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!

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

Task 5.2 – Local/Regional Training capacity Building Seminar

Interreg Mediterranean

HERIT-DATA



SCALABLE SMART ANALYTIC APPLICATION BUILDER FOR SENTIENT CITIES

UNIVERSITÀ DEGLI STUDI FIRENZE | DINFO | DISIT

Agenda - 22/12/2021

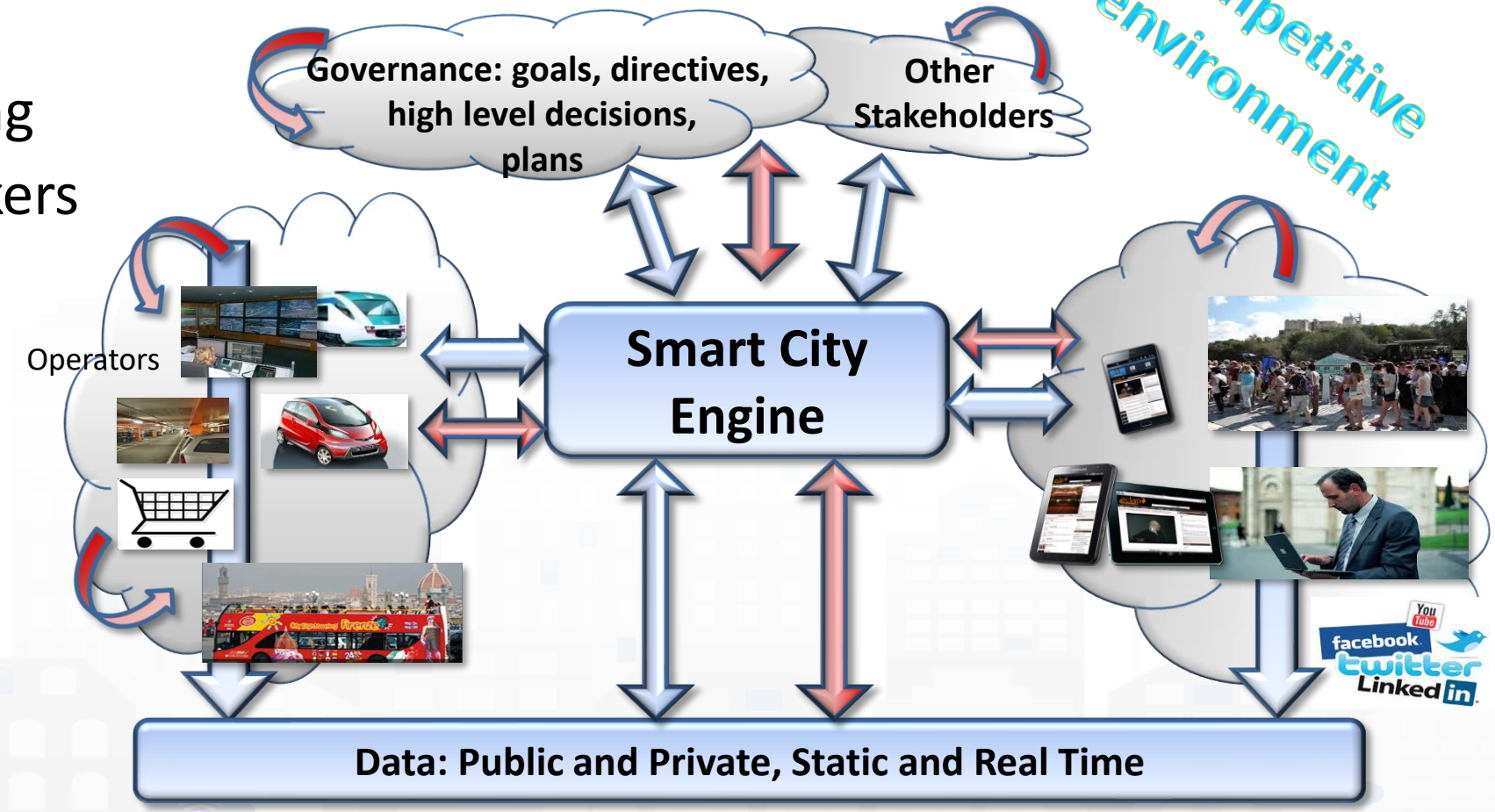
- 9:30 – Introduzione al progetto Herit-Data a al Task 5.2 sul seminario oggetto della mattinata, a cura di Davide Bruno, capofila del progetto Herit-Data come Regione Toscana e Alessandro Monti, di Fondazione per la Ricerca e l'Innovazione
- 9:45 – Presentazione della piattaforma di progetto e della soluzione Snap4City
- 10:00 – Prima parte della formazione sulla piattaforma.
  - struttura, interfacce per gli utenti, et al.
- 11:00 – Pausa
- 11:10 – Seconda parte della formazione sulla piattaforma.
  - creazione di cruscotti con indicatori (dashboard), back end, et al., a cura
- 12:00 – Conclusioni e chiusura del seminario, a cura di Davide

Agenda

- Process Overview
- Some Examples
- Different Approaches to Adopt Platform
- Your questions?
- Overview on Dashboard Production
- Dashboards by Selecting Data vs Widgets
- Dashboards with Business Logic/Intelligence
- Overview of Data Ingestion
- from KPI to Dashboards Herit-Data Cases
- 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



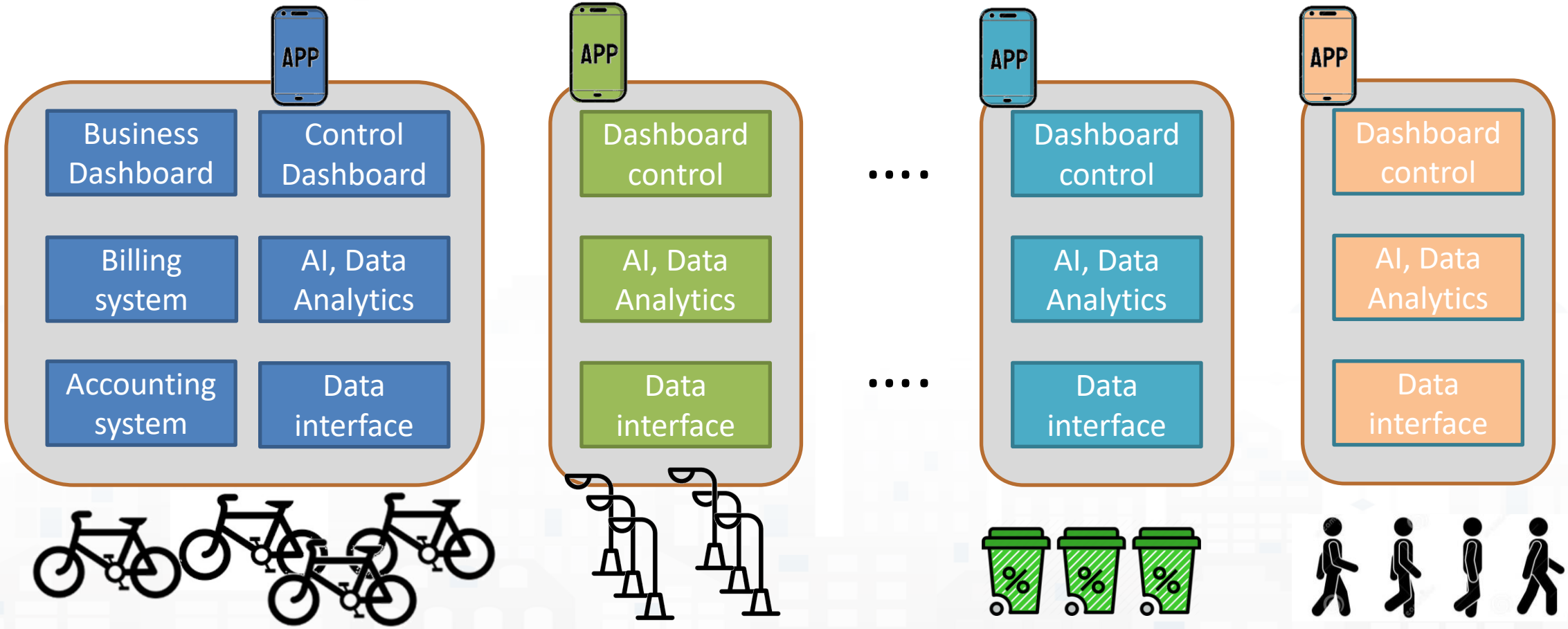
Requirements and Objectives

- 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

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

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

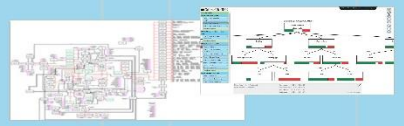
E015 digital ecosystem

NVIDIA



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

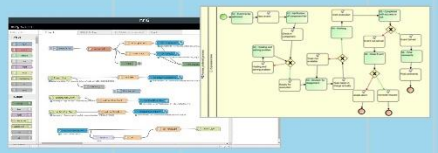
PREDICTION - ANOMALY DETECTION - ENVIRONMENTAL MODEL - 3D MODEL
KPI - SIMULATION - EARLY WARNING - SYNOPTIC - DIGITAL TWIN - VIRTUAL REALITY



EXPERT SYSTEM
KNOWLEDGE BASE
STORAGE



BIG DATA ANALYTICS
EXPLAINABLE ARTIFICIAL INTELLIGENCE
BUSINESS INTELLIGENCE
MACHINE LEARNING



DATA FLOWS, DATA DRIVEN
WORKFLOWS, MICROSERVICES
PARALLEL DISTRIBUTED PROCESSING

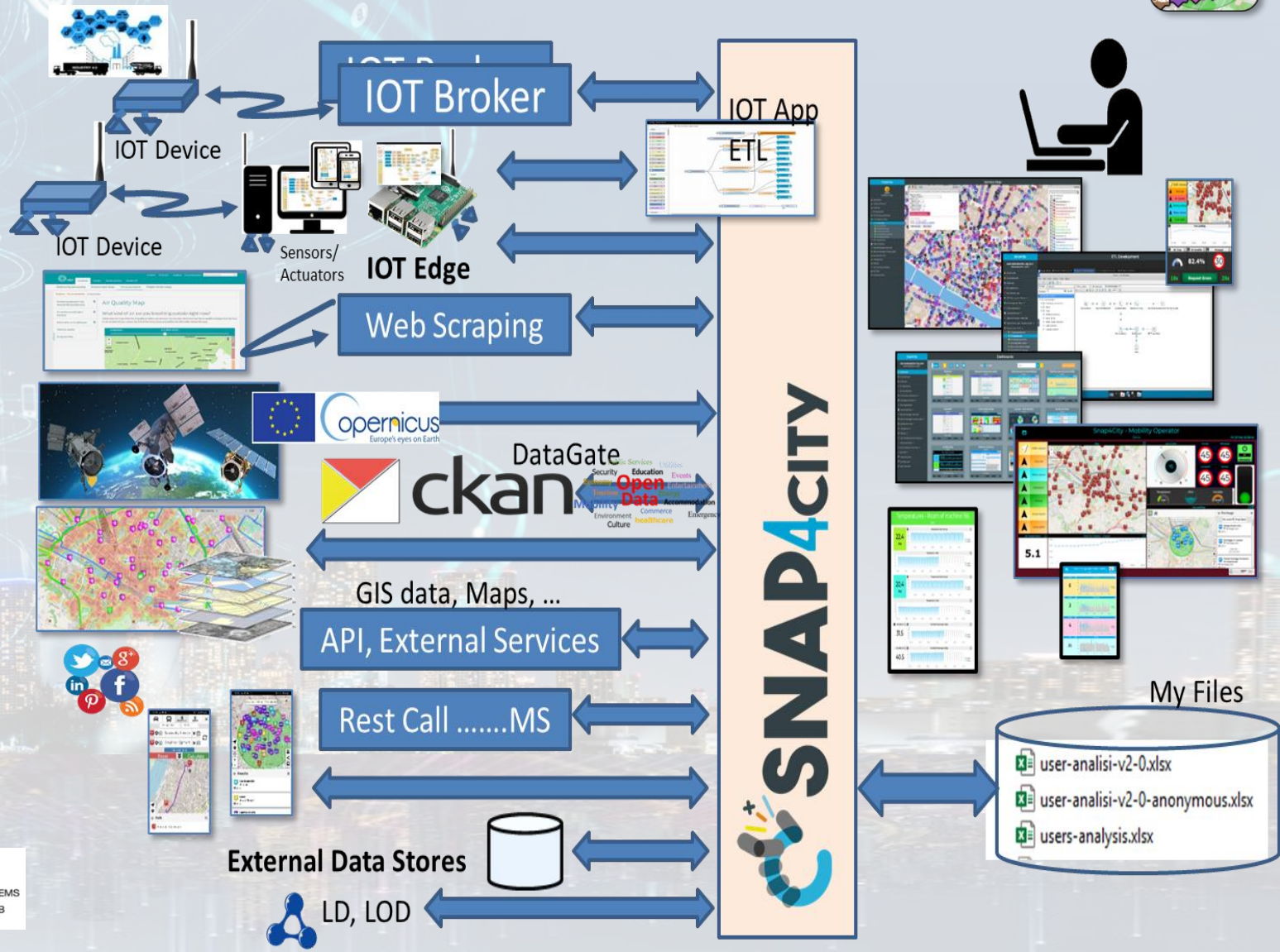


METHODOLOGIES
COURSES AND COMMUNITY
LIVING LABS
DEVELOPMENT TOOLS



Ingestion, aggregation → exploitation

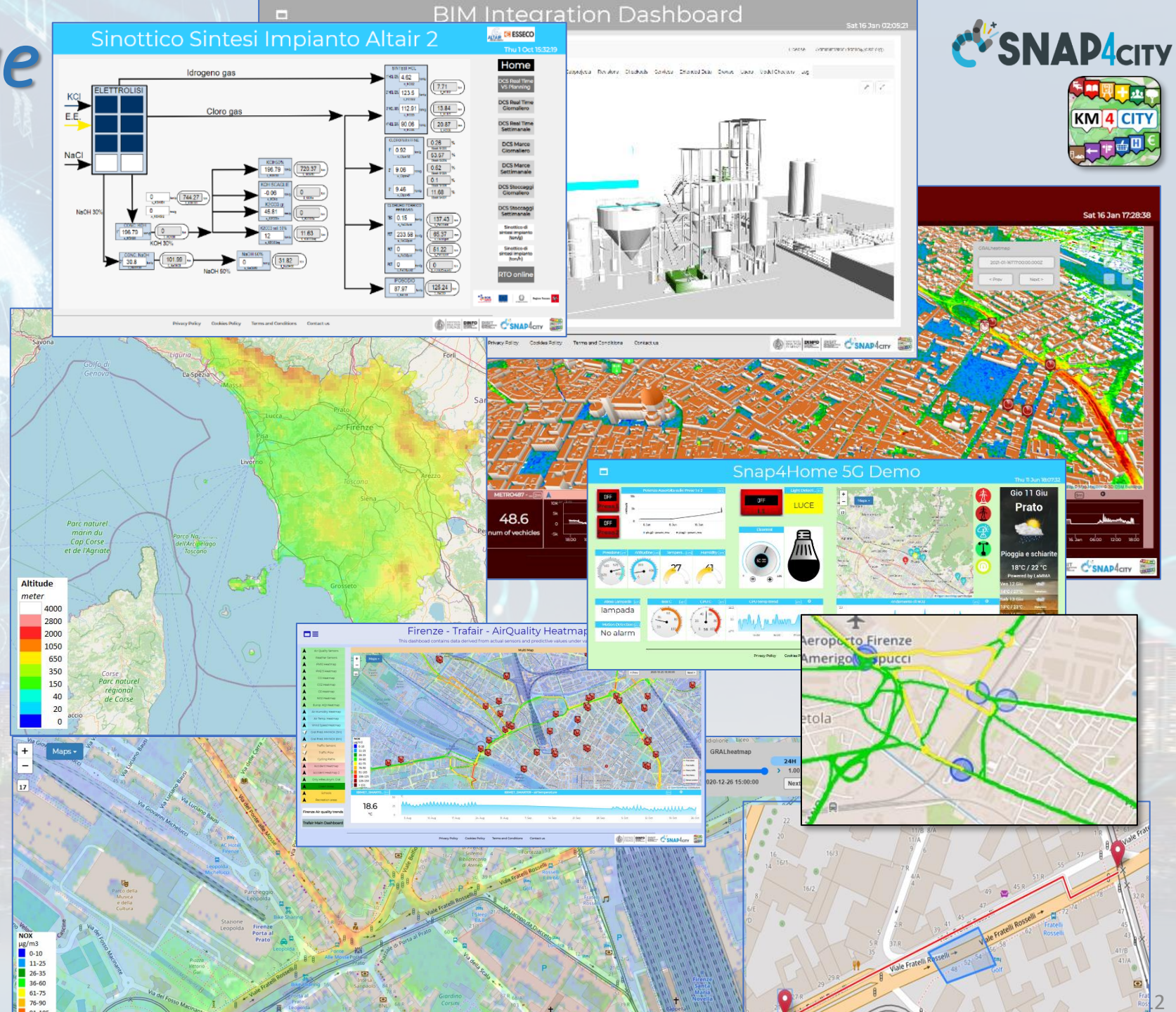
- **Snap4City efficient tools for**
  - Bidirectional data channels
  - Any format, any channel, any data, any broker, any protocol, …
  - **Km4City** Knowledge base Ontology reasoning on geo, space, time, relationships



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

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.



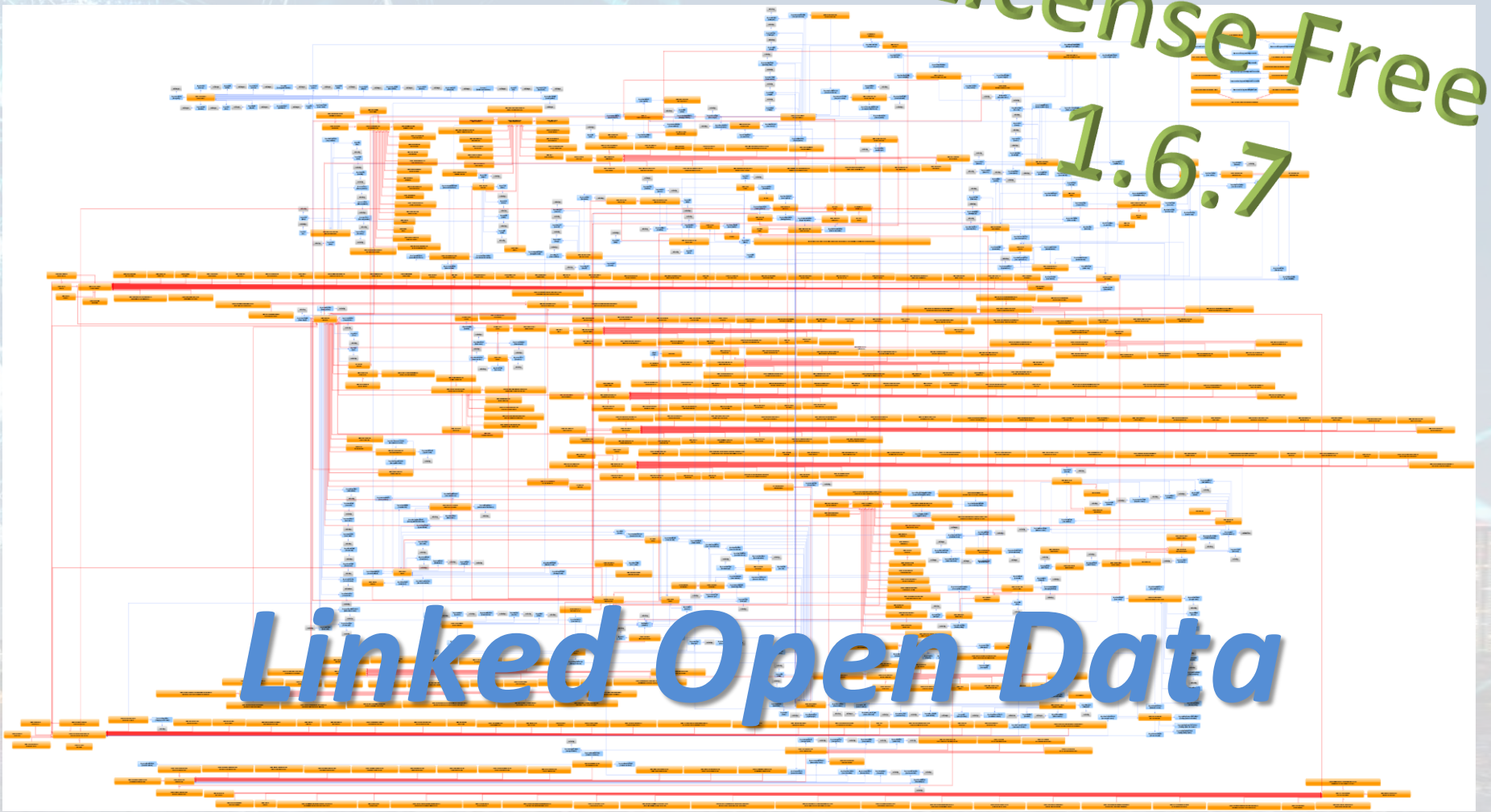
Standards and Interoperability (2021)

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

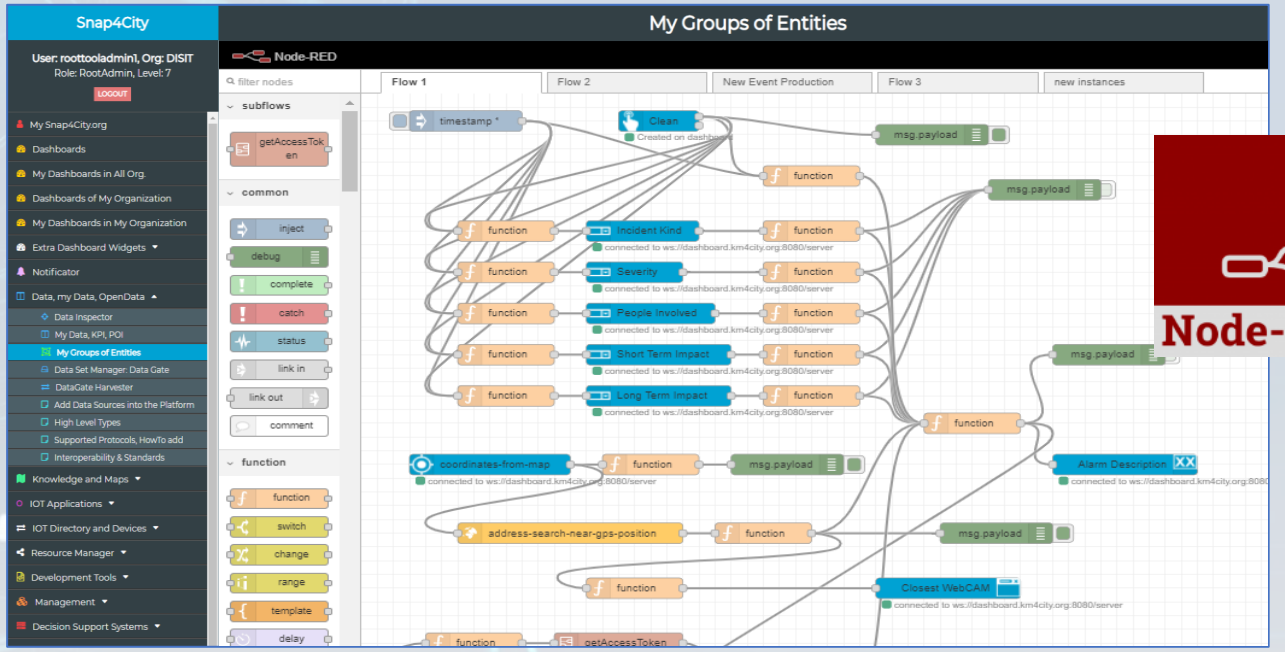
- **via**:
- **Smart City API** for Apps and third party
- **MicroServices** data driven develop via visual language Node-RED

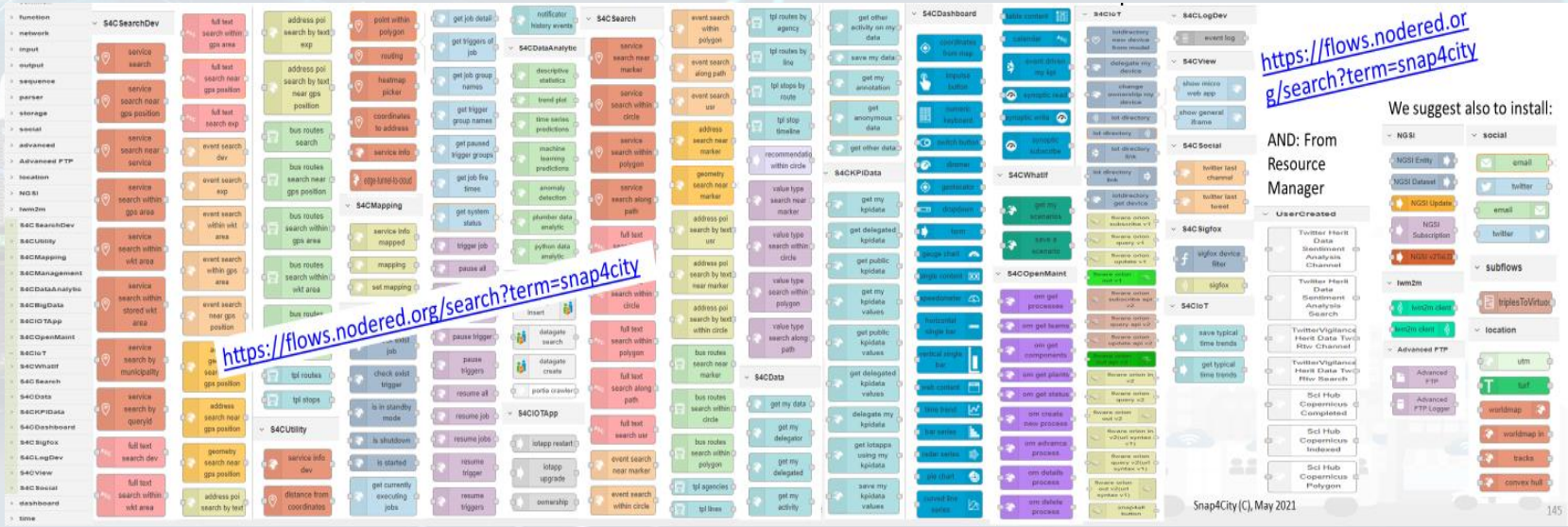


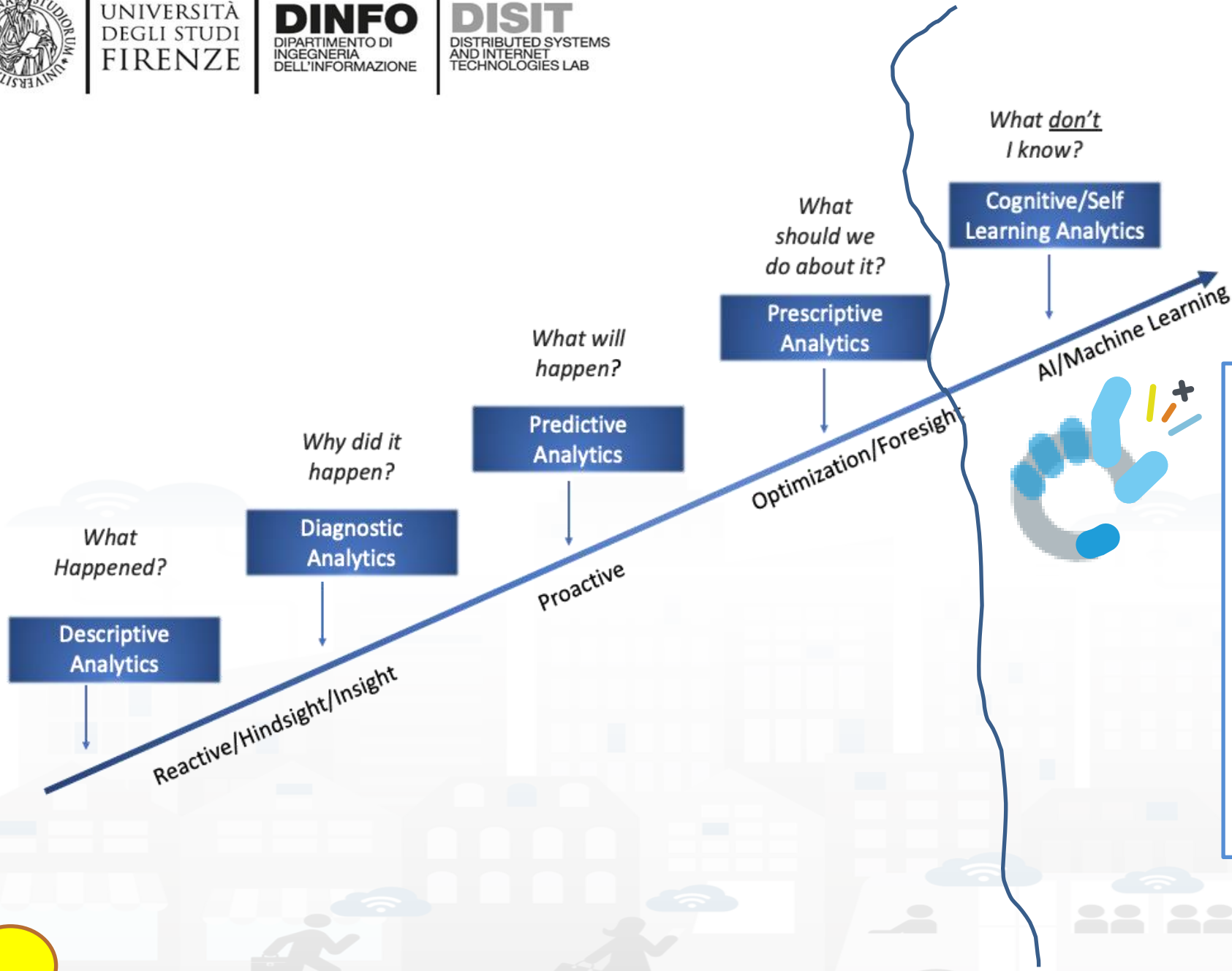
https://www.snap4city.org/19

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







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:

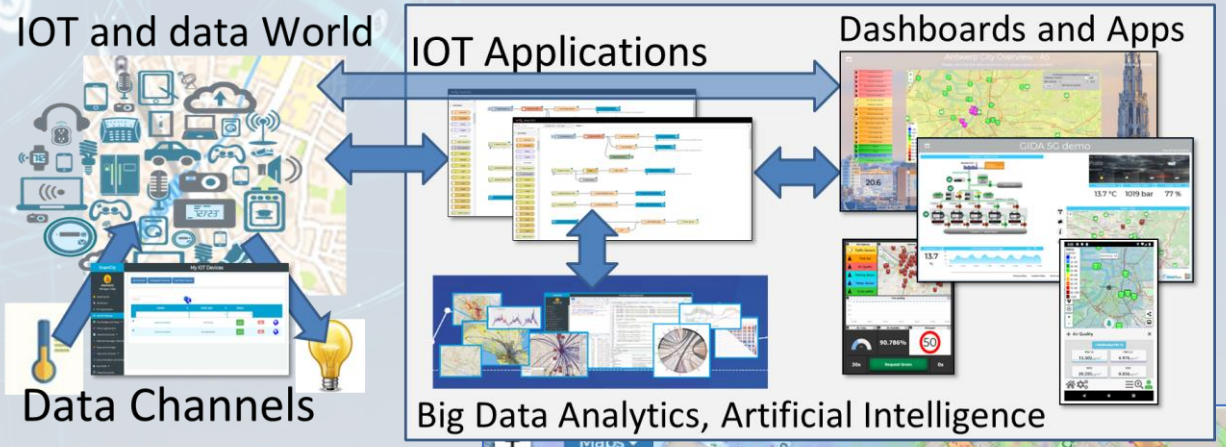
- Heatmaps, ..
- trajectories,
- OD matrices,
- Typical Time Trends, etc.

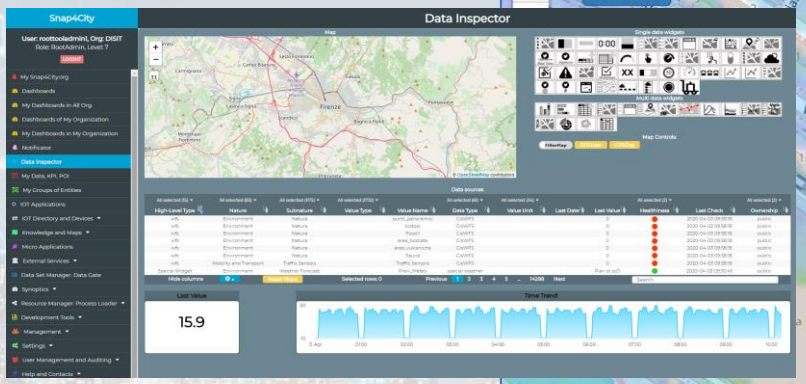
https://www.snap4city.org/download/video/course2020/da/Snap4City-4th-slot-Data-Analytic-v4-6.pdf

Solutions: reliable, secure and fast to realize

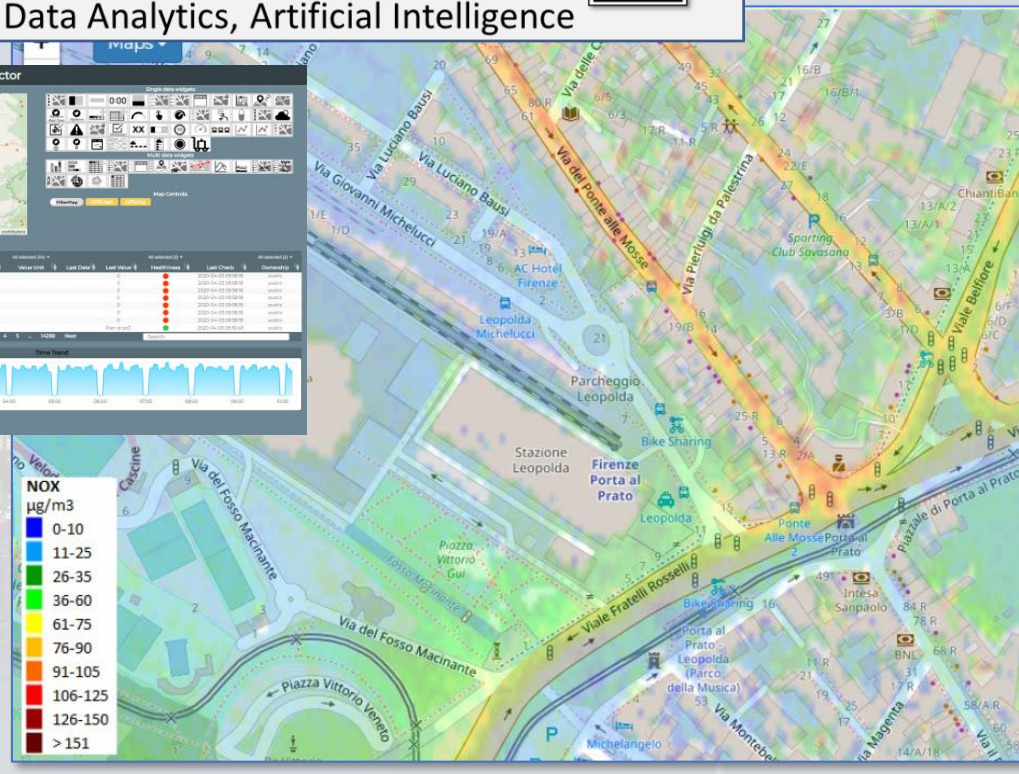
- **Via Snap4City tools**
  - **Dashboard Wizard**
  - **Dashboard Builder**
  - **Data/Visual Analytic**

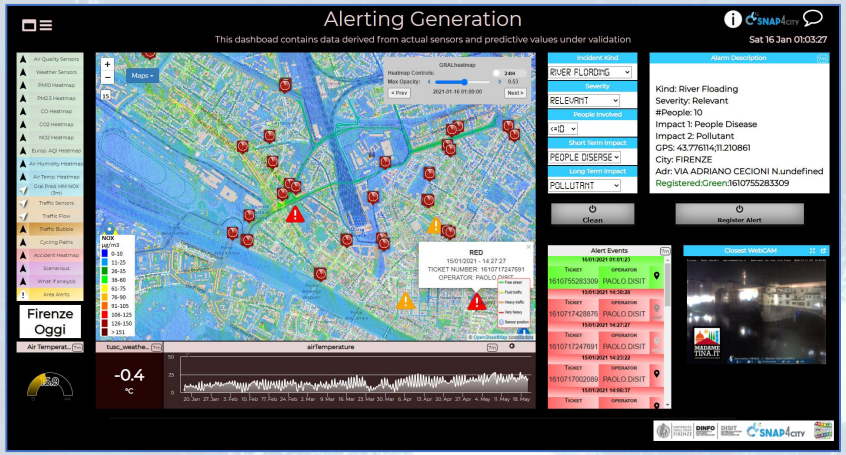
- **Smart Solutions results to be**
  - **Real time data drive**
  - **Secure end-to-end**
  - **GDPR compliant**
  - **Reliable, interoperable**
  - **Auditable, marketable**

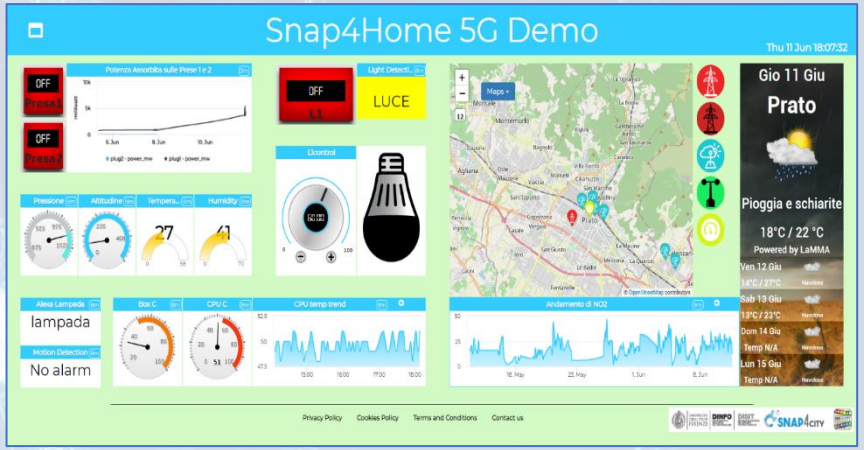


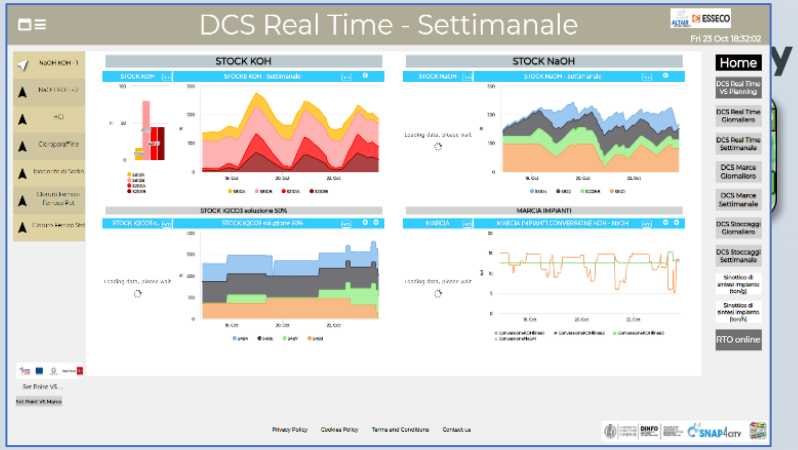


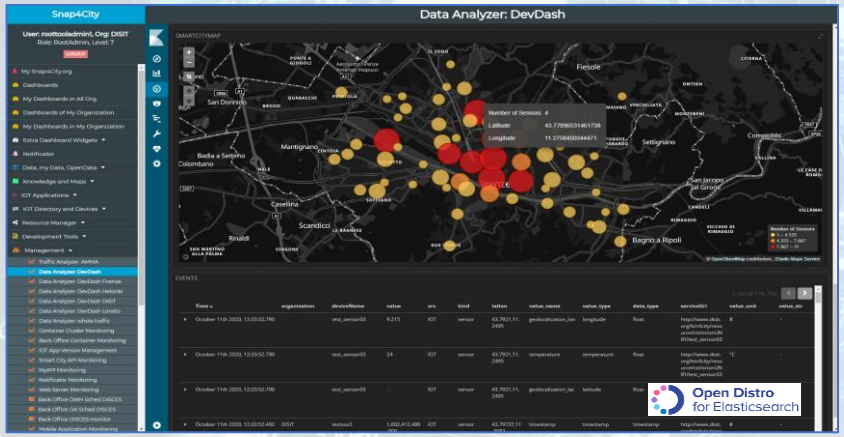


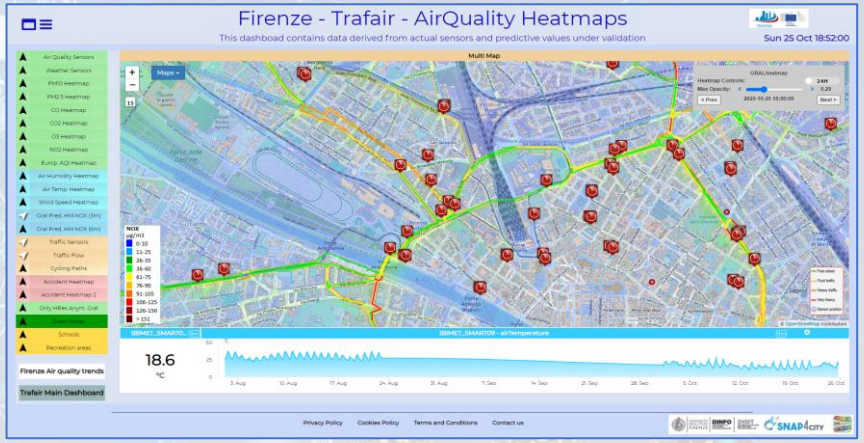


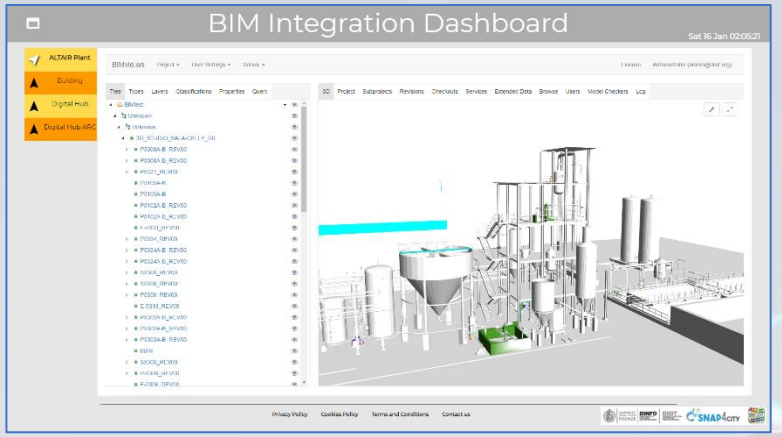

Alerting Generation
This dashboad contains data derived from actual sensors and predictive values under validation
Sat 16 Jan 01:03:27
Firenze Oggi
-0.4

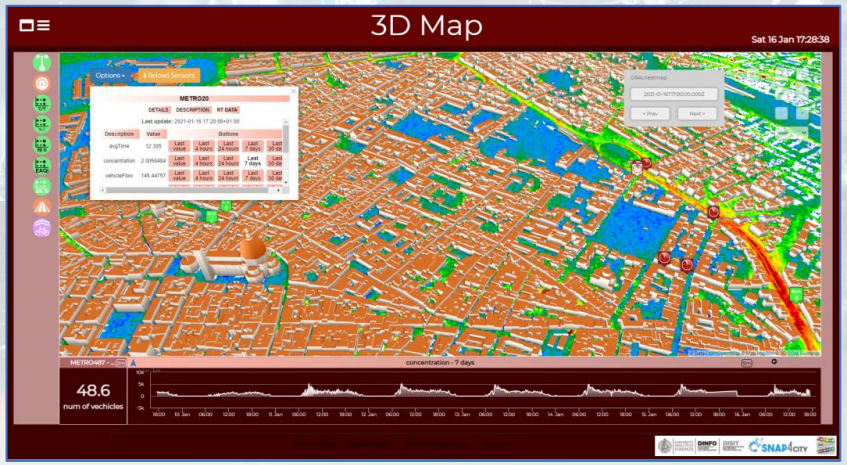

Snap4Home 5G Demo
Thu 11 Jun 18:07:32
LUCE
lampada
No alarm
Gio 11 Giu
Prato
Pioggia e schiarite
18°C / 22 °C

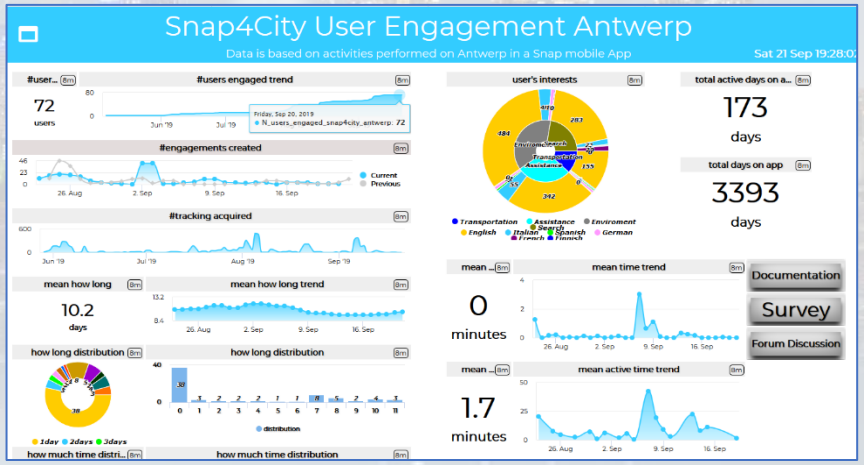

DCS Real Time - Settimanale
Fri 23 Oct 18:32:02
STOCK KOH
STOCK NaOH

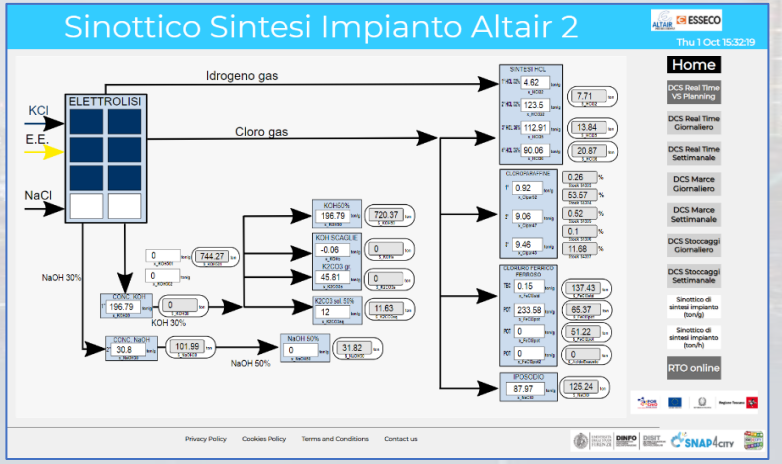

Data Analyzer: DevDash
Open Distro for Elasticsearch


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
72
users
173
days
3393
days
0
minutes
1.7
minutes
10.2
days
Documentation
Survey
Forum Discussion

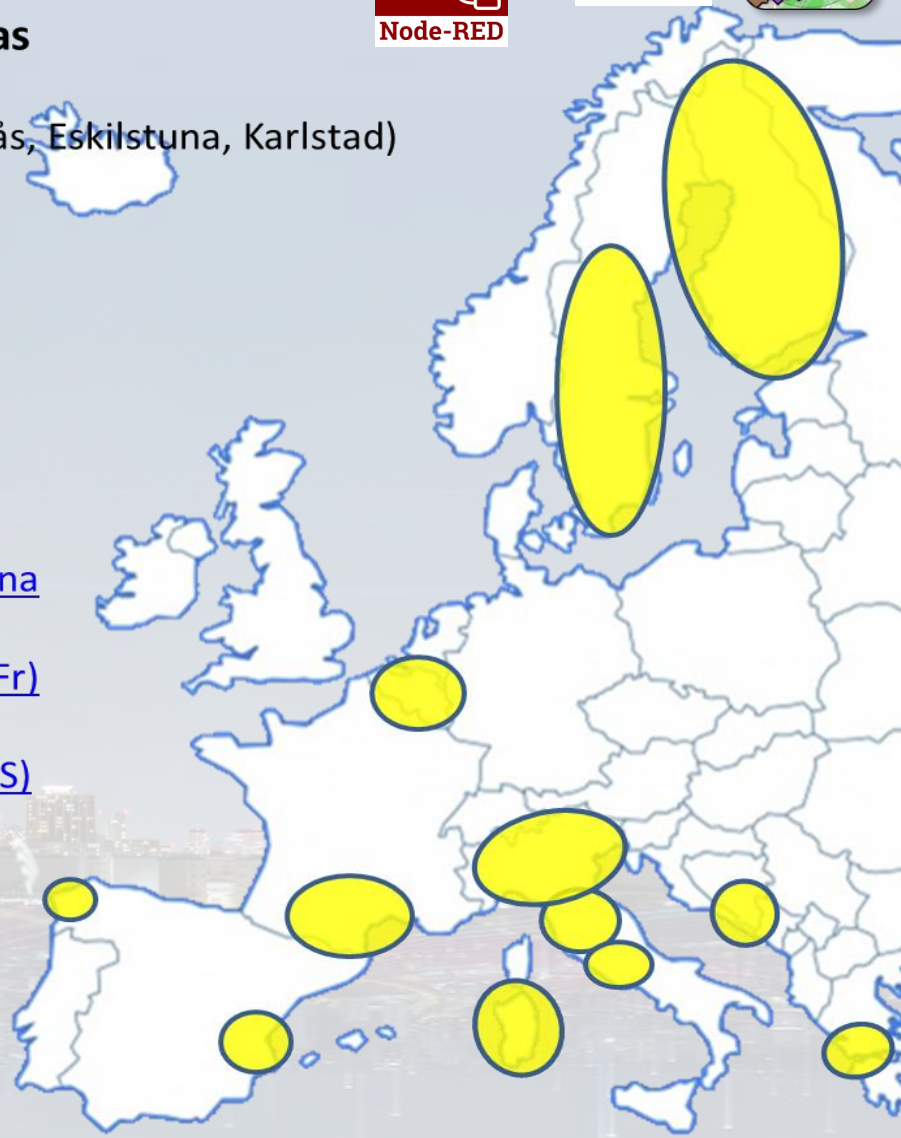

Sinottico Sintesi Impianto Altair 2
Thu 1 Oct 15:32:19
Idrogeno gas
Cloro gas
ELETTROLISI
KCl
E.E.
NaCl
NaOH 30%
KOH 30%
NaOH 50%

https://www.Snap4City.org

- > 7 running installations
  - Pisa, Toscana, Sweden, ISPRA, Snap4.eu,
  - Altair, Italmatic, ….
- 13 projects, 12 pilots on 9 Countries
  - >40 cities/area
- **Wide MULTItenant deploy, e.g.,**
  - 18 Organizations / tenant
  - > 7000 users on
  - > 1300 Dashboards
  - > 15 mobile Apps
  - **> 2 Million of structured data per day**
  - > 500 IoT Applications/node-RED
  - > 700 web pages with training
  - > 45 videos, training videos

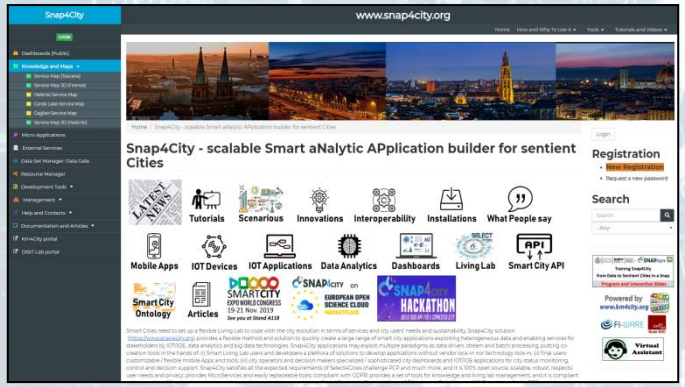
Main Organizations/areas

- 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)
- ……
- …..



How to adopt Snap4City

Https://www.snap4city.org



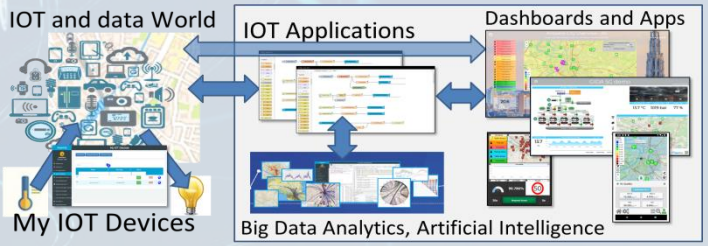
Smart City as a Service

- Supporting Org
- 100% Open Source Platform: Github
- Further developments
- Publishing Appliances and Dockers
- Training courses, docs
- Consulting
- Forums
- Etc.

SNAP4CITY on EUROPEAN OPEN SCIENCE CLOUD MARKETPLACE

Download and deploy

On your premise





Installation on your premise

- **Virtual Machines or Dockers**
- Different configurations
  - From small to scalable
  - Exploiting your legacy tools
  - Interoperable with any tool
- No vendor lock-in, No tech lock-in

Mixed solutions! For example:

- Start on Cloud as Smart City as a Service
  - Migrate on premise on the fly
- Start on Cloud into a sand box
  - Pass to install on premise what you need

Domains

- Smart City, control room
- Green Deal, smart light, ..
- Environment, pollutant, ..
- Mobility and transport
- Tourism and People
- Energy , Industry
- Social Media

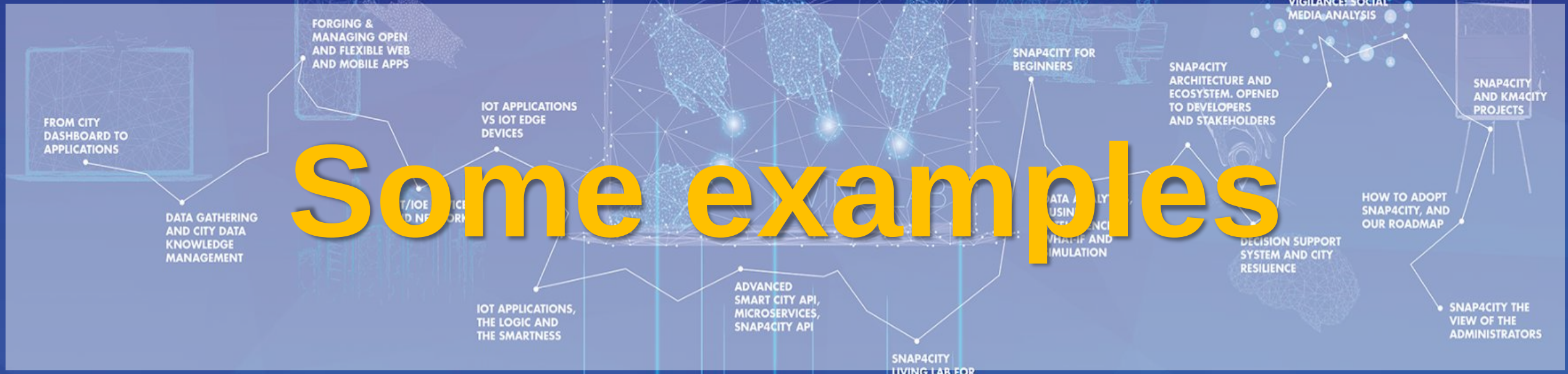
- Big Data
- Artificial Intelligence
- Public and private data



Publications http://www.disit.org/5487

TOP

Some examples



100% OPEN SOURCE

SNAP4 Appliances and Dockers **Installations**

Florence

https://www.snap4city.org/747



Smart City Control Room
Florence Metropolitan City

COMUNE DI FIRENZE

reference

SNAP4CITY

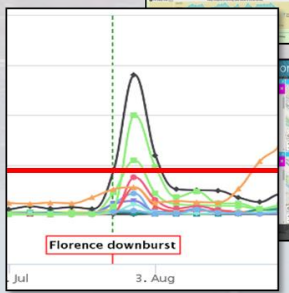
KM 4 CITY

- **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

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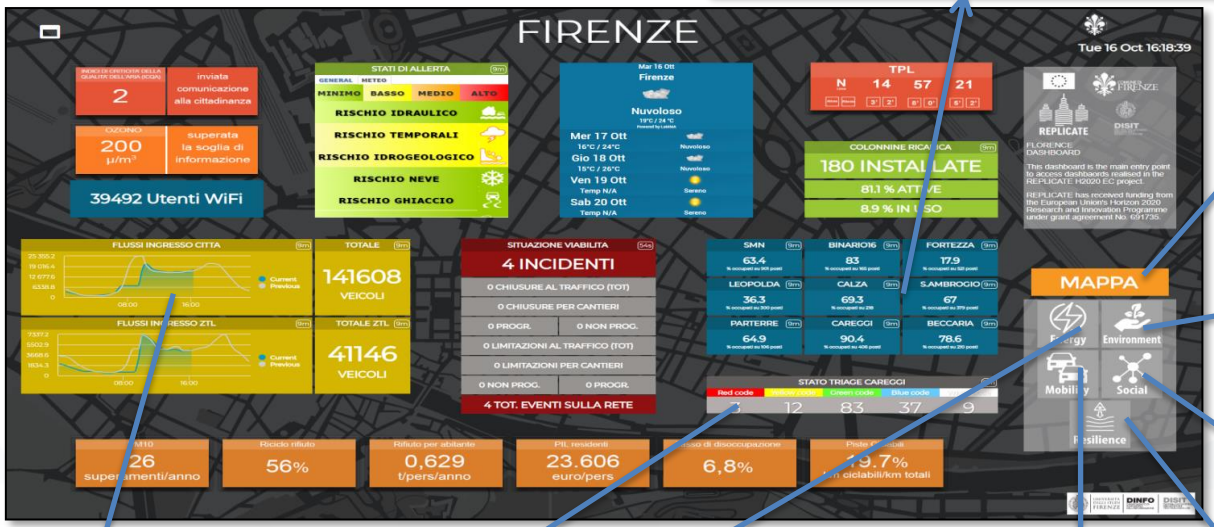
DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE

DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB

REPLICATE

KM4CITY

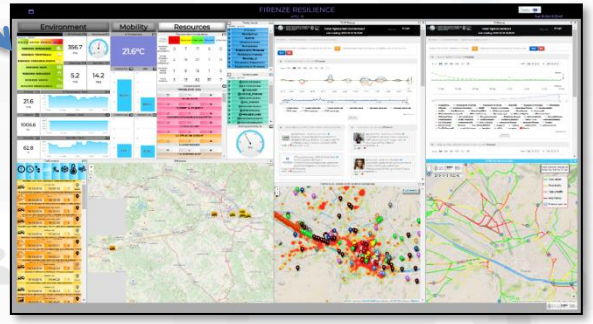


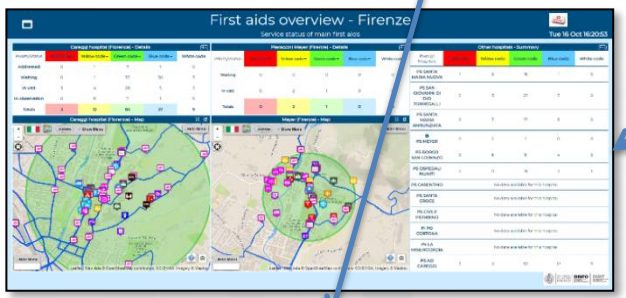




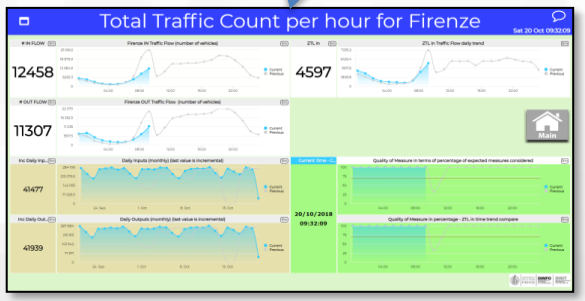






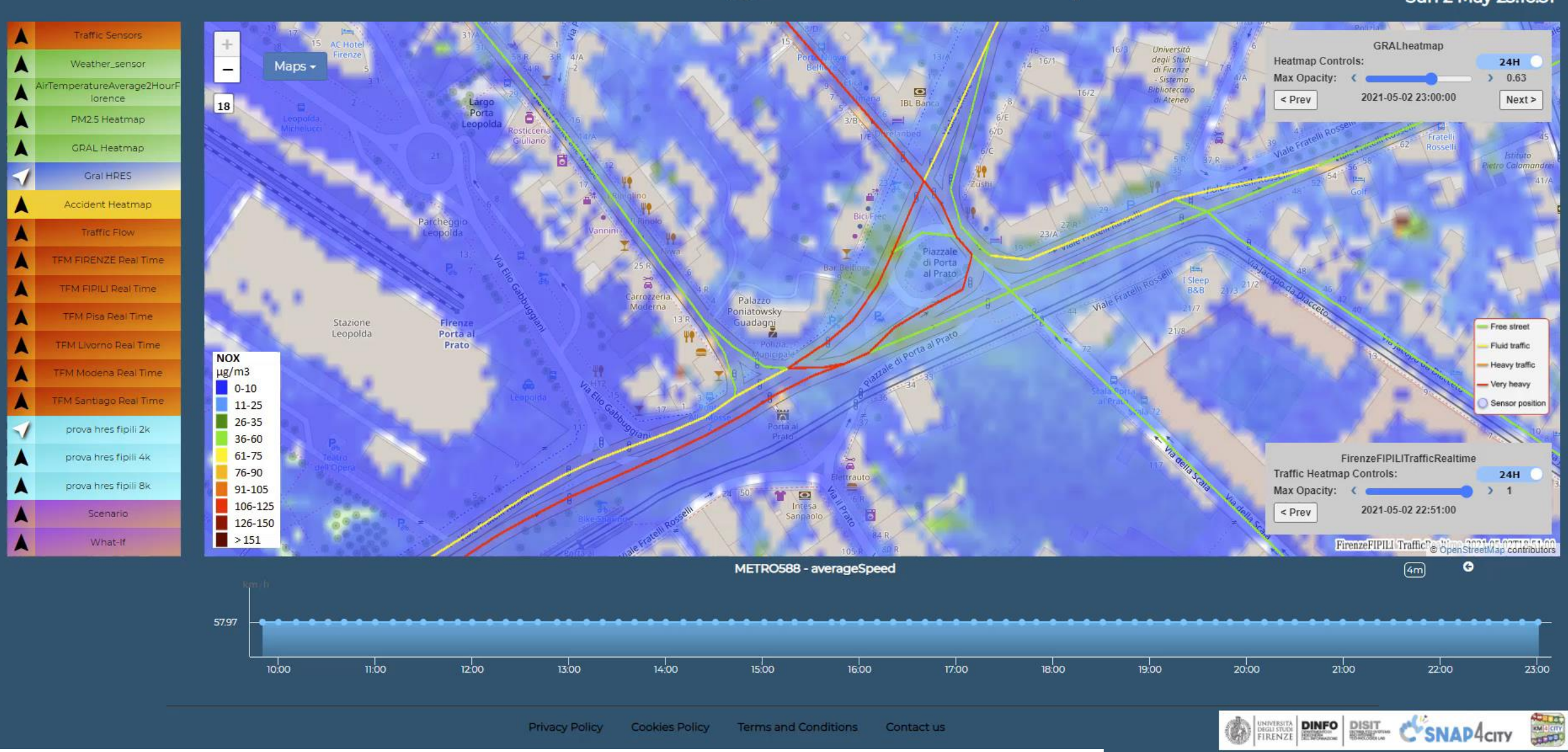








Traffic Flow Manager on multiple cities



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

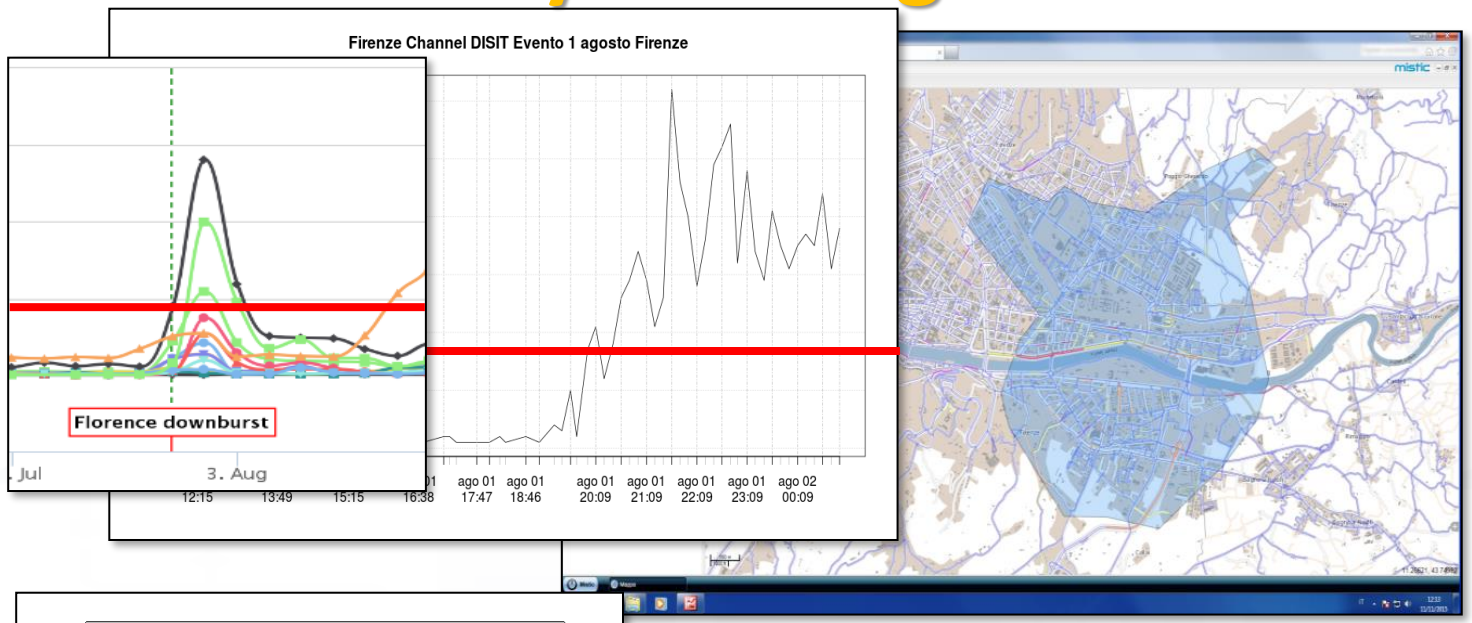
3D views

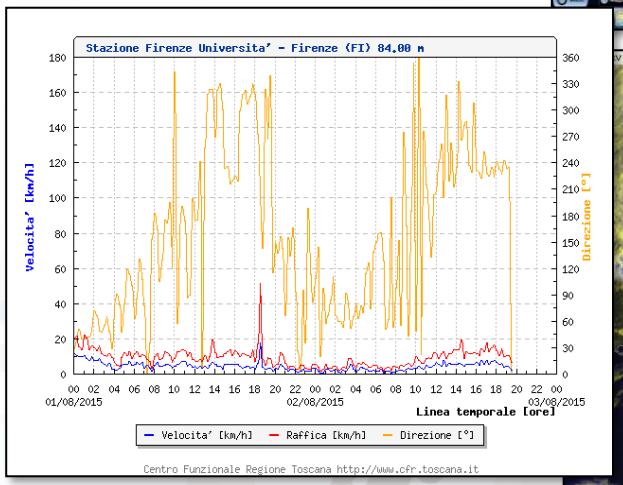


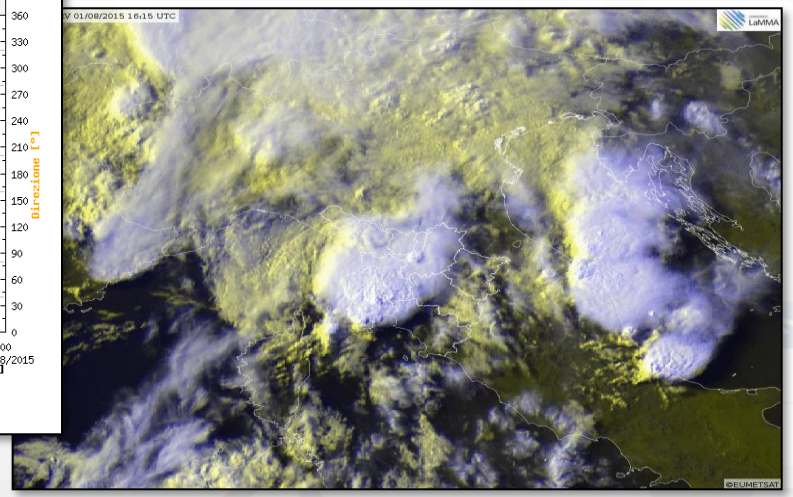
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjUxMA==

Twitter Vigilance

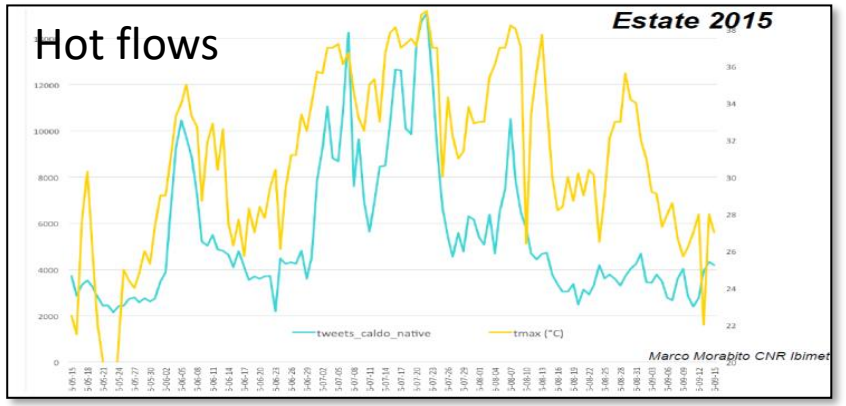
Early Warning







Predictive models



Attendance at long lasting events: EXPO2015

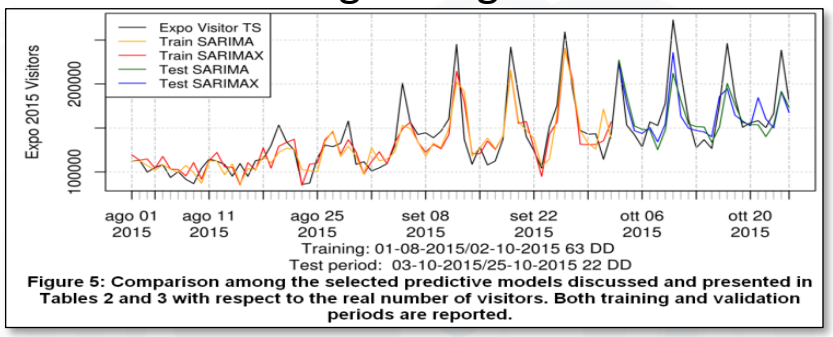
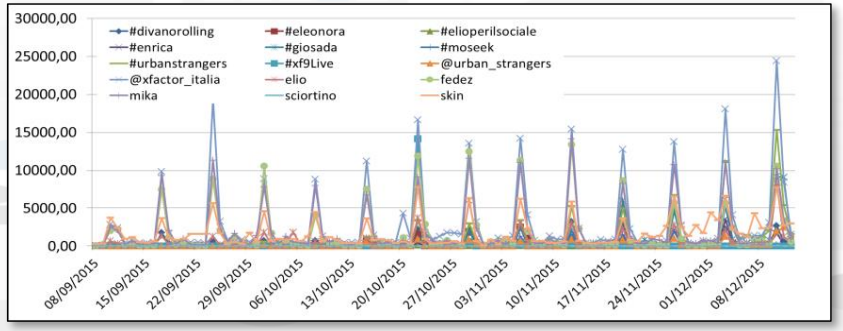


Figure 5: Comparison among the selected predictive models discussed and presented in Tables 2 and 3 with respect to the real number of visitors. Both training and validation periods are reported.

Attendance at recurrent events: TV, footbal



Tuscany Region

https://www.snap4city.org/760

Firenze, Pisa, Livorno, Prato, etc.

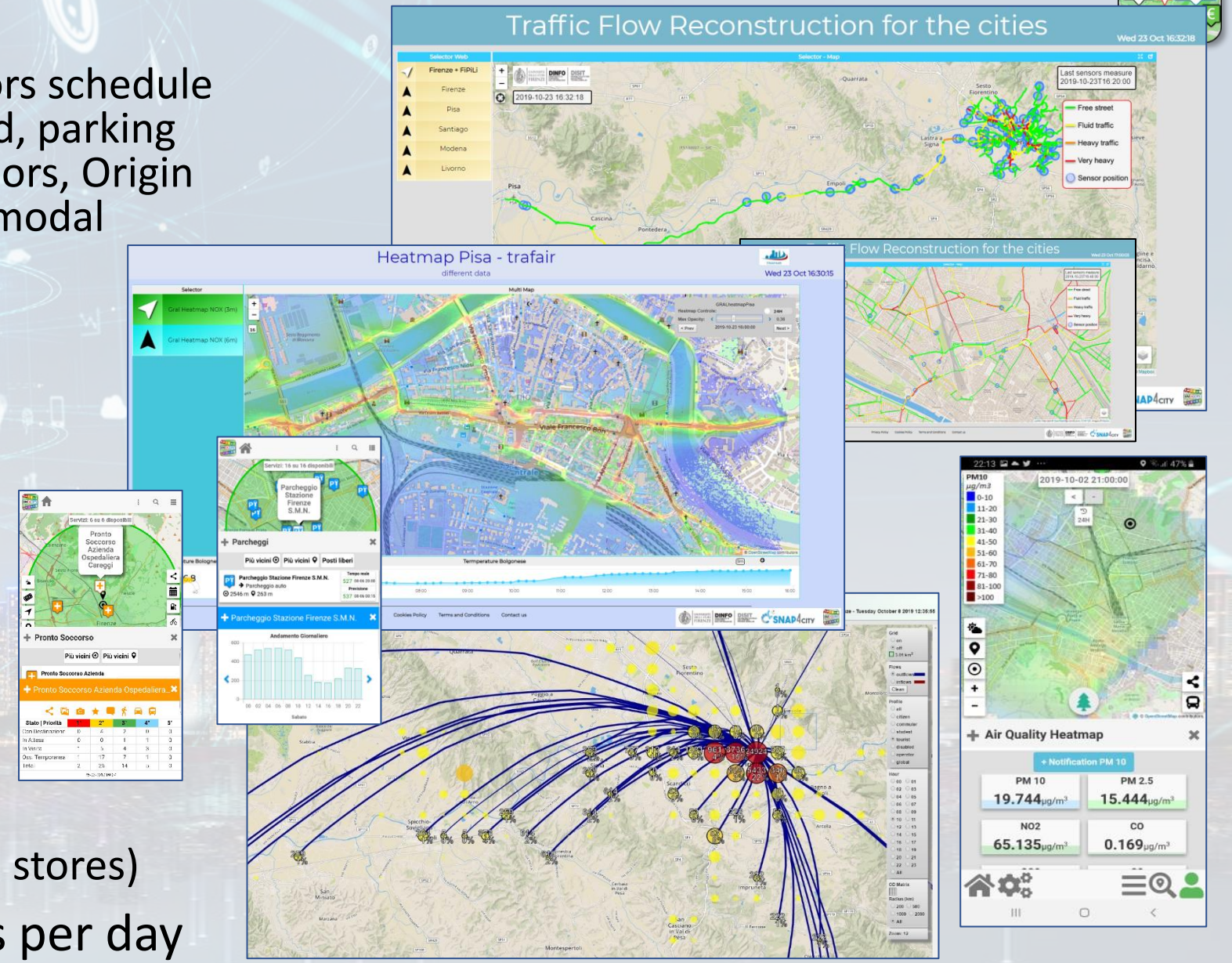






Tuscany Region

- **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

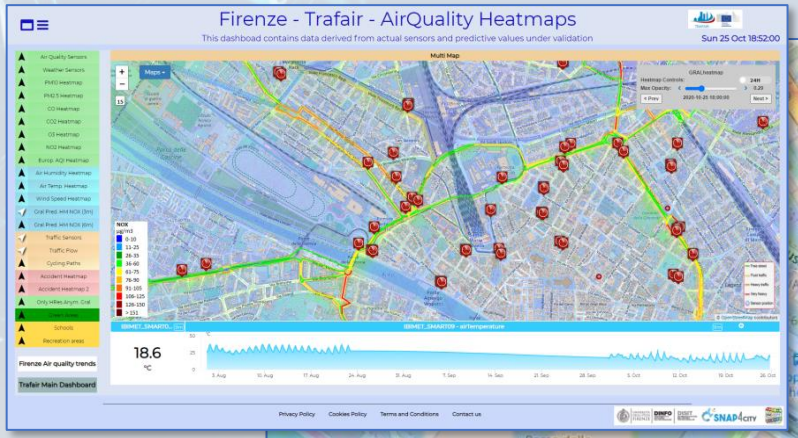


Environment and Quality of Life
Air Quality Predictions

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	

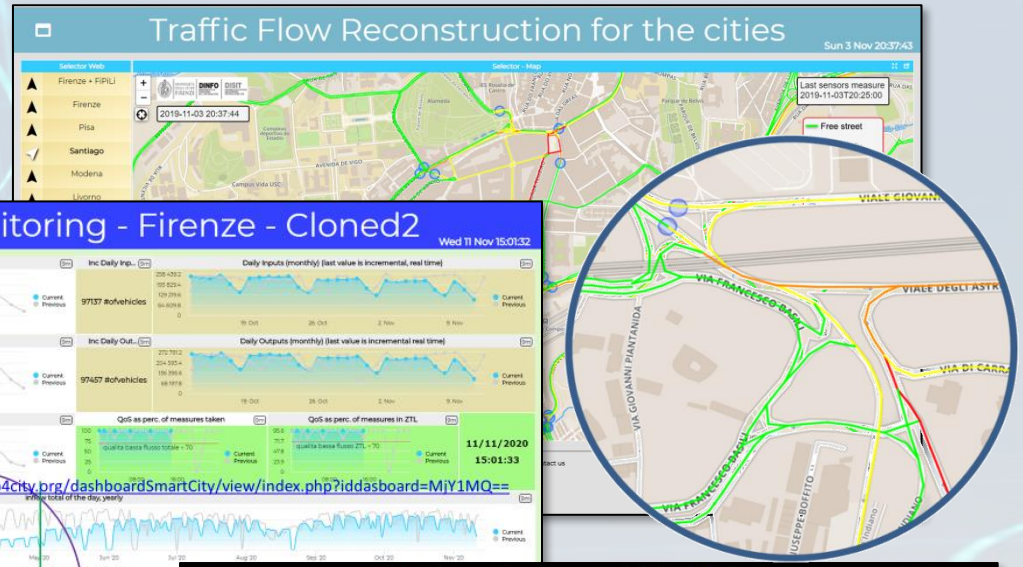
KPI of EC

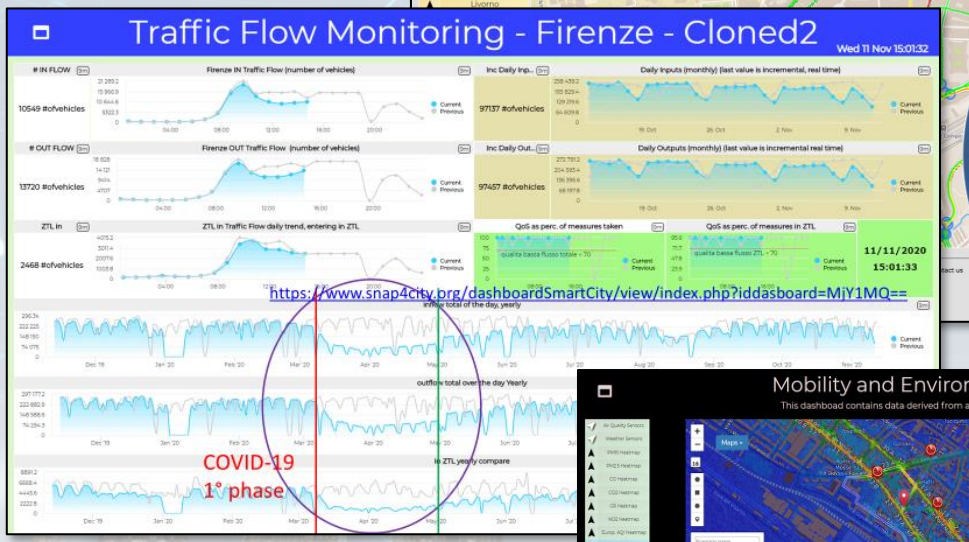
Mobility and Transport Traffic Flow Analysis

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

reference

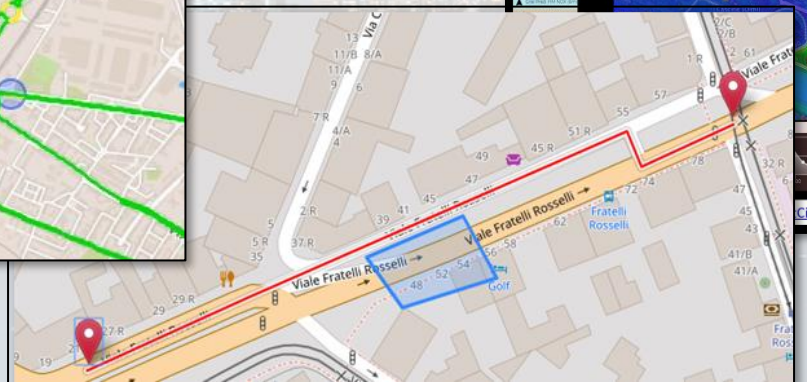
- **Multiple Domain Data**
  - Traffic Flow sensors, city structure, weather
- **Decision Makers Multiple Locations**
  - Real time Monitoring, predictions
  - Traffic Flow Predictions,
  - Traffic Reconstructions, routing
  - Dashboards, What-IF analysis
  - Mobile App, people flows
- **Historical and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



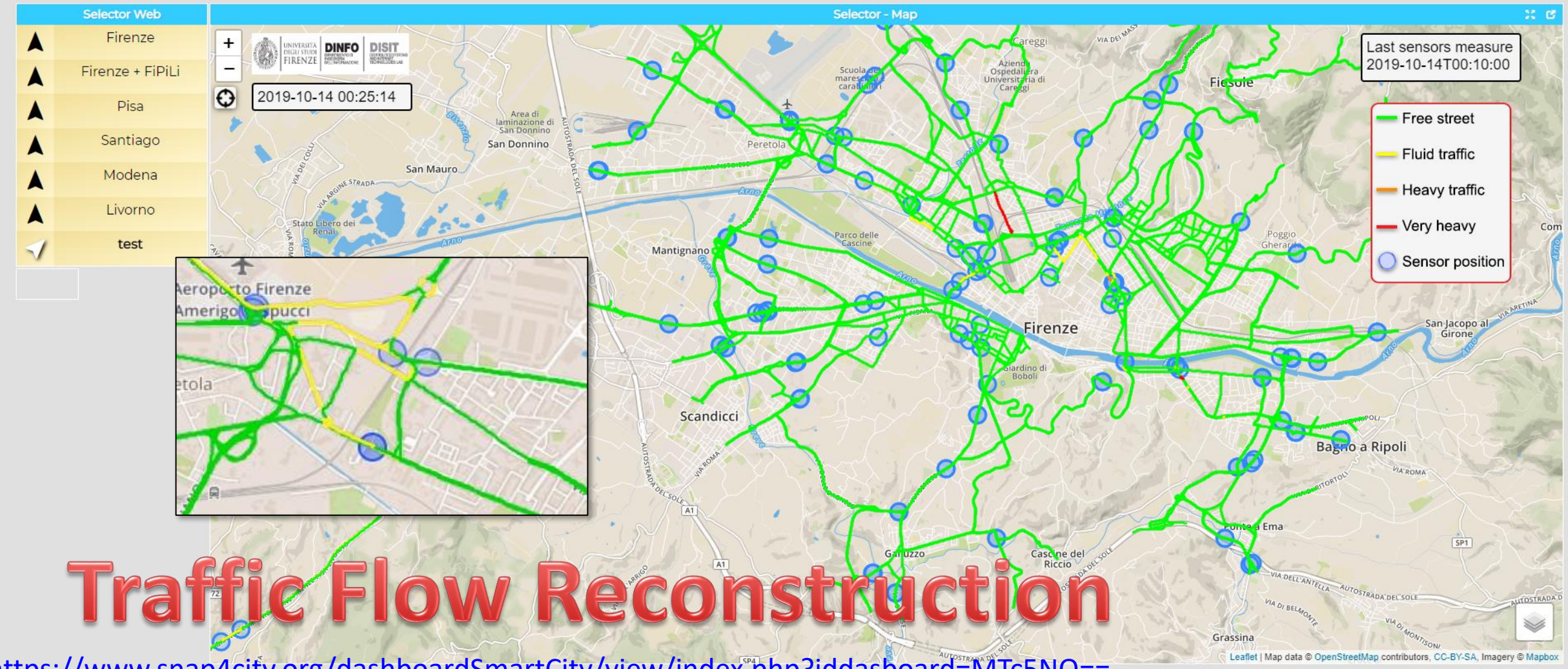








Traffic Flow Reconstruction for the cities



Traffic Flow Reconstruction

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

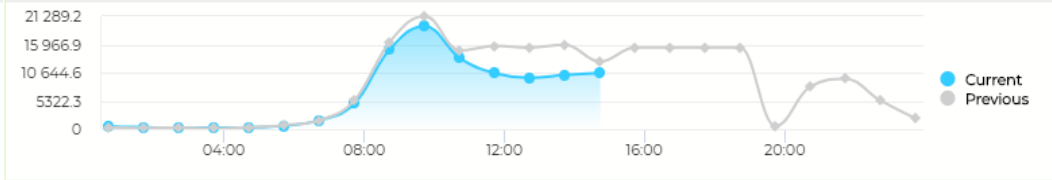
Traffic Flow Monitoring - Firenze - Cloned2

Wed 11 Nov 15:01:32

 # IN FLOW 9m

10549 #ofvehicles

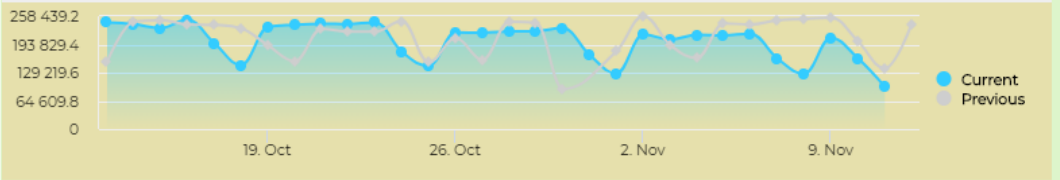
Firenze IN Traffic Flow (number of vehicles) 9m



Inc Daily Inp... 9m

97137 #ofvehicles

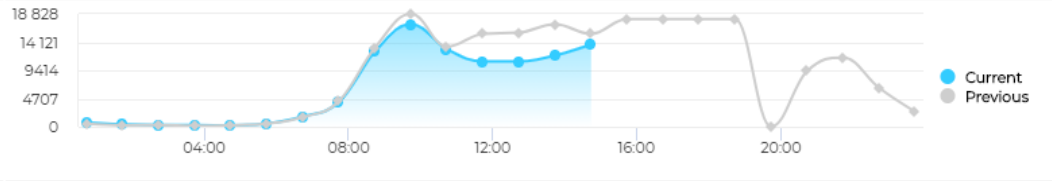
Daily Inputs (monthly) (last value is incremental, real time) 9m



 # OUT FLOW 9m

13720 #ofvehicles

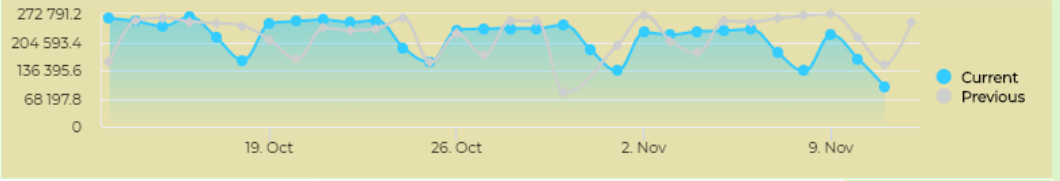
Firenze OUT Traffic Flow (number of vehicles) 9m



Inc Daily Out... 9m

97457 #ofvehicles

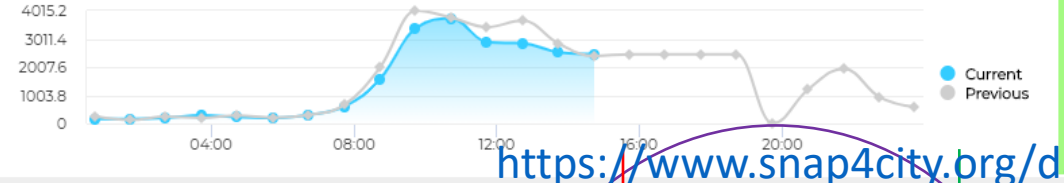
Daily Outputs (monthly) (last value is incremental real time) 9m



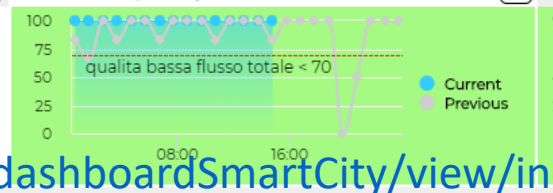
ZTL in 9m

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

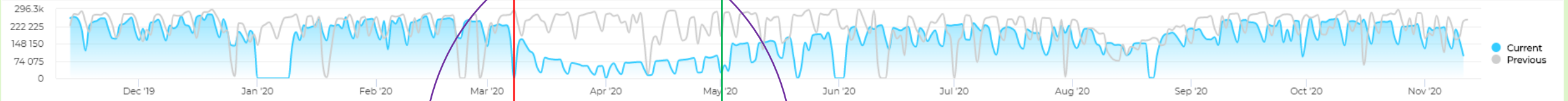


11/11/2020

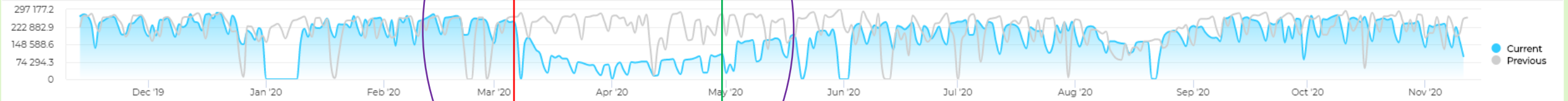
15:01:33

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

inflow total of the day, yearly 9m



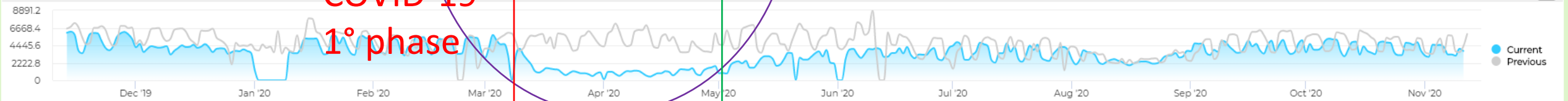
outflow total over the day Yearly 9m



COVID-19

1° phase

in ZTL yearly compare 9m



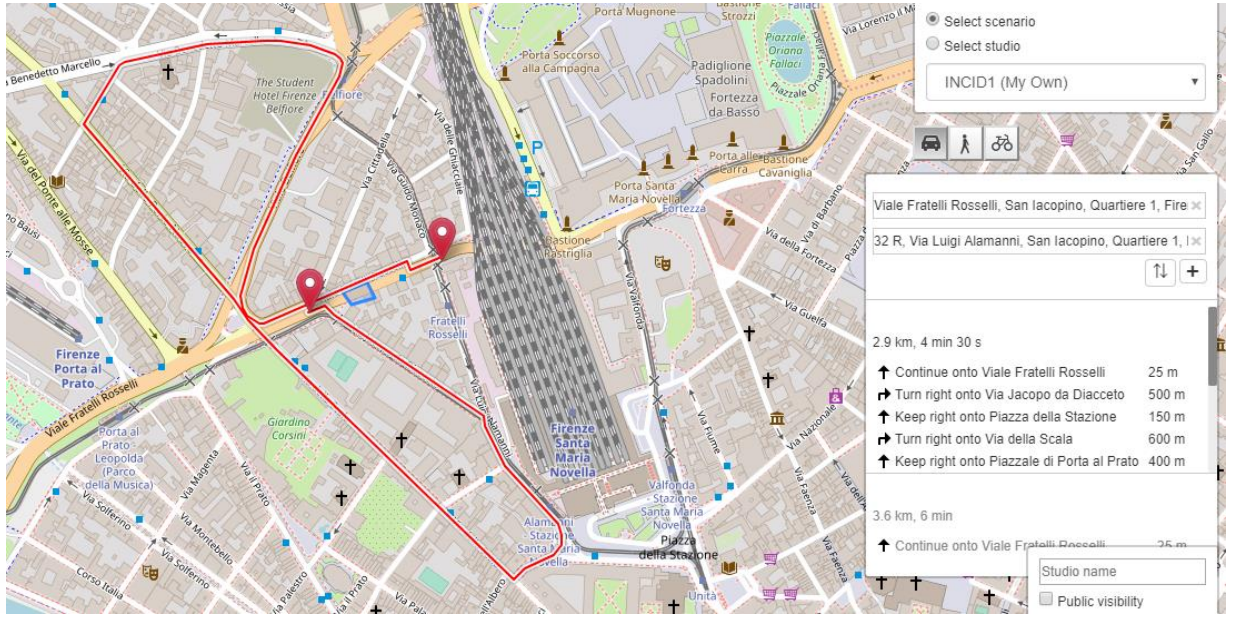
What-If Analysis

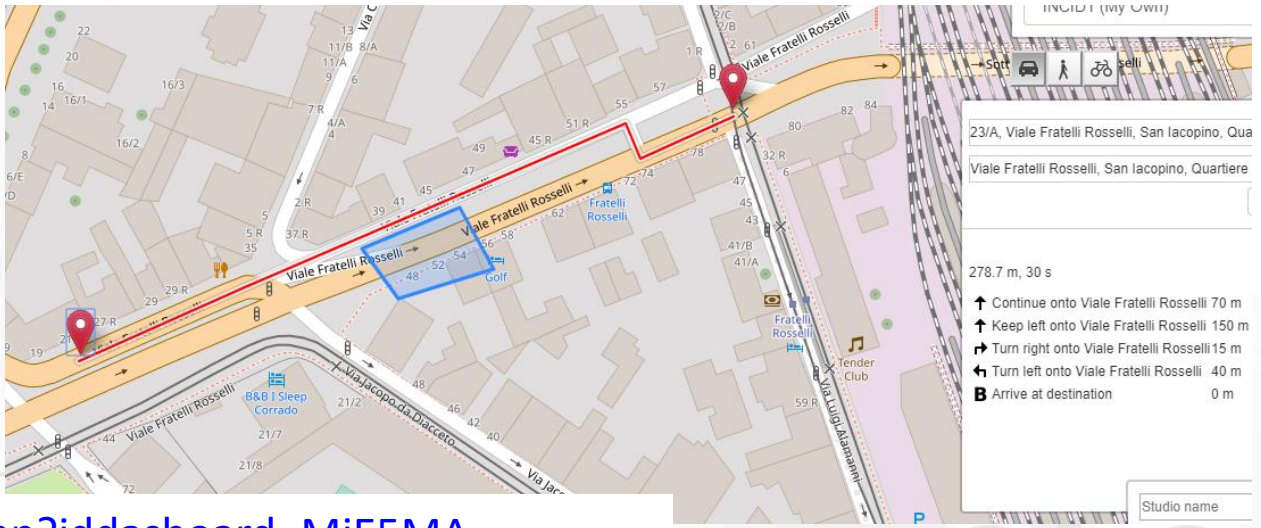
Accidents and elements blocking Points and Shapes taken into account for:

- 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

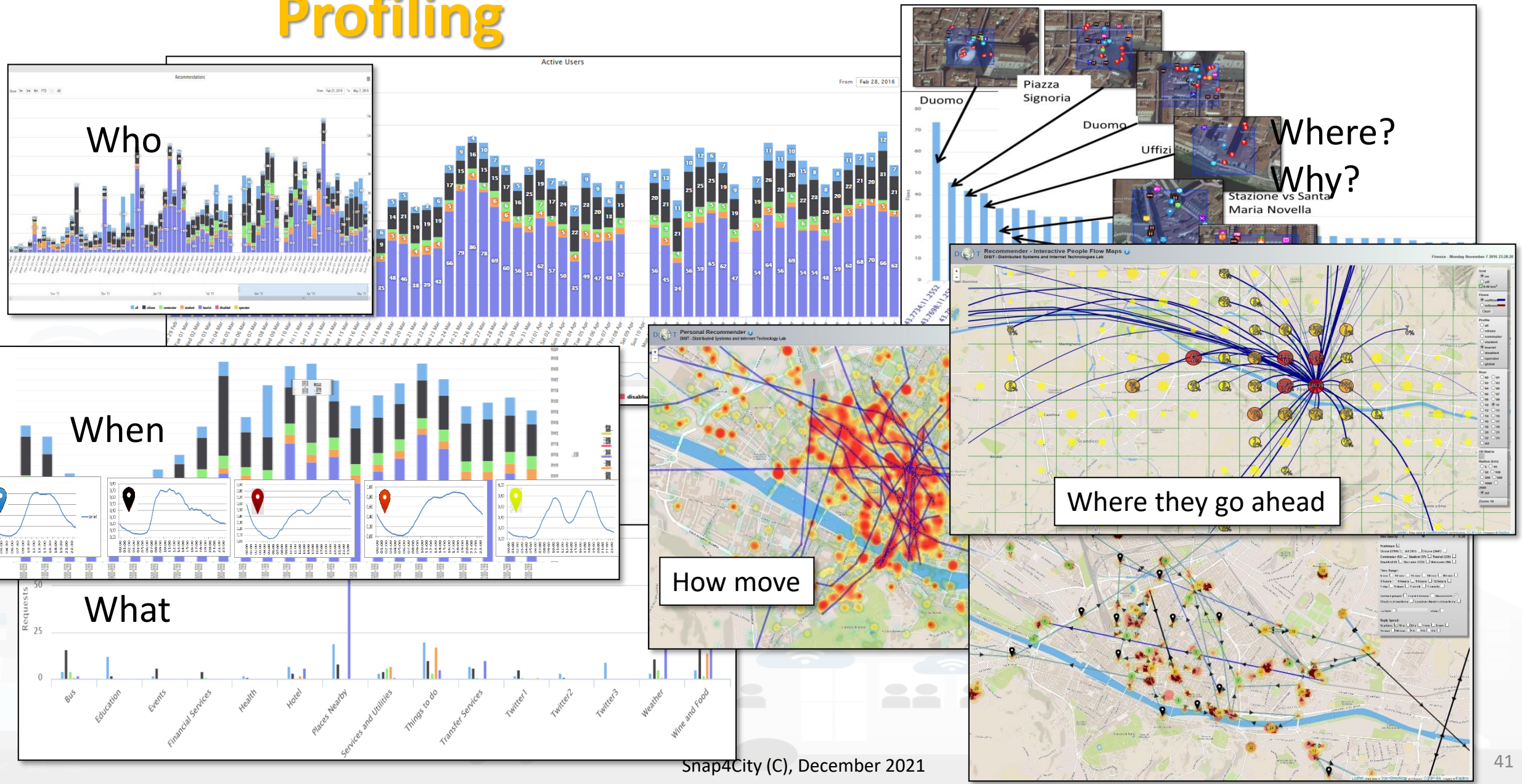
- Trajectories
- Hot Places by click and by move
- Origin destination matrices
- Most interested topics
- Most interested POI
- Delegation and relationships
- Accesses to Dashboards
- **Cumulated Scores from Actions**
- Requested information
- Routing performed
- …..

Produced information

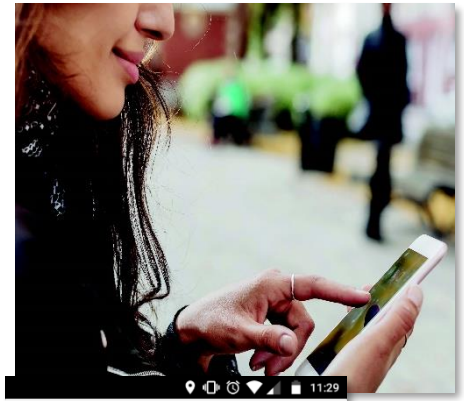
- Suggestions
- Engagements
- Notifications
- …

System

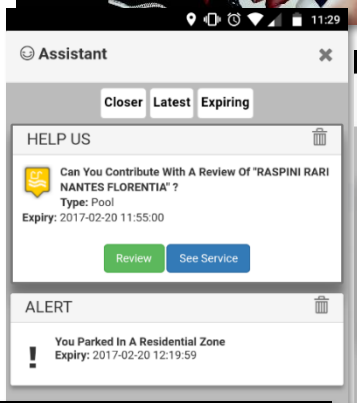
User Behavior Analyser for Collective Profiling

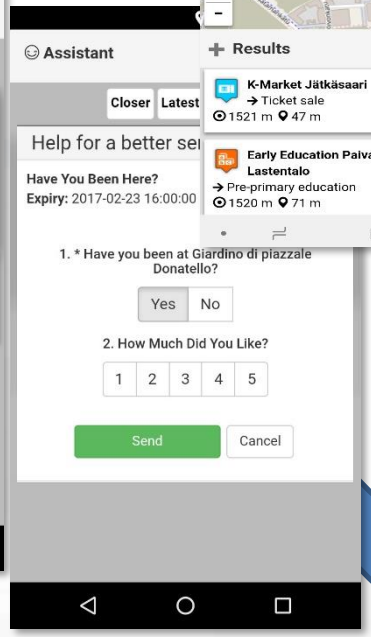


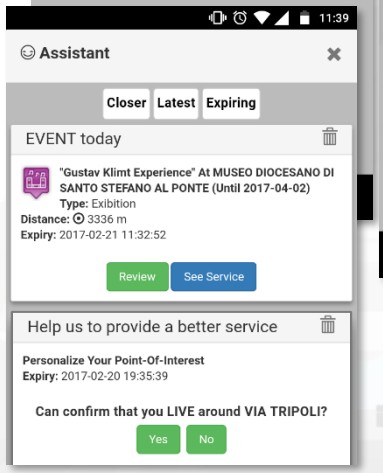
Users' Engagement

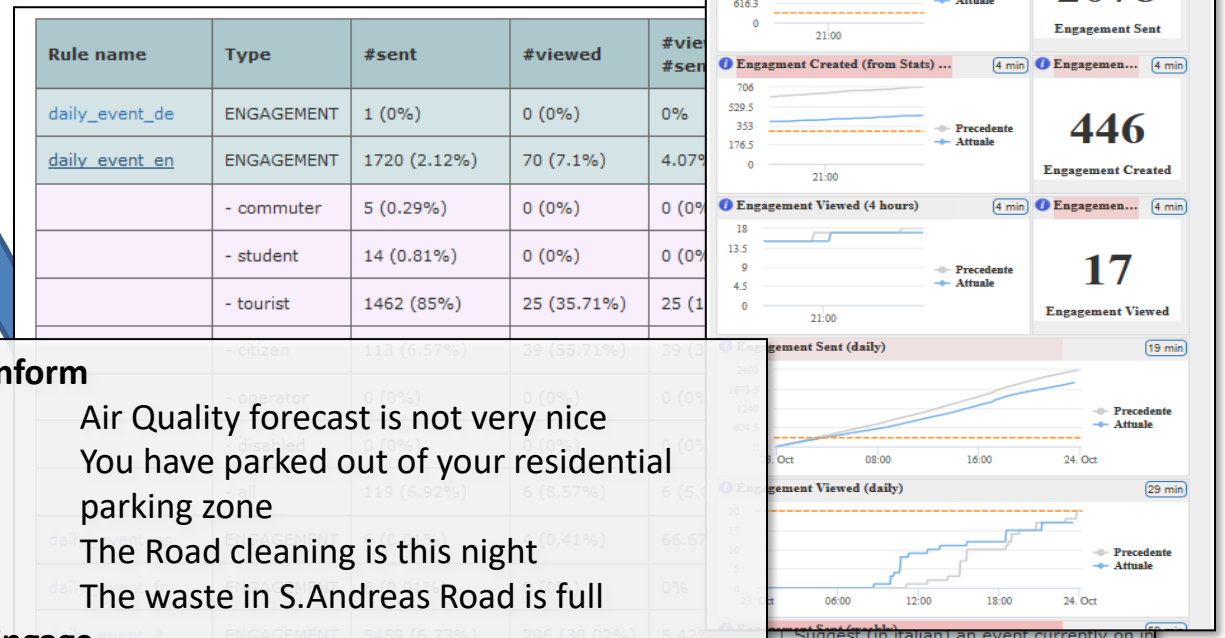




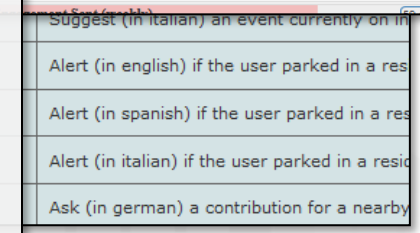








Rule name	Type	#sent	#viewed	#vie #sen
daily_event_de	ENGAGEMENT	1 (0%)	0 (0%)	0%
daily_event_en	ENGAGEMENT	1720 (2.12%)	70 (7.1%)	4.07%
	- commuter	5 (0.29%)	0 (0%)	0 (0%
	- student	14 (0.81%)	0 (0%)	0 (0%
	- tourist	1462 (85%)	25 (35.71%)	25 (1



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

Snap4City (C), Decem



Antwerp, Belgium

https://www.snap4city.org/526



People Monitoring on Pub Services
DIGIPOLIS Antwerp

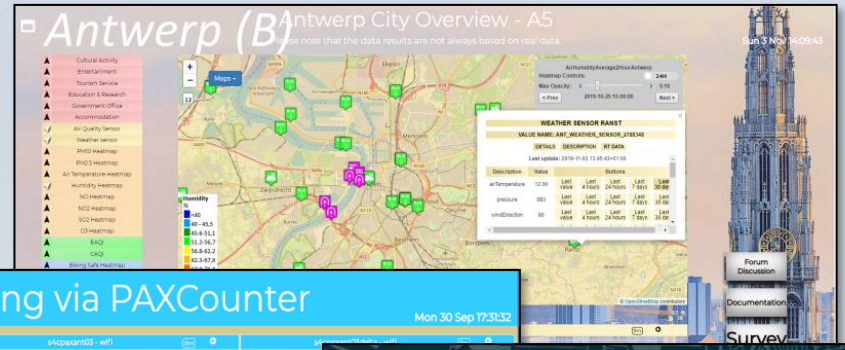
reference

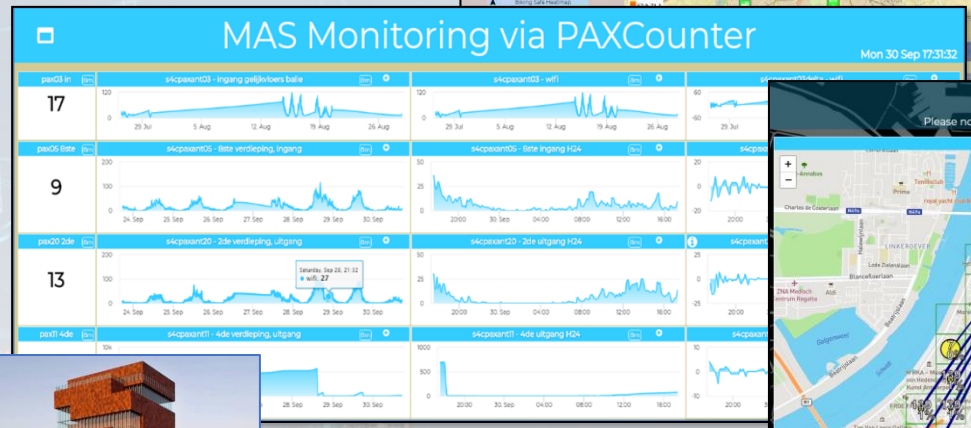
- **Multiple Domain Data**
  - PAX Counters: museum, pub services, COVID-19
- **Multiple Levels & Decision Makers**
  - Business Intelligence Dashboards
  - People flow, OD flows
  - Detection of critical conditions
- **Historical and Real Time data**
  - 20 fixed PaxCounters
  - 2 Mobile PaxCounters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

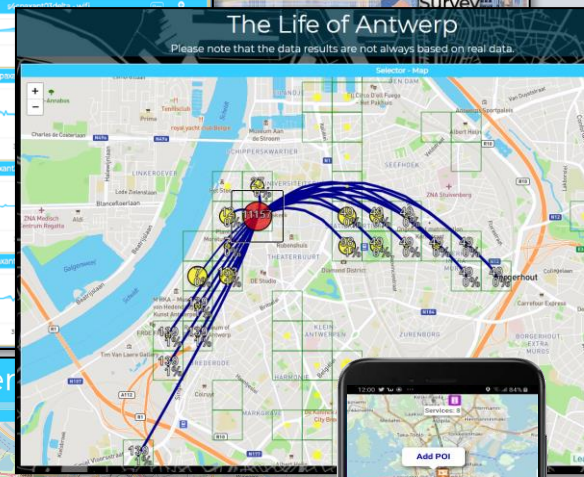






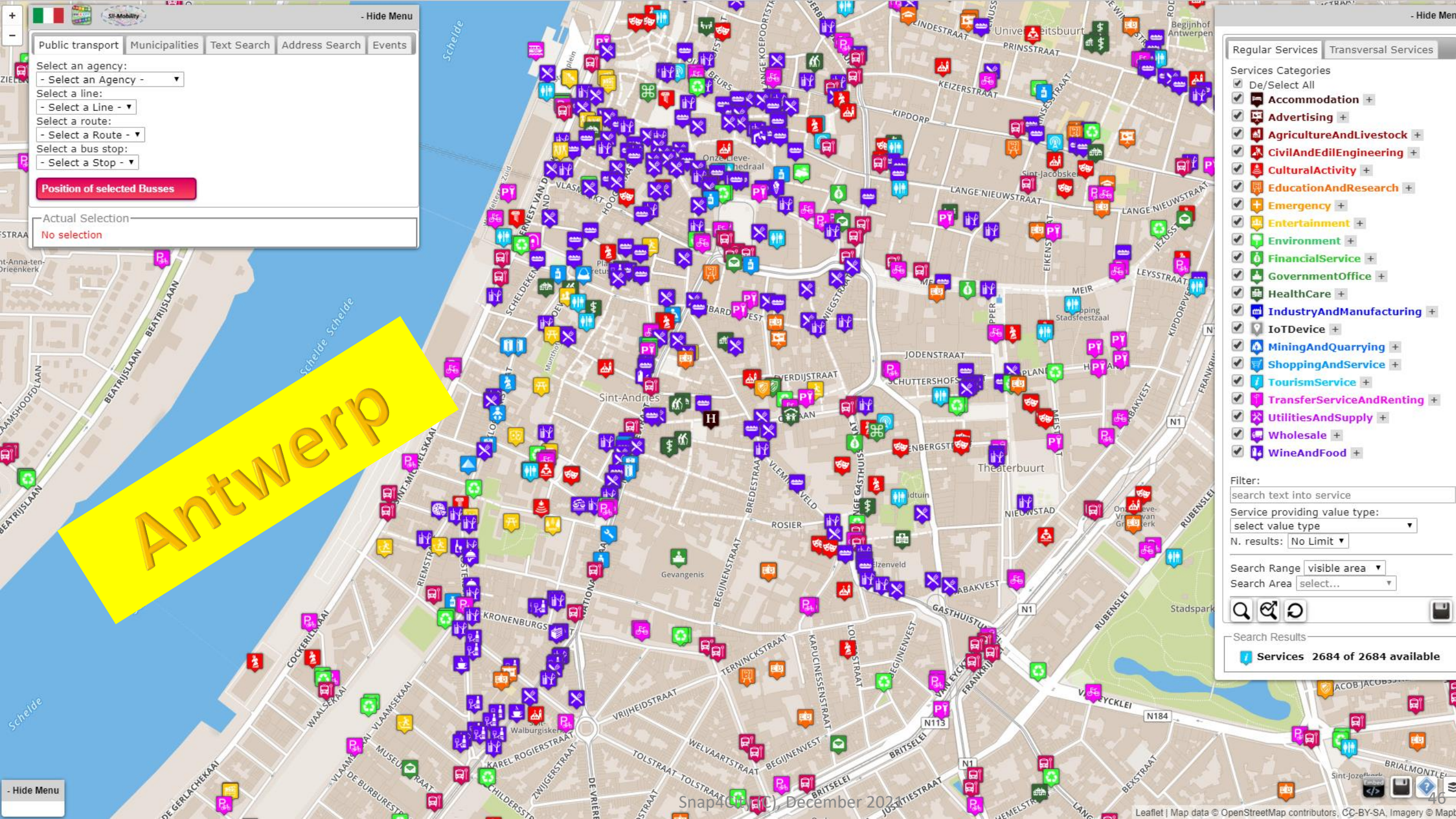










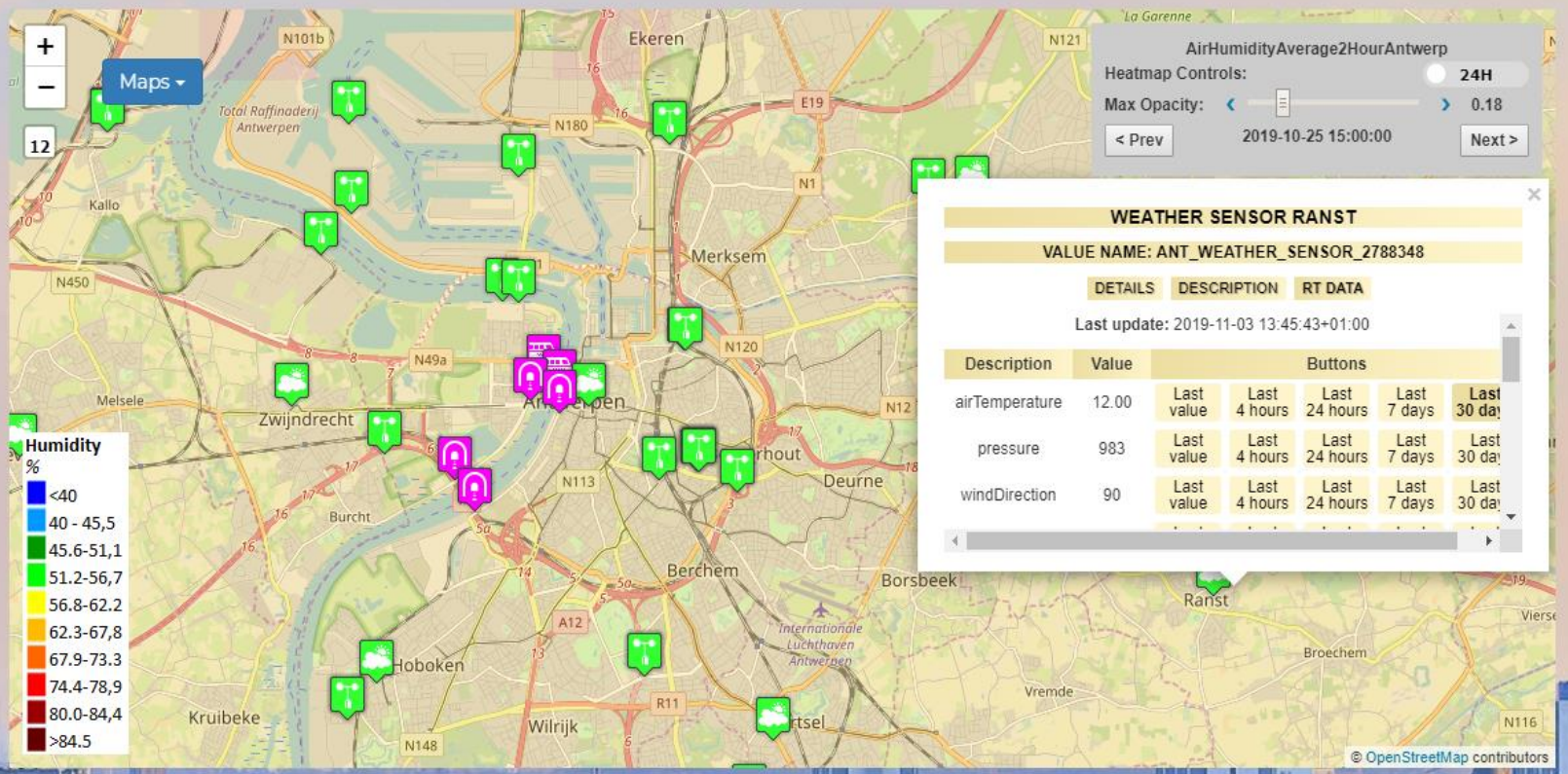

- Hide Menu
Public transport
Municipalities
Text Search
Address Search
Events
Select an agency:
- Select an Agency -
Select a line:
- Select a Line -
Select a route:
- Select a Route -
Select a bus stop:
- Select a Stop -
Position of selected Busses
Actual Selection
No selection
Antwerp
- Hide Menu
Regular 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
Schelde
Sint-Andries
Gevangenis
Theaterbuurt
Nieuwstad
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

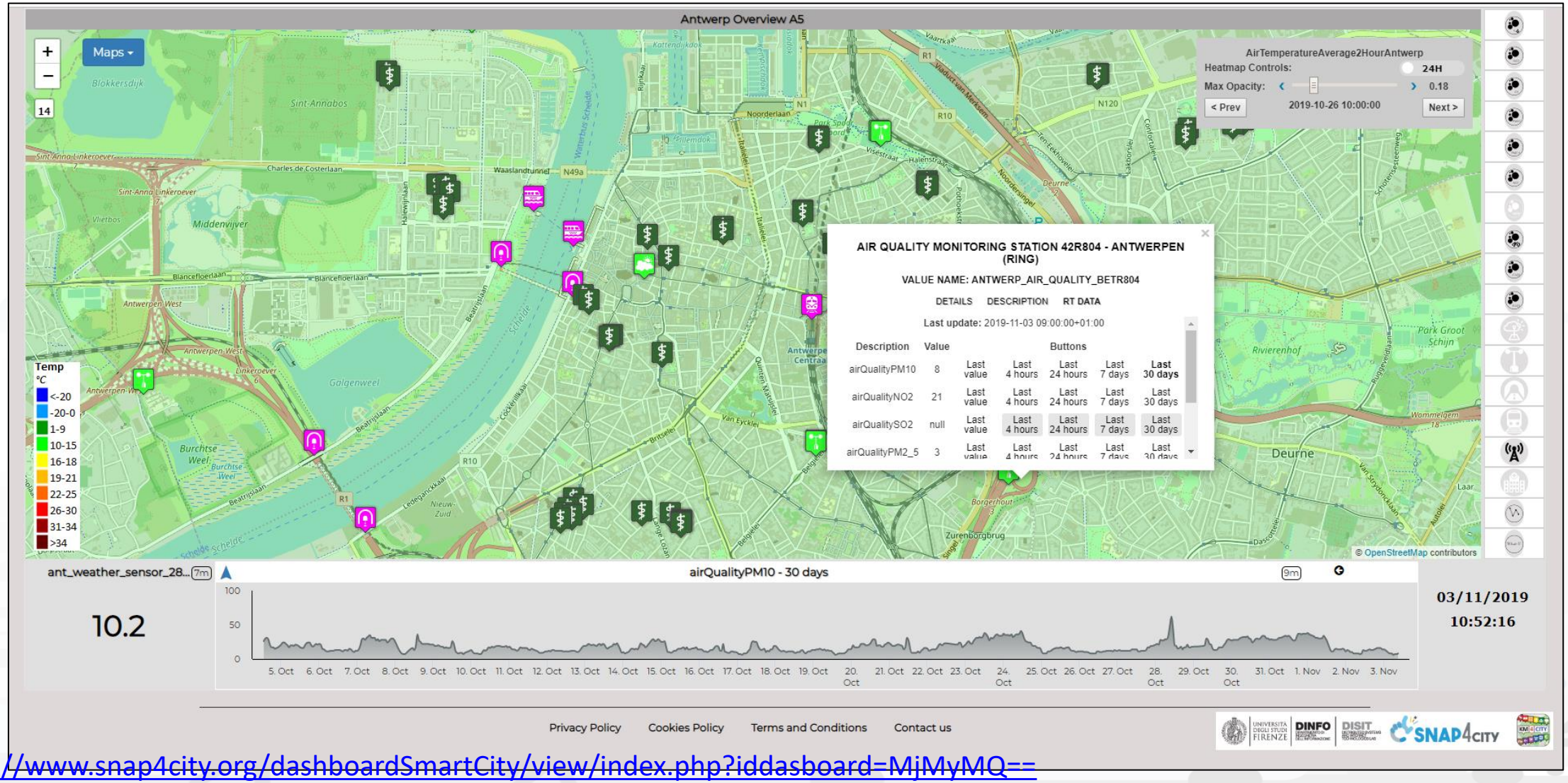
Survey

The Life of Antwerp

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

Antwerp

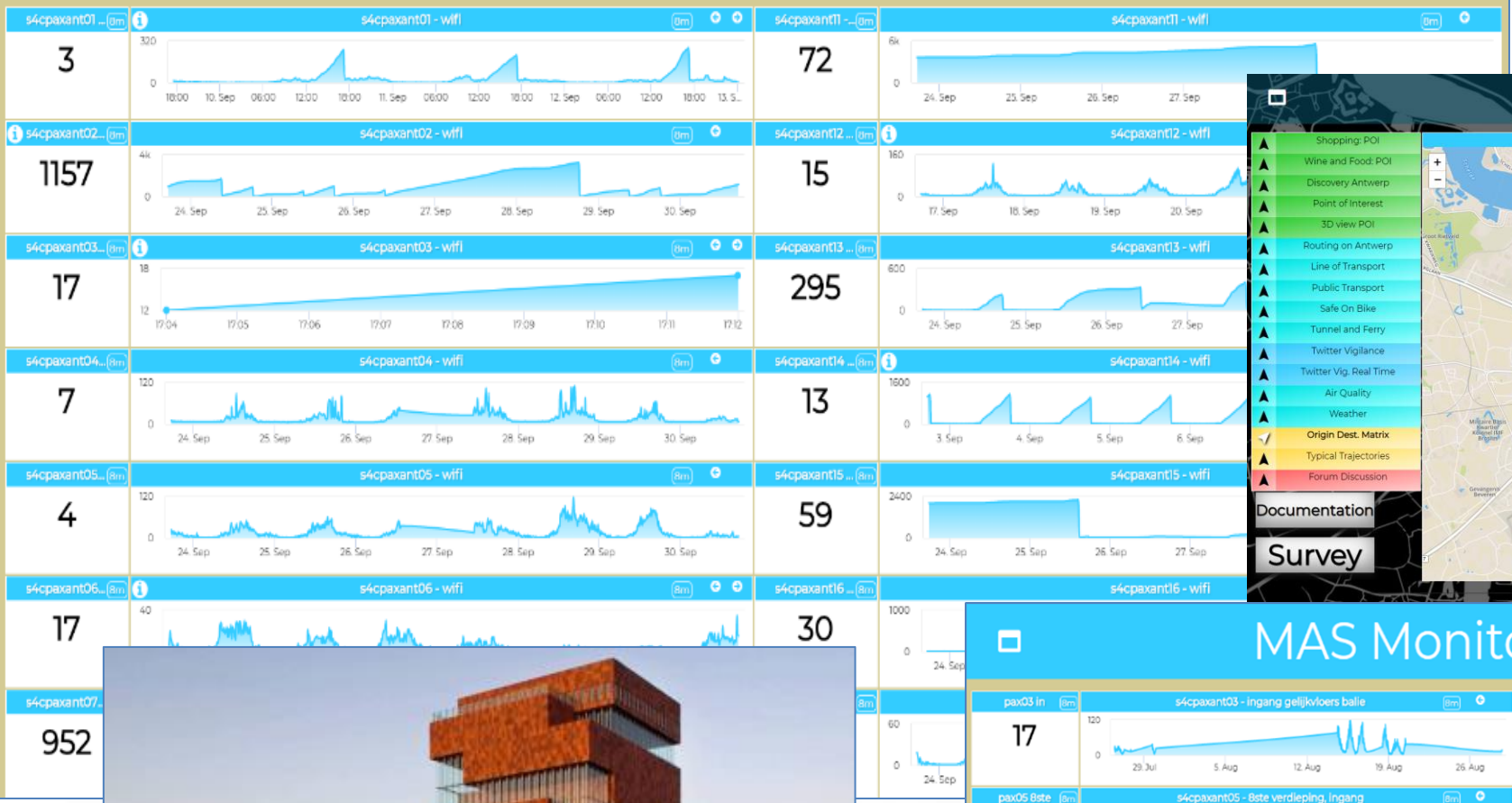
Unique Dashboard builder Multiple Styles



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

PAXCounter real time and trend

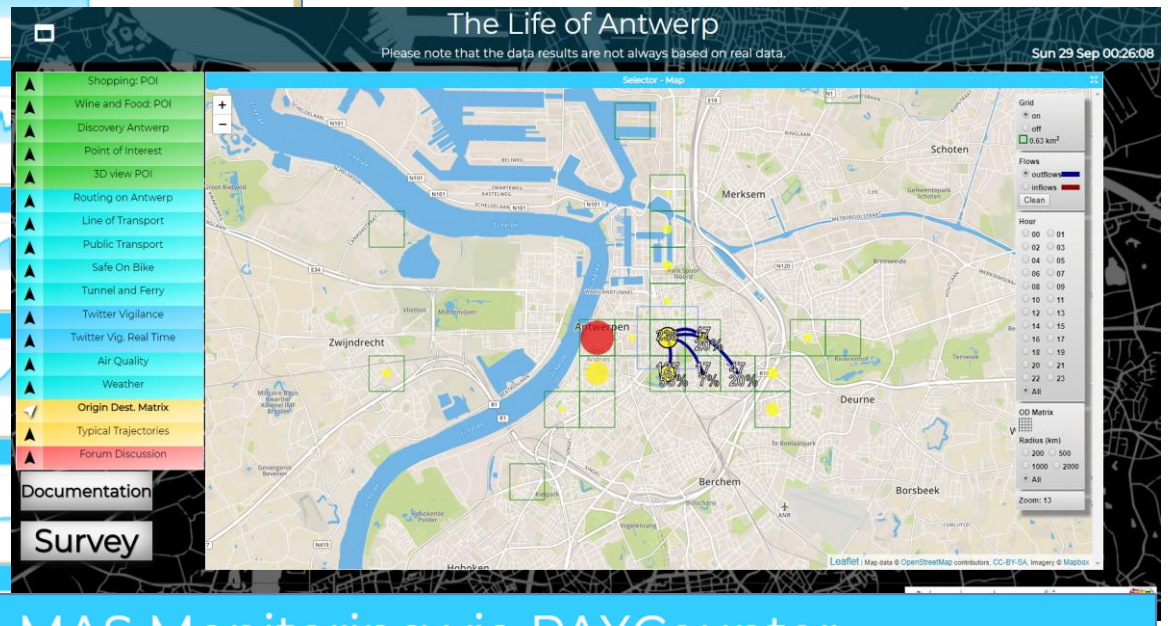
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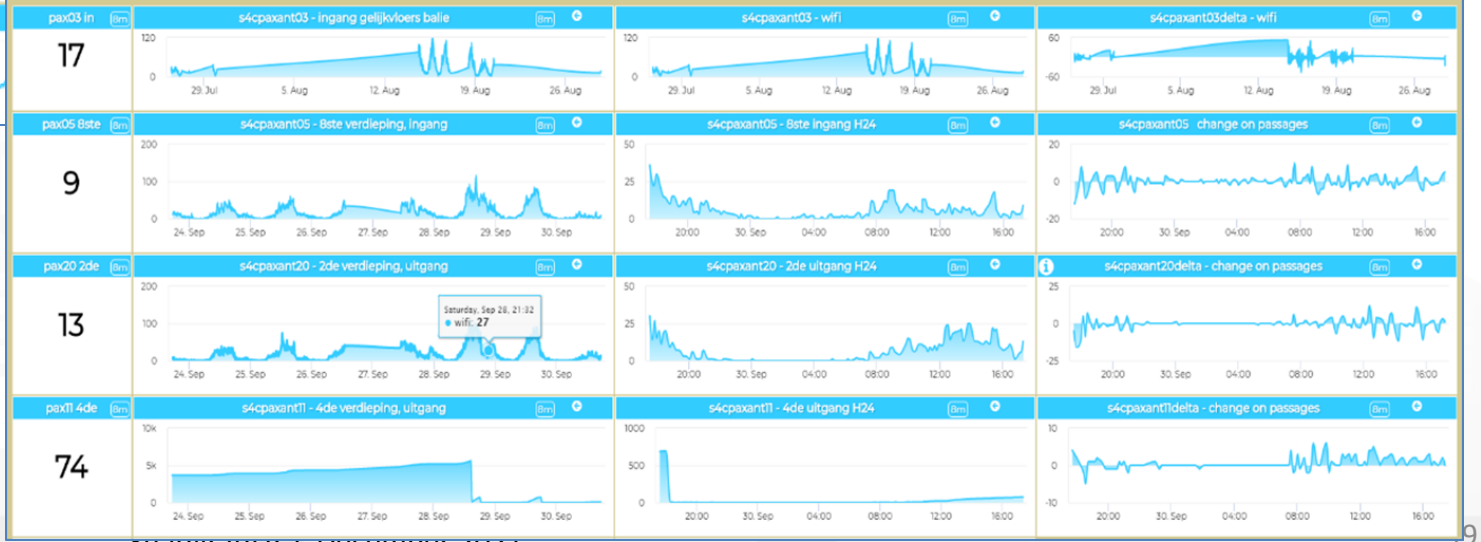
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MAS Monitoring via PAXCounter

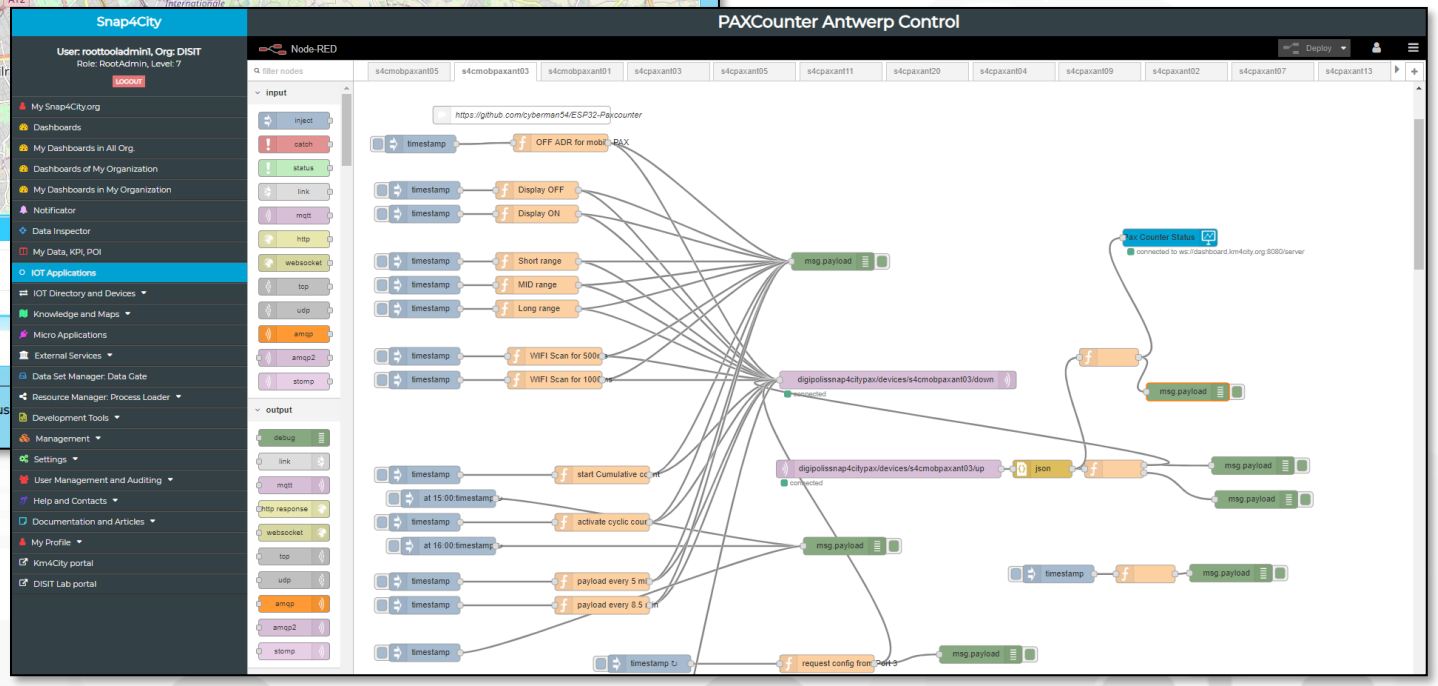
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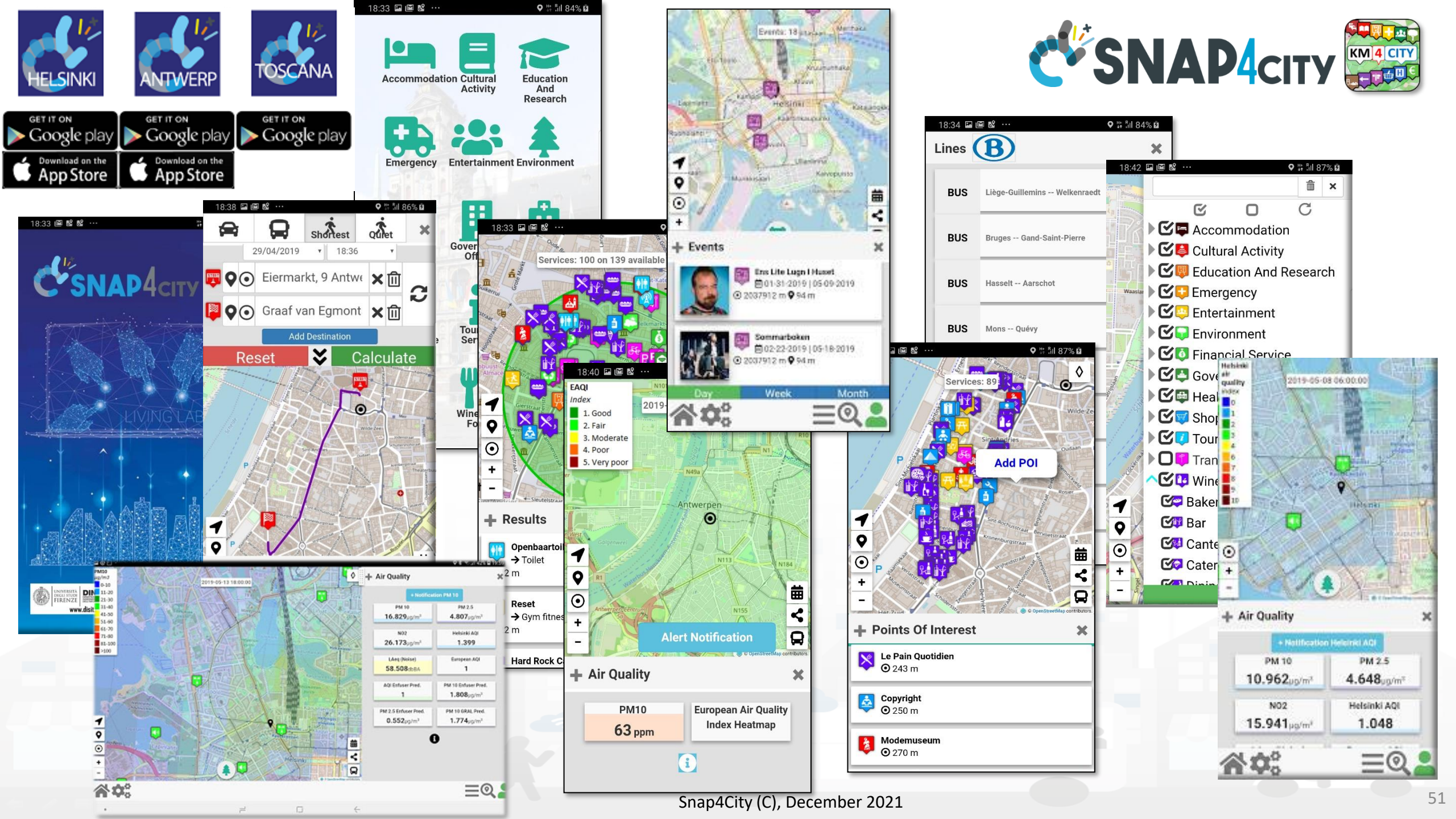
Programmable PAX counting







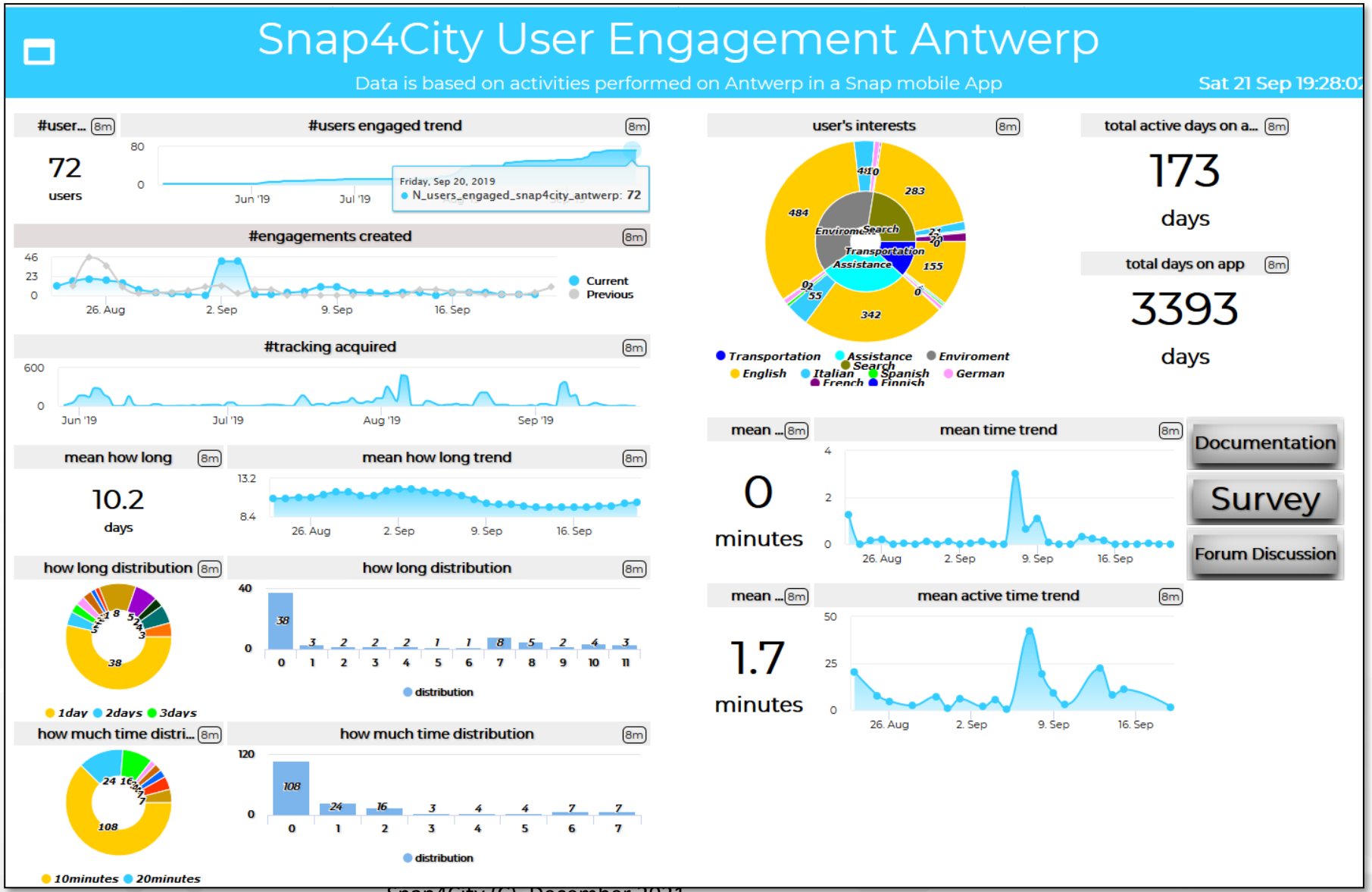
Antwerp


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KM 4 CITY
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Cultural Activity
Education And Research
Emergency
Entertainment
Environment
Shortest
Quiet
Add Destination
Reset
Calculate
Events
Day
Week
Month
Services: 100 on 139 available
EAQI Index
1. Good
2. Fair
3. Moderate
4. Poor
5. Very poor
Results
Air Quality
PM10
63 ppm
European Air Quality Index Heatmap
Alert Notification
Lines
BUS
Liège-Guillemins -- Welkenraedt
Bruges -- Gand-Saint-Pierre
Hasselt -- Aarschot
Mons -- Quévy
Add POI
Points Of Interest
Le Pain Quotidien
243 m
Copyright
250 m
Modemuseum
270 m
Financial Service
Bar
Air Quality
PM 10
10.962
PM 2.5
4.648
NO2
15.941
Helsinki AQI
1.048

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

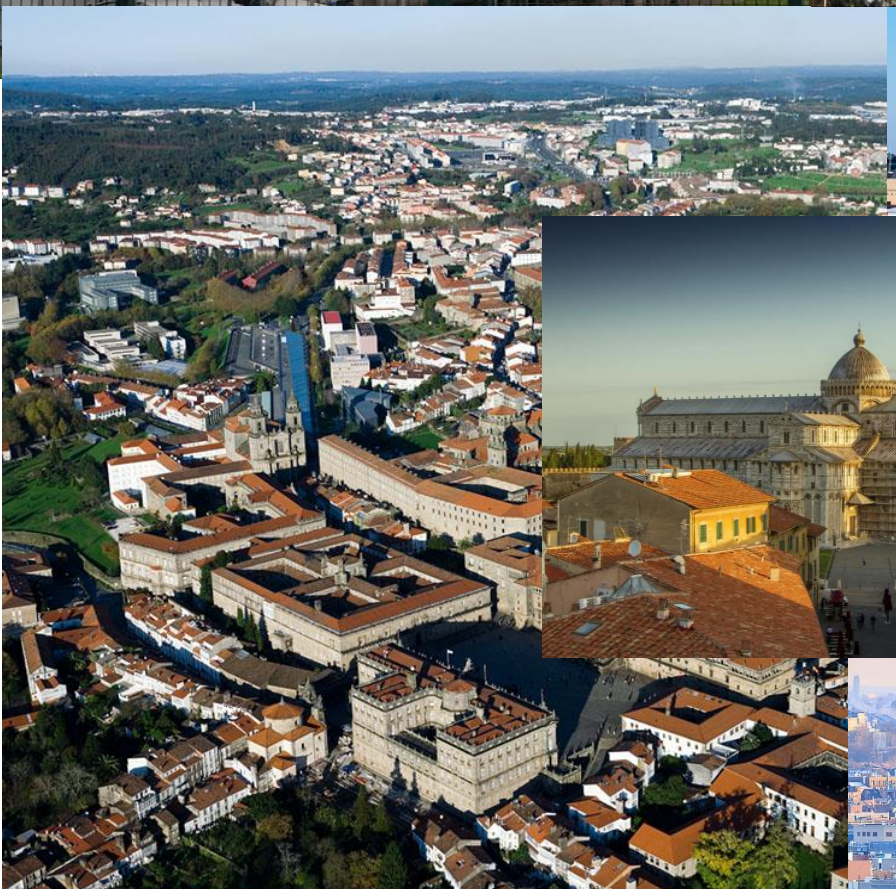
Dashboard monitoring the Mobile App:

- 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










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==

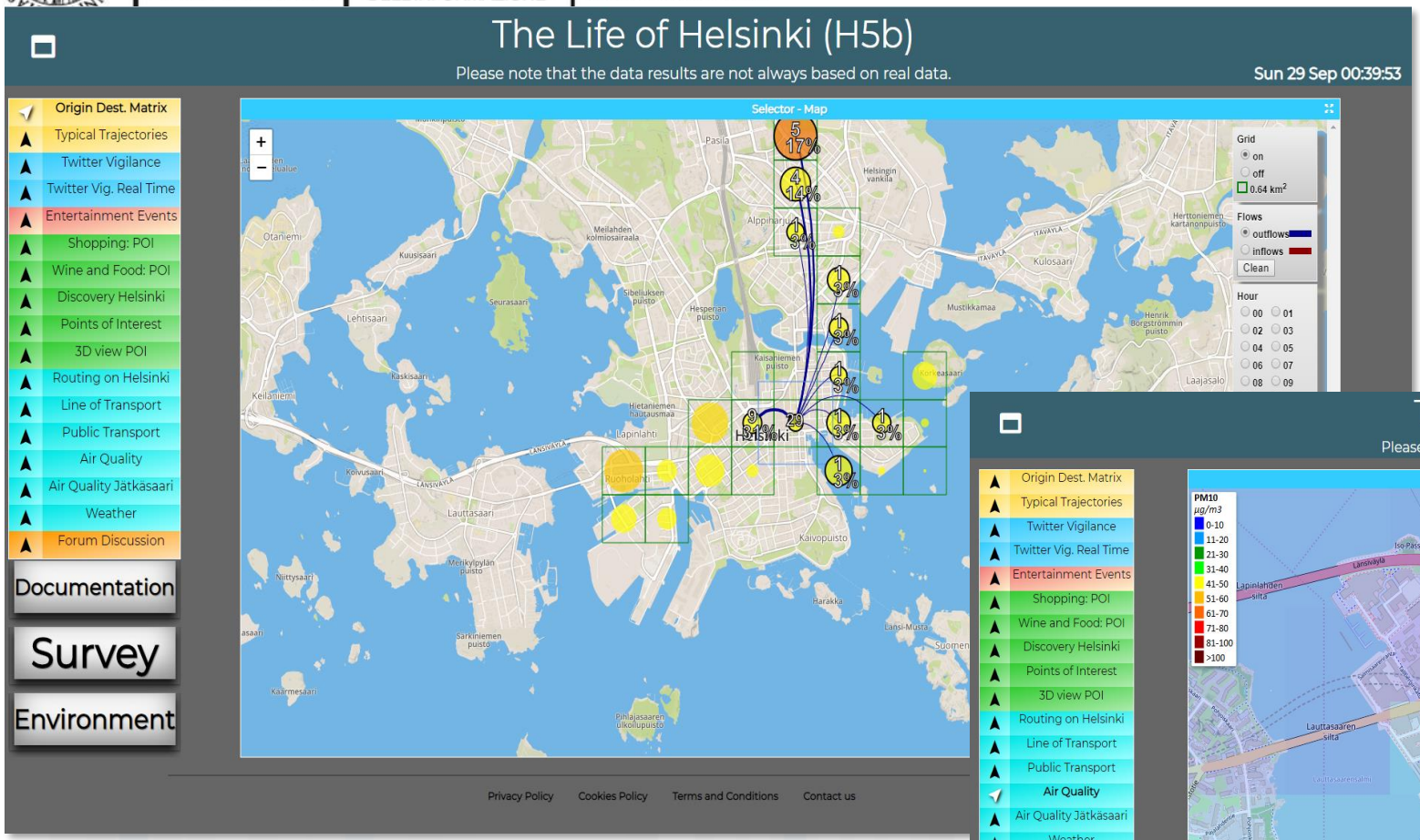
Helsinki, Finland

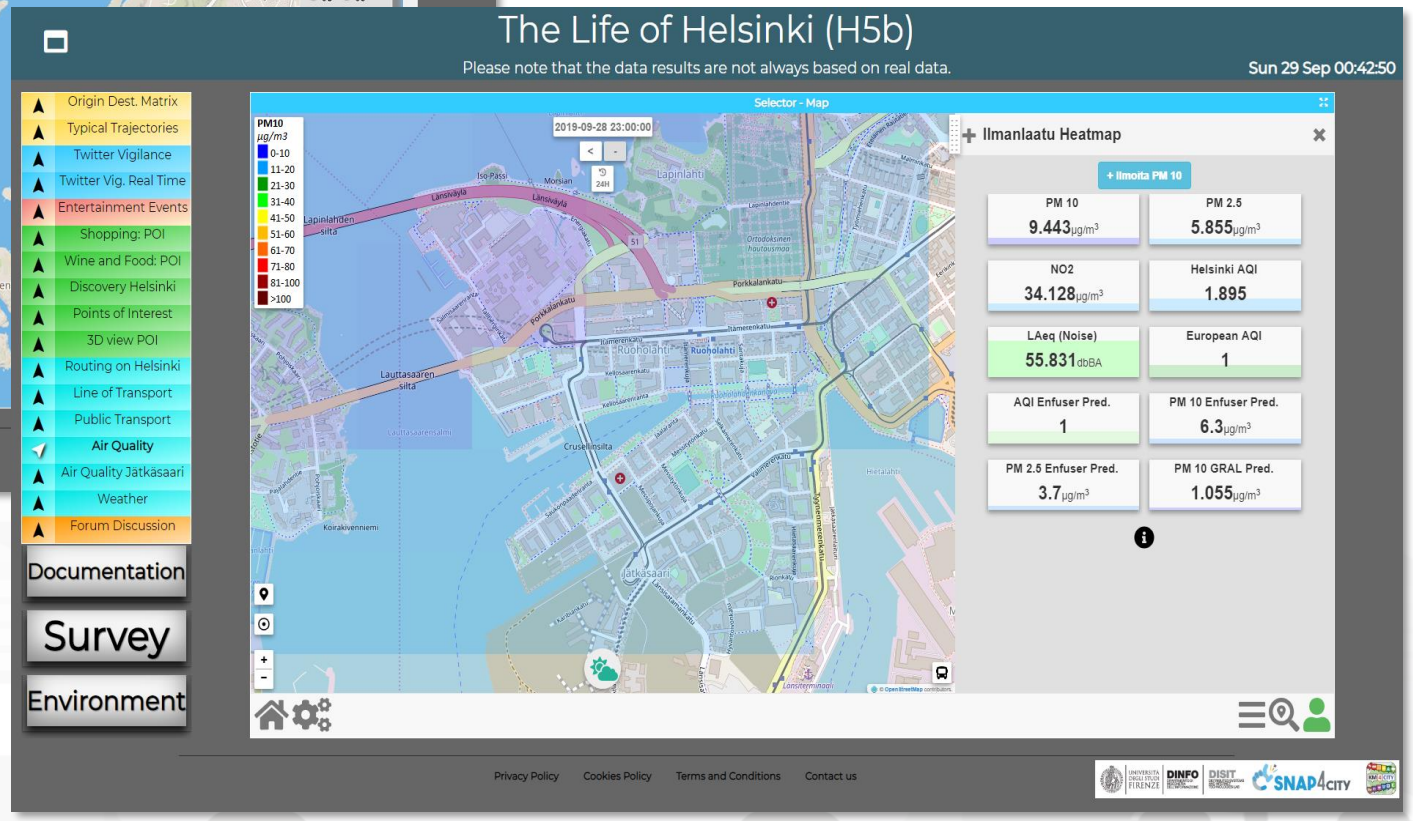
- **Dashboards & Services**:
  - **Environment** & **Weather**, PM10, PM2.5,NO, SO2, CO, noise, etc.
    - Sensors values, Heatmap & **Alerts** on critical
    - FMI Enfuser prediction: PM10, PM2.5, ..
    - GRAL predictions PM10, validations
    - Private sensors in Jätkäsaari area (personal dashboards)
  - **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)



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

Helsinki



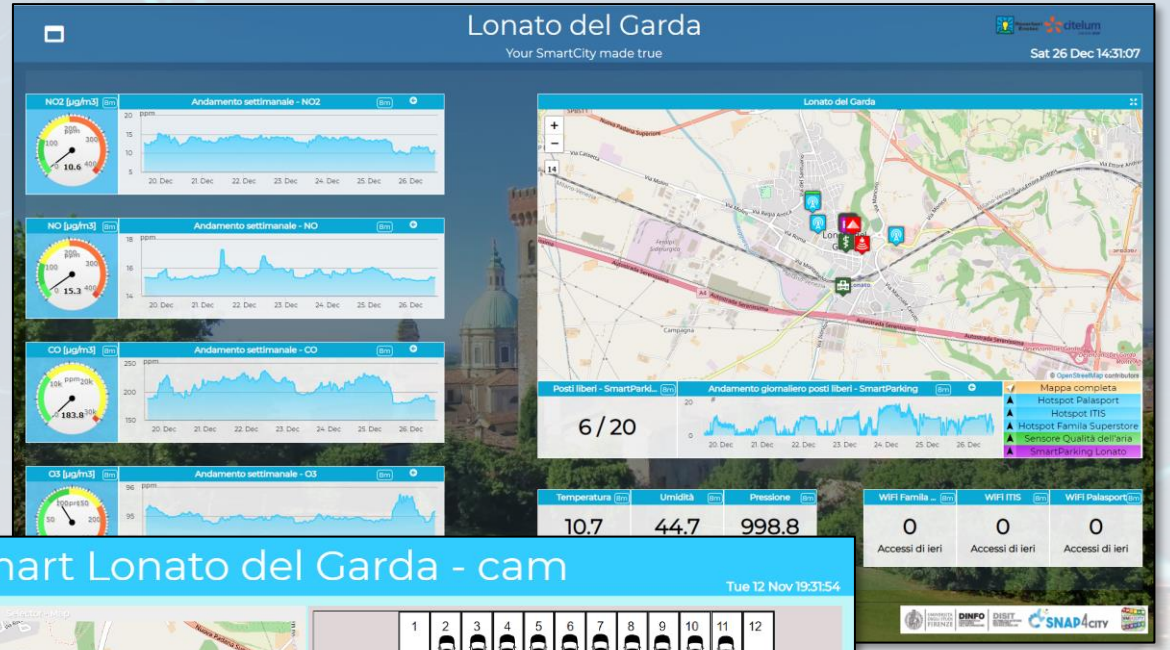


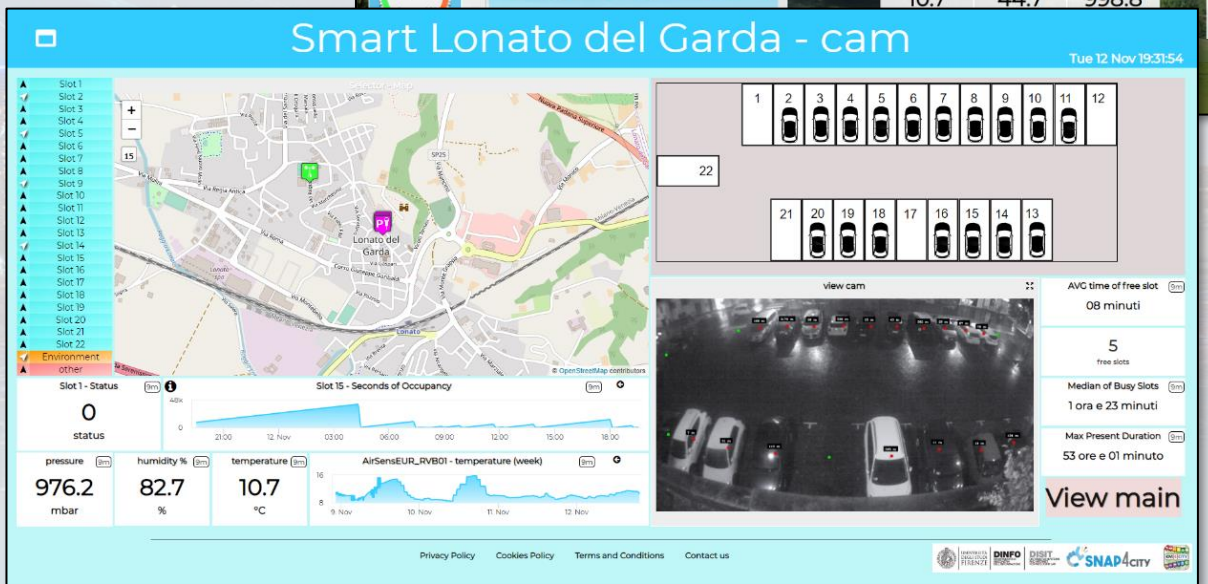
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTc1Mg==

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

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**

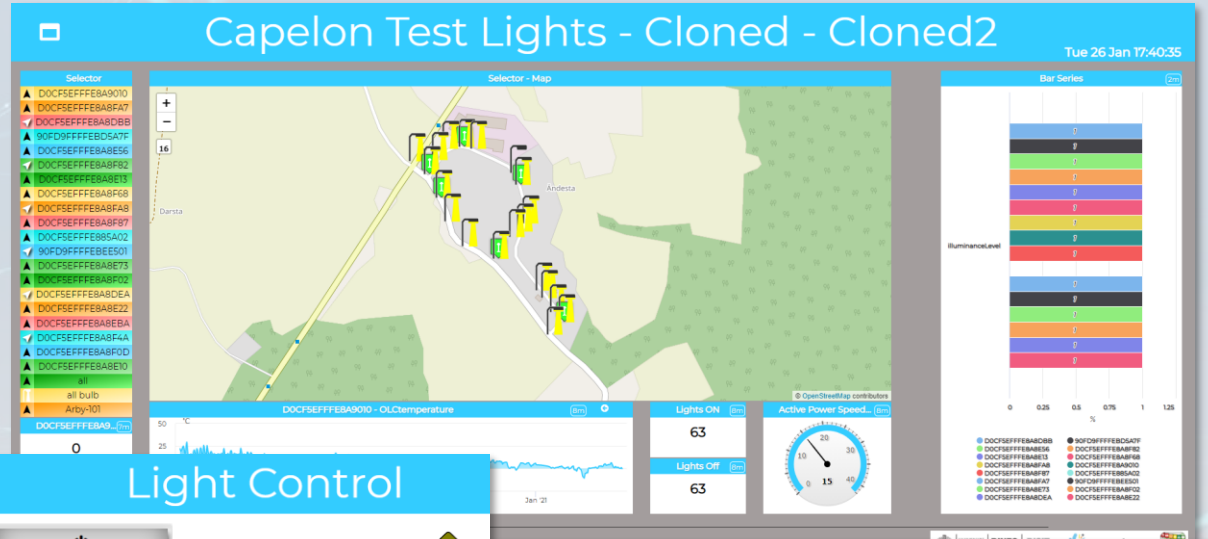




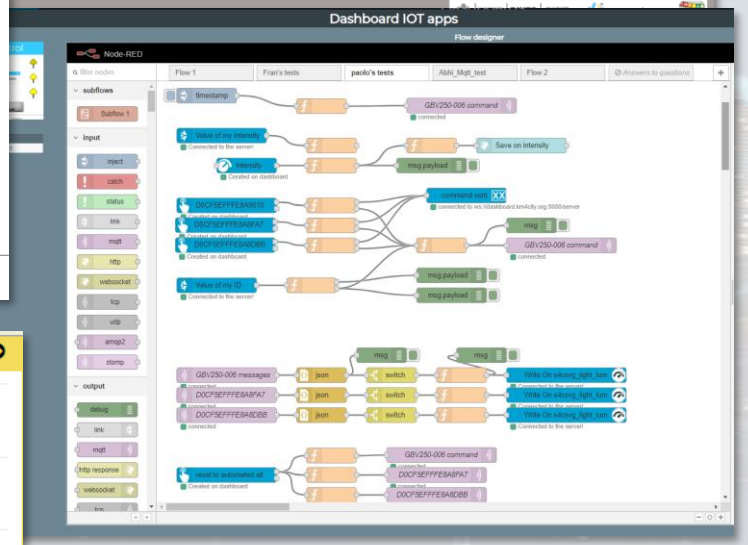
Smart Light Control of CAPELON *reference*

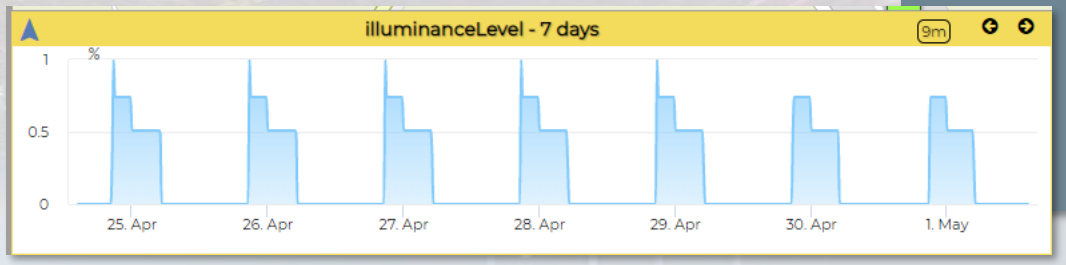
- **Energy Domain**
  - Smart Light, MQTT, ….
  - IoT Orion Broker FIWARE
- **Dashboards**
  - Map coverage on Sweden
  - Monitoring and real time control
  - Energy control, analytics
  - Direct control
- **Historical and Real Time data**
- **Services Exploited on:**
  - Multiple Levels, API
  - Dashboards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



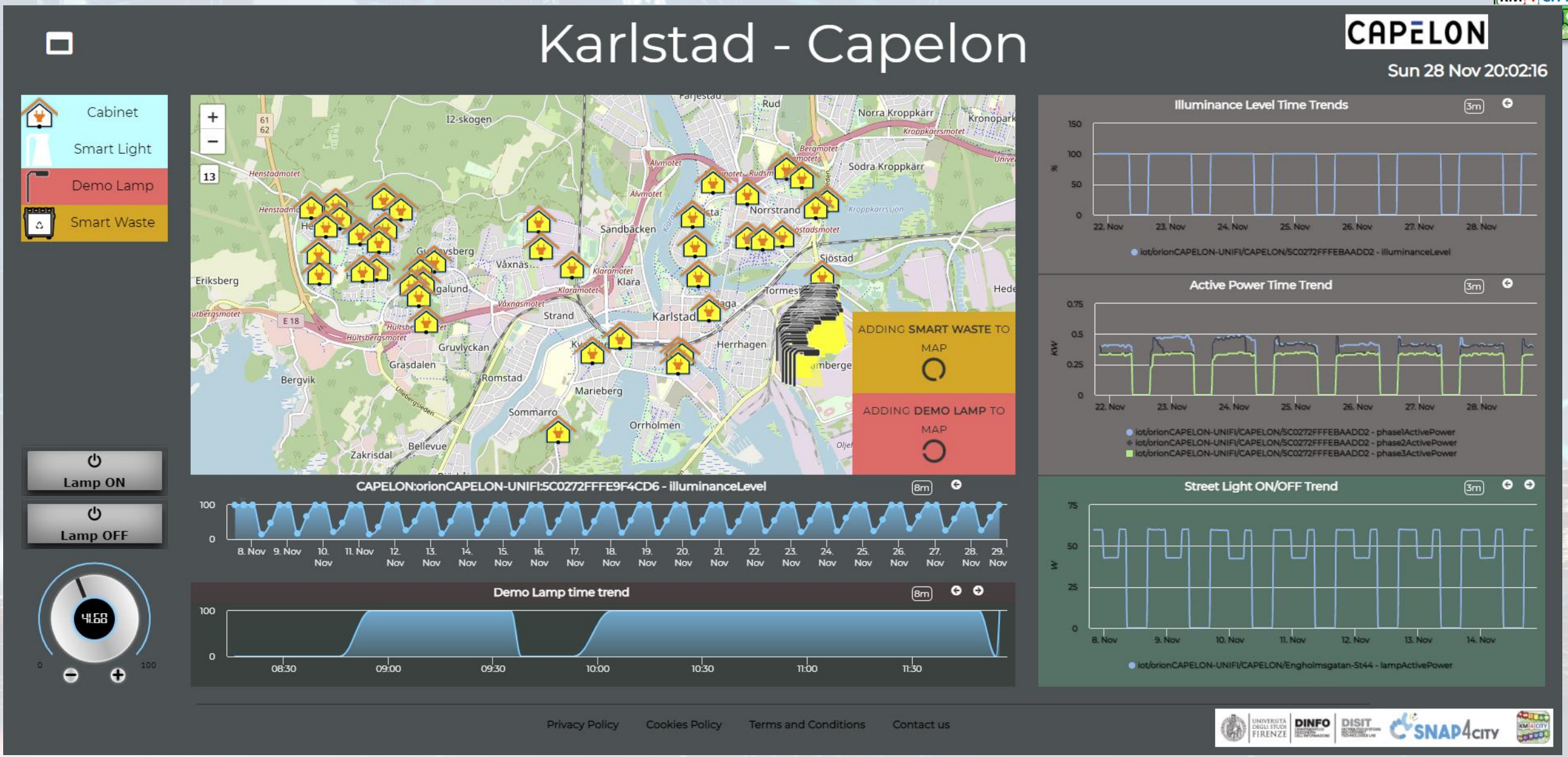








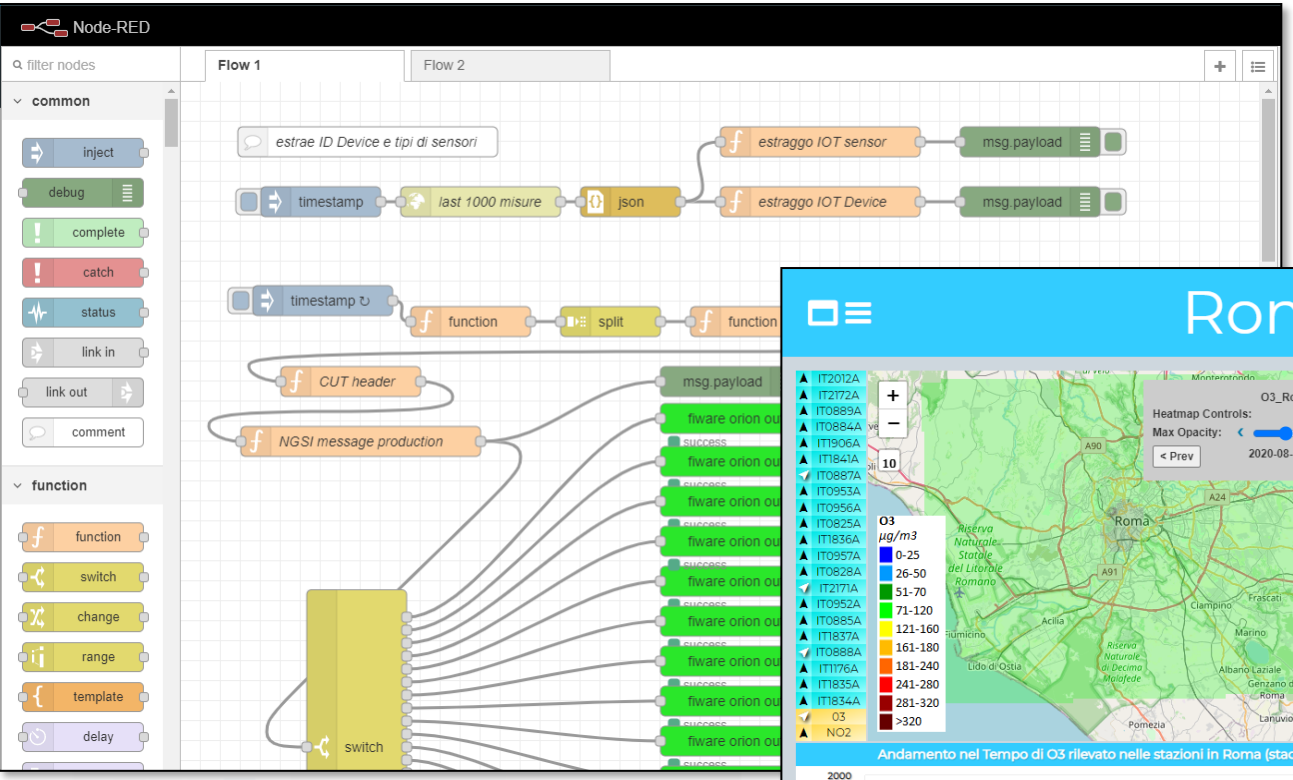
Karlstad Street Lights

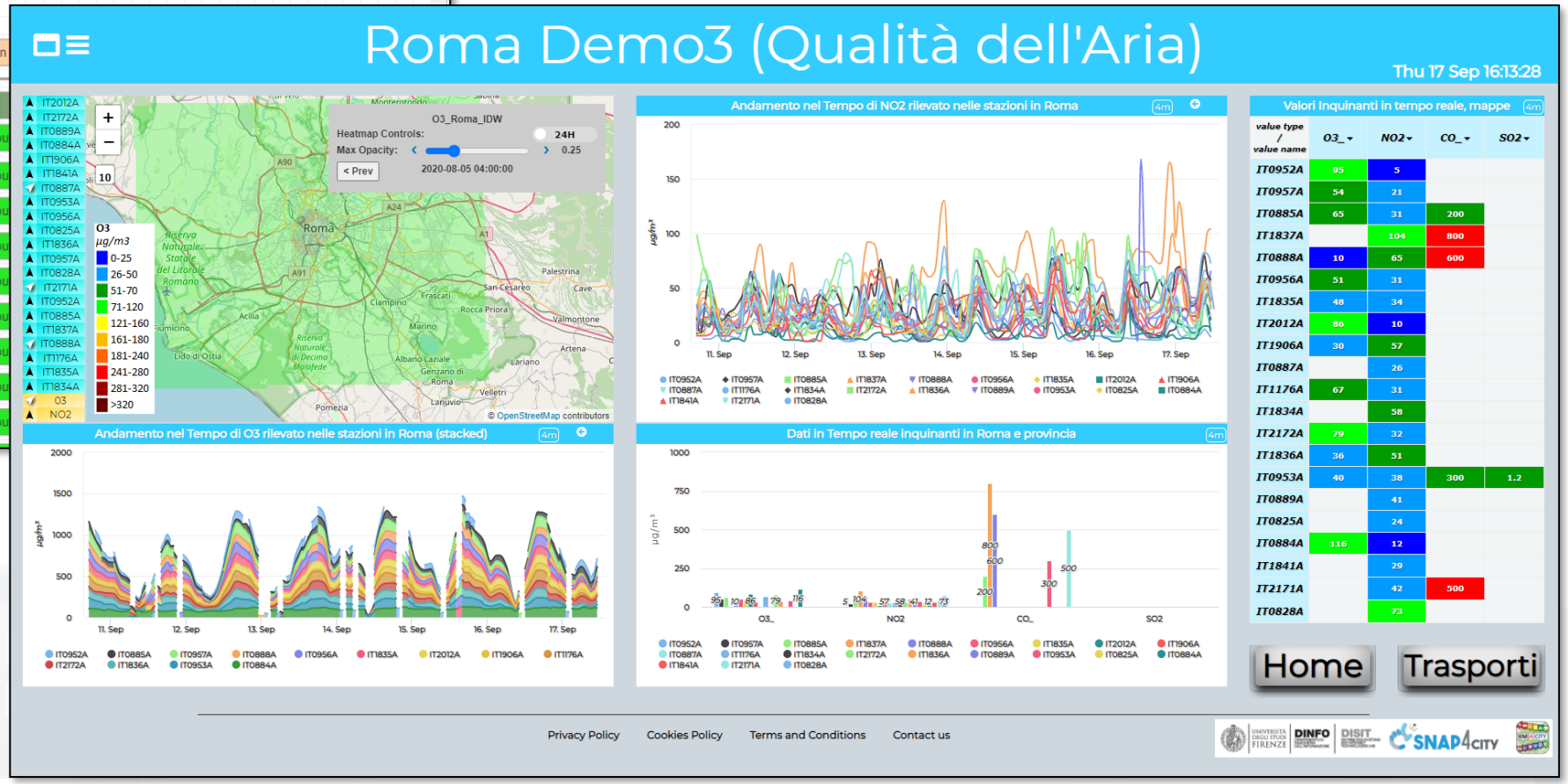


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzI5NQ==

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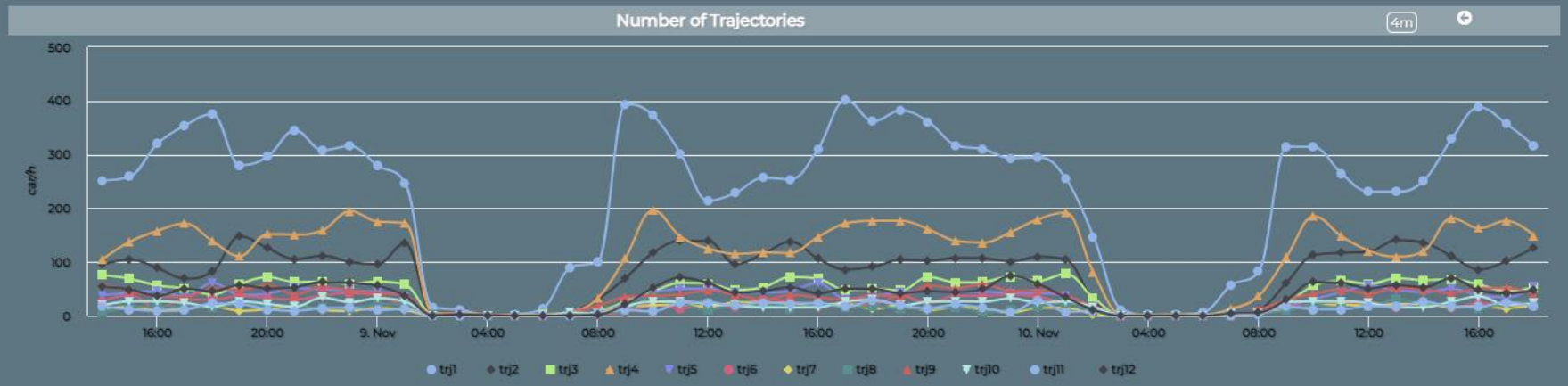


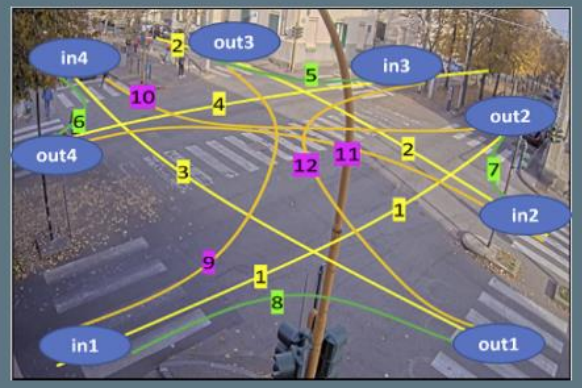
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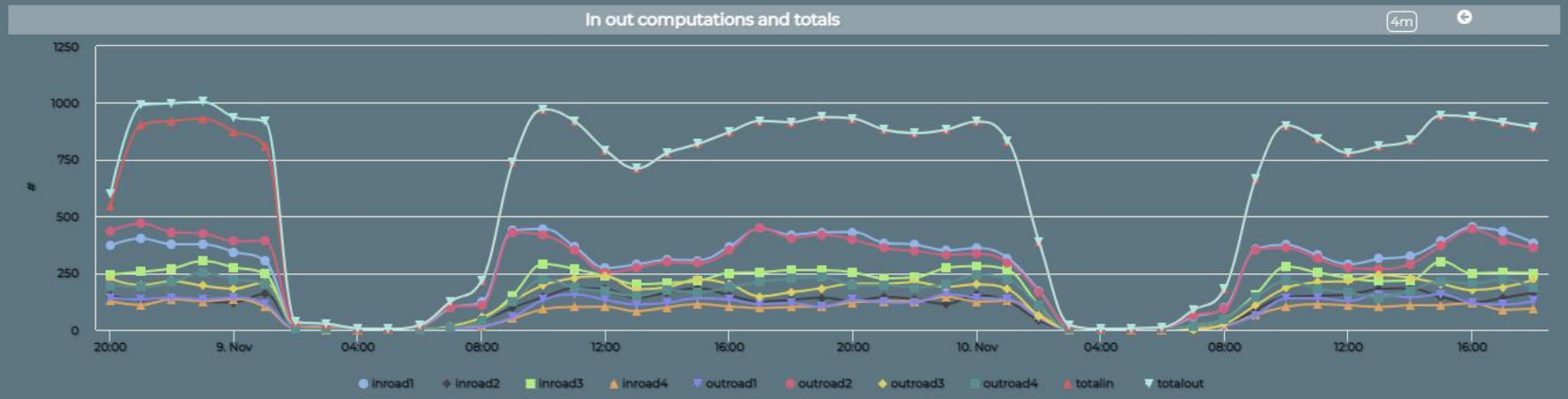
Venaria Reale

Monitoring Cross Road Venaria - (AXIS Camera)

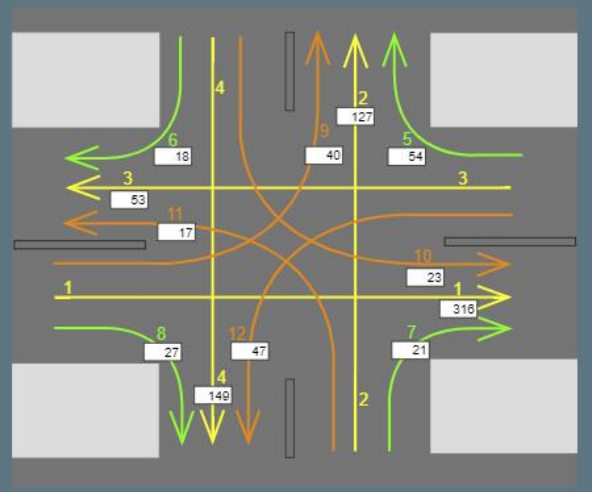
Wed 10 Nov 18:50:53







Venaria Street Cross - Synoptic

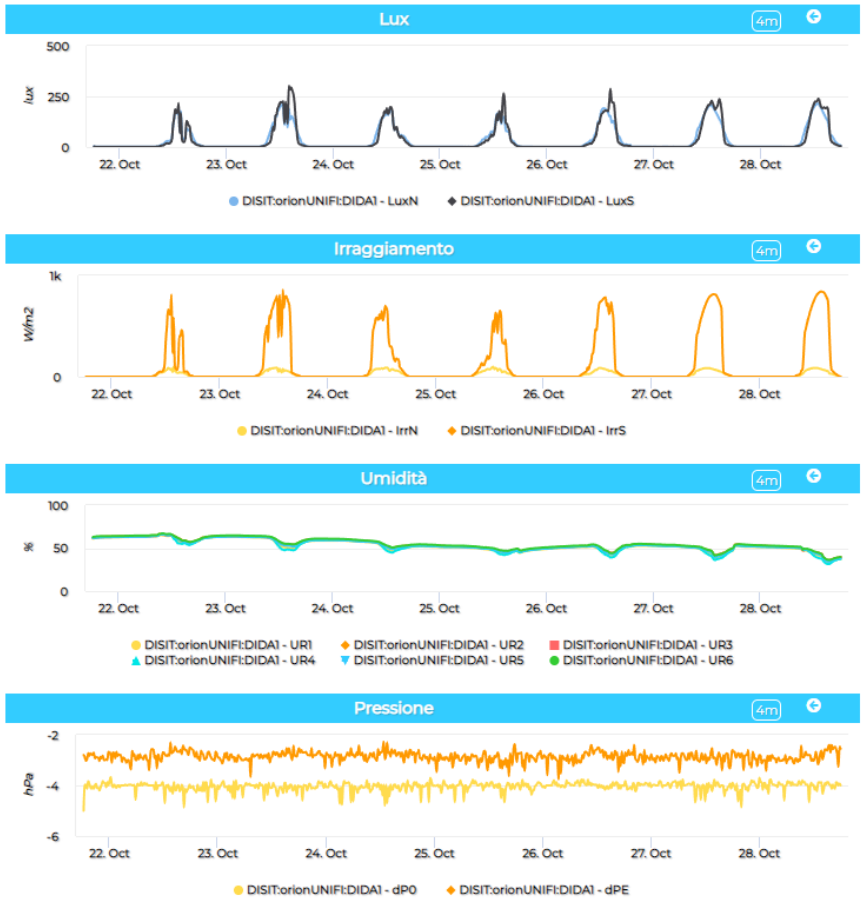


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzI5Ng==

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==

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.

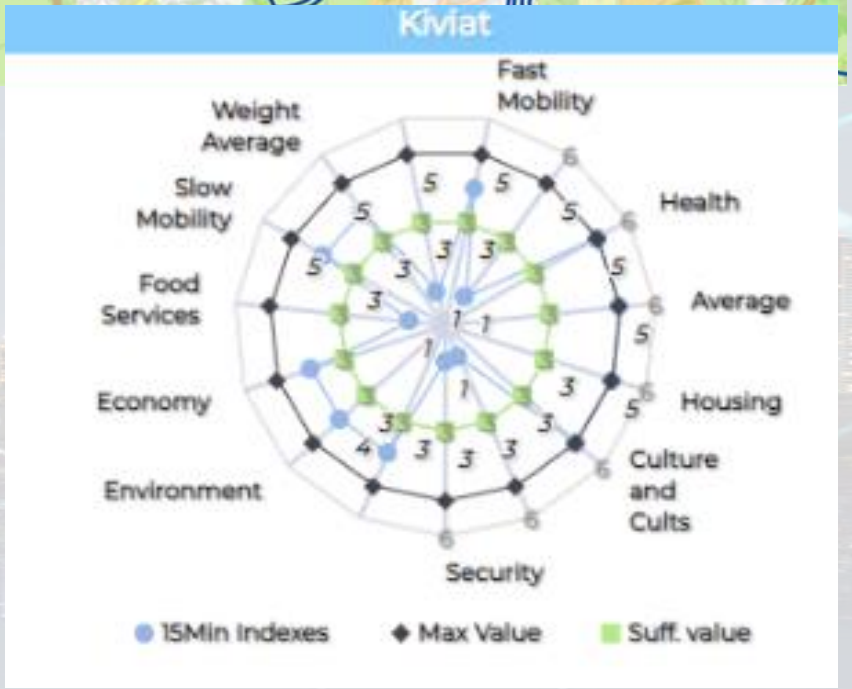


Good public transport services: bus, new tram line, train stations, cycle paths.



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

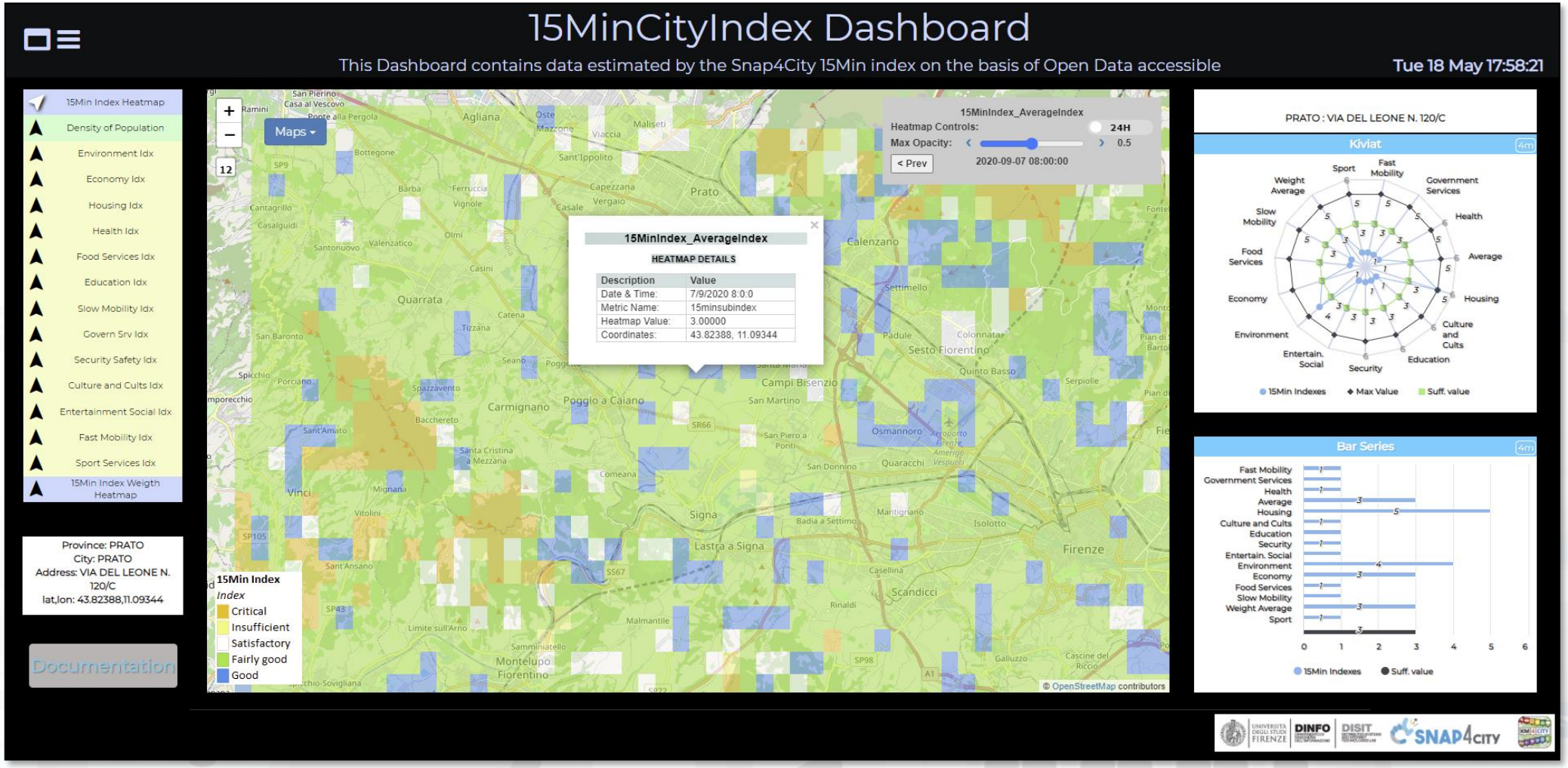




Careggi/Rifredi is a relevant district in Florence because of hosting the main Florence/Tuscany hospitals Careggi and Meyer, but also university headquarters and many other workplaces.

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

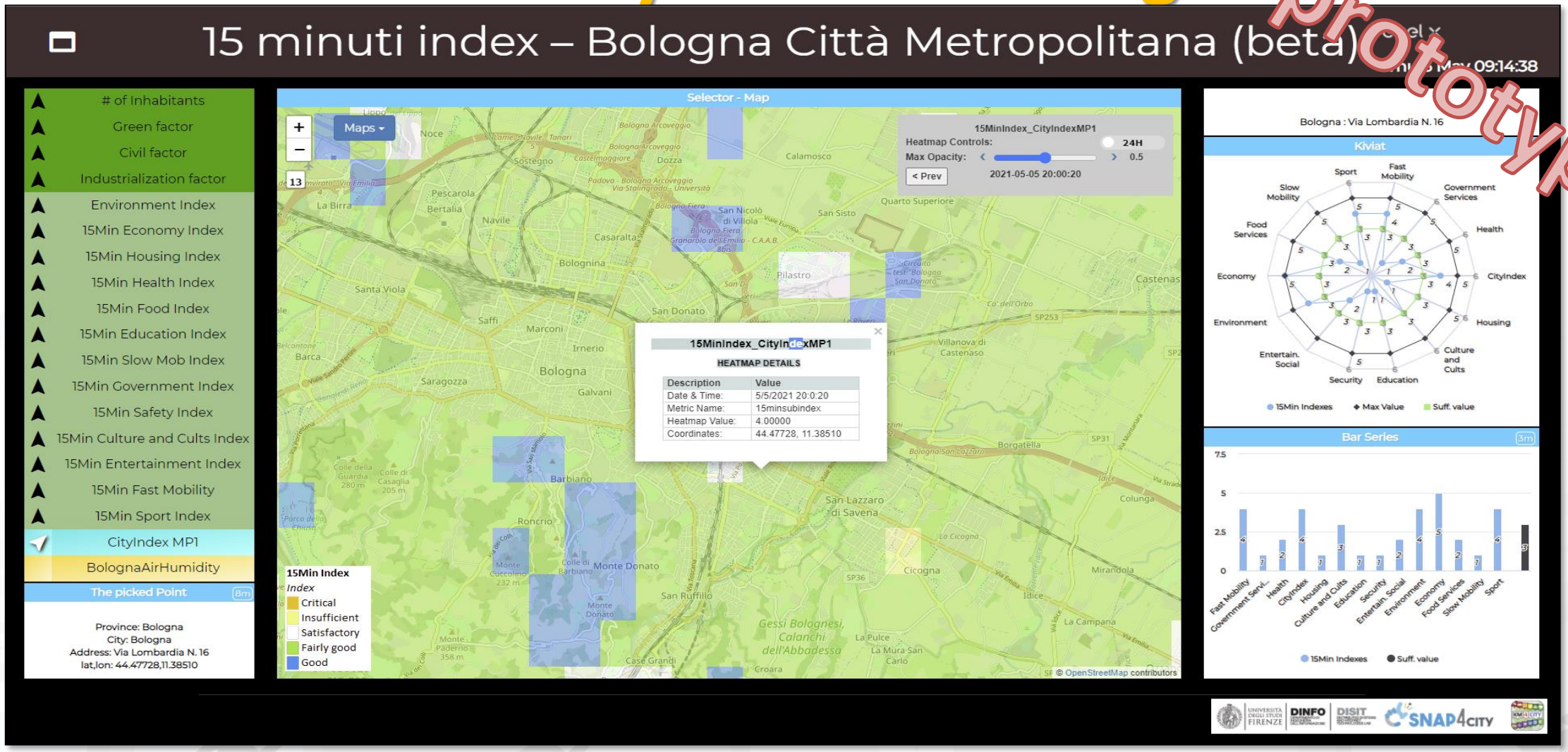
15MinCityIndex Firenze



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

15MinCityIndex on Bologna

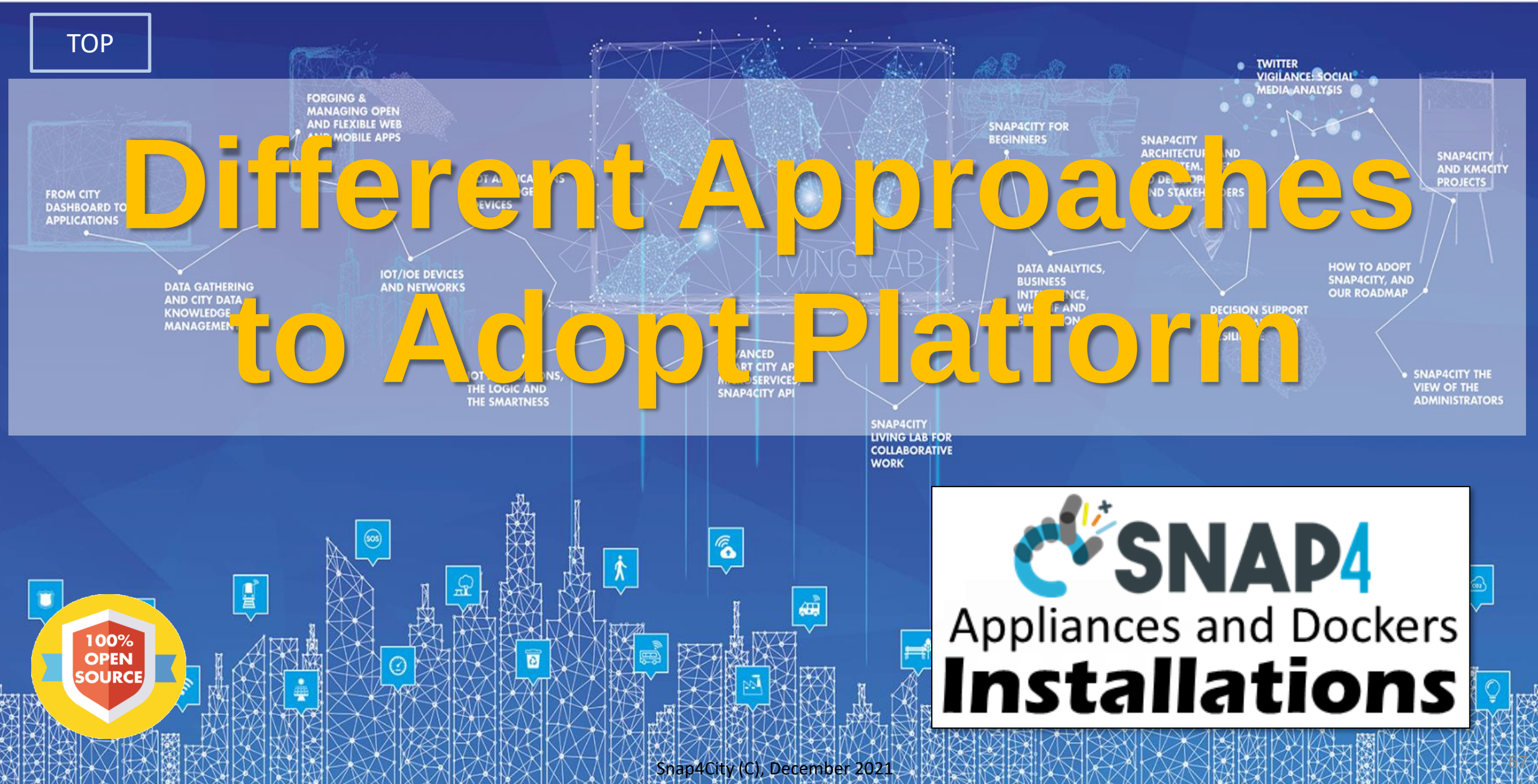
prototype



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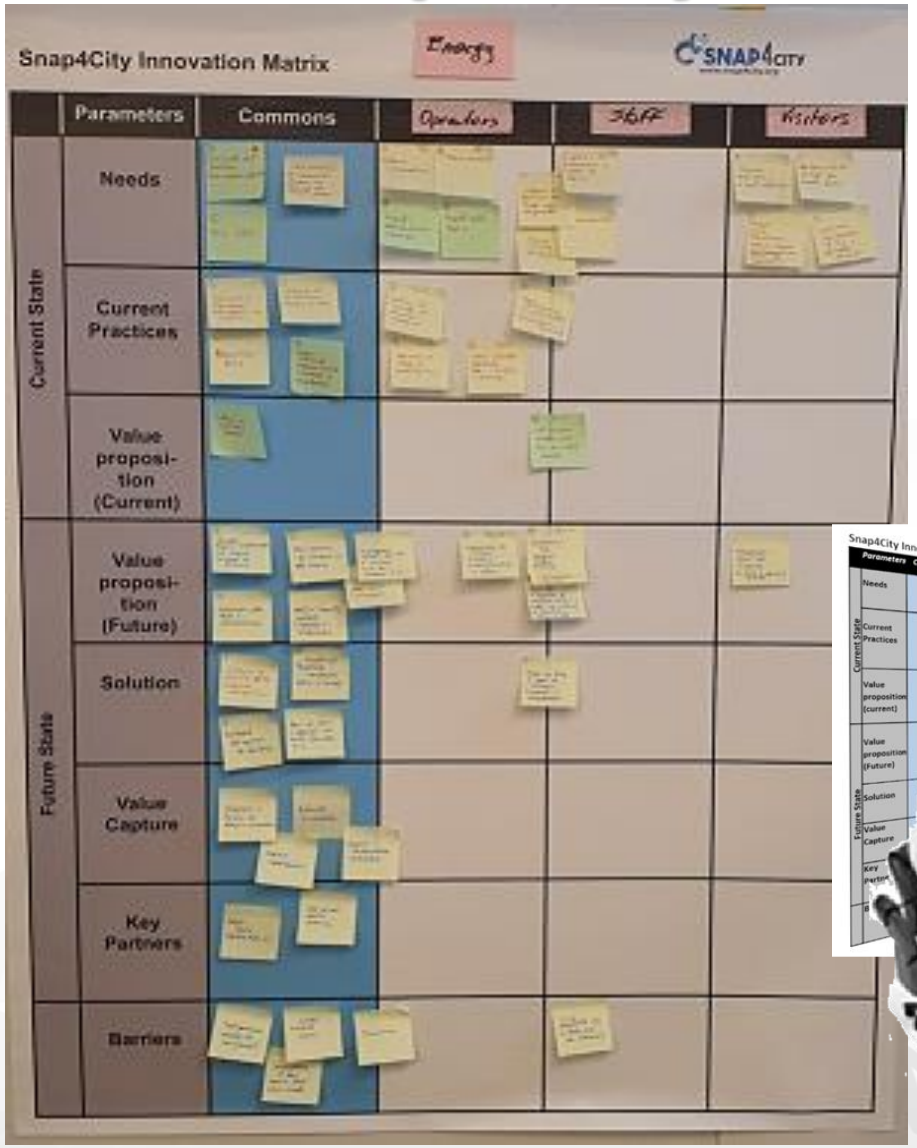
TOP

Different Approaches to Adopt Platform



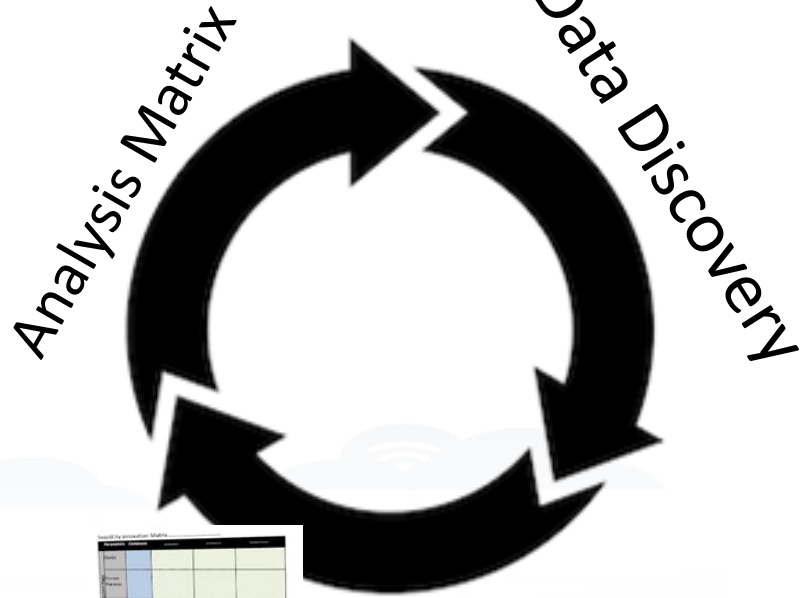
SNAP4 Appliances and Dockers **Installations**

Snap4City Innovation Matrix and Process

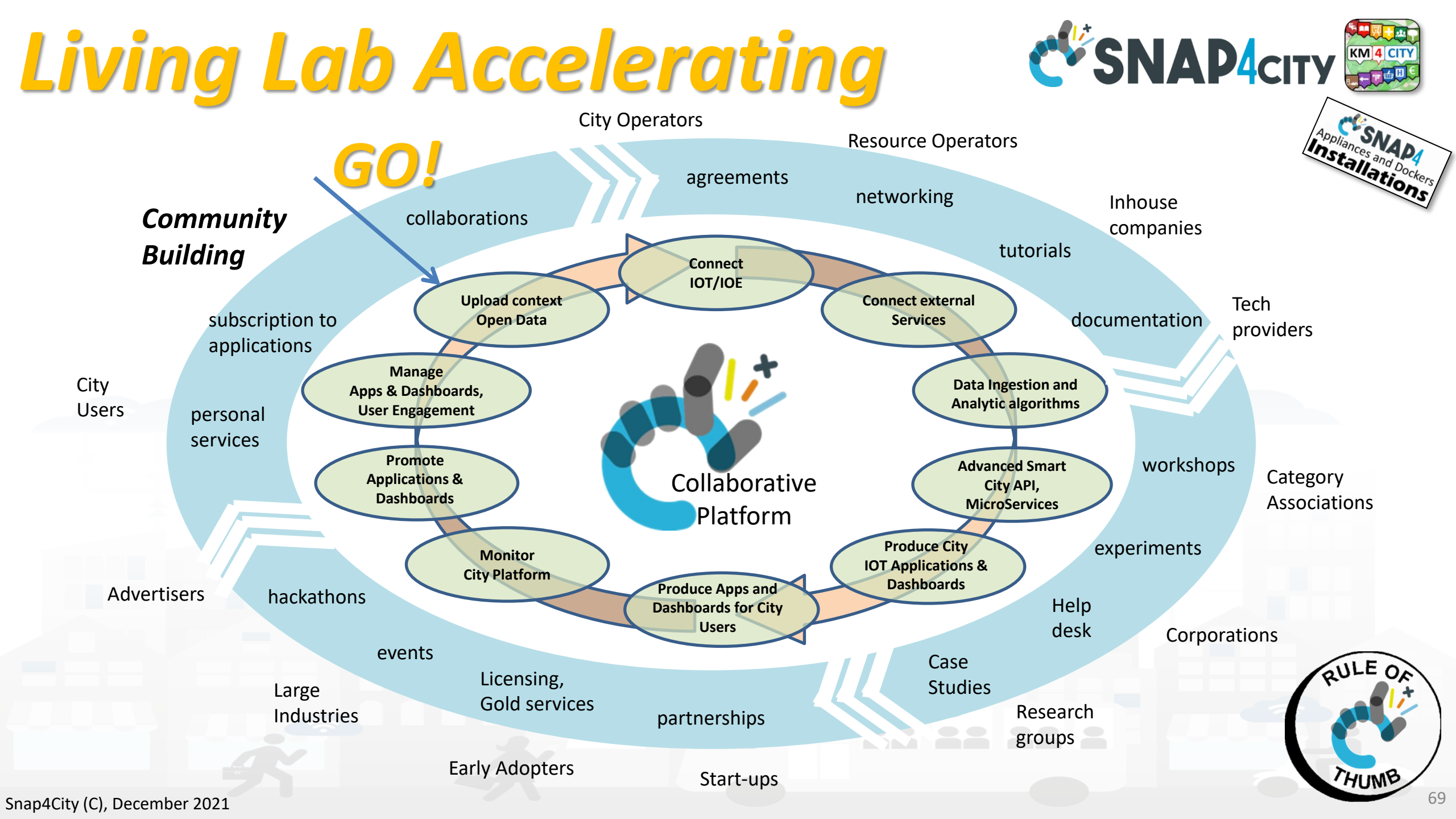




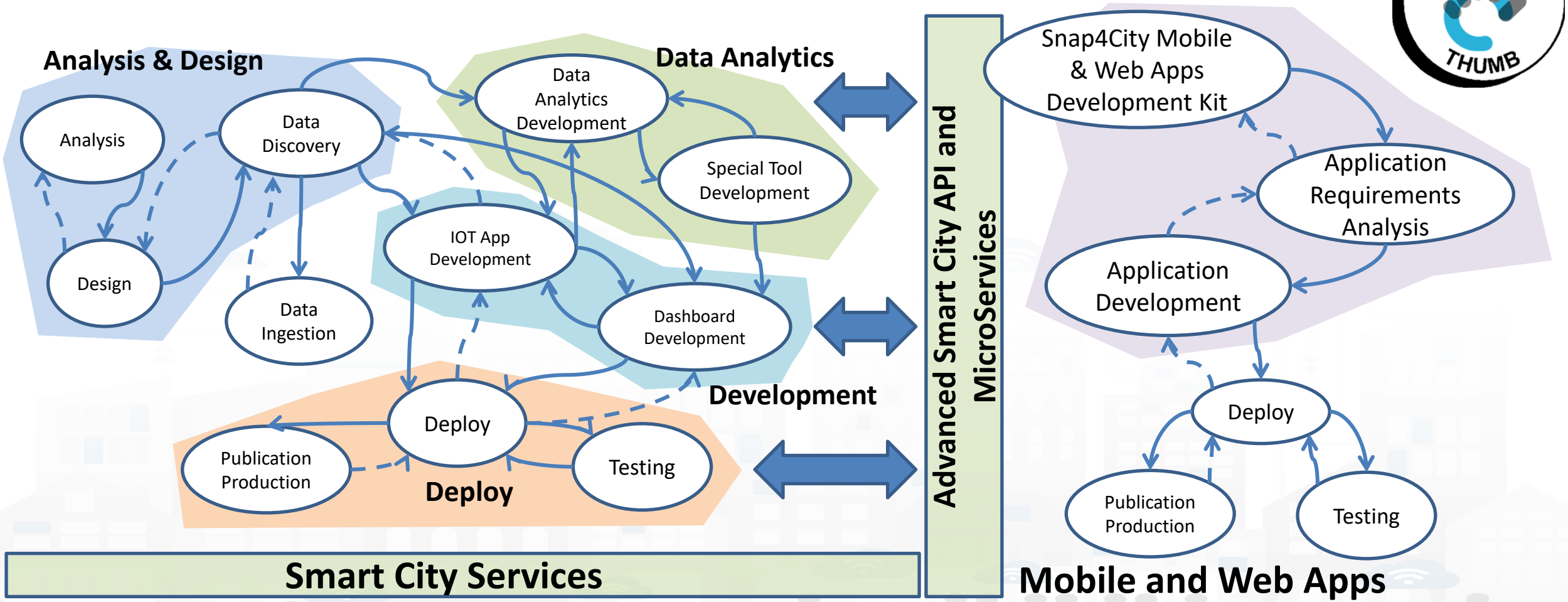




Living Lab Accelerating



Develop Mobile & Web Applications Exploiting Snap4City Smart City Services



Role: AreaManager

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** !

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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

- 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

Username: paolo.disit

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FIWARE Node-RED

Organization Groups

DISIT
- Developer
- Operativo

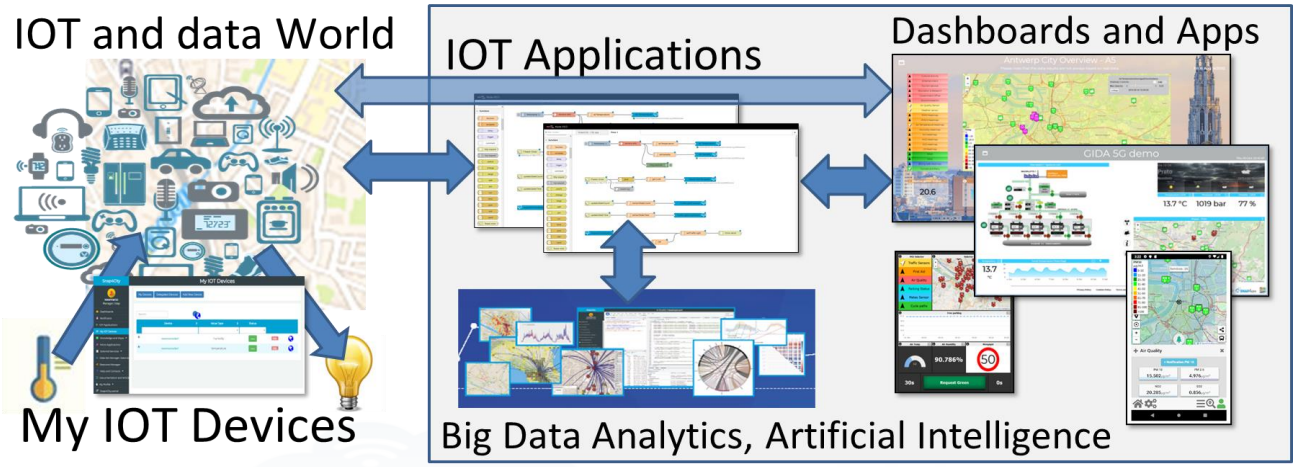
Updates on Tools

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

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Free Trial

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  - Subscribe on **DISIT Organization**
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  - Access on basic Tools
  - Access to a large volume of Data
  - Create Dashboards
  - Create IOT Applications
  - Connect your IOT Devices
  - Exploit Tutorials and Demonstrations



IF you need to go more in deep you can ask us to pass at the next Role becoming full AreaManager with full rights of development, also for Data Analytics, machine learning, etc.

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


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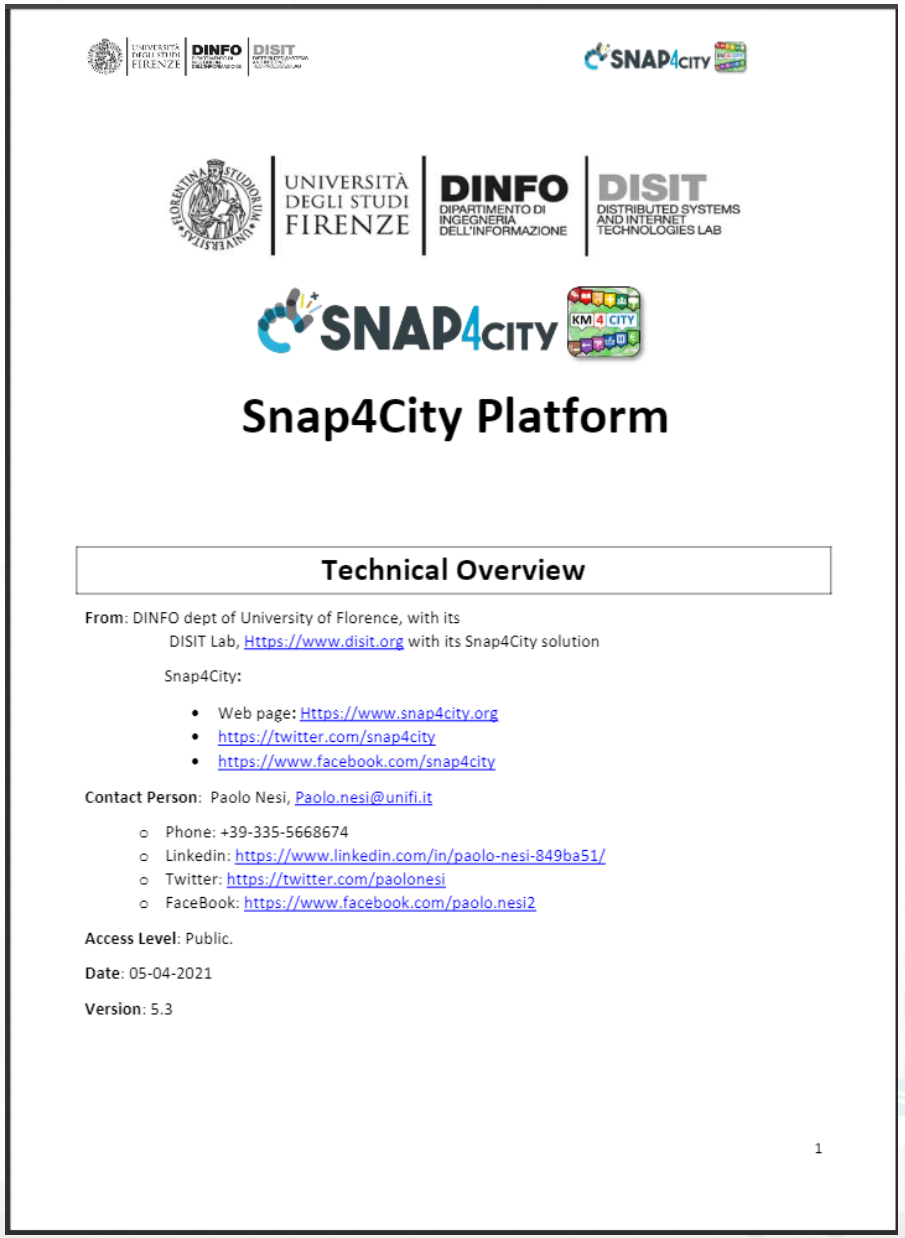


SMARTCITY EXPO WORLD CONGRESS

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

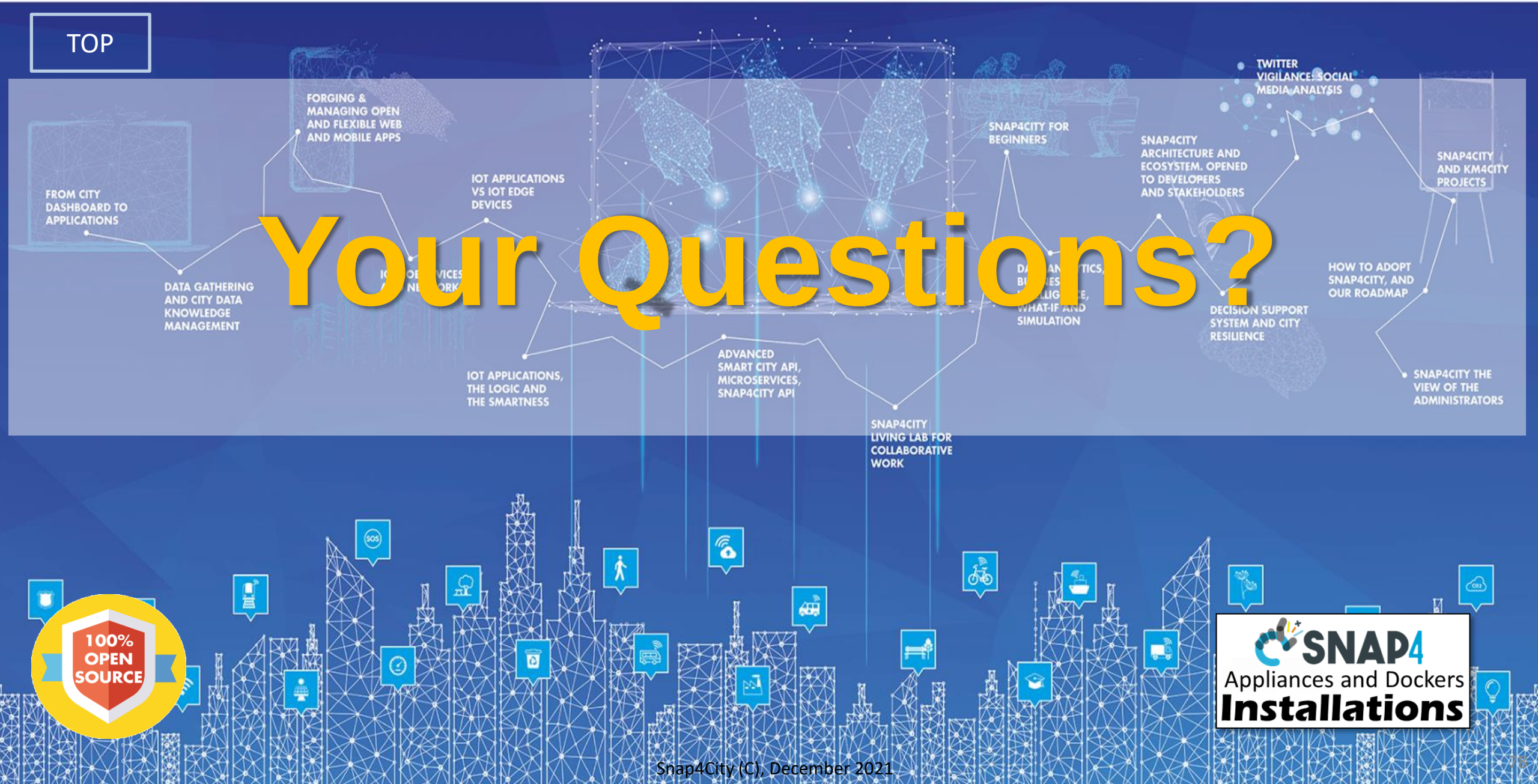
1

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

Overview



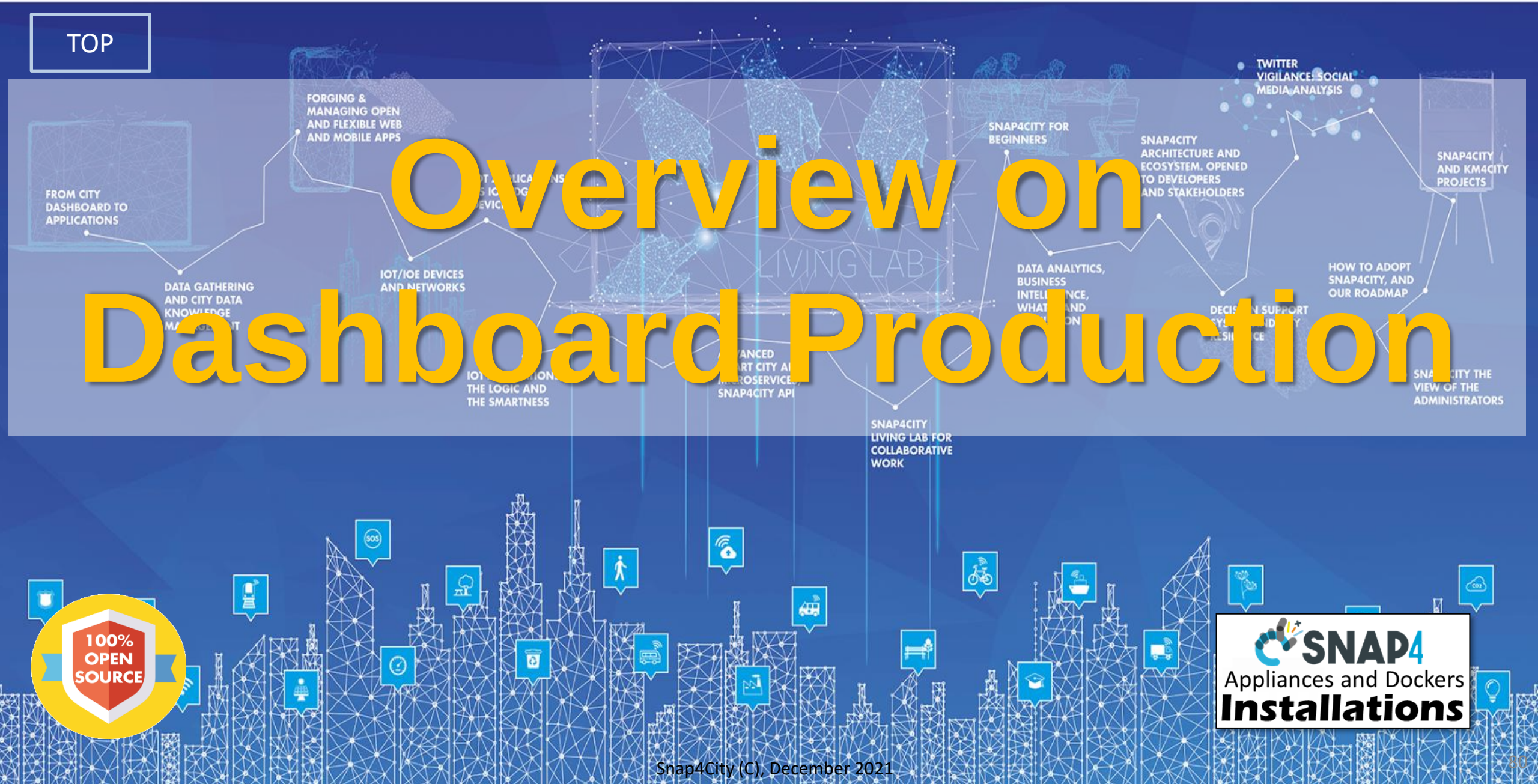
- https://fiware-foundation.medium.com/snap4city-fiware-powered-smart-app-builder-for-sentient-cities-acfe24df49d5
- https://www.snap4city.org/drupal/sites/default/files/files/FF_ImpactStories_Snap4City.pdf


TOP
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
SIMULATION
SNAP4CITY ARCHITECTURE AND ECOSYSTEM. OPENED TO DEVELOPERS AND STAKEHOLDERS
DECISION SUPPORT SYSTEM AND CITY RESILIENCE
TWITTER VIGILANCE: SOCIAL MEDIA ANALYSIS
SNAP4CITY AND KM4CITY PROJECTS
HOW TO ADOPT SNAP4CITY, AND OUR ROADMAP
SNAP4CITY THE VIEW OF THE ADMINISTRATORS
Your Questions?
100% OPEN SOURCE
SNAP4 Appliances and Dockers Installations



TOP

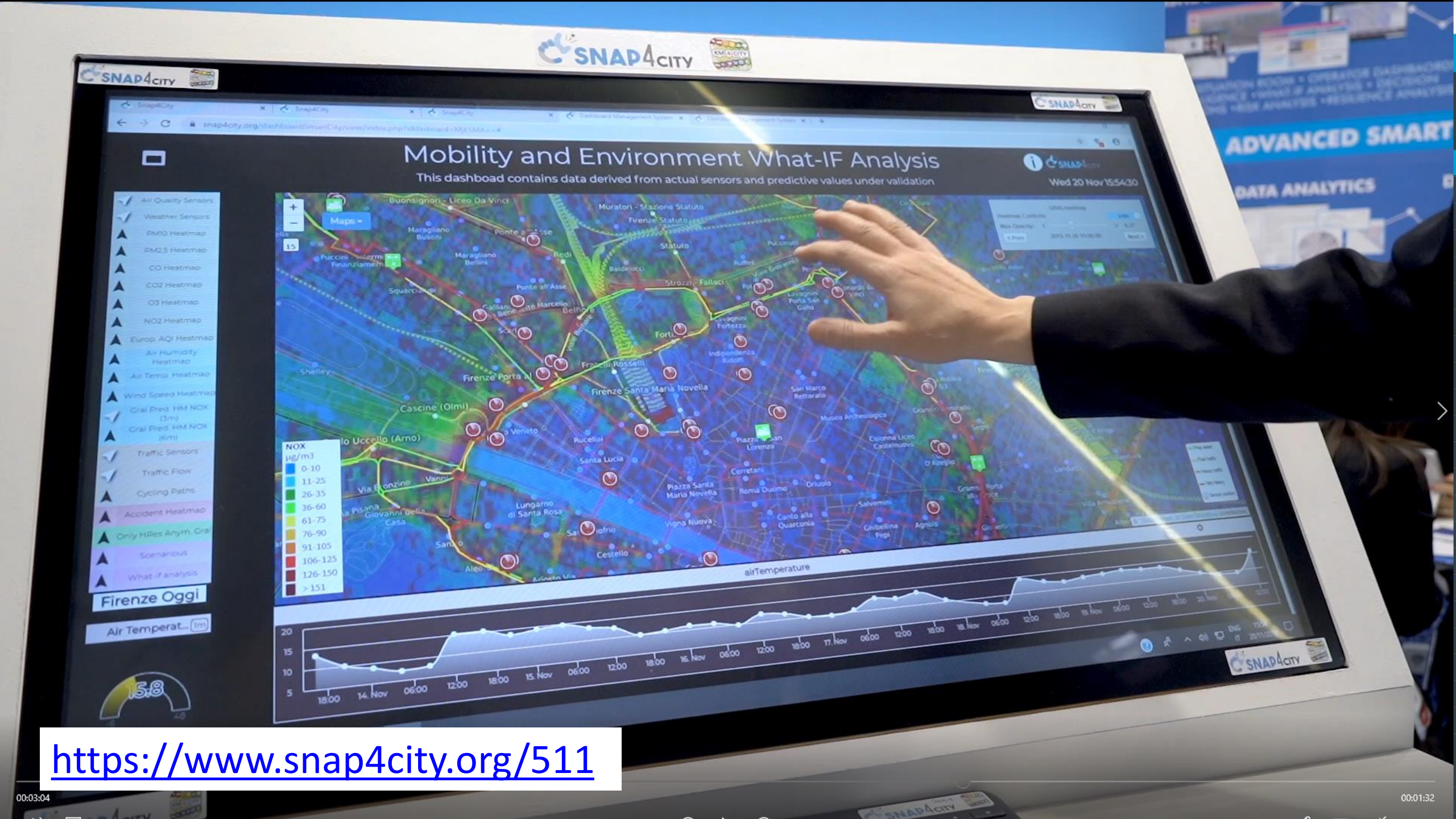
Overview on Dashboard Production



Control Room



https://www.snap4city.org/621



https://www.snap4city.org/511

00:03:04

00:01:32


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
Concentration - 7 days
Main

From Data to Visualization



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

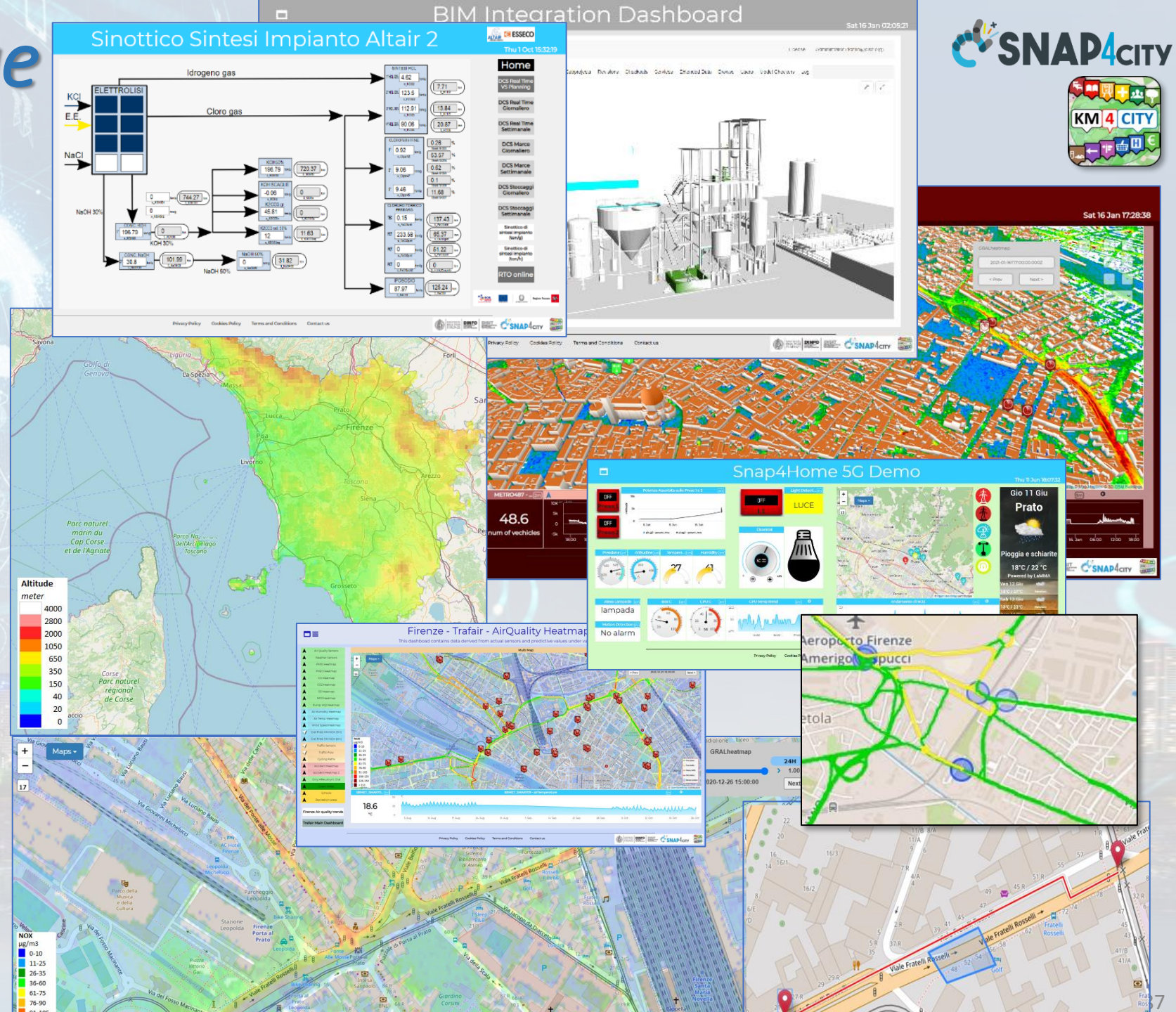


Snap4City Dashboard Builder vs Kibana

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

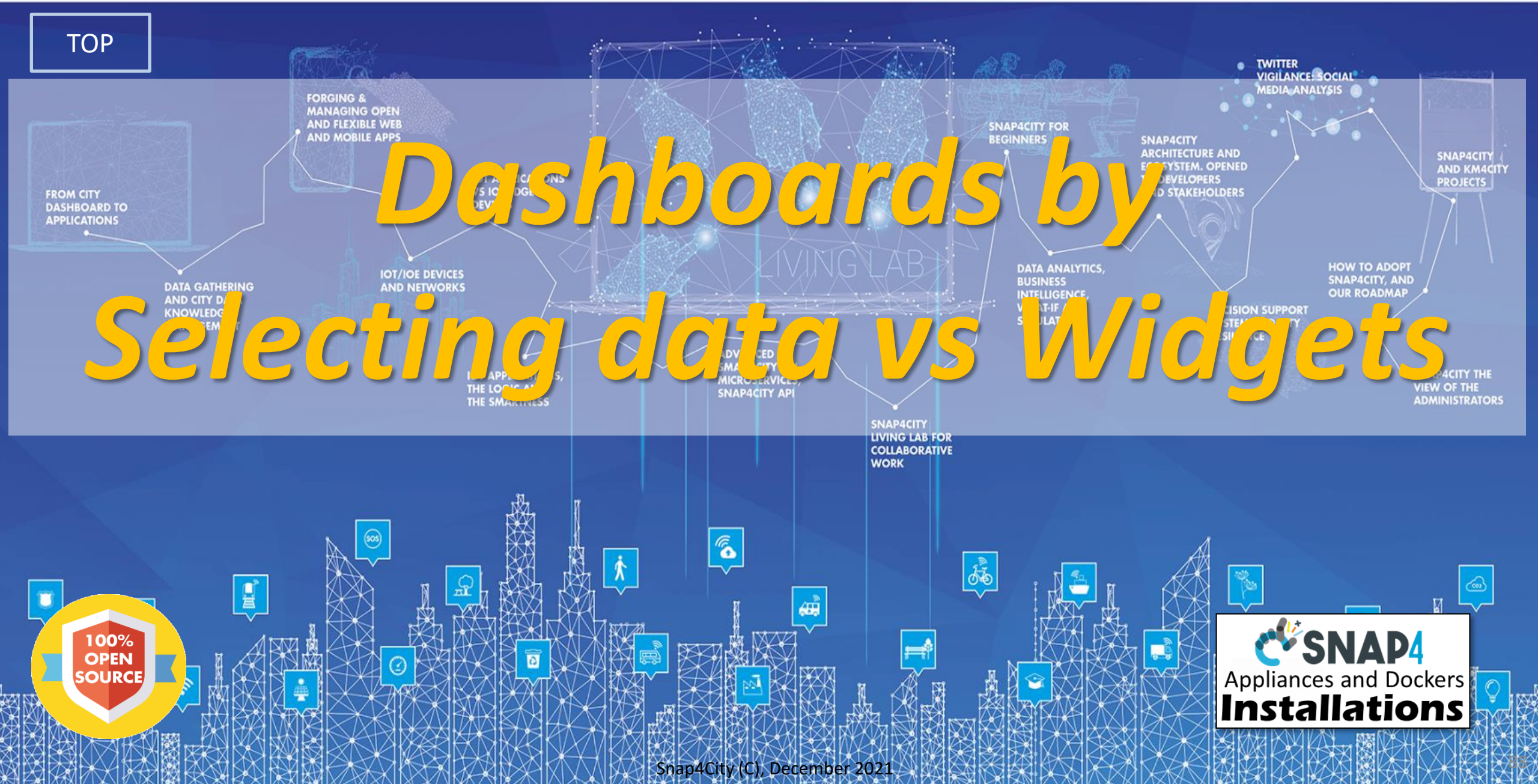
Data Type Coverage

- 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.



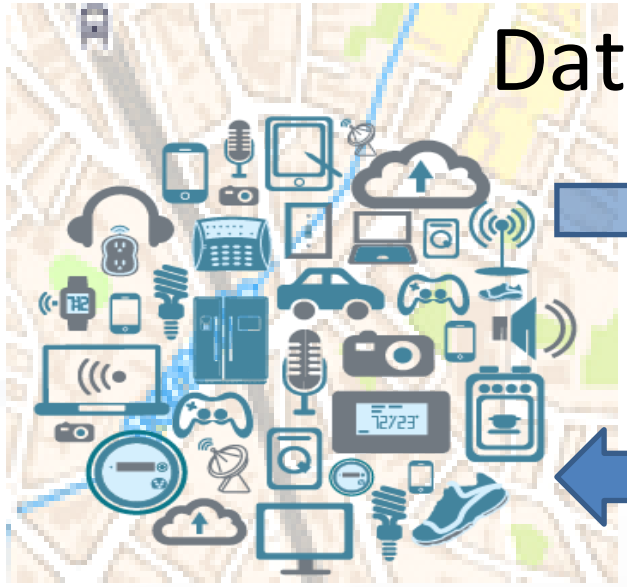
TOP

Dashboards by Selecting data vs Widgets



Simple Dashboards

Data and relationships



Storage

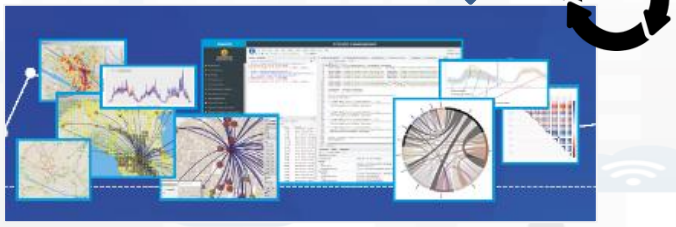
Dashboard Builder

Dashboards and Apps

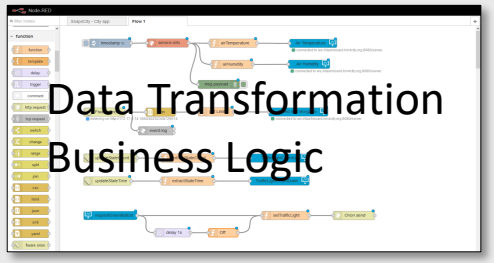


Data gather,producion

Big Data Analytics,
Artificial Intelligence



Dashboard Builder: Development



Data Transformation
Business Logic

IOT Applications



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

Widget Collection





Micro
Applicat
ions

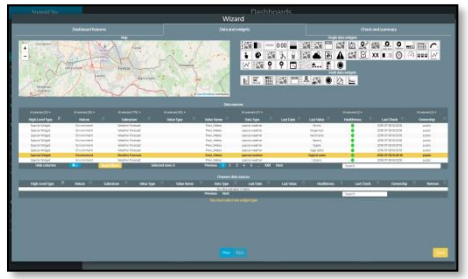


External
Services



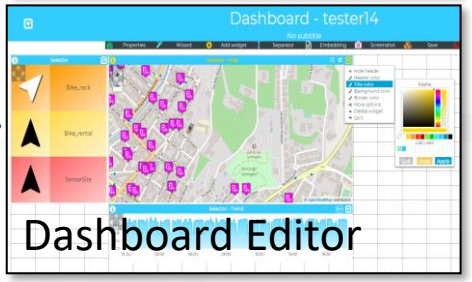
Custom
Widgets/
Synoptics

Dashboard Wizard



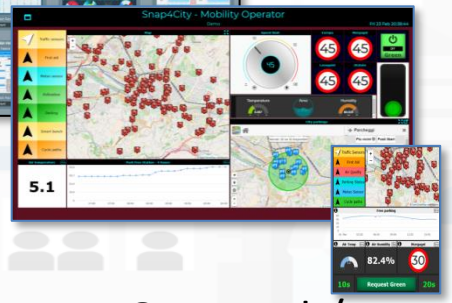
Create, save, load,
delegate, grant access,
change ownership





Dashboard Editor



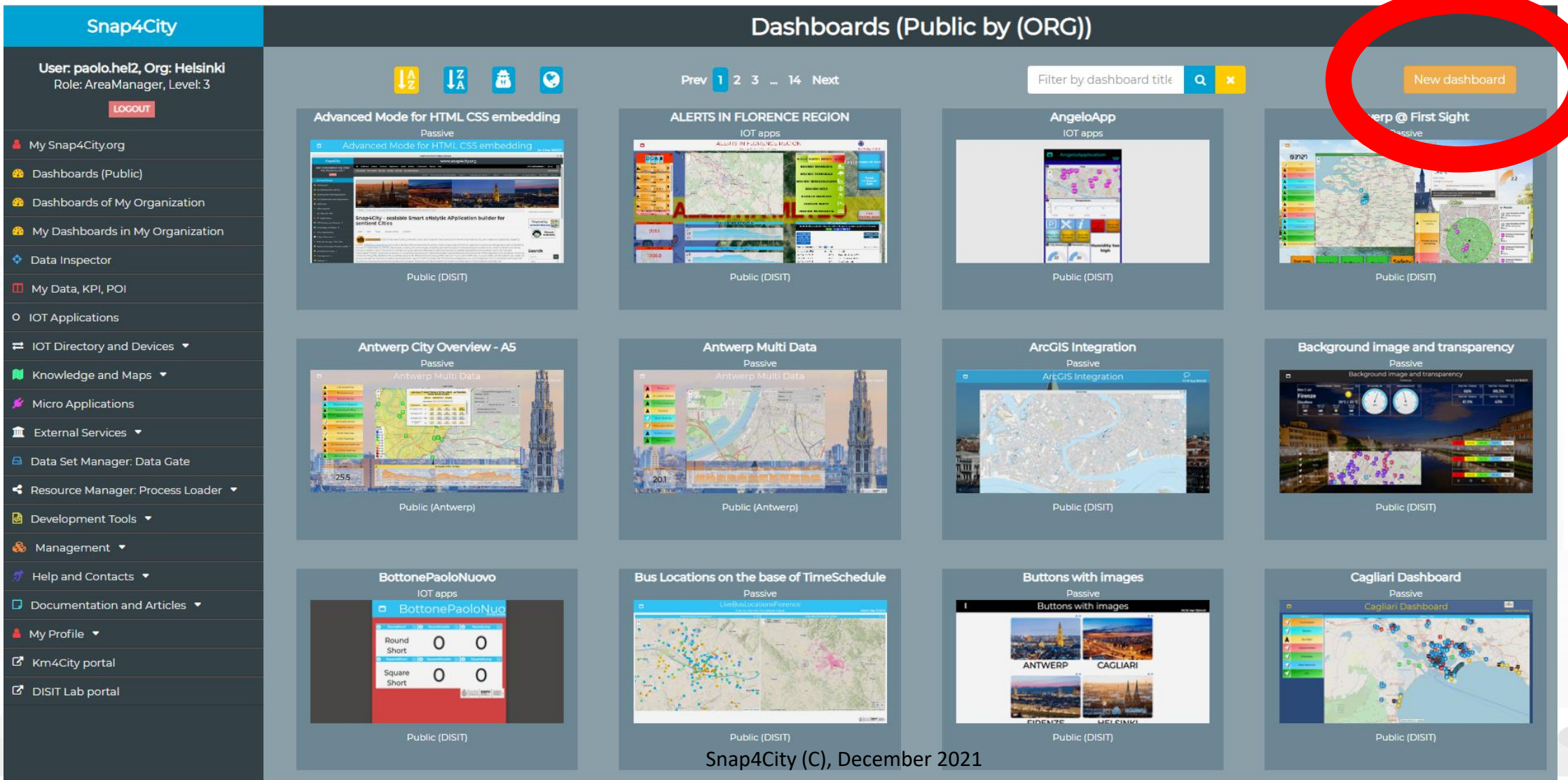


Public
Dashboard
Collection

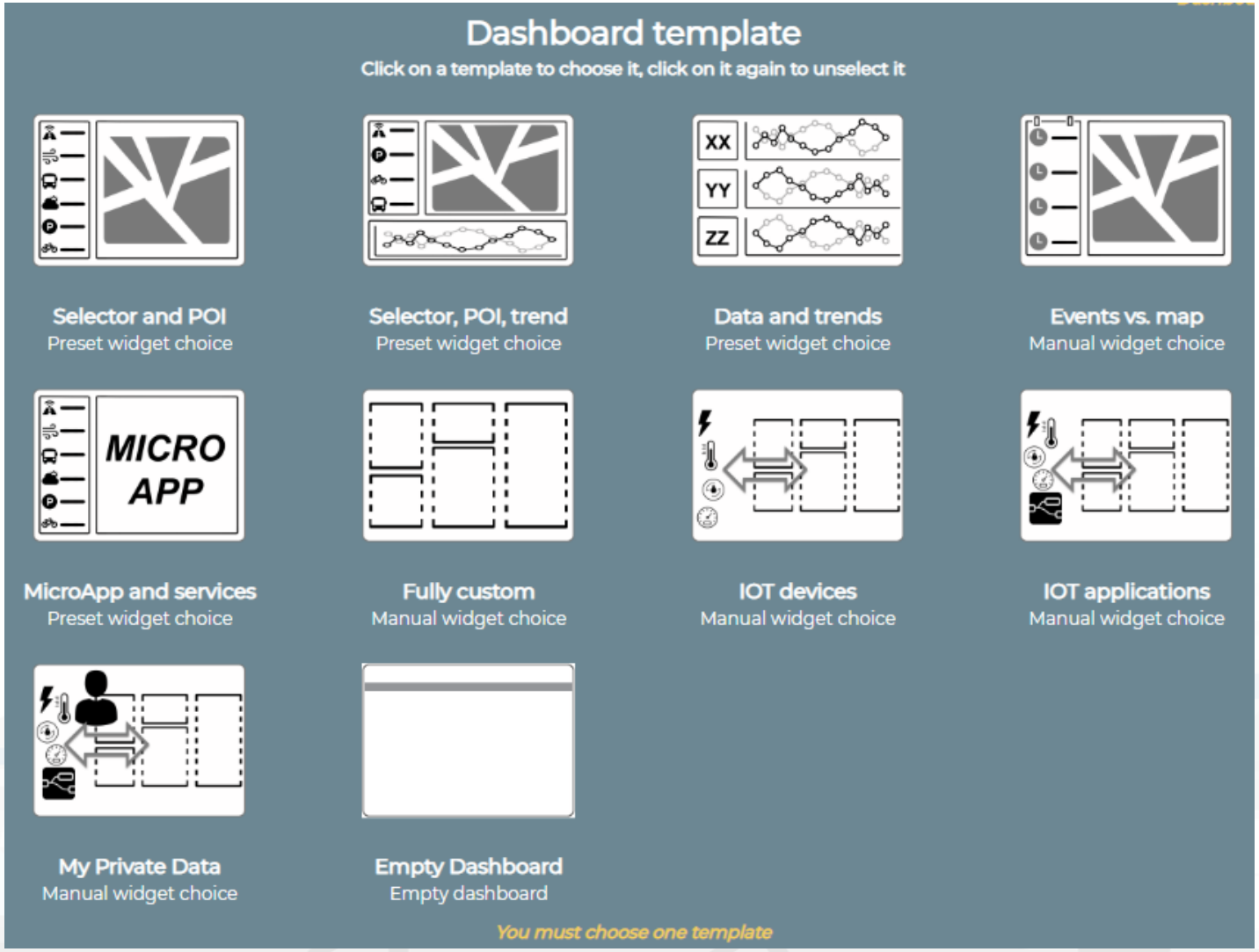


My Own Dash/App

Dashboard List and Editor



From Templates to Wizard and Dashboards

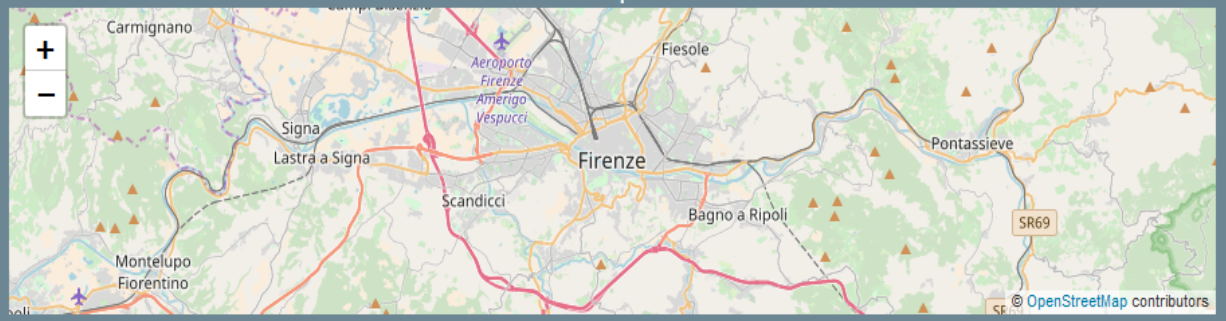


- to create a new Dashboard
- to add widgets and/or groups of them on any Dashboard

Wizard

Dashboard features | Data and widgets

Map



Single data widgets



Multi data widgets



Data sources

High-Level Type	Nature	Subnature	Value Type	Value Name	Data Type	Last Date	Last Value	Healthiness	Last Check	Ownership
Special Widget	Environment	Weather Forecast		Previ_Meteo	special weather				2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast		Previ_Meteo	special weather				2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast		Previ_Meteo	special weather				2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast		Previ_Meteo	special weather				2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast		Previ_Meteo	special weather				2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast		Previ_Meteo	special weather				2018-07-08 16:00:18	public
Special Widget	**Environment**	**Weather Forecast**		**Previ_Meteo**	**special weather**		**Vagli di sotto**		**2018-07-08 16:00:18**	**public**
Special Widget	Environment	Weather Forecast		Previ_Meteo	special weather		Uzzano		2018-07-08 16:00:18	public

Hide columns | Selected rows: 0 | Previous 1 2 3 4 5 … 1081 Next | Search

Choosen data sources

High-Level Type	Nature	Subnature	Value Type	Value Name	Data Type	Last Date	Last Value	Healthiness	Last Check	Ownership	Remove

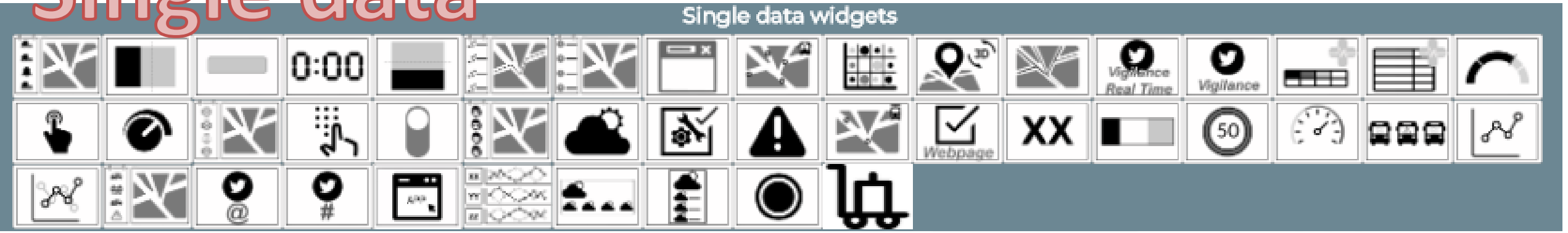
Close

Wizard

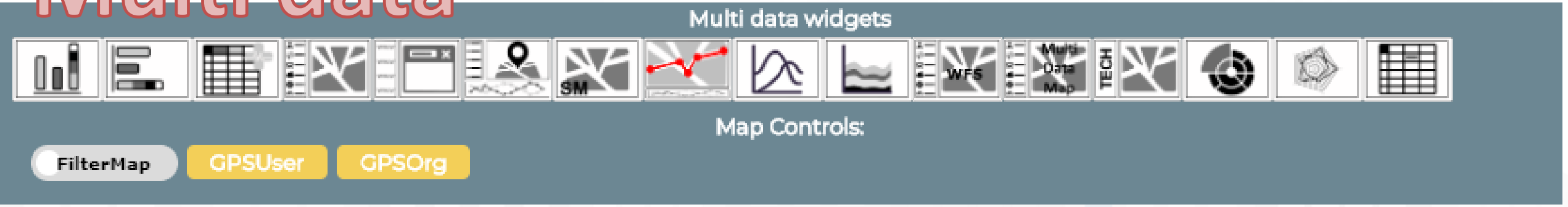
- Select the area of your interest: panning and zooming
- Select the
  - graphic aspect of your interest, or
  - High Level Type of your interest, or
  - Make a search if you a have a precise idea or
  - Act on filters: nature, subnature, type, name, value, date, health, owner, …
  - Combine them as you like
- Select the lines of your interest
- Then click on Next and get the Dashboard by wizard

ICONS of Widgets

Single data

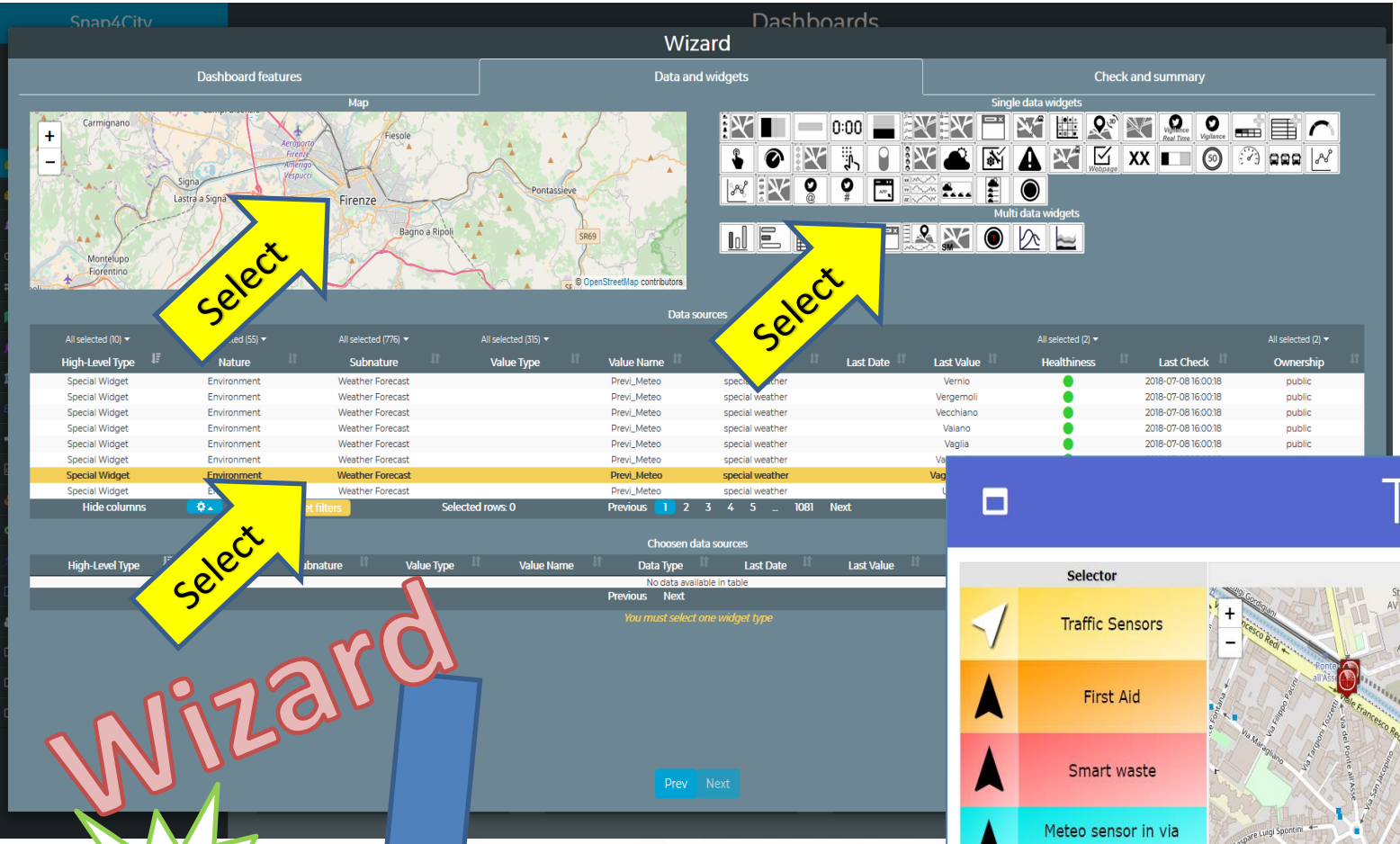


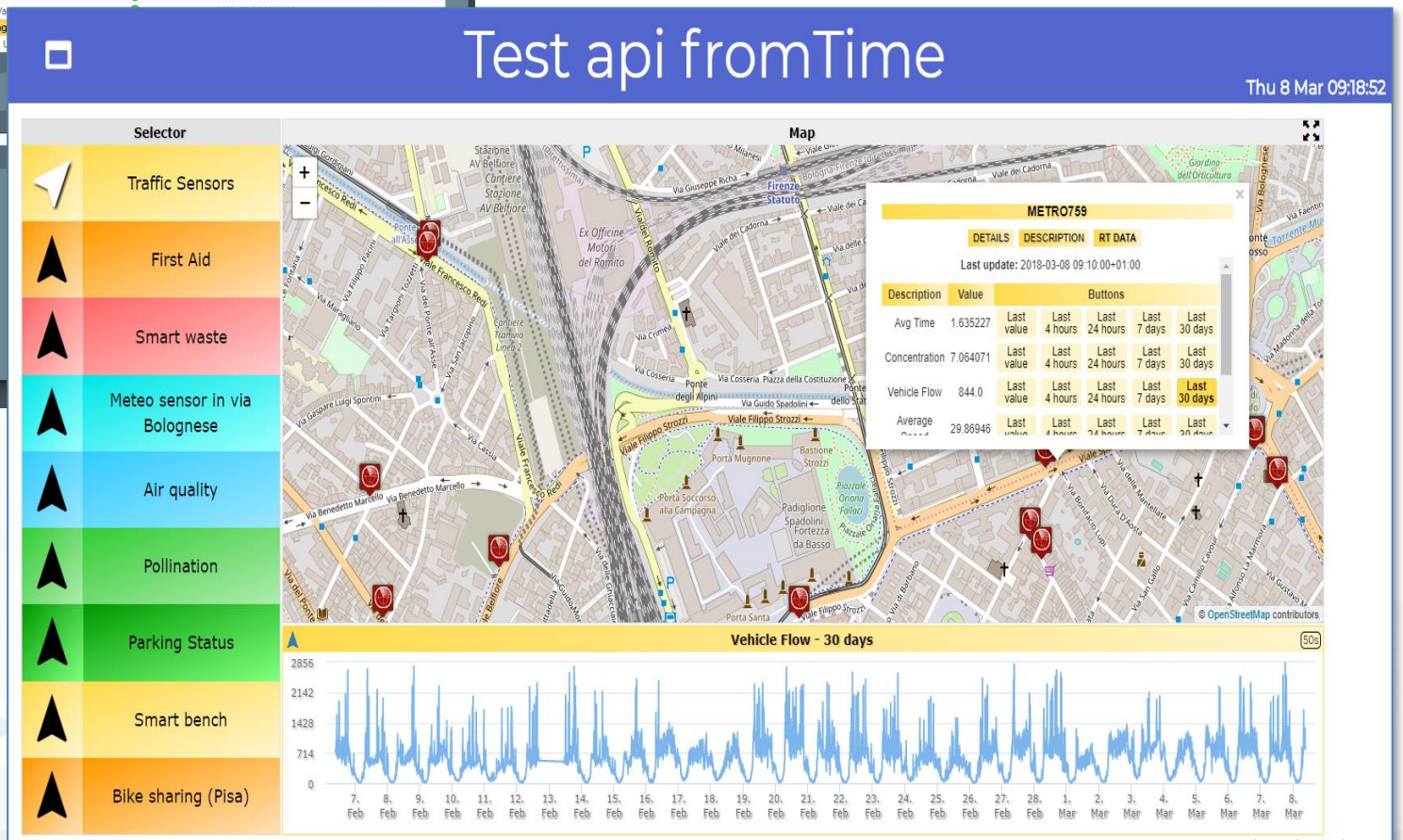
Multi data



Map Controls

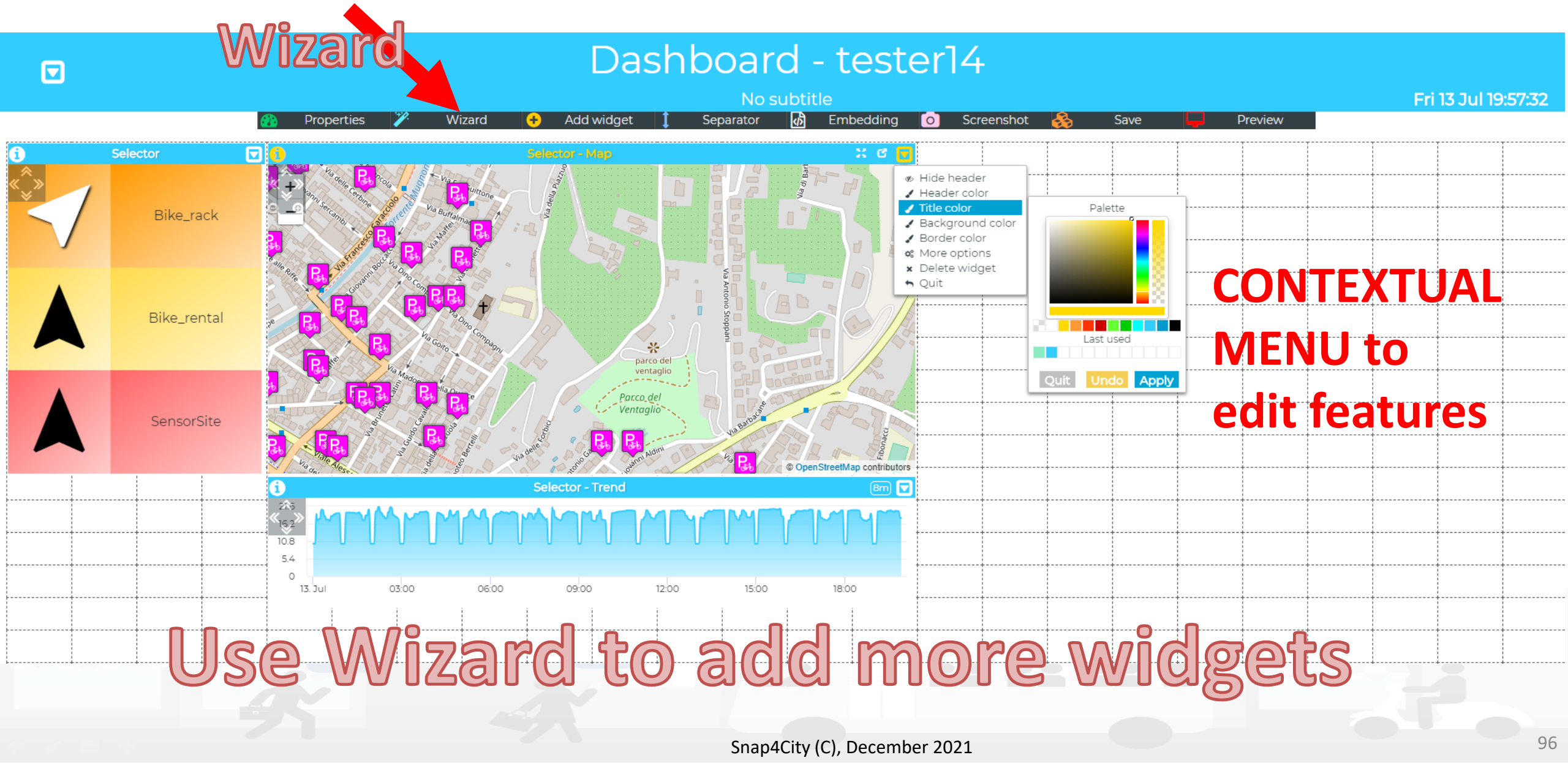
Dashboard Wizard





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

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

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

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

Widget Map (multi data map)

© OpenStreetMap contributors

The Life of Helsinki Button

Documentation
Forum Discussion
Survey

Buttons

External Content

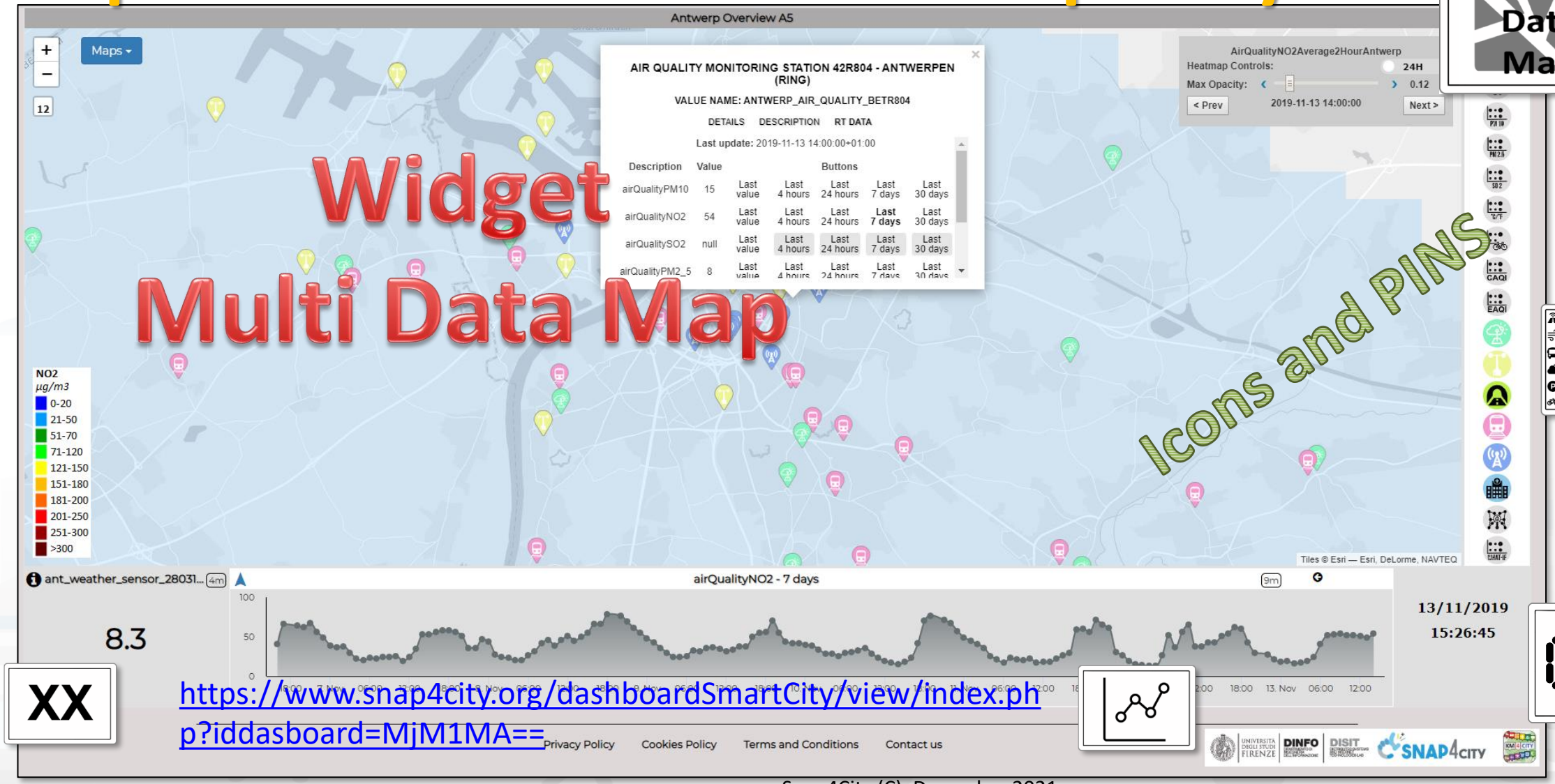
Weather sen... 9m
20.5
Weather sensor Helsinki Kaisaniemi - airTemperature 9m
3. Jun 4. Jun 5. Jun 6. Jun 7. Jun 8. Jun 9. Jun

Single Content

Time Trend

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

Unique Dashboard builder Multiple Styles



Widget Multi Data Map

Icons and PINS

Multi Data Map

Multi Data Map

XX

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

Single values

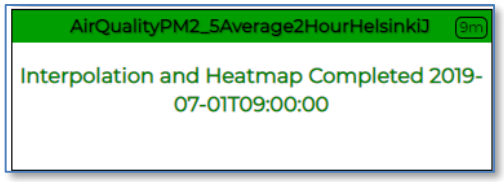
- Single Content
- Speedometer
- Gauge
- Single Bar



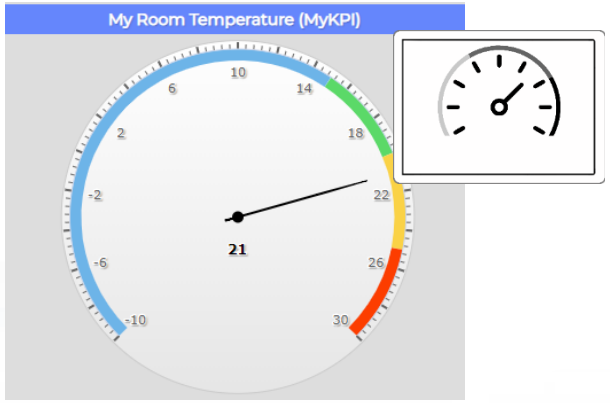


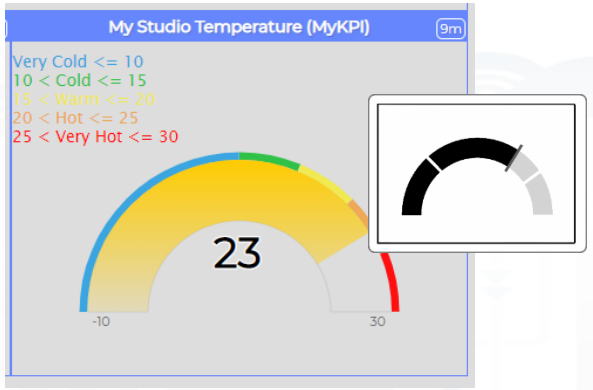


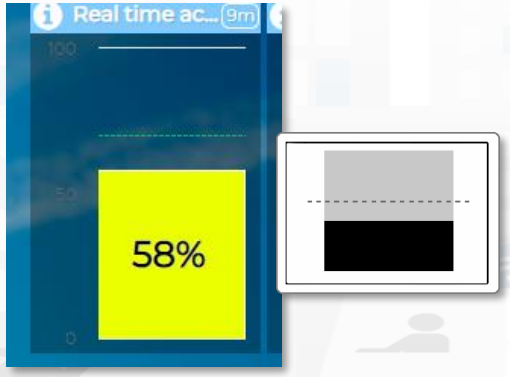










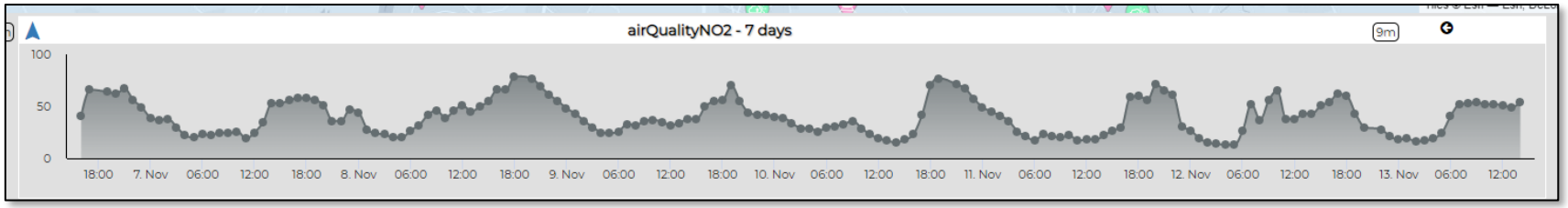


Most of the multi xxxx widgets can show also single values

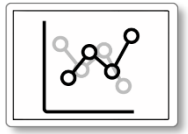
Time Series

- **Time Trend**

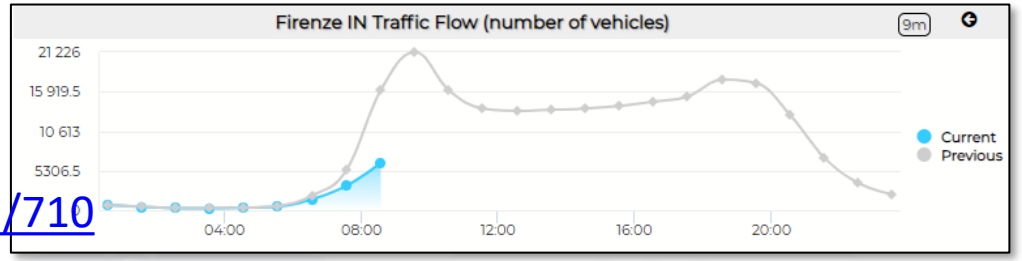




- **Time Trend Compare**
  - Comparing trends of the same time series

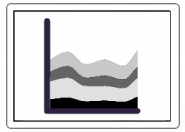


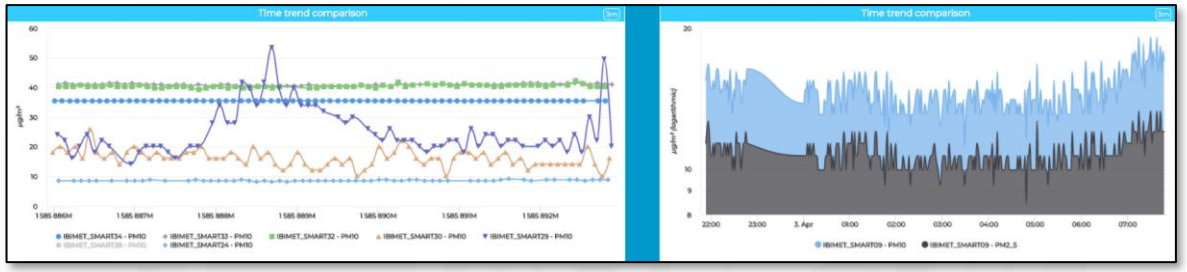
https://www.snap4city.org/710



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

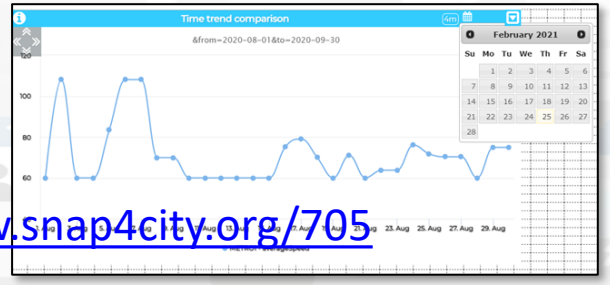






- **Typical Time Trend**
  - Showing the typical trend of a time serie: multiple modalities

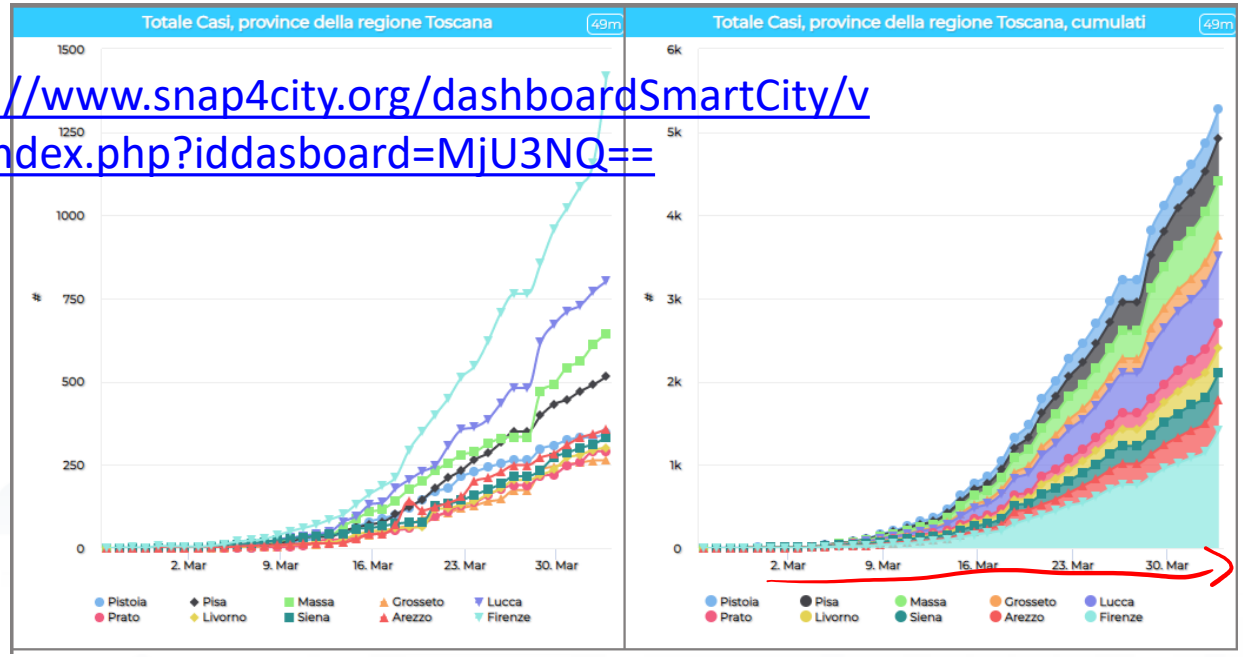


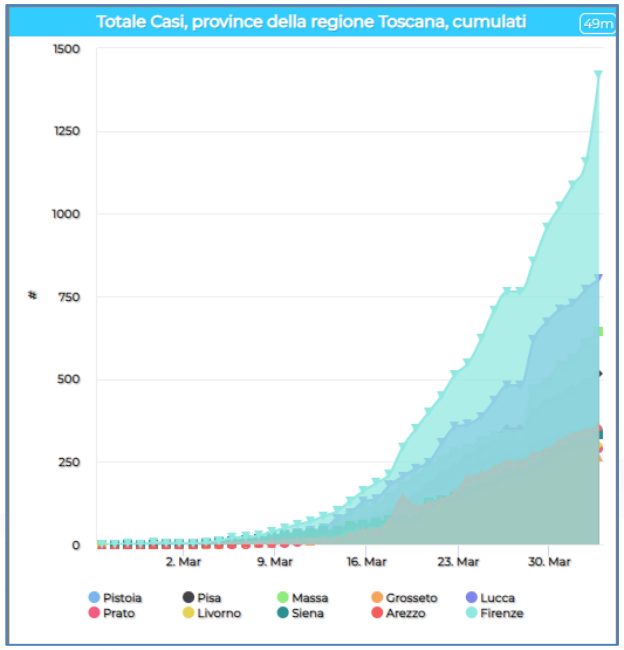


https://www.snap4city.org/705

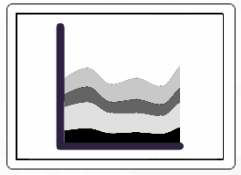
MultiSeries

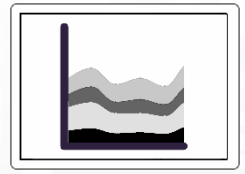
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjU3NQ==







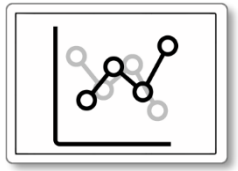




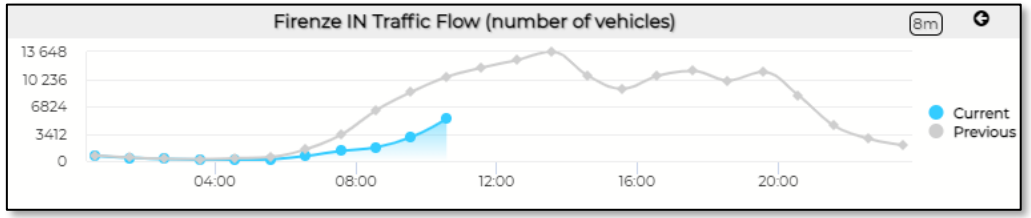
- **Staked, shaded or regular**,
- Grouped by Value_unit, **linear** or **Logarithmic**
- From historical data and/or **dynamic** data from IOT Applications

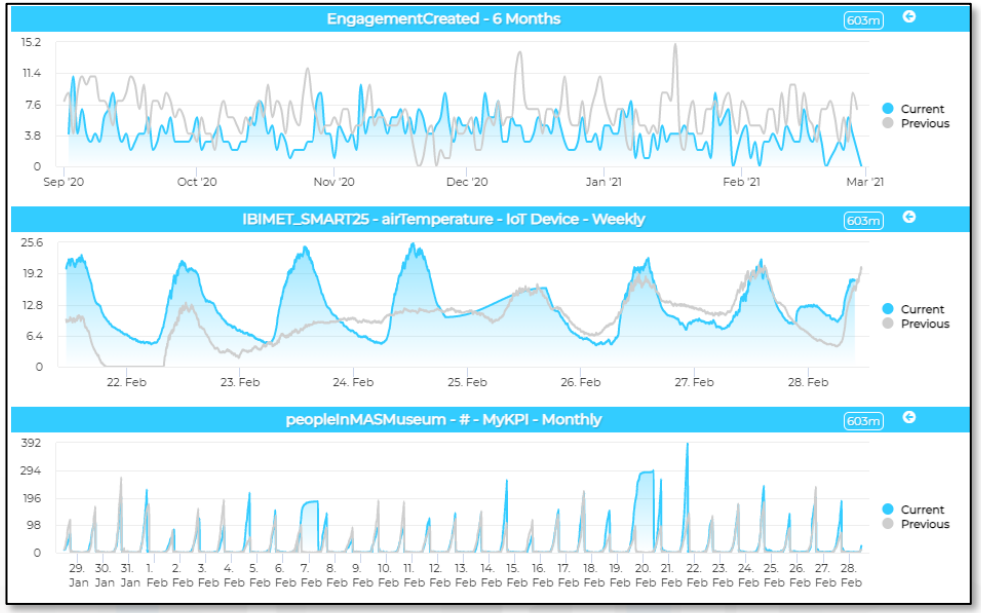
Time Trend Compare

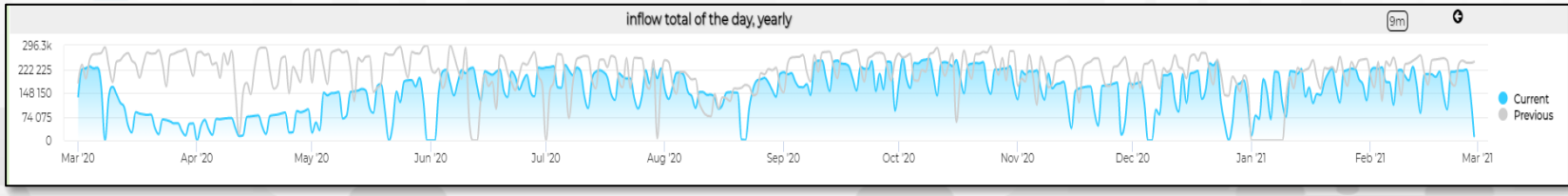
A tool for visual Analytics, Comparing



- **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





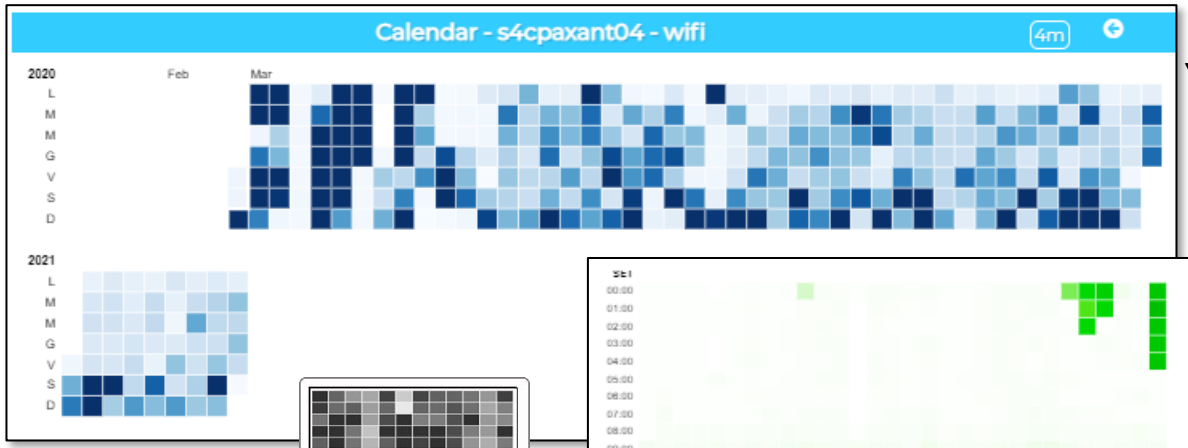


Calendar

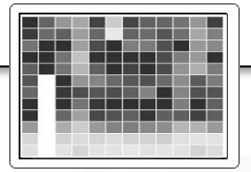
https://www.snap4city.org/706

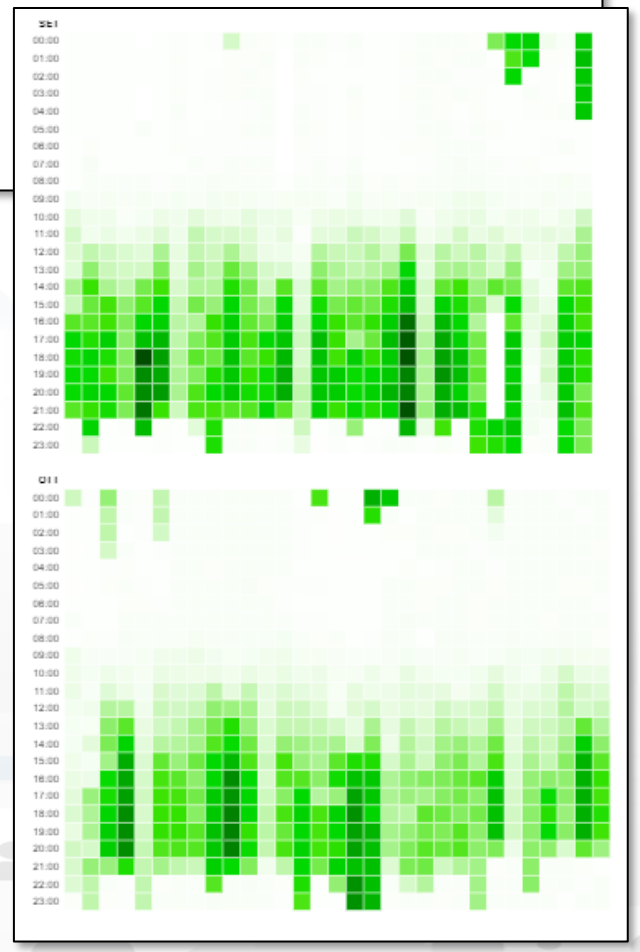
Showing: **Sum, Average or Median** value of a variable as a colored calendar:

- **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

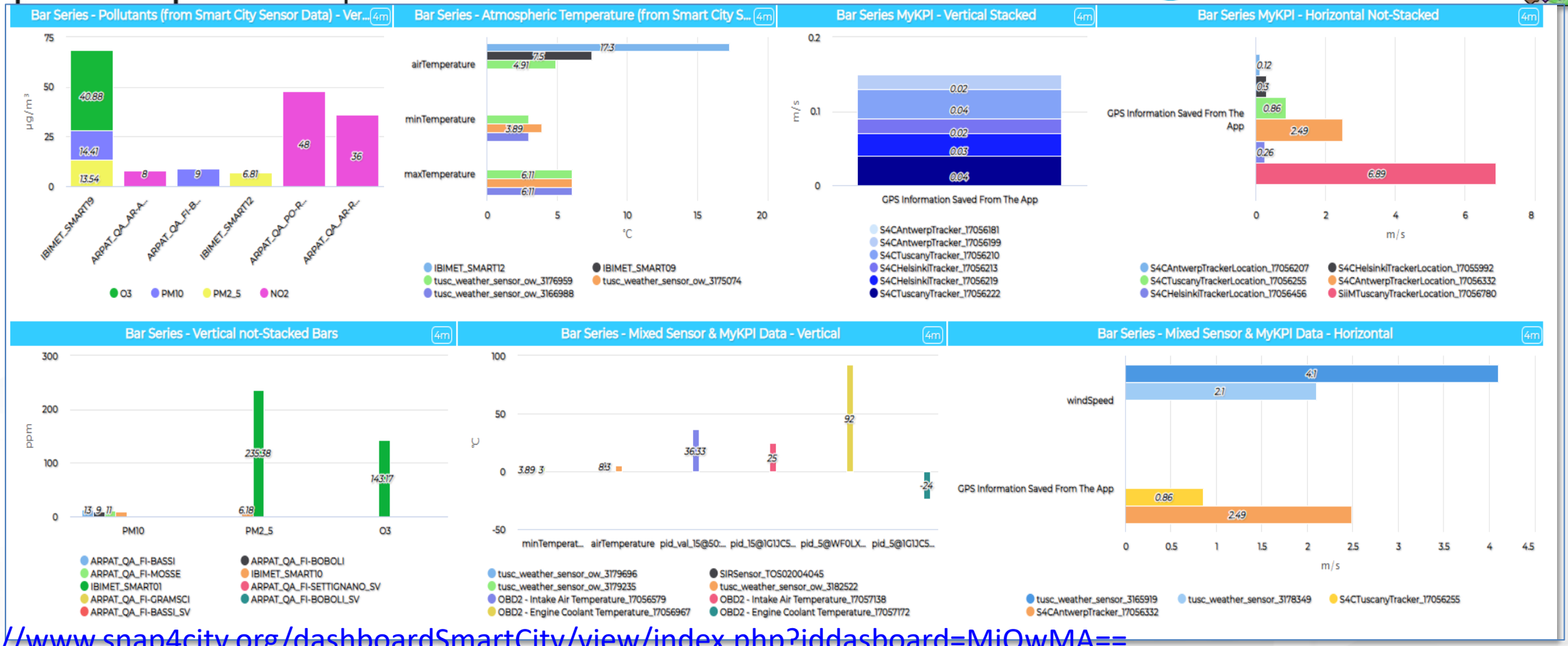




Month, 6M

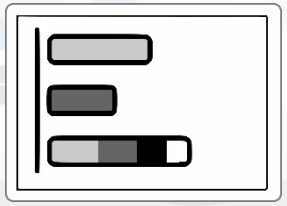
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzA4MA==

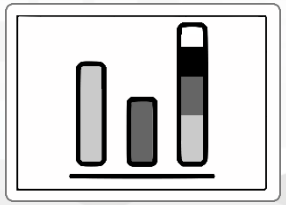
Barseries



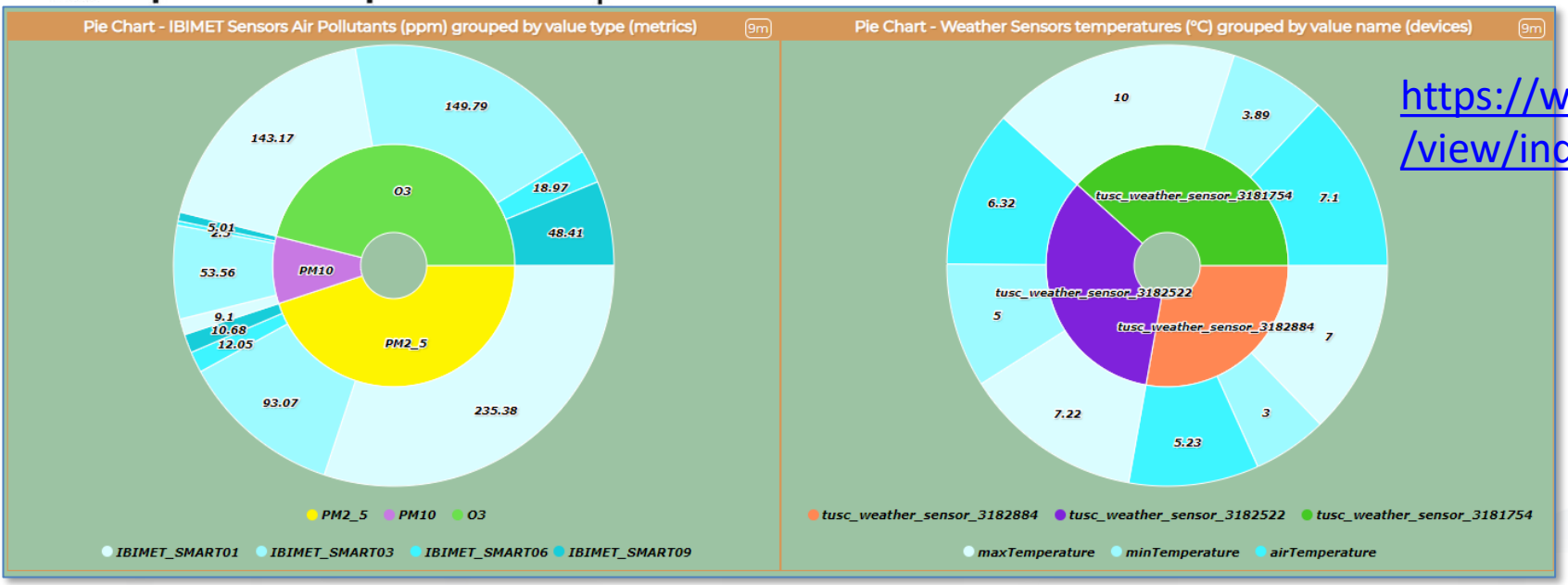
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjQwMA==

- **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

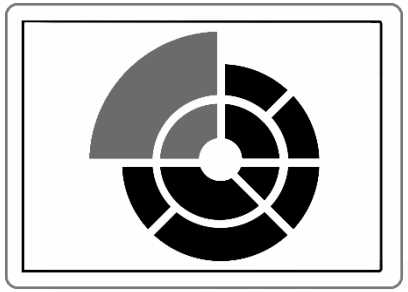


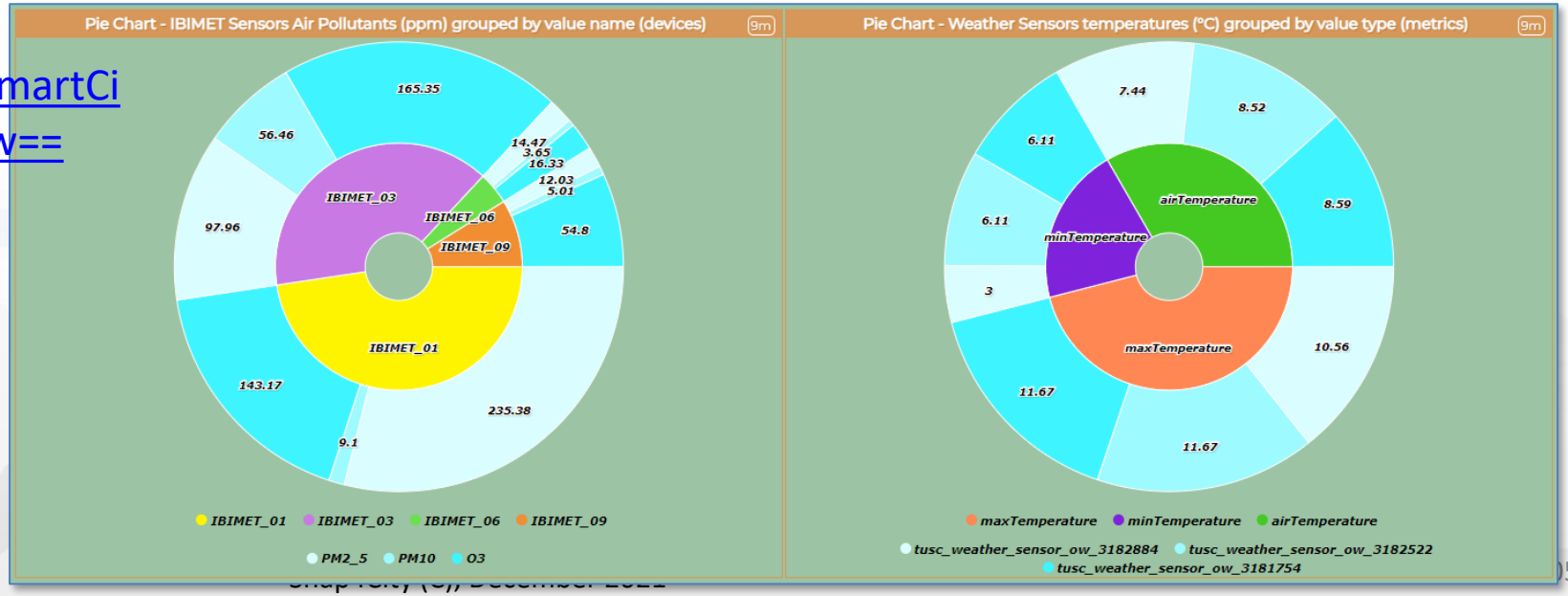


Pie & Donut



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

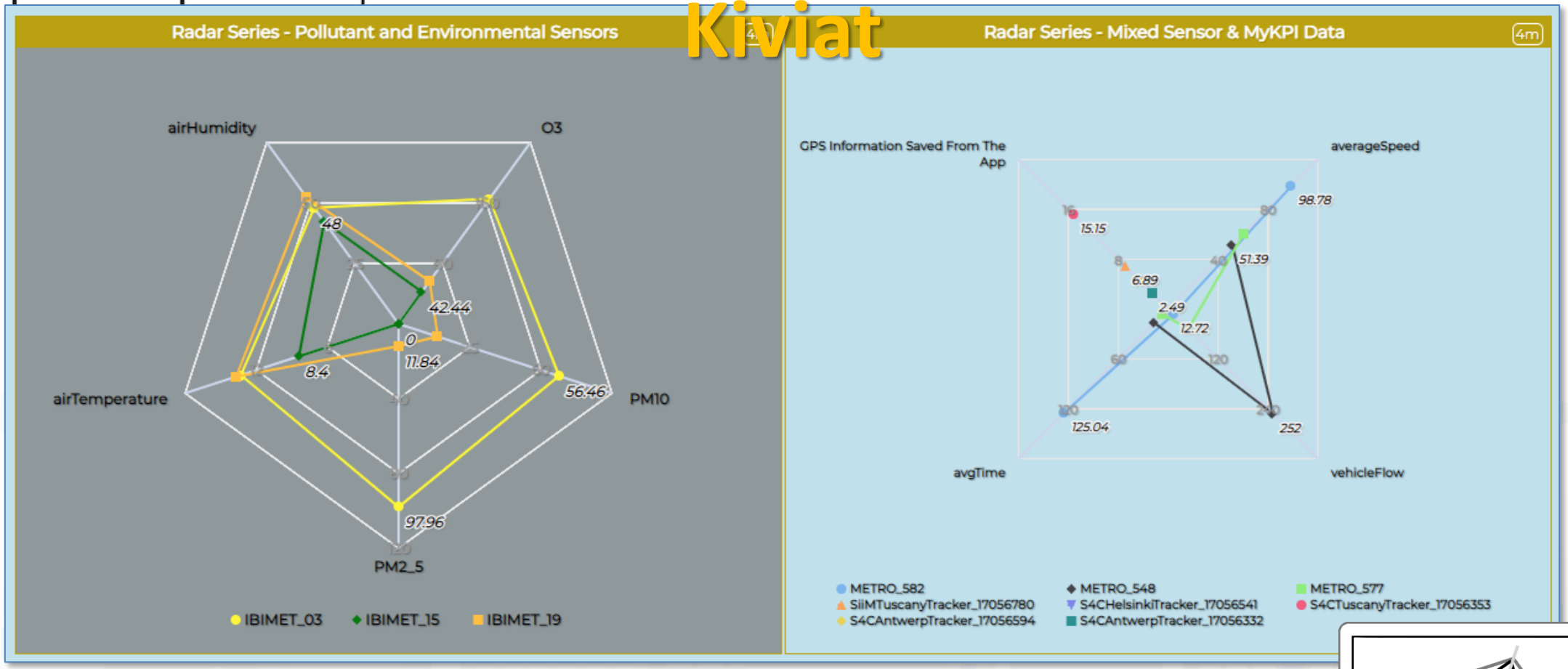




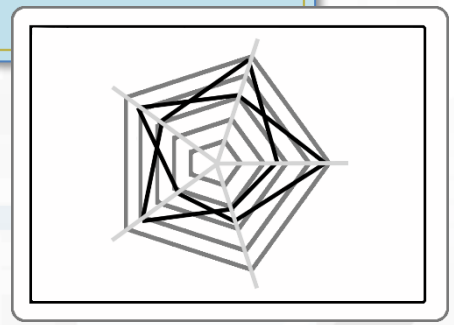
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjUyNw==

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

Radar, SpiderNet Kiviat

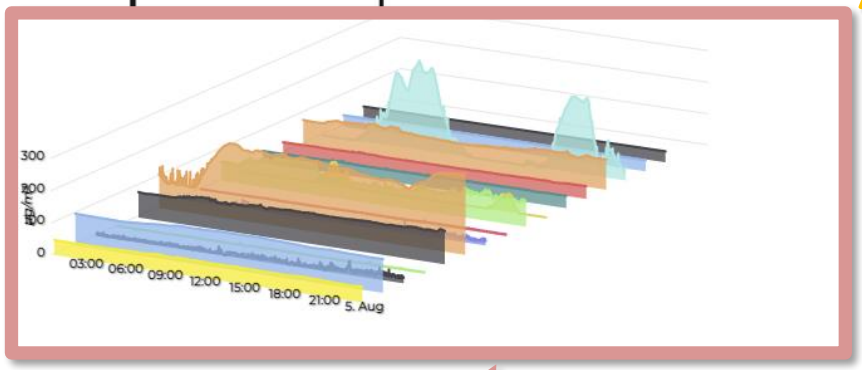


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjUwNQ==



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

Hypercube





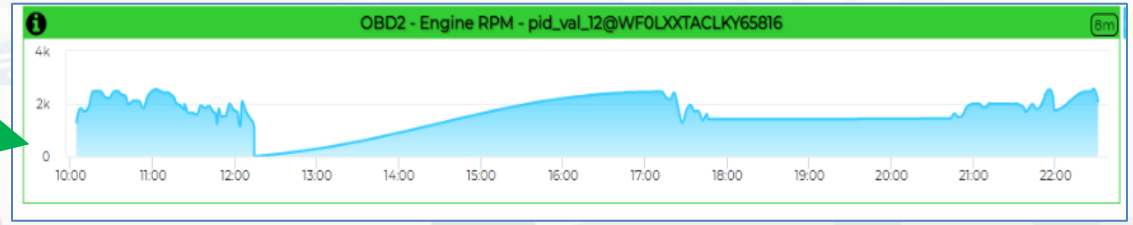
Longitude

Latitude

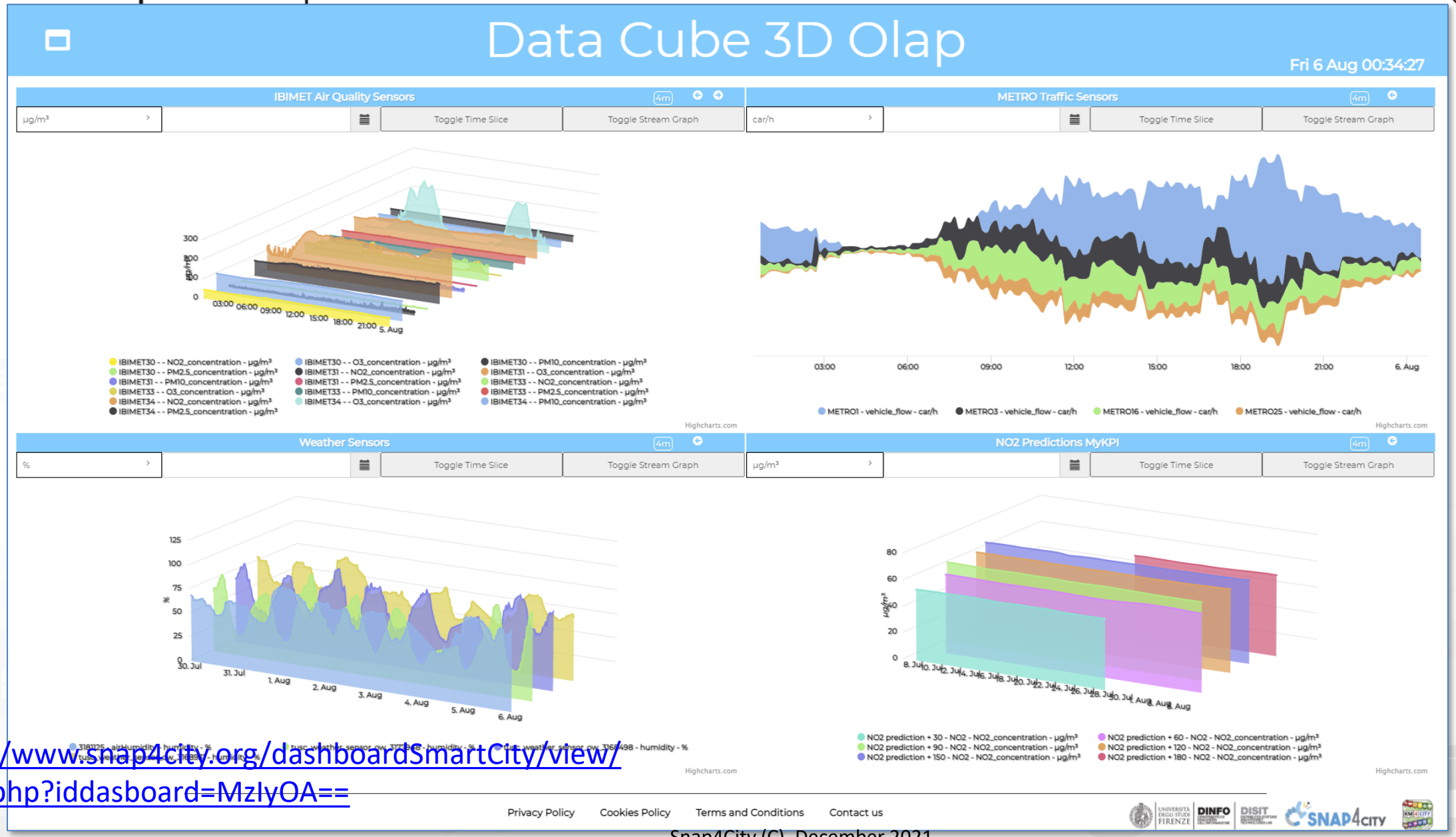
Values

Sensors of Devices, KPI, etc.

time

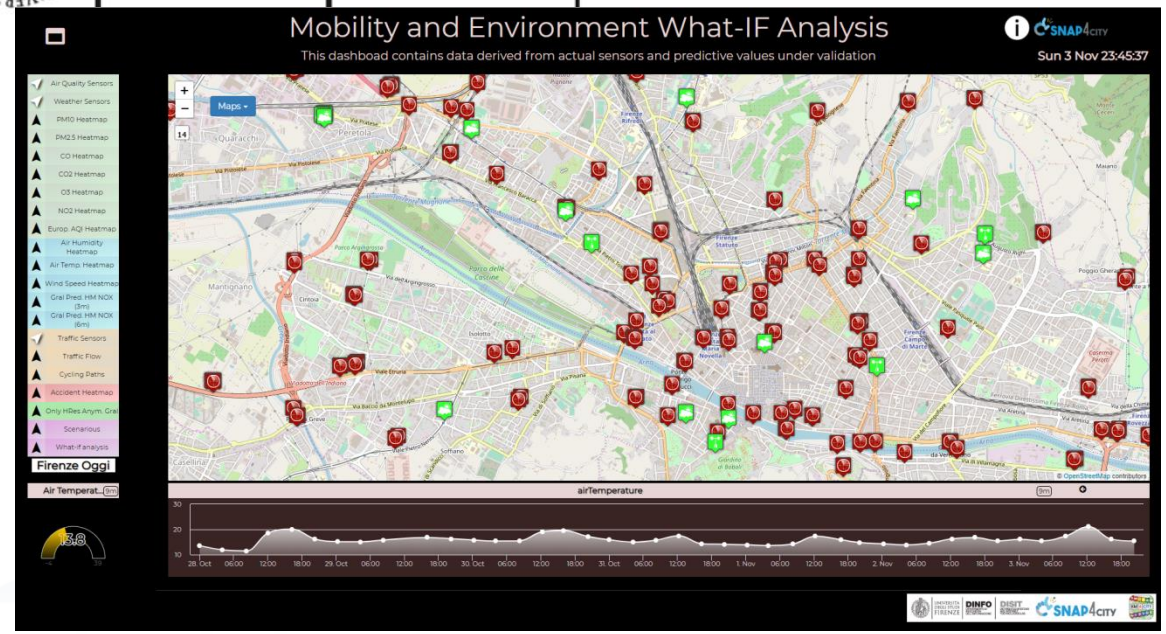


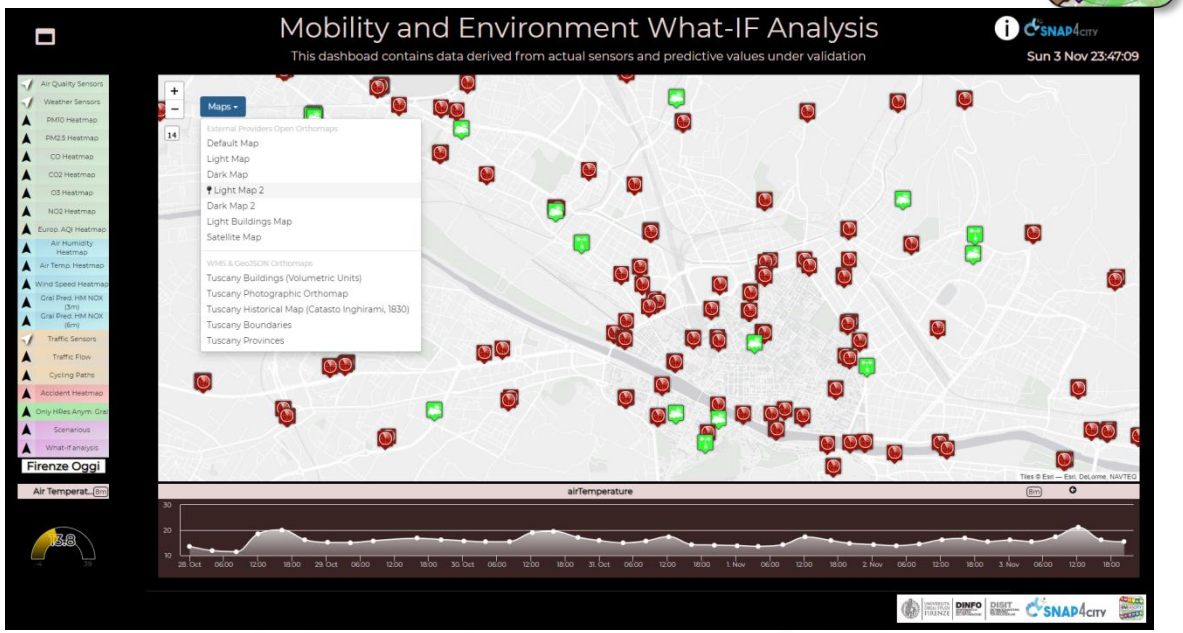
Data Cube 3D Olap



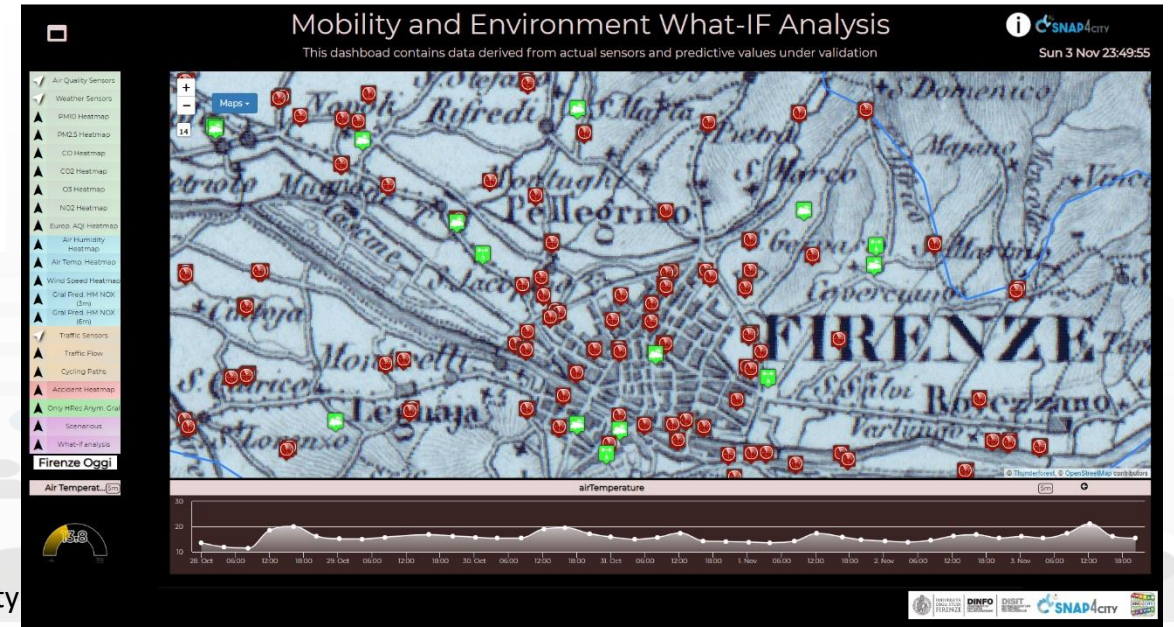
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzIyOA==

Orthomaps

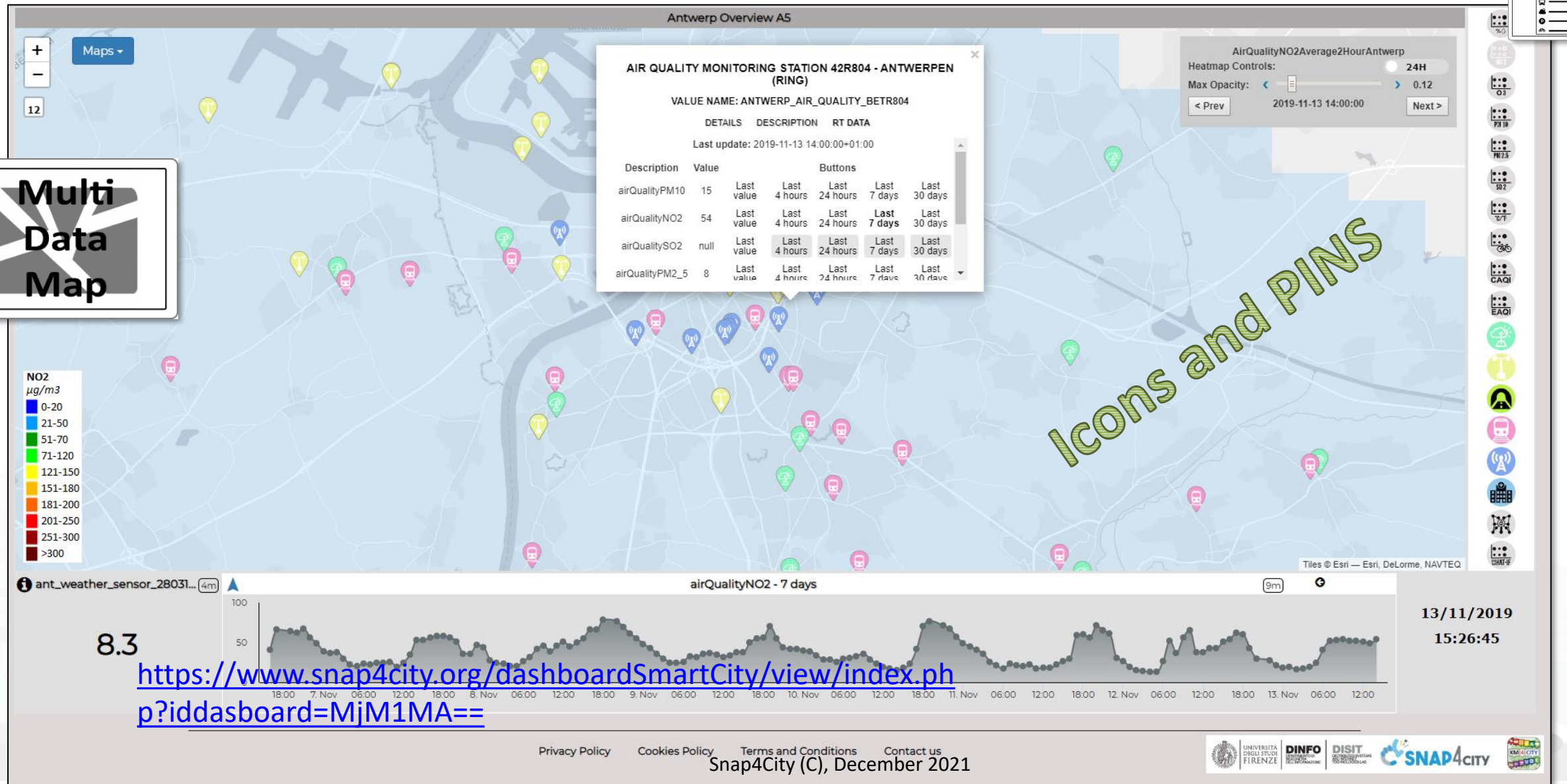

Mobility and Environment What-IF Analysis
This dashboad contains data derived from actual sensors and predictive values under validation
Sun 3 Nov 23:45:37
Firenze Oggi
airTemperature


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
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
Firenze Oggi
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
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
Firenze Oggi
airTemperature

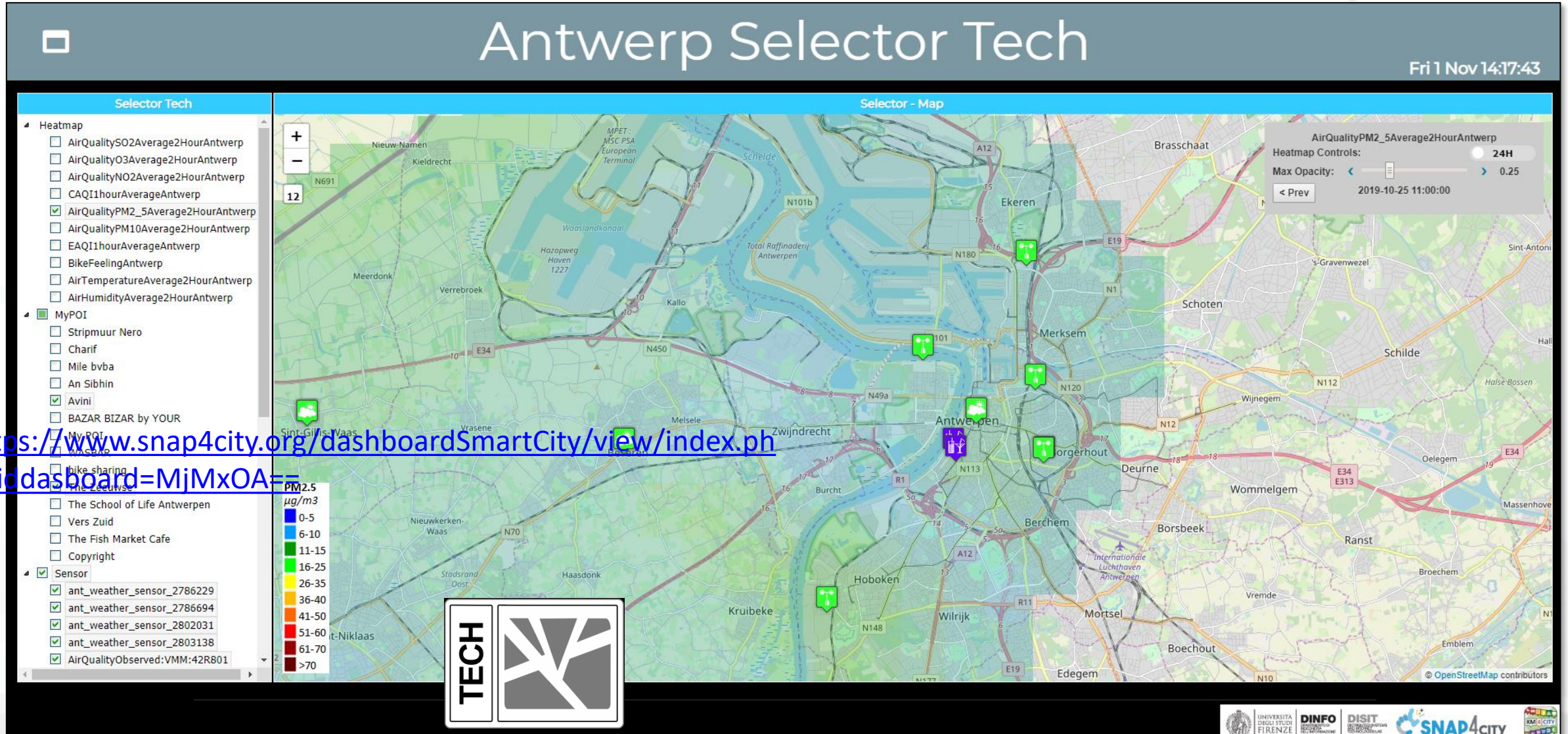

Mobility and Environment What-IF Analysis
This dashboad contains data derived from actual sensors and predictive values under validation
Sun 3 Nov 23:49:55
FIRENZE
Firenze Oggi
airTemperature

Menu Icon and PINs as Icons



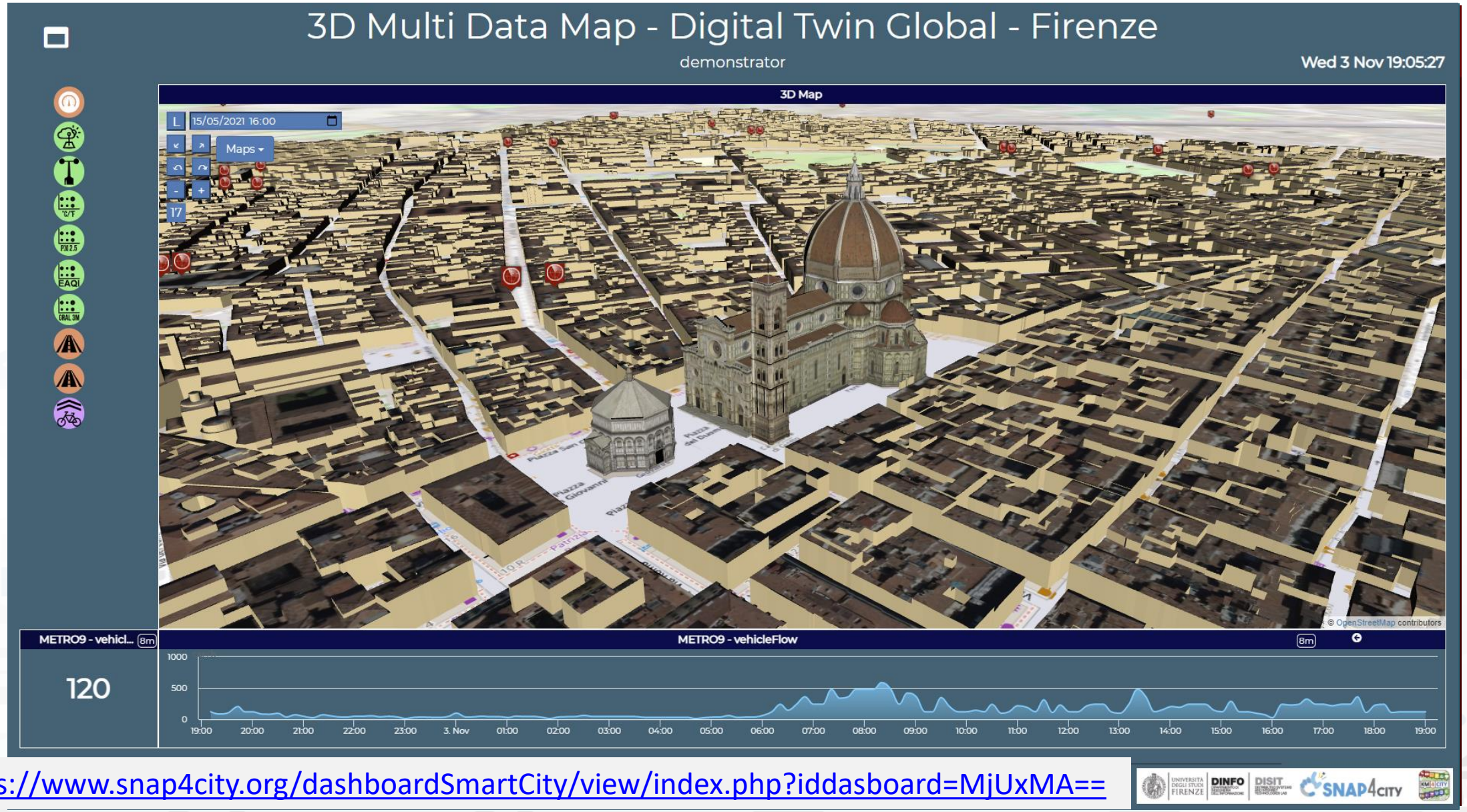
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Technical Selector: TECH MultiDataMap



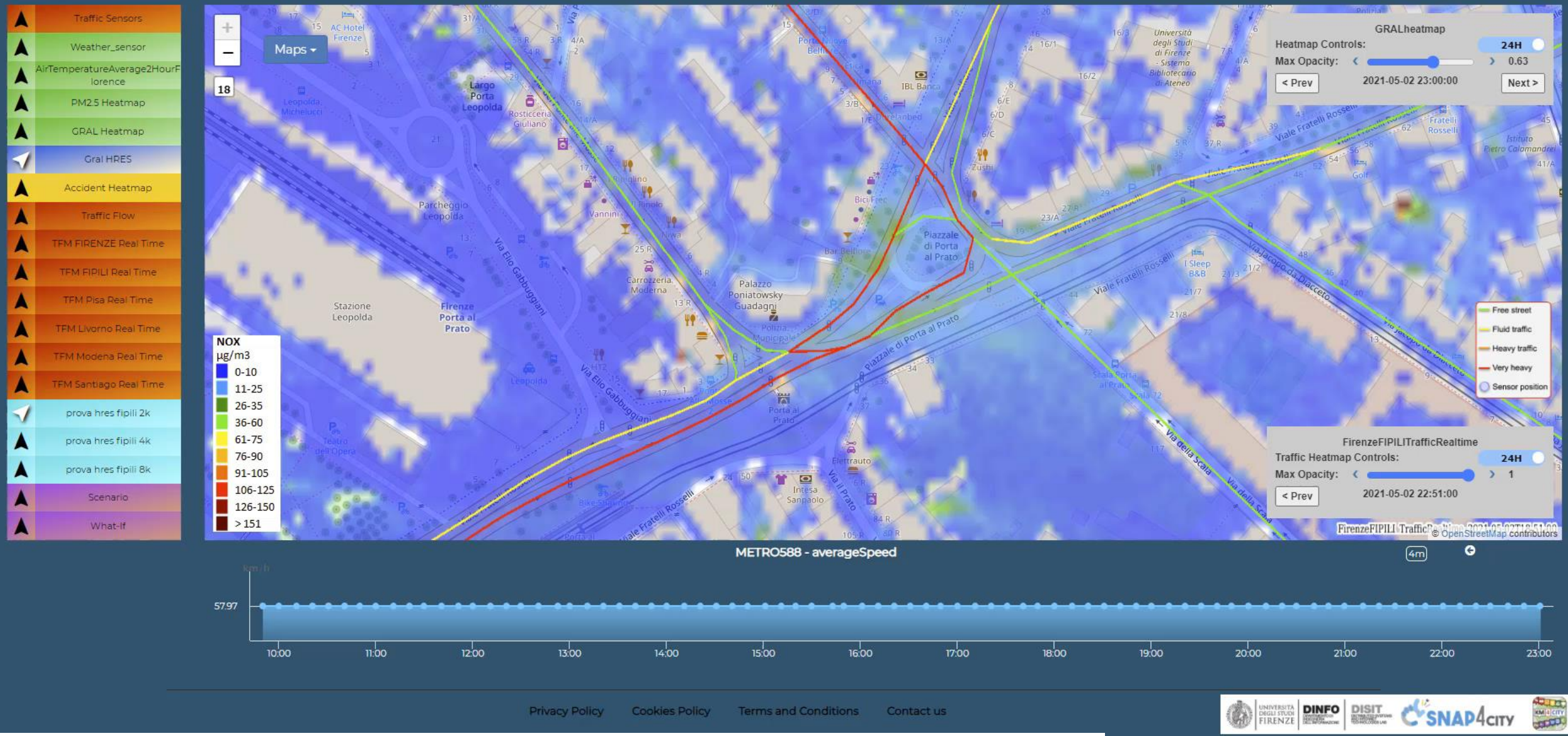
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3D views



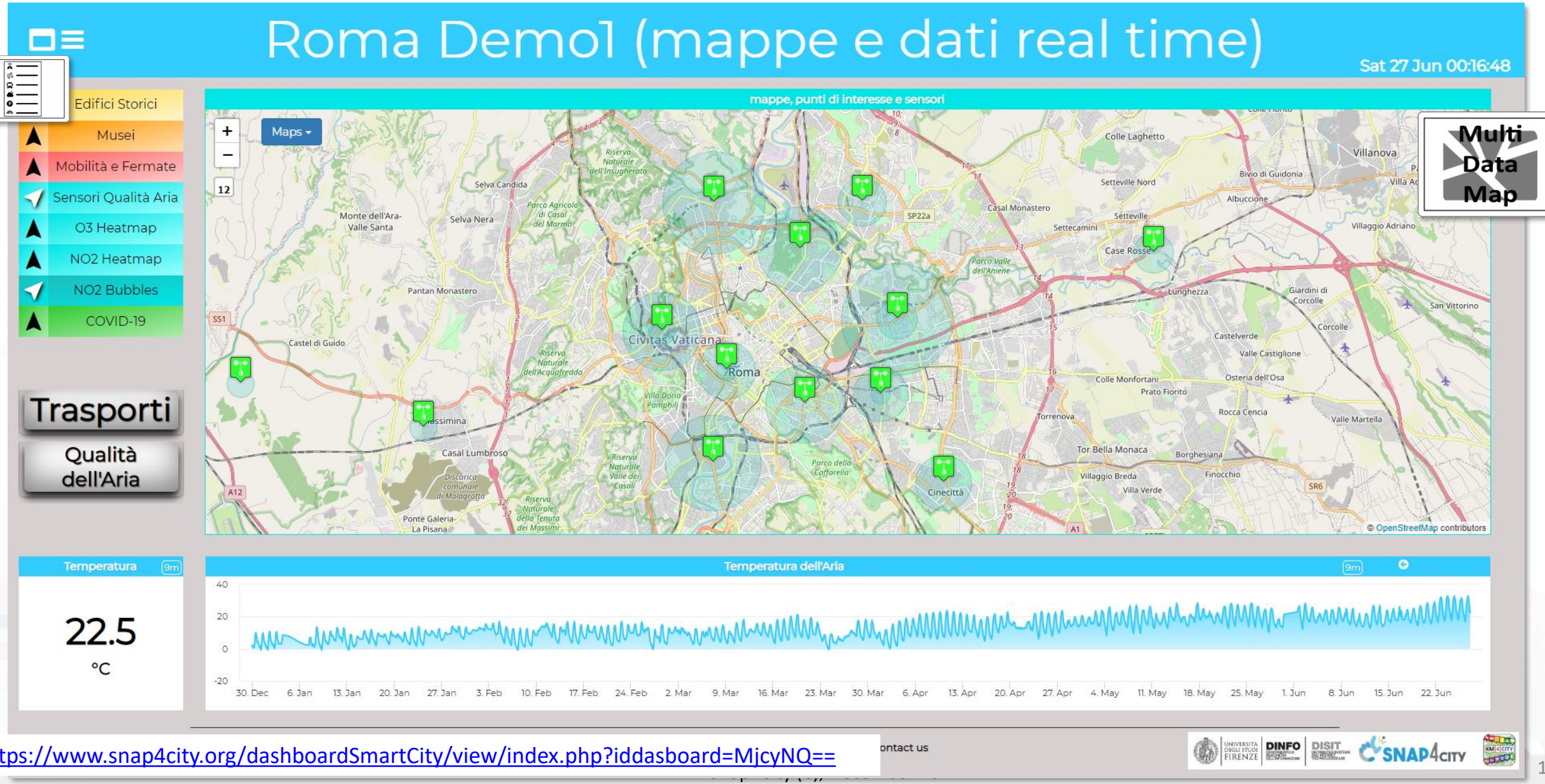
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjUxMA==

Traffic Flow Manager on multiple cities



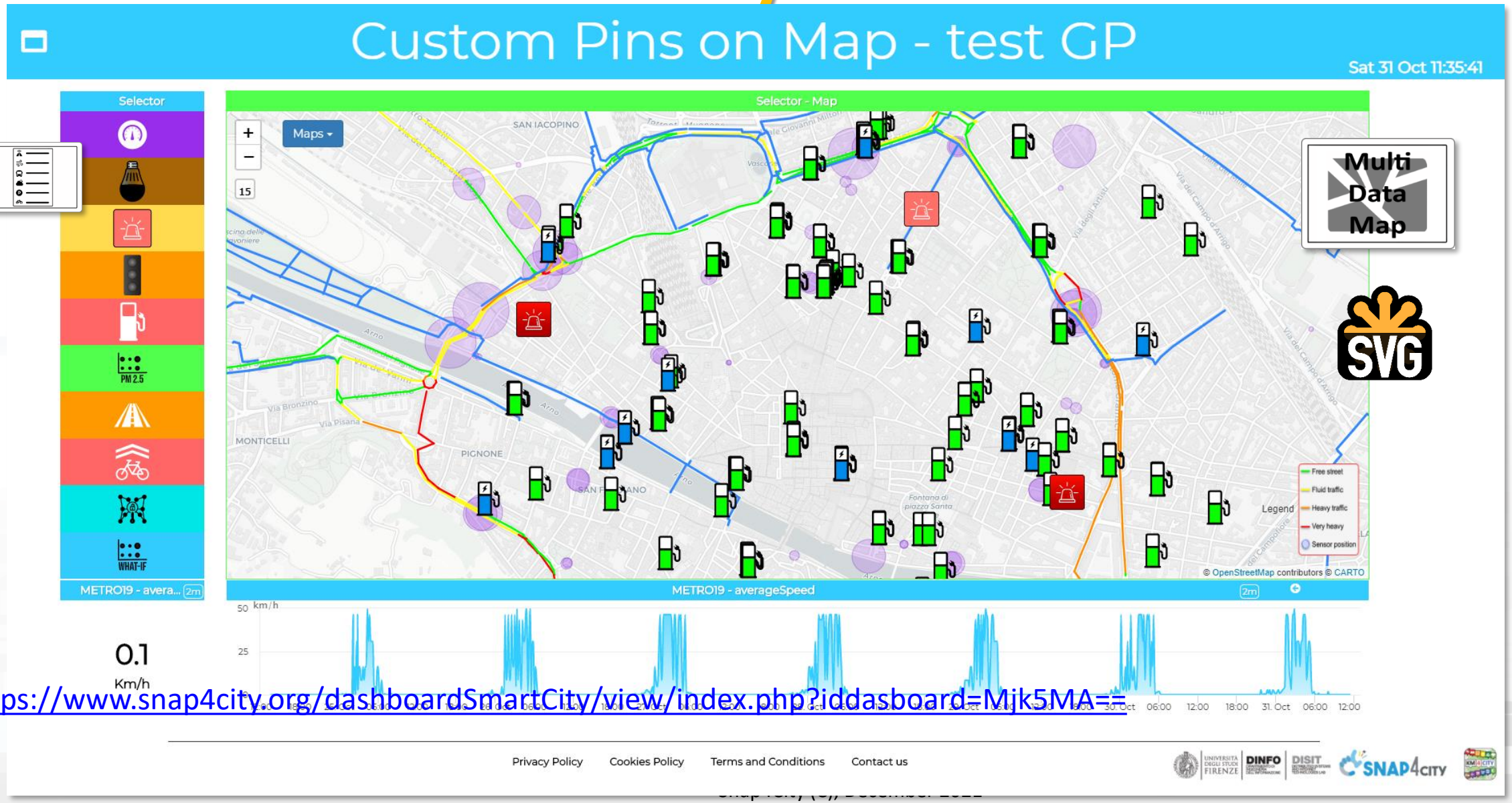
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzEyNg==

Weighted Bubbles



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

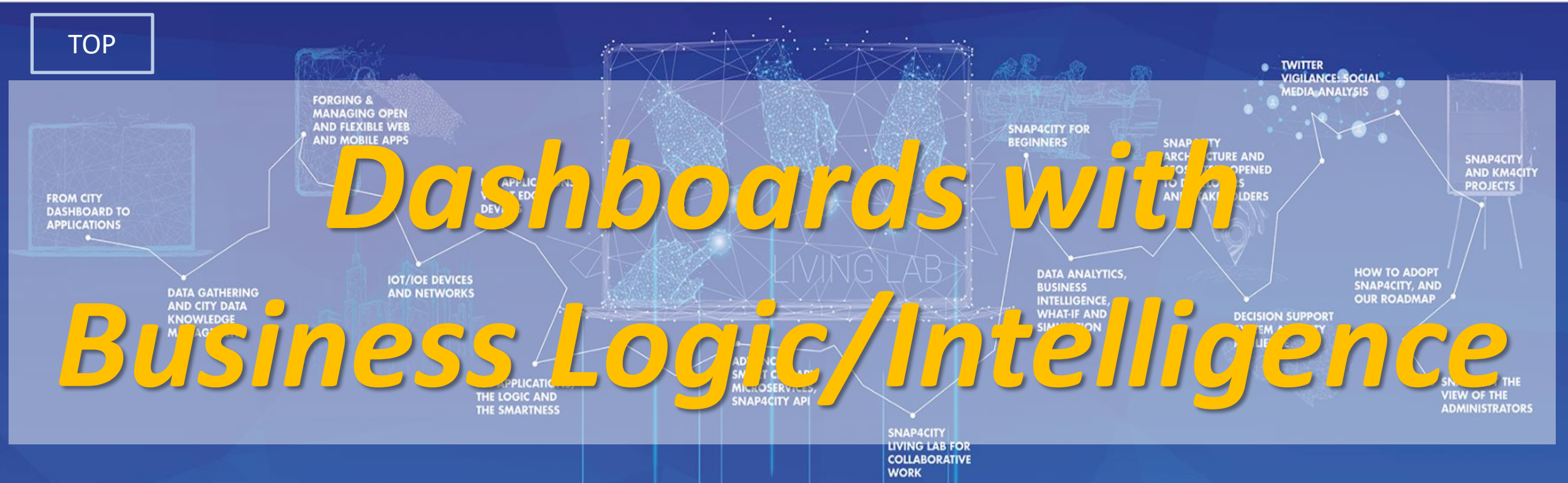
Custom Dynamic Pins



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

TOP

Dashboards with Business Logic/Intelligence



100% OPEN SOURCE

SNAP4 Appliances and Dockers **Installations**

Visual Analytics: Business Logic/intelligence

Dashboards and Apps

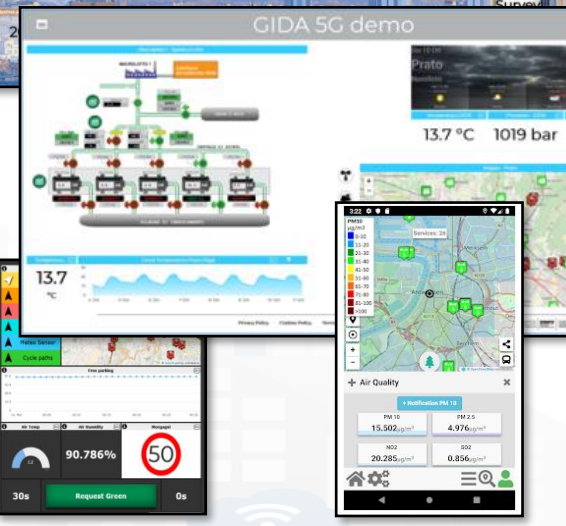
Data and relationships

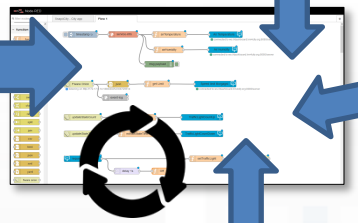


Storage

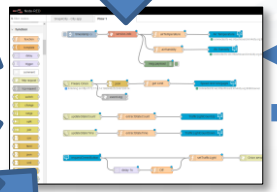
Dashboard Builder







Data gather,producion

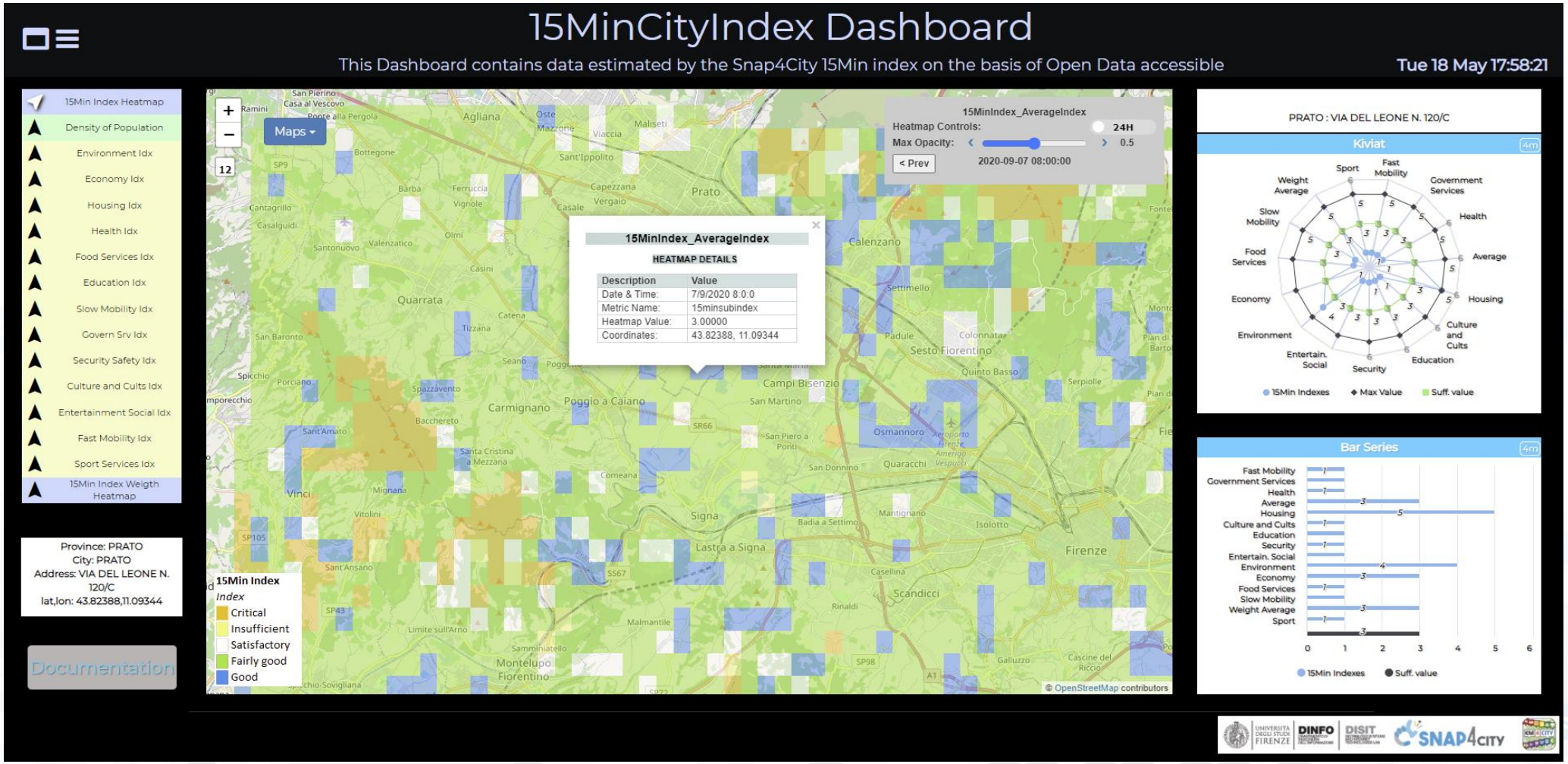


Business
LOGIC



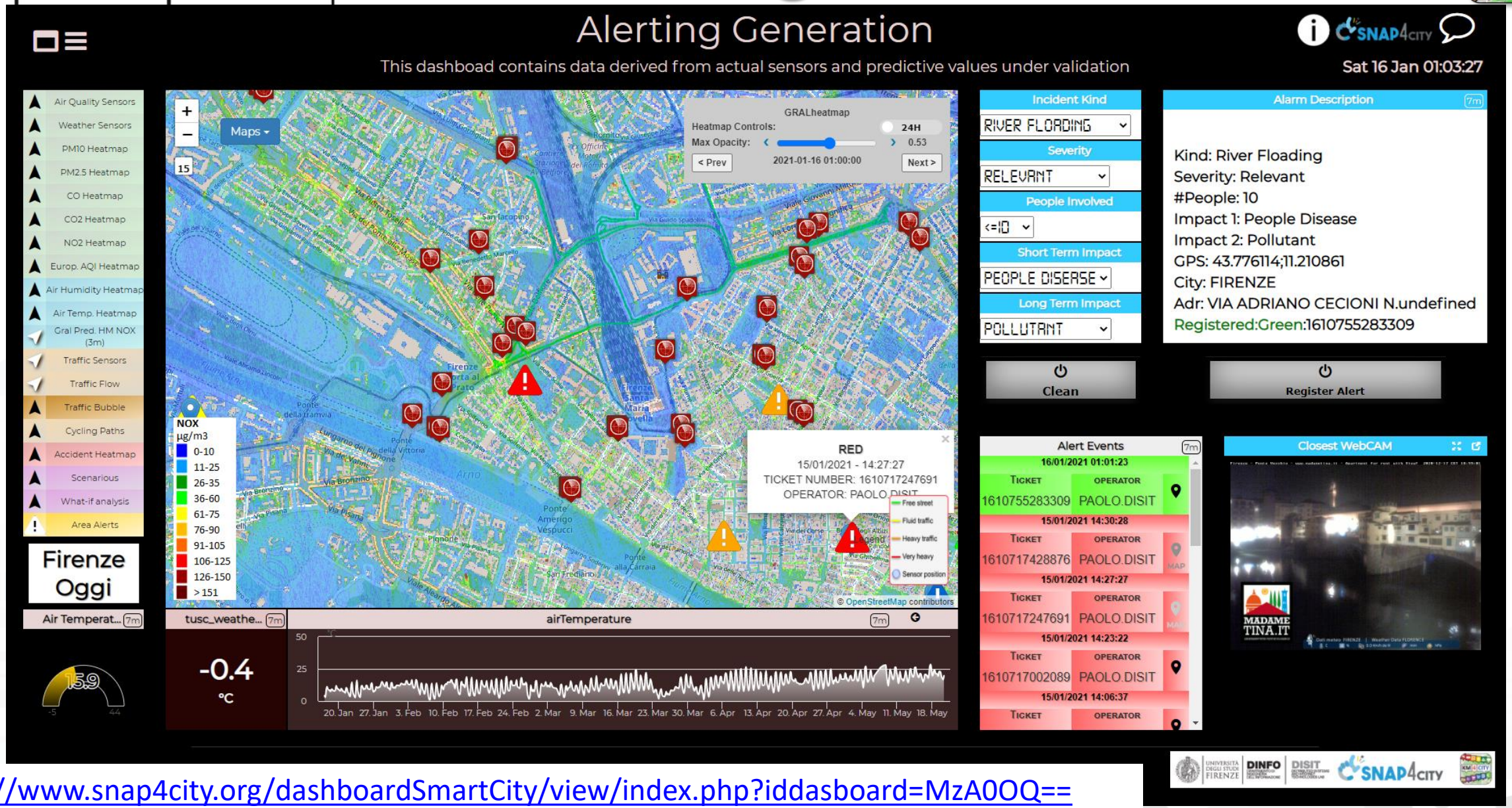
Big Data Analytics,
Artificial Intelligence

15MinCityIndex Firenze



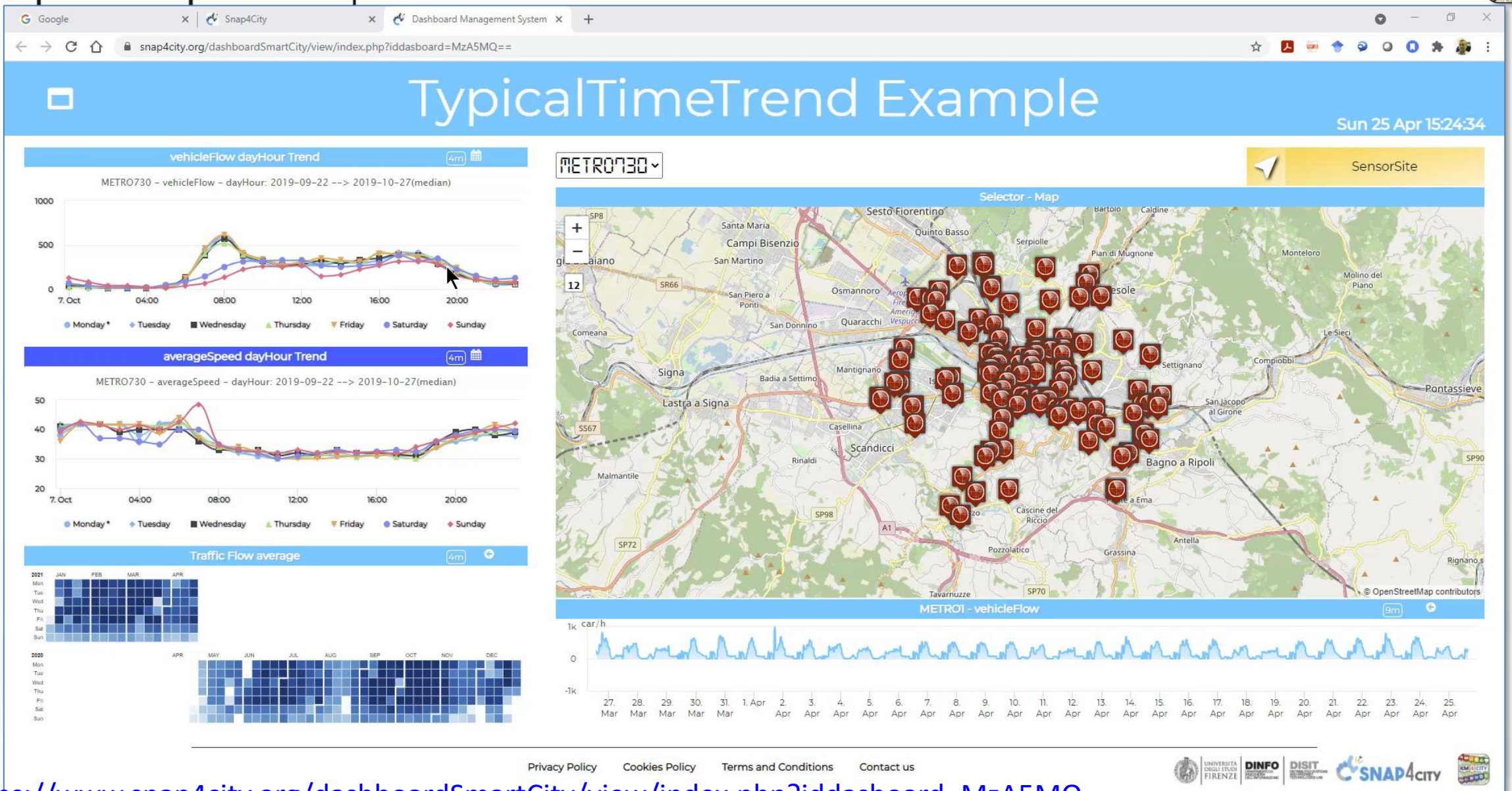
- https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjkzOA==

Alert Registration



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

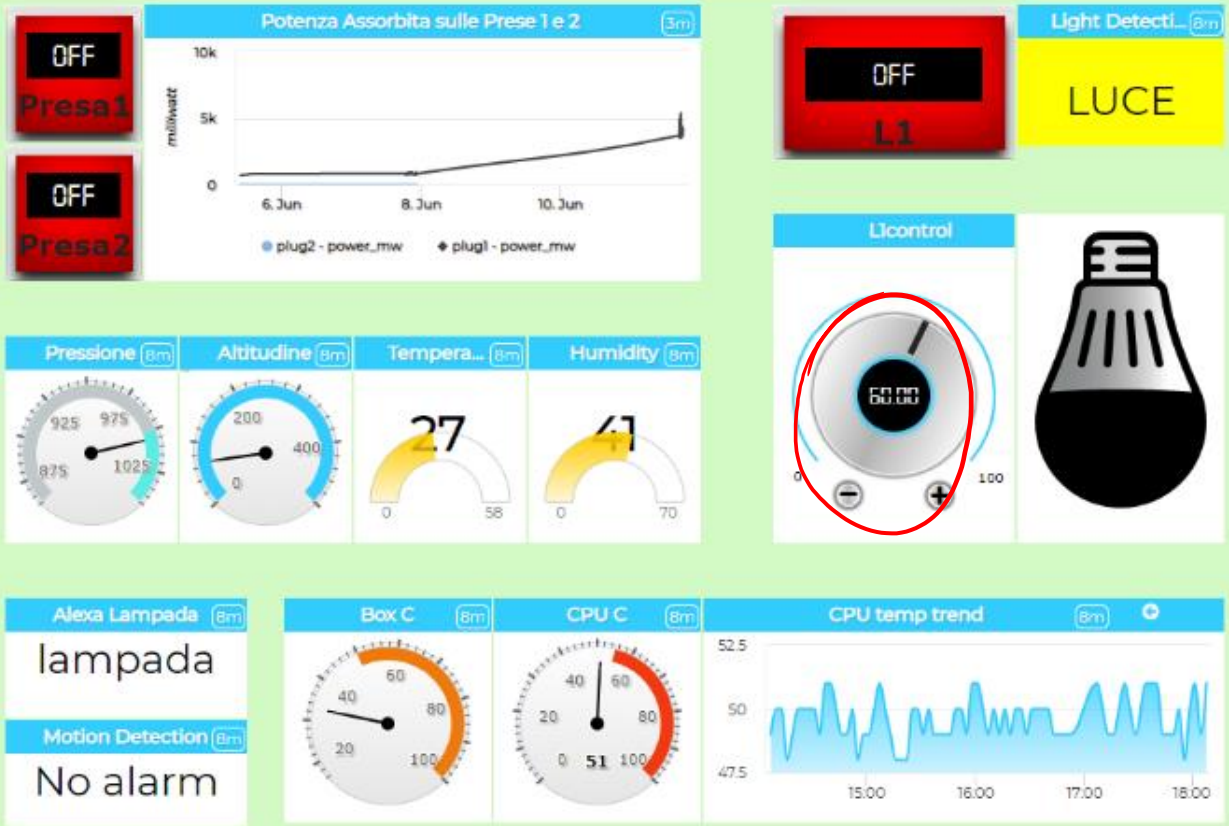
Typical Time Trends



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

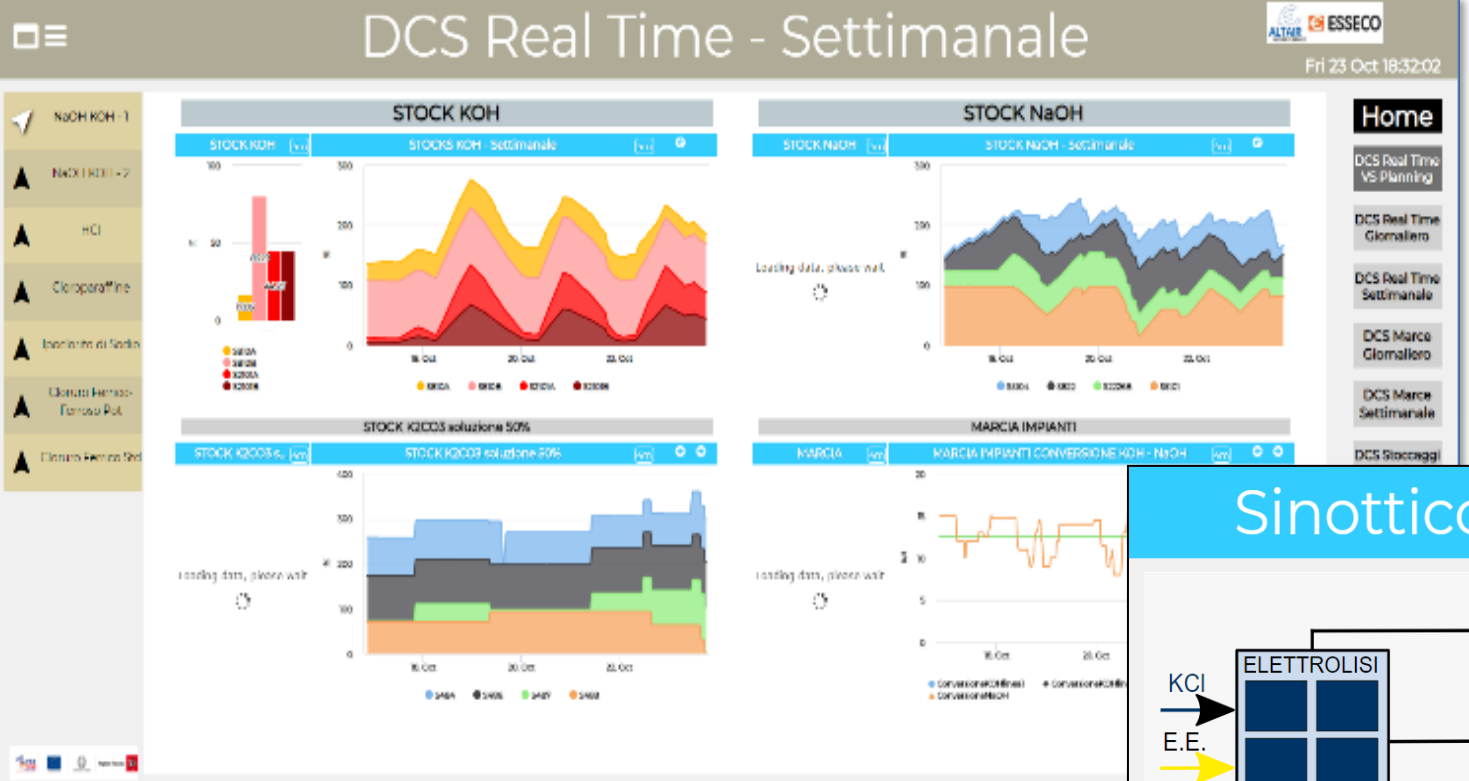
Snap4Home 5G Demo

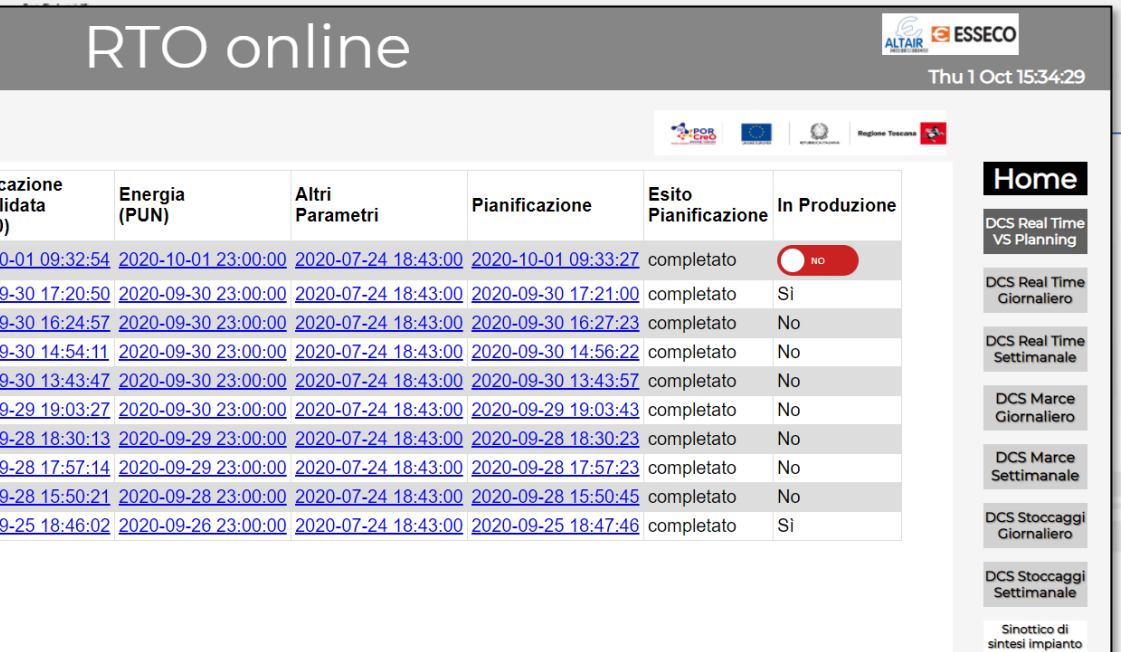
Thu 11 Jun 18:07:32



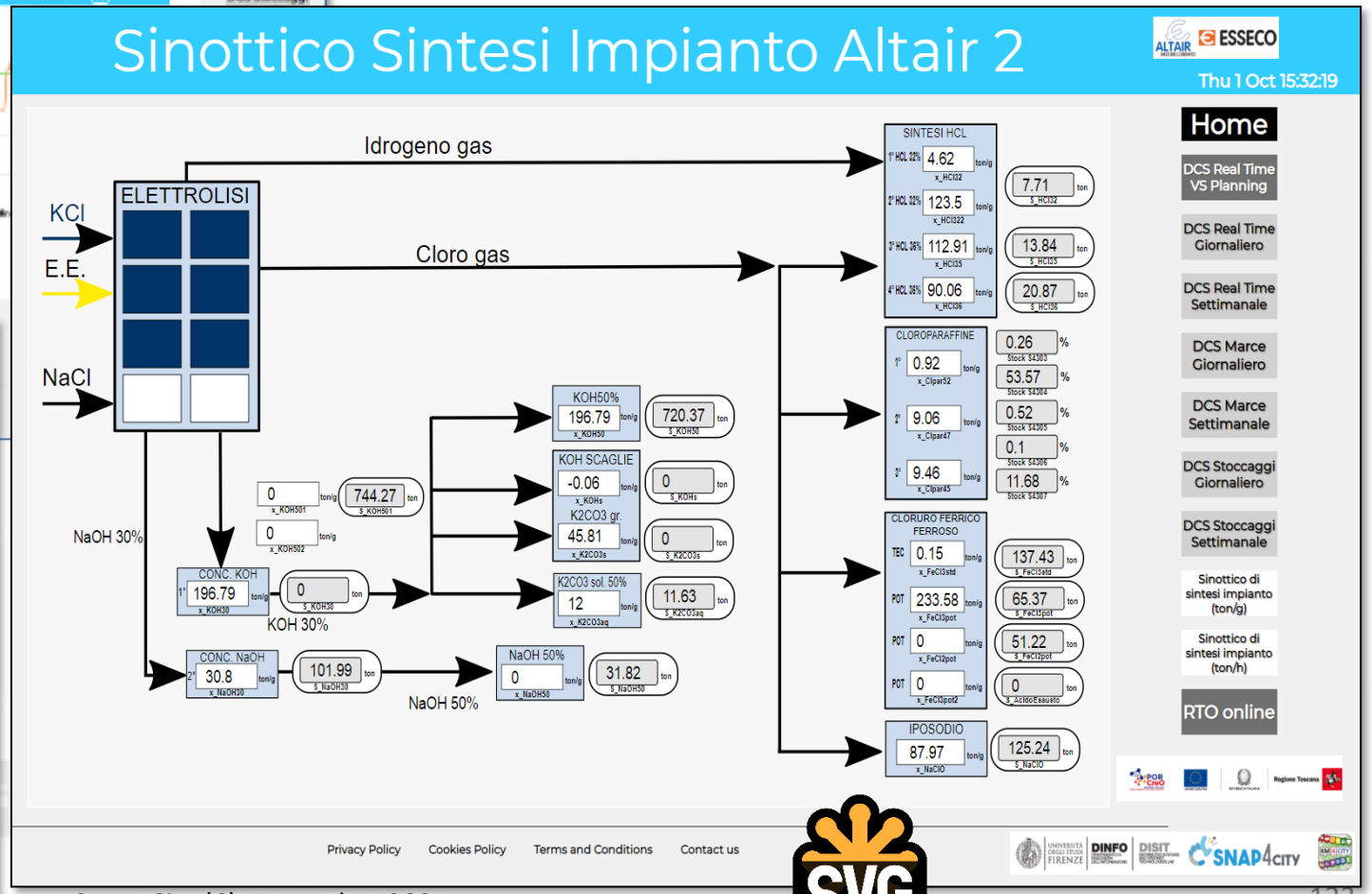
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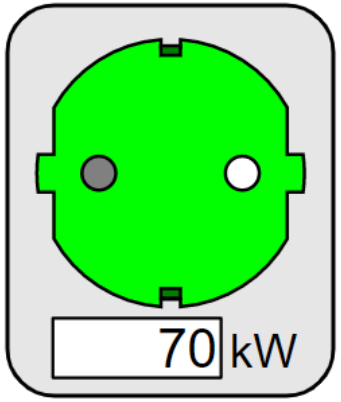
cazione lidata)	Energia (PUN)	Altri Parametri	Pianificazione	Esito Pianificazione	In Produzione
0-01 09:32:54	2020-10-01 23:00:00	2020-07-24 18:43:00	2020-10-01 09:33:27	completato	NO
9-30 17:20:50	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 17:21:00	completato	Sì
9-30 16:24:57	2020-09-30 23:00:00	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



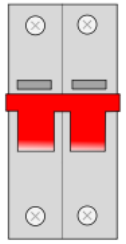
SVG Custom Widgets Examples 2

Tue 17 Nov 18:46:47

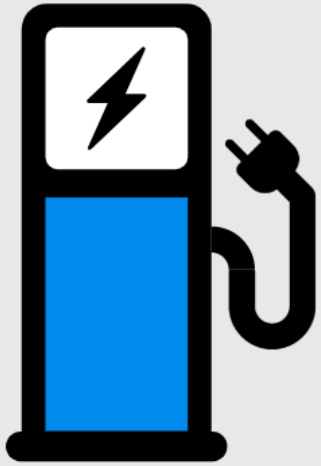
SVG shucko plug



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		

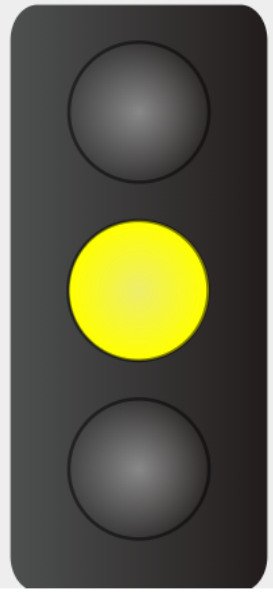
Underpass



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



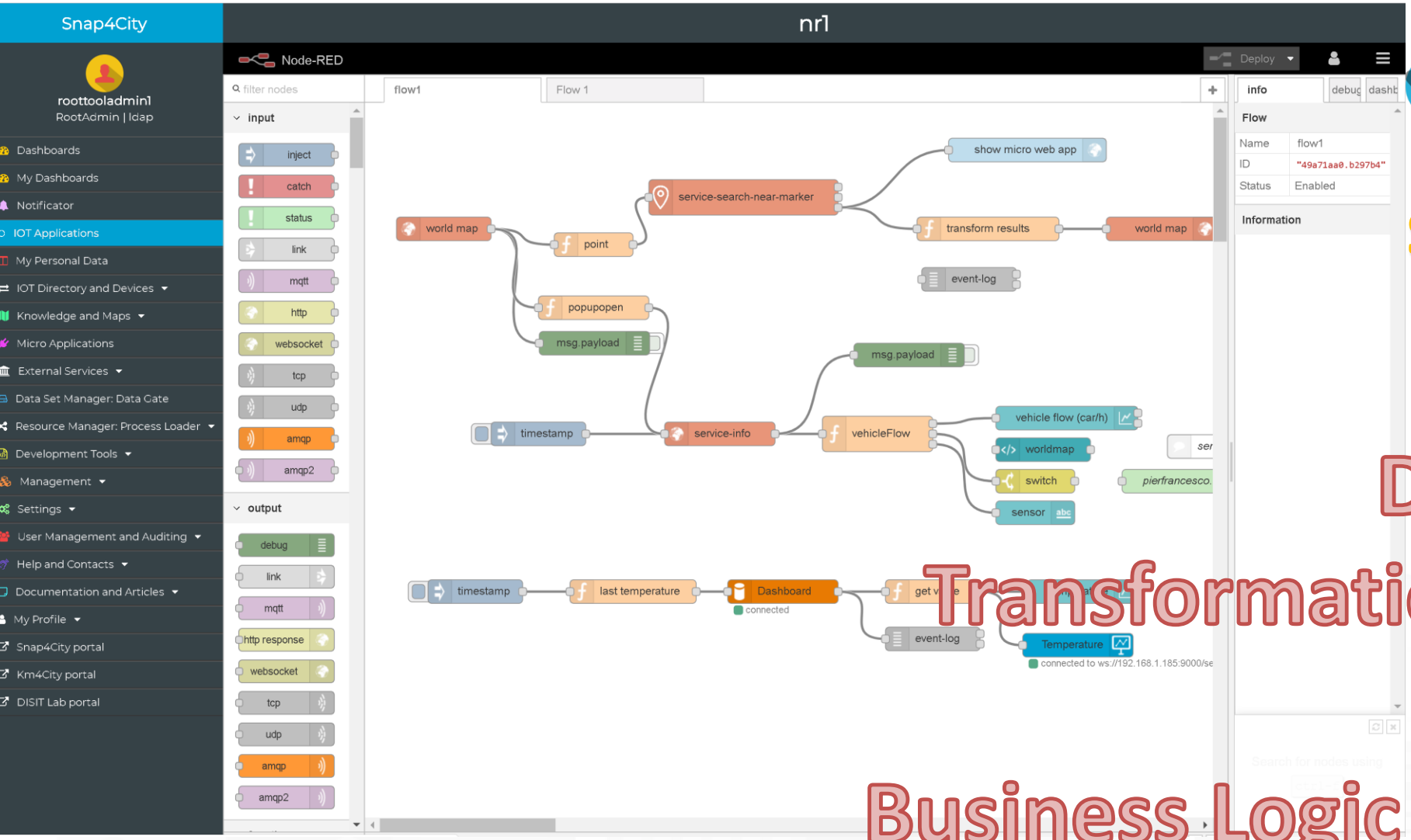
Speed Limit Explaination

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==



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

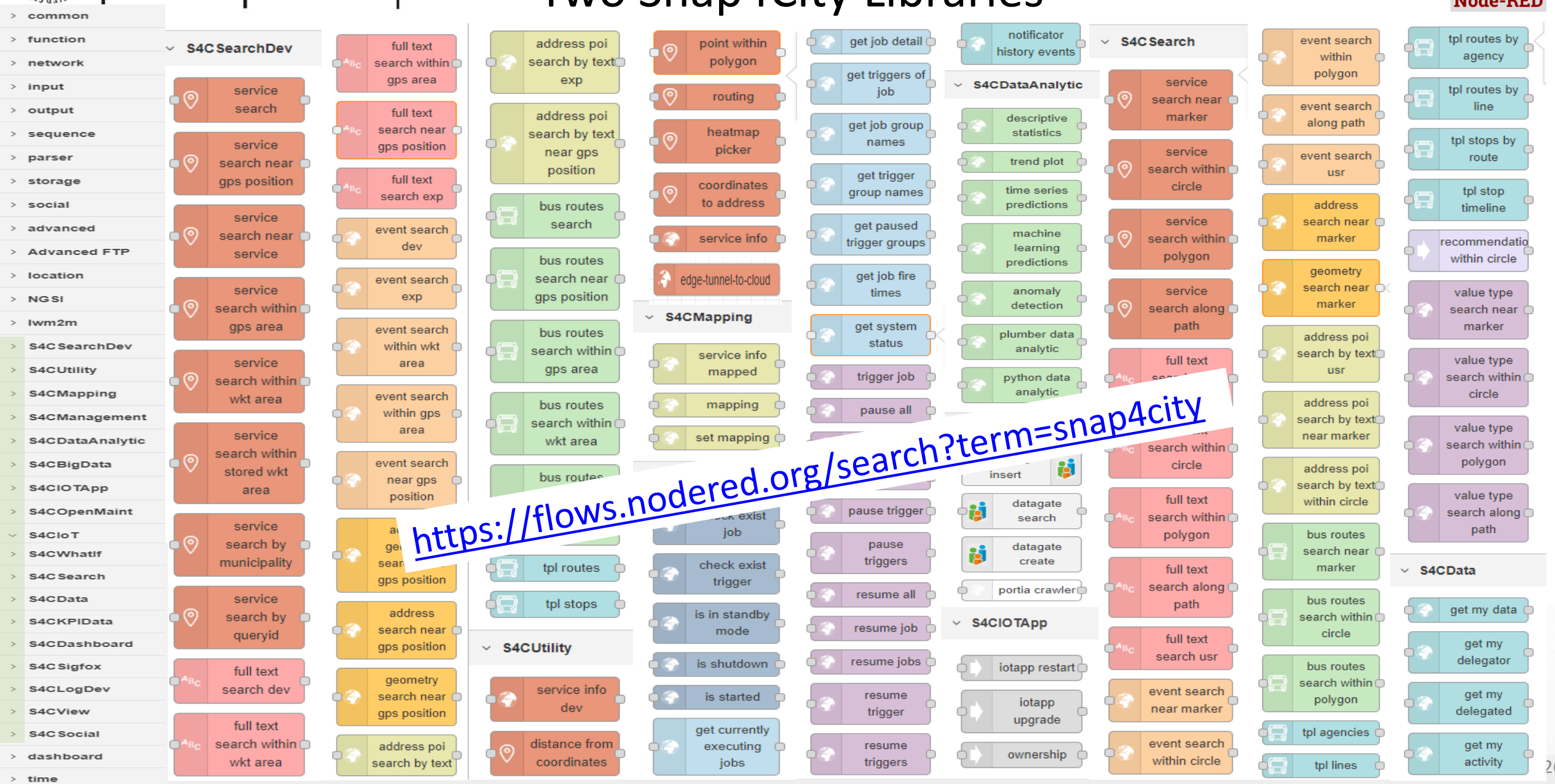
UNIVERSITÀ DEGLI STUDI FIRENZE | DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE | DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB

April 2021 collection

Two Snap4City Libraries

SNAP4CITY | Node-RED

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



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

April 2021 collection

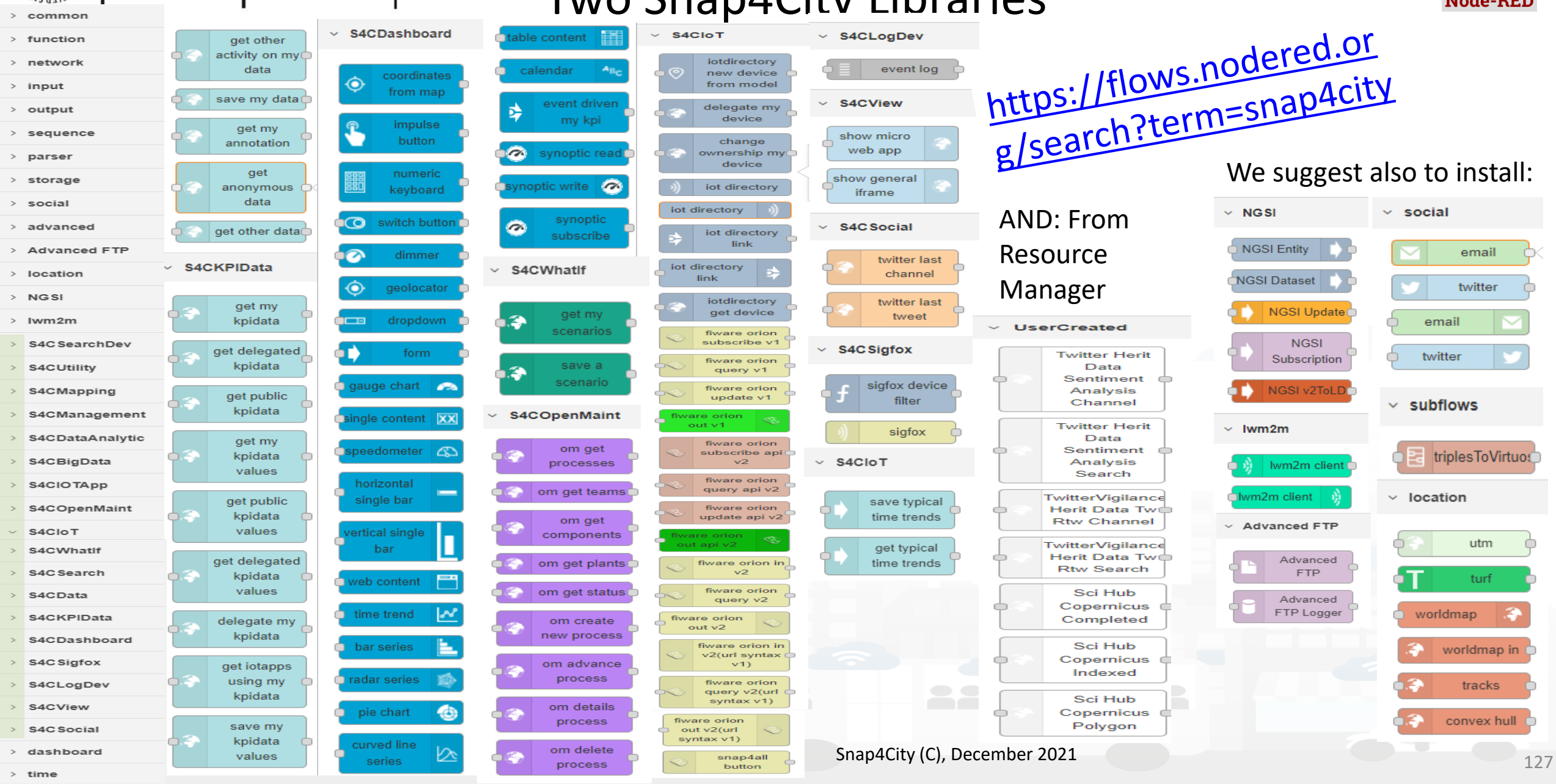
Two Snap4Citv Libraries

SNAP4CITY | Node-RED

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

We suggest also to install:

AND: From Resource Manager



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

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.

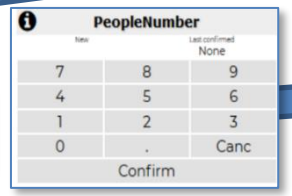
.....



Dashboard-IOT App







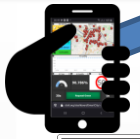


















MapClick

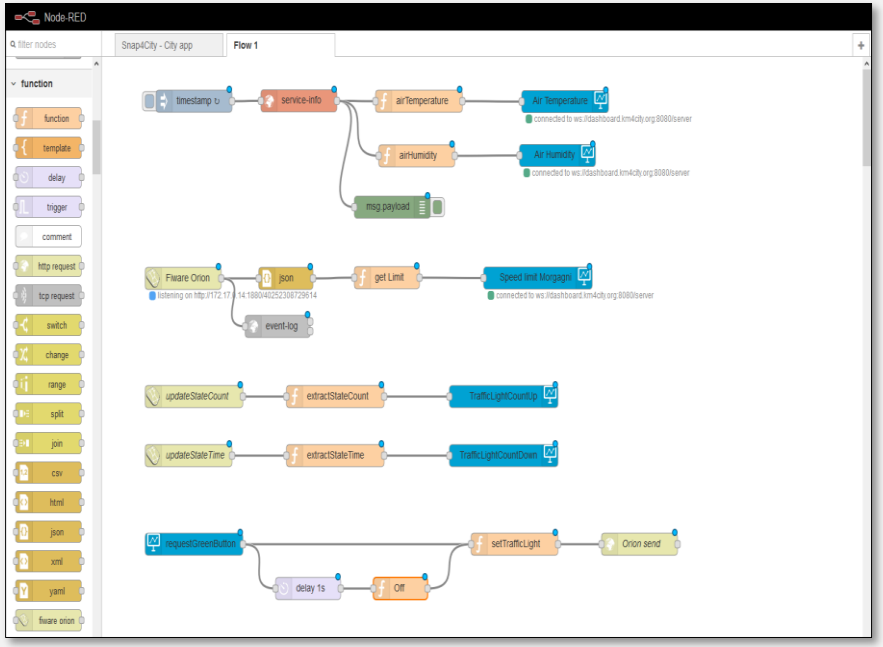
MyKPI variable onchange

Synoptics





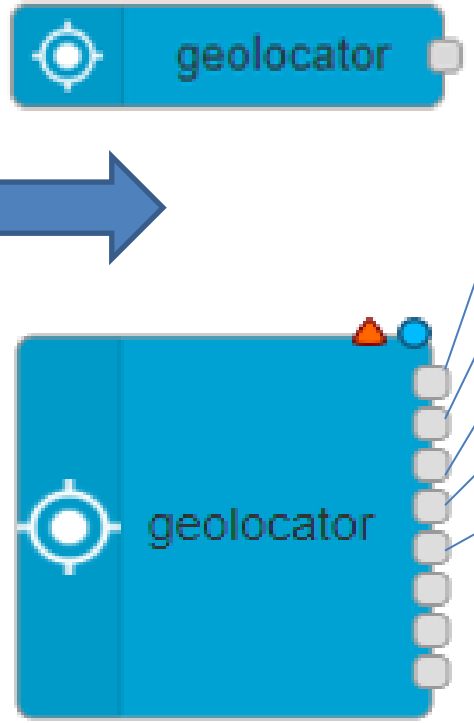
From Dashboard to IOT App



IOT Application

Geolocation of Mobile Device

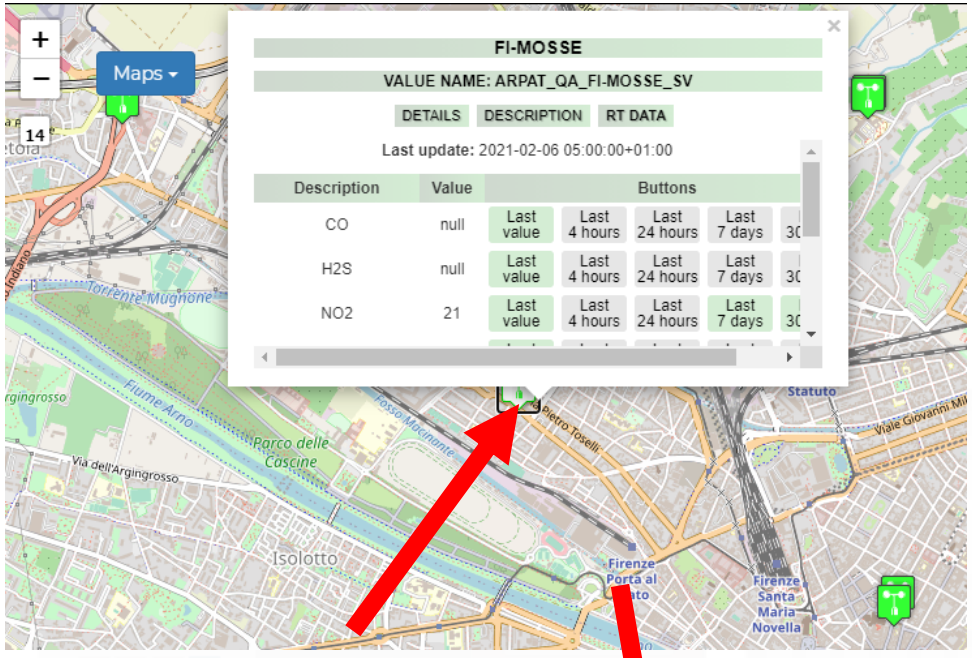




- Complete message
  - Returns a JSON containing all information about geolocation
- Latitude
  - Returns the latitude
- Longitude
  - Returns the longitude
- Accuracy
  - Returns the accuracy of latitude and longitude
- Altitude
  - Returns the altitude
- Altitude Accuracy
  - Returns the altitude accuracy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

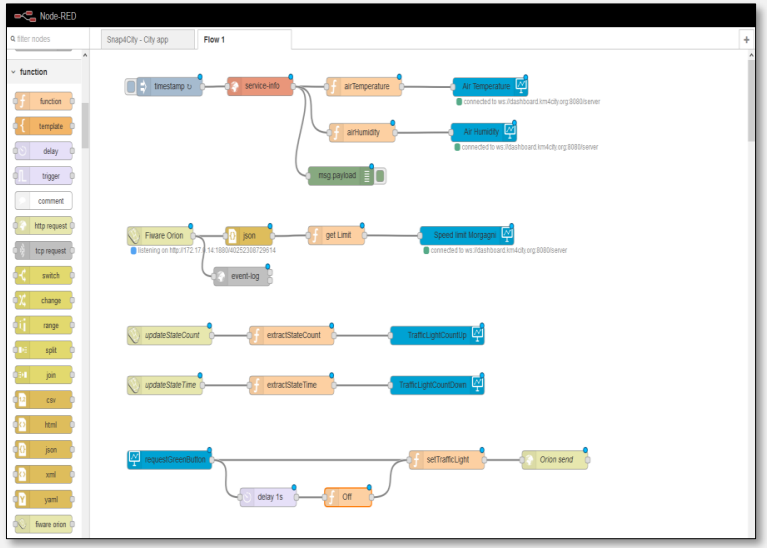
coordinates-from-map

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.

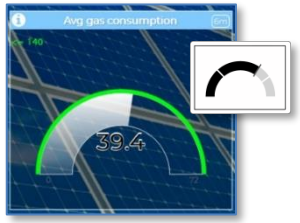
Dashboard-IOT App

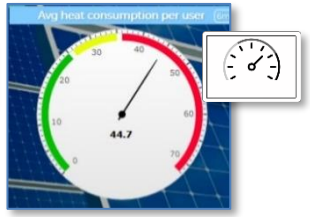
From IOT App to Dashboard

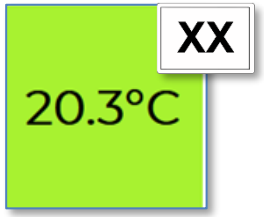


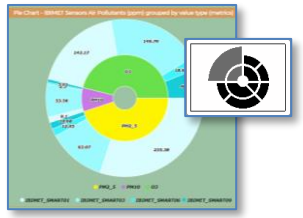
IOT Application

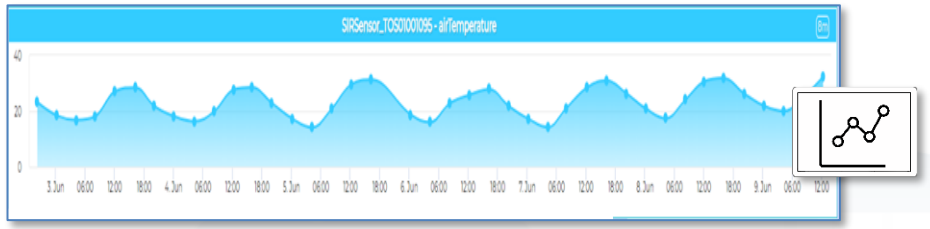
- gauge chart
- single content
- speedometer
- horizontal single bar
- vertical single bar
- web content
- time trend
- bar series
- radar series
- pie chart
- curved line series
- table content
- synoptic write
- calendar

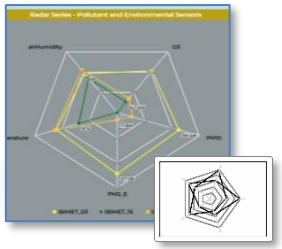


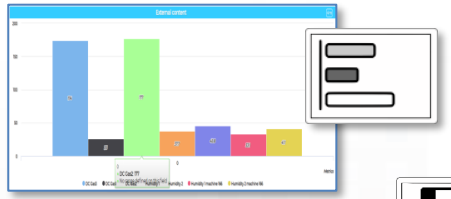


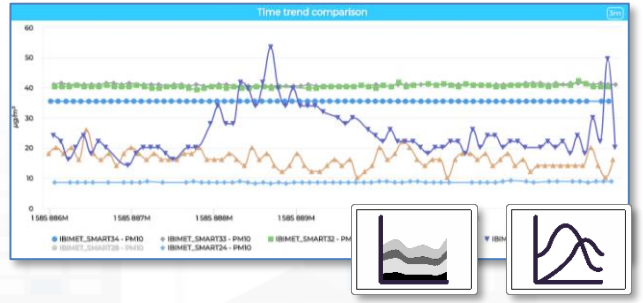


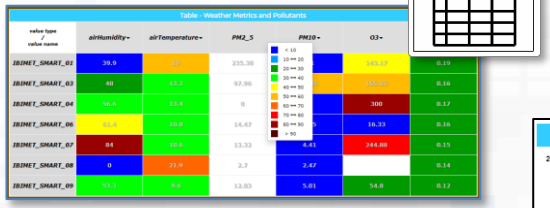


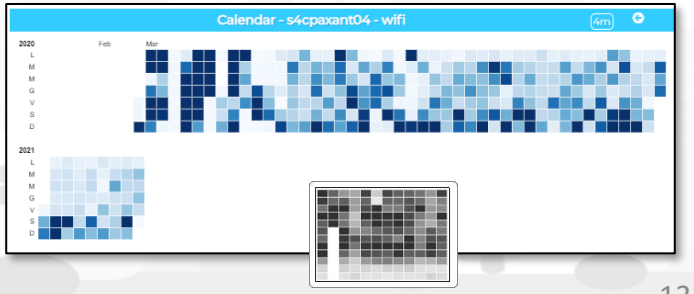






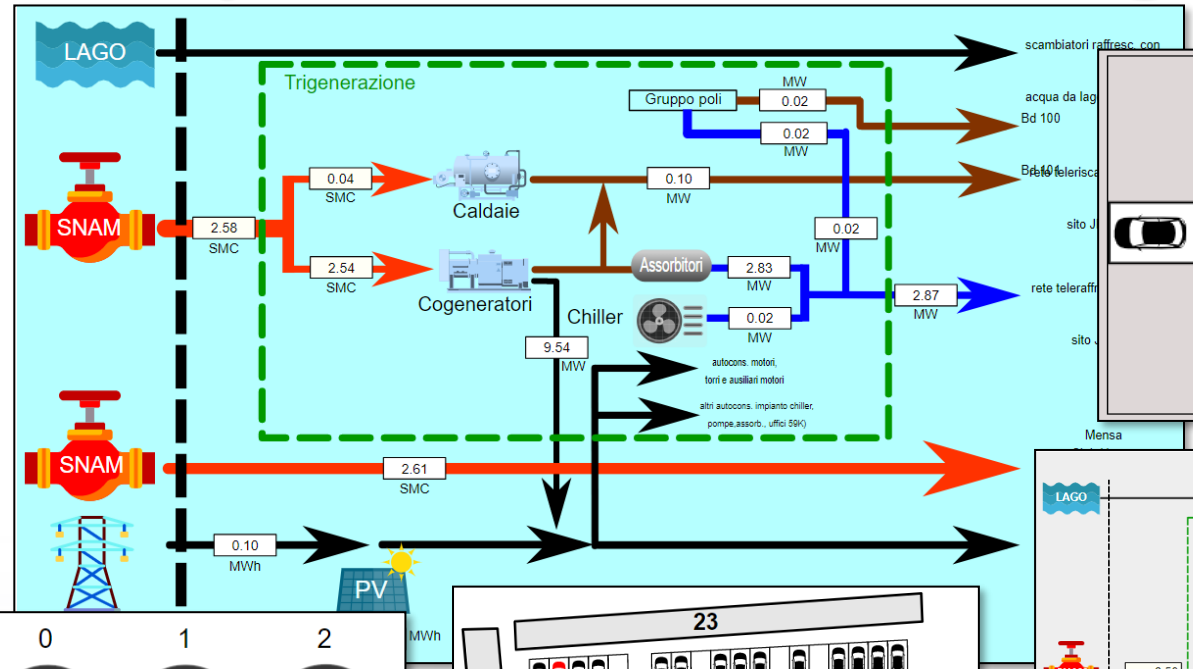


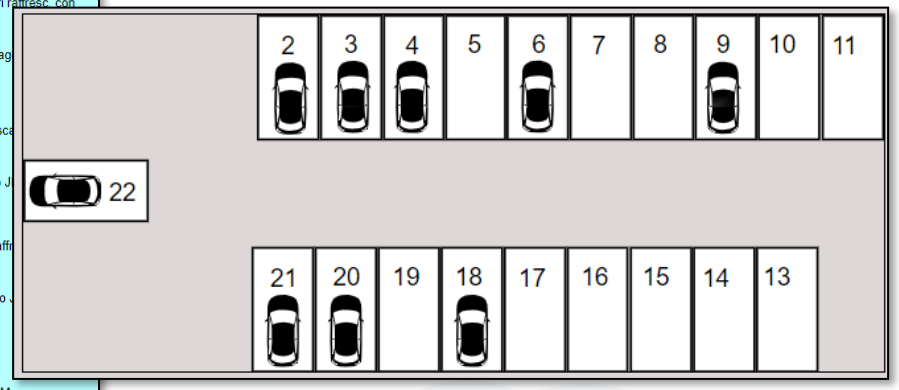


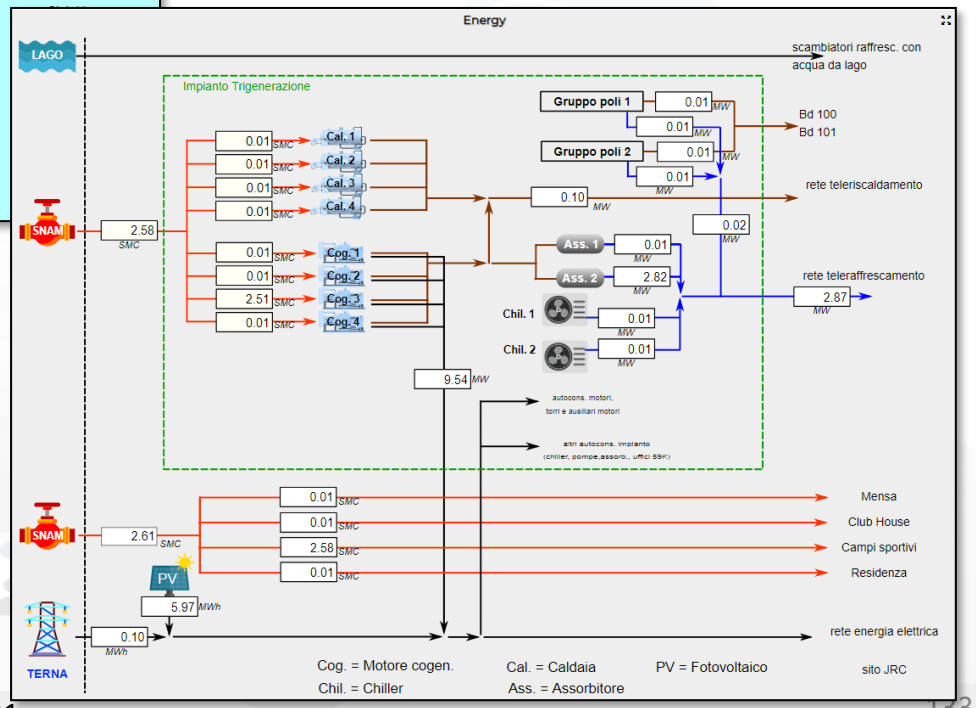


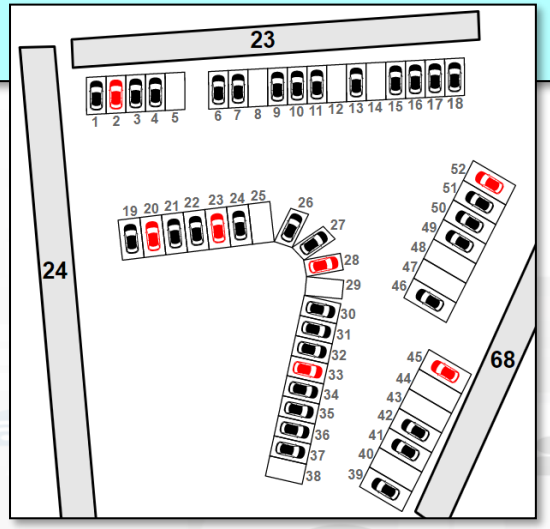
Special Custom Widgets

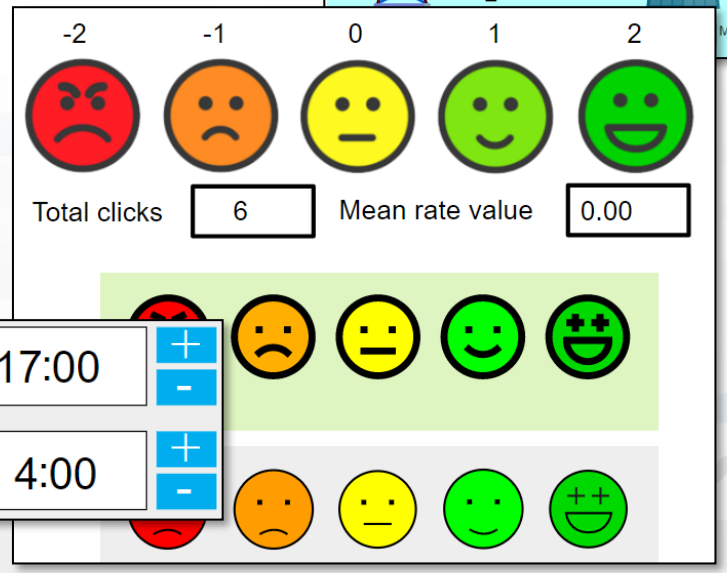
- Smart parking
- Smart Energy
- Smart Light
- Smart ….
- Energy View
- Custom Controls

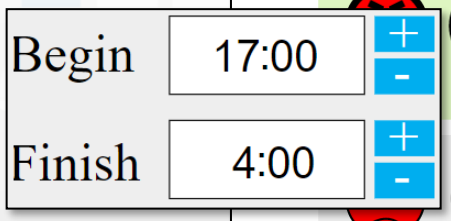












TOP

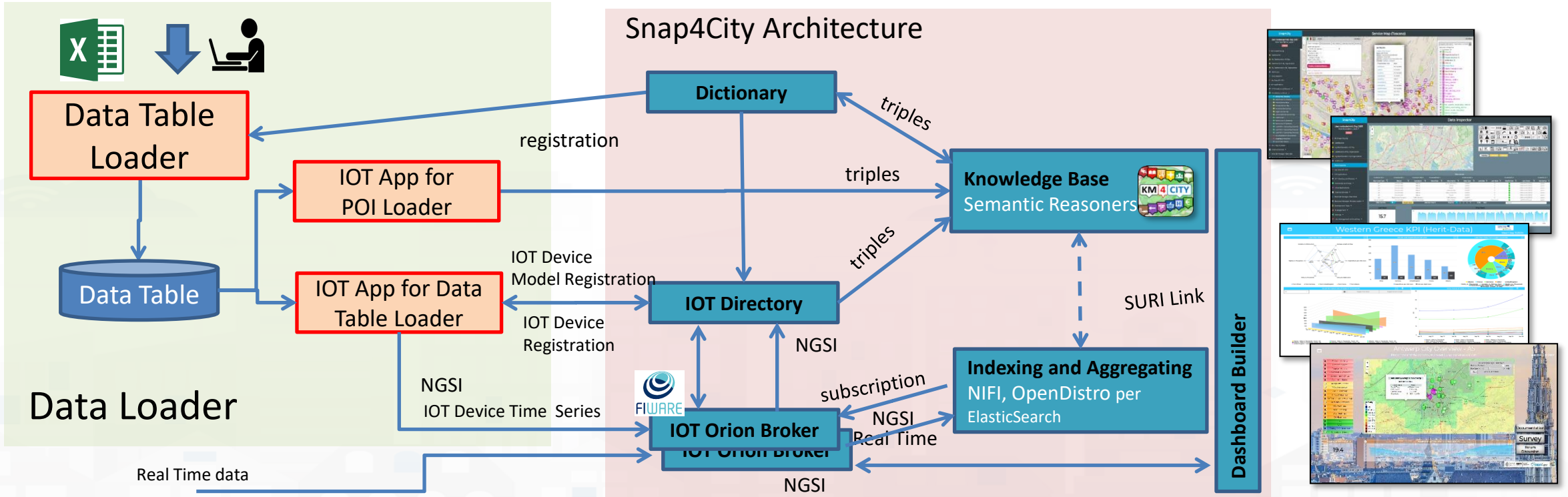
Overview of Data Ingestion



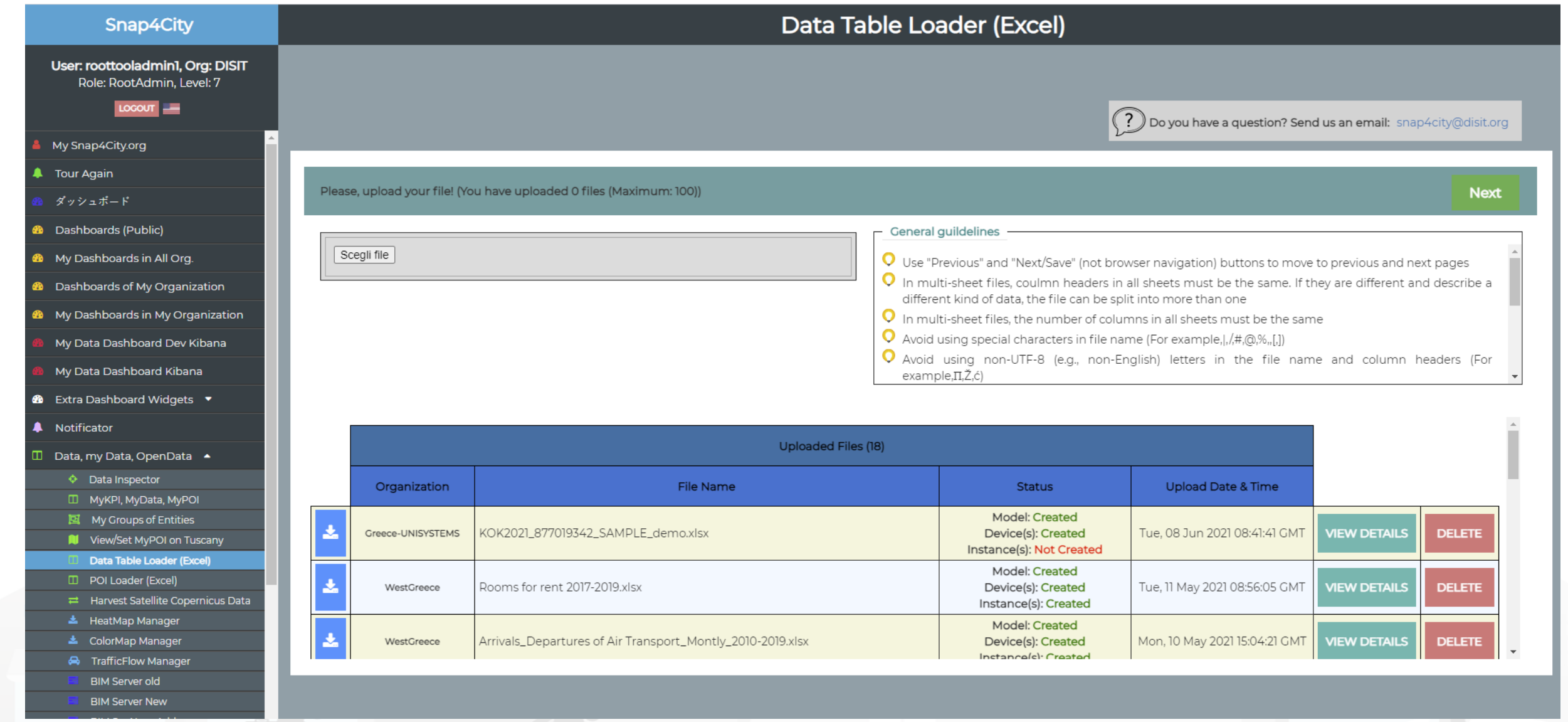
100% OPEN SOURCE

SNAP4 Appliances and Dockers **Installations**

Short cut Data Ingestion from Excel file



Data Table Loader



Example

Data from INSETE

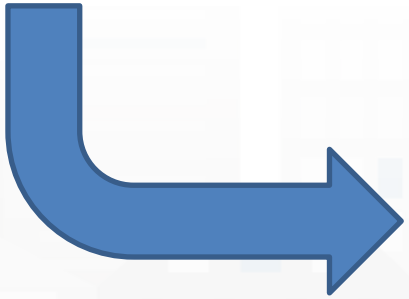
Basic Sizes of Incoming Tourism

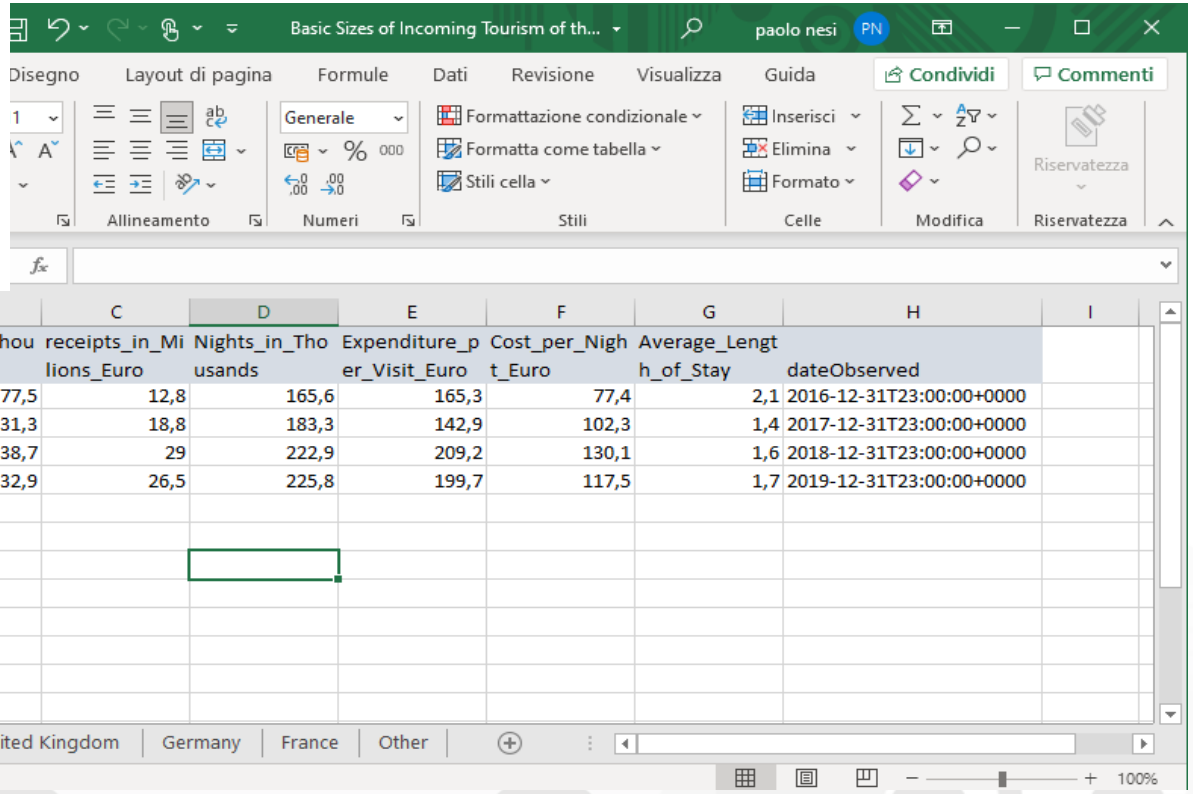
Basic Sizes of Incoming Tourism of the Region of Western Greece 2019							
Regions	Countries Origin	Visits (in thousands)	Receipts (in € million)	Nights (in thousands)	Expenditure / Visit (in €)	Cost / Night (in €)	Average Length of Stay
West Hellas	Albania	132.9	26.5	225.8	199.7	117.5	1.7
	United Kingdom	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%**			



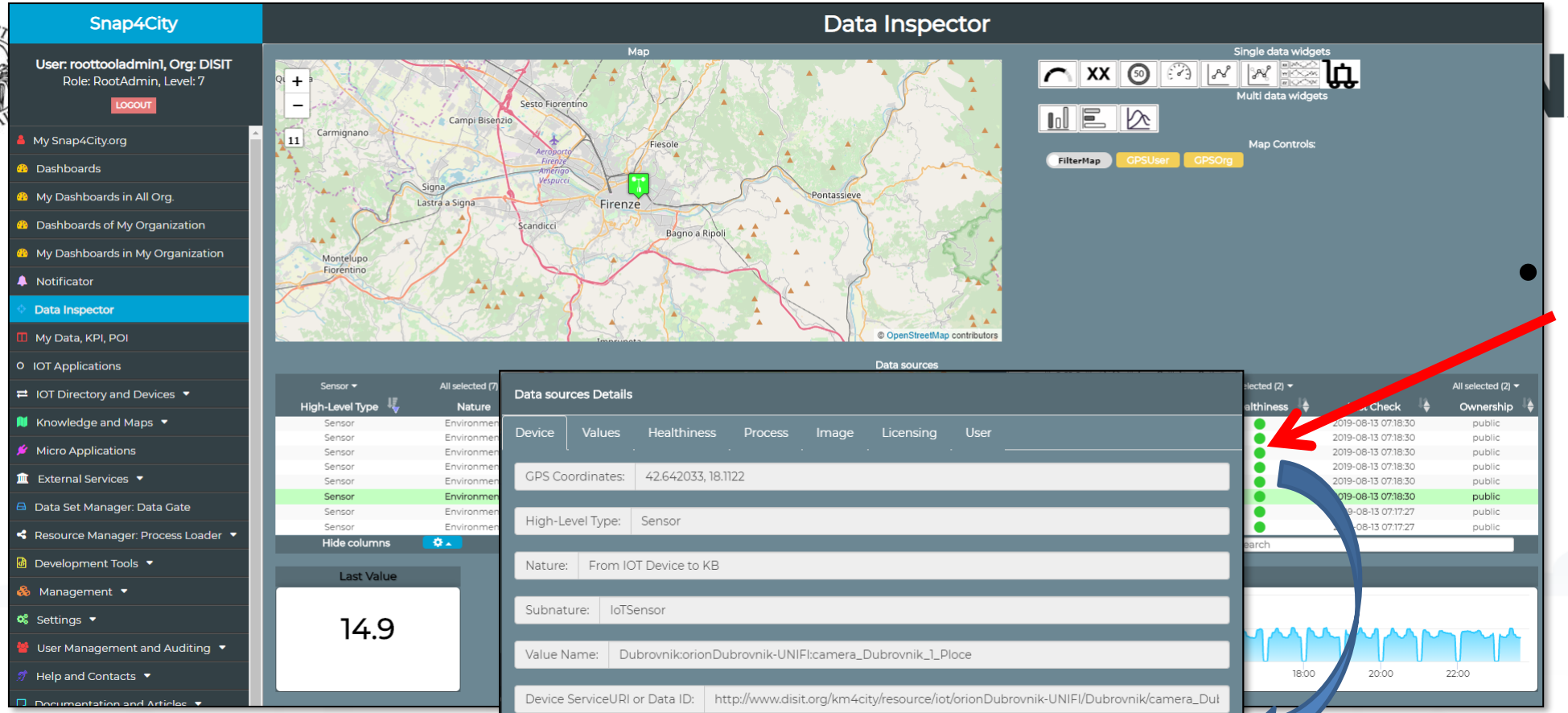




	A	B	C	D	E	F	G	H	I
1	Region	Visits_in_Thousands	receipts_in_Millions_Euro	Nights_in_Thousands	Expenditure_per_Visit_Euro	Cost_per_Night_Euro	Average_Length_of_Stay	dateObserved	
2	West Greece	77,5	12,8	165,6	165,3	77,4	2,1	2016-12-31T23:00:00+0000	
3	West Greece	131,3	18,8	183,3	142,9	102,3	1,4	2017-12-31T23:00:00+0000	
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

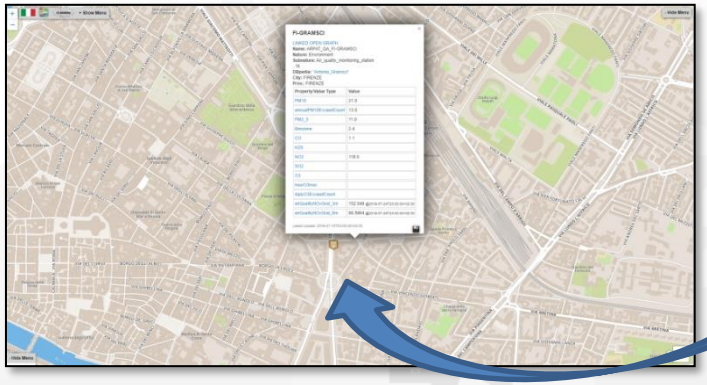
		Value Type												
		geolocation	Count	price	Count	price	price	duration	timestamp					
		Value Unit												
		text	K#	Meuro	K#	euro	euro	day	timestamp					
		Data Type												
		string	float	float	float	float	float	float	time					
Device Name	Sheet Name	Region	Visits_in_Thousands	receipts_in_Milions_Euro	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

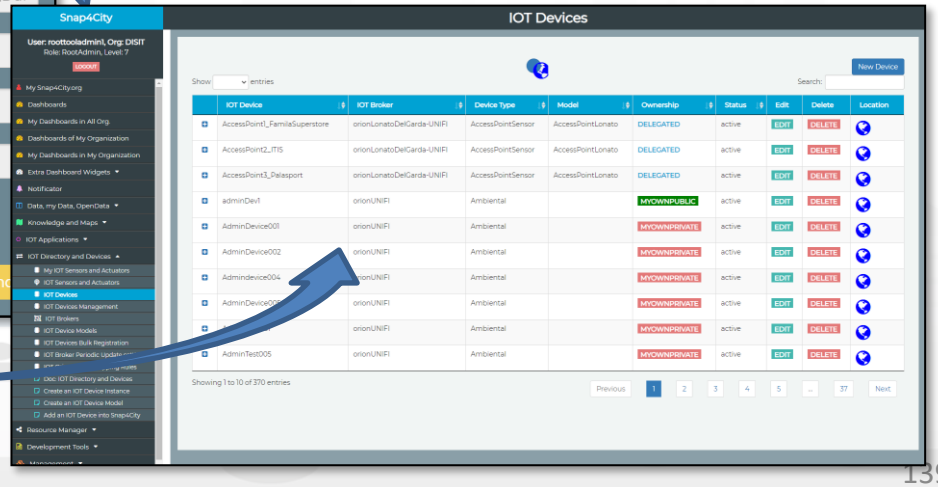


- Click with the mouse on it

HLT: Sensor

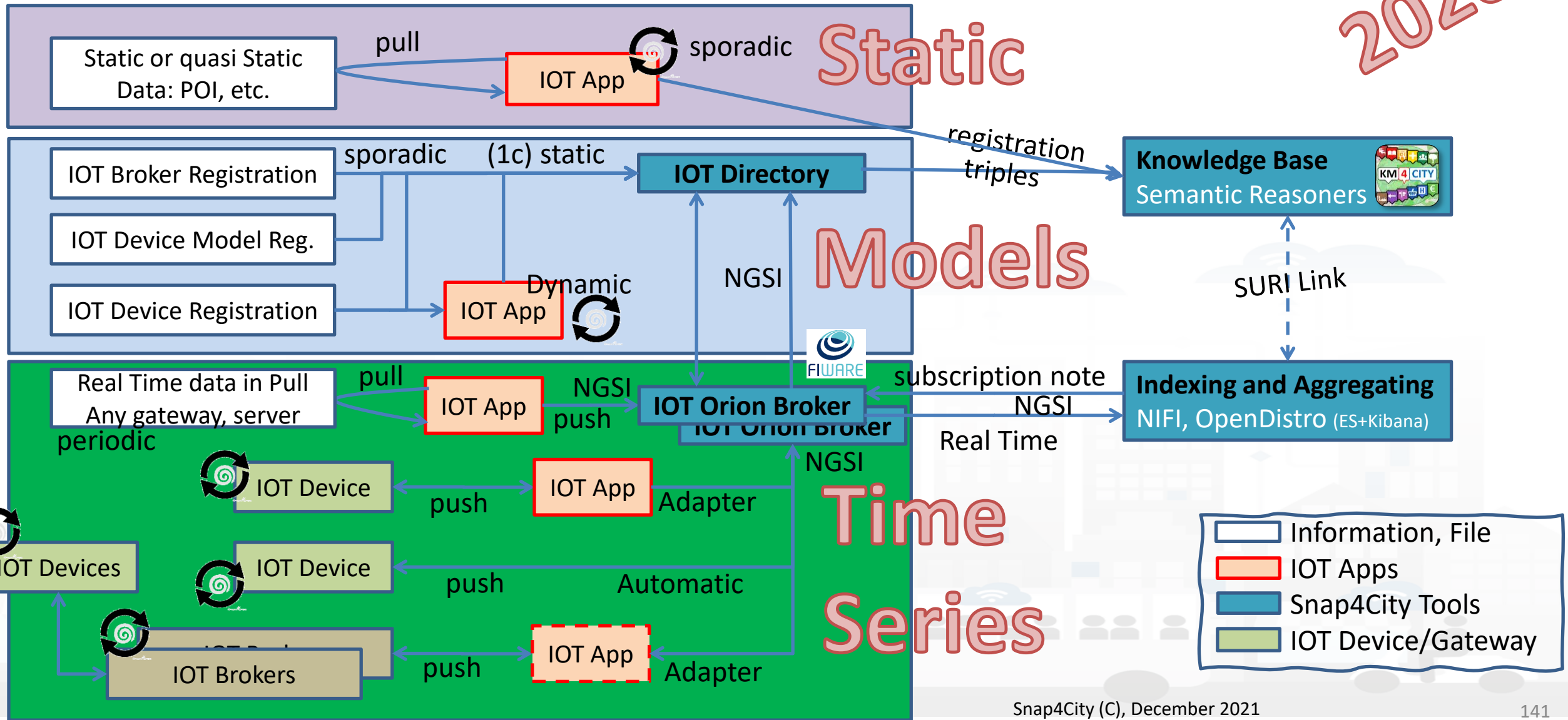
Knowledge Base view





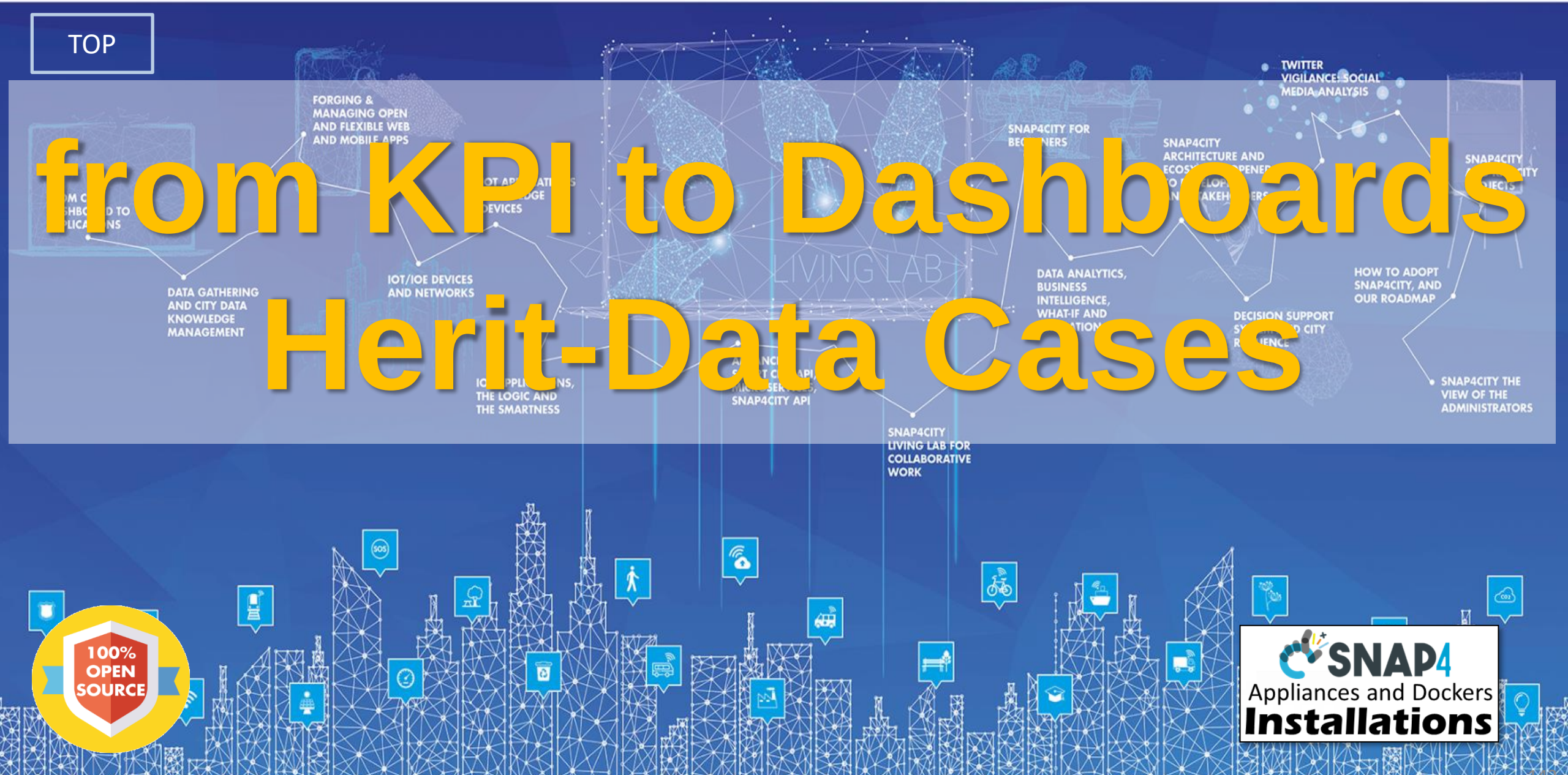
Snap4city Data Ingestion Flow Diagram

2020



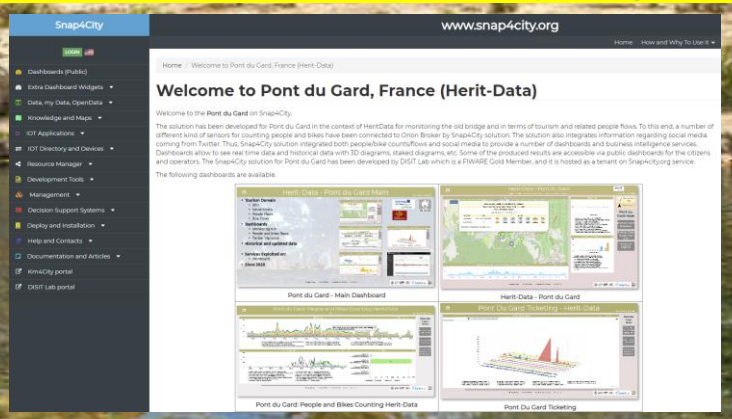
TOP

from KPI to Dashboards
Herit-Data Cases



Pont du Gard, France

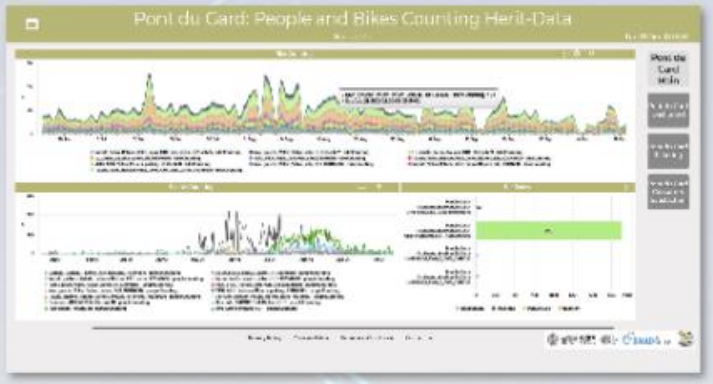
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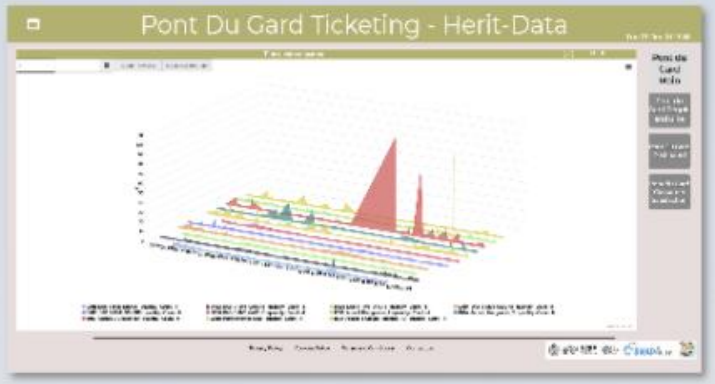


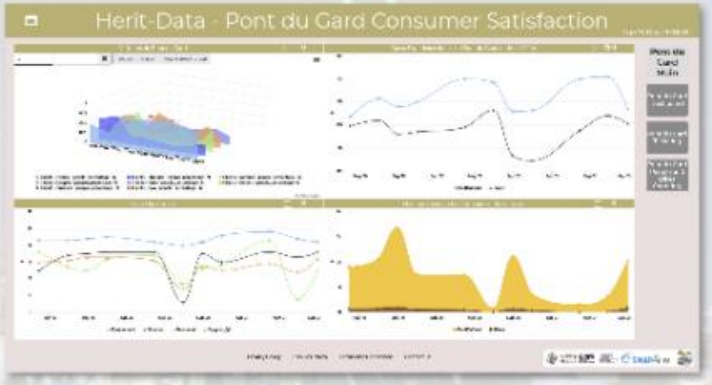
Pont du Gard

- **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**







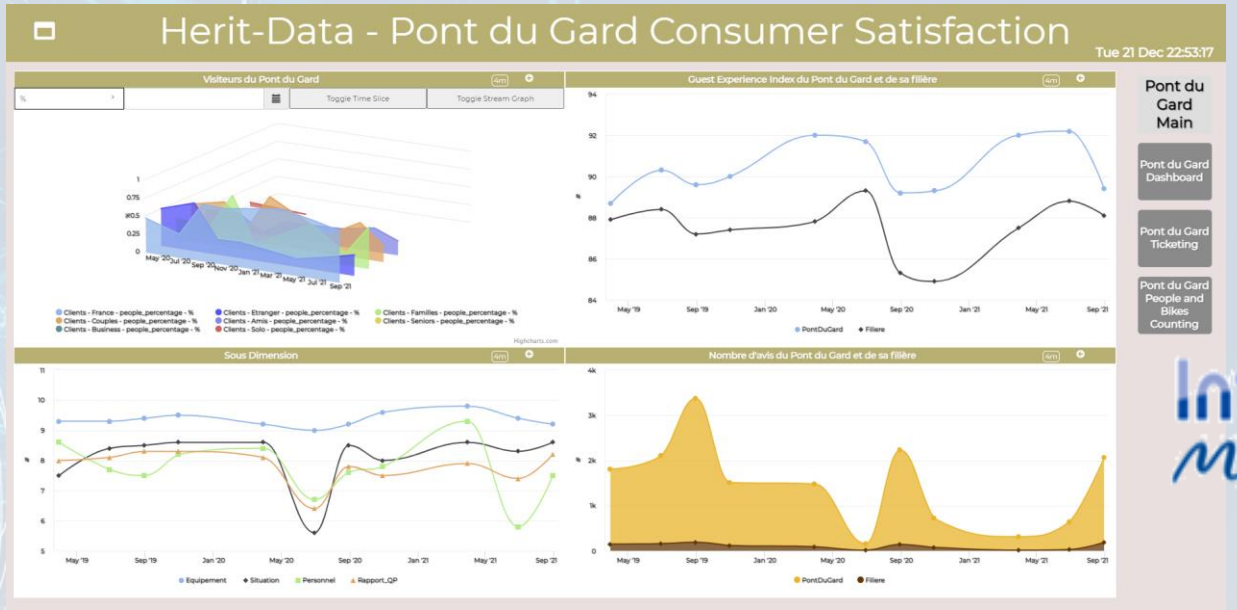


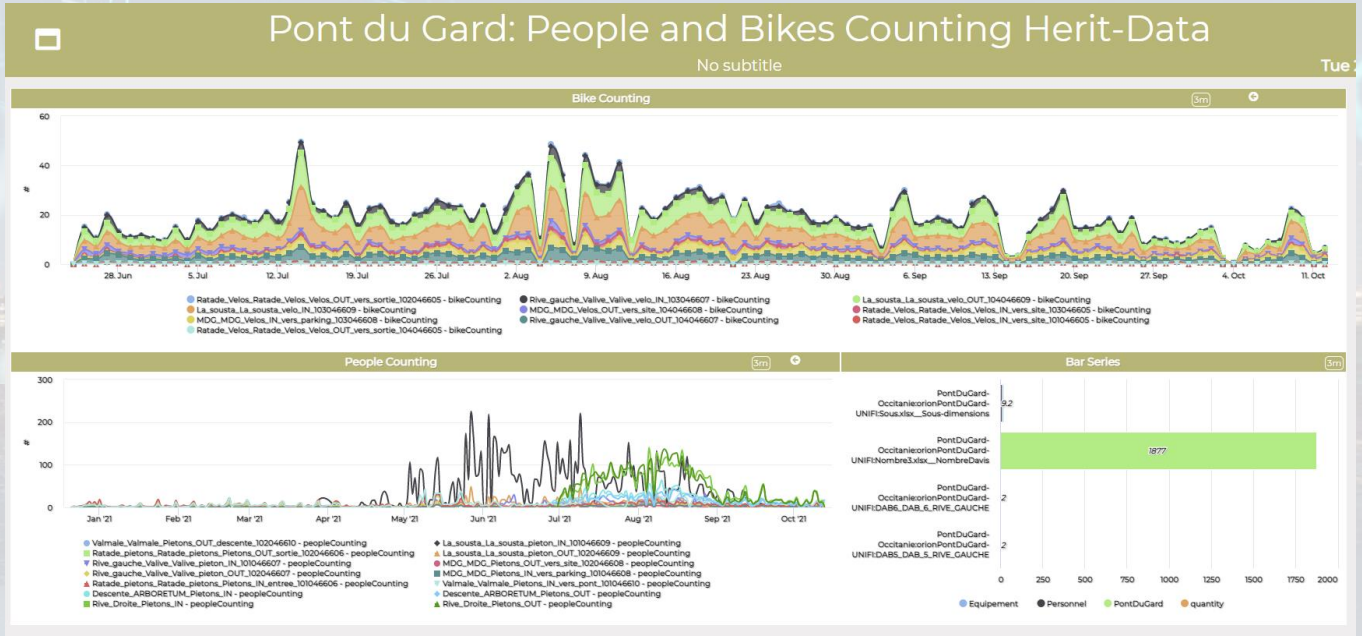


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Pont du Gard

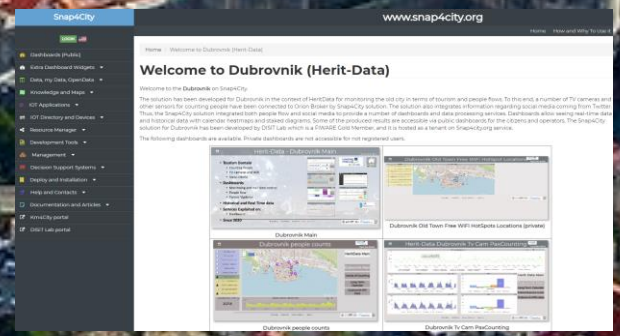
- **KPI:**
  - Consumer Satisfaction
  - Selling Tickets over time and locations
  - Business on Tourims
- **Real Time Data**
  - People Counting
  - Bike Counting
- **Social Media, Real Time**
  - A Set of Key: keywords, Hashtags, Citations
  - Volume of Tweets per Key and total
  - Sentiment Volume per Key and total





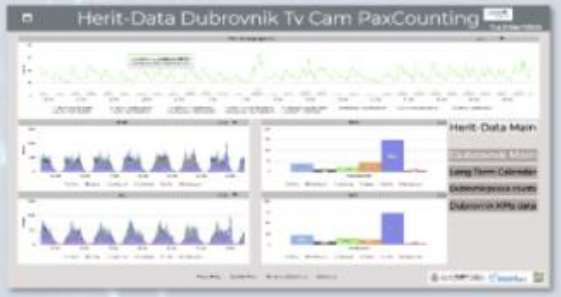
Dubrovnik, Croatia

https://www.snap4city.org/741



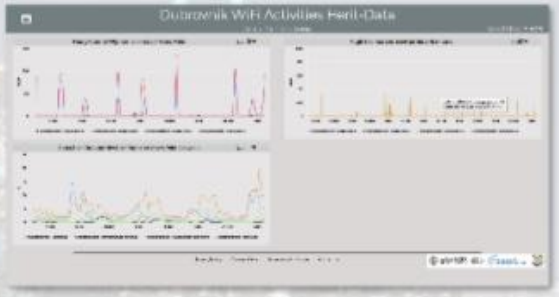
Dubrovnik

- **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**

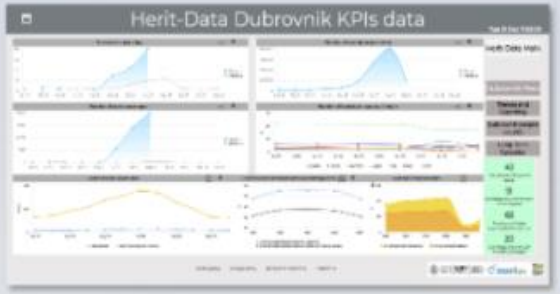








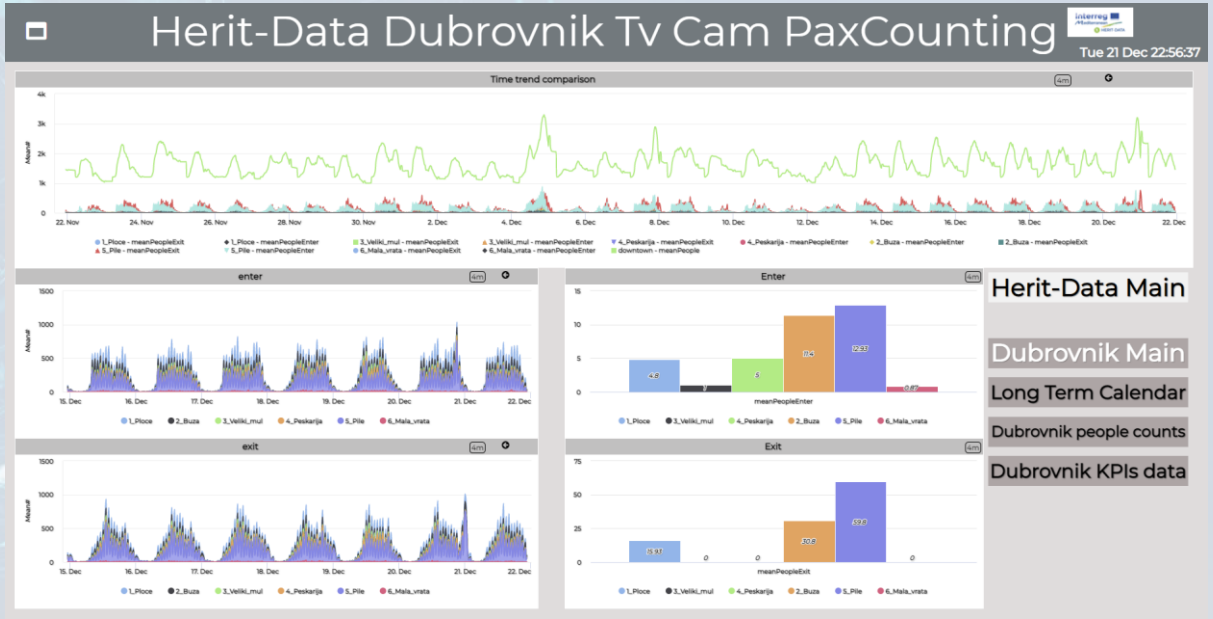


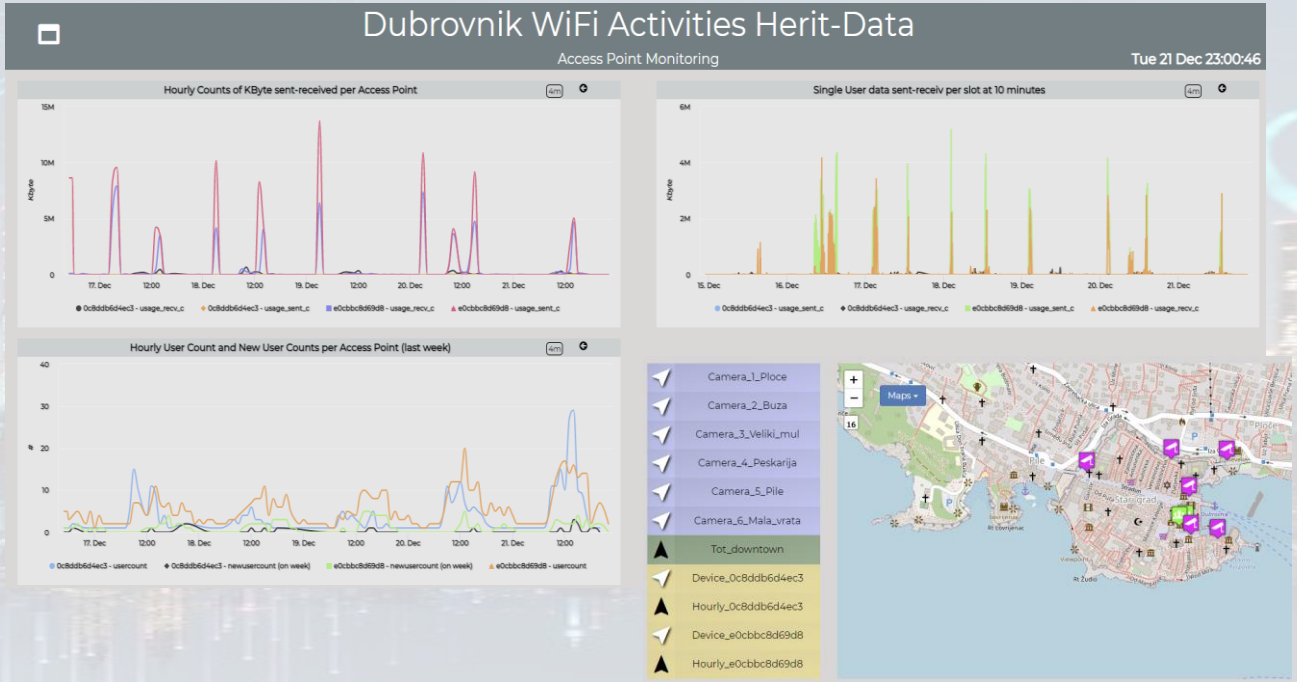


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzE0Ng==

Dubrovnik

- **KPI**
  - #overnights
  - #Cruise Passengers vs time
  - Environmental data
  - Tourists per Countries
  - Employers of the sector vs time
- **Real Time data**
  - PAX Counting via TV Cam
  - Pax Counting via Wi-Fi
  - Volume of Citizens vs Tourists
- **Social Media, Real Time**
  - A Set of Key: keywords, Hashtags, Citations
  - Volume of Tweets per Key and total
  - Sentiment Volume per Key and total

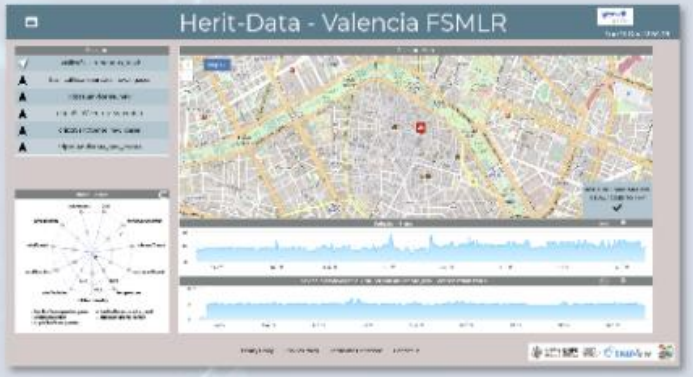


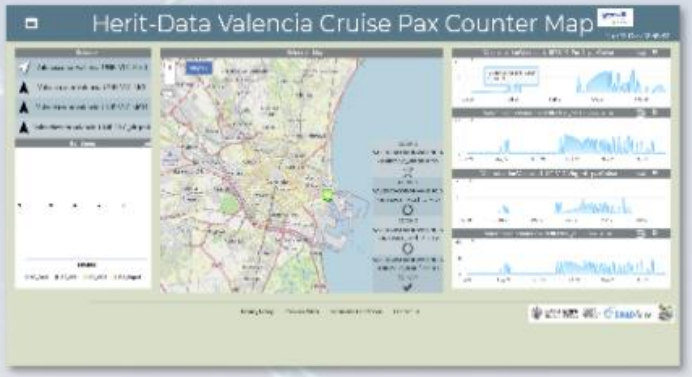



Interreg
Mediterranean
HERIT-DATA
Valencia, Spain
https://www.snap4city.org/742

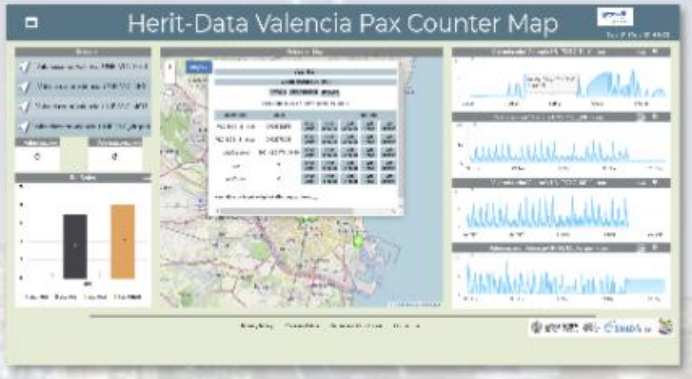
Valencia, FSMLR

- **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**







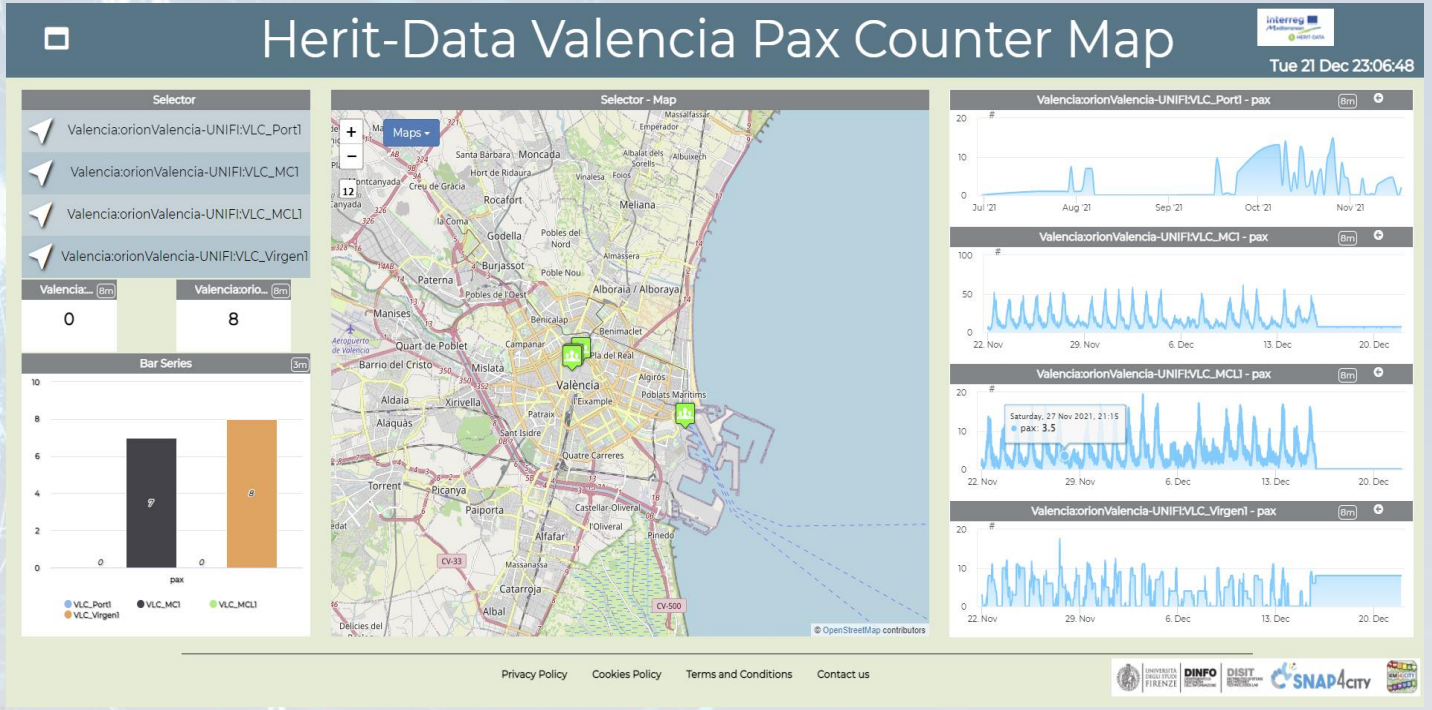


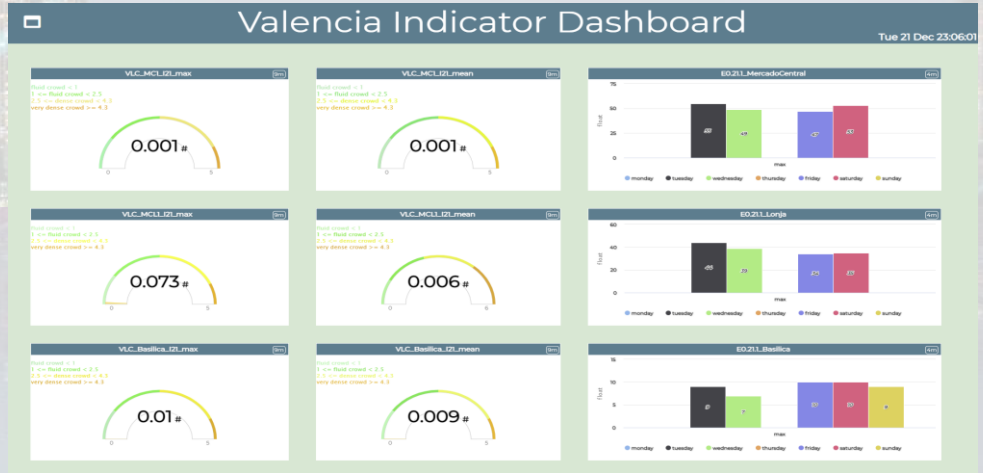


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzE1MA==

Valencia, FSMLR

- **KPI**
  - People
  - Environmental Data
- **Real Time**
  - PAX Counters
  - Environmental Data
- **Social Media, Real Time**
  - A Set of Key: keywords, Hashtags, Citations
  - Volume of Tweets per Key and total
  - Sentiment Volume per Key and total





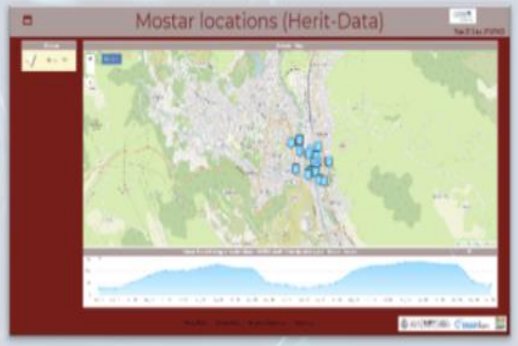
Mostar, Bosnia-Herzegovina

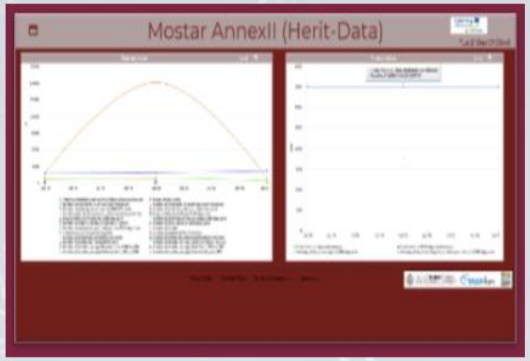
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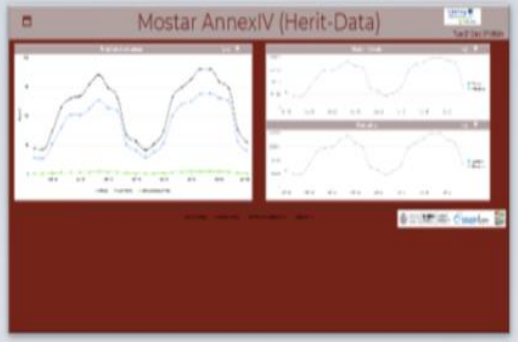


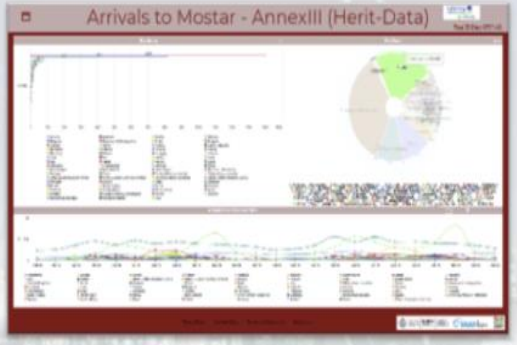
Mostar, Bosnia Herzegovina

- **Tourism Domain**
  - KPI: business, house prices, investments, stay duration, etc.
  - Profiled POI, Point of Interests
  - People flows: arrivals, overhights
- **Dashboards**
  - Monitoring KPI
  - POI, flows
- **Historical and updated data**
- **Services Exploited on:**
  - Dashboard
- **Since 2020**





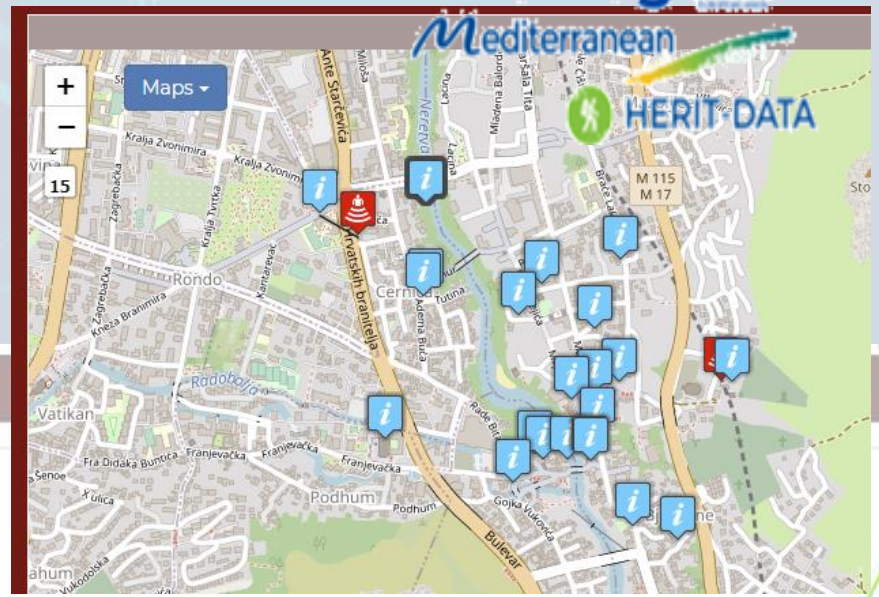


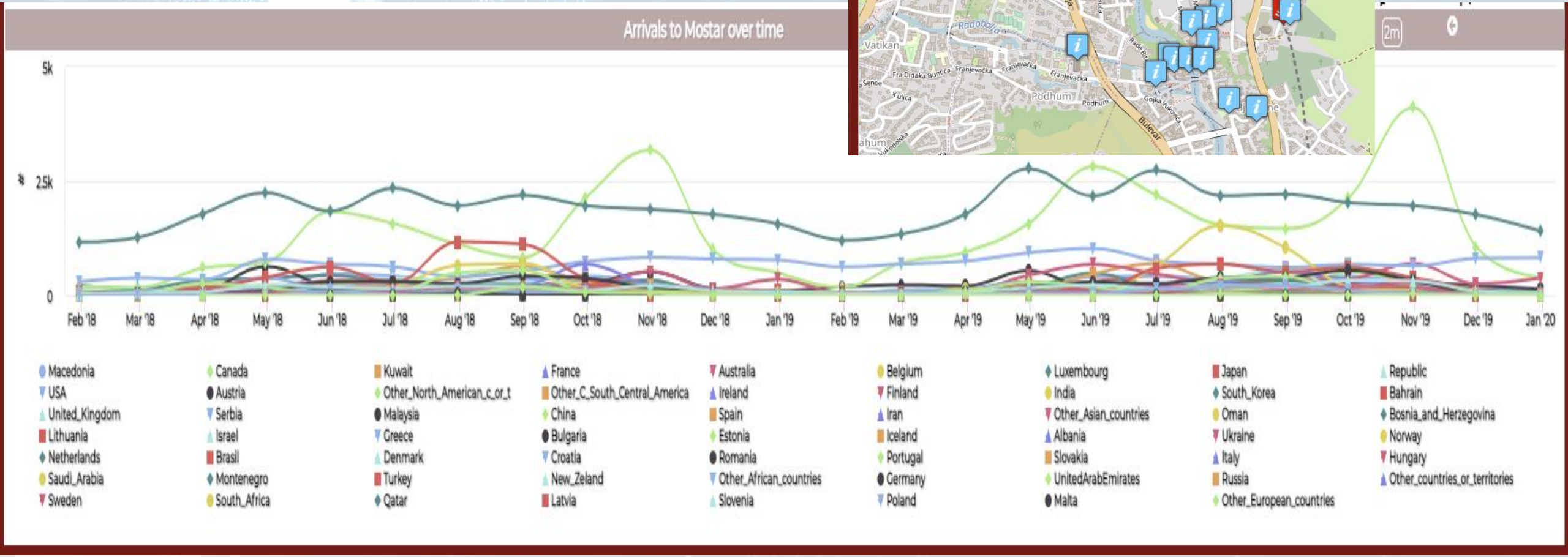


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Mostar, Bosnia Herzegovina

- Arrivals per Country Since 2018





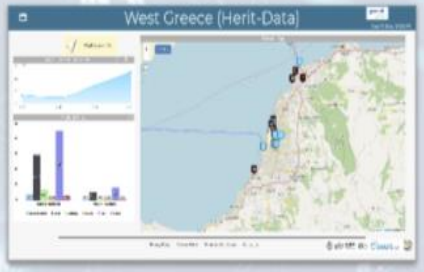


West Greece (Patra)

https://www.snap4city.org/743

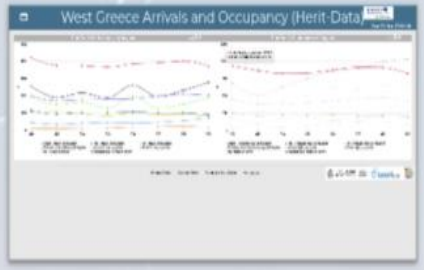
West Greece

- **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**

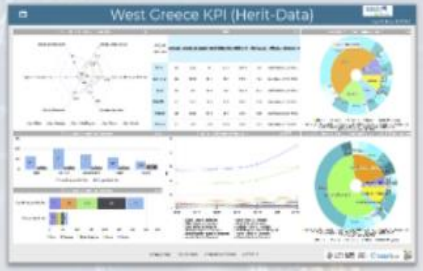


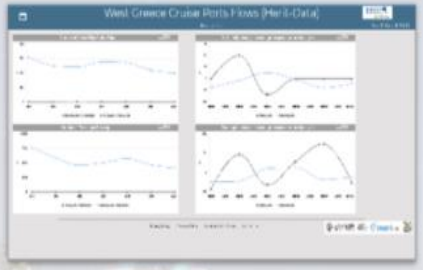


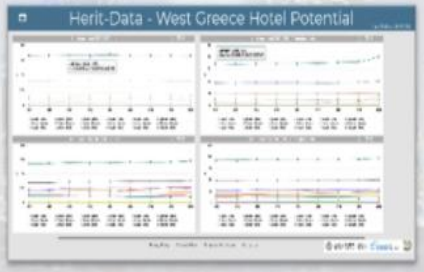










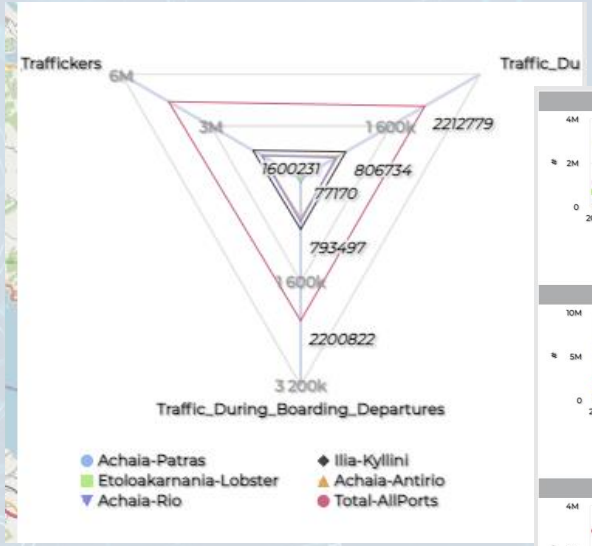


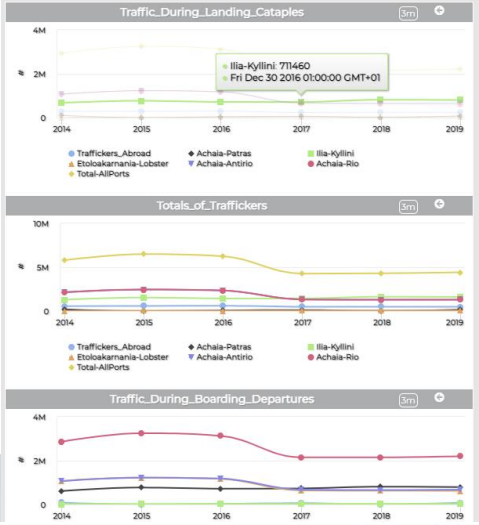


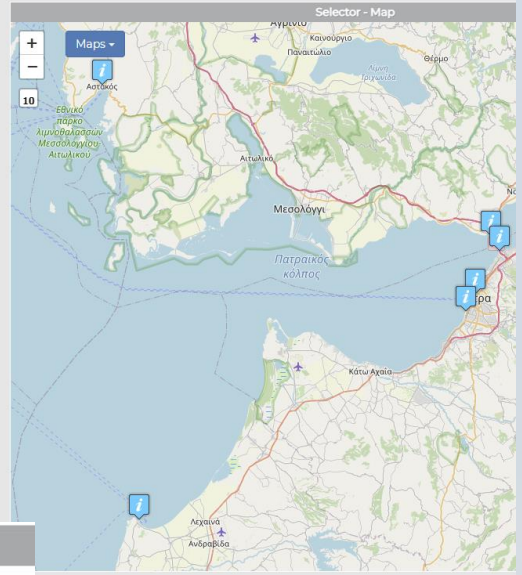
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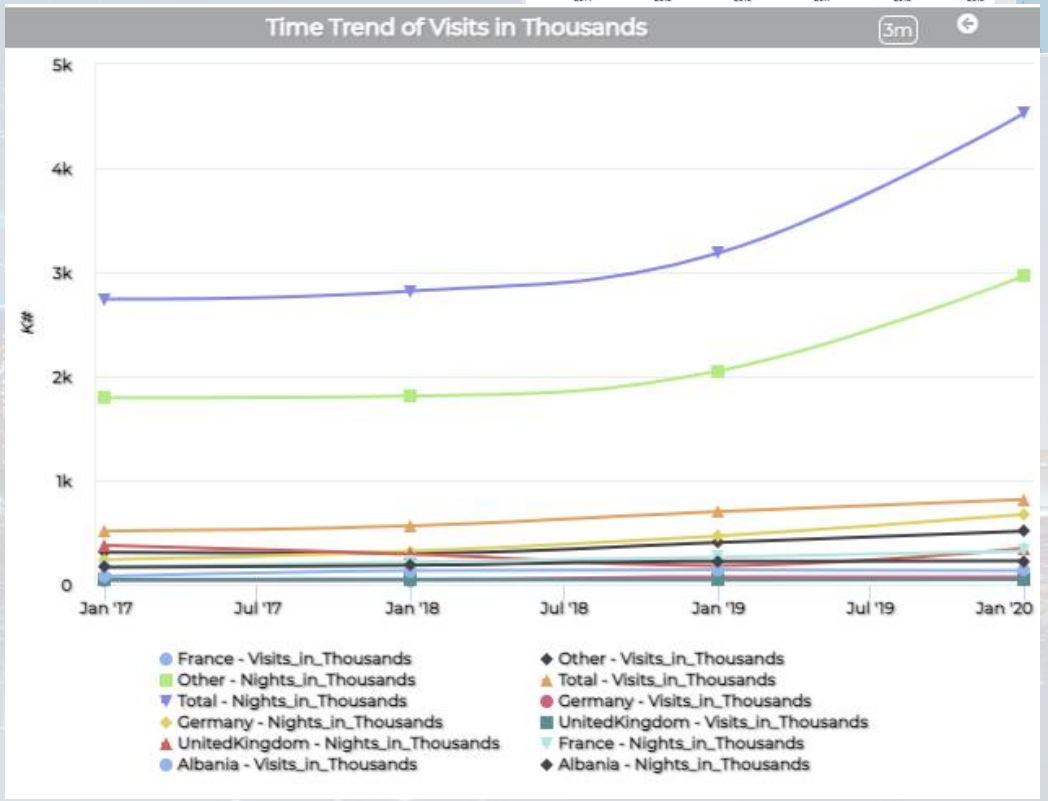
West Greece

- **KPI**
  - People arriving from locations
  - Expenditure per country per year
  - Tourists per Countries
  - Expenditure & cost per night per countries
- **Social Media, Real Time**
  - A Set of Key: keywords, Hashtags, Citations
  - Volume of Tweets per Key and total
  - Sentiment Volume per Key and total



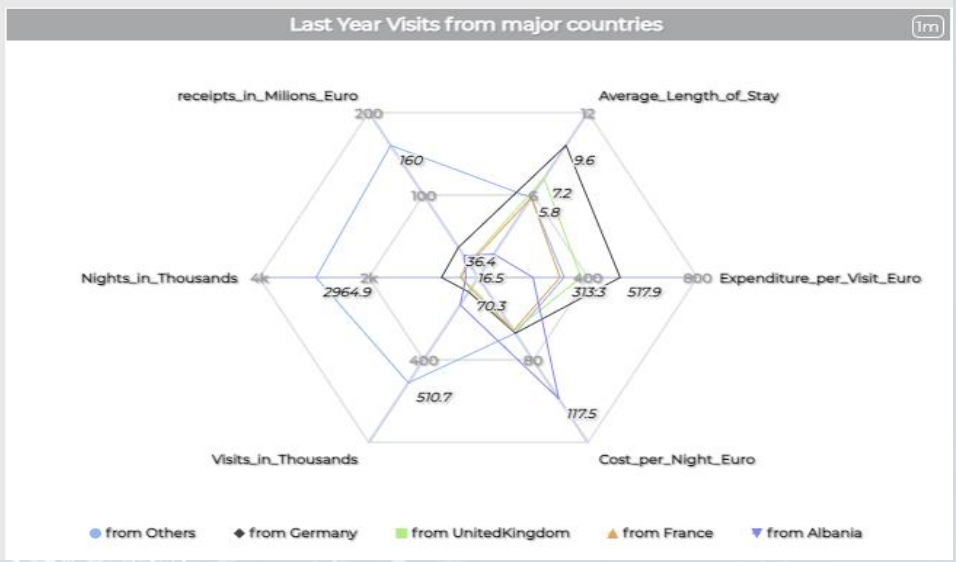


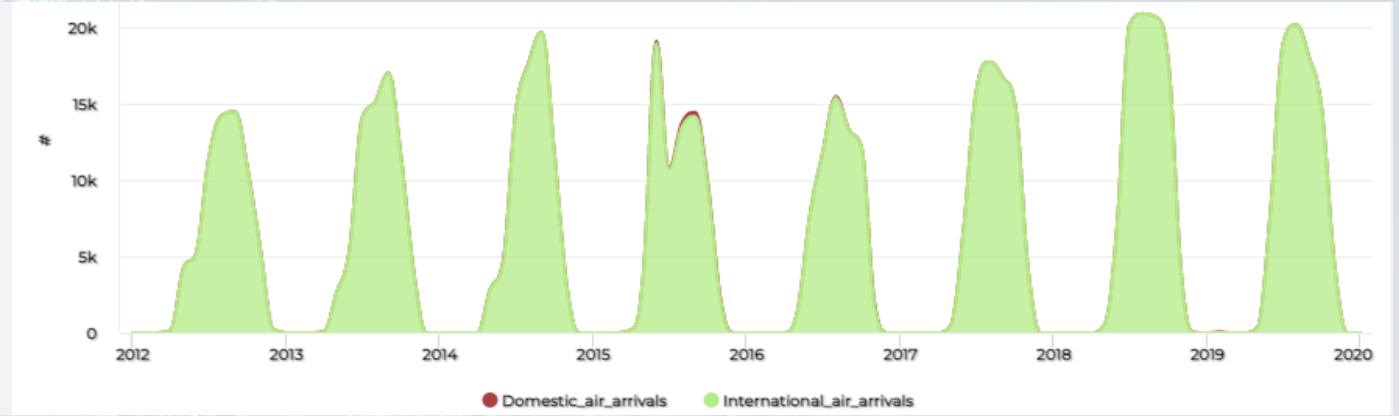




West Greece

- Profiling major Tourists per Countr
  - Visits
  - Receipts
  - Nights
  - Stay length
  - Night cost
  - Expenditure
- Arrivals and depatures
- Vistors on Archeological sites







Florence

https://www.snap4city.org/747

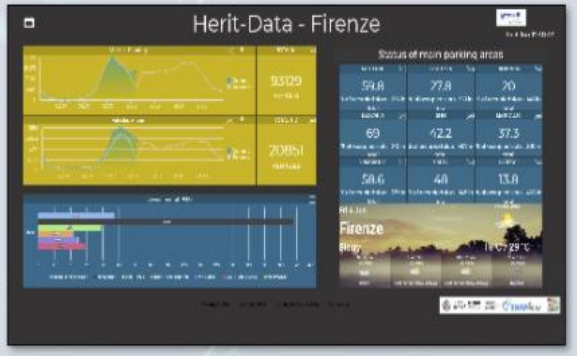


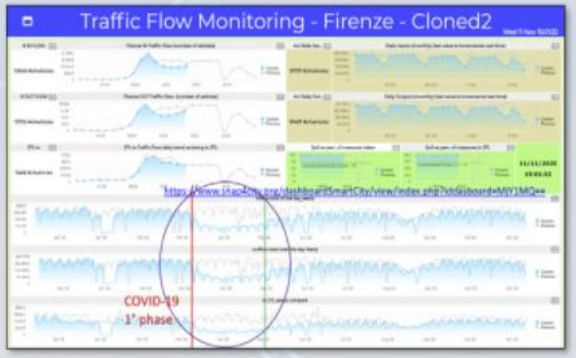
Herit-Data - Florence Main

Tue 21 Dec 23:38:03

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzE0NA==

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









Interreg Mediterranean HERIT-DATA

Main
Herit-Data Main

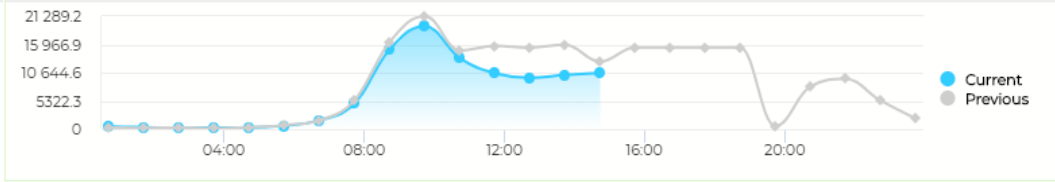
Regione Toscana

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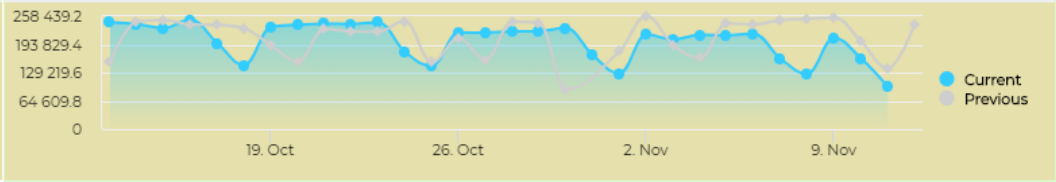
Traffic Flow Monitoring - Firenze - Cloned2

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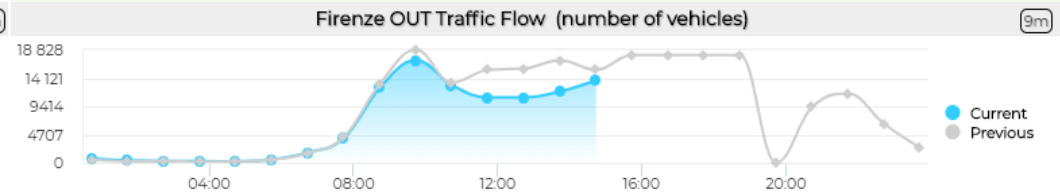
 # IN FLOW — 10549 #ofvehicles



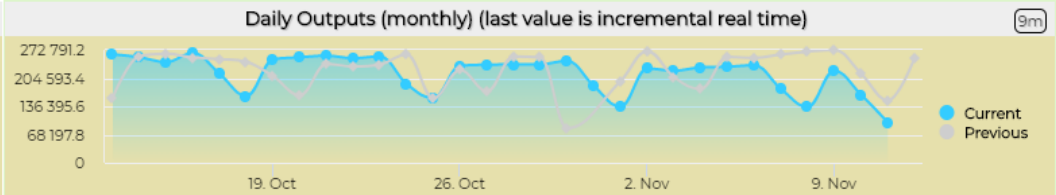
Inc Daily Inp... — 97137 #ofvehicles



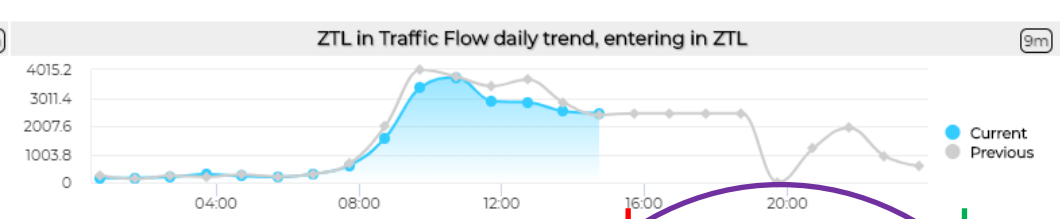
 # OUT FLOW — 13720 #ofvehicles

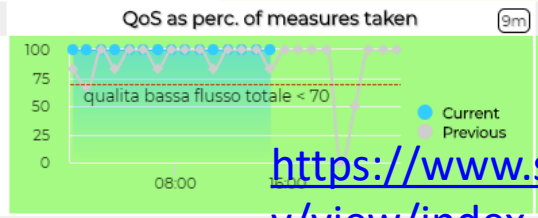


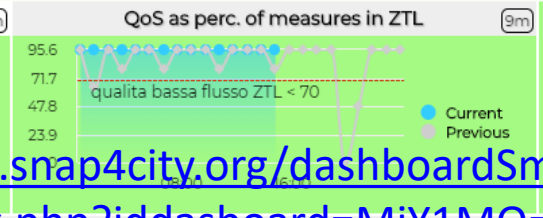
Inc Daily Out... — 97457 #ofvehicles



ZTL in — 2468 #ofvehicles



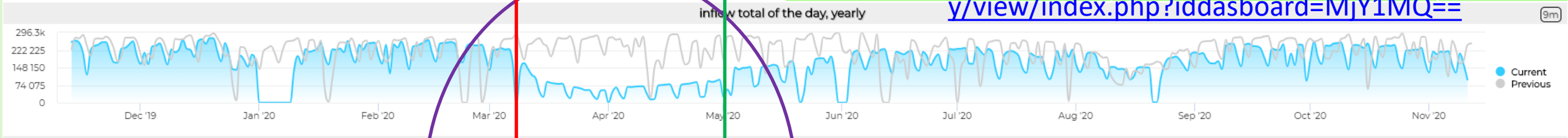


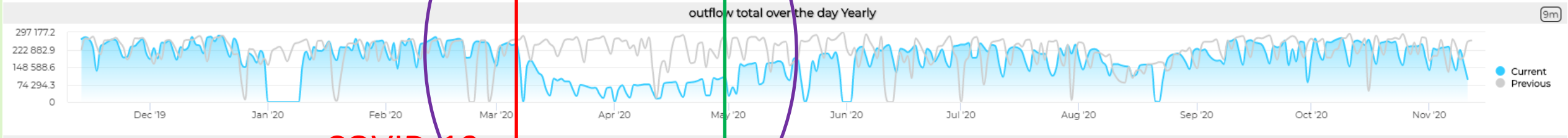


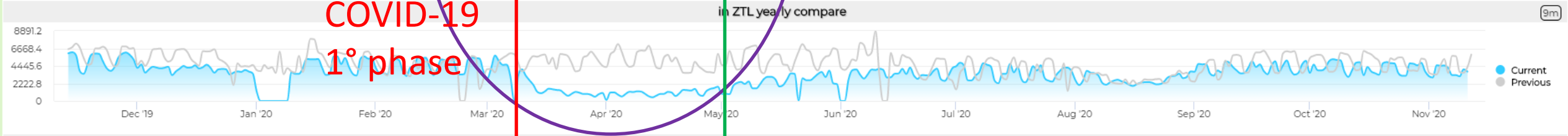
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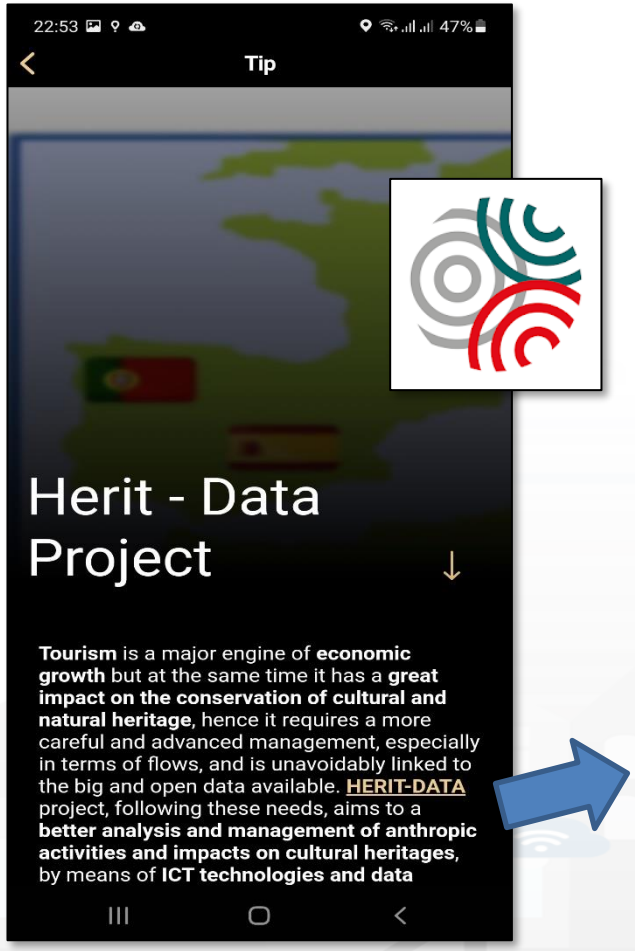


COVID-19

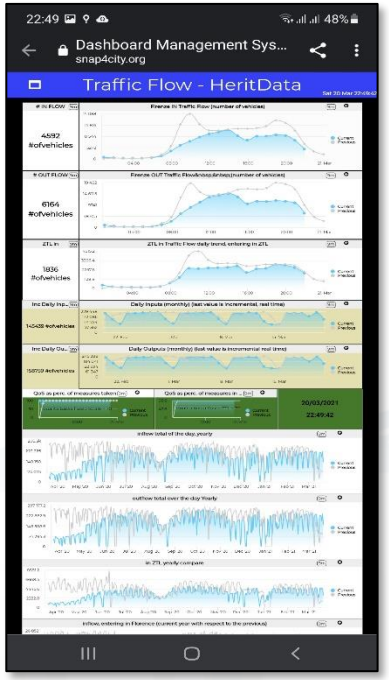
1° phase

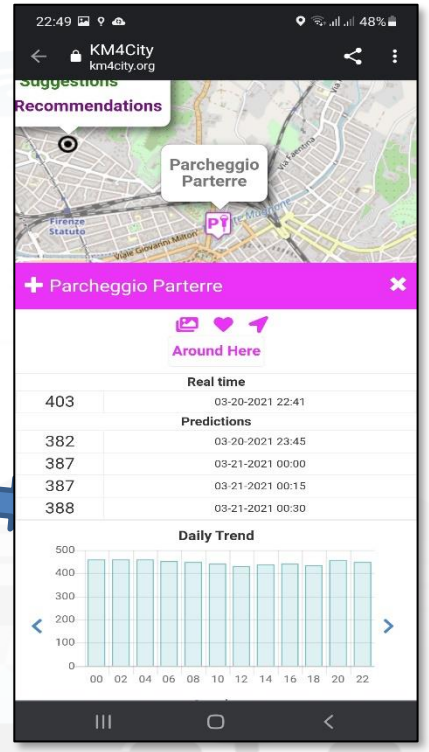
Florence Dashboard

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

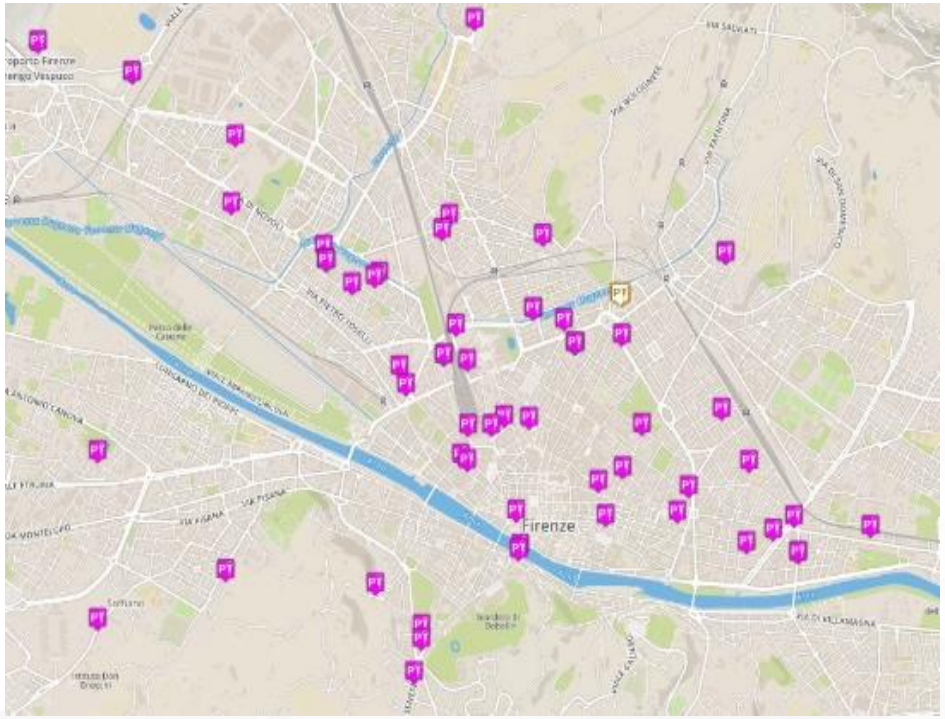








Different Reduction of parking for Covid



main Purpose	% of reduction in Lockdown	Recover in July 2020
Hospitals	55,9	31%
railway stations	84,2	60%
social hubs	85,8	72%
markets	45,1	25%
justice	96,1	82%

Impact on Pollutant on LockDown 2020

	CO2	CO	NO2	PM10
Percentage at which the average value of the pollutant has been reduced (February wrt April, 2020)	41,06	47,54	38,84	61,99
Percentage at which the MAX value of the pollutant has been reduced (February wrt April 2020)	38,89	34,62	63,02	60,21

Event: clashes between police and demonstrators in Florence, during an unauthorized demonstration against the restrictions of Covid-19 government measures (on 30th October 2020 night).

Italy: Protests flare in Florence over restrictions

31 Oct, 2020

Facebook Twitter Mi piace 655 Tweet



Florence mayor condemns violence and vandalism in historic centre in "surreal, terrible and painful night" for Tuscan city.

Protesters clashed with police in central Florence last night during an unauthorised protest over Italy's latest restrictions aimed at curbing the spread of covid-19.

In partnership with la Repubblica FIRENZE.it

Oct. 30 Protest Devastates Florence

10/31/2020



During the unauthorized evening demonstration against recent social lockdown pandemic measures lasting four hours in downtown Florence on the evening of October 30 saw

TOP NEWS STORIES

Oct. 30 Protest Devastates Florence
During the unauthorized evening demonstration against recent social lockdown pandemic measures lasting four hours in downtown Florence [...]

COVID Demonstrations Hit Florence
Unlike the U.S. protesters in Italy reserve public space for peaceful demonstrations which are organized to communicate a [...]

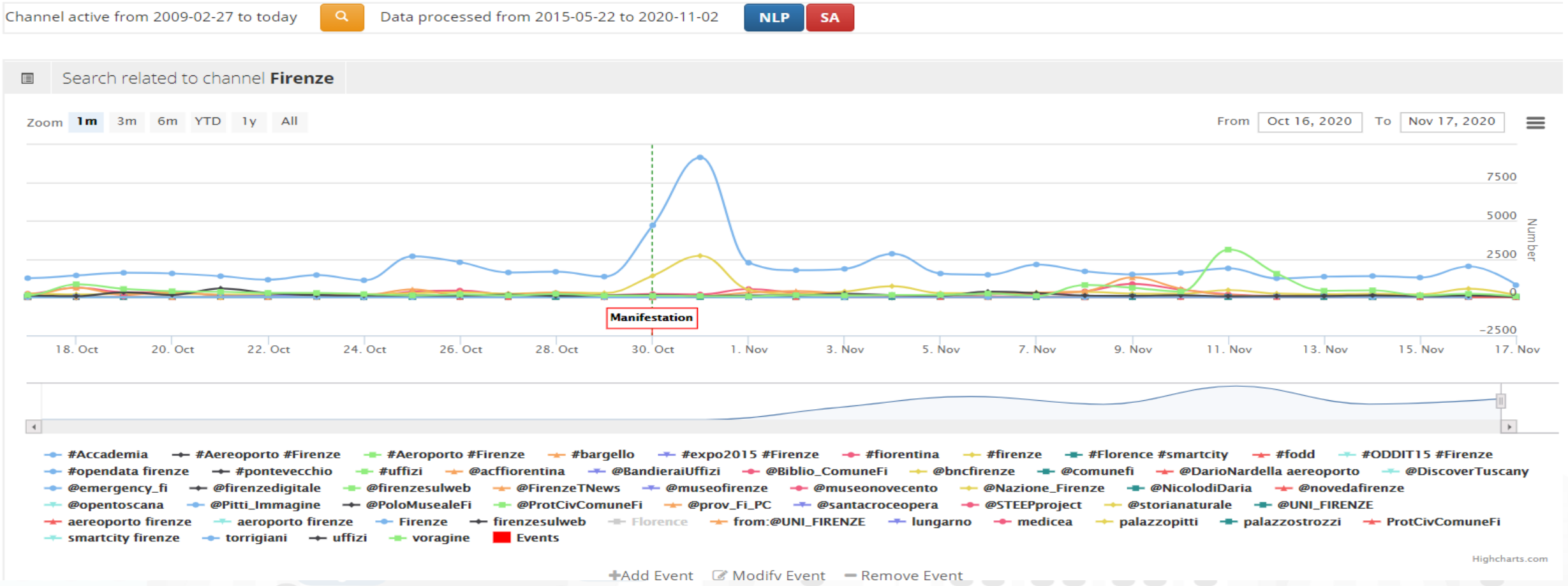
New Anti-Covid Regulations: Dos & Dont's
Given the upswing in Coronavirus infections and consequent hospital admissions since the beginning of October, Italian Prime Minister [...]

New Pandemic Regulations in Italy
In the face of the rise of Coronavirus infections, the Italian government has extended the national state [...]

LA COMPAGNIA
Original Language Movies
International Film Festivals

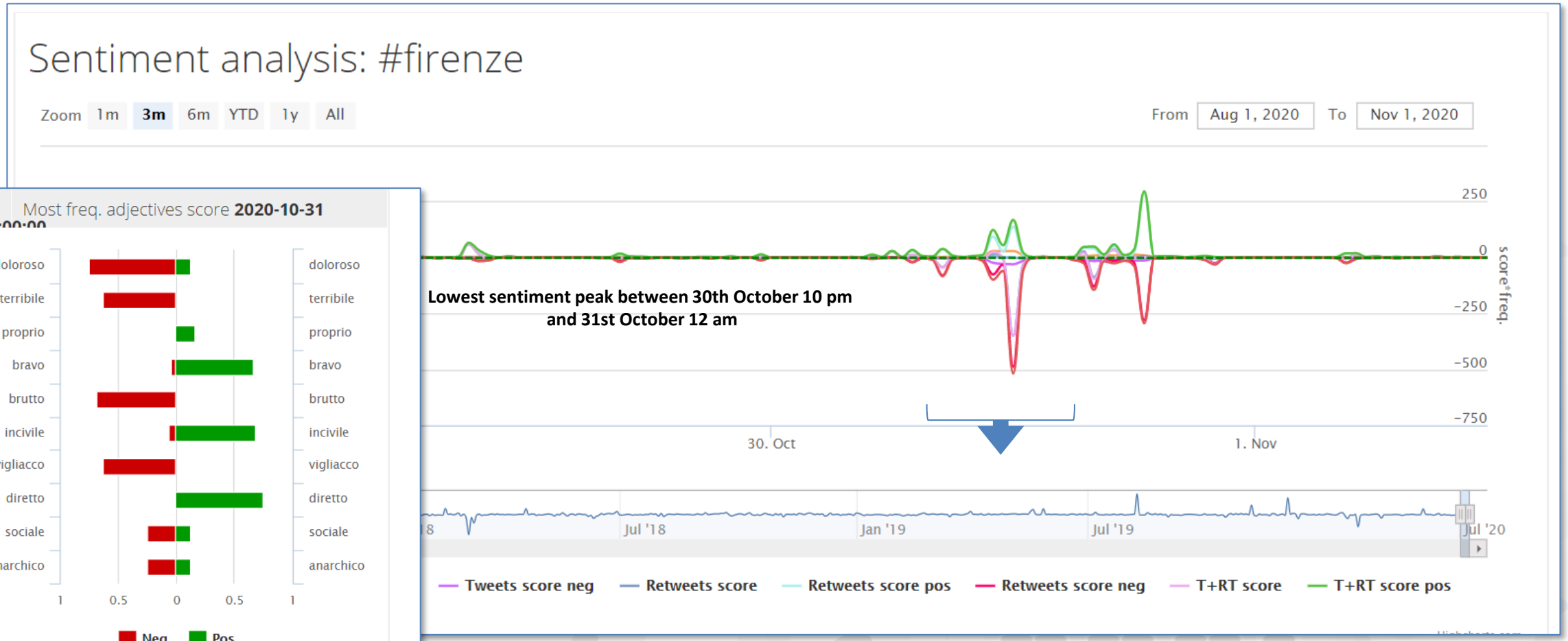
ORCHESTRA DELLA TOSCANA

30 October Manifestation



Twitter Vigilance

Sentiment Analysis for search «Firenze»



http://disit.org/tv/index.php?p=sa_ricerche&ricerca=436

Twitter Vigilance

Herit-Data Twitter Vigilance



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

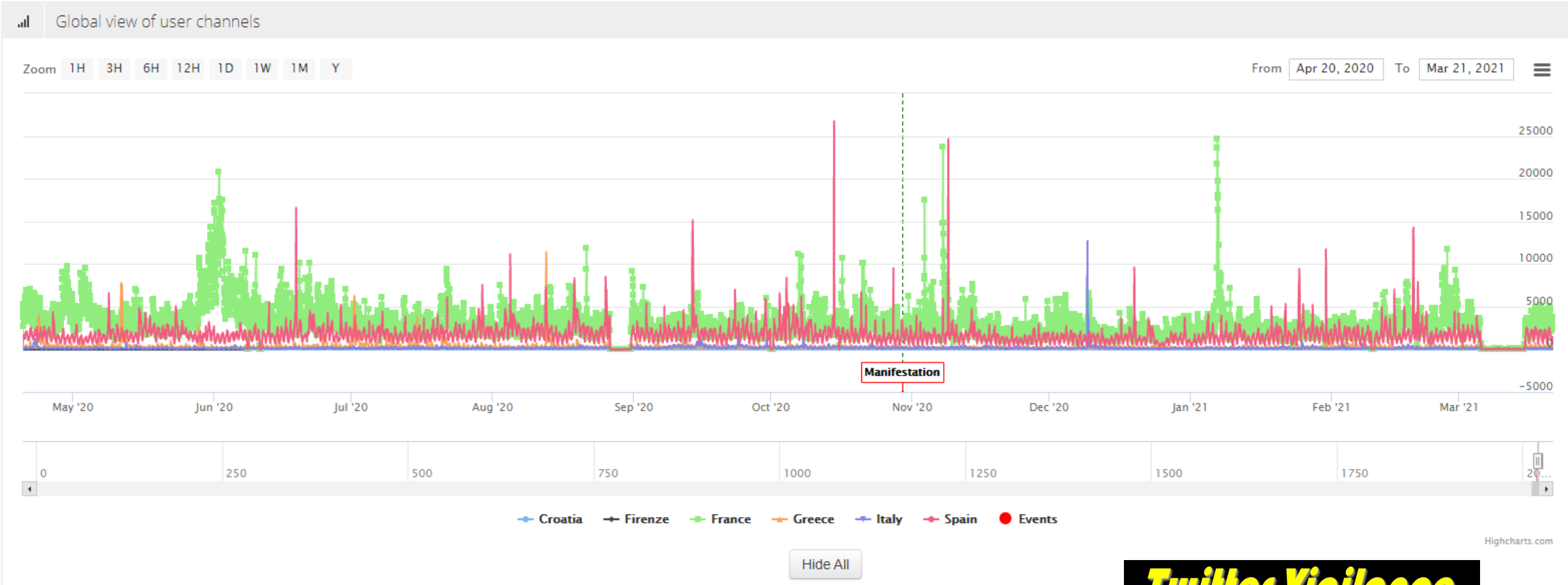
Twitter Vigilance Herit-Data: *Some Numbers*

Channel Name	Total Number of Collected TW+RTW	Number of Collected Tweets	Number of Collected Retweets	Twitter Volume Processing Time Range	NLP & Sentiment Analysis Processing Time Range	NLP & Sentiment Analysis Languages
Spain	113.7 Millions	40.99 Millions	72.49 Millions	From 30-01-2020 to current datetime	From 01-02-2020 to current datetime	English, Spanish
France	50,1 Millions	16.0 Millions	34.1 Millions	From 30-01-2020 to current datetime	From 01-02-2020 to current datetime	Italian, English, French
Greece	12.3 Millions	4.2 Millions	8.1 Millions	From 30-01-2020 to current datetime	From 01-02-2020 to current datetime	English
Italy	2.97 Millions	1.0 Million	1.9 Millions	From 30-01-2020 to current datetime	From 01-02-2020 to current datetime	Italian, English
Croatia	35.8 Thousands	15.5 Thousands	19,8 Thousands	From 30-01-2020 to current datetime	From 01-02-2020 to current datetime	English

Updated: Dec. 2021

Twitter Vigilance

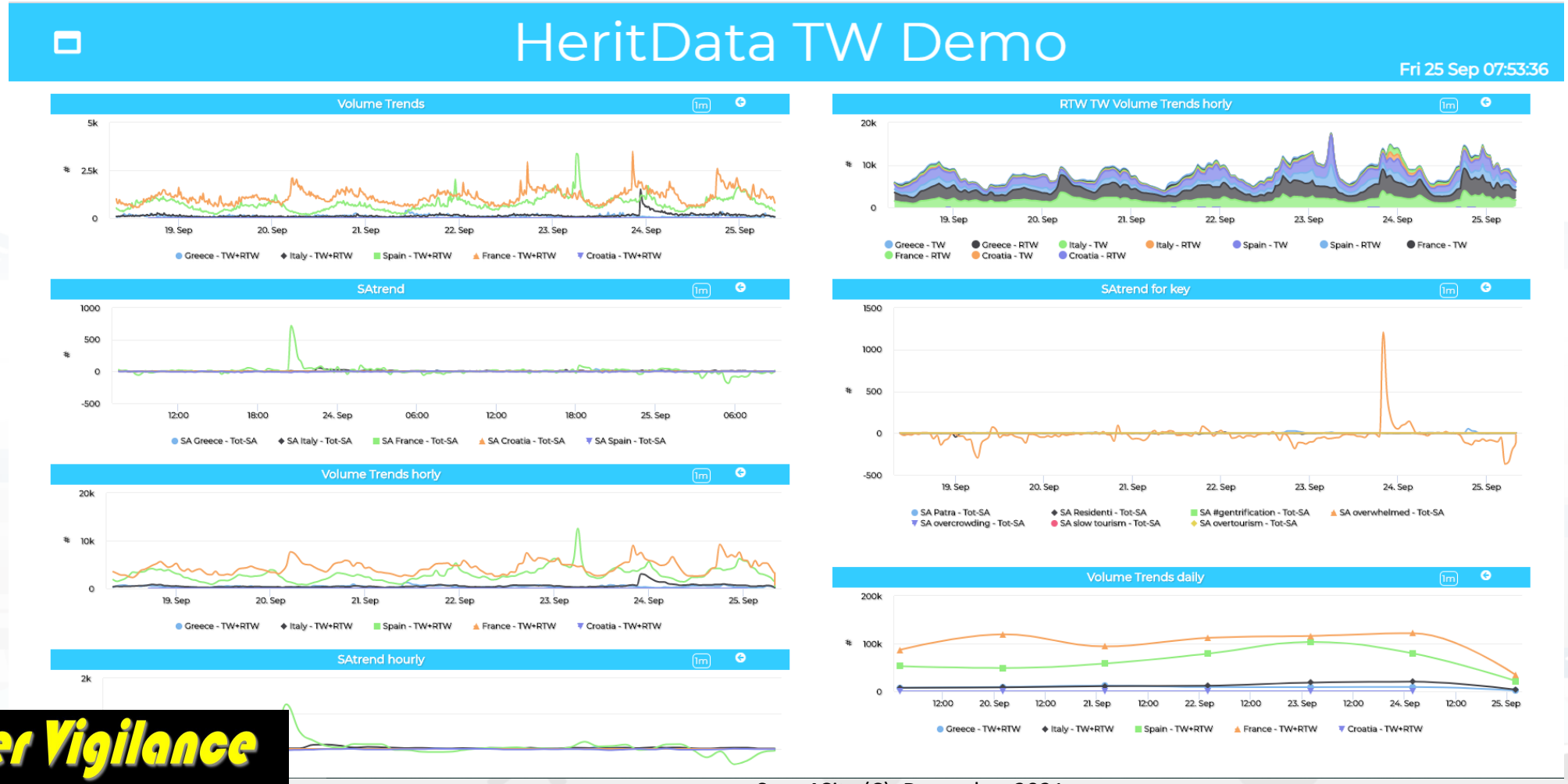
Overview on the last 12 months



Twitter Vigilance

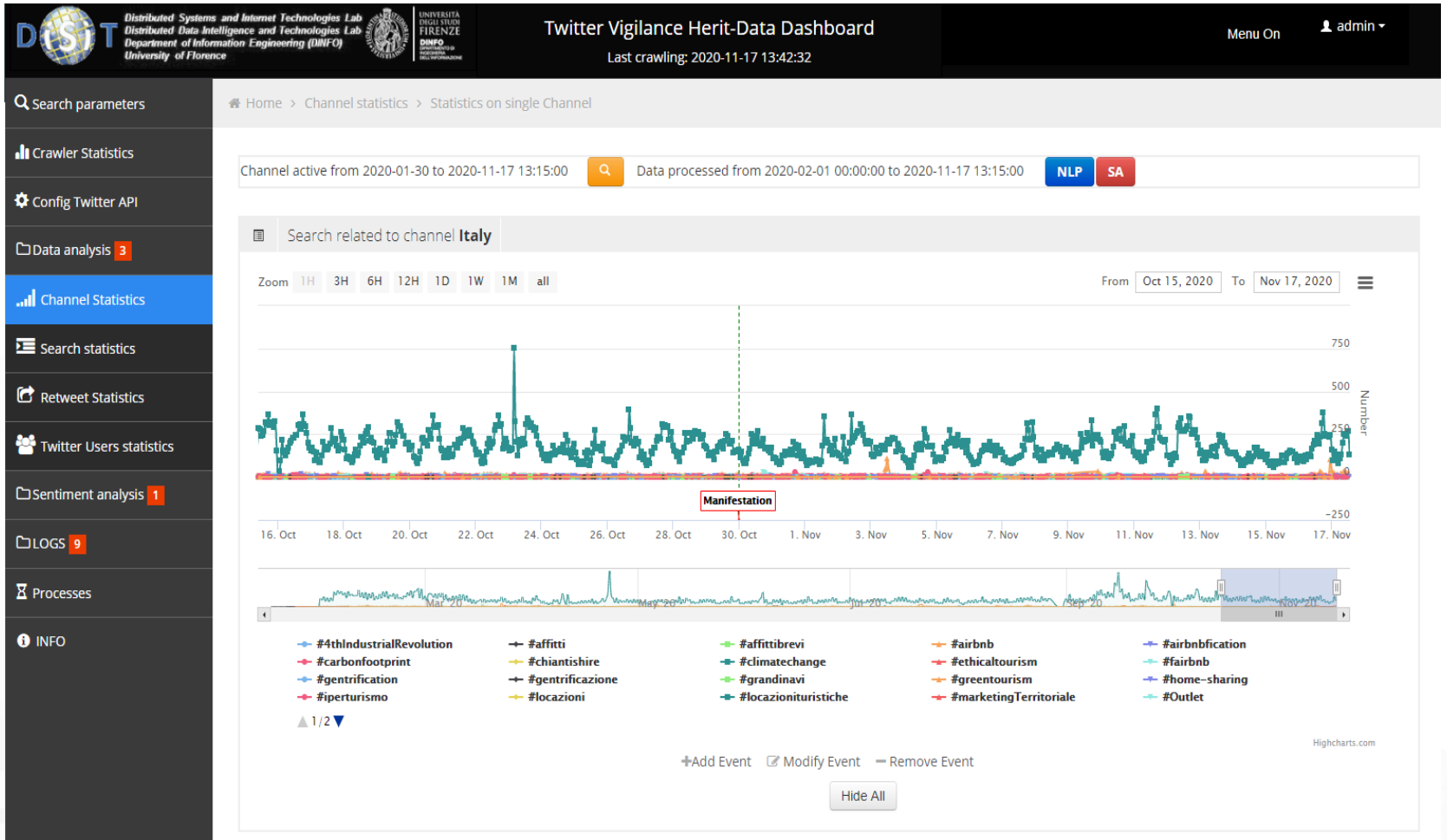
Twitter Vigilance Data on Dashboards trought IoT-App

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=Mjc3NQ==



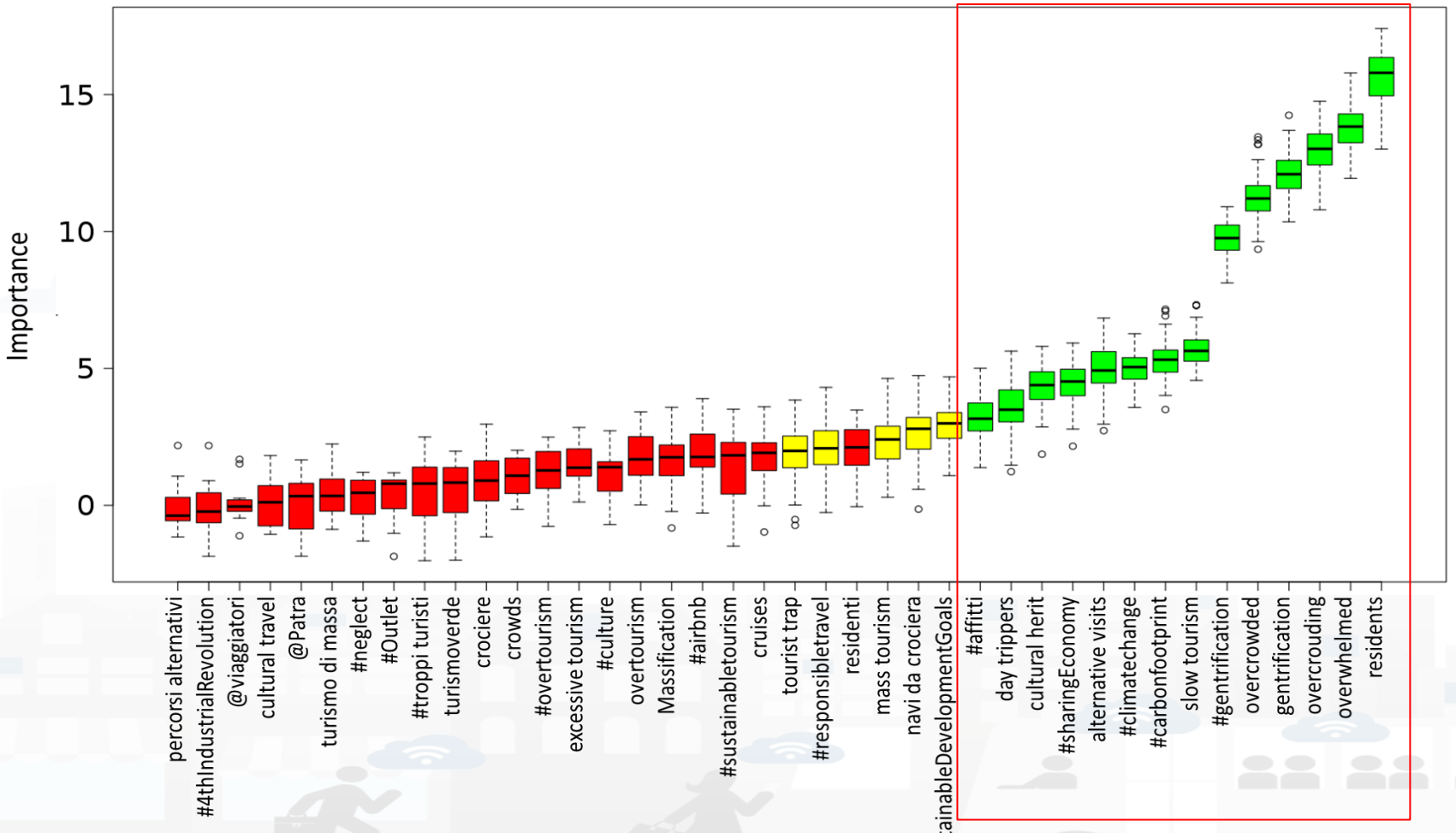
TV on Florence

#4thIndustrialRevolution #affitti #affittibrevi #airbnb
#airbnbfication #carbonfootprint #chiantishire #climatechange
#ethicaltourism #fairbnb #gentrification #gentrificazione
#grandinavi #greentourism #home-sharing #iperturismo
#locazioni #locazionituristiche #marketingTerritoriale #Outlet
#overtourism #responsibletravel #sharingEconomy
#socialtourism #SustainableDevelopmentGoals
#sustainabletourism #Tourism4SDGs #turismoEnogastronomico
#turismoEsperenziale #turismoetico #turismoSmart
#turismosostenibile #turismoverde #voluntourism



Twitter Vigilance

Relevant Feature Selection - Italy

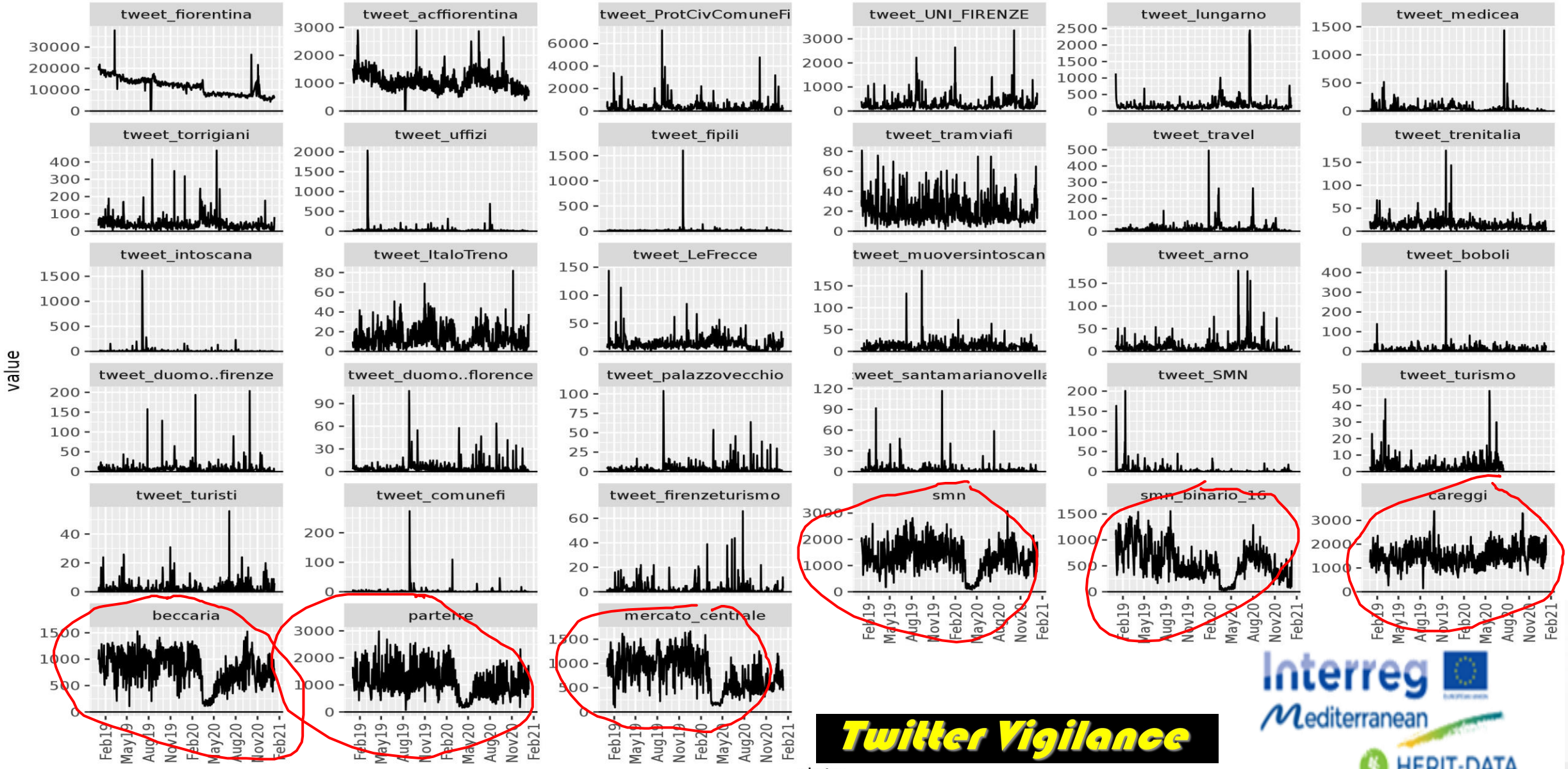


Random Forest Model Results expoiting the *confirmed* keys:

- Accuracy = 0.90
- Kappa index = 0.81

Twitter Vigilance

Twitter trends



Twitter Vigilance

SCALABLE SMART ANALYTIC APPLICATION BUILDER FOR SENTIENT CITIES

TOP



Just to start !

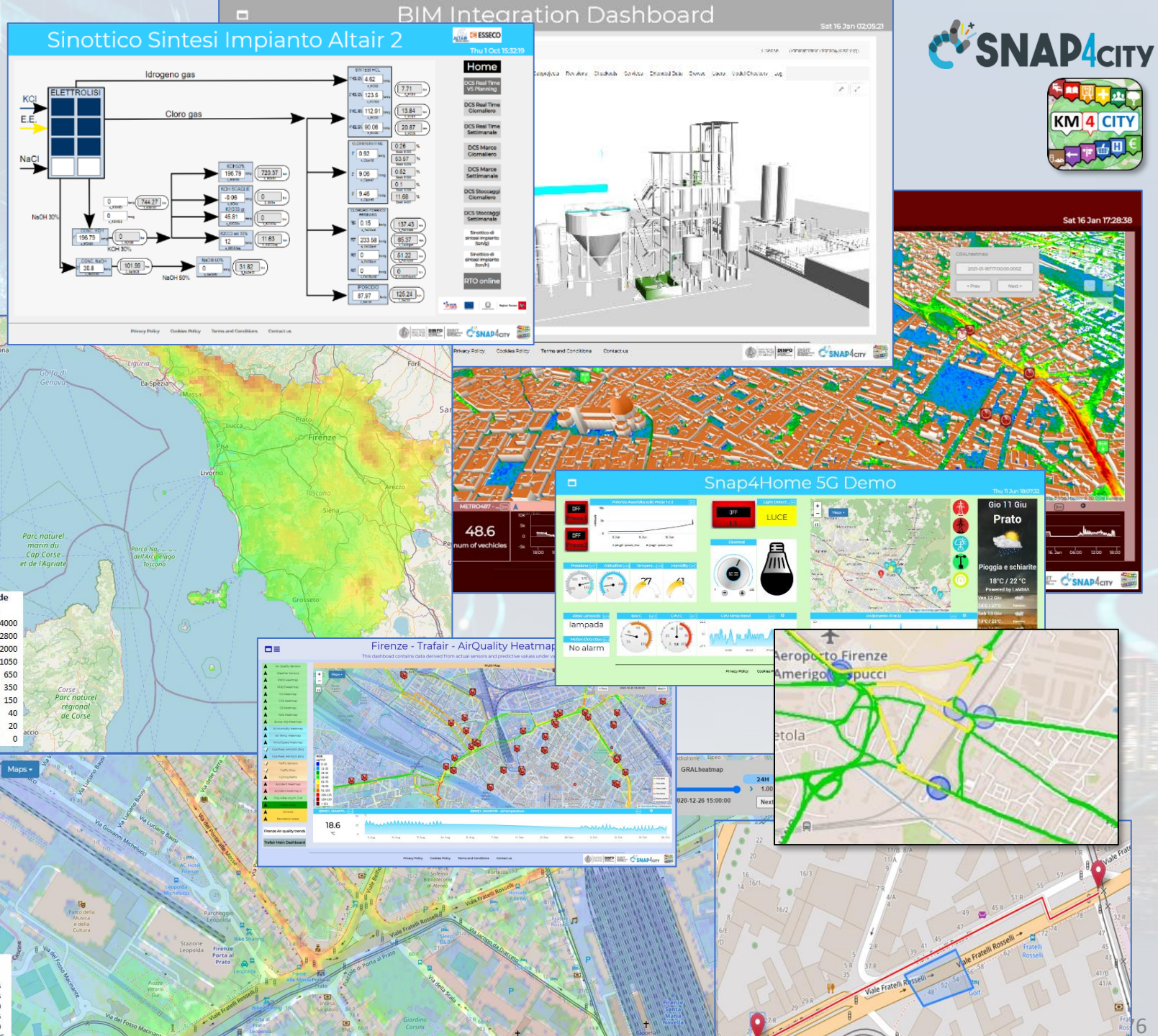
See many other features

100% OPEN SOURCE

SNAP4 Appliances and Dockers Installations

Data Type Coverage

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



https://www.snap4city.org/577

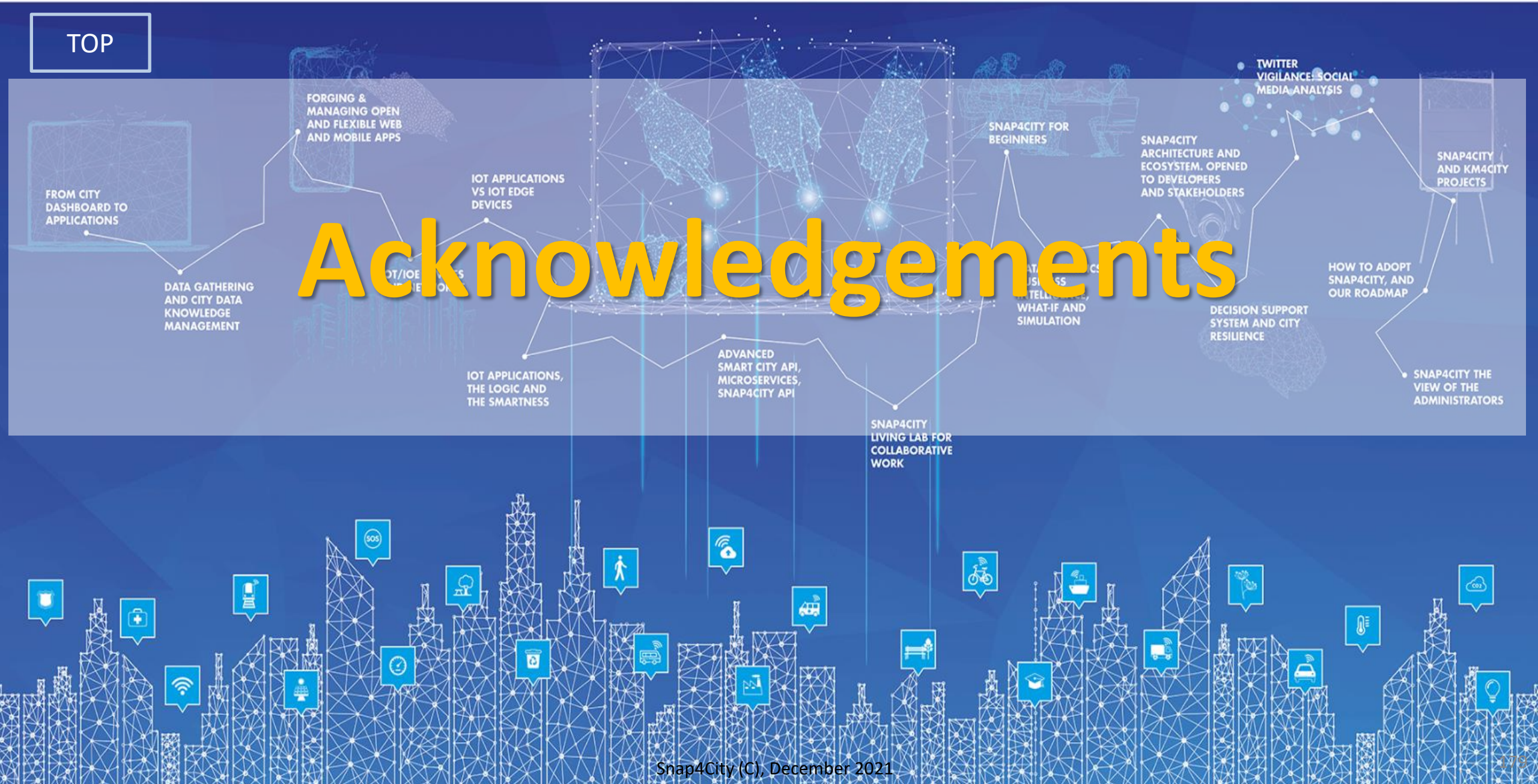
On Line Training Material (free of charge)

	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
	40%	20%	0%	5%	2%	3%	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

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 1.6

2017
Sii-Mobility

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

E0I5 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

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

Winner of Select4Cities PCP

SNAP4CITY

roadmap

2020

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

- Smart Mobility
- PISA, PUMS
- Living lab

2021

PC4City (2020-21)
Monitoring Terrain

Winner of Open Data Challenge of enel x

- Smart Light
- Sweden

Km4City 1.6.7

Contract

Smart Ambulance (2021-22)

Enterprise (2021-22)
Industry 4.0

Almafluida
Industry 4.0
(2021-22)

AMPERE (2021-22)
Industry 4.0

SYN-RG-AI
SmartCity

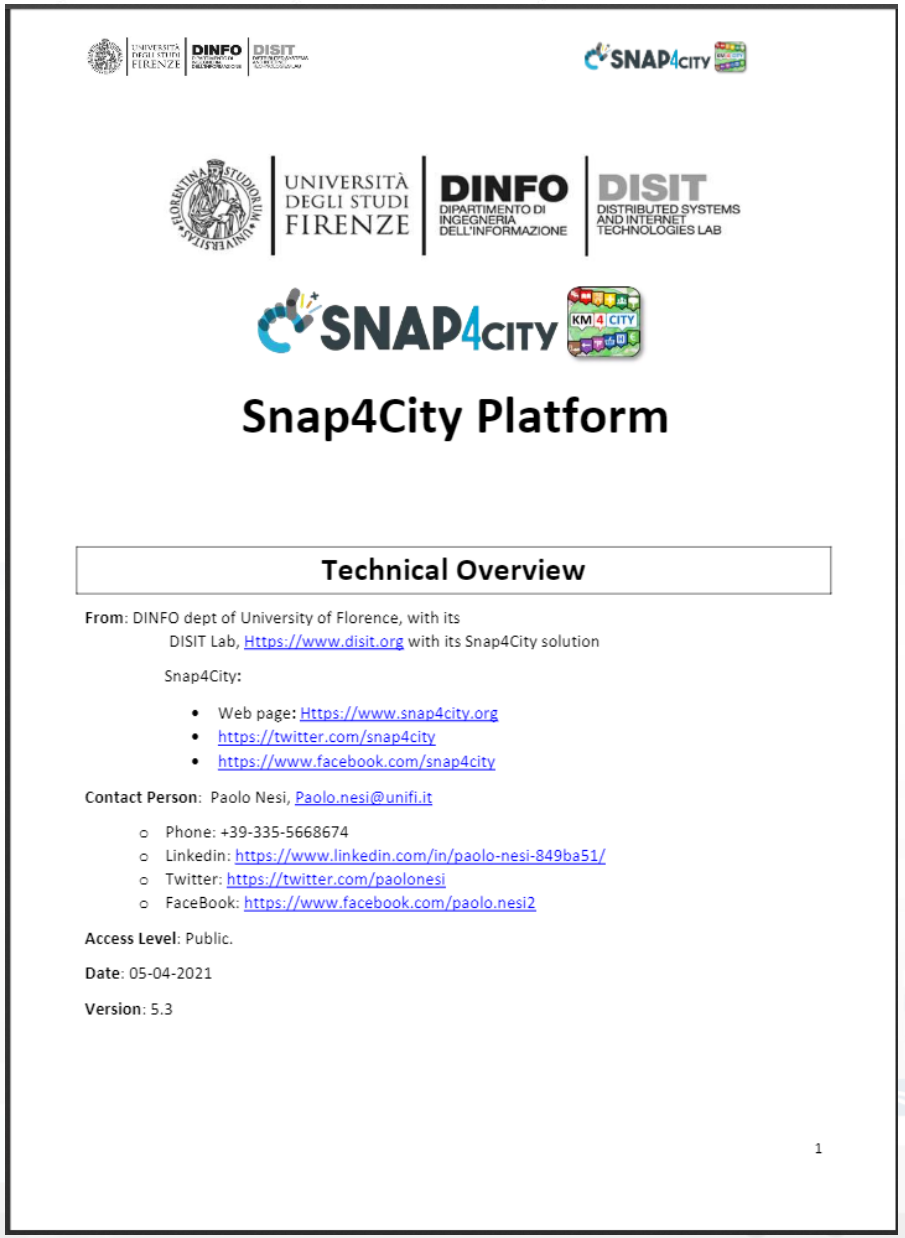
2022

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**

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

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.*


Merry
Christmas