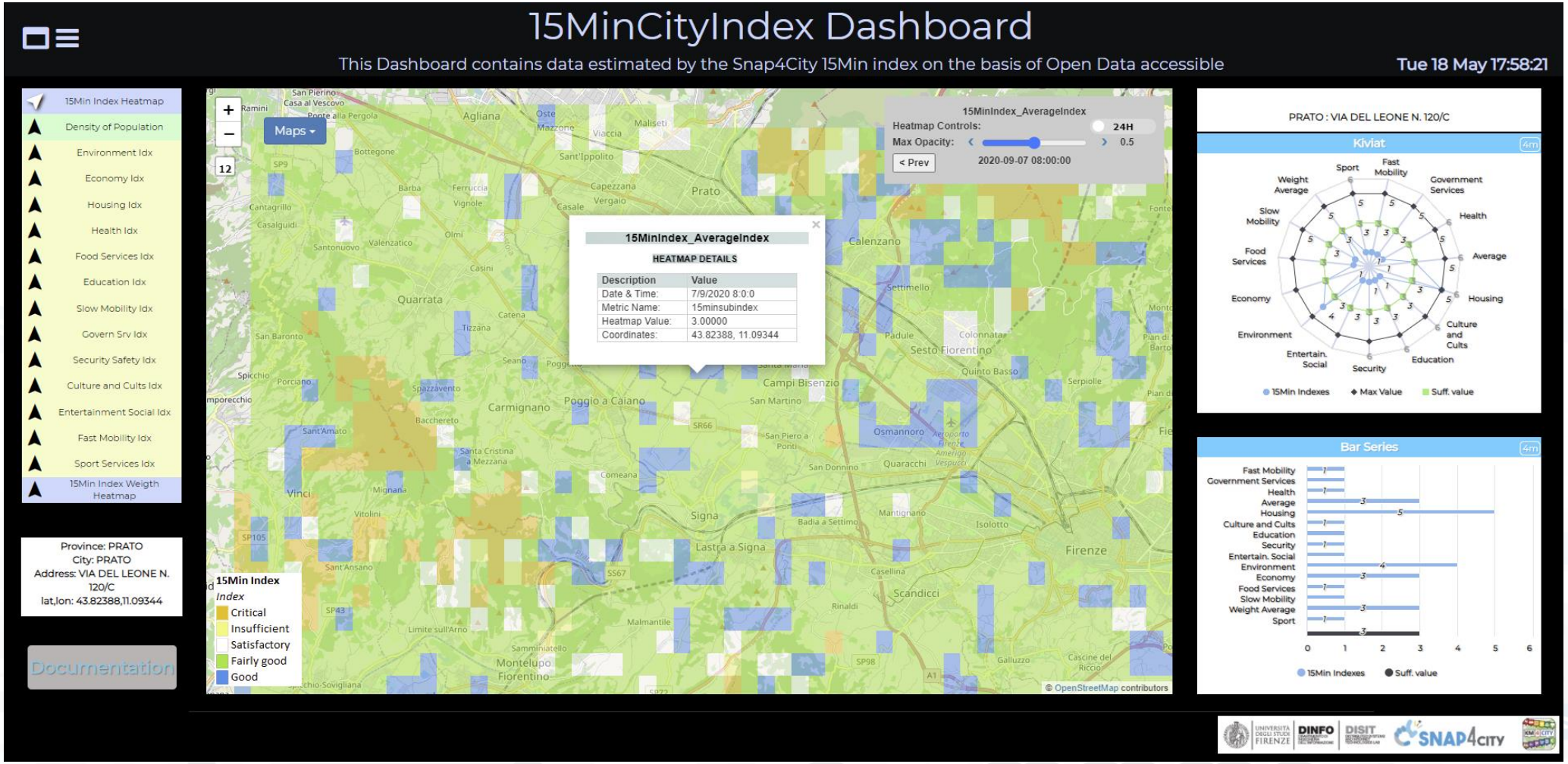


Business
LOGIC

Data gather,producion

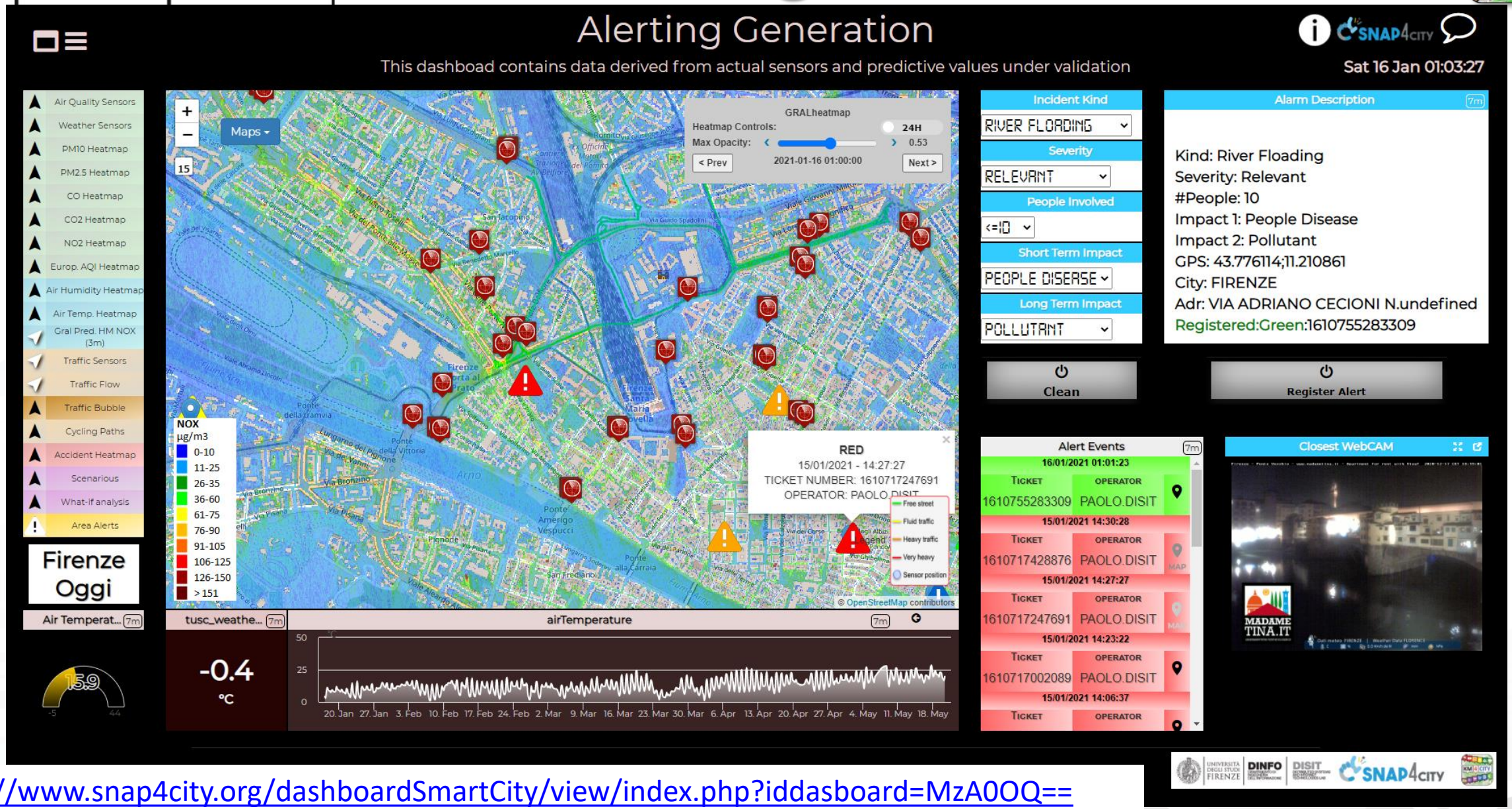
Big Data Analytics,
Artificial Intelligence

15MinCityIndex Firenze



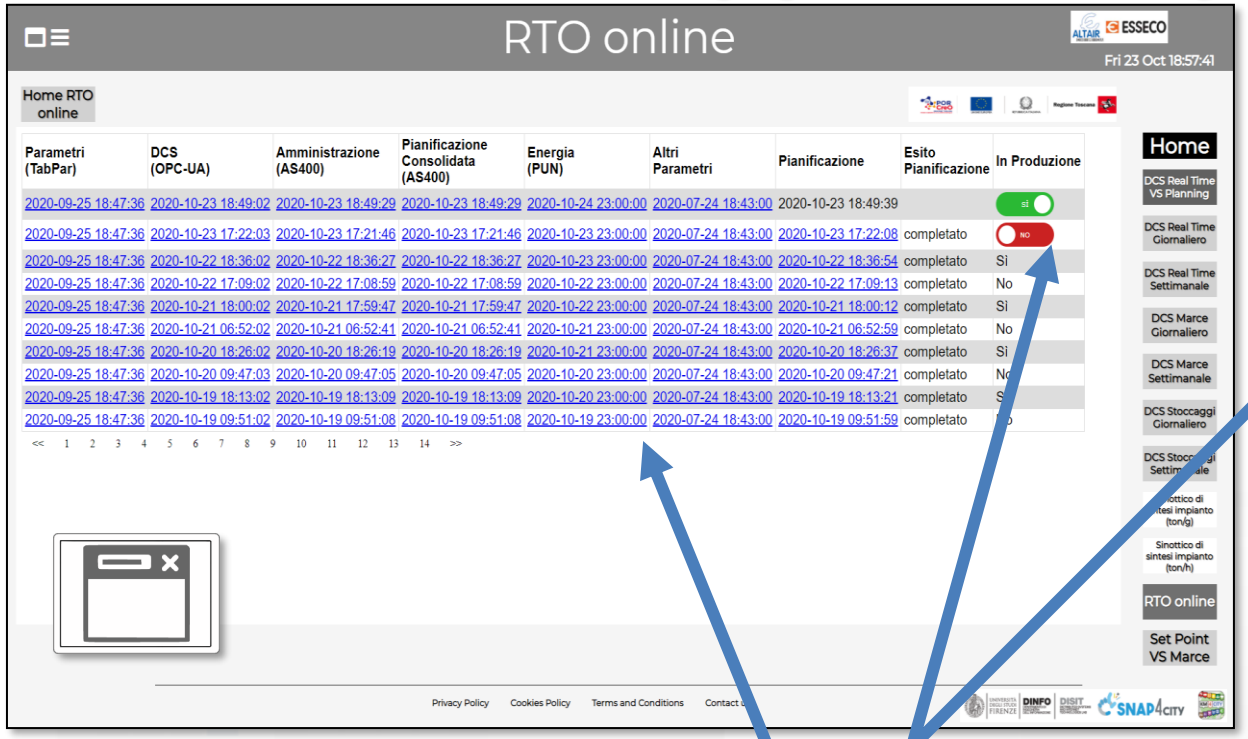
- https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjkzOA==

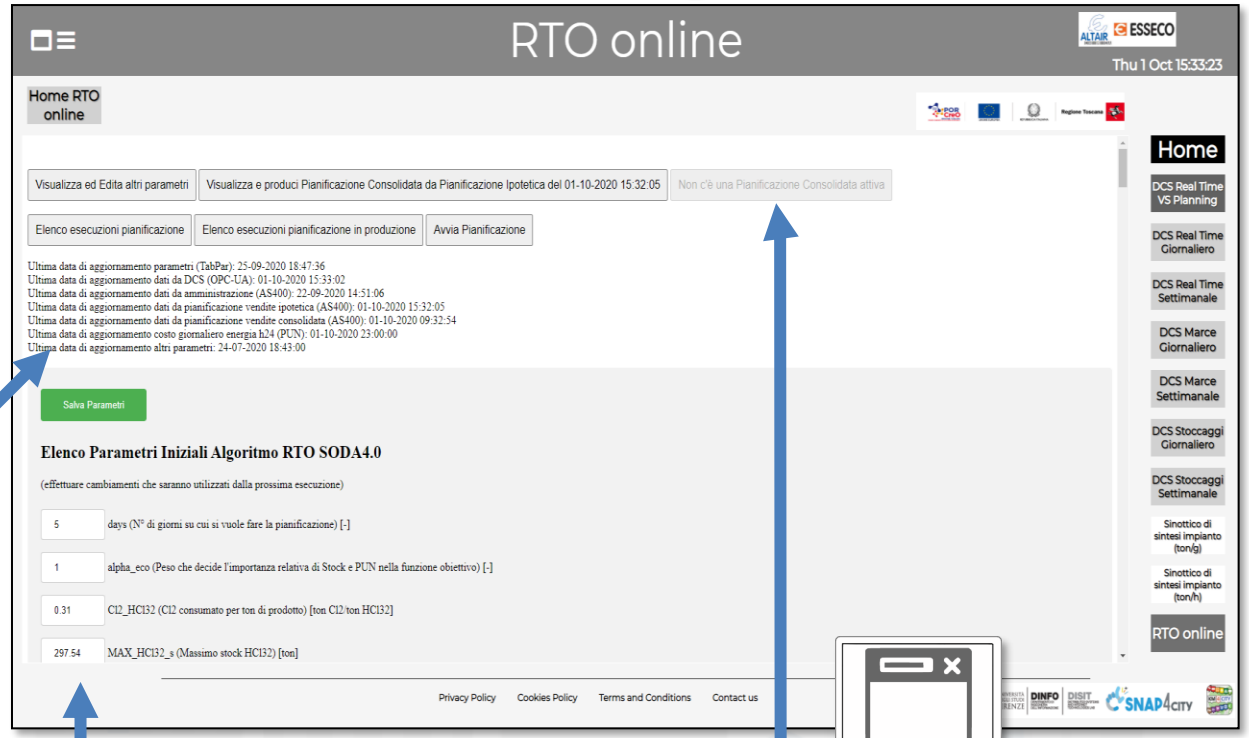
Alert Registration



https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzA0OQ==

IOT App with Dynamic Web Pages





- **HTML pages** can
  - be dynamically generated from the IOT App
  - provide forms to produce data to the IOT App, also including interactive elements
  - collect file from users, and produce files to web and to the system
  - have CSS and AJAX controls

Snap4Home 5G Demo

Thu 11 Jun 18:07:32

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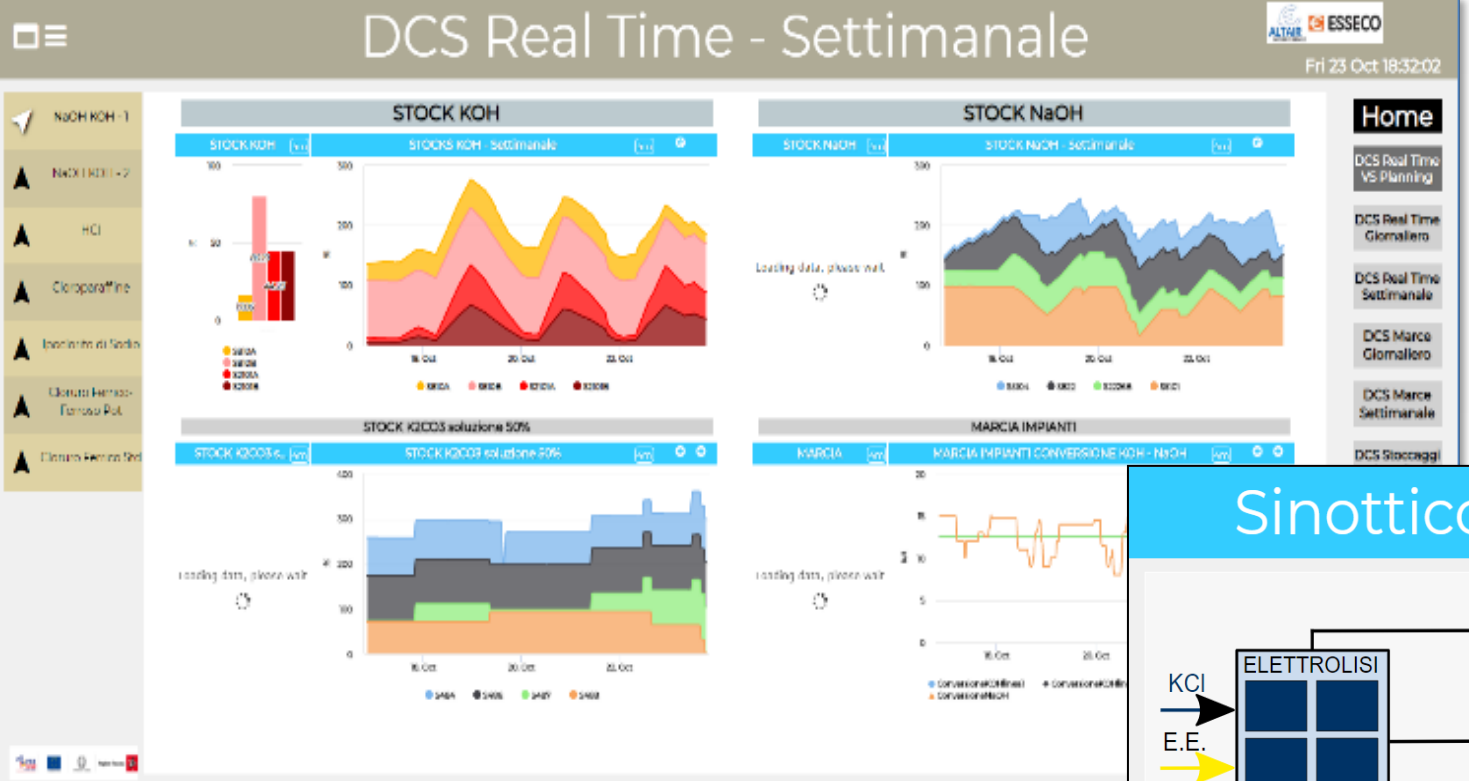
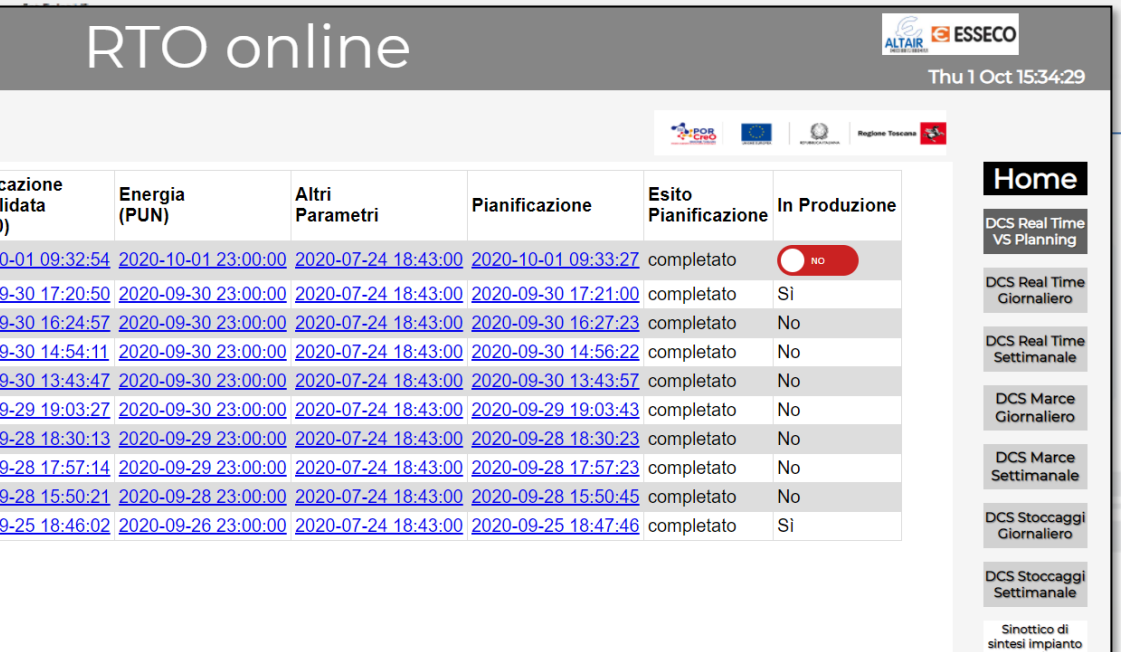
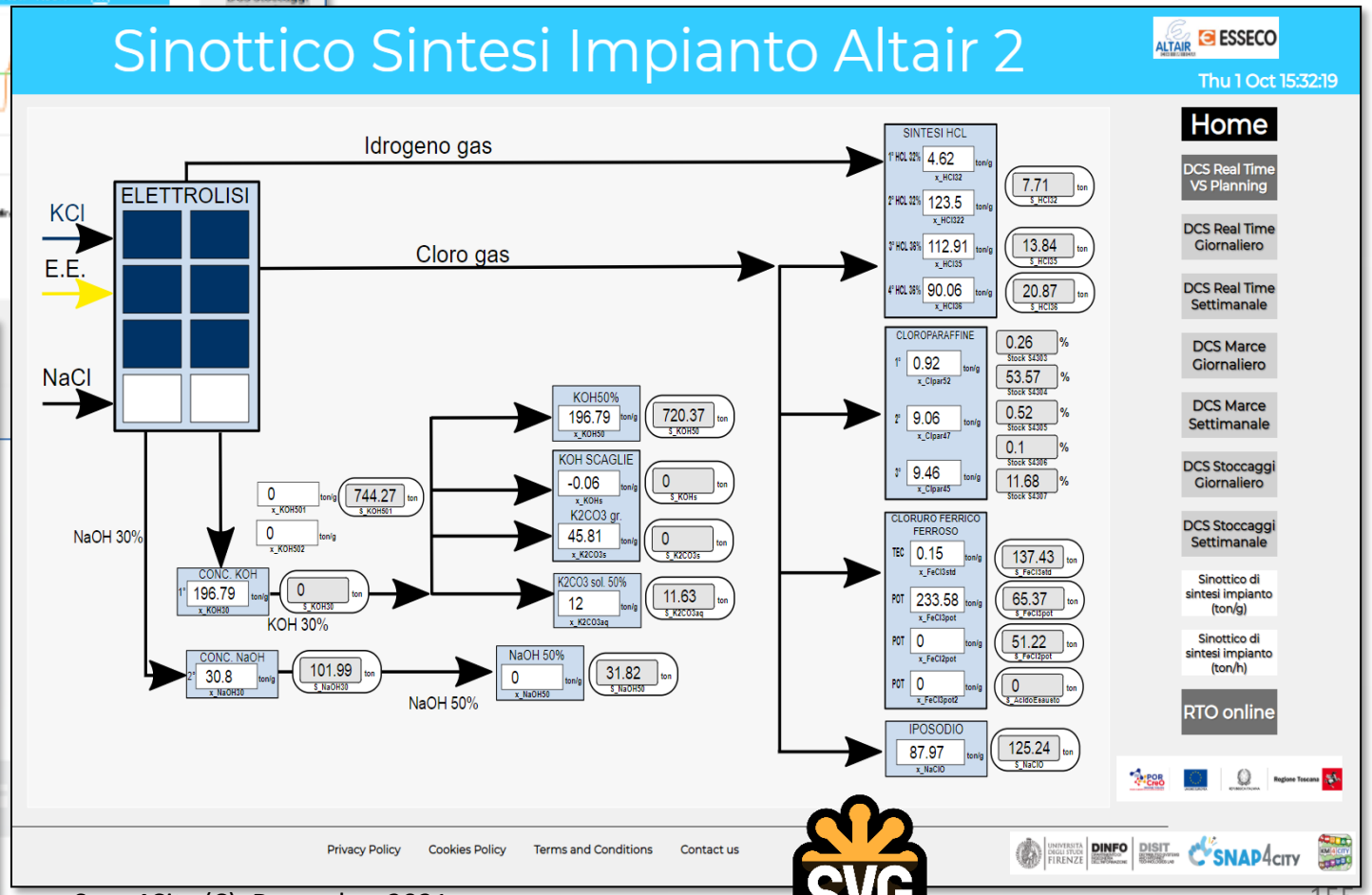
open fiber WIND 3 ZTE estra





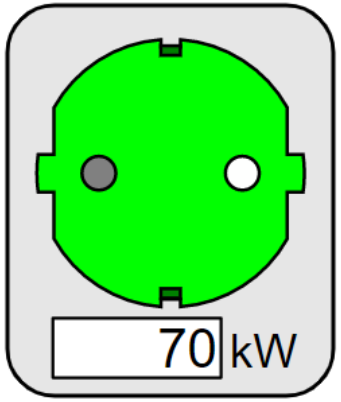
cazione lidata)	Energia (PUN)	Altri Parametri	Pianificazione	Esito Pianificazione	In Produzione
0-01 09:32:54	2020-10-01 23:00:00	2020-07-24 18:43:00	2020-10-01 09:33:27	completato	NO
9-30 17:20:50	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 17:21:00	completato	Sì
9-30 16:24:57	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 16:27:23	completato	No
9-30 14:54:11	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 14:56:22	completato	No
9-30 13:43:47	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 13:43:57	completato	No
9-29 19:03:27	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-29 19:03:43	completato	No
9-28 18:30:13	2020-09-29 23:00:00	2020-07-24 18:43:00	2020-09-28 18:30:23	completato	No
9-28 17:57:14	2020-09-29 23:00:00	2020-07-24 18:43:00	2020-09-28 17:57:23	completato	No
9-28 15:50:21	2020-09-28 23:00:00	2020-07-24 18:43:00	2020-09-28 15:50:45	completato	No
9-25 18:46:02	2020-09-26 23:00:00	2020-07-24 18:43:00	2020-09-25 18:47:46	completato	Sì



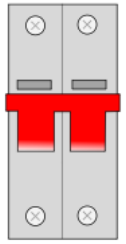
SVG Custom Widgets Examples 2

Tue 17 Nov 18:46:47

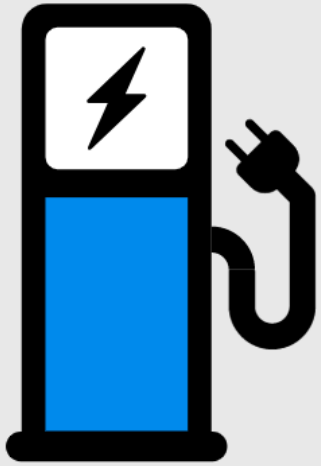
SVG shucko plug



Schuko switch



Charging Station Status



Legenda

Charging Station Status

Set on the keypad one of the following values

0 = ERROR (RED)

1 = AVAIBLE (GREEN)

2 = BOOKED (YELLOW)

3 = CHARGING

9999 = white icon

Charging Station status

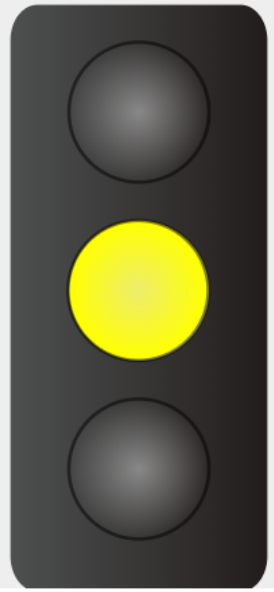
New | Last confirmed: None

7	8	9
4	5	6
1	2	3
0	.	Canc
Confirm		

Underpass

Set tunnel st...

Traffic Light



Traffic Light status set

YELLOW LIGHT

Speed Limit Set

New | Last confirmed: None

7	8	9
4	5	6
1	2	3
0	.	Canc
Confirm		

Dynamic Speed Limit Sign

Speed Limit Explaination

Speed Limit Custom Widget example

Write the speed limit by using the keypad and click CONFIRM.

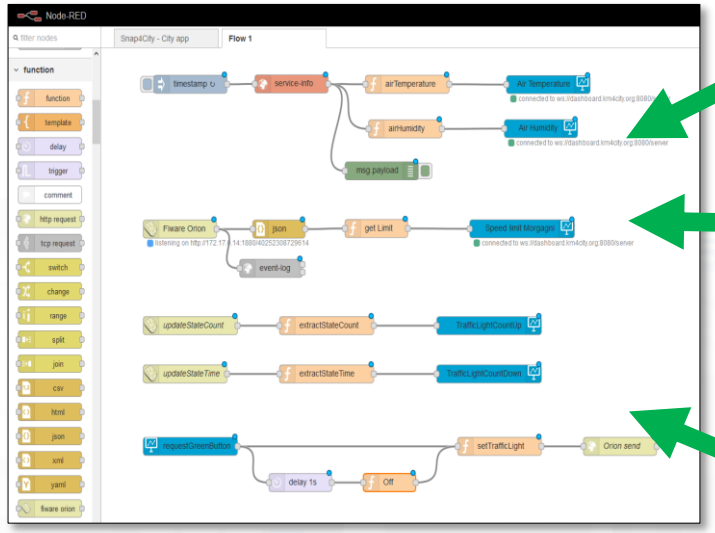
9999 = white sign.

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=Mjk4Ng==

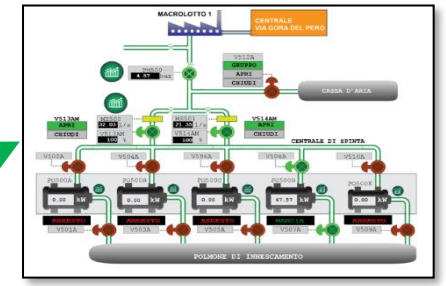
UI Business Logic

Advanced IOT Applications

- **Synoptics can ……**
  - **do all ☺**
- **Widgets can**
  - send/receive dynamic data,
  - change data sources, etc.
  - Provide interactive maps
- **HTML pages** can
  - be dynamically generated
  - provide forms to produce data for IOT Applications
  - Collect files on web and system
  - produce files on web ad system
  - have CSS and AJAX control

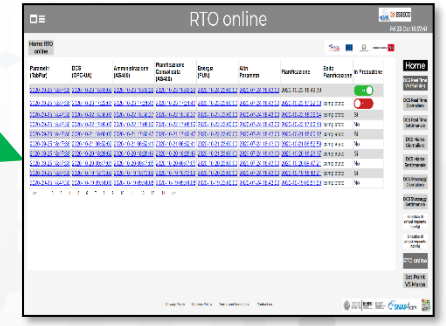


Synoptics
Custom
Widgets



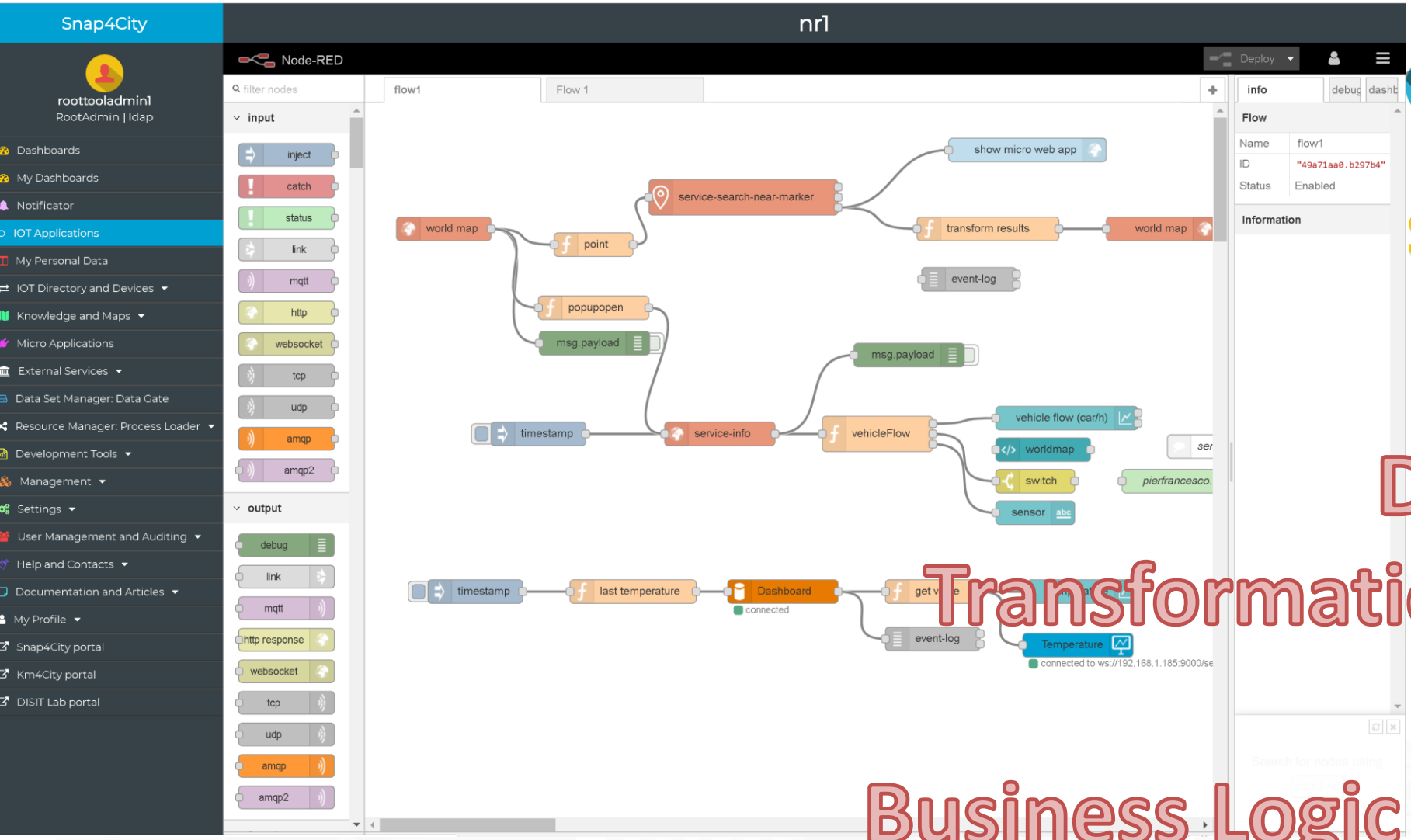
Widgets
Maps
Buttons
Keypads
Controls
..

HTML pages
HTML Forms
Tables
..



https://www.snap4city.org/394

https://www.snap4city.org/596



Data Adapation
Transformation, Conversion
Integration
Business Logic vs Dashboards
Data Analytics control
Everywhere: Cloud, on IoT Edge Devices

IOT Applications

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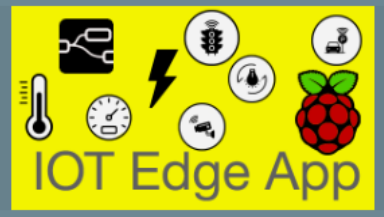

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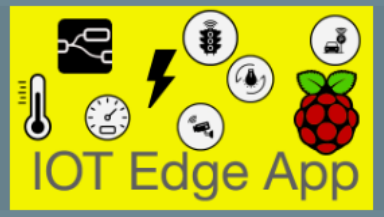
Management

2018-09-21T03:19


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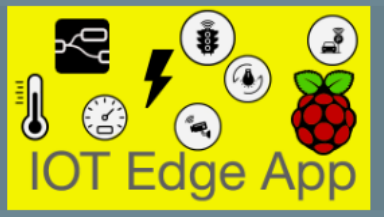
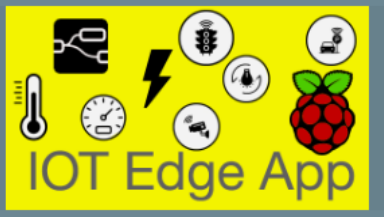
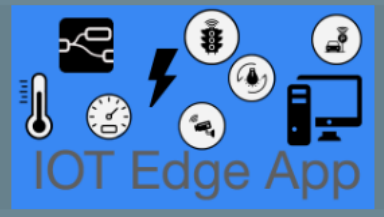
Management

2018-10-19T16:07


owner: pb3
Management

2018-10-19T17:17


owner: pb3
Management

2018-10-22T11:57


owner: semolarudy
Management

application

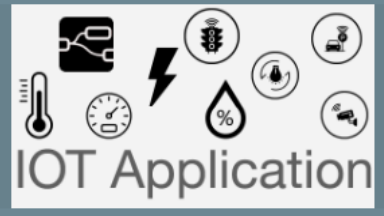

owner: tester5
Management

Bib APP


owner: semolarudy
Management

ChargingStations


owner: comunedashres
Management

Deprecated - SiiMobilityControlRoom


owner: badii
Management

SamsungGalaxyS4BarCode


owner: badii
Management

esercitazione


owner: tester2
Management

Iot-App


owner: tester14
Management

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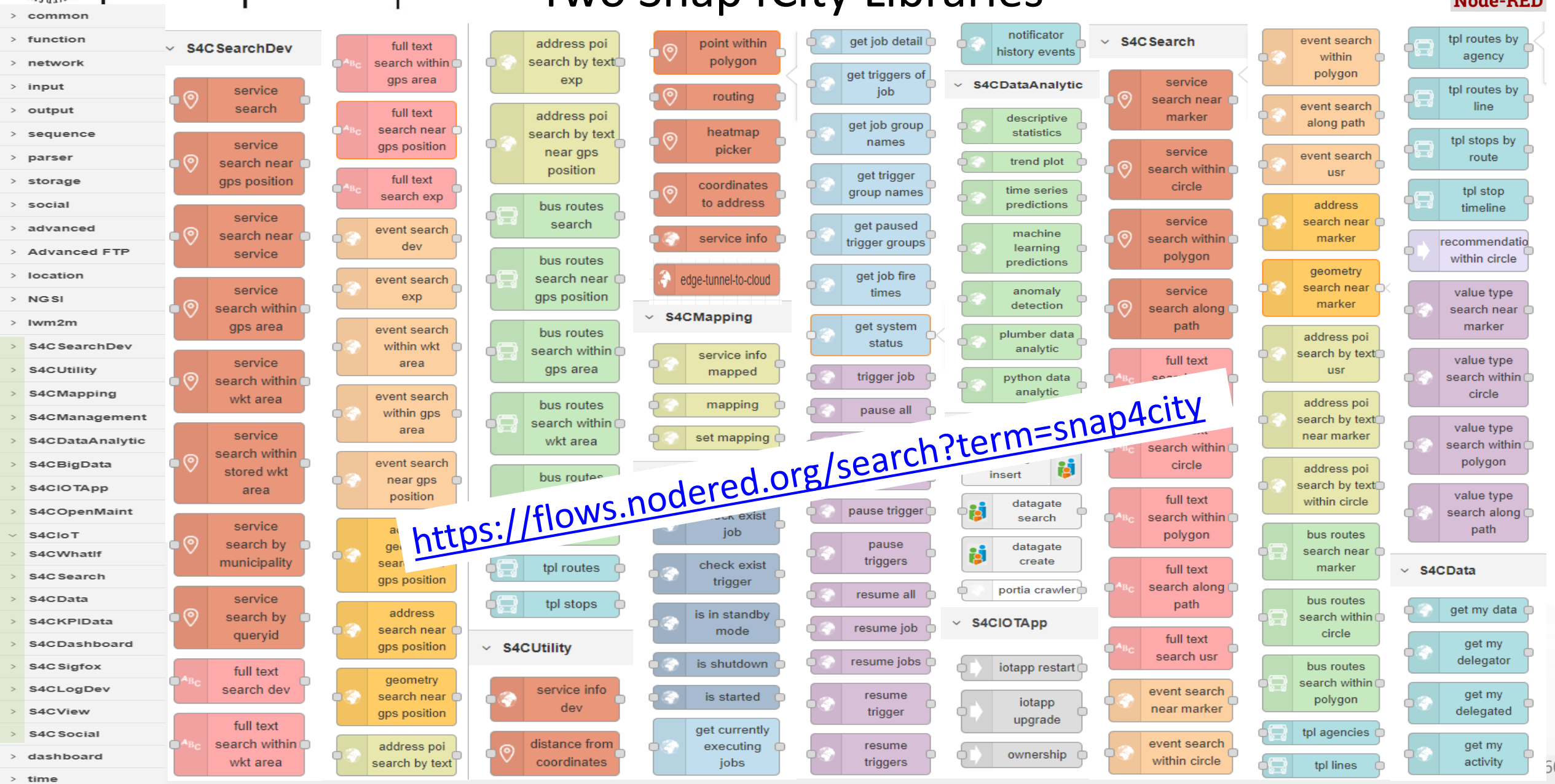
April 2021 collection

Two Snap4City Libraries

SNAP4CITY | Node-RED

https://flows.nodered.org/search?term=snap4city



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April 2021 collection

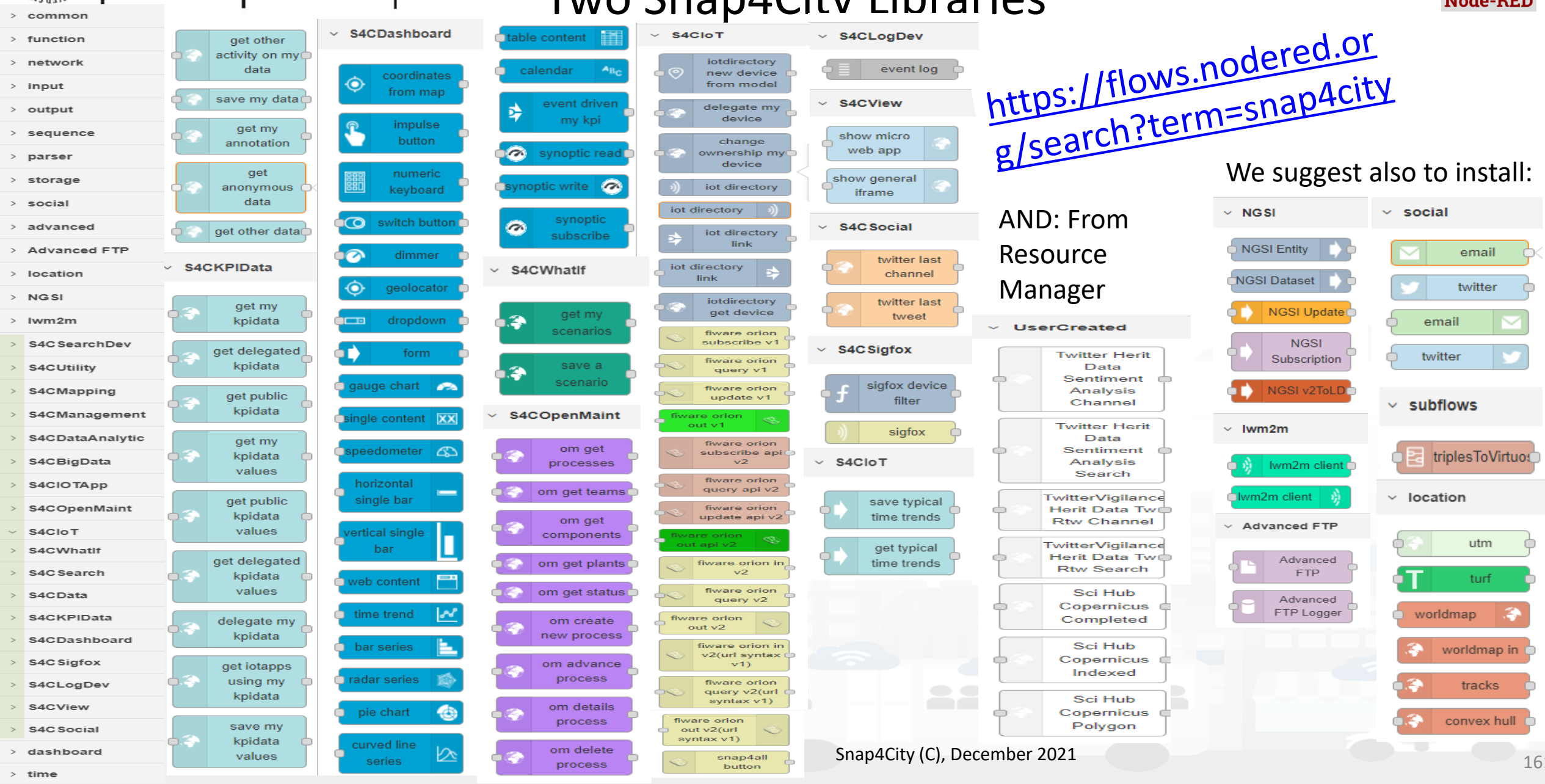
Two Snap4Citv Libraries

SNAP4CITY | Node-RED

https://flows.nodered.org/search?term=snap4city

We suggest also to install:

AND: From Resource Manager



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Nov. 2020 collection
Two Snap4City Libraries

SNAP4CITY | Node-RED

-Search and management of Services, POI, Parking, Public Transport, etc.

-Event management, ticket management

-Routing, Data Analytic, Open Data processing

-IoT device registration, Virtual Devices full control

-IOT adaptation, network management

-Dashboard management

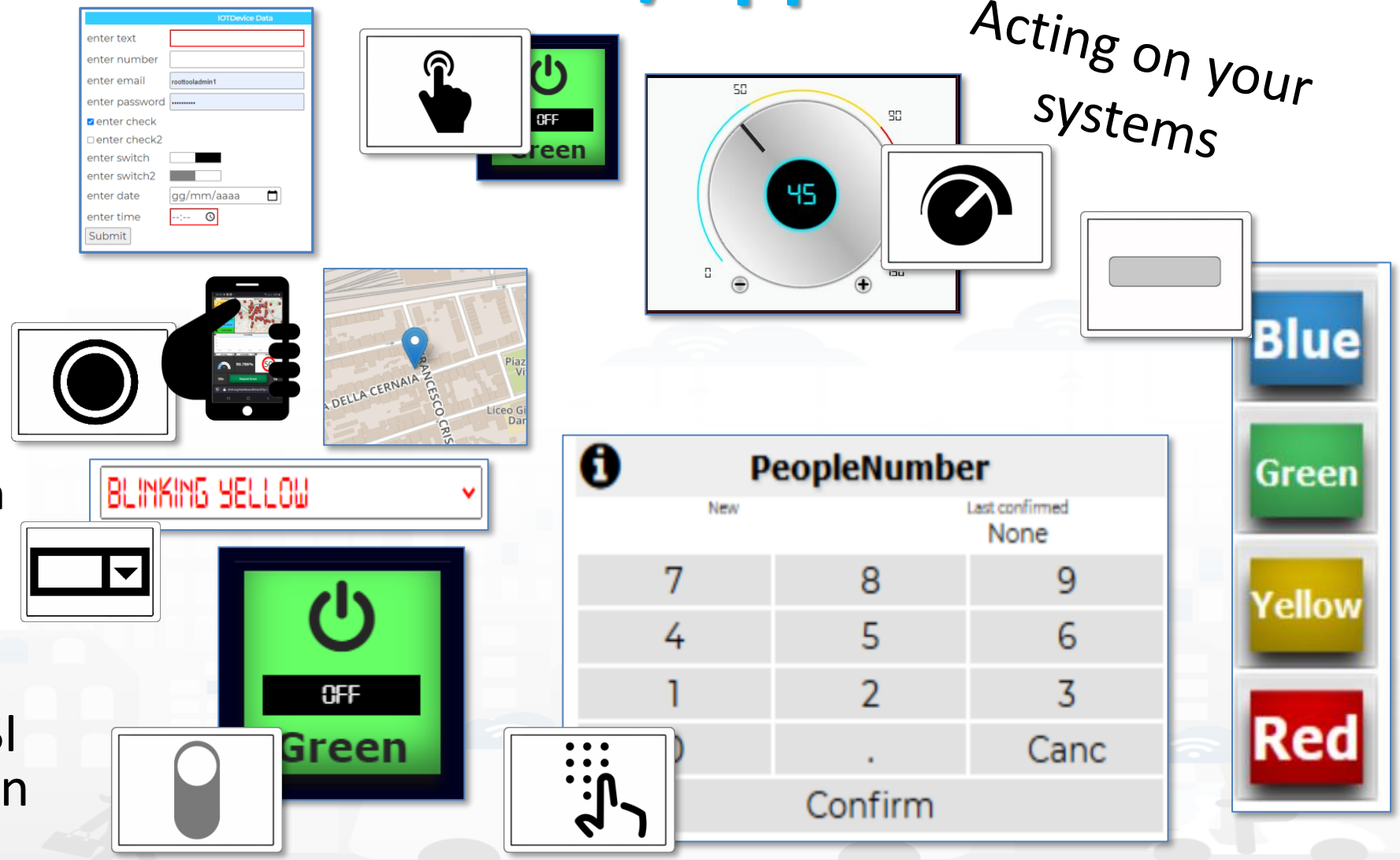
-Personal data management, KPI, etc.

.....

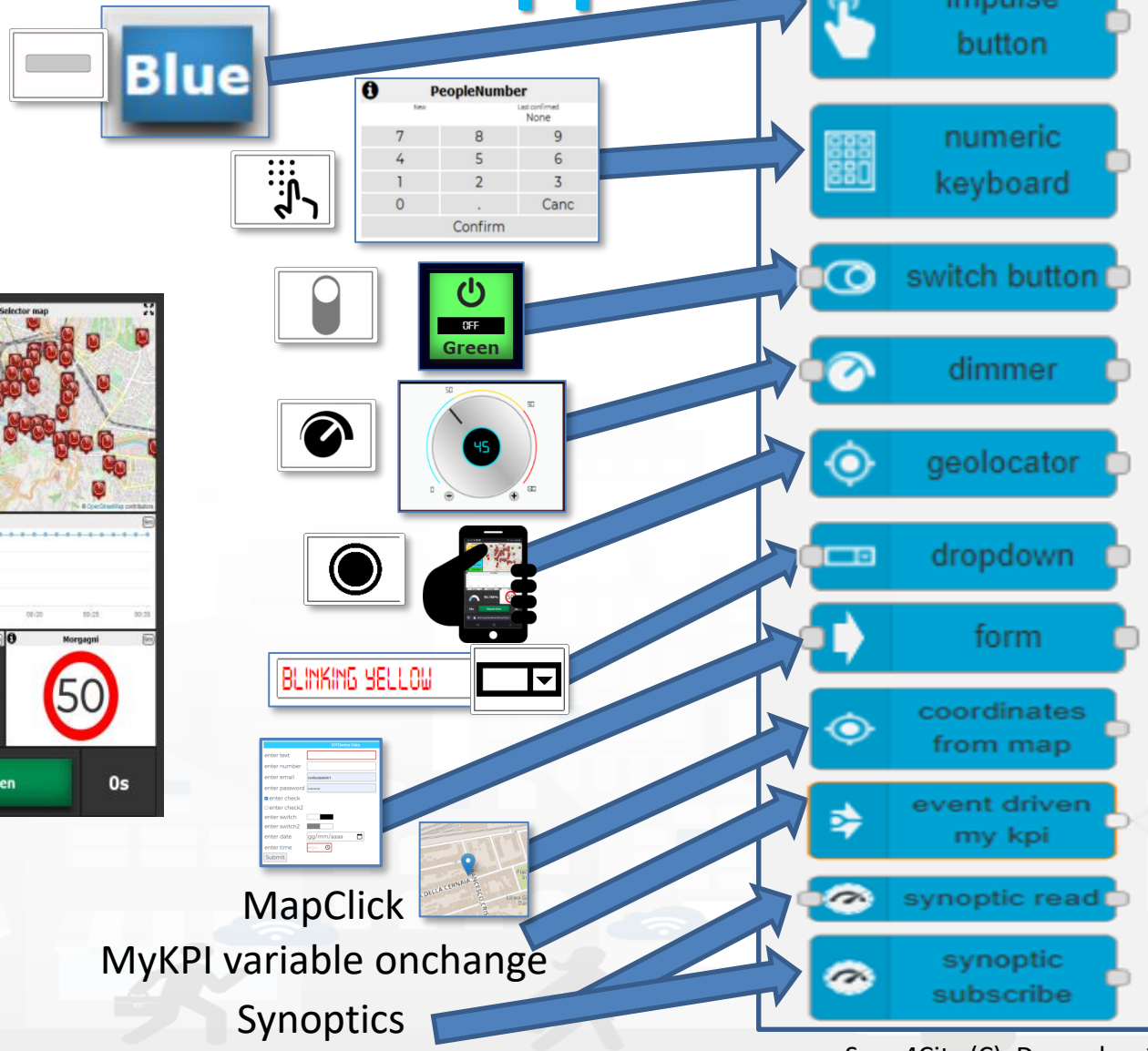
Widgets Interacting with IOT Apps virtual Sensors and Actuators

From Dashboard to IOT Devices/App

- **Widgets:**
  - Impulse Button
  - Button
  - Switch
  - Dimer/Knowb
  - KeyPad
  - Geolocator
  - Selection/Dropdown
  - Form
  - Map Picking
- **Registered** on some IOT brokers with NGSI mutual authentication



Dashboard-IOT App

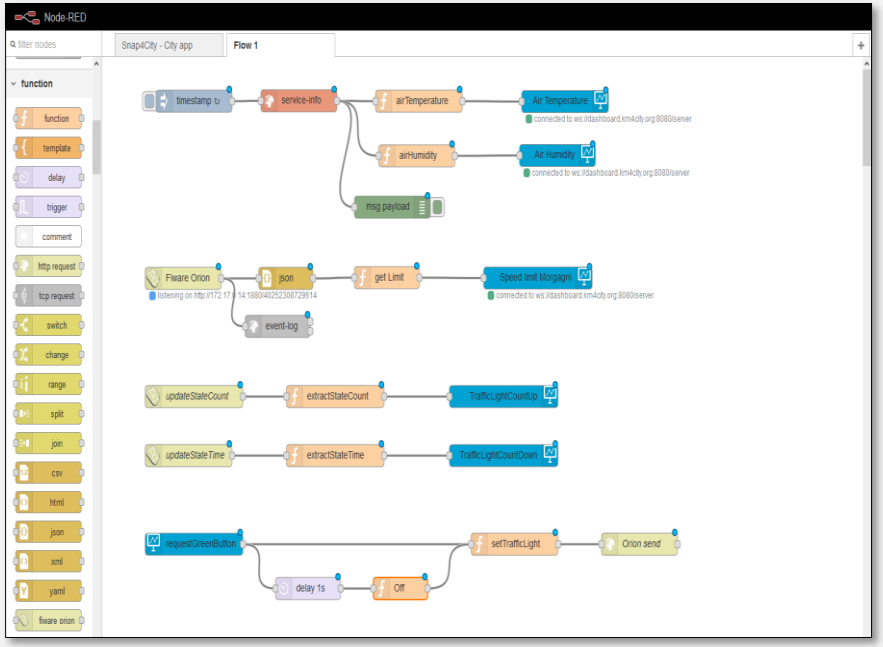


MapClick

MyKPI variable onchange

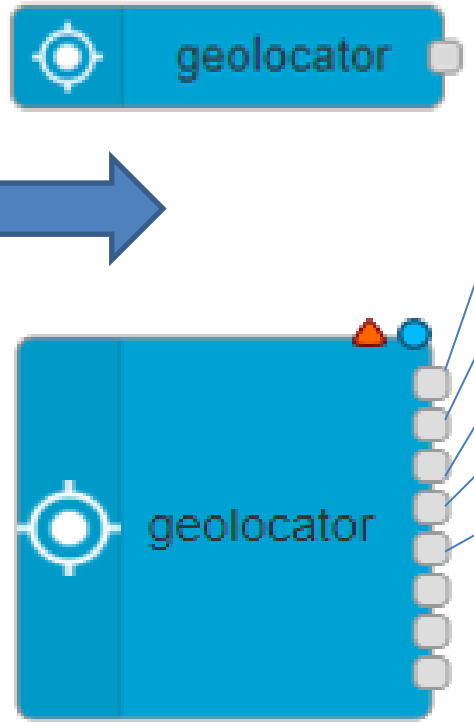
Synoptics

From Dashboard to IOT App



IOT Application

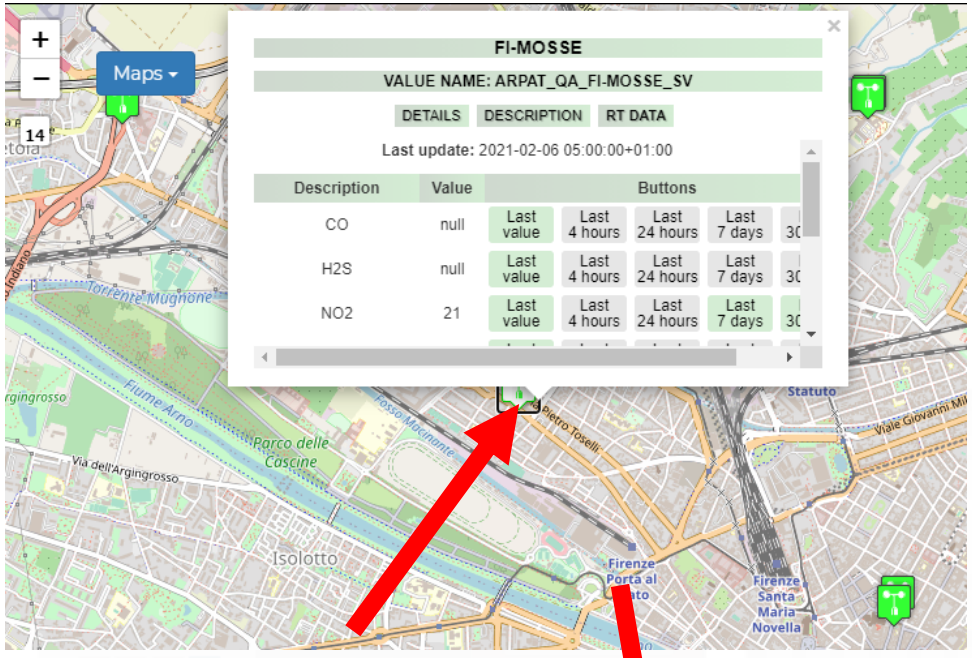
Geolocation of Mobile Device



- Complete message
  - Returns a JSON containing all information about geolocation
- Latitude
  - Returns the latitude
- Longitude
  - Returns the longitude
- Accuracy
  - Returns the accuracy of latitude and longitude
- Altitude
  - Returns the altitude
- Altitude Accuracy
  - Returns the altitude accuracy
- Heading
  - Returns the heading
- Speed
  - Returns the speed

Web Browser GPS data rendering the Snap4City Dashboard can be passed to IOT Applications and saved ☺

Multi Data Map ServiceURI selection vs IOT App



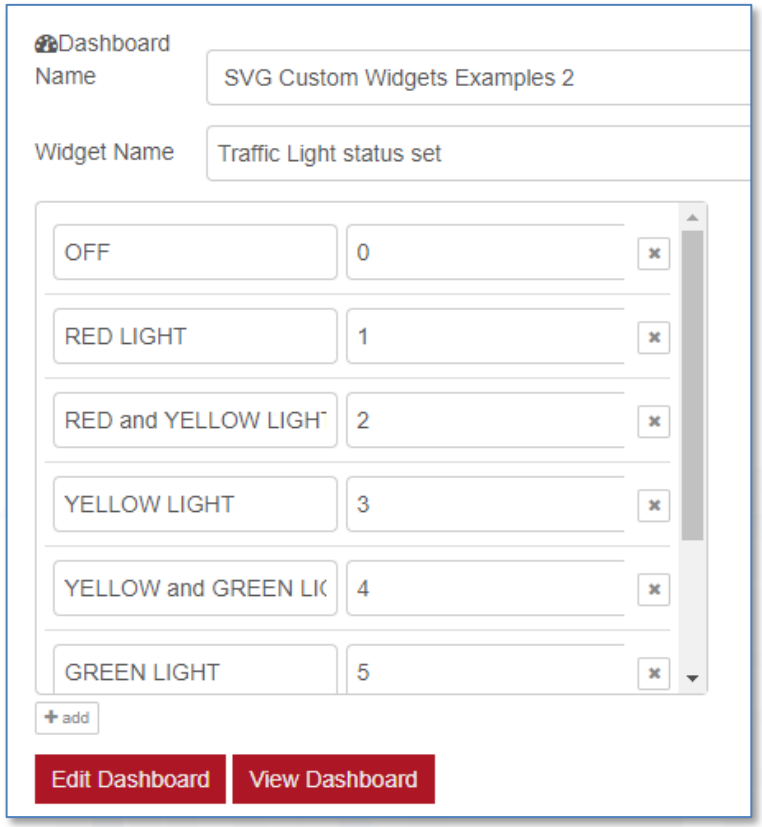
1) Click on PIN

coordinates-from-map

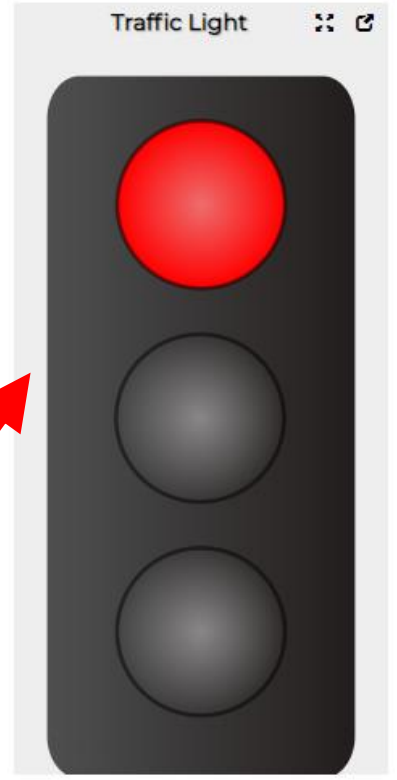
2) GET event with:
- Lat,Long
- **ServiceURI**

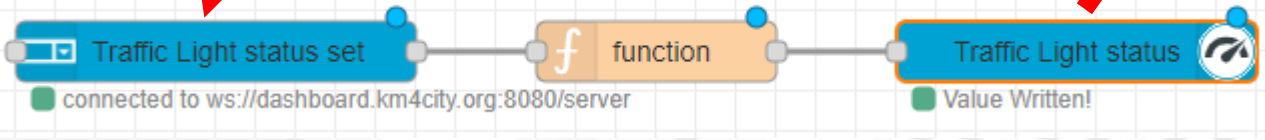
- 3) The click on the map passes GPS coordinates into IOT App and the ServiceURI. Thus you can use them to:
  - search for location
  - picking the value of one or more heatmaps
  - dynamically change data on widgets and dashboards
  - Get all the ServiceURI information and exploit them on Business Logic
  - Etc.

DropDown Selector



- Selecting MSG to be sent on the Business Logic IOT Application

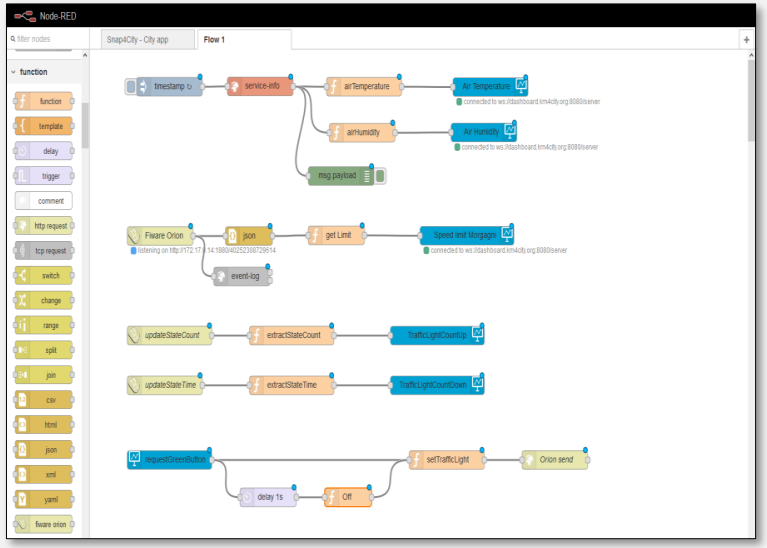





```
msg.payload = {value:JSON.parse(msg.payload).selected};
return msg;
```

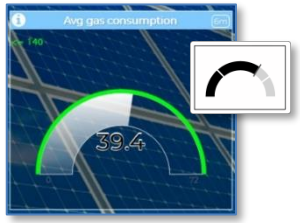
Dashboard-IOT App

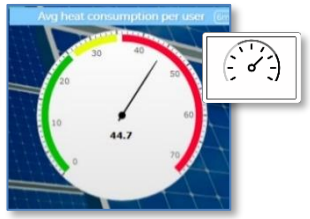
From IOT App to Dashboard

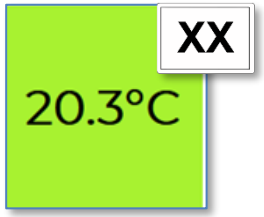


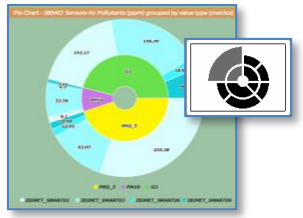
IOT Application

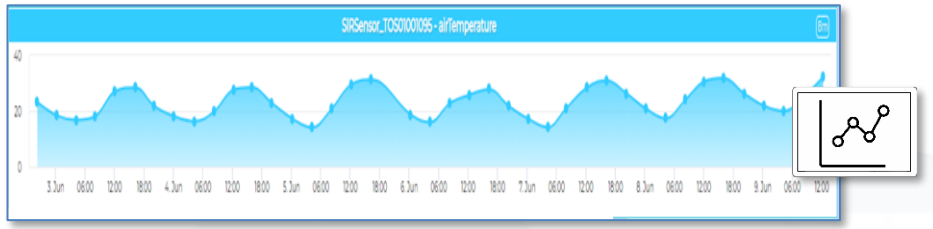
- gauge chart
- single content
- speedometer
- horizontal single bar
- vertical single bar
- web content
- time trend
- bar series
- radar series
- pie chart
- curved line series
- table content
- synoptic write
- calendar

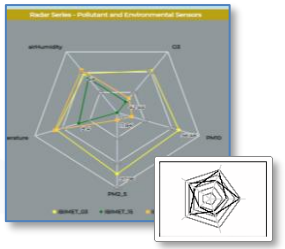


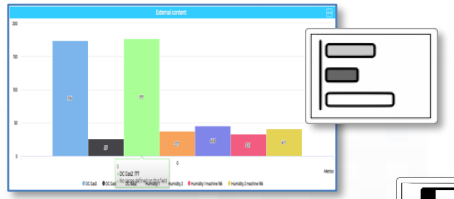


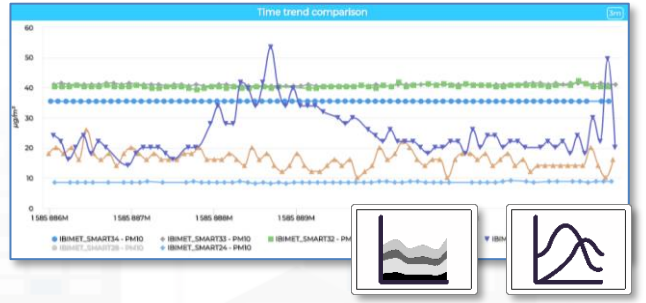


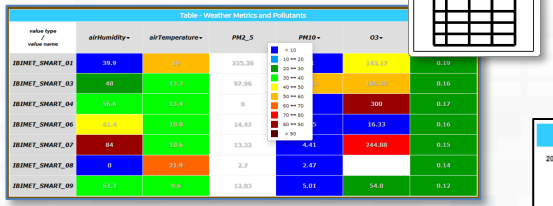


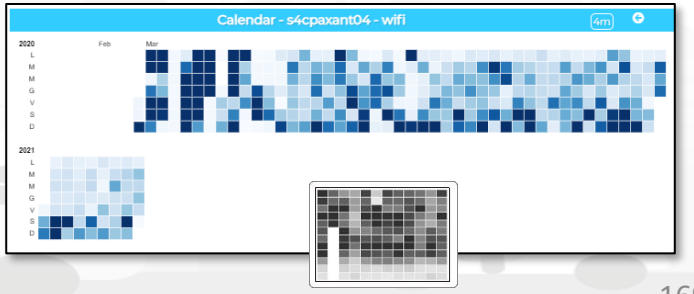








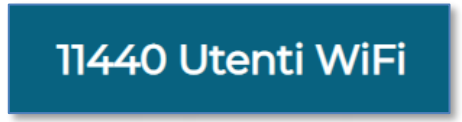




Single Content Widget (flexibility)

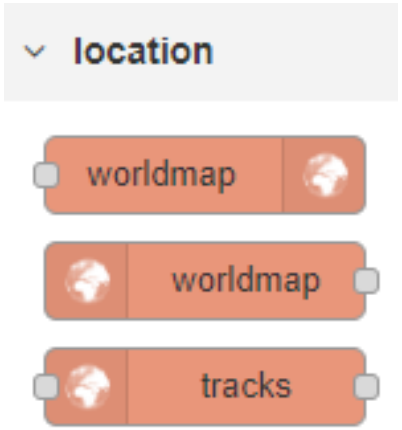
From Dashboard Editor and IOT Applications, accepts in input:

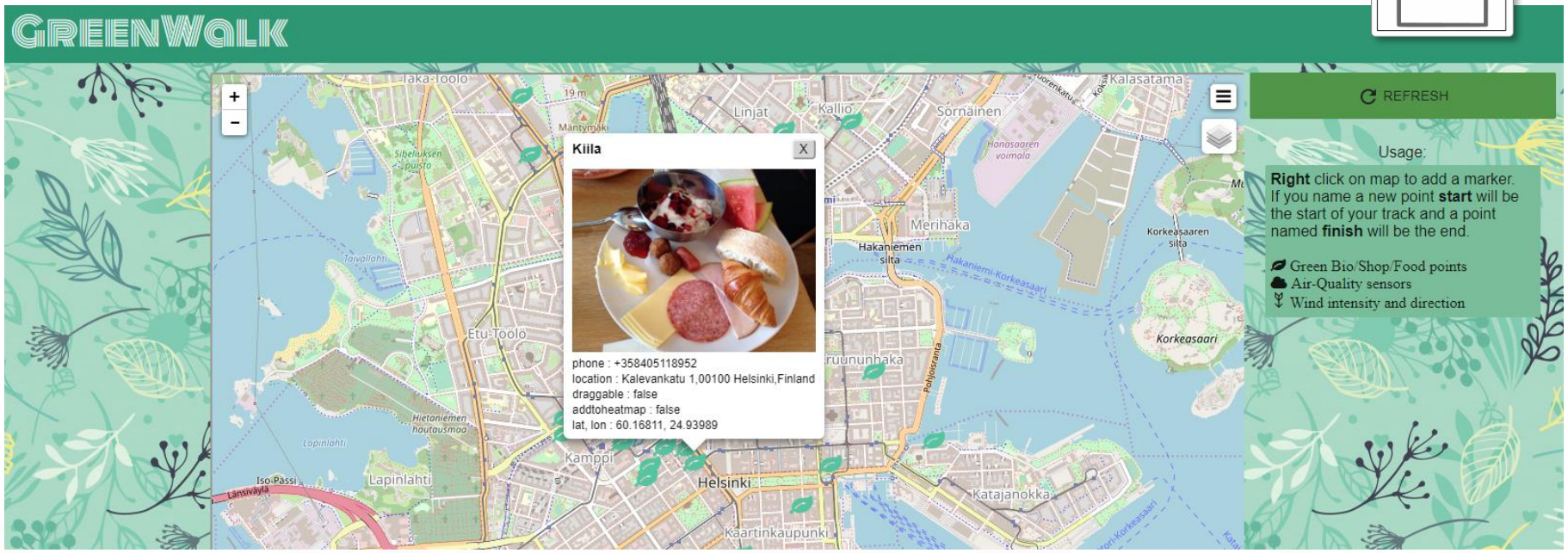
- Numbers
- String
- HTML code



https://www.snap4city.org/578

Controlling Maps from IOT Apps



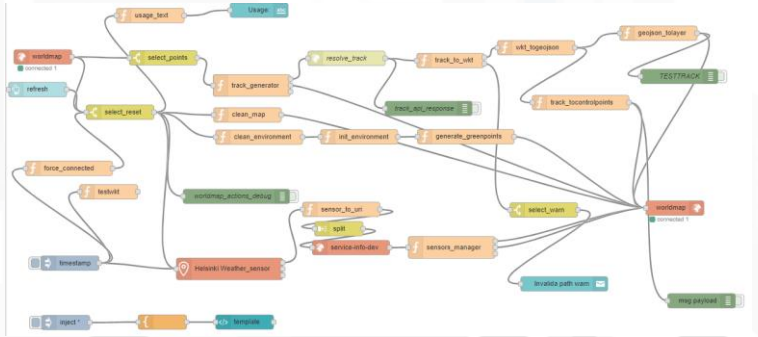


https://iot-app.snap4city.org/nodered/nrve0e3/ui/#!/0

- Show points on maps
- Get Points
- Tracks
- See examples on:

https://www.snap4city.org/409

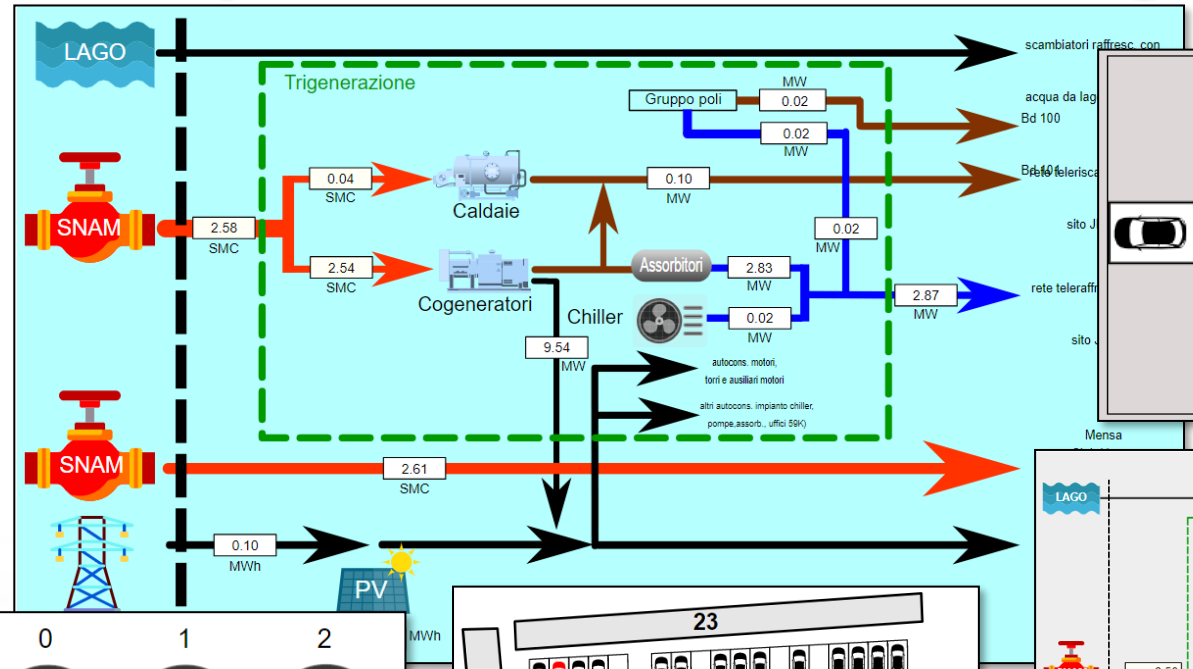
https://www.snap4city.org/417

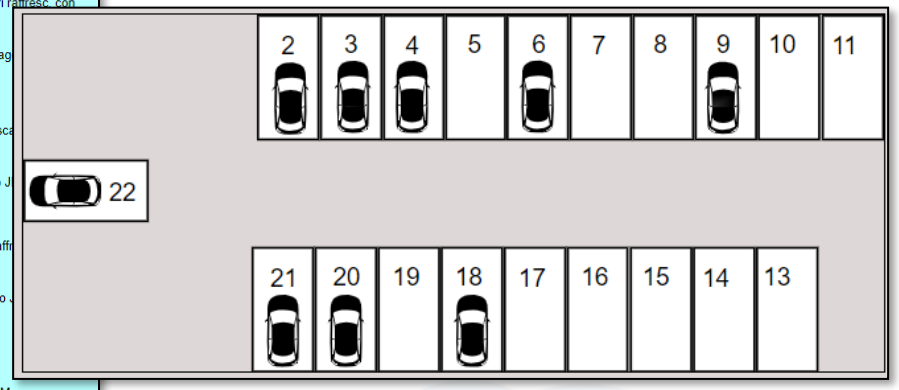


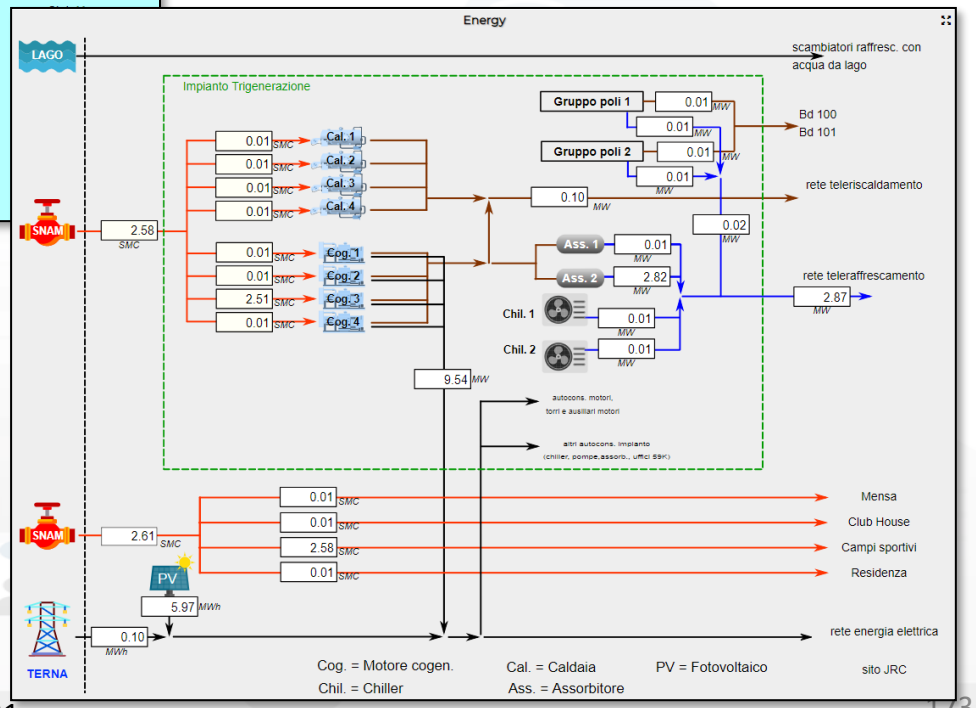
Synoptic, Custom Widgets and PINS Creation

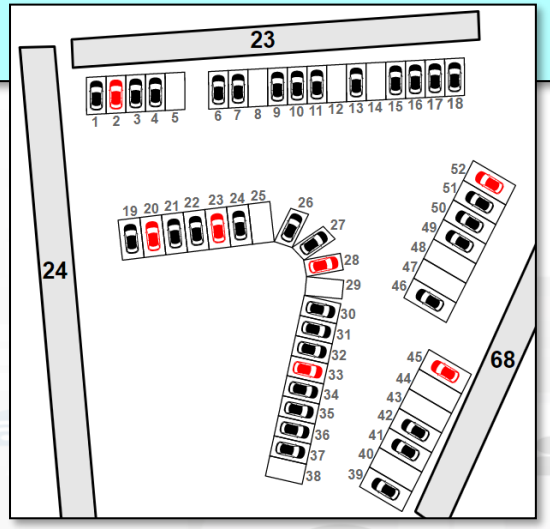
Special Custom Widgets

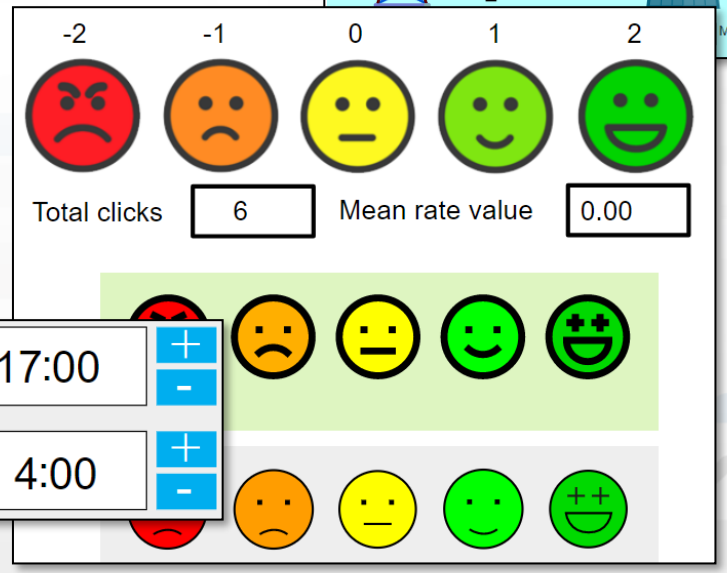
- Smart parking
- Smart Energy
- Smart Light
- Smart ….
- Energy View
- Custom Controls

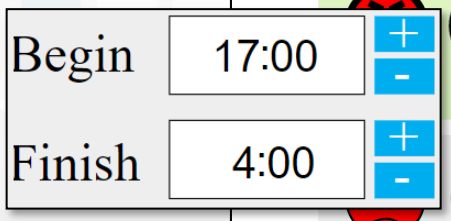




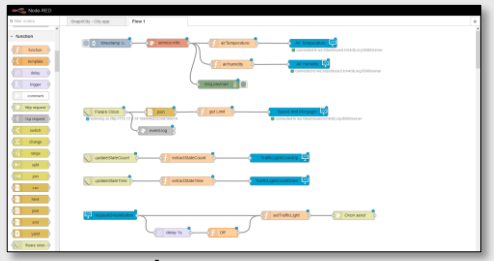






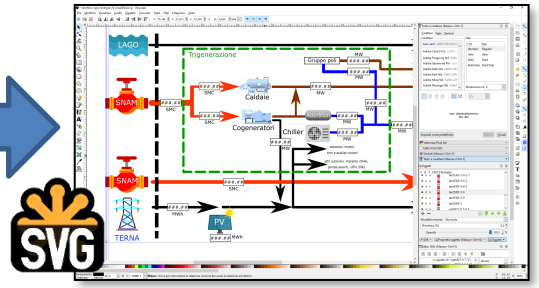


Custom Widget / Synoptic / PIN Development



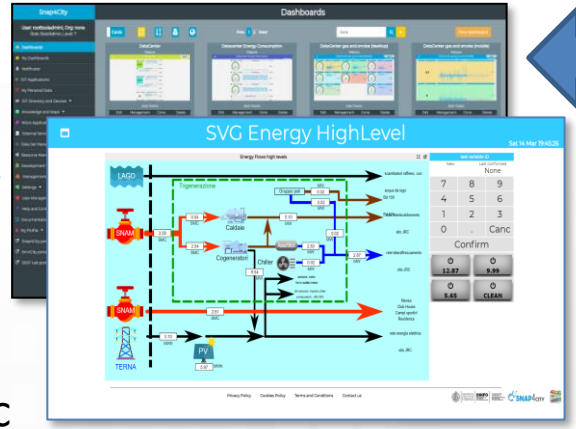
IOT Applications

Inkscape editor on your computer



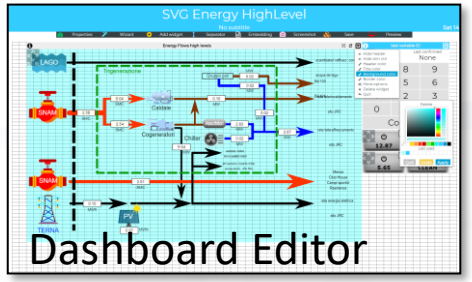
Create, save a Custom Widget in SVG

Knowledge and Storage Data from the Field and City



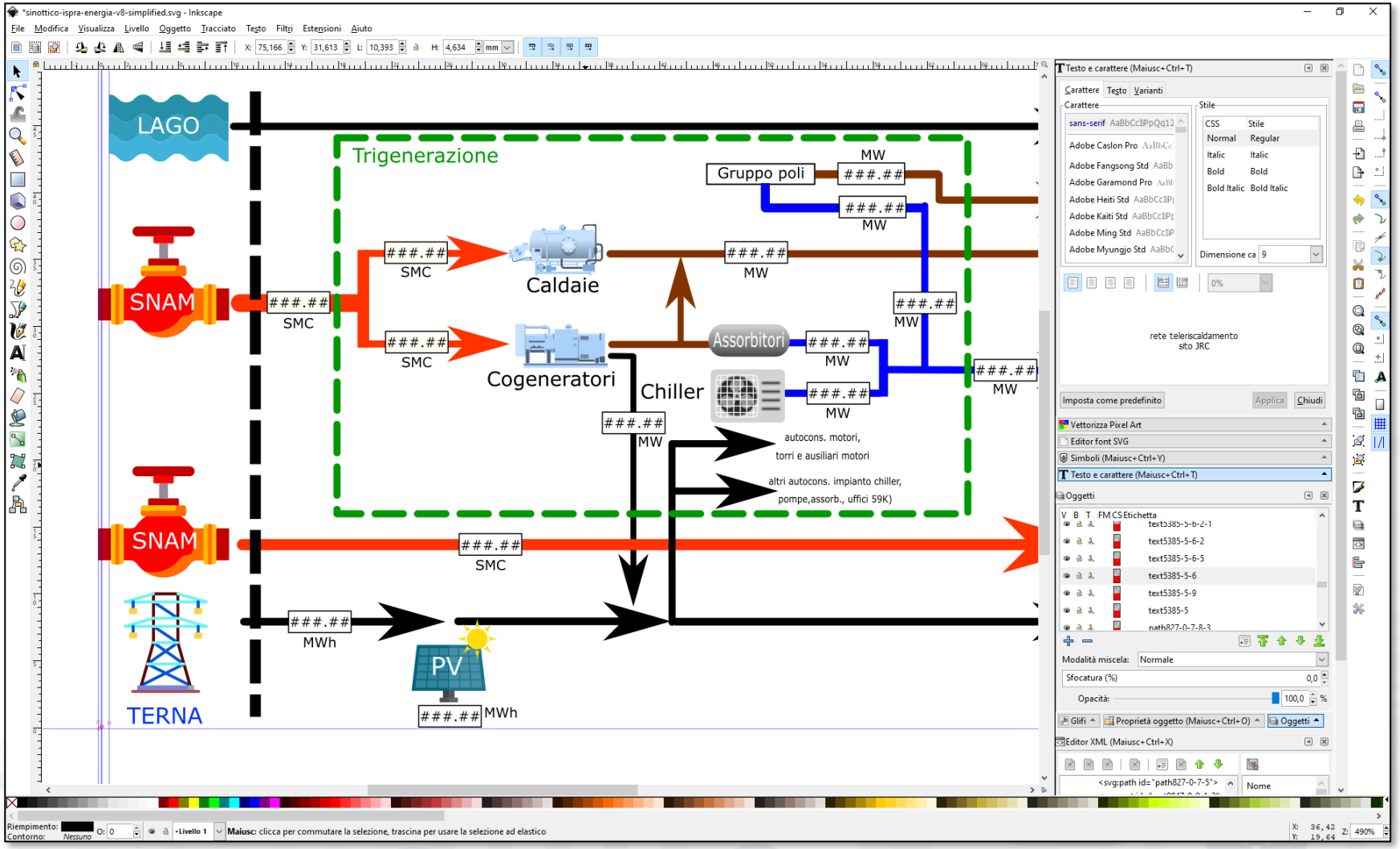
Public Dashboard Collection

My Own Dash/App



Create, save, load, delegate, grant access

1. Create and Load a Custom SVG
2. Select/Reuse an SVG
3. Make and Instance of Synoptic by Associate Variables with MyKPI
4. Create on Dashboard a Widget based on Synoptic HLT such as Ext. Srv.:
   - https://www.snap4city.org/synoptic/v2/synoptic.html?id=xxxx

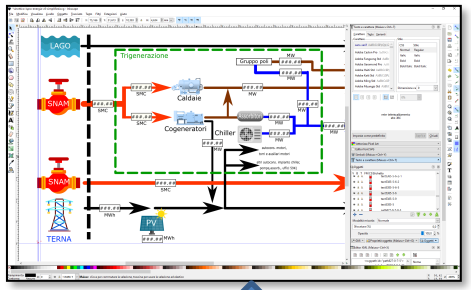


How to create a custom Widget

- [User manual on: https://www.snap4city.org/595](https://www.snap4city.org/595)

CW with a single READ Variable are automatically usable as PINS

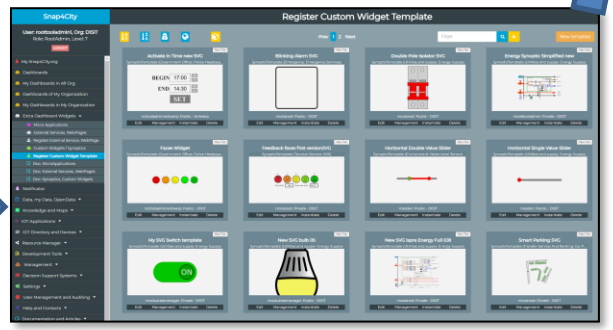
Create, save a Custom Widget in SVG



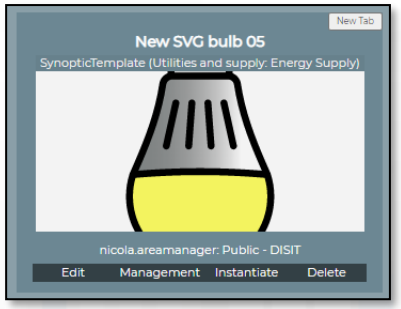
SVG Symbols Collection

From any open library

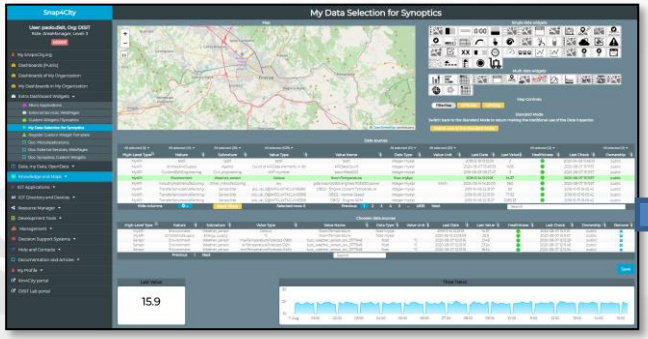
Upload as Custom Widget Template



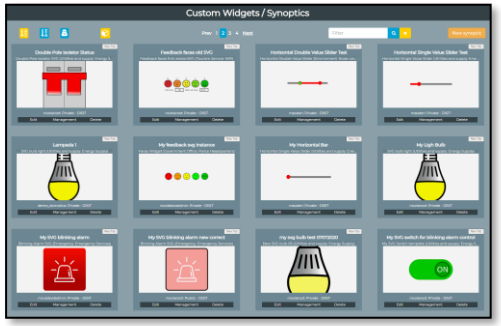
select

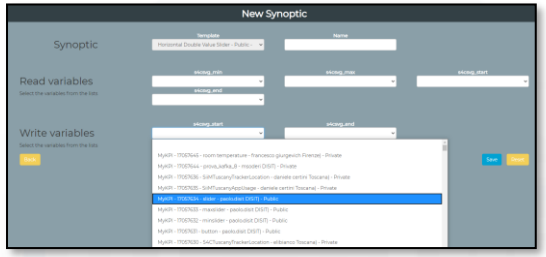


Select MyKPI and Sensor Data for Synoptics cases



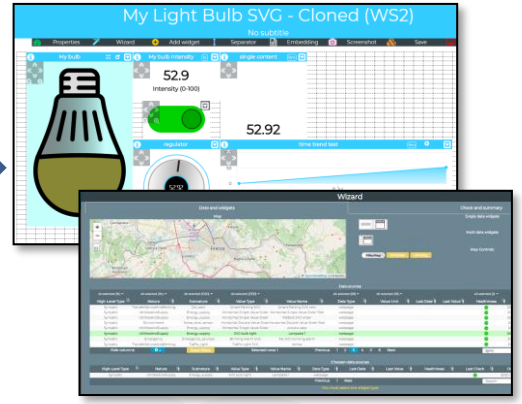
List of Custom Widgets / Synoptics

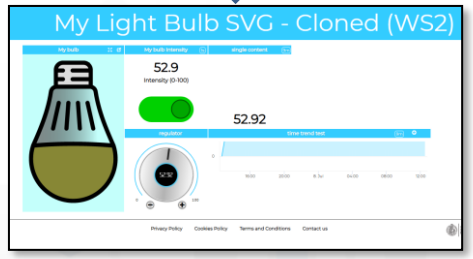




Instantiate as Custom Widgets / Synoptics Connect with WebSockets

Dashboard Editing/wizard

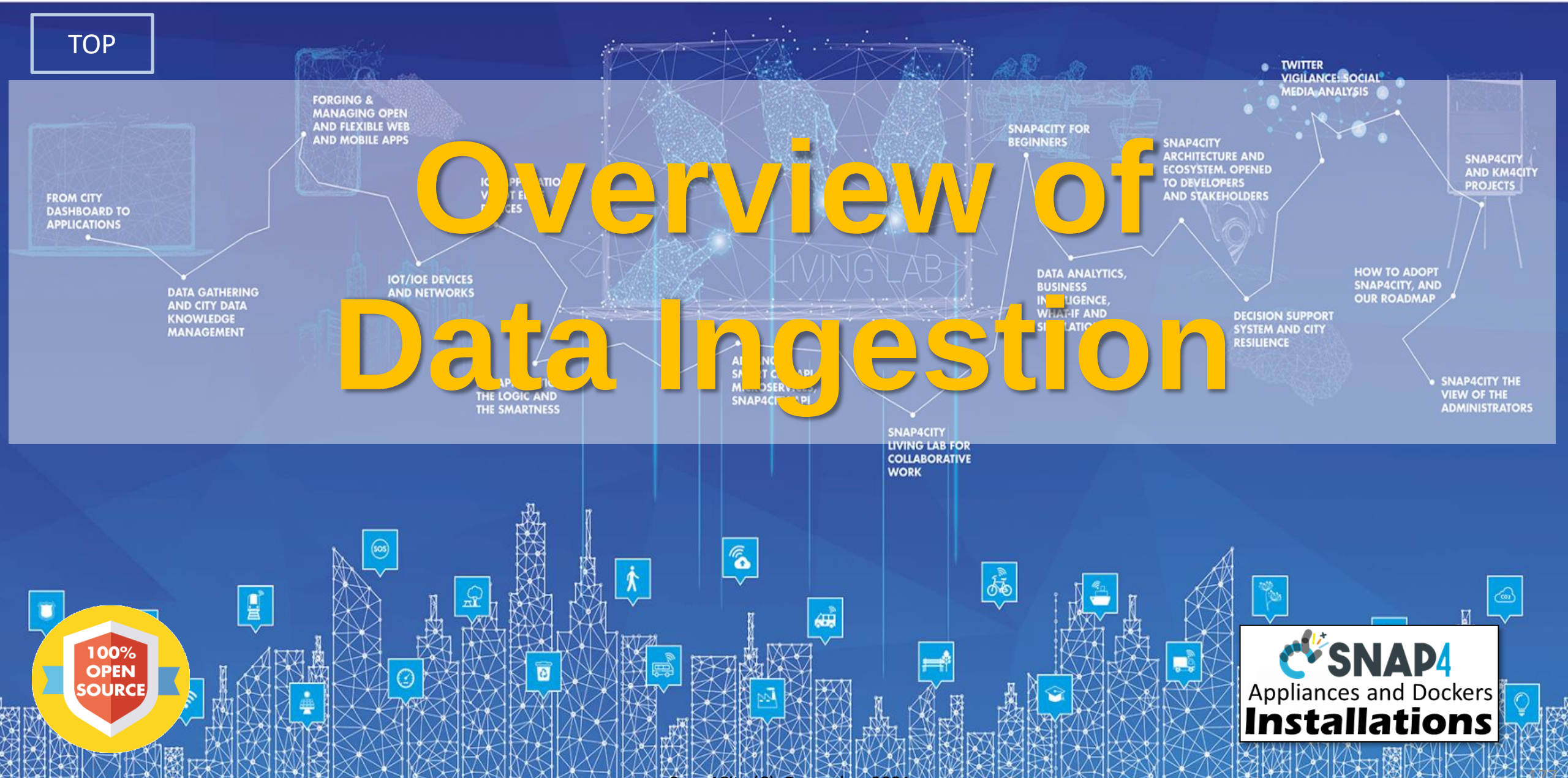




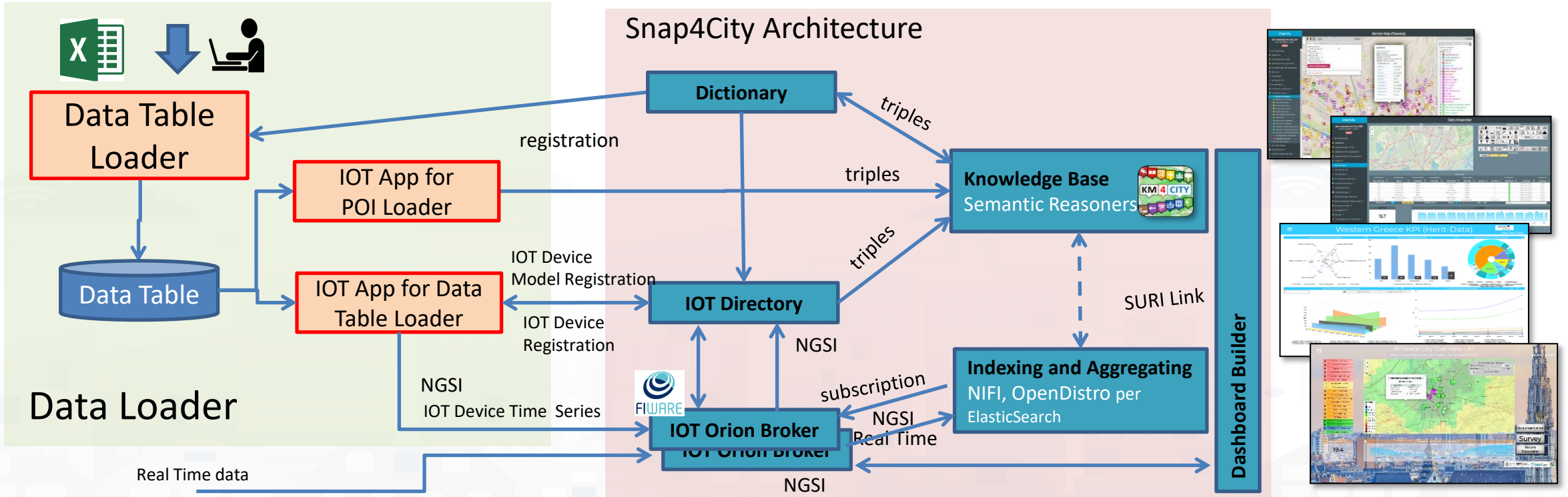
Final Dashboard

TOP

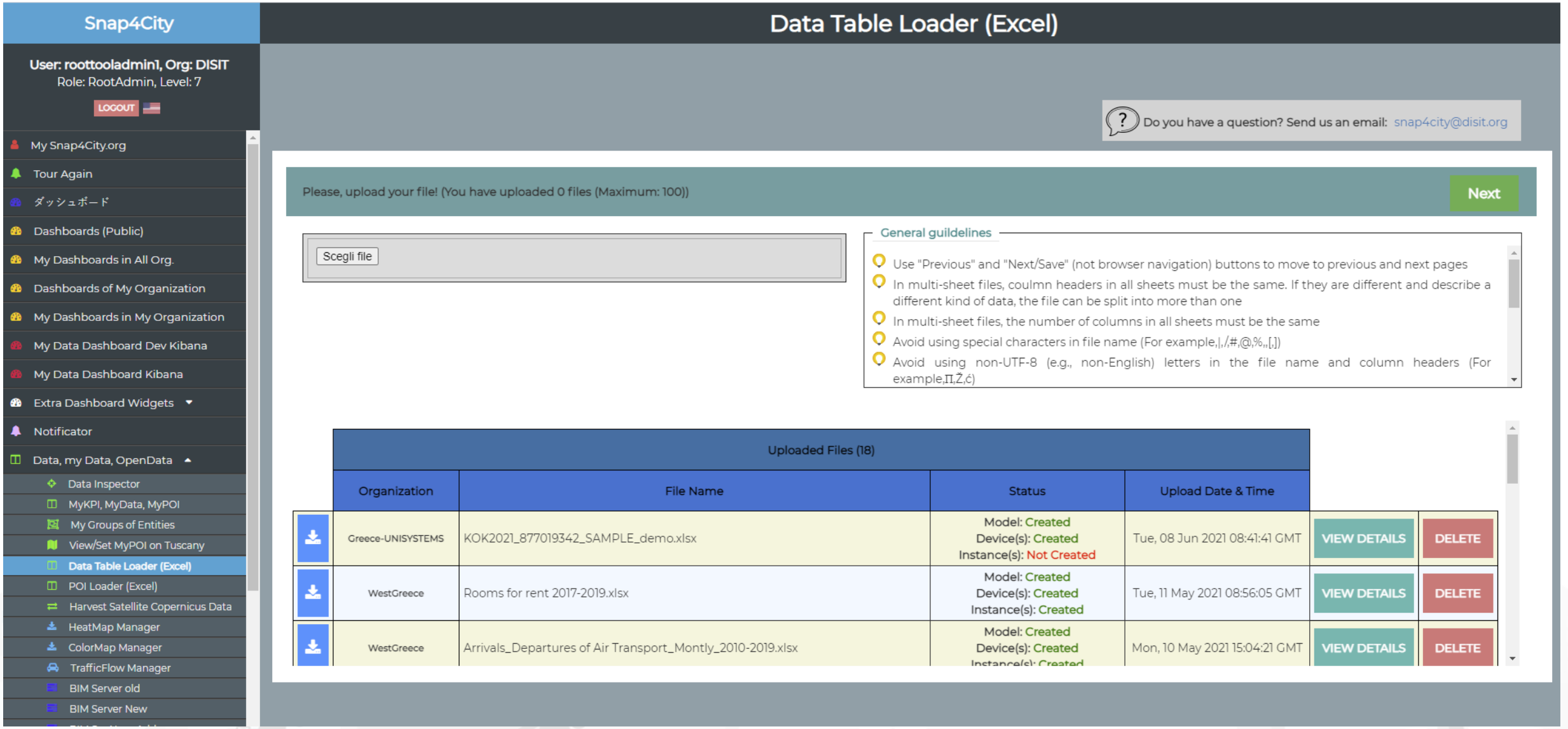
Overview of Data Ingestion



Short cut Data Ingestion from Excel file



Data Table Loader



Example

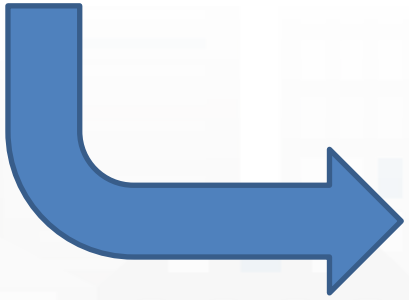
Data from INSETE

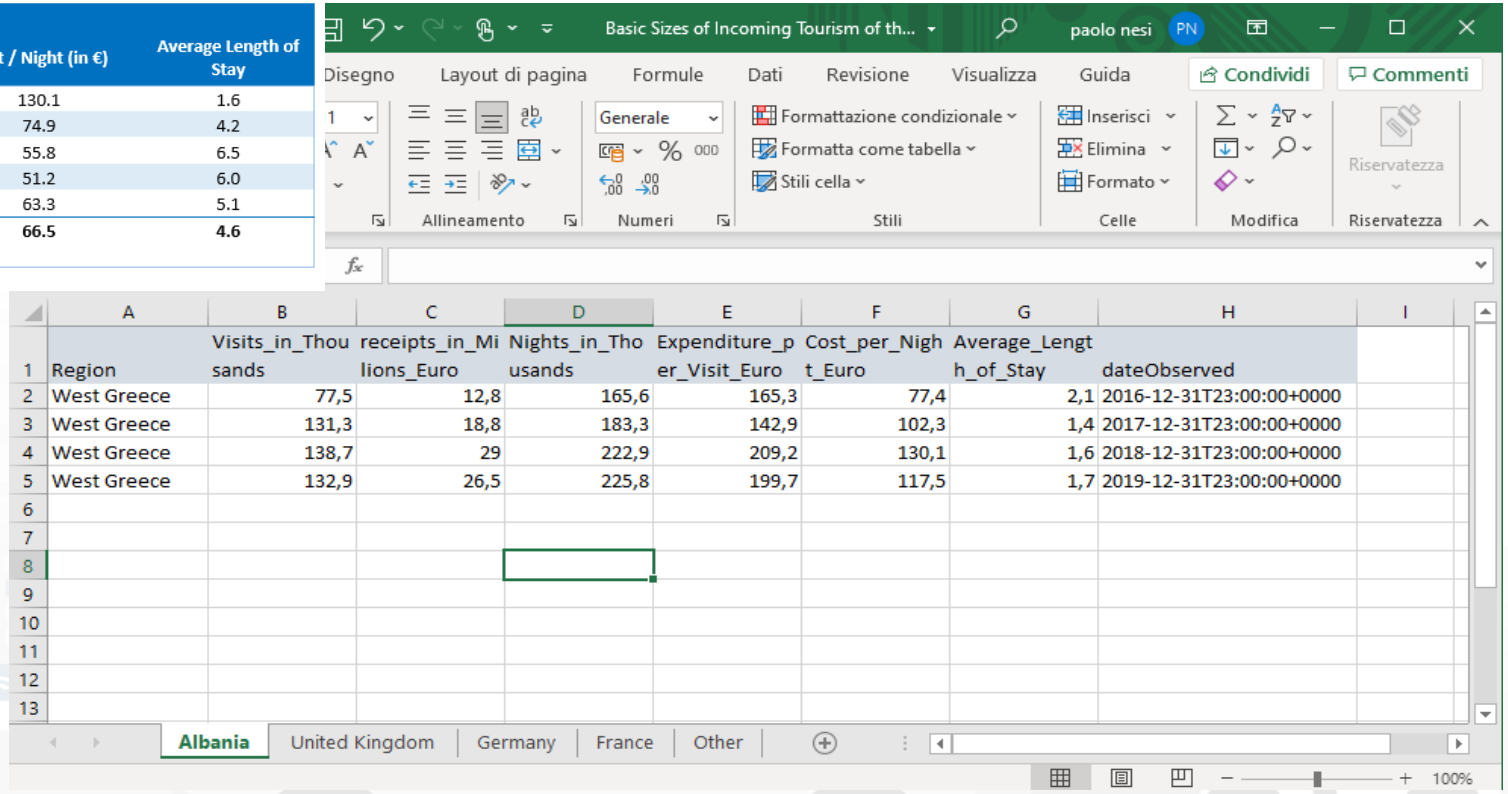
Basic Sizes of Incoming Tourism

Basic Sizes of Incoming Tourism of the Region of Western Greece 2019							
Regions	Countries Origin	Visits (in thousands)	Receipts (in € million)	Nights (in thousands)	Expenditure / Visit (in €)	Cost / Night (in €)	Average Length of Stay
West Hellas	Albania	132.9	26.5	225.8	199.7	117.5	1.7
	United Kingdom	47.7	17.9	345.8	375.2	51.8	7.2
	Germany	70.3	36.4	672.4	517.9	54.1	9.6
	France	55.4	16.5	321.6	298.1	51.4	5.8
	Other	510.7	160.0	2,964.9	313.3	54.0	5.8
	Total	**817.0**	**257.4**	**4,530.4**	**315.0**	**56.8**	**5.5**
	% of the total	**2.2%**	**1.5%**	**1.9%**			

Source: BoG Border Research, INSETE Intelligence Editing

Basic Sizes of Incoming Tourism of the Region of Western Greece 2018							
Regions	Countries of Origin	Visits (in thousands)	Receipts (in € million)	Nights (in thousands)	Expenditure / Visit (in €)	Cost / Night (in €)	Average Length of Stay
West Greece	Albania	138.7	29.0	222.9	209.2	130.1	1.6
	United Kingdom	42.6	13.5	180.6	317.6	74.9	4.2
	Germany	71.3	26.0	466.5	365.1	55.8	6.5
	France	44.2	13.5	262.9	304.7	51.2	6.0
	Other	402.5	129.8	2,050.7	322.4	63.3	5.1
	Total	**699.2**	**211.8**	**3,183.5**	**302.9**	**66.5**	**4.6**
	% of the total	**2.0%**	**1.4%**	**1.4%**			





	A	B	C	D	E	F	G	H	I
1	Region	Visits_in_Thousands	receipts_in_Millions_Euro	Nights_in_Thousands	Expenditure_per_Visit_Euro	Cost_per_Night_Euro	Average_Length_of_Stay	dateObserved	
2	West Greece	77,5	12,8	165,6	165,3	77,4	2,1	2016-12-31T23:00:00+0000	
3	West Greece	131,3	18,8	183,3	142,9	102,3	1,4	2017-12-31T23:00:00+0000	
4	West Greece	138,7	29	222,9	209,2	130,1	1,6	2018-12-31T23:00:00+0000	
5	West Greece	132,9	26,5	225,8	199,7	117,5	1,7	2019-12-31T23:00:00+0000	
6									
7									
8									
9									
10									
11									
12									
13									

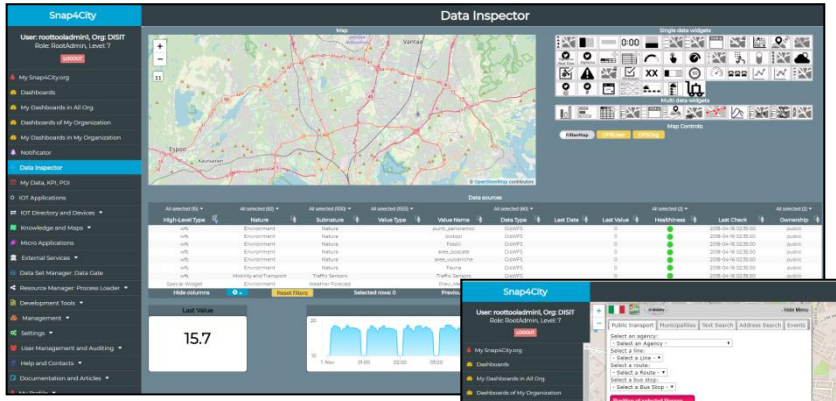
Resulted Data Table Loaded by Row Model

		Value Type												
		geolocation	Count	price	Count	price	price	duration	timestamp					
		Value Unit												
		text	K#	Meuro	K#	euro	euro	day	timestamp					
		Data Type												
		string	float	float	float	float	float	float	time					
Device Name	Sheet Name	Region	Visits_in_Thousands	receipts_in_Milions_Euro	Nights_in_Thousands	Expenditure_per_Visit_Euro	Cost_per_Night_Euro	Average_Length_of_Stay	dateObserved	Latitude	Longitude	Nature	Sub-Nature	Context Broker
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__Albania	Albania	West Greece	77.5	12.8	165.6	165.3	77.4	2.1	2016-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__Albania	Albania	West Greece	131.3	18.8	183.3	142.9	102.3	1.4	2017-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__Albania	Albania	West Greece	138.7	29	222.9	209.2	130.1	1.6	2018-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__Albania	Albania	West Greece	132.9	26.5	225.8	199.7	117.5	1.7	2019-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__UnitedKingdom	United Kingdom	West Greece	48.1	17.4	373.1	362.6	46.8	7.8	2016-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__UnitedKingdom	United Kingdom	West Greece	49.7	20	290.5	402.5	68.8	5.8	2017-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__UnitedKingdom	United Kingdom	West Greece	42.6	13.5	180.6	317.6	74.9	4.2	2018-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__UnitedKingdom	United Kingdom	West Greece	47.7	17.9	345.8	375.2	51.8	7.2	2019-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__Germany	Germany	West Greece	42.5	13.6	237.9	319.2	57	5.6	2016-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__Germany	Germany	West Greece	46.5	15	320.3	323.6	47	6.9	2017-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__Germany	Germany	West Greece	71.3	26	466.5	365.1	55.8	6.5	2018-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__Germany	Germany	West Greece	70.3	36.4	672.4	517.9	54.1	9.6	2019-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__France	France	West Greece	36.3	12.1	173.3	334.7	70.1	4.8	2016-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__France	France	West Greece	34.7	14.7	213.7	424.8	69	6.2	2017-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__France	France	West Greece	44.2	13.5	262.9	304.7	51.2	6	2018-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__France	France	West Greece	55.4	16.5	321.6	298.1	51.4	5.8	2019-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__Other	Other	West Greece	308.9	89.5	1791.9	289.8	50	5.8	2016-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__Other	Other	West Greece	301.3	90.3	1810.8	299.7	49.9	6	2017-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI
BasicSizesofIncomingTourismoftheRegionofWesternGreece.xlsx__Other	Other	West Greece	402.5	129.8	2050.7	322.4	63.3	5.1	2018-12-31T12:00:00.000+02:00	38.2384	21.7385	TourismService	Travel_information	orionWestGreece-UNIFI

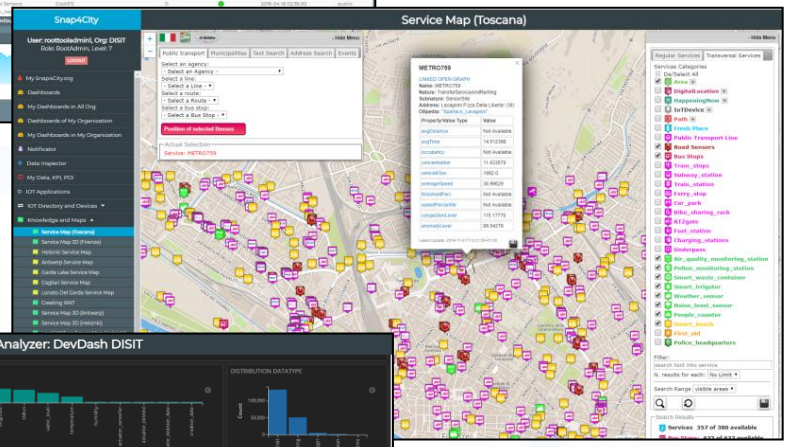
Checking data ingestion results

Knowledge base
Semantic reasoners

- **Data Inspector**
- **ServiceMap**, SCAPI
  - LOG / LOD viewer
  - Super Service Map
- IOT Directory
- SCAPI: Swagger
- IOT Broker



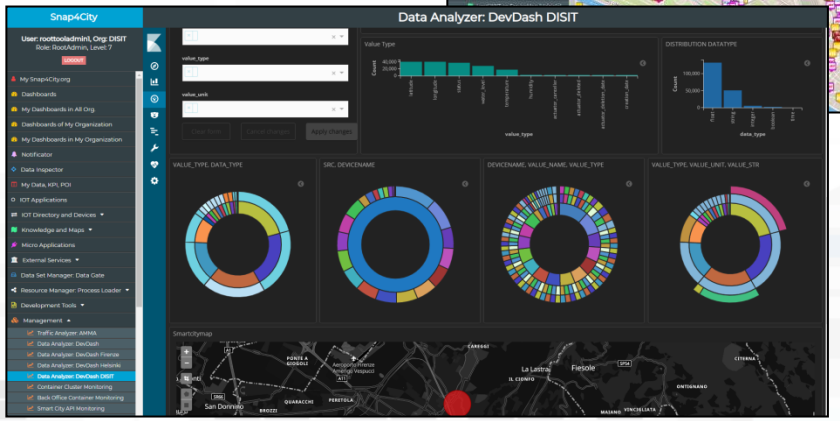
Data Inspector
Digital Twin view



ServiceMap

Indexing and aggregating
Elastic search

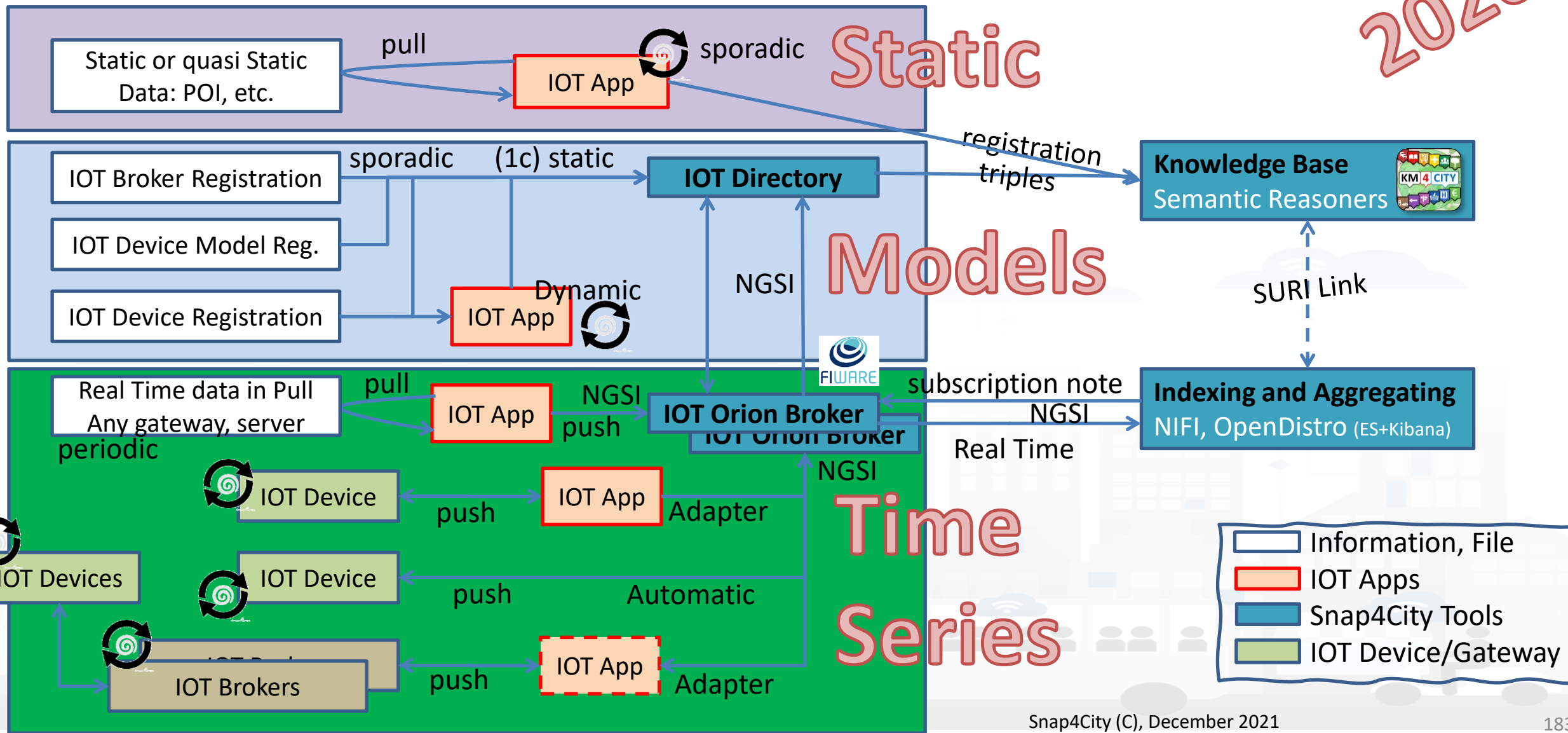
- **Data Inspector**
- **ServiceMap**, SCAPI
- **My Data Dashboard** (Kibana), DevDash
- Open Distro (ElasticSearch)



My Data Dashboard
DevDash

Some functionalities are limited to certain roles

Snap4city Data Ingestion Flow Diagram



SCALABLE SMART ANALYTIC APPLICATION BUILDER FOR SENTIENT CITIES

TOP

Just to start !

See many other features

100% OPEN SOURCE

SNAP4 Appliances and Dockers **Installations**

https://www.snap4city.org/577

On Line Training Material (free of charge)

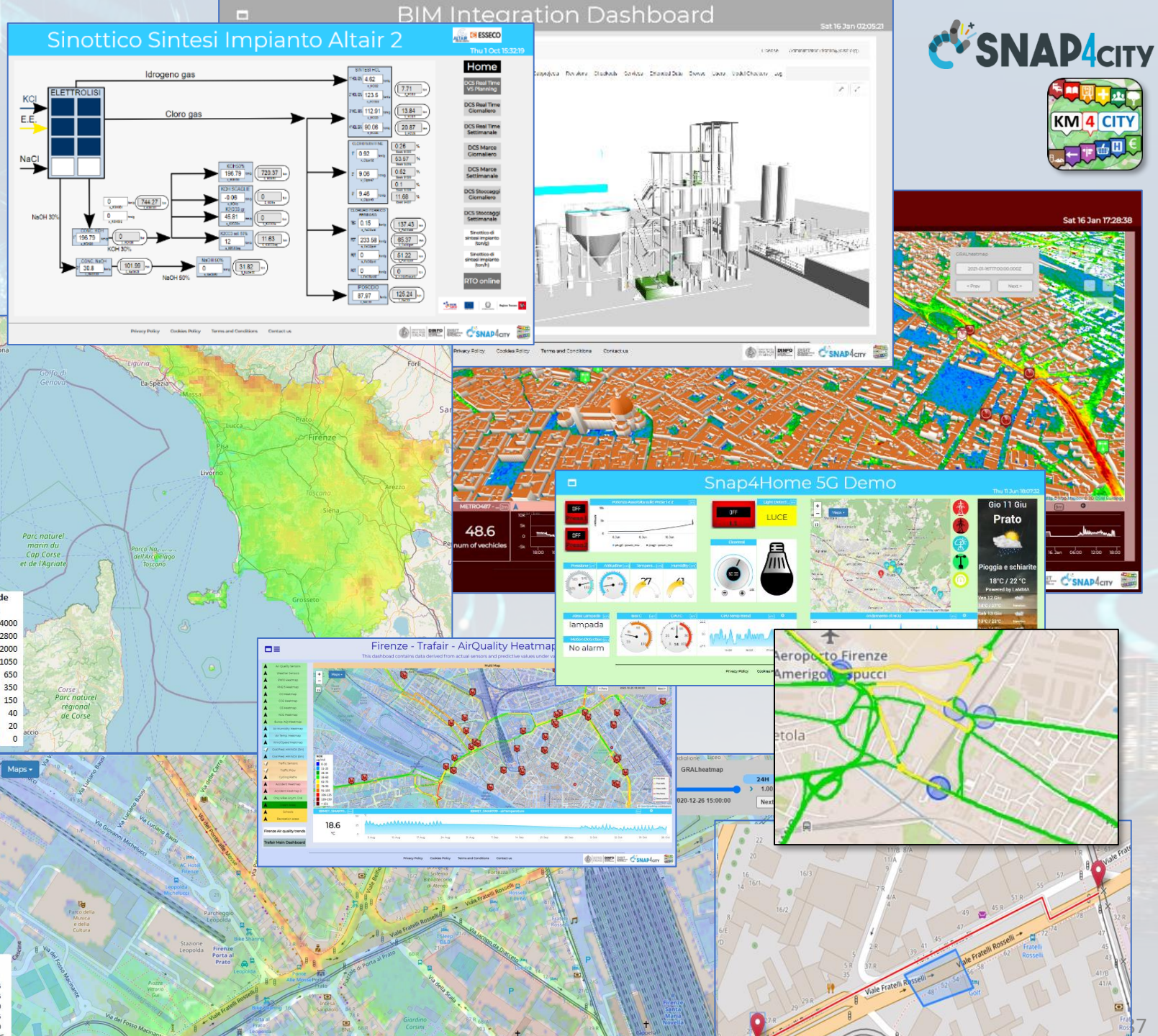
	1st part (*)	2nd part (*)	3rd part (*)	4th part (*)	5th part (*)	6th part (*)	7th part (*)
what	General	Dashboards	IOT App, IOT Network	Data Analytics	Data Ingestion processes	System and Deploy Install	Smart City API: Web & Mob. App
PDF							
Inter active							
Video1							
Video2							
Video3							
Video4				none		none	none
duration	2:55	3:16	3:41	2:00	2:48	2:35	1:47
	50%	30%	0%	0%	5%	0%	0%

Not addressed today but accessible on trainng

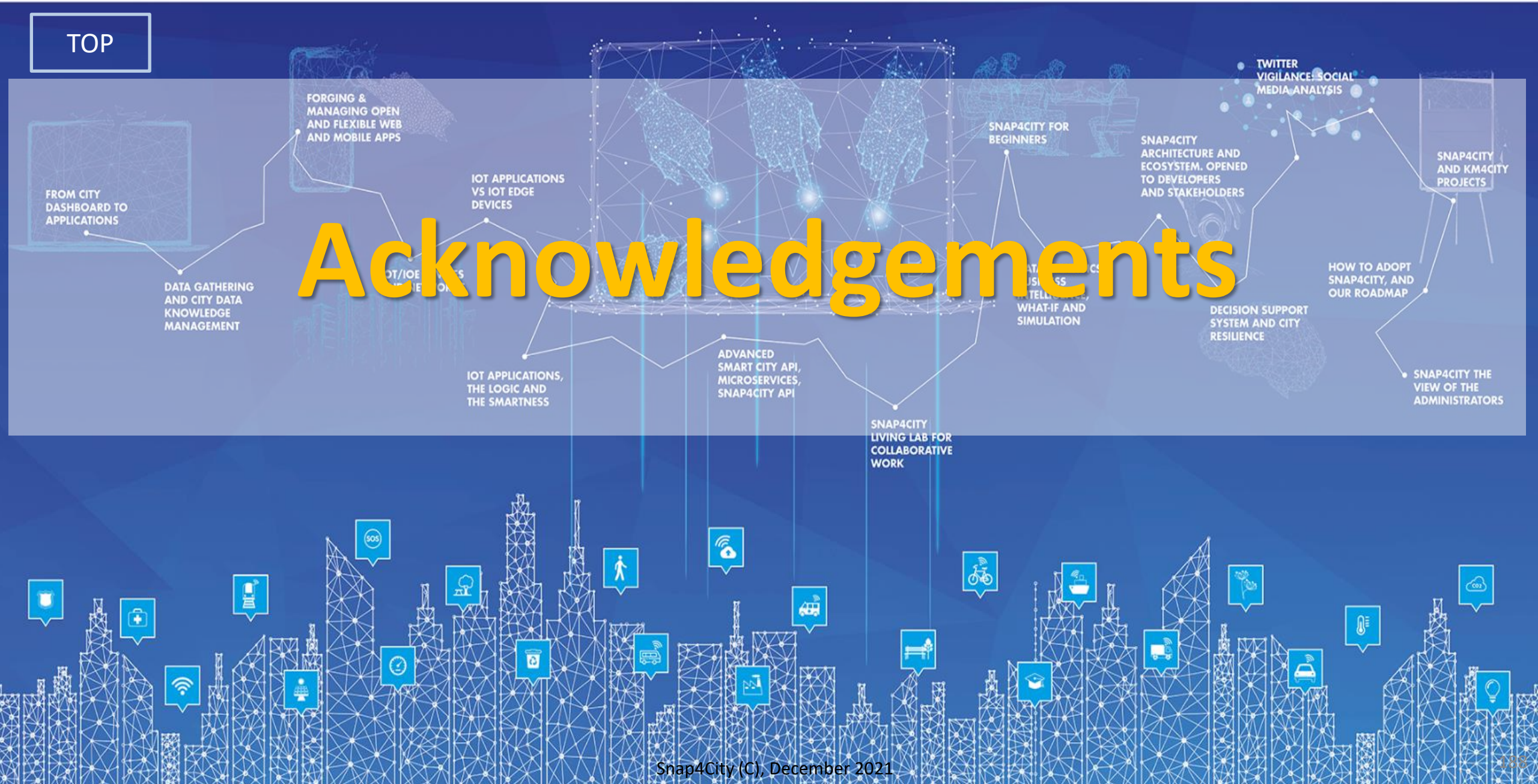
- Dashboard features:
  - GDPR ad ownership management, delegation
  - Dashboard cloning and management, monitoring dashboard usage
  - From dashboard to IoT App and viceversa
  - Chat per dashboard
  - Structure of the Applications, and data relationships
  - Exporting Dashboards into Third Party Web Pages
  - Dashboards for mobile devices
- Data / services
  - What if Analysis, Tools ready to use
  - Advanced Data Types: trajectories, traffic flow, heatmaps, ..
  - GIS integration, getting GIS data and producing GIS data
  - Exploiting external services into dashboards
  - Exploiting MicroApplications
  - Deep going into Data Inspector
  - Event management: email, telegram, SMS, etc..
  - BIM Integration and exploitation, local digital twin
  - 3D modelling exploitation, global digital twin
- Kibana Dashboards
- Routing, multimodal routing, dynamic routing, ready to use
- Decision support systems: System Thinking, FRAM for resilience, etc.
- Integration with ticketing management

Data Type Coverage

- POI, IOT, shapes,..
- KPI, personal KPI,..
- Dynamic icons/pins, ..
- Synoptics, animations, ..
- social media, Twitter
- maps, orthomaps, GTFS, GIS WFS/WMS, GeoTiff, ..
- calibrated heatmaps, ..
- traffic flow, typical trends, ..
- trajectories, events, ..
- 3D, BIM, Workflow, ..
- OD Matrices, scenarios, ..
- prediction models, ...
- decision support, ...
- Routing, ..
- Linked Data, ..
- Satellite data, ..
- etc.



TOP



Acknowledgements

DISIT lab roadmap vs model and tools' usage

2013
Km4City Ontology 1.1

- Tuscany, Road Graph
- Mobility
- culture, tourism
- Events
- Parking
- Services
- Linked open graph

2014
- Weather Forecast
- Real Time Wi-Fi
- Entertainment
- LOD

- Twitter Vigilance
- Social Media Analytics, Sentiment Analysis

Km4City 1.4

2015
Km4City 1.5

- Resilience Decision Support
- Smart First Aid
- User Behaviour Analysis, predictions
- Risk Analysis

ckan, resolute, H2020 (2015-18)

2016
(2016-21) H2020 REPLICATE

Km4City 1.6.4

- Smart Energy
- Sustainable Mobility
- Control Room
- Dashboard

Km4City 1.6.2

Sii-Mobility (2016-21) MIUR
SII-MOBILITY SCN

- Infomobility
- Mobile App
- Routing
- Multimodality

FIWARE

Km4City 1.5

- Resilience Decision Support
- Smart First Aid
- User Behaviour Analysis, predictions
- Risk Analysis

2017
Sii-Mobility

- Origin-Destination and trajectories
- Traffic Reconstruction
- Offer Analysis
- OBU, smart devices

E0l5 digital ecosystem (Powered by EXPO MILANO 2015)

(2016-19) MIUR
GHOST SIR

- Sardinia Region Smart City Strategies and plan

GREEN IMPACT C.A.P.A.C.I.T.Y.
GREEN IMPACT
POR FESR 2014-2020

- Industry 4.0
- Critical Plant
- Monitoring

- IOT/IOE, IOT App
- Living Lab
- Maker Support
- IOT Edge
- Smart City IOT
- GDPR,
- Privacy & Security

life weee (2017-20)

- Smart Waste

2018
MOSAiC Mobility 4.0 for SmArt (i) City (2018-20)

- Mobility Demand / Offer Analytics and Strategy

Sii-Mobility

- User engagement
- Bike Sharing
- Data Analytics ++
- Social Predictions
- OBD2

IOT/IOE

Km4City 1.6.6

Node-RED

SNAP4CITY SELECT for Cities H2020 (2017-19)

2019
5G (2018-21)

- 5G tech
- Energy
- Industry 4.0
- Synoptics

TRAFAIR CEF (2018-21)

- Traffic and Mobility Impact on Pollution
- NOX predictions

EUROPEAN OPEN SCIENCE CLOUD

SIRIUS

LAID Smart Bed

- Smart Health

GREEN FIELD PEAS Soda4.0 Optimization and Automated Decision System 4.0

- Industry 4.0

bee smart city

- Smart Lonato

Reverberi Enetec Gruppo MPES

SNAP4CITY KM4CITY

Winner of Select4Cities PCP

roadmap

2020

JRC EUROPEAN COMMISSION

Interreg Mediterranean HERIT-DATA

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

Interreg MARITTIMO-IT FR-MARITIME MOBI MART

- Smart Mobility
- PISA, PUMS
- Living lab

smartGARDAlake

2021

JRC EUROPEAN COMMISSION

enel X Contract

PC4City (2020-21)
Monitoring Terrain

Smart Ambulance (2021-22)

Winner of Open Data Challenge of enel X

Enterprise (2021-22)
Industry 4.0

Almafluida
Industry 4.0
(2021-22)

CAPELON

- Smart Light
- Sweden

AMPERE (2021-22)
Industry 4.0

Km4City 1.6.7

SYN-RG-AI
SmartCity

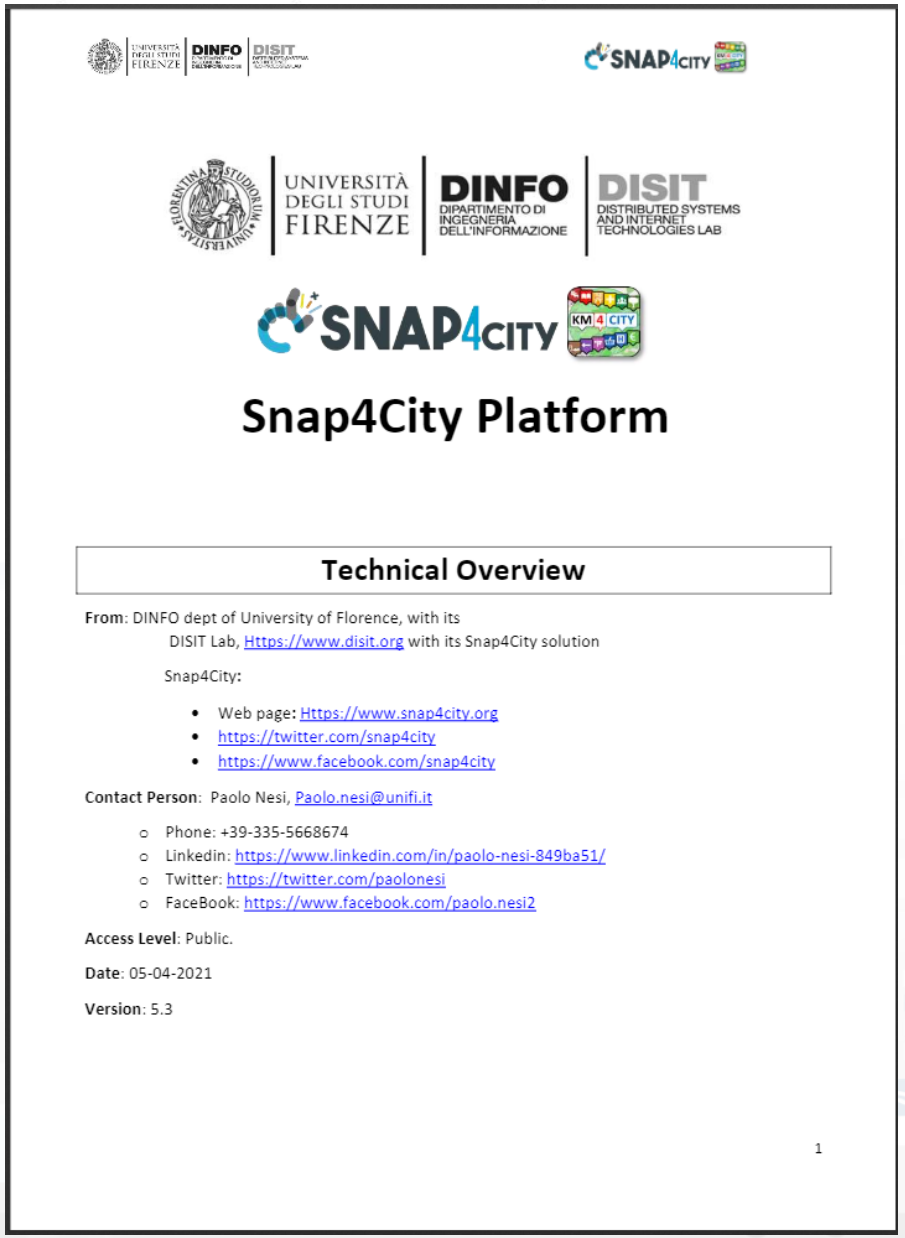
2022

AXIS collaboration
SmartCity

UNI.SYSTEMS
SmartCity

PRETTO
Industry 4.0

Overview



Snap4City Platform

Technical Overview

From: DINFO dept of University of Florence, with its
DISIT Lab, Https://www.disit.org with its Snap4City solution

Snap4City:

- Web page: Https://www.snap4city.org
- https://twitter.com/snap4city
- https://www.facebook.com/snap4city

Contact Person: Paolo Nesi, Paolo.nesi@unifi.it

- Phone: +39-335-5668674
- Linkedin: https://www.linkedin.com/in/paolo-nesi-849ba51/
- Twitter: https://twitter.com/paolonesi
- FaceBook: https://www.facebook.com/paolo.nesi2

Access Level: Public.

Date: 05-04-2021

Version: 5.3

1

- **2021**
- **https://www.snap4city.org/drupal/sites/default/files/files/Snap4City-PlatformOverview.pdf**

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Main running instances (11/21)

- Sii-Mobility → mobility and transport, sustainability
- REPLICATE → ICT, smart City Control room, Energy, IOT
- RESOLUTE → Resilience, ICT, Big Data
- GHOST → Strategies, smart city
- TRAFAIR → Environment & transport
- MOSAIC → mobility and transport
- WEEE Life → Smart waste, environment
- Smart Garda Lake → Castelnuovo del Garda, SMARTEA
- 5G → Industry 4.0 vs SmartCity
- Green Impact → Industry 4.0, Chemical Plant, control and plan
- SmartBed (Laid) → smart health
- Green Field Peas (Soda) → Industry 4.0, Chemical plant
- MobiMart and PISA Agreement → data aggregation, mobility and transport, Living Lab
- Lonato del Garda → smart parking, environment
- Herit Data → tourism, culture and management
- ISPRA JRC → site management and services
- Capelon (Sweden) → smart light solutions
- PC4City → land slide monitoring and predictions
- Italmatic → industry 4.0 production control

Acknowledgements

- Thanks to the European Commission for founding. All slides reporting logo of **Snap4City** https://www.snap4city.org **of Select4Cities H2020** are representing tools and research founded by European Commission for the **Select4Cities** project. **Select4Cities** has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation Programme (grant agreement n° 688196)
- **TRAFAIR is a CEF** project. All slides reporting logo of TRAFAIR project are representing tools and research founded by the EC on CEF programme http://trafair.eu/
- Thanks to the European Commission for founding. All slides reporting logo of **REPLICATE H2020** are representing tools and research founded by European Commission for the REPLICATE project. **REPLICATE** has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation Programme (grant agreement n° 691735).
- Thanks to the European Commission for founding. All slides reporting logo of **RESOLUTE H2020** are representing tools and research founded by European Commission for the RESOLUTE project. **RESOLUTE** has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation Programme (grant agreement n° 653460).
- Thanks to the MIUR for co-founding and to the University of Florence and companies involved. All slides reporting logo of **Sii-Mobility** are representing tools and research founded by MIUR for the Sii-Mobility SCN MIUR project.
- **Km4City** *is an open technology and research line of DISIT Lab exploited by a number of projects. Some of the innovative solutions and research issues developed into projects are also compliant and contributing to the Km4City approach and thus are released as open sources and are interoperable, scalable, modular, standard compliant, etc.*

TOP

SNAP4CITY

KM 4 CITY

Be smart in a SNAP!

SNAP4
Appliances and Dockers
Installations

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