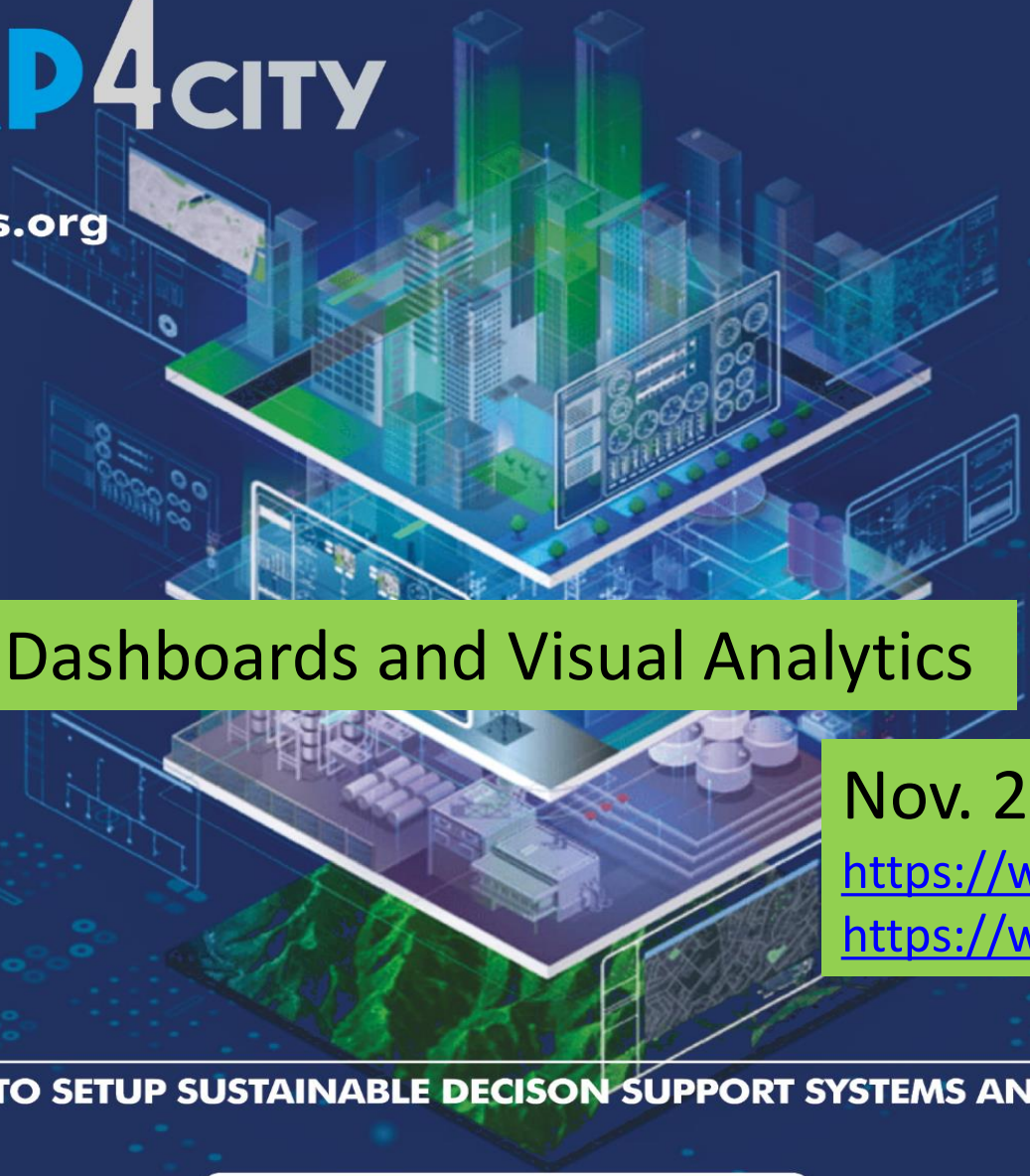
SNAP4CITY

www.snap4city.org
www.snap4solutions.org

www.km4city.org



Dashboards and Visual Analytics

Nov. 2023, Course, Part 2

https://www.snap4city.org/944
https://www.snap4city.org/577

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

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

Paolo Nesi, paolo.nesi@unifi.it
https://www.Km4City.org
https://www.disit.org

SNAP4CITY

KM4CITY

SNAP4 Appliances and Dockers Installations

Be smart in a SNAP!

SMARTCITY EXPO WORLD CONGRESS
7-9 November 2023, Barcelona, Spain
Visit Snap4City in Hall 1

100% OPEN SOURCE

EU GDPR COMPLIANT

PEN Test Passed

Powered by FIWARE

SNAP4CITY on EUROPEAN OPEN SCIENCE CLOUD MARKETPLACE

Node-RED

Dashboards and Visual Analytics

Nov. 2023, Course, Part 2
https://www.snap4city.org/944
https://www.snap4city.org/577

LIVING LAB

SCALABLE SMART ANALYTIC APPLICATION BUILDER FOR SENTIENT CITIES

UNIVERSITÀ DEGLI STUDI FIRENZE | DINFO | DISIT

Smart Solutions and Decision Support Systems

100% OPEN SOURCE

Powered by FIWARE

FREE TRIAL

PEN Test Passed

EU GDPR COMPLIANT

SNAP4 Appliances and Dockers Installations

EUROPEAN OPEN SCIENCE CLOUD

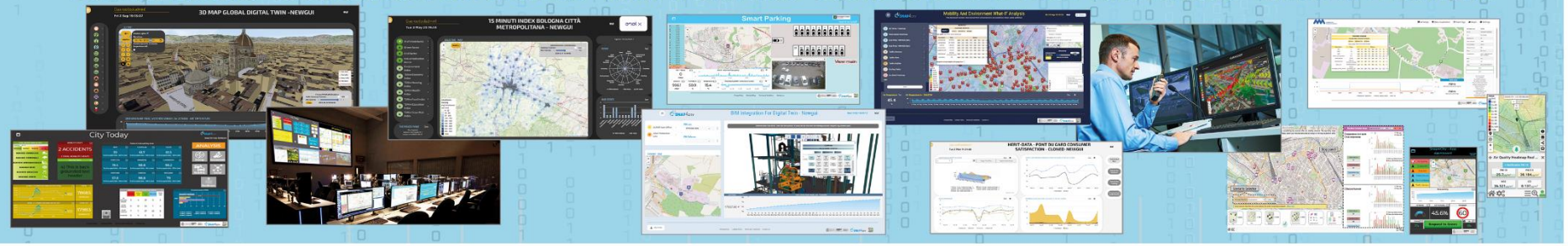
Node-RED

JS Foundation

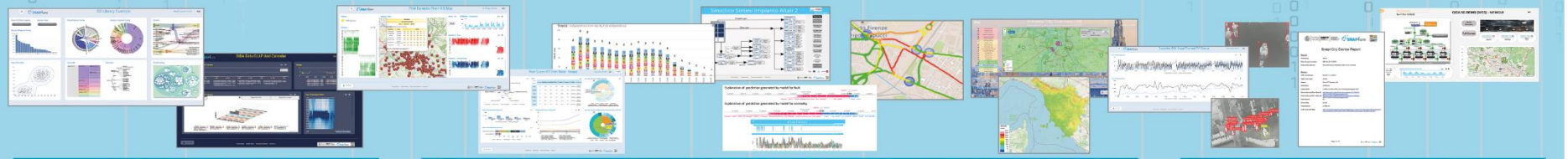
E015 digital ecosystem

NVIDIA

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



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

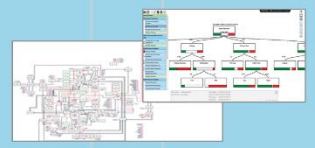


DASHBOARDS, WIDGETS
TEMPLATES

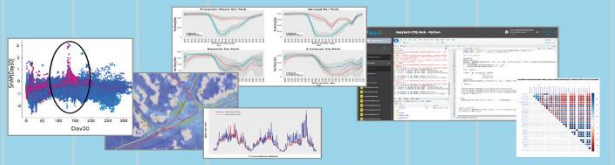
PREDICTION - ANOMALY DETECTION - CLUSTERING - ROUTING - SENTIMENT NLP - TRAFFIC FLOW
PEOPLE FLOWS - SDG - 15 MIN CITY INDEX - KPI - HEATMAPS - ORIGIN DESTINATION - ETC...

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

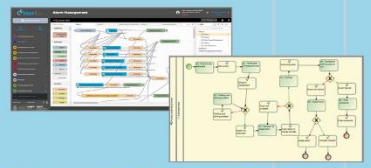
ANY: DATA, BROKER, NETWORK AND VERTICAL



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



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

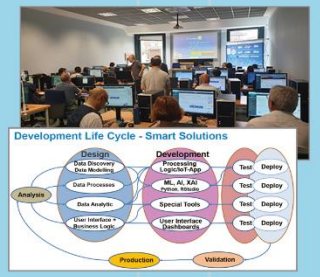


VISUAL PROGRAMMING, ADAPTERS
DATA FLOWS, WORKFLOWS
PARALLEL DISTRIBUTED PROCESSING
EVENT DRIVEN

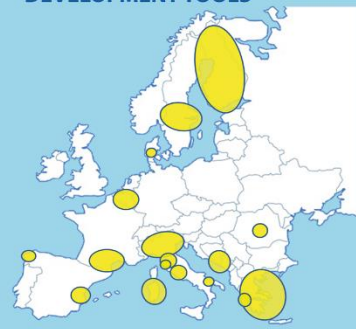
Native and External Smart Applications

- Mobility & Transport
- Light & Energy
- Waste
- Environment
- Building
- Tourism
- Asset Management
- Security and Safety
- Social Media

...



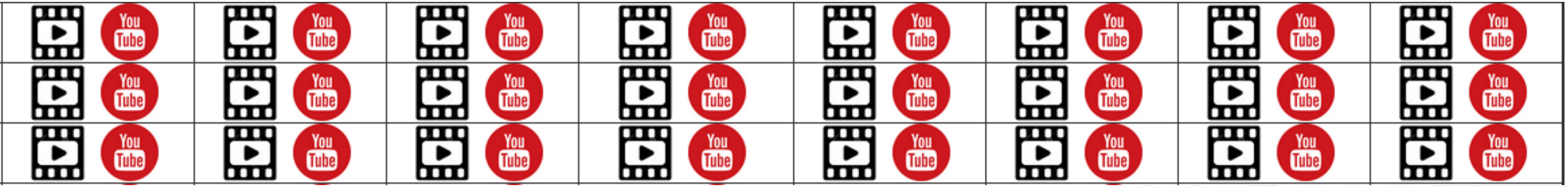
METHODOLOGIES
LIVING LABS
COURSES AND COMMUNITY
DEVELOPMENT TOOLS



https://www.snap4city.org/944

On Line Training Material (free of charge)

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

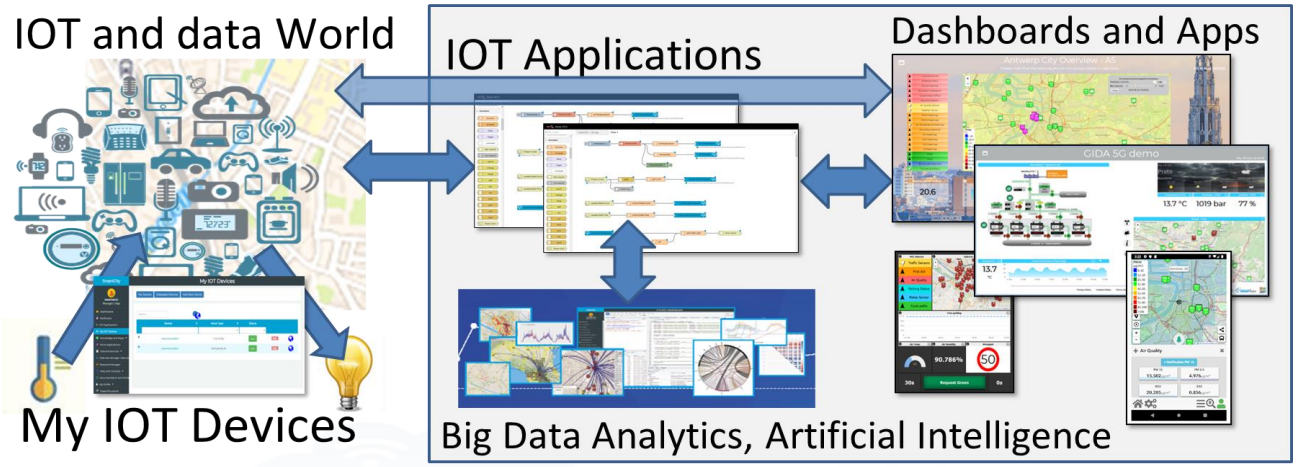


Note on Training Material

- **Course 2023**: https://www.snap4city.org/944
  - Introductionary course to Snap4City technology
- **Course** https://www.snap4city.org/577
  - Full training course with much more details on mechanisms and a wider set of cases/solutions of the Snap4City Technology
- **Documentation** includes a deeper round of details
  - Snap4City Platform Overview:
    - https://www.snap4city.org/drupal/sites/default/files/files/Snap4City-PlatformOverview.pdf
  - Development Life Cycle:
    - https://www.snap4city.org/download/video/Snap4Tech-Development-Life-Cycle.pdf
  - Client Side Business Logic:
    - https://www.snap4city.org/download/video/ClientSideBusinessLogic-WidgetManual.pdf
- **On line cases and documentation**:
  - https://www.snap4city.org/108
  - https://www.snap4city.org/78
  - https://www.snap4city.org/426

Free Trial

- Register on WWW.snap4city.org
  - Subscribe on **DISIT Organization**
- **You can:**
  - Access on basic Tools
  - Access to a large volume of Data
  - Create Dashboards
  - Create IOT Applications
  - Connect your IOT Devices
  - Exploit Tutorials and Demonstrations



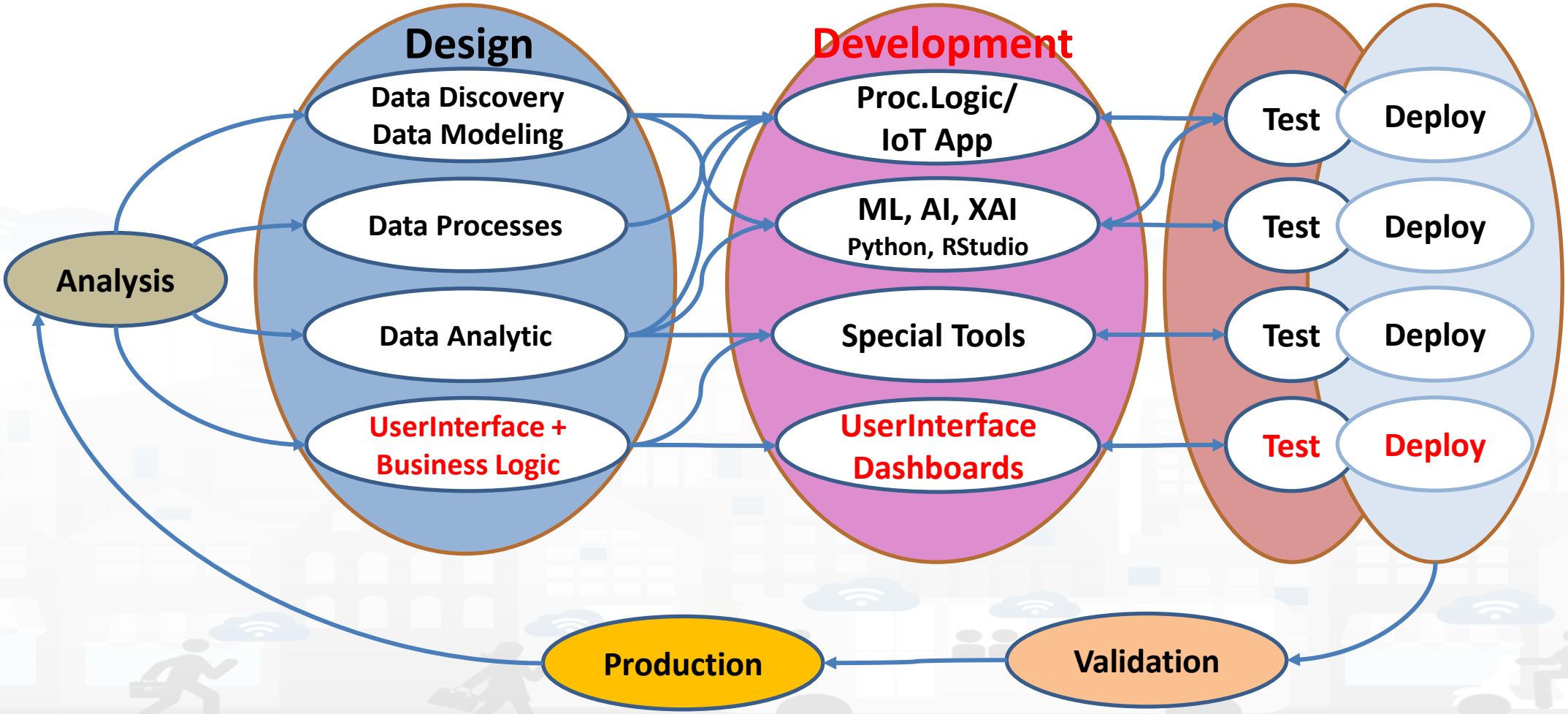
IF you need to go more in deep you can ask us to pass at the next Role becoming full AreaManager with full rights of development, also for Data Analytics, machine learning, etc.

Agenda of this second part

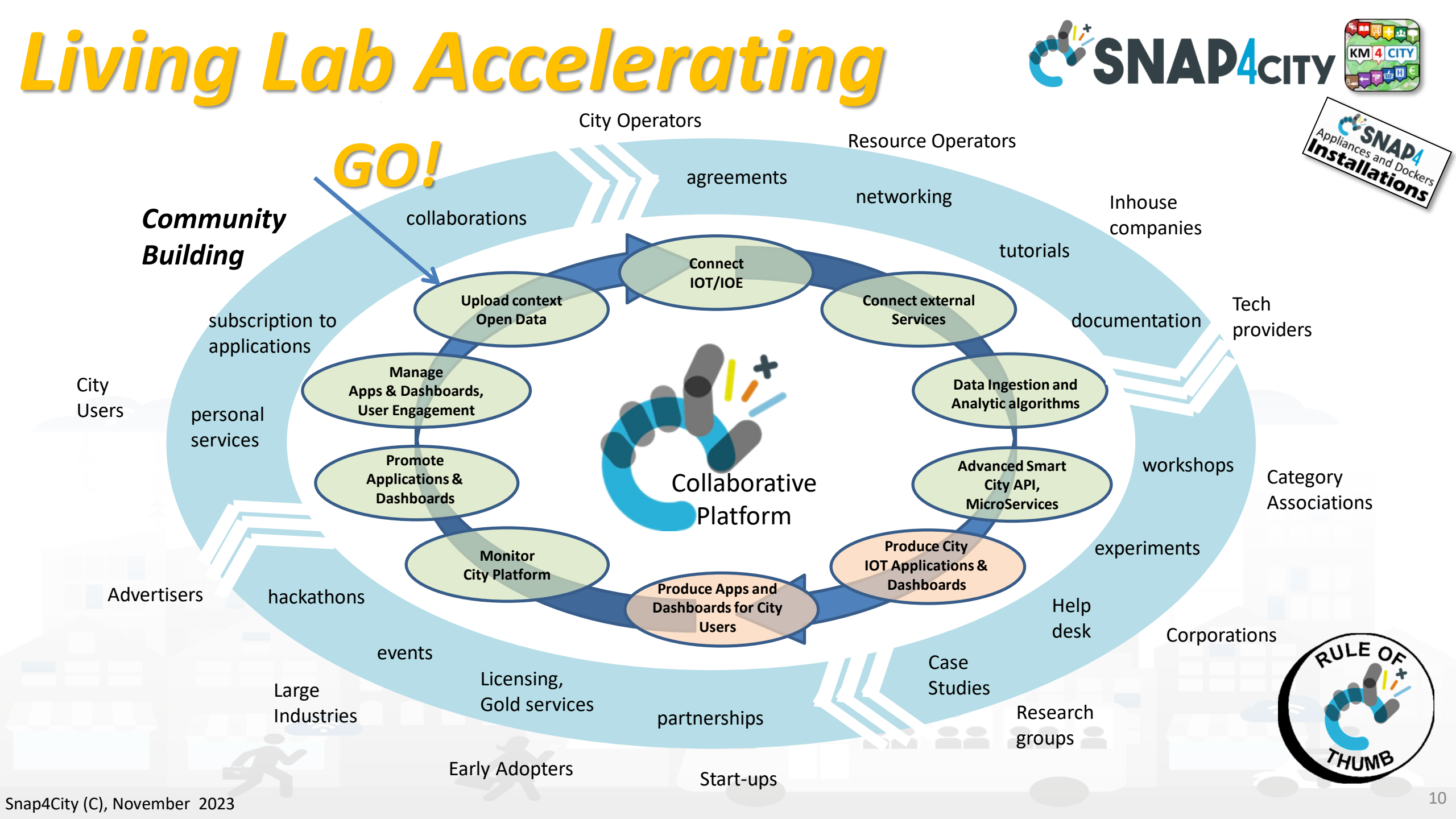
- Recall on Snap4City Architecture
- Snap4City Dashboards Purposes and Uses
  - Snap4City Dashboards vs Technical data monitoring dashboards
  - Snap4City Dashboards main concepts
- Main Data Kinds: data vs representations
- Snap4City DASHBOARDS: Main Concepts and simple Widgets
- Creating a Snap4City Dashboard
  - ***Coffe Break***
- Snap4City Multi Data Map Widget
- Snap4City High Level Types
  - Video Streams from TV Cameras
  - External Services (integration of) your or third party web pages
  - Synoptics, Custom Widgets as External Services
- Selector for the Multi Data Map Widget
- Data Inspector vs Data Processes Details
- Dashboard Management
- Training Material

https://www.snap4city.org/944

Development Life Cycle Smart Solutions

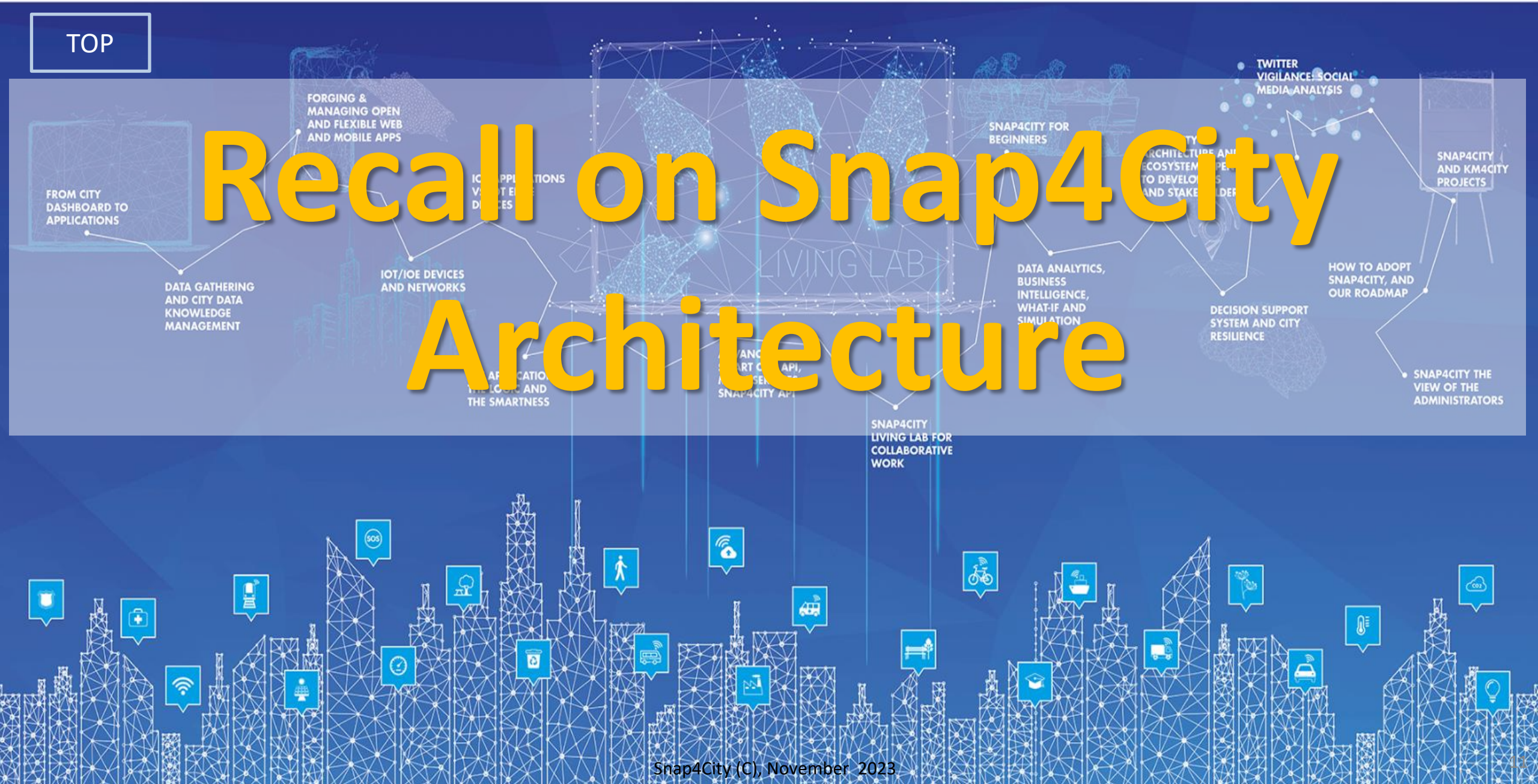


Living Lab Accelerating

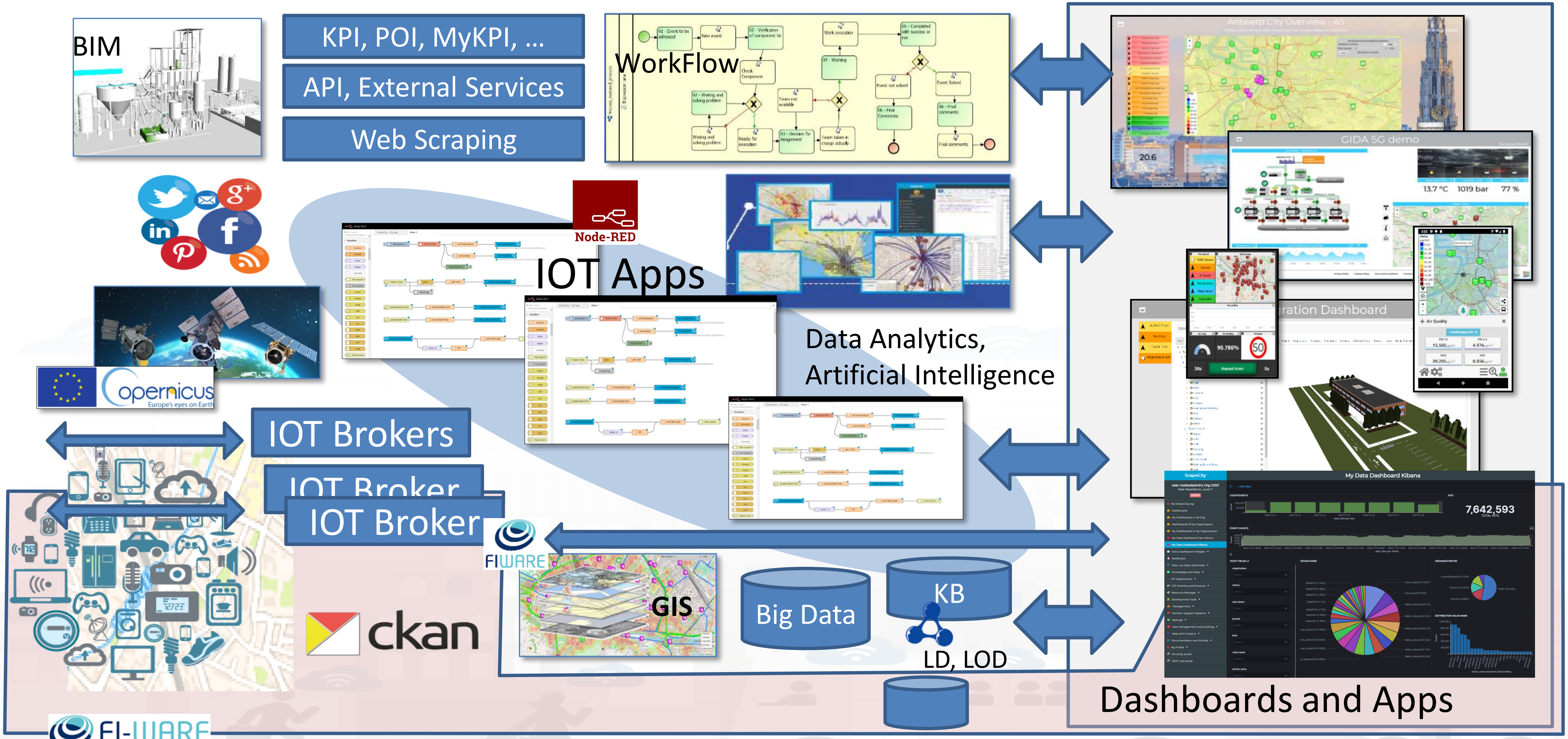


TOP

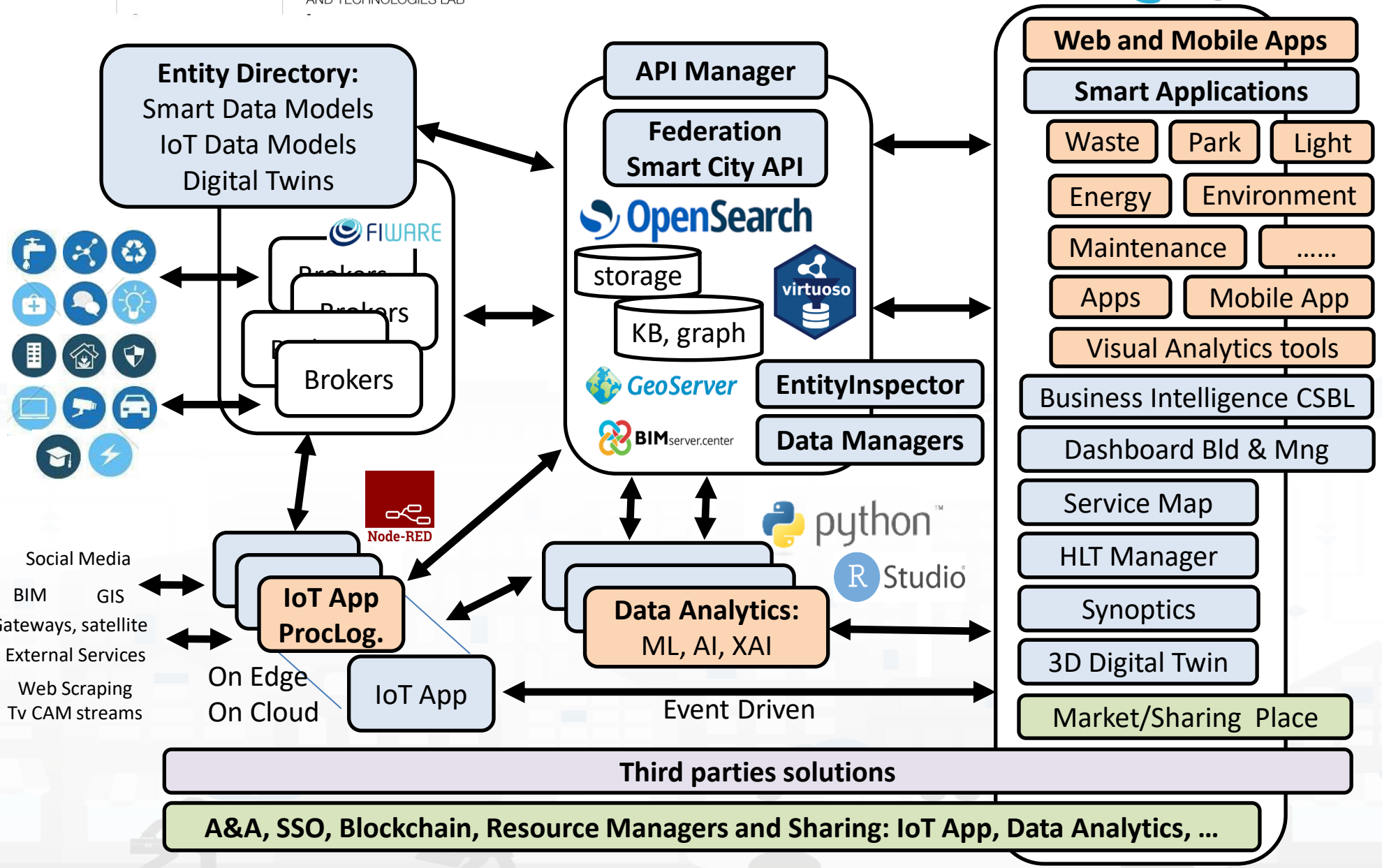
Recall on Snap4City Architecture



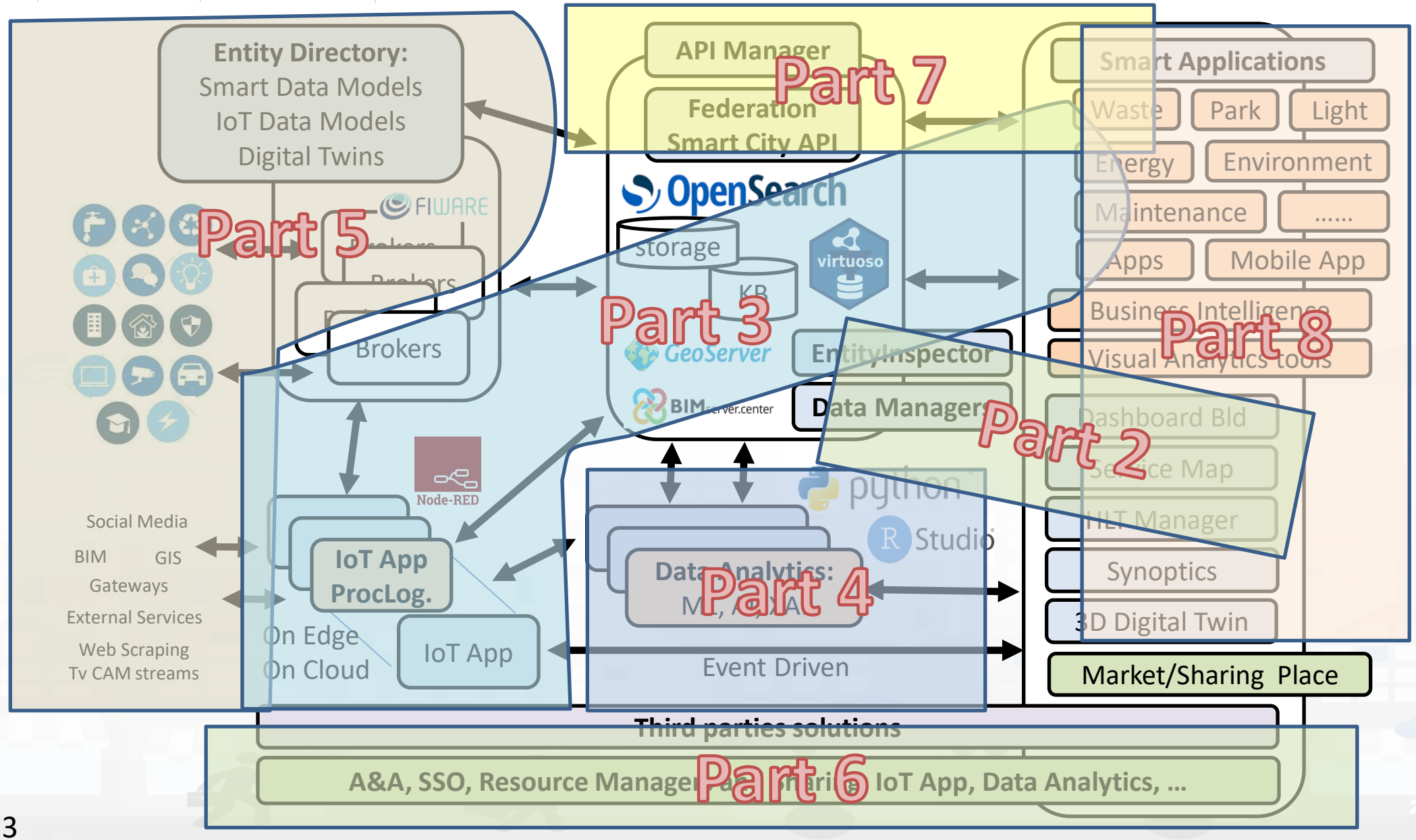
Concept


BIM
KPI, POI, MyKPI, …
API, External Services
Web Scraping
WorkFlow
Node-RED
IOT Apps
Data Analytics,
Artificial Intelligence
opernicus
Europe's eyes on Earth
IOT Brokers
IOT Broker
IOT Broker
FIWARE
GIS
Big Data
KB
LD, LOD
ckan
Dashboards and Apps
FI-WARE

Tech Arch


Entity Directory:
Smart Data Models
IoT Data Models
Digital Twins
FIWARE
Brokers
Brokers
Brokers
API Manager
Federation
Smart City API
OpenSearch
storage
KB, graph
virtuoso
GeoServer
EntityInspector
BIMserver.center
Data Managers
Node-RED
python
RStudio
Social Media
BIM
GIS
Gateways, satellite
External Services
Web Scraping
Tv CAM streams
IoT App
ProcLog.
On Edge
On Cloud
IoT App
Data Analytics:
ML, AI, XAI
Event Driven
Web and Mobile Apps
Smart Applications
Waste
Park
Light
Energy
Environment
Maintenance
……
Apps
Mobile App
Visual Analytics tools
Business Intelligence CSBL
Dashboard Bld & Mng
Service Map
HLT Manager
Synoptics
3D Digital Twin
Market/Sharing Place
Third parties solutions
A&A, SSO, Blockchain, Resource Managers and Sharing: IoT App, Data Analytics, …

Tech Arch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Brokers
Brokers
Brokers
Part 5
API Manager
Federation
Smart City API
Part 7
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virtuoso
Part 3
GeoServer
BIM server.center
EntityInspector
Data Managers
Smart Applications
Waste
Park
Light
Energy
Environment
Maintenance
.....
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Mobile App
Business Intelligence
Visual Analytics tools
Part 8
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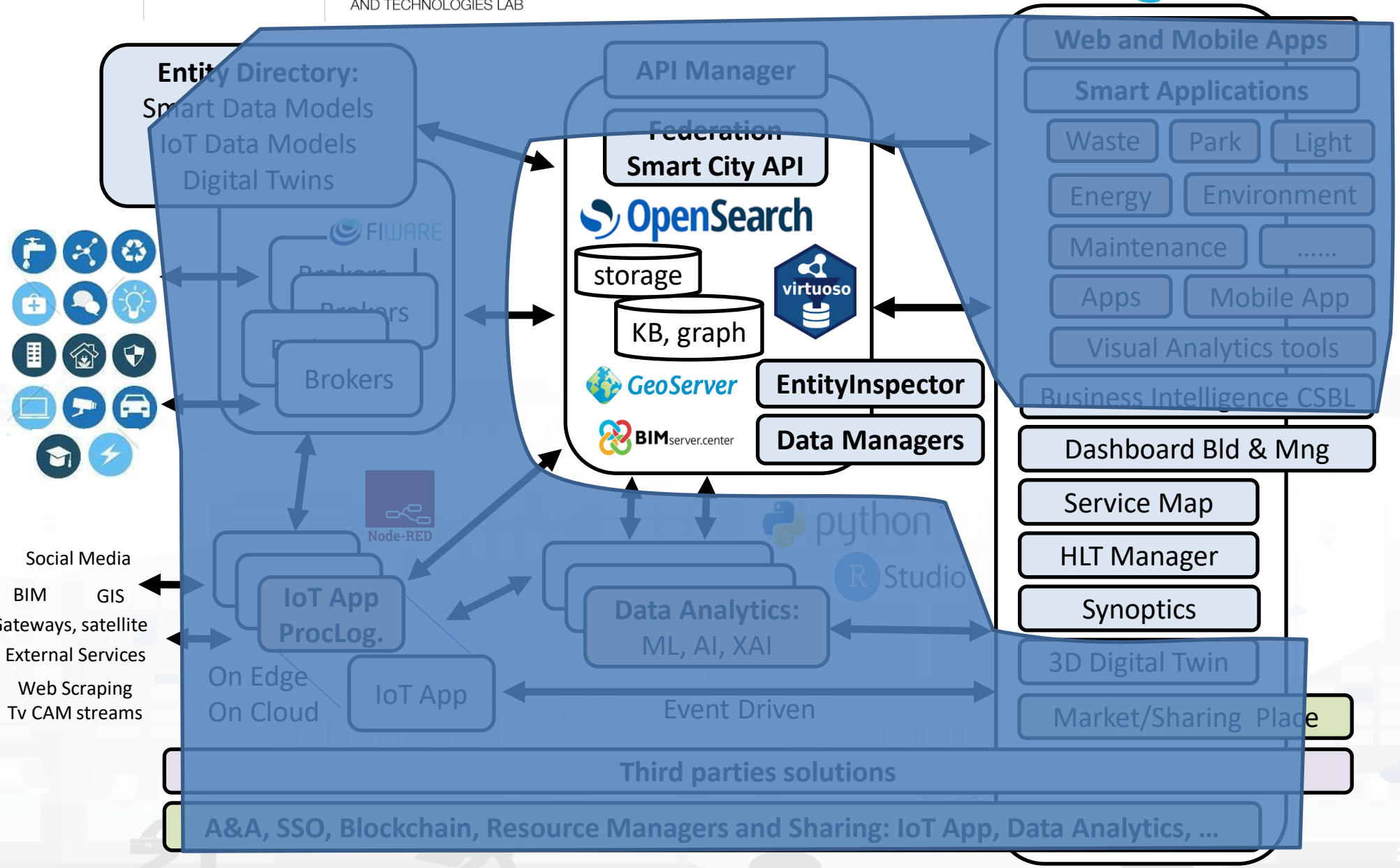
python
R Studio
Social Media
BIM
GIS
Gateways
External Services
Web Scraping
Tv CAM streams
IoT App
ProcLog.
On Edge
On Cloud
IoT App
Data Analytics:
Part 4
Event Driven
Third parties solutions
A&A, SSO, Resource Manager
Part 6
IoT App, Data Analytics, ...

Tech Arch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On Edge
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ML, AI, XAI
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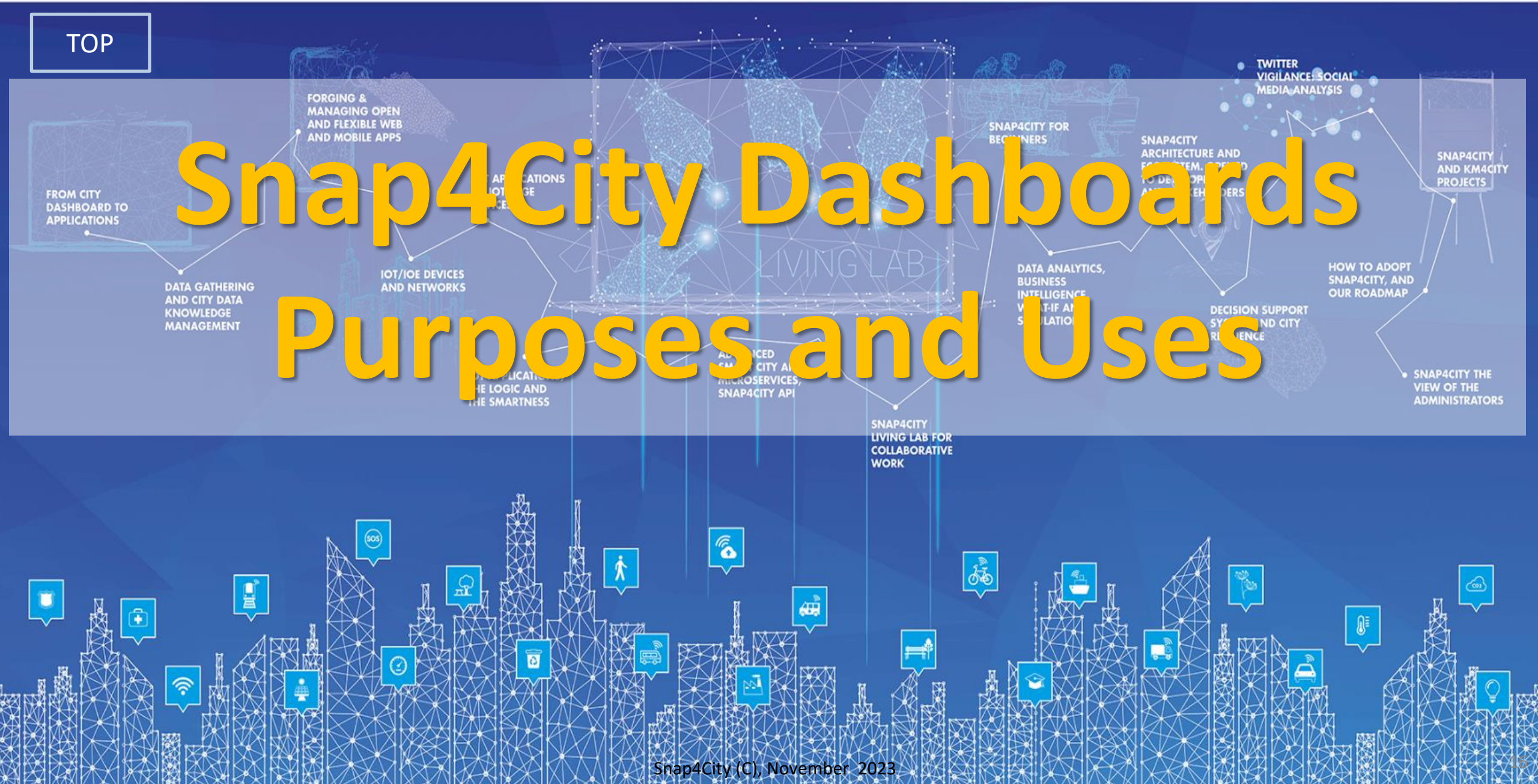
Third parties solutions
A&A, SSO, Blockchain, Resource Managers and Sharing: IoT App, Data Analytics, ...

TOP

Snap4City Dashboards Purposes and Uses



Dashboards and GUI Purposes

- **Real Time: control room, monitoring**
  - H24 Video Wall representation of the status:
- **Quasi Real Time, short term monitoring and management**
  - Situation Rooms: interactive data representation with visual analytics and business intelligence, What-if analysis by scenario
  - Operational management, real time What-if analysis by scenario
- **Mid and Long term, for tactic and strategic planning/restructuring**
  - Visual Analytics and indeep Business Intelligence
  - Long term What-If analysis

Real Time: control room, monitoring

- **Video Wall:** physical and virtual:
  - control room but also distributed control room: web and mobile views
- **Many Decision Makers** that have to
  - Early Warning: receiving real time notifications in push, telegram, etc.
  - share the same view monitoring a specific situation
    - may be located in multiple places
    - may be connected by using multiple kind of devices
  - Chatting privately on the same context
  - Receiving in real time the same changes and events

Control Room

https://www.snap4city.org/621

Early Warning, Detection

Issue:

- Detection of critical condition
- Not easily detected with other means

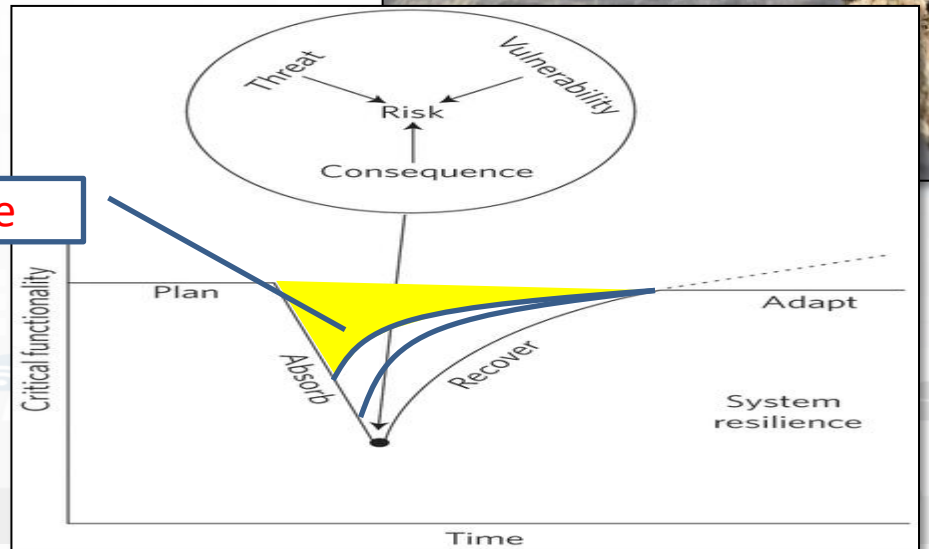
Impact:

- Early warning, faster reaction
- Increased resilience

Several metrics related to:

- Volume of retweets
- Sentiment analysis

Prepare
Absorb
Recover
Adapt



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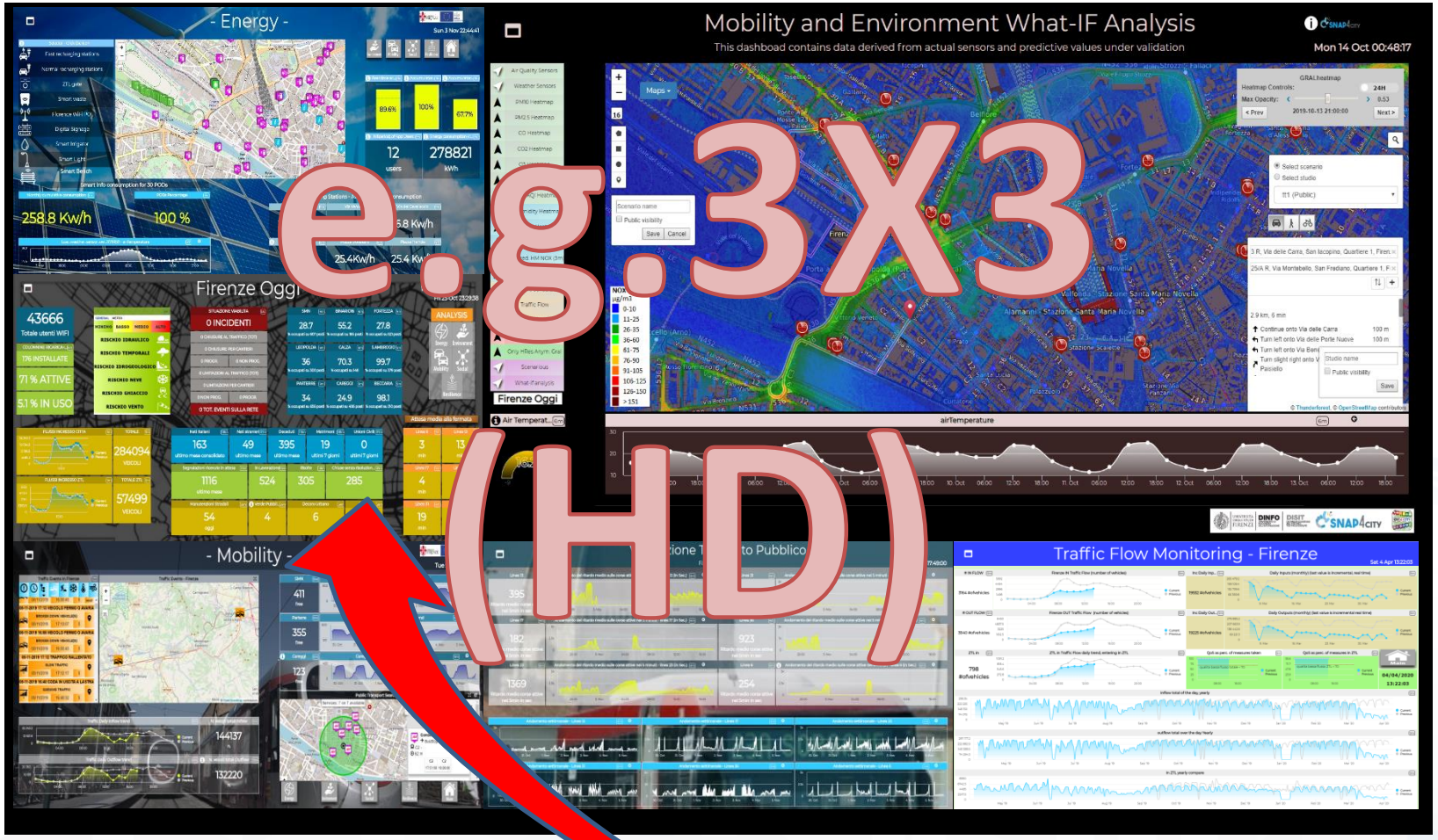
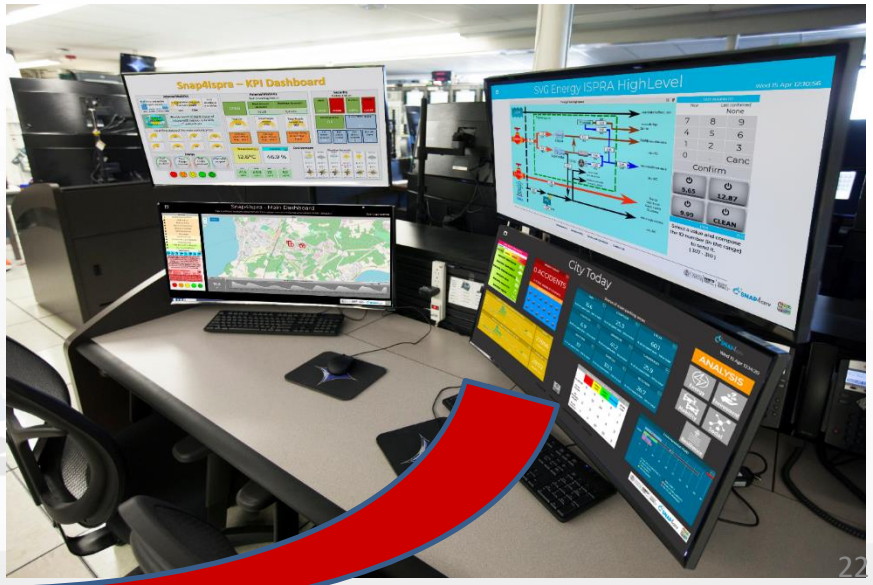
Video Wall

SNAP4CITY KM4CITY



e.g. 3X3 (HD)

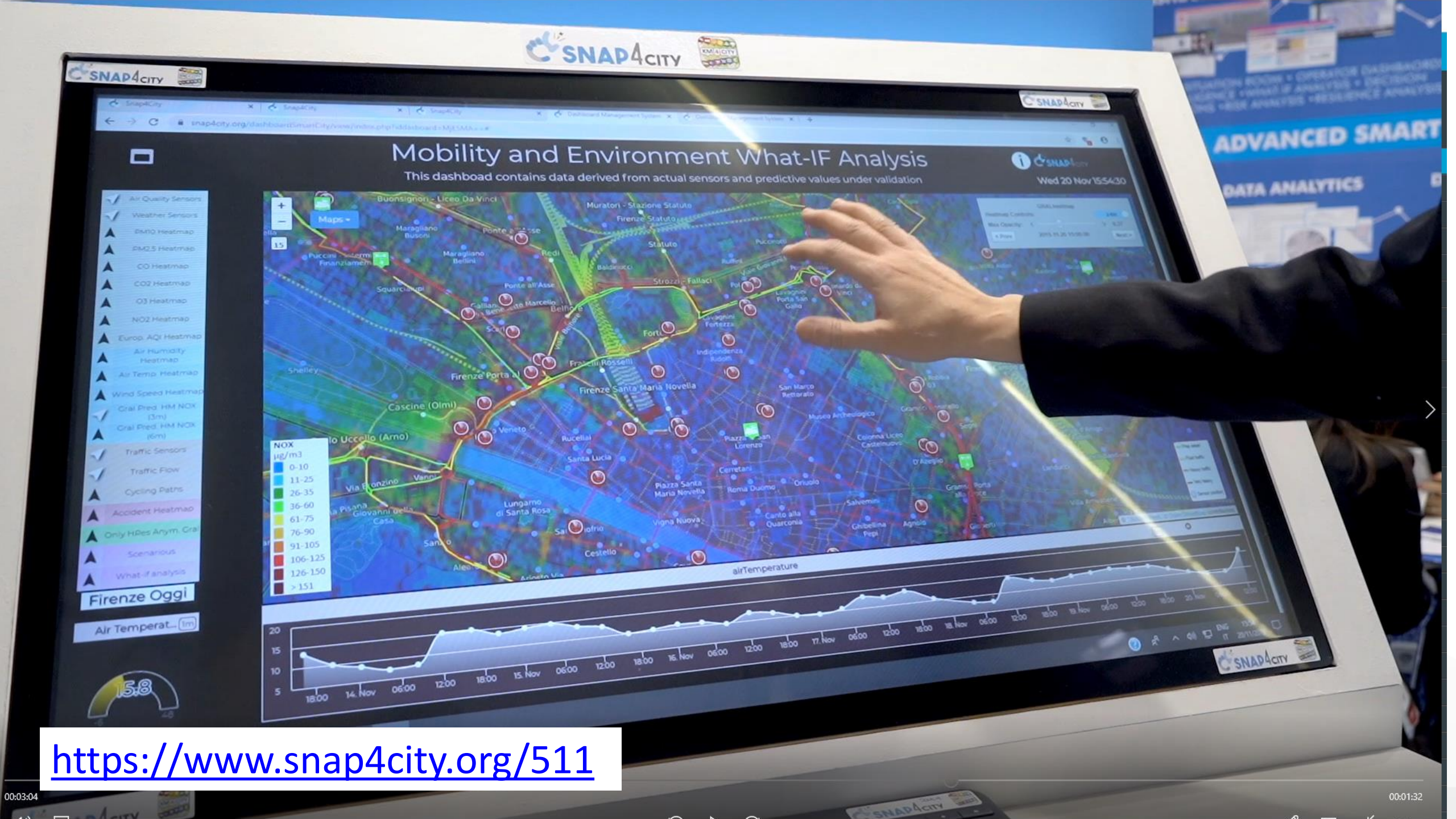


From Consolle Operator to the Video Wall


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

Quasi Real Time, short term monitoring and management

- **Situation Rooms:** limited number of people in the same room on the same screen
  - possibility of modifying the data in local simulations to better assess condition and validate proposed solving scenario
  - interactive data representation with
    - visual analytics and business intelligence,
    - What-if analysis by scenario
- **Operational management**,
  - real time What-if analysis by scenario



https://www.snap4city.org/511

Citizens Engagement

https://www.snap4city.org/511

Mid and Long term, for tactic and strategic planning/restructuring

- **Defining Scenarious**: changes in the city, rules, structure, flows, roads, etc.
  - Targeting indicators, KPI, etc.
  - Simulating decisions: visual acting on defined/supposed changes
- **Visual Analytics** in deep Business Intelligence
  - Assessing results, drill down/up on space-time-relations to see the effects of the supposed decisions
- **Long term What-If analysis**
  - Computation of long terms predictions on never seen conditions
  - Simulations of the effects

indicators

			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 target value has become a limit value since 1 January 2015	10 µg/m³	
PM_{10}	One day	Limit value, 50 µg/m³ — Not to be exceeded on more than 35 days per year.	50 µg/m³ (*)	99th percentile (3 days/year)
PM_{10}	Calendar year	Limit value, 40 µg/m³ (*)	20 µg/m³	
O_3	Maximum daily 8-hour mean	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	

- **United Nations Sustainable Development Goals, SDGs** (for which cities can do more to achieve some of the 17 SDGs, https://sdgs.un.org/goals);
- **15 minutes cities** (where primary services must be accessible within 15 minutes on foot);
- **objectives of the European Commission** in terms of pollutant emissions for: NO2, PM10, PM2.5 (https://environment.ec.europa.eu/topics/air_en);
- **PUMS: mobility and transport vs wnv**
- **SUMI: mobility and transport vs env**
- **ISO indicators: city smartness, digitization. Tech level**
- ….

Global Vs Local


SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

- ***15 Minute City Index:***
  - 13 subindexes: energy, slow mobility, fast mobility, housing, economy education, culture and cults, health, entertainment, gov, food, security…

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

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

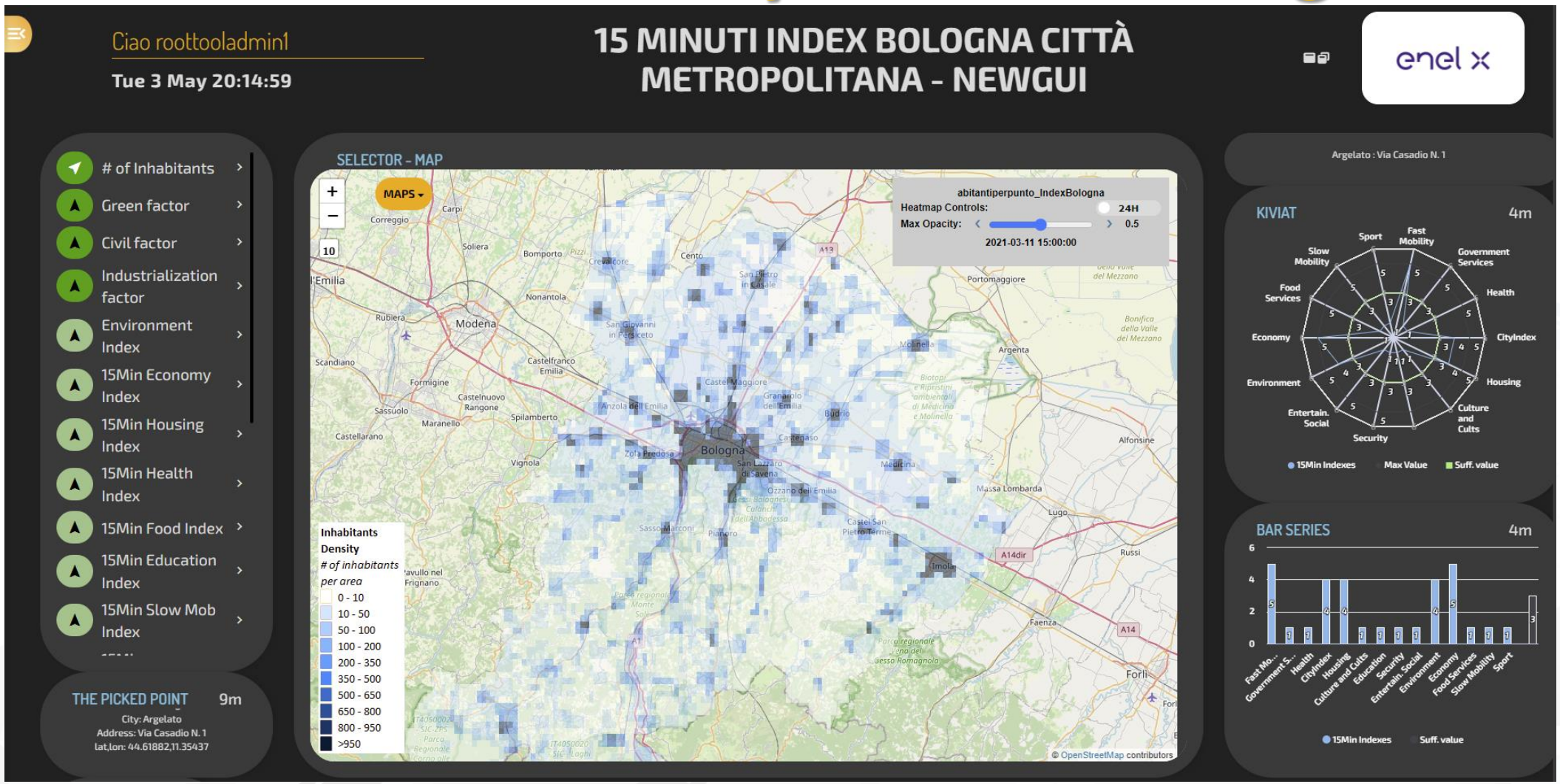
- Smart City infrastructure: monitoring and resilience, long terms predictions
- Effective and Low cost smart solutions
- What-if analysis, Simulations
- Origin Destination matrices computation

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

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

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

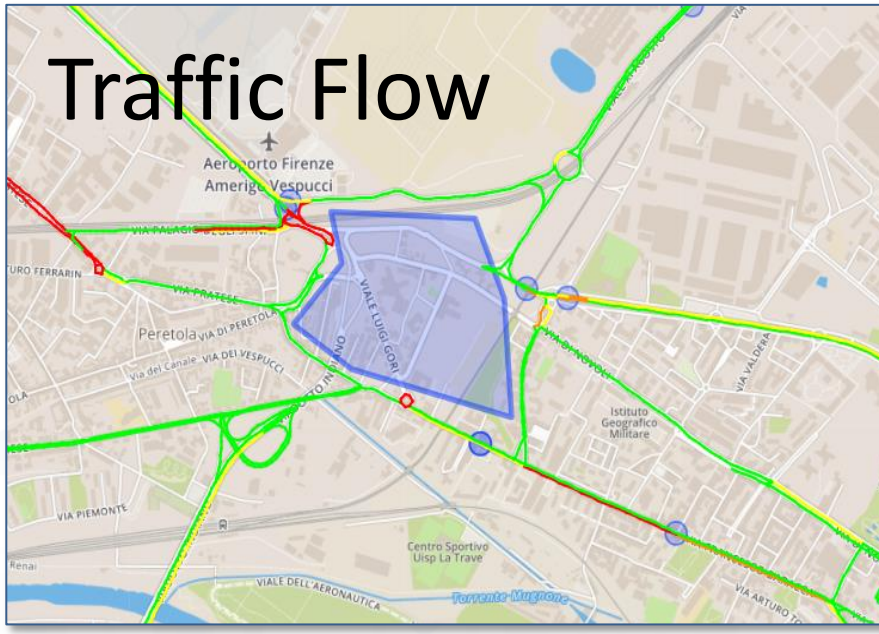
15MinCityIndex on Bologna

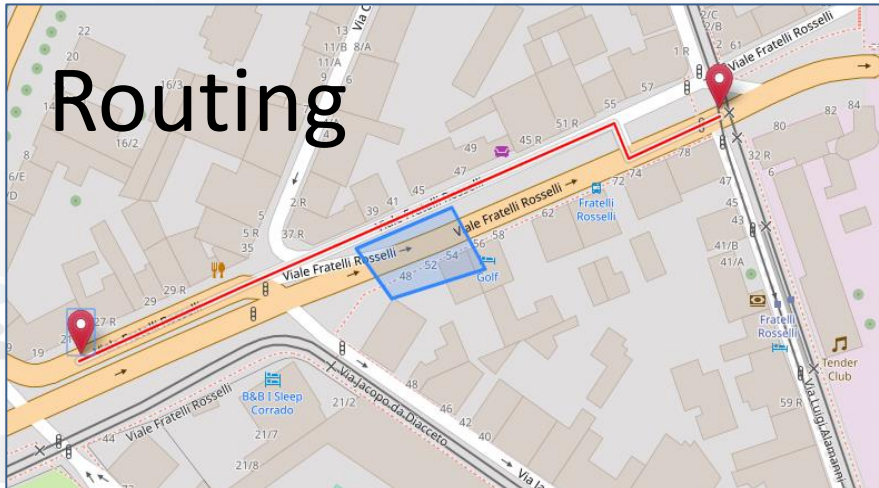


https://www.snap4city.org/dashboardSmartCity/view/Baloon-Dark.php?iddasboard=MzQxMg==

Decision Support Systems, What-if

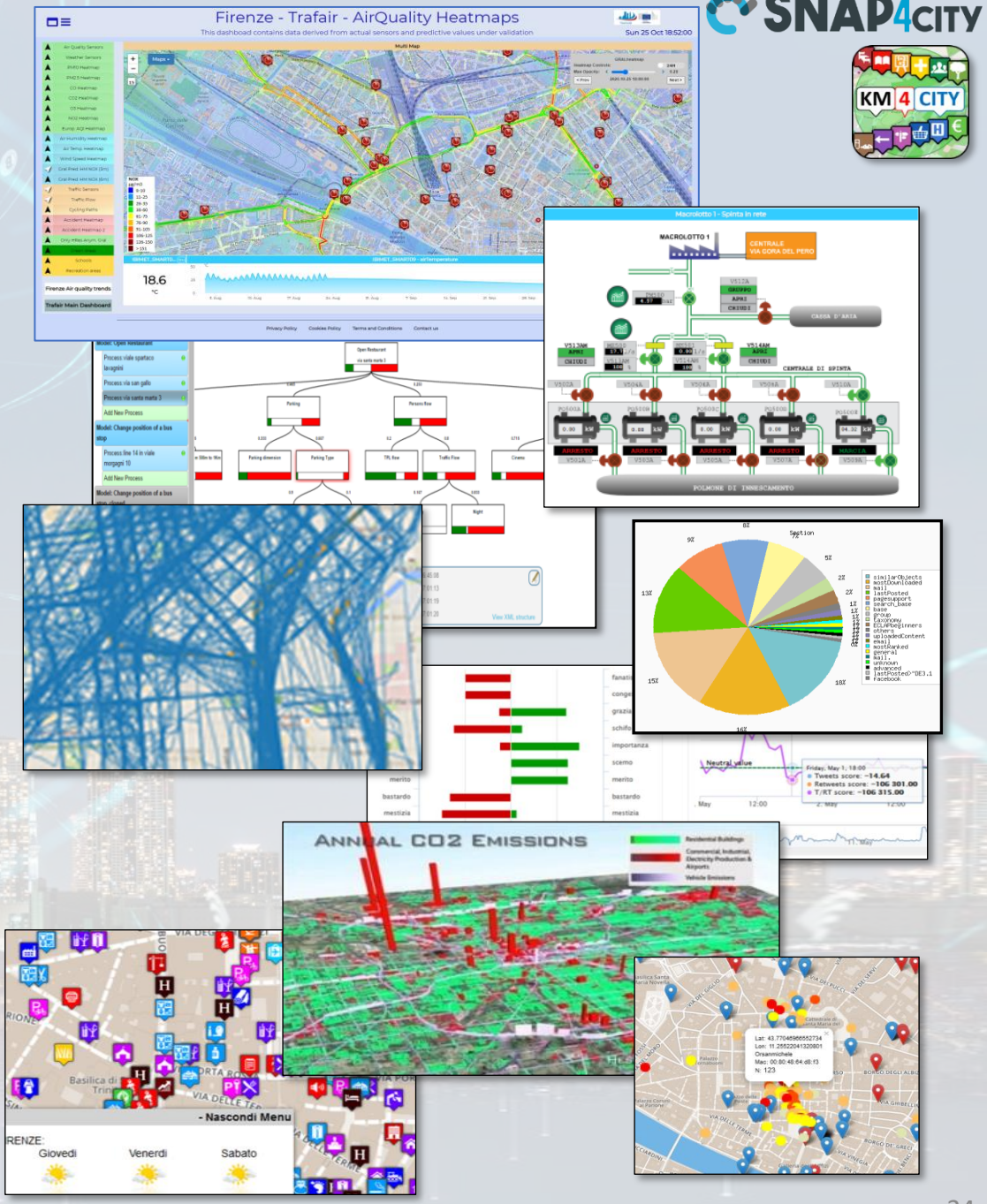
- **Event planning, via what-if analysis**
  - Change in the graph structure of the city
  - Impact on the flow of people and vehicles
  - Adaptation: public transport, traffic, pedestrian management, etc.
- **Immediate reaction to natural events or not**
  - Everything is ready and updated in real time
  - Each view is contextualized in terms of data: descriptive and prescriptive
- **Digital Twin**
  - More detail in the context integrated data
  - Greater realism in deductions and representations
  - Less fragmentation and non-uniformity in the views to support decisions





Data Driven Decision Support

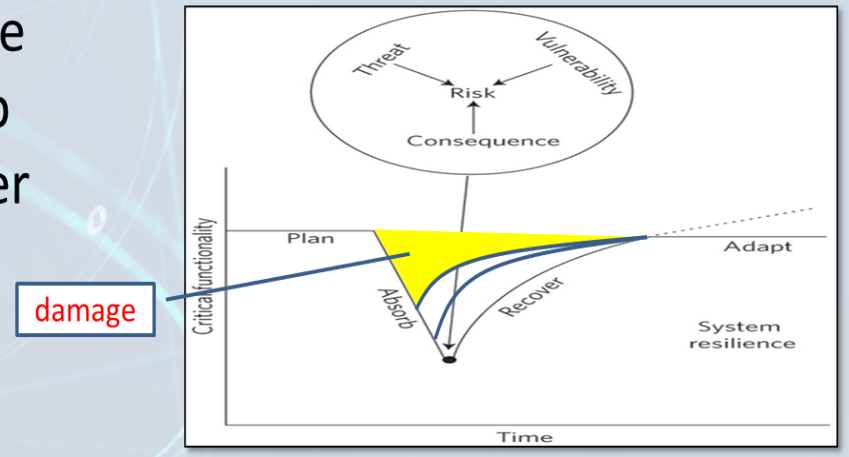
- Decision Support system
- Assessment / Strategies
- Data Rendering, visual analytics
- Data Processing
- Data aggregation, Storage, indexing
- Data Ingestion

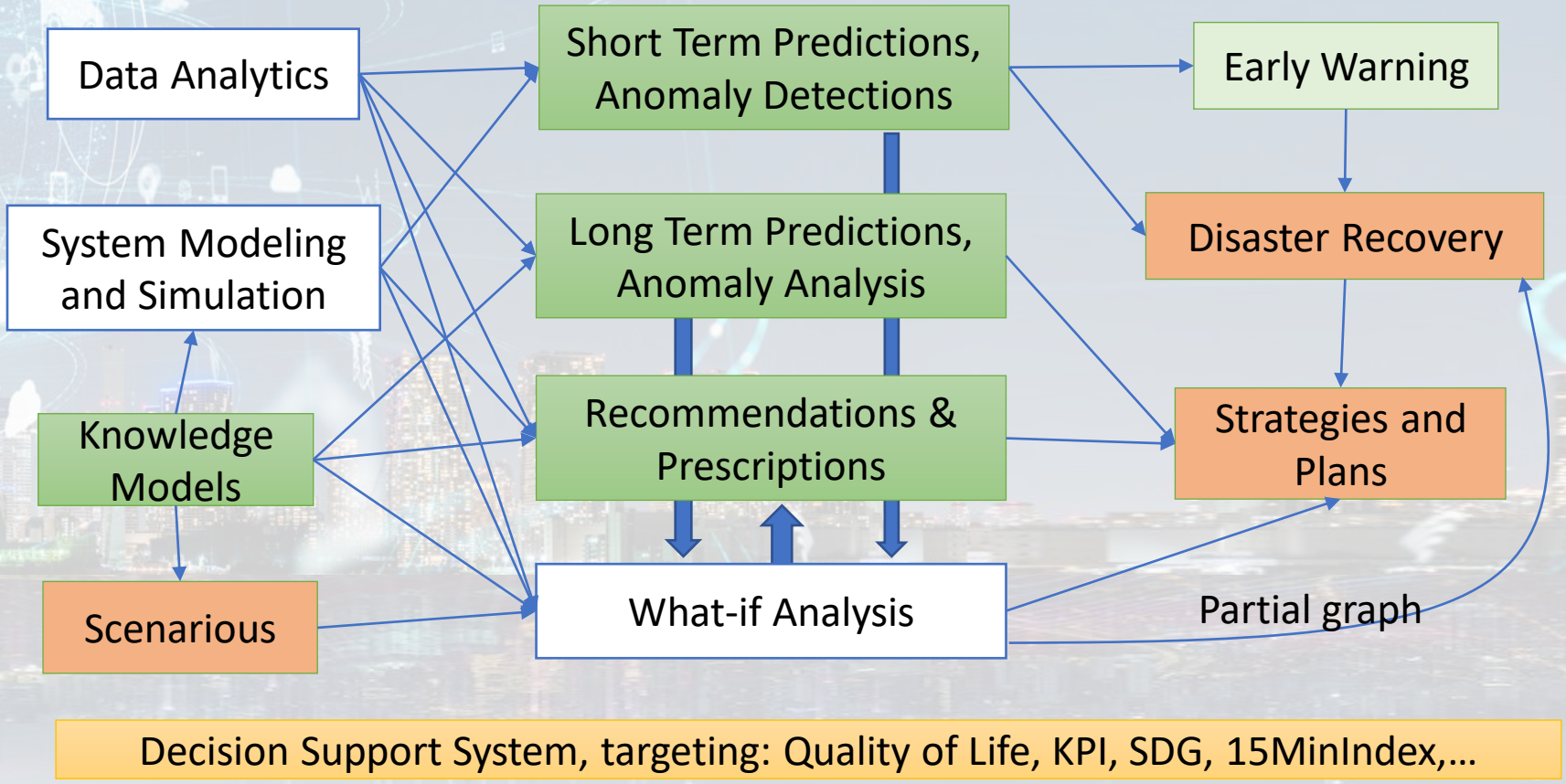


Snap4City Analytics

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

Prepare
Absorb
Recover
Adapt

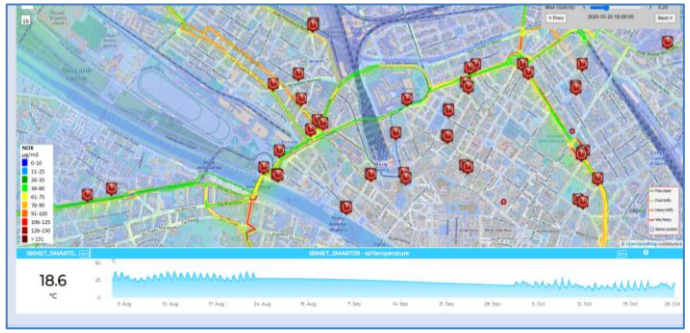


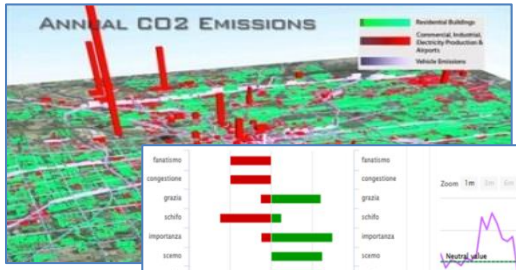


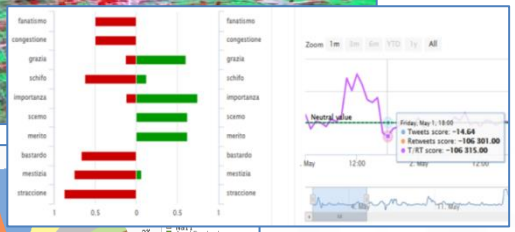
Decision Support System, targeting: Quality of Life, KPI, SDG, 15MinIndex,…

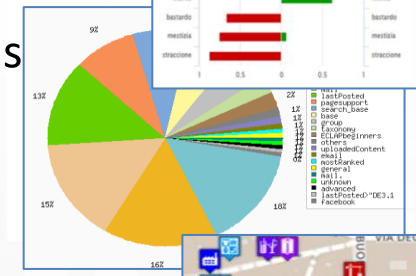
Digital Twin

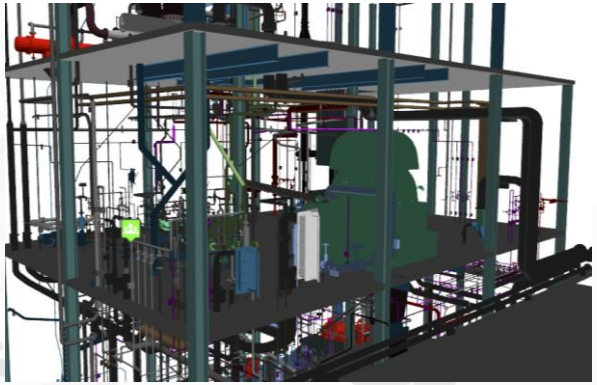
- **Digital Twin**
  - **Connected** with real systems
  - **Modelling** aspects: structural, visual, informative, real time data sensors (context), POI, functional, resources, etc.
  - **Integration:** AI/XAI techniques, simulations, users' needs, etc.
- **Utility to**
  - Experiment via simulations and analysis by case
    - Reduction of costs to experiments new solutions
    - Share the possibilities with city users
  - Virtual Representation
    - Easier to understand the context, review from multiple points of view
  - Who
    - Discussion with city users, decision makers
    - Support: decision makers, proposers of solutions

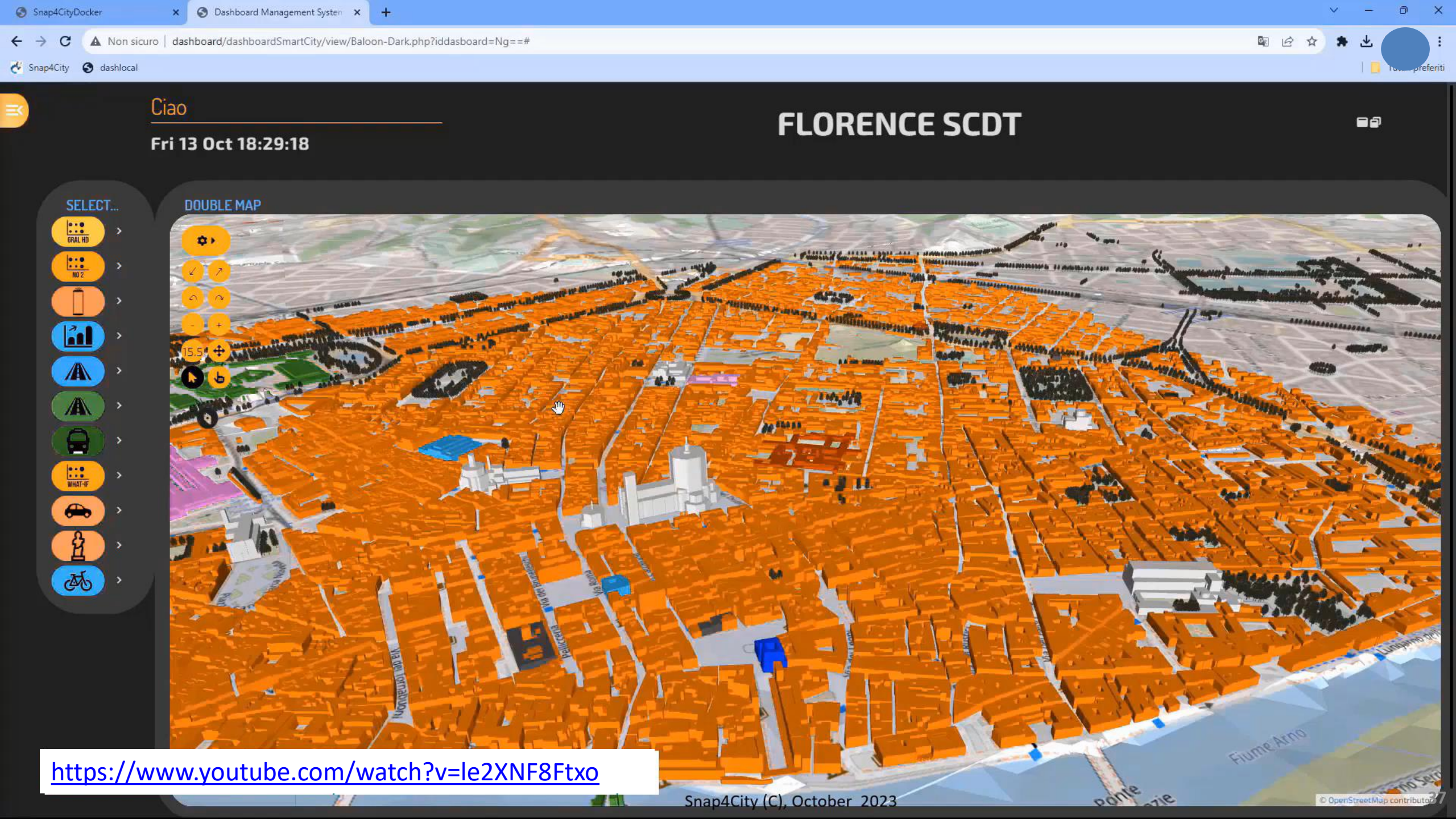




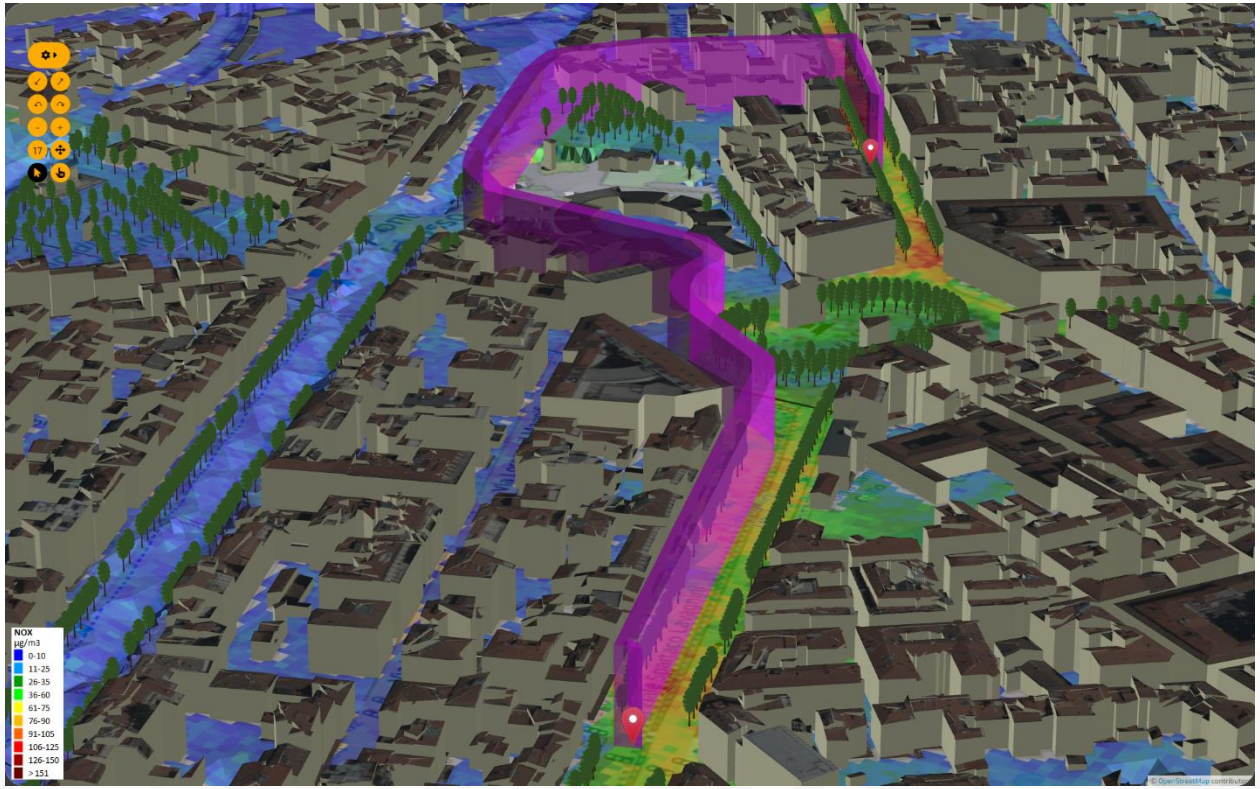


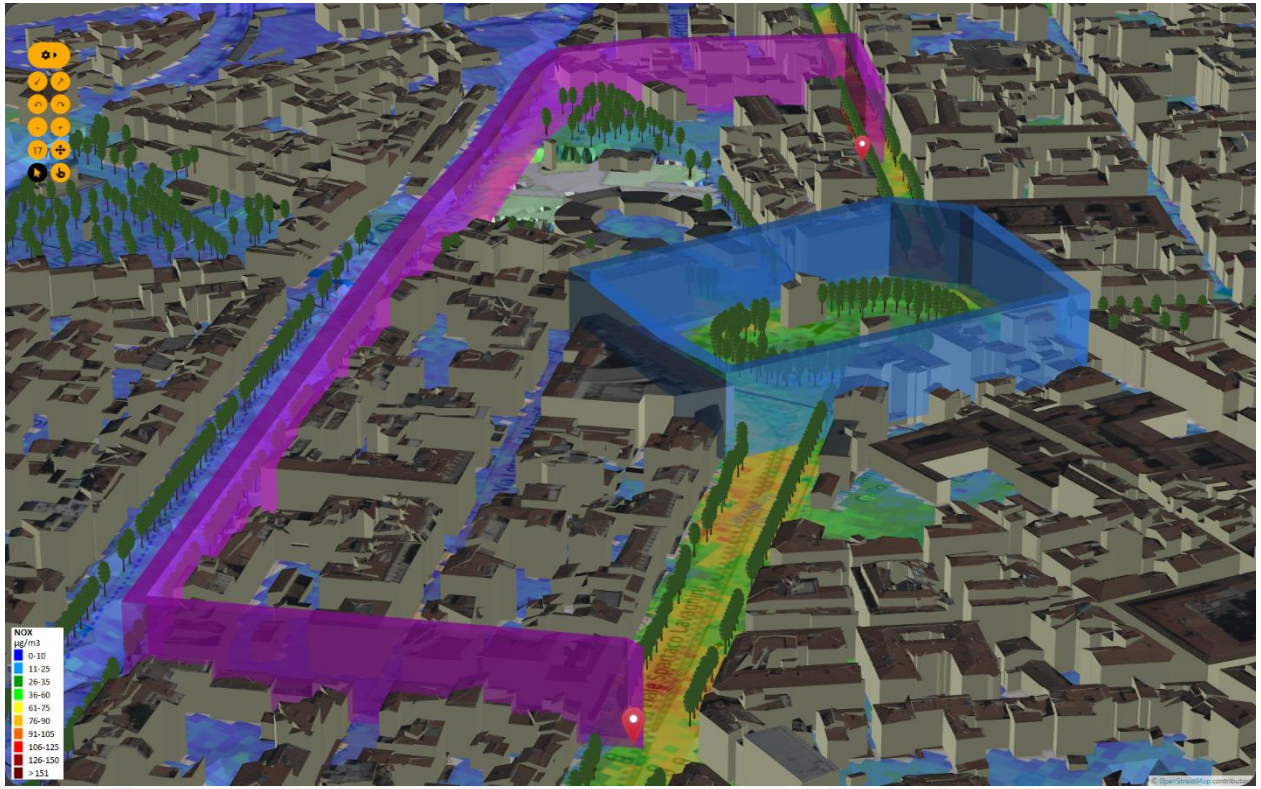





Snap4CityDocker
Dashboard Management Syster
Non sicuro | dashboard/dashboardSmartCity/view/Baloon-Dark.php?iddasboard=Ng==#
Snap4City
dashlocal
Ciao
Fri 13 Oct 18:29:18
FLORENCE SCDT
SELECT...
DOUBLE MAP
GRAL HD
NO 2
WHAT-IF
Fiume Arno
https://www.youtube.com/watch?v=le2XNF8Ftxo
Snap4City (C), October 2023
© OpenStreetMap contributors

Dyamic Routing in 3D space



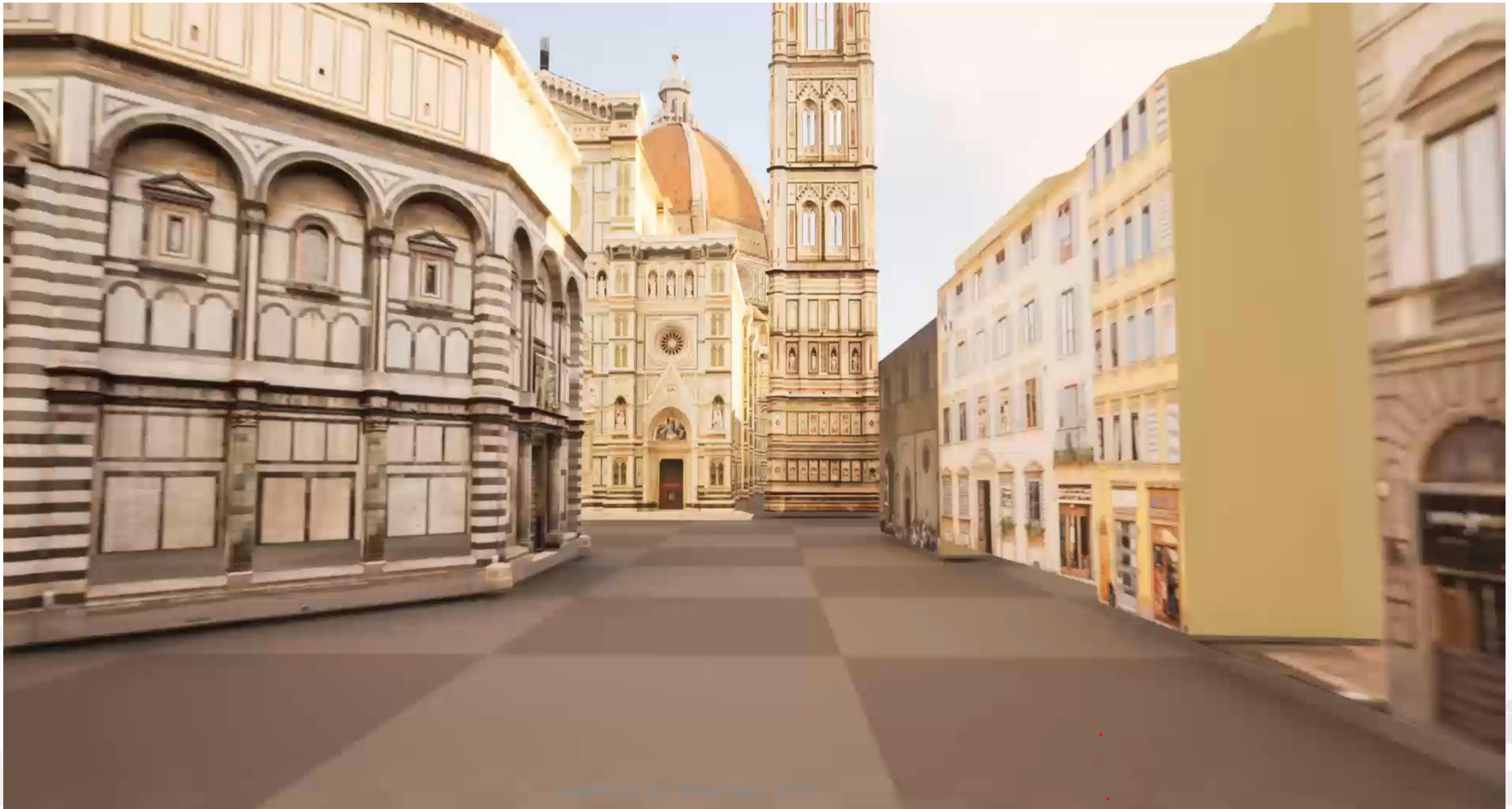


OCULUS

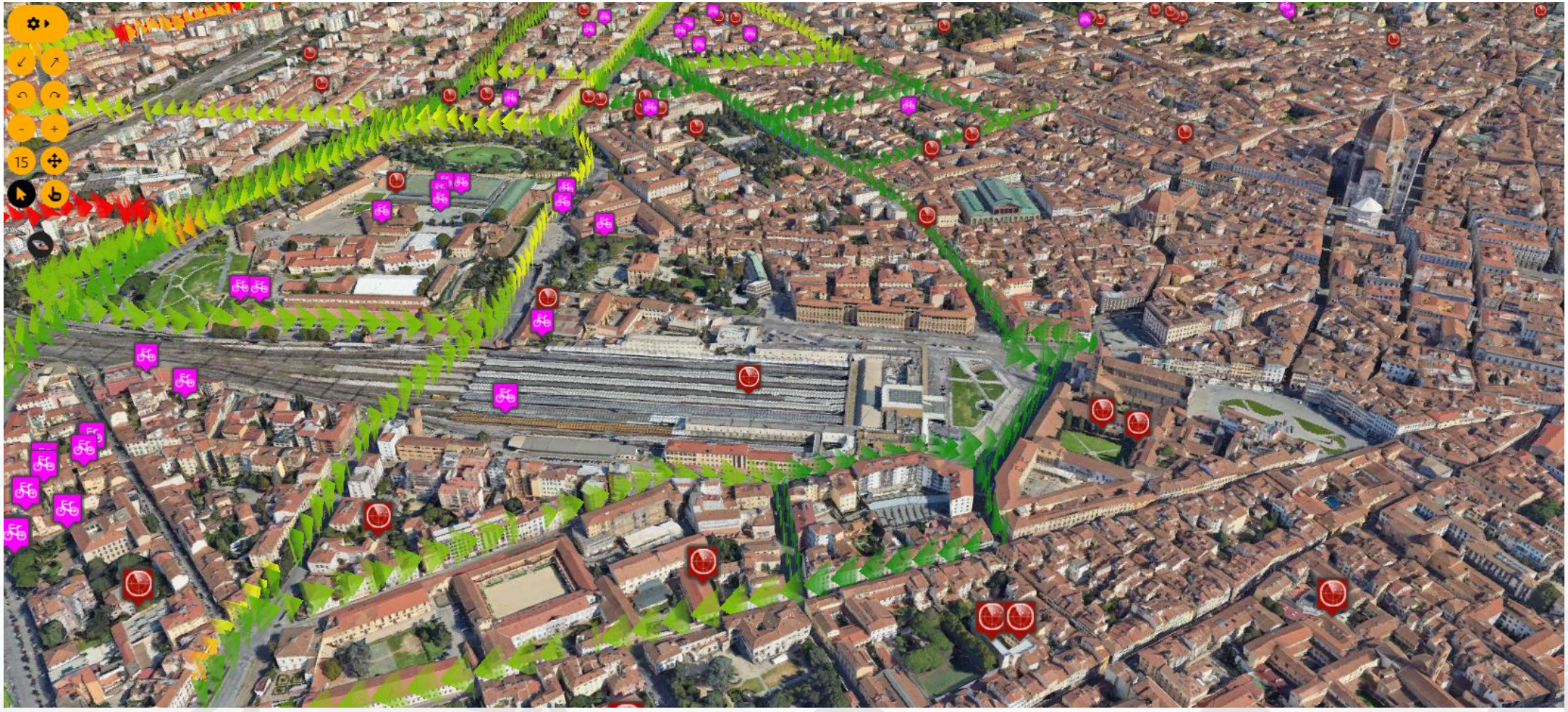

Perspective
Lit
Show
Scrivi qui per eseguire la ricerca
6°C
19:09
30/11/2022


Perspective
Lit
Show

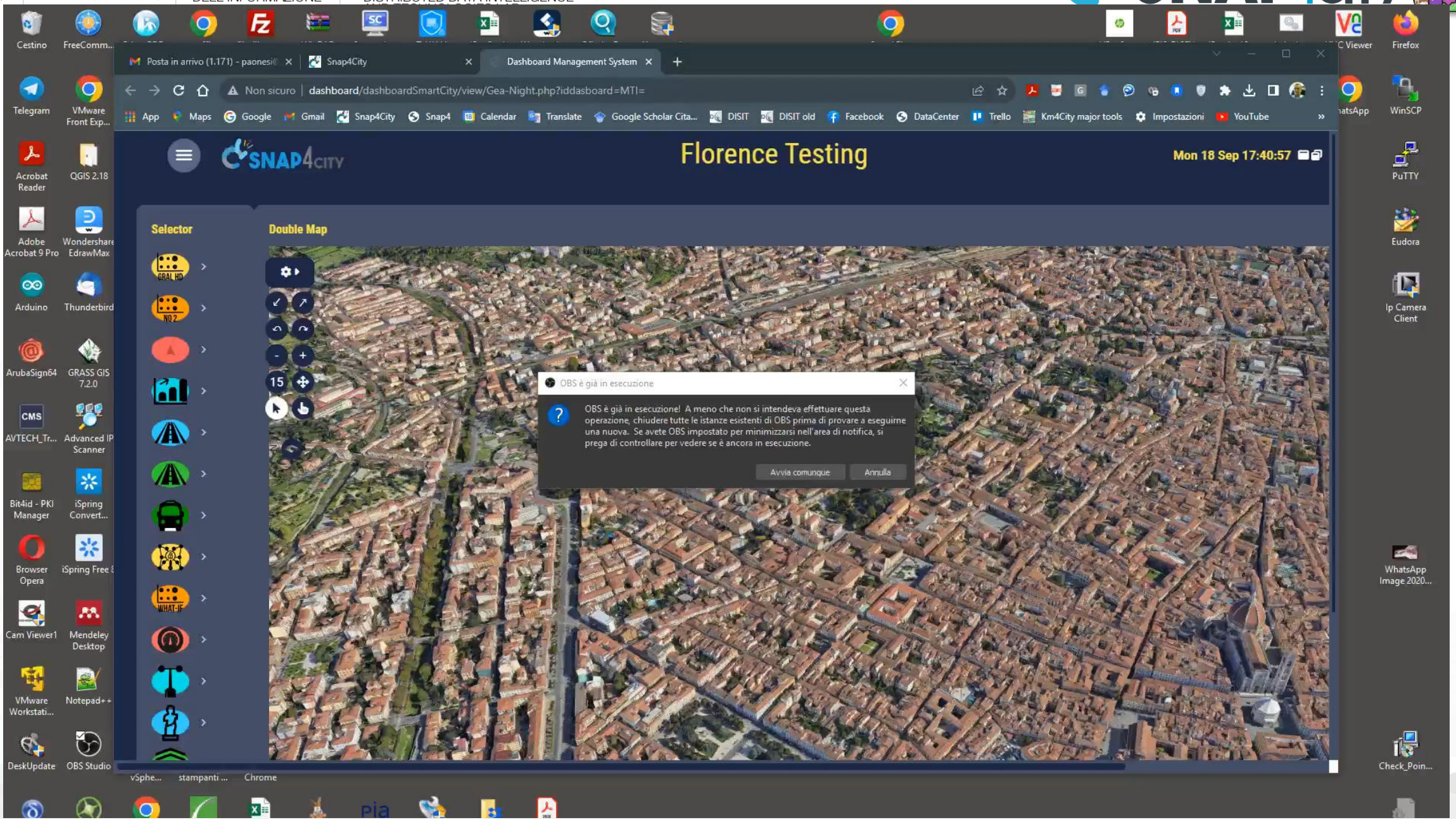
OCULUS



Snap4City Digital Twin Engine and data + 3D Google Data



Firenze


Florence Testing
Mon 18 Sep 17:40:57
Selector
Double Map
OBS è già in esecuzione
OBS è già in esecuzione! A meno che non si intendeva effettuare questa operazione, chiudere tutte le istanze esistenti di OBS prima di provare a eseguirne una nuova. Se avete OBS impostato per minimizzarsi nell'area di notifica, si prega di controllare per vedere se è ancora in esecuzione.
Avvia comunque
Annulla

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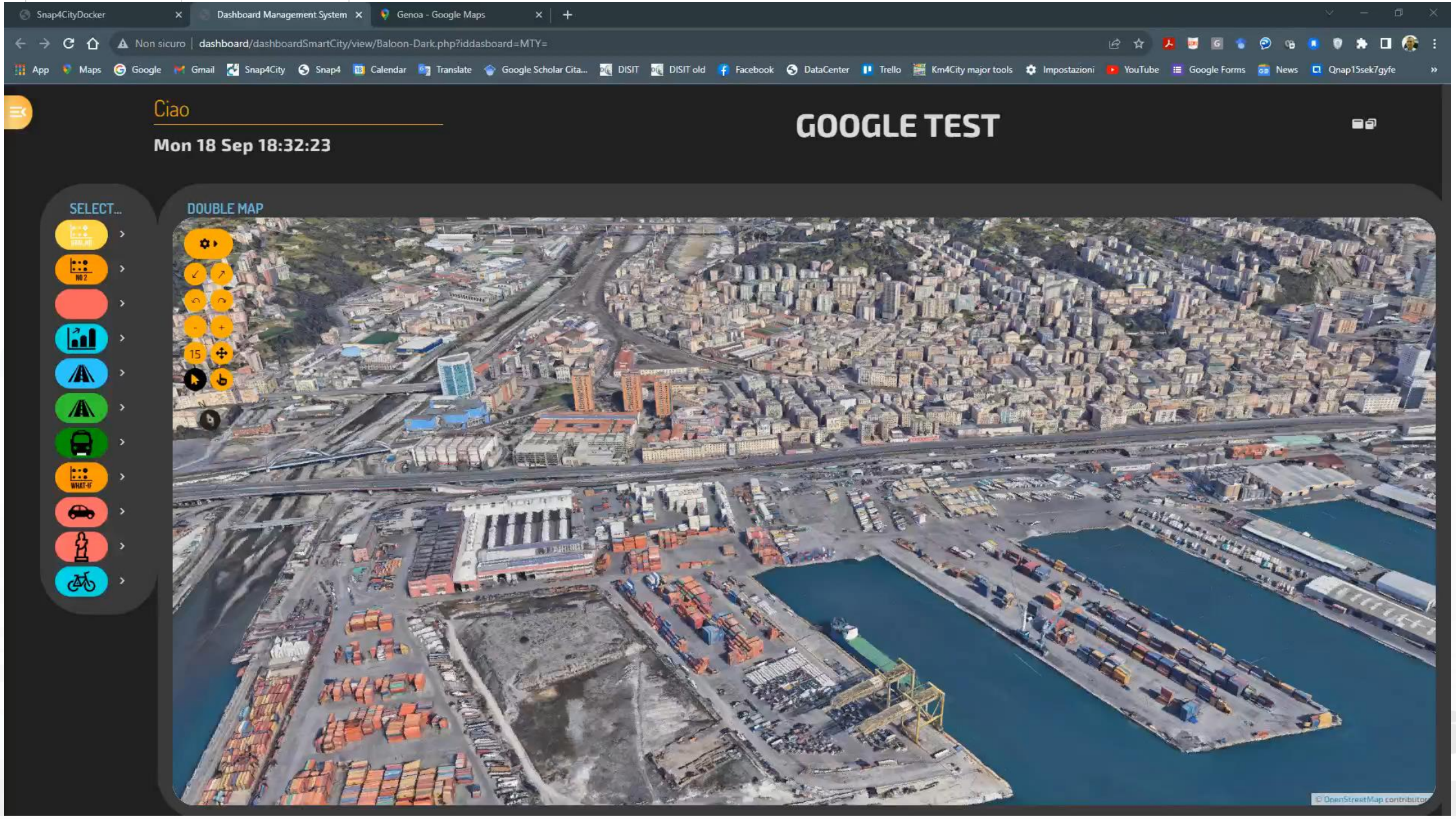
Genova

SNAP4CITY

KM4CITY



Snap4City | Dashboard Management System | Nuova scheda

snap4city.org/dashboardSmartCity/view/index.php?iddasboard=Mzg0NA==

Bookmarks | Calcio: ultime news... | Diffusioni in diretta,... | La Repubblica.it - H... | Corriere dello Sport.it | TIM Mail | Tim.it | E... | Gmail | YouTube | Maps | Telecom Italia ROU... | Firenze Traffic Flow | Snap4Altair | dashboard/iotapp/... | ilCorSaRoNeRo.link...

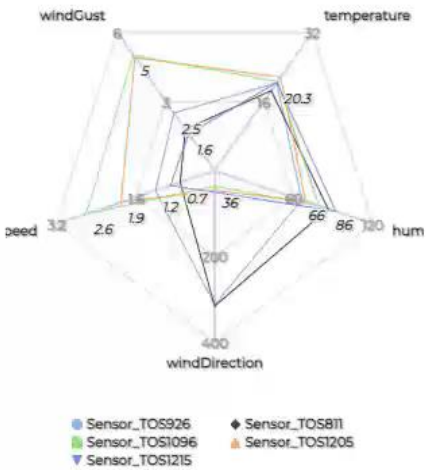
BIM Airport

Thu 25 May 18:16:22

Select the view of interest

- Airport Building 1
- Airport Heatmap dash
- Terminal Heatmap

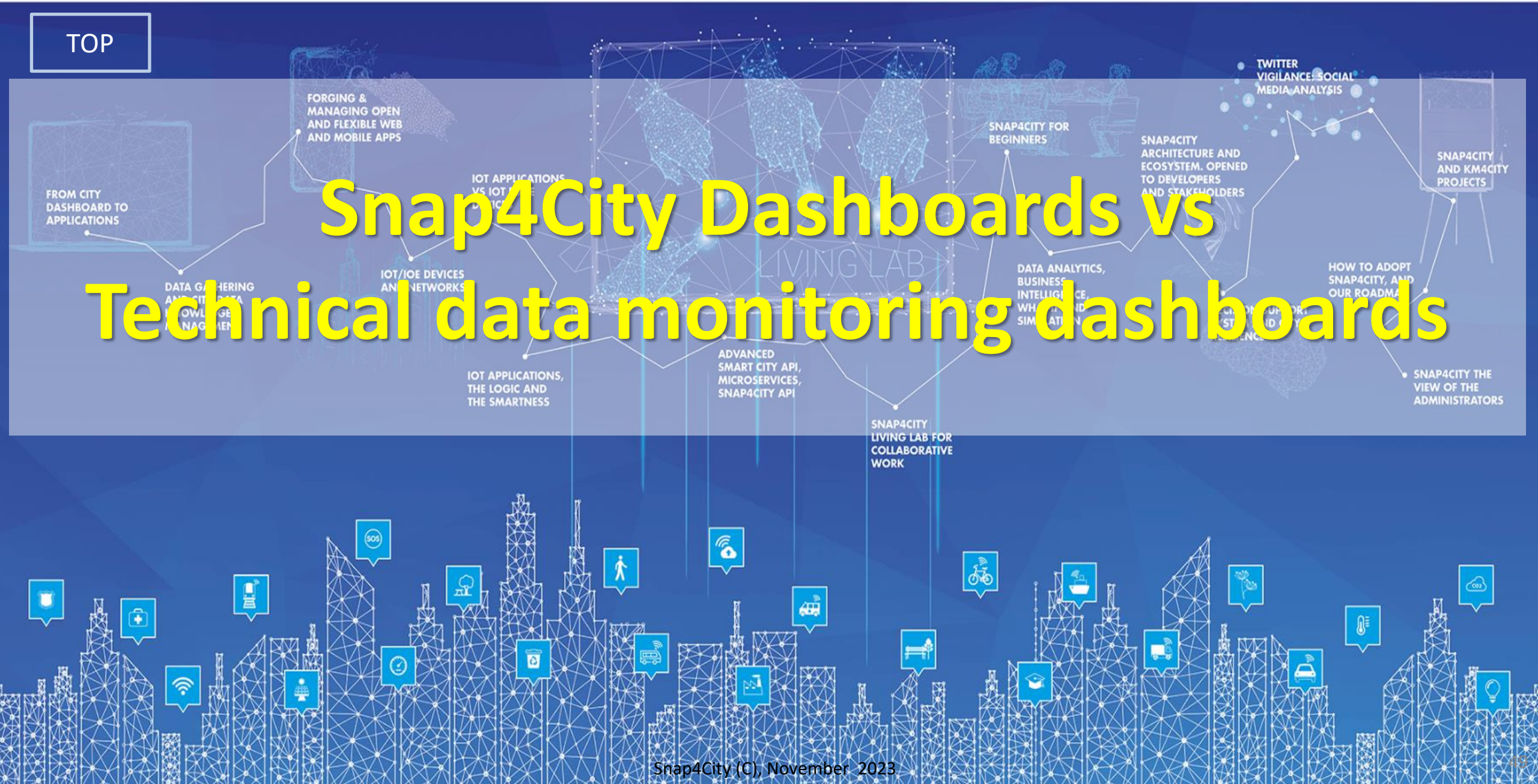
Sensor Data 4m



Last Value	Time Trend Chart
No data	

Local Digital Twin vs BIM

TOP



Snap4City Dashboards vs Technical data monitoring dashboards

Two Main Lines for Dashboarding

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

Ready to use

You can customize

Limited details

- **Dashboard Builder of Snap4City**

You need to create / customize

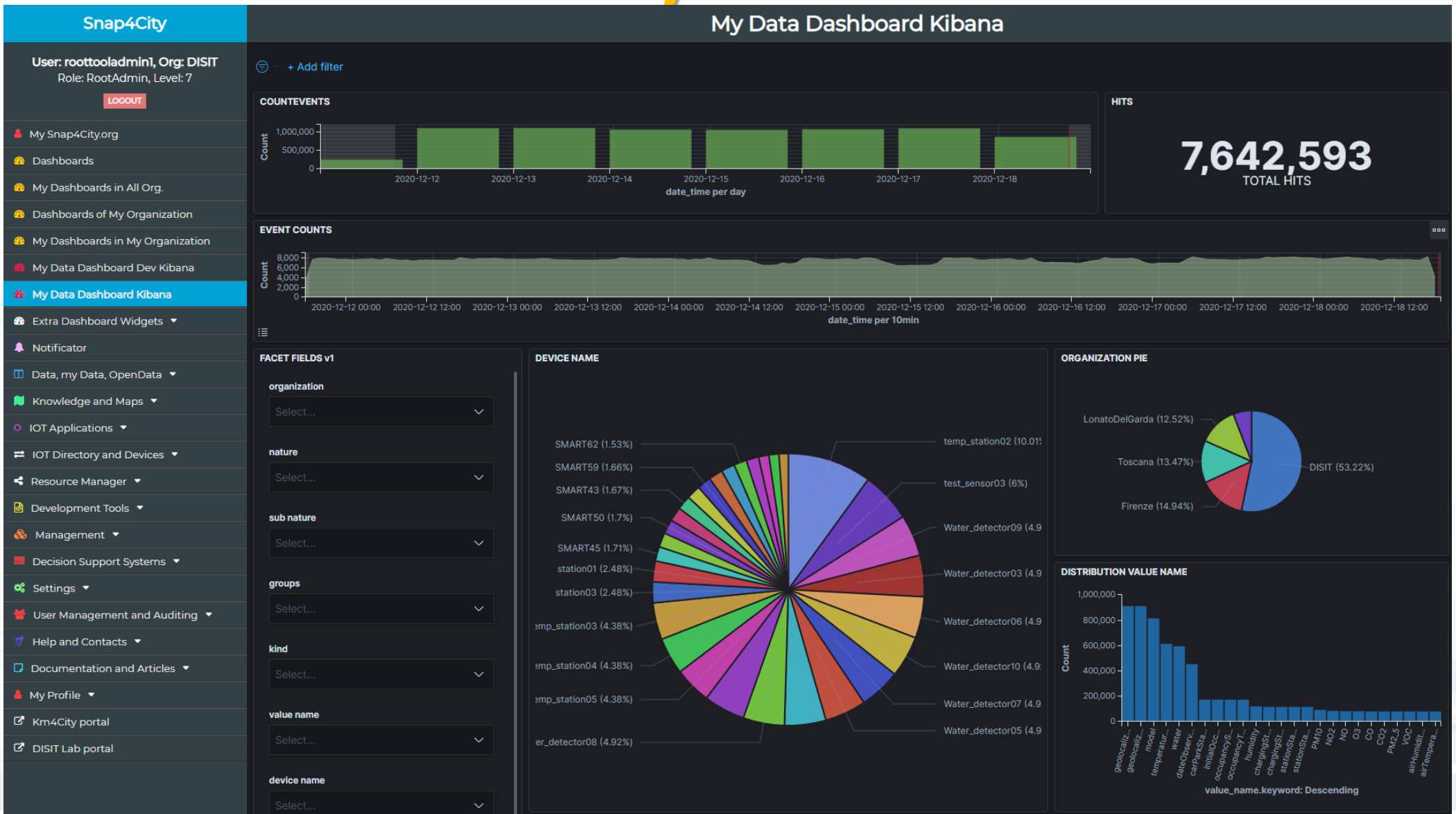
Full Control

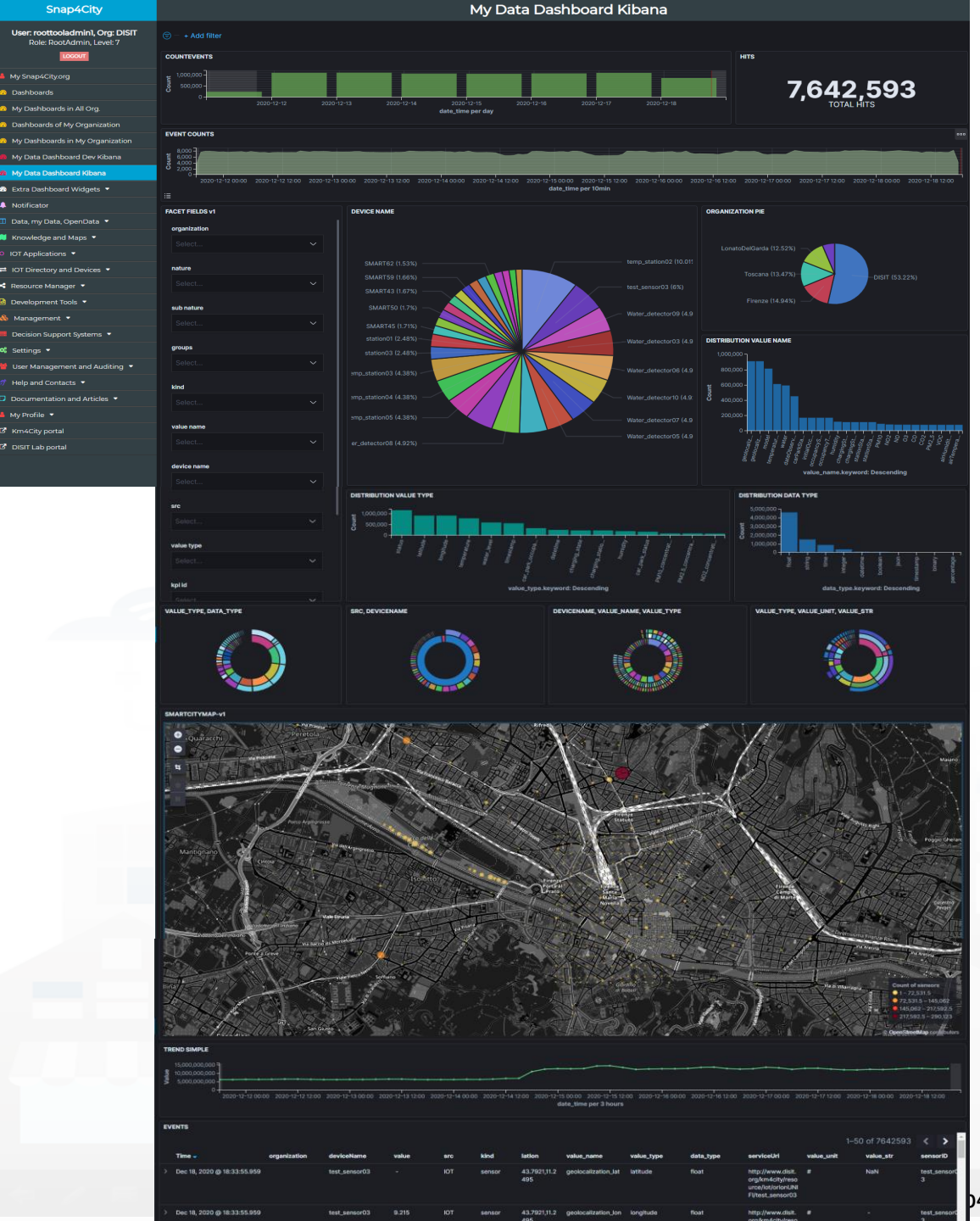
Professional details

My Dev Dash (DevDash)

- For accessing and browsing data on Open Search (Elastic Search) storage and other sources supported
  - **Family of Grafana, Kibana, Banana**
- **No Support for real time event driven** widgets/panels, actuators and synoptics, no sophisticated maps, etc.
- **Not suitable for control room**, decision makers, etc.
- **Limited Business Intelligence,** Custom widgets, animation, external services.
- **Oriented to developers**, complex production of custom views, etc.
- **Partial support of GDPR** and deep control of access.
- Snap4City uses this technology only for monitoring data flow into the Storage with tools named: DevDash, or MyDevDash

DevDash: My Data Dashboard





Business Analysis Dashboards For all kind of users: DevDash

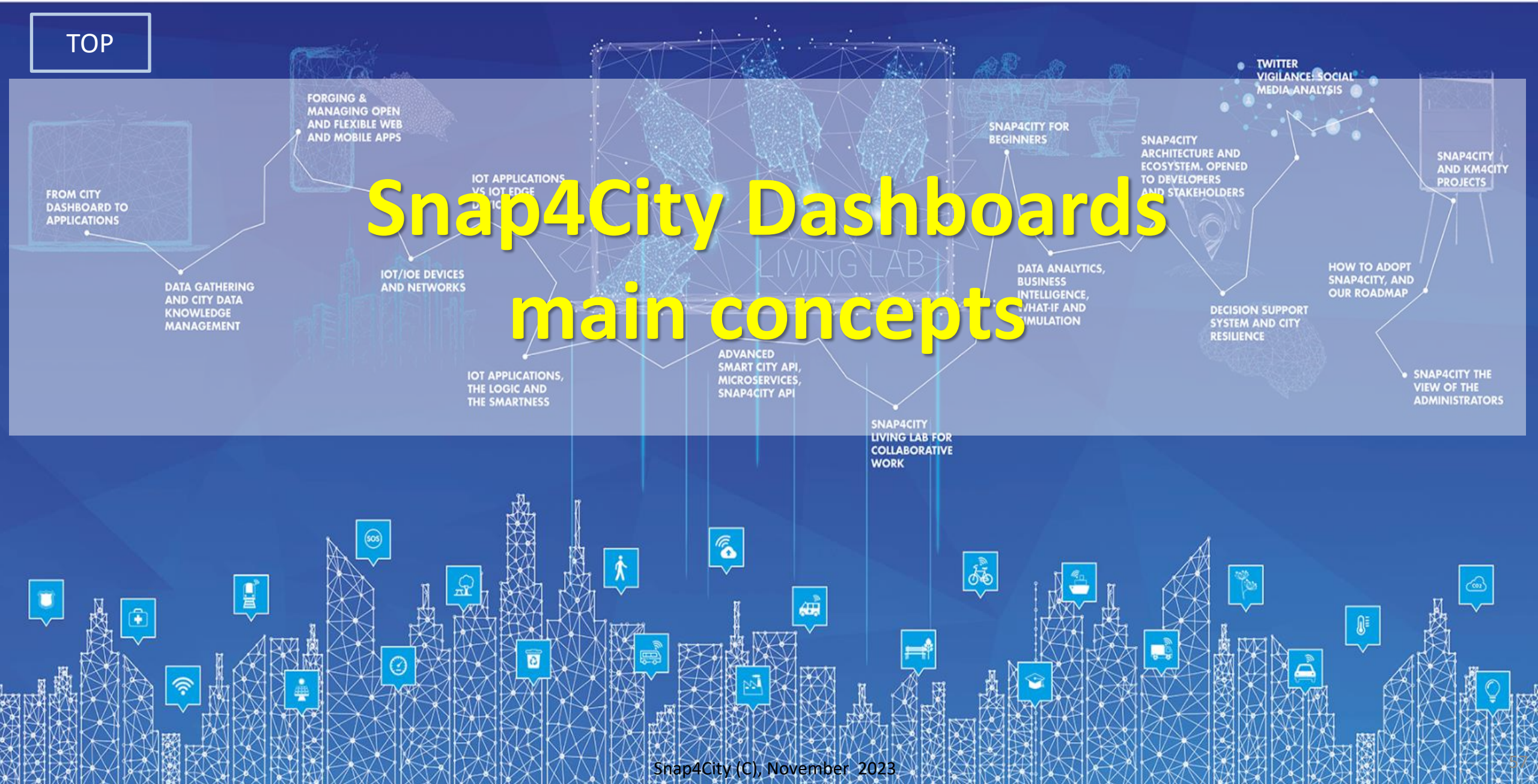
- Dynamic Filtering, Adaptable, …
- Full data details, drill down,…
- Synergic with **Data Inspector** which addresses data relationships, processing and information
- **Only Your Data for**
  - Manager and Area Managers
- **All Accessible Data for**
  - ToolAdmin and RootAdmin

Dashboard Builder of Snap4City

- For accessing and browsing data on: OpenSearch, Mongo, MySQL, Smart City API, Super and thus from federated Smart City API, etc.
- **Supports sensors/actuators**: data driven data, maps in extended manner, data driven widgets, large collection of widgets, direct IoT Connections, custom widgets, animated PIN on maps, a large set of panel/widgets, etc.
- **Very simple to be used for control room**, decision makers, situation rooms, operators, tactic, strategic, etc.
- **Very well integrated with c**ustom widgets, animation, external services.
- **Very simple to be customized** for non programmers since all the tools are visual.
- **Custom Business Intelligence**, Visual Analytics
- **Custom Widgets**
- **Support for GDPR** and deep control of access.

Snap4City Dashboard Builder (2023) vs Kibana/Grafana

Features	Snap4City Dashboard Builder	Kibana, Grafana
Large Collection of Widgets, also from D3 library	YES	Nothing
Custom Widgets SVG of any kind, full defined process for customization	YES	Nothing
Real time event driven widgets and data	YES	Nothing
Server/Client Side 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, Origin Destination Matrix, …	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 (also any other D3 Widgets)	YES	Nothing
Typical Time Trends: day hours, month week, month days, …..	YES	Nothing
Time Trend Compare: day, week, 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, SVG, etc…	YES	Nothing
Digital Twin Local (BIM) and Global (3D city representation) with 3D traffic, Heatmaps, Devices, …	YES	Nothing
Faceted search	YES: selectors, forms, buttons	YES



Snap4City Dashboards main concepts

Dashboards (Public by (ORG))

LOGIN

Switch to Legacy Layout

Dashboards (Public)

- www.snap4solutions.org
- Extra Dashboard Widgets
- Data Management, HLT
- Knowledge and Maps
- Processing Logics / IOT App
- Entity Directory and Devices
- Resource Manager
- Development Tools
- Management
- Decision Support Systems
- Deploy and Installation
- Help and Contacts
- Documentation and Articles
- Km4City portal

Privacy Policy Cookies Policy

Prev 1 ... 34 35 36 37 38 Next

Filter by dashboard

Traffic Flow Manager test

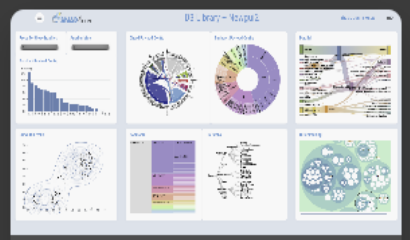
Passive

Public (DISIT)

Traffic Flow Monitoring - Firenze - Cloned2

Passive

Public (Firenze)



D3 library -- newgui2

Proc.Logic / IoT App

Public (DISIT)

Traffic Flow Reconstruction - Sii-Mobility

Passive

Public (Other)

Traffic Flow Reconstruction for the cities

Passive

Public (Other)

3D Map Global Digital Twin -newgui2

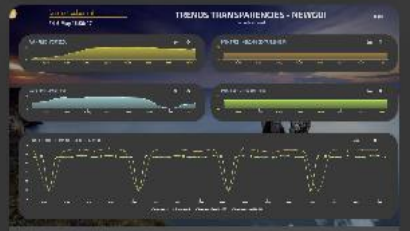
Passive

Public (DISIT)

3D Multi Data Map - Digital Twin Global - Firenze

Passive

Public (DISIT)



Trends transparencies - newgui

Passive

Public (DISIT)

Tuscany TRAFAIR Data Dashboard

Passive

Public (DISIT)

Tuscany weather dashboard 1

Passive

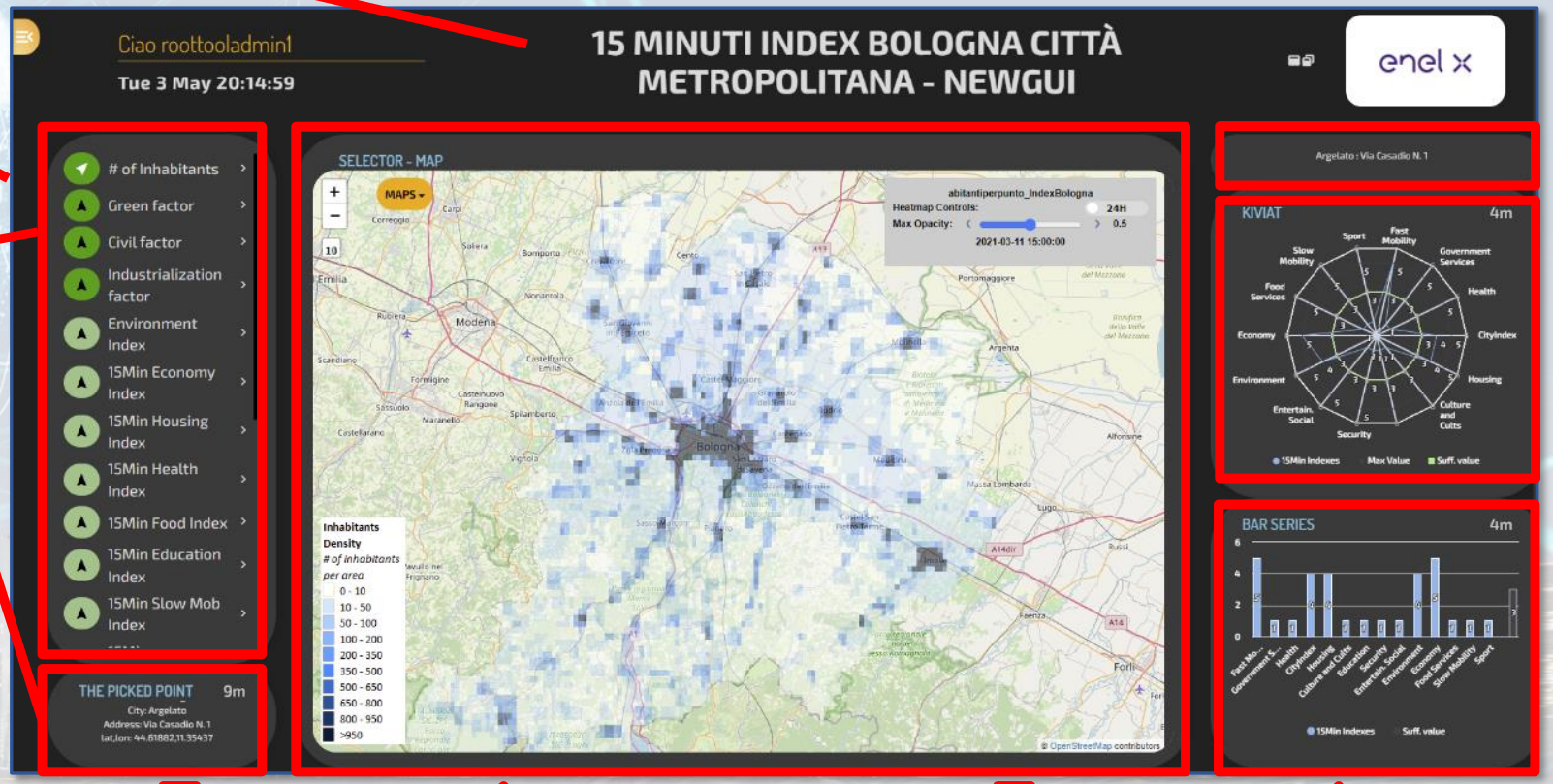
Public (DISIT)

Snap4City Dashboards main concepts

Header

Dashboard

Interactive Widgets



Server Communication

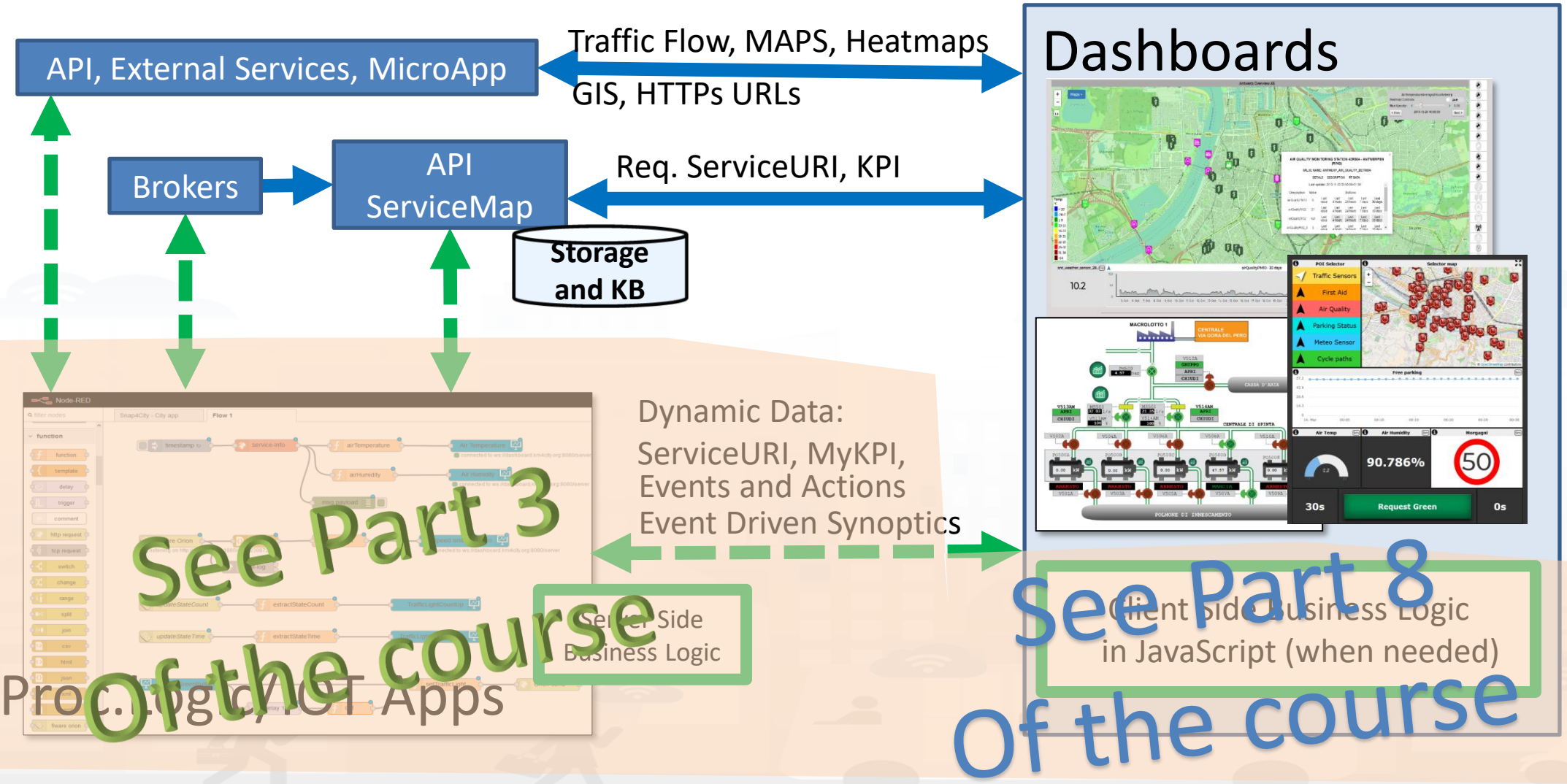
- **Real Time data requests/send**
- **Event Driven**
- **Server Side Business Logic**
  - **See Part 3 of the course**

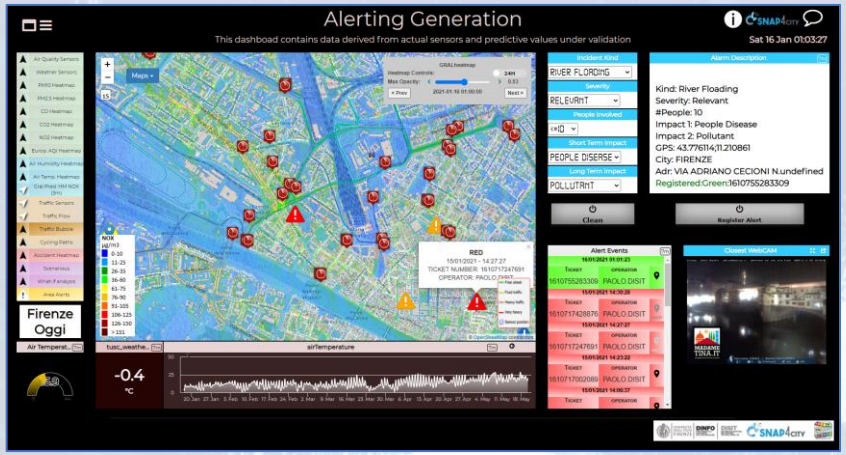
Inter Widget Communication:

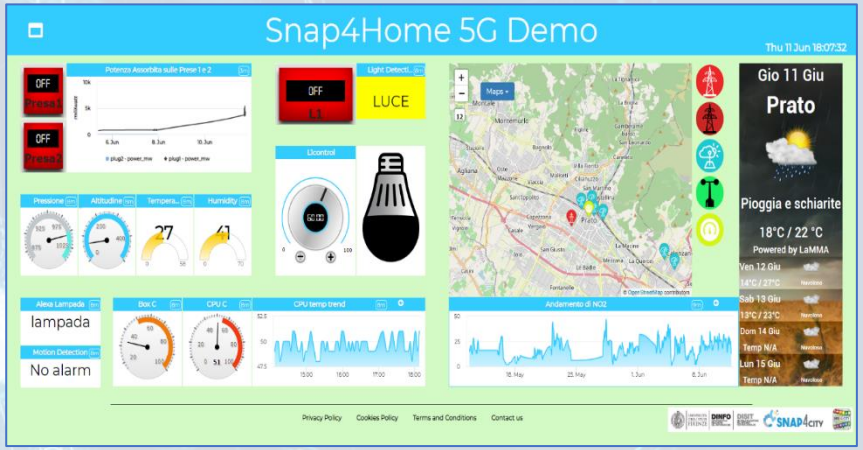
Client Side Business Logic

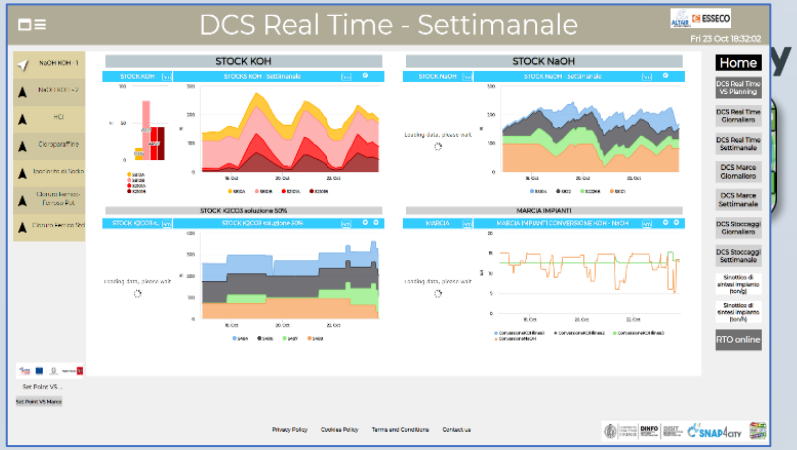
See part 8 of the Course

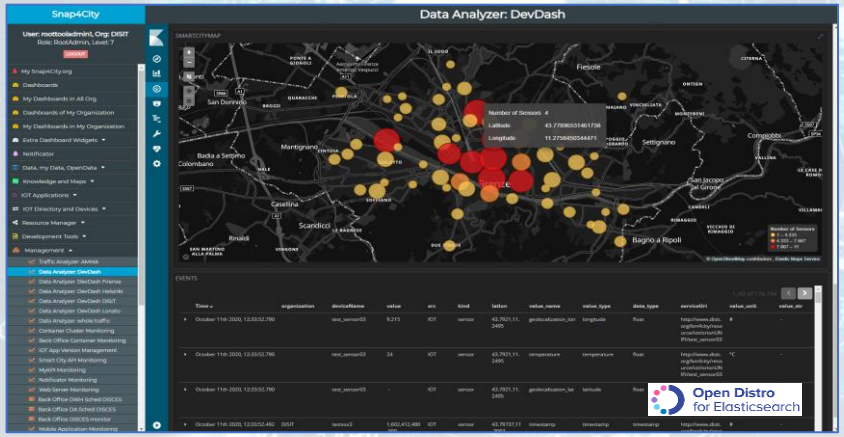
How the Dashboards exchange data

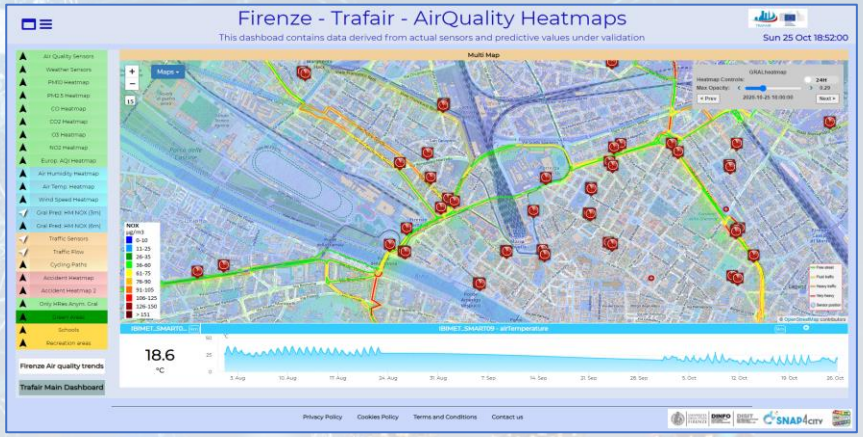


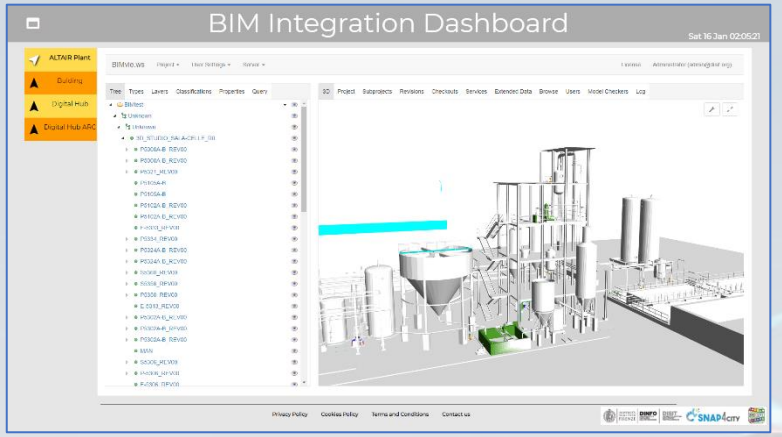

Alerting Generation
This dashboad contains data derived from actual sensors and predictive values under validation
Firenze Oggi
-0.4


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

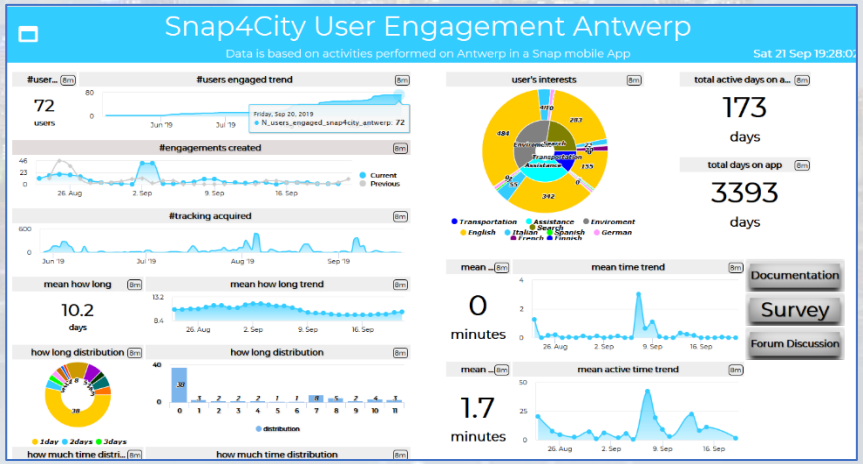

DCS Real Time - Settimanale
STOCK KOH
STOCK NaOH
Home

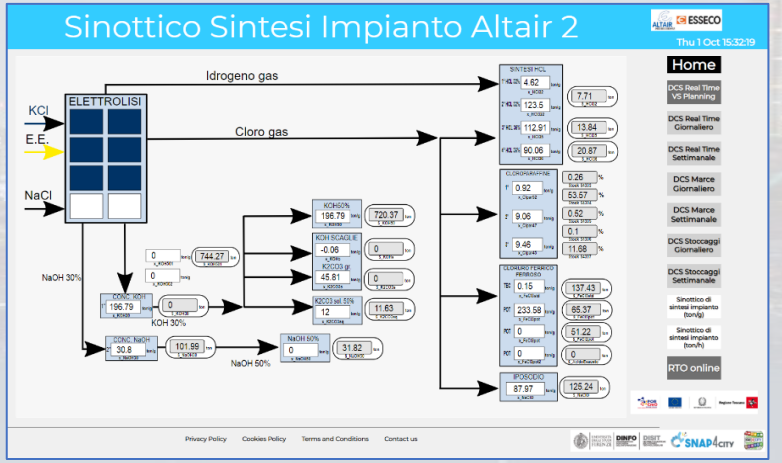

Data Analyzer: DevDash
Open Distro for Elasticsearch


Firenze - Trafair - AirQuality Heatmaps
This dashboad contains data derived from actual sensors and predictive values under validation
18.6


BIM Integration Dashboard


3D Multi Data Map - Digital Twin Global - Firenze
demonstrator
192


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


Sinottico Sintesi Impianto Altair 2
Idrogeno gas
Cloro gas
ELETTROLISI
KCl
E.E.
NaCl
NaOH 30%
KOH 30%
NaOH 50%
Home

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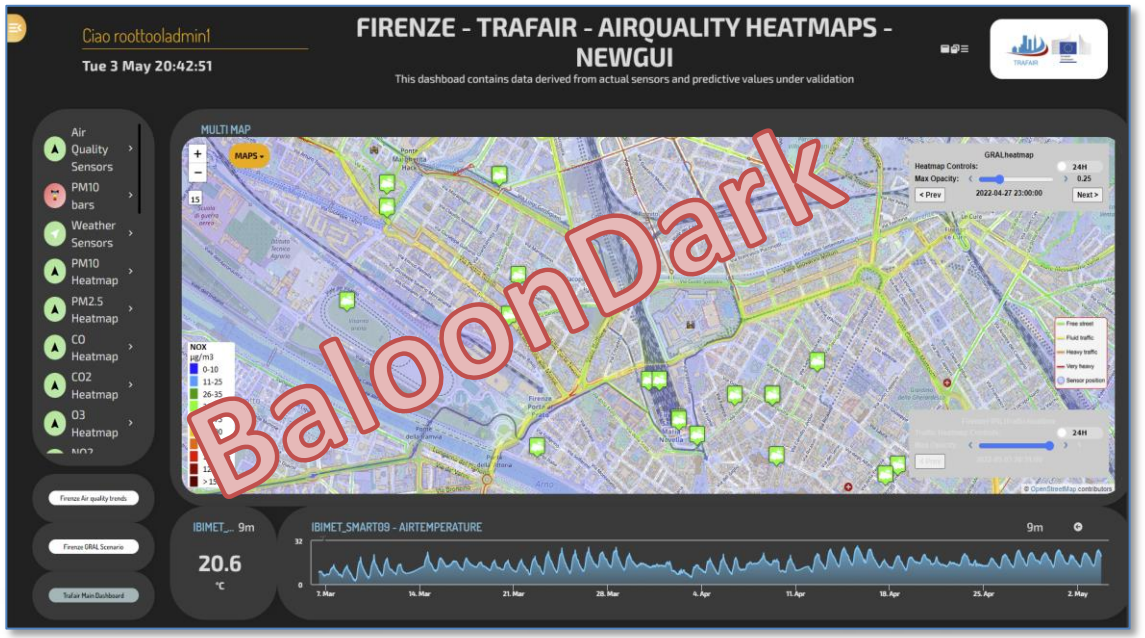
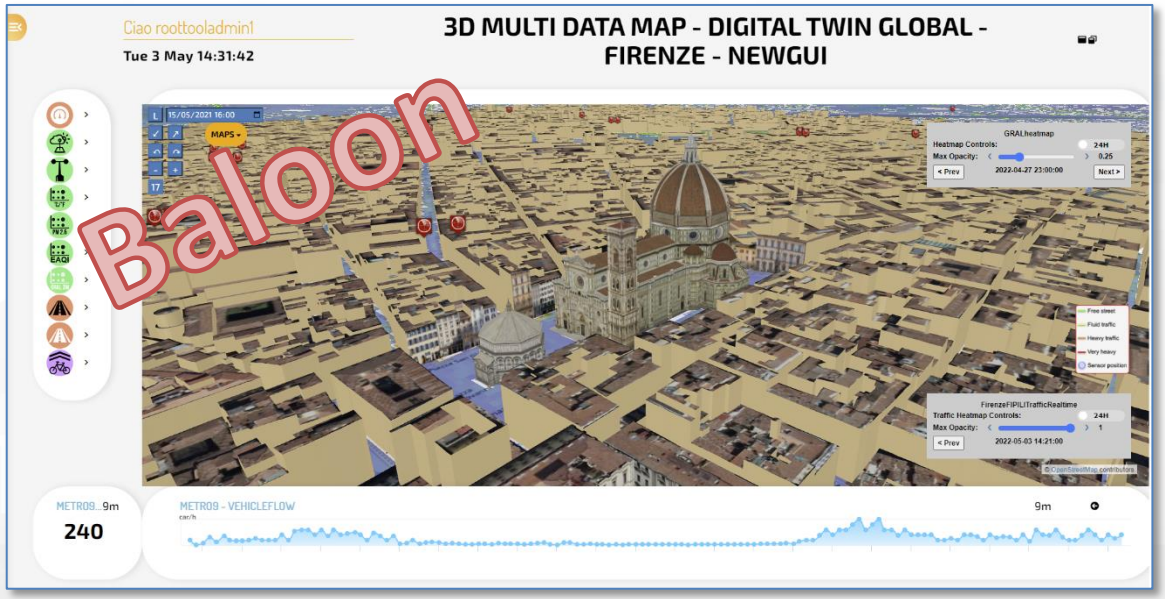
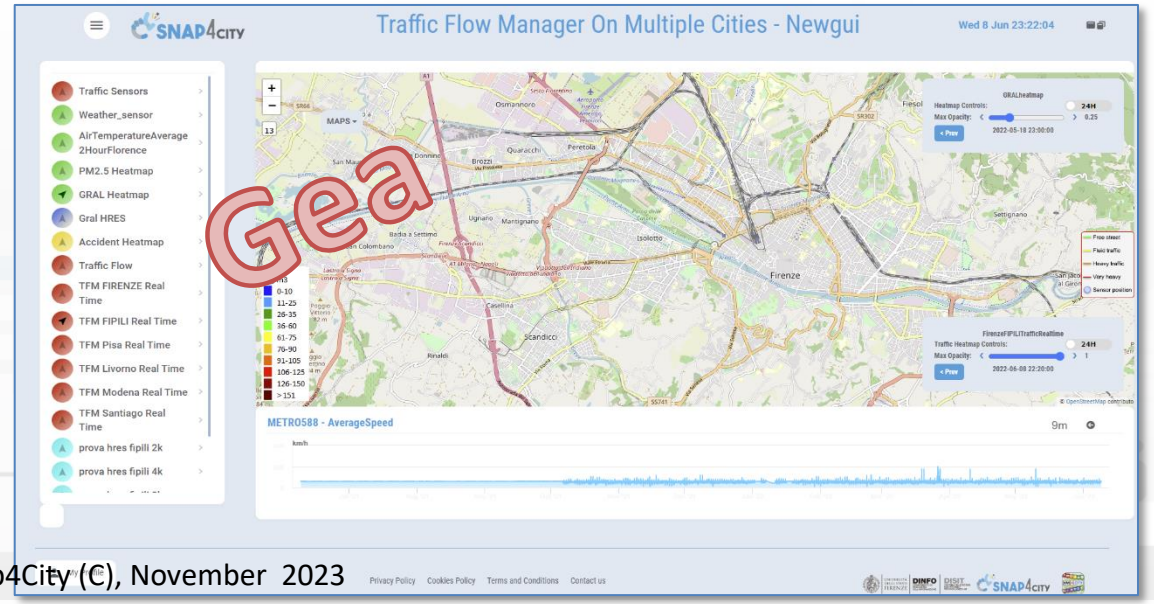
DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB DISTRIBUTED DATA INTELLIGENCE AND TECHNOLOGIES LAB

Themes

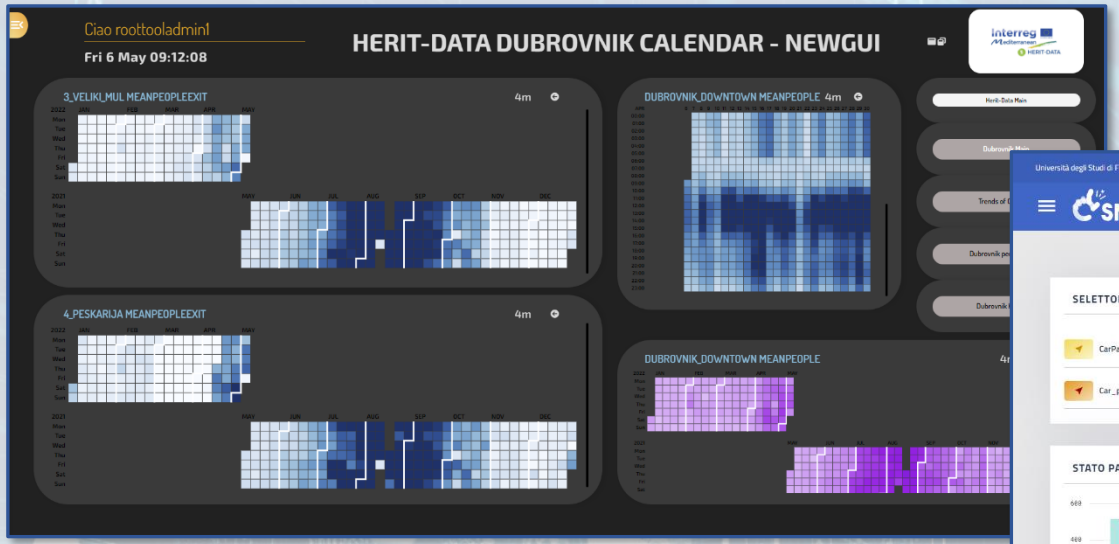
SNAP4CITY KM4CITY

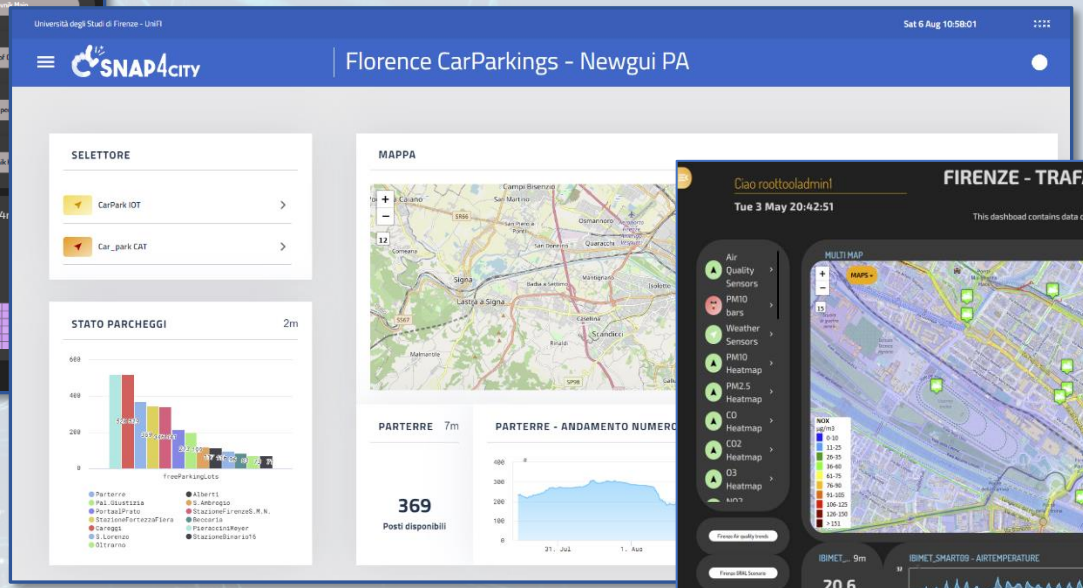


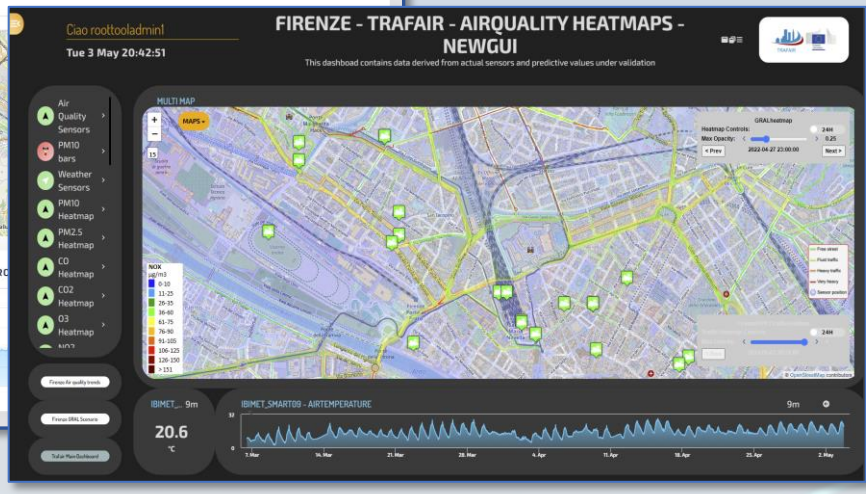


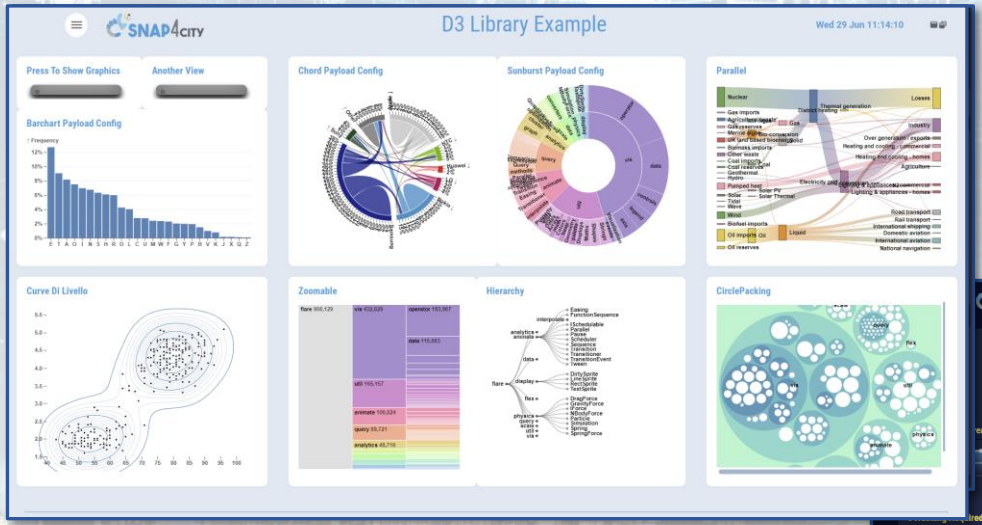


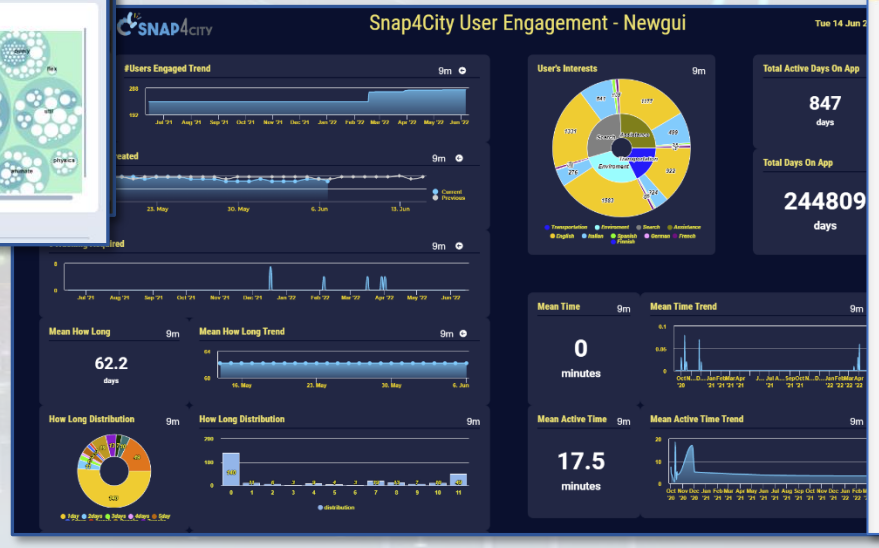
Different Themes

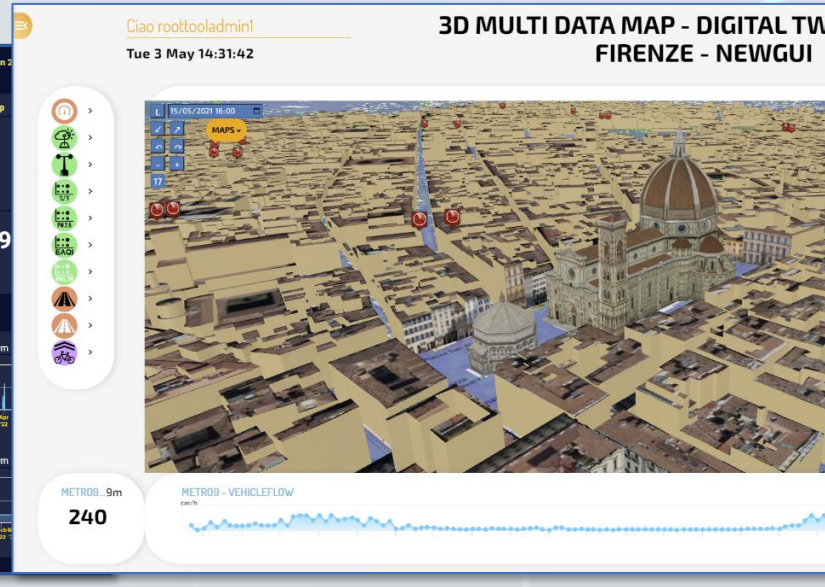








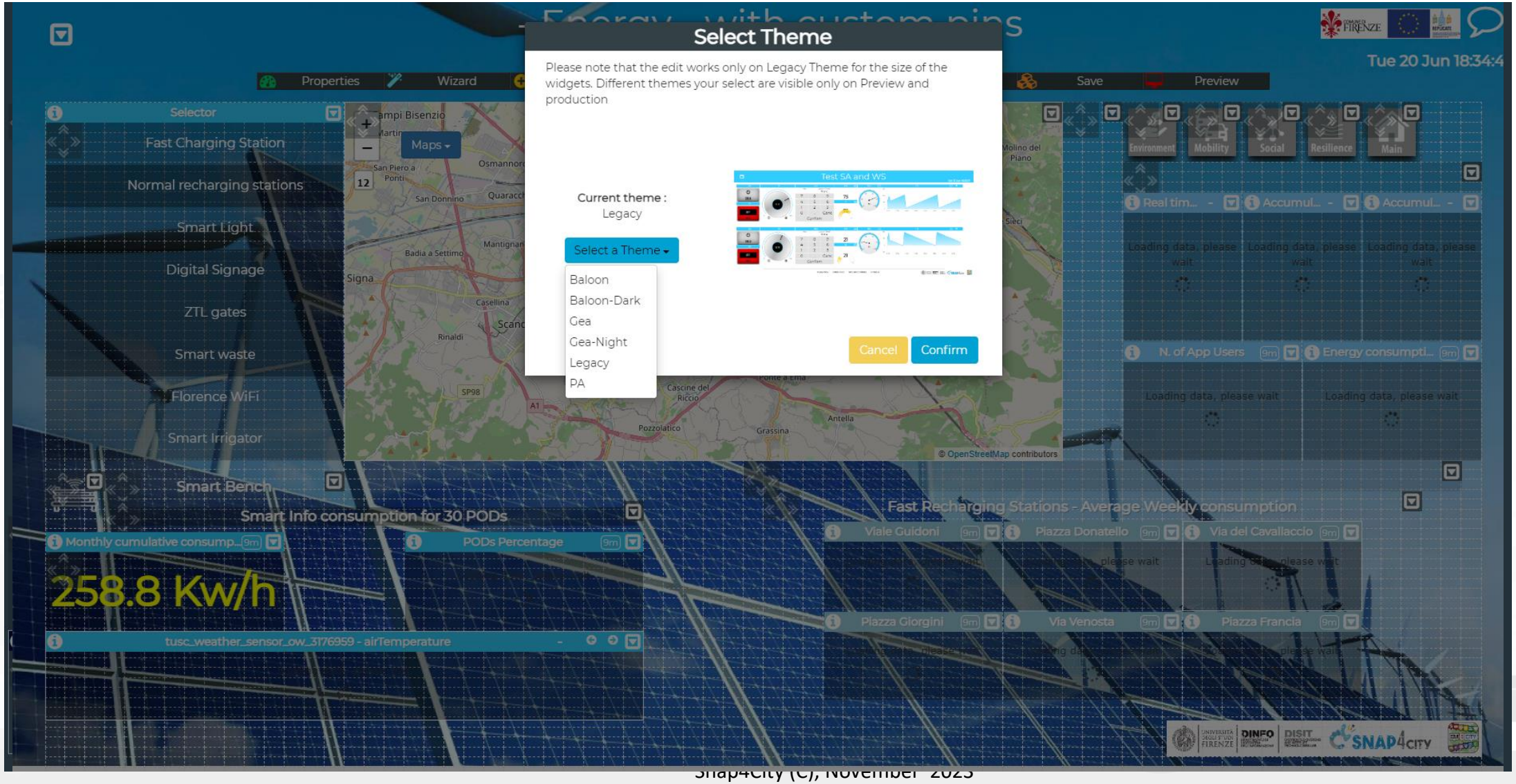




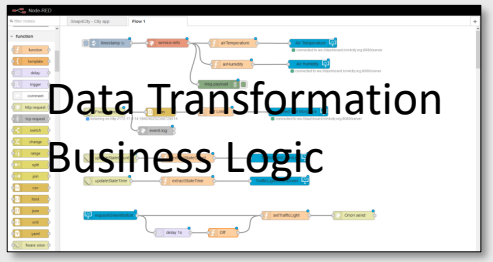
New styles/themes can be developed by specializing a few files from open source

https://www.snap4city.org/793

Changing Theme



Dashboard Builder: Development



Data Transformation
Business Logic

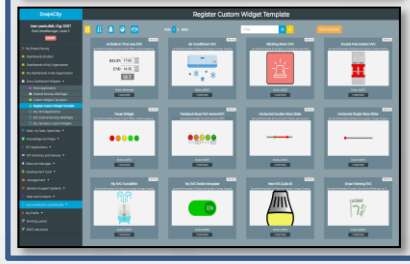
IOT Applications

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

Widget Collection

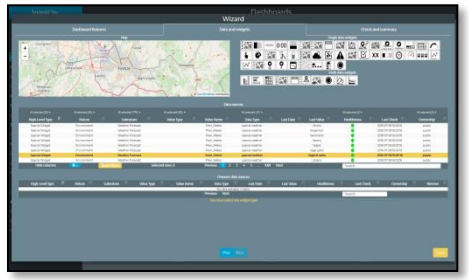
Micro
Applicat
ions

External
Services

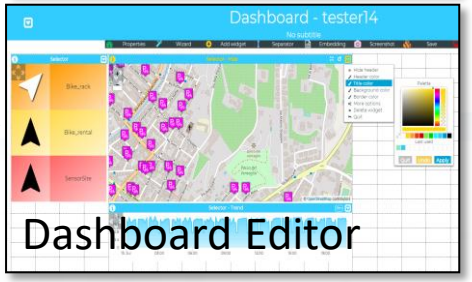


Custom
Widgets/
Synoptics

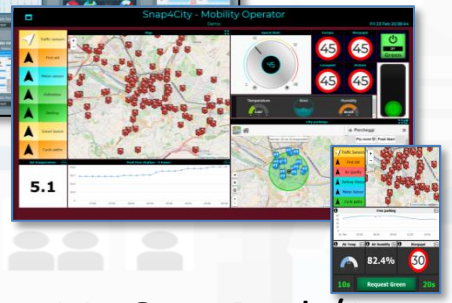
Dashboard Wizard



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



Dashboard Editor

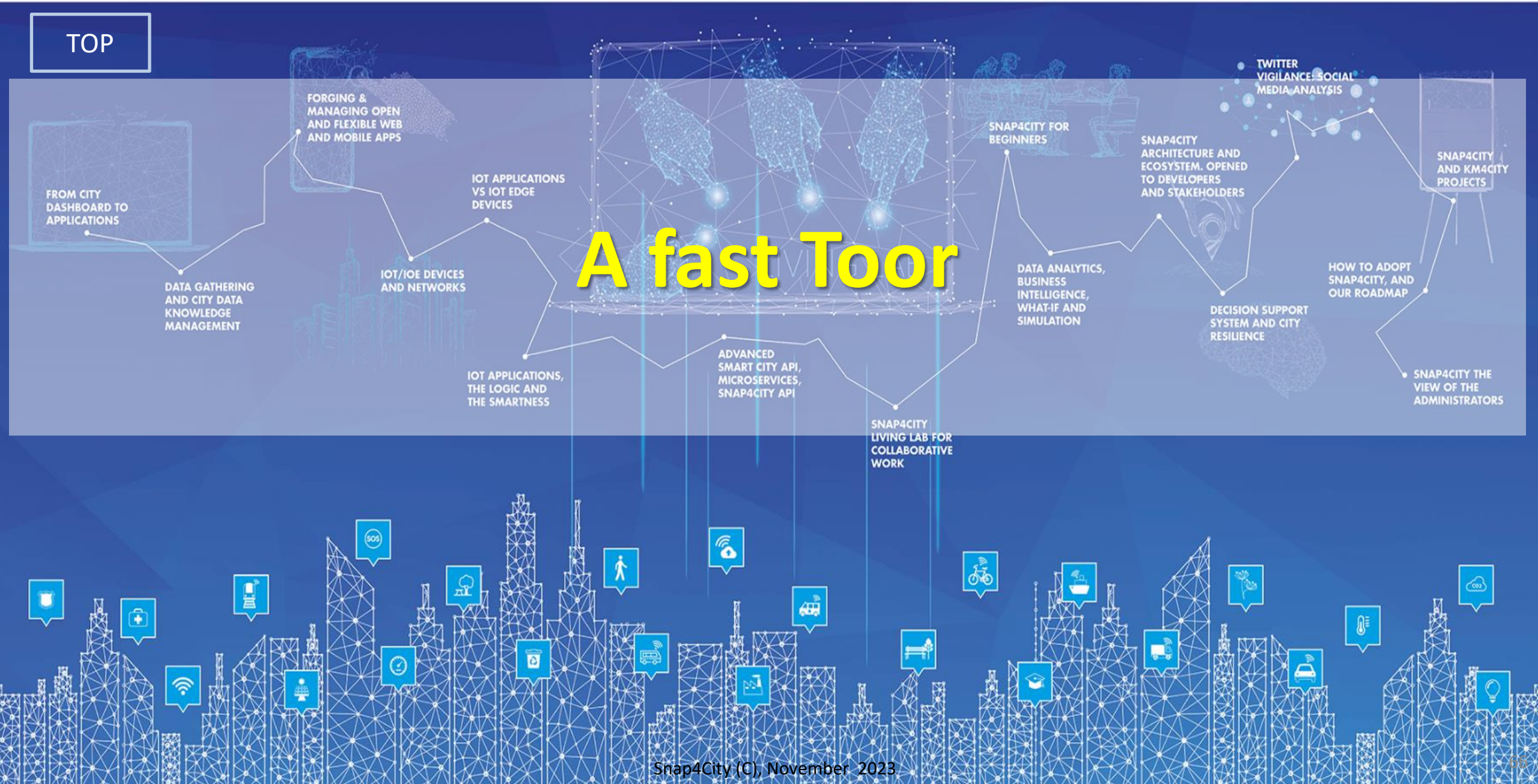


Public
Dashboard
Collection

My Own Dash/App

SCALABLE SMART ANALYTIC APPLICATION BUILDER FOR SENTIENT CITIES

TOP



A fast Toor

https://www.youtube.com/watch?v=qS34LLdT9JM

Welcome on Snap4City

Snap4City is a full-featured platform to manage, aggregate, visualize and analyze big data, IoT. These operations can be customized to accomodate any business need

This short tour is going to show you the main features of the platform.

Leave the tour | Take the tour

nap4city.org

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Switch to Legacy Layout

Home | How and Why To Use it | Tools | Tutorials and Videos

- Extra Dashboard Widgets
- Data Management, HLT
- Knowledge and Maps
- Processing Logics / IOT App
- Entity Directory and Devices
- Resource Manager
- Development Tools
- Management
- Decision Support Systems
- Deploy and Installation
- Help and Contacts
- Documentation and Articles

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HOW ARE YOU GOING TO BUILD THE FUTURE?

Snap4City: a framework for rapid implementation of Decision Support Systems and Smart Applications.

Home > Snap4City: Smart aNalytic APp builder for sentient Cities and IOT

Snap4City: Smart aNalytic APp builder for sentient Cities and IOT

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Registration

- New Registration
- Request a new password
- Recover your registration

Search

Search

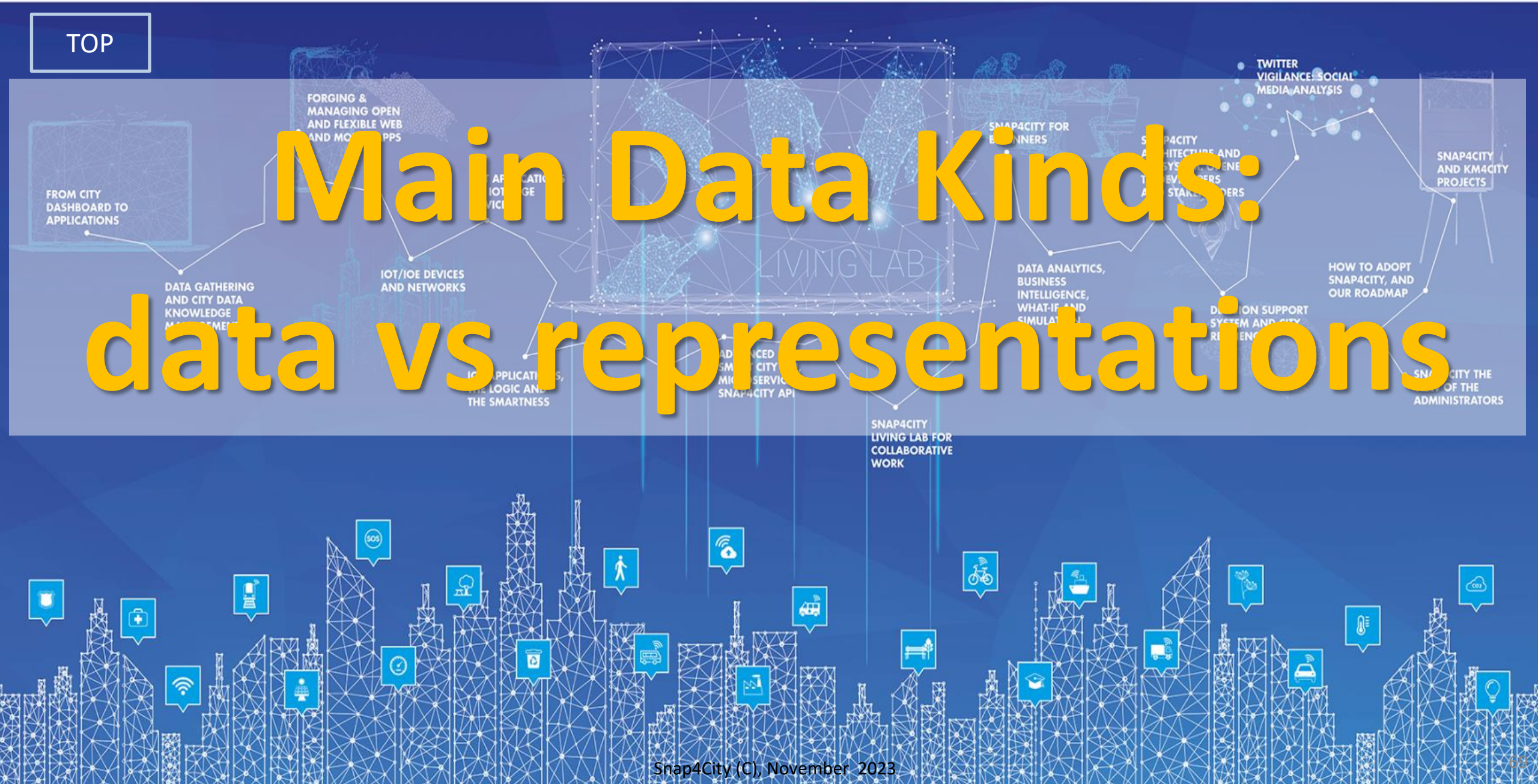
-Any-

Training on Tools and Platform

Powered by www.km4city.org

TOP

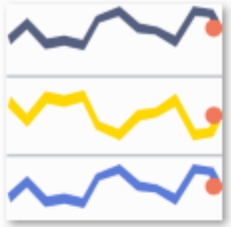
Main Data Kinds: data vs representations



From Data to Visualization

Visual Representations


Sliderwith-multiple-steps-for-KPI


sparklines

kpi


histogram


heatmap


flow-maps


geo-maps

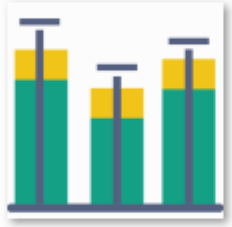

donut-chart

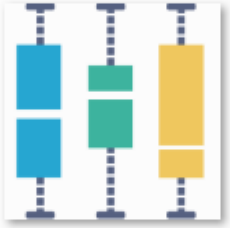

Data-grid


chord


Cone


Bubble-matrix-chart


Bullet


Box-plot


staked-area


Stacked-line-chart


Stacked-combinational-Chart


spider-maps


Sequence-Sunbur


Pivot


pie-chart-1


Pareto-chart


radar

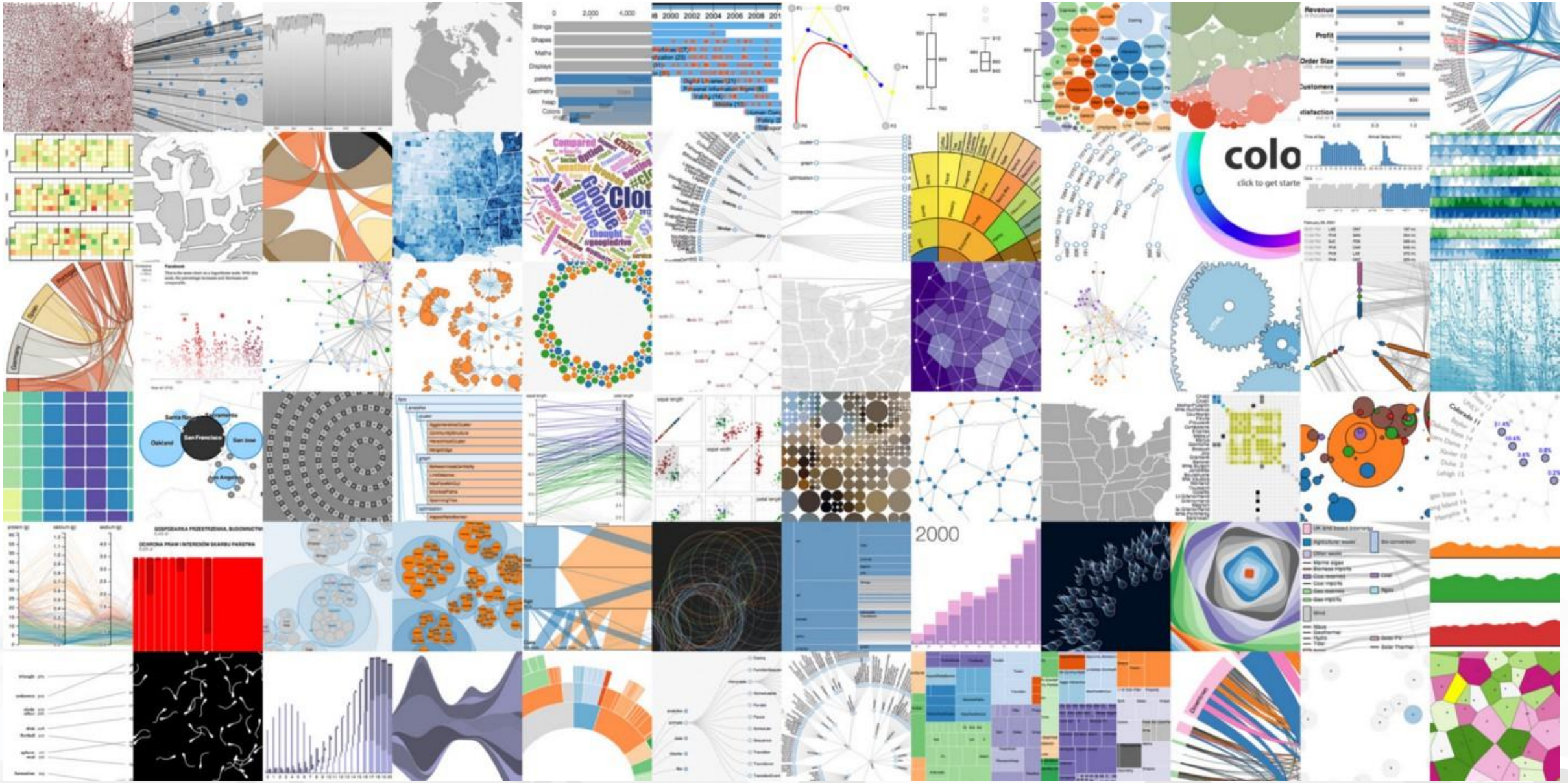

Bubble-maps


waterfall


Sunburst


Sankey

D3.js graphs



Main Concepts

- **Time Series**
  - Data sources (sensors / actuators) which provide changes of time. E.g., a sensor of some kind.
- **Geolocated Data on maps (PINs)** can be:
  - Structural info.: roads, building, etc.
  - Maps, orthomaps, Heatmaps (HM)
  - Elements and their positions as
    - Points of Interest
    - Shapes: garden, building, cycling paths, etc.
    - Entities/Devices as Time Series: which may move over time, e.g., tracking a Car
  - Origin Destination Maps, ODM
  - Trajectories, people and traffic flows, etc.
  - etc.
- **Static non GeoLocated Data**:
  - almost nothing since……

A single Data Kind may have multiple representations:

e.g.: the position of the car at 15:30, the trjaectory of yesterday, the ODM with set of travels performed in the last year, the most freq. Visited places as HM

TOP

Time Series, multi series

What About IoT Devices, Time Series

IOT Device

IOT Device

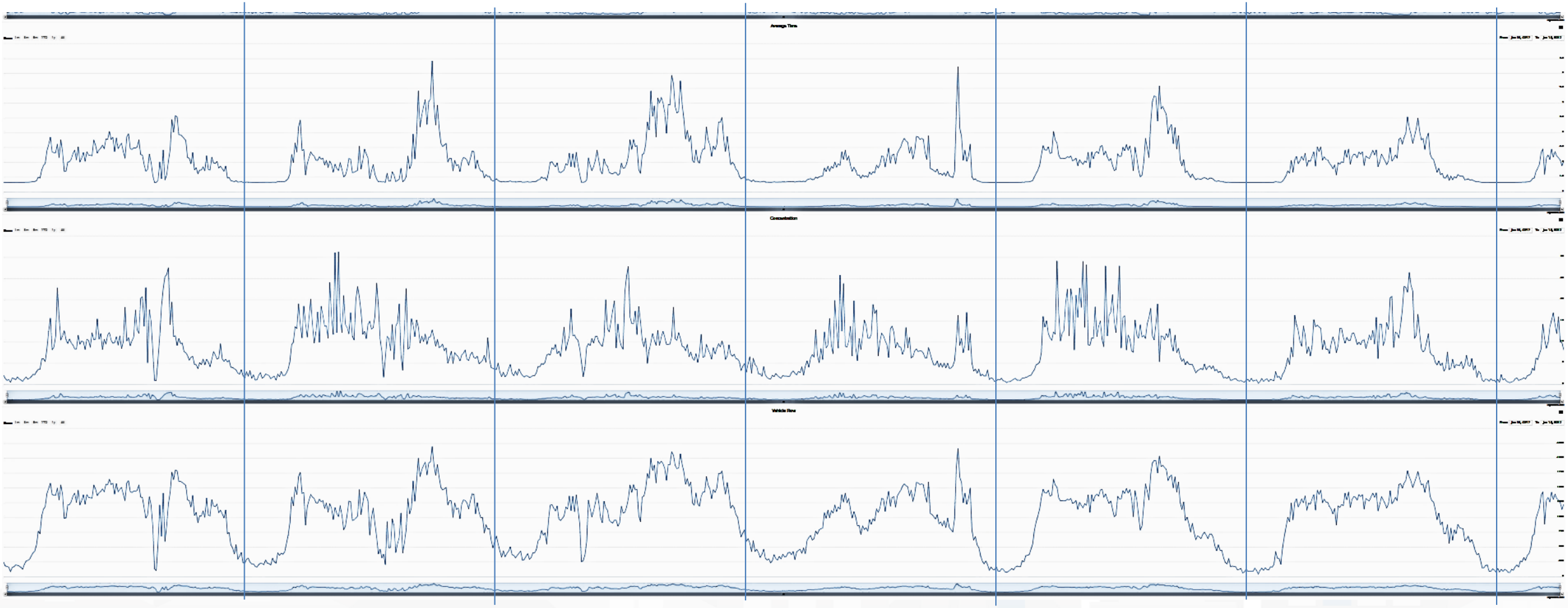
Sends a message

Message (
timestamp: 02-04-2020 at 10:30,
Temperature: 29.34,
Humidity: 35
)

dateObserved	Temp	Humidity
02-04-2020 10:30	34.5	23
02-04-2020 10:40	36.5	24
02-04-2020 10:50	36.0	22.5

- A set of data coming from an IoT Device with multiple sensor become a time series of values for devices.
  - For example: taking a new measure every 10 minutes (Red Lines)
  - Non regular rates can be valid data as well.
- Each new measure in Snap4City is conventionally time located in «dateObserved», which has to be **Unique.**
  - **Only one message per dateObserved is allowed**

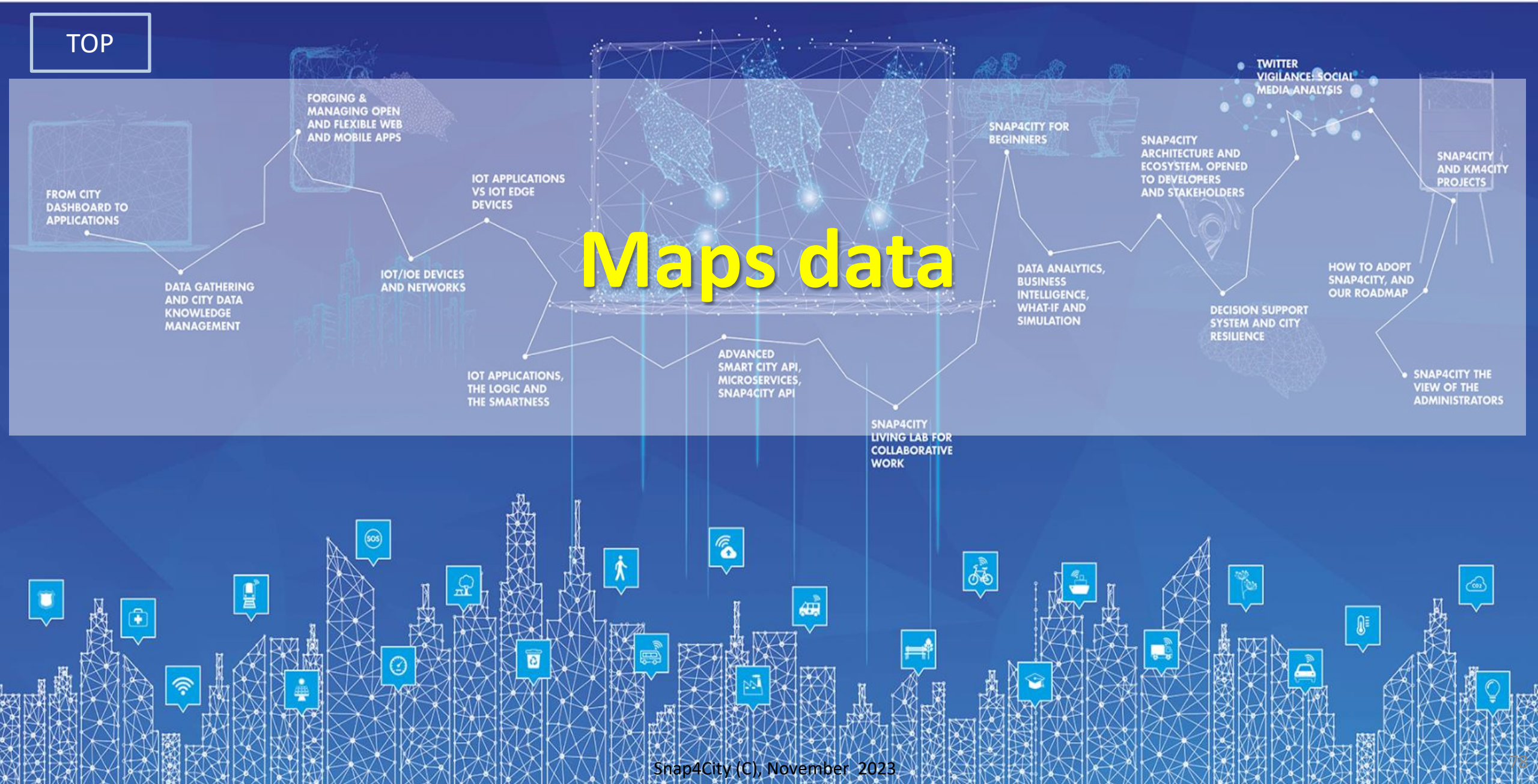
Traffic Flow data



- Day by day traffic flow, on the week data from 3 sensors

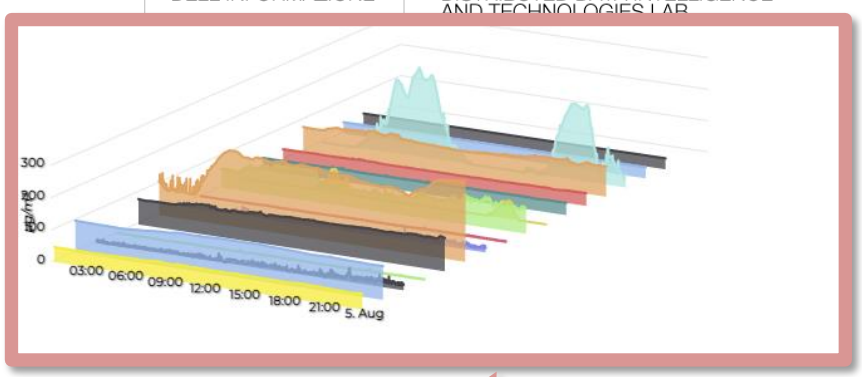
SCALABLE SMART ANALYTIC APPLICATION BUILDER FOR SENTIENT CITIES

TOP



Maps data

Hypercube



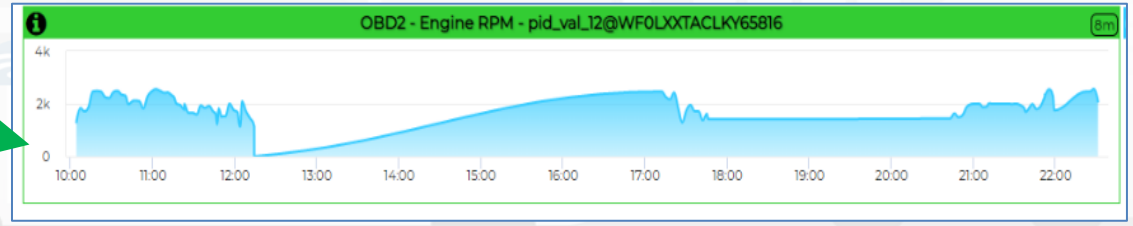
Longitude

Latitude

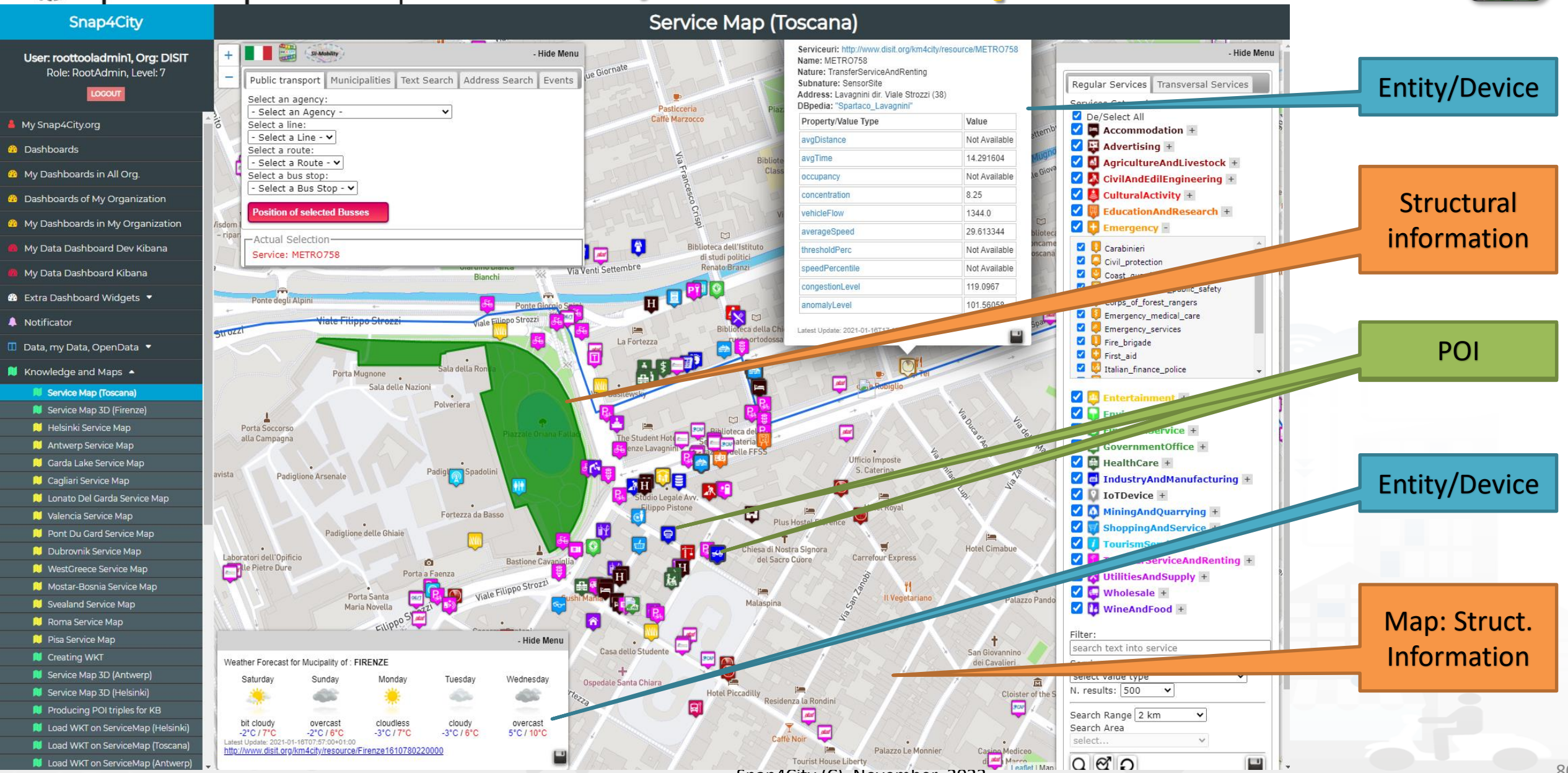
Values

Sensors of Devices, KPI, etc.

time



KB, ServiceMap



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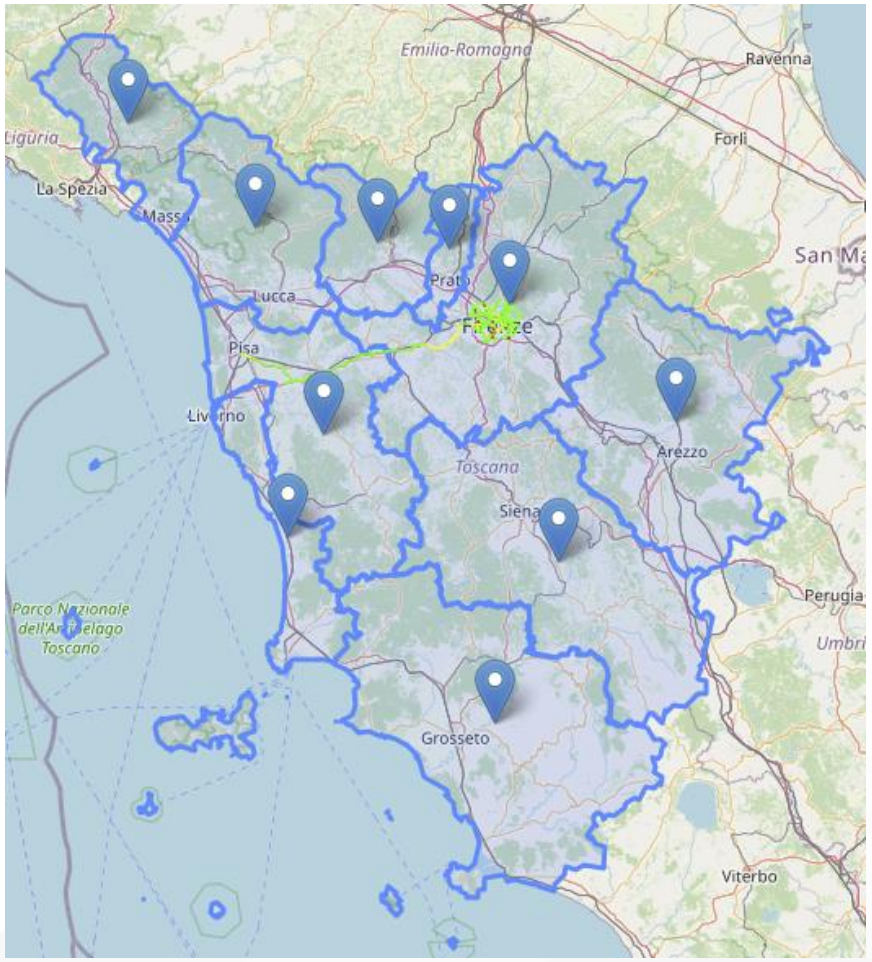
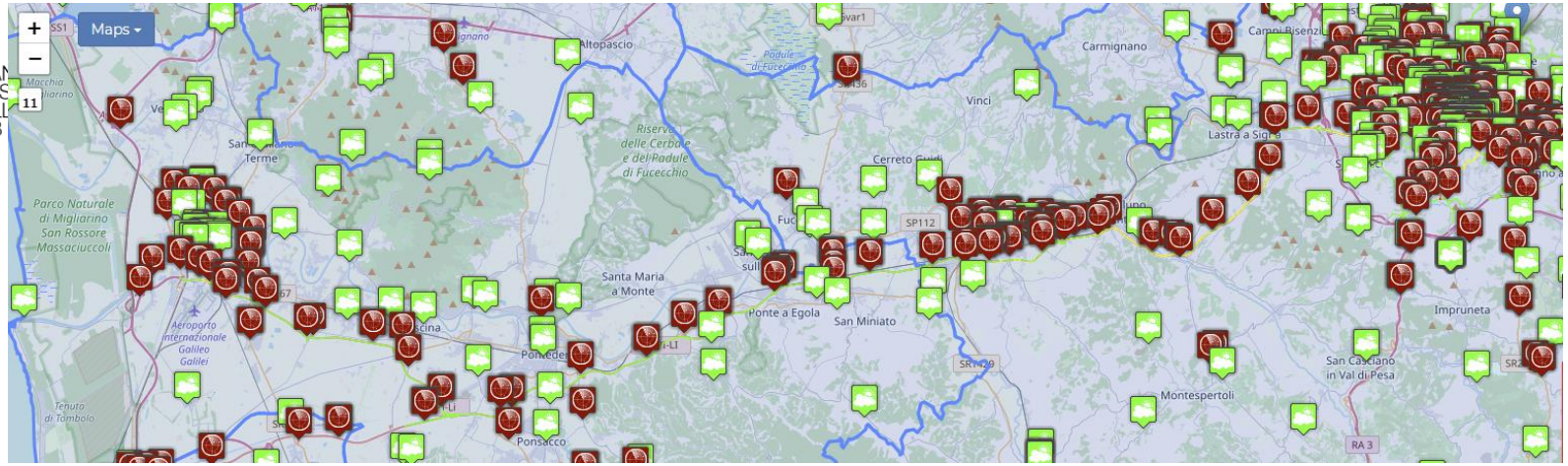
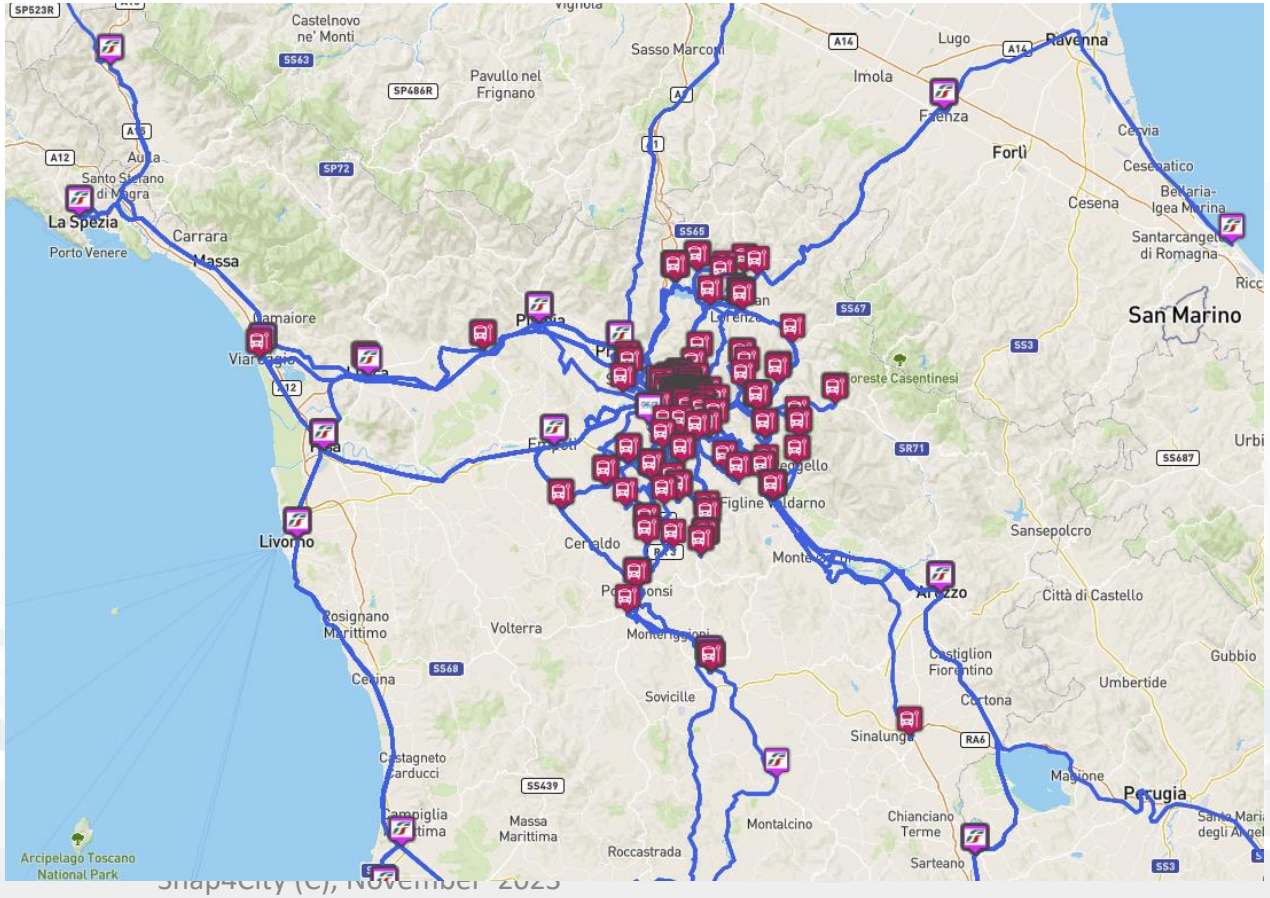
DISIT DISTRIBUTED SYSTEMS AN INTERNET TECHNOLOGIES DISTRIBUTED DATA INTELL AND TECHNOLOGIES LAB







Admin Models & limitations

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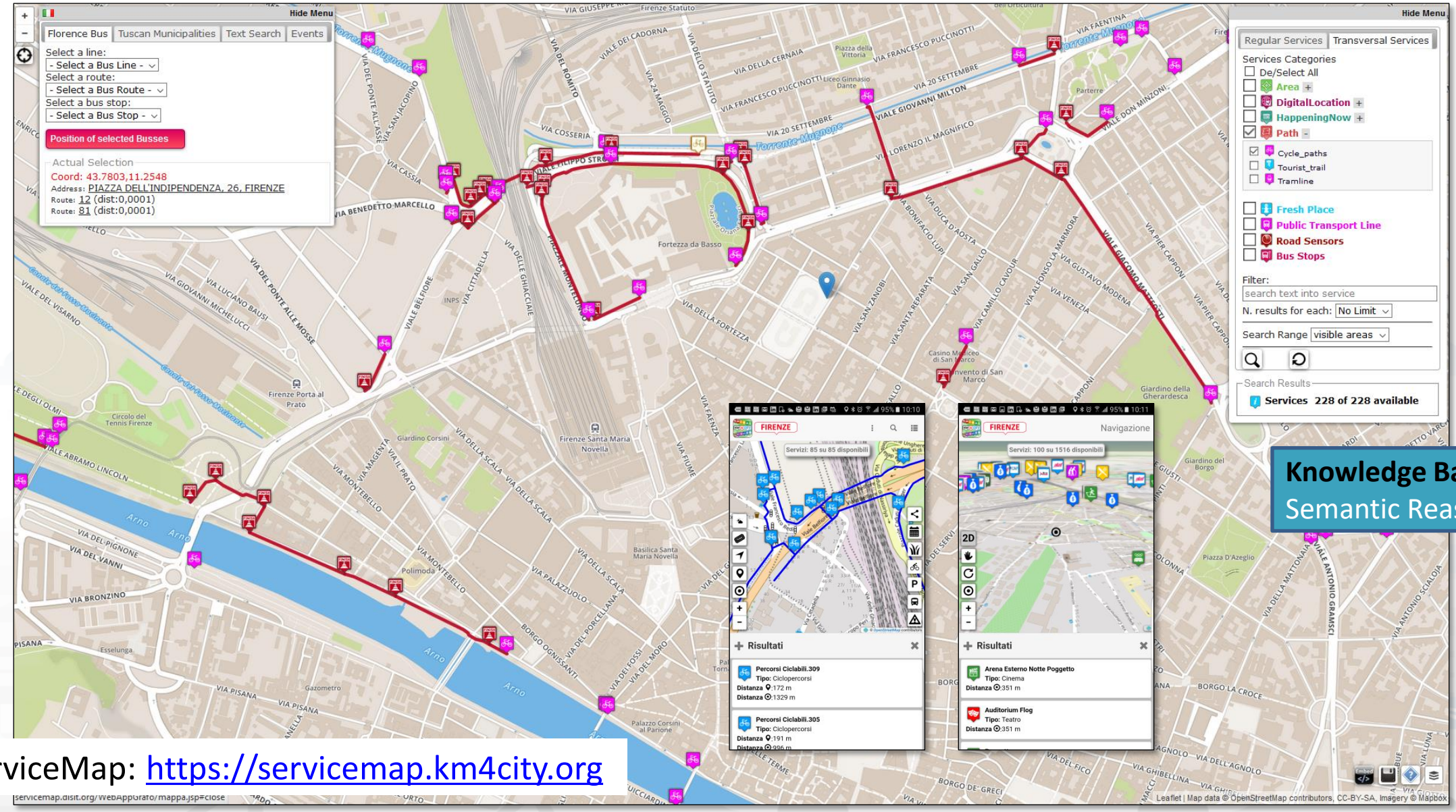
Cycling Paths

SNAP4CITY KM4CITY

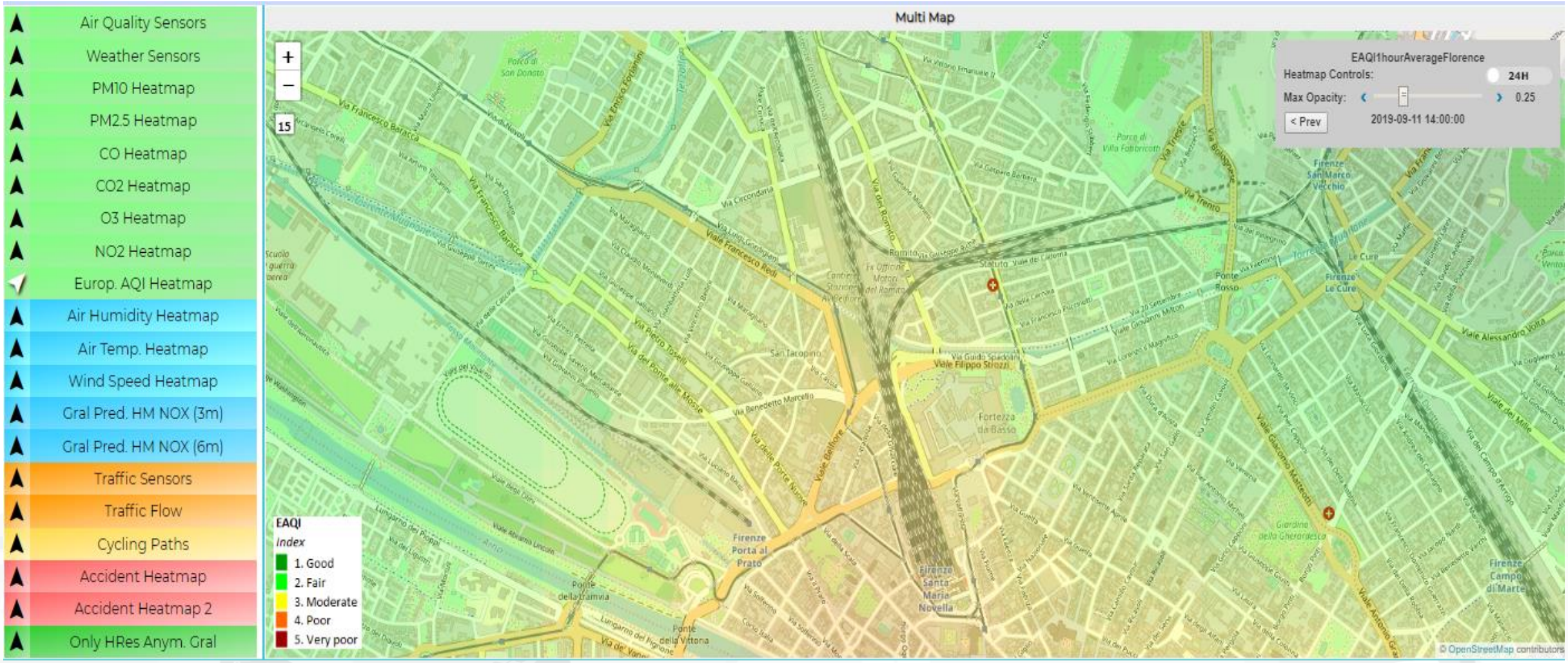


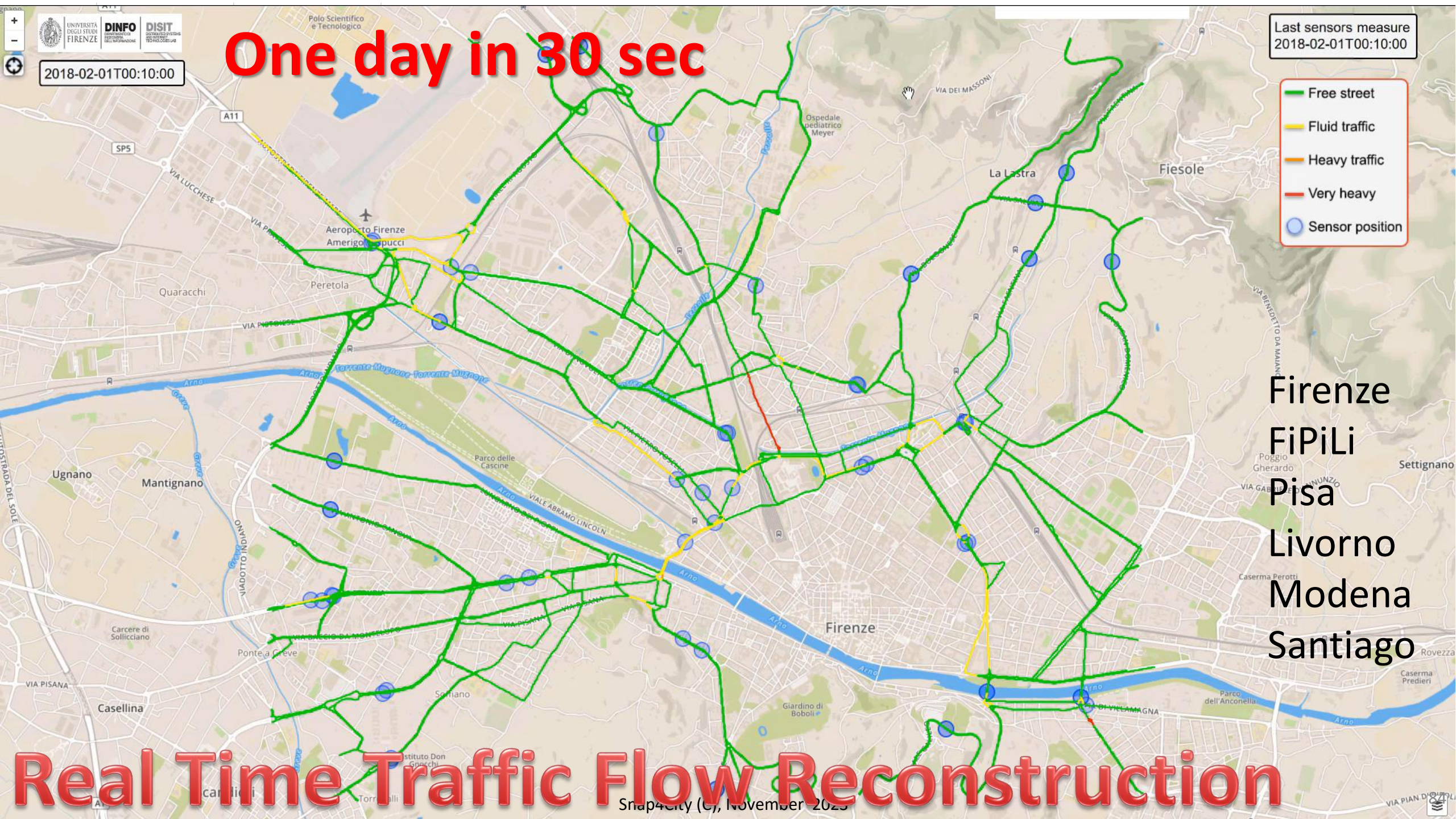
Sii-Mobility

Knowledge Base
Semantic Reasoners

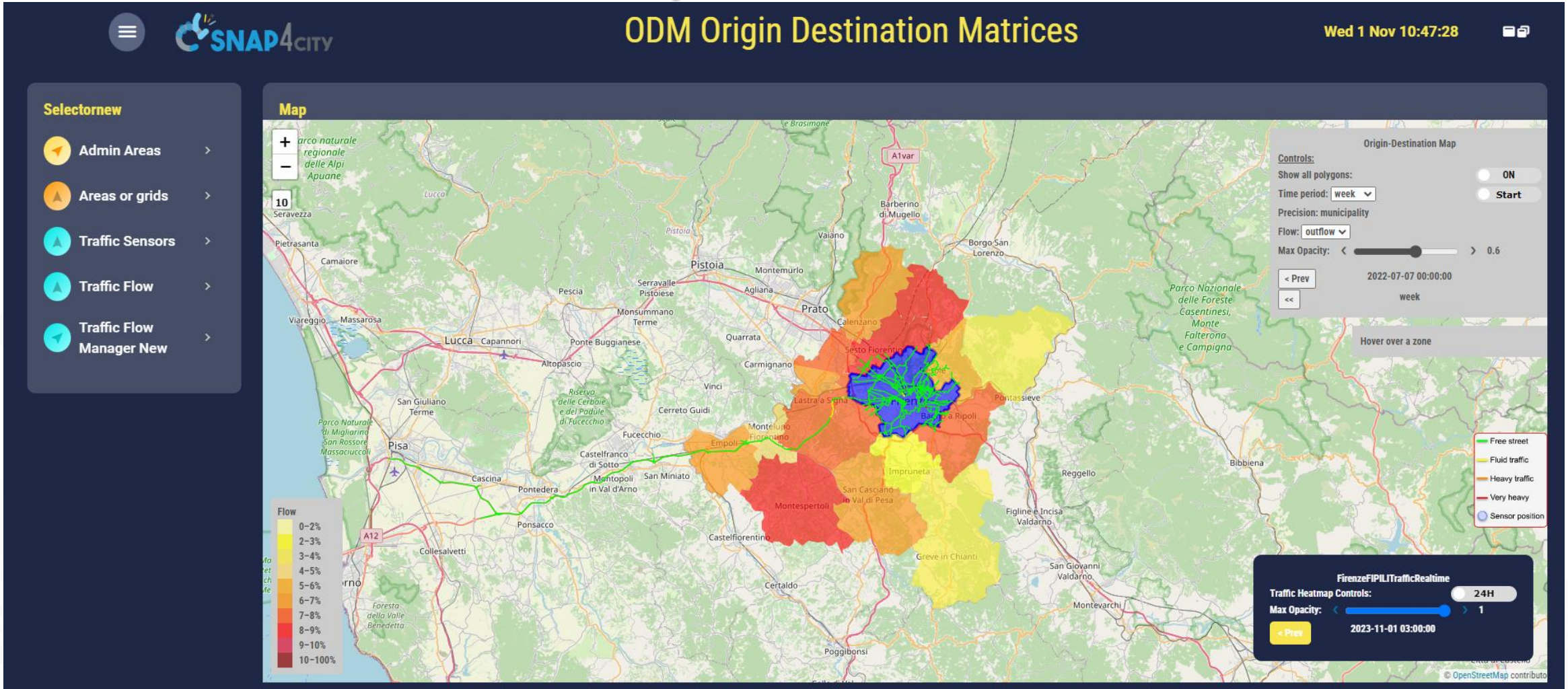
ServiceMap: https://servicemap.km4city.org

EAQI Heatmap and sequence

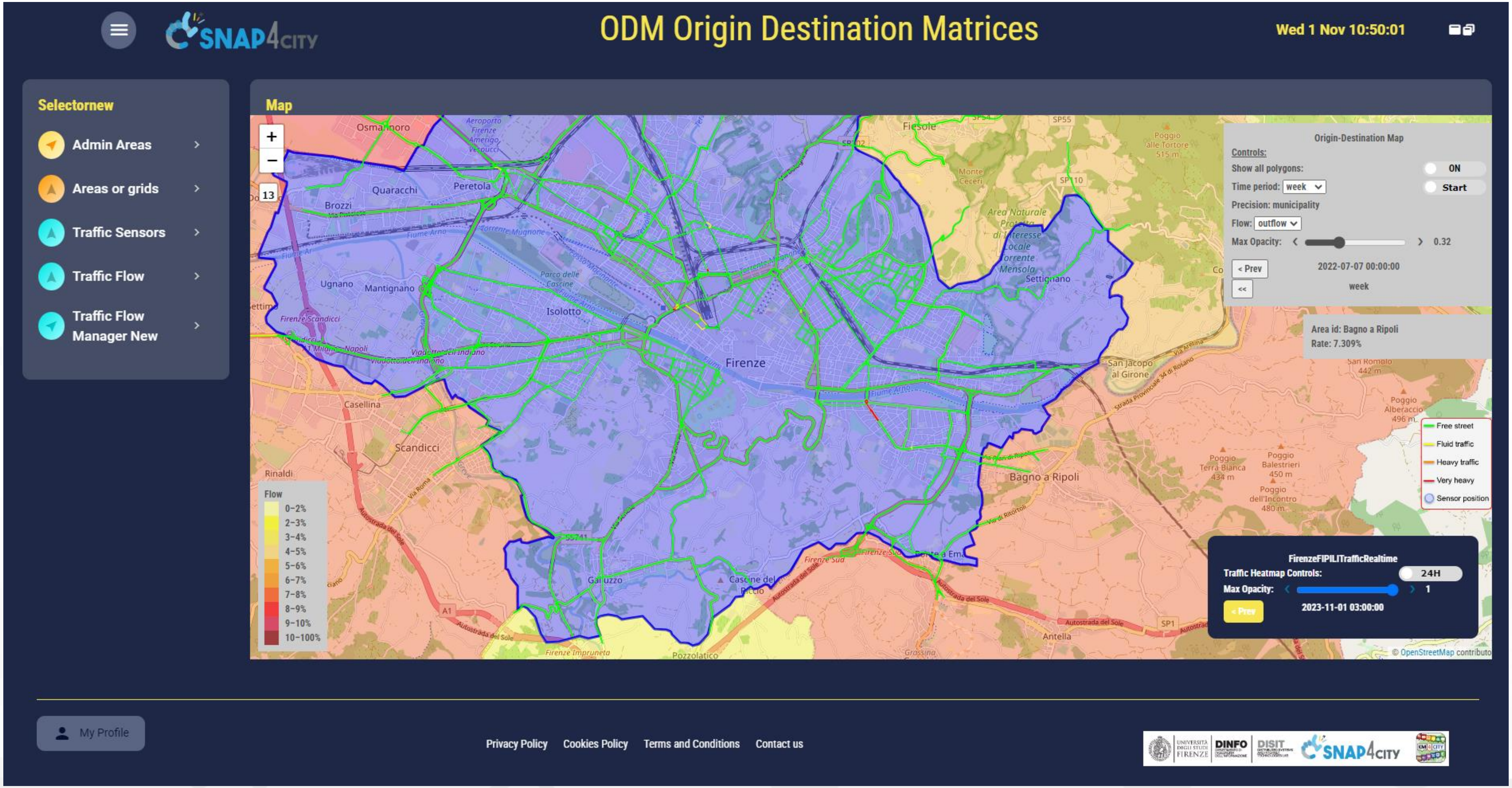



One day in 30 sec
2018-02-01T00:10:00
Last sensors measure
2018-02-01T00:10:00
Free street
Fluid traffic
Heavy traffic
Very heavy
Sensor position
Firenze
FiPiLi
Pisa
Livorno
Modena
Santiago
Real Time Traffic Flow Reconstruction

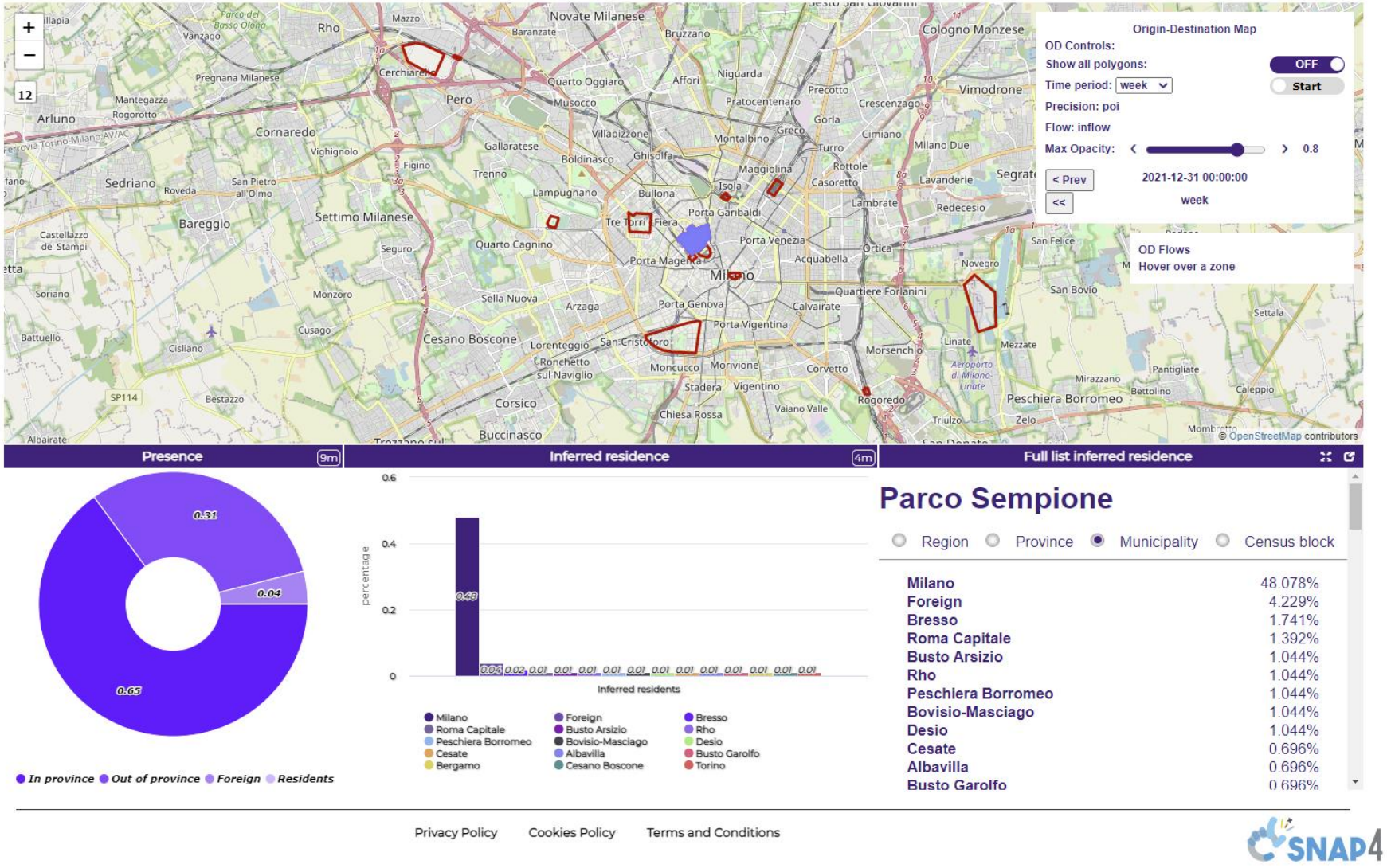
ODM, Traffic Flow



https://www.snap4city.org/dashboardSmartCity/view/Gea-Night.php?iddasboard=Mzk3Nw==


ODM Origin Destination Matrices
Wed 1 Nov 10:50:01
Selectornew
Admin Areas
Areas or grids
Traffic Sensors
Traffic Flow
Traffic Flow Manager New
Map
Origin-Destination Map
Controls:
Show all polygons:
ON
Time period: week
Start
Precision: municipality
Flow: outflow
Max Opacity:
0.32
< Prev
2022-07-07 00:00:00
week
Area id: Bagno a Ripoli
Rate: 7.309%
Flow
0-2%
2-3%
3-4%
4-5%
5-6%
6-7%
7-8%
8-9%
9-10%
10-100%
Free street
Fluid traffic
Heavy traffic
Very heavy
Sensor position
FirenzeFIPILITrafficRealtime
Traffic Heatmap Controls:
24H
Max Opacity:
1
2023-11-01 03:00:00
Firenze
Bagno a Ripoli
Scandicci
Fiesole
My Profile
Privacy Policy
Cookies Policy
Terms and Conditions
Contact us

ODM Visual Analytic on Milan Area



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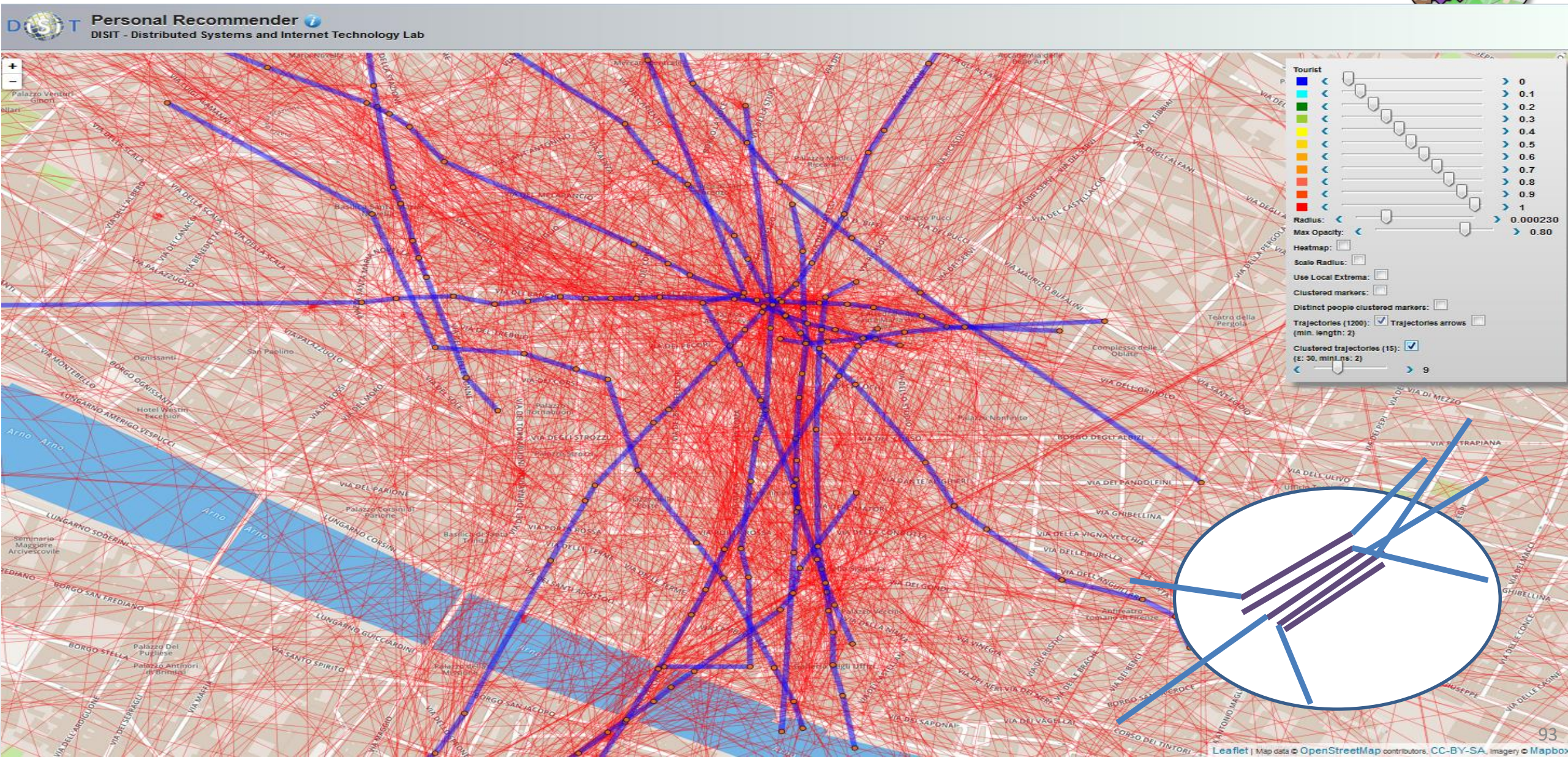
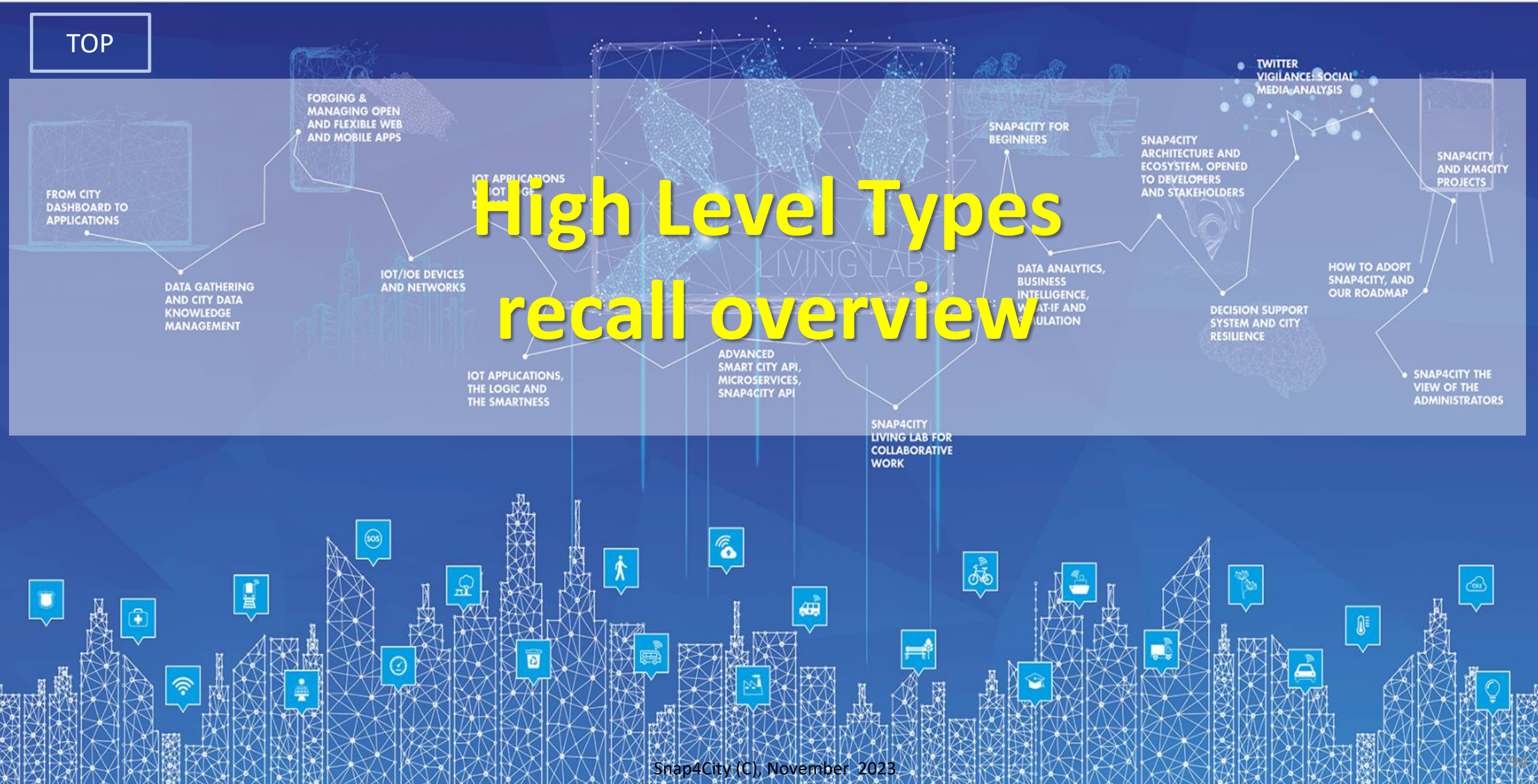
Cluster di Trajectories

KM 4 CITY



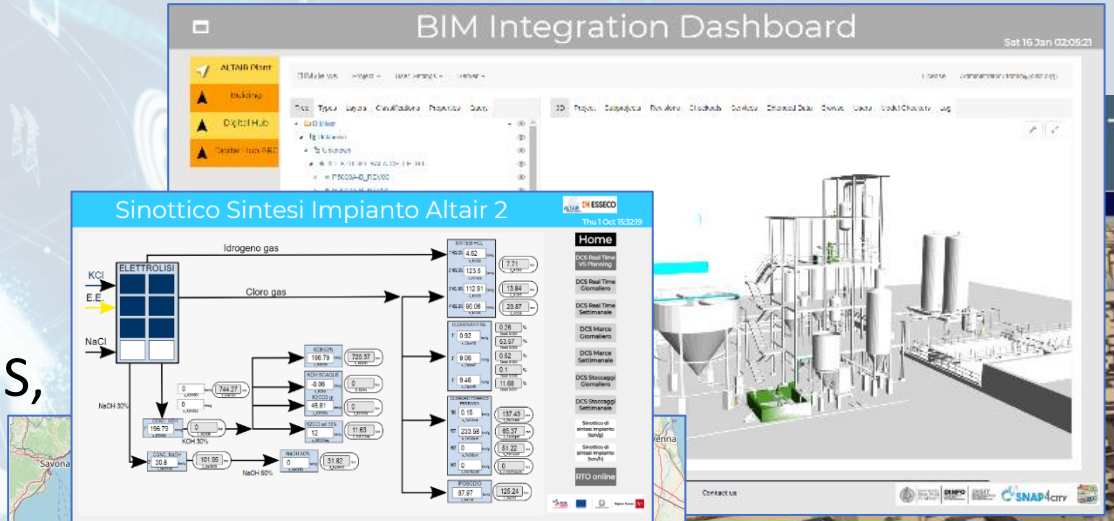


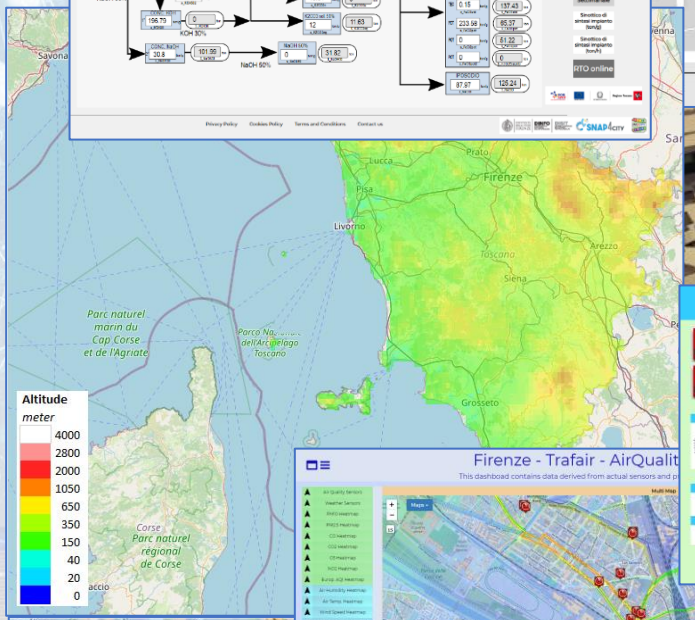
High Level Types recall overview

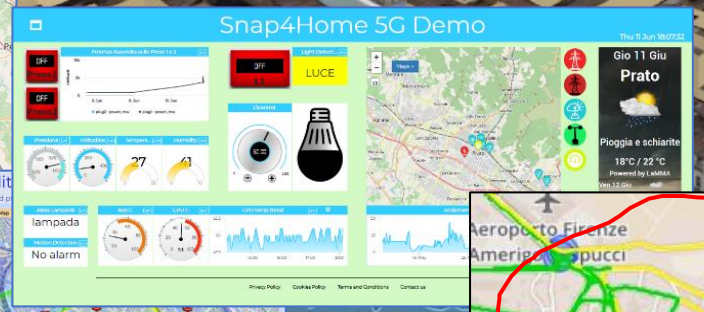
High Level Types

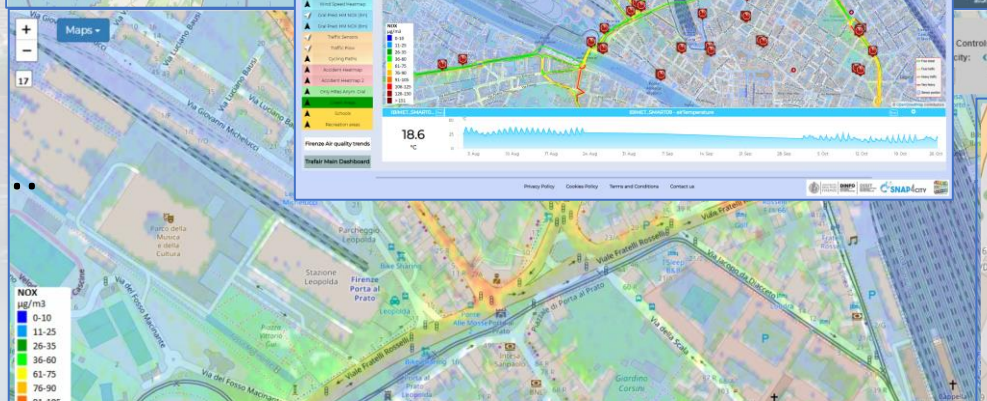
Snap4City (C), November 2023

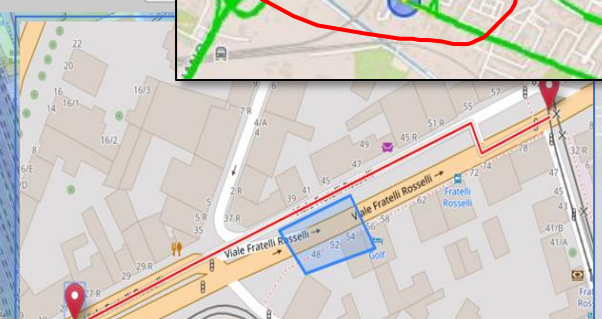
- POI, IOT Devices, shapes,..
  - FIWARE Smart Data Models,
  - IoT Device Models
- GIS, maps, orthomaps, WFS/WMS, GeoTiff, calibrated heatmaps, ..
- Satellite data, ..
- traffic flow, typical trends, ..
- trajectories, events, Workflow, ..
- 3D Models, BIM, Digital Twins, ..
- OD Matrices of several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



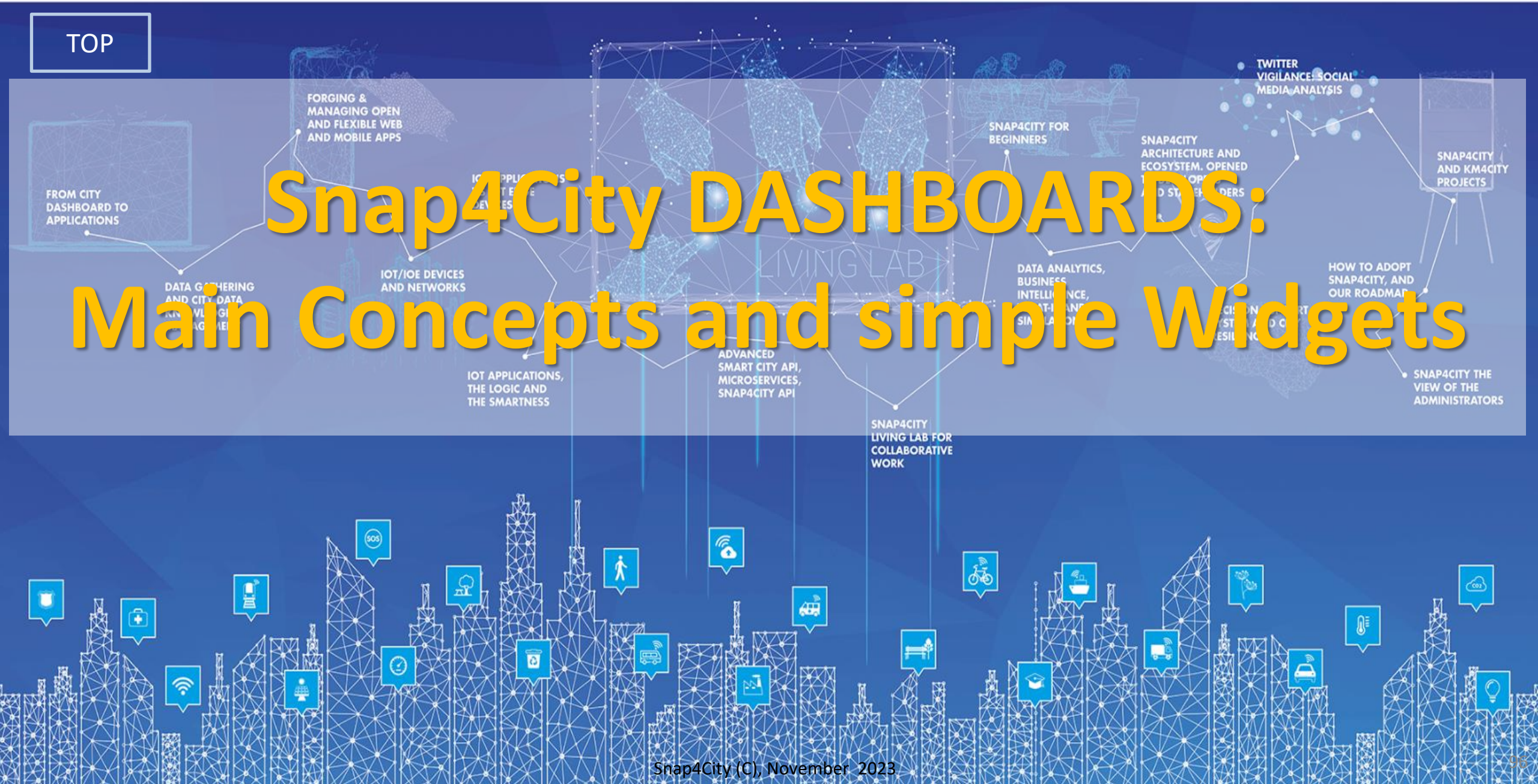








TOP



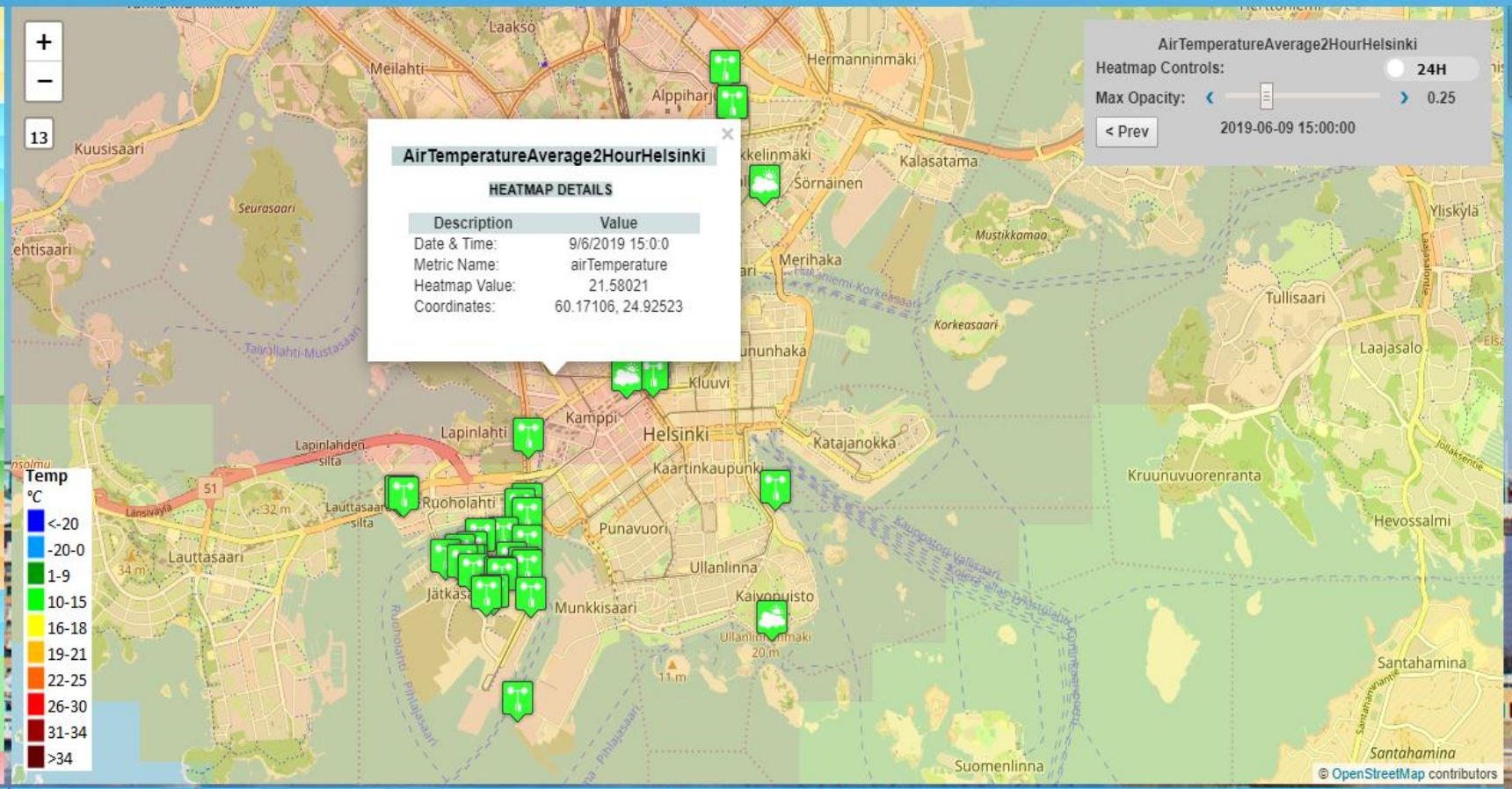
Snap4City DASHBOARDS: Main Concepts and simple Widgets

Helsinki City Overview (H5a)

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

Sun 9 Jun 17:07:25

- BusStop
- 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



Weather sen... 9m

20.5

Weather sensor Helsinki Kaisaniemi - airTemperature 9m

The Life of Helsinki

Documentation

Forum Discussion

Survey

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

Helsinki City Overview (H5a)

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

Sun 9 Jun 17:07:25

Selection

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

AirTemperatureAverage2HourHelsinki

HEATMAP DETAILS

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

AirTemperatureAverage2HourHelsinki

Heatmap Controls: 24H

Max Opacity: 0.25

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

Temp °C

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

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

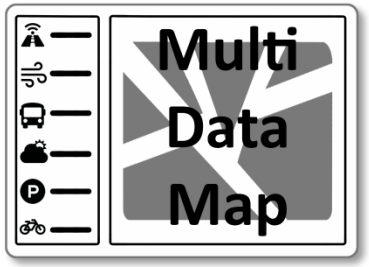
3. Jun 4. Jun 5. Jun 6. Jun 7. Jun 8. Jun 9. Jun

Single Content

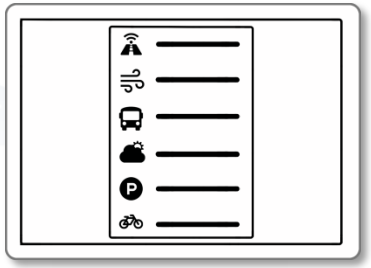
Time Trend

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

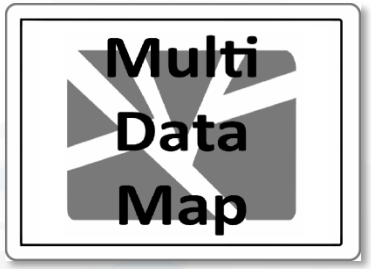
Dashboard Usage & Recipe



- https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTQwNg==
- **Selector Widget**: (of different kinds) present "Information", according to the HighLevelType (**HLT**), as overlapped layers on Target
  - **Additive**: PIN (POI, sensors, etc.), Cycling Paths, shapes, ...
  - **Mutual Exclusive by group**:
    - Heatmaps,
    - traffic,
    - Scenarios + what-if,
    - etc.

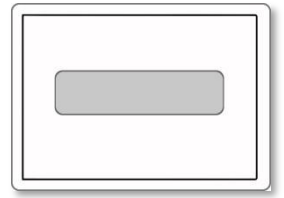


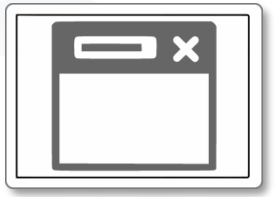
- **MultiDataMap Widget (Target**: (may be of different kind), this one may manage
  - Multiple representations on the same map
  - Each representation may provide specific interaction modalities and controls

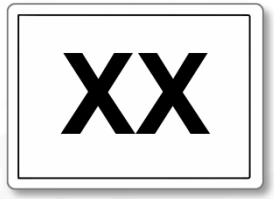


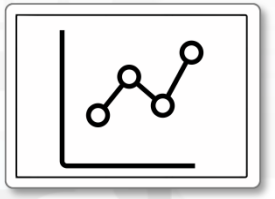
Other Widgets in the dashboard

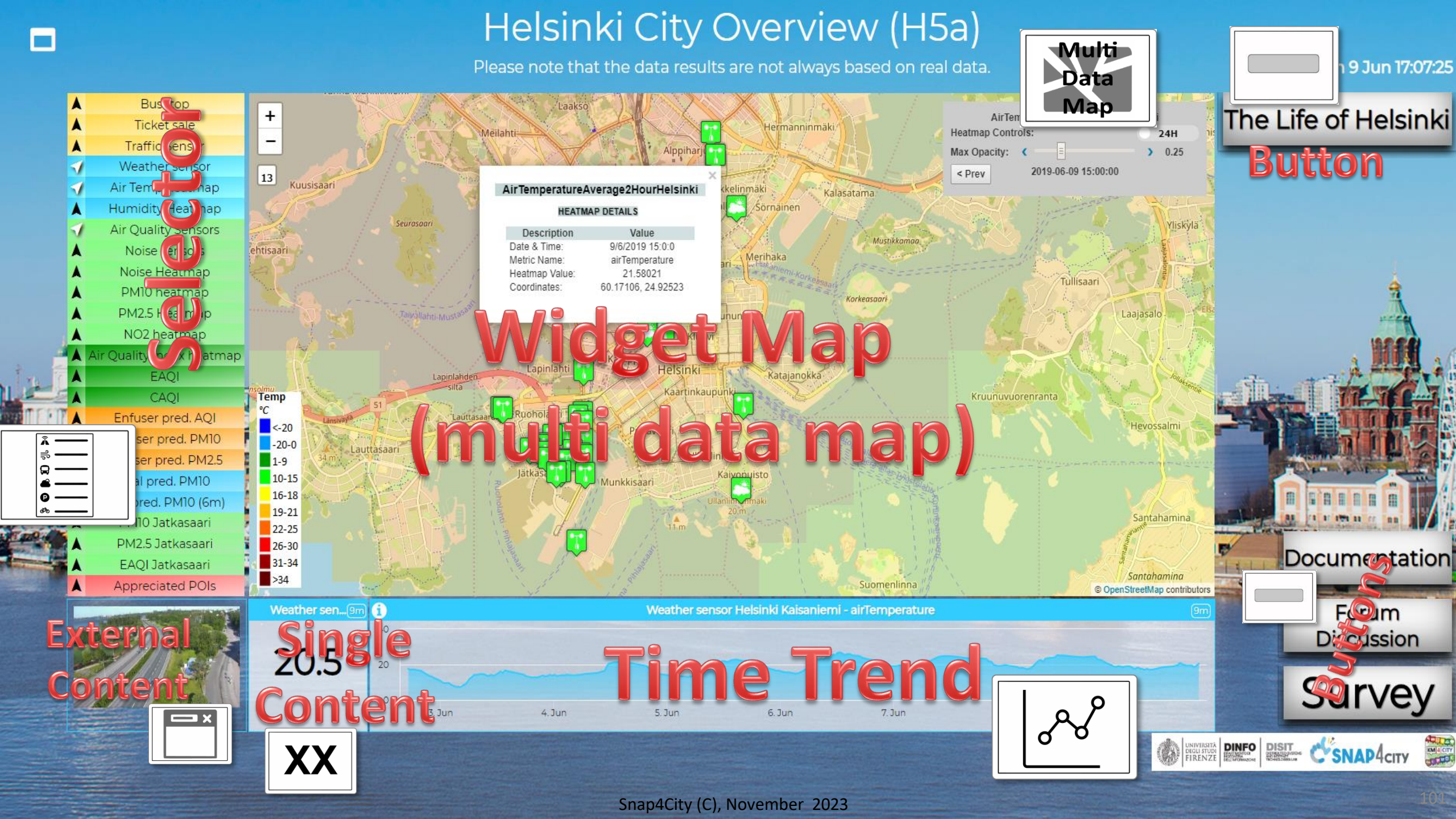
- **Button Widget** may be of different kind and may
  - Open external web pages, services, forum, surveys, etc.
  - Send messages on the field (IOT), etc.
- **External Content**:
  - Web pages (HTML + CSS + etc..), Video Streams
  - Many many other tools see next exercise
- **Single Content**
  - Single value: numeric, string, HTML, etc.
- **Time Trend**
  - Time Series: numeric values over time



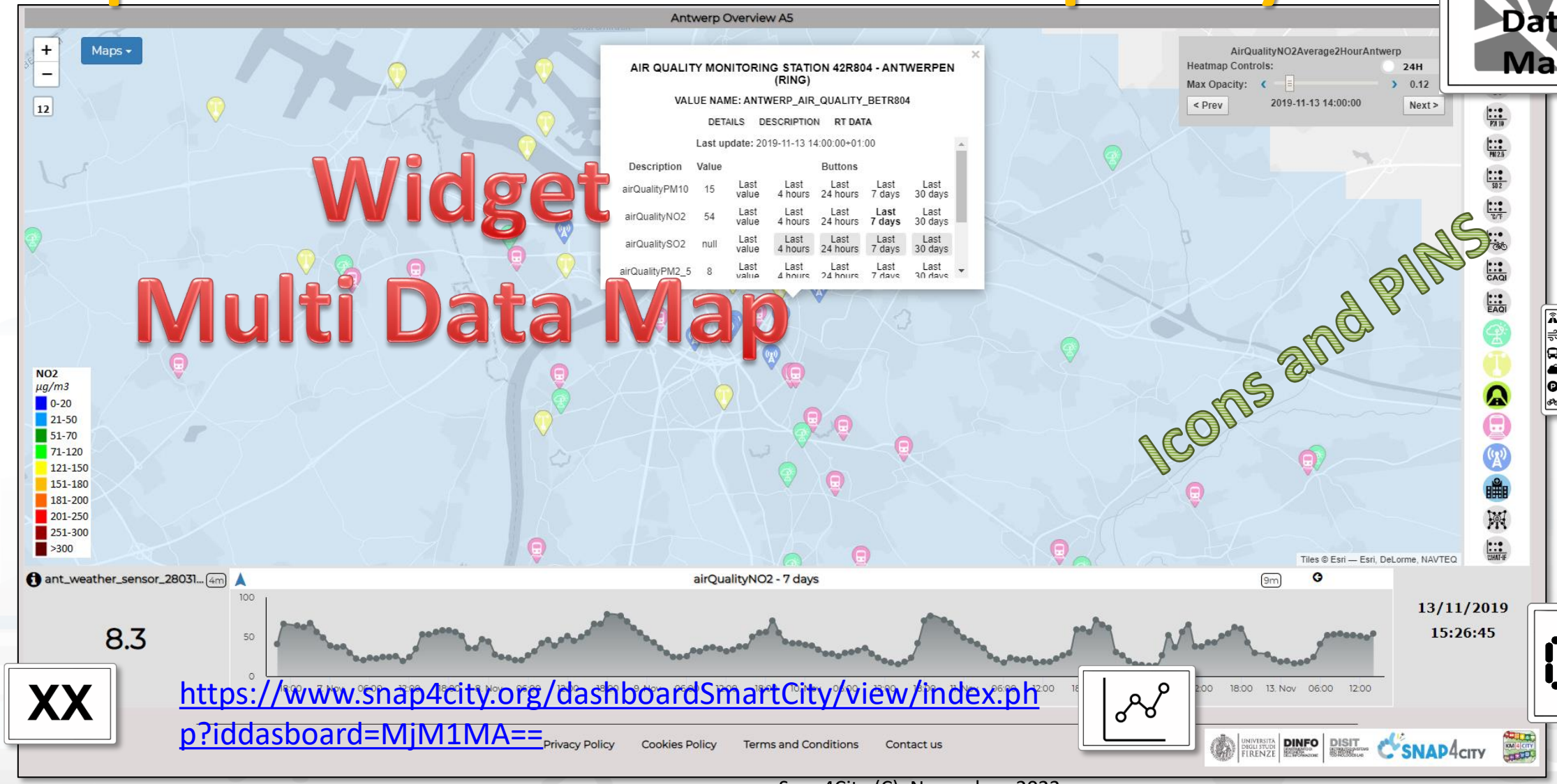







Helsinki City Overview (H5a)
Please note that the data results are not always based on real data.
9 Jun 17:07:25
Multi Data Map
The Life of Helsinki Button
Selector
Bus stop
Ticket sale
Traffic sensor
Weather sensor
Air Temp heatmap
Humidity Heatmap
Air Quality Sensors
Noise sensors
Noise Heatmap
PM10 heatmap
PM2.5 Heatmap
NO2 heatmap
Air Quality Index heatmap
EAQI
CAQI
Enfuser pred. AQI
Enfuser pred. PM10
Enfuser pred. PM2.5
Dal pred. PM10
Pred. PM10 (6m)
PM10 Jatkasaari
PM2.5 Jatkasaari
EAQI Jatkasaari
Appreciated POIs
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
Heatmap Controls:
24H
Max Opacity:
0.25
< Prev
2019-06-09 15:00:00
Temp °C
<-20
-20-0
1-9
10-15
16-18
19-21
22-25
26-30
31-34
>34
Widget Map
(multi data map)
Helsinki
Lapinlahti
Kaisaniemi
Kruunuvuorenranta
Hevossalmi
Santahamina
Suomenlinna
Munkkisaari
Lauttasaari
Ruoholahti
Jätkäsaari
Kaivopuisto
Katajanokka
Kaartinkaupunki
Tullisaari
Laajasalo
Yliskylä
Kalasatama
Merihaka
Meilahti
Laakso
Hermanninmäki
Kuusisaari
Seurasaari
Korkeasaari
Mustikkamaa
© OpenStreetMap contributors
Documentation
Forum Discussion
Survey
Buttons
External Content
Weather sen...
20.5
Single Content
Weather sensor Helsinki Kaisaniemi - airTemperature
Time Trend
3. Jun
4. Jun
5. Jun
6. Jun
7. Jun
XX
UNIVERSITÀ DEGLI STUDI FIRENZE
DINFO
DISIT
SNAP4CITY
KM4CITY

Unique Dashboard builder Multiple Styles



Widget Multi Data Map

Icons and PINS

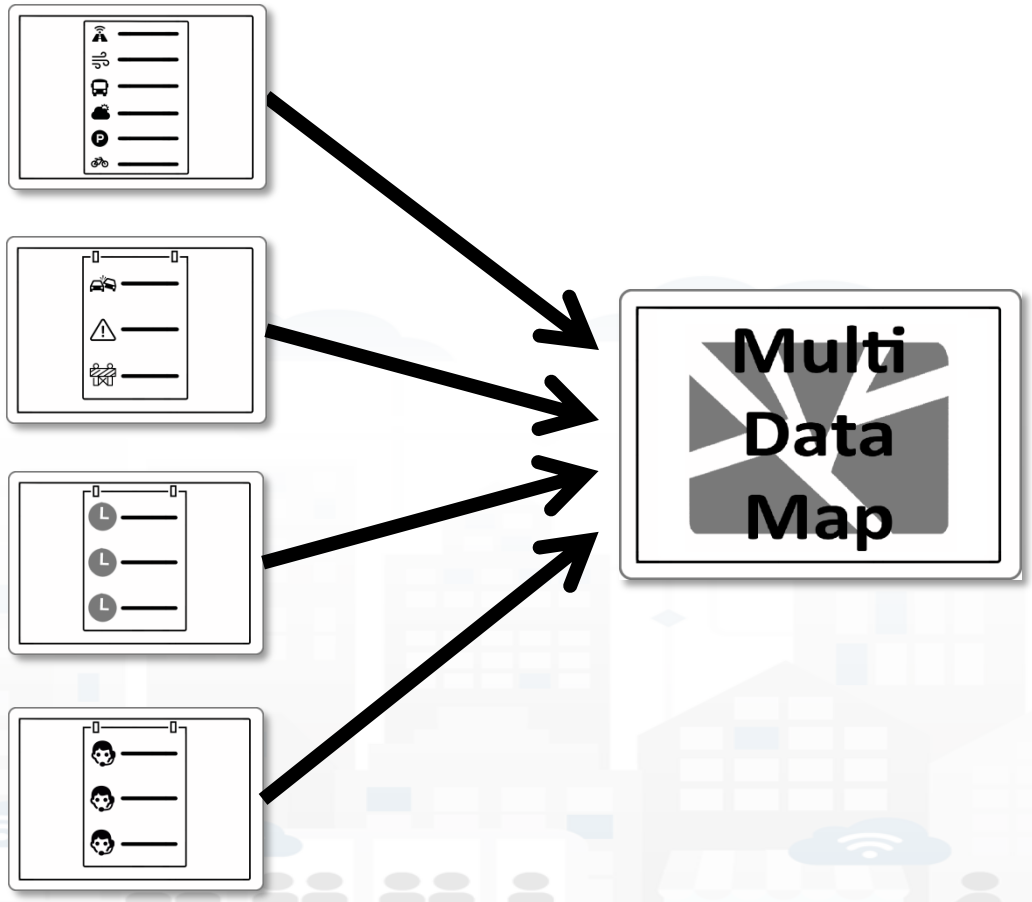
Multi Data Map

Multi Data Map

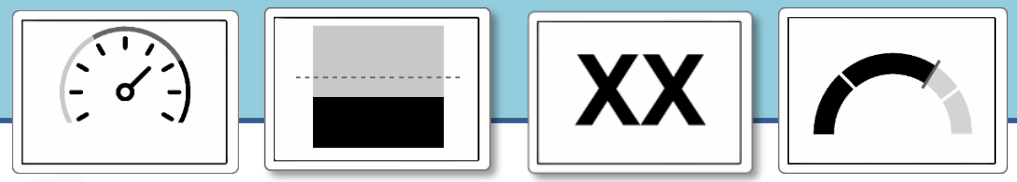
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjM1MA==

Dashboard Usage and recipe: Event map target

- Selector to Show on Map a
  - category of Map positioned elements
  - Single Entity
  - Heatmap among many
  - Traffic flow
  - Origin Destination Map
- Events which are also PIN on map



Main Single Values Widgets

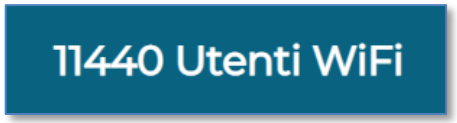


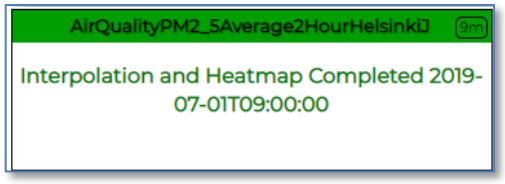
Single Value Widgets

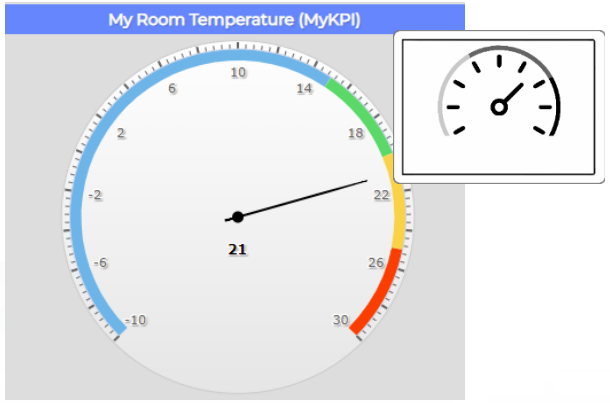
- Entity/device can be a Time Series
- They can be connected to some Entity/device to show the last value associated with the widget
- They can be controlled to show a specific value over time

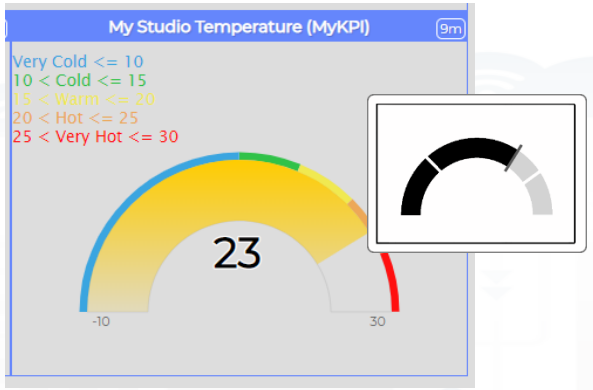
Single values

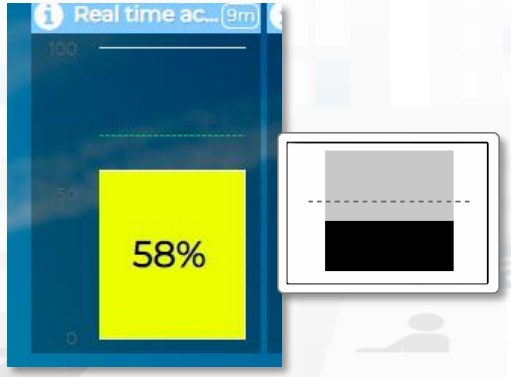
- **Single Content**
- **Speedometer**
- **Gauge**
- **Single Bar**









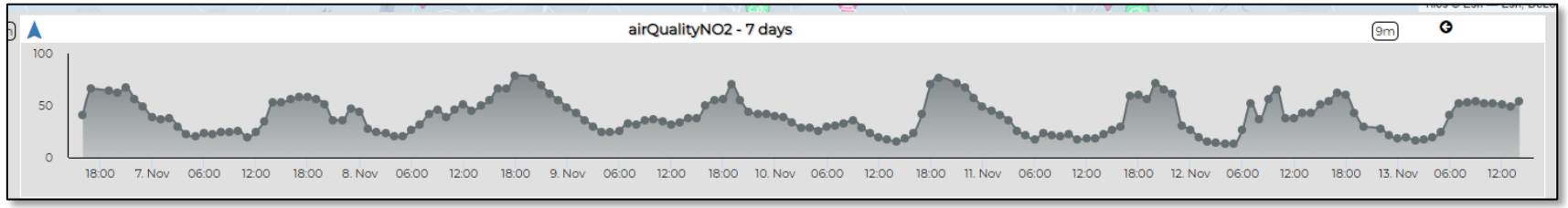


Most of the multi xxxx widgets can show also single values

Time Series, Multi Series Widgets

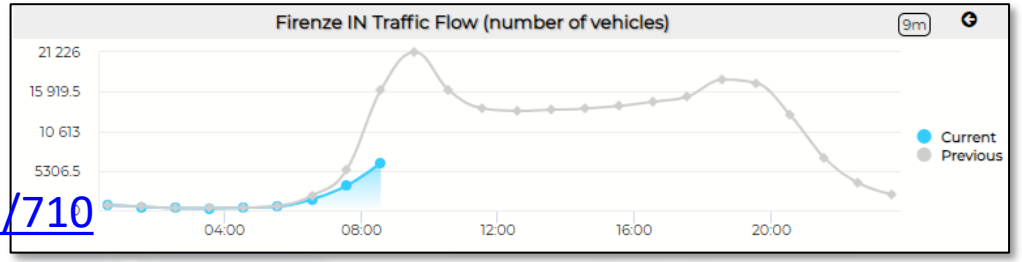
Time Series

- **Time Trend**

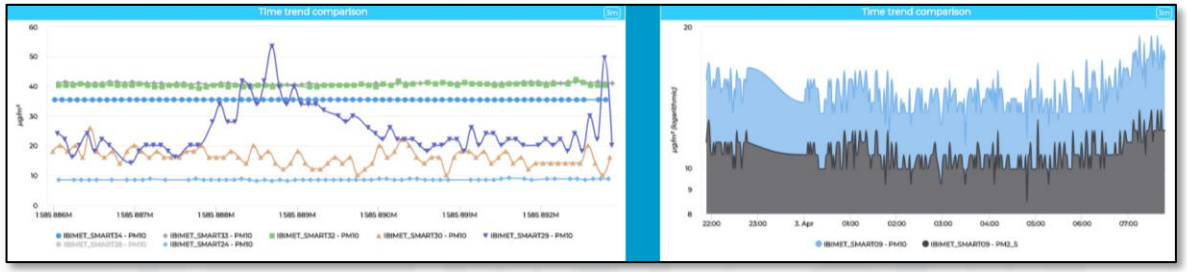


- **Time Trend Compare**
  - Comparing trends of the same time series

https://www.snap4city.org/710

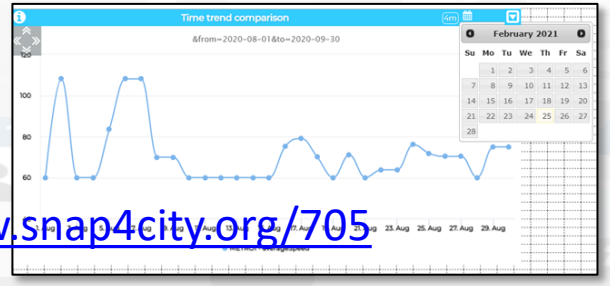


- **Multi Series**
  - Showing multiple trends of multiple time series with same unit



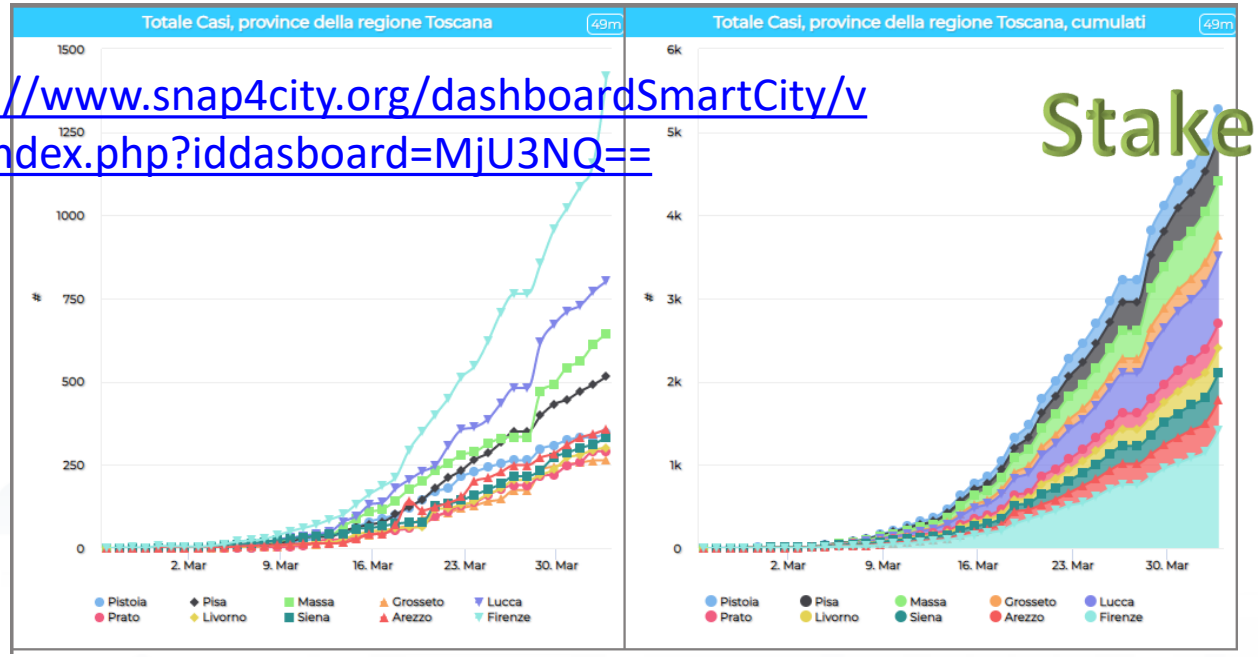
- **Typical Time Trend**
  - Showing the typical trend of a time serie: multiple modalities

https://www.snap4city.org/705



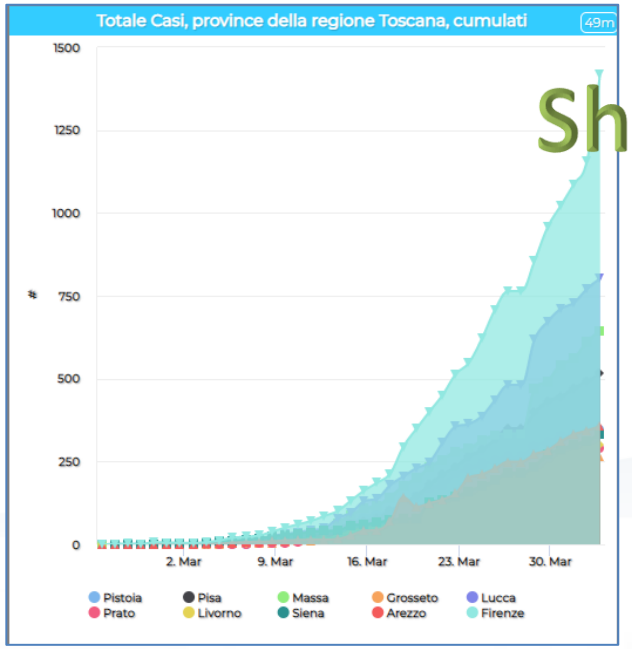
MultiSeries

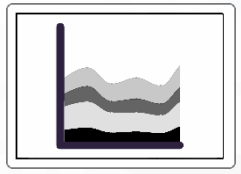
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjU3NQ==

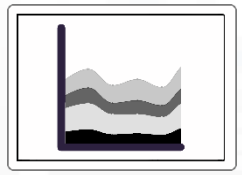


Staked

Shaded







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

Time Series Test - Cloned

Fri 3 Apr 09:54:08

METRO55 - averageSpeed · METRO738 - averageSpeed · METRO707 - averageSpeed

Time trend comparison Filled Areas - Multiple Temperature Metrics 3m

°C

28. Mar · 29. Mar · 30. Mar · 31. Mar · 1. Apr · 2. Apr · 3. Apr

tusc_weather_sensor_ow_3178587 - minTemperature · tusc_weather_sensor_ow_3172996 - maxTemperature

Weather sensor Zwijndrecht - airTemperature · IBIMET_SMART06 - airTemperature

Time trend comparison - Stacked Filled Areas (ONLY ON EQUALLY SAMPLED DATA SERIES !) 3m

µg/m³

14. Mar · 16. Mar · 18. Mar · 20. Mar · 22. Mar · 24. Mar · 26. Mar · 28. Mar · 30. Mar · 1. Apr · 3. Apr

IBIMET_SMART30 - PM10 · IBIMET_SMART30 - PM2_5

Time trend comparison 3m

µg/m³

21. Mar · 22. Mar · 23. Mar · 24. Mar · 25. Mar · 26. Mar · 27. Mar · 28. Mar · 29. Mar · 30. Mar · 31. Mar · 1. Apr · 2. Apr · 3. Apr

IBIMET_SMART16 - PM10 · IBIMET_SMART18 - PM10 · IBIMET_SMART28 - PM10 · IBIMET_SMART15 - PM10

Time trend comparison - MyKPI 3m

Friday, Mar 27, 22:55:59
Temperature3DataCenter - Gradi Centigradi: 17.5
Fri Mar 27 2020 22:55:59 GMT+01
No range defined on this field

30. Mar · 31. Mar · 1. Apr · 2. Apr · 3. Apr

Smart Bench Temperature - Temperature · Temperature3DataCenter - Gradi Centigradi · BatteryTemperatureGalaxyTabS4 - Gradi Centigradi

Time trend comparison 3m

µg/m³

1 585 886M · 1 585 887M · 1 585 888M · 1 585 889M · 1 585 890M · 1 585 891M · 1 585 892M

IBIMET_SMART34 - PM10 · IBIMET_SMART33 - PM10 · IBIMET_SMART32 - PM10 · IBIMET_SMART30 - PM10 · IBIMET_SMART29 - PM10 · IBIMET_SMART28 - PM10 · IBIMET_SMART24 - PM10

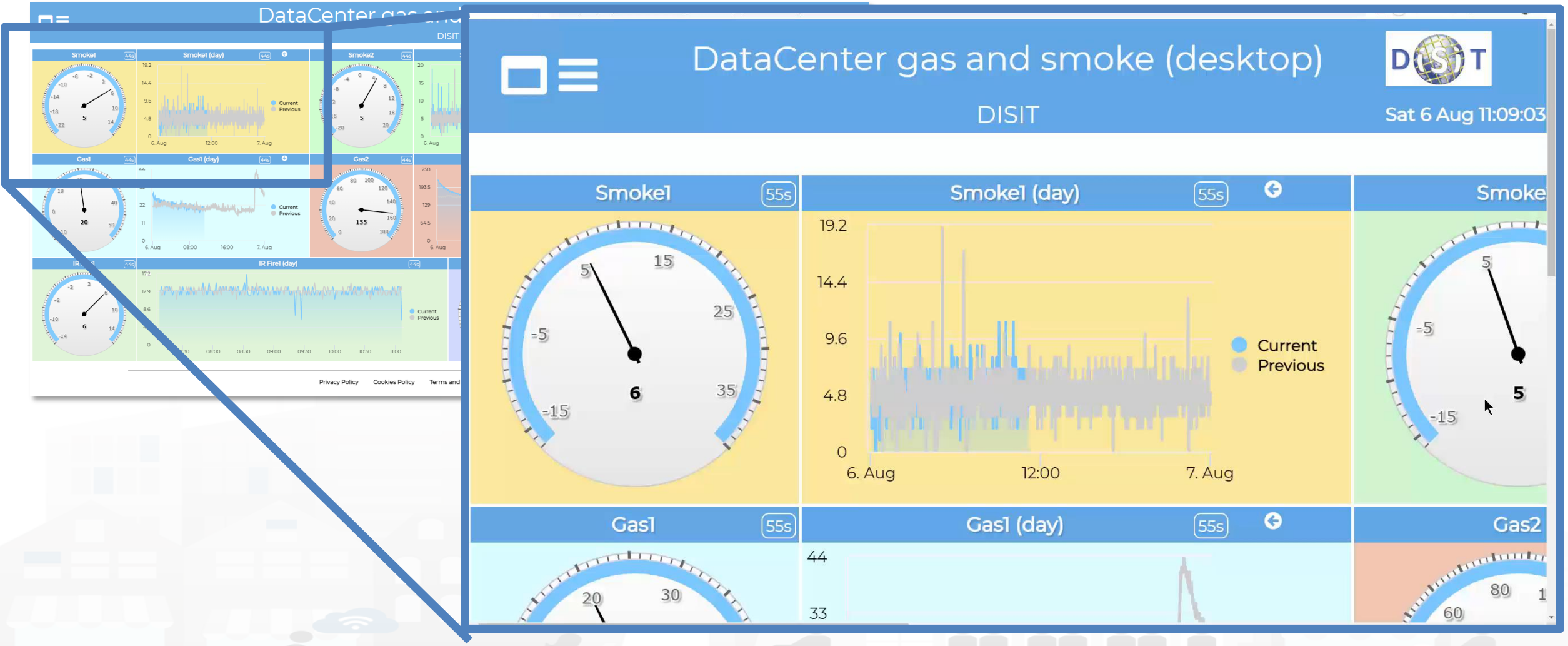
Time trend comparison 3m

µg/m³ (logarithmic)

22:00 · 23:00 · 3. Apr · 01:00 · 02:00 · 03:00 · 04:00 · 05:00 · 06:00 · 07:00

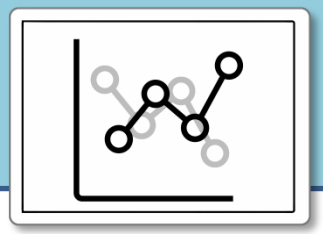
IBIMET_SMART09 - PM10 · IBIMET_SMART09 - PM2_5

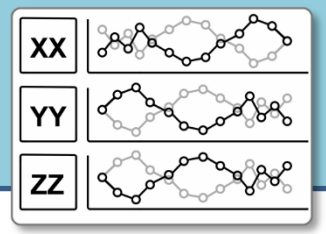
Drill Down over time



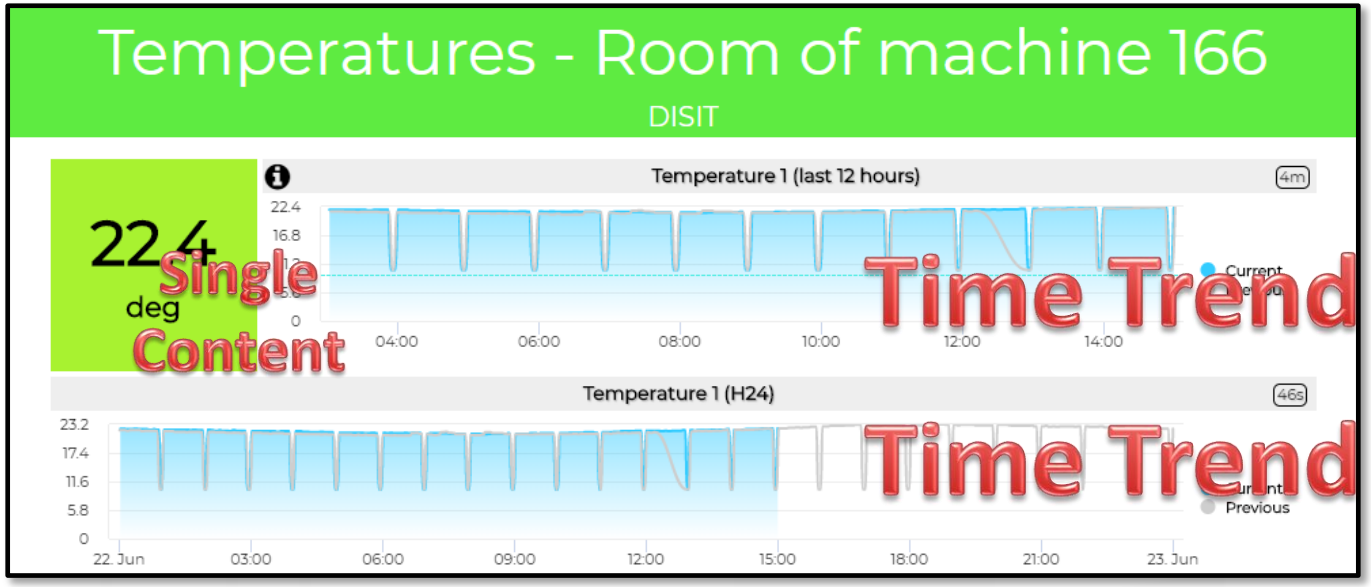
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjA1

Time Trend Compare Widgets for Time Series





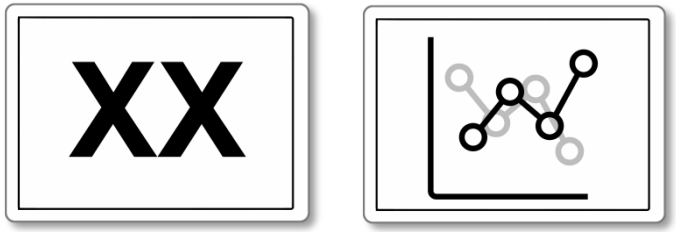
https://www.snap4city.org/710

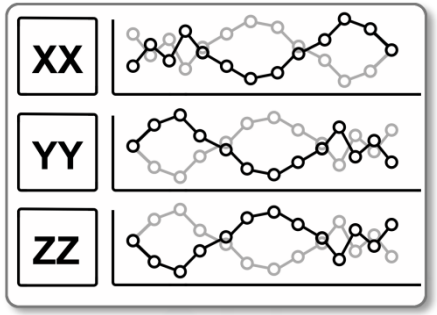


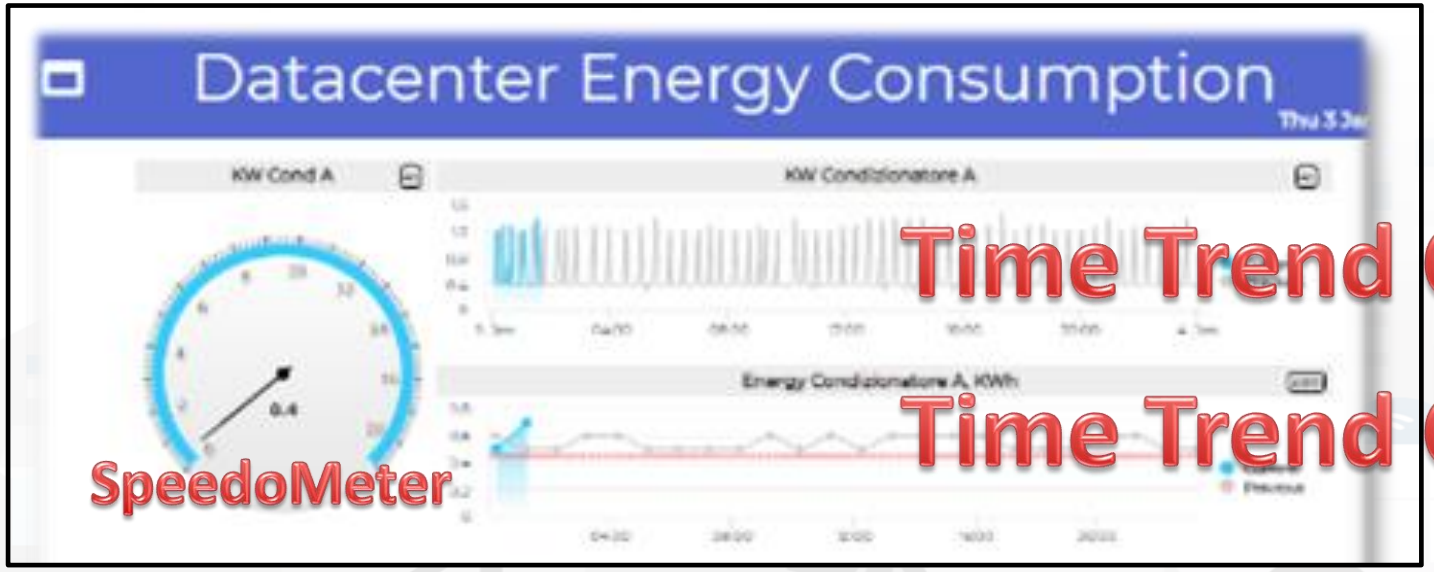
Single Content

Time Trend Compare

Time Trend Compare



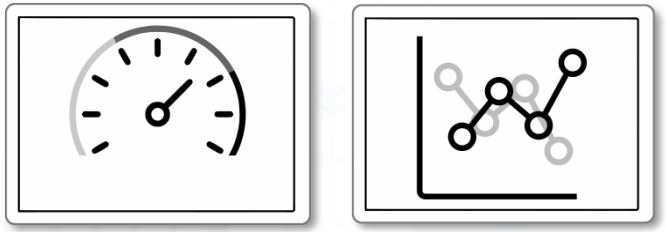




SpeedoMeter

Time Trend Compare

Time Trend Compare

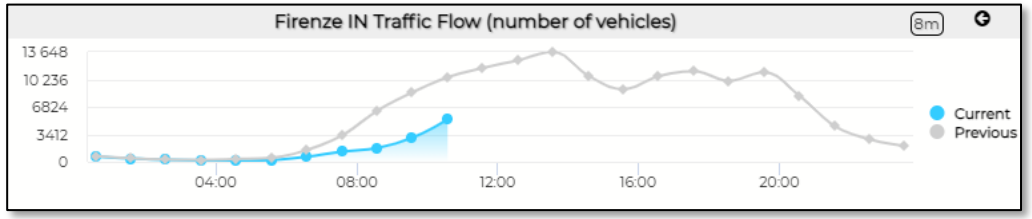


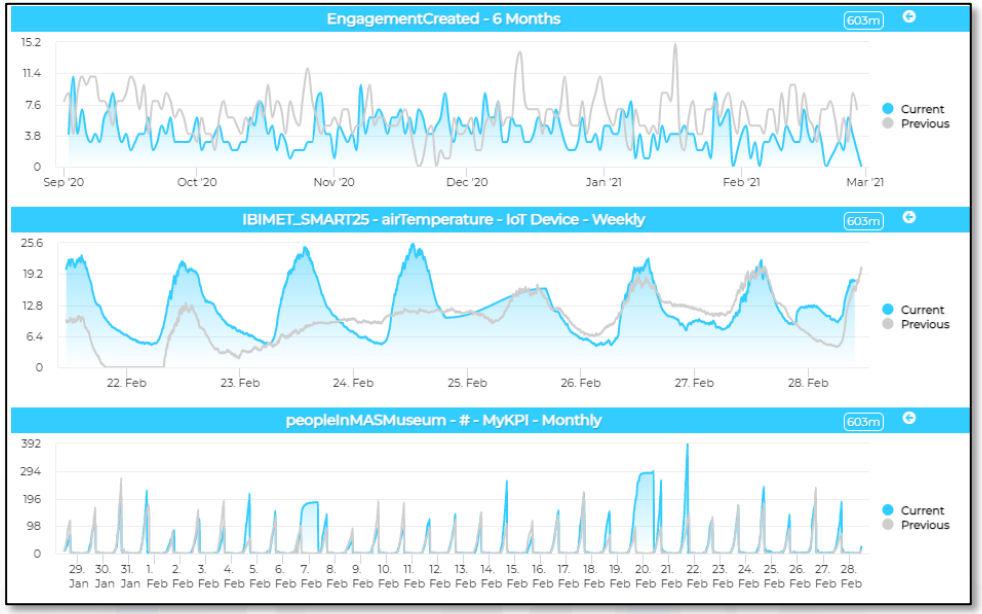
They manage
HLT: Sensor

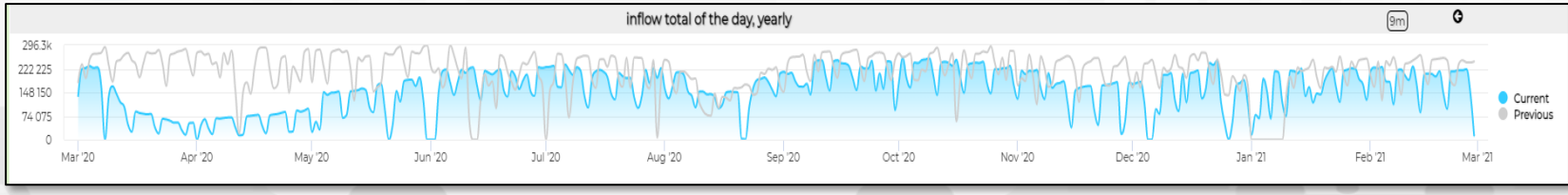
Time Trend Compare

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





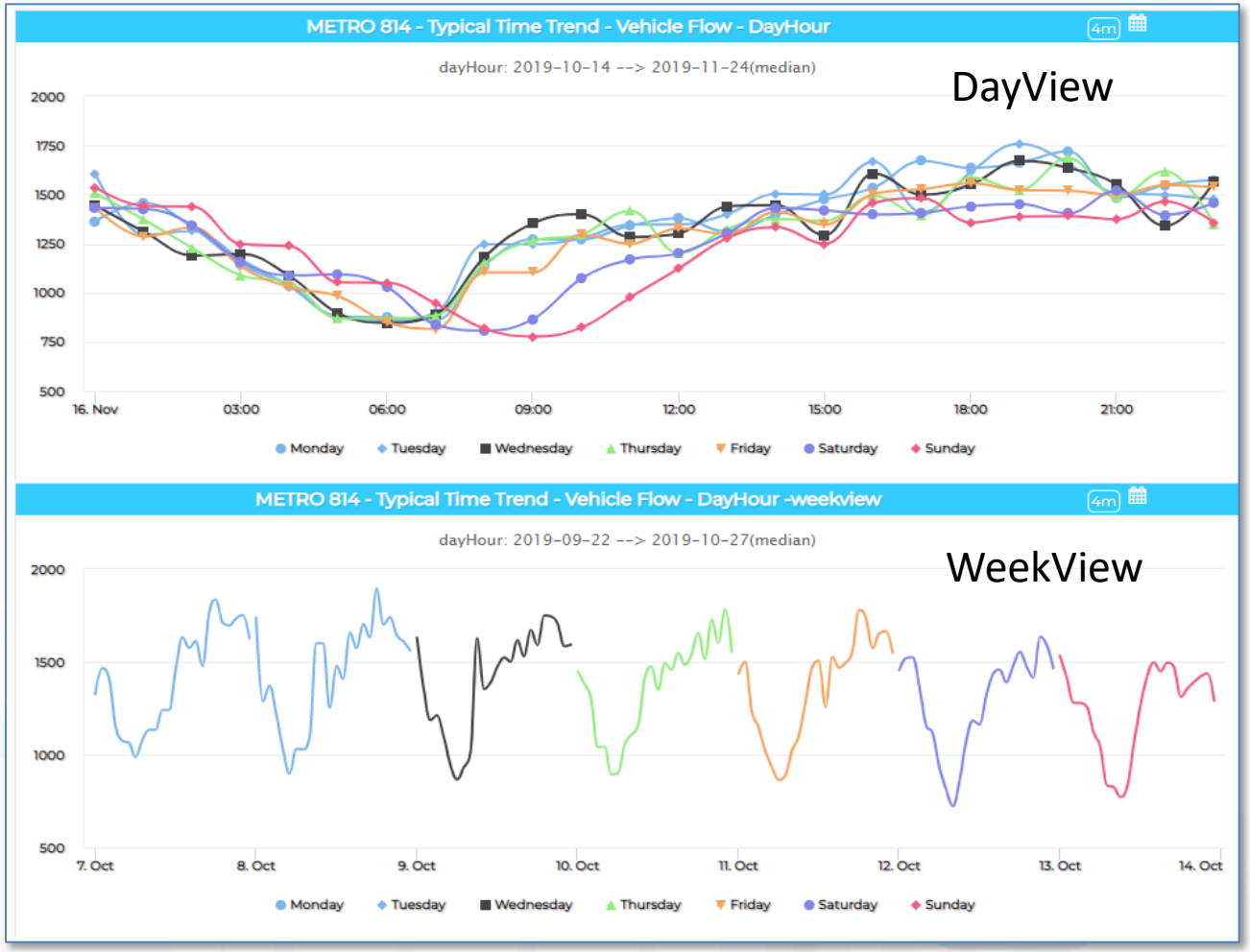


Typical Time Trend, Visual Analytic on Time Series

https://www.snap4city.org/705

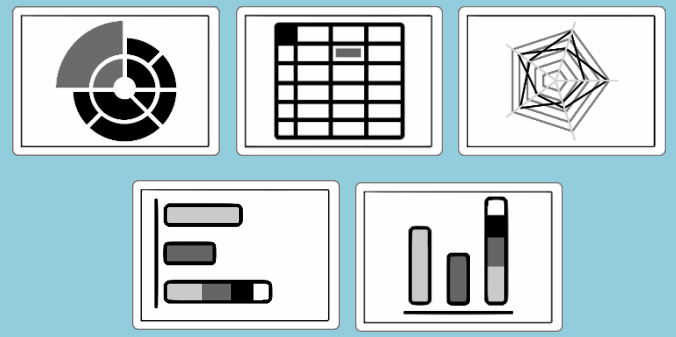
Typical Time Trend

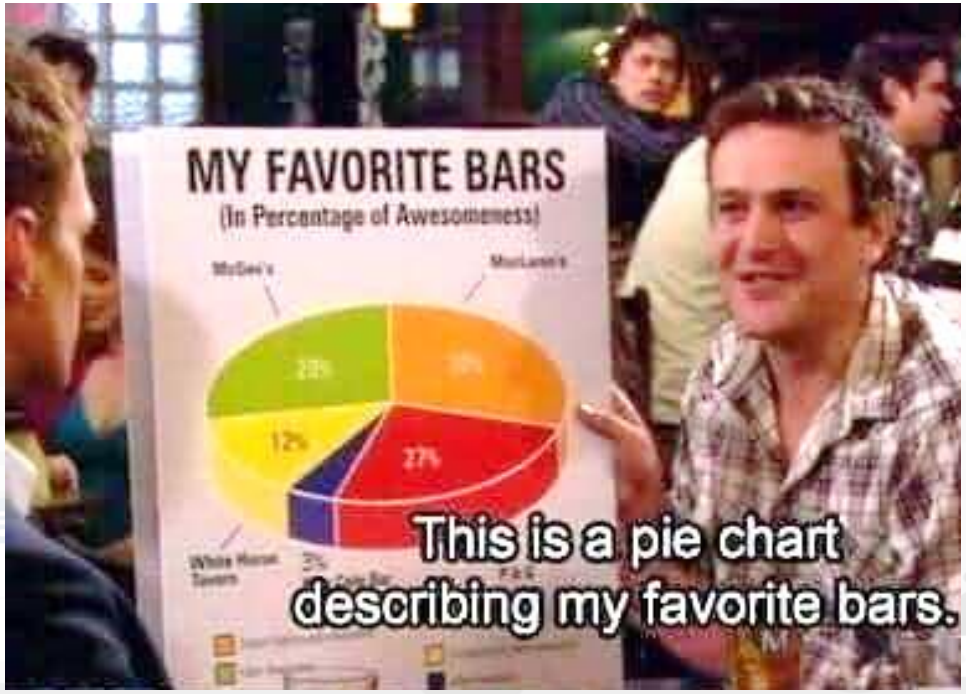
- They:
  - **need to be computed in advance** on the basis of a Time Serie variable, and a reference period of computation.
  - **represent typical trends of: min, max, average, median**
  - You can change the data on view
- **Formats**:
  - **DayHour**: 7 time trends, one for each day of the week, each hour, 24 values.
    - As DayView or WeekView, start monday
  - **MonthDay**: a value per day, 30 values of the month.
  - **MonthWeek**: a value per day aligned to week days: 28 values, 4 weeks.
    - 1st Monday of the month
    - 3rd Friday, etc.



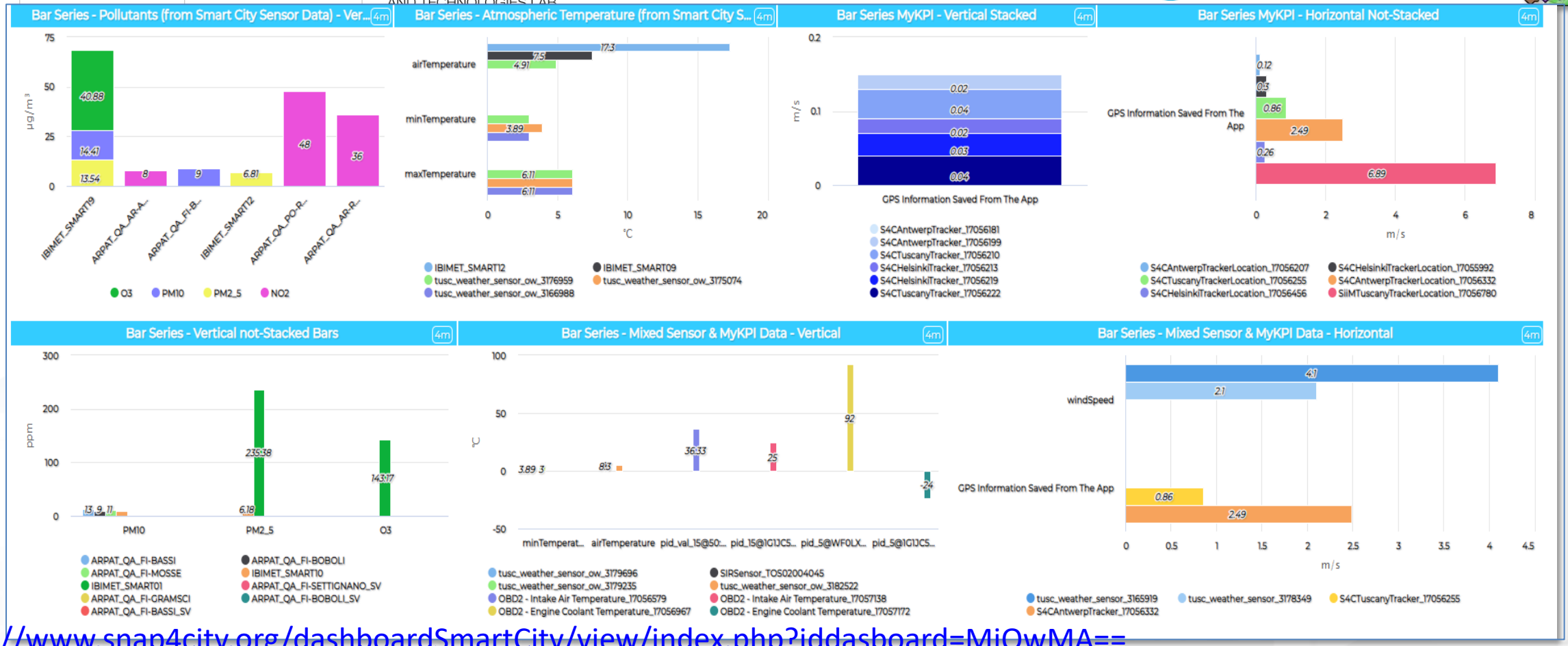
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzA4NA==

Bars, Pies, Donut, Spiders, Tables Widgets



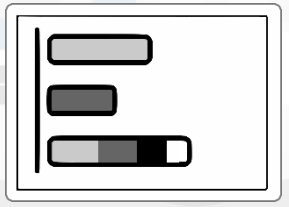


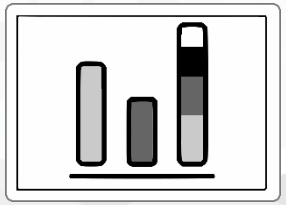
Barseries



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





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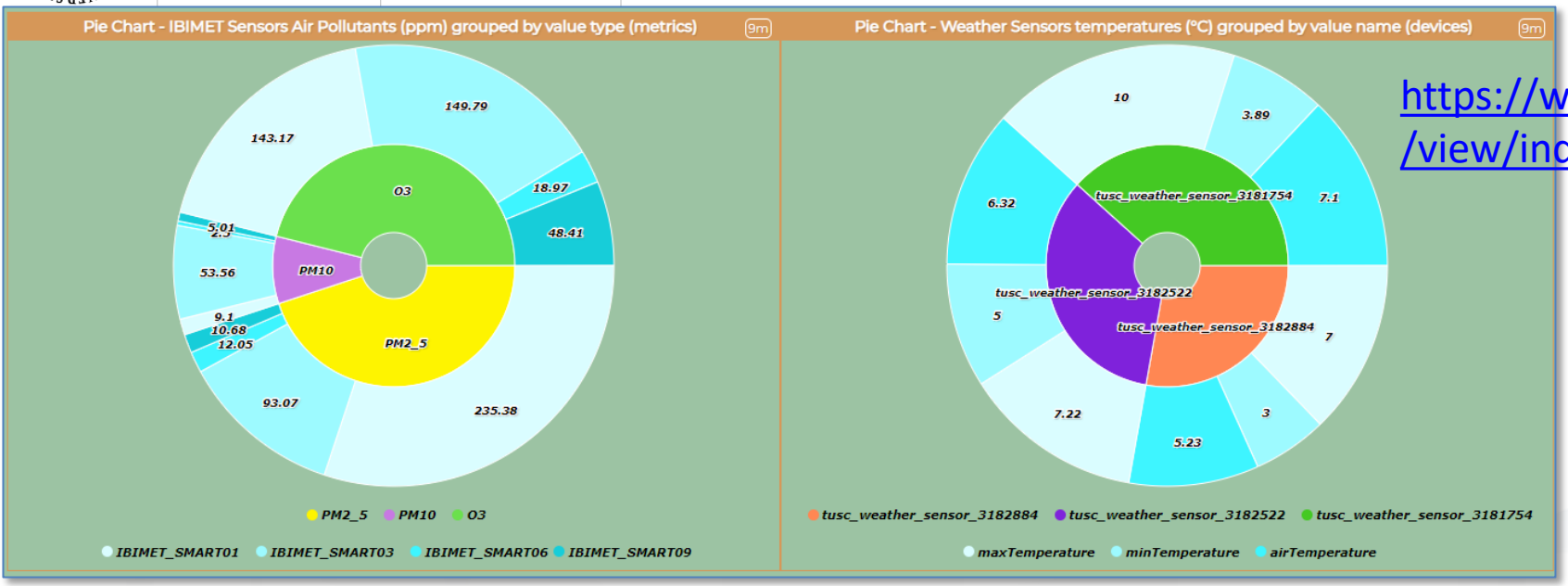
DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB DISTRIBUTED DATA INTELLIGENCE AND TECHNOLOGIES LAB

Pie & Donut

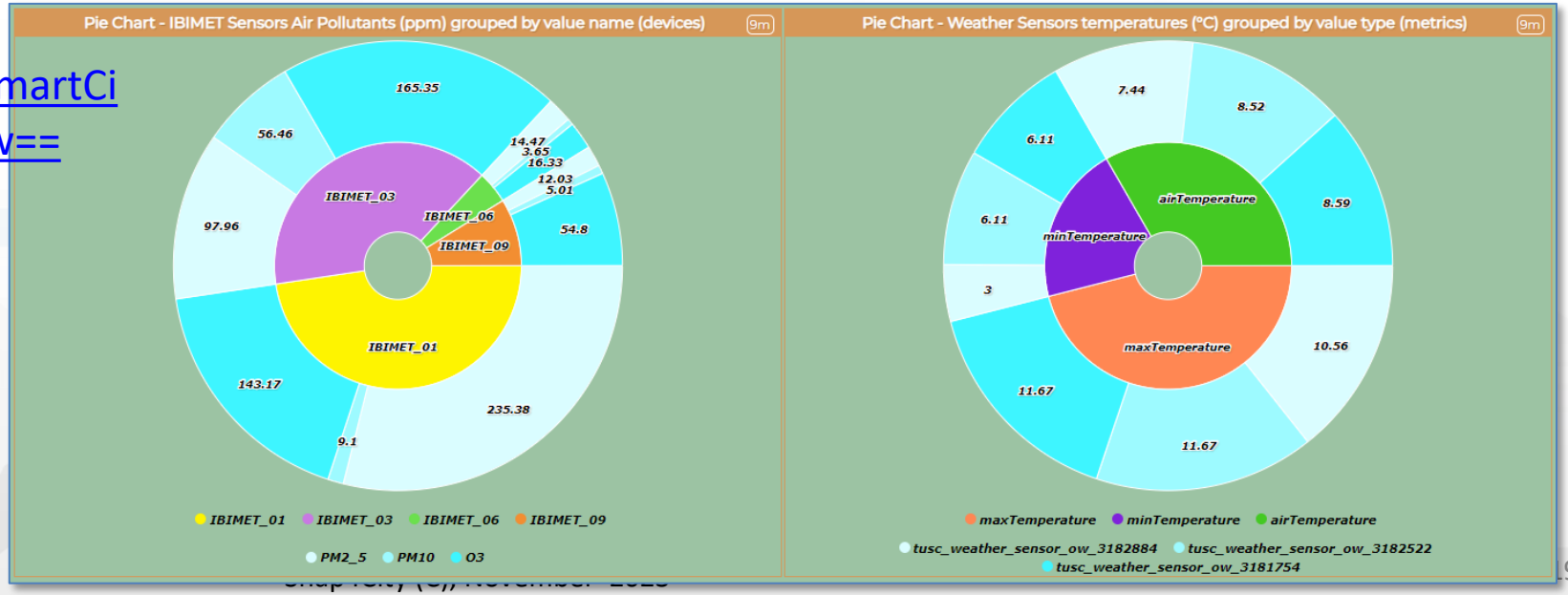
SNAP4CITY KM4CITY



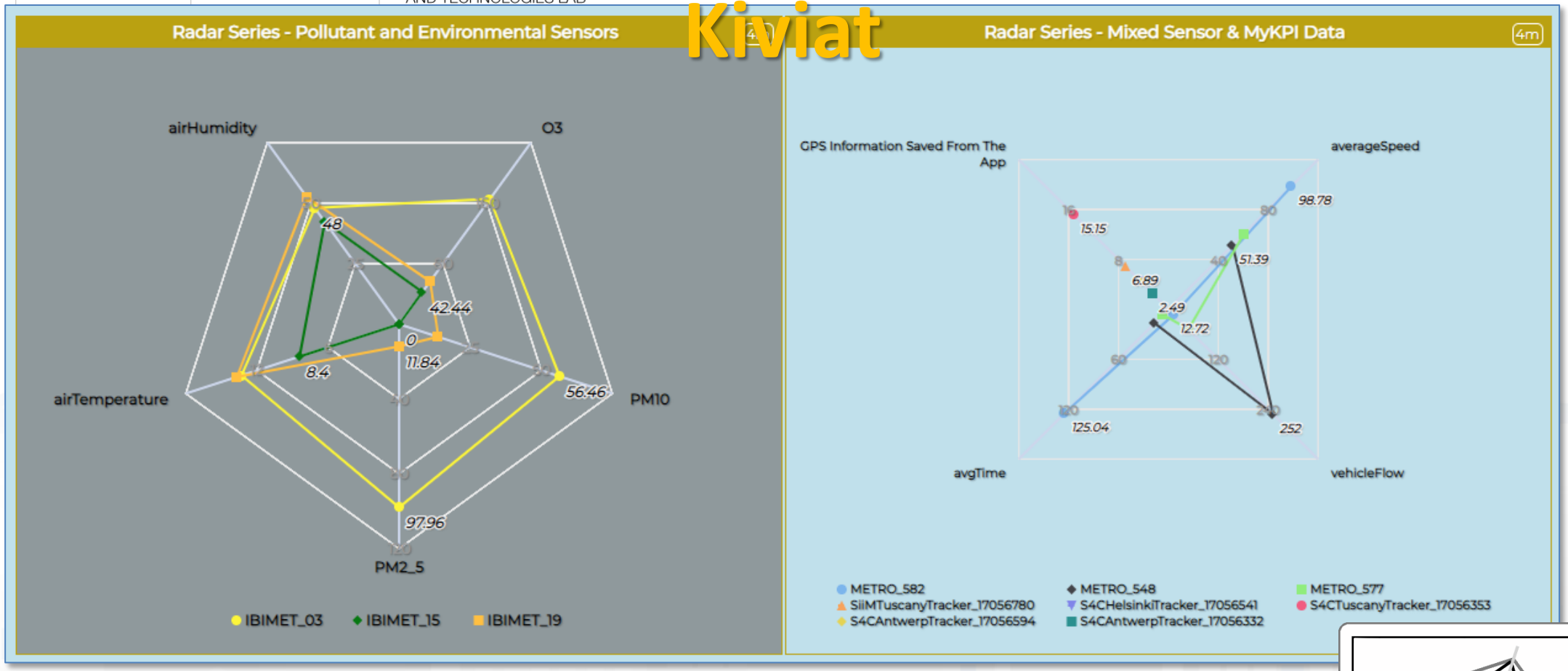
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjUxNw==

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

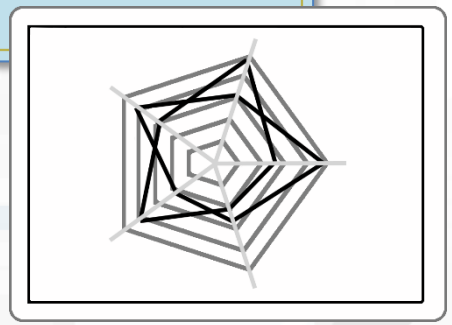
- Single level Pie and two levels as Donut
- Grouped ValueType, ValueUnit



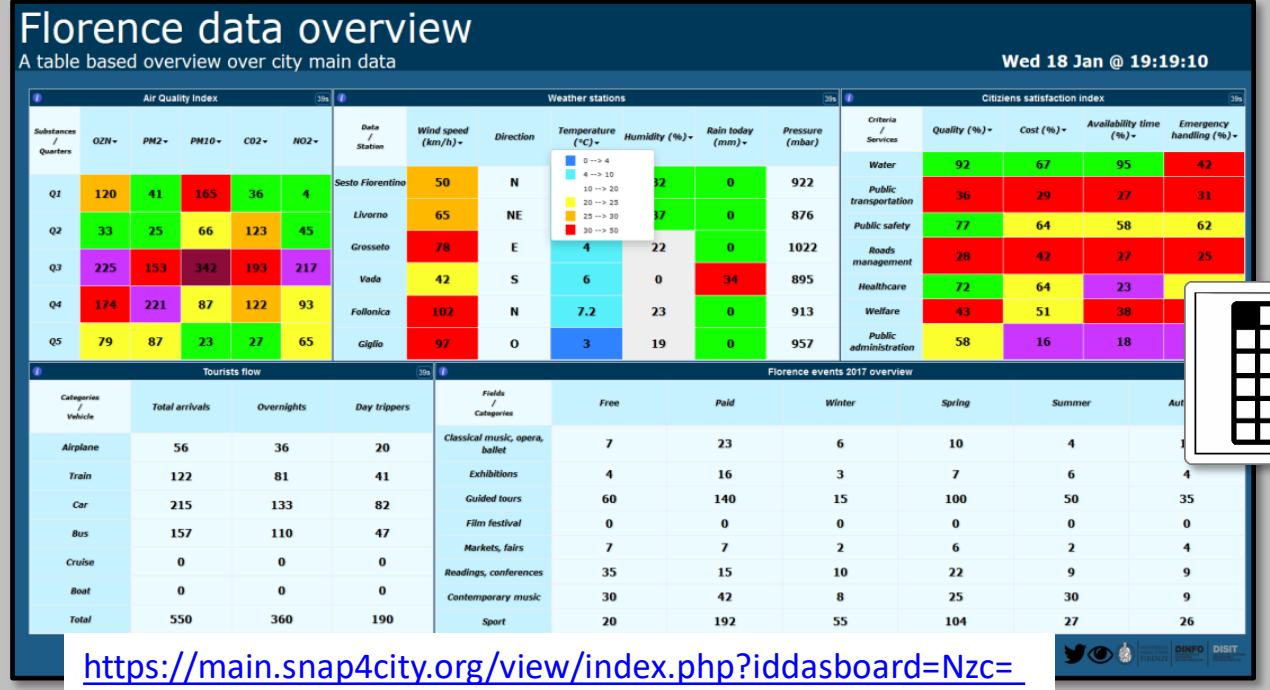
Radar, SpiderNet Kiviat



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



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

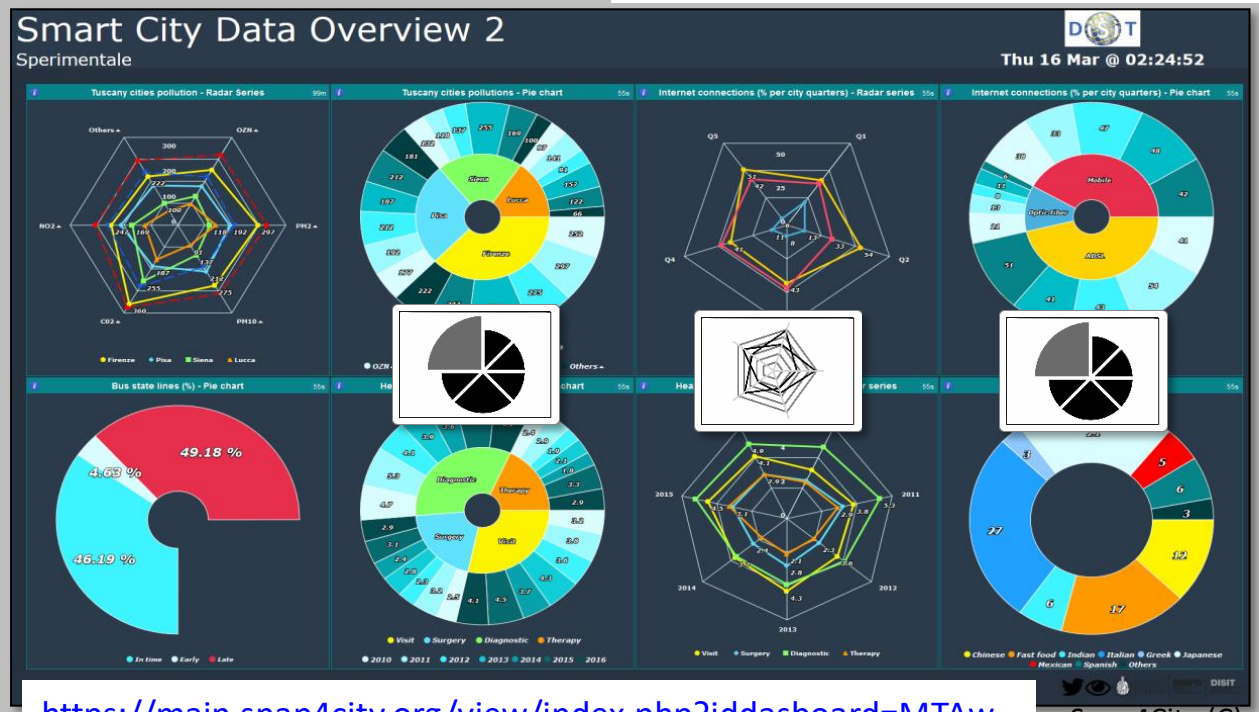


Table

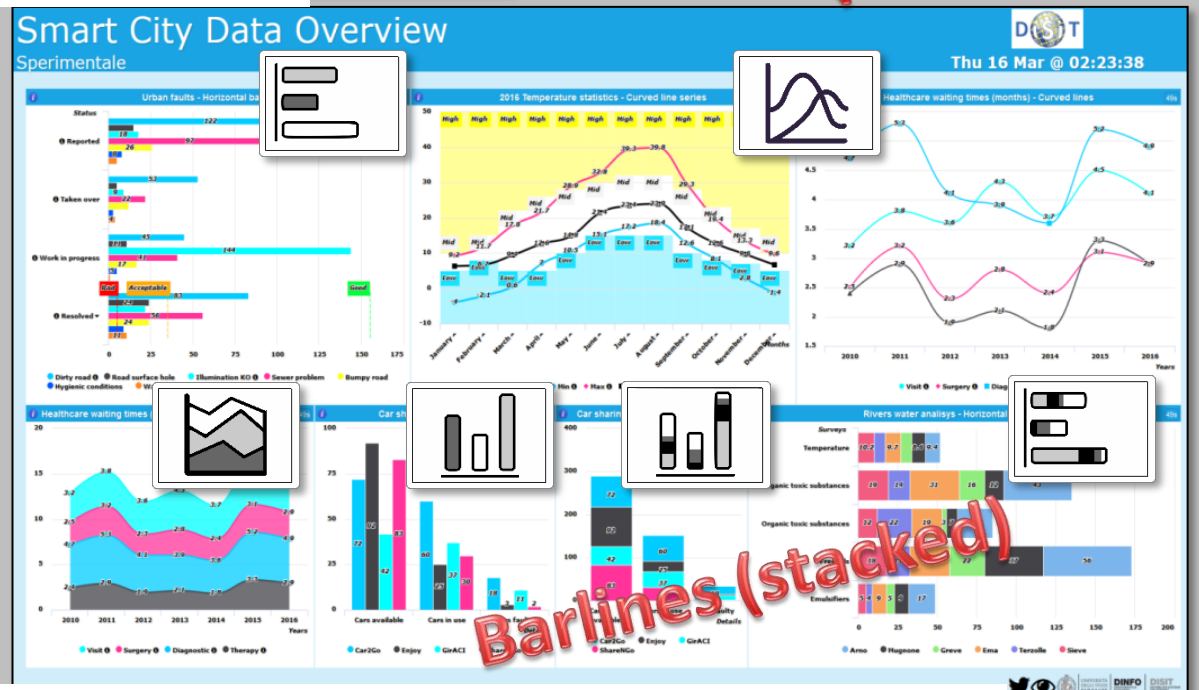
Kiviat and Pies

Curved Lines (stacked)

https://main.snap4city.org/view/index.php?iddasboard=Nzc=



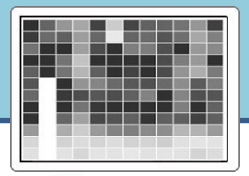
https://main.snap4city.org/view/index.php?iddasboard=MTAw



Barlines (stacked)

https://main.snap4city.org/view/index.php?iddasboard=ODM=

Calendar Widgets for Time Series

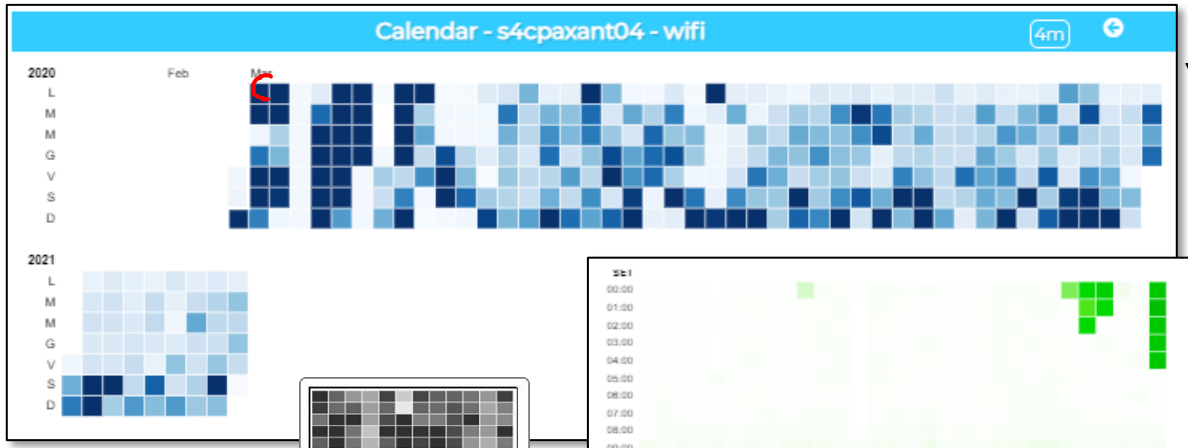


Calendar

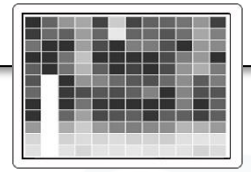
https://www.snap4city.org/706

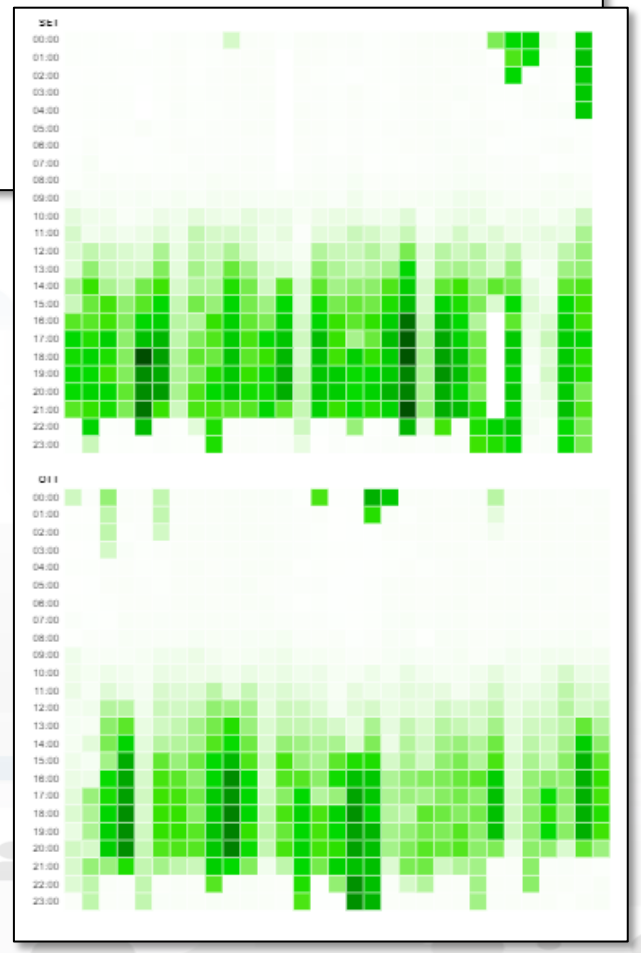
Showing: **Sum, Average or Median** value of a variable as a colored calendar:

- **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==

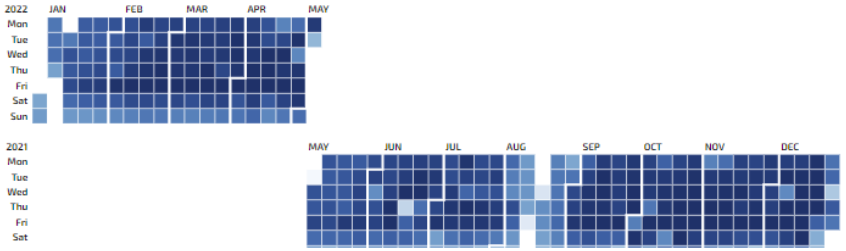
Ciao roottooladmin1

Tue 3 May 13:59:05

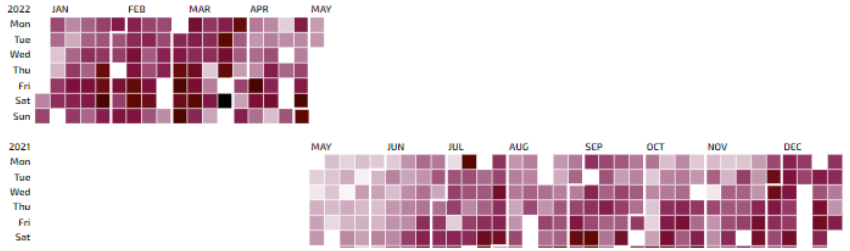
HERIT-DATA - ACTIVITIES CALENDAR - NEWGUI

Interreg Mediterranean HERIT-DATA

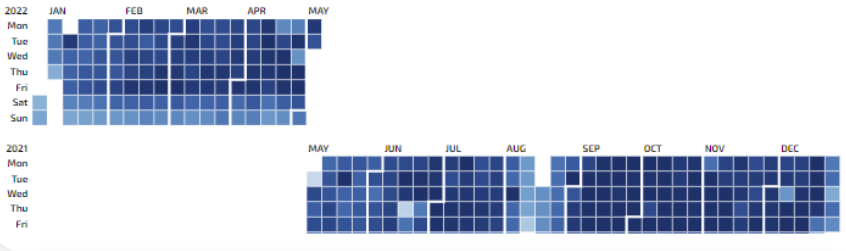
METRO763 VEHICLEFLOW VOLUME 4m



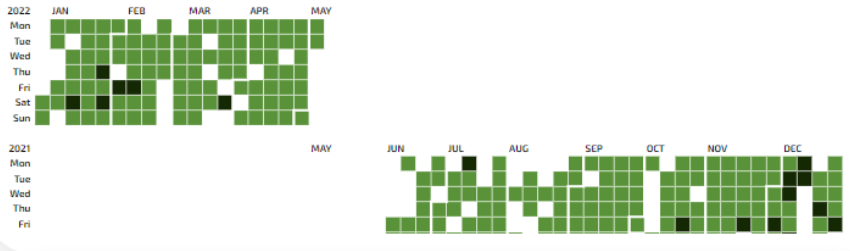
ARPAT_QA_FI-GRAMSCI_SV NO2 VOLUME 4m



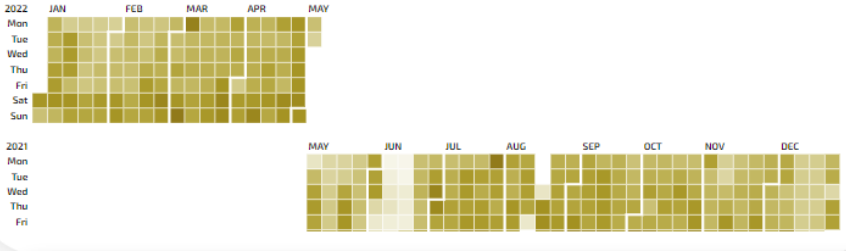
METRO762 VEHICLEFLOW (DAY MEAN) 4m



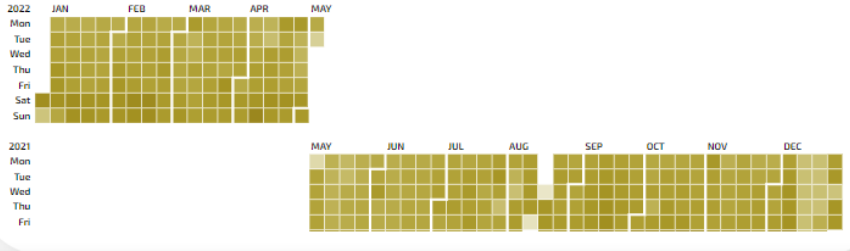
ARPAT_QA_FI-GRAMSCI_SV CO VOLUME 4m



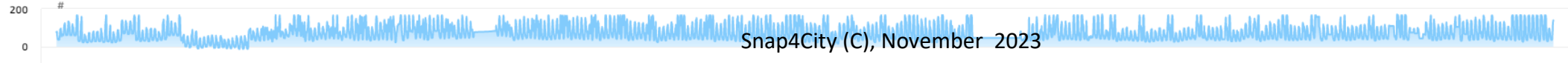
CARPARKSTAZIONEBINARIO16 BUSY SLOTS2 VOLUME 4m



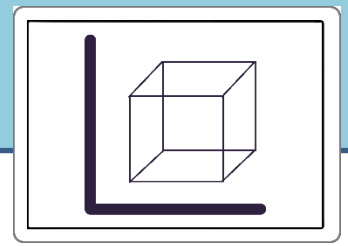
CARPARKSTAZIONEFIRENZES.M.N. BUSY SLOTS VOLUME 4m



CARPARKSTAZIONEBINARIO16 - OCCUPIEDPARKINGLOTS 9m

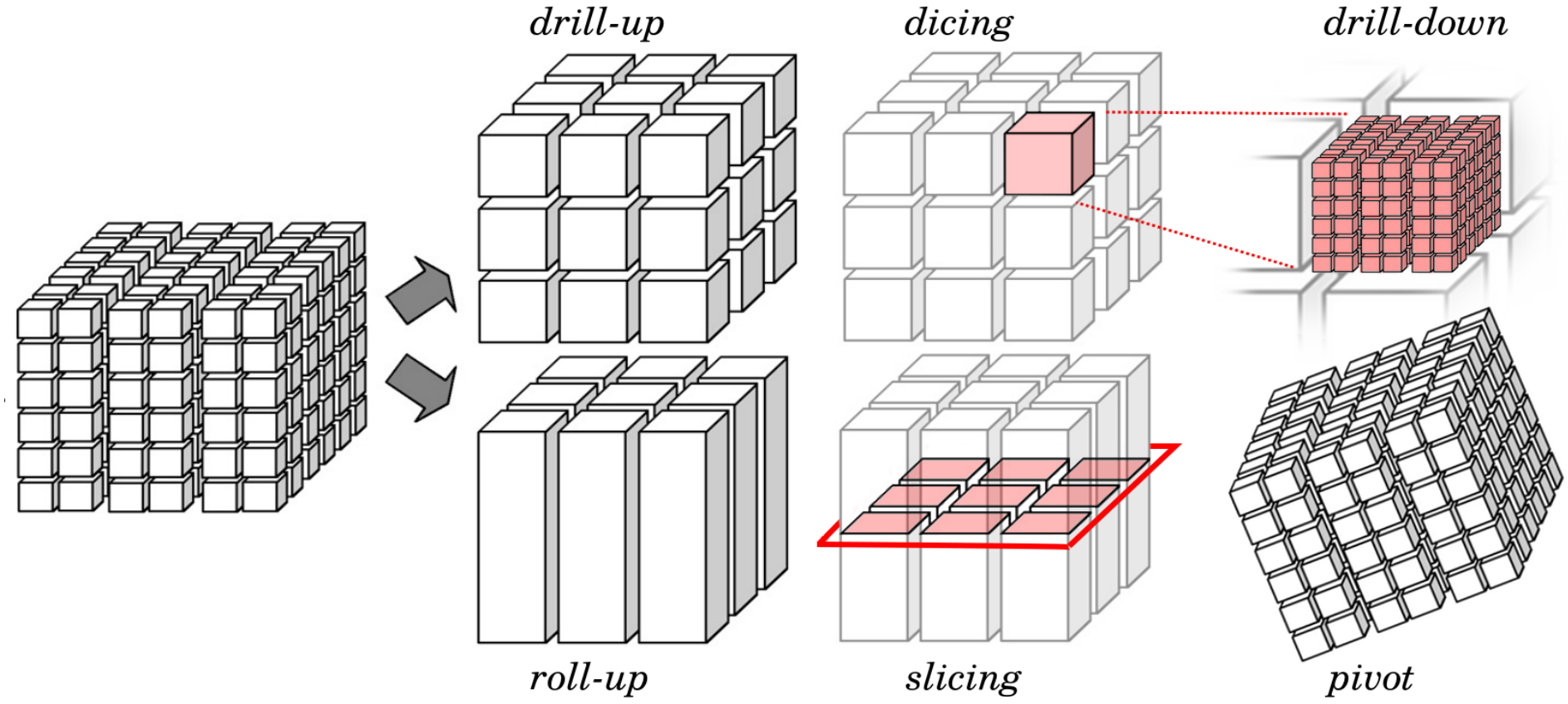


OLAP Data Cubes Widgets



The data cubes

- Using Dashboard Wizard with Widgets all the different transformations may be possible with different representations.
- The IoT App allows to make them Dynamic



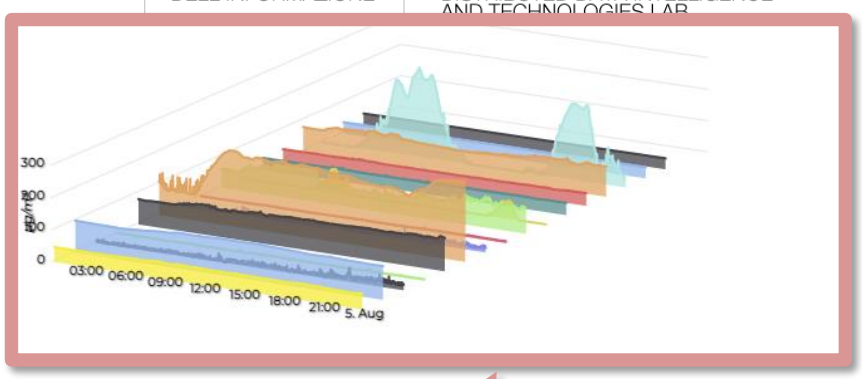
UNIVERSITÀ DEGLI STUDI FIRENZE

DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE

DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB DISTRIBUTED DATA INTELLIGENCE AND TECHNOLOGIES LAB

Hypercube

SNAP4CITY KM4CITY



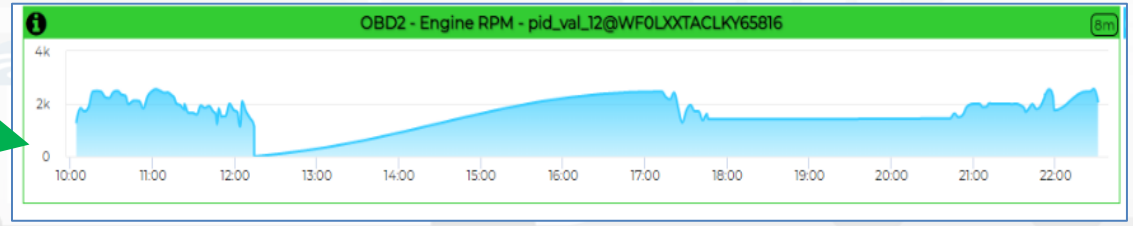
Longitude

Latitude

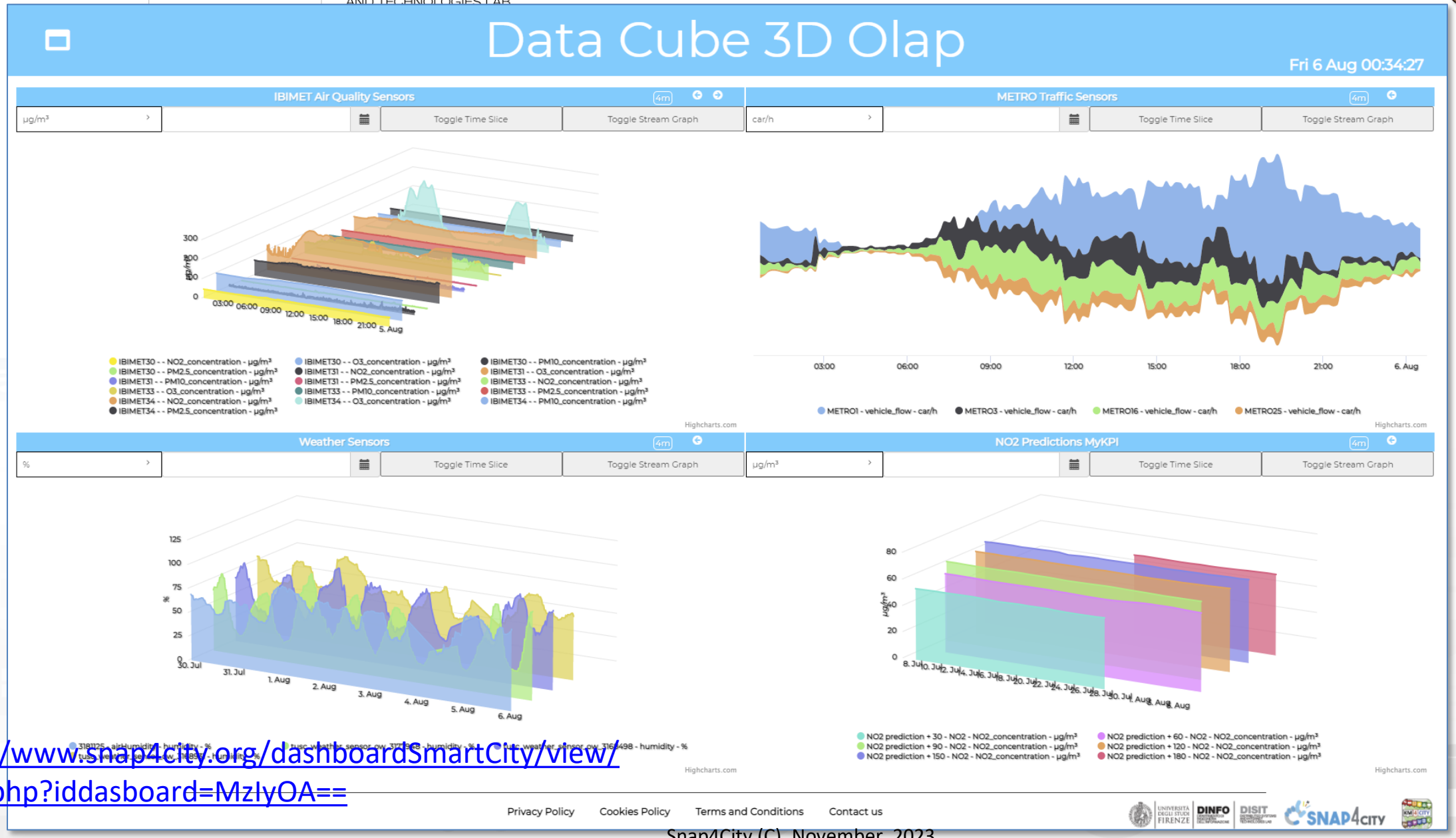
Values

Sensors of Devices, KPI, etc.

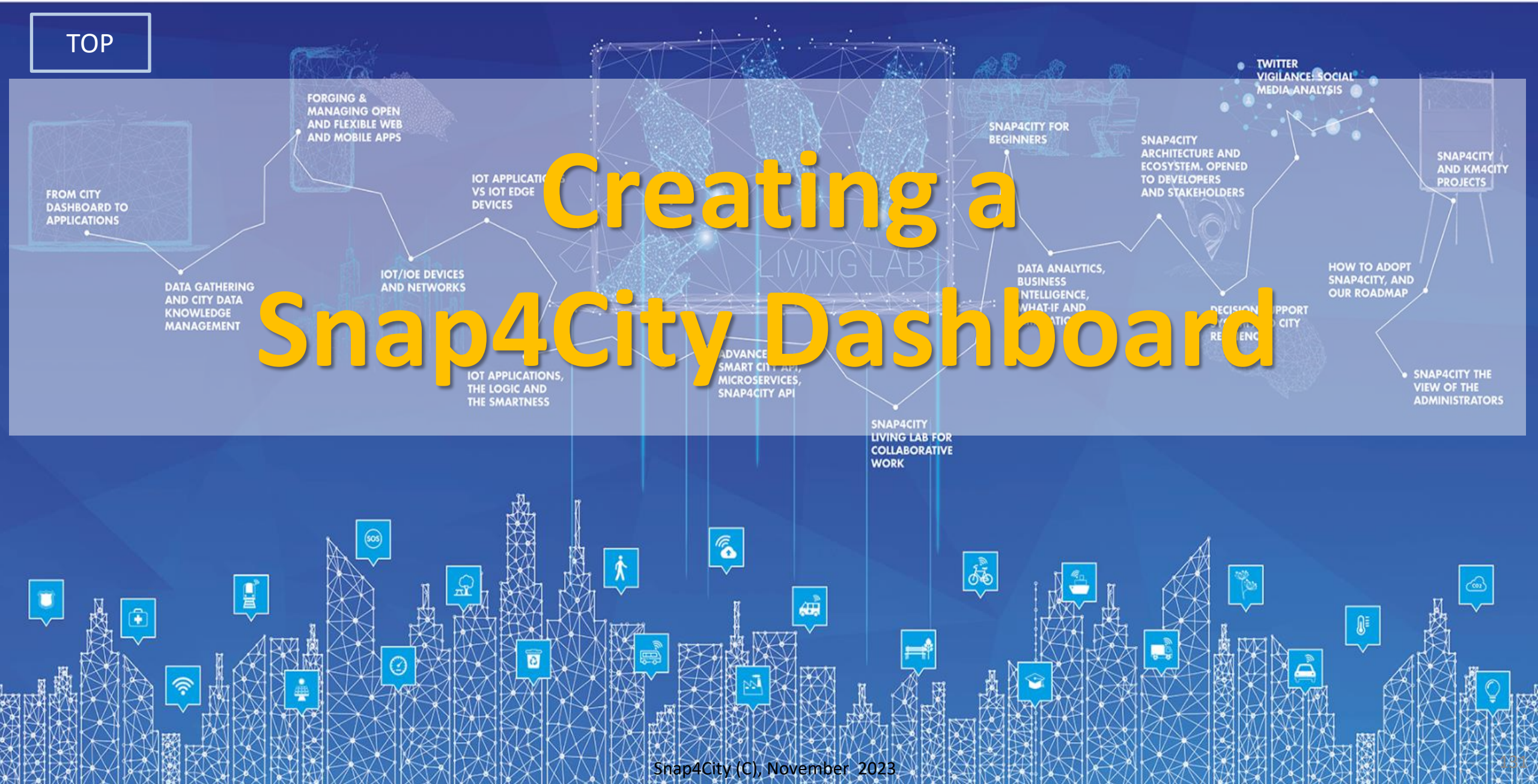
time



Data Cube 3D Olap

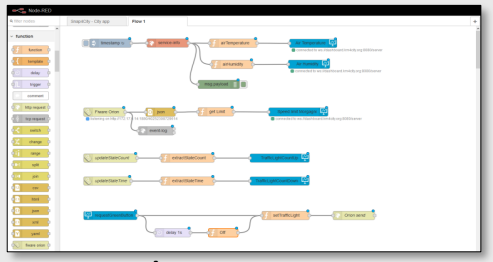


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzIyOA==



Creating a Snap4City Dashboard

Dashboard Development



IOT Applications

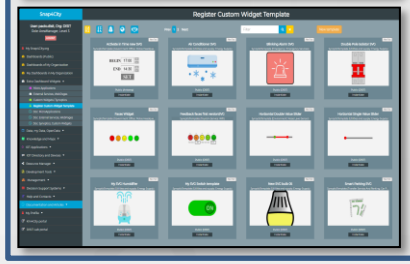
Knowledge Base,
Km4City

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

Widget Collection

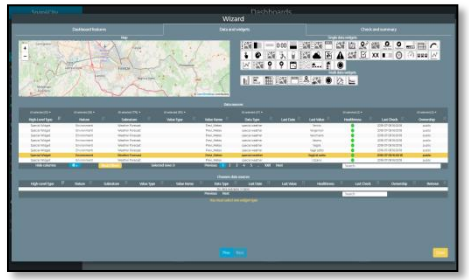
Micro
Applicat
ions

External
Services

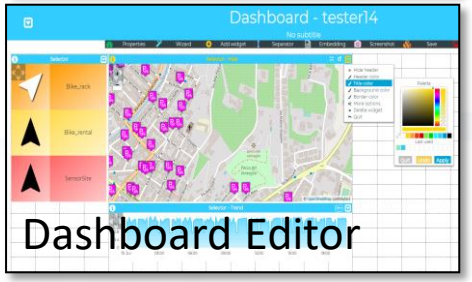


Custom
Widgets/
Synoptics

Dashboard Wizard

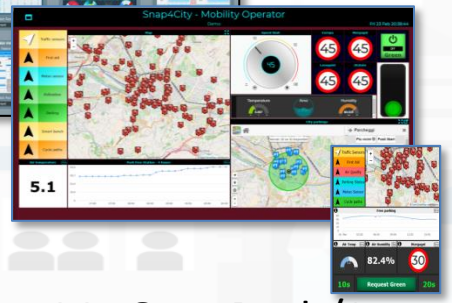


Dashboard Editor



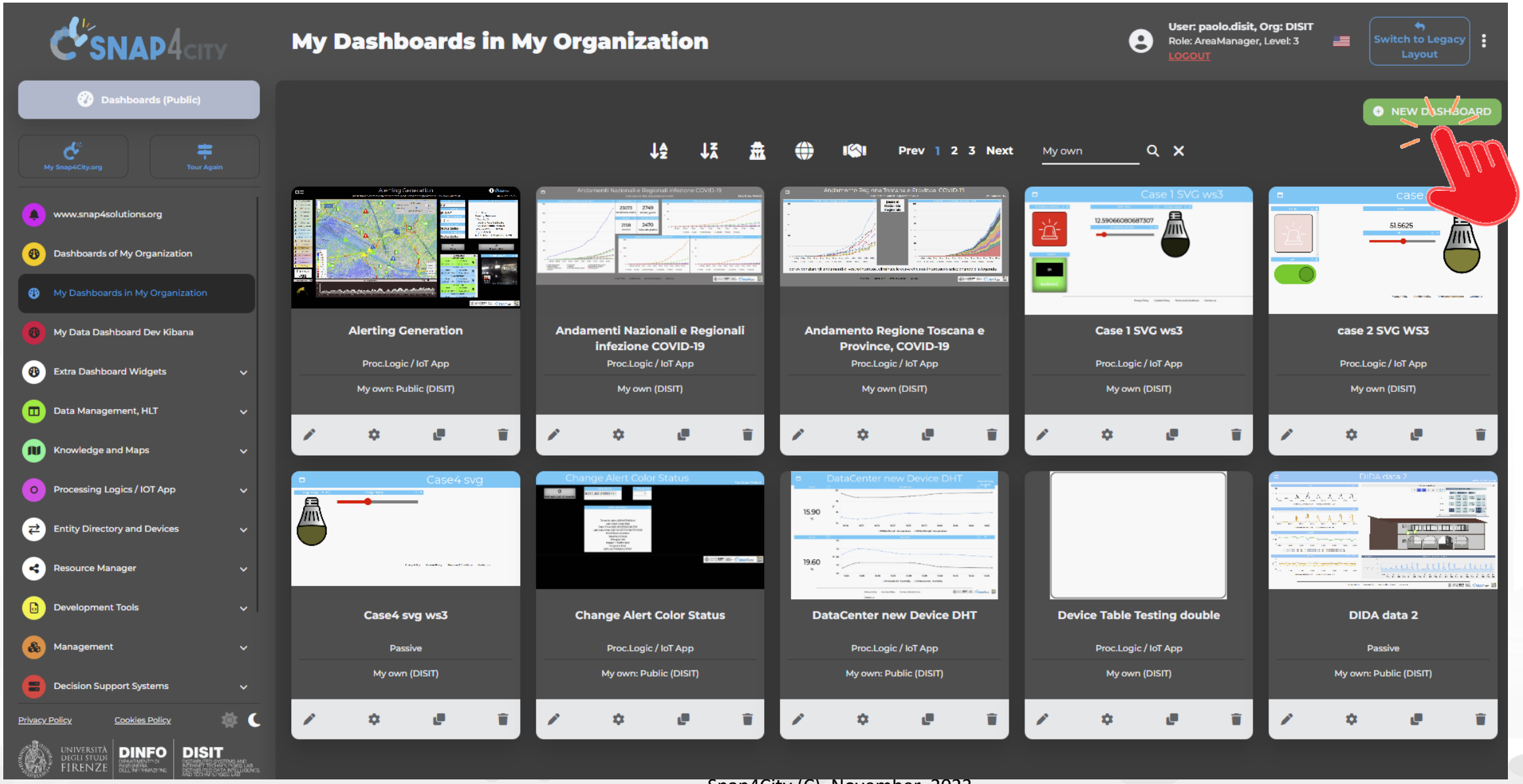
Create, save, load,
delegate, grant access

Public
Dashboard
Collection

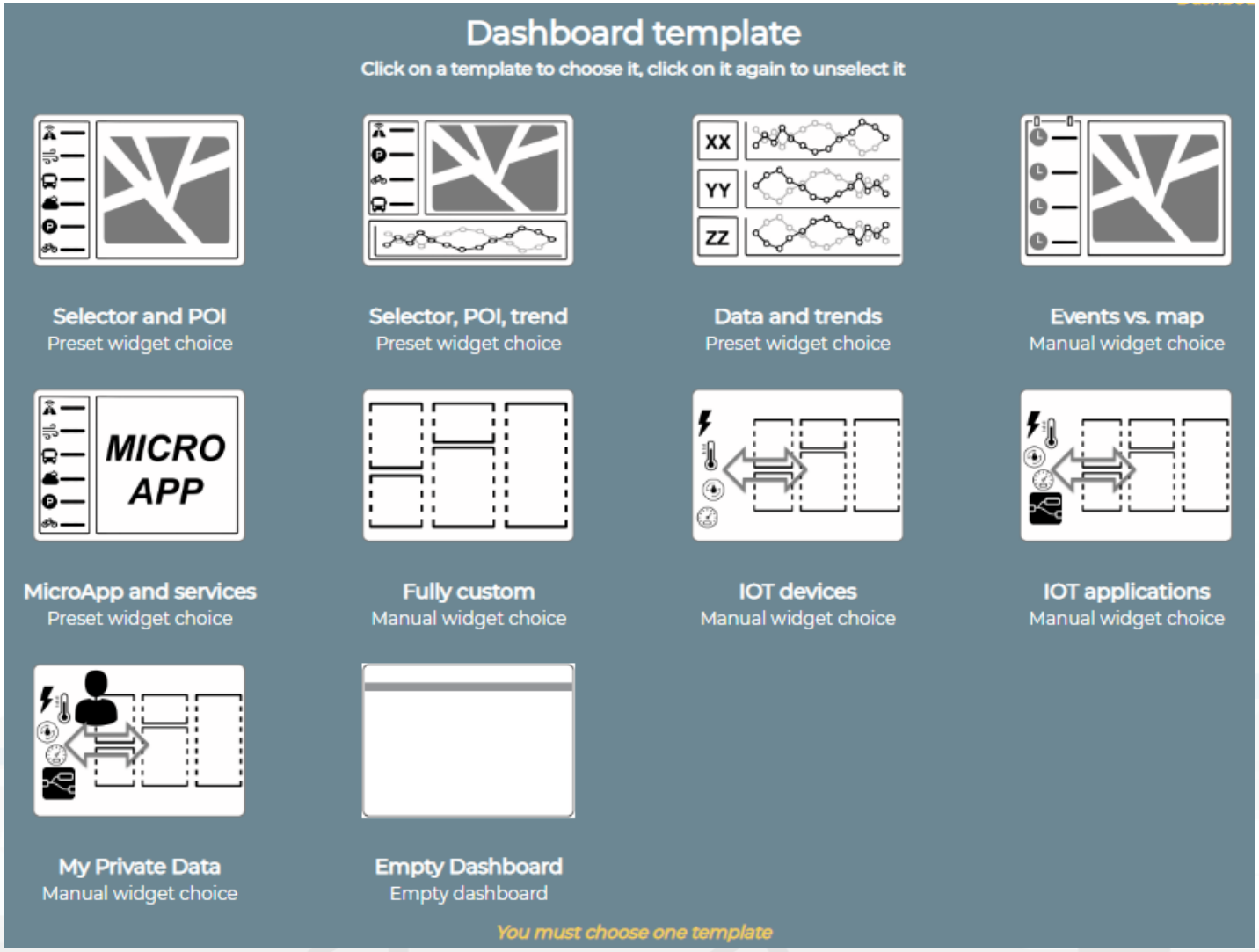


My Own Dash/App

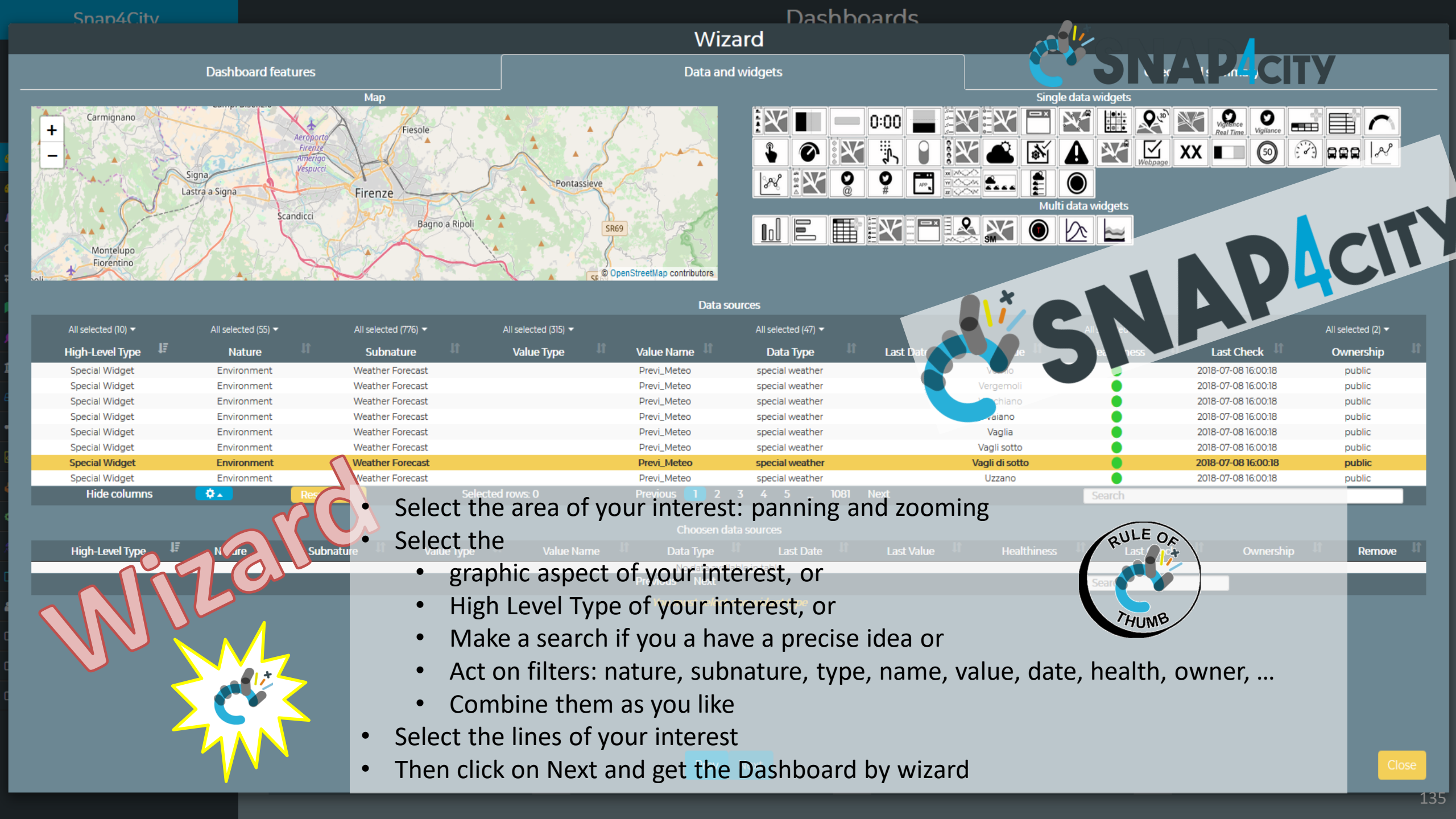
New Dash ?


SNAP4CITY
My Dashboards in My Organization
User: paolo.disit, Org: DISIT
Role: AreaManager, Level: 3
LOGOUT
Switch to Legacy Layout
NEW DASHBOARD
Dashboards (Public)
My Snap4City.org
Tour Again
www.snap4solutions.org
Dashboards of My Organization
My Dashboards in My Organization
My Data Dashboard Dev Kibana
Extra Dashboard Widgets
Data Management, HLT
Knowledge and Maps
Processing Logics / IOT App
Entity Directory and Devices
Resource Manager
Development Tools
Management
Decision Support Systems
Privacy Policy
Cookies Policy
Prev 1 2 3 Next
My own
Alerting Generation
Proc.Logic / IoT App
My own: Public (DISIT)
Andamenti Nazionali e Regionali infezione COVID-19
Proc.Logic / IoT App
My own (DISIT)
Andamento Regione Toscana e Province, COVID-19
Proc.Logic / IoT App
My own (DISIT)
Case 1 SVG ws3
Proc.Logic / IoT App
My own (DISIT)
case 2 SVG WS3
Proc.Logic / IoT App
My own (DISIT)
Case4 svg
Case4 svg ws3
Passive
My own (DISIT)
Change Alert Color Status
Change Alert Color Status
Proc.Logic / IoT App
My own: Public (DISIT)
DataCenter new Device DHT
DataCenter new Device DHT
Proc.Logic / IoT App
My own: Public (DISIT)
Device Table Testing double
Proc.Logic / IoT App
My own (DISIT)
DIDA data 2
DIDA data 2
Passive
My own: Public (DISIT)

From Templates to Wizard and Dashboards

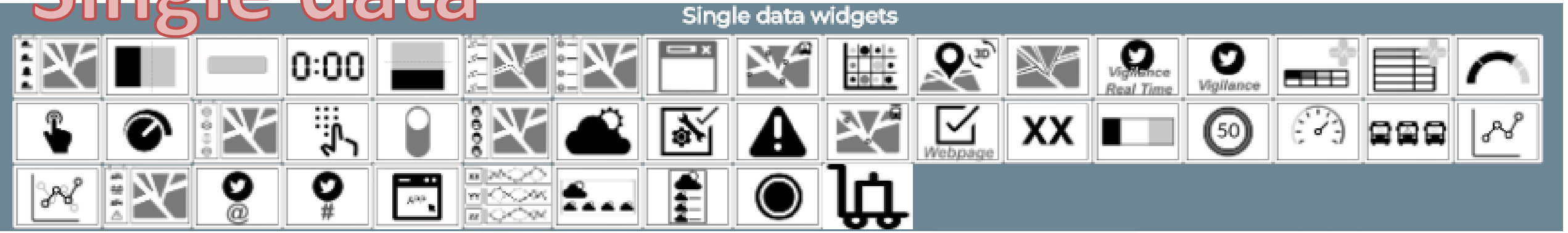


- to create a new Dashboard
- to add widgets and/or groups of them on any Dashboard

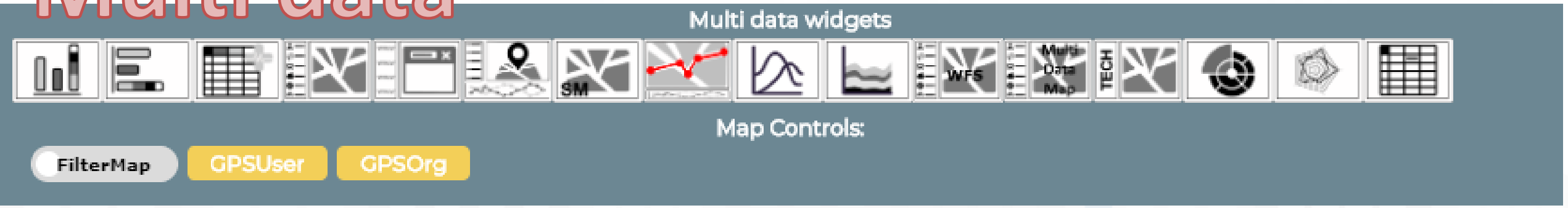

Wizard
Dashboard features
Data and widgets
Map
Carmignano
Fiesole
Aeroporto Firenze Amerigo Vespucci
Signa
Lastra a Signa
Firenze
Pontassieve
Scandicci
Bagno a Ripoli
SR69
Montelupo Fiorentino
© OpenStreetMap contributors
Single data widgets
Multi data widgets
Data sources
All selected (10)
All selected (55)
All selected (776)
All selected (315)
All selected (47)
All selected (2)
High-Level Type
Nature
Subnature
Value Type
Value Name
Data Type
Last Check
Ownership
Special Widget Environment Weather Forecast Previ_Meteo special weather 2018-07-08 16:00:18 public
Vergemoli
Vaglia
Vagli sotto
Special Widget Environment Weather Forecast Previ_Meteo special weather Vagli di sotto 2018-07-08 16:00:18 public
Uzzano
Hide columns
Selected rows: 0
Previous 1 2 3 4 5 1081 Next
Search
Choosen data sources
Value Name
Data Type
Last Date
Last Value
Healthiness
Remove
Wizard
Select the area of your interest: panning and zooming
Select the
graphic aspect of your interest, or
High Level Type of your interest, or
Make a search if you a have a precise idea or
Act on filters: nature, subnature, type, name, value, date, health, owner, …
Combine them as you like
Select the lines of your interest
Then click on Next and get the Dashboard by wizard
RULE OF THUMB
Close
SNAP4CITY
135

Widgets' Icons

Single data

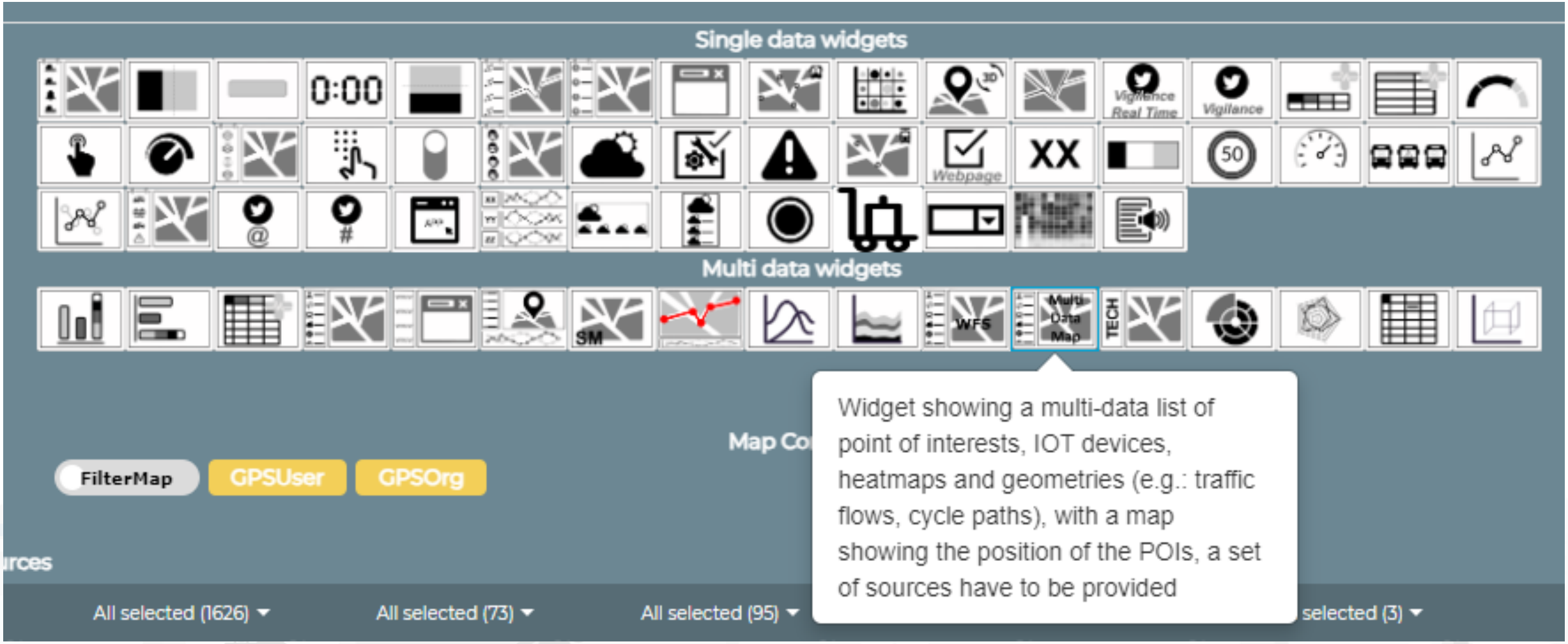


Multi data

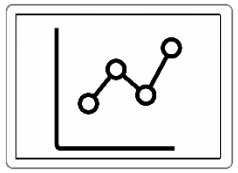


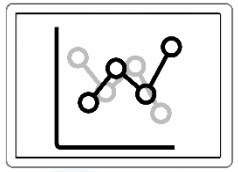
Map Controls

Widget selection

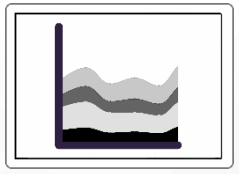


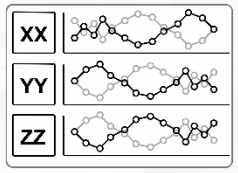
Selection of Main Widgets icons


Time Trend

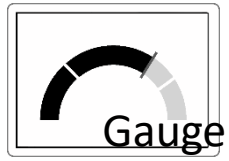

Time Trend Compare

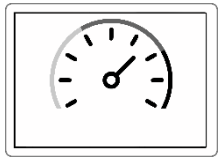

MultiSeries

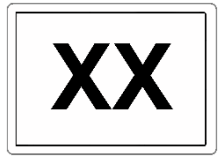

MultiSeries (stacked)



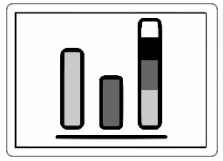
Multi TimeTrend

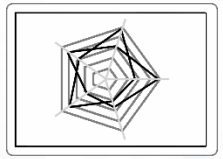


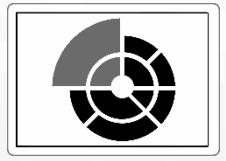

Speedometer

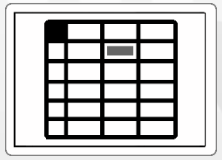


Single Content

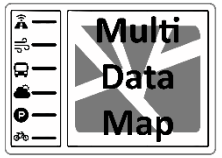

Barseries


Spider / Kiviat

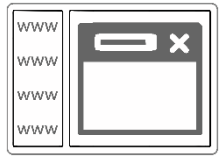

Pie / Donut

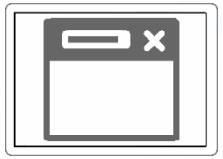


Table

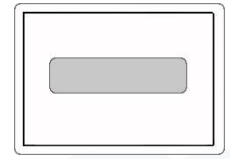


Selector + Multi Data Map

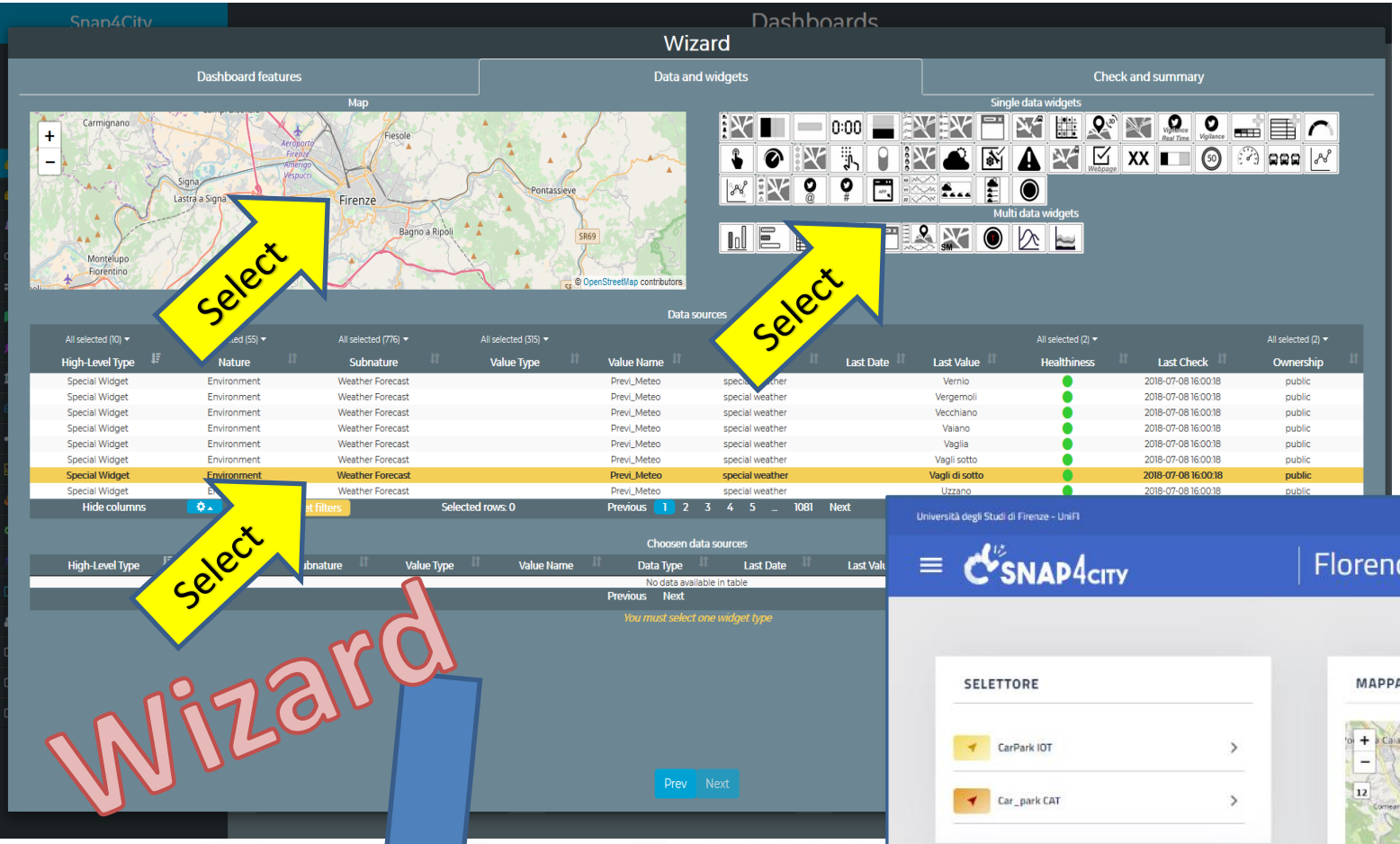

Selector + External Service

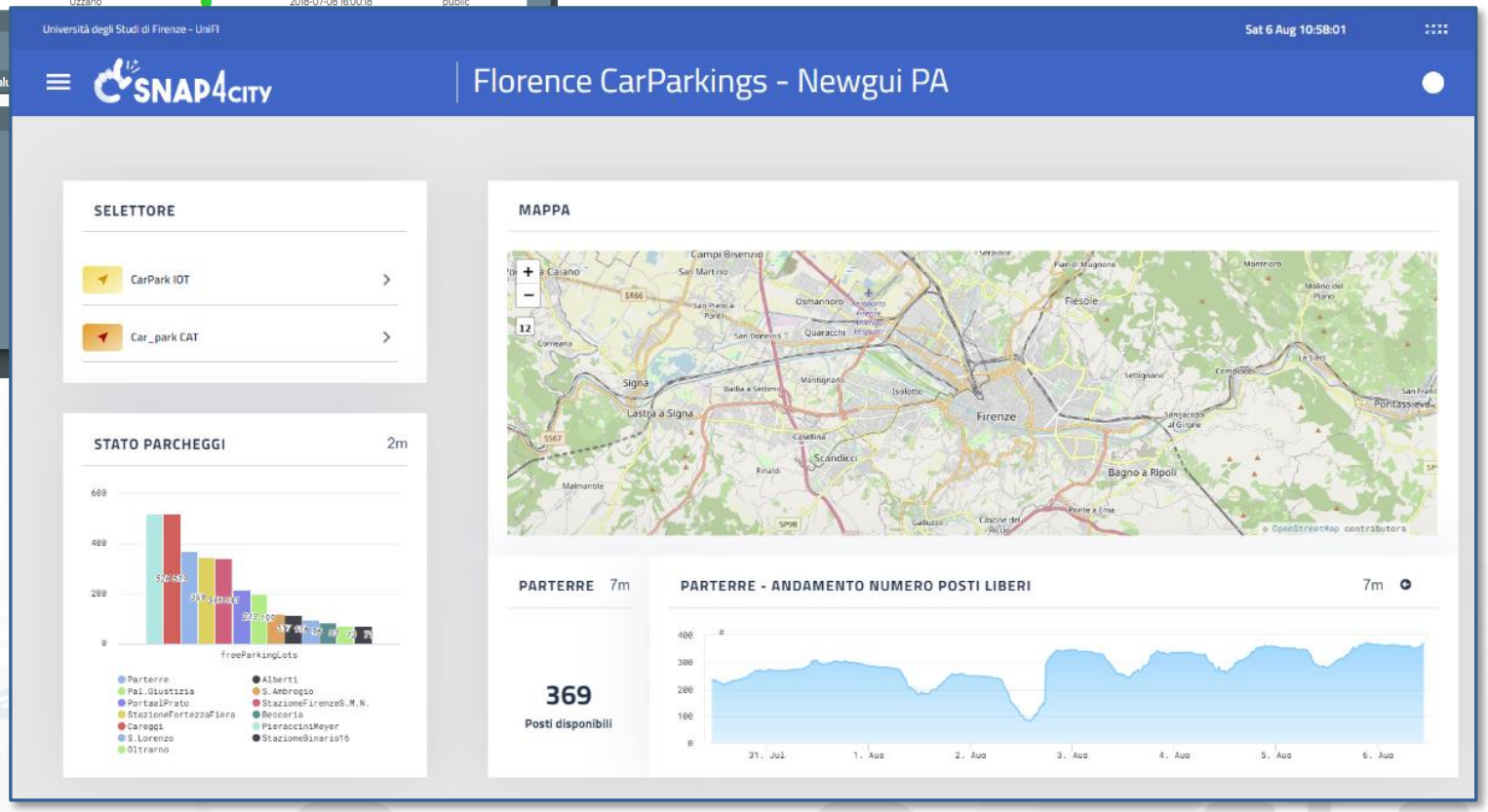

External Service

Clock

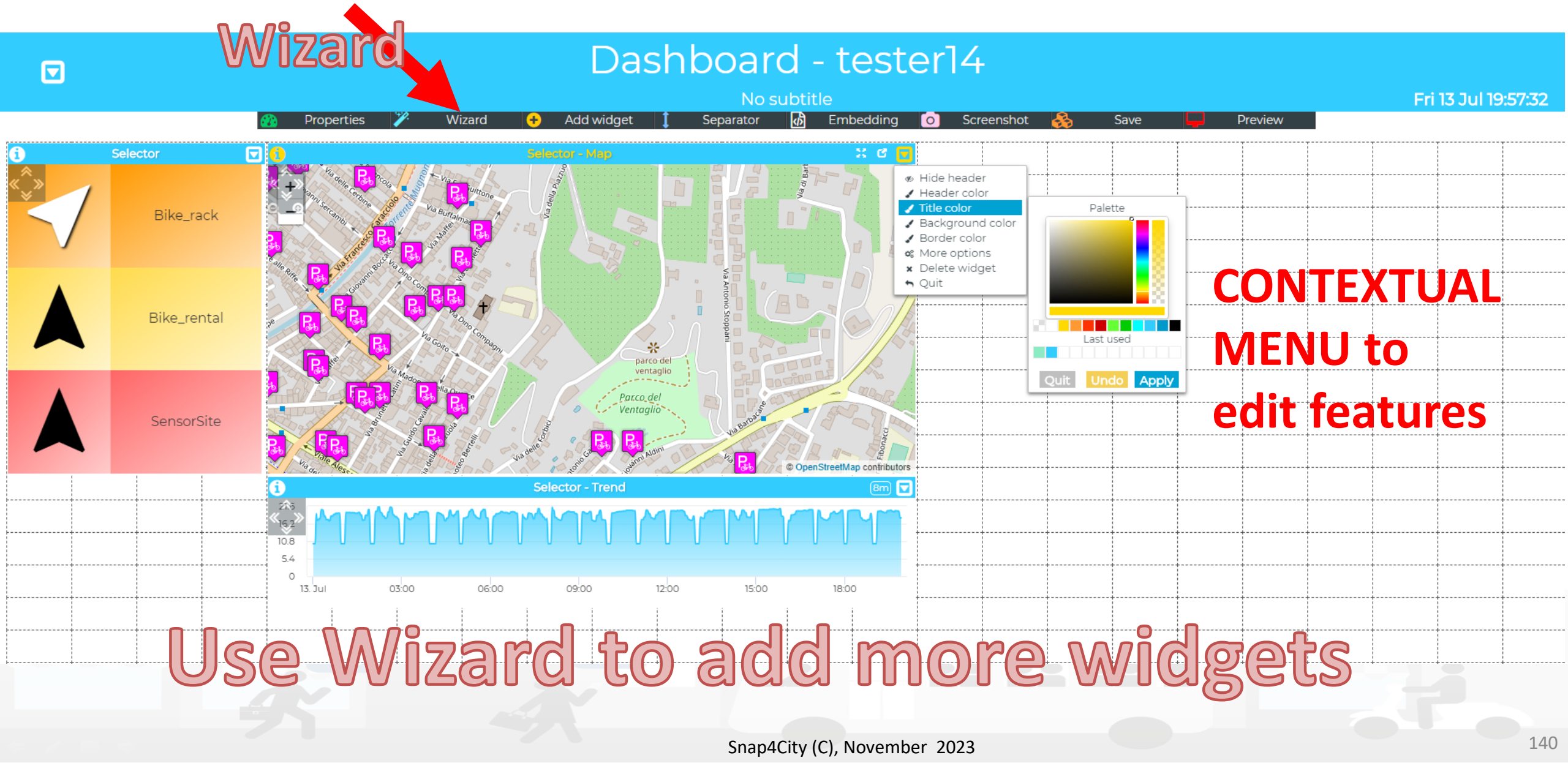

Button

Dashboard Wizard

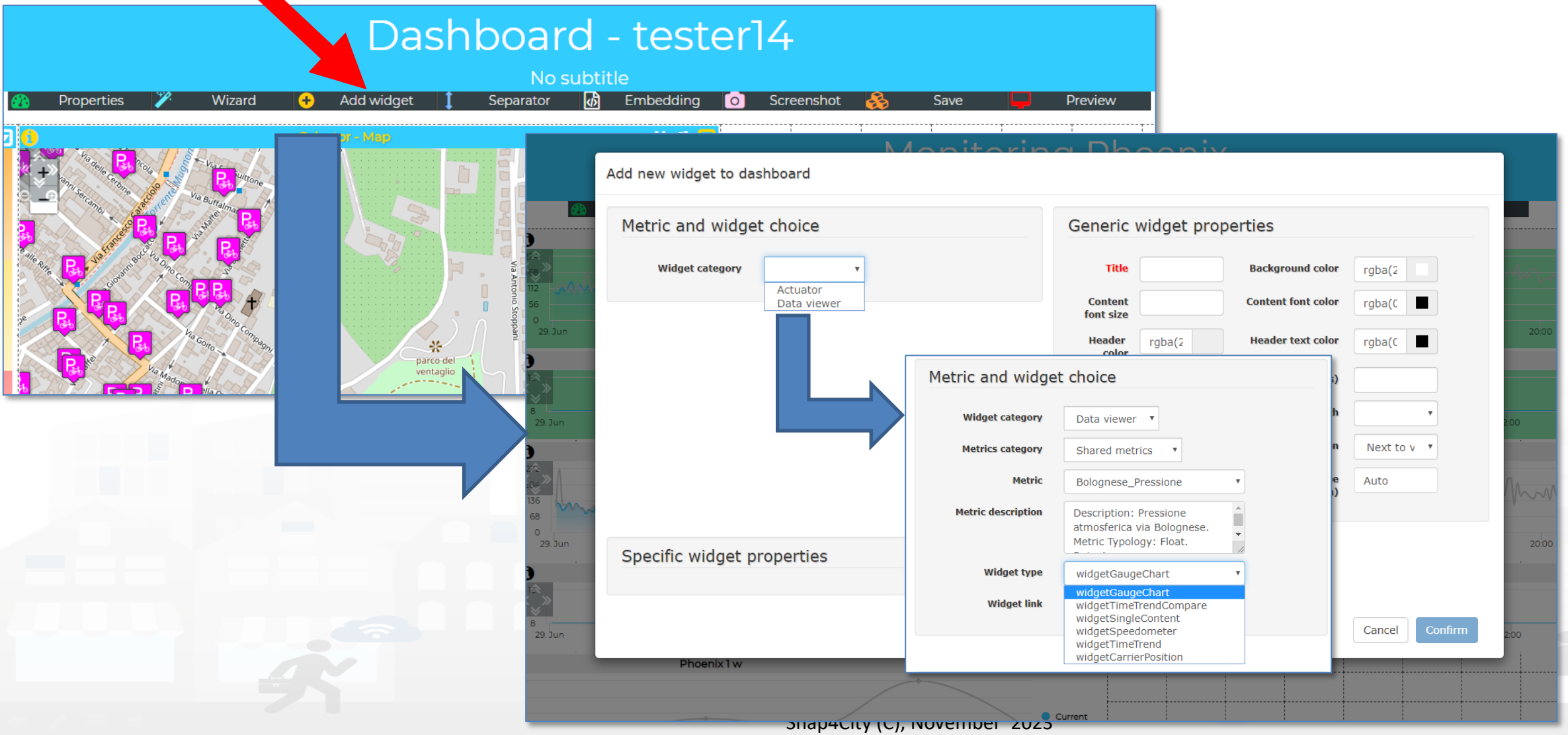




The Wizard help you in selecting only possible combination of data vs graphic representation


Wizard
Dashboard - tester14
No subtitle
Fri 13 Jul 19:57:32
Properties
Wizard
Add widget
Separator
Embedding
Screenshot
Save
Preview
Selector
Bike_rack
Bike_rental
SensorSite
Selector - Map
parco del ventaglio
Parco del Ventaglio
© OpenStreetMap contributors
Hide header
Header color
Title color
Background color
Border color
More options
Delete widget
Quit
Palette
Last used
Quit
Undo
Apply
Selector - Trend
8m
16.2
10.8
5.4
0
13. Jul
03:00
06:00
09:00
12:00
15:00
18:00
CONTEXTUAL MENU to edit features
Use Wizard to add more widgets

Manual Addition of Widgets



Dashboards summary and further exercises

- **Suitable** as: City Dashboard, App interface, and Control Room Dashboards, Situation Room Dashboard, Operator Dashboard
- **Created** visually compounding graphic Widgets
  - Each widget can be set to have an autonomous update
  - Each metric/data-source may have associated with an alarm: blinking and sending events to people and machines in different manners
- **Can be**: public or private, private dash can be delegated or passed in ownership
- See https://main.snap4city.org/management/dashboards.php?linkId=dashboardsLink&fromSubmenu=false&sorts[title_header]=1
- See the following tutorials
  - **HOW TO: create a Dashboard in Snap4City**
  - **HOW TO: add data sources to the Snap4City Platform**
  - **US1. Using City Dashboards**
  - **US2. Using and Creating Snap4City Applications with Dashboards**
  - **US4. Creating City Dashboards and related Event Monitoring and Actions**

Snap4City

https://www.snap4city.org/dashboardSmartCity/management/iframeApp.php?linkUrl=https://www.snap4city.org/drupal&linkId=snap4cityPortalLink&pageTitle=www.snap4city.org&fromSubmenu=false

www.snap4city.org

https://www.youtube.com/watch?v=UChDNYboMvY

User: nicola.mitolo, Org: DISIT
Role: Manager, Level: 4
LOGOUT

Switch to Legacy Layout

Dashboards (Public)

- www.snap4solutions.org
- Dashboards of My Organization
- My Dashboards in My Organization
- My Data Dashboard Kibana
- Extra Dashboard Widgets
- Data Management, HLT
- Knowledge and Maps
- Processing Logics / IOT App
- Entity Directory and Devices
- Decision Support Systems
- Deploy and Installation
- Help and Contacts
- Documentation and Articles
- Km4City portal

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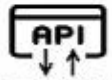
Home How and Why To Use it Tools Tutorials and Videos

HOW ARE YOU GOING TO BUILD THE FUTURE?

Snap4City: a framework for rapid implementation of Decision Support Systems and Smart Applications.

Home / Snap4City: Smart aNalytic APp builder for sentient Cities and IOT

Snap4City: Smart aNalytic APp builder for sentient Cities and IOT

- TECHNICAL OVERVIEW: https://www.snap4city.org/download/video/Snap4City-PlatformOverview.pdf
- Development Life Cycle: https://www.snap4city.org/download/video/Snap4Tech-Development-Life-Cycle.pdf
- Client-Side Business Logic Widget Manual: https://www.snap4city.org/download/[illegible].pdf

Username: nicola.mitolo

Search

Search

-Any-

Training on Tools and Platform

Powered by www.km4city.org

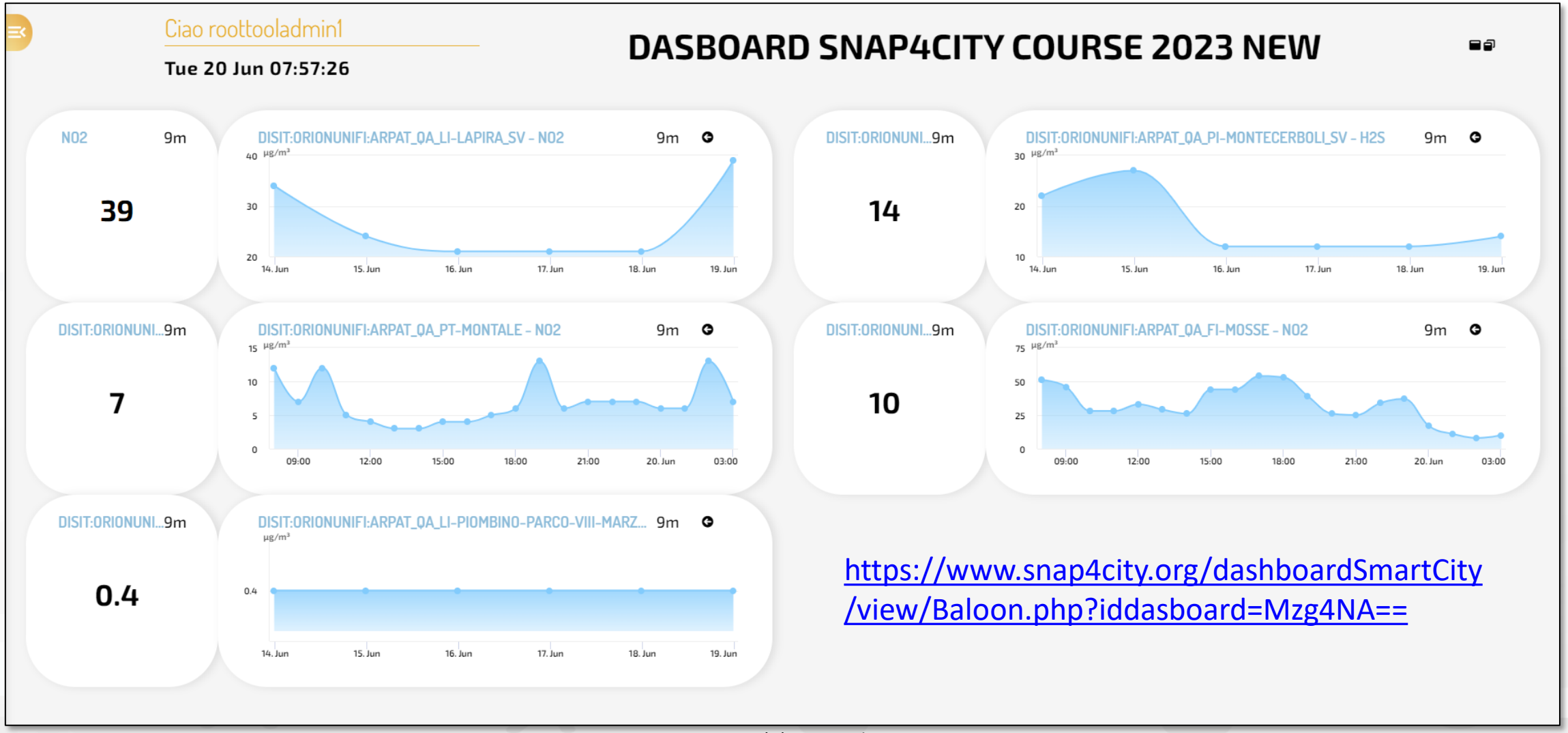
FIWARE Node-RED

Sii-Mobility

Organization Groups

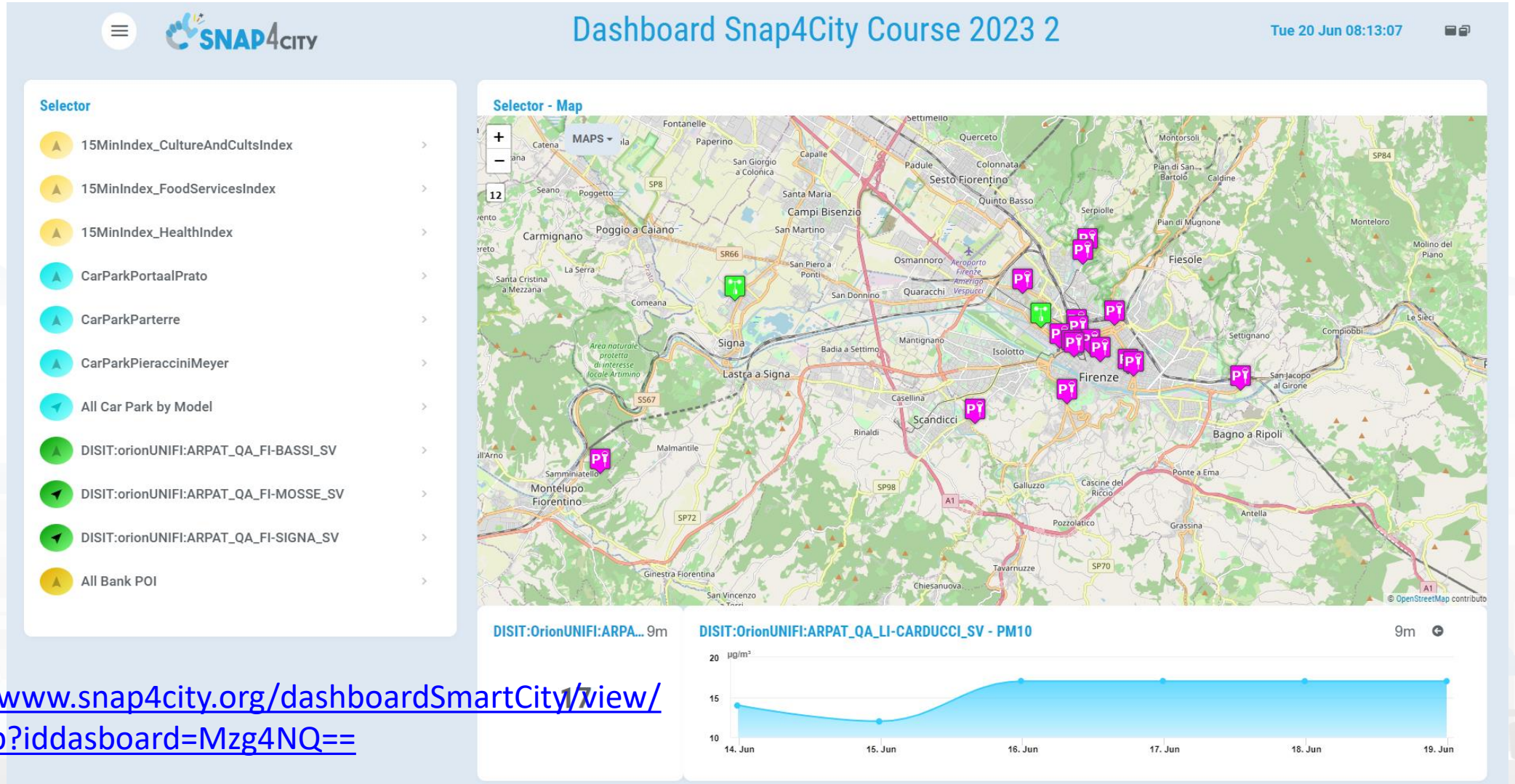
DISIT

First Example



https://www.snap4city.org/dashboardSmartCity/view/Baloon.php?iddasboard=Mzg4NA==

Second Example with some improvement



https://www.snap4city.org/dashboardSmartCity/view/Gea.php?iddasboard=Mzg4NQ==

App Maps Google Gmail Snap4City Snap4 Calendar Translate Google Scholar Cita... DISIT DISIT old Facebook DataCenter Trello Km4City major tools Impostazioni YouTube Google Forms News Qnap15sek7gyfe

Snap4City

Dashboards (Public by (ORG))

Wizard

Dashboard features | Data and widgets | Check and summary

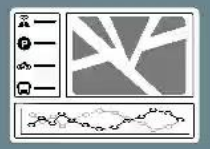
Dashboard title

Dashboard title can't be empty

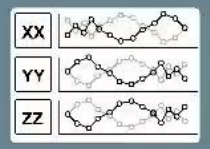
Dashboard template

Click on a template to choose it, click on it again to unselect it

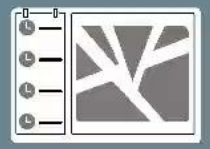
Selector and map
Preset widget choice



Selector, map, trend
Preset widget choice

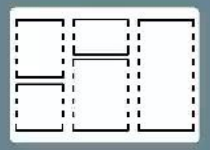


Data and trends
Preset widget choice



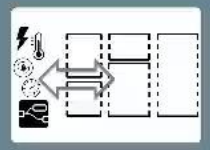
Events vs. map
Manual widget choice

MicroApp and Services
Preset widget choice

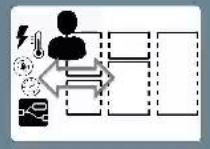


Fully custom
Manual widget choice

IOT devices
Manual widget choice



IOT applications
Manual widget choice



My Private Data
Manual widget choice

Empty Dashboard
Empty dashboard

You must choose one template

https://www.youtube.com/watch?v=UChDNYboMvY

Prev Next

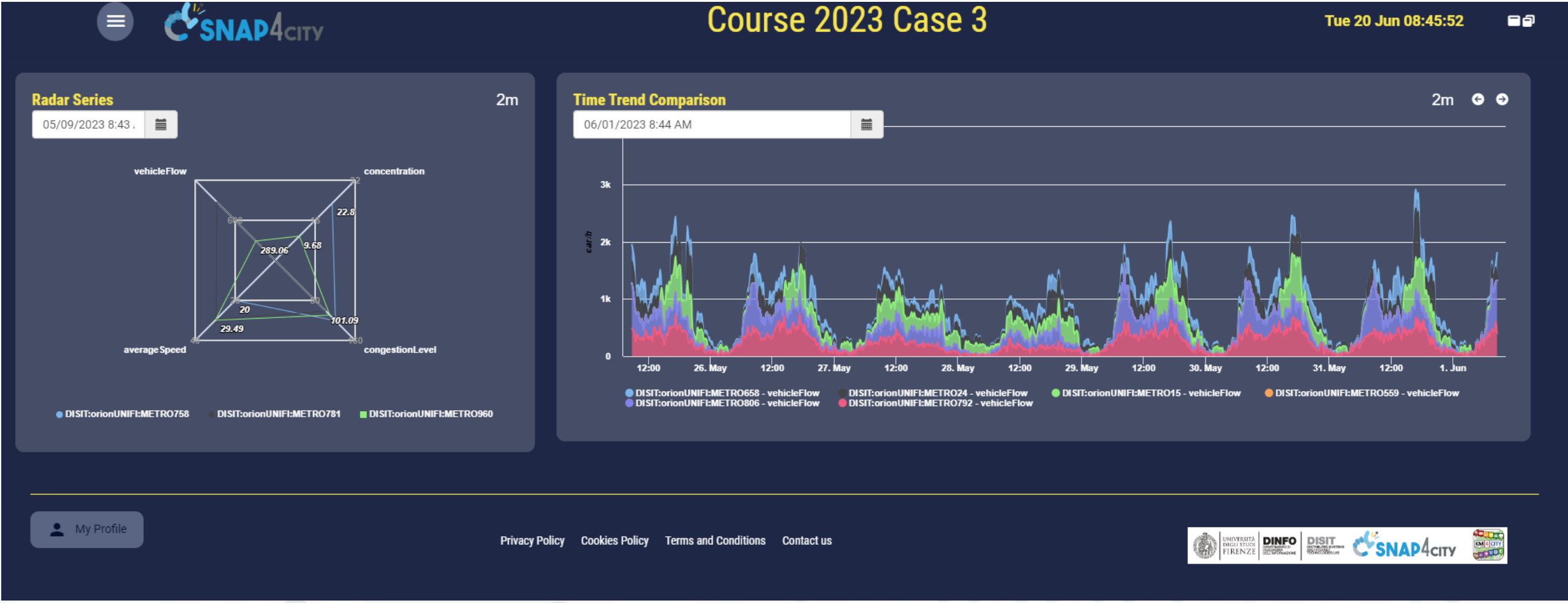
Close

SuperSetting

User Management and Auditing

Help and Contacts

Example Case 3



https://www.snap4city.org/dashboardSmartCity/view/Gea-Night.php?iddasboard=Mzg4Ng==

Combining Widgets:
Nesting & Linking Dashboards

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DISTRIBUTED DATA INTELLIGENCE AND TECHNOLOGIES LAB

SNAP4CITY KM4CITY

Mixt per Roma

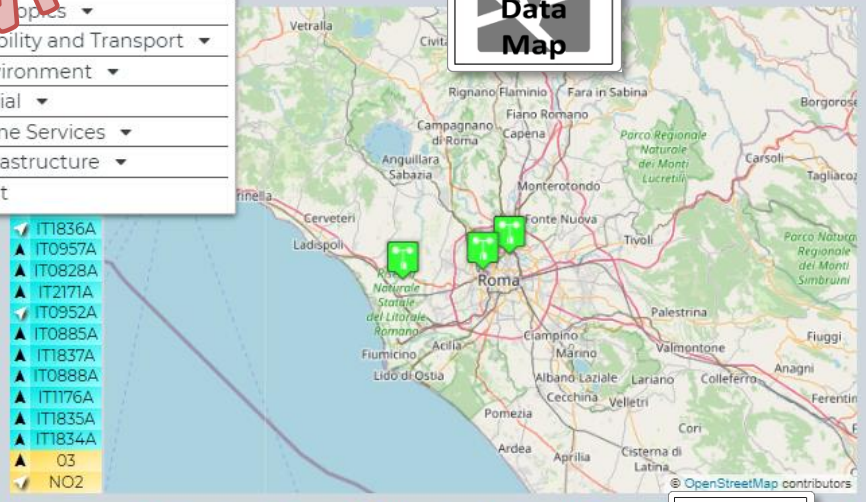
MENU

Roma Demo3 (Qualità dell'Aria)

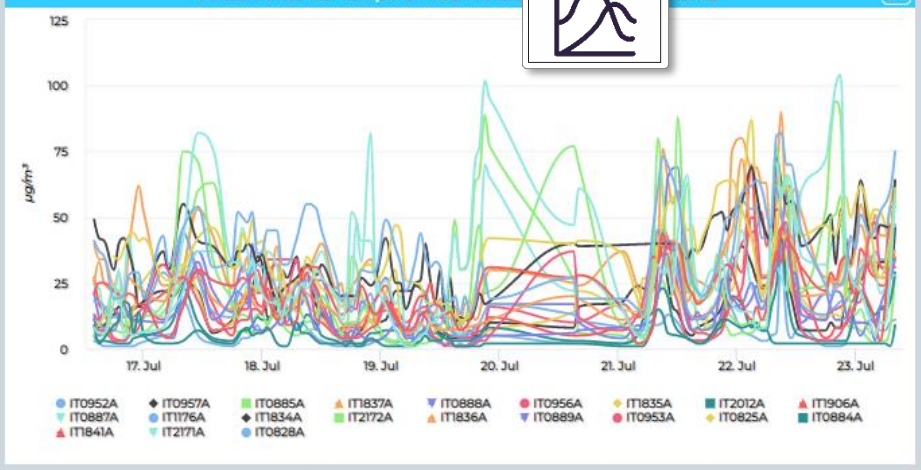
Thu 23 Jul 13:35:09

- Mobility and Transport
- Environment
- Social
- Some Services
- Infrastructure
- Quit

Multi Data Map



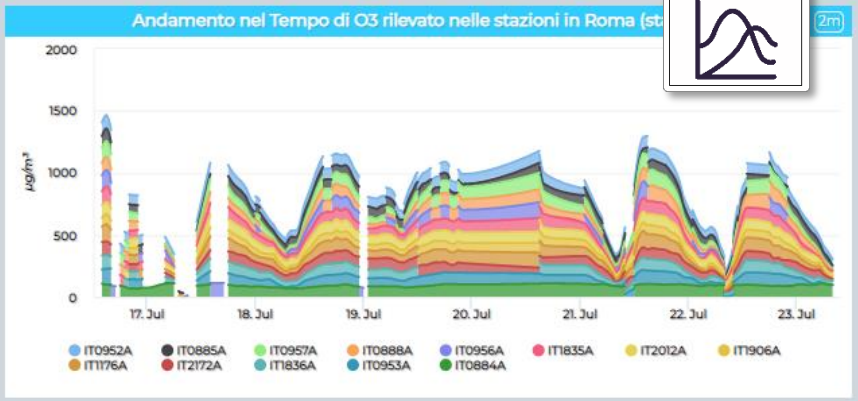
Andamento nel Tempo di NO2 rilevato [illegible] Roma 2m



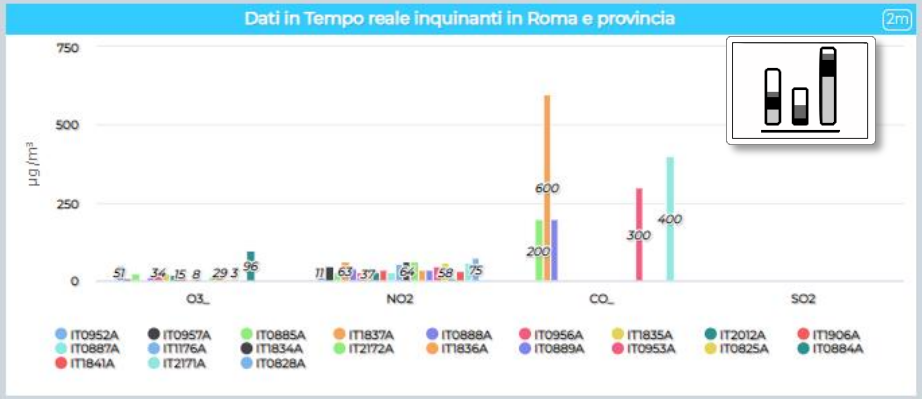
Valori Inquinanti in tempo reale, mappe 2m

value type / value name	O3_	NO2	CO_	SO2
IT0952A	51	11		
IT0957A	7	46		
IT0885A	25	29	200	
IT1837A		63	600	
IT0888A	11	37	200	
IT0956A	34	29		
IT1835A	24	37		
IT2012A	20	29		
IT1906A	15	34		
IT0887A		28		
IT1176A	8	54		
IT1834A		64		
IT2172A	15	61		
IT1836A	29	35		
IT0953A	3	47	300	1.3
IT0889A		34		
IT0825A		58		
IT0884A	96	9		
IT1841A		31		
IT2171A		57	400	
IT0828A		75		

Andamento nel Tempo di O3 rilevato nelle stazioni in Roma (st[illegible] 2m



Dati in Tempo reale inquinanti in Roma e provincia 2m



Home Trasporti

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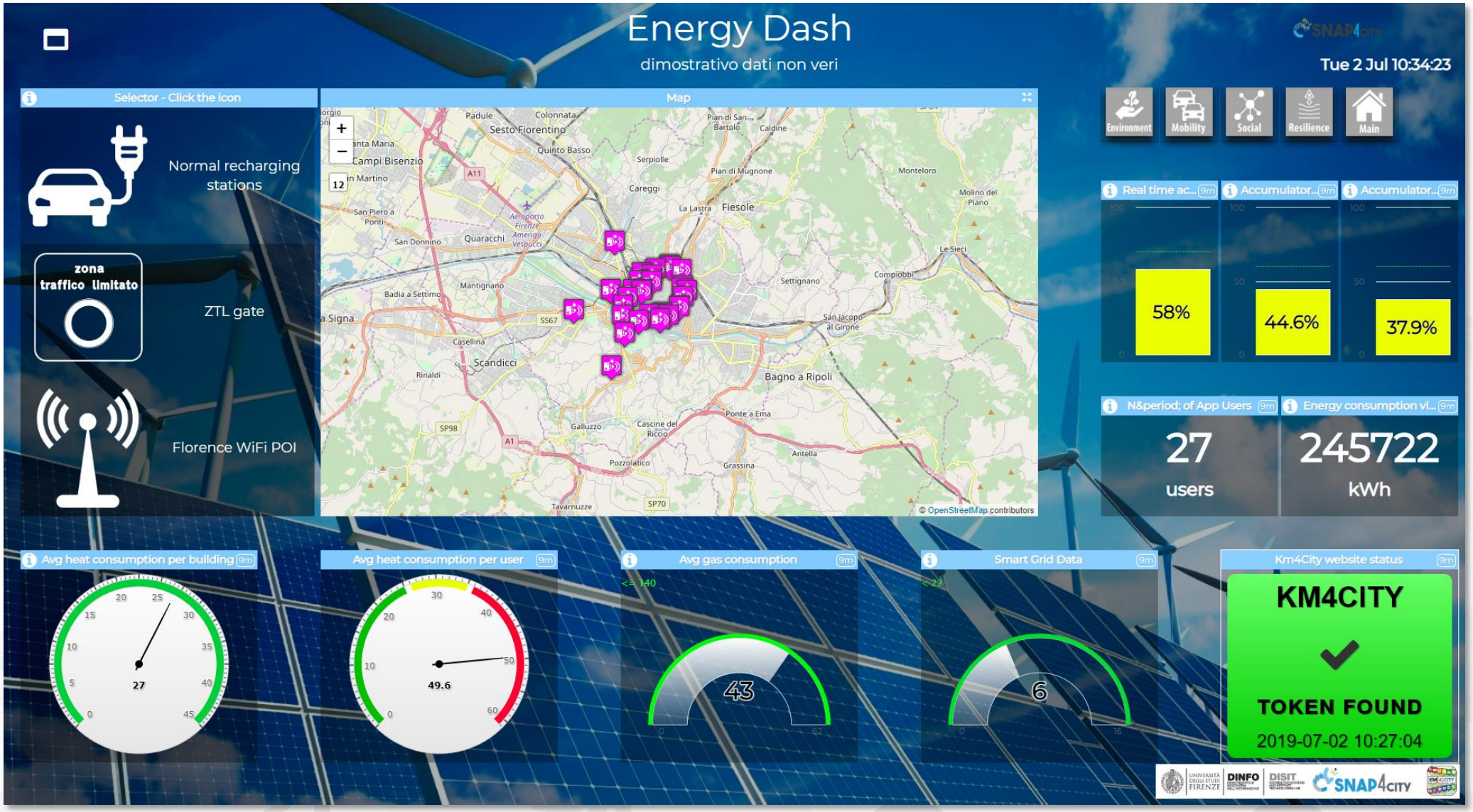
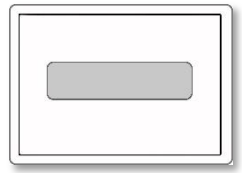
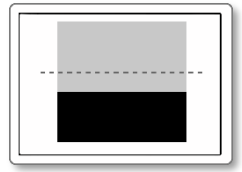
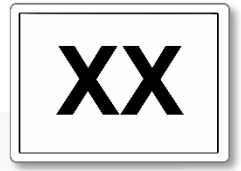
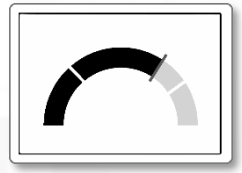
Match Widget vs Icon

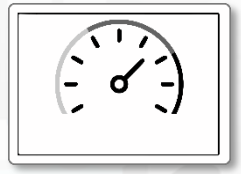












Monitoring My PAXCounter and Tracks (example)

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

Wed 3 Jul 09:18:07

Your PAX Counter

paxwifitest0... 8m

Single Content

paxwifitest001 - WIFI number 8m

Time Trend

paxwifitest001 - WIFI - Last Week 8m

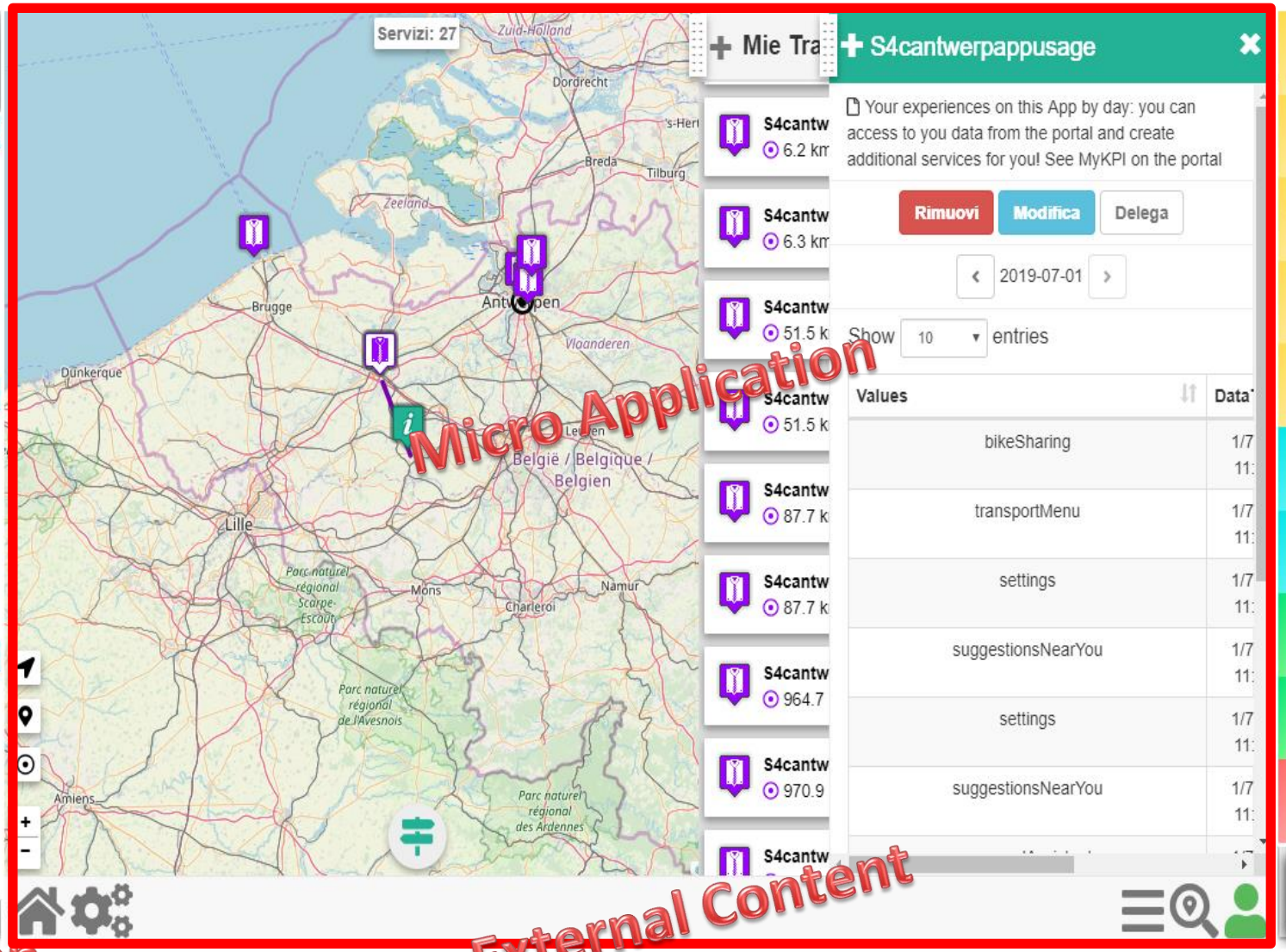
Time Trend

paxwifitest001 - WIFI - Last Month 8m

Time Trend

Documentation

Button



Micro Application

External Content

Origin Dest. Matrix

Typical Trajectories

My Track

Delegated Tracks

Multi Tracks

Twitter Vigilance

Twitter Vig. Real Time

Air Quality

Weather

Fourm Discussion

Selector Web

Survey

Button

FIRENZE

Tue 16 Oct 16:18:39

INDICI DI CRITICITA' DELLA QUALITA' DELL'ARIA (ICQA) 2 — inviata comunicazione alla cittadinanza

OZONO 200 µ/m³ — superata la soglia di informazione

39492 Utenti WiFi

STATI DI ALLERTA 9m

GENERAL | METEO

MINIMO | BASSO | MEDIO | ALTO

RISCHIO IDRAULICO

RISCHIO TEMPORALI

RISCHIO IDROGEOLOGICO

RISCHIO NEVE

RISCHIO GHIACCIO

Mar 16 Ott
Firenze
Nuvoloso
19°C / 24 °C
Powered by LaMMA

Mer 17 Ott 16°C / 24°C	Nuvoloso
Gio 18 Ott 15°C / 26°C	Nuvoloso
Ven 19 Ott Temp N/A	Sereno
Sab 20 Ott Temp N/A	Sereno

TPL

N	14	57	21
Attesa	3'	8'	5'
Ritardo	2'	0'	2'

COLONNINE RICARICA 9m

180 INSTALLATE

81.1 % ATTIVE

8.9 % IN USO

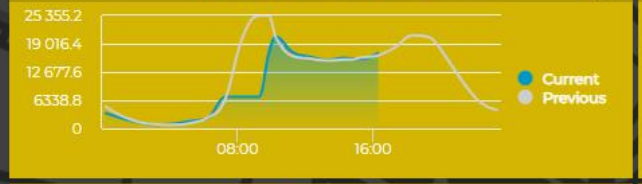
REPLICATE

FLORENCE DASHBOARD

This dashboard is the main entry point to access dashbaords realised in the REPLICATE H2020 EC project.

REPLICATE has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No. 691735.

FLUSSI INGRESSO CITTA 9m

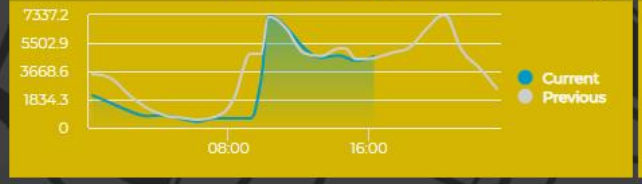


TOTALE 9m

141608

VEICOLI

FLUSSI INGRESSO ZTL 9m



TOTALE ZTL 9m

41146

VEICOLI

SITUAZIONE VIABILITA 54s

4 INCIDENTI

0 CHIUSURE AL TRAFFICO (TOT)

0 CHIUSURE PER CANTIERI

0 PROGR. | 0 NON PROG.

0 LIMITAZIONI AL TRAFFICO (TOT)

0 LIMITAZIONI PER CANTIERI

0 NON PROG. | 0 PROGR.

4 TOT. EVENTI SULLA RETE

SMN 9m	BINARIO16 9m	FORTEZZA 9m
63.4 % occupati su 901 posti	83 % occupati su 165 posti	17.9 % occupati su 521 posti
LEOPOLDA 9m	**CALZA 9m**	**S.AMBROGIO 9m**
36.3 % occupati su 300 posti	69.3 % occupati su 218	67 % occupati su 379 posti
PARTERRE 9m	**CAREGGI 9m**	**BECCARIA 9m**
64.9 % occupati su 106 posti	90.4 % occupati su 406 posti	78.6 % occupati su 210 posti

STATO TRIAGE CAREGGI 9m

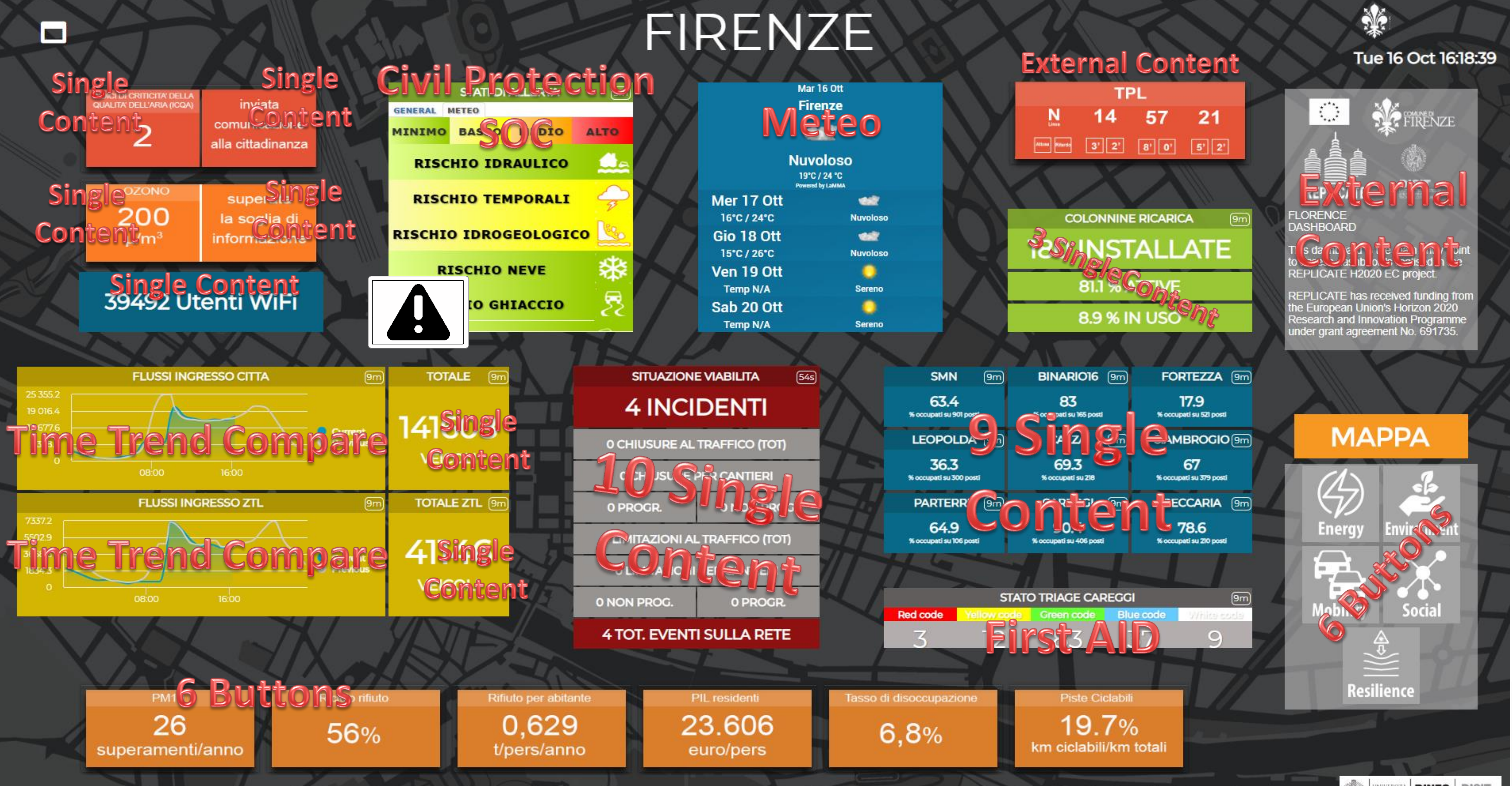
Red code	Yellow code	Green code	Blue code	White code
3	12	83	37	9

MAPPA

Energy | Environment | Mobility | Social | Resilience

PM10	Riciclo rifiuto	Rifiuto per abitante	PIL residenti	Tasso di disoccupazione	Piste Ciclabili
26 superamenti/anno	56%	0,629 t/pers/anno	23.606 euro/pers	6,8%	19.7% km ciclabili/km totali

Most of the widgets are connected to an URL to jump to other views/dashboards


FIRENZE
Tue 16 Oct 16:18:39
Single Content
Single Content
Civil Protection
SOC
Meteo
External Content
TPL
COLONNINE RICARICA
3 Single Content
External Content
FLORENCE DASHBOARD
REPLICATE has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No. 691735.
Single Content
Single Content
Single Content
RISCHIO IDRAULICO
RISCHIO TEMPORALI
RISCHIO IDROGEOLOGICO
RISCHIO NEVE
Mar 16 Ott
Firenze
Nuvoloso
Mer 17 Ott
Gio 18 Ott
Ven 19 Ott
Sab 20 Ott
FLUSSI INGRESSO CITTA
TOTALE
Time Trend Compare
Single Content
SITUAZIONE VIABILITA
4 INCIDENTI
0 CHIUSURE AL TRAFFICO (TOT)
10 Single Content
4 TOT. EVENTI SULLA RETE
SMN
BINARIO16
FORTEZZA
LEOPOLDA
9 Single Content
MAPPA
FLUSSI INGRESSO ZTL
TOTALE ZTL
Time Trend Compare
Single Content
STATO TRIAGE CAREGGI
Red code
Yellow code
Green code
Blue code
White code
First AID
Energy
Mobility
Social
Resilience
6 Buttons
6 Buttons
26 superamenti/anno
56%
Rifiuto per abitante
0,629 t/pers/anno
PIL residenti
23.606 euro/pers
Tasso di disoccupazione
6,8%
Piste Ciclabili
19.7% km ciclabili/km totali

Most of the widgets are connected to an URL to jump to other views/dashboards

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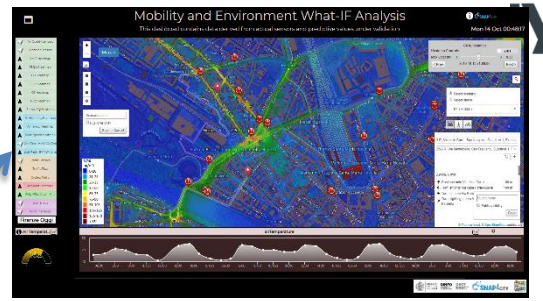
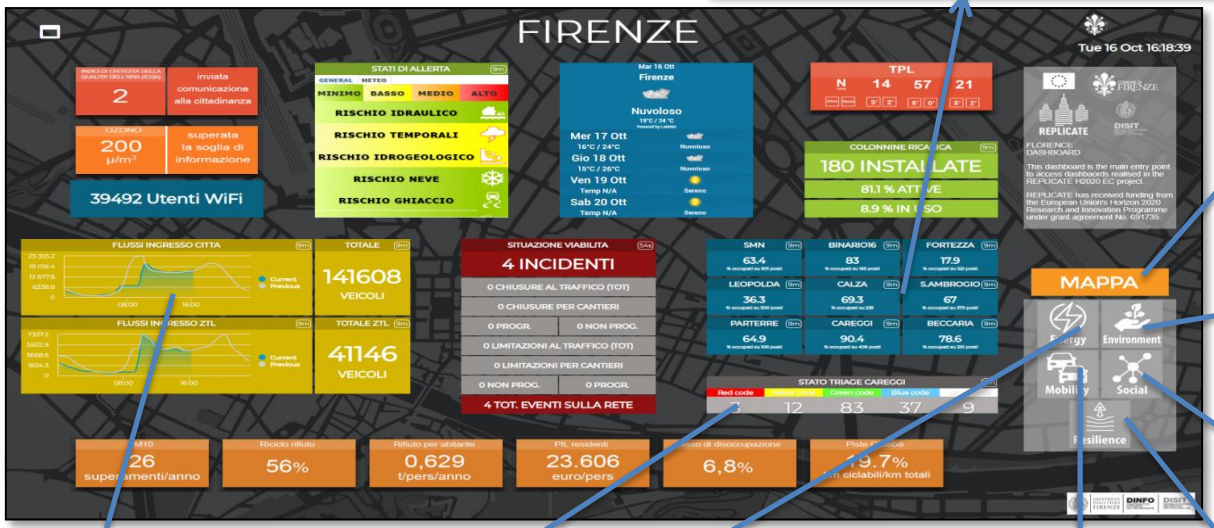
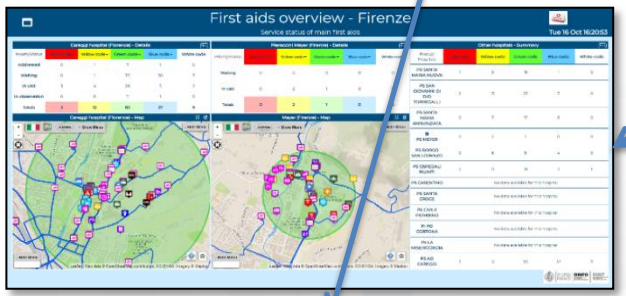
DISTRIBUTED DATA INTELLIGENCE AND TECHNOLOGIES LAB

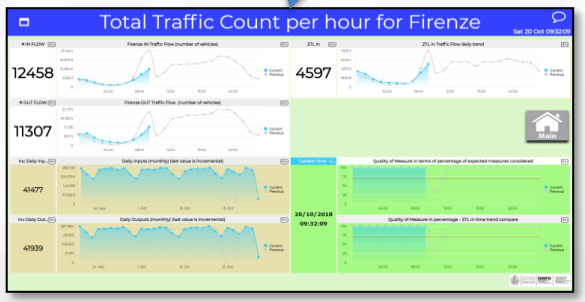
REPLICATE

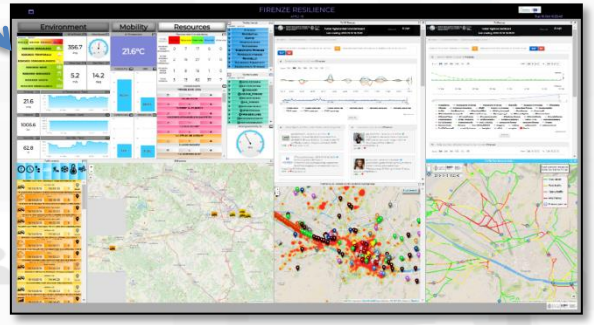
KM4CITY



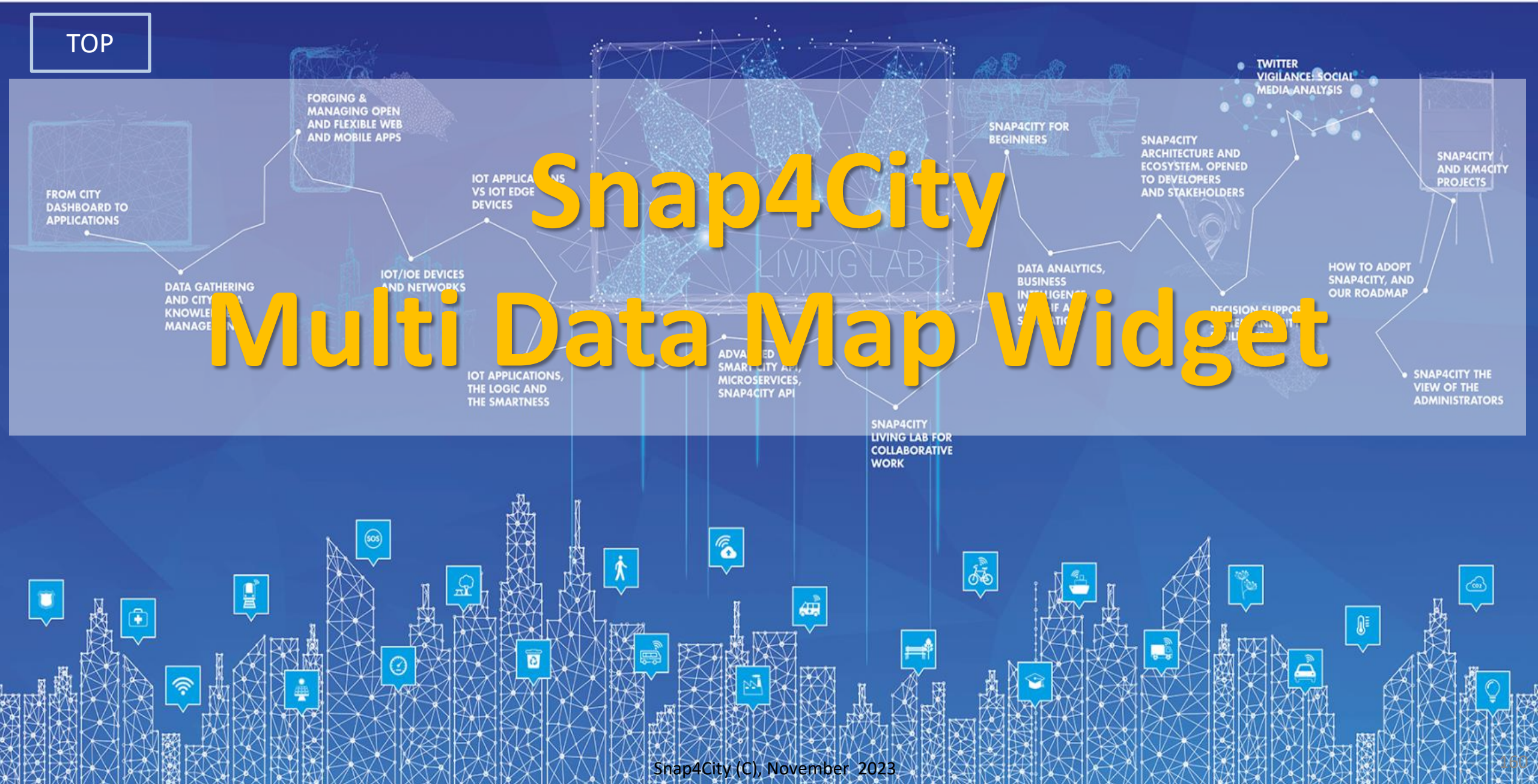






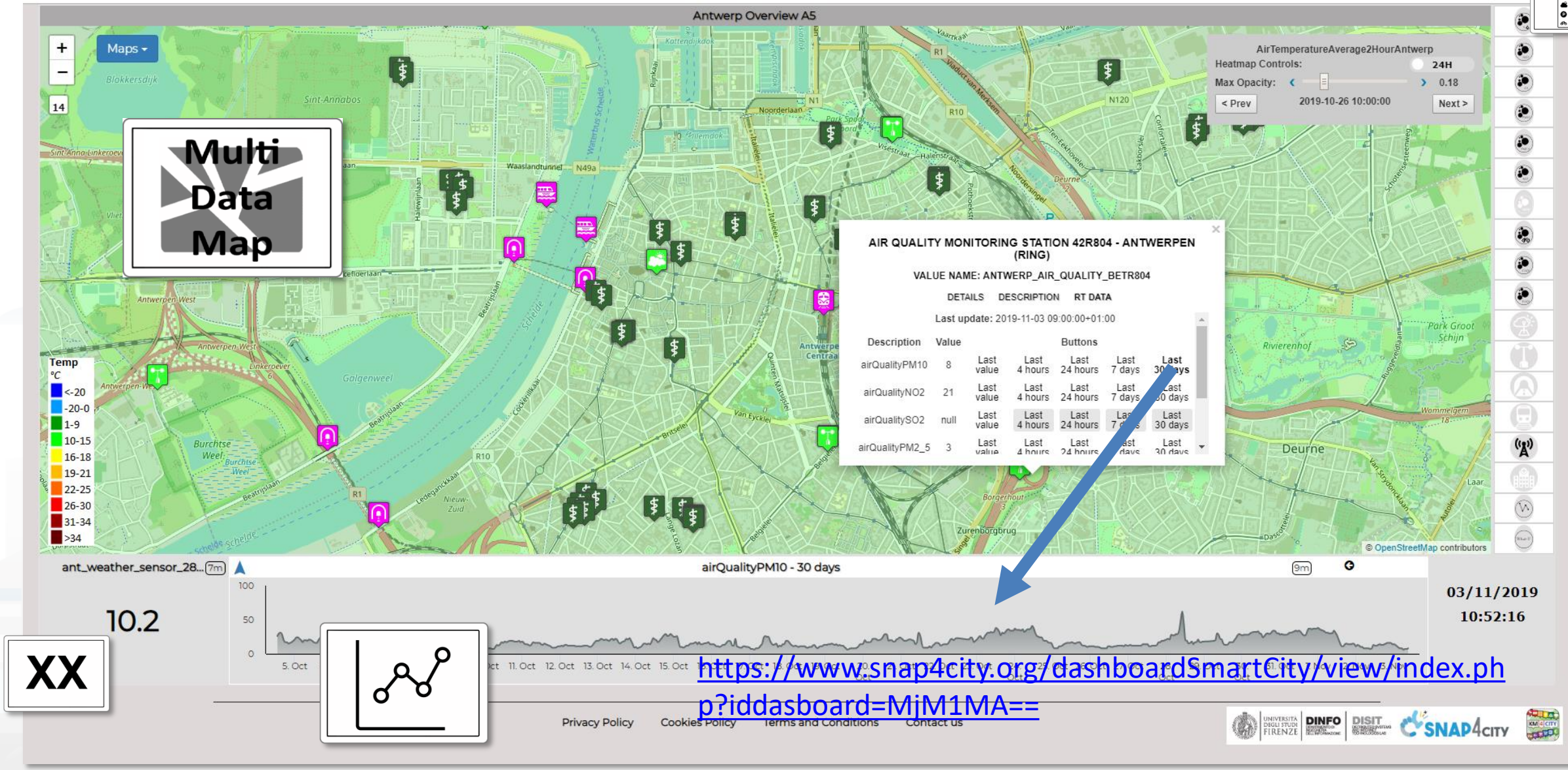


TOP



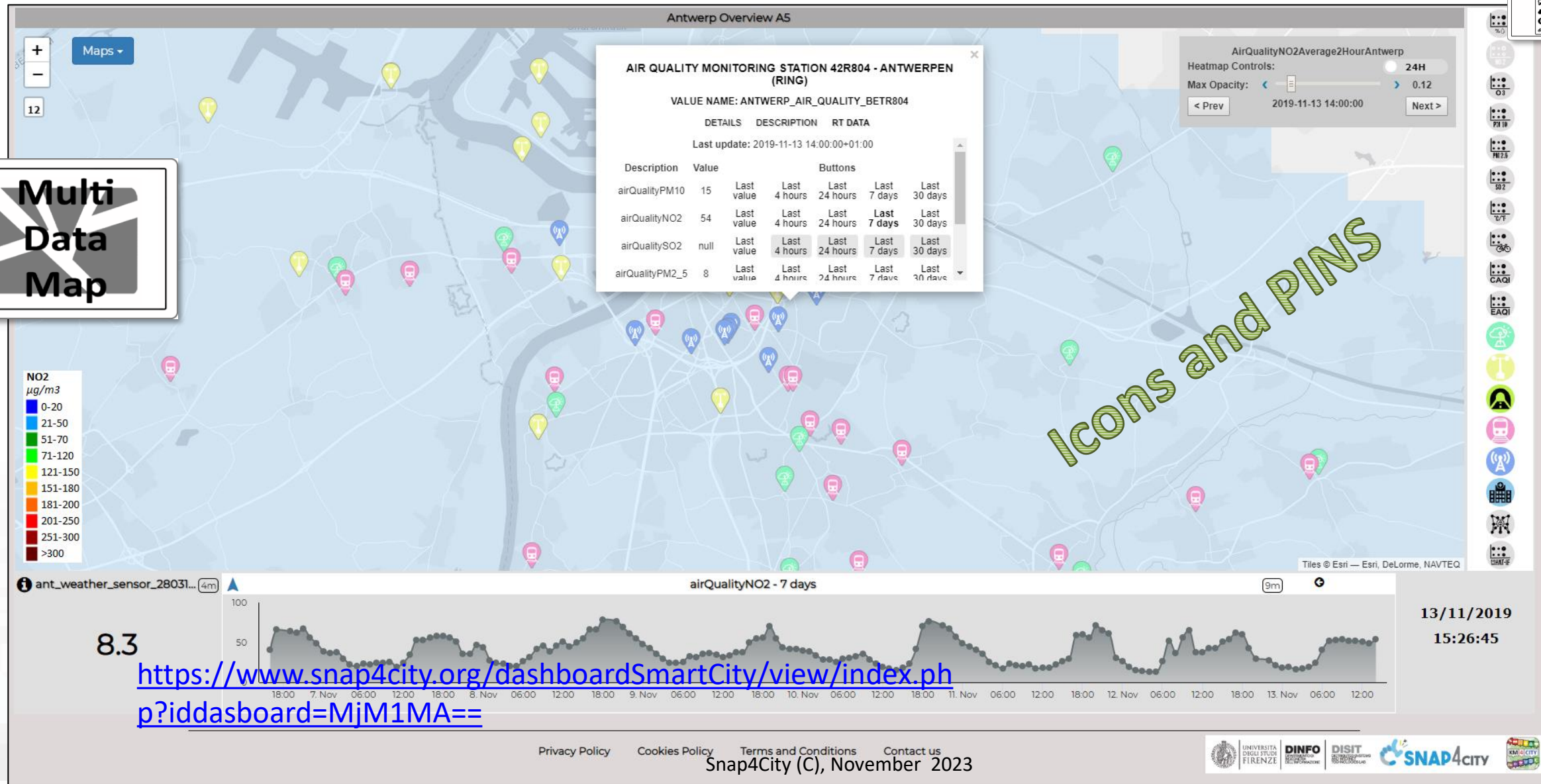
Snap4City
Multi Data Map Widget

Unique Dashboard builder Multiple Styles



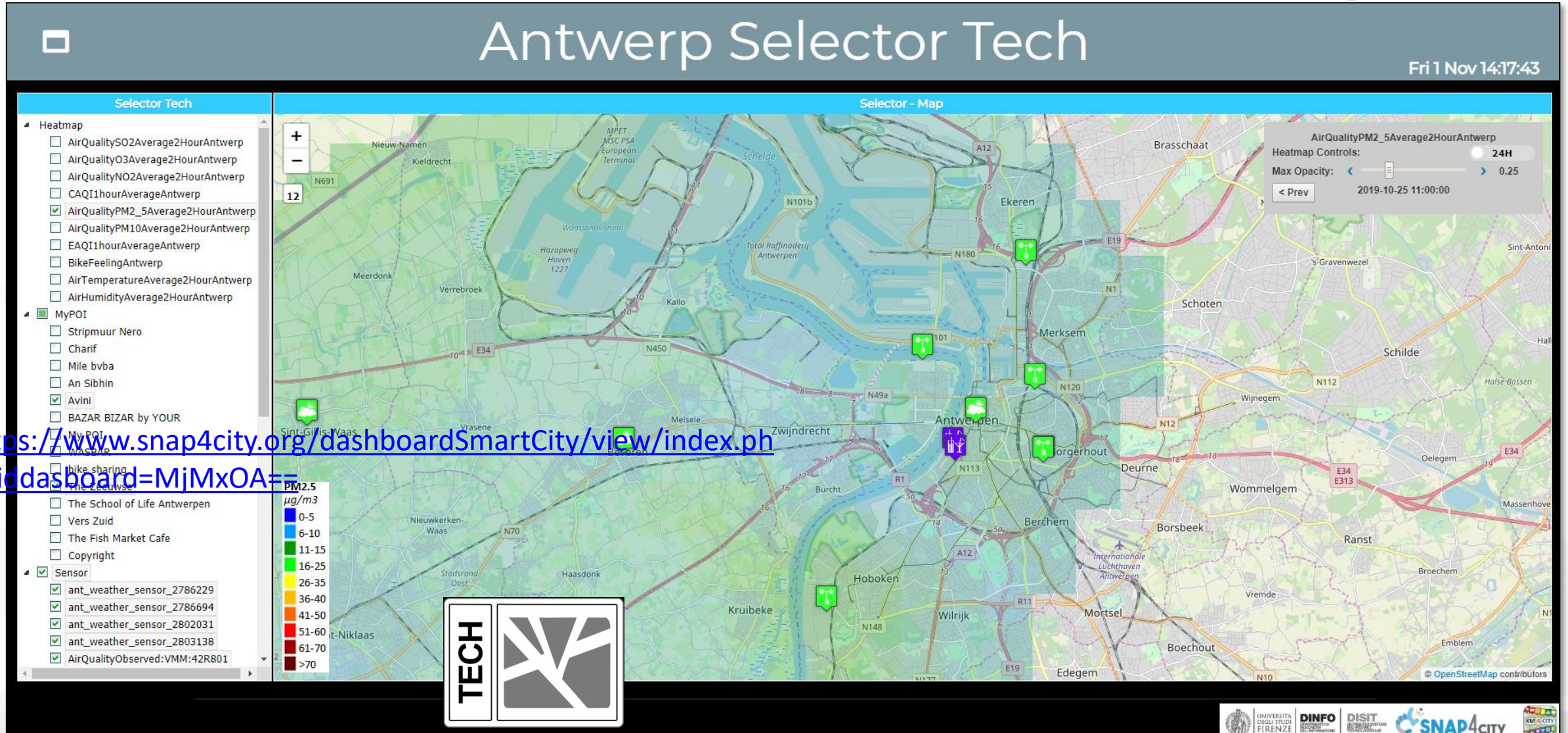
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjM1MA==

Menu Icon and PINs as Icons



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

Technical Selector: TECH MultiDataMap



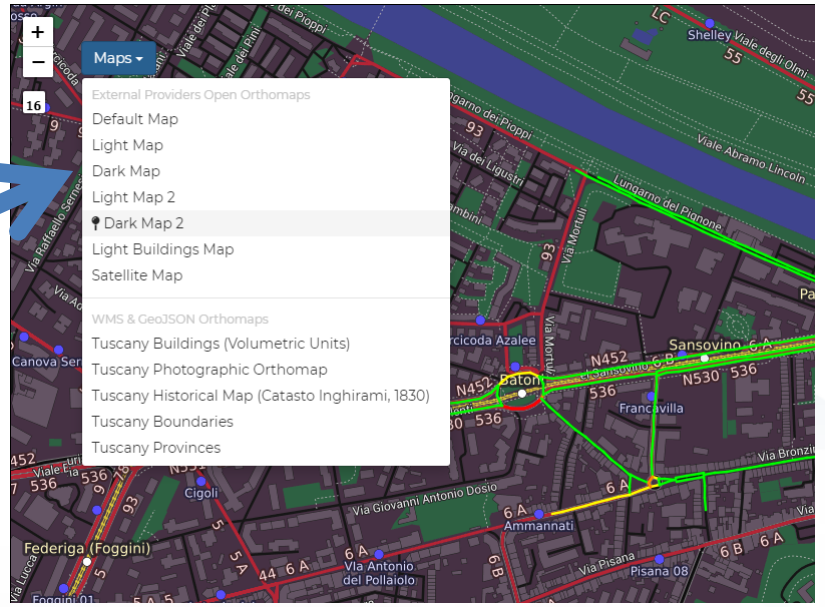
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjMxOA==

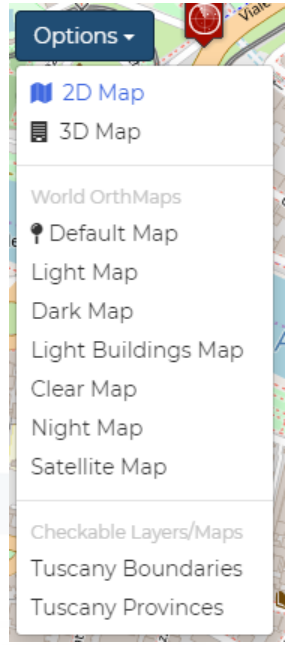
Multi Data Map: many kinds of data

- **Orthomaps**: plain maps and overlapped layers
- A range of **Pins Kinds** for marking Services, IOT Devices, etc.
- **Services**:
  - POI, MyPOI, IOT Devices, Sensors, Actuators, IOT Device Moving, etc.
  - Cycling paths
  - Areas shapes: gardens, etc…
  - GIS data
- **Heatmaps**: different types
- **Traffic Flows:** different kinds
- **OD matrices**
- **Special data:**
  - **What-If** analysis: routing, public routing, traffic flow
  - **Routing: private, public, pedestrian, public means**
  - **Scenarios** definition
- **3D** buildings on special version of MMD
- ….

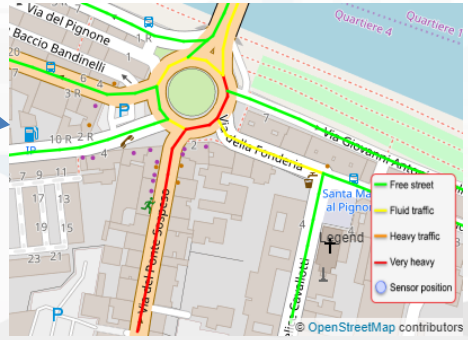
Multi Data Map Widget

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

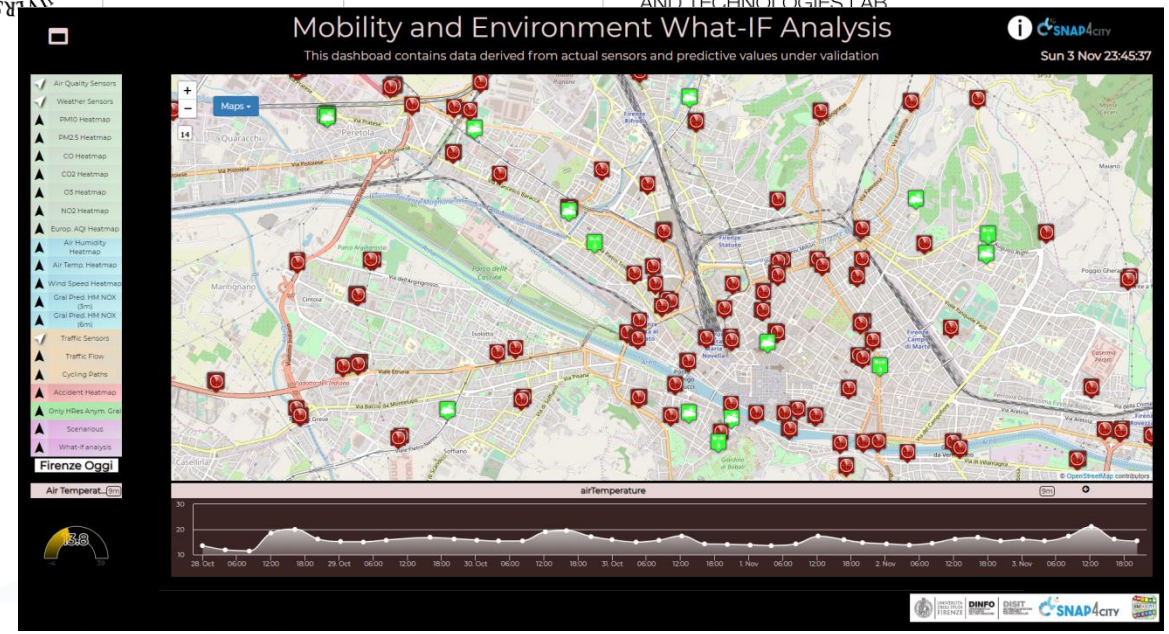


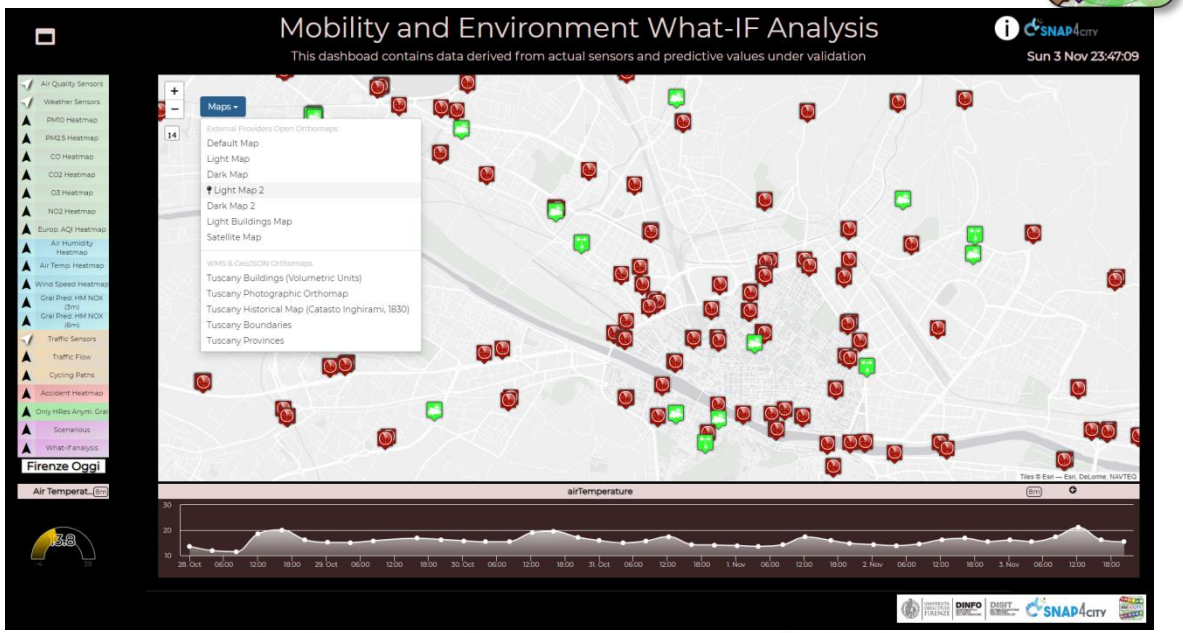


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjE5MA==#

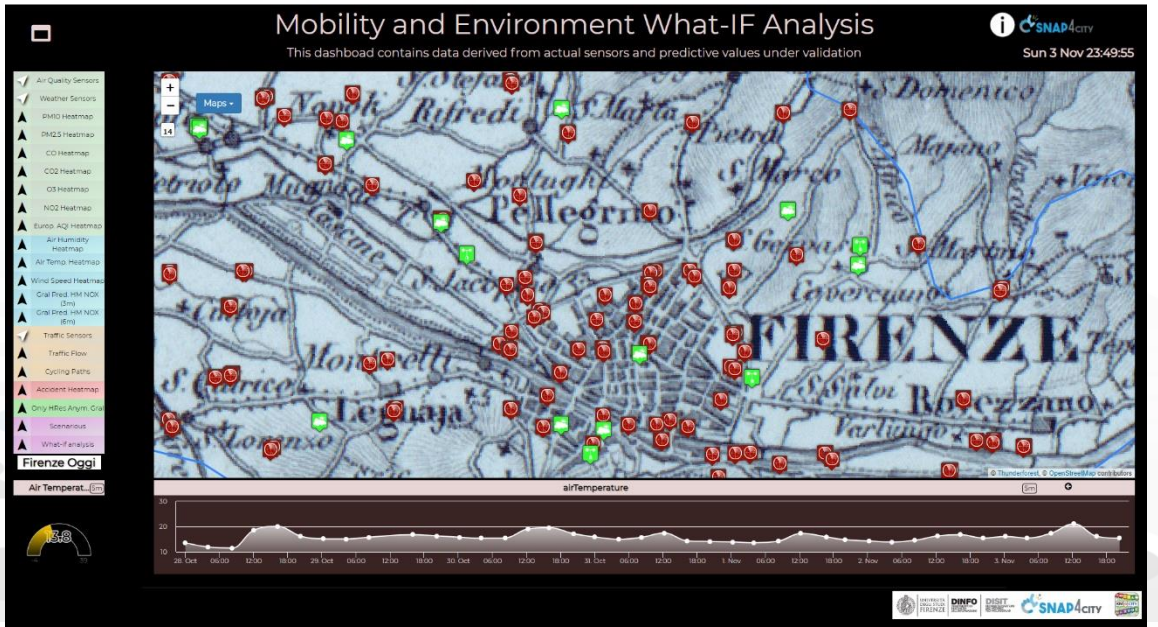


Orthomaps


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


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


Mobility and Environment What-IF Analysis
This dashboad contains data derived from actual sensors and predictive values under validation
Sun 3 Nov 23:48:22
Maps
Default Map
Light Map
Dark Map
Light Map 2
Dark Map 2
Light Buildings Map
Satellite Map
Tuscany Buildings (Volumetric Units)
Tuscany Photographic Orthomap
Tuscany Historical Map (Catasto Inghirami, 1830)
Tuscany Boundaries
Tuscany Provinces
airTemperature

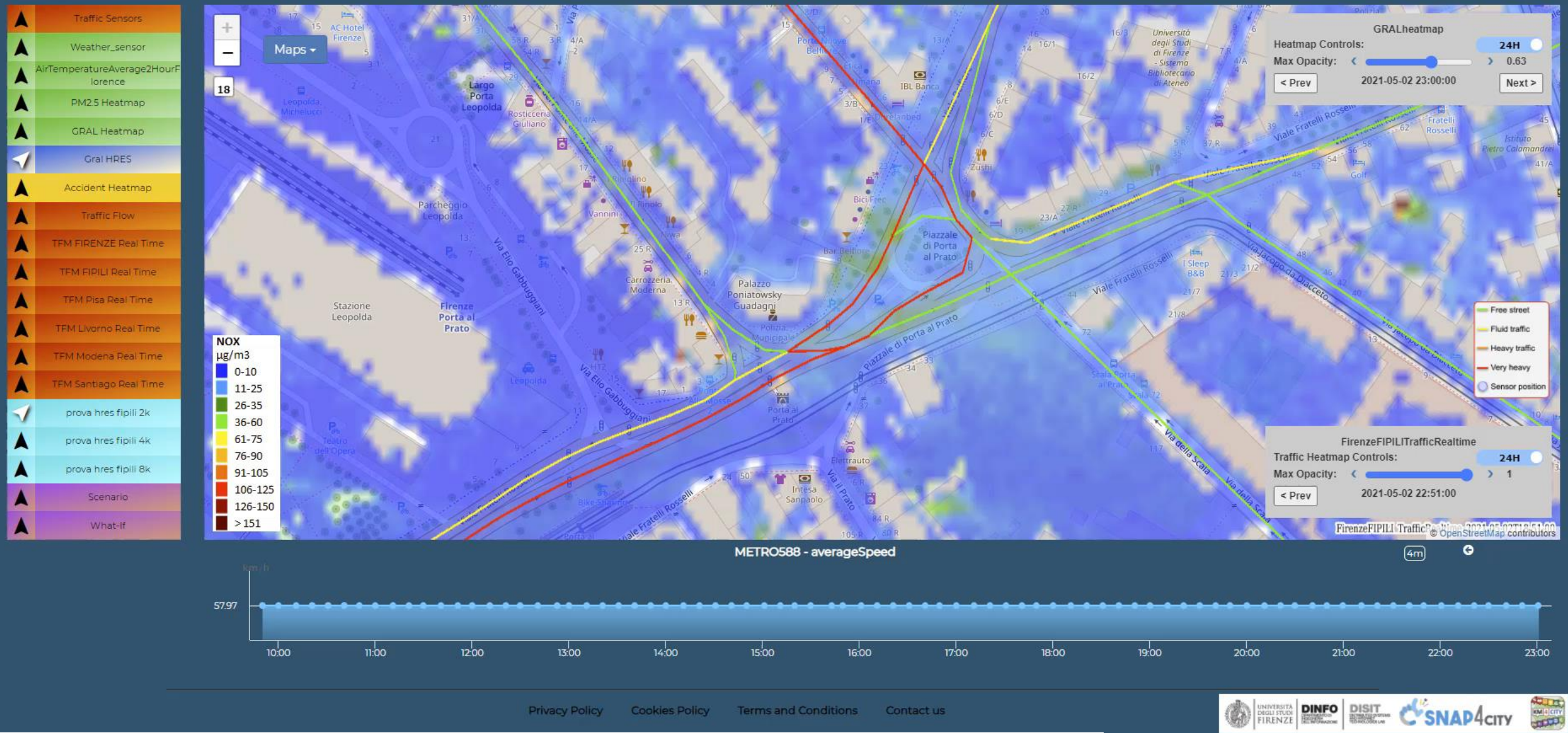

Mobility and Environment What-IF Analysis
This dashboad contains data derived from actual sensors and predictive values under validation
Sun 3 Nov 23:49:55
Maps
FIRENZE
airTemperature

Orthomaps as graphic layers

- **Orthomaps can be**:
  - Directly exploited from public service via WMS protocol, from some GIS services as GeoServer
  - Loaded into the Snap4City GeoServer
  - Layered if they can be overlapped each other, such as map with gov border above.
- The Dashboard owner can
  - Select the Orthomaps to be used shown as default in the dashboard
- Each organization has its own set of Orthomaps

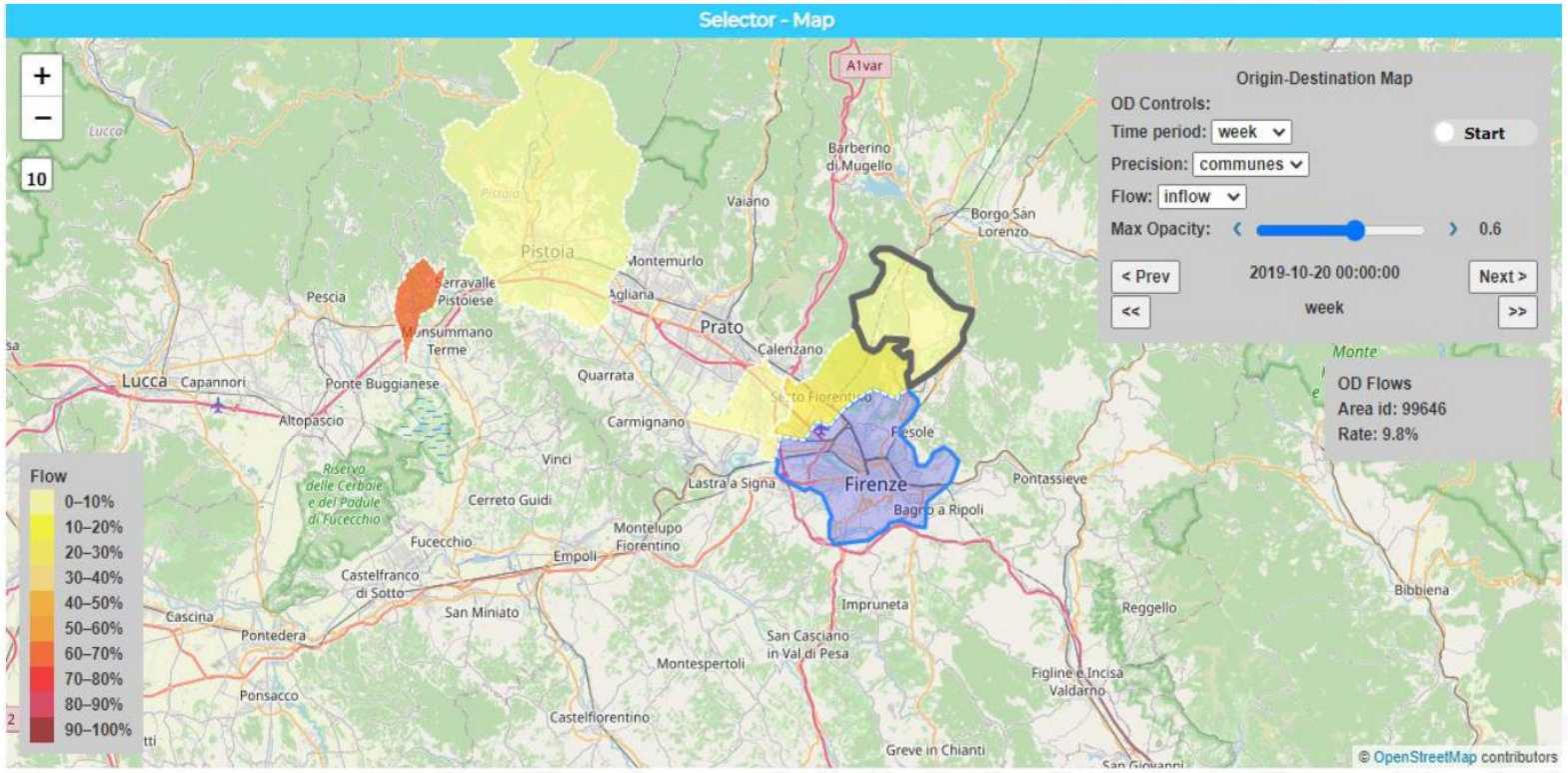
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjE5MA==

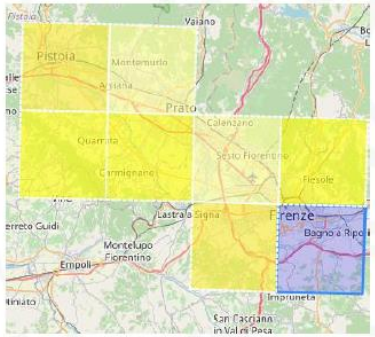
Traffic Flow Manager on multiple cities

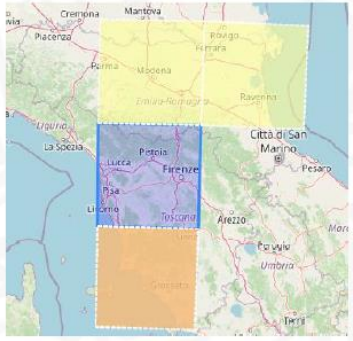


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzEyNg==

Different Origin Destination Matrices





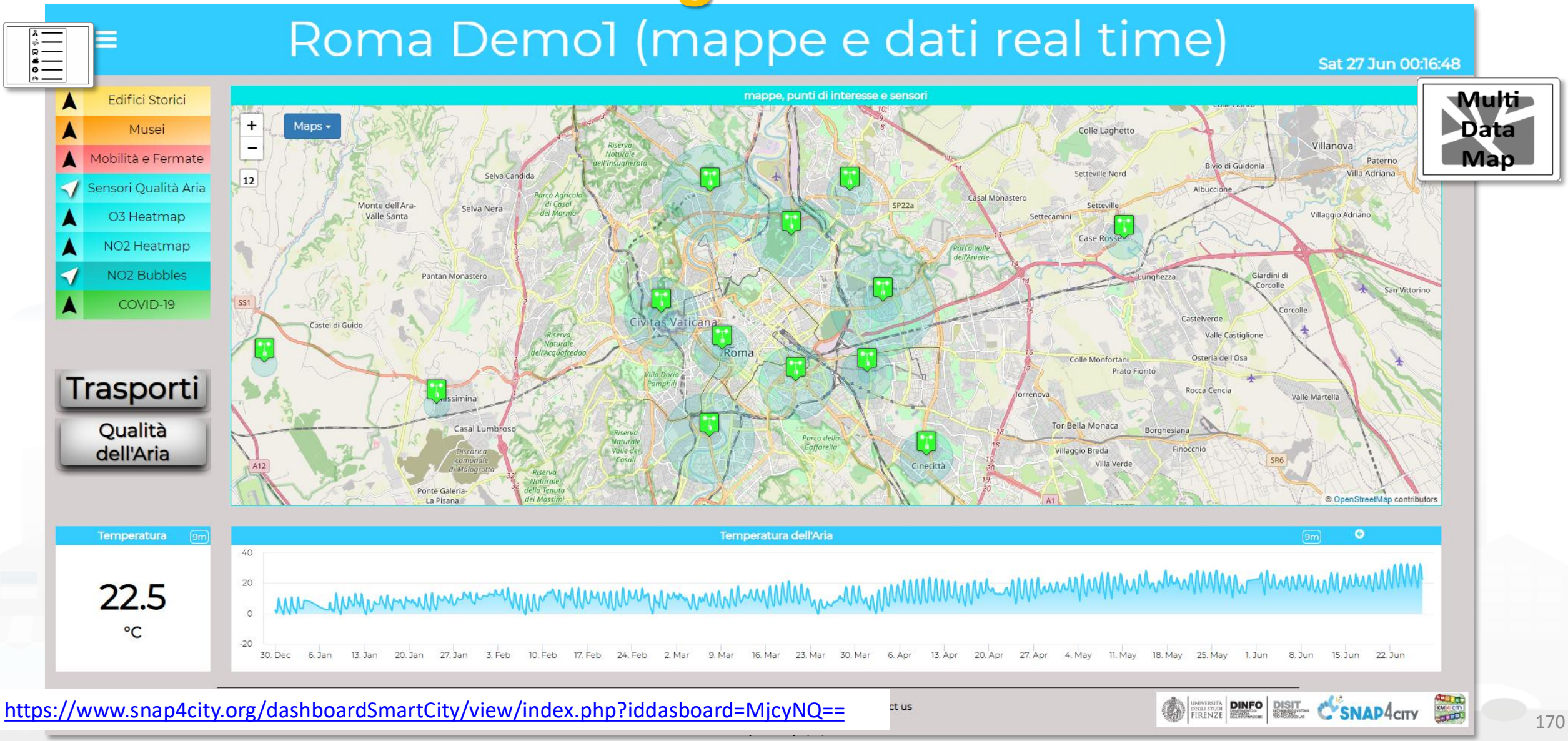


- Get specific value
- Time window
- Opacity
- Animation
- Inflow/outflow
- Sequence of OD matrices: next/prev

shapes

- **Shapes**: city, region, territories, etc.
  - GADM https://gadm.org/ , and ACE
- **Squared** MGRS:
  - 1m, 10m, 100m, **1Km, 10Km, 100Km**

Weighted Bubbles



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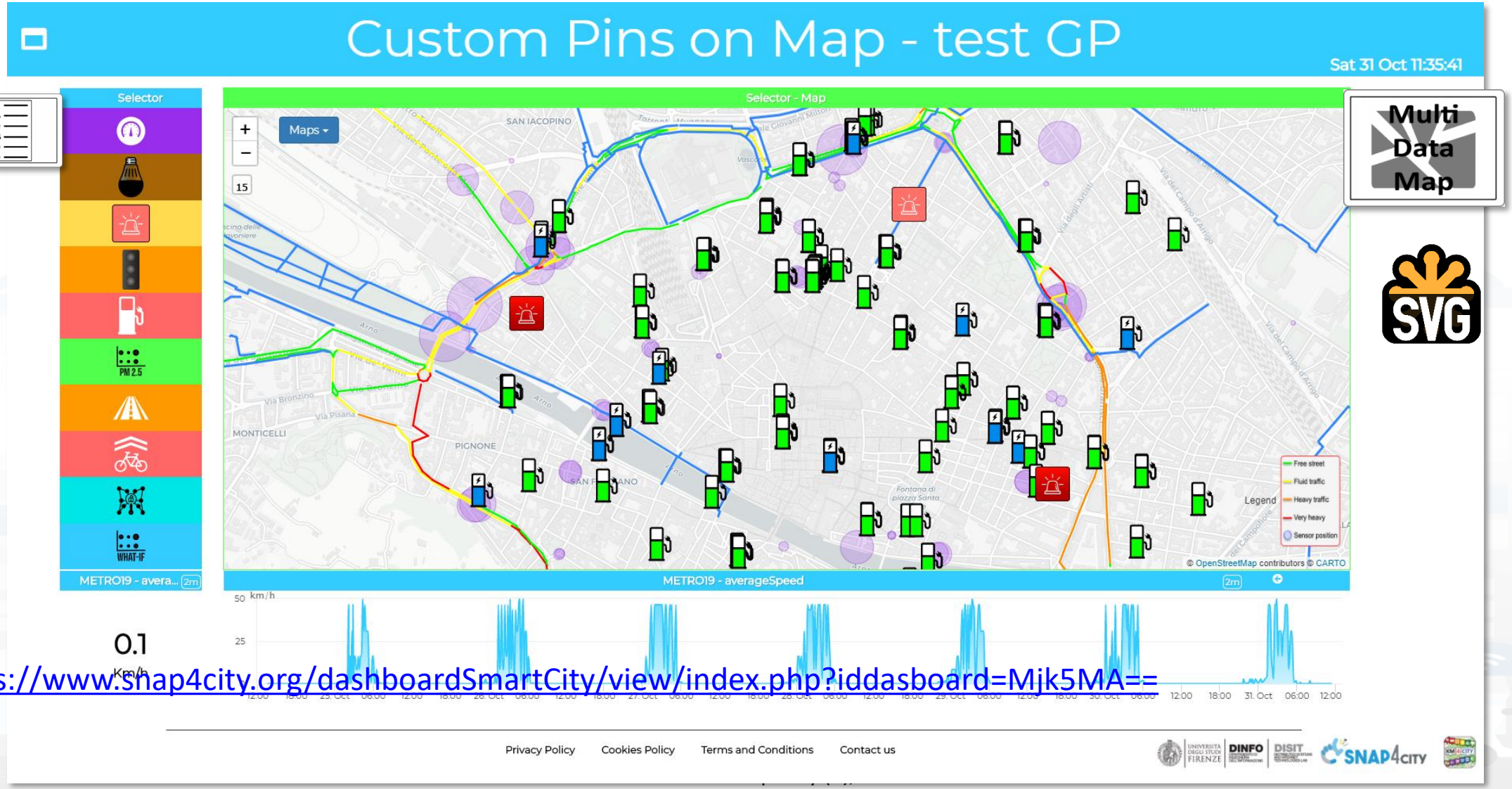
Custom Dynamic Pins



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

Pins on Multi Data Maps (1)

Normal Over

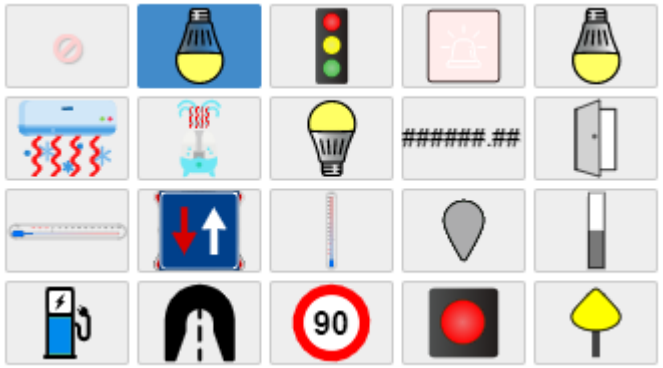
- **Classic**: (default)
  - Text menu or Icon Menu
    - Custom color of the Menu only
  - Fixed on the basis of Nature and Subnature

Normal Over Icon Menu

- **Icon**: (accessible as **Icon Mode** of selector)
  - Also usable with **Text Mode** of the menu
  - Selectable from a large set
  - Coherent with Icon on Menu
  - Custom Color

Pins on Multi Data Maps (2)

Bubble Pins



Pins and Menu icons

- **Bubble**:
  - Text Menu or Icon Menu
  - Custom Color
  - Size depending on ServiceURI Attribute, IOT Device ValueName
- **Custom**: (accessible from Alternate View Mode)
  - Can be created by AreaManagers as **Custom Widgets**
    https://www.snap4city.org/663
  - Selectable from a set
  - Coherent with Menu, also usable with text menu
  - Variable/Dynamic colors/animations associated with ServiceURI Attribute, IOT Dev ValueName

3D Map Global Digital Twin -Newgui2

Thu 25 May 17:54:20

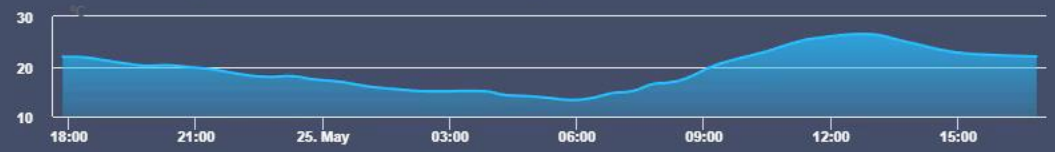
3D Map

Air Quality FI-BASSI - NO2

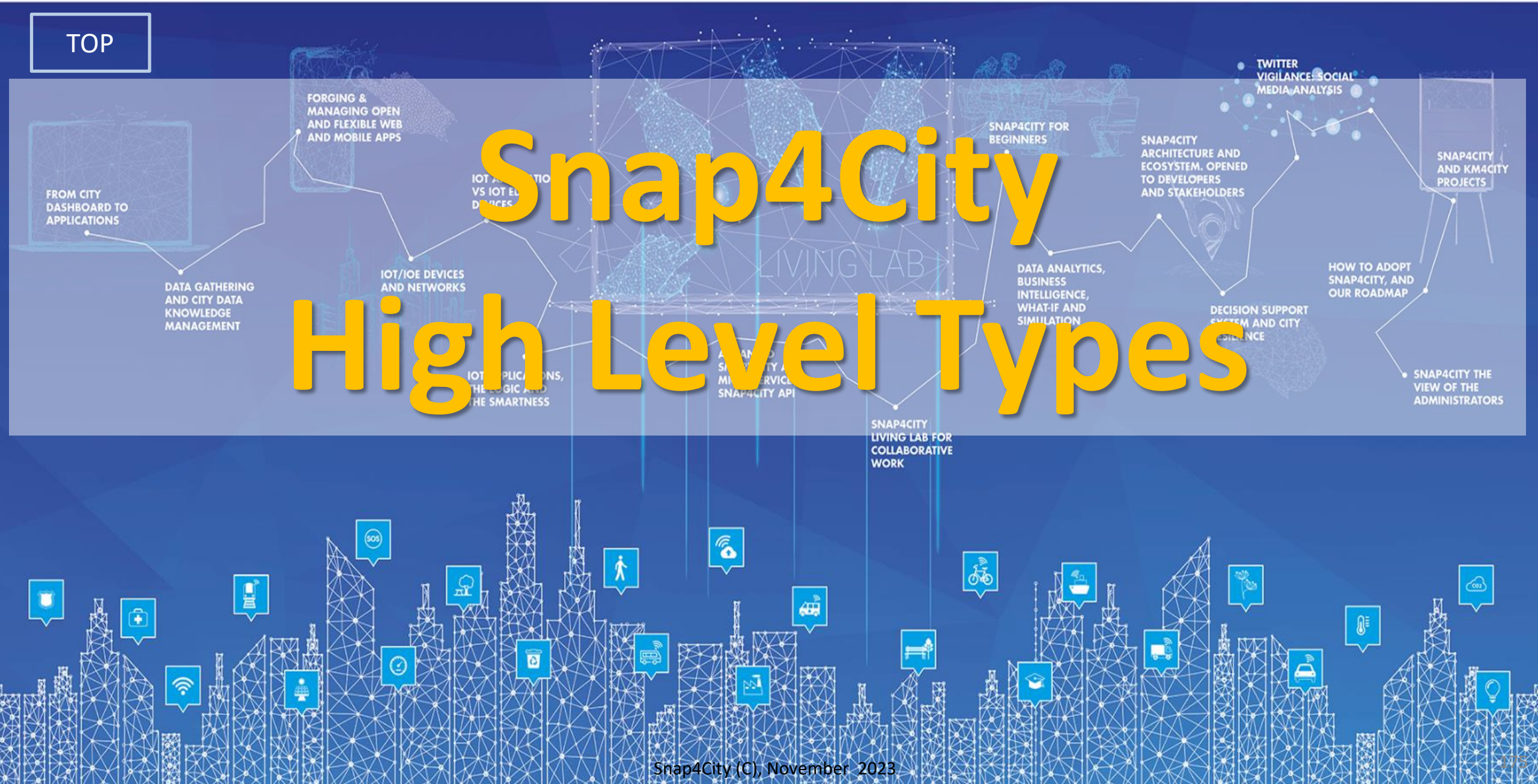
6m

Weather_sensor_ Open Weather 3176959 - Air Temperature

6m



TOP

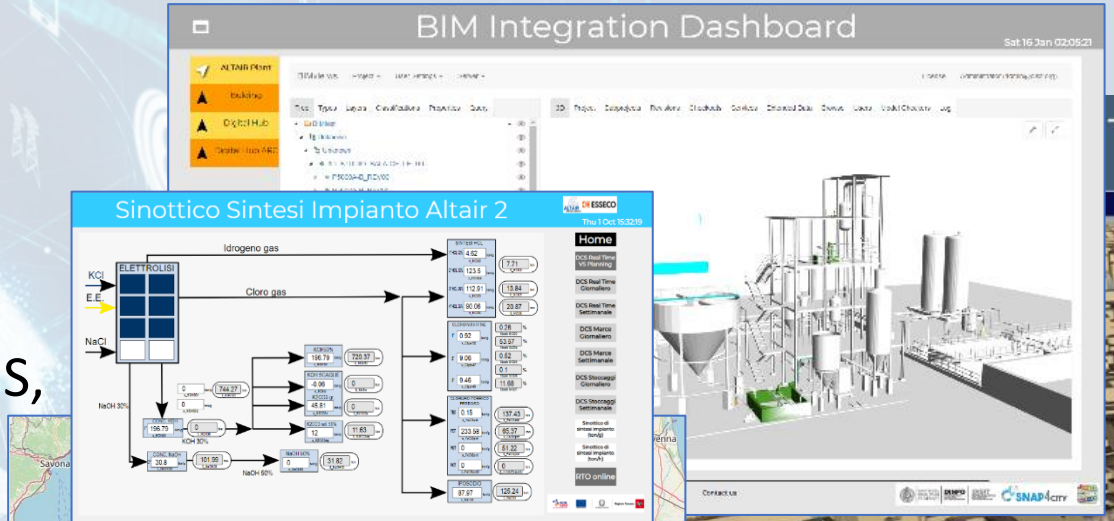


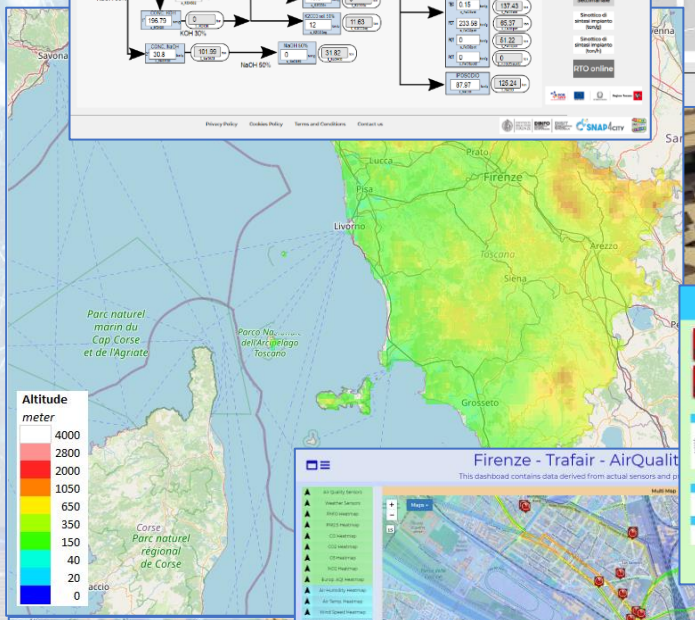
Snap4City High Level Types

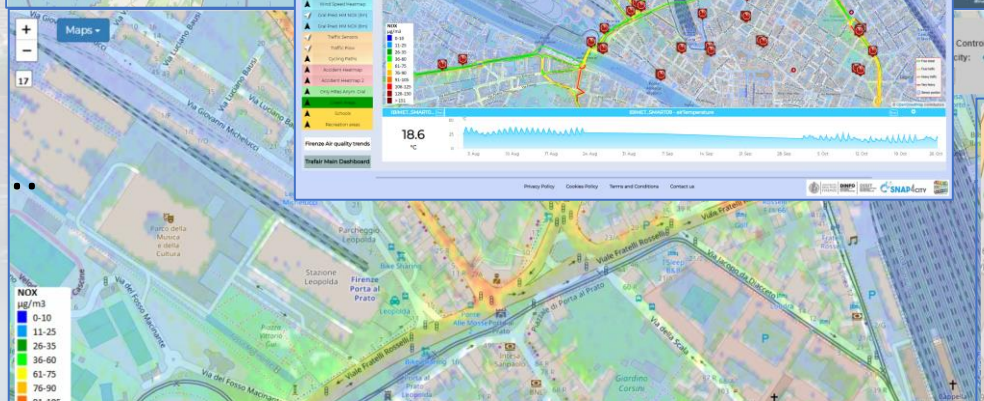
High Level Types

Snap4City (C), November 2023

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

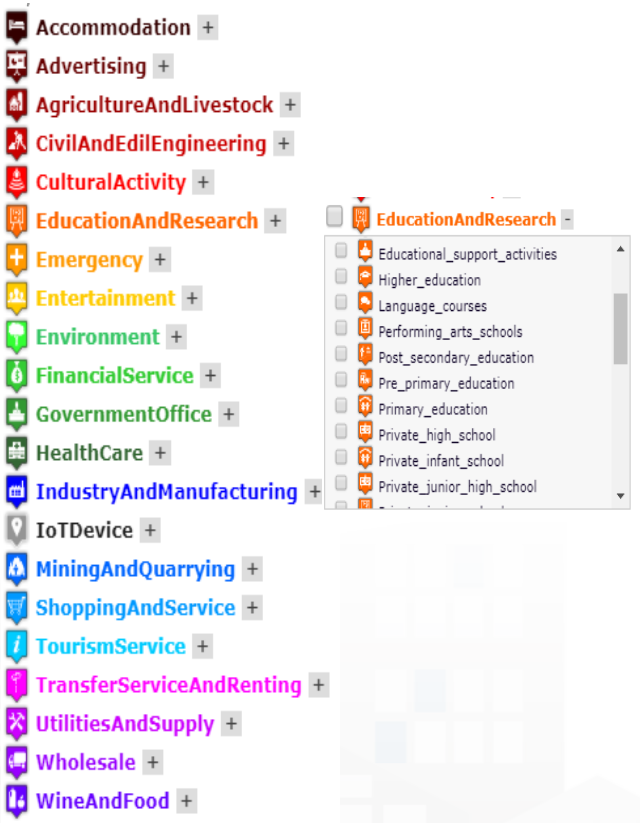






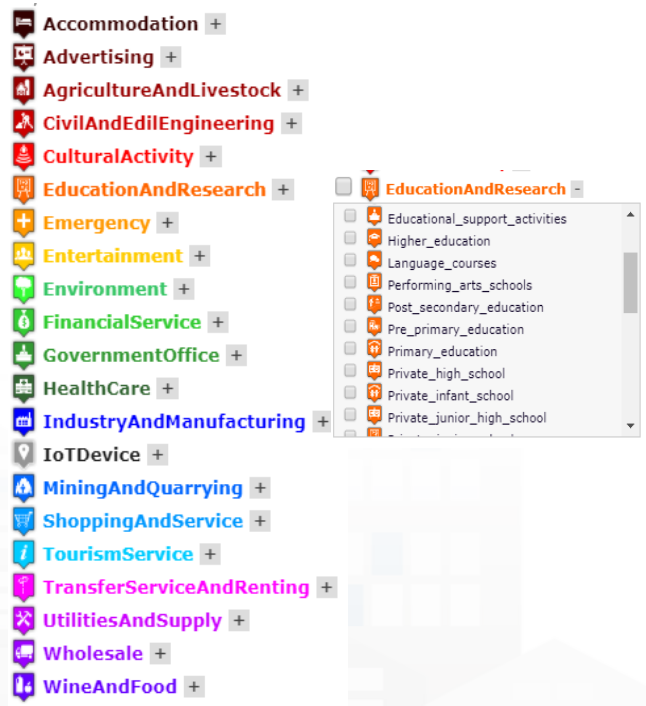
HLT: Unified Classification for Data and Services

- **Data Models**: all devices/entities sprunt from that model
  - Entity Model, IoT Device Model, Mobile Device Model, Data Table Model
- **Devices**: are instances of some model or sprunt from processes
  - Entity Device, IoT Device, Mobile Device, Data Table Device, Sensor Device
- **Variables**, Sensor/sensor-actuator, :
  - Entity Varible, IoT Device Variable, Mobile Device Variable, Data Table Variable, Sensor, Sensor-Actuator
  - **Dashboard-IOT App:** messages from GUI to Business Logic on IoT App
- **MyKPI**: dynamic GPS, info, single variable, Time Series, (Classification)
  - **KPI:** former KPI model
  - **MyPersonaData/MyData**: safes in which specific personal data are saved.
- **POI**: static GPS, info about a location, (Classification),
  - **MyPOI**: personal POI that can be leveraged to standard POI by administrator
- **Heatmaps**: matrices on some area, Time Series, (Classification)
- **Traffic Flow**: road segments with flow density, Time Series, (Classification)
- **OD Matrices**: origin destination matrices, Time Series, (Classification)
- **Complex events:** emergency, alarm, entertainment, CAP, … special widgets

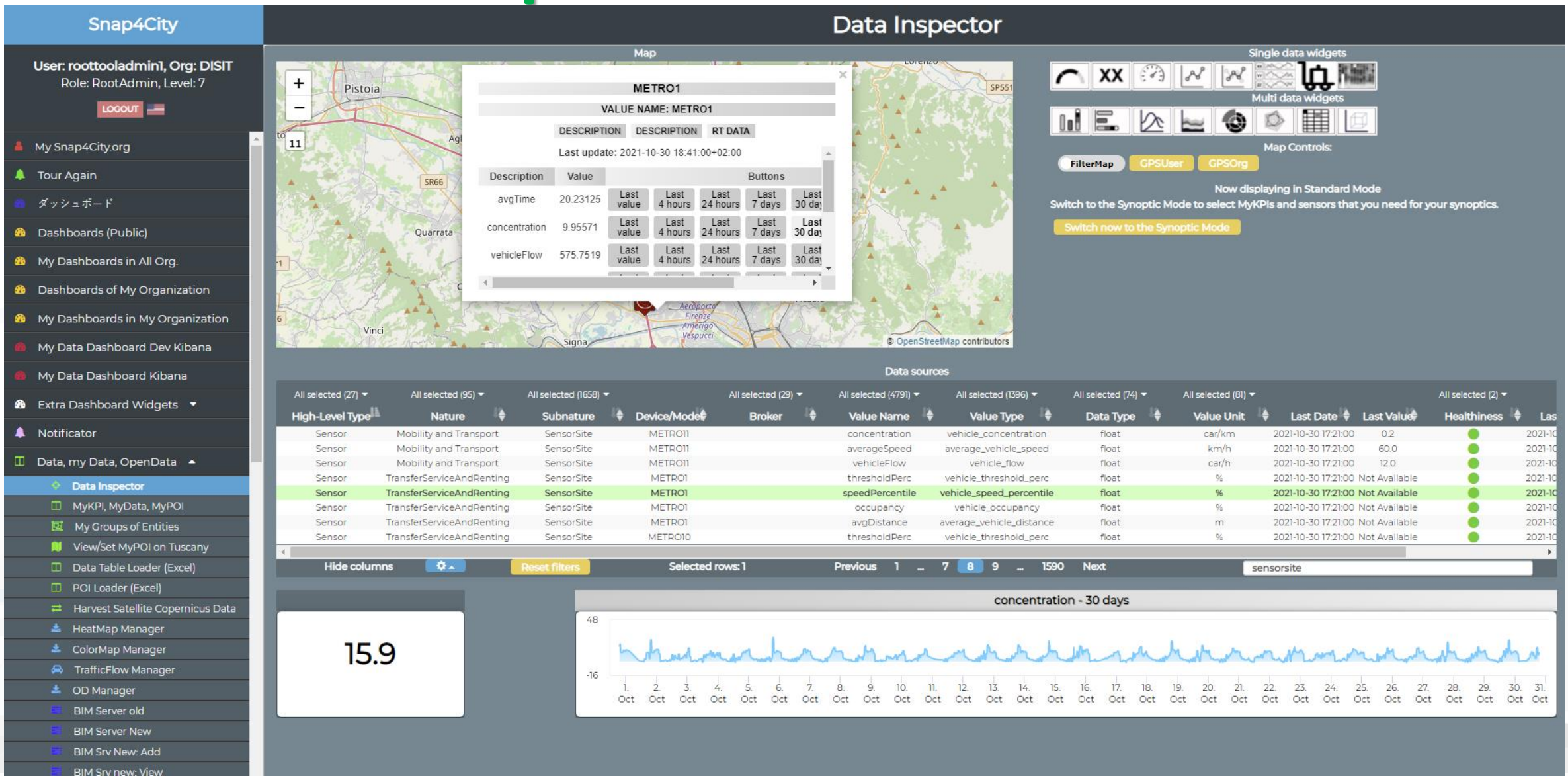


HLT: Unified Classification for Data and Services

- **External Service**: third party visualization tools, iFRAMED…
  - Also TV CAMs are rendered here, and substantially all the other Services
- **Synoptics**: graphic representations with animation connected to variables and/or MyKPI and/or IoTApp, etc.
- **BIM representations**: Digital Twin Local, …
- **Micro Applications**: Snap4City, Km4City micro applications, iFRAMED
- **Special Widget**: a set of special visualization tool with their dedicated data type
- **WFS**: a specific tool for WFS GIS rendering, please note almost the same kind of data type can be visualized as Data above described



Data Inspector: HLT classification



HLT: Unified Classification for Data and Services

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

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

High Level Types

Nature

SubNature

Semantic Classific.

Dev/Model name

Broker name

Technical Source

Value Name

Value Type

Data Type

Value Unit

Variables, names

Last Date/Time

Last Value

Real Time

Healthiness

Last Check

Status

Ownership

Organization

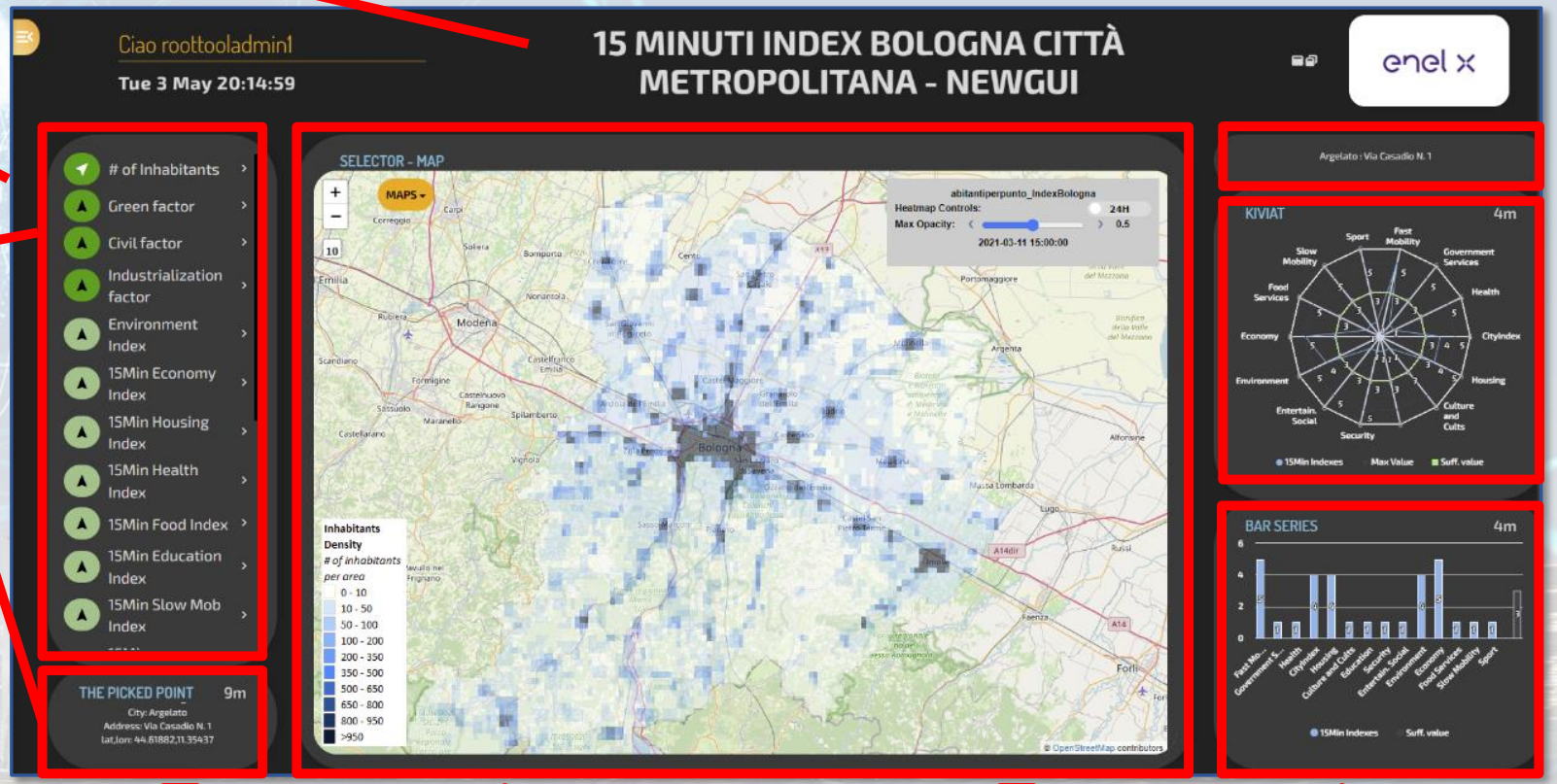
For Admin

Snap4City Dashboards main concepts

Header

Dashboard

Interactive Widgets



Server Communication

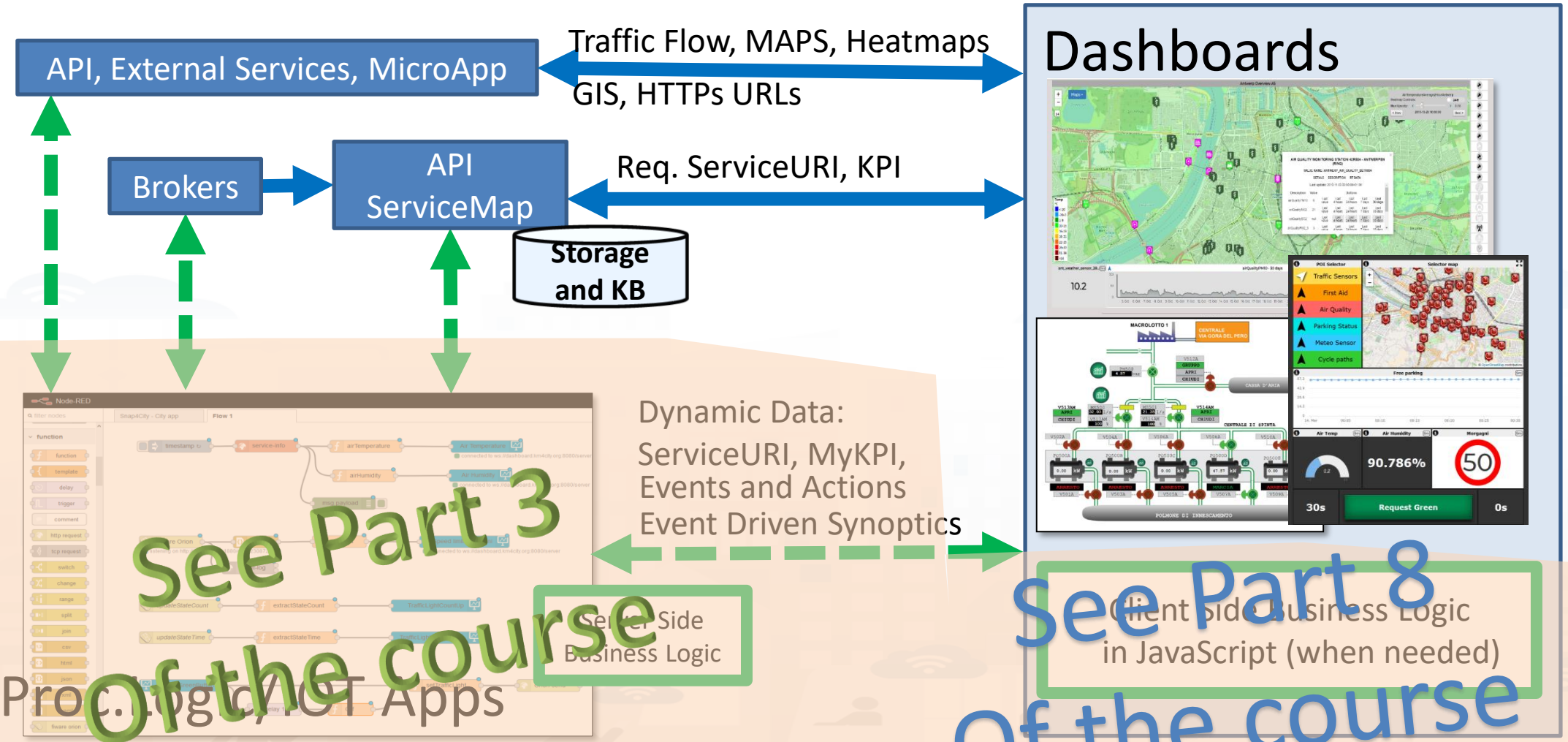
- Real Time data requests/send
- Event Driven
- Server Side Business Logic
  - See Part 3 of the course

Inter Widget Communication:

Client Side Business Logic

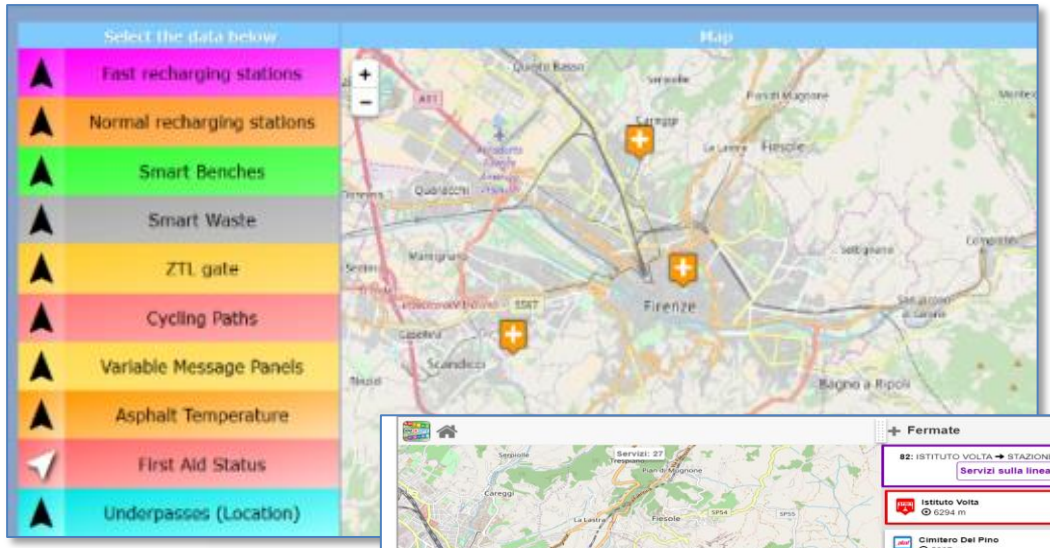
See part 8 of the Course

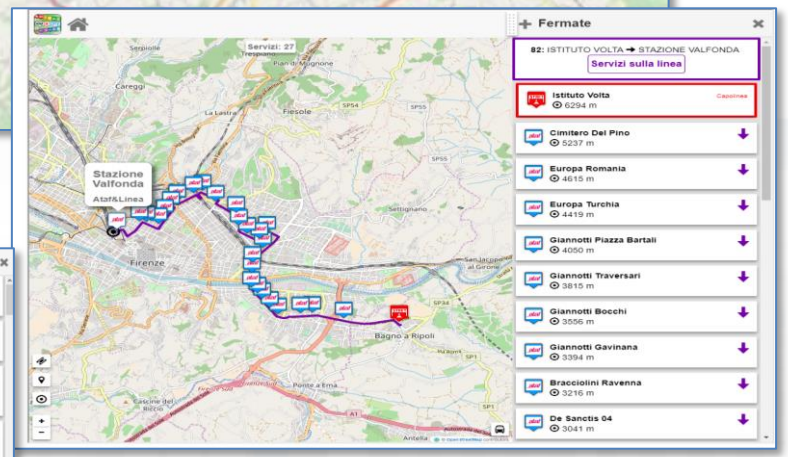
How the Dashboards exchange data



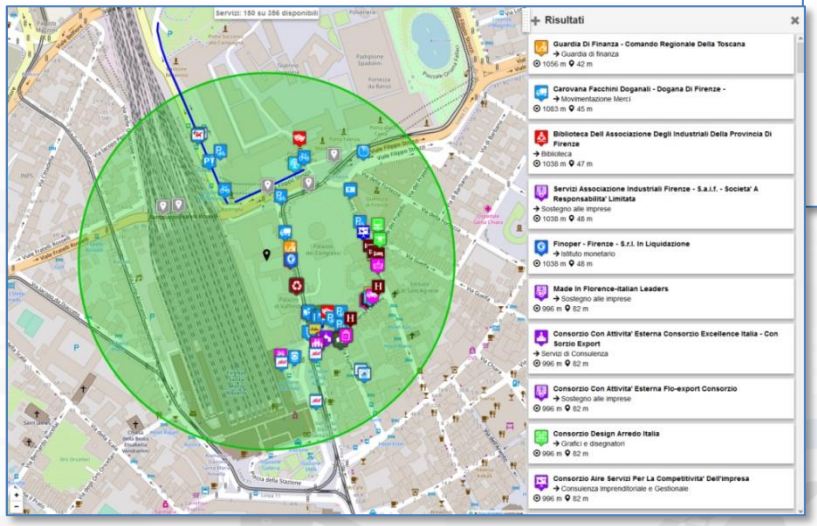
HLT: POI

High Level Types





Single POI



Categories

- Accommodation +
- Advertising +
- AgricultureAndLivestock +
- CivilAndEdilEngineering +
- CulturalActivity +
- EducationAndResearch +
- Emergency +
- Entertainment +
- Environment +
- FinancialService +
- GovernmentOffice +
- HealthCare +
- IndustryAndManufacturing
- IoTDevice +
- MiningAndQuarrying +
- ShoppingAndService +
- TourismService +
- TransferServiceAndRenting +
- UtilitiesAndSupply +
- Wholesale +
- WineAndFood +

EducationAndResearch -
- Educational_support_activities
- Higher_education
- Language_courses
- Performing_arts_schools
- Post_secondary_education
- Pre_primary_education
- Primary_education
- Private_high_school
- Private_infant_school
- Private_junior_high_school

POI: static GPS, info about a location, (Classification),
MyPOI: personal POI that can be leveraged to standard POI by administrator

HLT: Entities

High Level Types

- **Data Models**: all devices sprunt from that model
  - Entity Model, IoT Device Model, Mobile Device Model, Data Table Model
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  - Entity Instance, IoT Device, Mobile Device, Data Table Device, Sensor Device
- **Variables**, Sensor/sensor-actuator, :
  - Entity Variable, IoT Device Variable, Mobile Device Variable, Data Table Variable, Sensor, Sensor-Actuator
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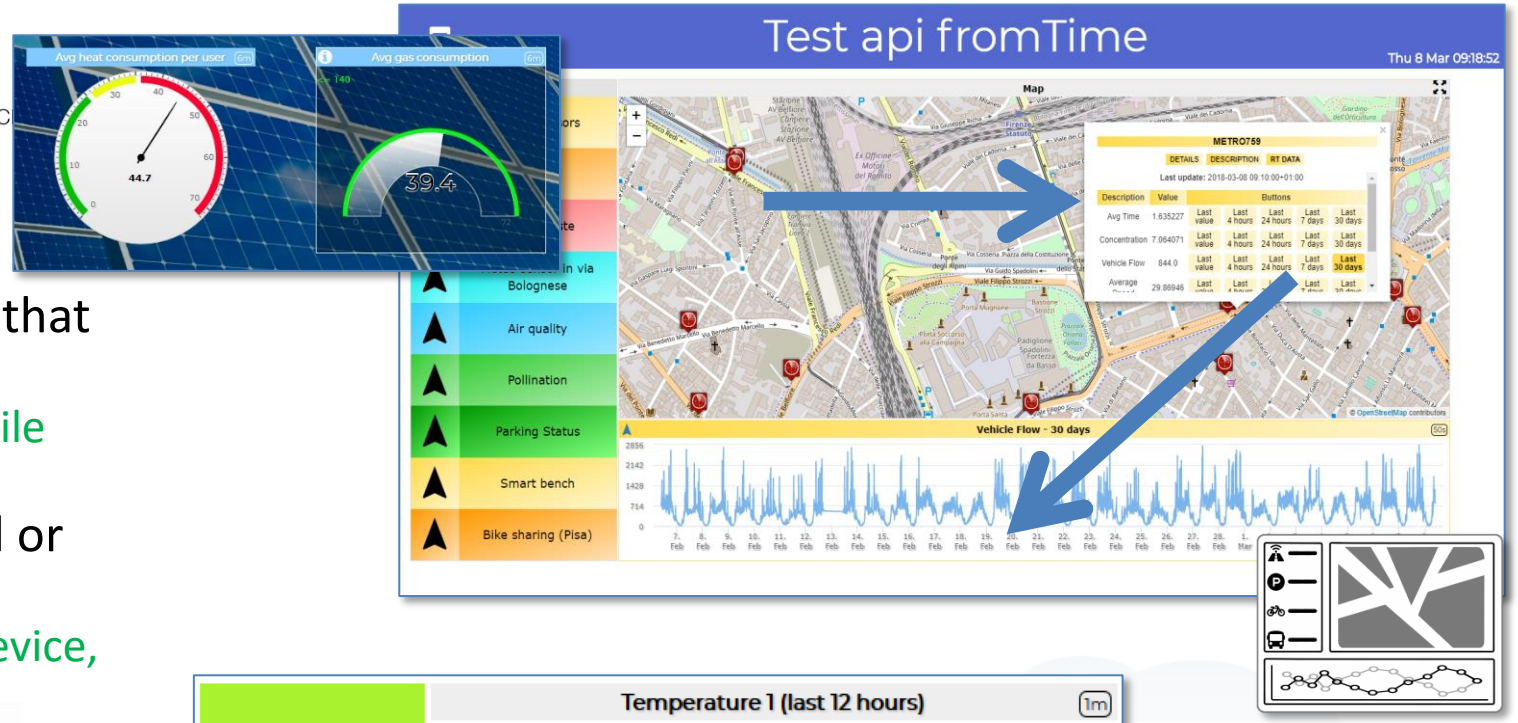
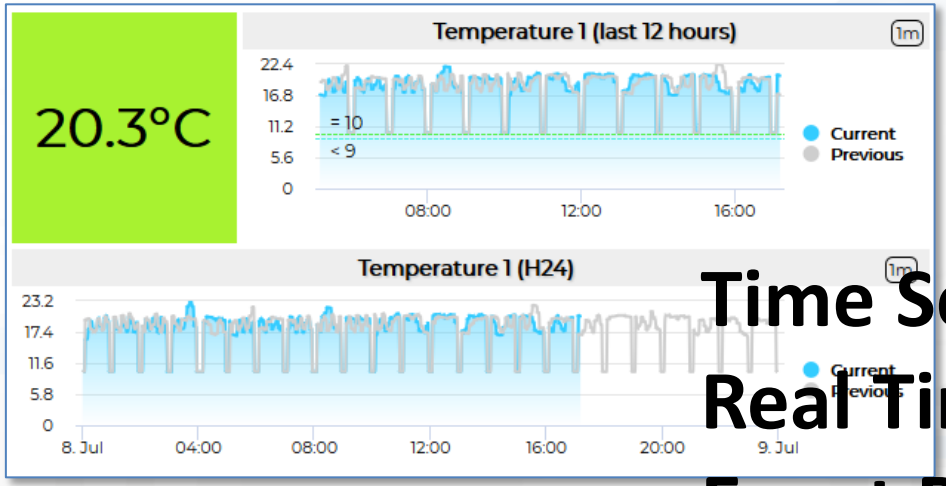


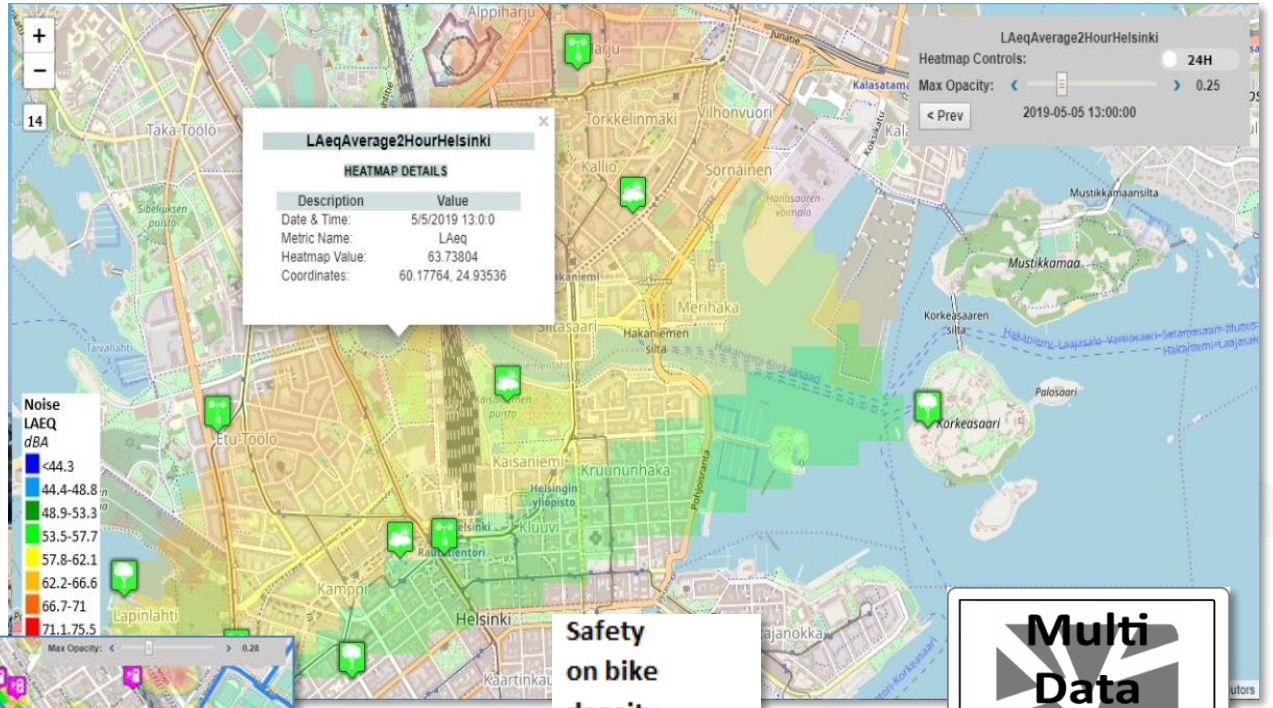


Time Series
Real Time
Event Driven
Historical Data

HLT: Heatmaps

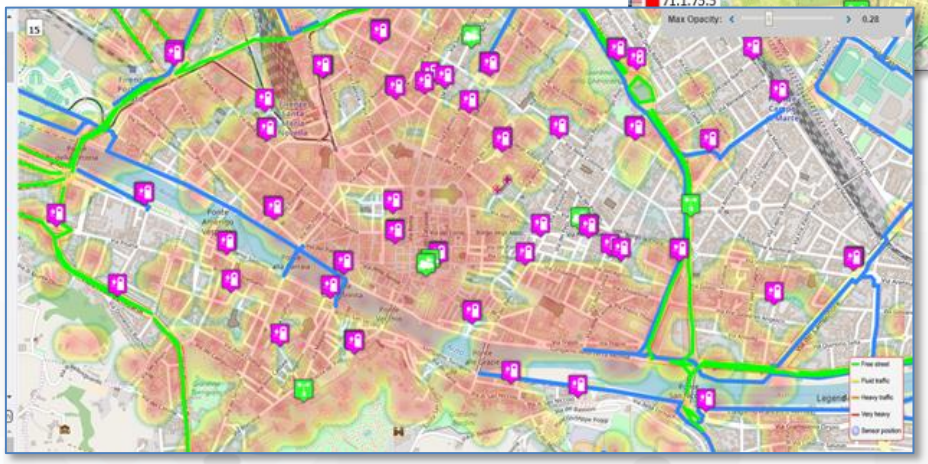
High Level Types

ColorMaps For Calibrated



Type: calibrated

EAQI
Index
1. Good
2. Fair
3. Moderate
4. Poor
5. Very poor



Type: Gaussian

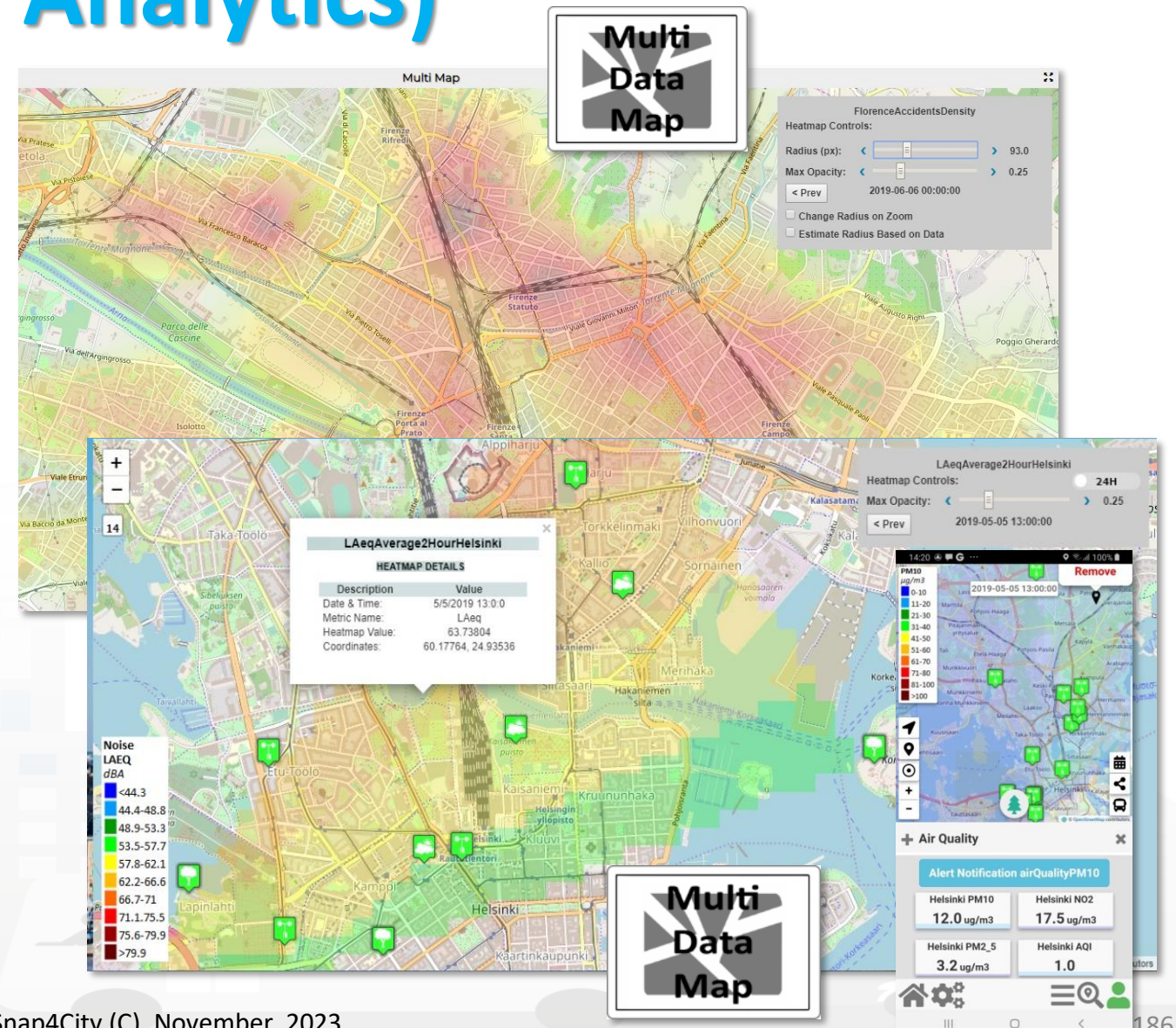
Safety on bike density
Very bad
Bad
Not so good
Neutral
Good
Very good
Excellent

Multi Data Map

Noise LAEQ dBA
<44.3
44.4-48.8
48.9-53.3
53.5-57.7
57.8-62.1
62.2-66.6
66.7-71
71.1.75.5
75.6-79.9
>79.9

Heatmaps (flexible Data Analytics)

- **Main:**
  - **Heatmaps are Time series**
- **A) Gaussian Heatmaps**
- **B) Calibrated heatmaps**
  - From KmxKm to 4x4 mt
  - PM10, PM2.5, SO2, NO2, Noise, NO, O3, Enfuser, **GRAL**,…. Copernicus
  - Any programmed ColorMap
  - Animations
  - Piking values in any place, values on their position.
  - On Web and Mobile App



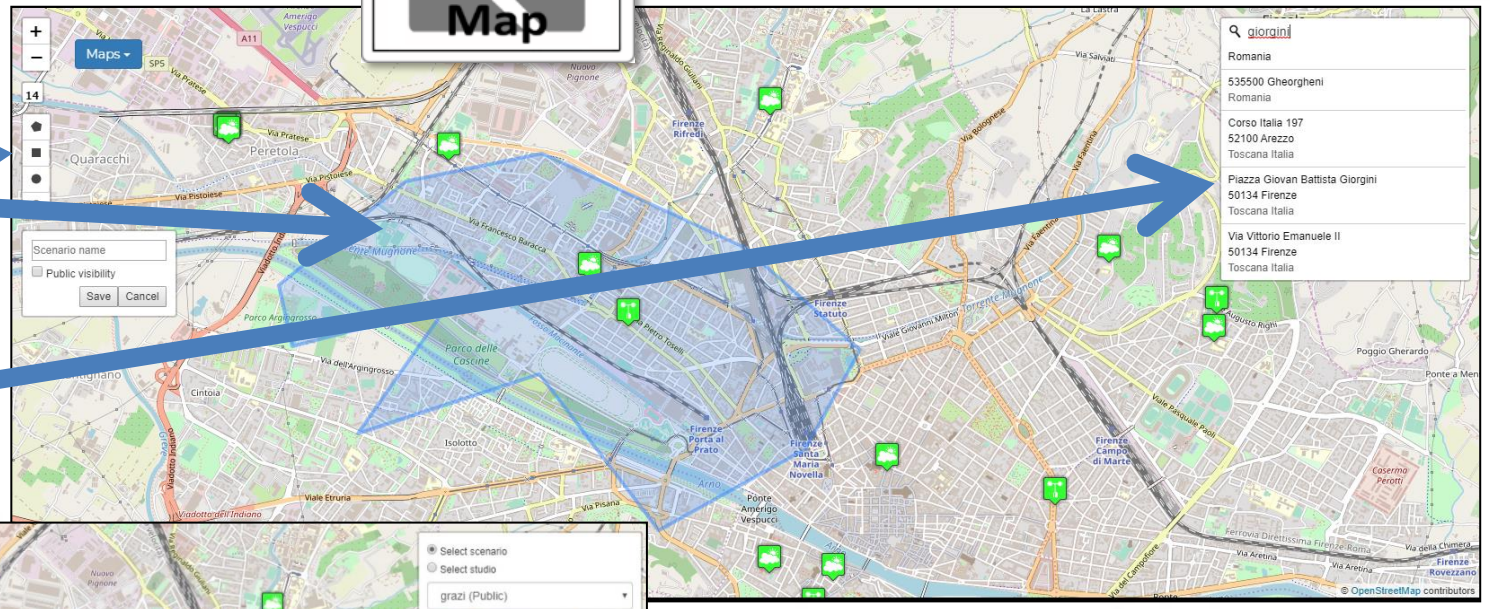
HeatMap Manager: managing, colormaps

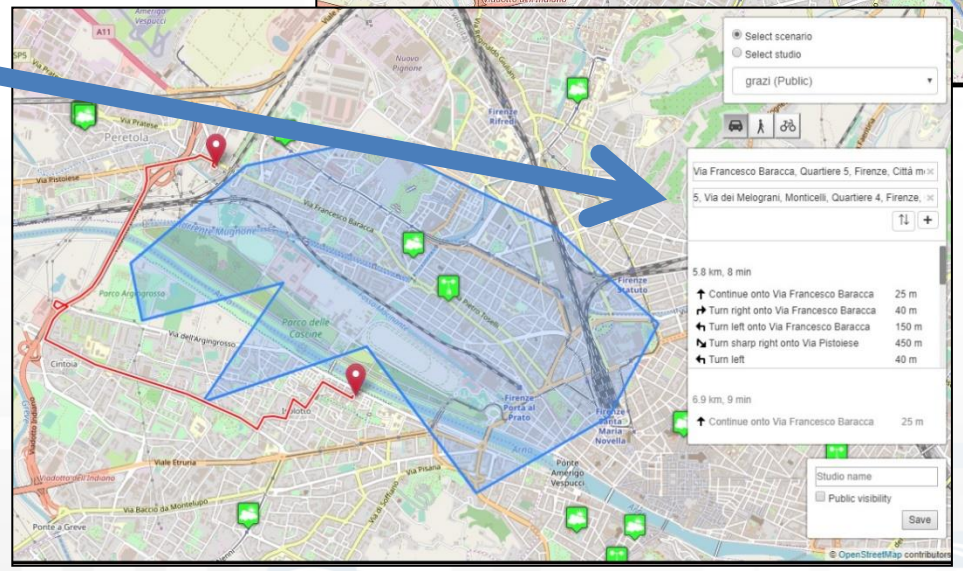
- Historical data, time series
- Huge amount of data and points per heatmap
- Data coming from: sensors, IOT App, Copernicus Satellite, …
- Multiple formats
- High speed computing
- WMS (GIS) compliant
- Animations
- Color maps: from few (5) to dense color scale (1000)
- Picking any place
- Smart City API to get them
- MicroServices for IOT Applications

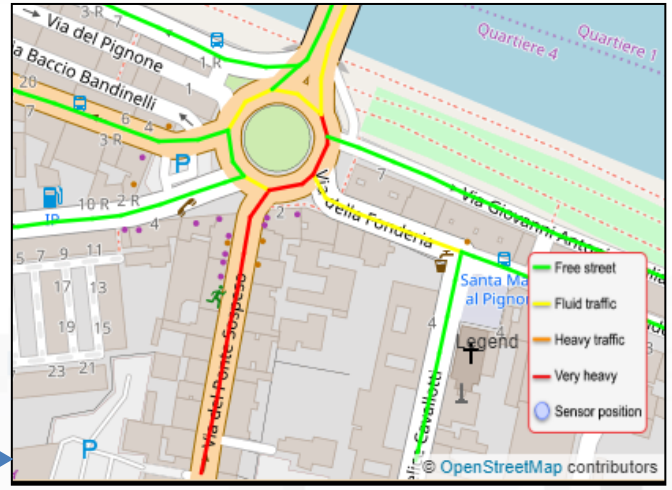
HLT: Special Tools

High Level Types

- **Scenarious**
  - Full text search of roads and geolocations.
  - Multiple areas, days
  - Global map of OSM
- **What-IF**
  - Conditional routing
  - Dynamic routing
  - Multiple paths
- **Traffic Flows**







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

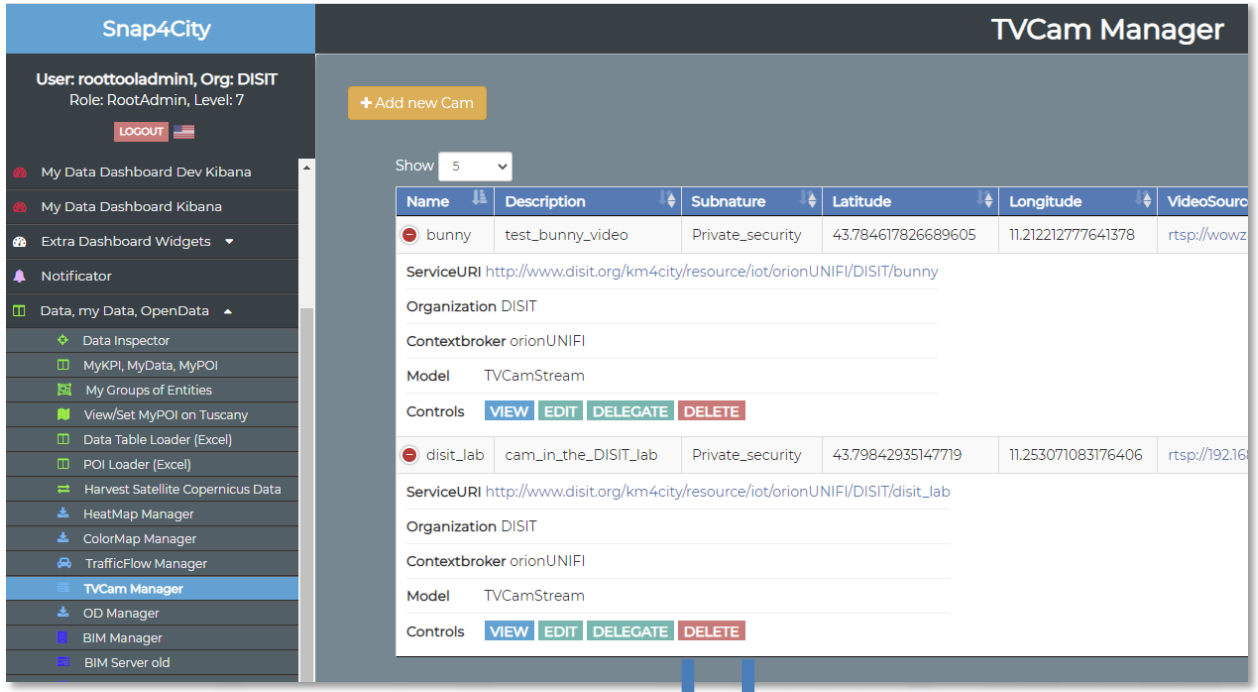
Video Streams from TV Cameras

Settings for RootAdmin Only

TV Cameras

- **Two main modalities**
  - **Image frames**, periodically updated
    - Format: JPG
    - Protocols: http/https (with and without autentication)
    - Via **IPCAM Service**
  - **Video Stream**
    - Formats: MP4, H264,
    - Protocol: RTSP, ONVIF (with and without autentication)
    - Via **TVCam Manager**
      - ***based on Kurento, TURN, WebRTC***

TVCam Manager



RTSP
ONVIF

TVCam Streaming Servers

WebRTC

Video Device Model: TVCamStream

Variable		example
dateObserved	Timestamp	
name	ID camera	bunny
description	Text	test_bunny_video
videoSource	Call	rtsp://wowzaec2demo.streamlock.net/vod/mp4:BigBuckBunny_115k.mp4
…. custom		It is possible to create other models extending this kind of model

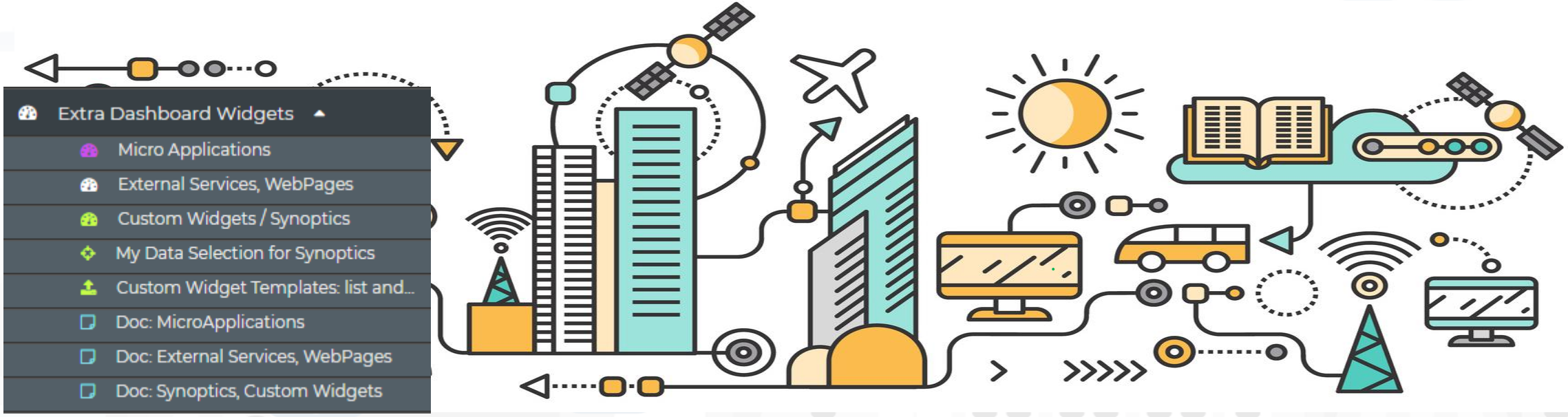
In addition you have:

- Model: TVCamStream
  - ContextBroker: selected in the model
- ServiceURI (automatically assigned)
- Nature and Subnature: ……..
- GPS Lat, Long: you can decide at the instance

Optional:

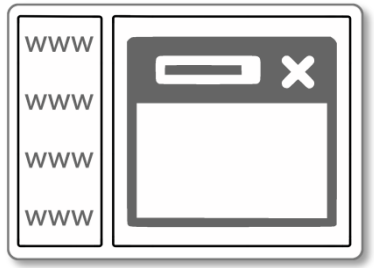
- Username: ……..
- Password: ……..

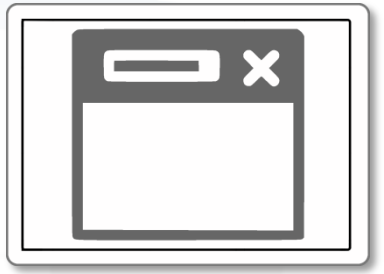
External Services (integration of) your or third-party web pages

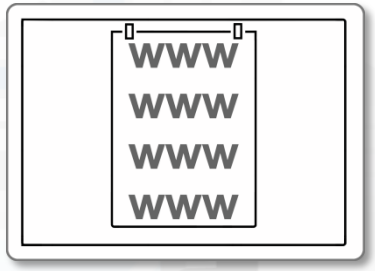


Dashboard Usage and Recipes

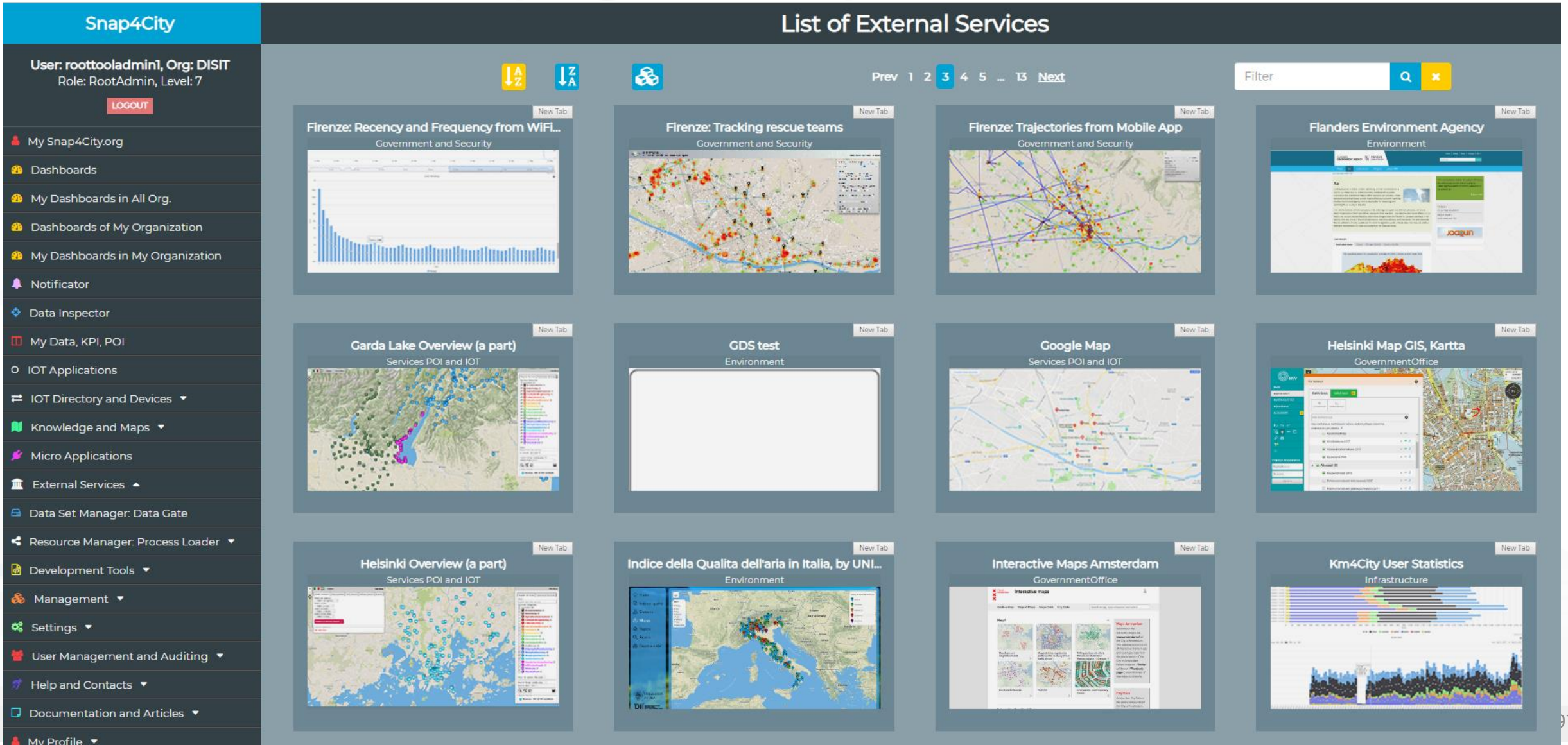
- https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTc3NA==
- **External Content Widget (optional zoom feature):**
  - **External Services**: Web Pages, web sites, web tools (registered or not)
    - **Tools**: Twitter Vigilance, Origin Destination Matrices, WiFi Tool, …
    - **GIS & MAPs**: ServiceMap, ArcGIS, ServiceMap3D, GoogleMap, etc. etc.
    - **TV CAM** Proxy adapted, VideoCam Streams, …
  - **MicroApplications**
    - More than 300 micro applications based on Snap4City and Km4City Tech.
  - **Synoptics and Custom widgets**
  - **Snap4City pages**: Form discussion, help desk, user manual, …
  - **Snap4City Dashboards** for nested views, MultiDashboards views
    - Ultra HD screens, UHD or even wider….
- **Selector WEB**
  - Anything that can be shown on External Content WG, one or more





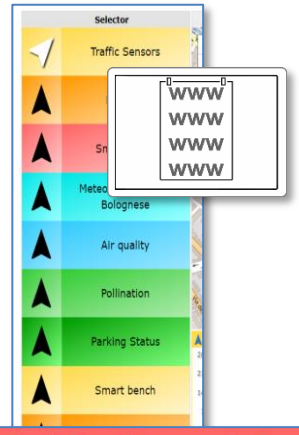


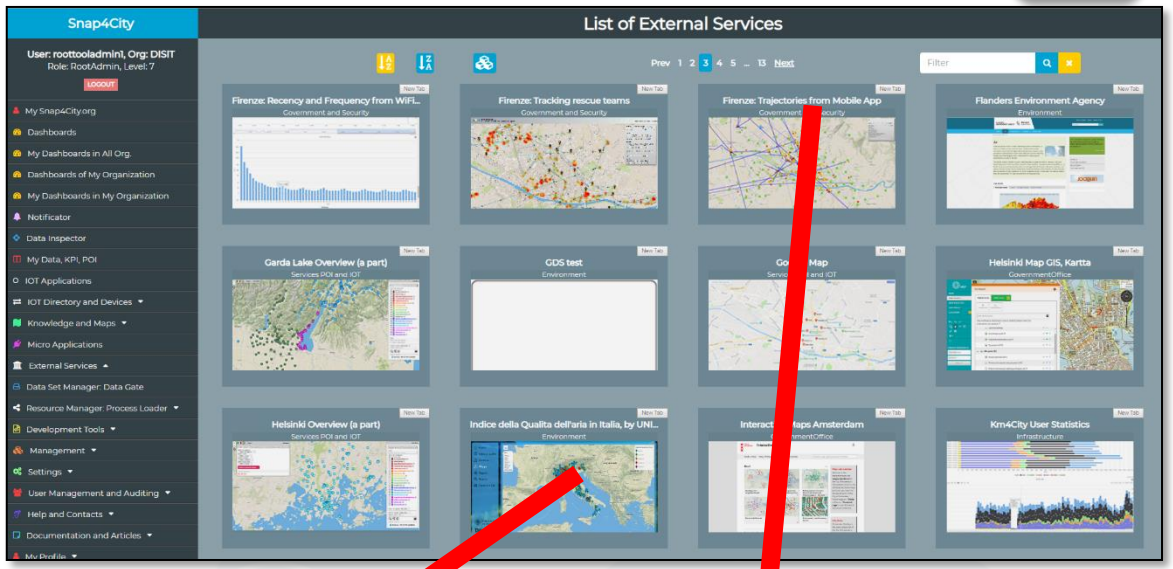
External Services (registered)

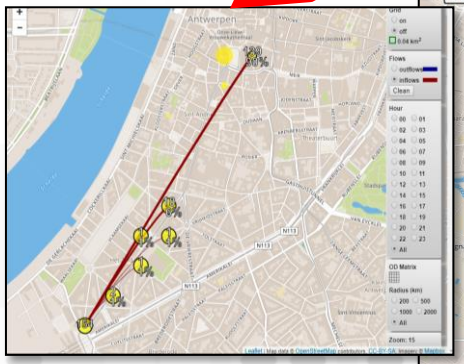


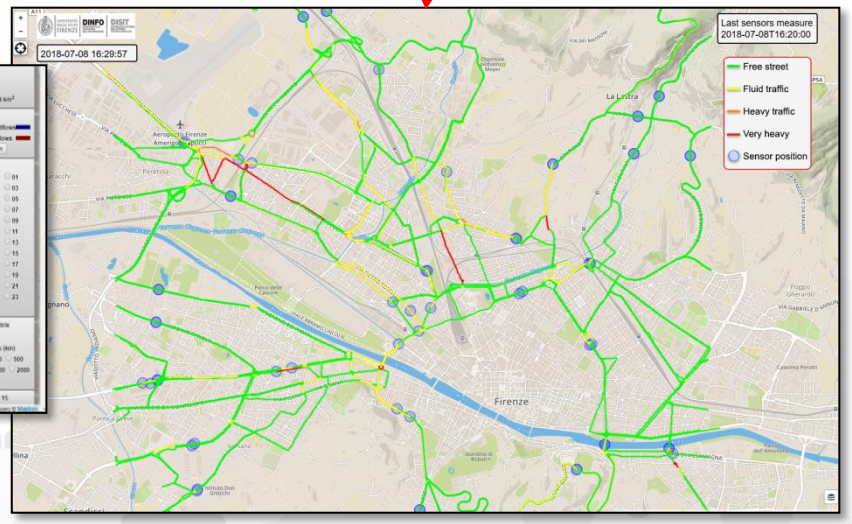
HLT: External Services

High Level Types





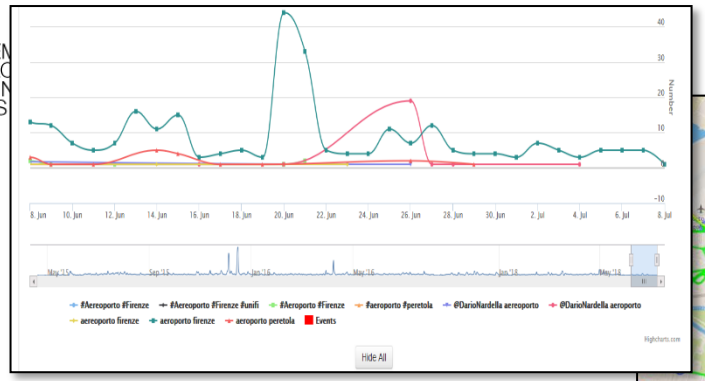


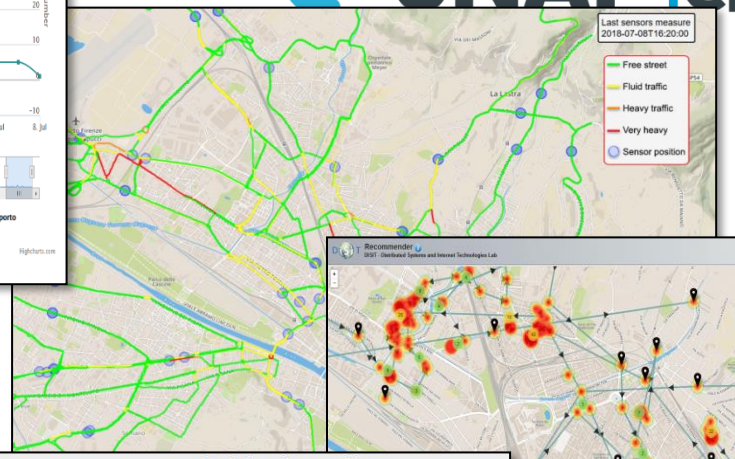


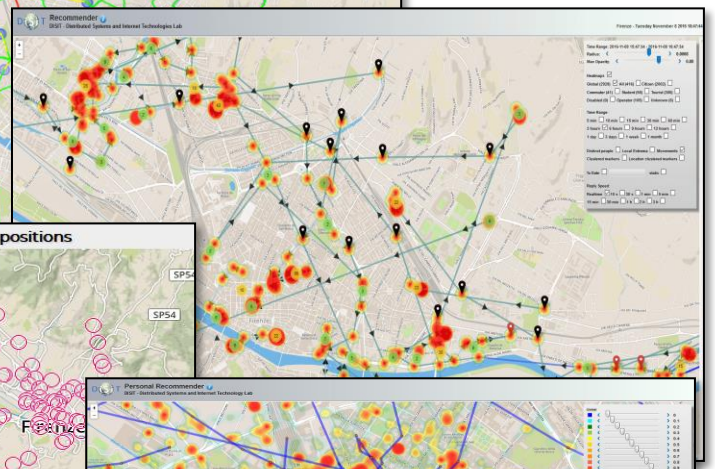
External Services

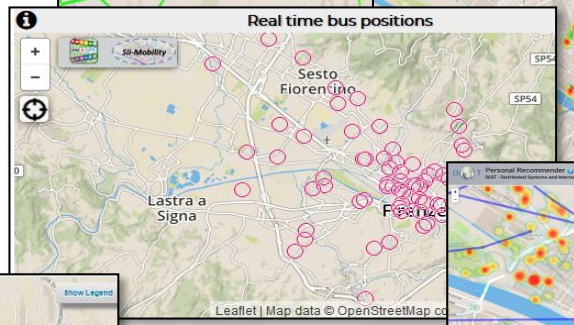
Nature

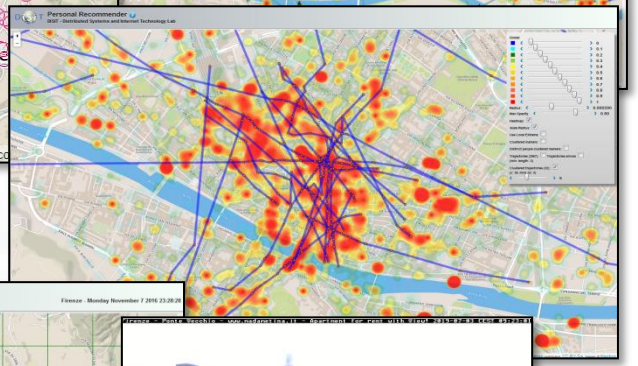
- **Twitter Vigilance:**
  - Daily and real time
  - Volume and sentiment analysis
- Services on Maps, GIS, ArcGIS
- Real time sensors on 3D
- Web HTML5 Applications
- Origin Destination Matrix
- Real Time fleets
- Routing, Multimodal tools
- **IPCAM** connector
- **Synoptics**
- **Third party tools!**
- **…..**
- **Other tools also internal**
  - Traffic Flow Reconstruction
  - User behaviour monitoring
  - Tracking tools
  - Heatmaps tools
  - Trajectories tools

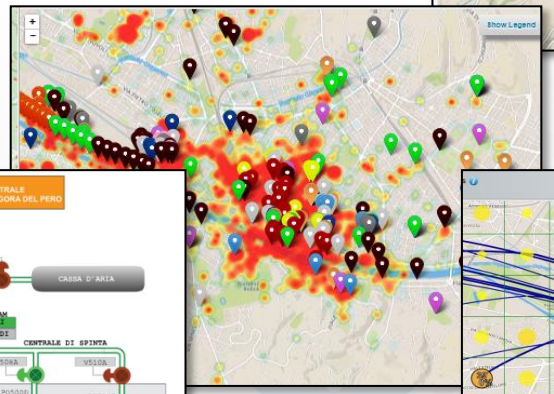


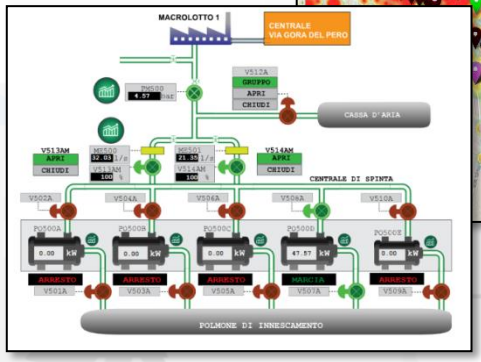


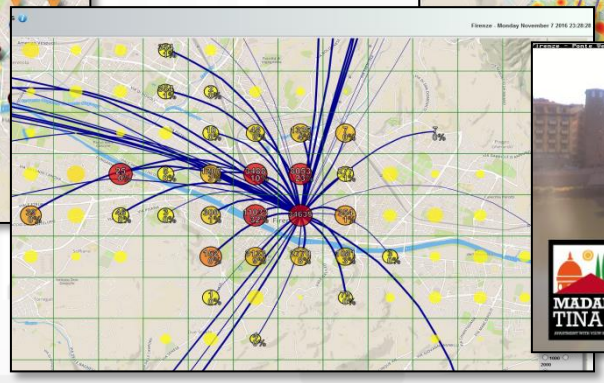




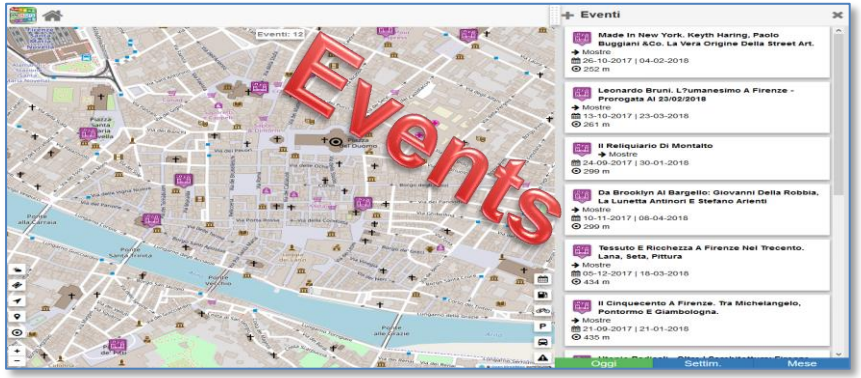


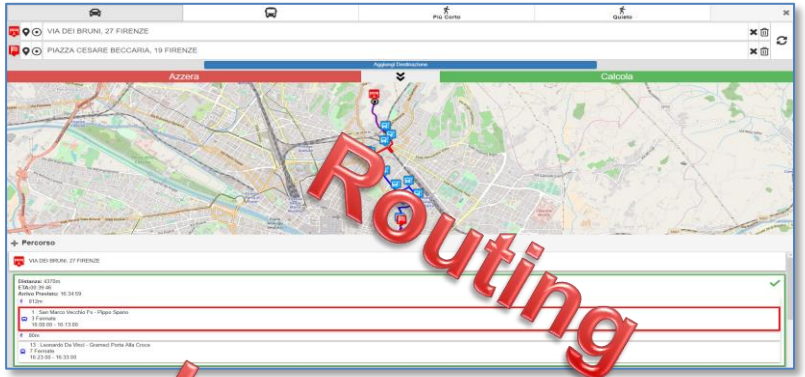


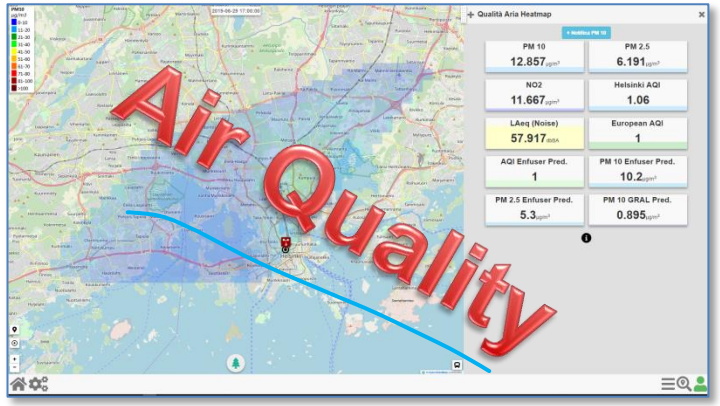


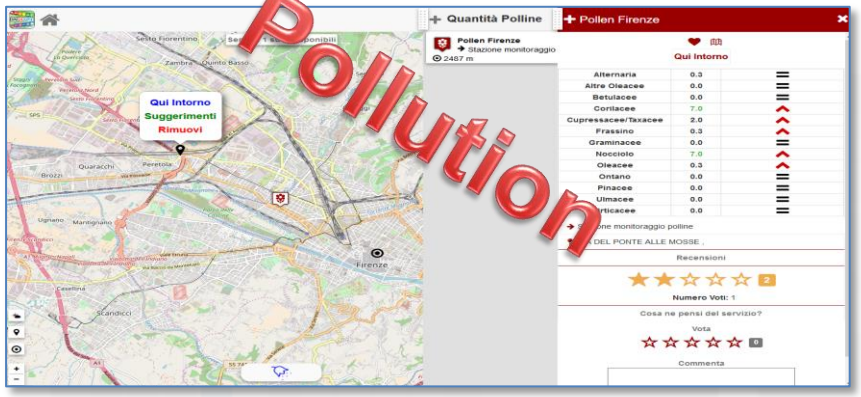


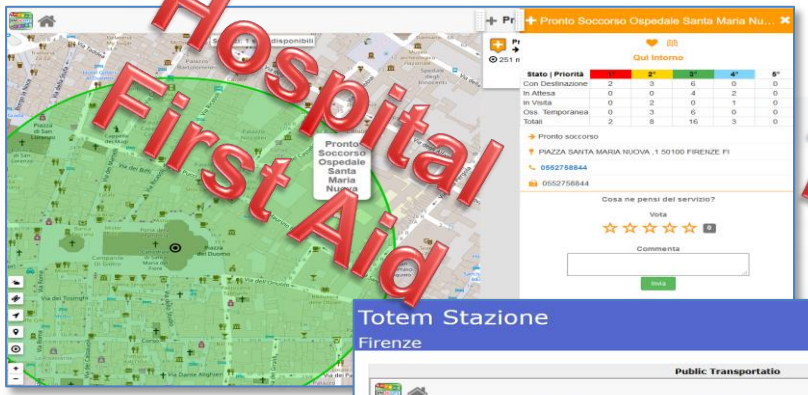
HTML5 MicroApplications

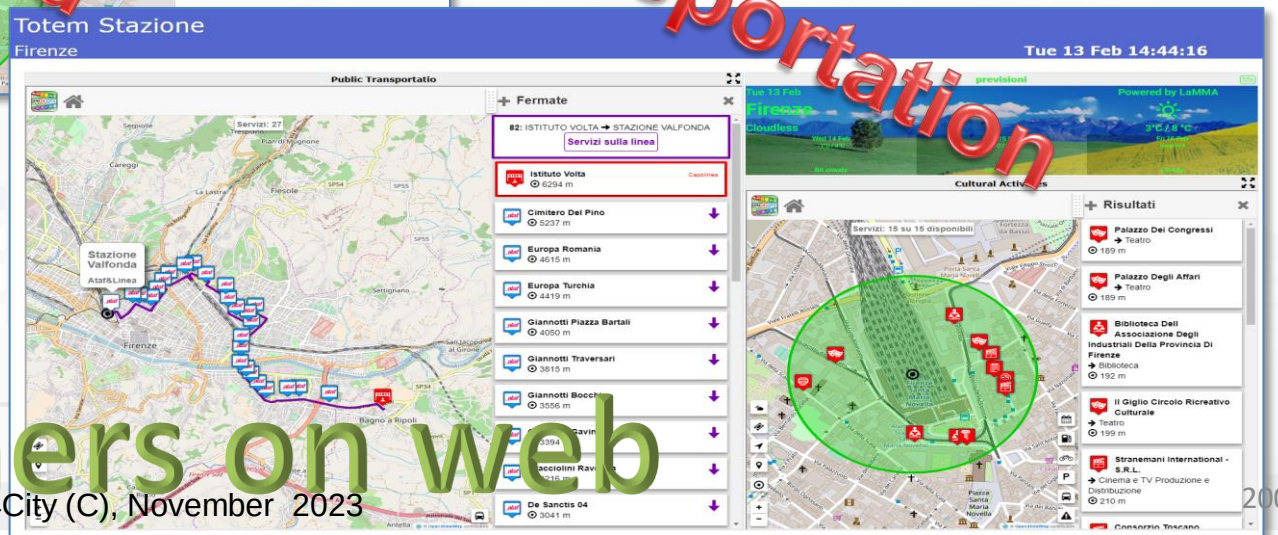


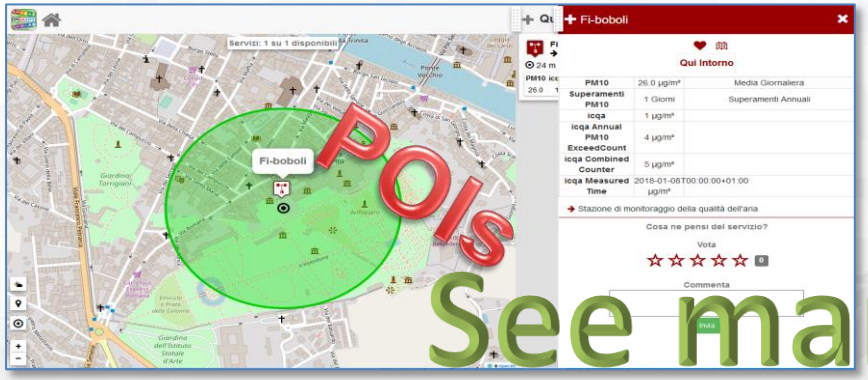






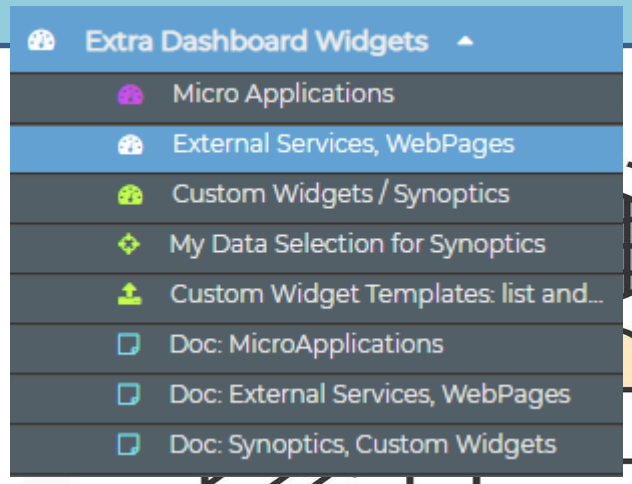




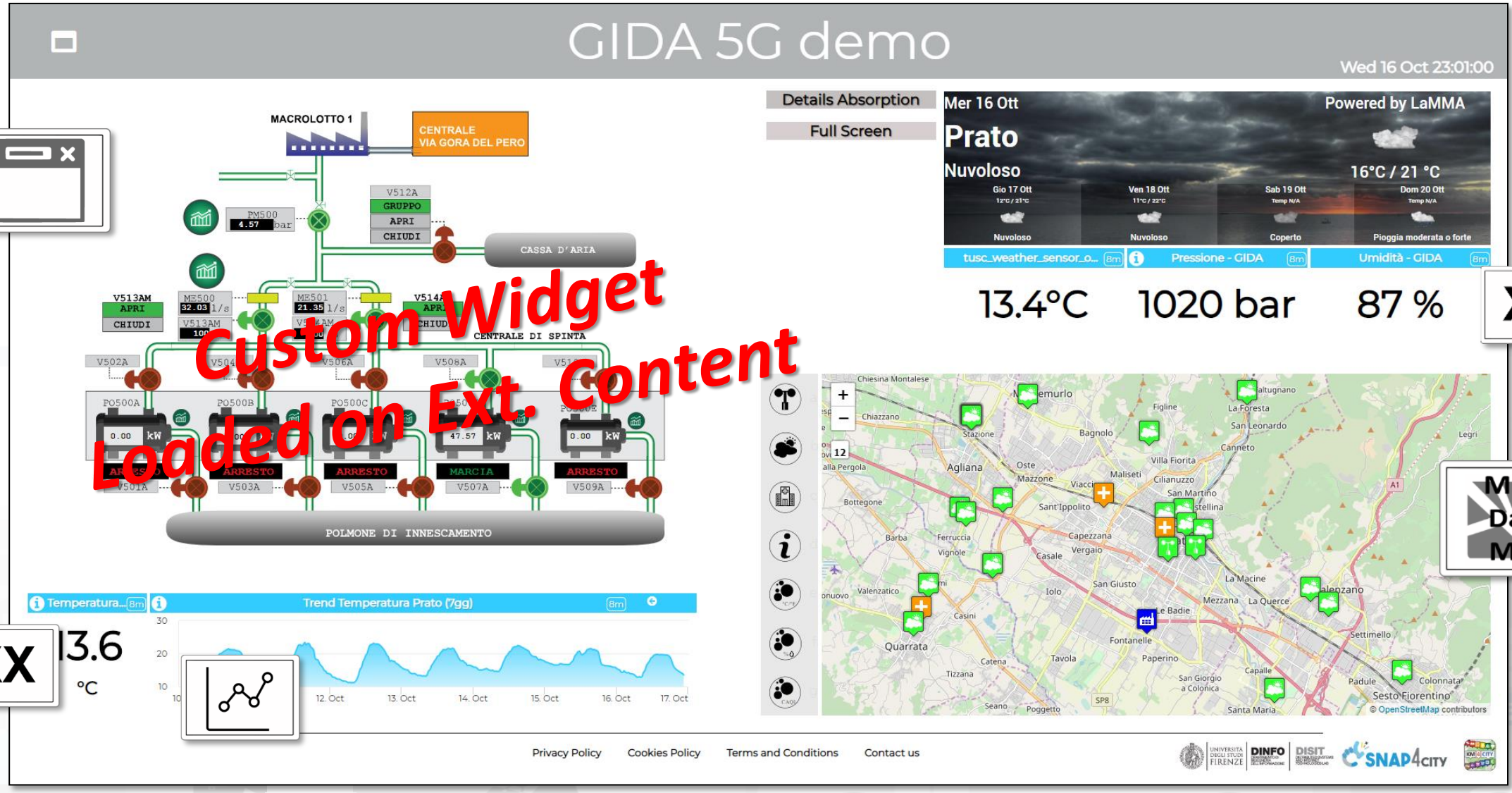


See many others on web

Synoptic, Custom Widgets and PINS Creation



Demo UC5 GIDA



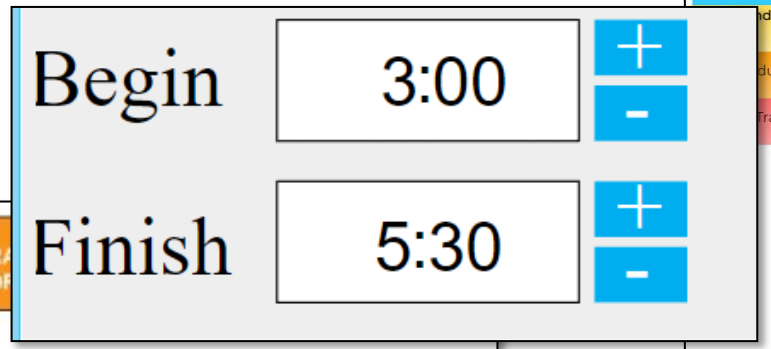
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjIyNg==

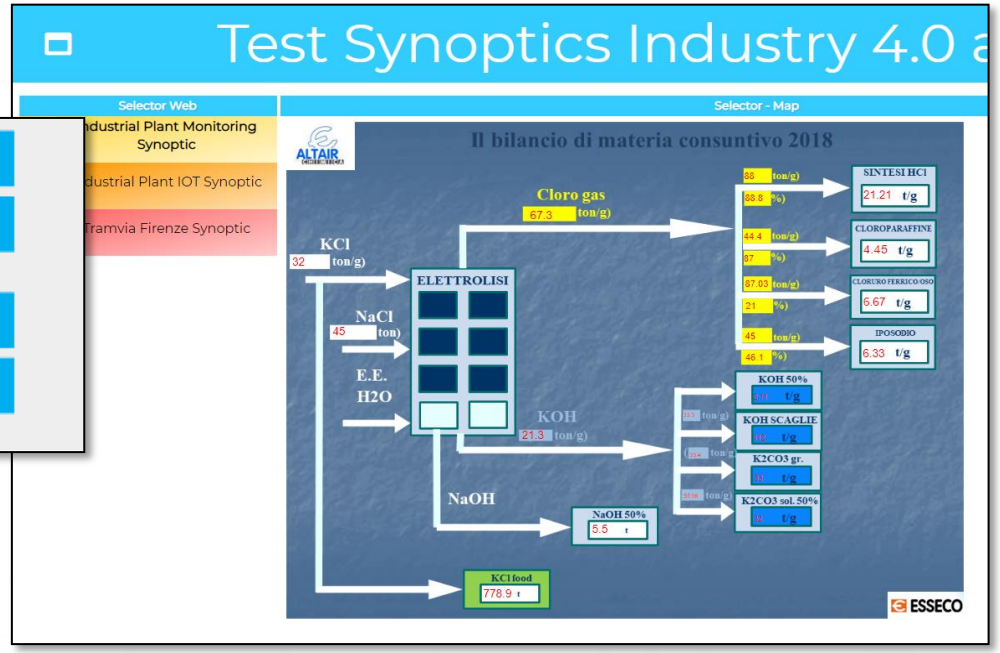
Custom Widgets

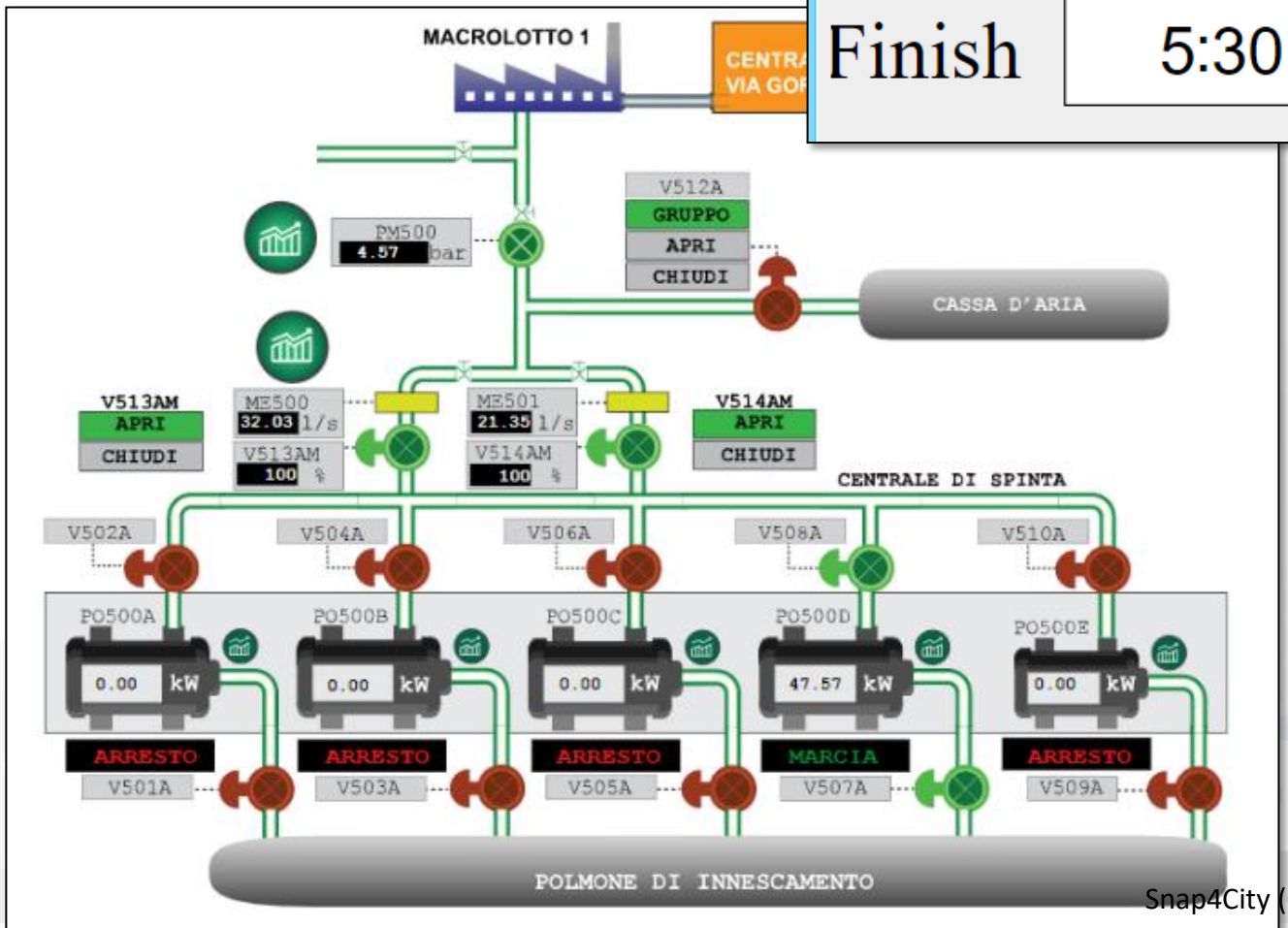
Custom Dashboards and Widgets (interactive, Animations, etc.)

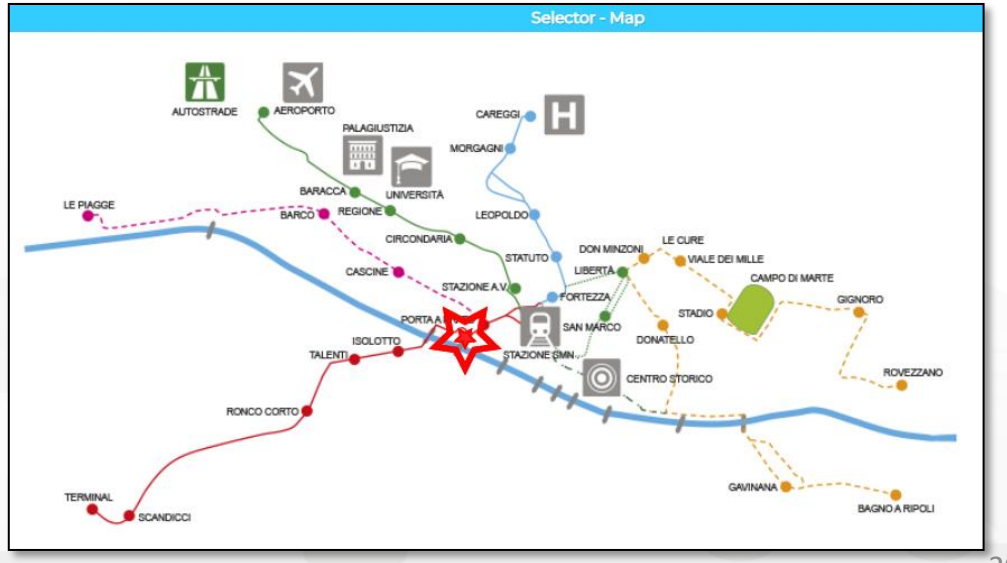
-- SVG for graphic design

-- MyKPI for collecting data



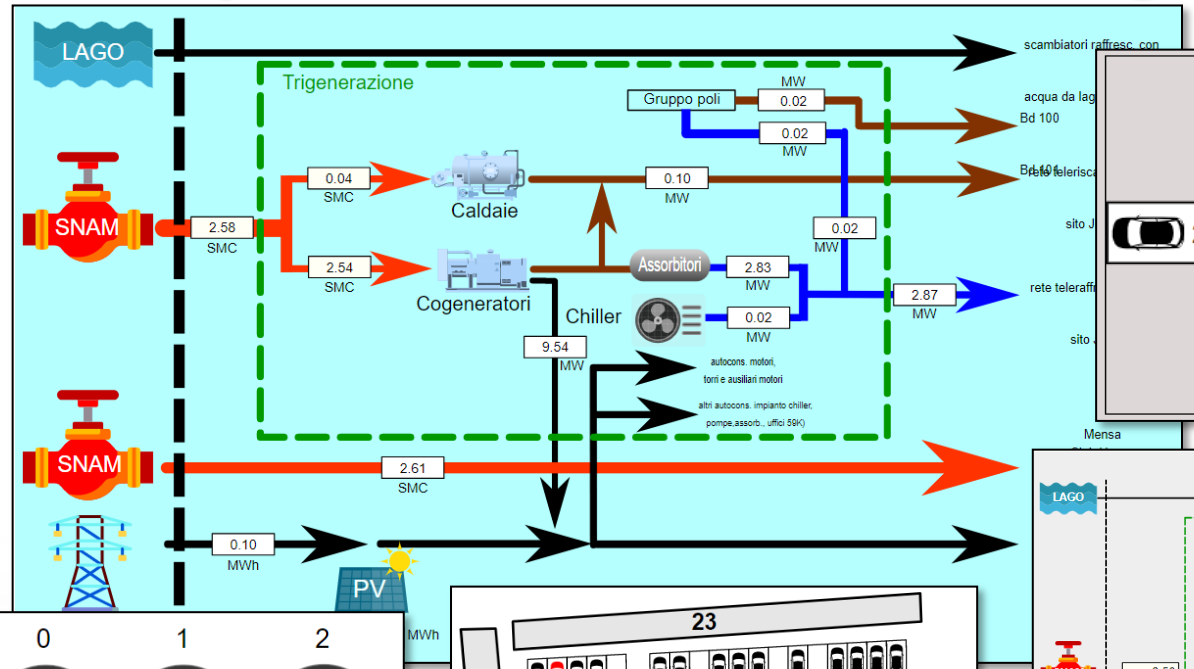


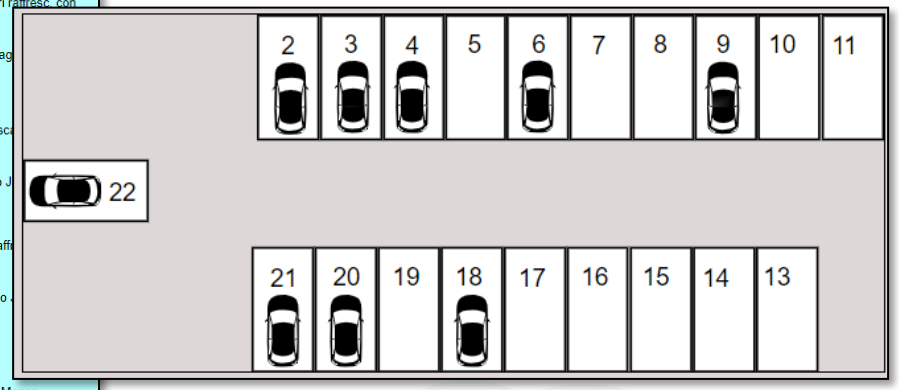


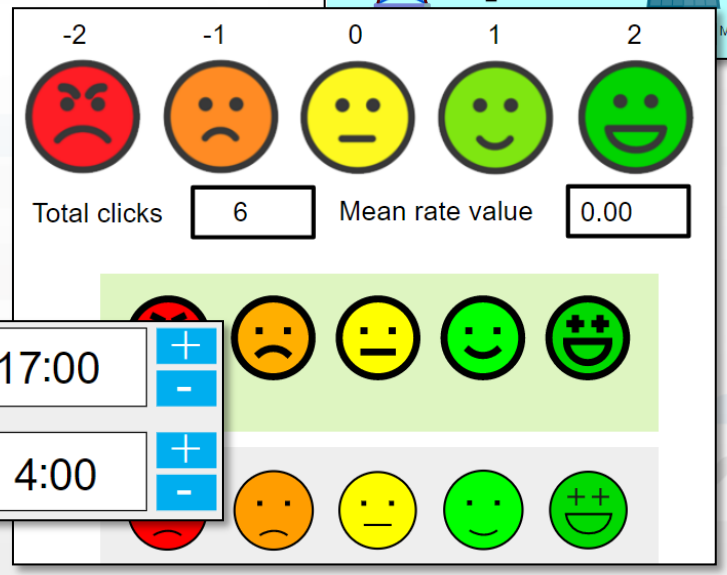


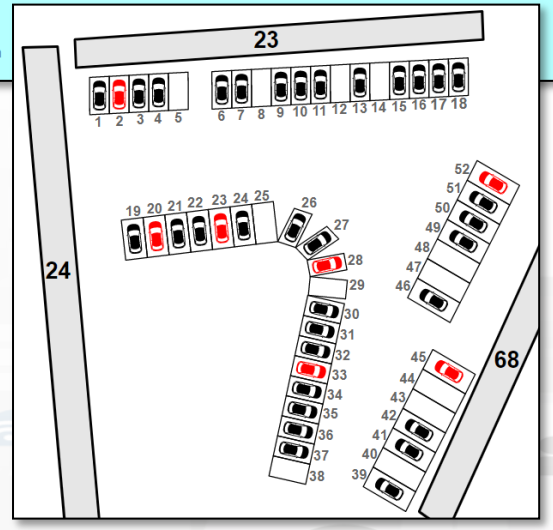
Special Custom Widgets

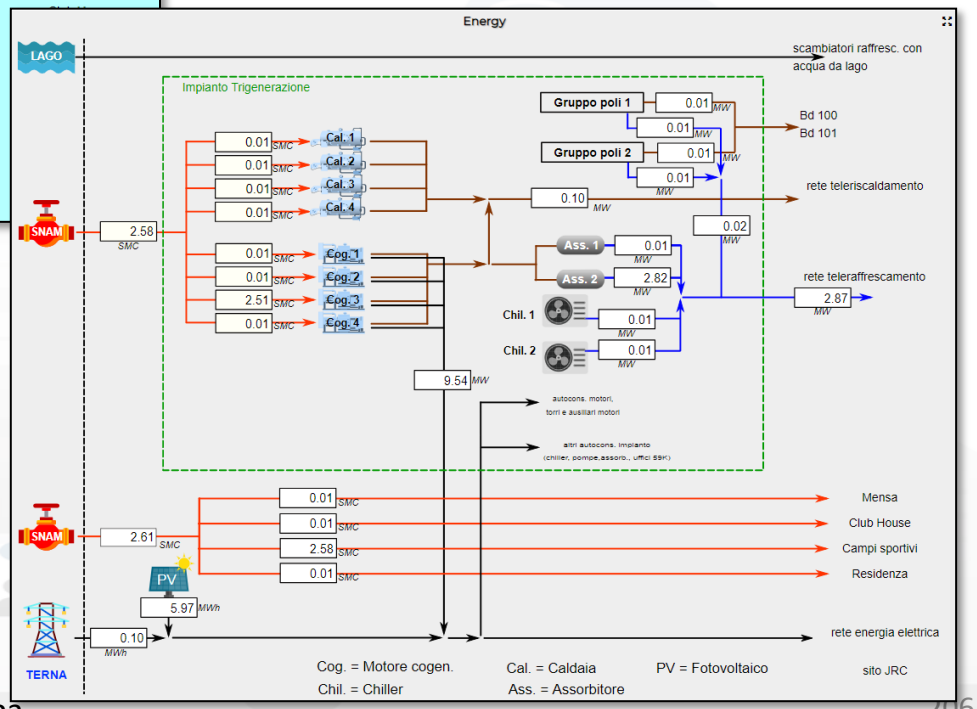
- Smart parking
- Smart Energy
- Smart Light
- Smart ….
- Energy View
- Custom Controls

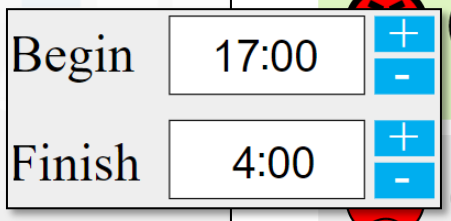




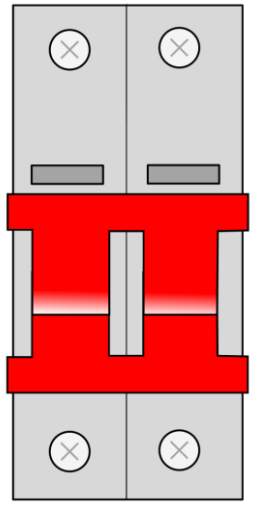




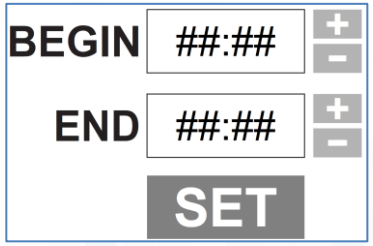


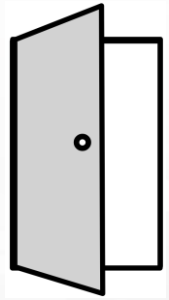


Other examples

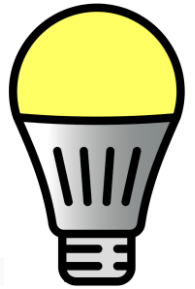


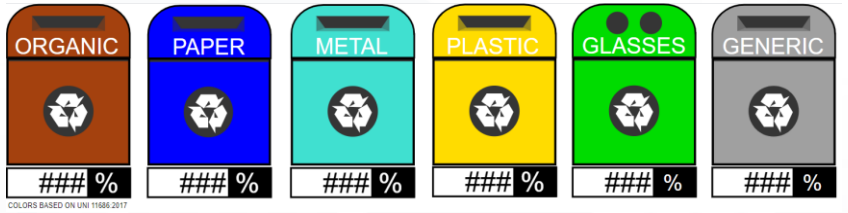
- **Virtual Actuators (sensor-actuator)**
  - From: Dashboard
  - To: IOT App, MyKPI, other Synoptics

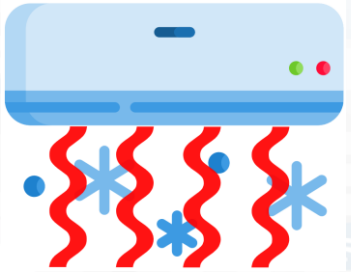


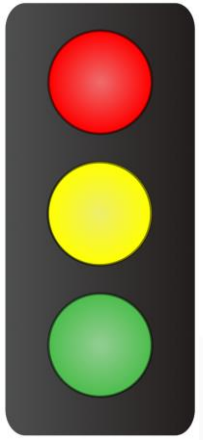


- **Virtual Sensors**
  - From: MyKPI, Sensors, IOT App, other Synoptics
  - To: Dashboards









######.##

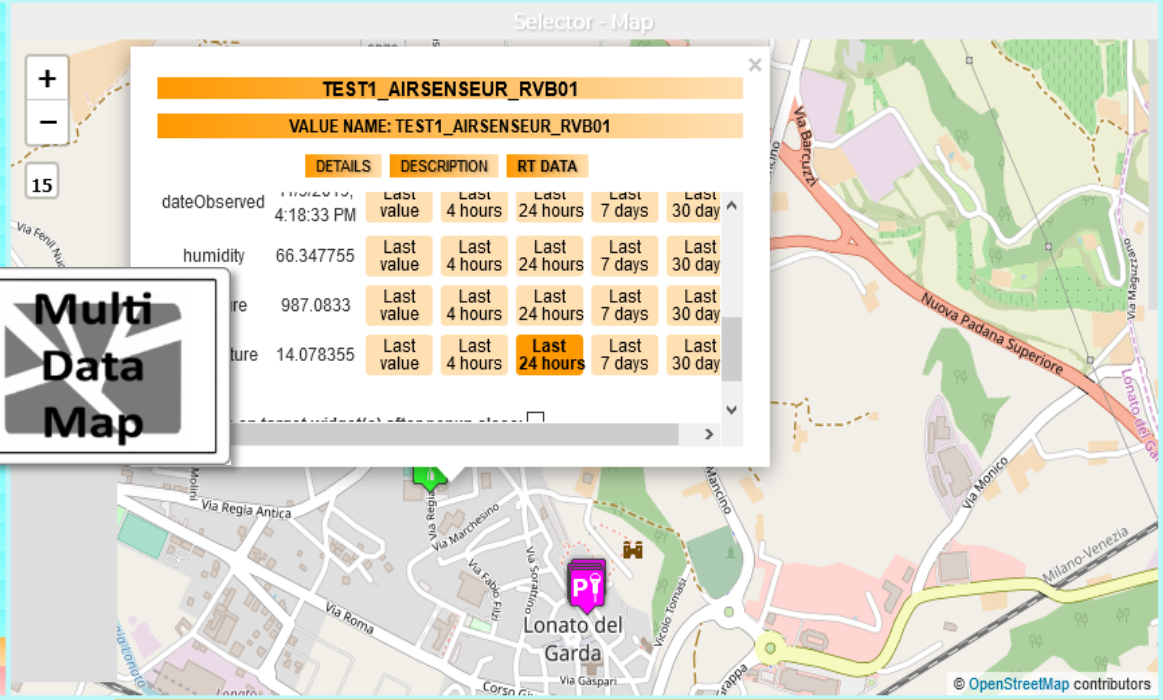
https://www.snap4city.org/663

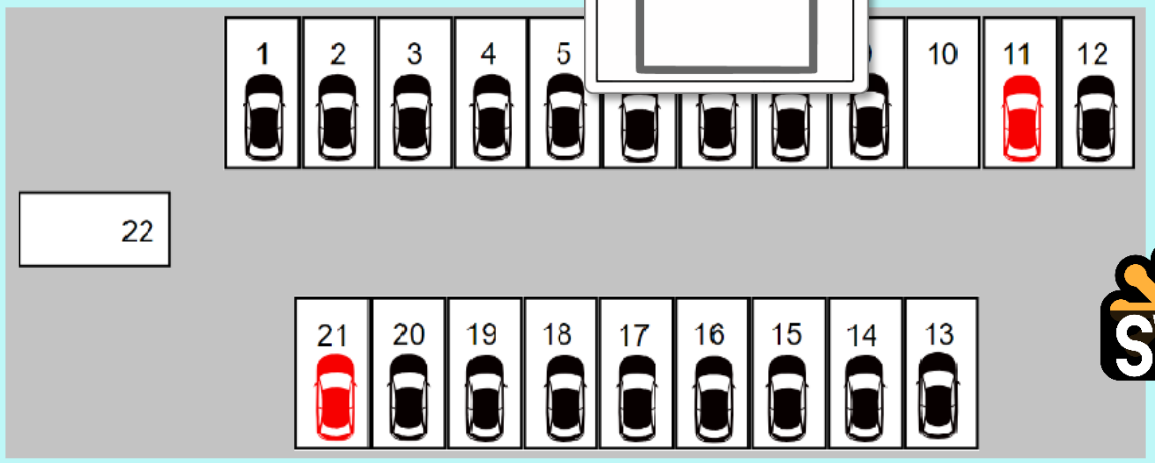
Smart Lonato del Garda

Sat 9 Nov 17:20:59

Slot 1
Slot 2
Slot 3
Slot 4
Slot 5
Slot 6
Slot 7
Slot 8
Slot 9
Slot 10
Slot 11
Slot 12
Slot 13
Slot 14
Slot 15
Slot 16
Slot 17
Slot 18
Slot 19
Slot 20
Slot 21
Slot 22
Environment
other

Selector - Map

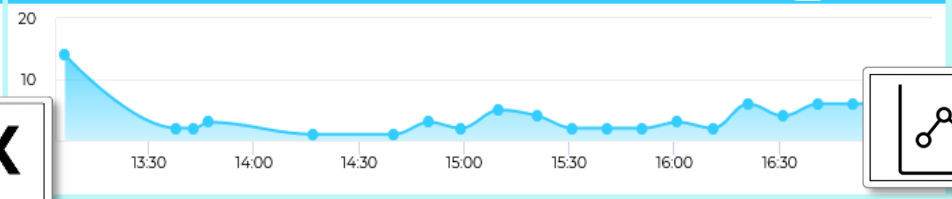




SVG

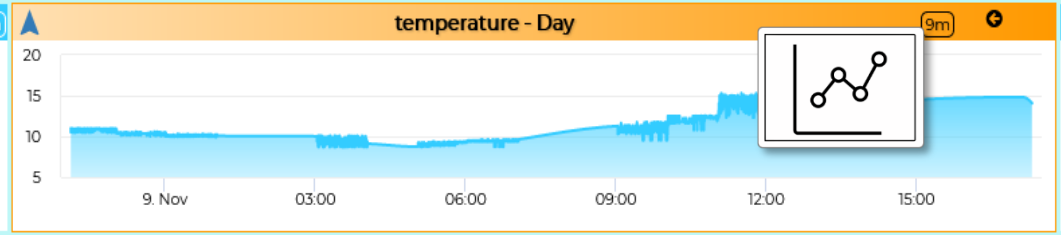
NumFreeSlo... 9m
2
free
XX

NumFreeSlots - Slots 9m

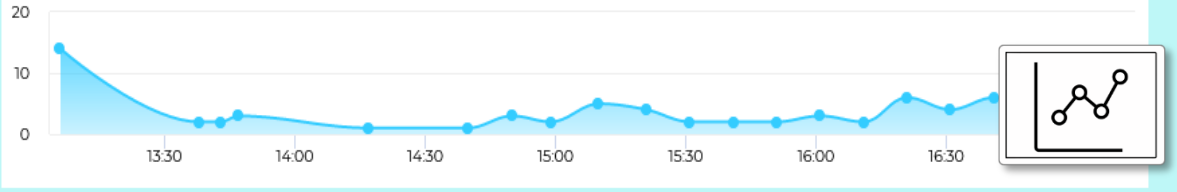


SmartParkingLonato_1 ... 9m
XX

temperature - Day 9m



NumFreeSlots - Slots 9m



pressure 9m
987.1
mm

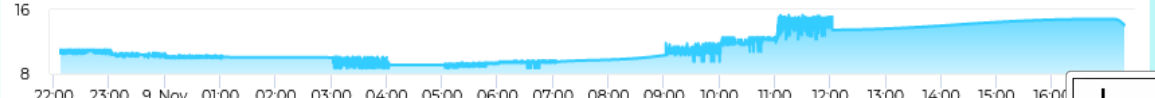
humidity % 9m
66.3
%
XX

temperature 9m
14.1
C
XX

Slot ID 9m
14
slot ID

Max Present Duration 9m
19 ore e 11 minuti
XX

TEST1_AirSensEUR_RVB01 - temperature 9m



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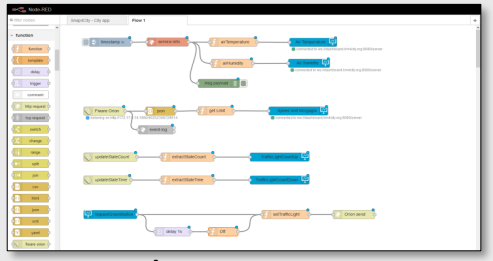
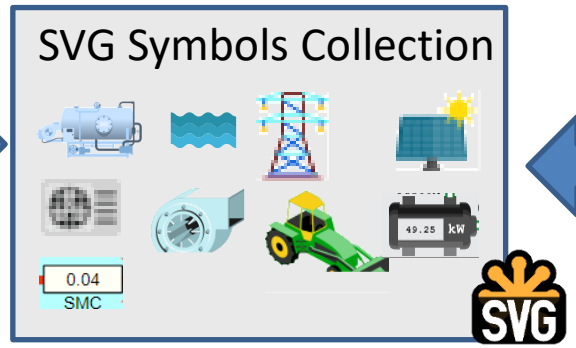
DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB DISTRIBUTED DATA INTELLIGENCE AND TECHNOLOGIES LAB
SNAP4CITY KM4CITY

Custom Widget / Synoptic / PIN Development

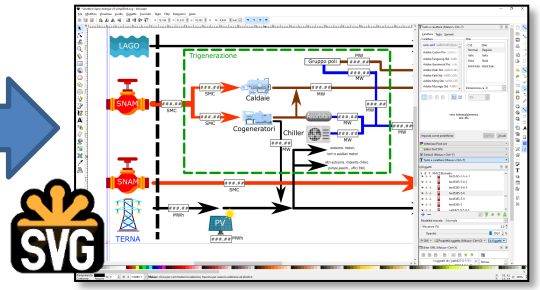


IOT Applications

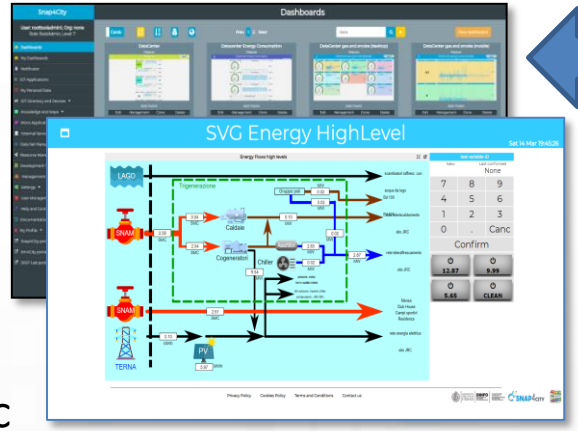
Knowledge and Storage Data from the Field and City



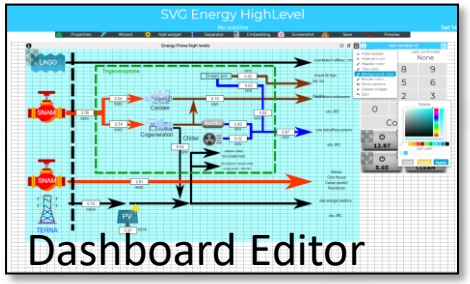
Inkscape editor on your computer



Create, save a Custom Widget in SVG



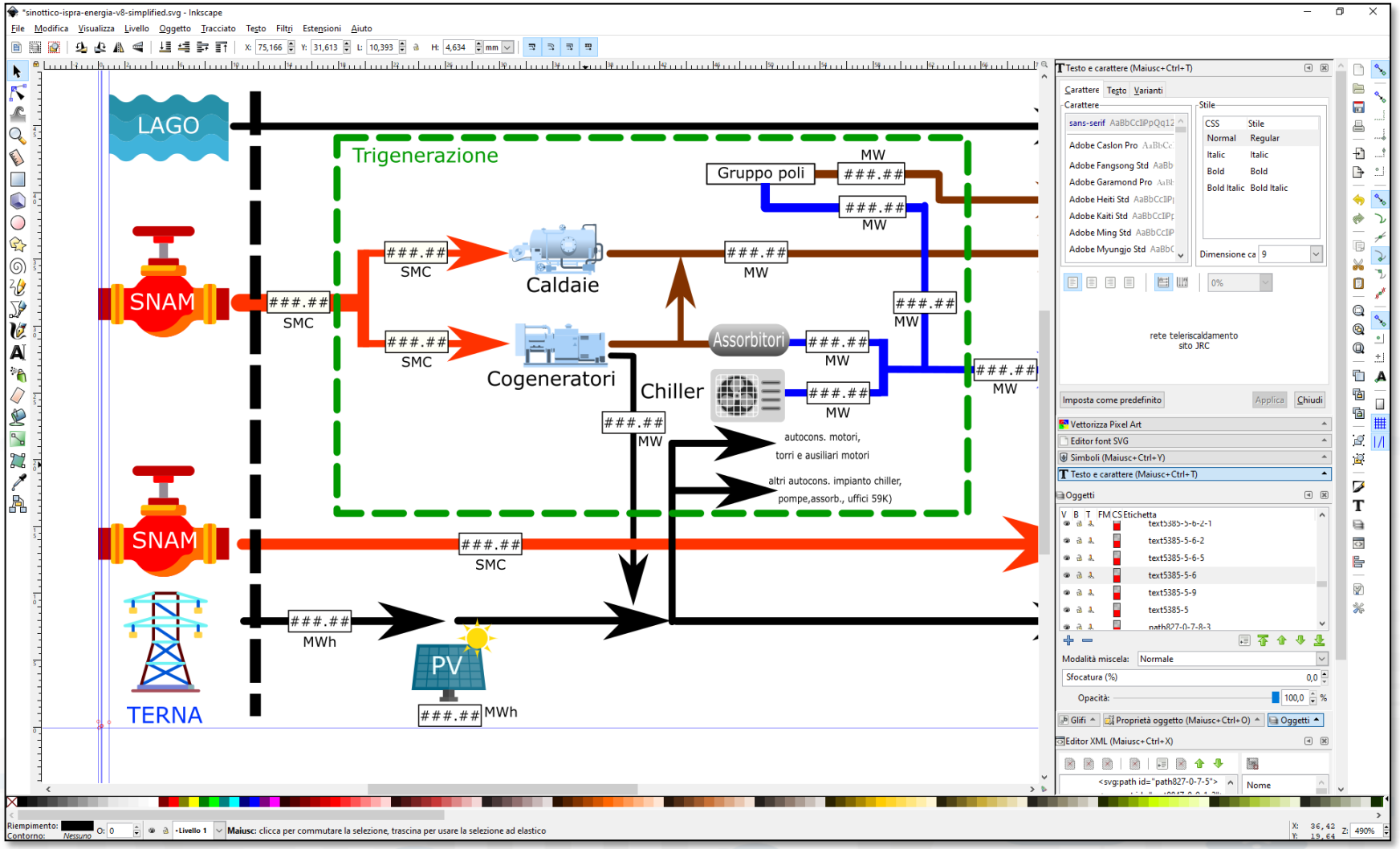
Public Dashboard Collection



Create, save, load, delegate, grant access

My Own Dash/App

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

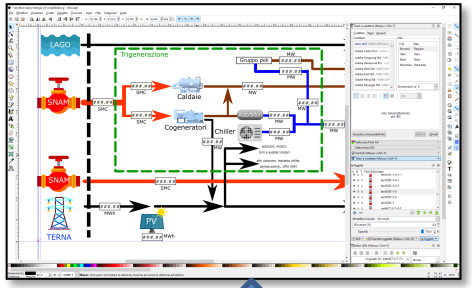


How to create a custom Widget

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

CW with a single READ Variable are automatically usable as PINS

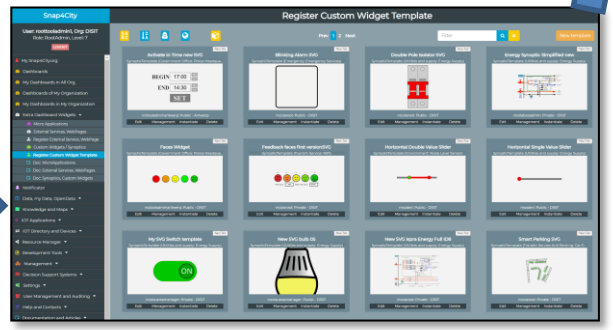
Create, save a Custom Widget in SVG



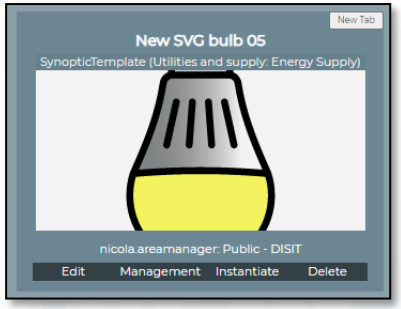
SVG Symbols Collection

From any open library

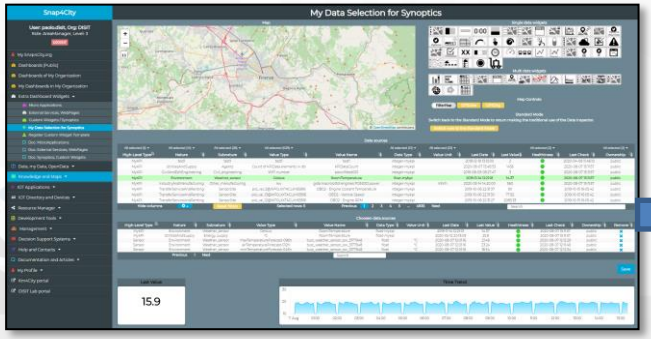
Upload as Custom Widget Template



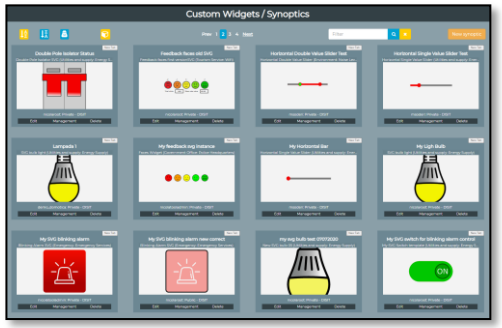
select

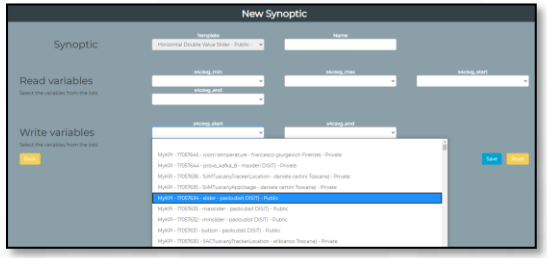


Select MyKPI and Sensor Data for Synoptics cases



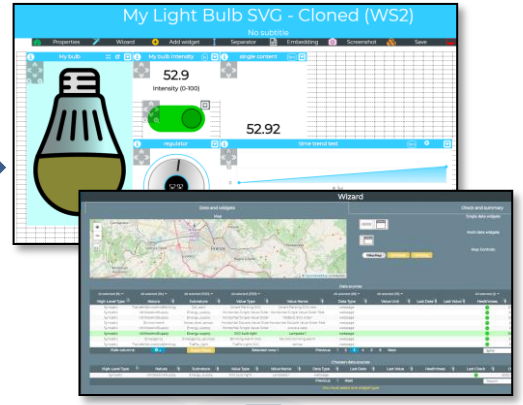
List of Custom Widgets / Synoptics

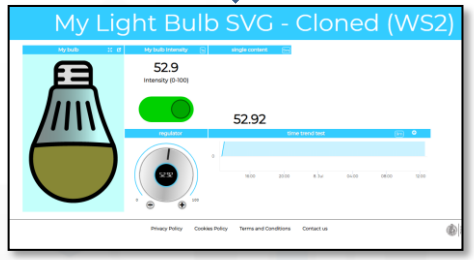




Instantiate as Custom Widgets / Synoptics Connect with WebSockets

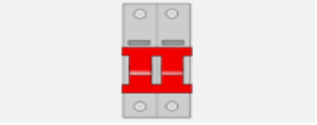
Dashboard Editing/wizard



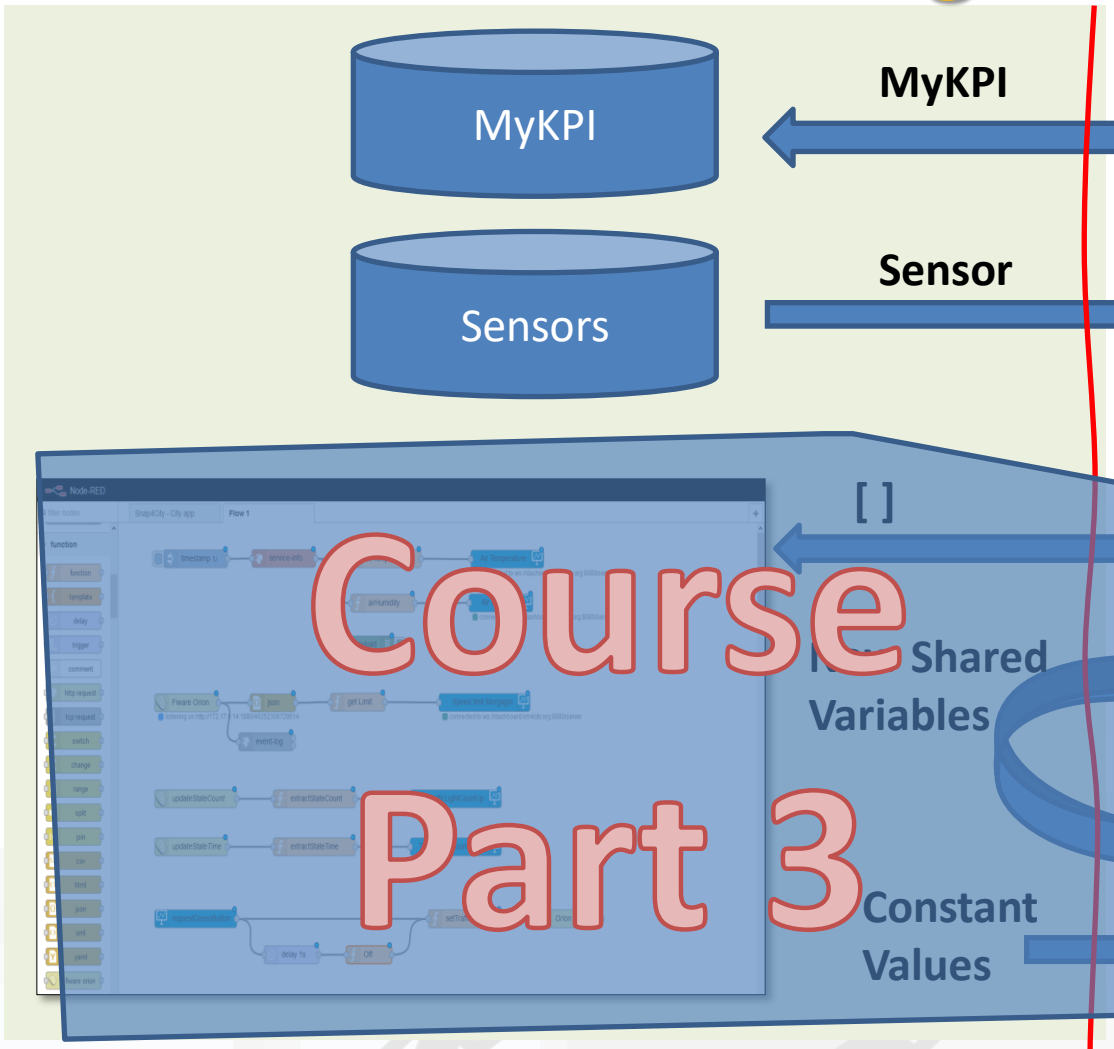


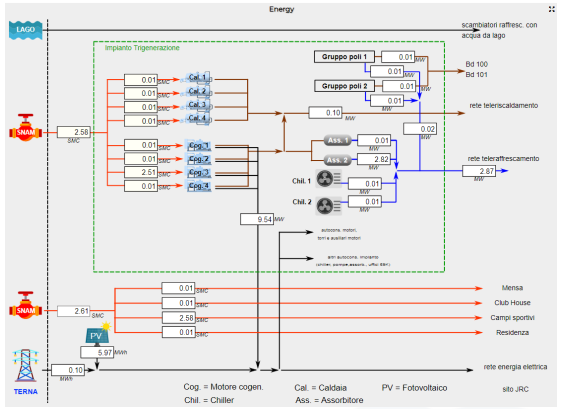
Final Dashboard

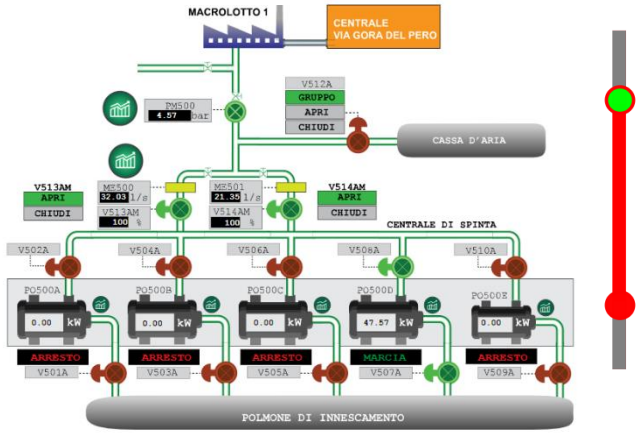
Help on Custom Widgets

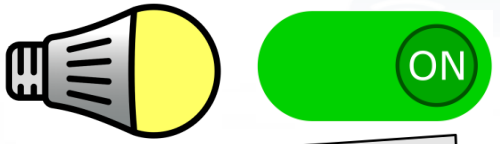
Custom Widget name and image	*Explanation*	*Variable(s)*	*Accepted values*
Activate in Time new SVG 	Set the begin and the end hours by using the small + and – buttons. Click SET to send the defined hours to the server.	s4csvg_begin (read and write variable) Default value: ##:##	starting hour in the form HH:mm to be set by clicking the + and – button
		s4csvg_finish (read and write variable) Default value: ##:##	ending hour in the form HH:mm to be set by clicking the + and – button
Air Conditioner SVG 	Change the image according to the value received.	s4csvg_airconditioner_status (read variable) Default value: undefined state, the SVG shows the overlapped cold and hot images.	0 = OFF, 1 = cold, 2 = hot
Blinking Alarm SVG 	The image blink or stop to blink according to the value received. Example: https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=Mjc4NQ==	s4csvg_blinking_alarm (read variable) Default value: 1, blinking	0 = OFF (fixed image), 1 = blinking
Double Pole Isolator SVG 	By clicking the SVG, the status of the switch changes accordingly and the corresponding value is sent to the server. Example: https://main.snap4city.org/view/index.php?iddasboard=Mjk4Ng==	s4csvg_isolator_onoff (read and write variable) Default value: undefined state, the SVG shows the overlapped position up and position down images.	0 = OFF (position down), 1 = ON (position up)
Faces Widget 	By clicking a coloured face the corresponding value is sent to the server. Examples: https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjU0NA==	s4csvg_userFeedback: value sent to the server by clicking the corresponding face (write variable). Default value: no value sent. The SVG shows the five	-2 = very bad, -1 = bad, 0 = so-and-so, 1 = quite-good, 2=good

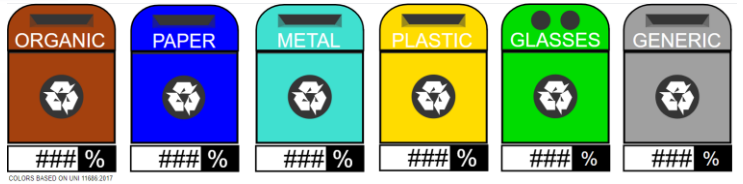
From-To Custom Widgets / Synoptics to Storage in WS

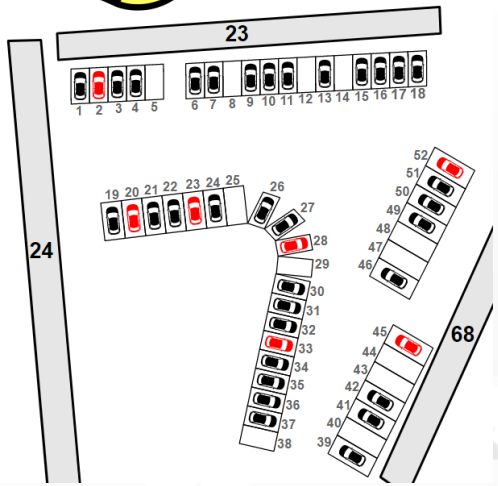


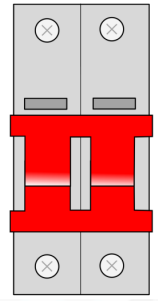


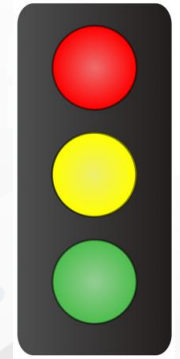




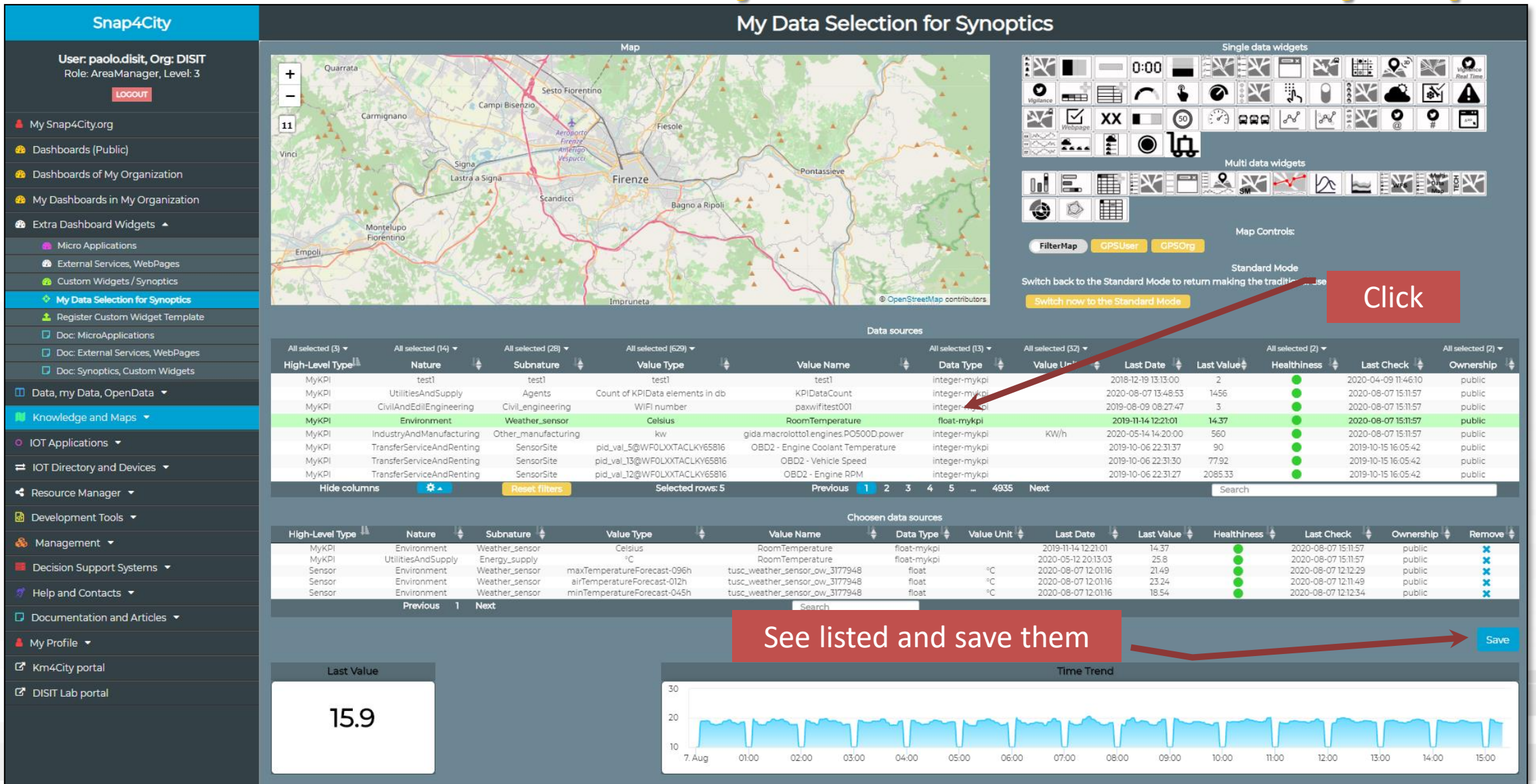




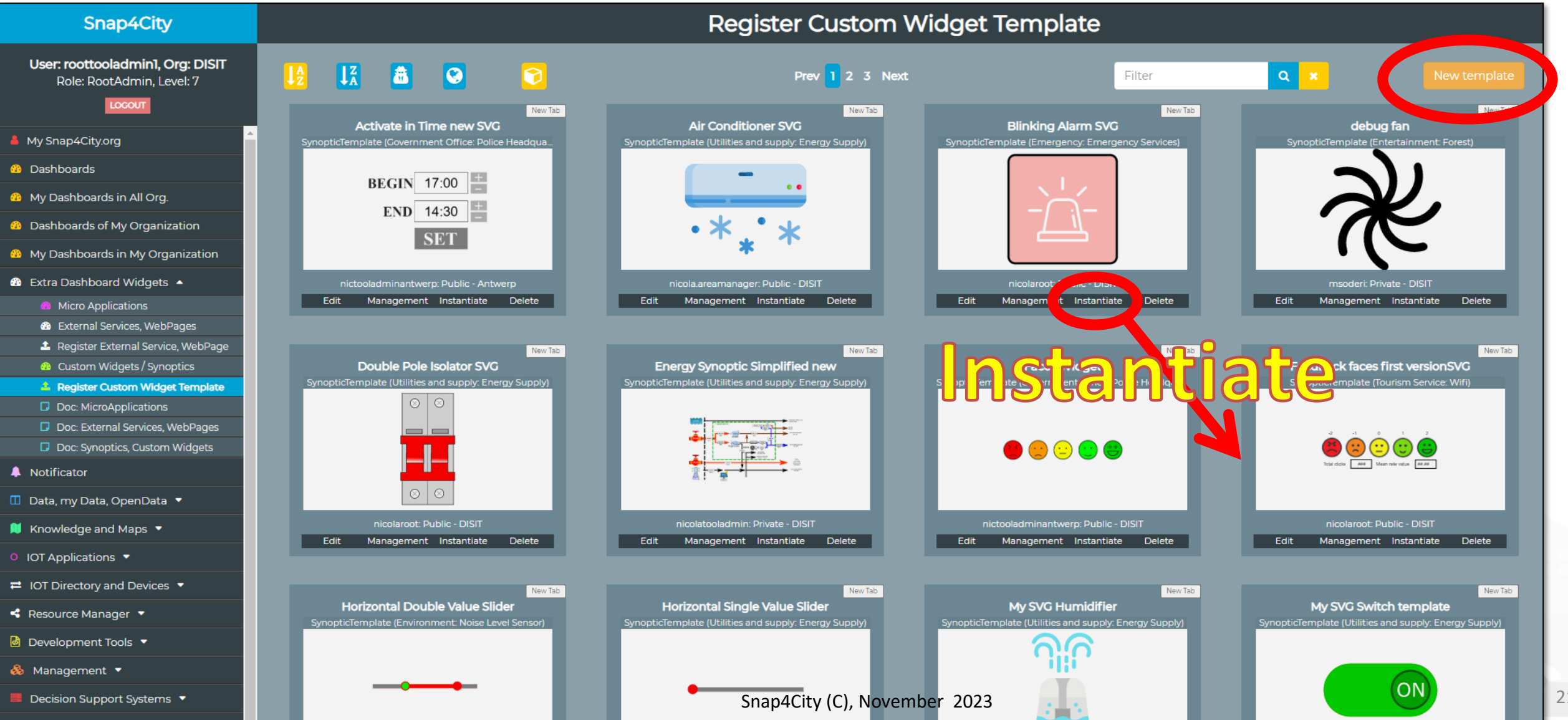




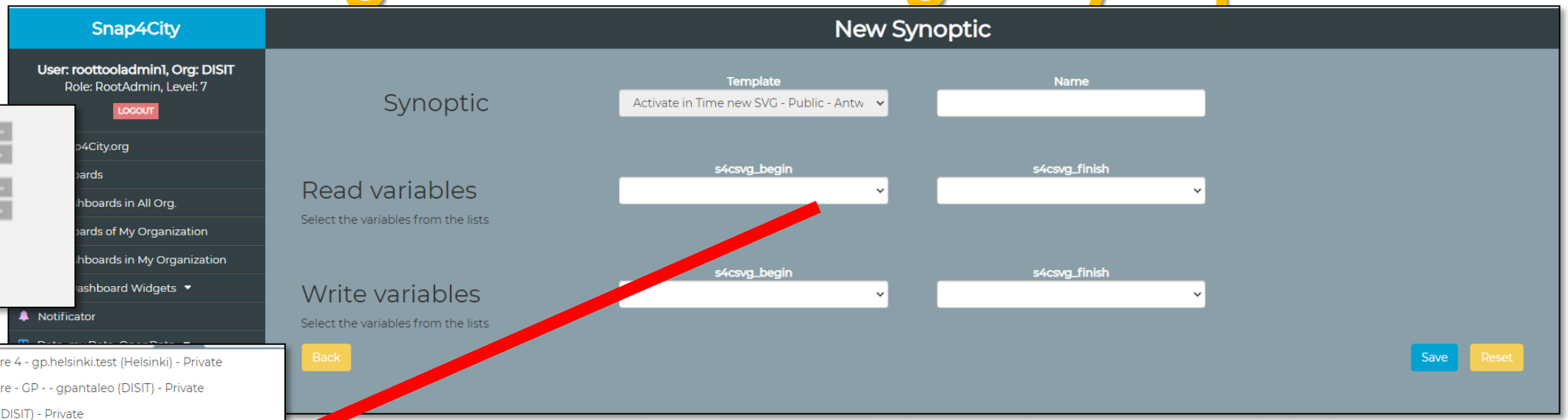
Select the Sensors and MyKPI to be used on Synoptics

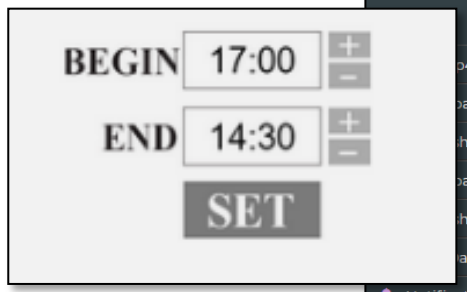


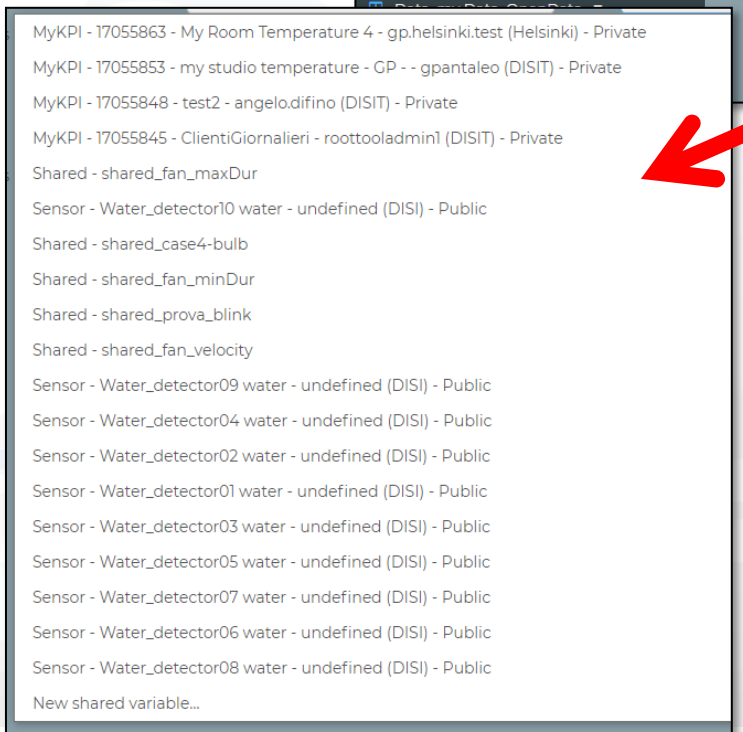
Custom Widgets Templates



Instantiating a Custom Widget Synoptic



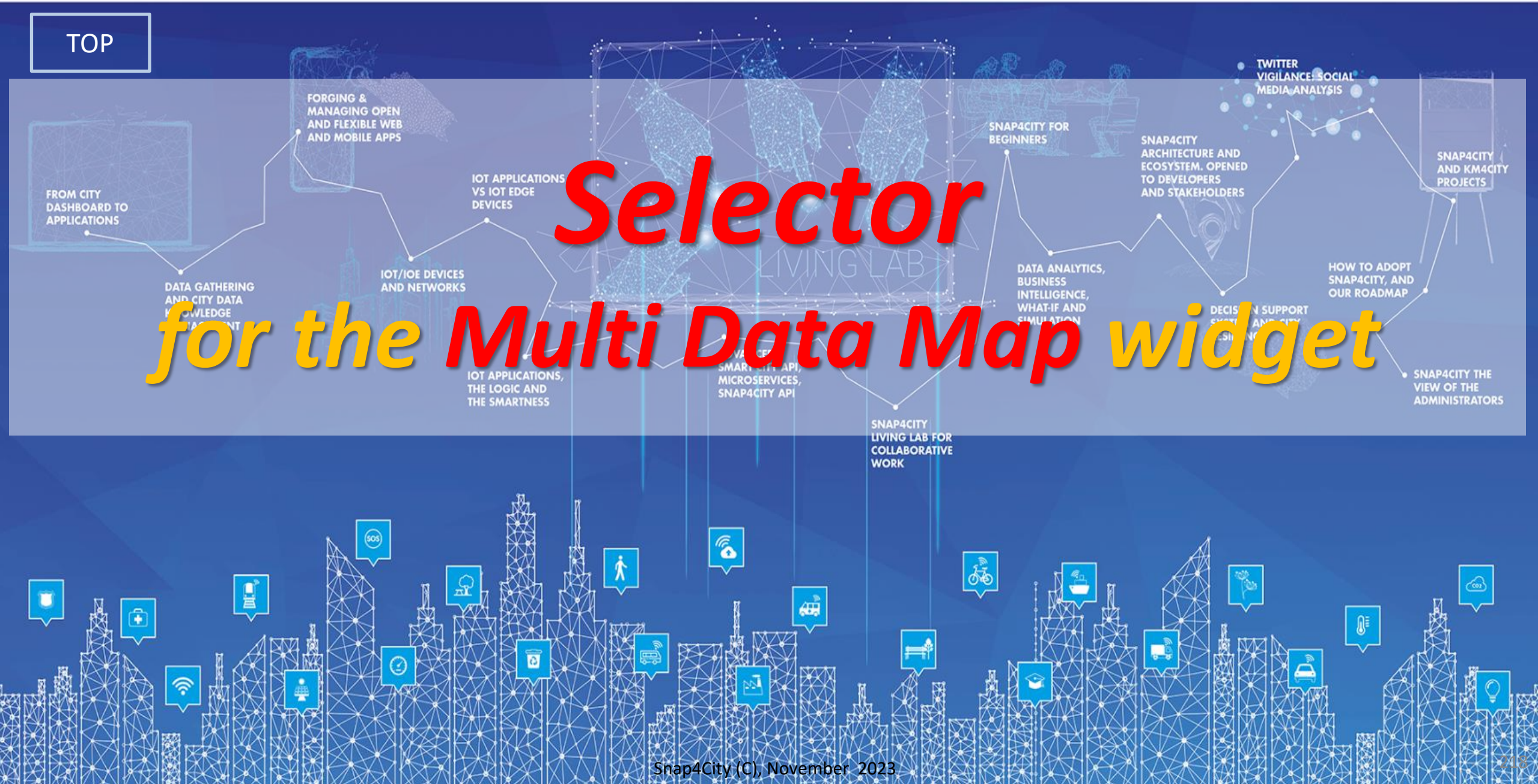




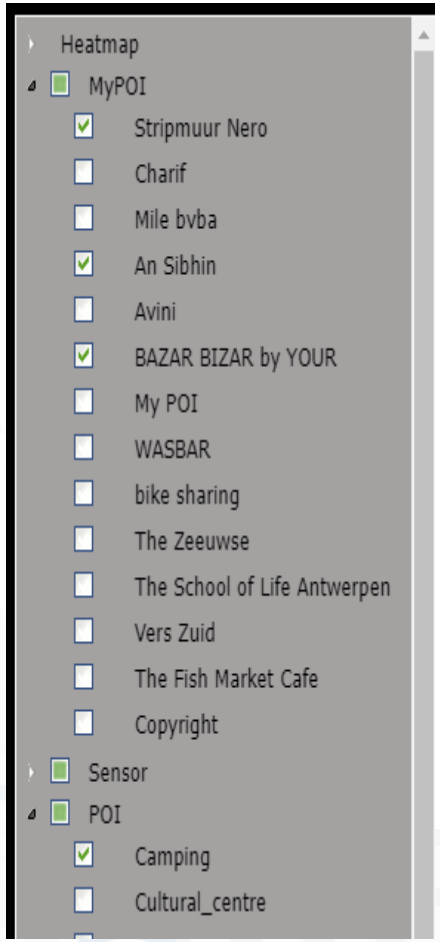
- **[ ]**
  - **leave it empty to connect later direcly from/to IOT APP**
- **MyKPI**
  - Read/write data, your KPI, and real time values
- **Sensors**
  - Your data collected as sensors only rendering data
- **New Shared Variables**
  - ….. Only for Case 3: Synoptic vs Synoptic Communications
  - No protection of data value

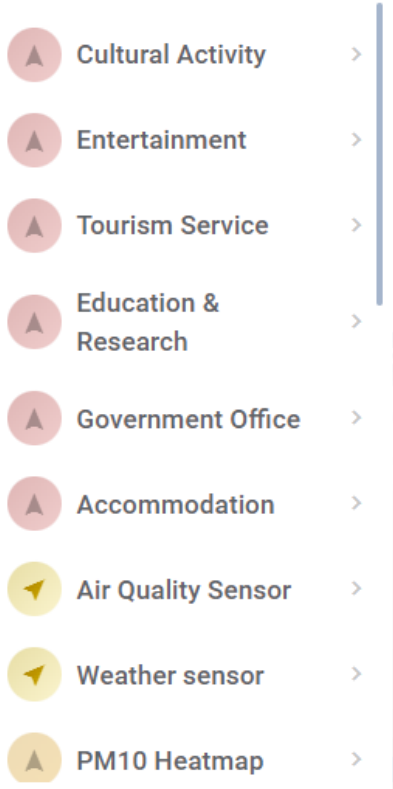
TOP

Selector for the Multi Data Map widget



The Selector for Multi Data Maps

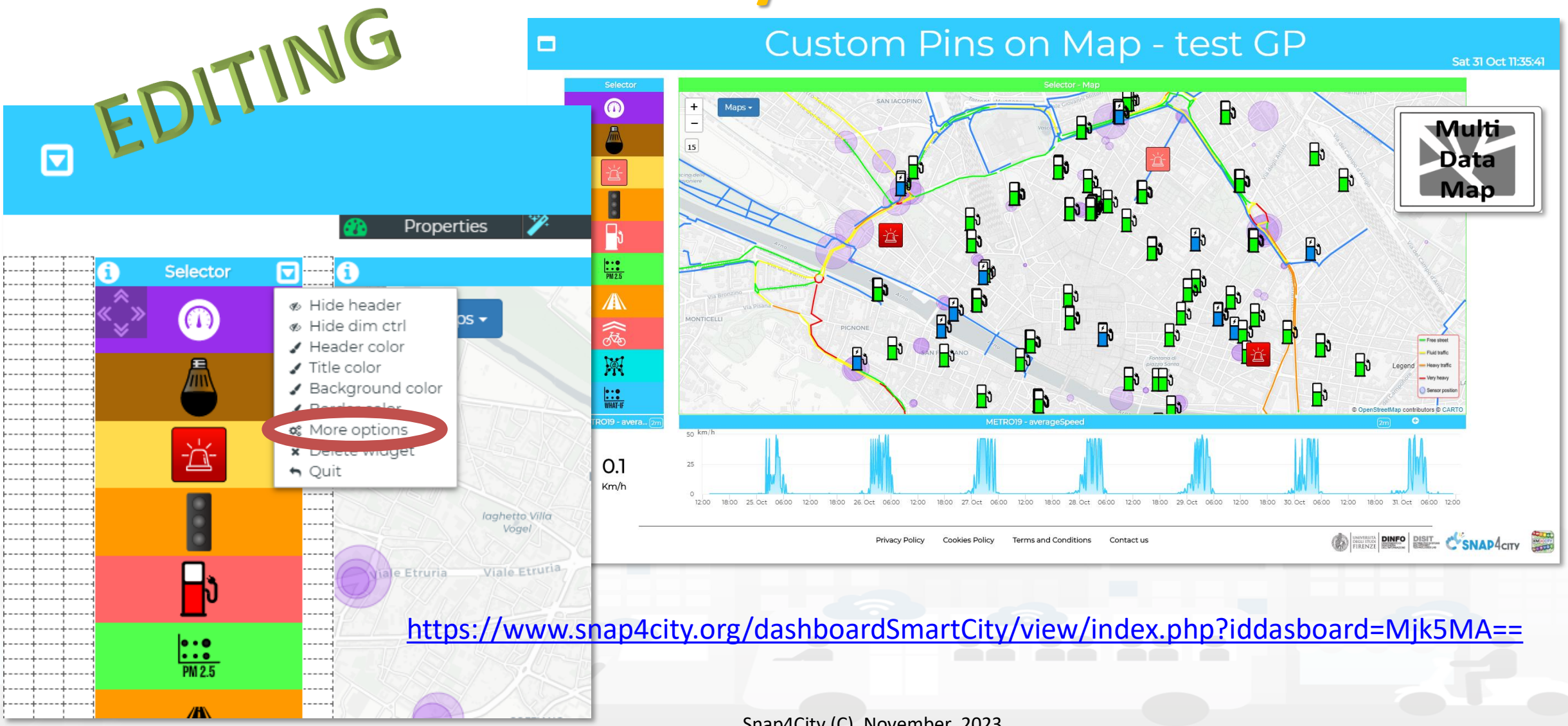




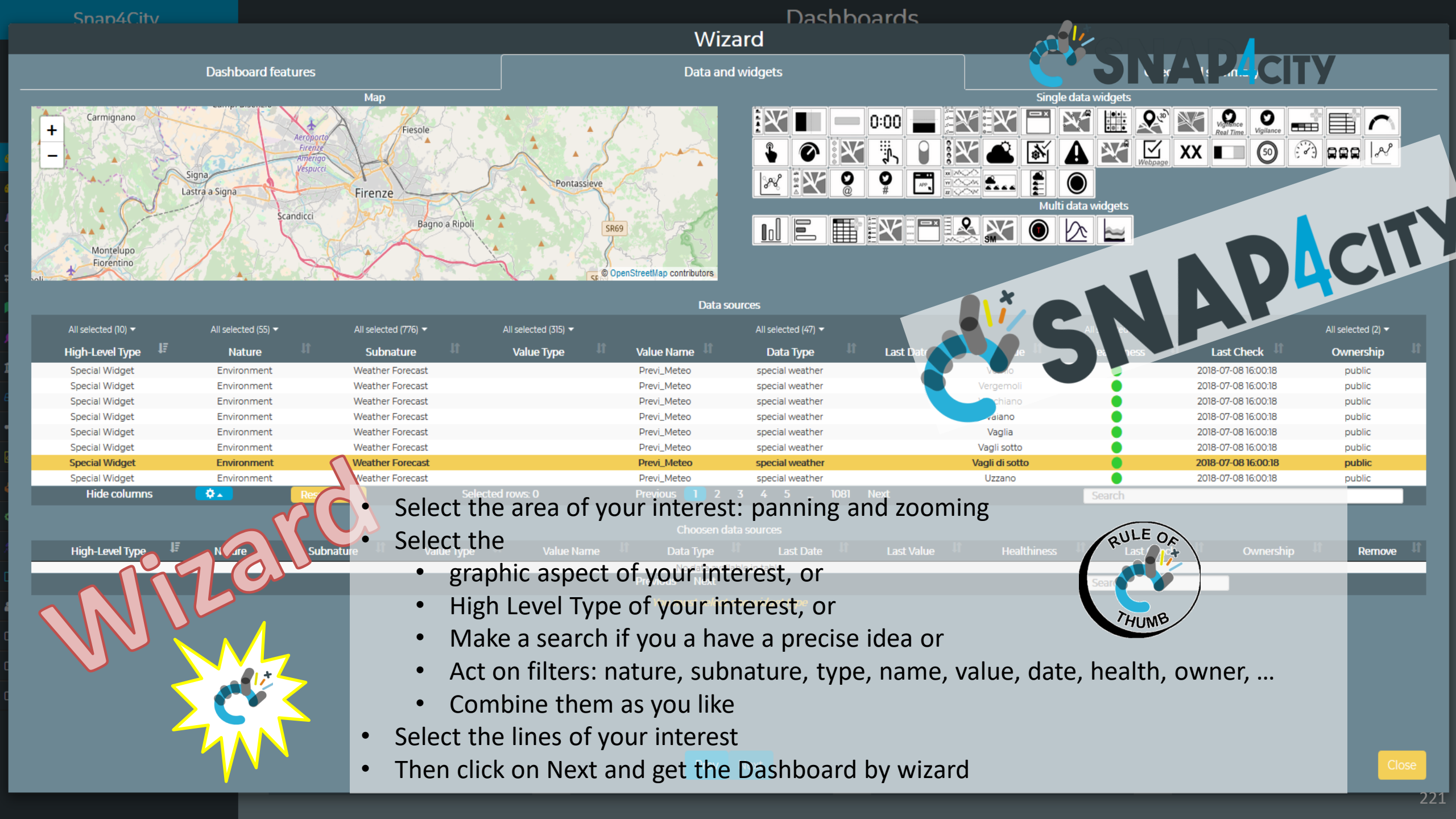
- **Different styles**
  - Icon and Text menu
  - Custom Menu Icon
  - Icon Menu buttons
  - Etc.
- **Features**
  - Removable header
  - Colours custom
  - Transparencies
  - Mixed modalities
- **Note:**
  - Manus can be realized also with a set of Buttons

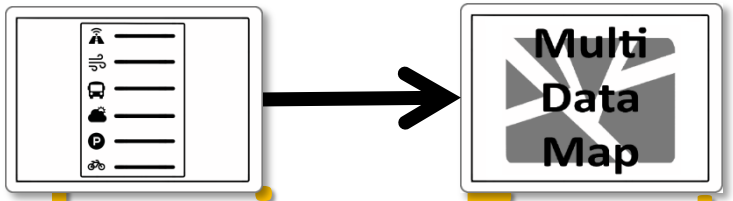
The Selector is the Map Controller

Custom Dynamic Pins



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


Wizard
Dashboard features
Data and widgets
Map
Single data widgets
Multi data widgets
Data sources
Wizard
Select the area of your interest: panning and zooming
Select the
graphic aspect of your interest, or
High Level Type of your interest, or
Make a search if you a have a precise idea or
Act on filters: nature, subnature, type, name, value, date, health, owner, …
Combine them as you like
Select the lines of your interest
Then click on Next and get the Dashboard by wizard
RULE OF THUMB
Close



Dashboard Usage and recipe: Event map target

- **Selector to Show on Map a**
  - **category of Map positioned elements**
    - https://servicemap.disit.org/WebAppGrafo/api/v1/?selection=43.08694333811321;8.791809082031252;44.93758500391093;14.065246582031252&categories=Traffic_sensor&maxResults=0&maxDists=0.1&text=&model=&value_type=&format=json
    - https://servicemap.disit.org/WebAppGrafo/api/v1/?queryId=e5f39066cd68ffe259ed8877bcee222b&format=json
  - **Entity by Model**
    - https://www.disit.org/superservicemap/api/v1?selection=59.36535064975547;13.457822799682619;59.39031474260852;13.566999435424806&model=SmartLightCapelon&format=json
  - **Single Entity**
    - https://servicemap.disit.org/WebAppGrafo/api/v1/?serviceUri=http://www.disit.org/km4city/resource/iot/orionFirenze2/Firenze/SHT20lab_new&format=json&fromTime=3-day
  - **Heatmap among many**
    - https://wmsserver.snap4city.org/geoserver/Snap4City/wms?service=WMS&layers=Florence_PM10
  - **Traffic flow**
    - https://wmsserver.snap4city.org/geoserver/Snap4City/wms?service=WMS&layers=FirenzeFIPILITrafficRealtime&trafficflowmanager=true
    - https://firenzetraffic.km4city.org/trafficRTDetails/roads/read.php
  - **Origin Destination Map**
    - https://odmm.snap4city.org/api/get?precision=communes&from_date=&organization=Toscana&inflow=True&longitude=11.255751&latitude=43.769710&od_id=mobile_Toscana_1000&perc=True
- **Events which are also PIN on map**
- **Il Service URI as the unique identifier of the Entity**
  - **http://www.disit.org/km4city/resource/iot/orionUNIFI/DISIT/METRO632**

MoreOptions (below part)

Specific widget properties

Map widgets Selector Ma

Active rows font color rgba(0,0,0,1)

Icon/Text Mode Icon Only

Map Pin Icon Pin Icon

Default	Symbol mode	Symbol choice	Symbol preview	Symbol color	Description	Query	Color1	Color2	Data widgets	Default View Mode	Map Icon color	Alternate View Mode	Variable Name	Order	
Yes	Auto				Traffic Bubbl...	https://se...	rgba(1!	rgba(1!	Nothing se			Bub	vehicleFl	1	✖
No	Auto				Psvgb_X-val3	https://se...	rgba(1(	rgba(1(	METRO19	Pir		Cus	val3	2	✖
No	Auto				Psvgb_X-val1	https://se...	rgba(2!	rgba(2!	METRO19	Pir		Cus	val1	3	✖
No	Auto			rgba((	Psvgb_X-val4	https://se...	rgba(2!	rgba(2!	METRO19	Pir		Cus	val4	4	✖
No	Auto			rgba(!	recharging st...	https://se...	rgba(2!	rgba(2!	METRO19		Symbol (	Cus	stationSt	5	✖
No	Auto	PM 2.5	PM 2.5		PM2_5 Heatmap	https://wm...	rgba(8:	rgba(8:	Nothing se					Empty	✖
No	Auto				Traffic Flow	https://fi...	rgba(2!	rgba(2!	Nothing se					Empty	✖
No	Auto				Cycling Paths	https://se...	rgba(2!	rgba(2!	Nothing se					Empty	✖
No	Auto				Scenario	/scenario/	rgba(0,	rgba(1!	Nothing se					Empty	✖
No	Auto	WHAT-IF	WHAT-IF		What-IF	/whatif/	rgba(5:	rgba(	Nothing se					Empty	✖

You may need to save and reopen the MoreOptions more than once to pass on different kinds of configurations

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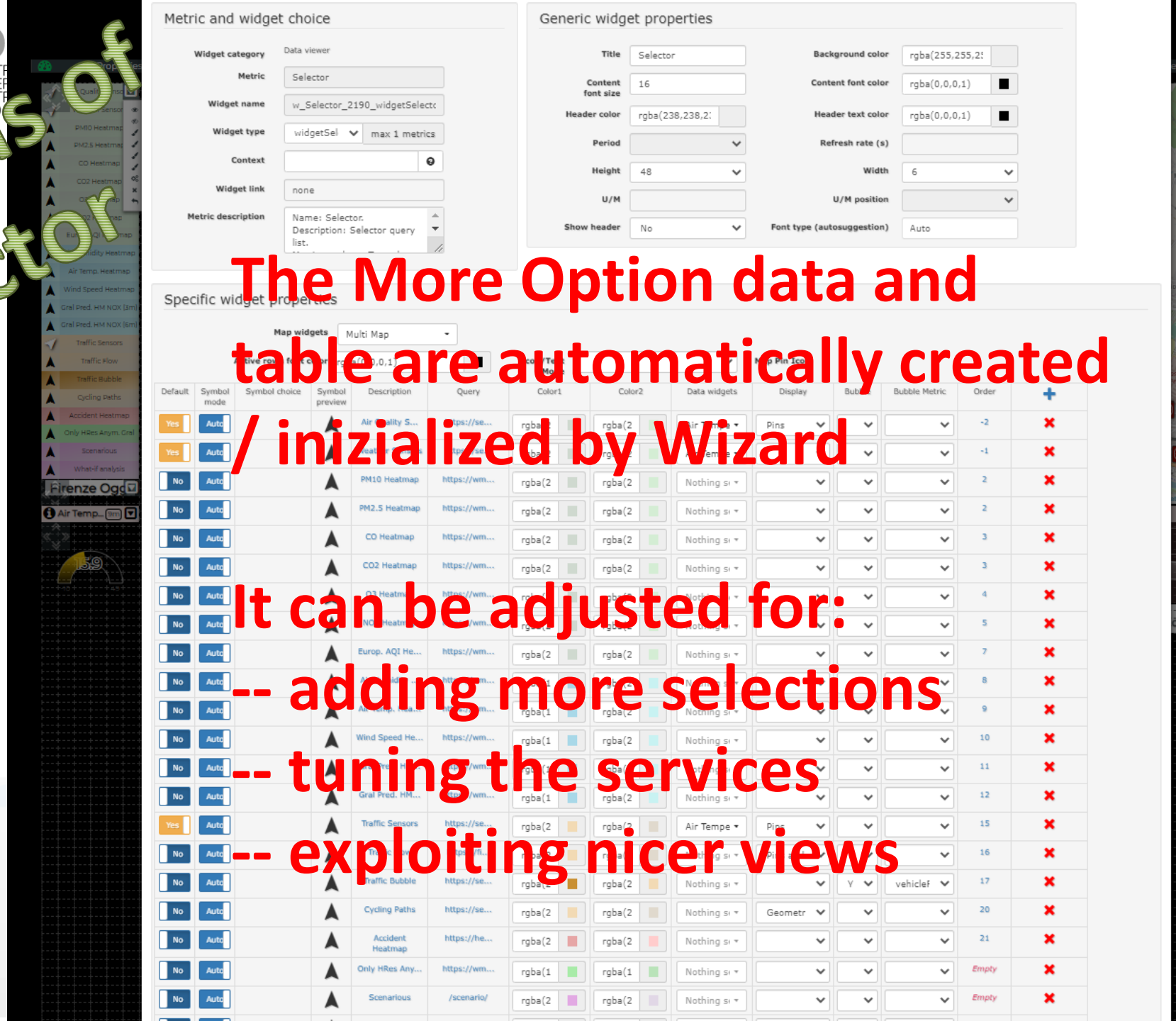
More Options of the Selector

- Setting:
  - Heatmaps
  - Bubbles
  - Icons
  - Custom
  - Traffic flow
  - Cycling path
  - What-if
  - Etc. etc.



The Selector is the Map Controller

MoreOptions

Specific widget properties

Selector - Map

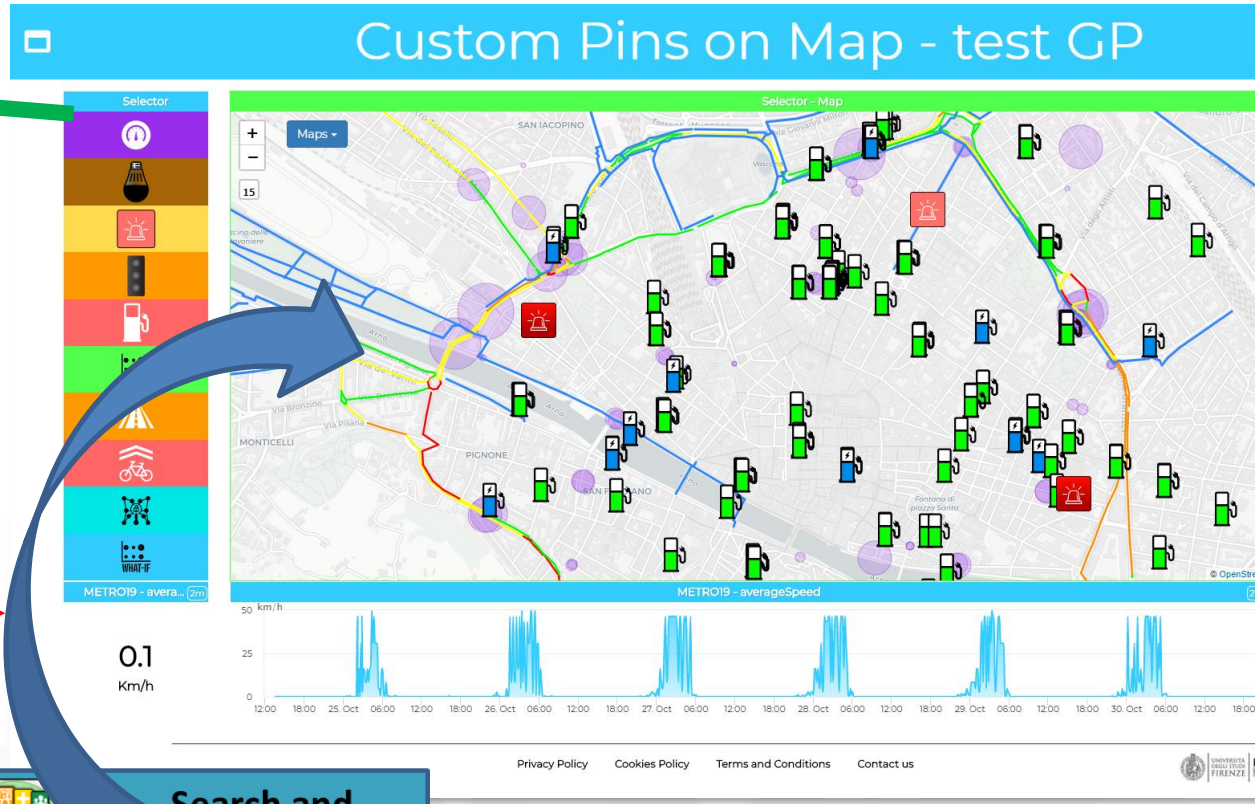
Active rows font color rgba(0,0,0,1)

Icon/Text Mode

Default	Symbol mode	Symbol choice	Symbol preview	Symbol color	Description	Query
Yes	Auto				Traffic Bubbl...	https://se...
No	Auto				Psvgb_X-val3	https://se...
No	Auto				Psvgb_X-val1	https://se...
No	Auto			rgba((	Psvgb_X-val4	https://se...
No	Auto			rgba(9	recharging st...	https://se...
No	Auto	PM 2.5	PM 2.5		PM2_5 Heatmap	https://wm...
No	Auto				Traffic Flow	https://fi...
No	Auto				Cycling Paths	https://se...
No	Auto				Scenario	/scenario/
No	Auto	WHAT-IF	WHAT-IF		What-IF	/whatif/

More Options Edit

- Query ID
- REST CALL
- Command
- Heatmap



Knowledge base
Semantic reasoners

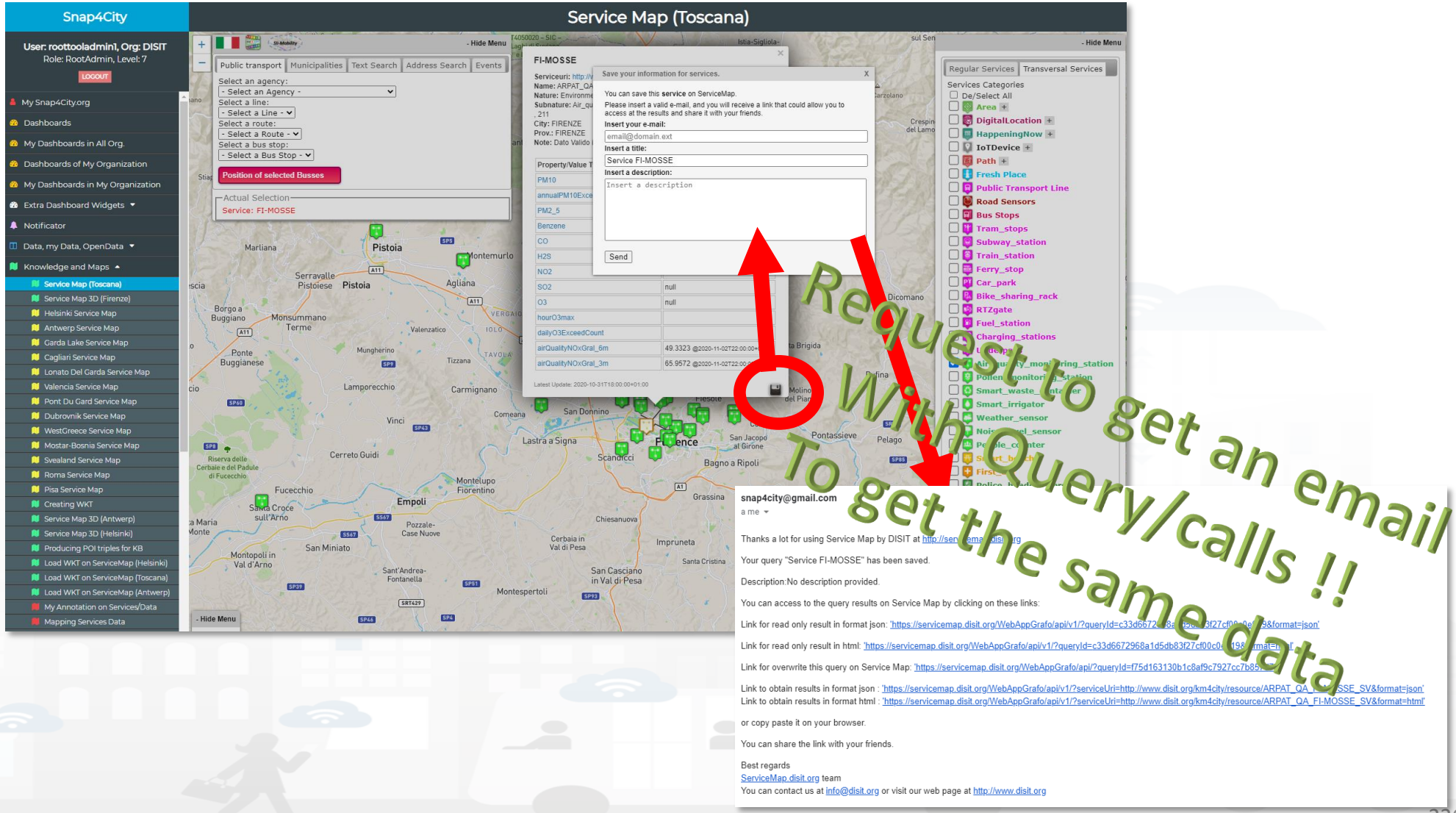
Indexing and aggregating
Elastic search

Search and Query, Smart City API
Facet, semantic search

- ***The Query is produced by Wizard but can be manually changed***

How to Get the «Query» used in More Options (1)

- **Query ID**
  - **only Read and Read/Write of the query**
- **REST CALL of the Smart City APIs**
  - **JSON**
  - **HTML (do not use into MoreOptions)**



The example of email from ServiceMap

snap4city@gmail.com

a me

Thanks a lot for using Service Map by DISIT at http://servicemap.disit.org

Your query "Service FI-MOSSE" has been saved.

Description:No description provided.

You can access to the query results on Service Map by clicking on these links:

Link for read only result in format json: 'https://servicemap.disit.org/WebAppGrafo/api/v1/?queryId=c33d6672968a1d5db83f27cf00c0e919&format=json'

Link for read only result in html: 'https://servicemap.disit.org/WebAppGrafo/api/v1/?queryId=c33d6672968a1d5db83f27cf00c0e919&format=html'

Link for overwrite this query on Service Map: 'https://servicemap.disit.org/WebAppGrafo/api/?queryId=f75d163130b1c8af9c7927cc7b857d70'

Link to obtain results in format json : 'https://servicemap.disit.org/WebAppGrafo/api/v1/?serviceUri=http://www.disit.org/km4city/resource/ARPAT_QA_FI-MOSSE_SV&format=json'
Link to obtain results in format html : 'https://servicemap.disit.org/WebAppGrafo/api/v1/?serviceUri=http://www.disit.org/km4city/resource/ARPAT_QA_FI-MOSSE_SV&format=html'

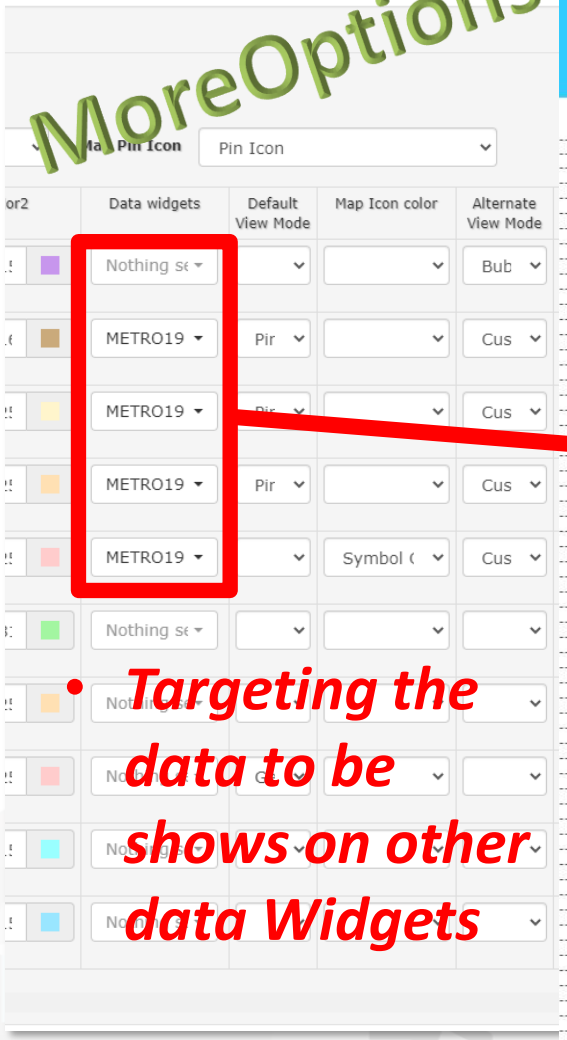
or copy paste it on your browser.

You can share the link with your friends.

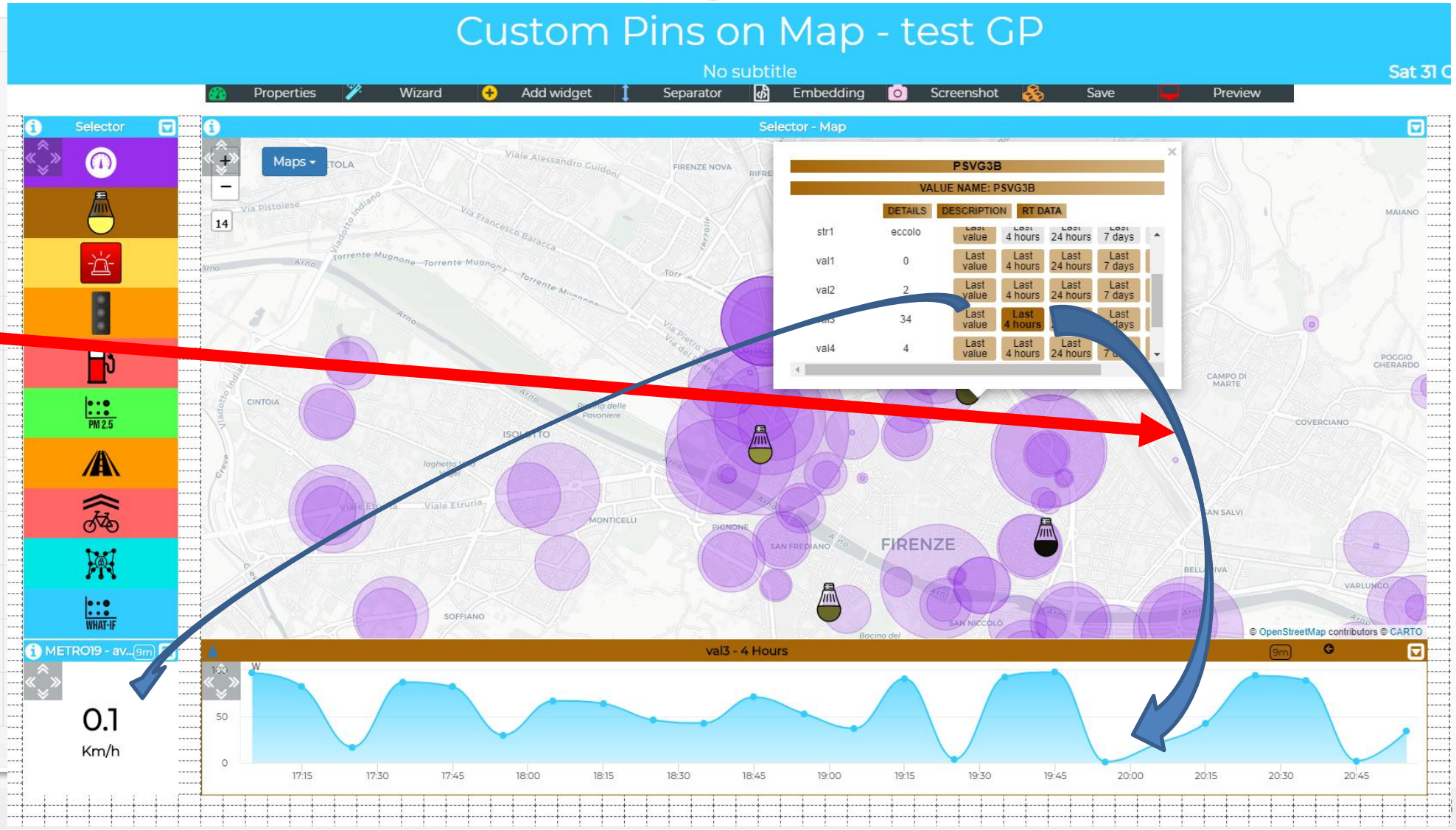
Best regards
ServiceMap.disit.org team
You can contact us at info@disit.org or visit our web page at http://www.disit.org

The Selector is the Map Controller

MoreOptions



- *Targeting the data to be shows on other data Widgets*

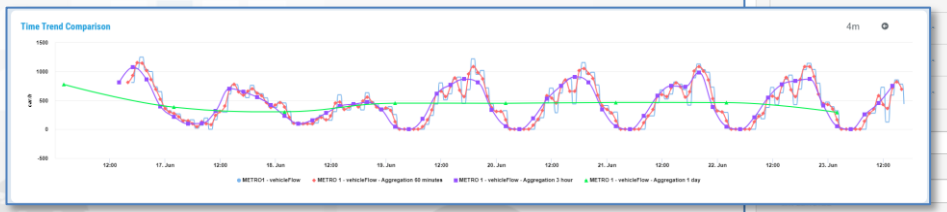


TOP

Setting More Options for the Multi Series widget

Setting Multiseries More Options

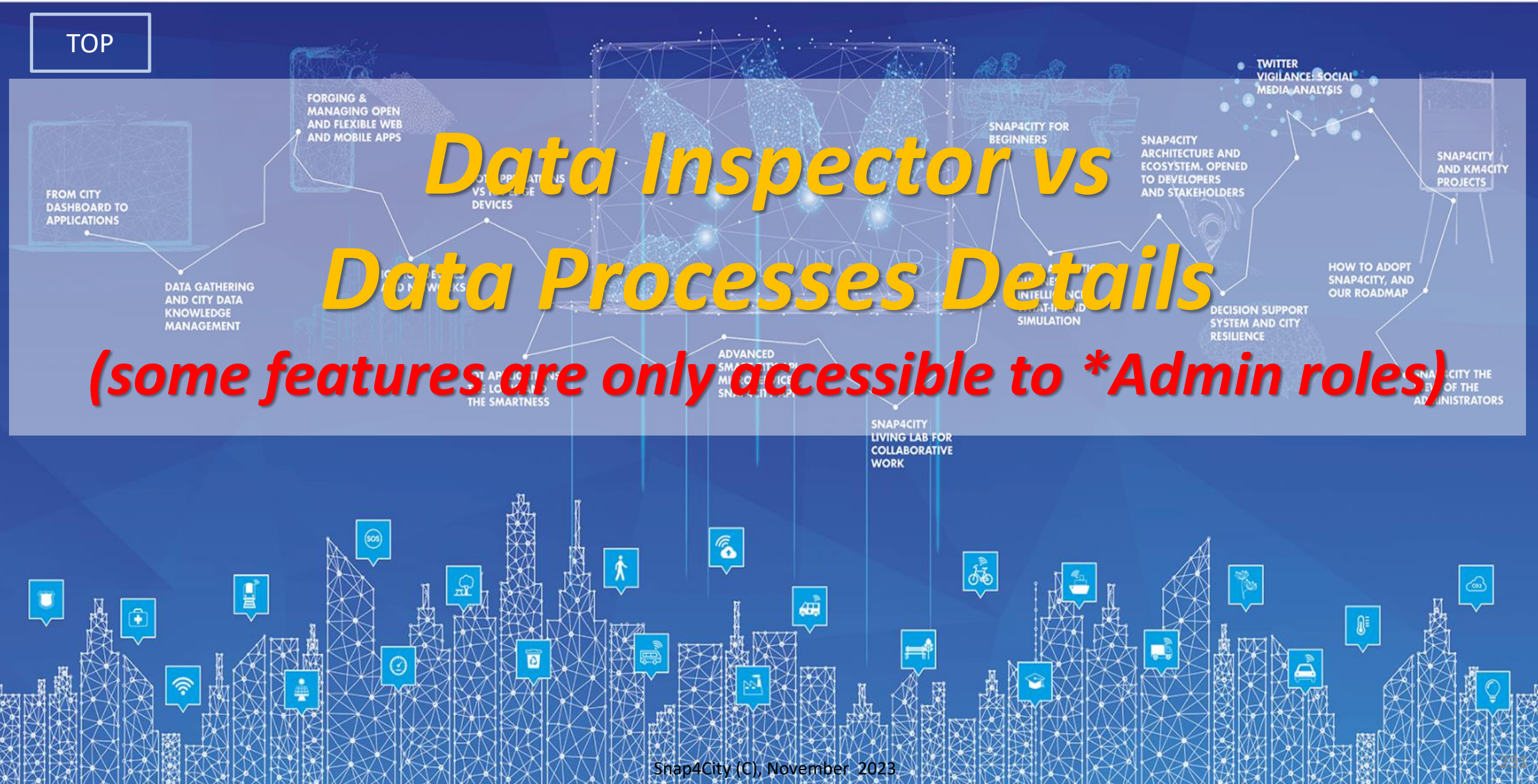
- Stacked/non stacked, shaded
- Linear / Log
- Typical time trend
- ServiceURI: http://www.disit.org/km4city/resource/iot/orionUNIFI/DISIT/METRO1
- Query: https://servicemap.disit.org/WebAppGrafo/api/v1/?serviceUri=http://www.disit.org/km4city/resource/iot/orionUNIFI/DISIT/METRO1&fromTime=7-day&valueName=vehicleFlow&aggregation=60-minute
- Query ID, MyKPI ID etc.



TOP

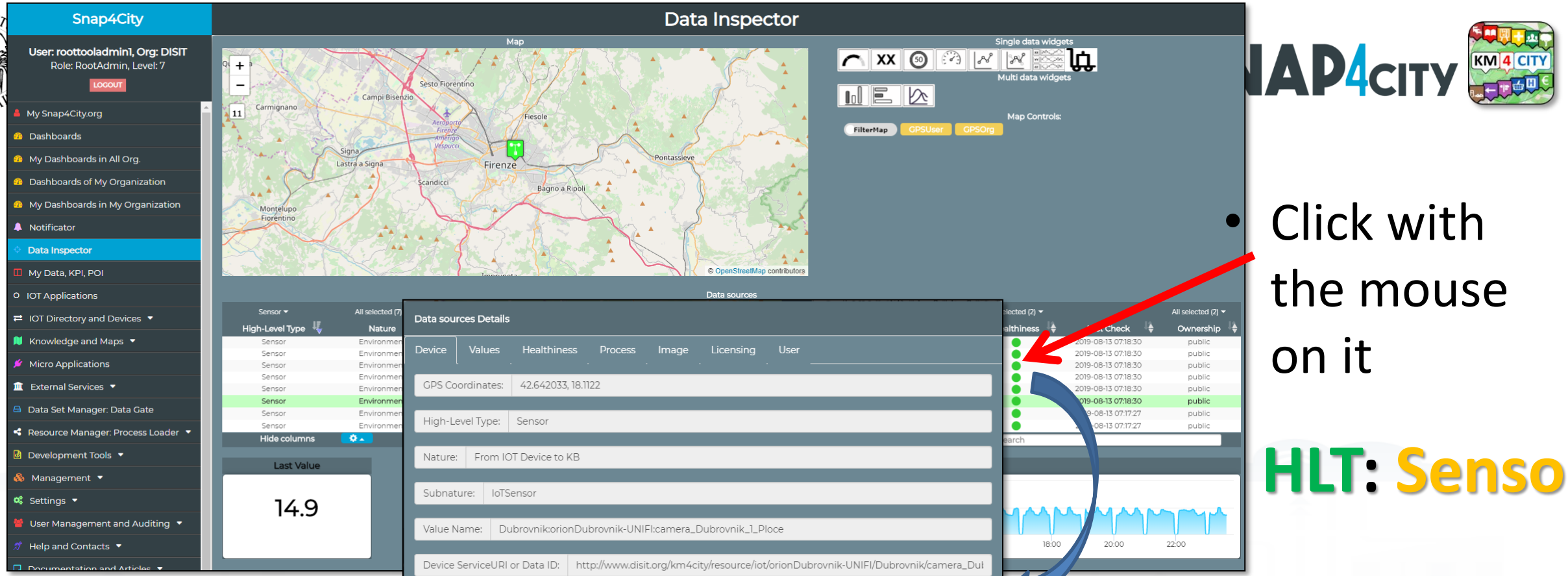
Data Inspector vs Data Processes Details

(some features are only accessible to *Admin roles)



Advanced Features of the Data Inspector

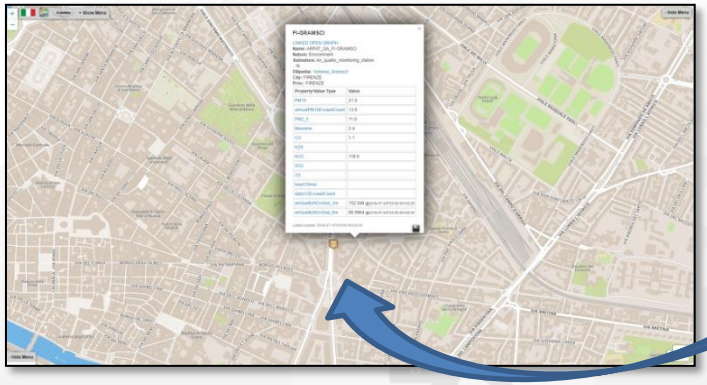
- Some features accessible only for the Owner and *Admin, such as:
  - Specific information on the basis of the High Level Type
  - Values connected to the data (structure of the single data)
  - Details regarding the ingestion process
  - Eventual image representing the City Entity, for example the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

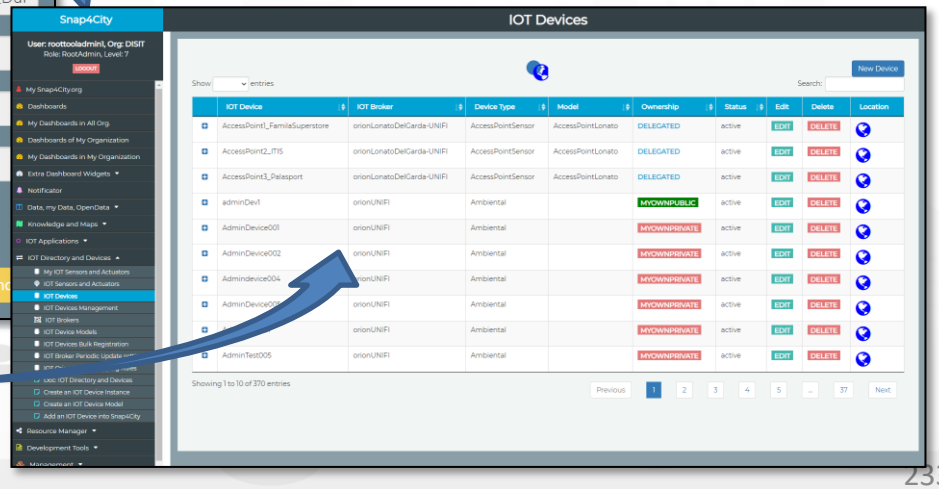


- Click with the mouse on it

HLT: Sensor

Knowledge Base view





HLT: Sensor

- Specific values of selected
- Information of the values of the other sensors on the same device
- View Trends, marking problems, healthiness by point according to a Fuzzy model
- Marking problems for future machine learning processes (separate tool)

Data sources Details

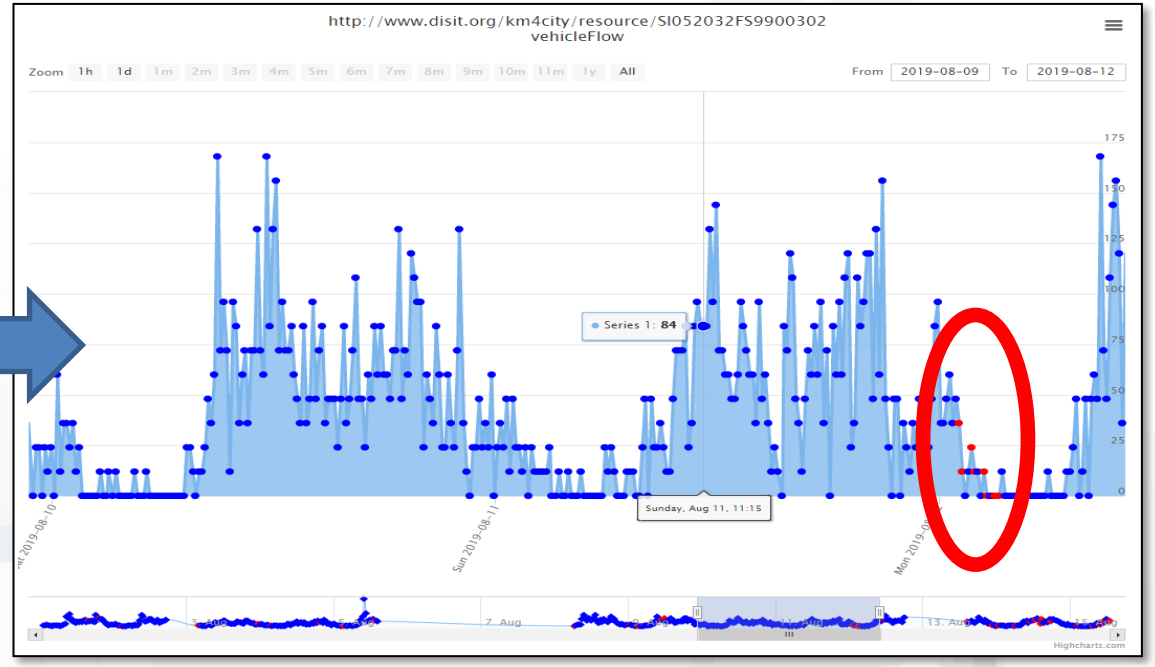
Device | Values | Healthiness | Process | Image | Licensing | User

Last Date: 2020-07-21 19:00:00

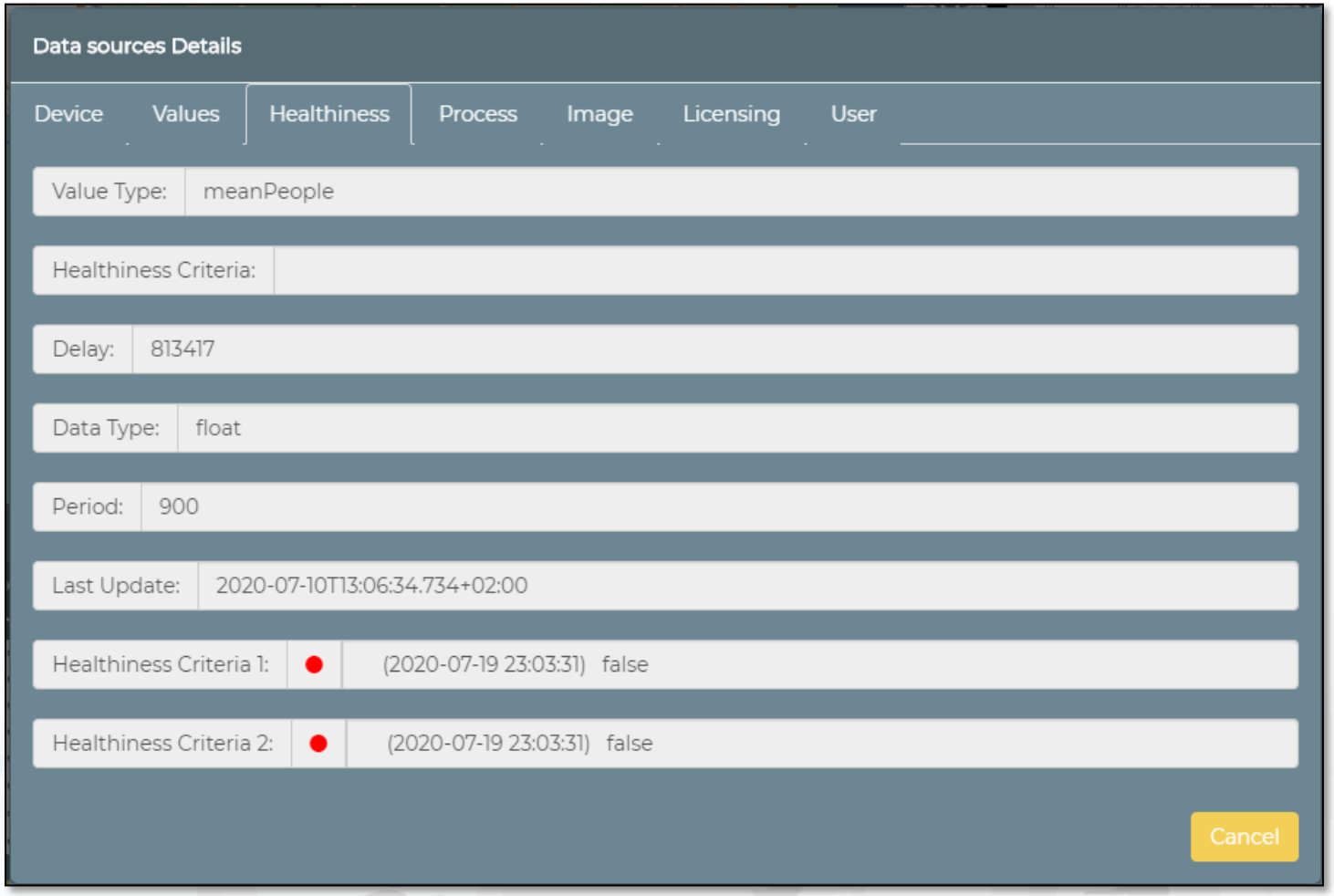
Last Value:

Value Type	Healthy	Delay (s)	Reason	Healthiness Criteria	Refresh Rate (s)	Data type	Unit	Value	Time Trend
dateObserved	●	61890	undefined	undefined	300	time	timestamp	2020-07-21T17:00:00.000Z	VIEW
deceduti	●	61890	undefined	undefined	300	integer	#	16797	VIEW
dimessi_guariti	●	61890	undefined	undefined	300	integer	#	71775	VIEW
isolamento_domiciliare	●	61890	undefined	undefined	300	integer	#	6838	VIEW
nuovi_attualmente_positivi	●	61890	undefined	undefined	300	integer	#	-131	VIEW
ricoverati_con_sintomi	●	61890	undefined	undefined	300	integer	#	151	VIEW
stato	●	61890	undefined	undefined	300	string	#	ITA	VIEW
tamponi	●	61890	undefined	undefined	300	integer	#	1212468	VIEW
terapia_intensiva	●	61890	undefined	undefined	300	integer	#	21	VIEW
totale_attualmente_positivi	●	61890	undefined	undefined	300	integer	#	7010	VIEW
totale_casi	●	61890	undefined	undefined	300	integer	#	95582	VIEW
totale_ospedalizzati	●	61890	undefined	undefined	300	integer	#	172	VIEW
codice_regione	●	61890	missing value	undefined	300	integer	status		VIEW
denominazione_regione	●	61890	missing value	undefined	300	string	status		VIEW

Cancel



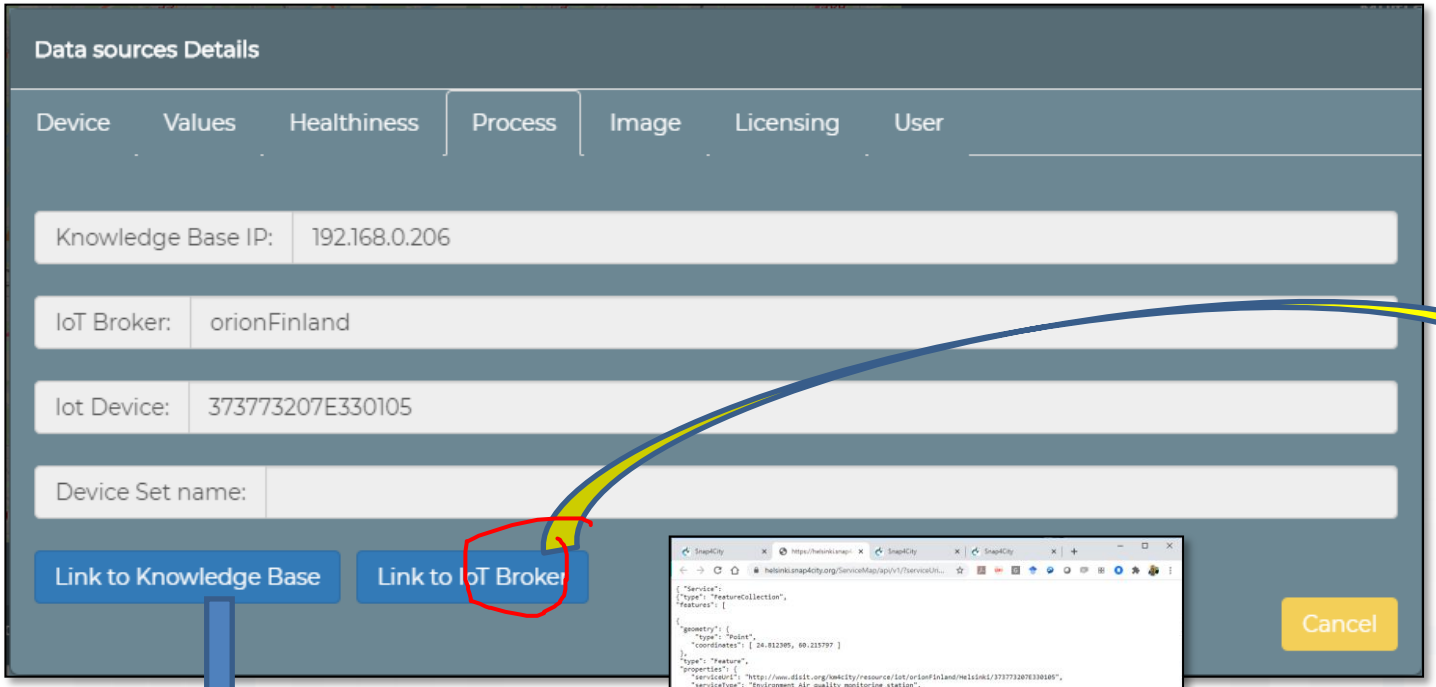
HLT: Sensor Healthiness

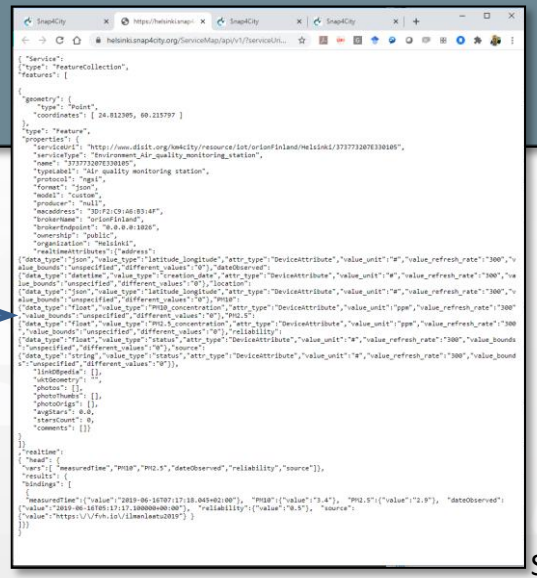


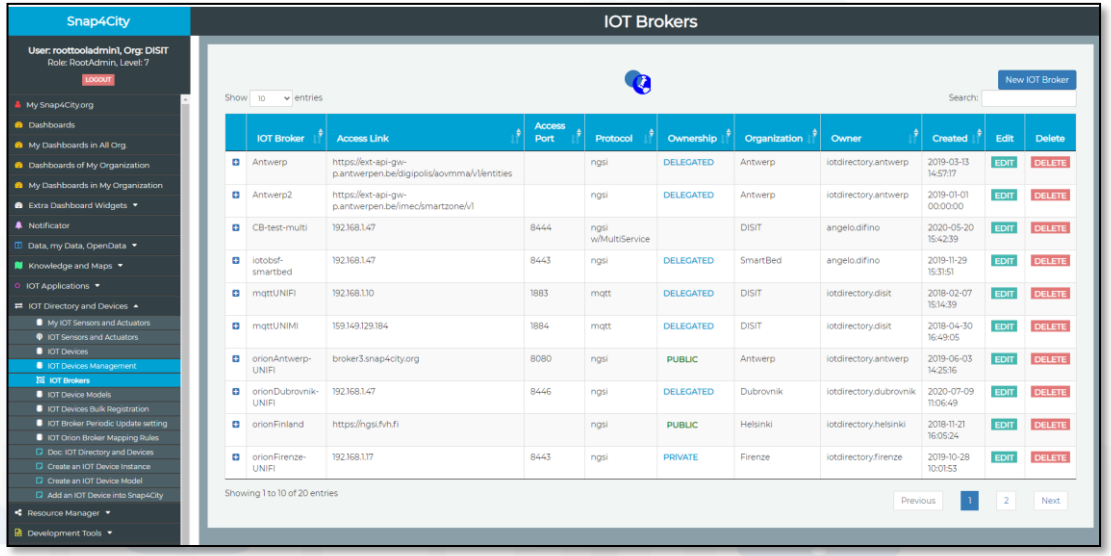
- Two different criteria
  - **H1**: at least an event i nthe last 24 hours
  - **H2**: machine learning for most of Sensors devices

Some functionalities are limited to certain roles

Details regarding the IOT Ingestion process



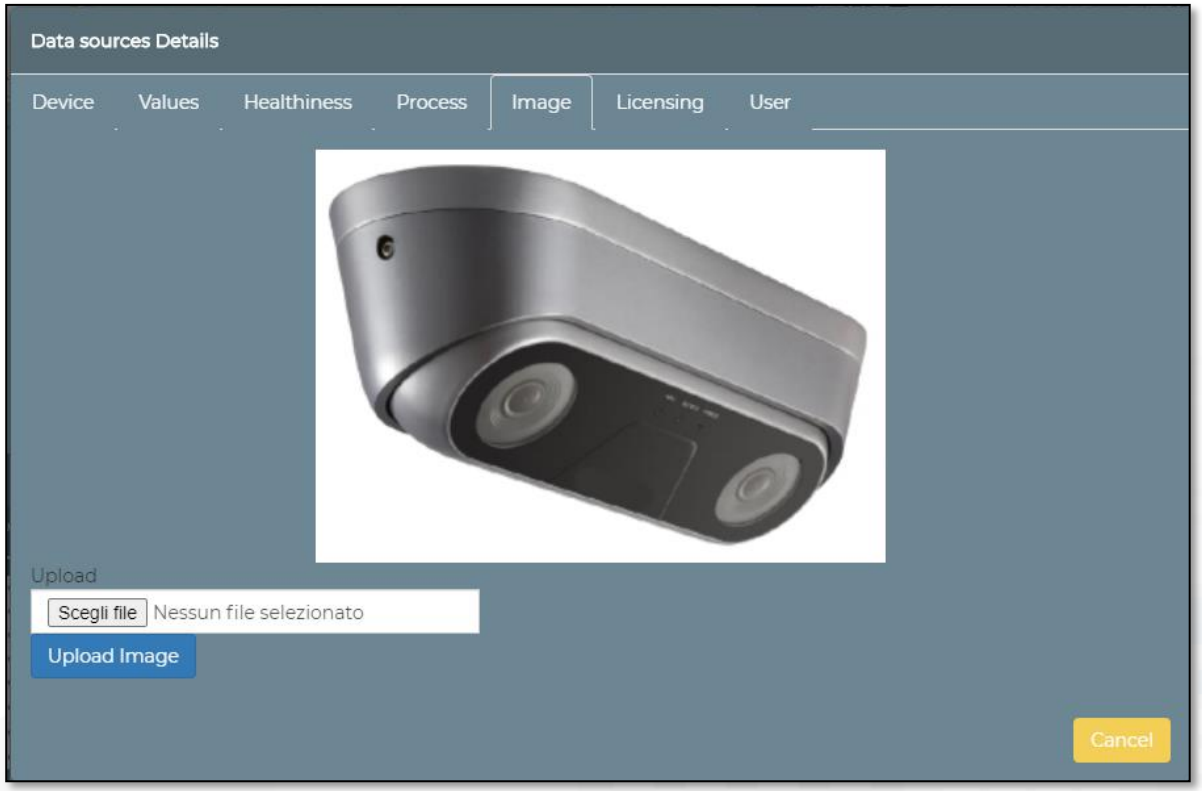


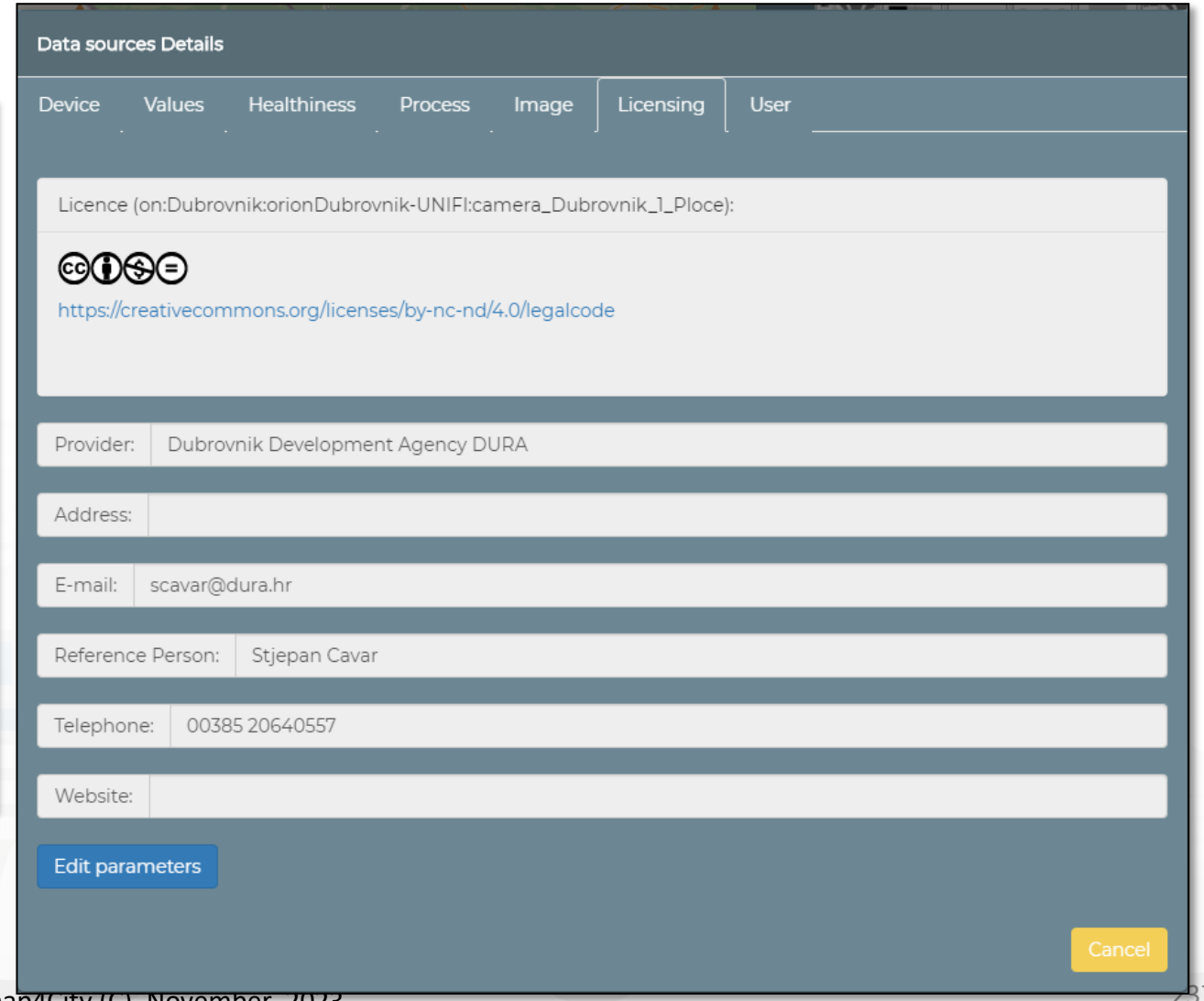


- For IOT Device data
- IOT Broker details

Some functionalities are limited to certain roles

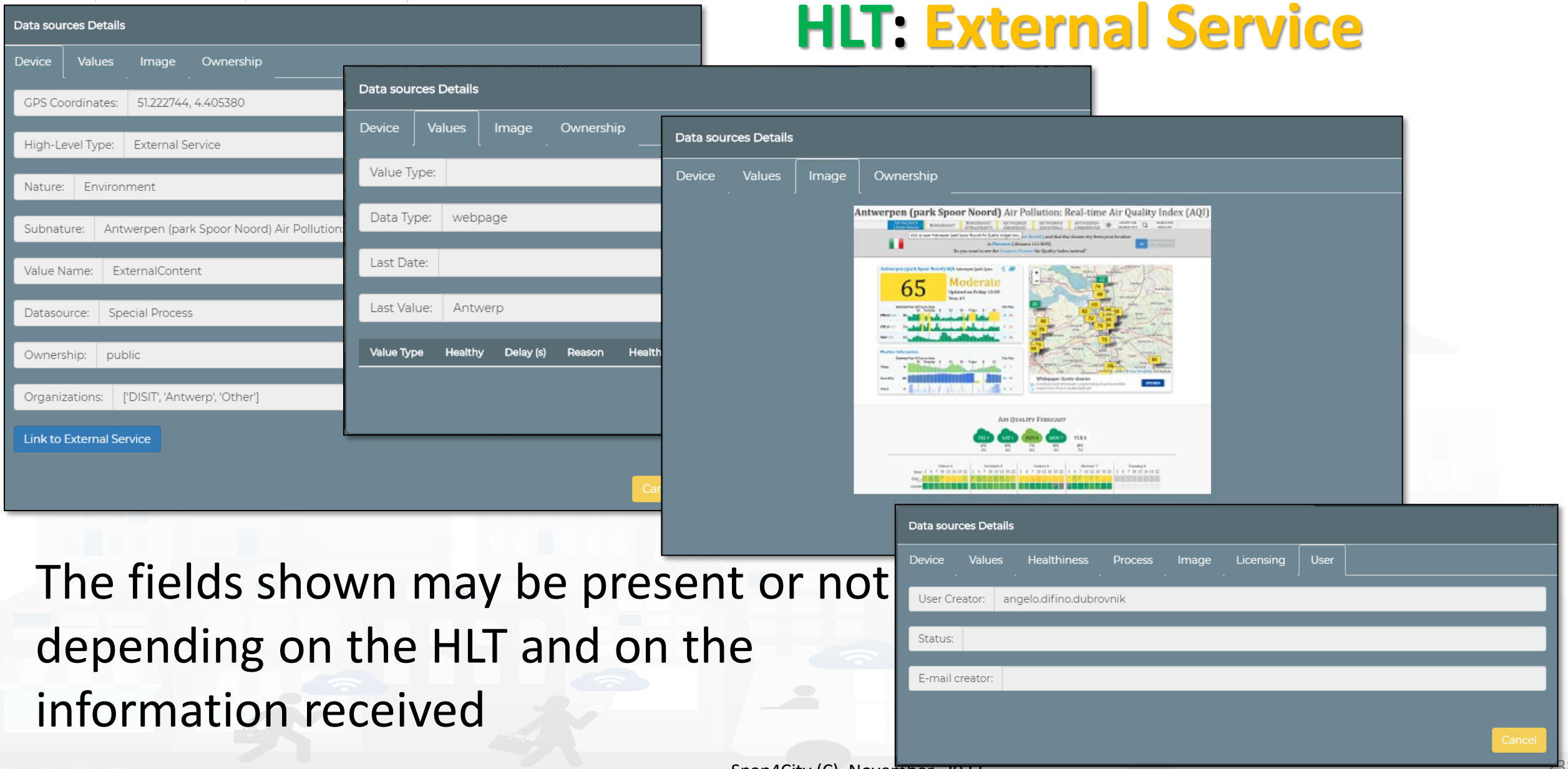
Image of the Devices and Licensing





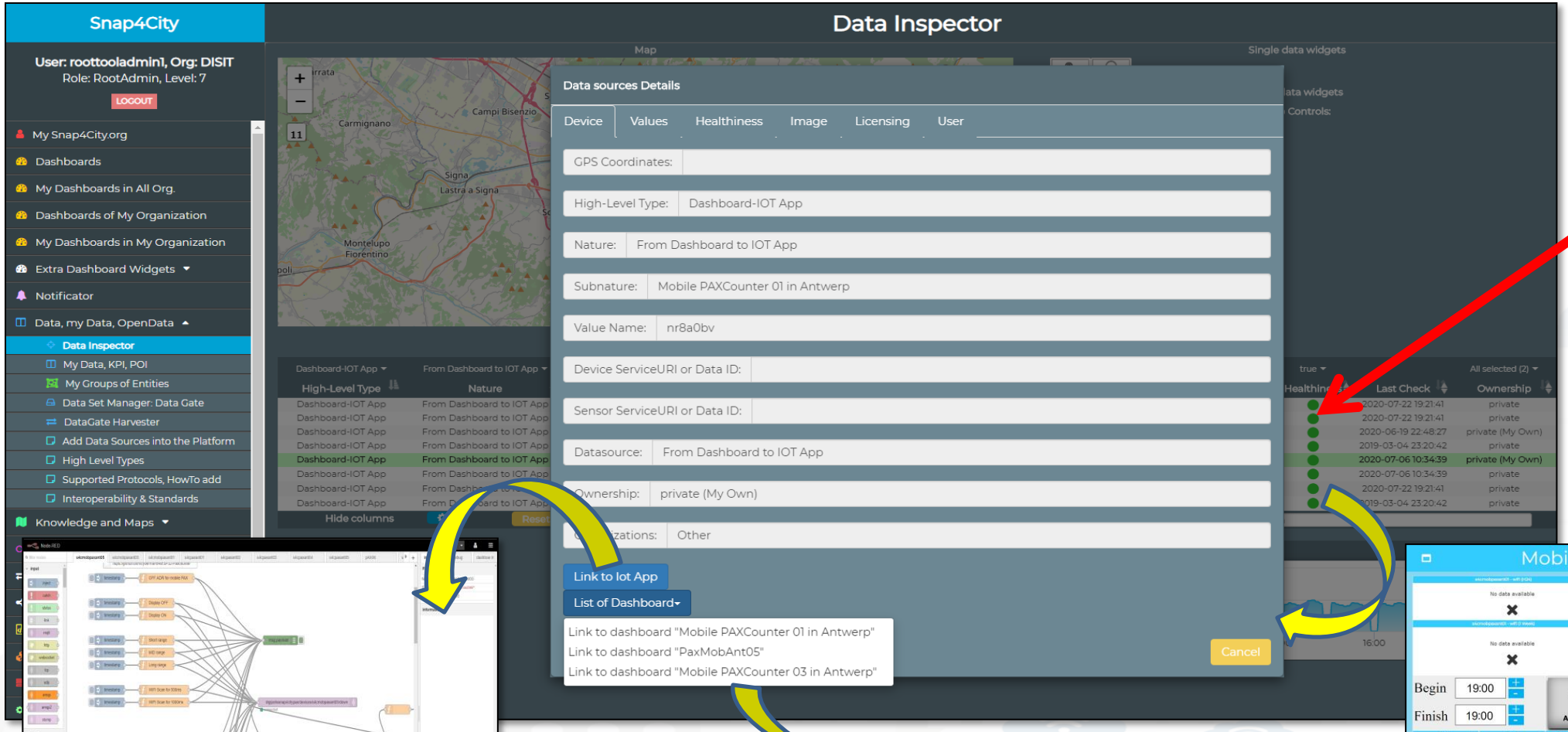
Some functionalities are limited to certain roles

HLT: External Service



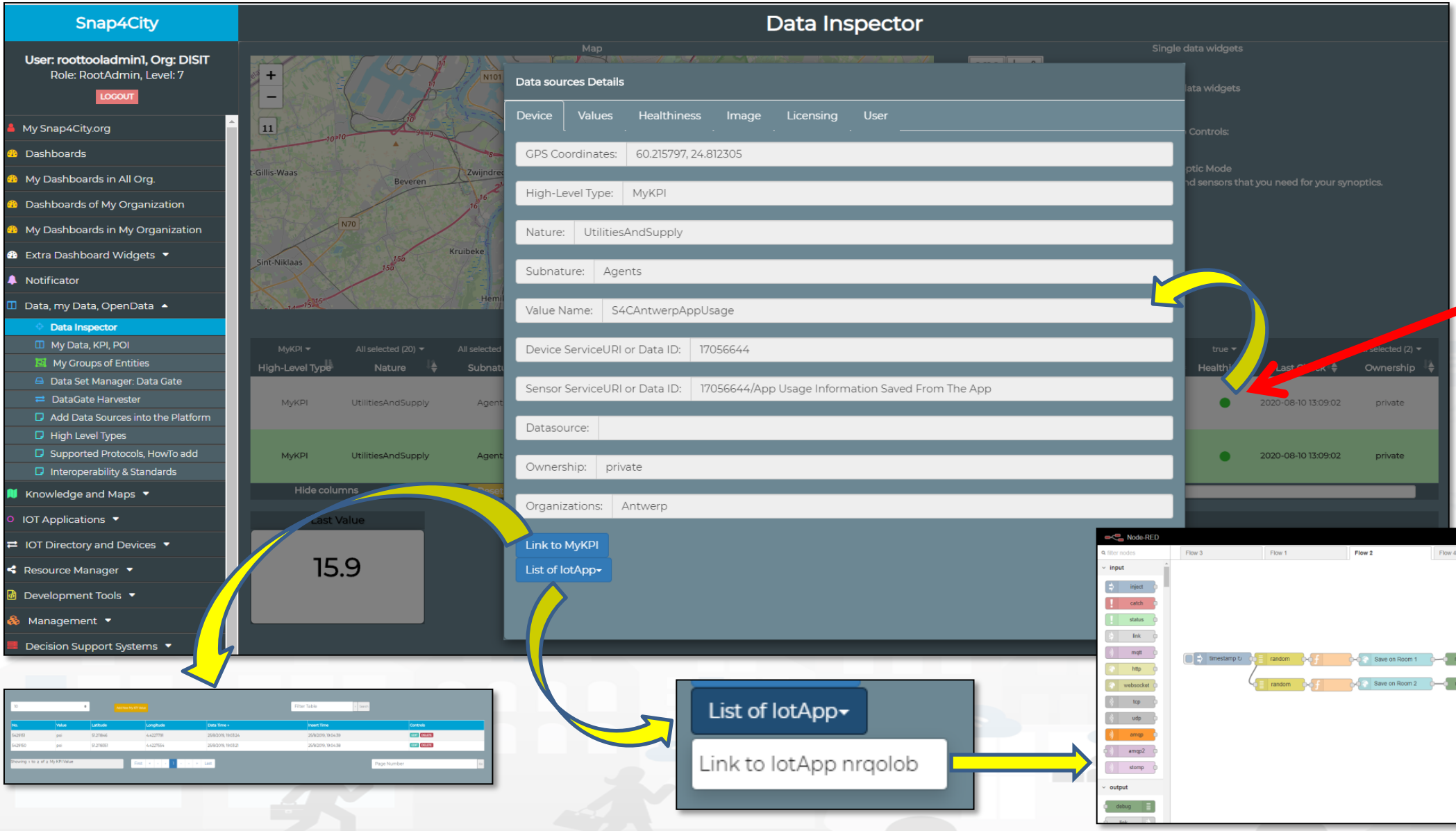
The fields shown may be present or not depending on the HLT and on the information received

HLT: From Dashboard to IOT APP



- Click with the mouse on it

HLT: MyKPI

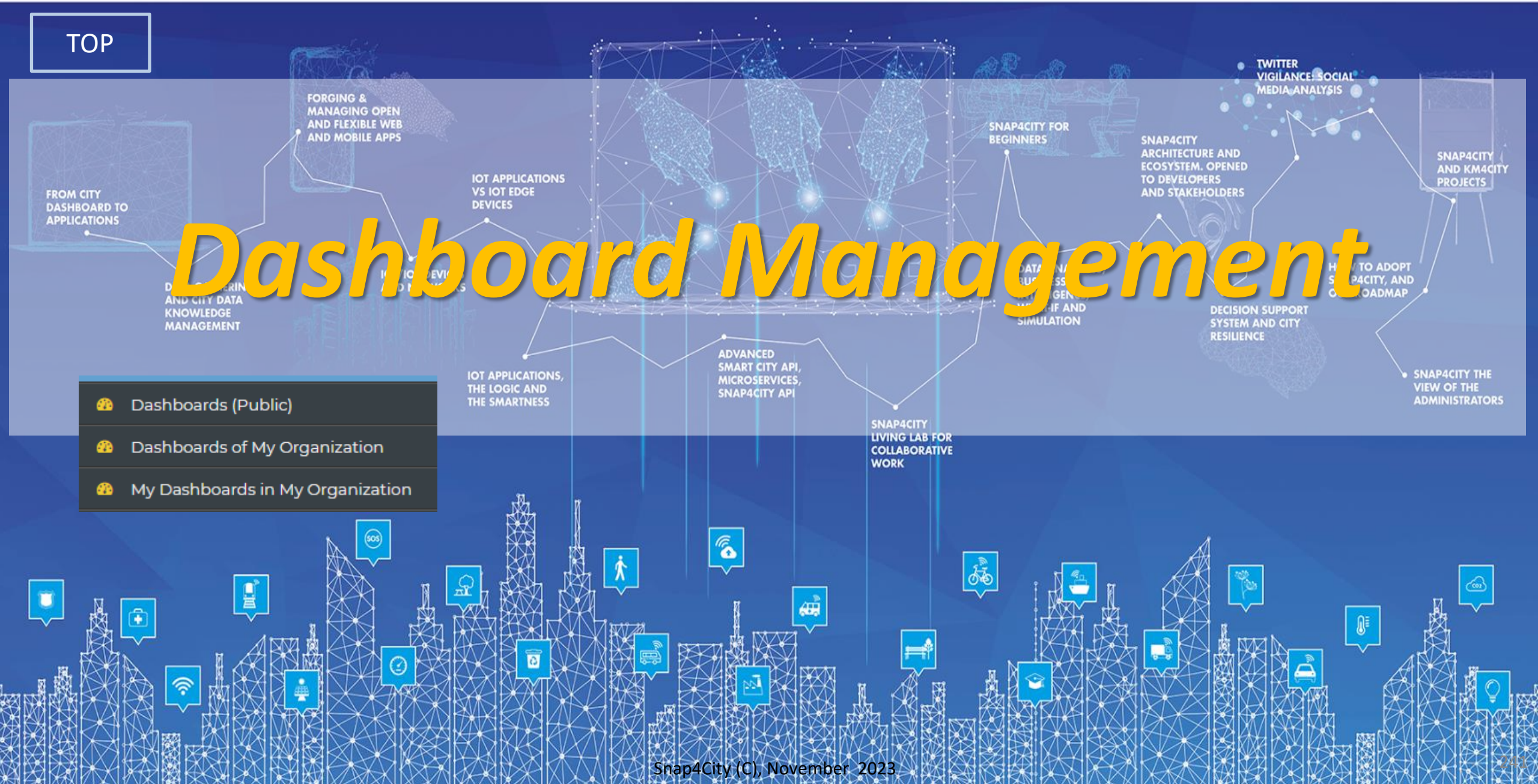


- Click with the mouse on it

Some functionalities are limited to certain roles

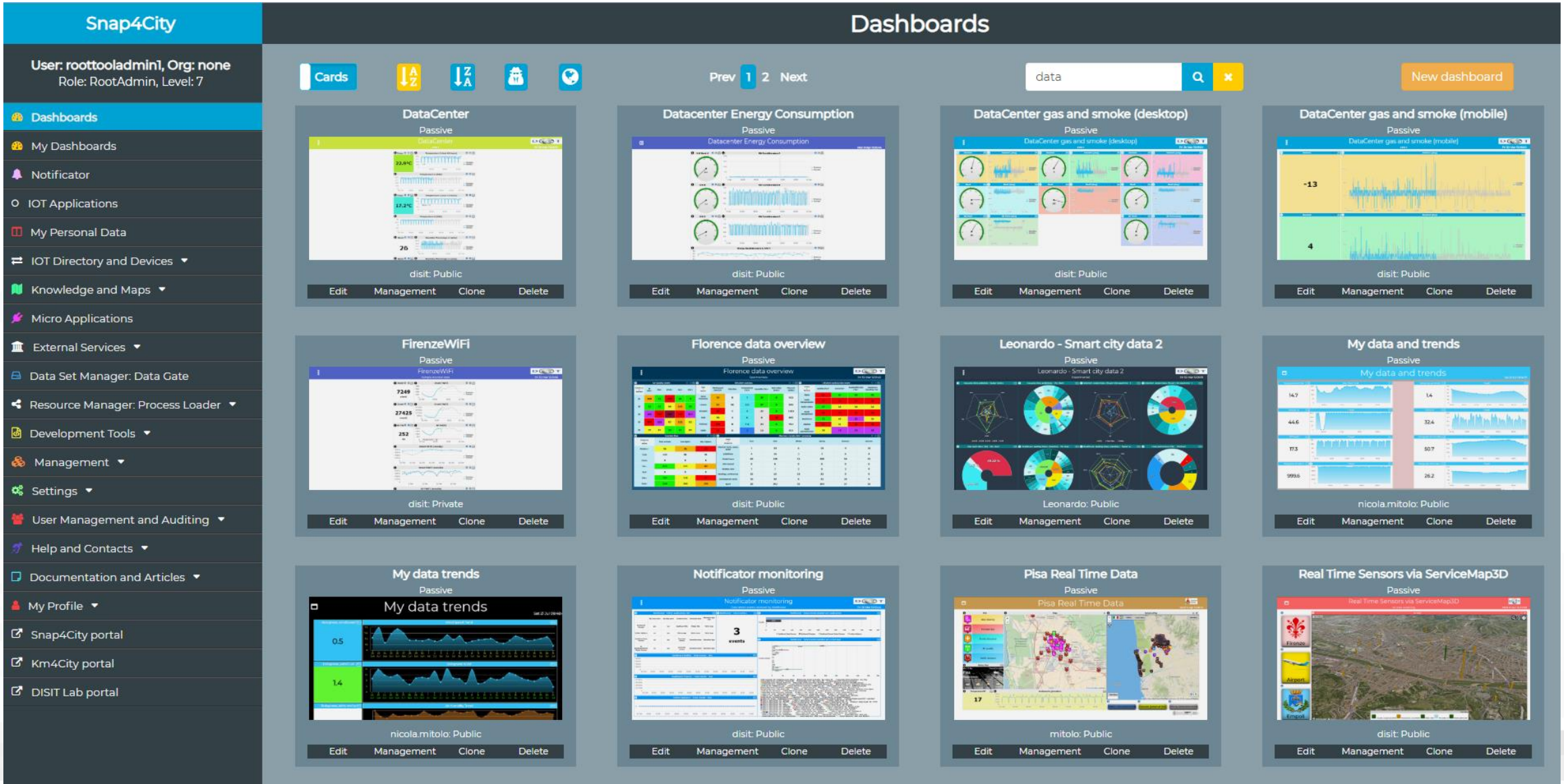
TOP

Dashboard Management



Dashboards List, Manage, Share, Delegate, Clone, …

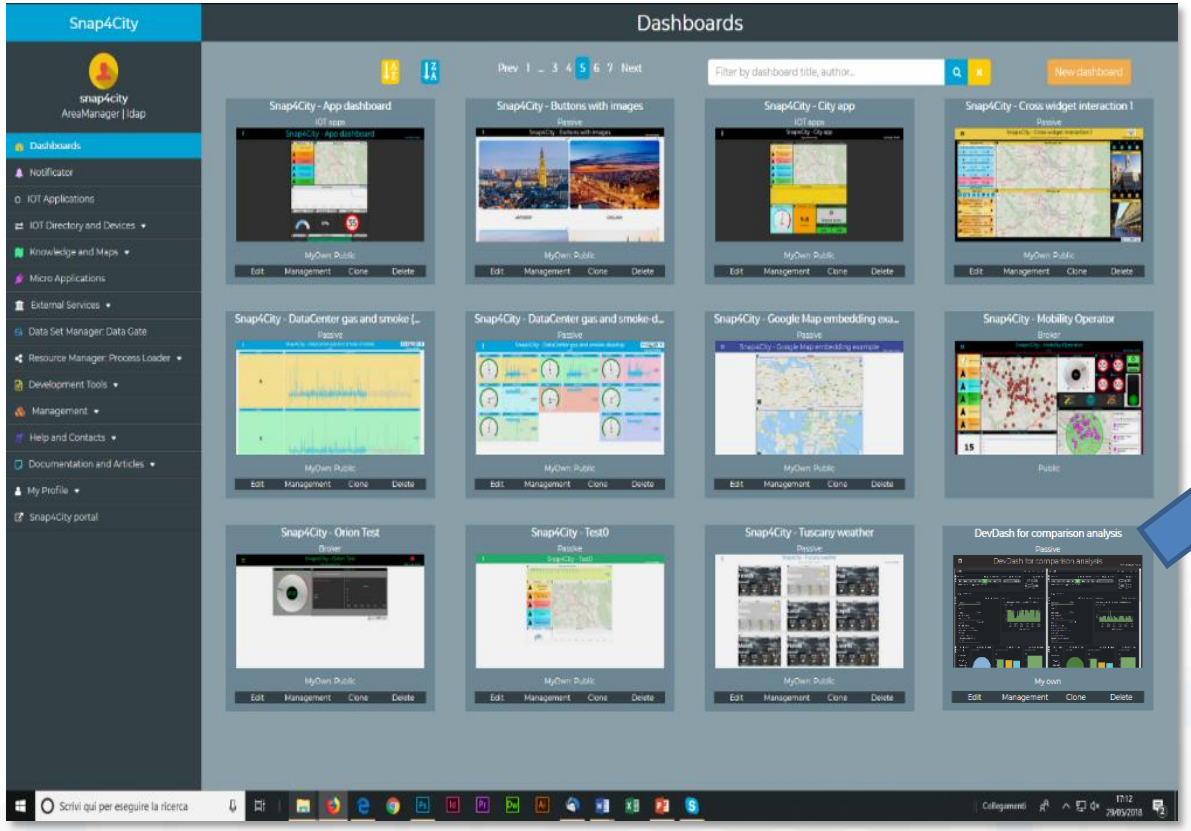
Dashboard List and Editor

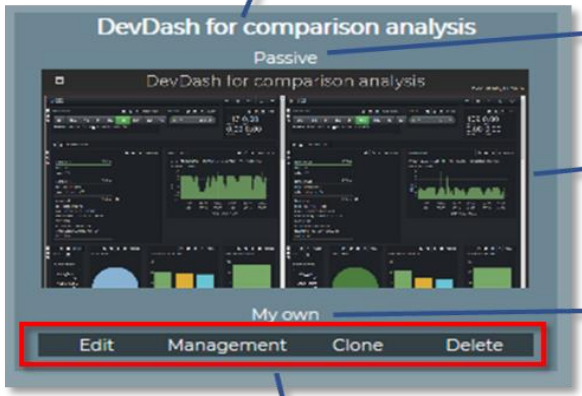


Clone Dashboard

- Cloned: Same dash with title having «- Cloned» at the end
  - You can: Clone, change name, pass to your colleague, edit, etc.
- Be carefull that exploited resources are not cloned

Dashboard Listing and Features





Dashboard Title

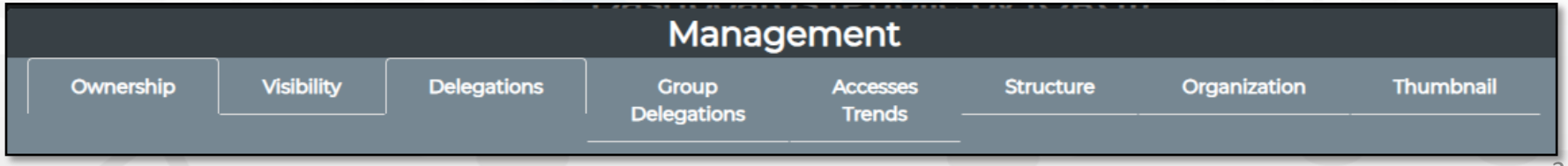
Dashboard Type

Dashboard Preview (click to open the dashboard in view)

Ownership

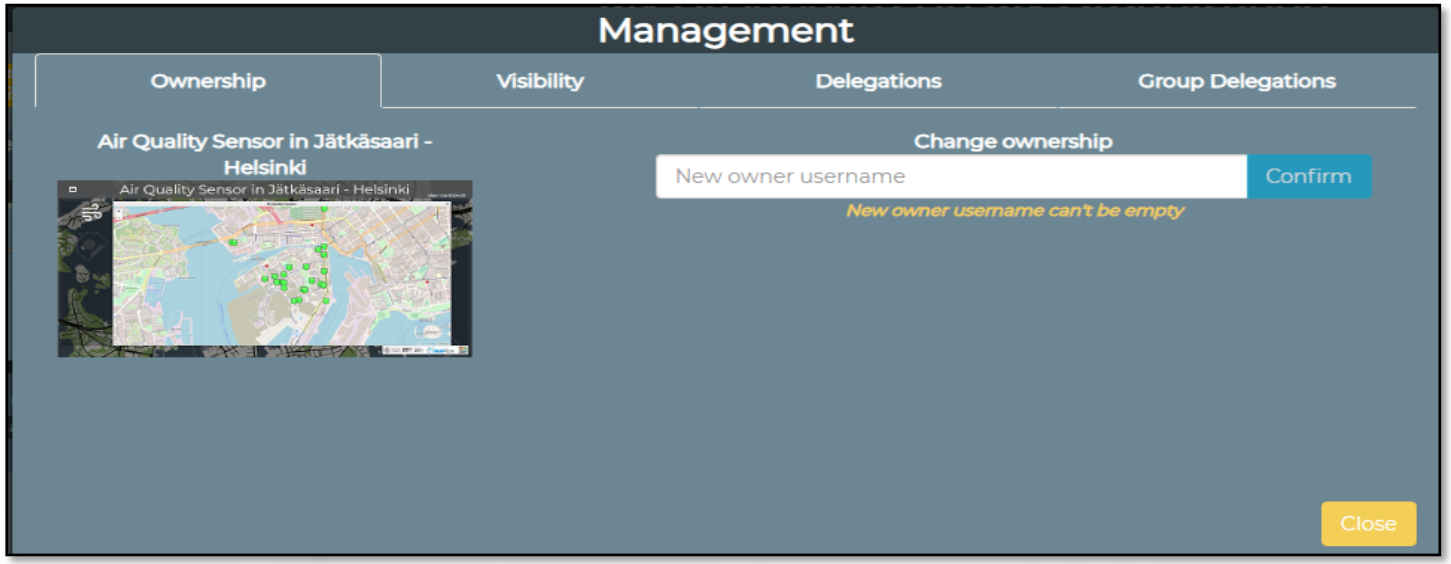
Additional actions (only for the dashboard owner)

- Edit (open Dashboard Builder)
- Management
- Clone (clone the Dashboard)
- Delete (delete the Dashboard)



Dashboard Management

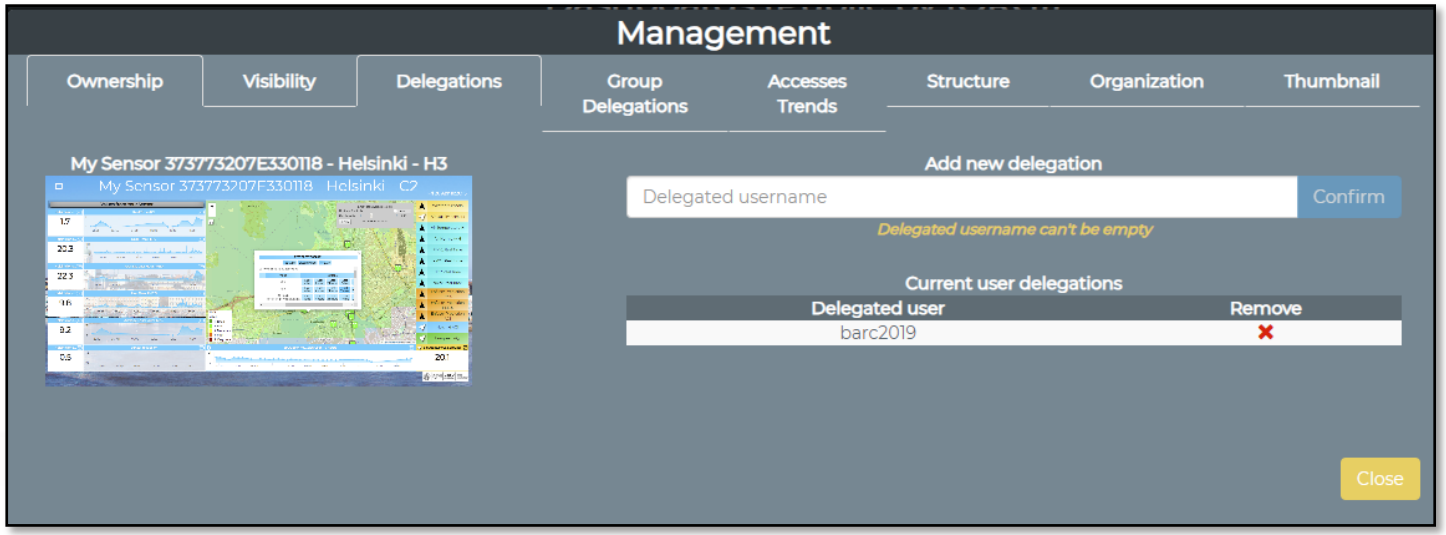
- **Change Ownership**
  - Towards any user
  - Knowing the nickname



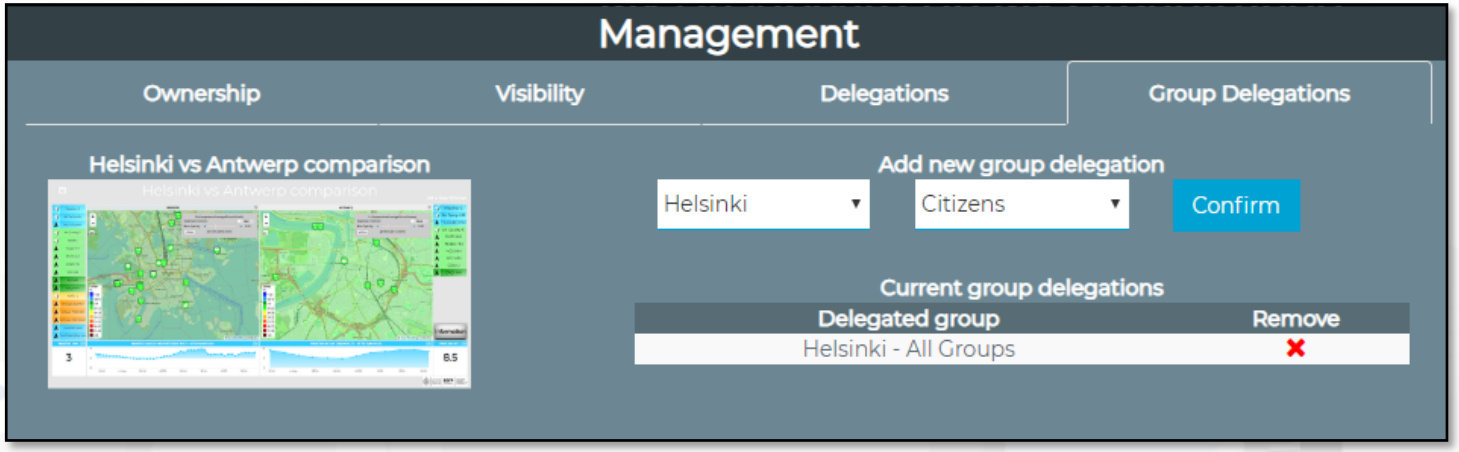
- Visibility
  - **Public or Private**
  - please note that data has to be published as well to make them accessible

Dashboard Management

- **Delegation** access to other **users**
  - See next example

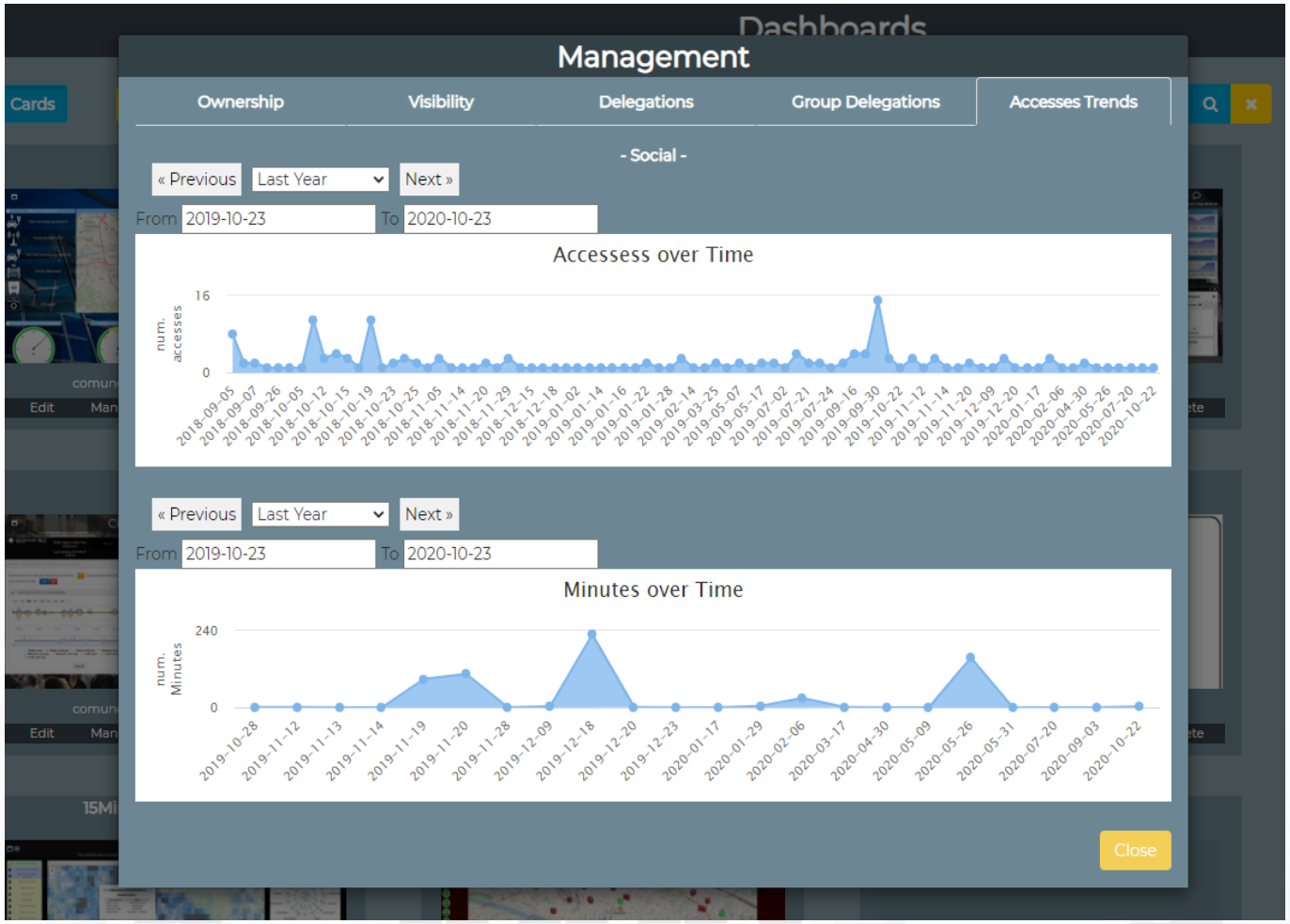


- **Delegation** Access to other **Groups** [Higher roles cross **Organization**]
  - See next example



Monitoring Dashboard Usage

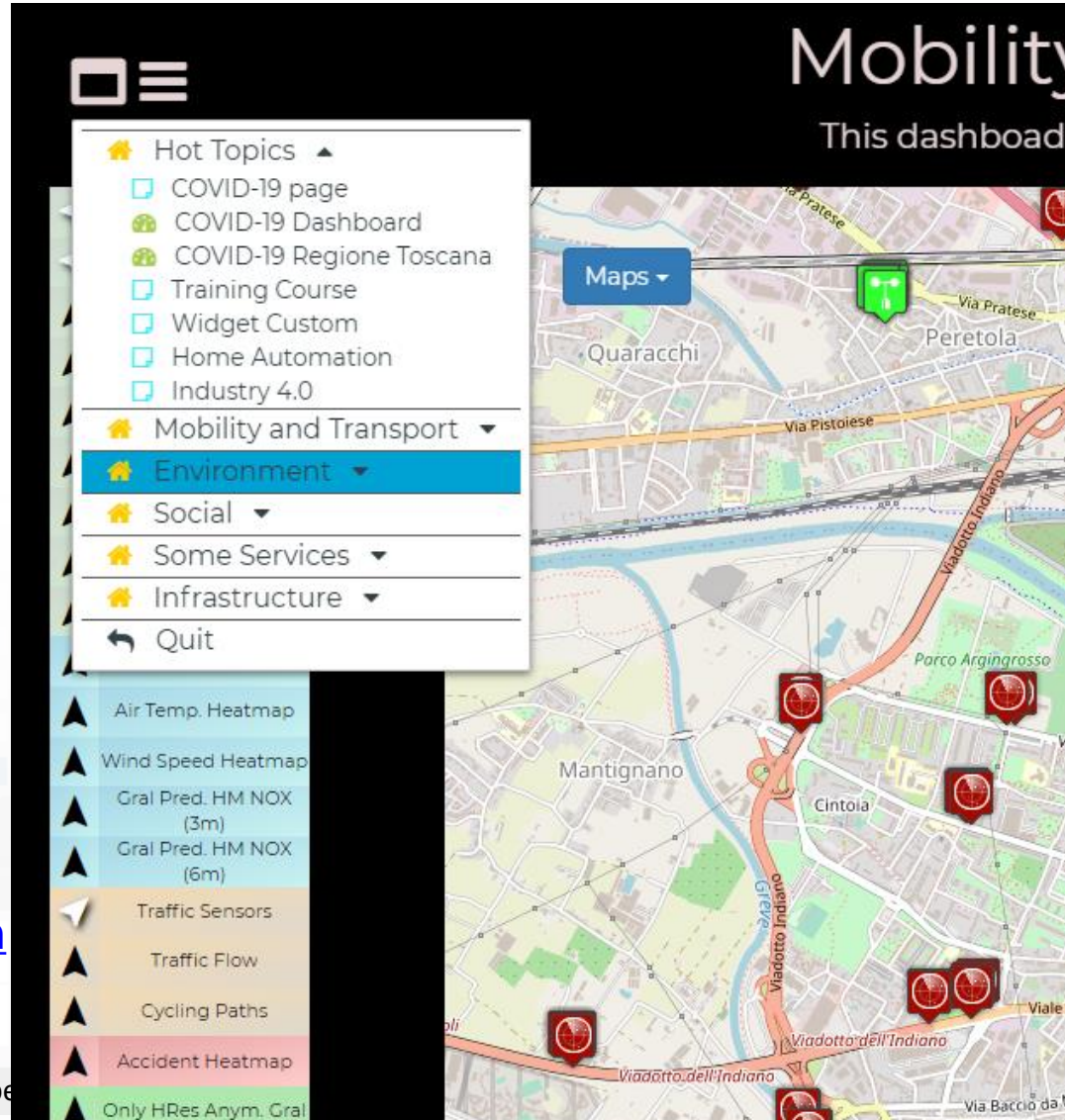
- **Key Performance Indicators**
  - Number of Accesses
  - Minutes of exposition
- **Time Periods:**
  - Day by Day
  - Week by Week
  - Month by Month
  - 6 months by 6 months
  - Year by Year



The Organization and its Dashboard menu

Dashboard Menu a Short Cut for other…..

- **Each Organization** on Snap4City may define its own Menu on Dashboards
  - The Menu can be activated or not in each single Dashboard of the ORG
- **Definition includes a** list of Items and Subitems, each of which with
  - colors & icons
  - Links to web pages/dashboards to be activated and modality
  - User Roles at which it has to be proposed
  - Etc.



TC 1.23 – Dashboard Menu management per Organization

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

UNIVERSITÀ DEGLI STUDI FIRENZE

DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE

DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB DISTRIBUTED DATA INTELLIGENCE AND TECHNOLOGIES LAB

Mixt per Roma

SNAP4CITY KM4CITY

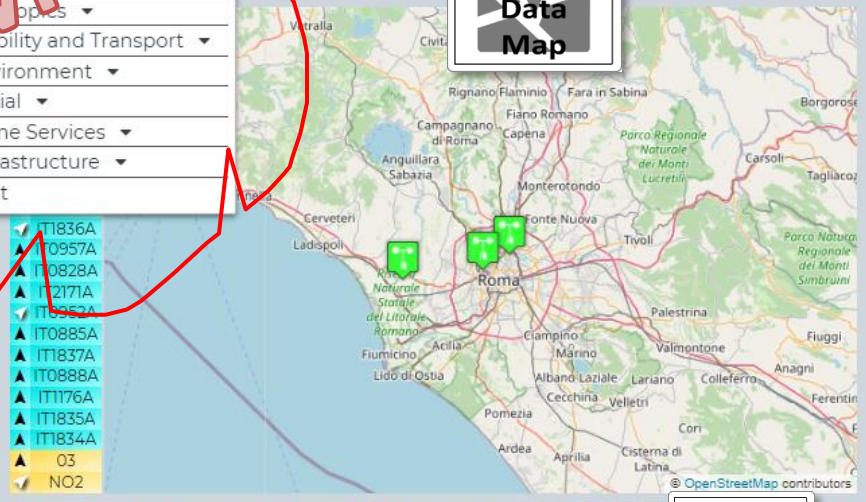
MENU

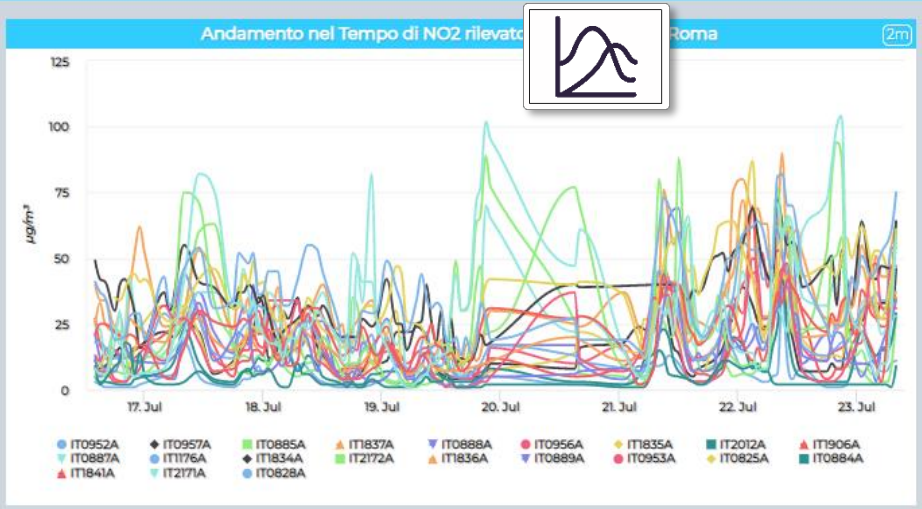
Roma Demo3 (Qualità dell'Aria)

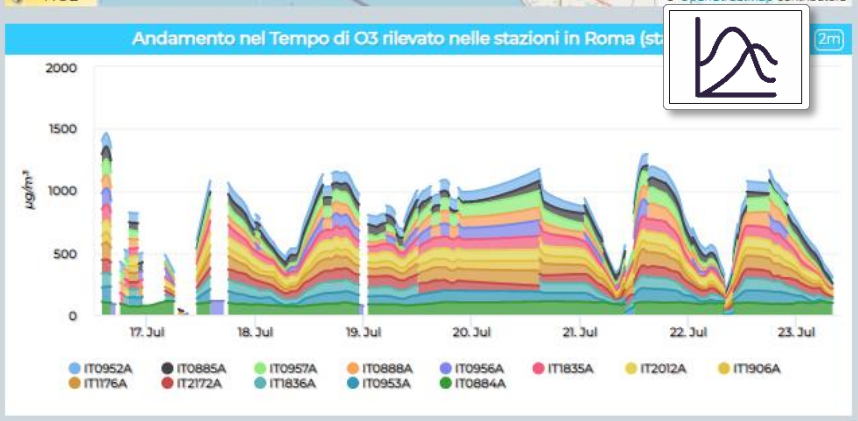
Thu 23 Jul 13:35:09

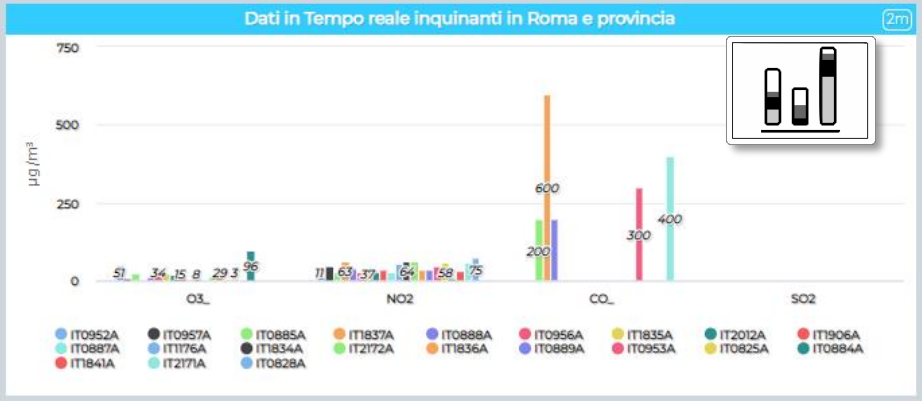
- Mobility and Transport
- Environment
- Social
- Some Services
- Infrastructure
- Quit

Multi Data Map









Valori Inquinanti in tempo reale, mappe 2m

value type / value name	O3_	NO2	CO_	SO2
IT0952A	51	11		
IT0957A	7	46		
IT0885A	25	29	200	
IT1837A		63	600	
IT0888A	11	37	200	
IT0956A	34	29		
IT1835A	24	37		
IT2012A	20	29		
IT1906A	15	34		
IT0887A		28		
IT1176A	8	54		
IT1834A		64		
IT2172A	15	61		
IT1836A	29	35		
IT0953A	3	47	300	1.3
IT0889A		34		
IT0825A		58		
IT0884A	96	9		
IT1841A		31		
IT2171A		57	400	
IT0828A		75		

Home Trasporti

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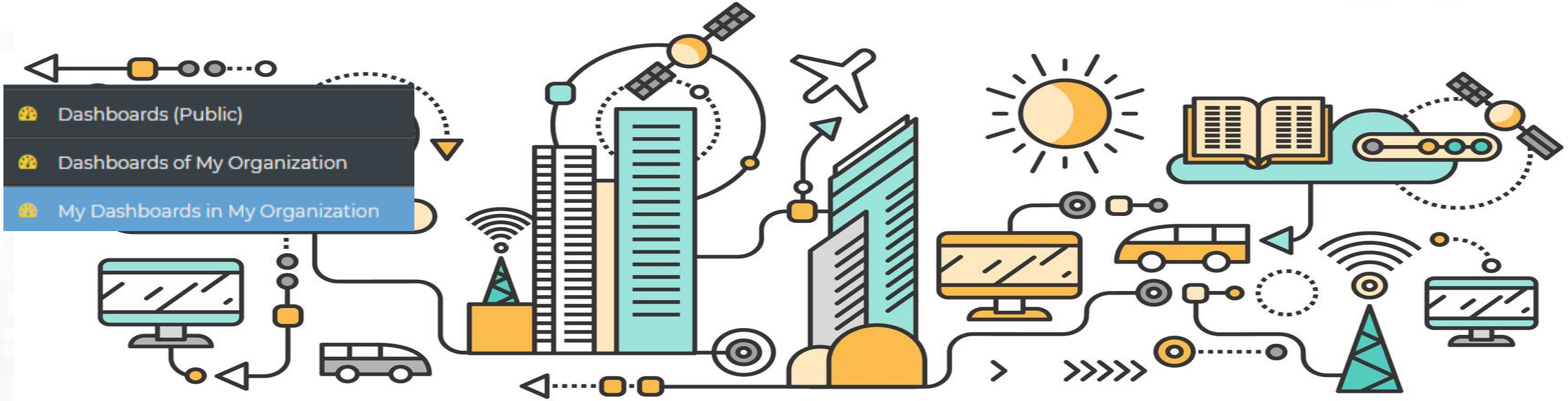
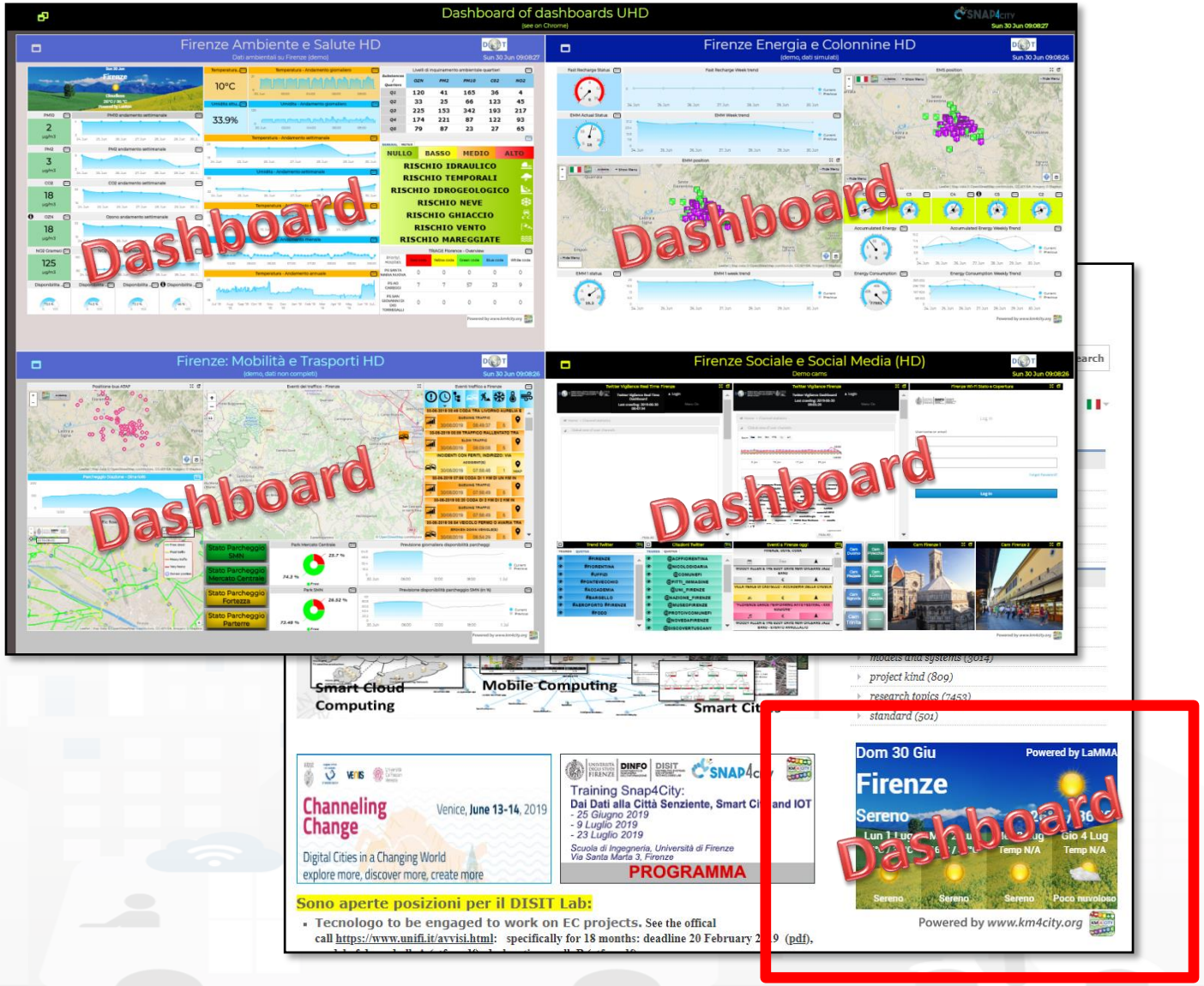
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjcyNg==

Dashboard Embedding into third party Web Sites/pages



Additional Properties from Edit Dashboard

- **Embedding Dashboards into**
  - a Dashboard
  - third Party Web Page
- **Header** or not
- **Footer** or not
- **Responsive** or not
- **Size**: any
- **Background** Image: any
- Add / change Screenshot (**Thumbnails**)
- **Menu** on left upper corner or not

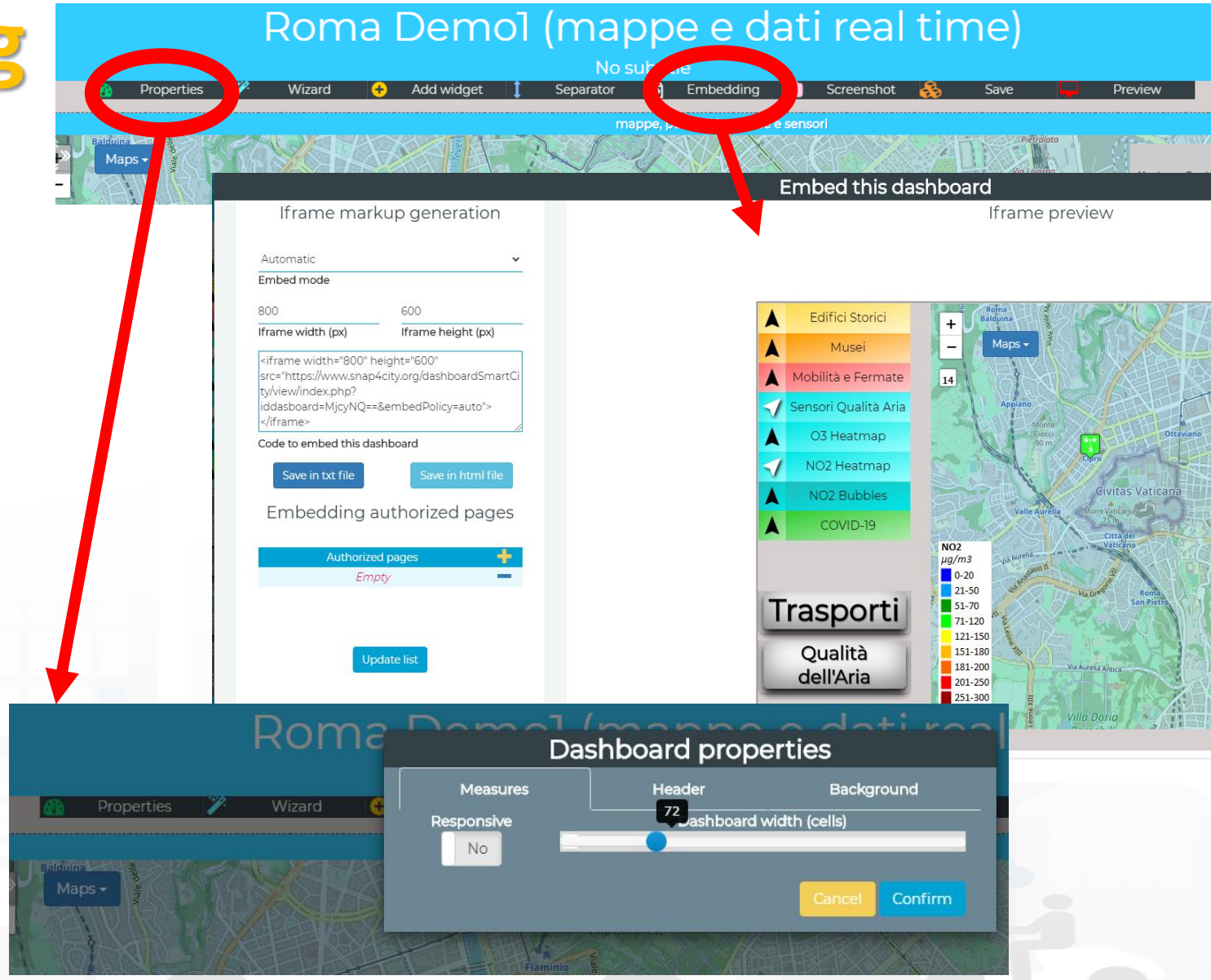


Exmaple of Dashboard without header

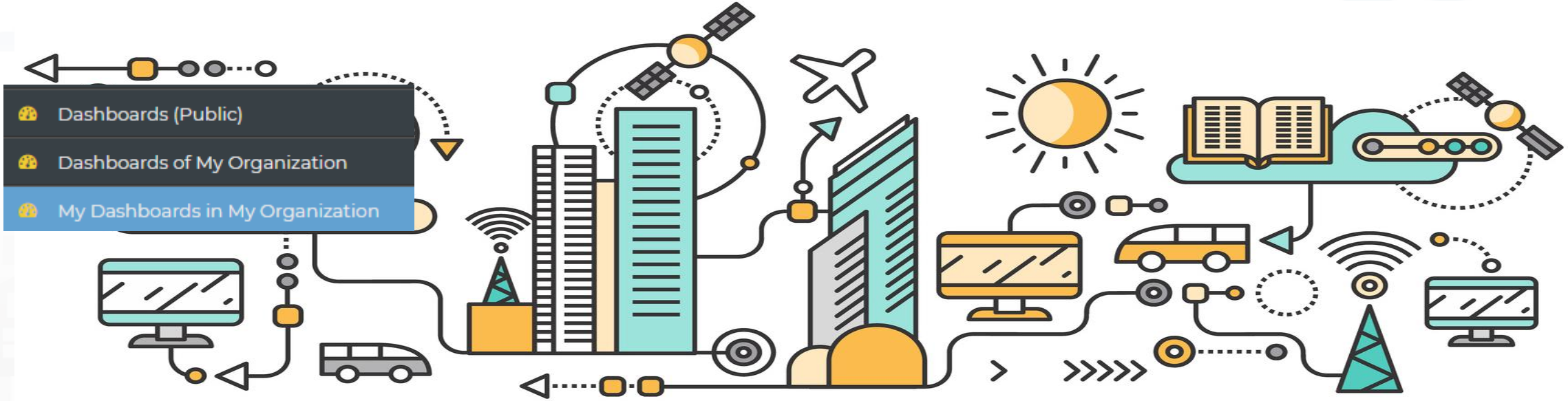
- To embed a dashboard without the header you can use the command
  - https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzMxNw==&embedPolicy=auto
  - embedPolicy can be: auto | manual
- Then:
  - header will be hiddend
  - footer will be reduced to the logo only, centered in the view

Dashboard Embedding

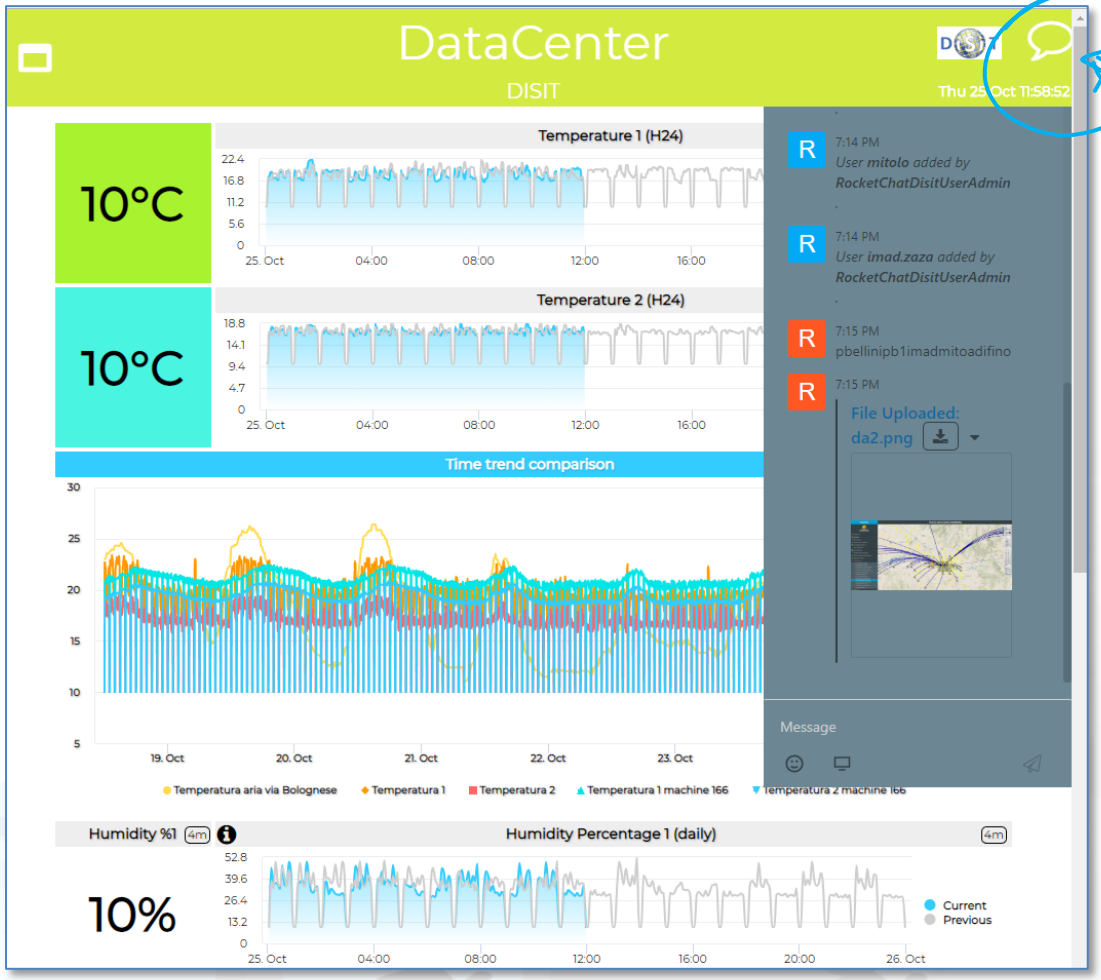
- go in Dashboard Edit
  - Get code for embedding
  - Providing domain on which you embed
  - See Iframe preview
- **Dashboard properties**
  - we suggest set Responsive
  - deciding on header On Off
  - Adjust size of Iframe and dashboard for tuning



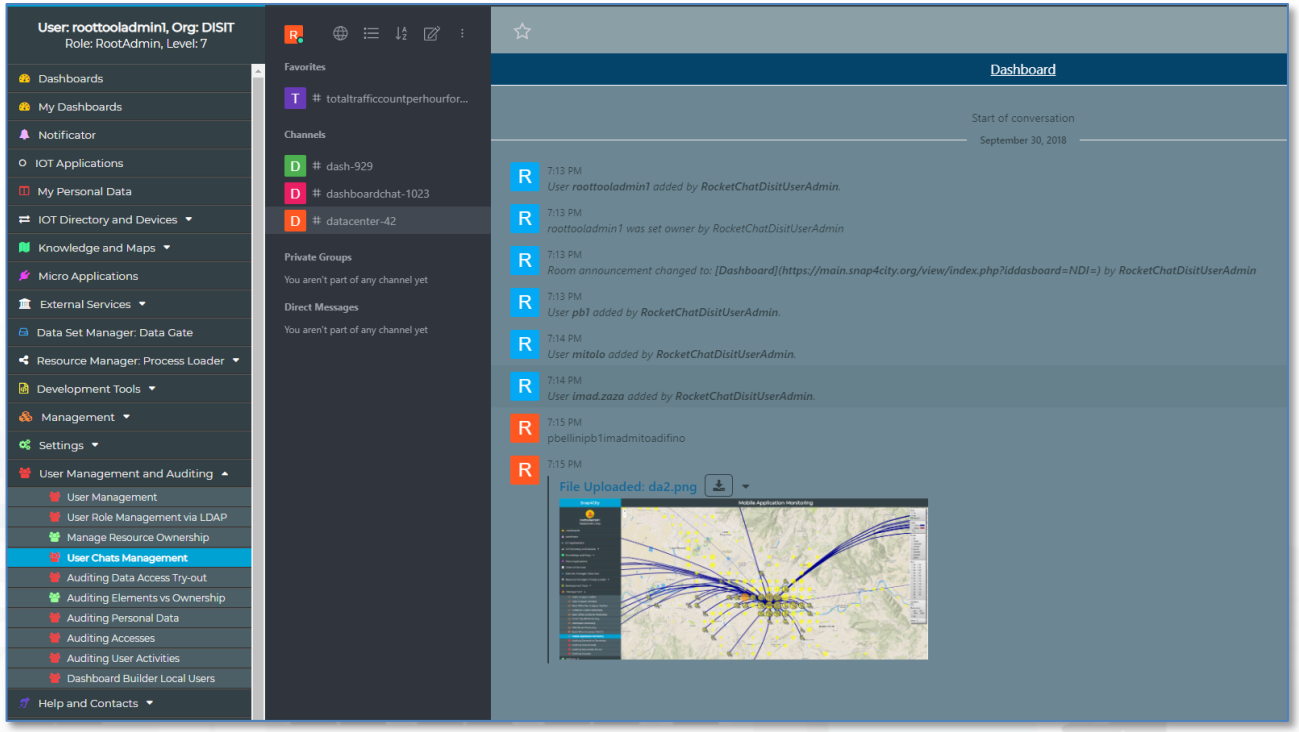
Private Dashboard ChatRoom



Private ChatRoom per Dashboard



Chat Management



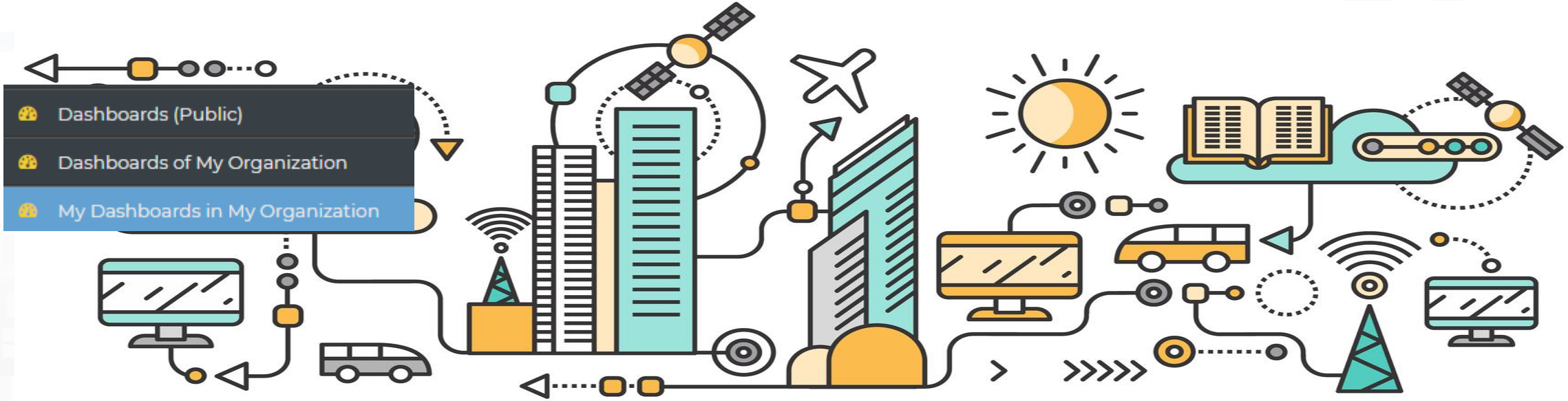
Chat Rooms

- **Activated** by the Dashboard creator which can invite a number of users of the platform to
  - Exchange Comments and Pictures
  - access on web and mobile
  - provoke notifications
- Accessible only under authentication
- The administrator can access to the log for review and log of the discussions.
- Chat Room capability is available as an additional appliance

Dashboard Chat Rooms

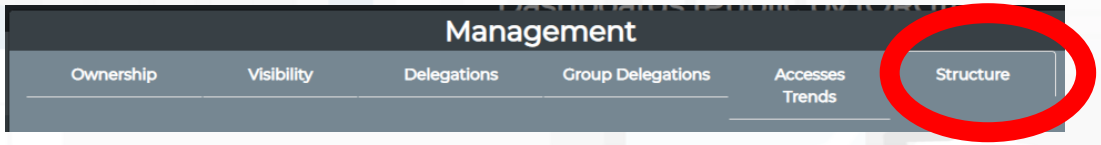
- Each Dashboard may have only **one separate ChatRoom**
- The Dashboard Owner can
  - Activate the Chat Room on Dashboard header in Edit
  - Add users of the platform to the chat room
- The **Chat** Room
  - Allows to Exchange Comments and Pictures
  - Can be Accessed on web and mobile
  - May Provoke notifications on the header of the Dashboard
  - Is accessible only under authentication
- The Administrators can access to the Log for review of the discussions

Dashboard Structure

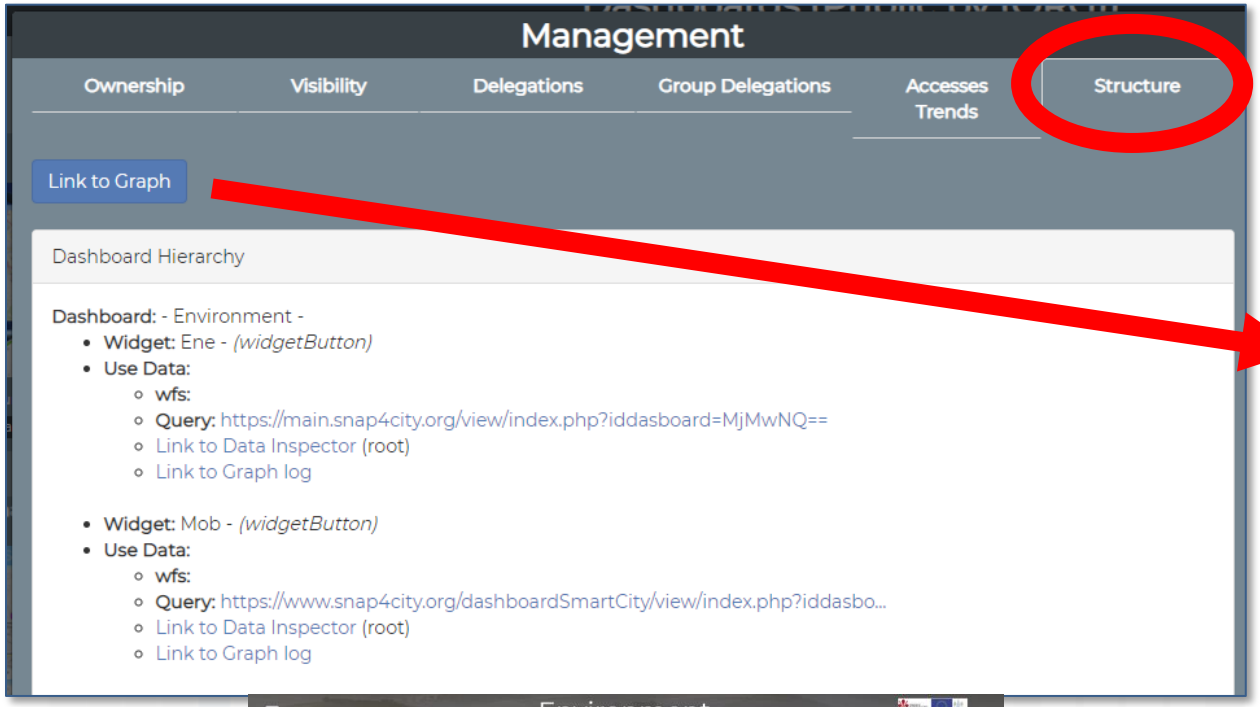


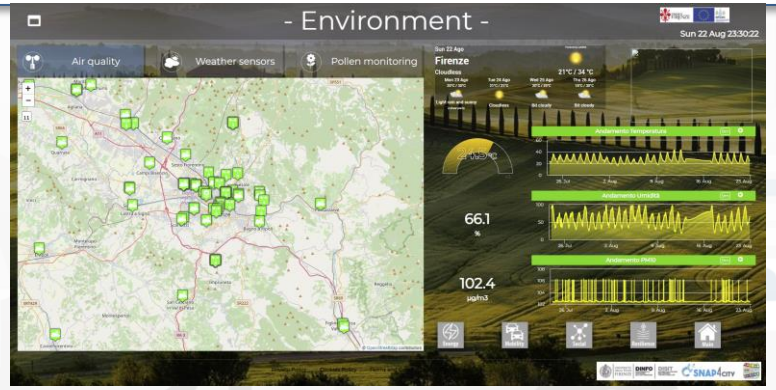
Dashboard Structure

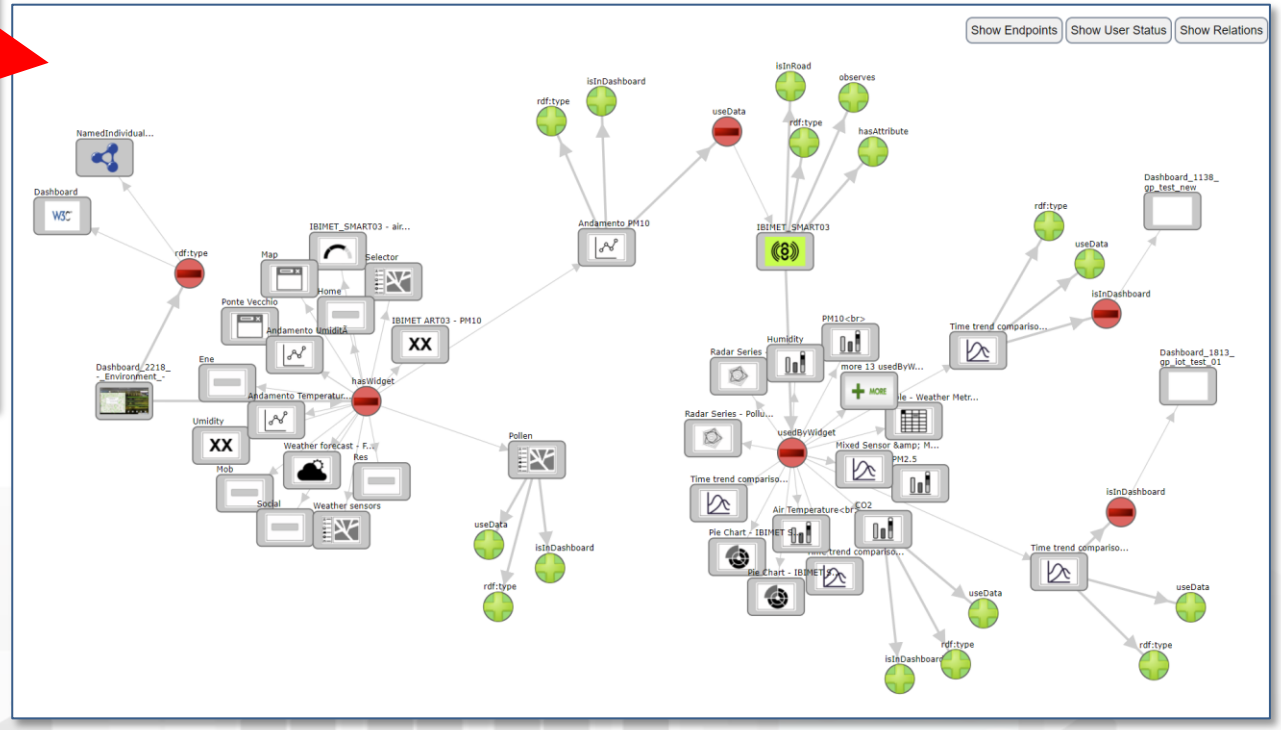
- **For each Dashboard** (Nane, ID, ORG, Users, etc..) you can have
  - W number of widgets
    - For each Widget
      - Name,
      - A data (1 …N)
  - I number of IoT Applications
    - ….
- **Thus:**
  - Different Dashboards may share the same data
  - Different Widgets in different Dashboards may share the same data…
  - Critical courses,….. More relevant data….
- **Access from Dashboard Management**



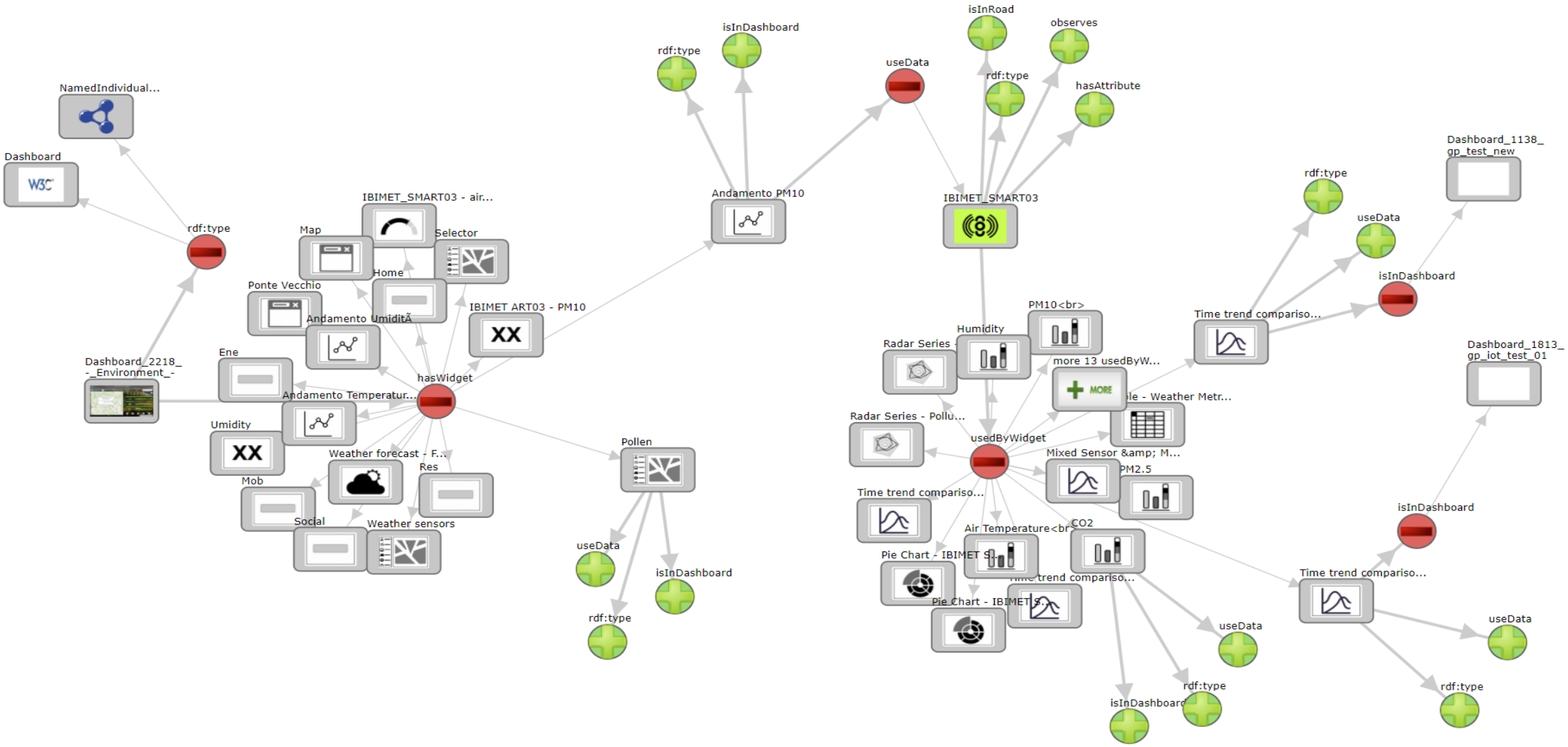
Dashboard Management: Graph of Smart Application







Show Endpoints | Show User Status | Show Relations

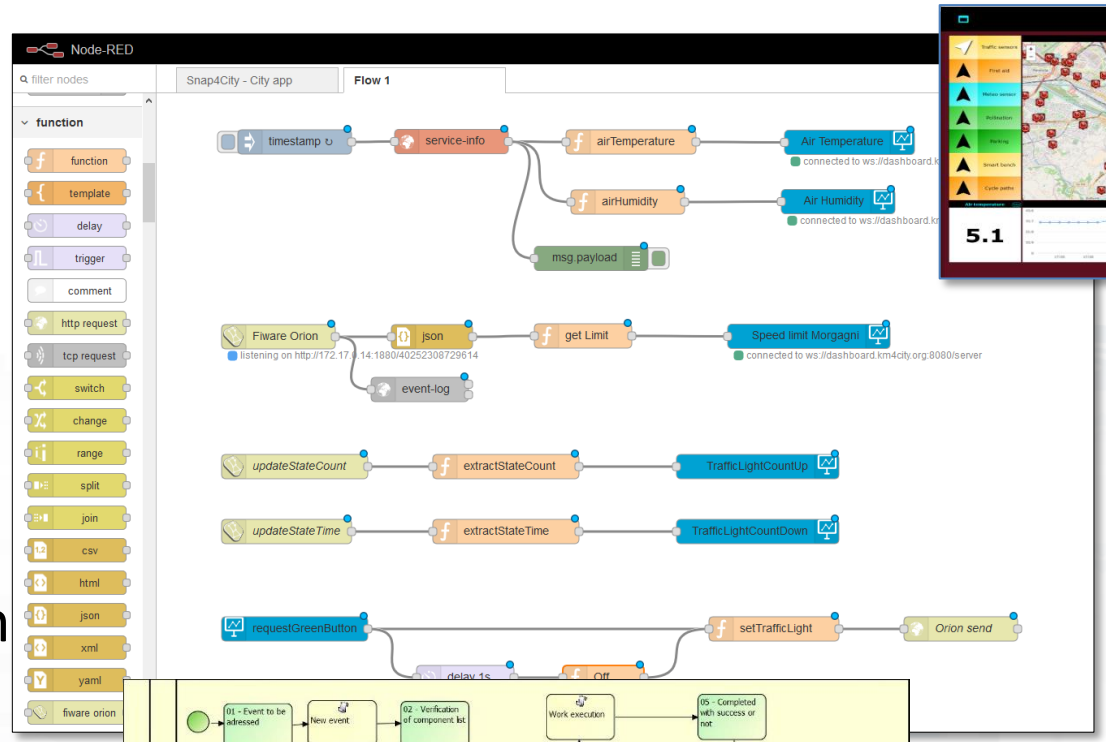


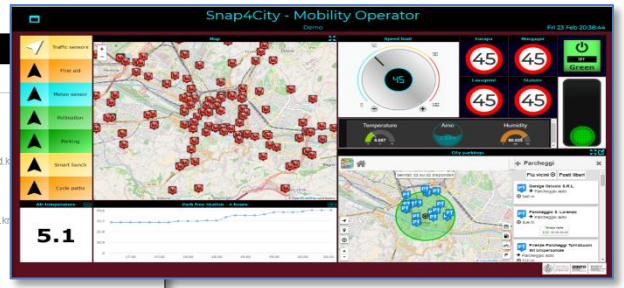
Notifications from Dashboard and from any Data Condition

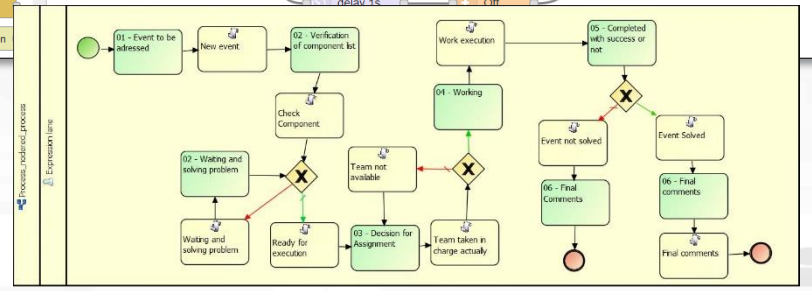
Smart City Monitoring: notifications, alerting

Notification with IOT App may

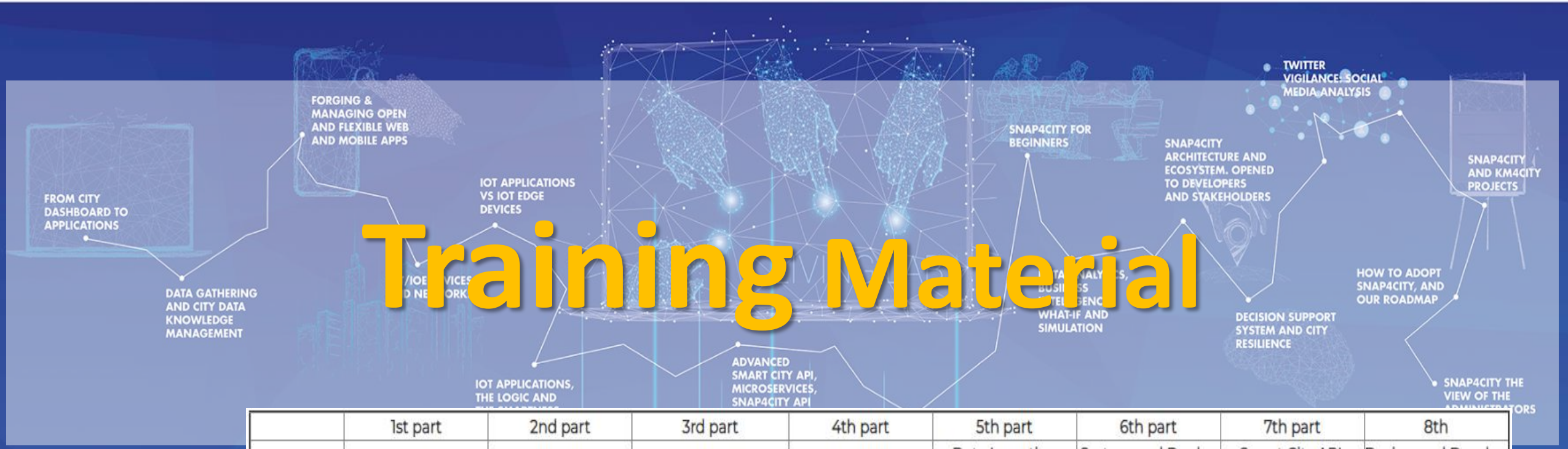
- Fire on any kind of condition exploiting on IOT App logic
- produce messages/events on
  - **Facebook, Telegram,**
  - **SMS, MMS, IOT Devices, ..**
  - **email, LOGS, FTP, ..**
  - **dashboards**, mobiles, …
  - **Workflow/incident** managem system for **ticketing**
  - **video wall** management,
  - **Video Management System** Milestone
  - etc. etc.







facebook



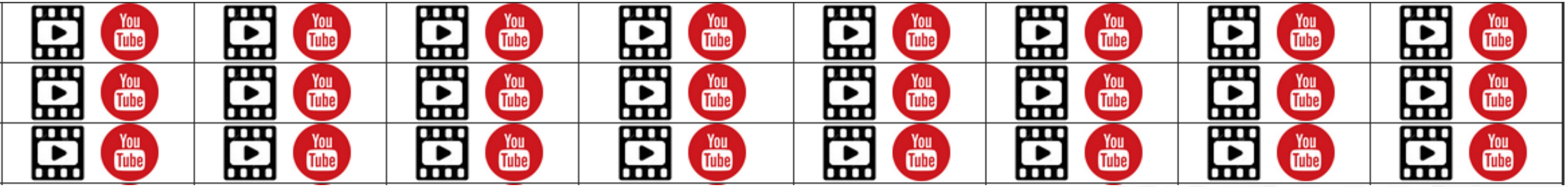
Training Material

	1st part	2nd part	3rd part	4th part	5th part	6th part	7th part	8th
what	Overview	Dashboards	IOT App, IOT Network	Data Analytics	Data Ingestion processes	System and Deploy Install	Smart City API: Web & Mob. App	Design and Develop Smart Solutions
PDF 2022								
Interactive (2022) with video and animations								

https://www.snap4city.org/944

On Line Training Material (free of charge)

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



Note on Training Material

- **Course 2023**: https://www.snap4city.org/944
  - Introductionary course to Snap4City technology
- **Course** https://www.snap4city.org/577
  - Full training course with much more details on mechanisms and a wider set of cases/solutions of the Snap4City Technology
- **Documentation** includes a deeper round of details
  - Snap4City Platform Overview:
    - https://www.snap4city.org/drupal/sites/default/files/files/Snap4City-PlatformOverview.pdf
  - Development Life Cycle:
    - https://www.snap4city.org/download/video/Snap4Tech-Development-Life-Cycle.pdf
  - Client Side Business Logic:
    - https://www.snap4city.org/download/video/ClientSideBusinessLogic-WidgetManual.pdf
- **On line cases and documentation**:
  - https://www.snap4city.org/108
  - https://www.snap4city.org/78
  - https://www.snap4city.org/426

Dashboards (Public)

My Snap4City.org | Tour Again

www.snap4solutions.org
Dashboards of My Organization
My Dashboards in My Organization
My Data Dashboard Dev Kibana
Extra Dashboard Widgets
Data Management, HLT
Knowledge and Maps
Processing Logics / IOT App
Entity Directory and Devices
Resource Manager
Development Tools
Management
Decision Support Systems
Deploy and Installation
Help and Contacts
Documentation and Articles

Snap4City: Smart aNalytic APp builder for sentient Cities and IOT

You can't delete this newsletter because it has not been sent to all its subscribers.

- TECHNICAL OVERVIEW: https://www.snap4city.org/download/video/Snap4City-PlatformOverview.pdf
- Development Life Cycle: https://www.snap4city.org/download/video/Snap4Tech-Development-Life-Cycle.pdf
- Client-Side Business Logic Widget Manual: https://www.snap4city.org/download/video/ClientSideBusinessLogic-WidgetManual.pdf
- Booklet Data Analytics Snap4Solutions: https://www.snap4city.org/download/video/DRL_SNAP4SOLU.pdf

Username: paolo.disit

Search

Search

-Any-

Training on Tools and Platform

Powered by www.km4city.org

FIWARE Node-RED

Sii-Mobility

Organization Groups

DISIT
- Developer
- Operativo

Updates on

2023 booklets

- Smart City

https://www.snap4city.org/download/video/DPL_SNAP4CITY.pdf

- Industry

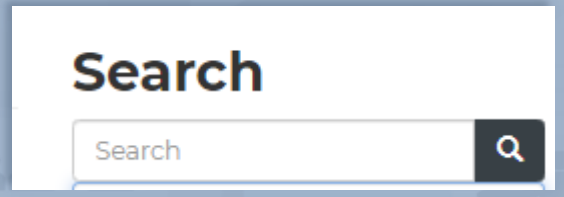
https://www.snap4city.org/download/video/DPL_SNAP4INDUSTRY.pdf

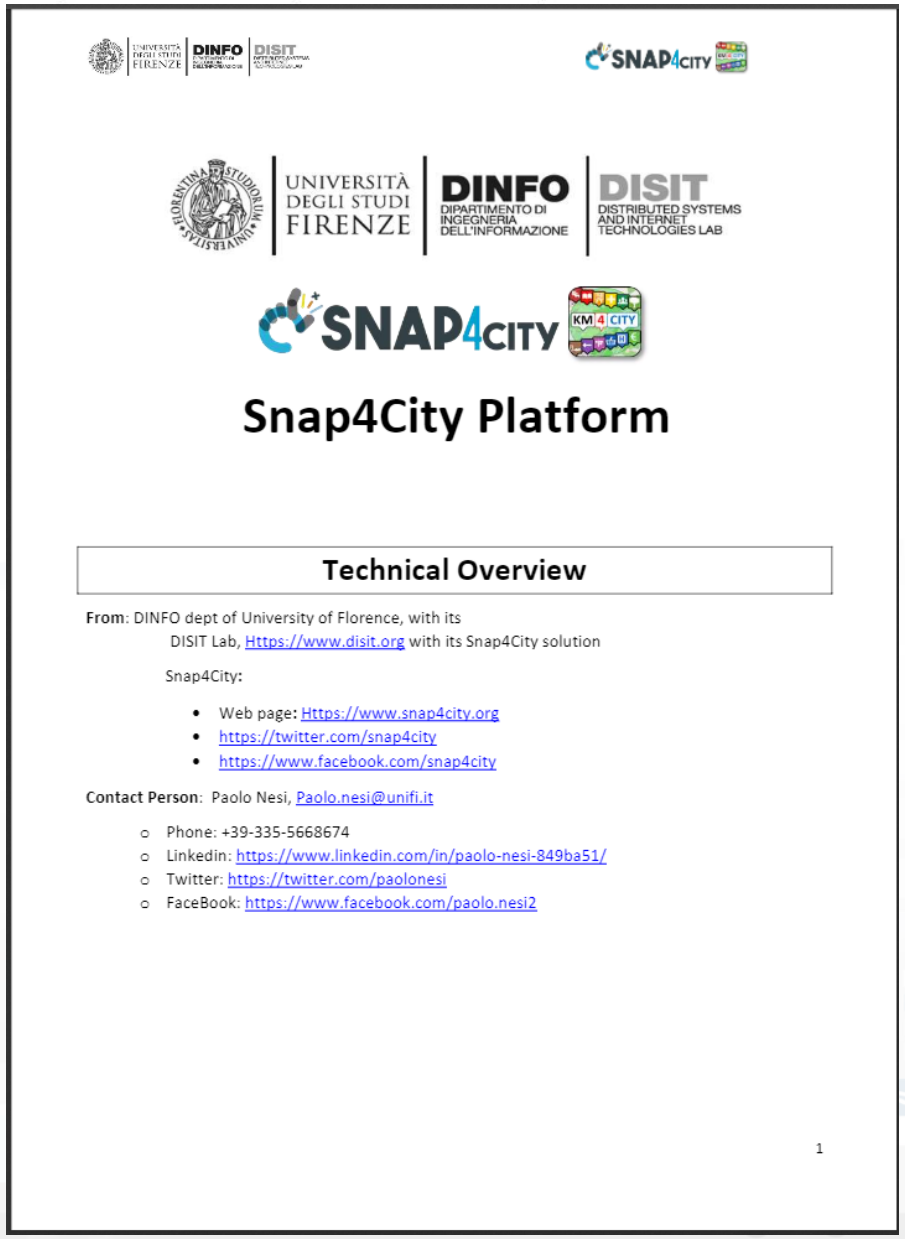
- Artificial Intelligence

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

The Platform

- **Free Registration on Snap4City.org**
  - Please select DISIT ORG to be sure to access at the examples
  - Most of the cities / tenant are private and they do not left much visible
- **What you get** is probably the 10% of what is on the platform ☺
- **Training**: https://www.snap4city.org/577
- **Scenarious**: https://www.snap4city.org/4
- **Publications**: https://www.snap4city.org/426
- **WEB pages**: https://www.snap4city.org/78
- ***SEARCH on the right side***





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

SNAP4CITY

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

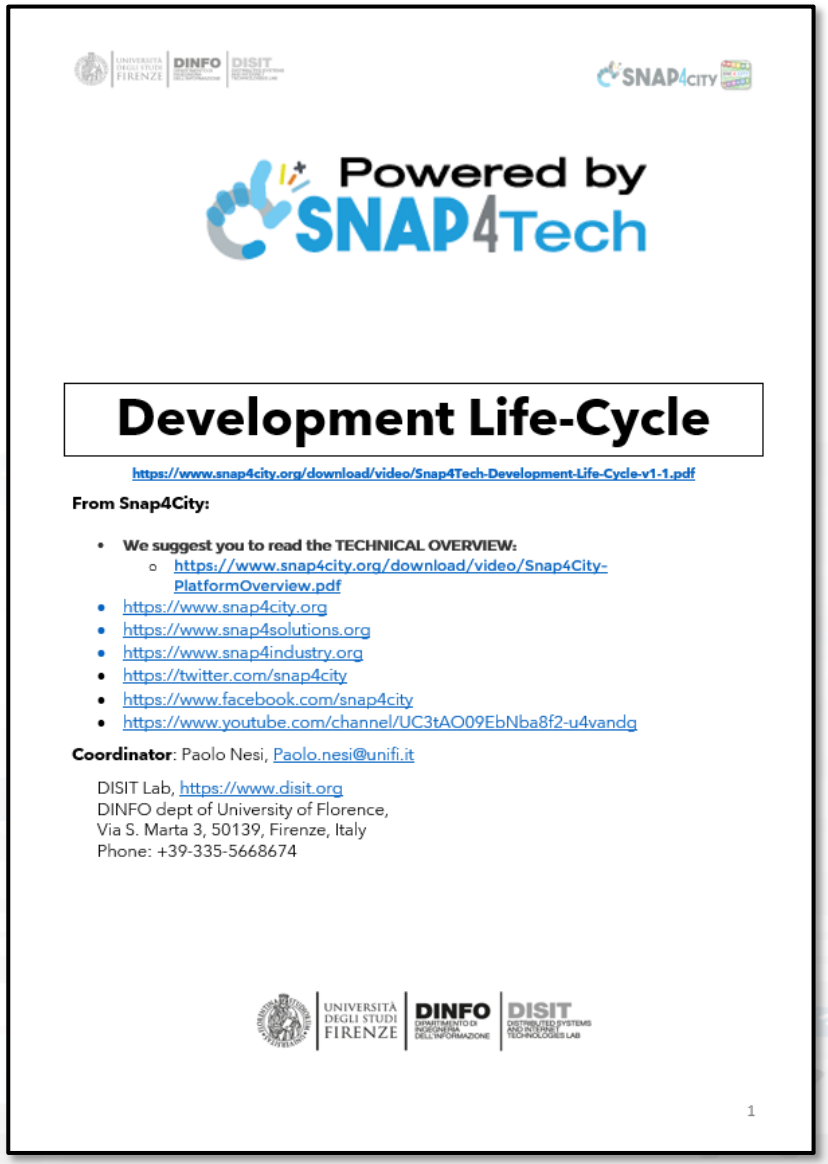
- Phone: +39-335-5668674
- Linkedin: https://www.linkedin.com/in/paolo-nesi-849ba51/
- Twitter: https://twitter.com/paolonesi
- FaceBook: https://www.facebook.com/paolo.nesi2

1

Tech Overview

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

Development



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Development Life-Cycle

https://www.snap4city.org/download/video/Snap4Tech-Development-Life-Cycle-v1-1.pdf

From Snap4City:

- **We suggest you to read the TECHNICAL OVERVIEW:**
  - https://www.snap4city.org/download/video/Snap4City-PlatformOverview.pdf
- https://www.snap4city.org
- https://www.snap4solutions.org
- https://www.snap4industry.org
- https://twitter.com/snap4city
- https://www.facebook.com/snap4city
- https://www.youtube.com/channel/UC3tAO09EbNba8f2-u4vandg

Coordinator: Paolo Nesi, Paolo.nesi@unifi.it

DISIT Lab, https://www.disit.org
DINFO dept of University of Florence,
Via S. Marta 3, 50139, Firenze, Italy
Phone: +39-335-5668674

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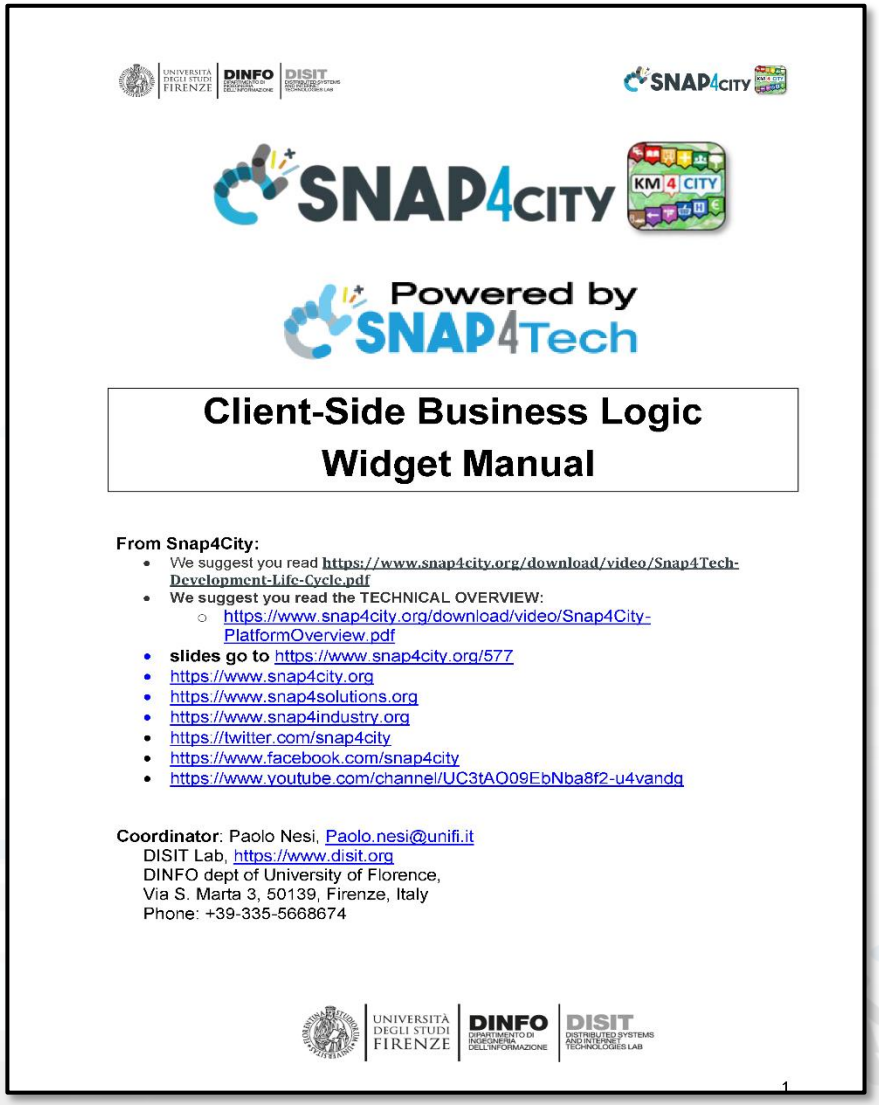
https://www.snap4city.org/download/video/Snap4Tech-Development-Life-Cycle.pdf

Client Side Business Logic



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Client-Side Business Logic Widget Manual

From Snap4City:

- We suggest you read **https://www.snap4city.org/download/video/Snap4Tech-Development-Life-Cycle.pdf**
- **We suggest you read the TECHNICAL OVERVIEW:**
  - https://www.snap4city.org/download/video/Snap4City-PlatformOverview.pdf
- **slides go to** https://www.snap4city.org/577
- https://www.snap4city.org
- https://www.snap4solutions.org
- https://www.snap4industry.org
- https://twitter.com/snap4city
- https://www.facebook.com/snap4city
- https://www.youtube.com/channel/UC3tAQ09EbNba8f2-u4vandg

Coordinator: Paolo Nesi, Paolo.nesi@unifi.it
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Phone: +39-335-5668674

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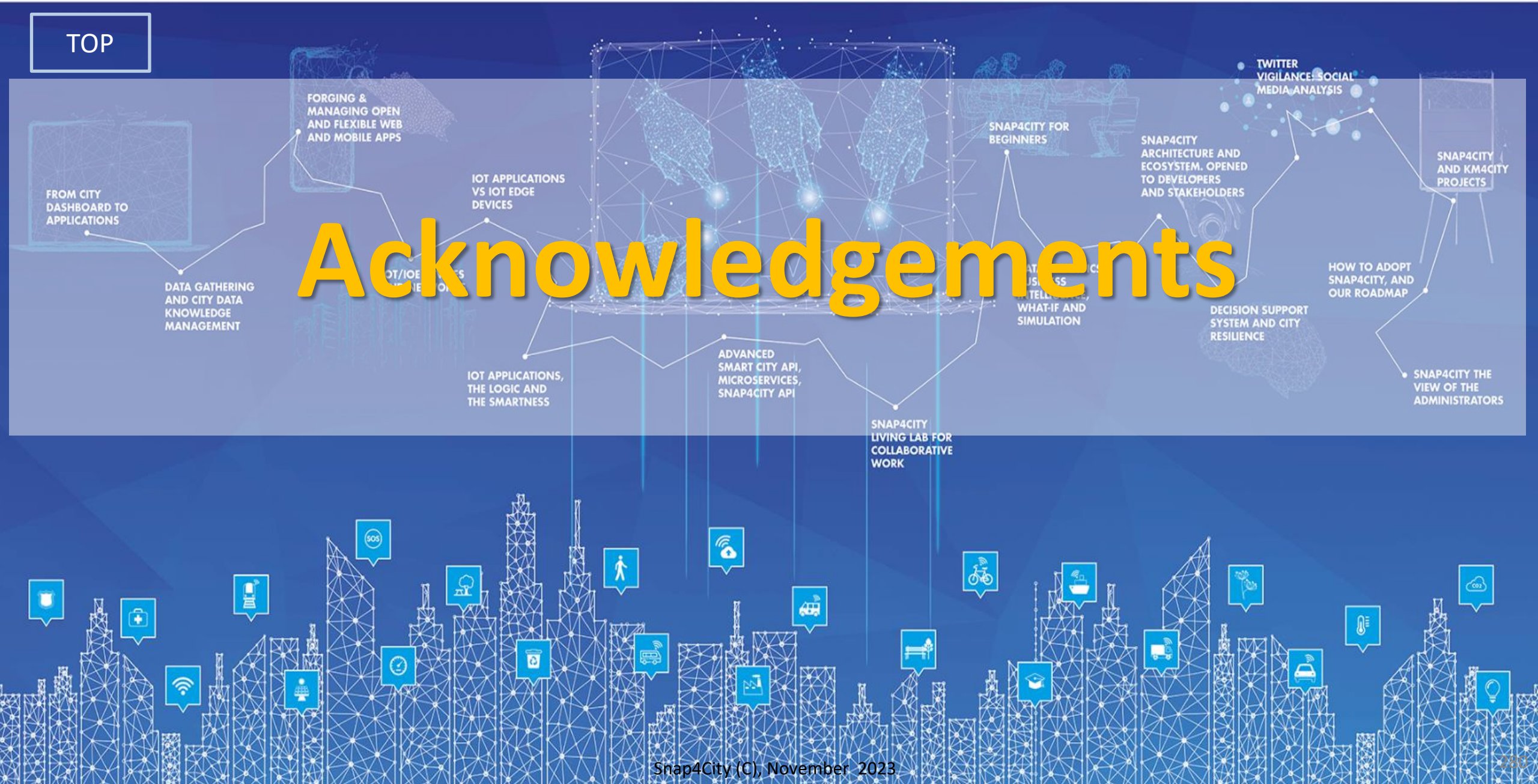
https://www.snap4city.org/download/video/ClientSideBusinessLogic-W

df

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



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

- 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

2017
Sii-Mobility

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

E015 digital ecosystem (Powered by EXPO MILANO 2015)

(2016-19) MIUR

GHOST SIR

IOT/IOE

Km4City 1.6.6

Node-RED

SNAP4CITY SELECT for Cities H2020 (2017-19)

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

life weee (2017-20)

- Smart Waste

MOSAiC Mobility 4.0 for SmArt (i) City (POR CreO, Regione Toscana) (2018-20)

- Mobility Demand / Offer Analytics and Strategy

2018
Sii-Mobility

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

5G (2018-21)

5G tech
Energy
Industry 4.0
Synoptics

TRAFAIR

CEF (2018-21)

- Traffic and Mobility Impact on Pollution
- NOX predictions

2019
EUROPEAN OPEN SCIENCE CLOUD

SIRIUS

LAID Smart Bed (POR CreO, Regione Toscana)

- Smart Health

GREEN FIELD PEAS Soda4.0 Optimization and Automated Decision System 4.0 (POR CreO, Regione Toscana)

- Industry 4.0

bee smart city

- Smart Lonato

Reverberi Enetec Gruppo MPES

SNAP4CITY SELECT for Cities — 1° place award to UNIVERSITY OF FLORENCE - DEPARTMENT OF INFORMATION ENGINEERING — SNAP4CITY

Winner of Select4Cities PCP

SNAP4CITY roadmap

SODA

2020

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

- Smart Mobility
- PISA, PUMS
- Living lab

smartGARDAlake

Km4City 1.6.7

Smart Ambulance (2021-22)

Enterprise (2021-22) Industry 4.0

Sii-Mobility

enel x Contract

JRC EUROPEAN COMMISSION

2021

PC4City (2020-21) Monitoring Terrain

Winner of Open Data Challenge of enel x

CAPELON

- Smart Light
- Sweden

Almafluida Industry 4.0 (2021-22)

AMPERE (2021-22) Industry 4.0

SYN-RG-AI SmartCity

GRUPPO PRETTO Industry 4.0

uni.systems SmartCity, 2021-23

AXIS COMMUNICATIONS AXIS collab SmartCity

2022

ASYMMETRICA URBAN TECHNOLOGY Asymmetrica Smart City, 2022-23

ITALFERR GRUPPO FERROVIE DELLO STATO ITALIANE Italferr, Smart City

JRC EUROPEAN COMMISSION Contract, 2022-23

2023

ART-ER ATTRATTIVITÀ RICERCA TERRITORIO Contract, 2022-23

Filippi 2022-2023

enel x Contract

IMPETUS Security and Risk

Smartea

CN MOST, 2022-26

EI THE, 2022-26

G. Agile, 2021-23

TUSCANY X.0 EDIH 2023-26

Merano, smart light

OceanRace, Genova, AWS

Cuneo, smart city

AMMIRARE

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7-9 November 2023, Barcelona, Spain

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SNAP4 Appliances and Dockers **Installations**

CONTACT

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Università degli Studi di Firenze - School of Engineering

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