100% OPEN SOURCE

EU GDPR COMPLIANT

PEN Test Passed

SNAP4CITY on EUROPEAN OPEN SCIENCE CLOUD MARKETPLACE

SNAP4 Appliances and Dockers Installations

SNAP4CITY

KM4CITY

Be smart in a SNAP!

LIVING LAB

Snap4City per le Scuole

SCALABLE SMART ANALYTIC APPLICATION BUILDER FOR SENTIENT CITIES

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

UNIVERSITÀ DEGLI STUDI FIRENZE | DINFO | DISIT

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SNAP4CITY

Powered by KM4CITY

scalable Smart aNalytic APplication builder for sentient Cities: for Living Lab and co-working with Stakeholders

https://www.Snap4City.org

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Challenges: Requests and Deductions

Public Admin.

Pub. Admin: detection of critical conditions, improving services

Mobility Operators

Tune the service, reselling data and services , prediction

Commercial: customers prediction and profiles, promotions via ads

Tourism Museums

Tune the service, prediction

API for SME

Smart City Engine

User profiling
Collective profiles
User segmentation

Services & Suggestions
Transport, Mobility, Commercial (retail), Tourism, Cultural

Personal Time Assistant
dynamic ticketing, whispers to save time and money, geoloc information, offers, etc.

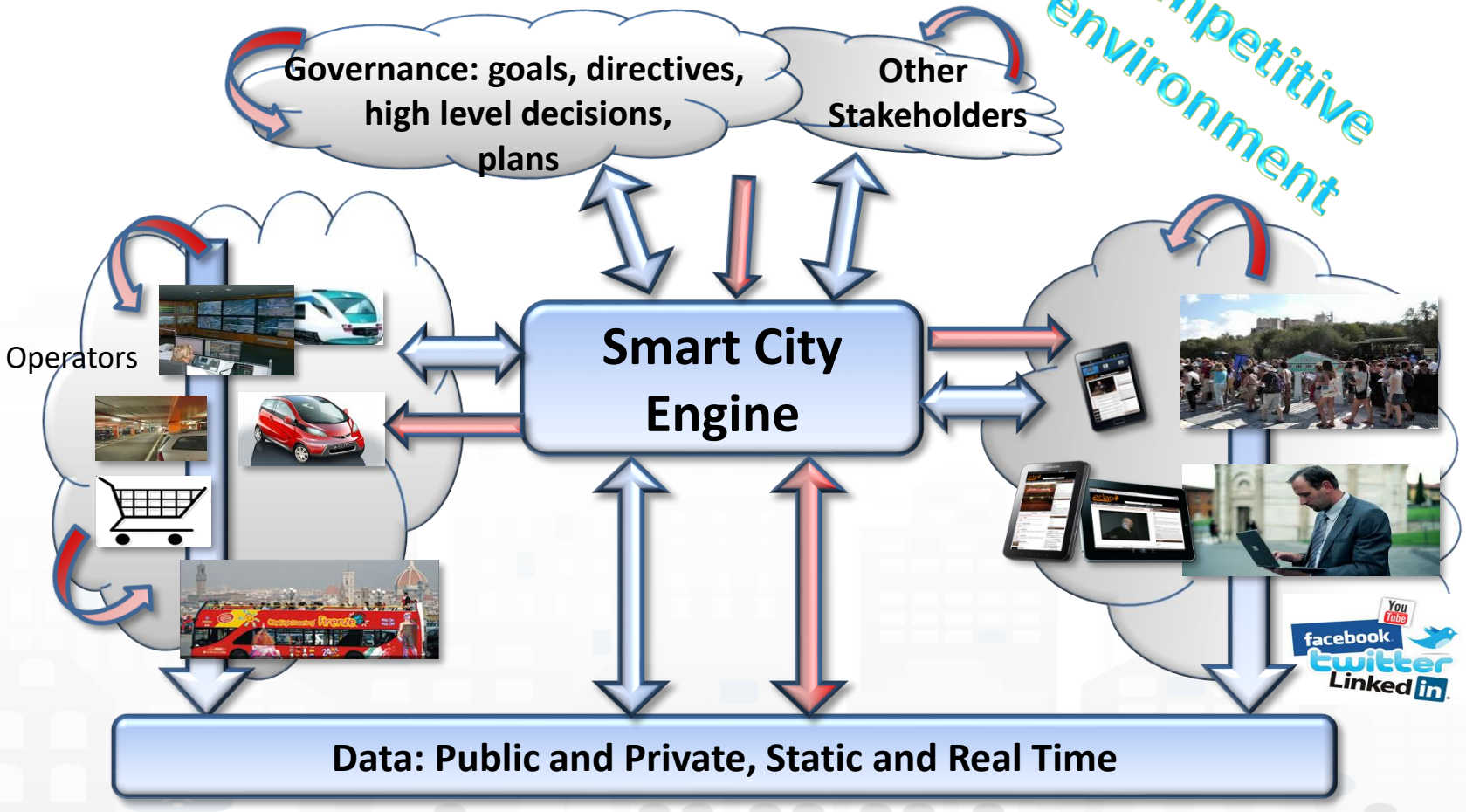
User Behavior
Crowd Sources

Data: Public and Private, Static and Real Time

Private: user movements, social media, crowd sources, commercial (retail)
Public: infomobility, traffic flow, TV cameras, flows, ambient, weather, statistic, accesses to LTZ, services, museums, point of interests, …

From Strategies to (re-)Actions

- Informing
- Suggesting
- Engaging
- Alerting, Early Warning
- Making Decision active
- New Plan



Data vs Smart Services enabling on Snap4City

- **Public Transportation and mobility activated services in some where with Snap4City**
  - **Smart parking** (parking locations and real time parking data) … predictions
  - **Smart Fuel pricing** (fuel station locations and real time prices)
  - **Routing** (detailed GIS information, text indexing of streets, POI, etc.)
    - **Quite routing, perfect shopping, etc. etc**. (more data in needed….)
  - **multimodal routing** (detailed GIS information, Public transport time schedule)
  - **Info traffic** (traffic flow sensors, real time Traffic events, their localization, etc.)
  - **Dense info traffic** (traffic flow sensors and traffic flow reconstruction algorithm)
  - **Car/Bike/Scooter Sharing** (position and availability of Cars/Bikes, Scooters) … predictions
  - **Smart Biking** (cycling paths, environmental data) … predictions
  - **E-vehicles** (position, status of recharging stations,. …) … predictions vs booking
  - **Smart river crossing** (position and status of Underpass, Ferry) … prediction
  - **Quality of Public Transport** (actual time of arrival at the bus stops, wrt planned time schedule**)**
  - **Early Warning vs Resilience** (combination of several data including mobility, events, Social to perform early warning…)

Data vs Smart Services enabling on Snap4City

- **Social and Users Behaviour**
  - **Smart First Aid** (Location of First AID, real time status of triage)
  - **search for POI and public transport services** (POI geolocalized, spatial queries, along paths)
  - **Social Media Monitoring and acting** (Identif. of dysfunction, quality of service perceived)
  - **Information to Tourists** (Entertainment Events)
  - **Early Warning, prediction of audience** (Twitter data, social media)
  - **Improvement of services for Tourists** (people flow, usage of services)
    (Origin Destination Matrices, trajectories, heatmaps)
    (People Monitoring, via App, Wifi, PAX Counter)
    (Twitter Data, social mea,….)
- **Weather and environment, quality of life**
  - **Weather forecast/condition** (Weather forecast)
  - **Air quality Pollution** (pollution sensors, PM10, PM2.5, NOX, etc.)
  - **Pollination** (Pollination sensors)
  - **Alerting on Air quality for multiple parameters** (Prediction of parameters time slots, notification)
  - **Information Heatmaps for weather and air quality** (air quality sensors, heatmaps, prediction)
  - **Air quality indexes, and forecast** (…….

http://www.darionardella.it/il-sindaco-dario-nardella-in-missione-a-madrid-e-barcellona/

Firenze Oggi 2019

Fri 25 Oct 23:29:38

43666
Totale utenti WIFI

COLONNINE RICARICA<... 9m
176 INSTALLATE
71 % ATTIVE
5.1 % IN USO

GENERAL METEO 9m

MINIMO	BASSO	MEDIO	ALTO

RISCHIO IDRAULICO
RISCHIO TEMPORALI
RISCHIO IDROGEOLOGICO
RISCHIO NEVE
RISCHIO GHIACCIO
RISCHIO VENTO

SITUAZIONE VIABILITA 8s
0 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.
0 TOT. EVENTI SULLA RETE

SMN 9m	BINARIO16 9m	FORTEZZA 9m
28.7 % occupati su 607 posti	55.2 % occupati su 165 posti	27.8 % occupati su 521 posti
LEOPOLDA 9m	**CALZA 9m**	**S.AMBROGIO 9m**
36 % occupati su 300 posti	70.3 % occupati su 148	99.7 % occupati su 379 posti
PARTERRE 9m	**CAREGGI 9m**	**BECCARIA 9m**
34 % occupati su 656 posti	24.9 % occupati su 406 posti	98.1 % occupati su 210 posti

ANALYSIS
Energy
Environment
Mobility
Social
Resilience

FLUSSI INGRESSO CITTA 9m
26 393.2
19 794.9
13 196.6
6598.3
0
12:00
Current
Previous

TOTALE 9m
284094
VEICOLI

FLUSSI INGRESSO ZTL 9m
5522
4141.5
2761
1380.5
0
12:00
Current
Previous

TOTALE ZTL 9m
57499
VEICOLI

Nati Italiani 119m	Nati stranieri 119m	Deceduti 119m	Matrimoni 119m	Unioni Civili 119m
163 ultimo mese consolidato	49 ultimo mese	395 ultimo mese	19 ultimi 7 giorni	0 ultimi 7 giorni

Segnalazioni ricevute in attesa 119m	In Lavorazione 119m	Risolte 119m	Chiuse senza risoluzion... 119m
1116 ultimo mese	524	305	285

Manutenzioni Stradali 59m	Verde Pubbli... 59m	Decoro Urbano 59m	Relitti 59m
54 oggi	4	6	3

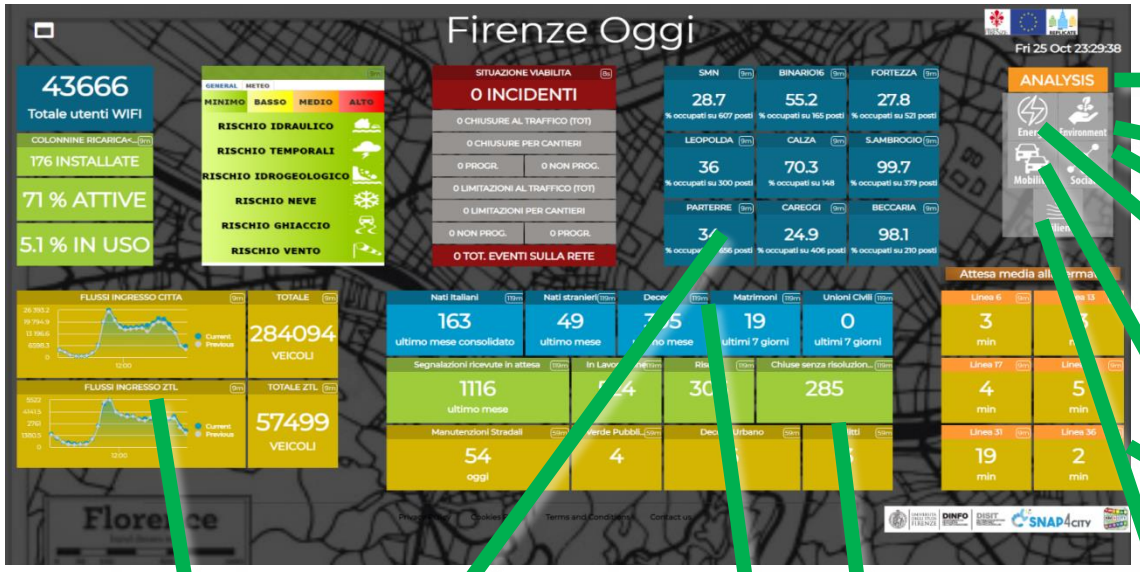
Attesa media alla fermata

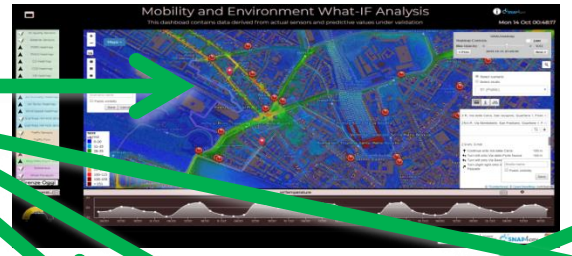
Linea 6 9m	Linea 13 9m
3 min	13 min
Linea 17 9m	**Linea 23 9m**
4 min	5 min
Linea 31 9m	**Linea 36 9m**
19 min	2 min

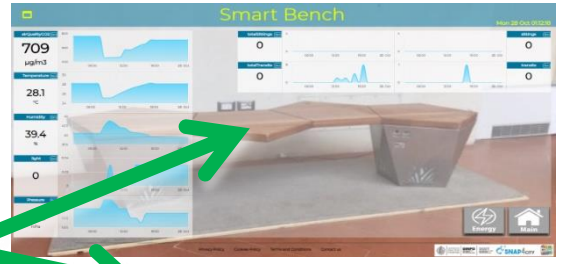
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTQzOA==

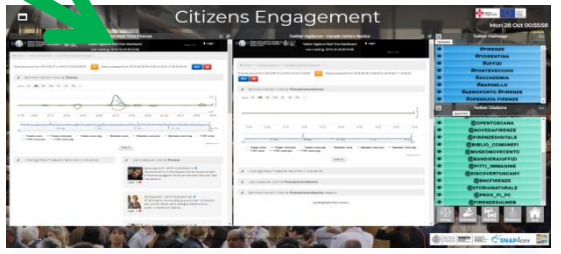
Smart City Control Room

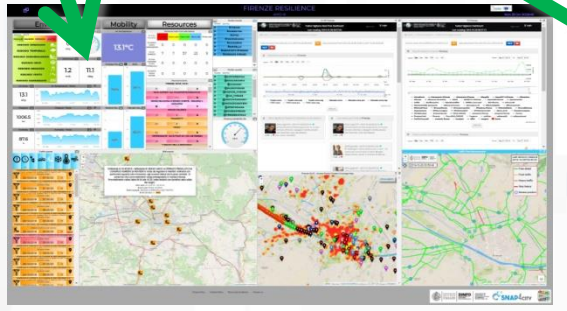
a set of dashboards and tools

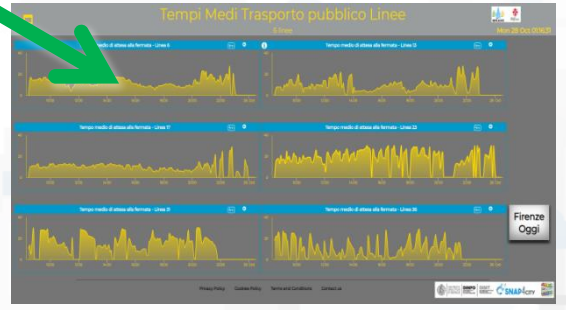






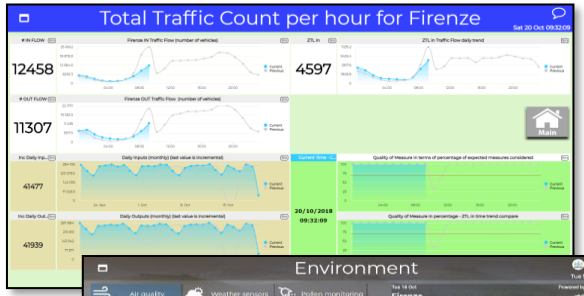






Florence Case

- **Smart City Control Room**
- **Dashboards and Services**
- **Mobile App:** Firenze Where What

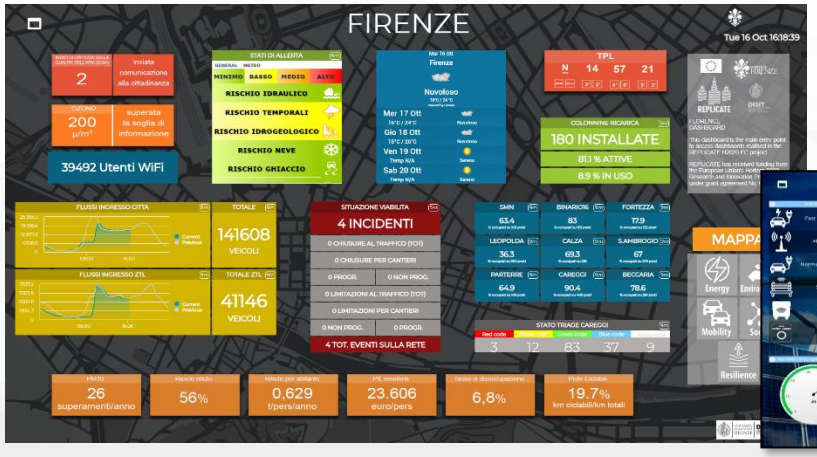


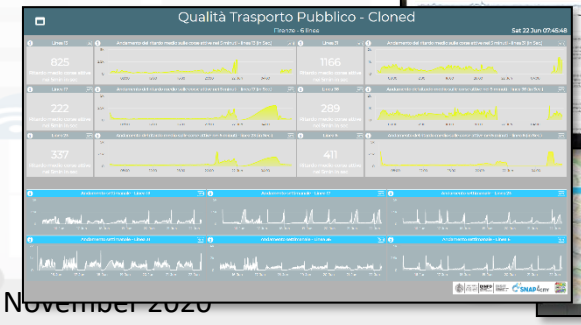
- **Mobility**:
  - quality of public transportation service (mean delay on bus-stops)
  - public transport operators schedule and paths, routing, multimodal routing
  - traffic flow reconstruction
  - Smart parking: predictions
  - Accidents and events, Log, heatmaps
- **Environment**:
  - smart irrigators
  - smart waste
  - Sensors: PM10. PM2.5,…..
  - Heatmaps: PM10, PM2.5, ….
  - NOX predictions
- **Energy**:
  - recharging stations (fast and reg.)
  - consumption meters (smart info)
  - smart light, street lights
- **Weather**
  - Forecast and actual

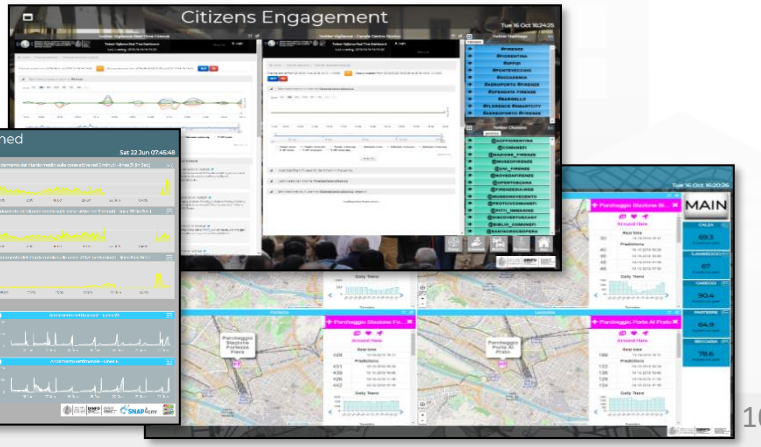
- **Social**:
  - smart benches
  - Twitter monitoring, Sentiment analysis, NLP text
  - TV camera streams
- **People Flows**:
  - Wi-Fi, people flow
  - Origin destination matrices
- **Governmental and Communications**:
  - KPI of the City
  - Digital Signage
  - Civil protection, Resilience (Resolute)
- **Tourism and Culture:**
  - POI, etc.

Analysis:

- **what-if routing, scenarios,**
- **traffic flow, environmental predictions**







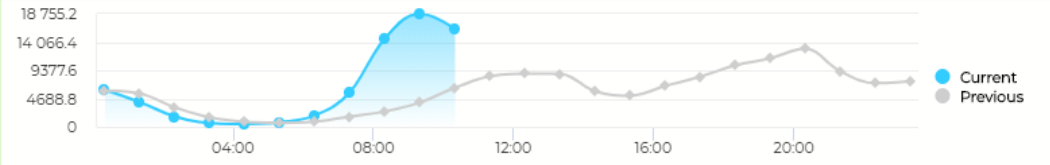
Traffic Flow Monitoring - Firenze - Cloned2

Mon 27 Jul 10:42:17

 # IN FLOW 9m

16219 #ofvehicles

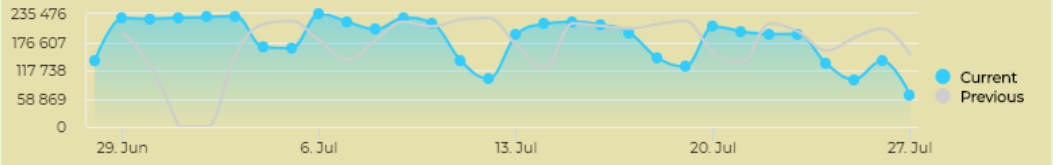
Firenze IN Traffic Flow (number of vehicles) 9m



Inc Daily Inp... 9m

65025 #ofvehicles

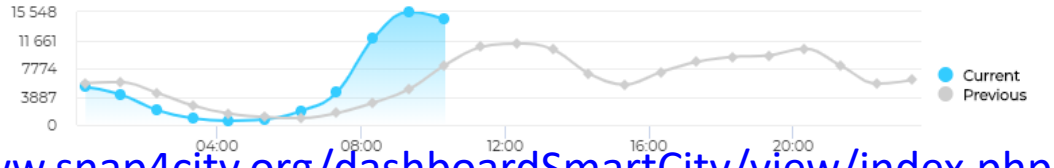
Daily Inputs (monthly) (last value is incremental, real time) 9m



 # OUT FLOW 9m

14510 #ofvehicles

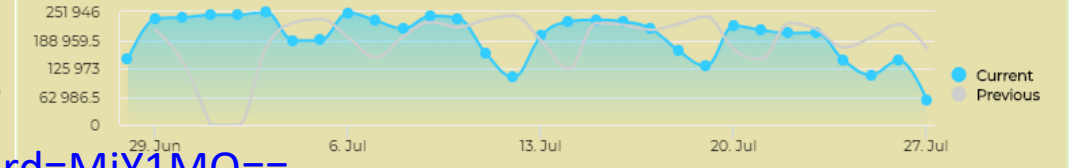
Firenze OUT Traffic Flow (number of vehicles) 9m



Inc Daily Out... 9m

56810 #ofvehicles

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

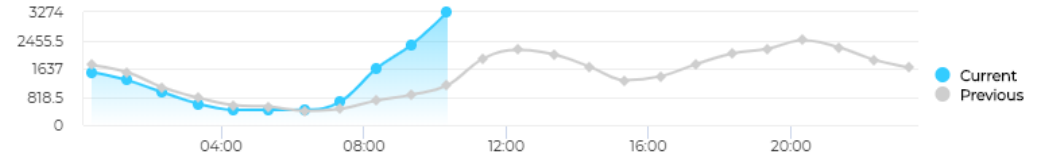


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjY1MQ==

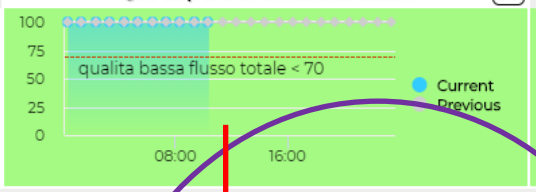
ZTL in 9m

3274 #ofvehicles

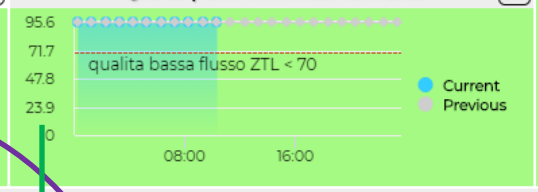
ZTL in Traffic Flow daily trend, entering in ZTL 9m



QoS as perc. of measures taken 9m



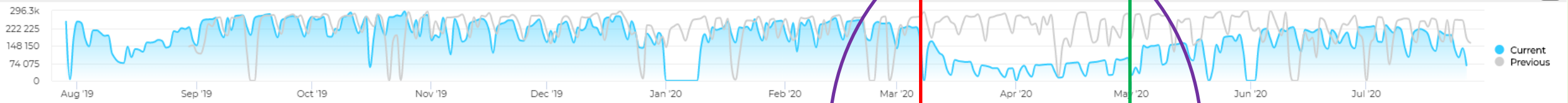
QoS as perc. of measures in ZTL 9m



27/07/2020

10:42:17

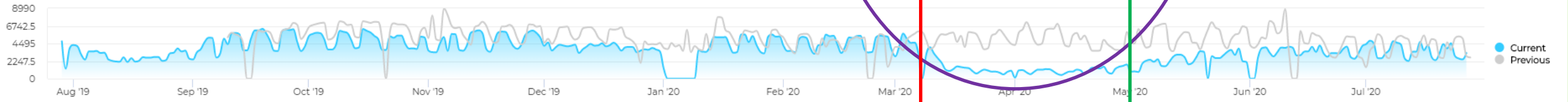
inflow total of the day, yearly 9m



outflow total over the day Yearly 9m

COVID-19 time

in ZTL yearly compare 9m



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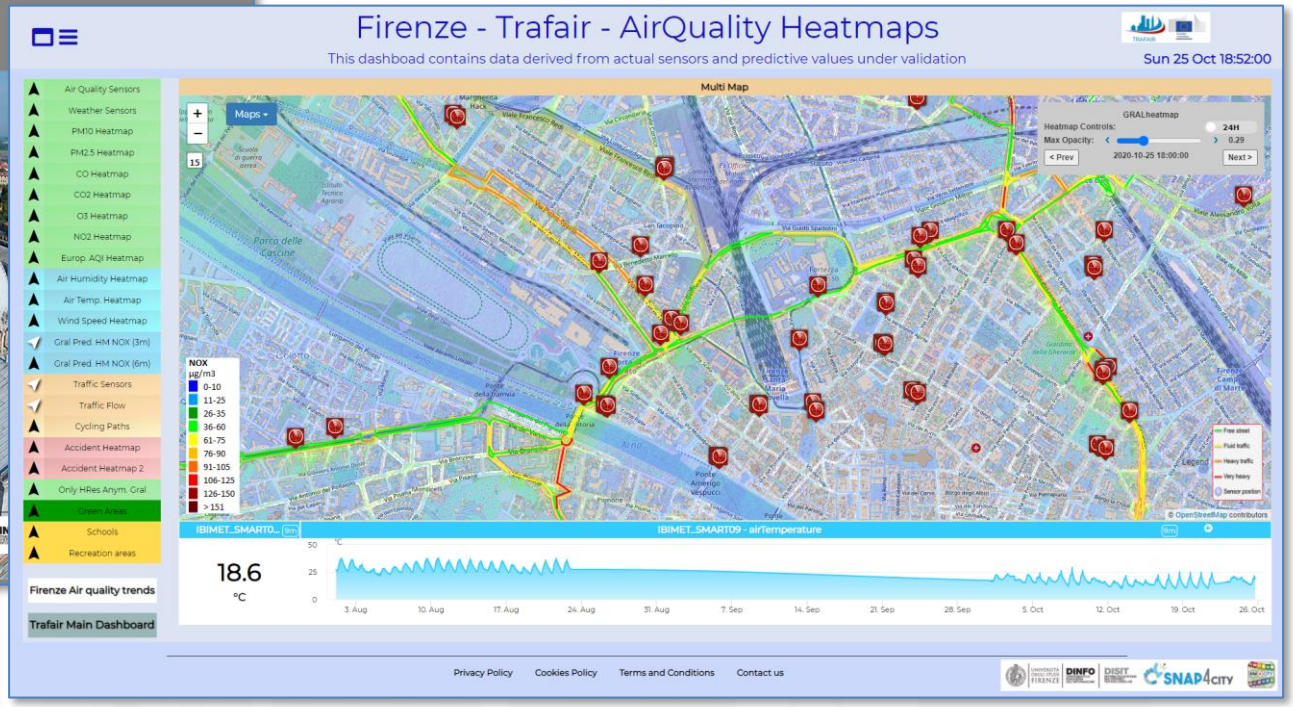
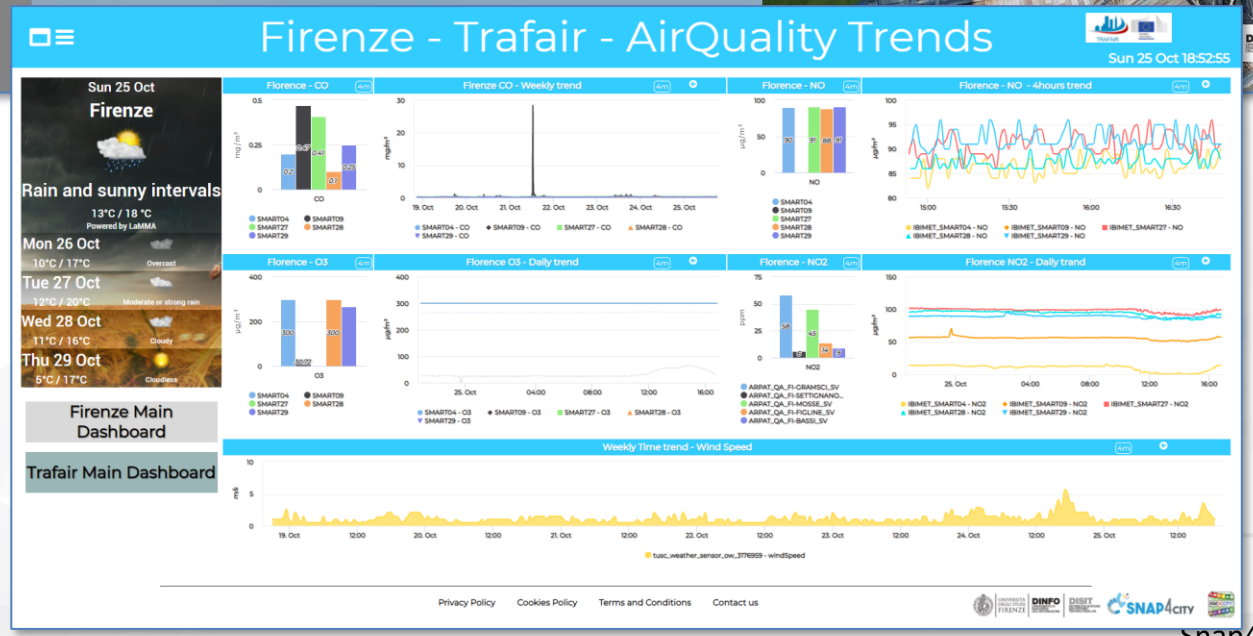
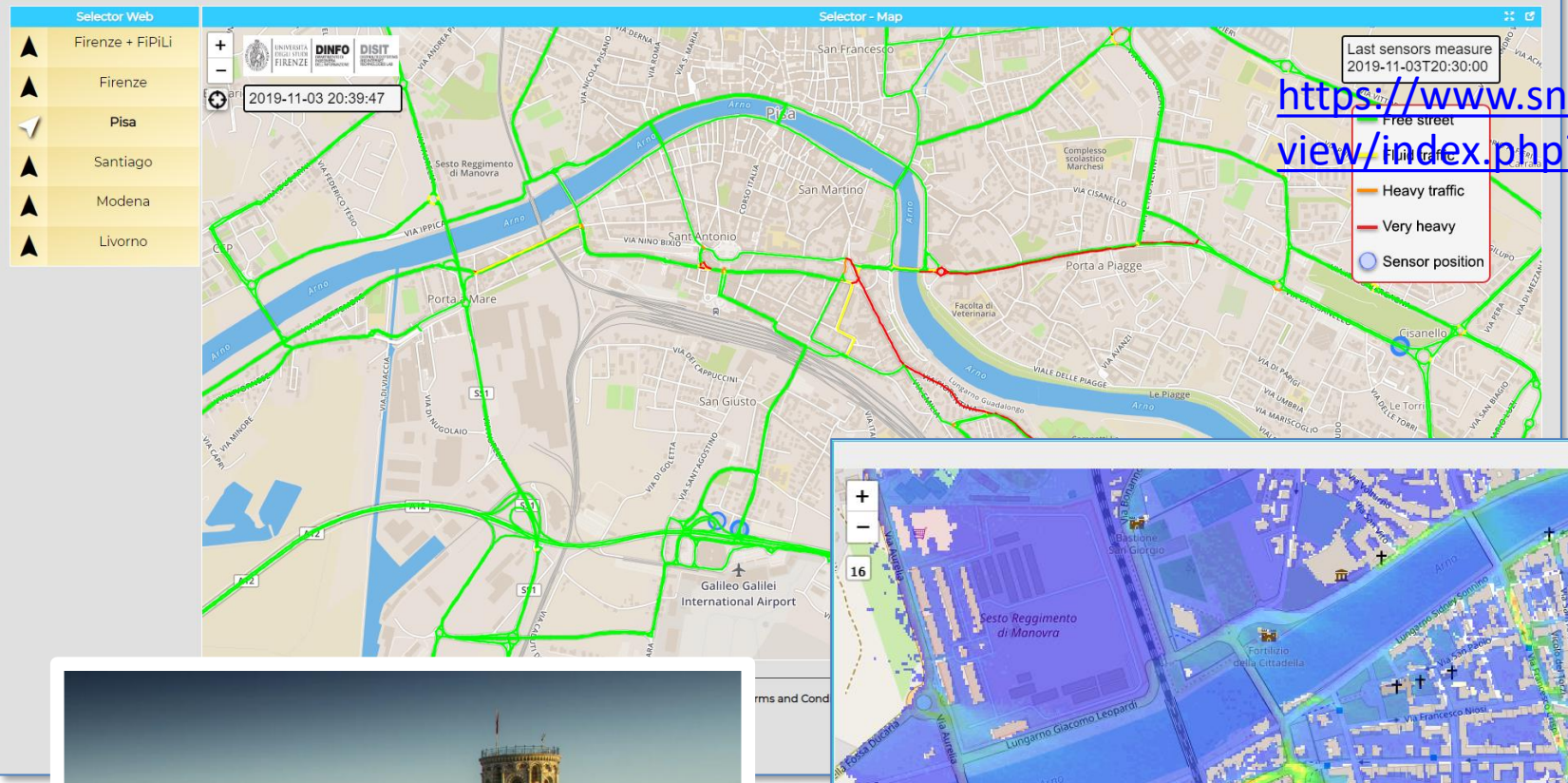




https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTUzMg==

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjU0Mg==

Traffic Flow Reconstruction for the cities



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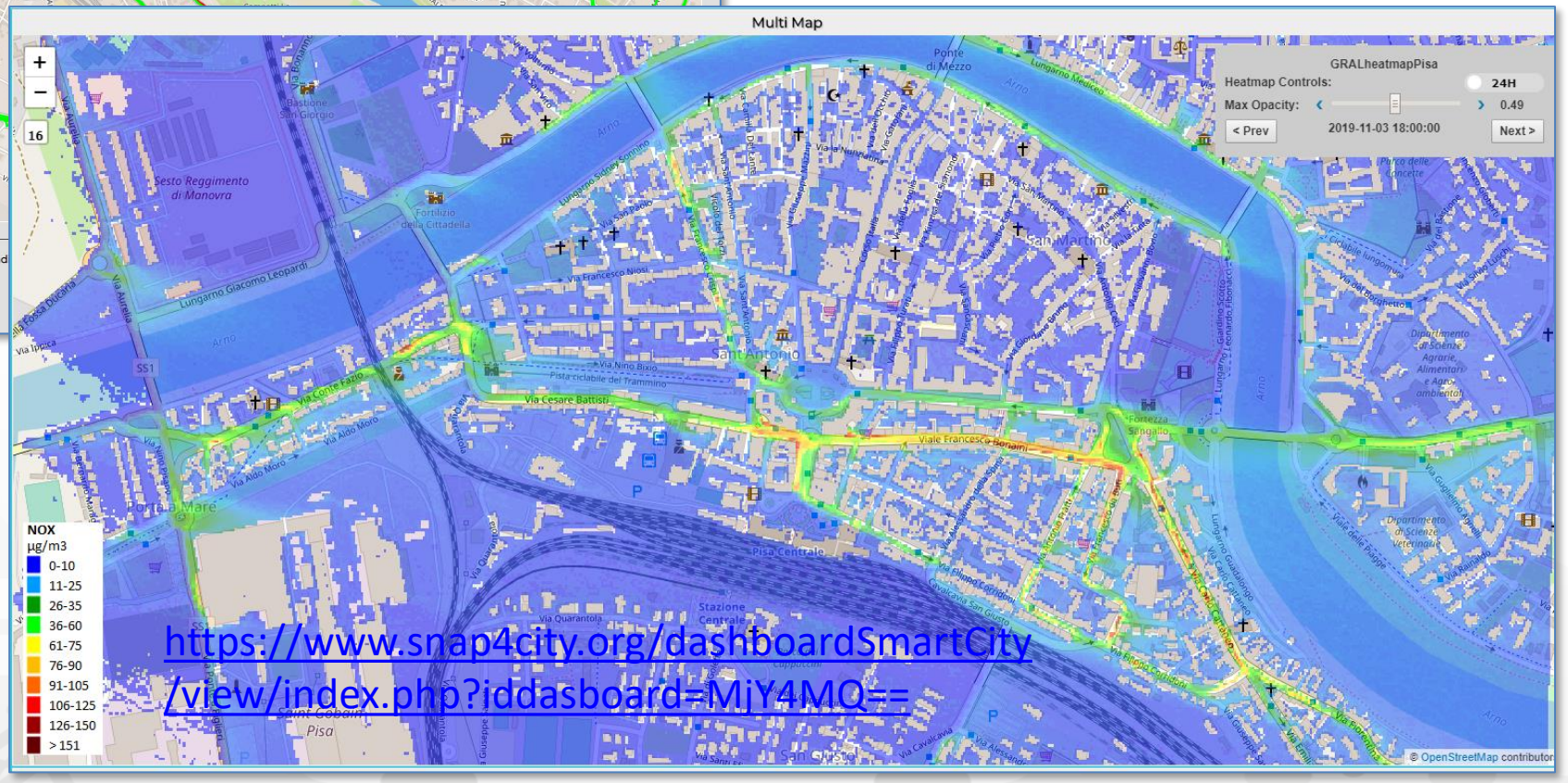


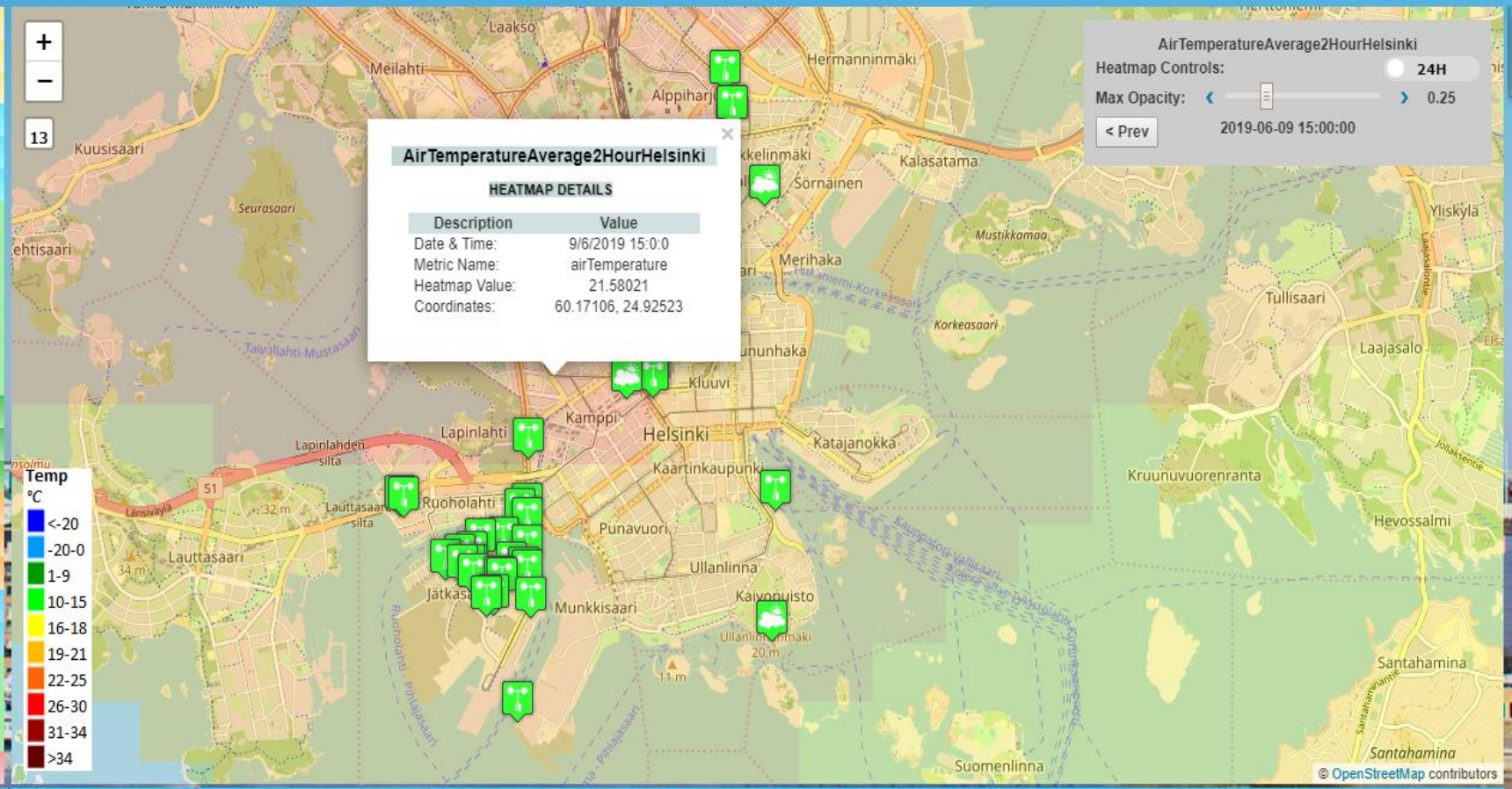
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjY4MQ==

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

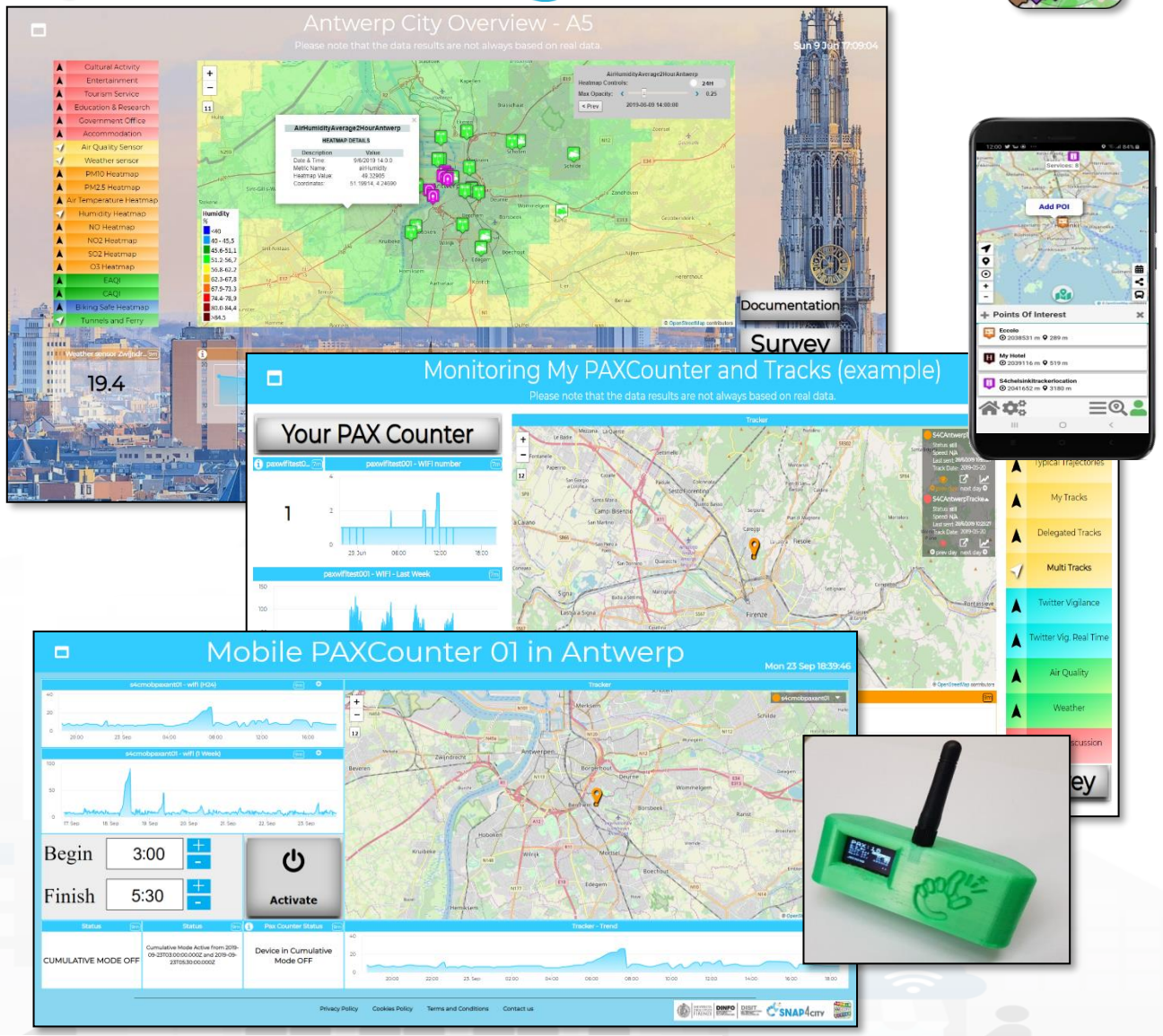
Forum Discussion

Survey

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

Antwerp Case

- **Dashboards & Services**:
  - **Environment** & **Weather**: PM10, PM2.5,NO, SO2, CO, etc.
    - Heatmap & **Alerts** on critical
  - **Mobility**: public transport Operators schedule and path, monitoring of river crossing, routing, what-if
  - **PAX Counters:** museum and public services, mobile PAX Counter for events
  - **Social**: Twitter Vigilance, early warning
  - **Life in Antwerp**: OD matrix people flow, Twitter Vigilance SA, hot places, ...
  - **Tourism and Culture**
- **Mobile App and MicroApplications:**
  - Antwerp in a Snap (all stores)



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

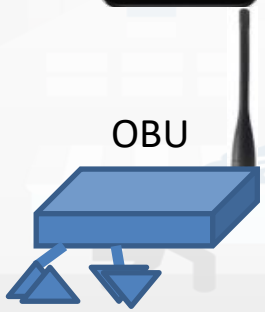
MyKPI: Tracking of Devices and Mobiles

- Real Time Trajectories for
  - Mobile Phone
  - Moving IOT Devices
  - OBU, Vehicular Kits
  - Multiple tracks
  - Day by day
- Micro Application

Mobile
PAX Counter

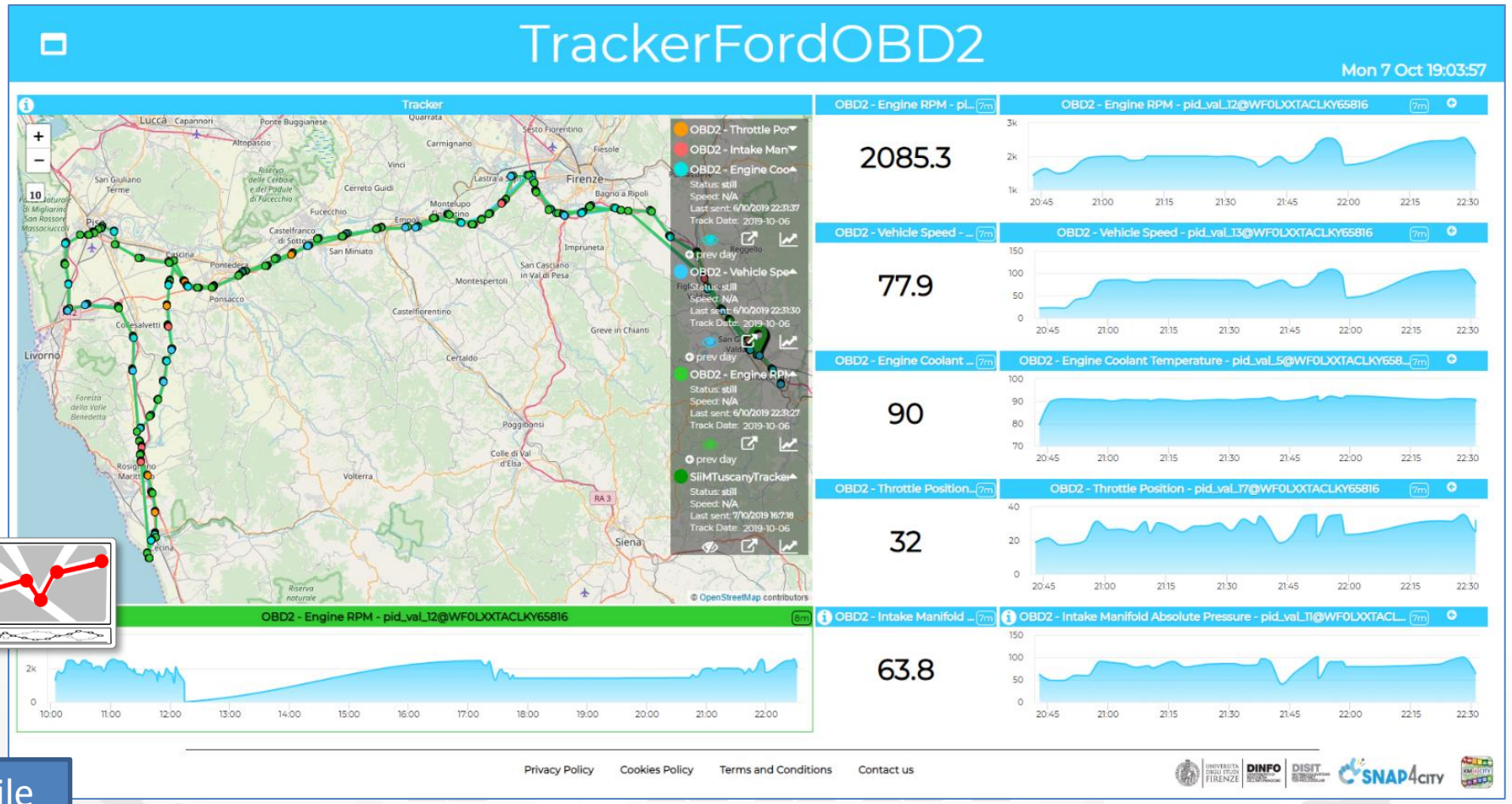
Apps

OBD2



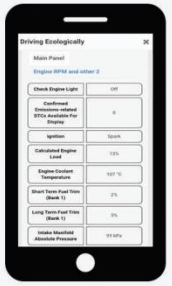
OBU

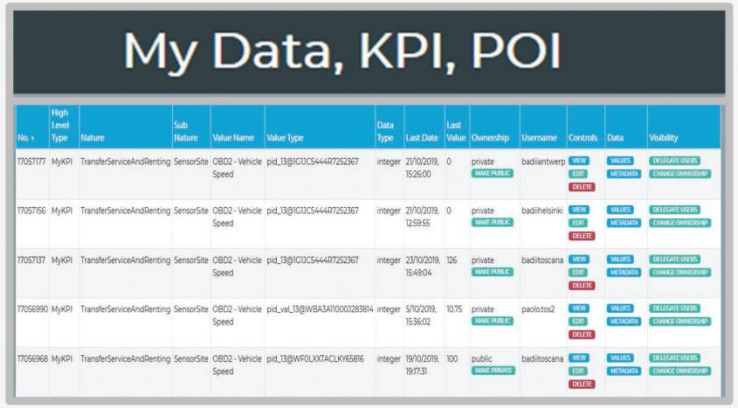
Mobile sensors

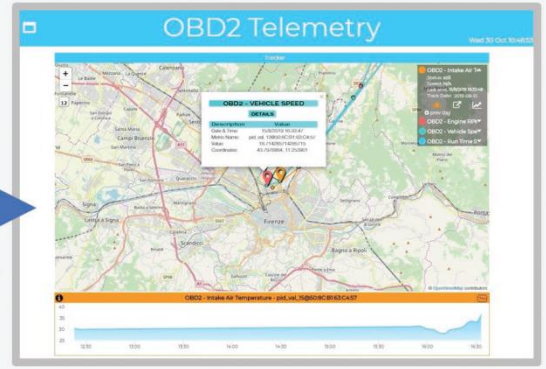


IOE – Vehicle Monitoring

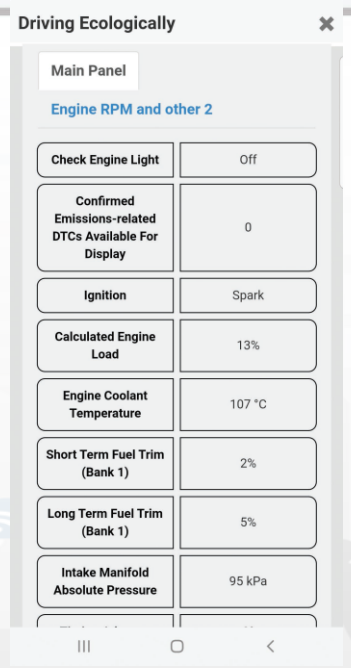
CANBUS sniffer

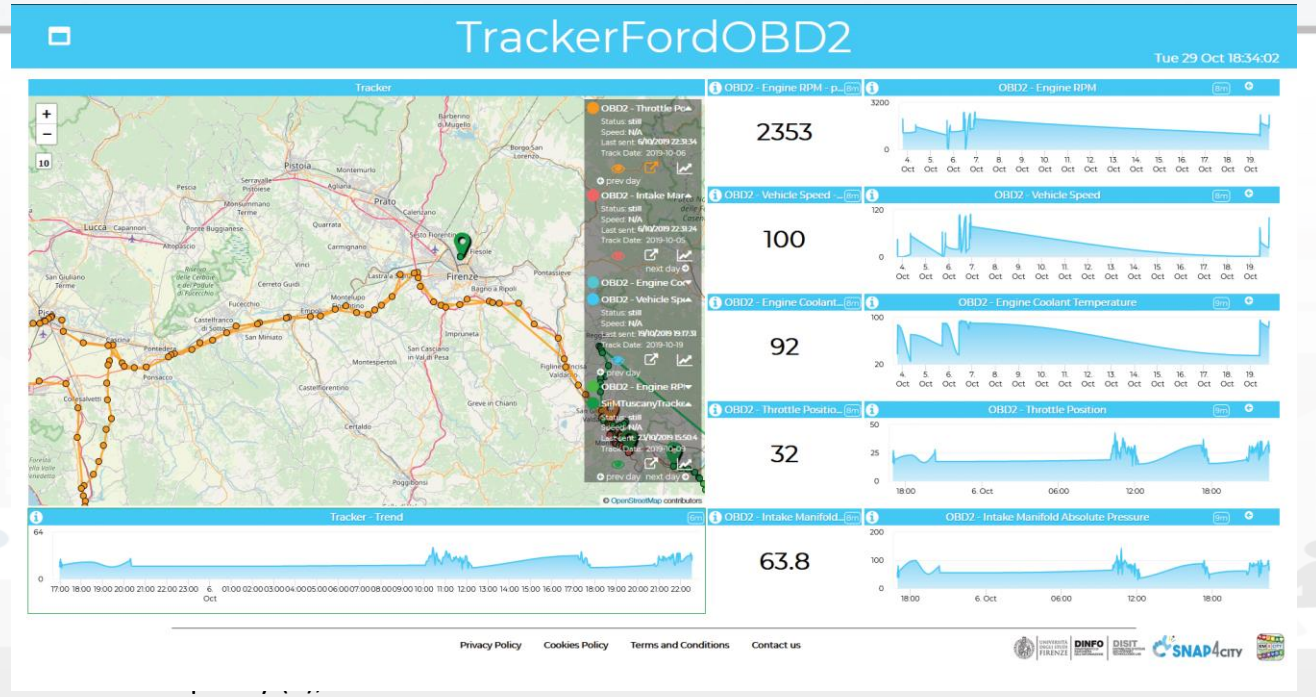




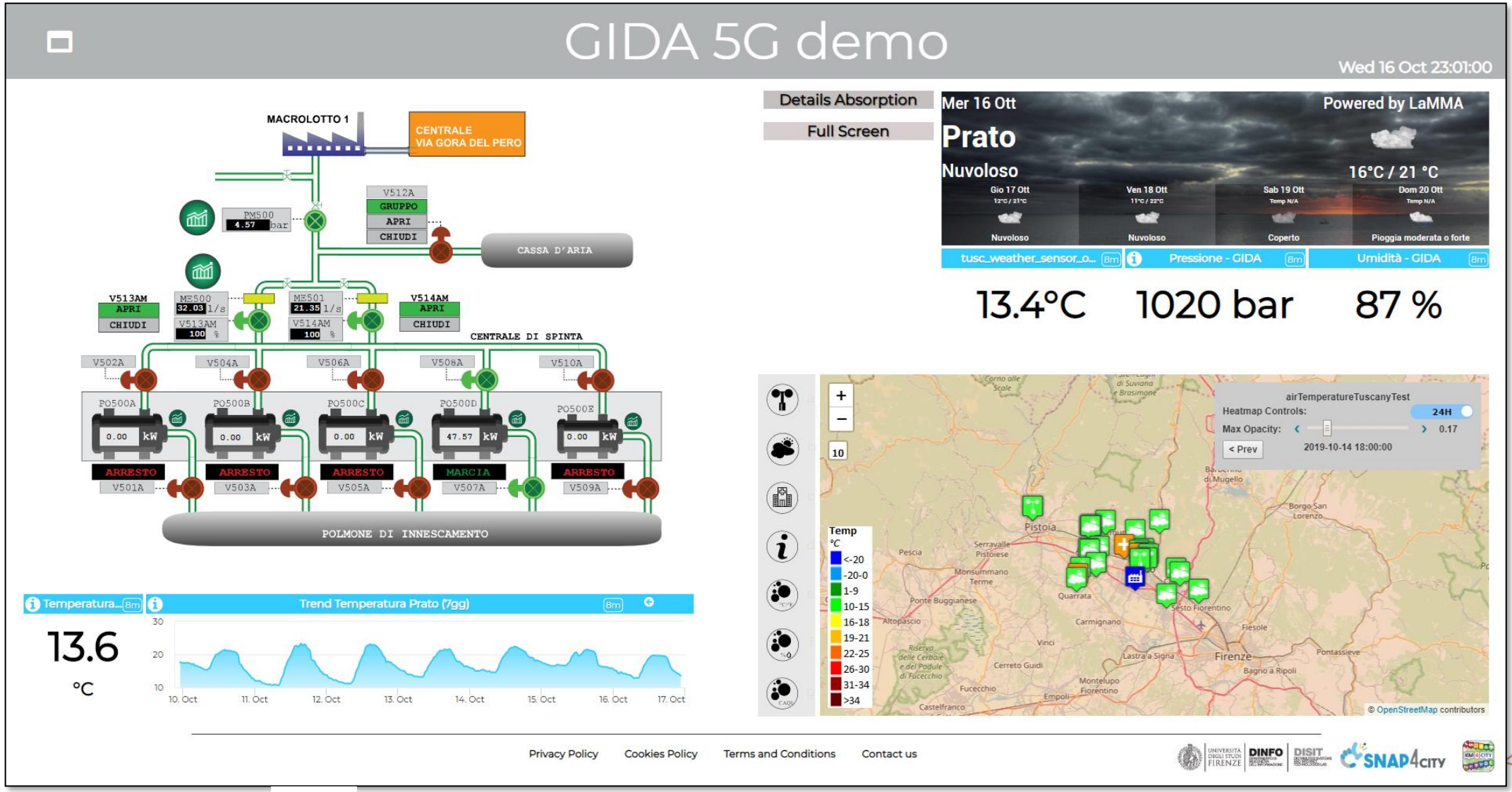


Tuscany in a Snap Mobile App on Android





Dashboards & Services:



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

Cross widget interaction 2

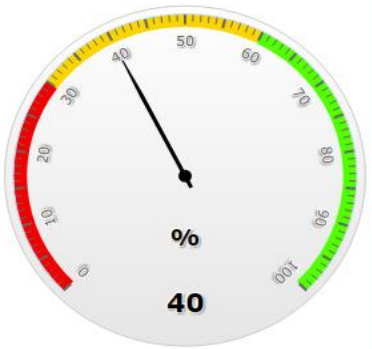
E Experimental

Mon 15 Jan 15:16:37

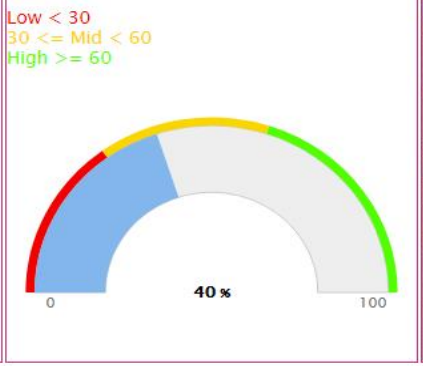
Any data
Real time updated
Flexible design
Easy to produce
Highly interactive

PARKING Station | PARKING Parterre | PARKING M. Centrale | PARKING Fortezza | Duomo | Michelangelo | P. Signoria | Pollution | Rivers | Polls

Park free - Speedometer 2m



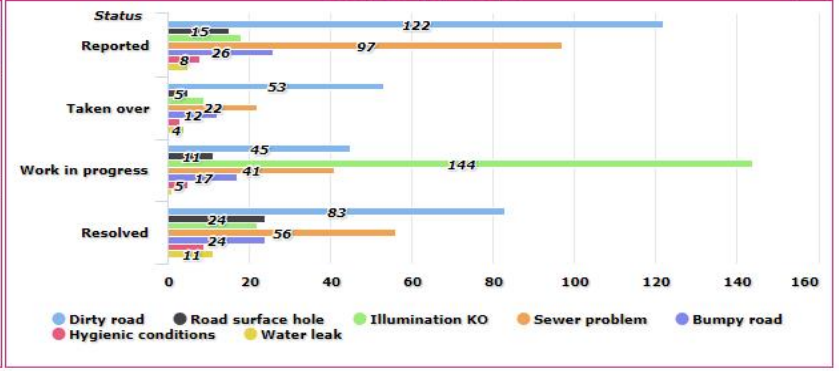
Park free - Gauge 2m



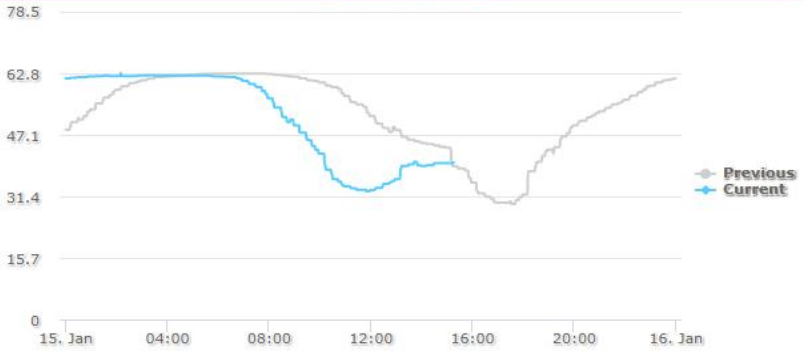
City webcams

Traffic events 5m

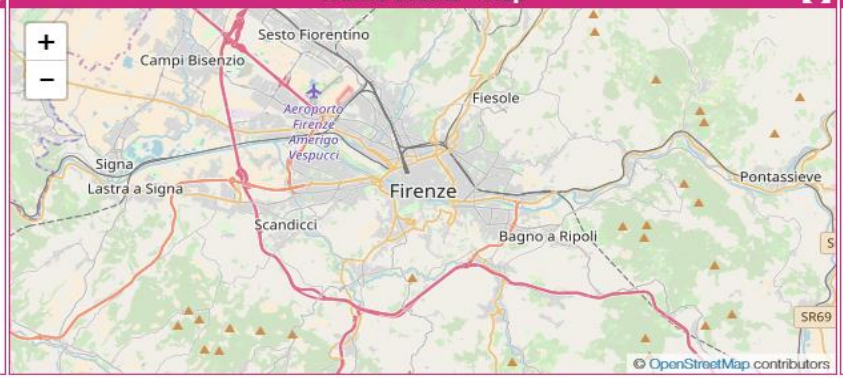
Urban faults - Bars 8m



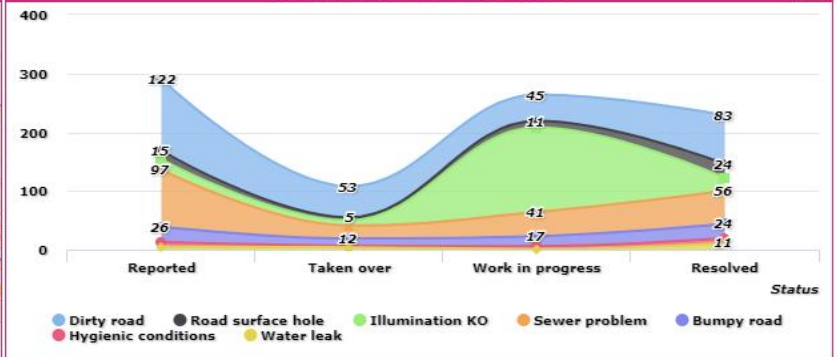
Park free - 24 hours 3m



Traffic events - Map



Urban faults - Stacked areas 8m

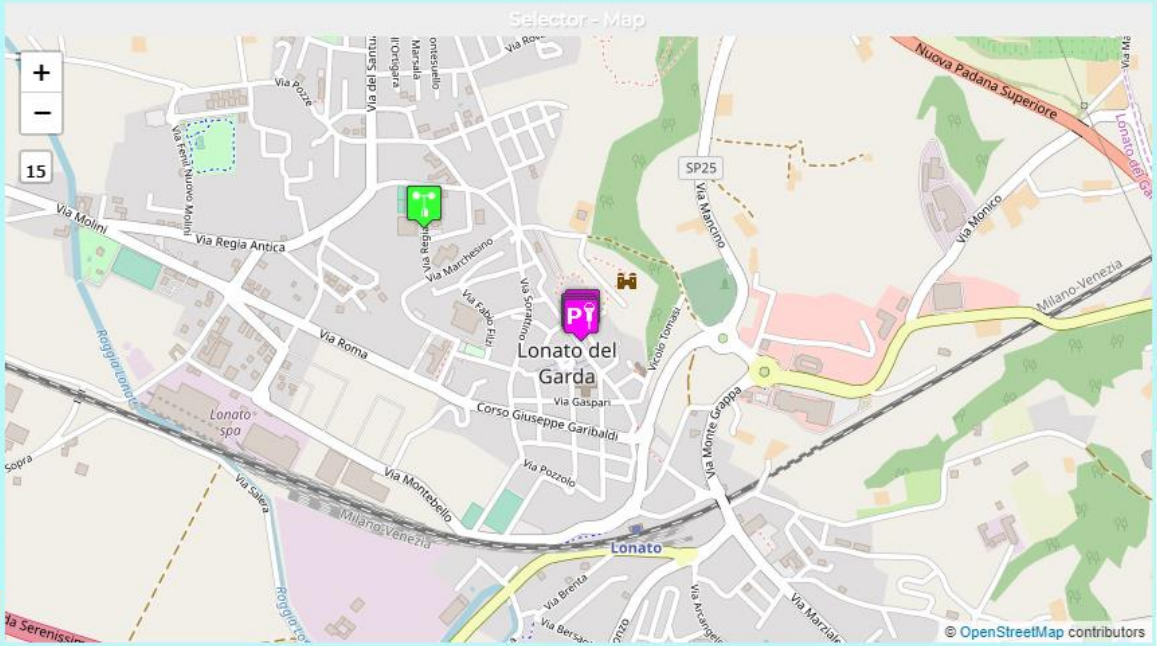


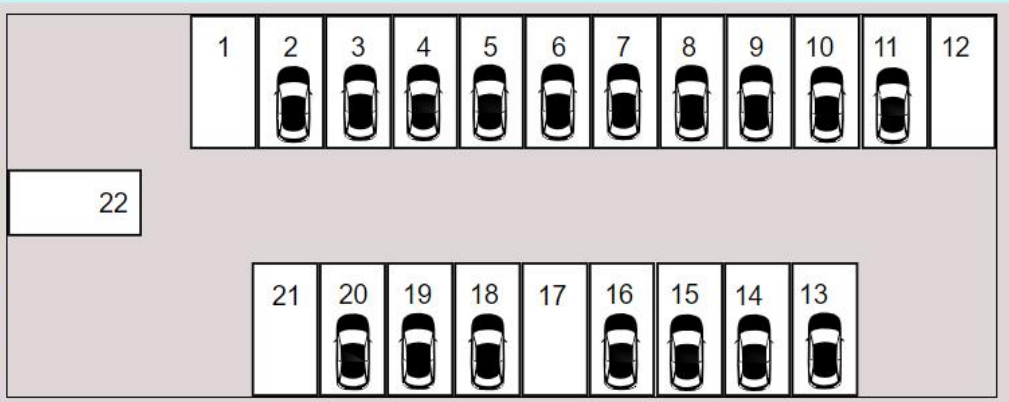
https://main.snap4city.org/view/index.php?iddasboard=MTU1

Smart Lonato del Garda - cam

Tue 12 Nov 19:31:54

- 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





view cam

AVG time of free slot 9m
08 minuti

5
free slots

Median of Busy Slots 9m
1 ora e 23 minuti

Max Present Duration 9m
53 ore e 01 minuto

View main

Slot 1 - Status 9m
0
status

Slot 15 - Seconds of Occupancy 9m

pressure 9m
976.2
mbar

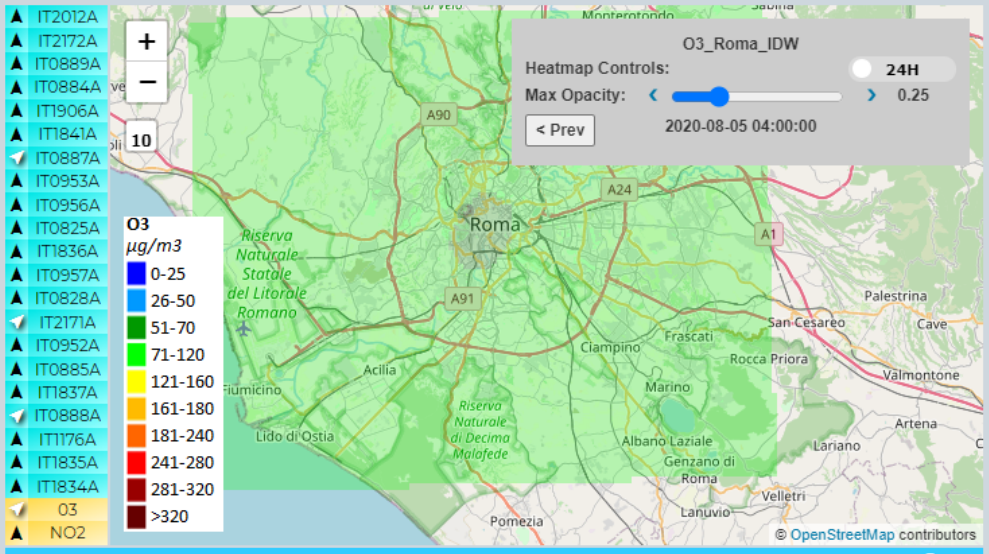
humidity % 9m
82.7
%

temperature 9m
10.7
°C

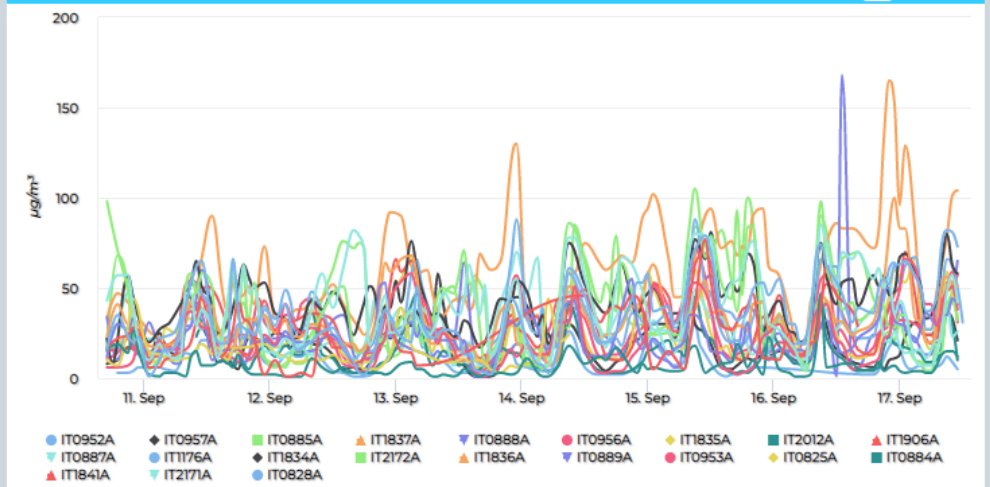
AirSensEUR_RVB01 - temperature (week) 9m

Roma Demo3 (Qualità dell'Aria)

Thu 17 Sep 16:13:28



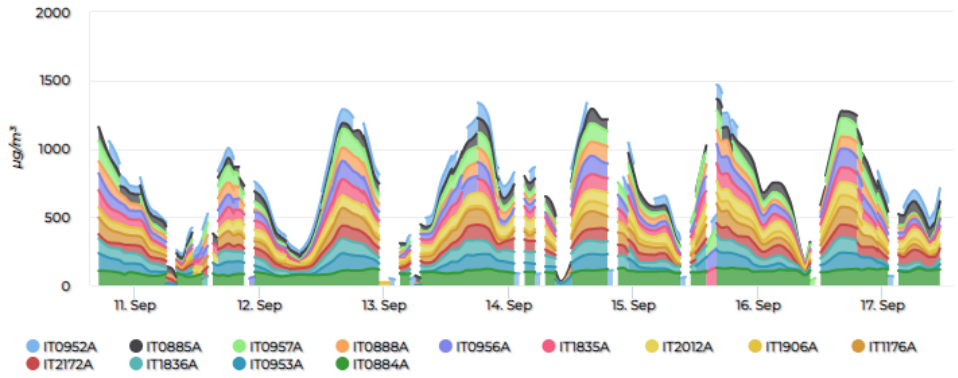
Andamento nel Tempo di NO2 rilevato nelle stazioni in Roma



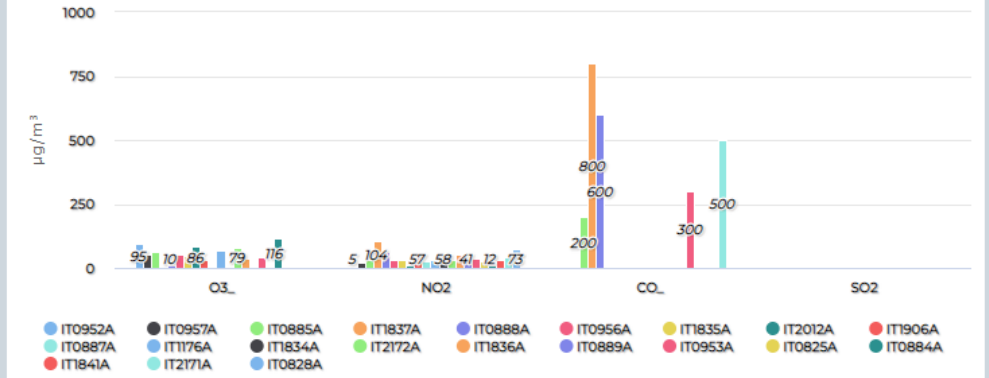
Valori Inquinanti in tempo reale, mappe

value type / value name	O3_	NO2	CO_	SO2
IT0952A	95	5		
IT0957A	54	21		
IT0885A	65	31	200	
IT1837A		104	800	
IT0888A	10	65	600	
IT0956A	51	31		
IT1835A	48	34		
IT2012A	86	10		
IT1906A	30	57		
IT0887A		26		
IT1176A	67	31		
IT1834A		58		
IT2172A	79	32		
IT1836A	36	51		
IT0953A	40	38	300	1.2
IT0889A		41		
IT0825A		24		
IT0884A	116	12		
IT1841A		29		
IT2171A		42	500	
IT0828A		73		

Andamento nel Tempo di O3 rilevato nelle stazioni in Roma (stacked)



Dati in Tempo reale inquinanti in Roma e provincia



Home

Trasporti

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

Andamenti Nazionali e Regionali infezione COVID-19

Sulla base dei dati della protezione civile, elaborazioni DISITLab

Sun 19 Apr 19:21:39

per evidenziare gli andamenti di vostro interesse: eliminare le curve che non interessano selezionandole in legenda.
Alcuni dati in passato non sono pervenuti alla protezione civile

486	nuovi_att_positivi
108257	Attualmente_positivi
23660	deceduti
47055	dimessi_guariti

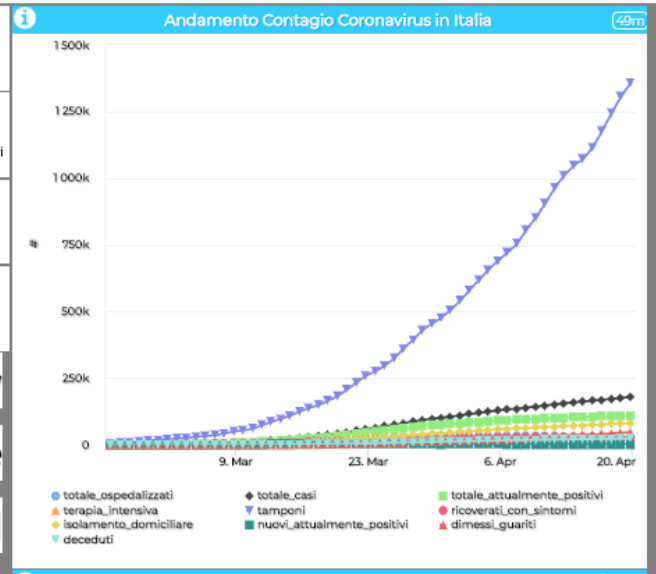
LOG view

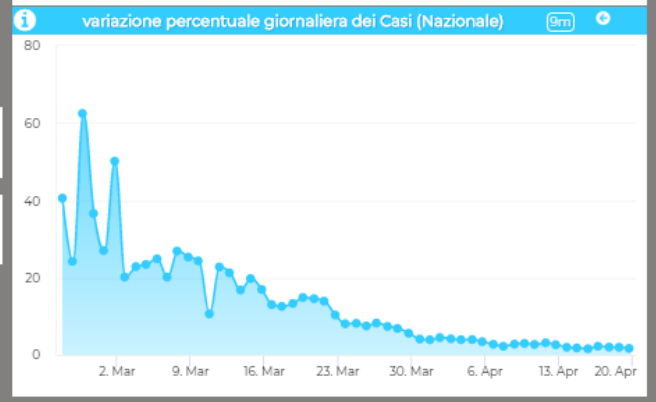
Mobile

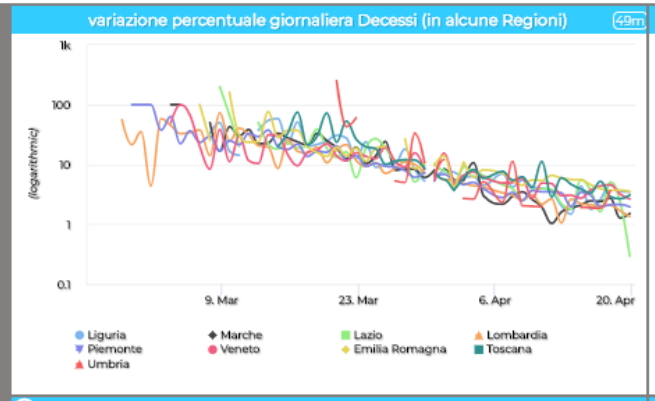
Staked

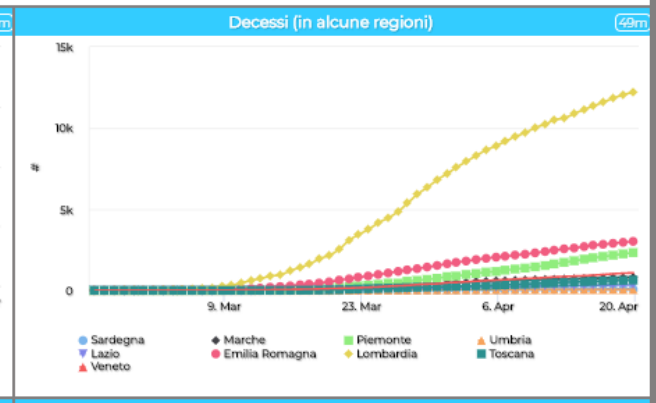
Regione Toscana

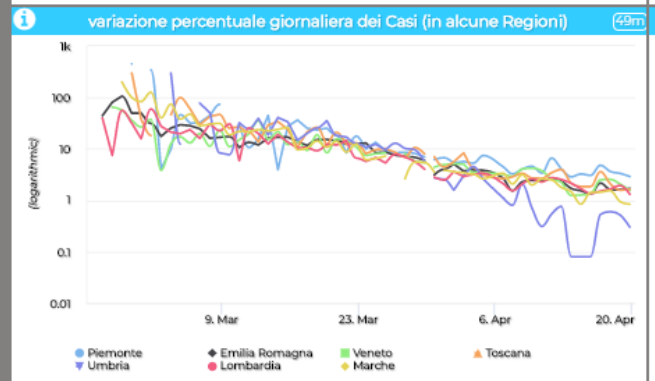
Regione LOG

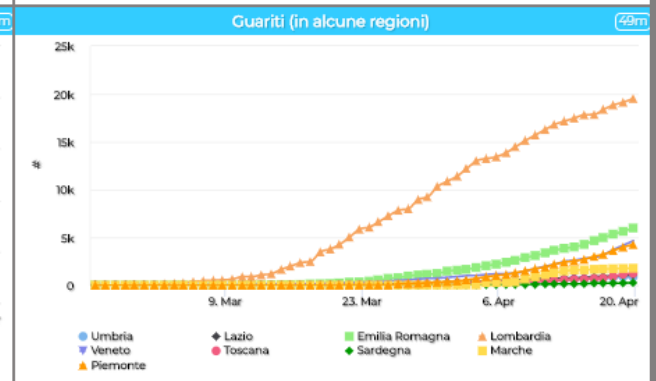


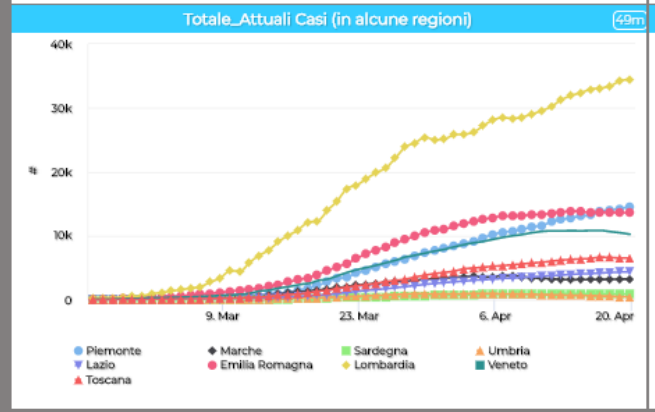


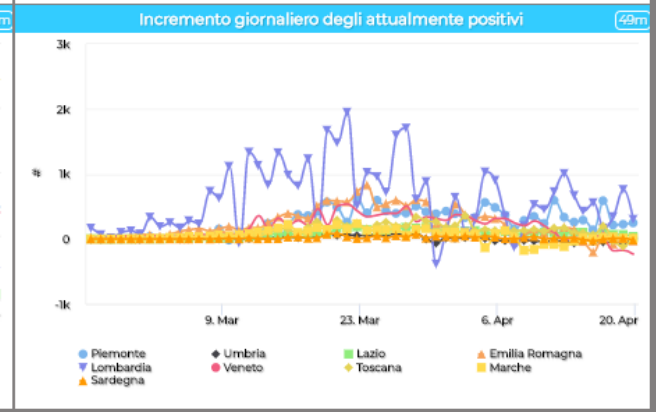






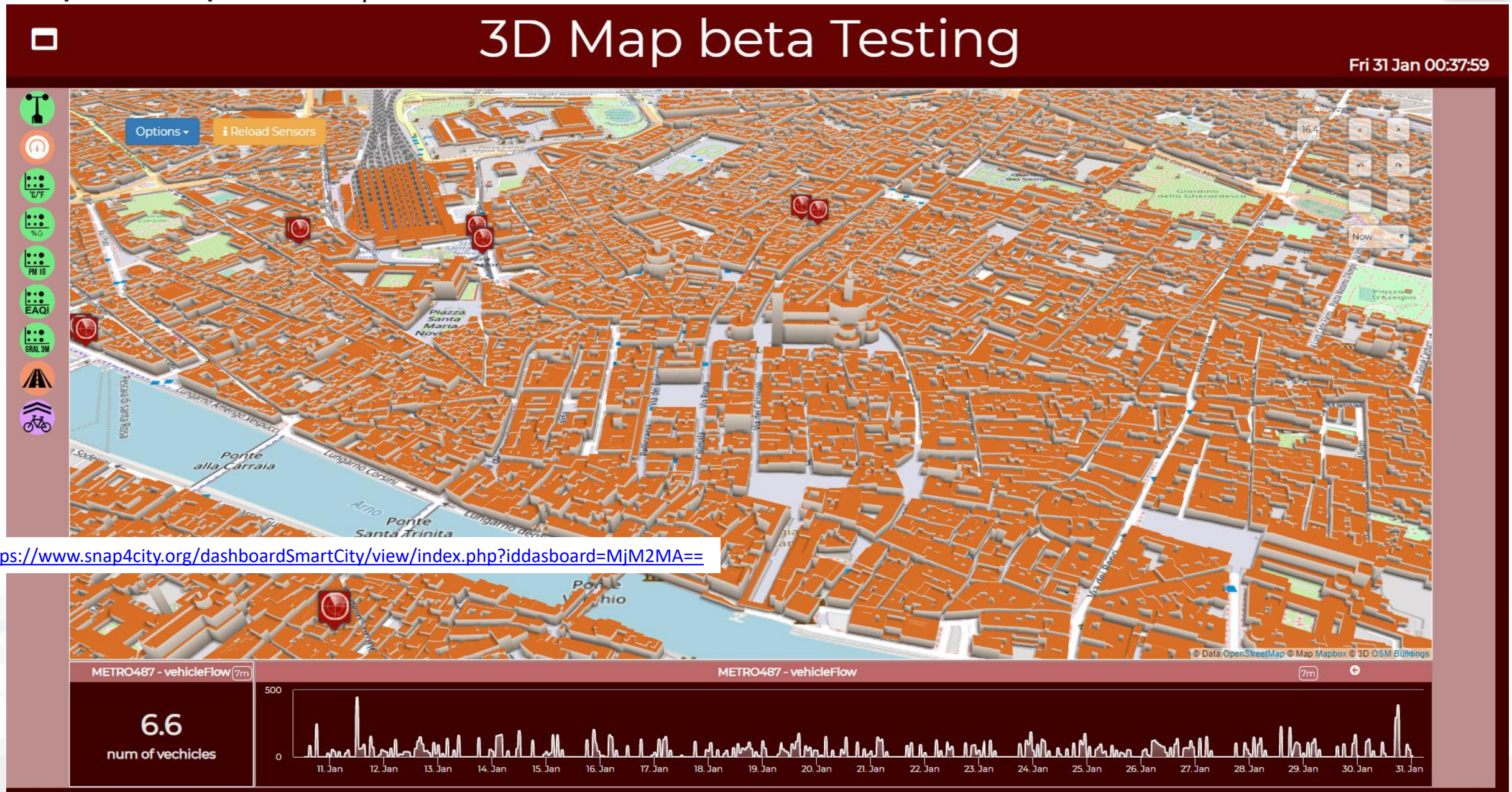






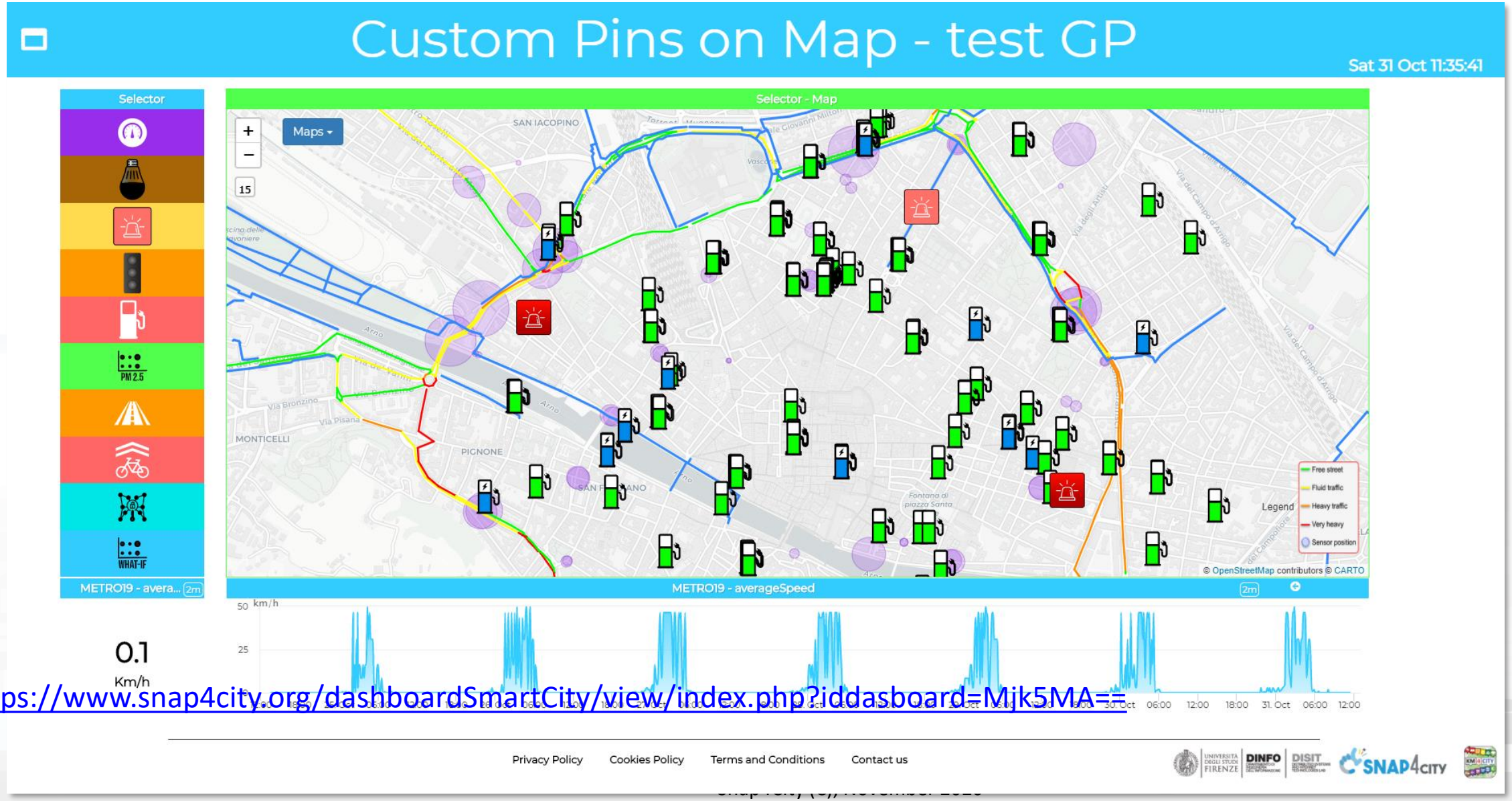
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjU2OQ==

3D Map beta Testing



https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjM2MA==

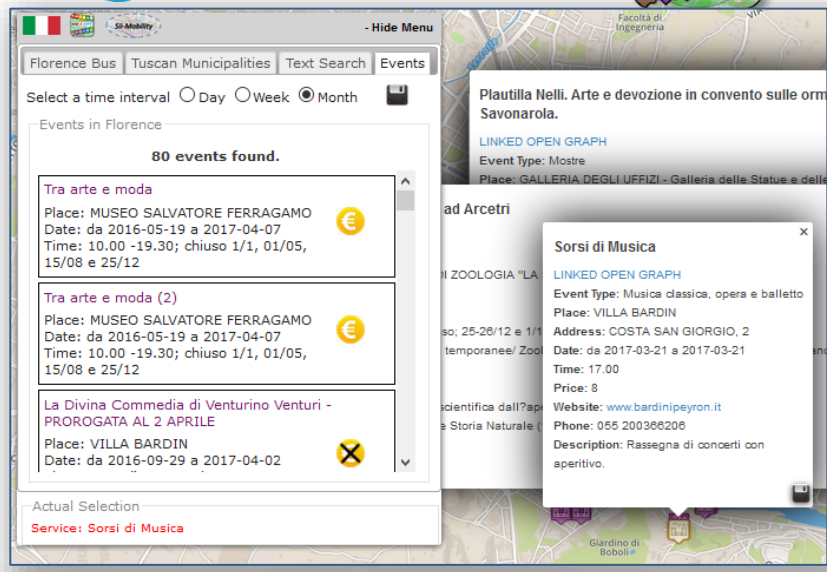
Custom Dynamic Pins

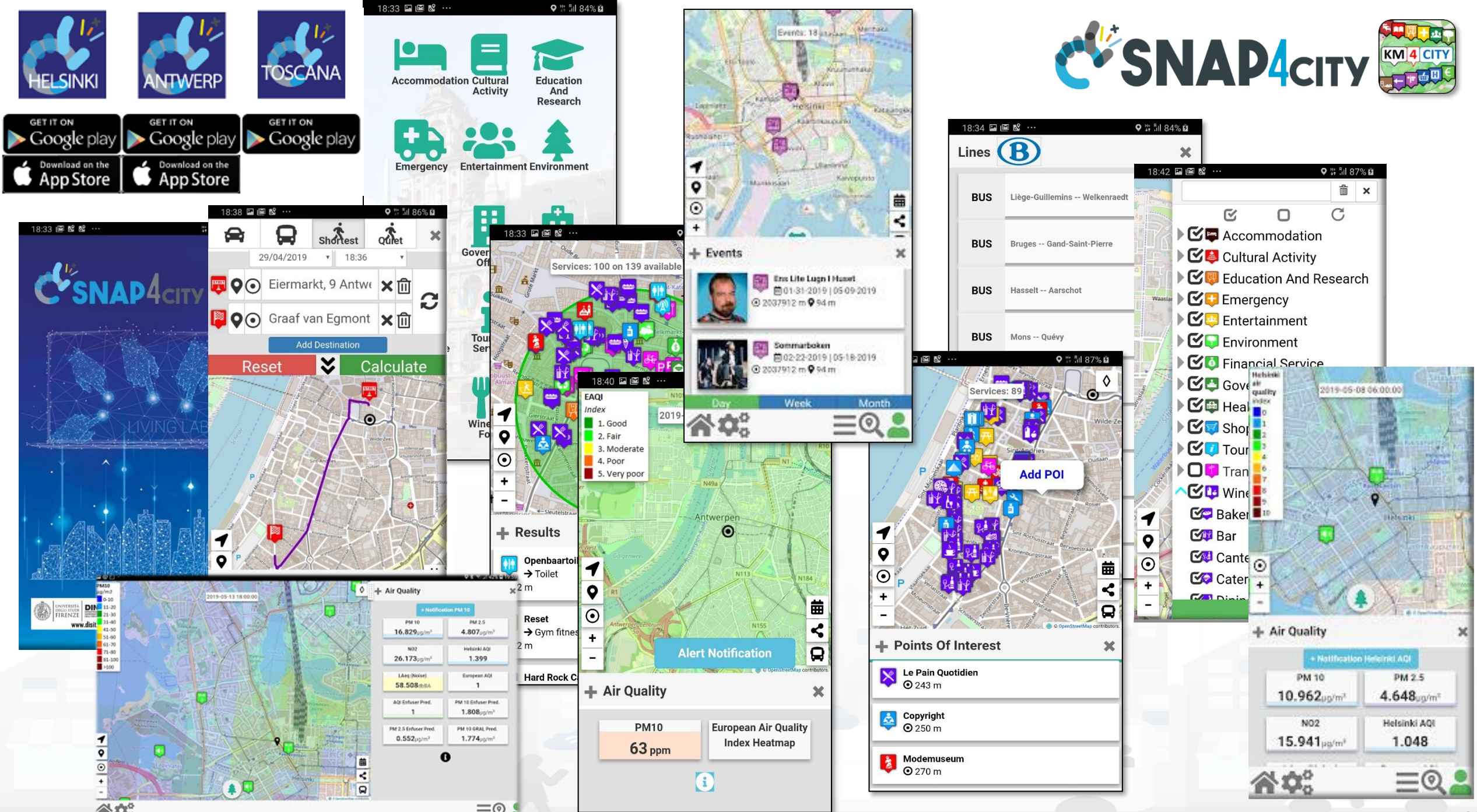


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=Mjk5MA==

Access to Event information

- **Getting Traffic Events: ESB, etc.**
- **Getting Critical Events: CAP standard**
- **Getting Police events**
- **Getting Entertainment Events** in the city
  - Theater, museum, show, sport, etc.
  - **Getting Event details**
    - Event kind, and thus ordering
    - in the day, week, and month
    - Location, and thus ordering, or selecting events per area, per residence
    - General information
    - Opening and cost (if any)
    - Etc.




HELSINKI
ANTWERP
TOSCANA
GET IT ON Google play
Download on the App Store
SNAP4CITY
KM 4 CITY
Accommodation
Cultural Activity
Education And Research
Emergency
Entertainment
Environment
Shortest
Quiet
Add Destination
Reset
Calculate
Events
Day
Week
Month
Services: 100 on 139 available
EAQI
Index
1. Good
2. Fair
3. Moderate
4. Poor
5. Very poor
Results
Antwerpen
Alert Notification
Air Quality
PM10
63 ppm
European Air Quality Index Heatmap
Lines
BUS
Liège-Guillemins -- Welkenraedt
Bruges -- Gand-Saint-Pierre
Hasselt -- Aarschot
Mons -- Quévy
Add POI
Points Of Interest
Le Pain Quotidien
243 m
Copyright
250 m
Modemuseum
270 m
Air Quality
PM 10
10.962
PM 2.5
4.648
NO2
15.941
Helsinki AQI
1.048

Snap4Home

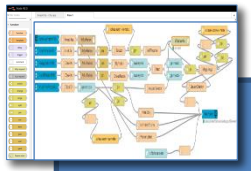
Philips Hue: Controlling Lights

Hue Hub

Hue: Motion Control / Alarm

TP Link: Controlling / Measuring Energy Plugs

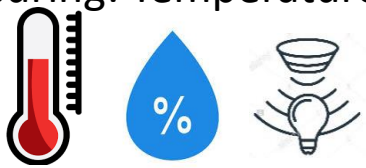
Alexa: Voice Control

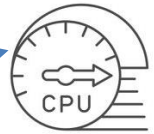


IOT Edge:

Raspberry pi: Node-RED + Snap4City

Measuring: Temperature, Humidity, light in the room



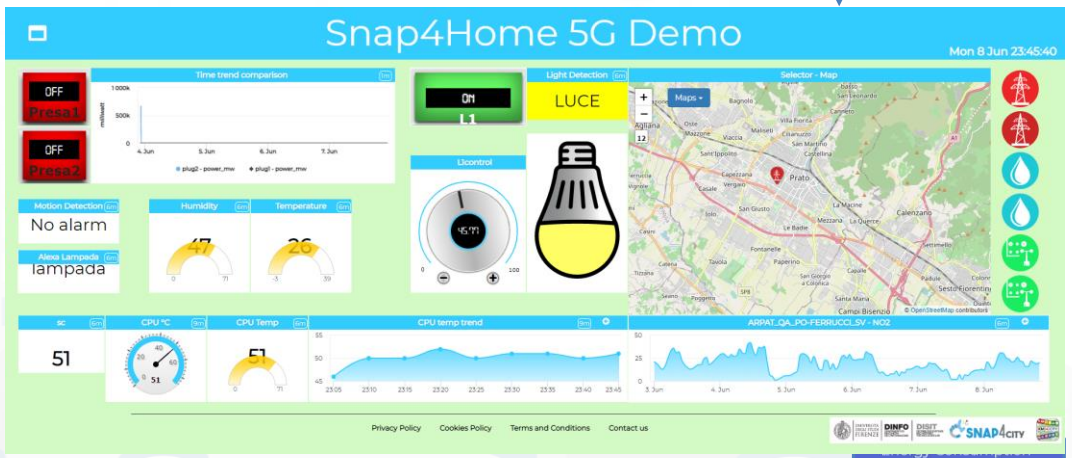


Monitoring: CPU clock, status

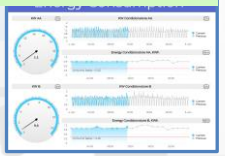
5G gateway

Internet

SNAP4CITY

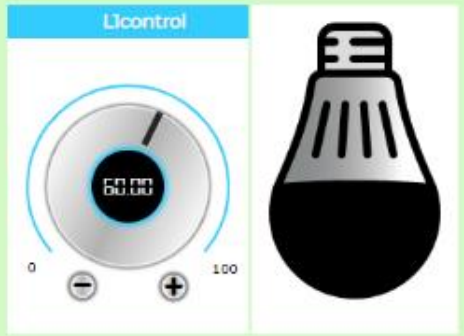


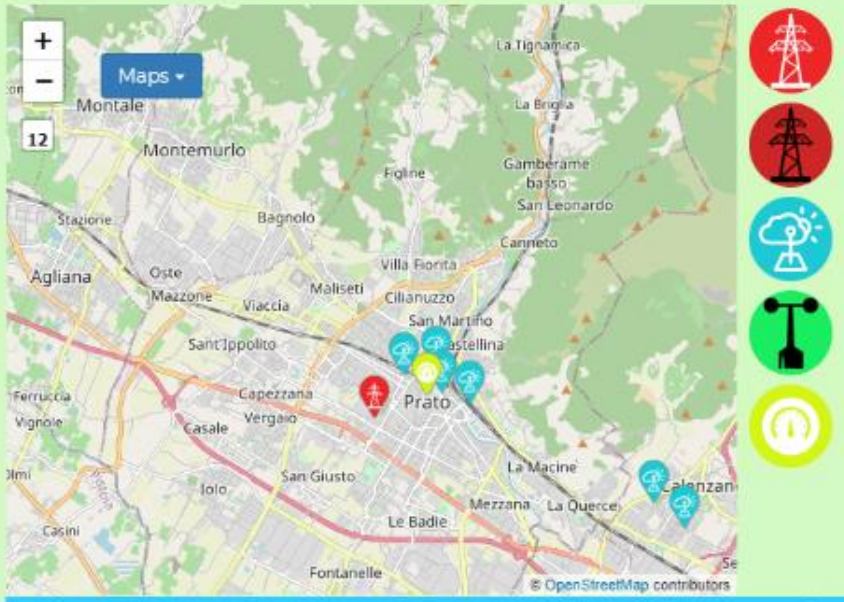
Environmental Contextual data from the city.
Historical Data, Remote Control, Mobile App

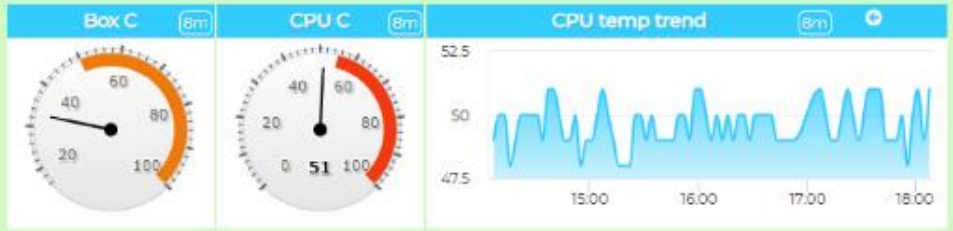


Snap4Home 5G Demo

Thu 11 Jun 18:07:32

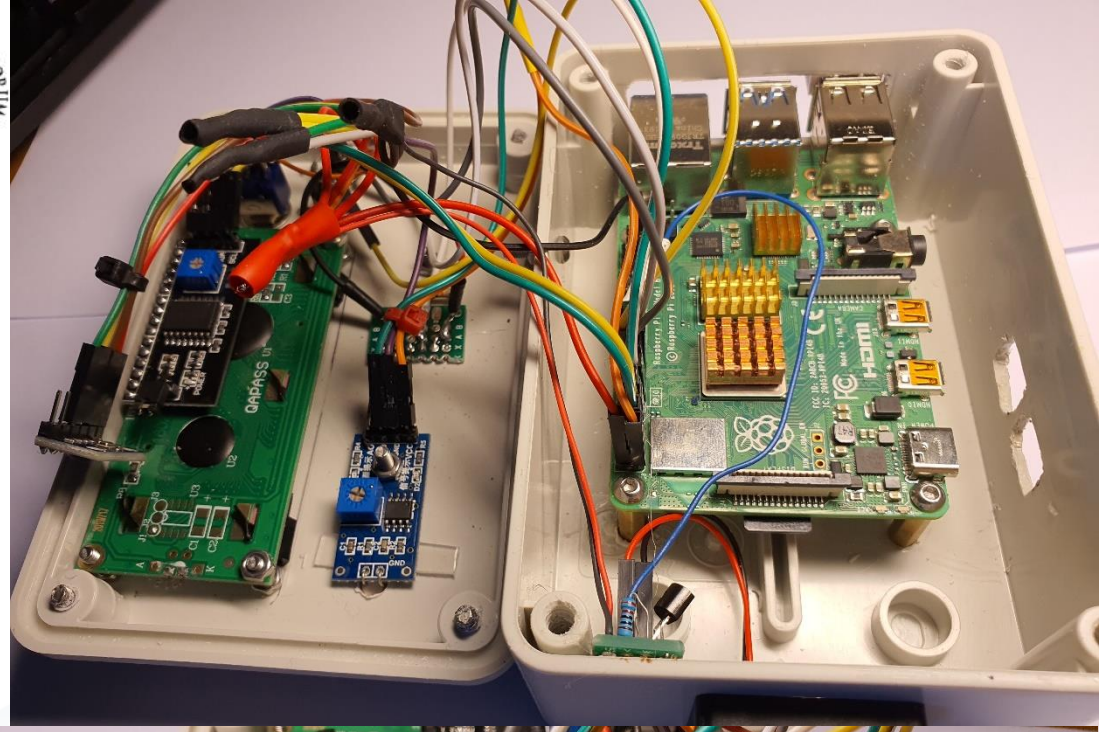
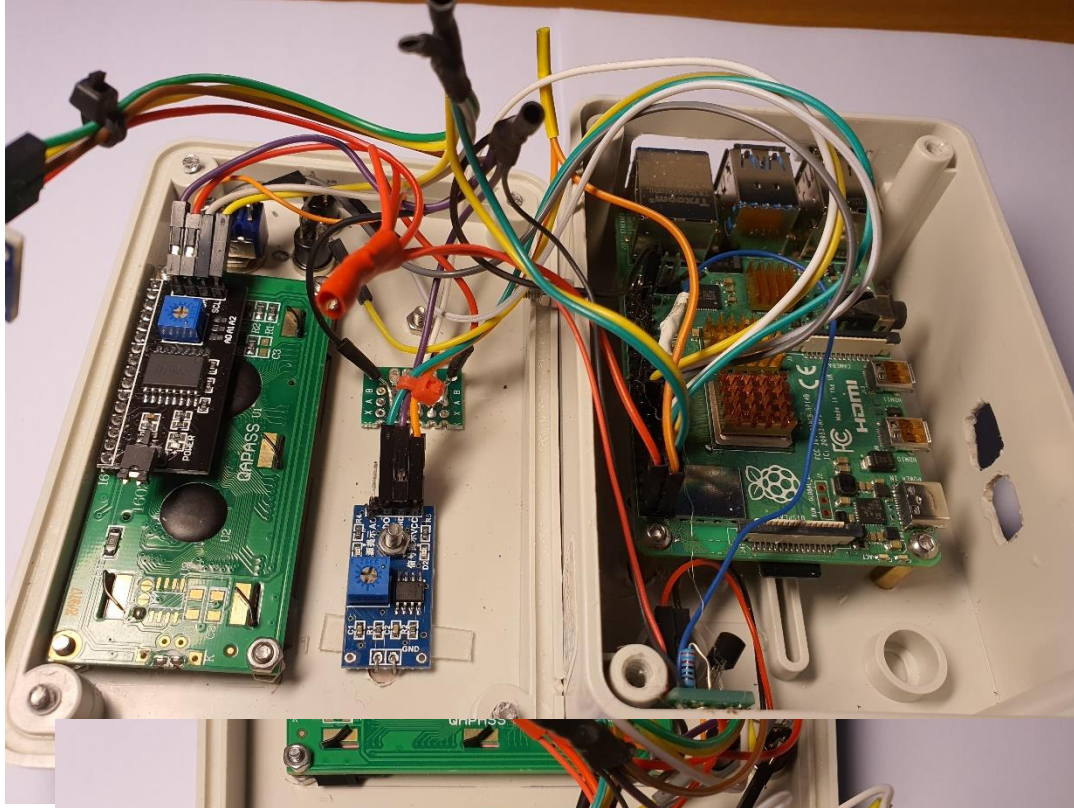
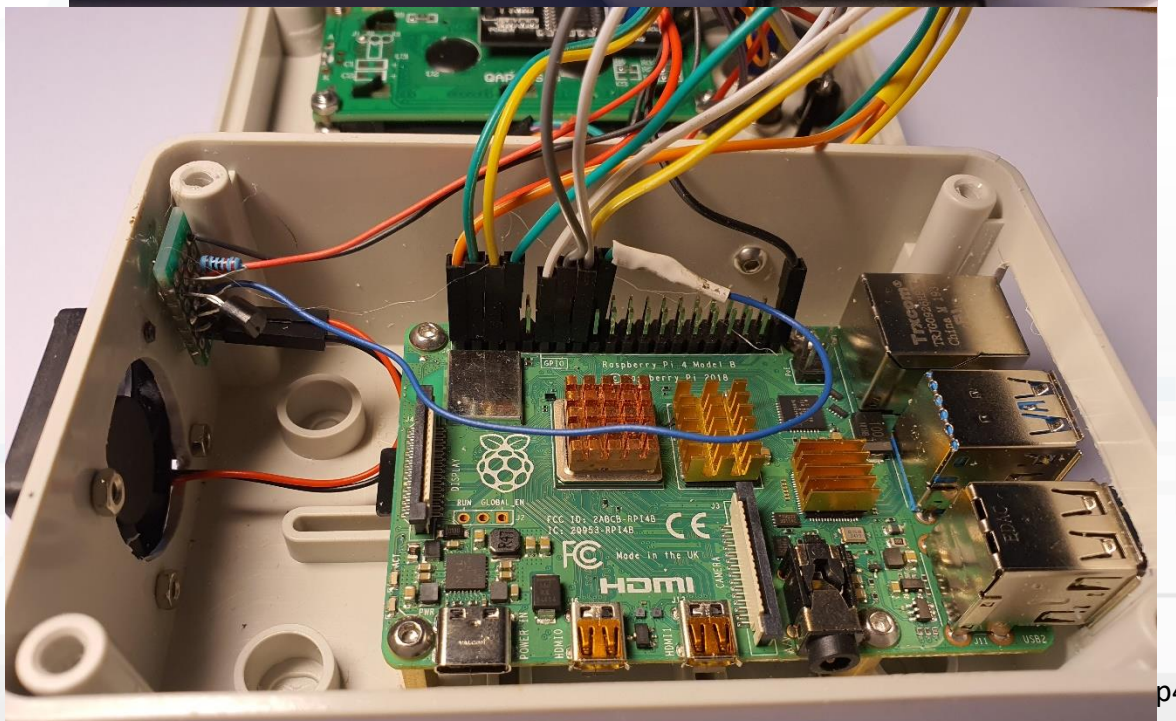
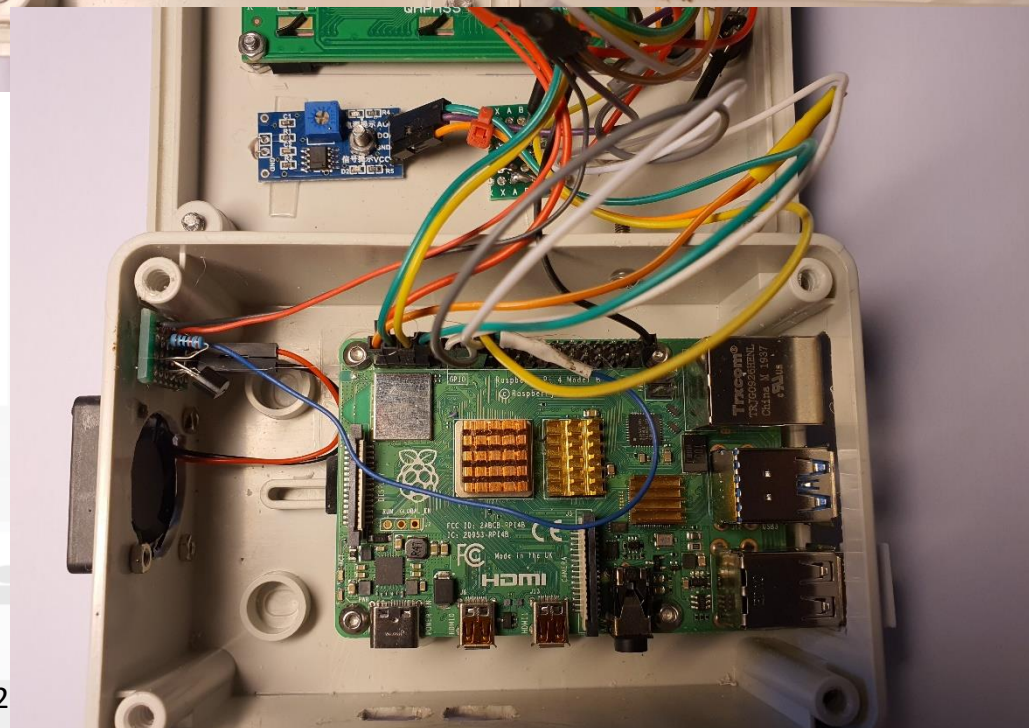






open fiber WIND 3 ZTE estra


T:27'C; Hum:43%
P1:NaNW;P2:NaNW
SNAP4CITY
PHILIPS
tp-link

https://www.snap4city.org/4

- Snap4City & Snap4Industry Registered Instances
- Scenario: MODBUS for Snap4Industry Snap4City Applications
- Scenario: MOBIMART Interreg: MOBilità Intelligente MARe Terra
- Scenario: City of Roma case, mobility and environmental data
- Scenario: Herit-Data video and aims
- Scenario: Control Room vs Video Wall
- Scenario: Snap4Home the case of: Alexa, Philips, Sonoff, TP-link, etc. (Italiano)
- Scenario: how to manage maintenance and accidents workflows
- Scenario: Snap4Home, how to exploit Snap4City solution on home automation
- Scenario: Energy Monitoring
- Scenario: Multipurpose User Engagement Tools
- Scenario: 5G Enabled Water Cleaning Control (smart city, industry 4.0)
- Scenario: High Level Control of Industrial Plant (industry 4.0)
- Scenario: Vehicle Monitoring via OBD2
- Scenario: Events and Museums Monitoring in Antwerp
- Scenario: High Resolution Prediction of Environmental Data
- Scenario: Mobility and Transport Analyses in multiple cities
- Scenario: People Flow Analysis via Wi-Fi
- Scenario: Antwerp Pilot on Environmental Data
- Scenario: Helsinki Pilot on Environmental Data
- Scenario: Firenze Smart City Control Room
- Scenario: Mobile & Web App: Toscana Where What … Km4City, Toscana in a Snap
- Scenario: Helsinki Pilot on User Behaviour
- Scenario: Antwerp Pilot on User Behaviour

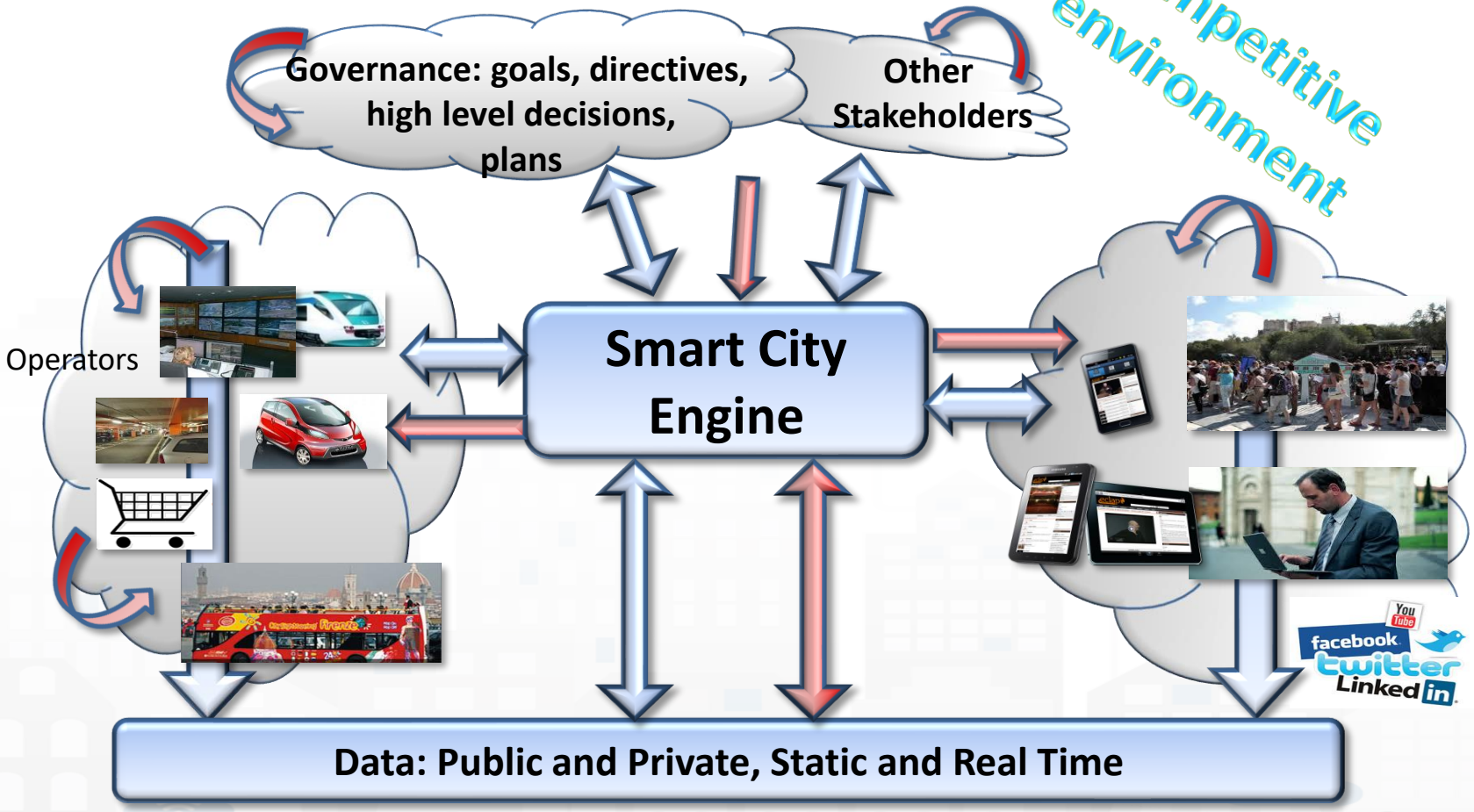
- Data Analytic: Origin Destination Matrices, Algorithms and tools
- Data Analytic: Traffic Flow Reconstruction
- Data Analytic: in general, and the cases of Antwerp and Helsinki
- Data Analytic: Predicting Air Quality
- Data Analytic: Analyzing Public Transportation Offer wrt Mobility Demand

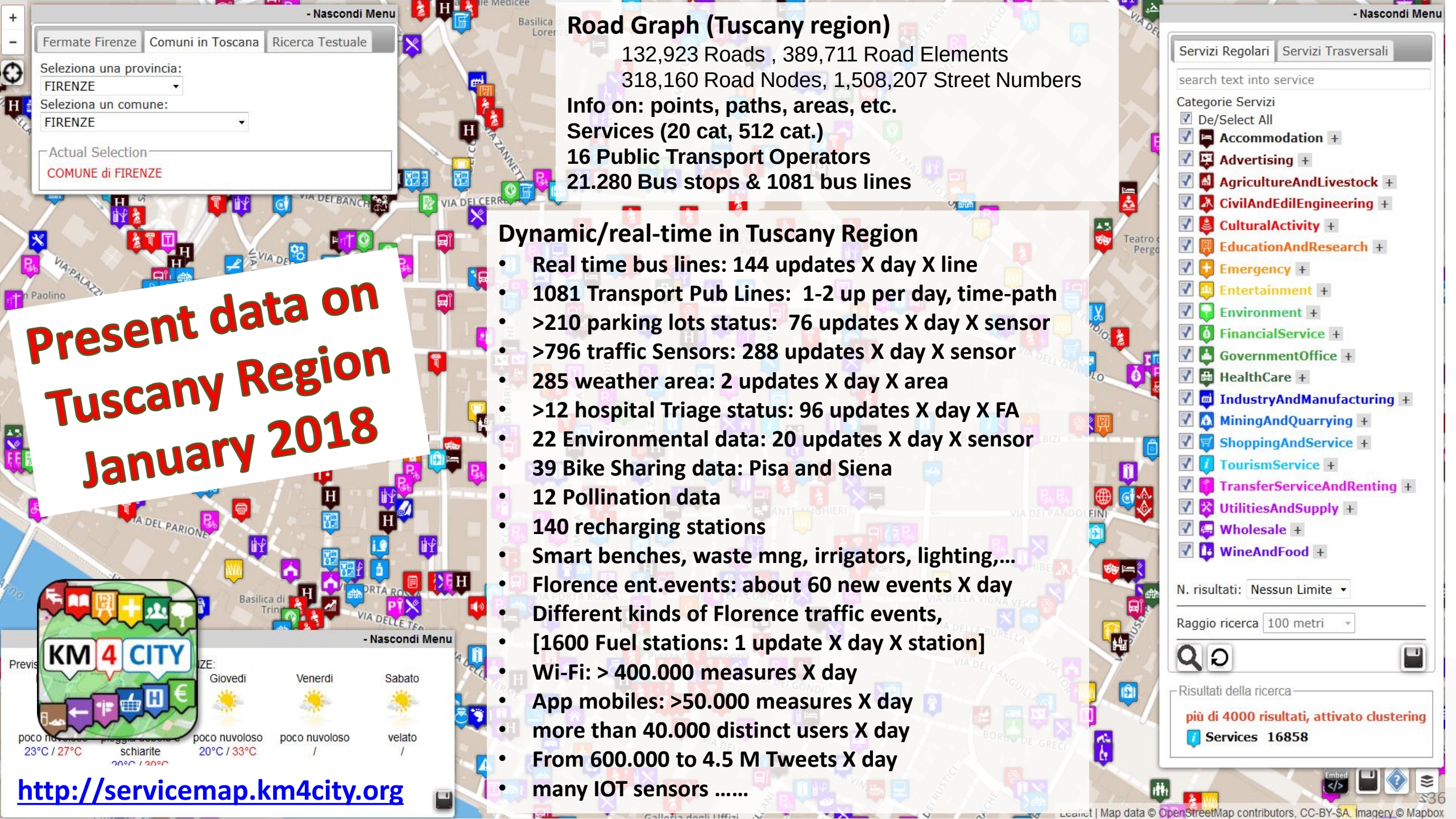
Integrated Urban Platform

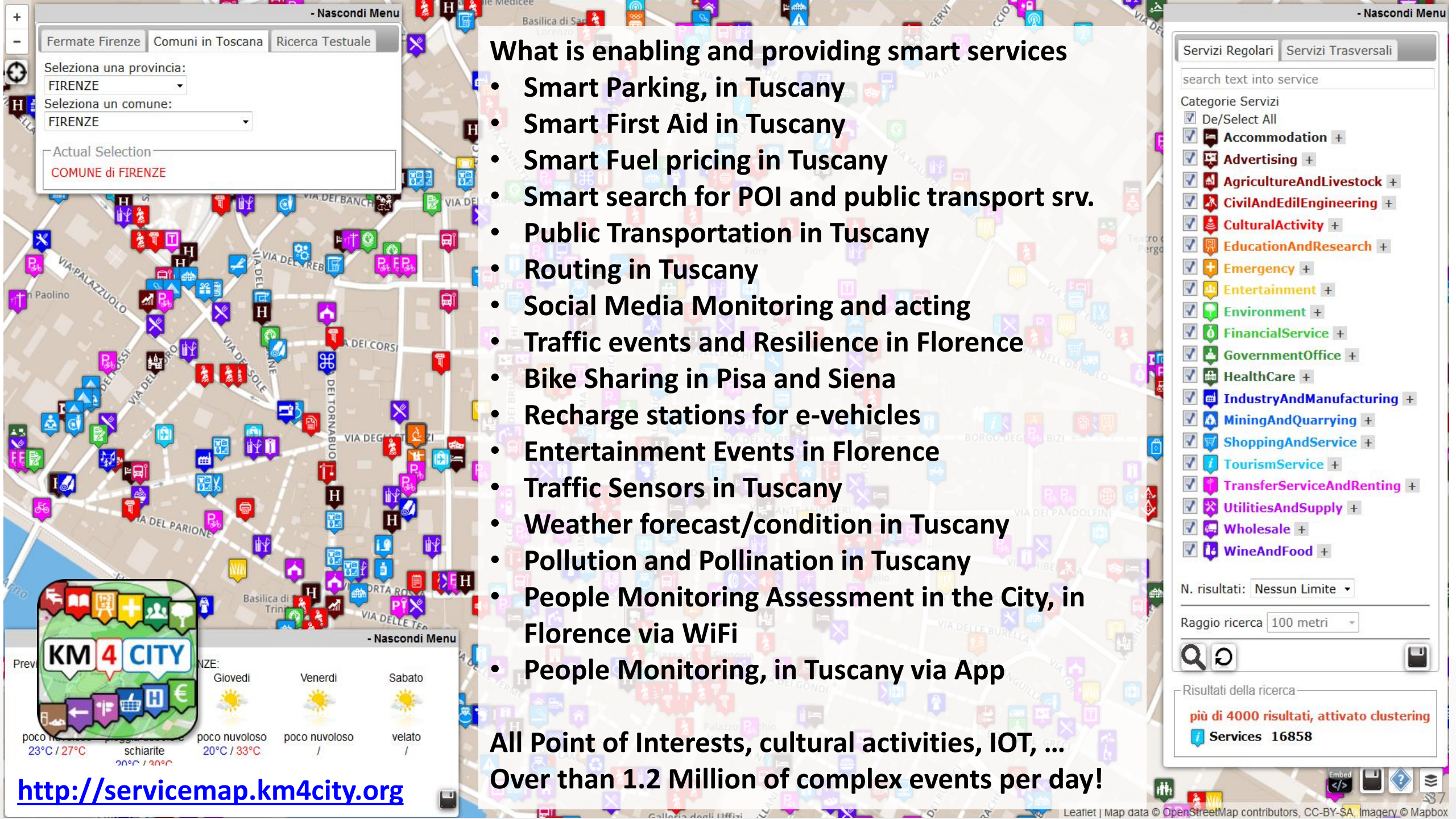
- **Produce value from data supporting Living lab**
  - Stimulate virtuous behavior, influence City Users!
  - Put in action CITY Strategies
- **Data Exploitation performing**
  - predictions, reasoning, business intelligence, ..
  - users behavior analysis, decision support system, ..
  - Control Room, Real Time Monitoring tools, ….
- **Aggregate & integrate data**
  - Multiple protocols from urban operators, ….
  - open data, IOT, sensors, internet of everything, cloud, mobile devices, Wi-Fi, social media, ...

From Strategies to (re-)Actions

- Informing
- Suggesting
- Engaging
- Alerting, Early Warning
- Making Decision active
- New Plan




- Nascondi Menu
Fermate Firenze
Comuni in Toscana
Ricerca Testuale
Seleziona una provincia:
FIRENZE
Seleziona un comune:
FIRENZE
Actual Selection
COMUNE di FIRENZE
Road Graph (Tuscany region)
132,923 Roads , 389,711 Road Elements
318,160 Road Nodes, 1,508,207 Street Numbers
Info on: points, paths, areas, etc.
Services (20 cat, 512 cat.)
16 Public Transport Operators
21.280 Bus stops & 1081 bus lines
Present data on Tuscany Region January 2018
Dynamic/real-time in Tuscany Region
• Real time bus lines: 144 updates X day X line
• 1081 Transport Pub Lines: 1-2 up per day, time-path
• >210 parking lots status: 76 updates X day X sensor
• >796 traffic Sensors: 288 updates X day X sensor
• 285 weather area: 2 updates X day X area
• >12 hospital Triage status: 96 updates X day X FA
• 22 Environmental data: 20 updates X day X sensor
• 39 Bike Sharing data: Pisa and Siena
• 12 Pollination data
• 140 recharging stations
• Smart benches, waste mng, irrigators, lighting,…
• Florence ent.events: about 60 new events X day
• Different kinds of Florence traffic events,
• [1600 Fuel stations: 1 update X day X station]
• Wi-Fi: > 400.000 measures X day
• App mobiles: >50.000 measures X day
• more than 40.000 distinct users X day
• From 600.000 to 4.5 M Tweets X day
• many IOT sensors ……
- Nascondi Menu
Servizi Regolari
Servizi Trasversali
search text into service
Categorie Servizi
De/Select All
Accommodation
Advertising
AgricultureAndLivestock
CivilAndEdilEngineering
CulturalActivity
EducationAndResearch
Emergency
Entertainment
Environment
FinancialService
GovernmentOffice
HealthCare
IndustryAndManufacturing
MiningAndQuarrying
ShoppingAndService
TourismService
TransferServiceAndRenting
UtilitiesAndSupply
Wholesale
WineAndFood
N. risultati: Nessun Limite
Raggio ricerca 100 metri
Risultati della ricerca
più di 4000 risultati, attivato clustering
Services 16858
KM 4 CITY
Giovedi
Venerdi
Sabato
poco nuvoloso
20°C / 33°C
poco nuvoloso
/
velato
/
23°C / 27°C
schiarite
http://servicemap.km4city.org
Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox



What is enabling and providing smart services

- Smart Parking, in Tuscany
- Smart First Aid in Tuscany
- Smart Fuel pricing in Tuscany
- Smart search for POI and public transport srv.
- Public Transportation in Tuscany
- Routing in Tuscany
- Social Media Monitoring and acting
- Traffic events and Resilience in Florence
- Bike Sharing in Pisa and Siena
- Recharge stations for e-vehicles
- Entertainment Events in Florence
- Traffic Sensors in Tuscany
- Weather forecast/condition in Tuscany
- Pollution and Pollination in Tuscany
- People Monitoring Assessment in the City, in Florence via WiFi
- People Monitoring, in Tuscany via App

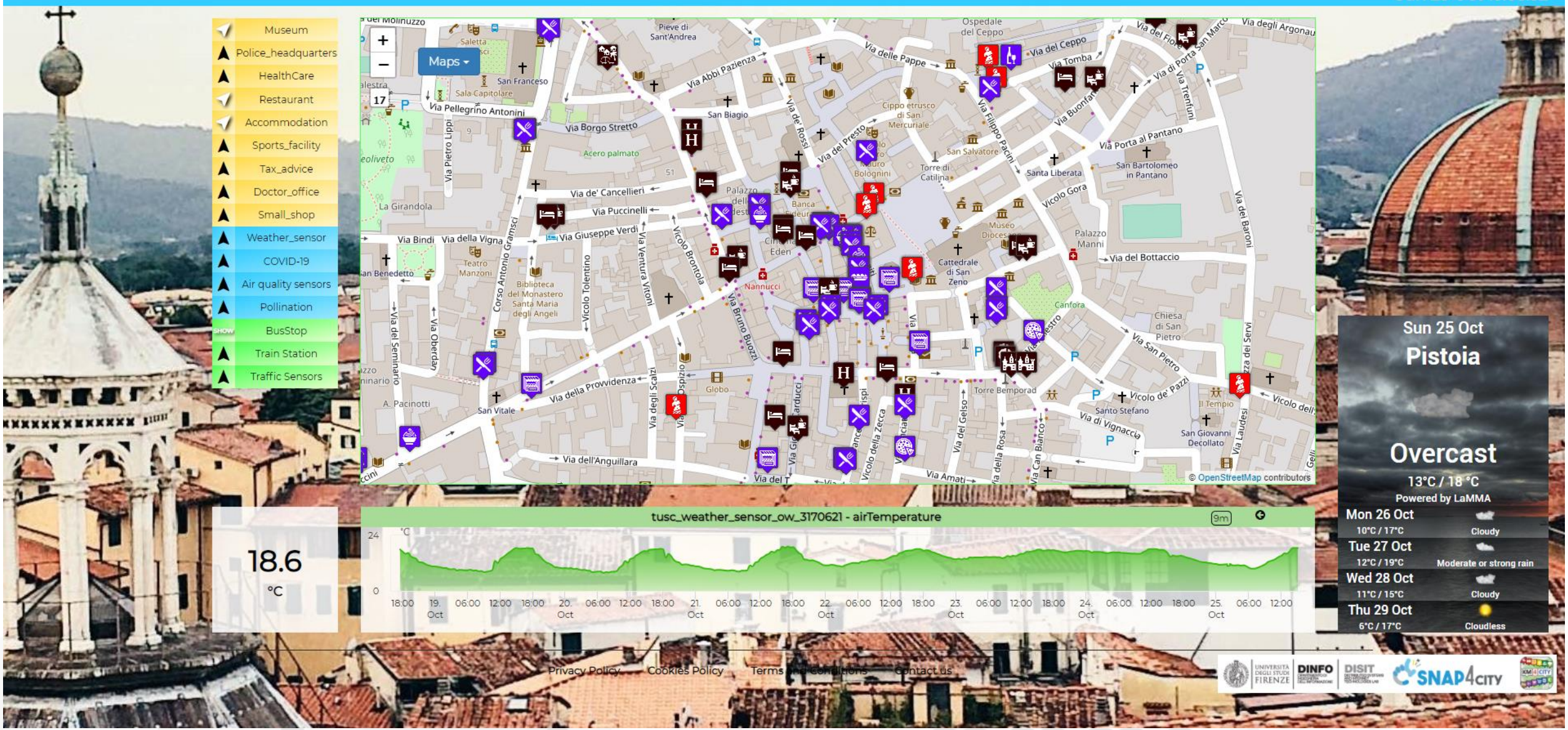
All Point of Interests, cultural activities, IOT, …

Over than 1.2 Million of complex events per day!

http://servicemap.km4city.org

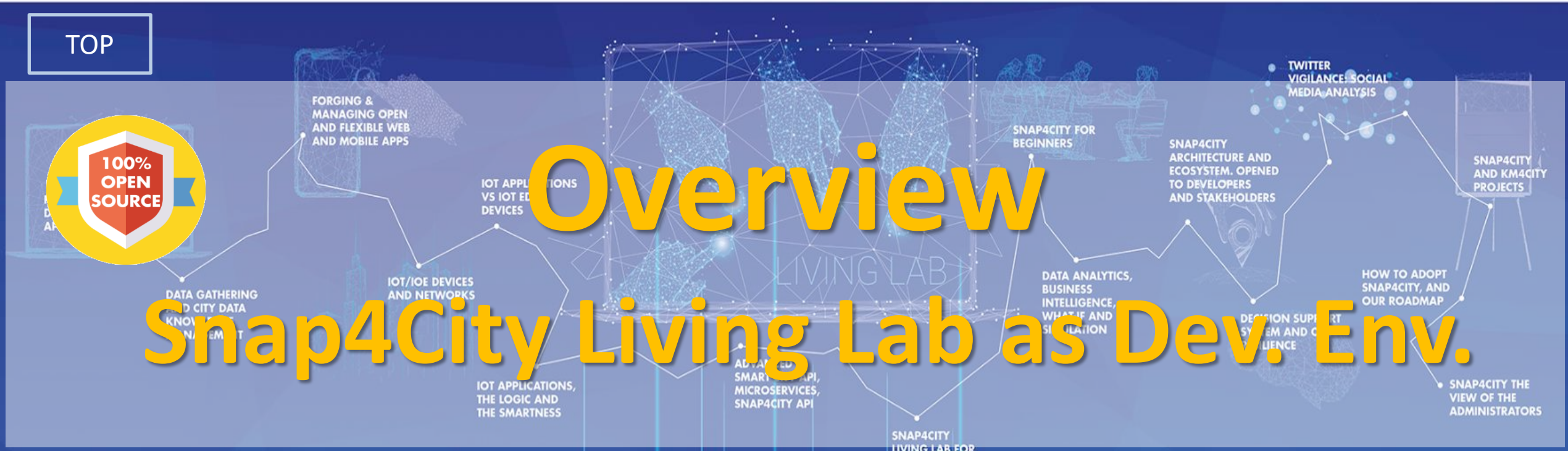
Pistoia overview 2020

Sun 25 Oct 15:05:52



https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=Mjk4NA==

TOP



Overview

Snap4City Living Lab as Dev. Env.

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

SNAP4CITY
www.snap4city.org

KM4CITY

Powered by FIWARE

SNAP4 Appliances and Dockers Installations

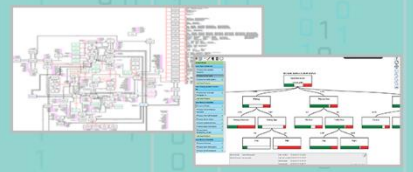
FREE TRIAL

PEN Test Passed

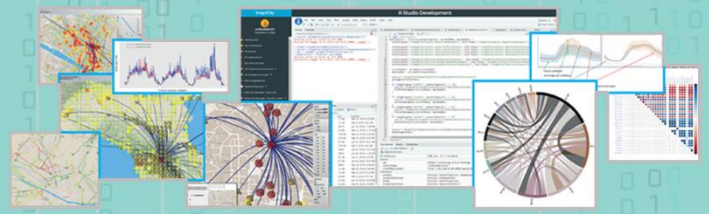
EU GDPR COMPLIANT

100% OPEN SOURCE

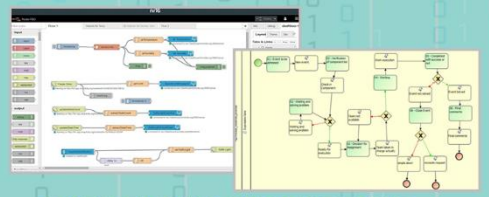
DASHBOARDS AND APPS - CONTROL ROOMS - DECISION SUPPORT SYSTEMS - WHAT-IF ANALYSIS



EXPERT SYSTEM
KNOWLEDGE BASE
STORAGE

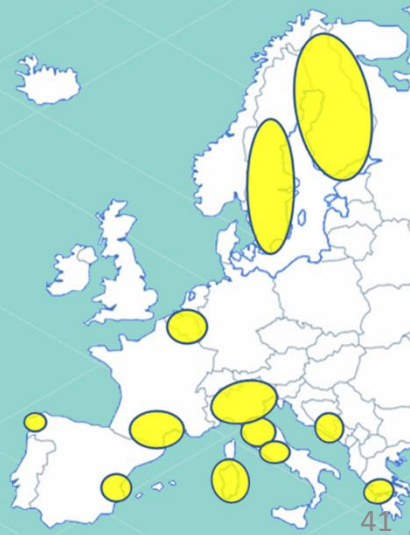


BIG DATA ANALYTICS
ARTIFICIAL INTELLIGENCE
BUSINESS INTELLIGENCE
MACHINE LEARNING



DATA FLOWS, WORKFLOWS
MICROSERVICES
MANAGEMENT

METHODOLOGIES
COURSES AND COMMUNITY
LIVING LABS
DEVELOPMENT TOOLS



Your Level

All Tools

Welcome: how to start using Snap4City for beginners

Personalized Suggestions

Snap4City developers suggest you reading:

You have already created a **Dashboard**. Now, you may decide to make it public (visible and accessible) to all on WEB, or to provide access in view to other specific users that you know by nickname.
In addition, you can pass the Ownership of a **Dashboard** to some other user of the system, and you can clone the **Dashboard** as well. So that you can create **Dashboard** for other users as well.
We sugget to test these functionaltiies since you can:

- access to Data Set **Manager** to upload/download, share data sets as files in CSV: https://datagate.snap4city.org/ssologin_handler
- upload data for the **knowledge base** and **dashboards** via Data Set **Manager**,
- access and share of resources as: **dashboards**, **IOT Applications**, blocks, etc.; https://processloader.snap4city.org/.../ssoLogin.php?redirect=page.php%3FshowFrame=false
- access to help and contacts, FAQ, documentation and articles
- manage personal data: profile, IOT Sensors, **Annotations**, Personal Data, **Dashboards**..; https://www.snap4city.org/drupal/myprofiledata
- Auditing Access to My Data according to **GDPR**.

See this ... case for development tools of the above possibilities:

TC1.10. Dashboard delegation to access and passage of ownership, and/or cloning

Exercises

If you are not registred please apply for a **free registration from https://www.snap4city.org** and then pass to ACCESS AT THE TOOLS and full Snap4City environment

Snap4City puts in the hands of City Users a flexible environment to quickly create a large range of smart city applications/views exploiting heterogeneous data and services of stakeholders by IOT/IOE and big data technologies. For Snap4City, City Users can be citizens, students, operators, researchers, decision makers, developers, etc. see Users' Roles on Snap4City.

- **Manager:** is a **final user**, has the capability of: accessing and creating Dashboards with a large set of data (high level types as: POI, sensors, KPI, micro applications, external services, etc.), attaching alerts and notifications; registering IOT Devices; creating IOT Applications exploiting MicroServices; loading and sharing data sets; managing personal data and annotations; full access to documentation, help desk, FAQ, coworking; managing personal profile and data according to GDPR; **NOTE:** accessible features are mainly visual and simple to understand and to use, and provide a limited number of parameters on each dialog and for each action. Default values of created elements can be changed editing elements.
- **AreaManager:** is a **Developer/researcher, students, city operator**, with additional capabilities with respect to the Manager to: register IOT Brokers; creating advanced IOT applications; create massive data transformation processes; create data analytics in multiple languages, testing and load them, create microservices; adding external services; sharing results, loading shapes; analyzing performance of the back office; **NOTE:** technical views and details are fully accessible

SLIDES

NEWS

Flyer

News

VIDEOS

Suggested Activities to be performed to Learn HOW to use Snap4City:

This page would guide you along few steps to ... how the solution allows you to incrementally pass from **Level 0 to 5, from a Manager to an Area Manager:**

- Level 0 user: access at data/services views of the city by using public Dashboards; (Public User) **(overview on dashboards)**
- Level 1 user: create personal/professional views/dashboards on data; (Manager) **(see what a Manager can do), (see how Dashboards can be created)**

Dashboards (Public)
Knowledge and Maps
Service Map (Toscana)
Service Map 3D (Firenze)
Helsinki Service Map
Garda Lake Service Map
Cagliari Service Map
Service Map 3D (Helsinki)
Micro Applications
External Services
Data Set Manager: Data Gate
Resource Manager
Development Tools
Management
Help and Contacts
Documentation and Articles
Km4City portal
DISIT Lab portal

Snap4City - scalable Smart aNalytic APplication builder for sentient Cities

Tutorials Scenarious Innovations Interoperability Installations What People say

Mobile Apps IOT Devices IOT Applications Data Analytics Dashboards Living Lab Smart City API

Smart City Ontology Articles

SMARTCITY EXPO WORLD CONGRESS 19-21 Nov. 2019 *See you at Stand A118*

SNAP4CITY on EUROPEAN OPEN SCIENCE CLOUD MARKETPLACE

SNAP4CITY HACKATHON BUILD YOUR APP FOR A CONNECTED CITY

Smart Cities need to set up a flexible Living Lab to cope with the city evolution in terms of services and city users' needs and sustainability. Snap4City solution (https://www.snap4city.org) provides a flexible method and solution to quickly create a large range of smart city applications exploiting heterogeneous data and enabling services for stakeholders by IOT/IOE, data analytics and big data technologies. Snap4City applications may exploit multiple paradigms as data driven, stream and batch processing, putting co-creation tools in the hands of: (i) Smart Living Lab users and developers a plethora of solutions to develop applications without vendor lock-in nor technology lock-in, (ii) final users customizable / flexible mobile Apps and tools, (iii) city operators and decision makers specialized / sophisticated city dashboards and IOT/IOE applications for city status monitoring, control and decision support. Snap4City satisfies all the expected requirements of Select4Cities challenge PCP and much more, and it is 100% open source, scalable, robust, respects user needs and privacy; provides MicroServices and easily replaceable tools; compliant with GDPR; provides a set of tools for knowledge and living lab management, and it is compliant

Login

Registration

- New Registration
- Request a new password

Search

Search

-Any-

Training Snap4City from Data to Sentient Cities in a Snap
Program and Interactive Slides

Powered by www.km4city.org

FI-WARE Node-RED

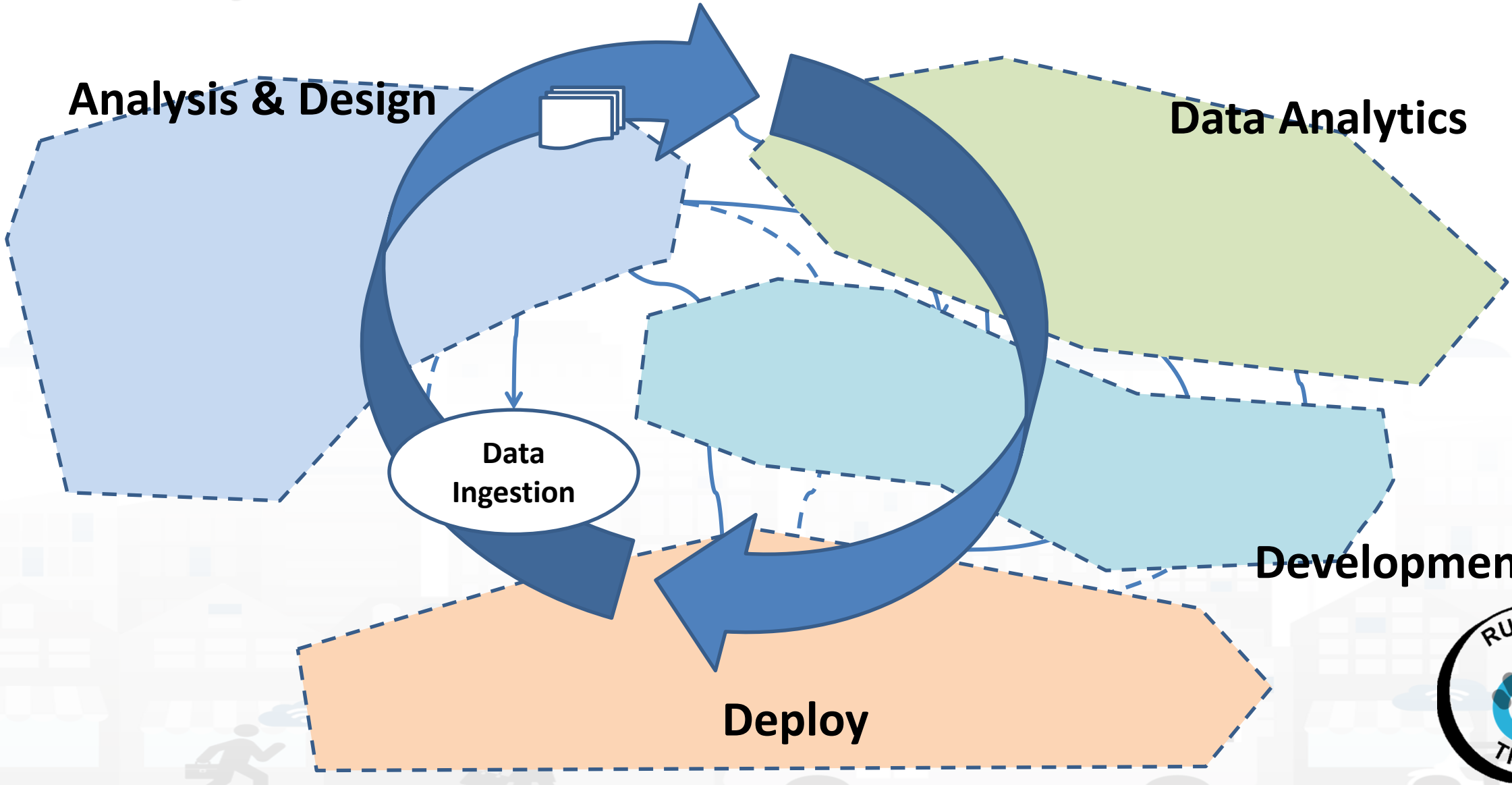
Virtual Assistant

https://www.snap4city.org/577

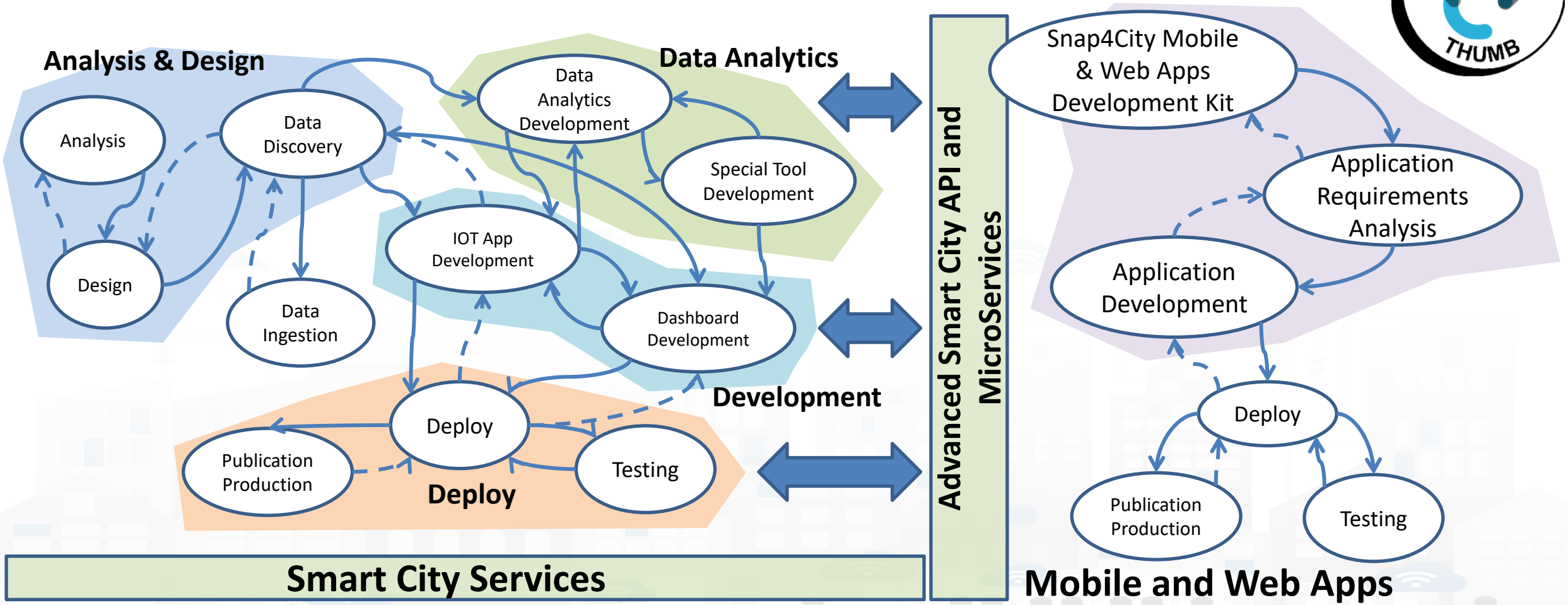
On Line Training Material (free of charge)

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

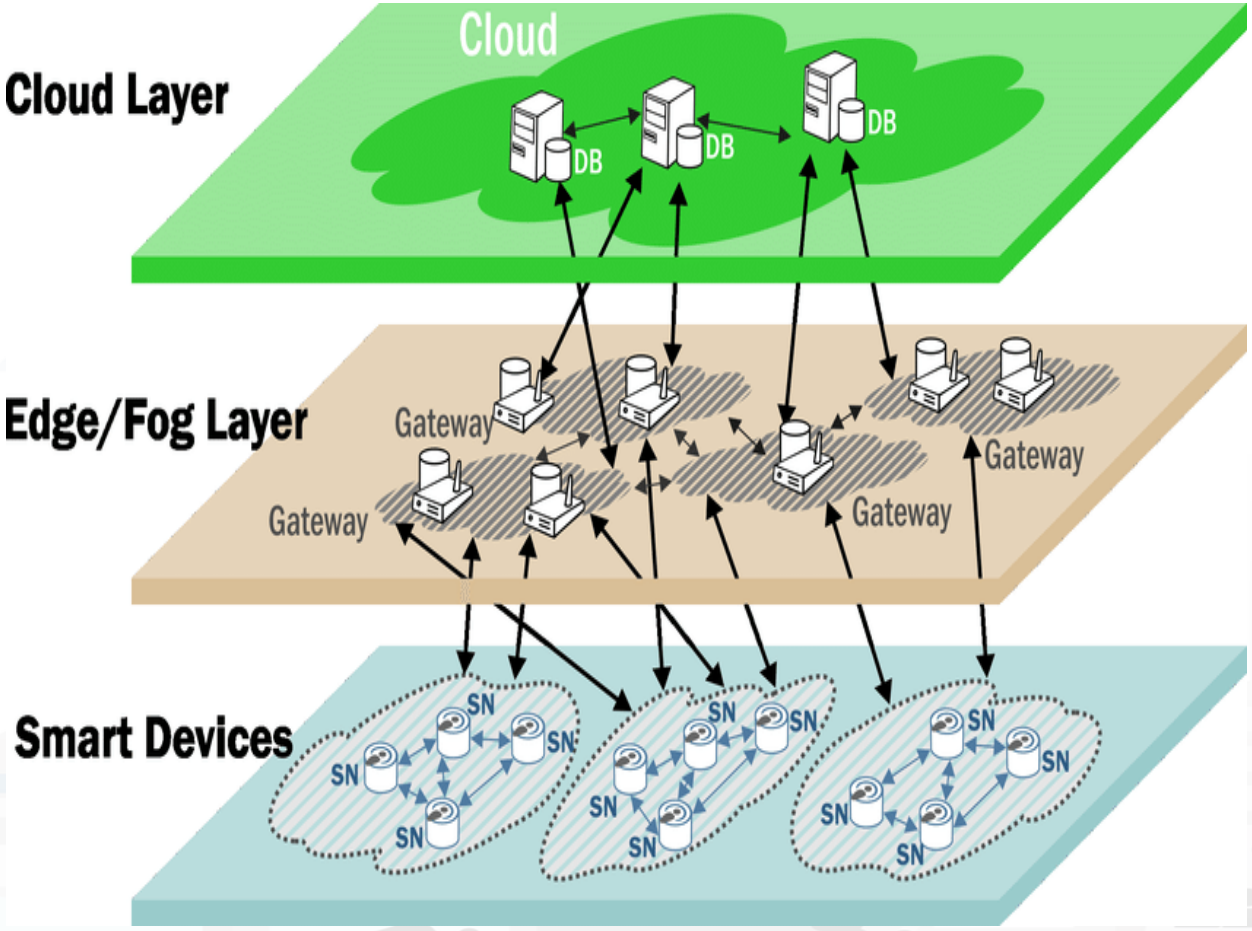
Development Life Cycle Smart City Services

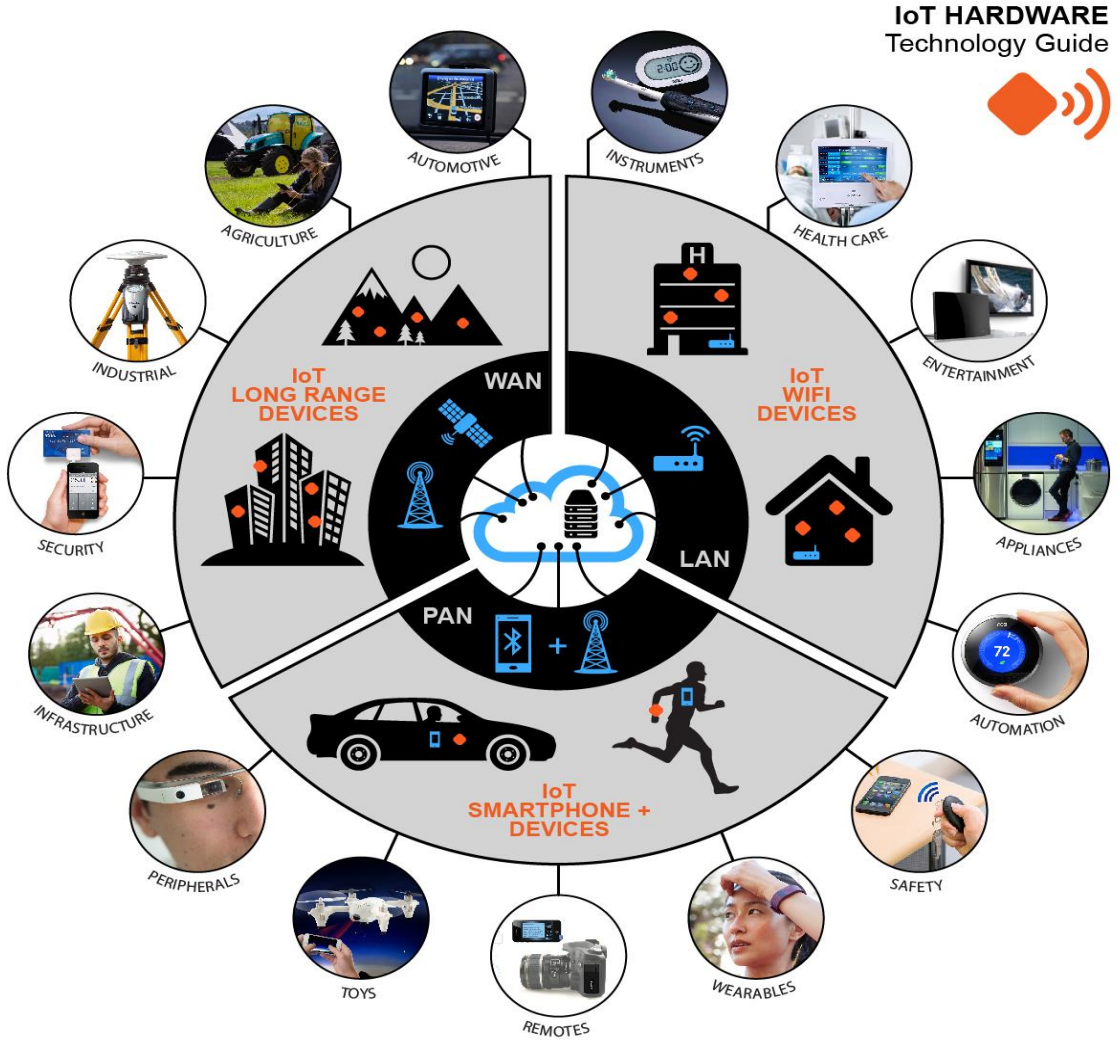


Develop Mobile & Web Applications Exploiting Snap4City Smart City Services

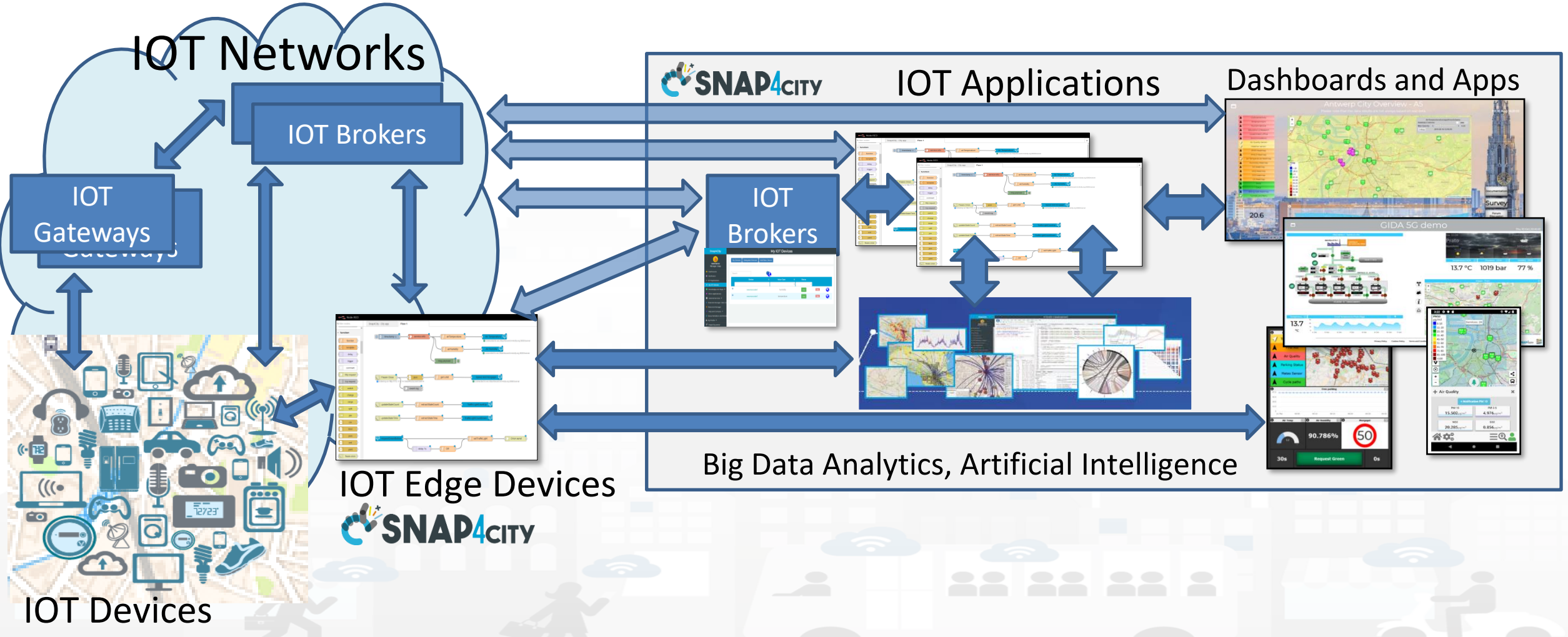


Cloud vs Fog/Edge Computing

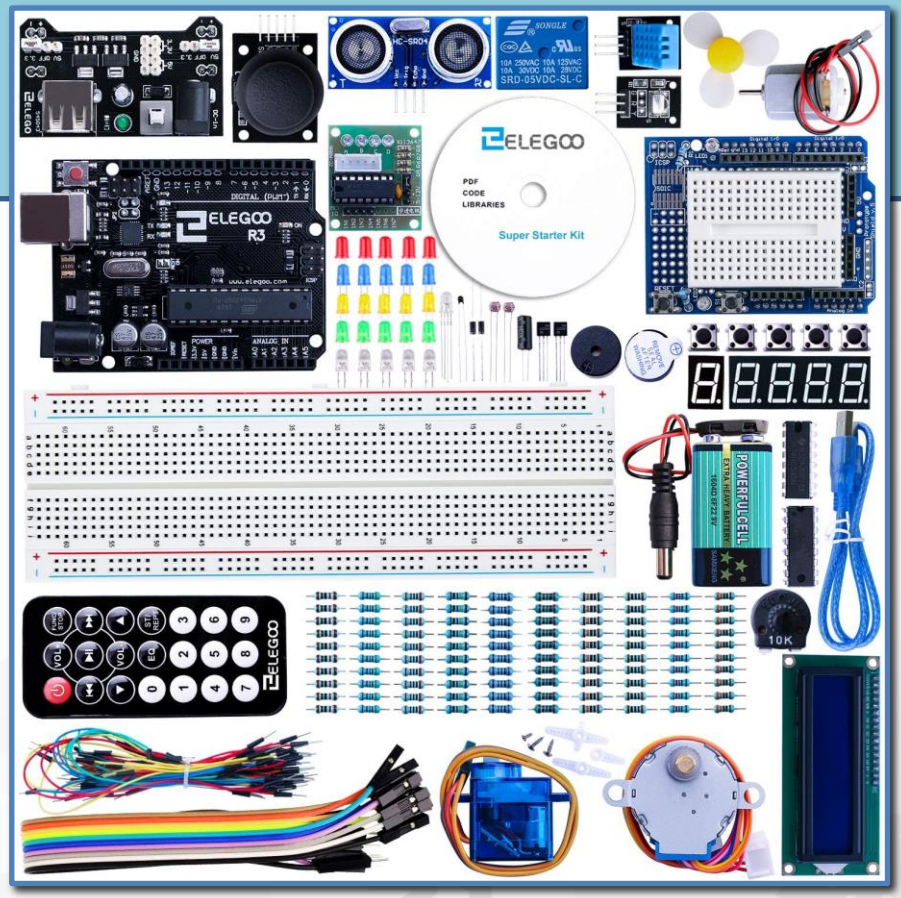


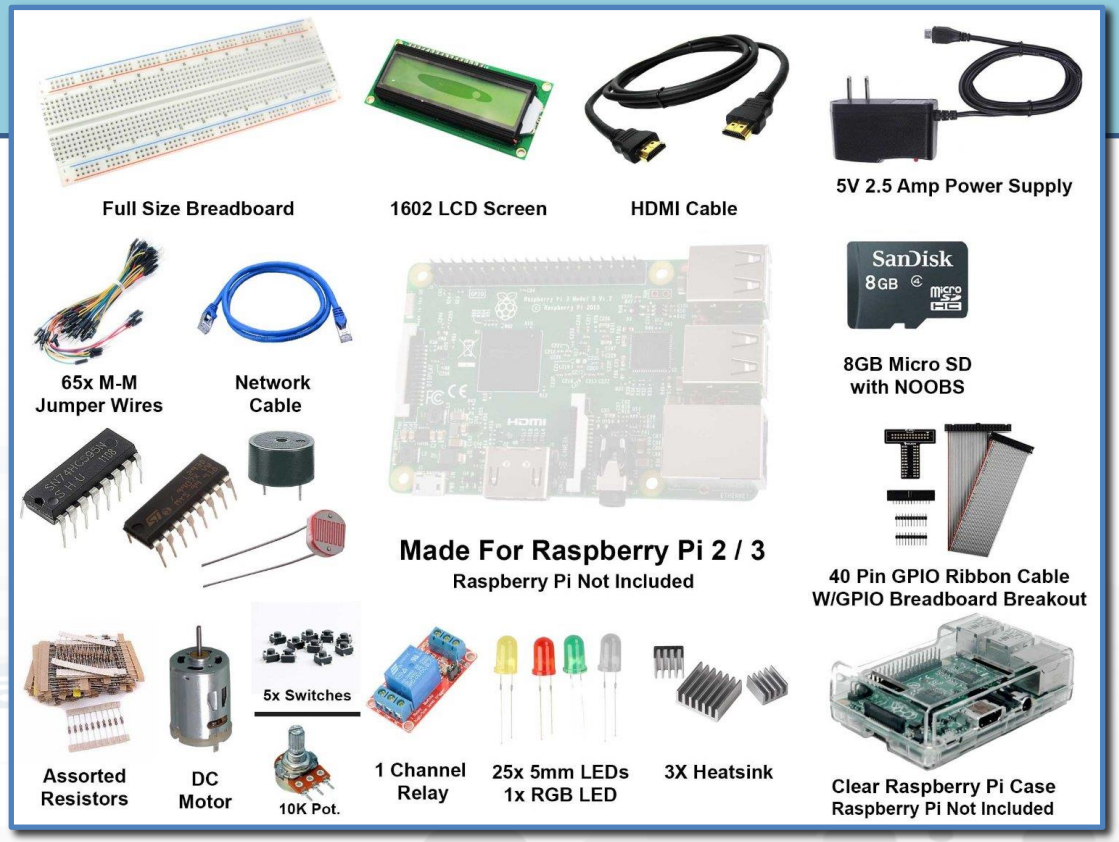


Snap4City Services on Edge and on Cloud



IOT Devices and IOT Networks of any kind



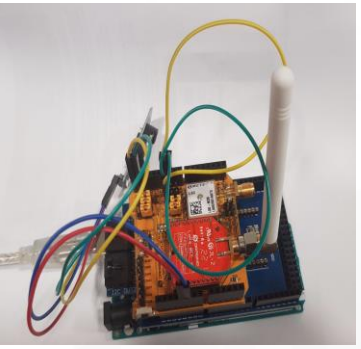


IOT Devices

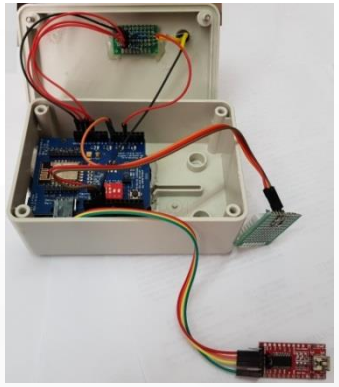
Sensors/
Actuators

IOT Edge Devices

LoraWAN +
Arduino +
I2C, NGSI



Arduino,
Wi-Fi, NGSI

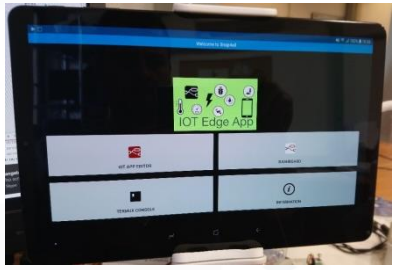


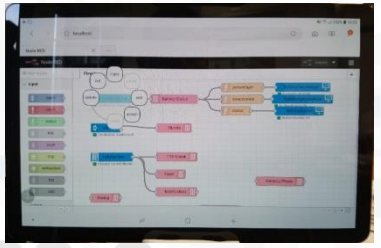
Snap4All
IOT Button
ESP, NGSI,
Wi-FI, BT

Snap4All PAX
Counter
LoraWAN
WIFI, NGSI,
GPS

IOT Edge
NodeRED:
Raspberry Pi,
NGSI, WiFi,
RJ45,..

IOT Edge
NodeRED:
Android, LINUX,
Windows, …



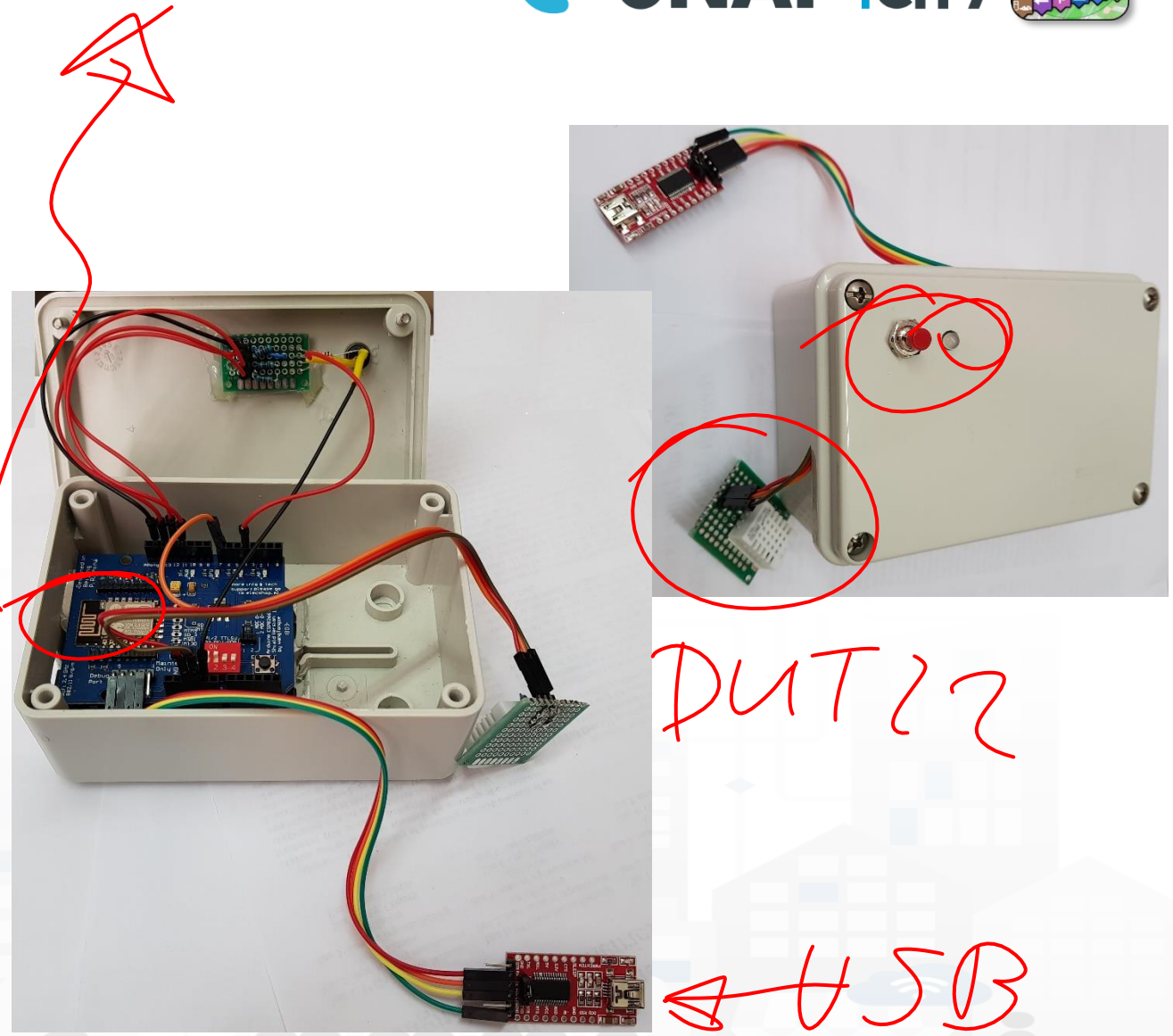


LoraWan
Gateway:
IOT Edge, NGSI,
WIFI, RJ45, GPS

Any Sensor / Actuator
Open to other protocols

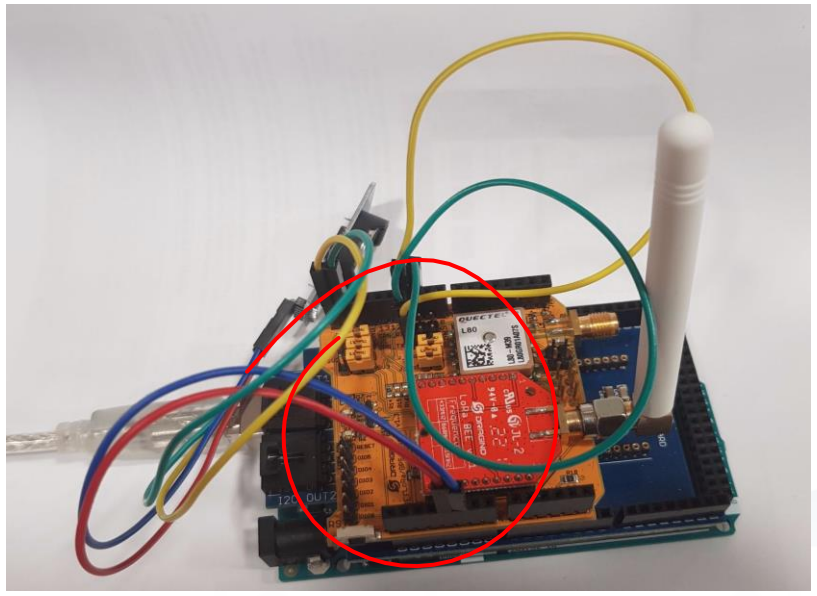
IOT Device with Arduino

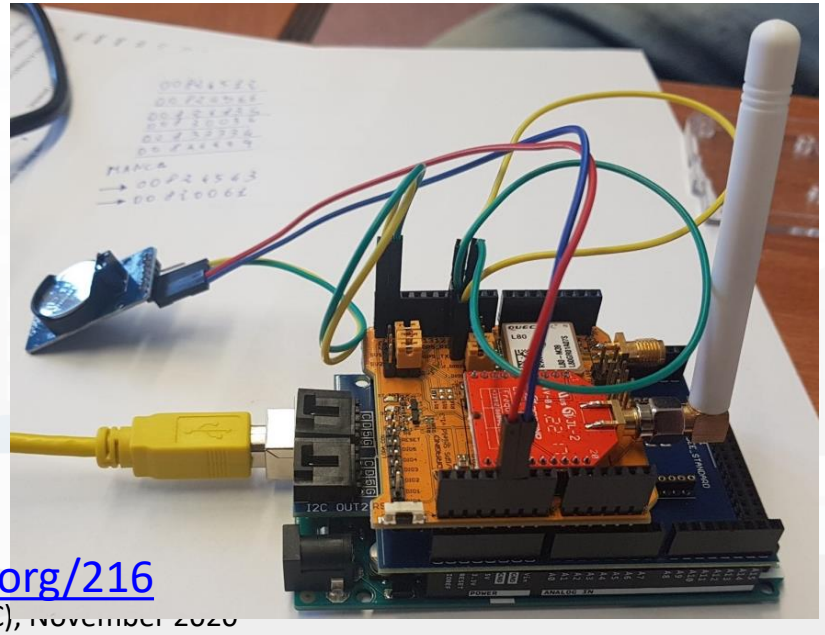
- Arduino Uno
- Wi-Fi shield, standard
- Mutual Authentication with certificates, or K1,K2,sha
- Secure encrypted connection, NGSI
- Open Source
- Fully Customizable
  - Any sensor
  - NGSI or any other protocol



Lora IOT Device, Arduino

- Arduino Uno, Mega
- LoraWan Connection
- Any sensor, + I2C
- Fully Customizable
- Open Source
- NGSI or any other protocols
- Gateway: Lora-NGSI Snap4



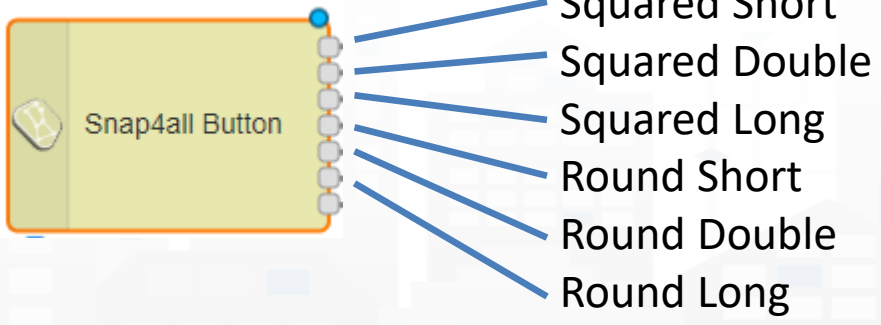


https://www.snap4city.org/216

Snap4All IOT Button

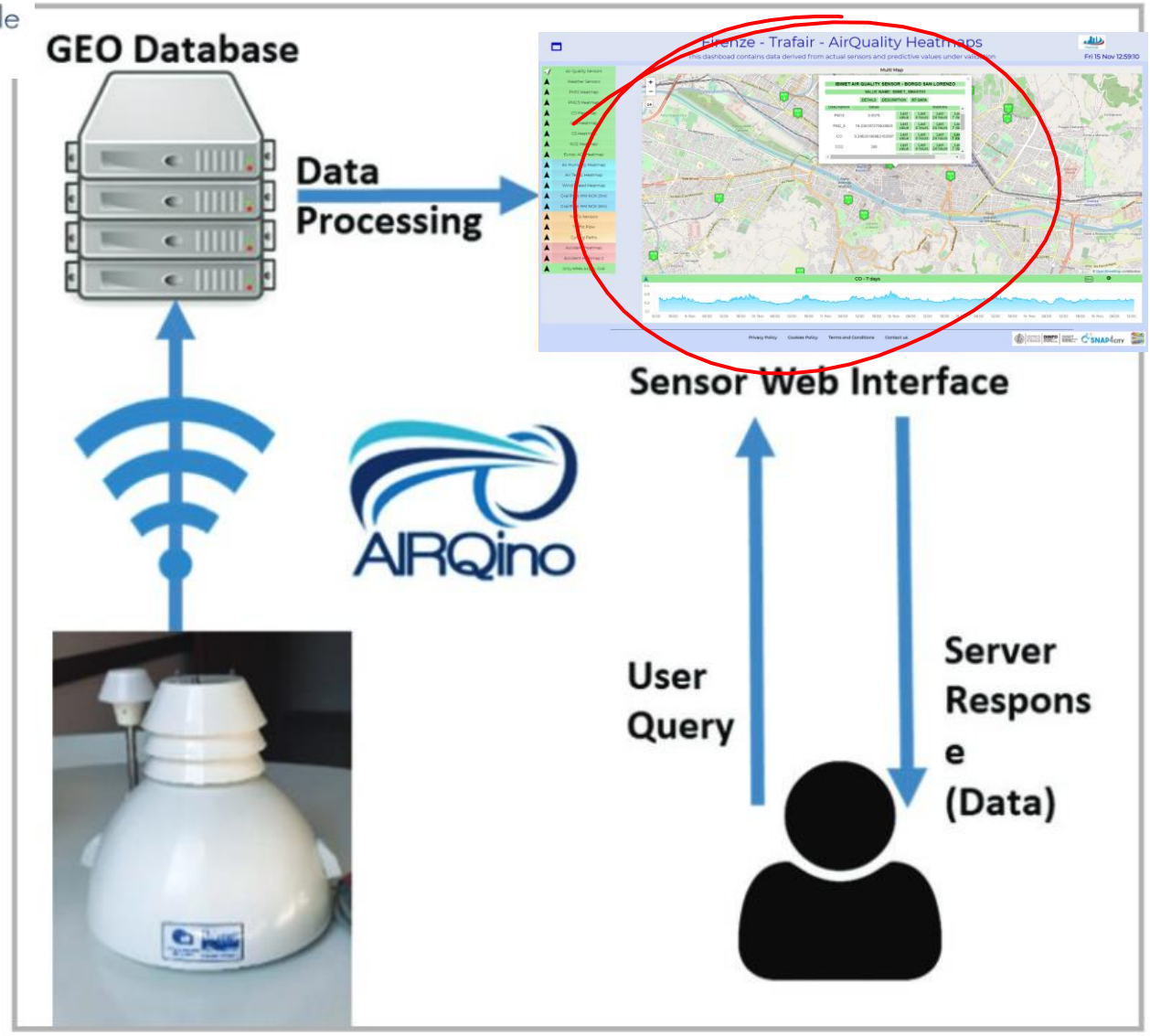
- Multi Wi-Fi
- Ready to use BLE
- ESP based, cheap & easy
  - low/no energy consumption/ standby
- Mutual Authentication with certificates, or K1,K2,sha
- secure encrypted connection, NGSI
- Open Source, Fully Customizable
- HW extensible to sensors

version: 3



https://www.snap4city.org/drupal/node/276
https://www.snap4city.org/drupal/node/297 help config


T2 Peretola Aeroporto
1012
GEST


GEO Database
Data Processing
Firenze - Trafair - AirQuality Heatmaps
Sensor Web Interface
AIRQino
User Query
Server Response (Data)

PaxCounter devices

- Fixed PaxCounter LoraWan
  - Based on Wi-Fi- Bluetooth
- Mobile PaxCounter LoraWan
  - Based on Wi-Fi- Bluetooth
- Fixed PaxCounter(LoraWan+Wifi out)
  - Based on Wi-Fi- Bluetooth

LoRa® Wi Fi Bluetooth™

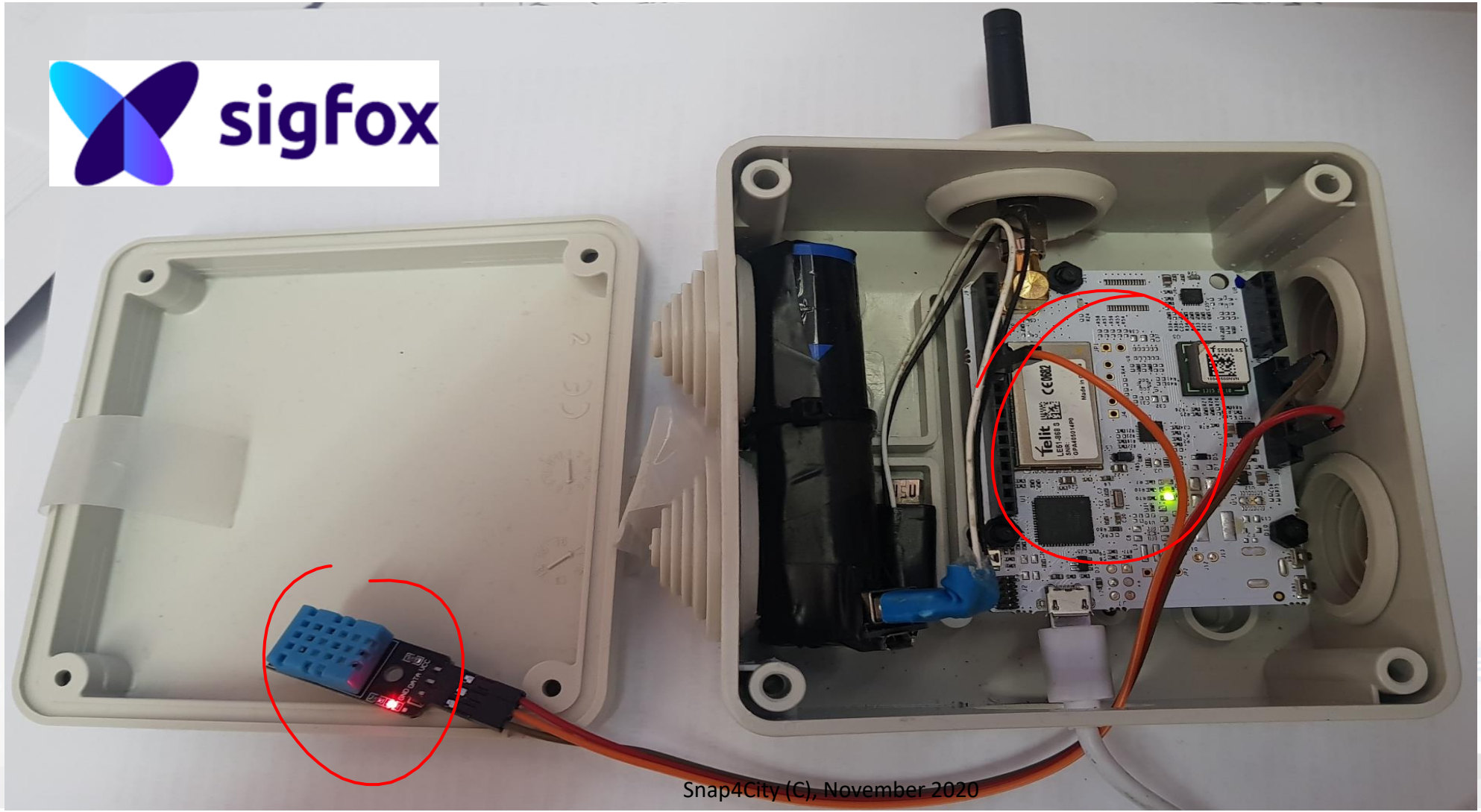
https://www.snap4city.org/drupal/node/456

Libelium

- PM10
- Temp
- Humidity
- Pm2.5
- NO
- NO2
- CO2
- Etc.

https://www.snap4city.org/659 how to set up on Snap4City

SigFOX: example of a develoment platform



IOT Network Manager vs Final User

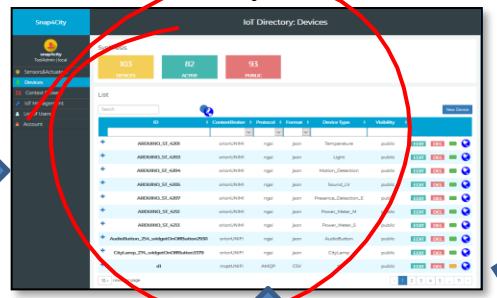
Network of IOT Brokers

IOT Broker

External

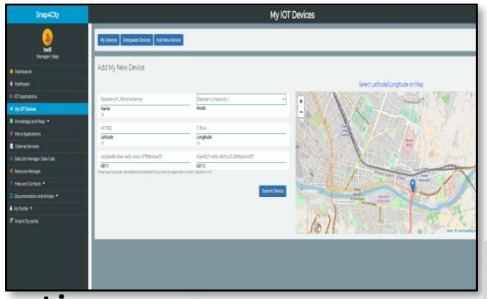
Internal

IOT Directory



IOT Network Manager

My IOT Device



Register

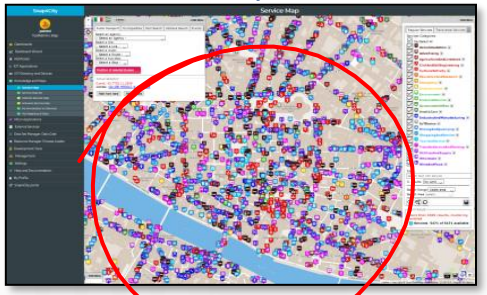
Registering

Discovering

Knowledge Base, Km4City

Knowledge and Storage Data from the Field and City

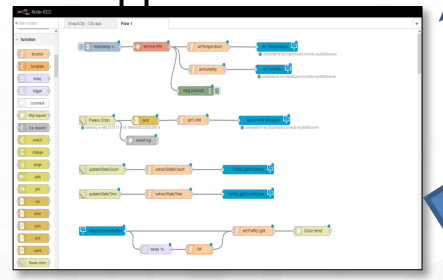
Browsing



ServiceMap Knowledge Base

Discovering

IOT Application

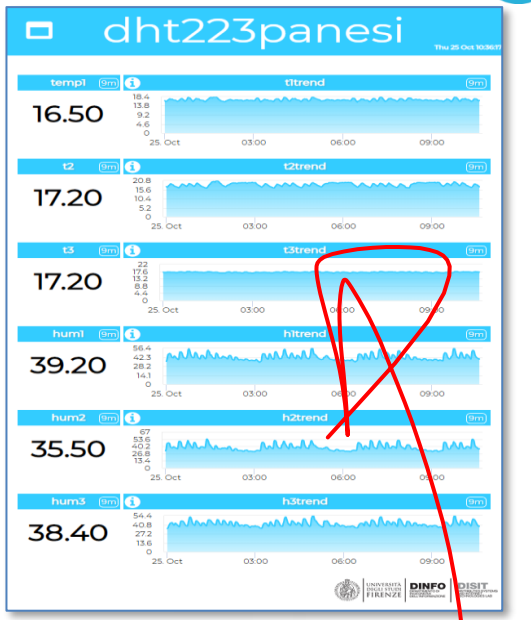


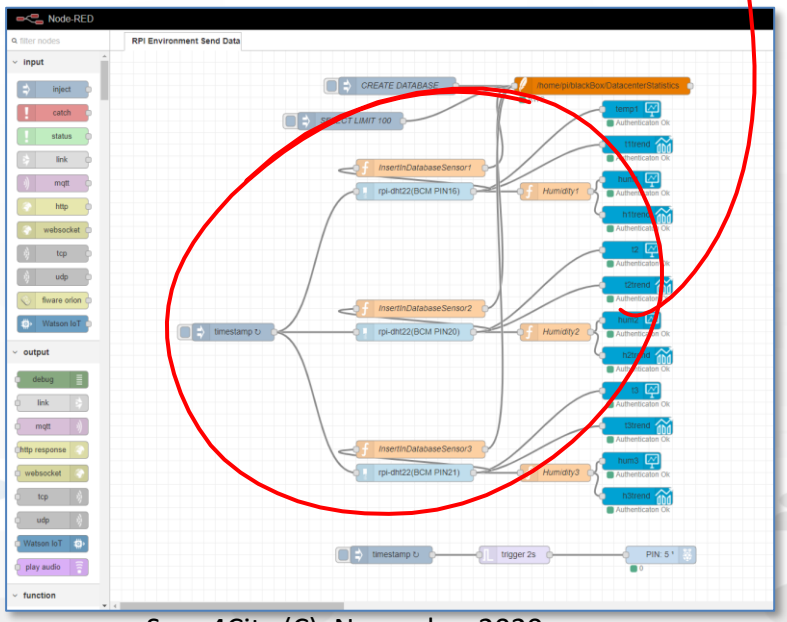
Final user Manager

Dashboard Wizard

IOT Edge on Raspberry Pi

- Raspberry Pi
- Mutual Authentication with certificates
- Secure encrypted connection
- IOT Application inside
- Any sensor
- Any protocol from IOT devices
- NGSI or any other protocol
- Fully Customizable
- Local and Cloud Dashboard
- **Special MicroServices**





MicroServices:
- DHT
- ModBus
- any shield
- etc....

IOT App for Data Ingestion and Data Transformation

Snap4City

roottooladmin1
RootAdmin | ldap

- Dashboards
- My Dashboards
- Notificator
- IOT Applications
- My Personal Data
- IOT Directory and Devices
- Knowledge and Maps
- Micro Applications
- External Services
- Data Set Manager: Data Gate
- Resource Manager: Process Loader
- Development Tools
- Management
- Settings
- User Management and Auditing
- Help and Contacts
- Documentation and Articles
- My Profile
- Snap4City portal
- Km4City portal
- DISIT Lab portal

Node-RED

Deploy

filter nodes

input: inject, catch, status, link, mqtt, http, websocket, tcp, udp, amqp, amqp2

output: debug, link, mqtt, http response, websocket, tcp, udp, amqp, amqp2

flow1 | Flow 1

world map, point, service-search-near-marker, show micro web app, transform results, world map, event-log, popupopen, msg.payload, msg.payload, timestamp, service-info, vehicleFlow, vehicle flow (car/h), worldmap, switch, sensor, ser, pierfrancesco.

timestamp, last temperature, Dashboard, connected, get value, temperature, event-log, Temperature, connected to ws://192.168.1.185:9000/se

IOT Application Editor

info | debug | dashb

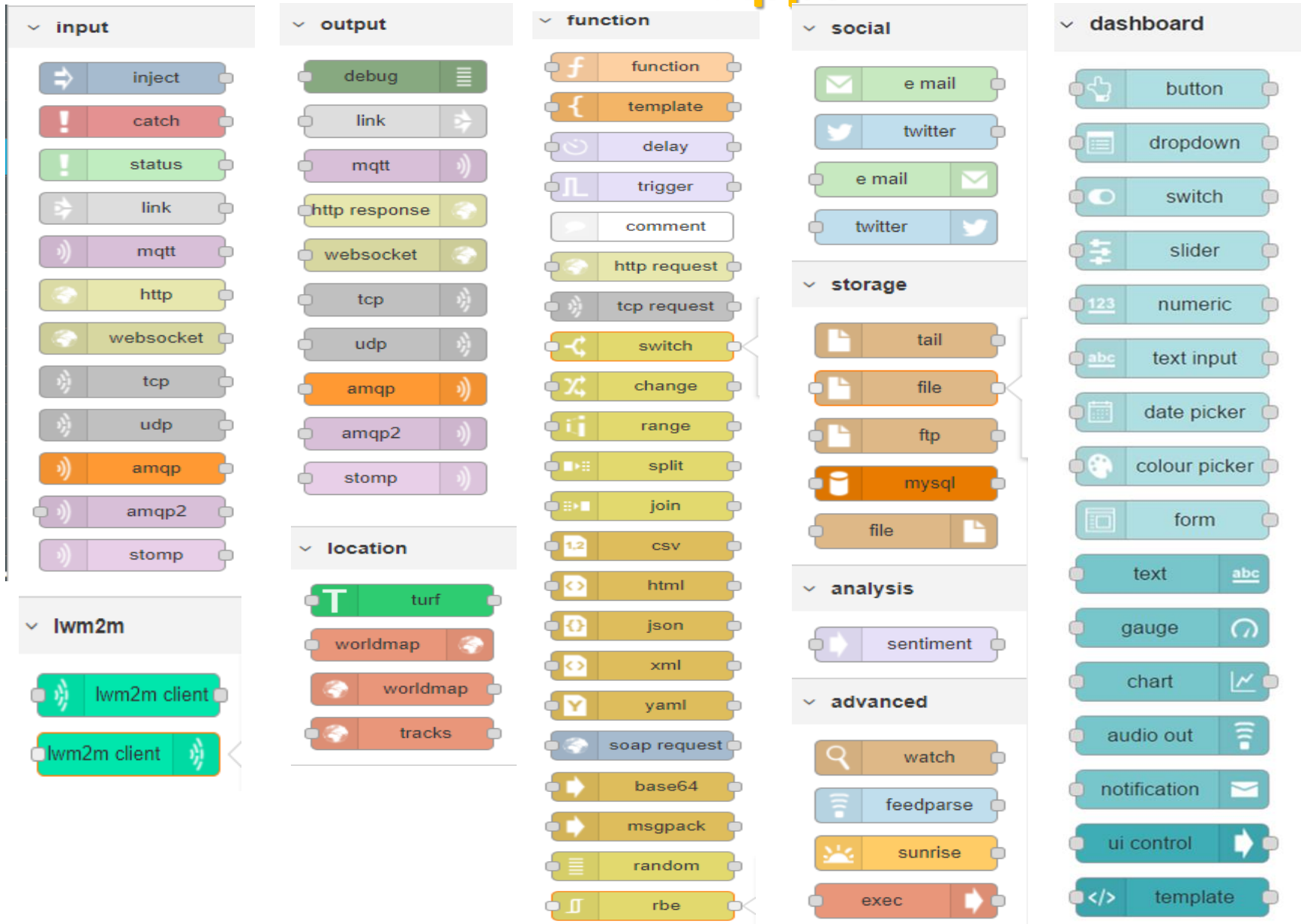
Flow

Name	flow1
ID	"49a71aa0.b297b4"
Status	Enabled

Information

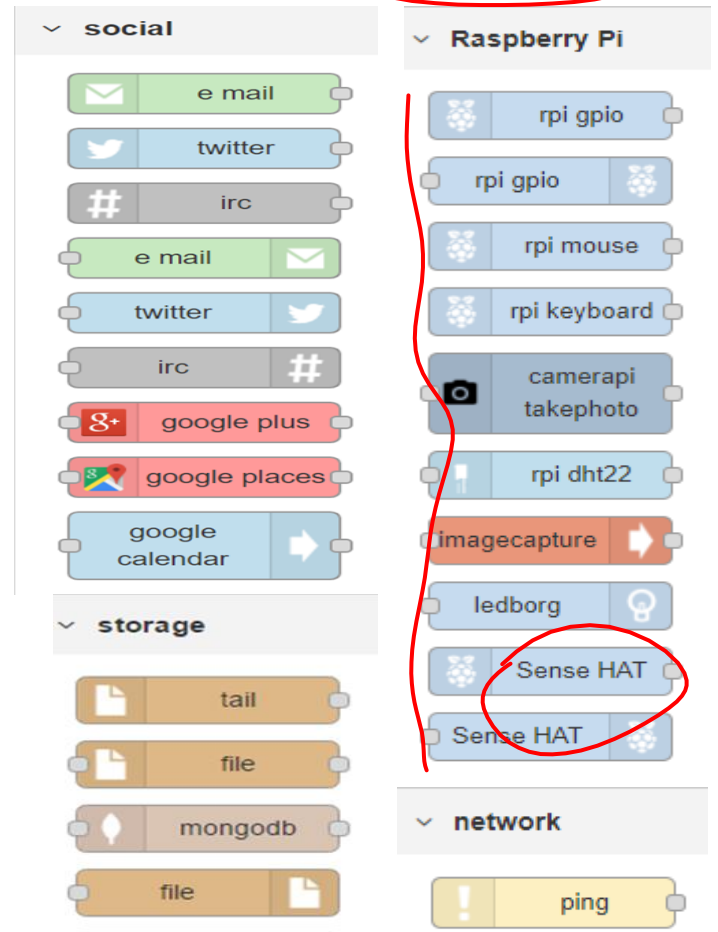
Search for nodes using

Basic Node.js Blocks on NodeRed on our Advanced IOT Apps



Node-RED

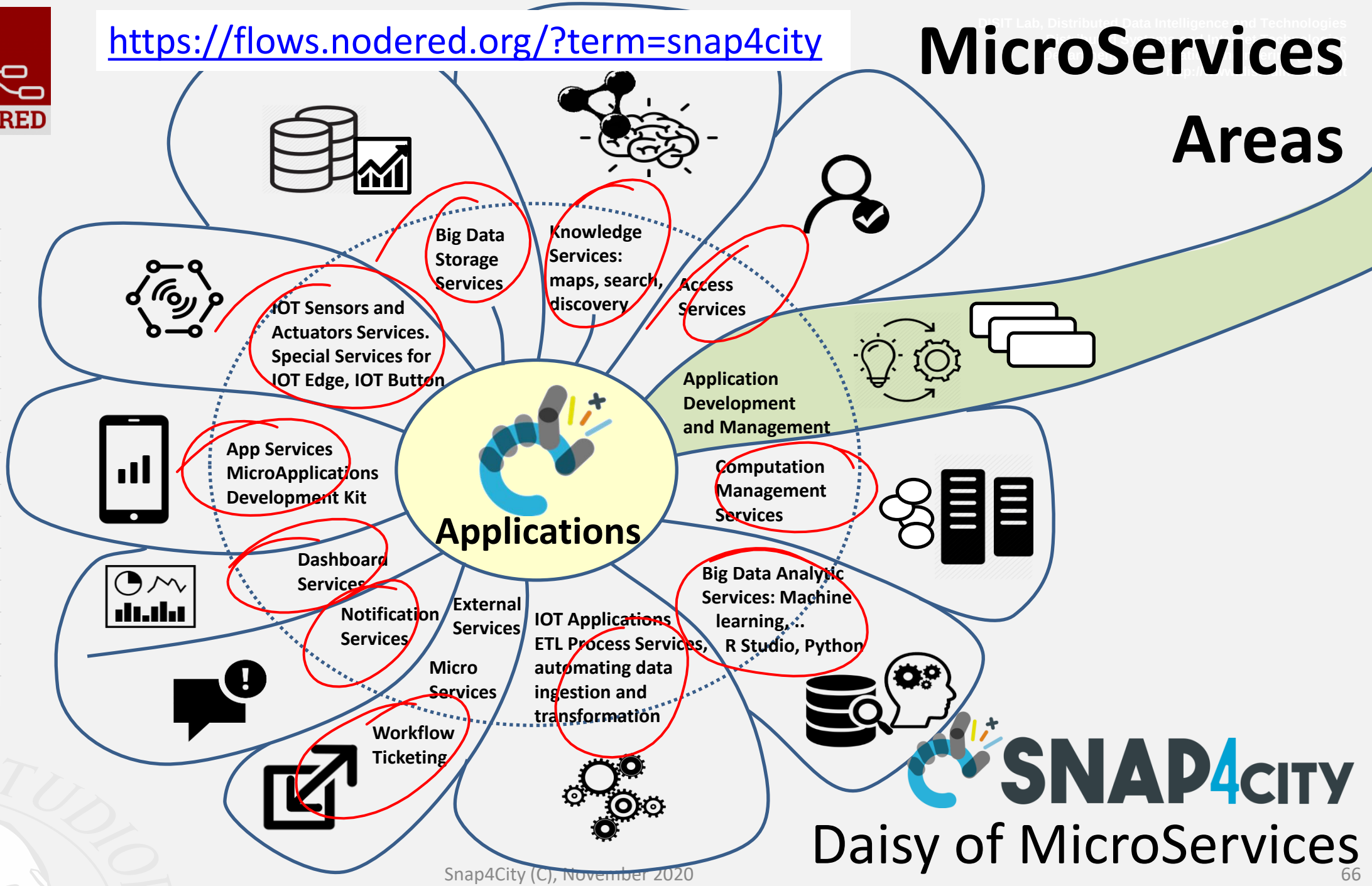
+ on IOT Edge Raspberry



MicroServices Areas

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

- input
- output
- function
- social
- storage
- analysis
- advanced
- NGSI
- lwm2m
- S4CSearchDev
- S4CUtility
- S4CMapping
- S4CManagement
- S4CDataAnalytic
- S4CBigData
- S4CIOTApp
- S4CSearch
- S4CData
- S4CKPIData
- S4CDashboard
- S4CSigfox
- S4CIoT
- S4CLogDev
- S4CView
- S4CSocial
- location
- dashboard



SNAP4CITY

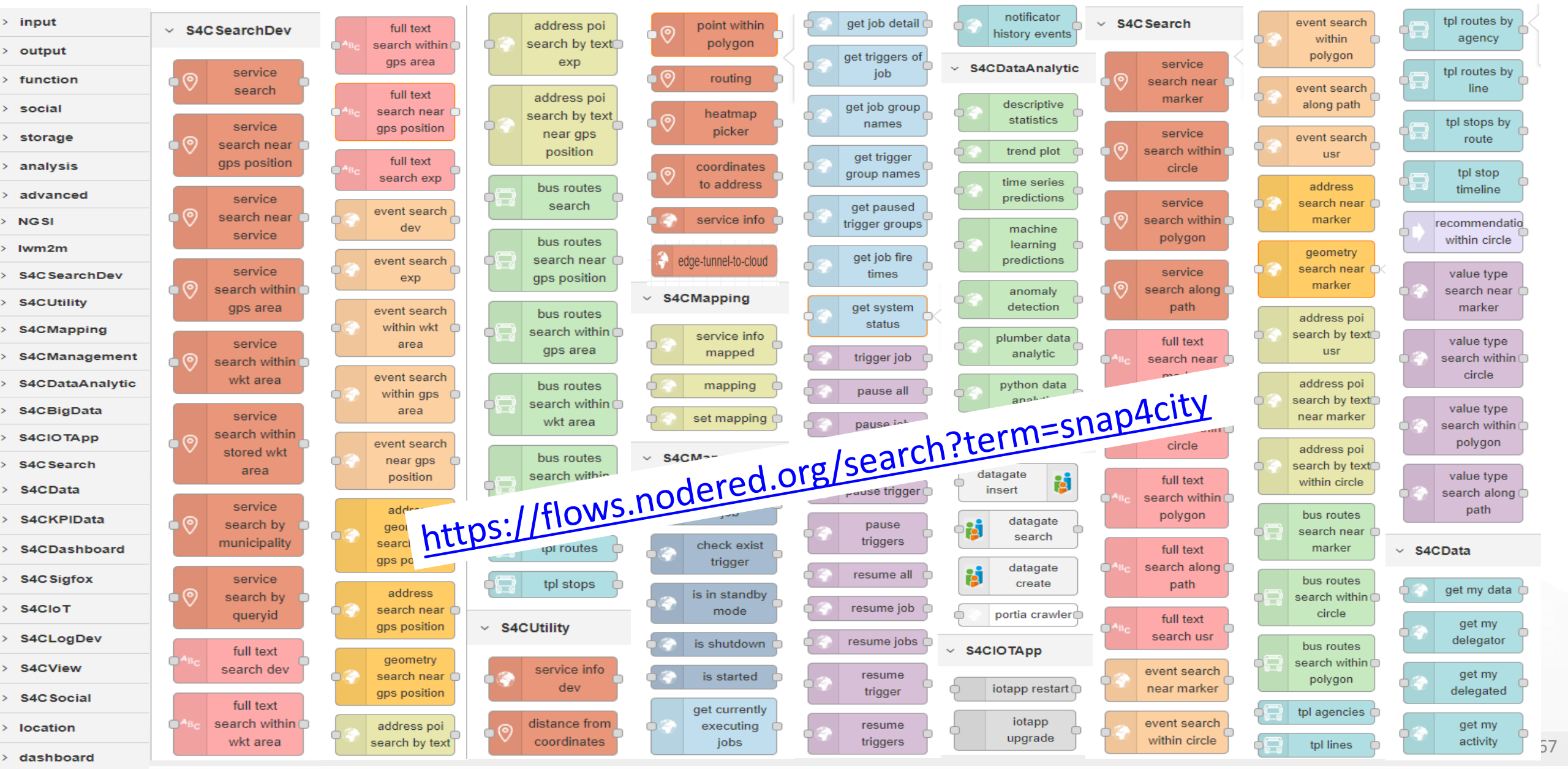
Daisy of MicroServices

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

Aug 2020 collection

Two Snap4City Libraries

SNAP4CITY | Node-RED

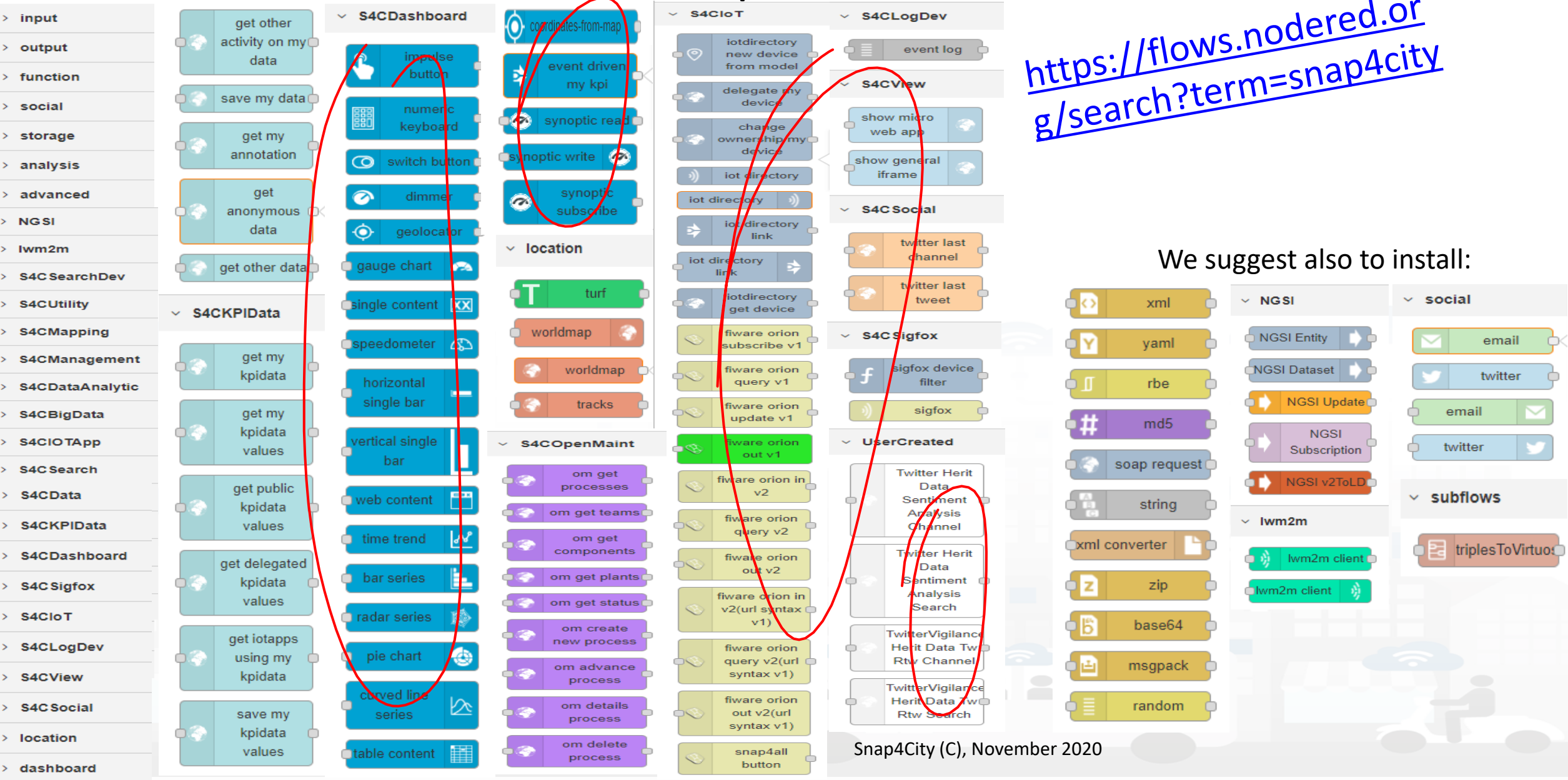


https://flows.nodered.org/search?term=snap4city

Aug 2020a collection

Two Snap4Citv Libraries

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

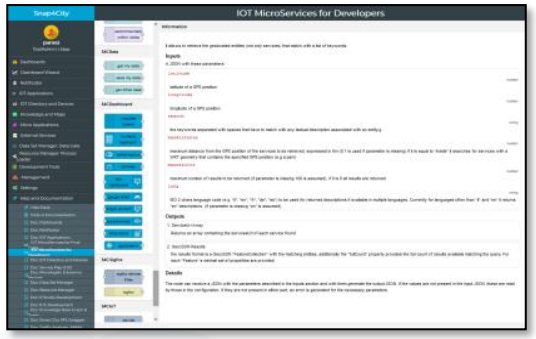


We suggest also to install:

Developing IOT Applications

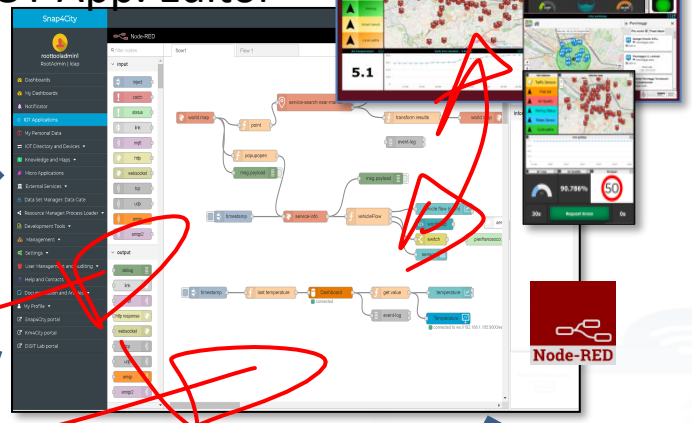
IOT Discovering

MicroServices collections

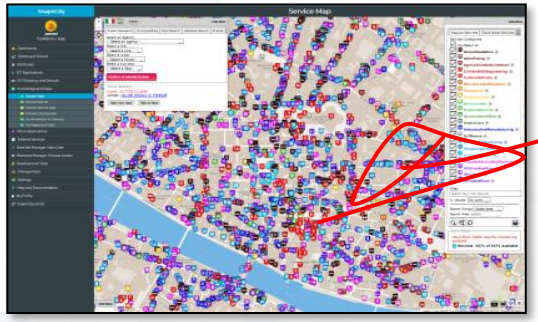


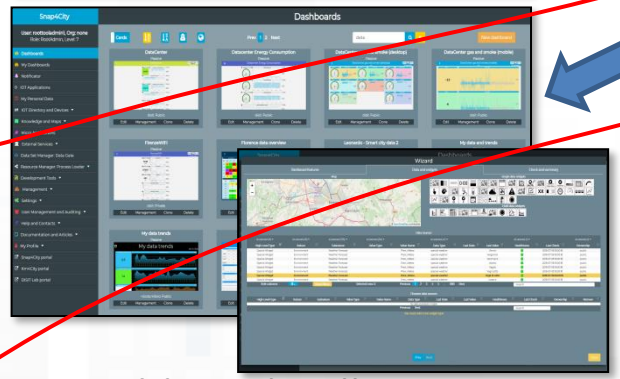
My IOT Applications

IOT App. Editor



Generating IOT App
With Dashboard





ServiceMap Discovery

Dashboard Collection,
Editor and Wizard

Sharing/saving
reusing IOT App

Resource Manager

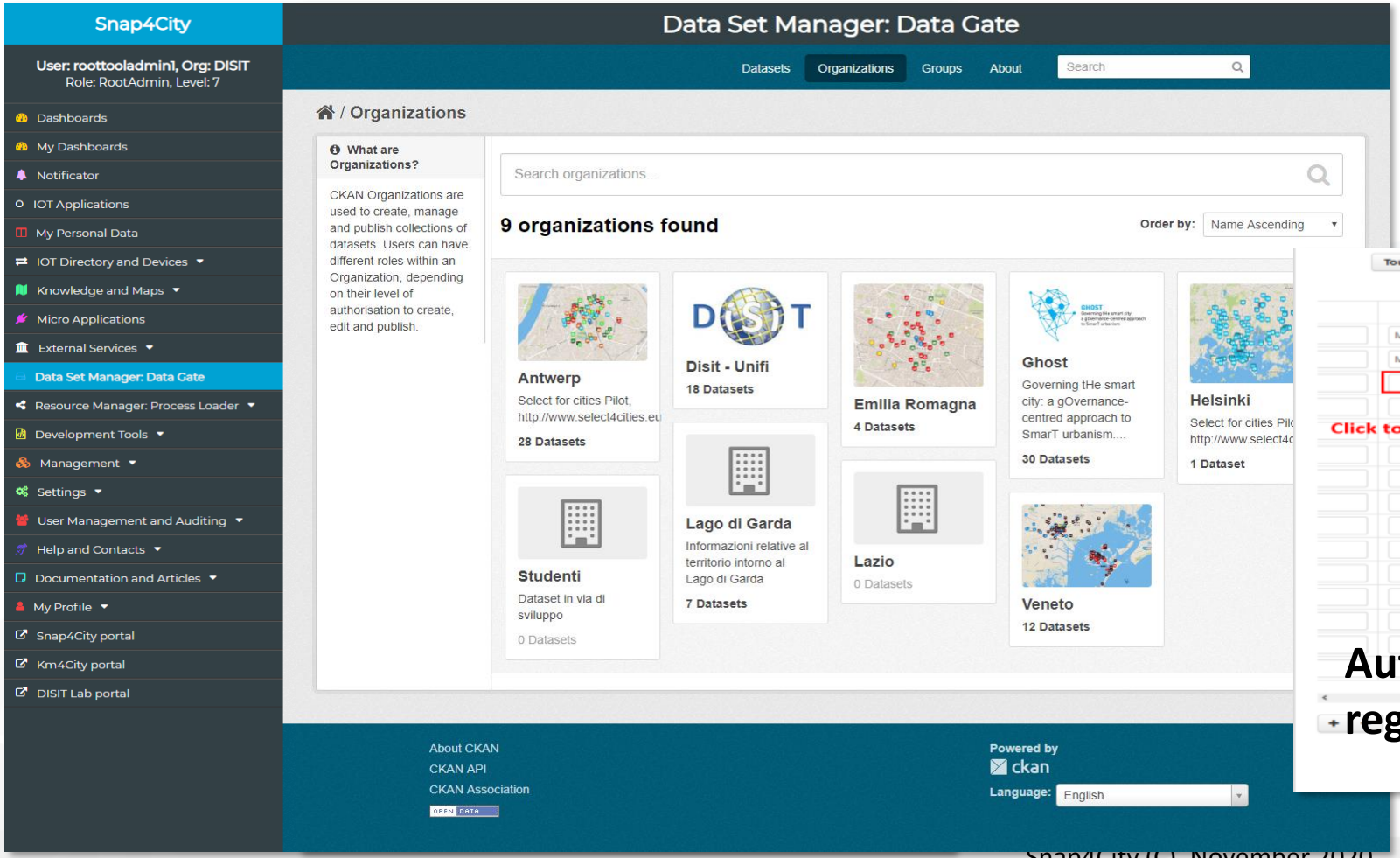
Knowledge Base, Km4City

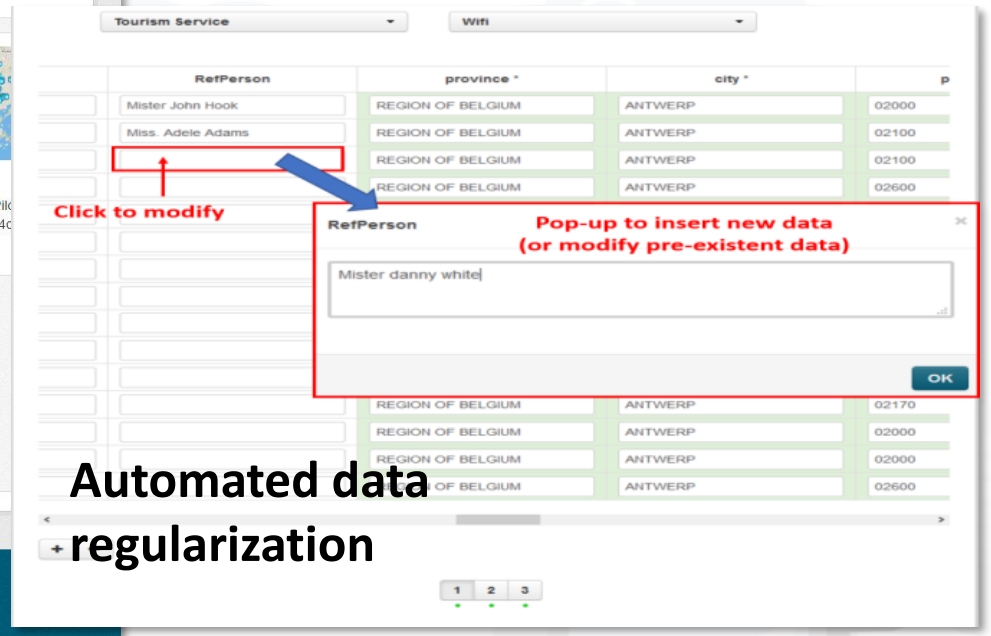
GitHub

Integrated DataGate/CKAN
Static open data ingestion

Federated Crawling
Federated Distribution

Data Set:
- Search
- Loading
- Download
- Share
- Publish
- Also automated



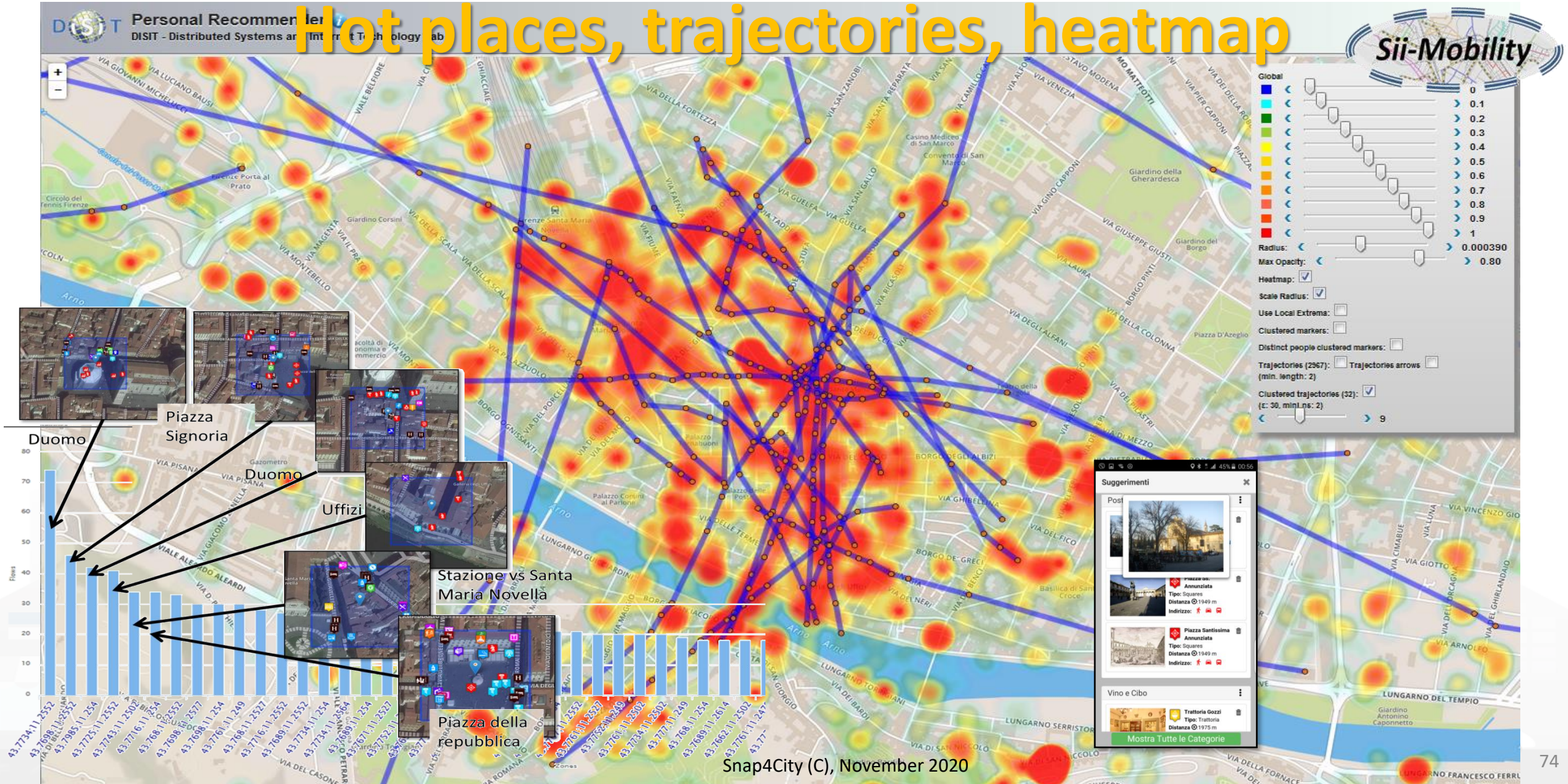


Automated data regularization

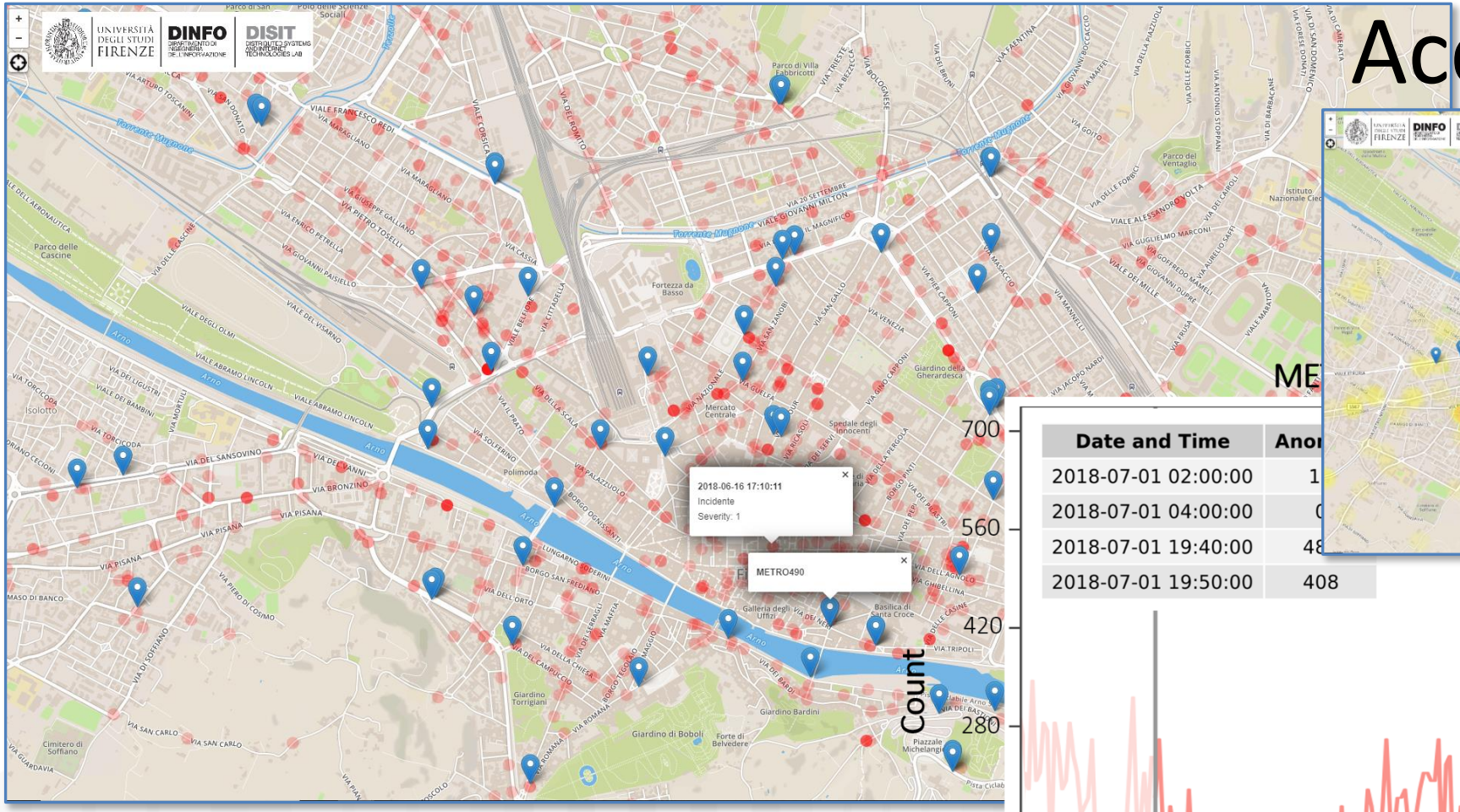
Data Analytics if needed

User Behaviour Analyser

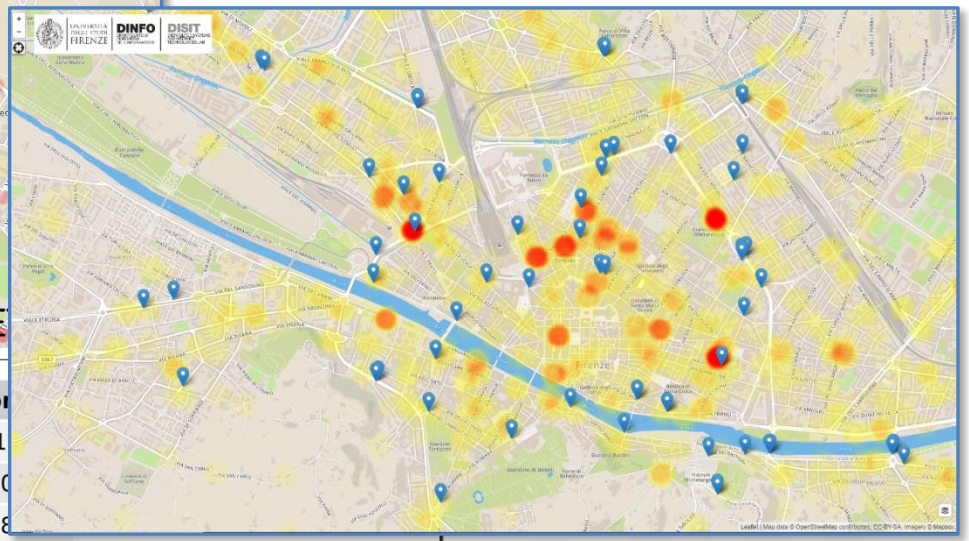
Hot places, trajectories, heatmap



Anomaly Detection

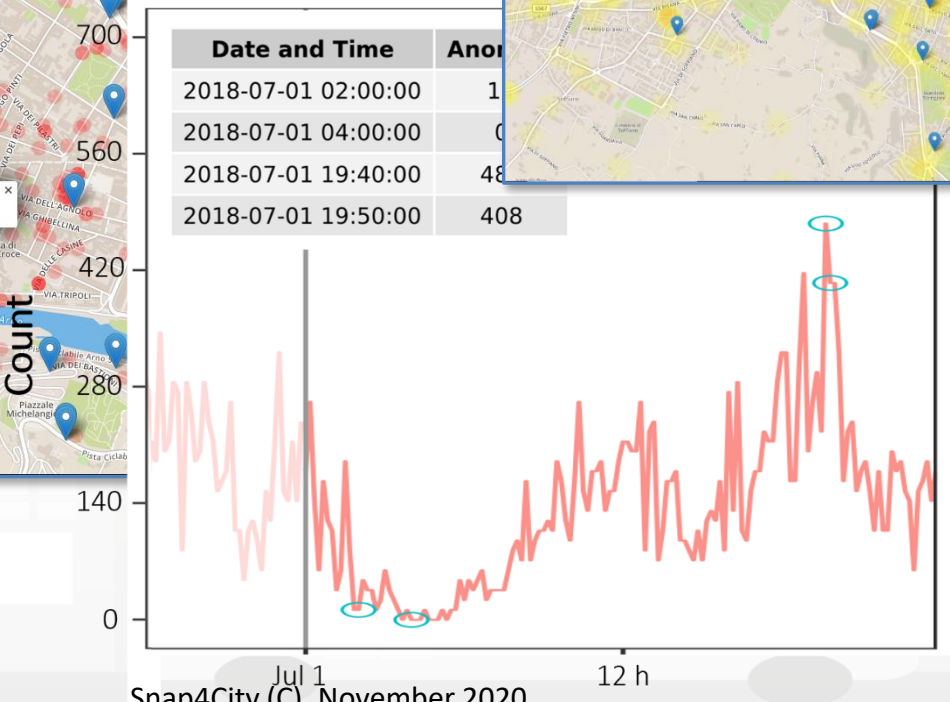


Accidents Density



Accidents vs Traffic

Date and Time	Ano
2018-07-01 02:00:00	1
2018-07-01 04:00:00	0
2018-07-01 19:40:00	48
2018-07-01 19:50:00	408



Free Parking Predictions

Careggi car park			
Model features	BRNN model results		
	R-squared	RMSE	MASE
Baseline	0.974	24	1.87
Baseline + Weather	0.975	24	1.75
Baseline + Traffic sensors	0.975	24	2.04
Baseline + Weather + Traffic sensors	0.975	24	1.87

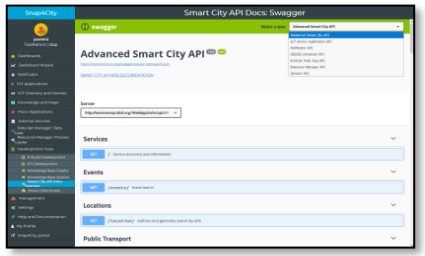
Active on Mobile Apps as:

- «Firenze dove cosa»
- «Toscana dove cosa»

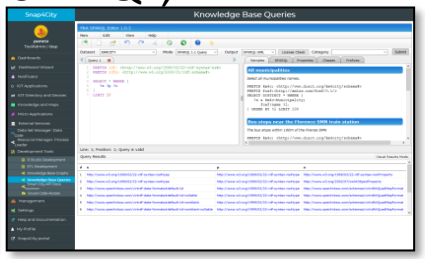
Precision: 97,5%

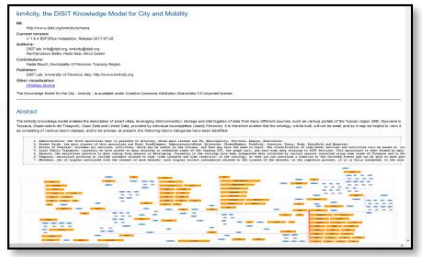
Data Analytics Dev. in R Studio and/or Tensor Flow

Swagger



SPARQL, FLINT





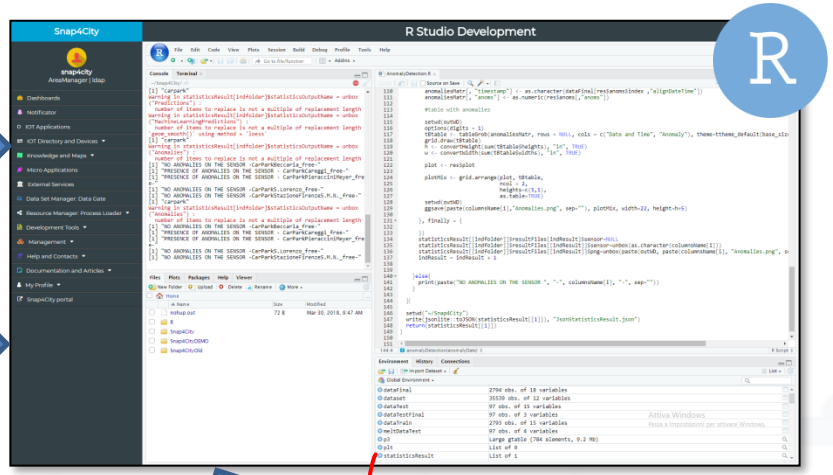
Ontology Schema

LOG.disit.org

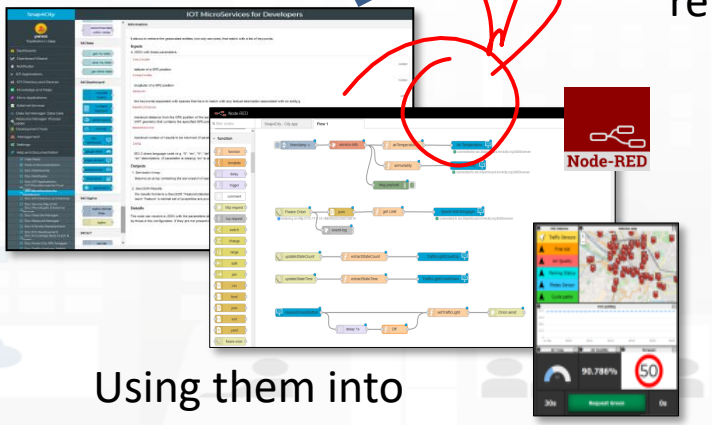
Knowledge Base, Km4City

Big Data Store Facility

Smart City API from Knowledge Base and other tools

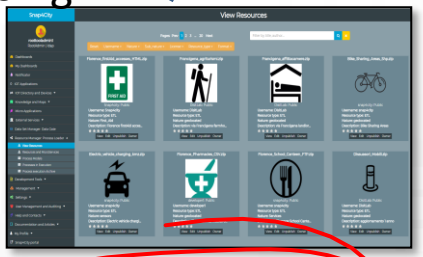


Creating MicroServices



Using them into IOT Applications

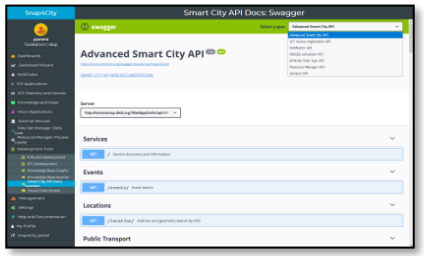
Saving / Sharing reusing



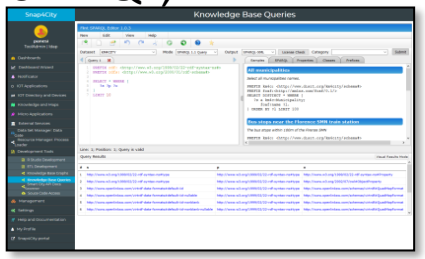
Resource Manager

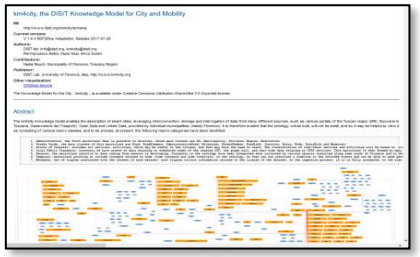
Data Analytics Development in Python, ..

Swagger



SPARQL, FLINT





Ontology Schema

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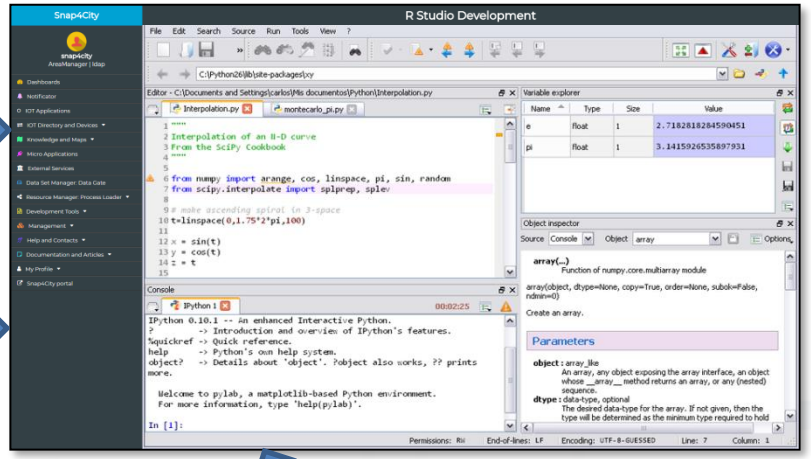
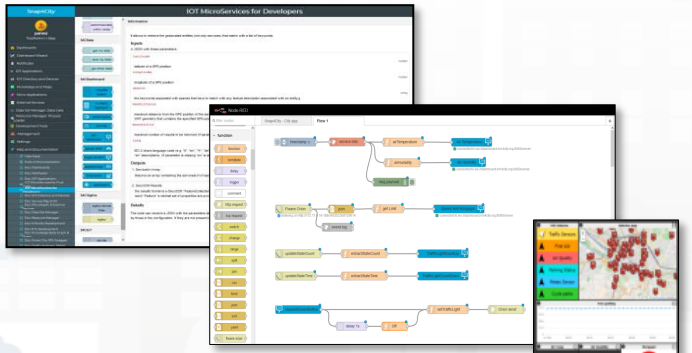


Coding
Testing

Creating MicroServices



Using them into IOT Applications

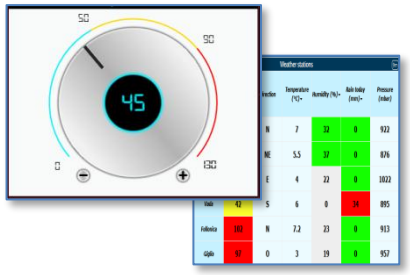
Saving / Sharing resusing

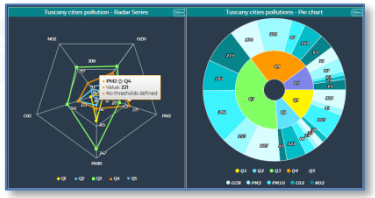
Resource Manager

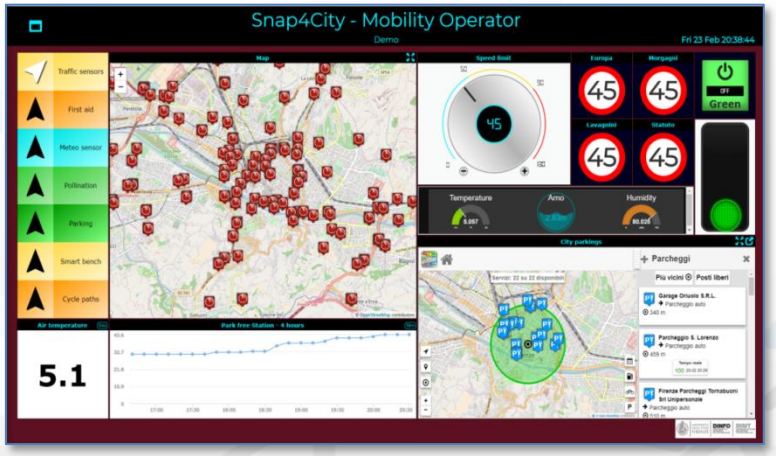
Dashboards and Business Intelligence

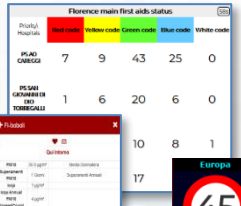

MAPPA FIRENZE
Fri 19 Oct 17:24:39
Colonnine Ricarica
Colonnine ricarica Fast
Pannelli a Messaggio Variabile
Parcheggi
Piste Ciclabili
Sensori del Traffico
Stazioni ambientali
Stazioni meteo
Traffico Real Time
Varchi ZTL
Wi-Fi
Eventi Traffico a Firenze
Concentration - 7 days
Main

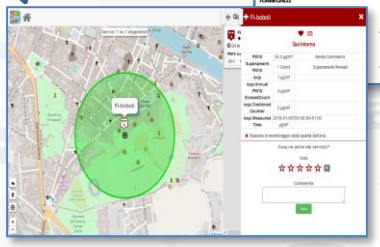
Dashboard List and Editor

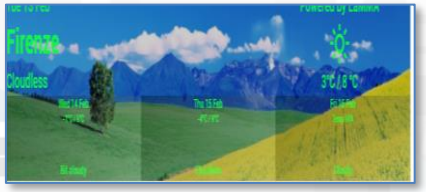


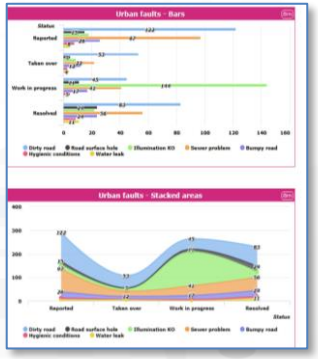


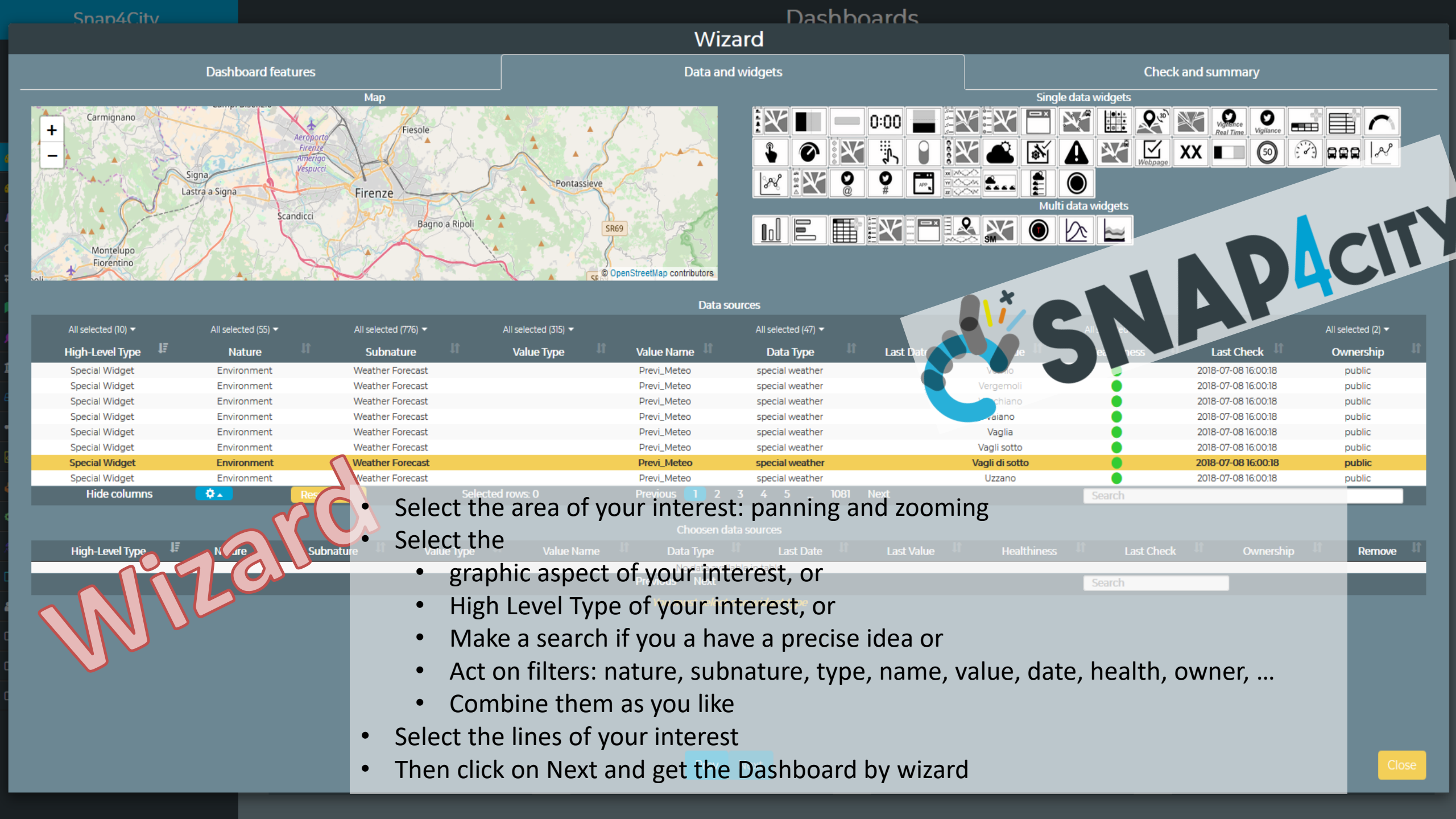




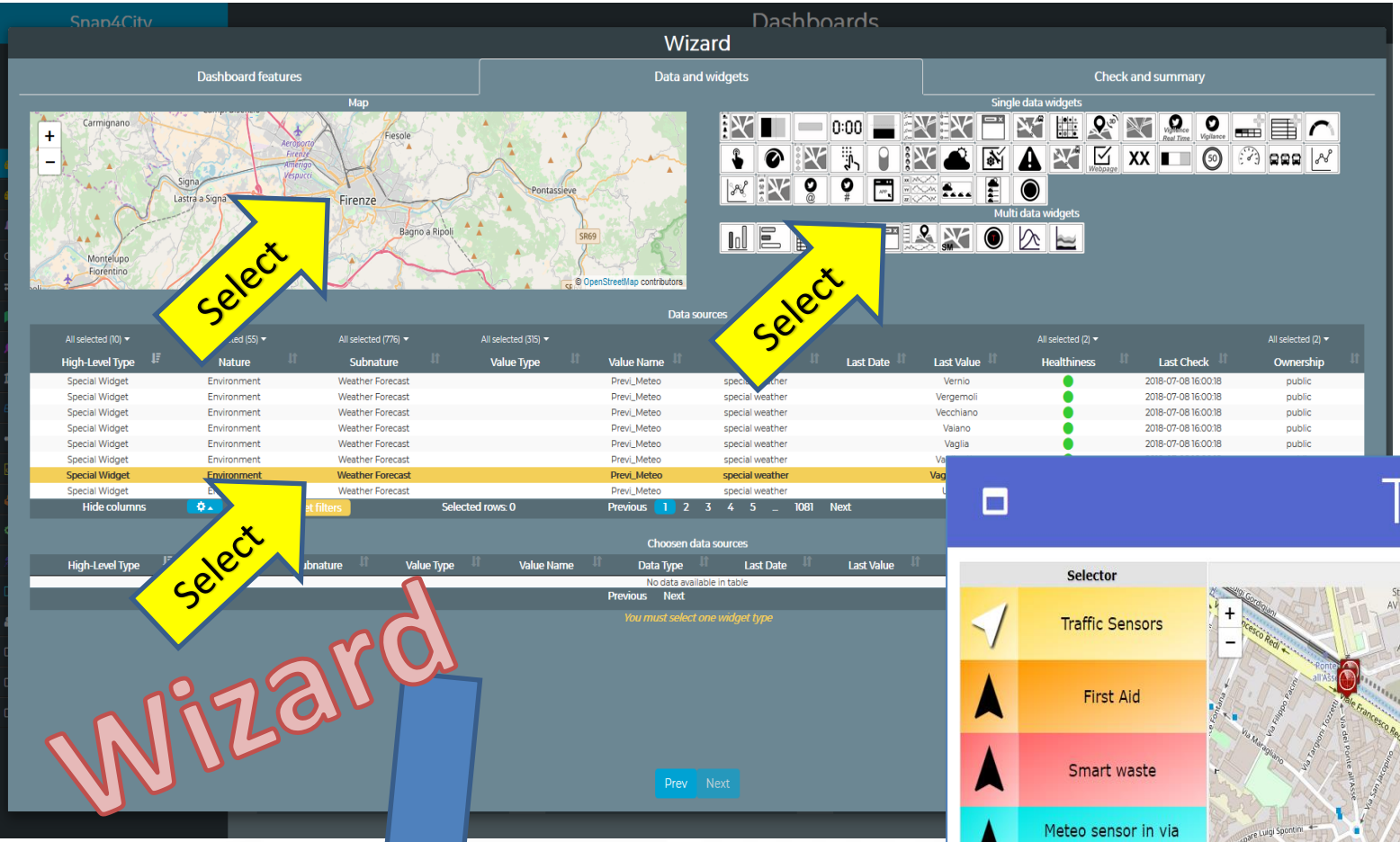


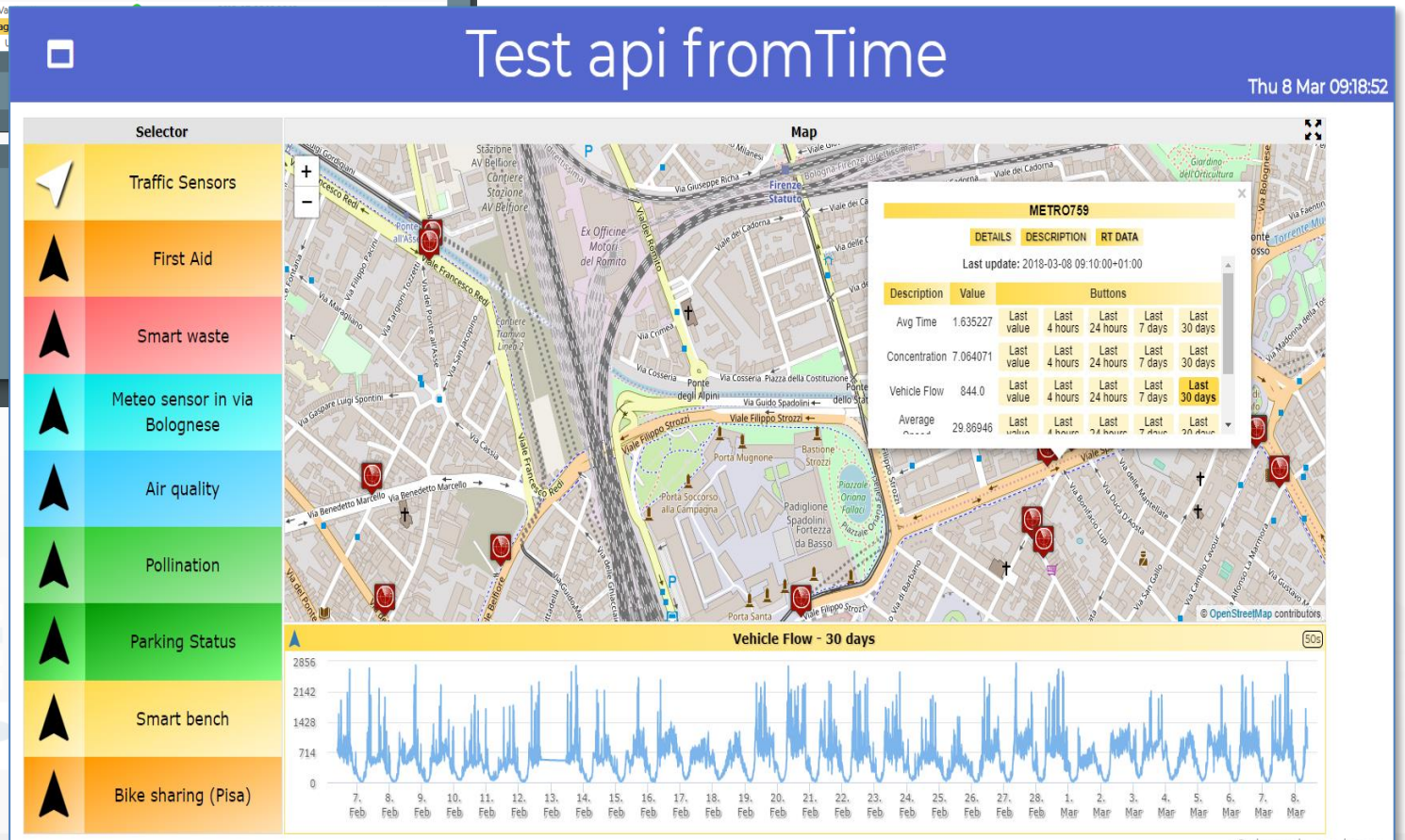





Wizard
Dashboard features
Data and widgets
Check and summary
Map
Carmignano
Fiesole
Aeroporto Firenze Amerigo Vespucci
Signa
Lastra a Signa
Firenze
Pontassieve
Scandicci
Bagno a Ripoli
SR69
Montelupo Fiorentino
© OpenStreetMap contributors
Single data widgets
Multi data widgets
Data sources
All selected (10)
All selected (55)
All selected (776)
All selected (315)
All selected (47)
All selected (2)
High-Level Type
Nature
Subnature
Value Type
Value Name
Data Type
Last Check
Ownership
Special Widget Environment Weather Forecast Previ_Meteo special weather 2018-07-08 16:00:18 public
Vergemoli
Vaglia
Vagli sotto
Vagli di sotto
Uzzano
Hide columns
Selected rows: 0
Previous 1 2 3 4 5 1081 Next
Search
Choosen data sources
Remove
Close
SNAP4CITY
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

Dashboard Wizard

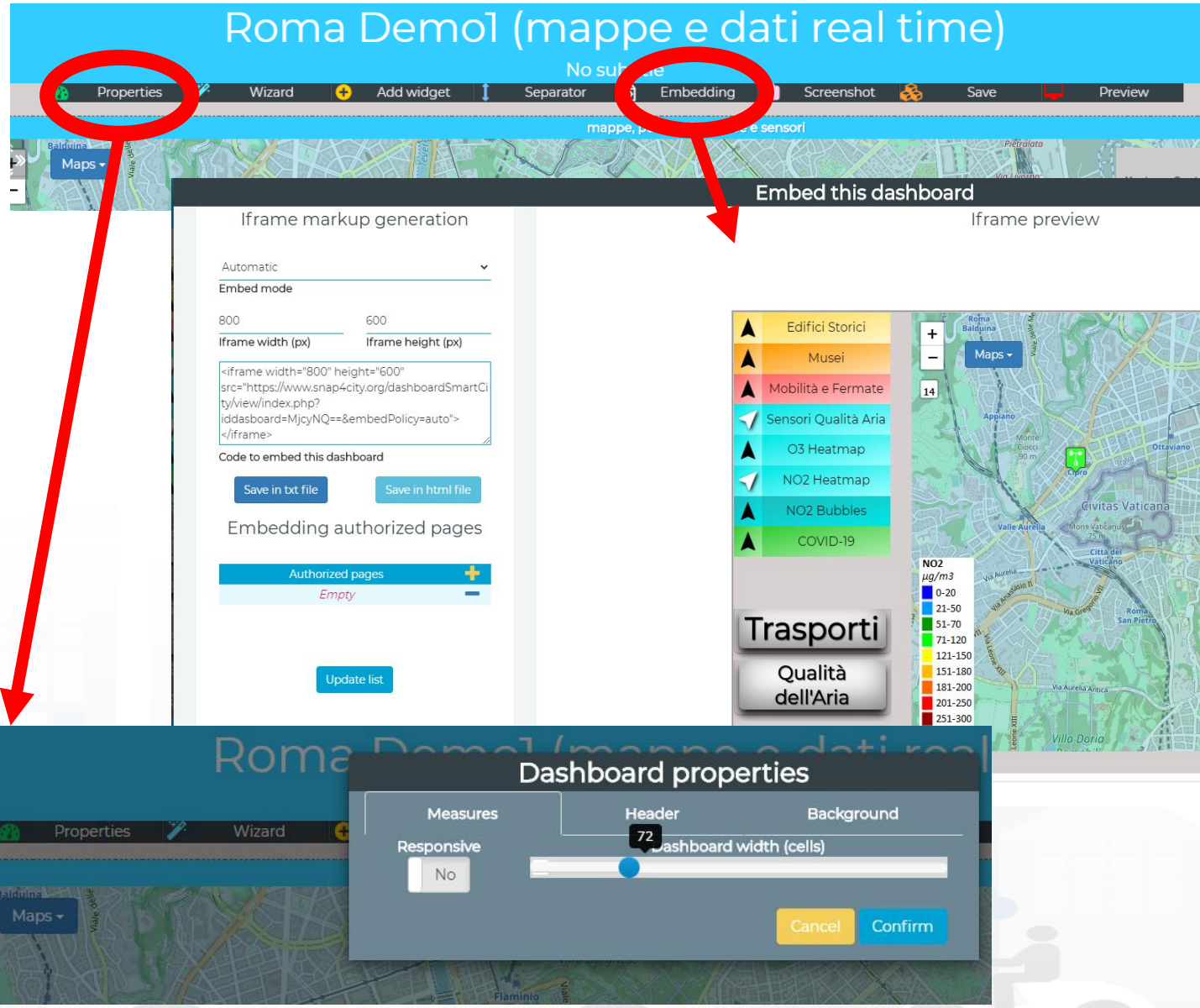




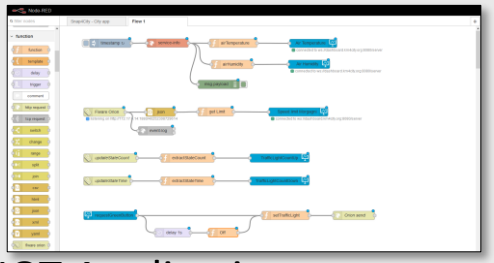
The Wizard help you in selecting only possible combination of data vs graphic representation

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



Dashboard Development



IOT Applications

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

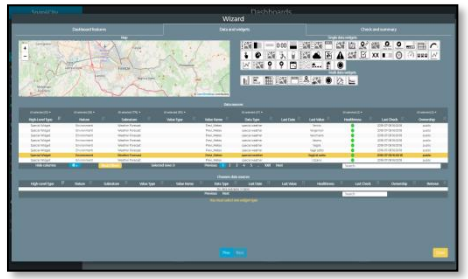
Widget Collection

Micro
Applicat
ions

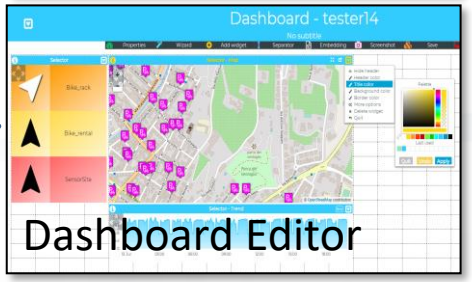
External
Services

Custom
Widgets/
Synoptics

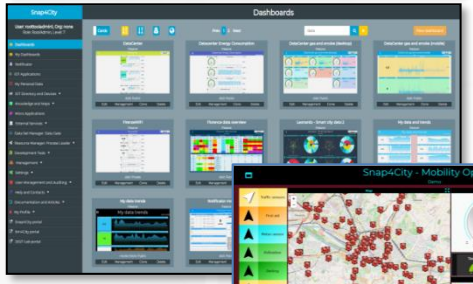
Dashboard Wizard

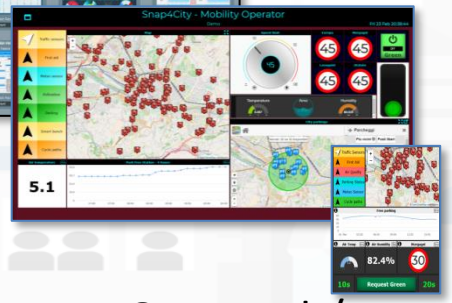


Create, save, load,
delegate, grant access



Dashboard Editor



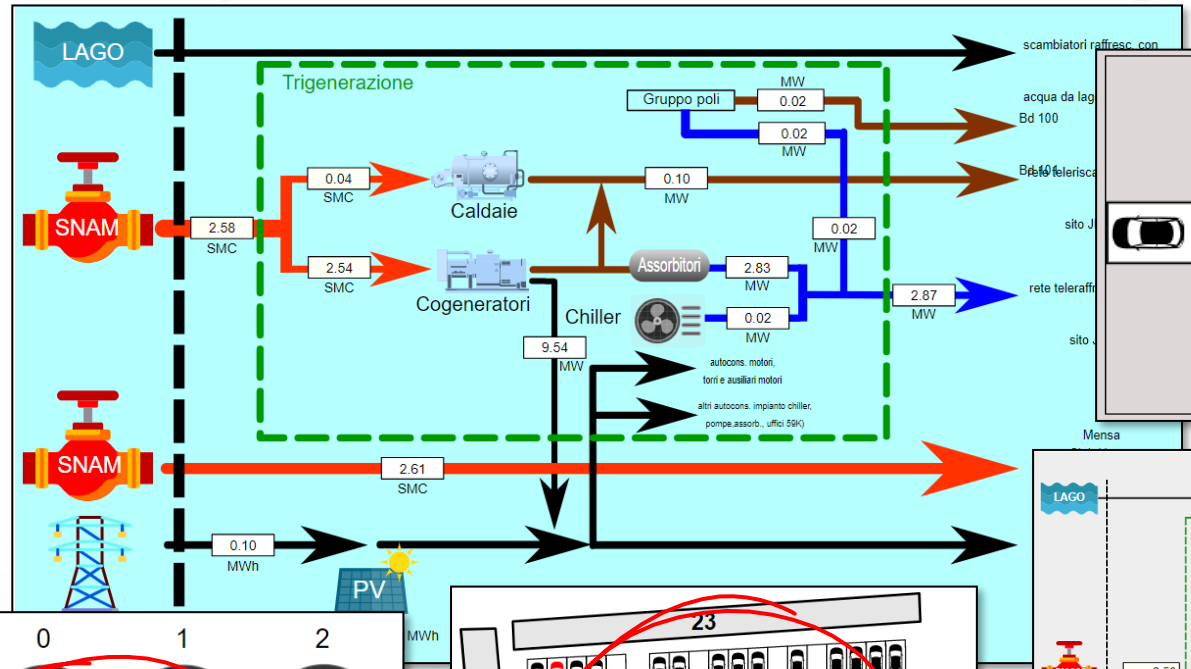


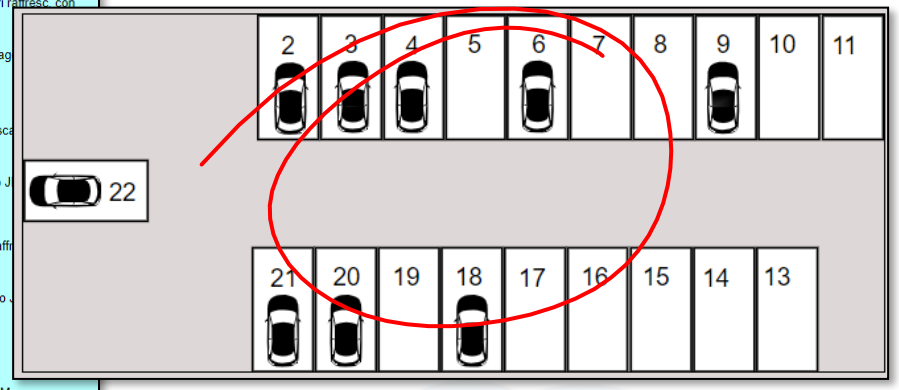
Public
Dashboard
Collection

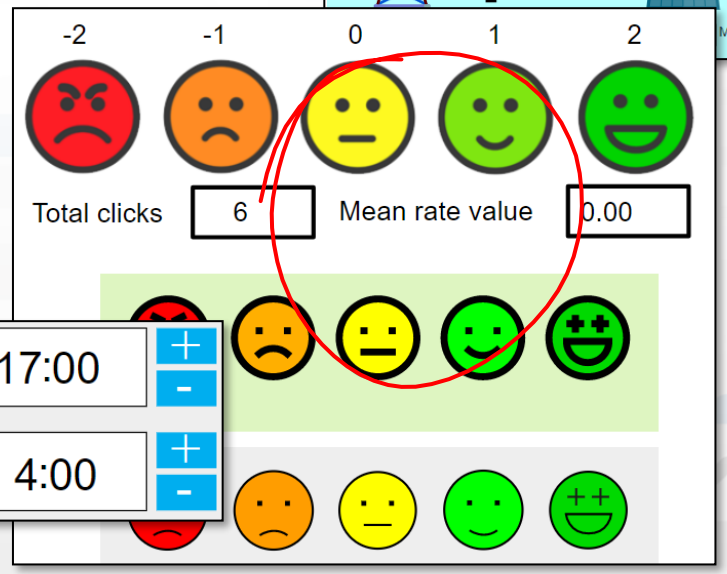
My Own Dash/App

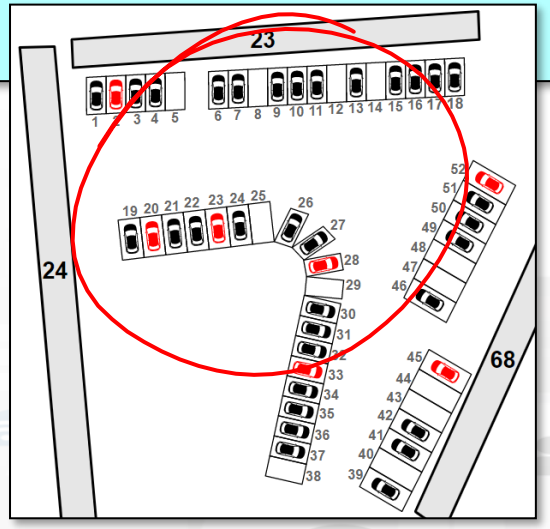
Special Custom Widgets

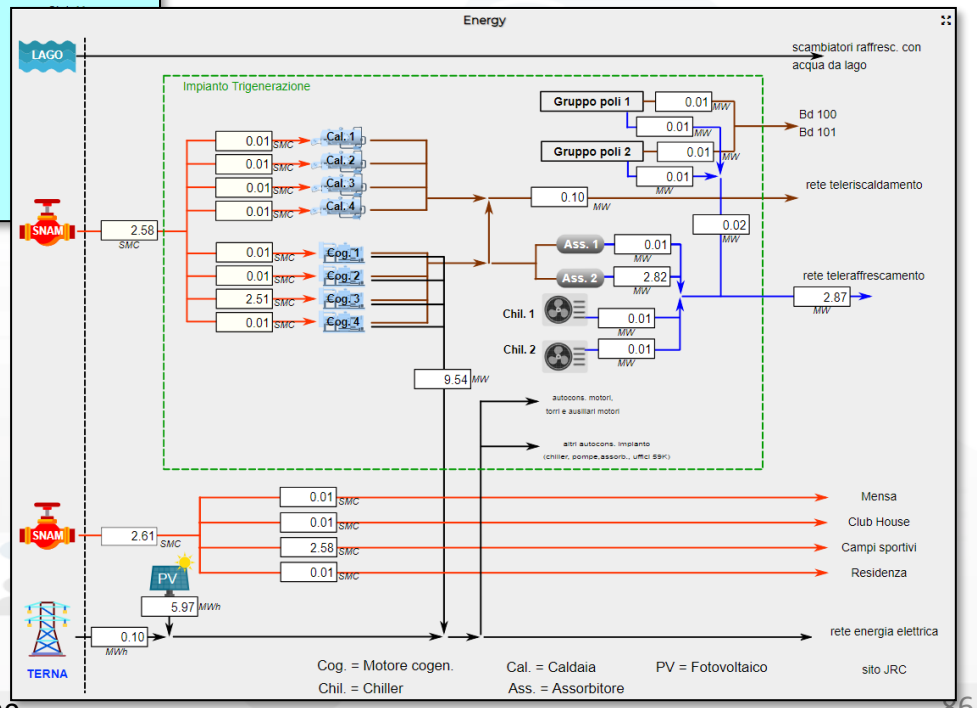
- Smart parking
- Smart Energy
- Smart Light
- Smart ….
- Energy View
- Custom Controls



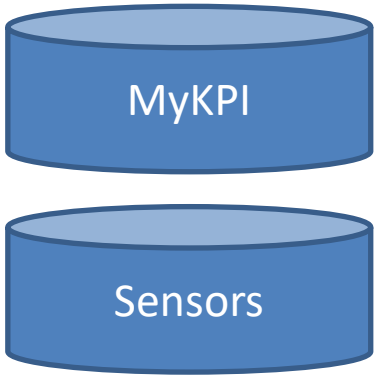








From-To Custom Widgets / Synoptics to Storage in WS



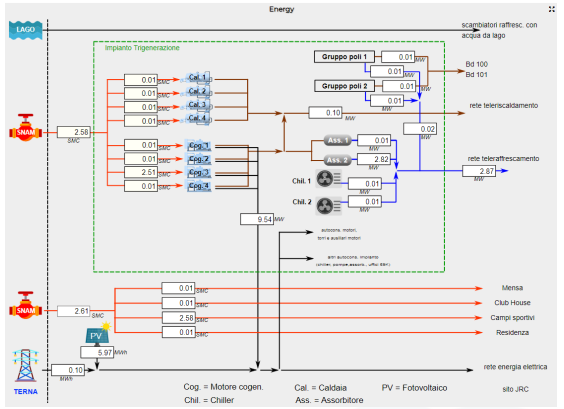
MyKPI

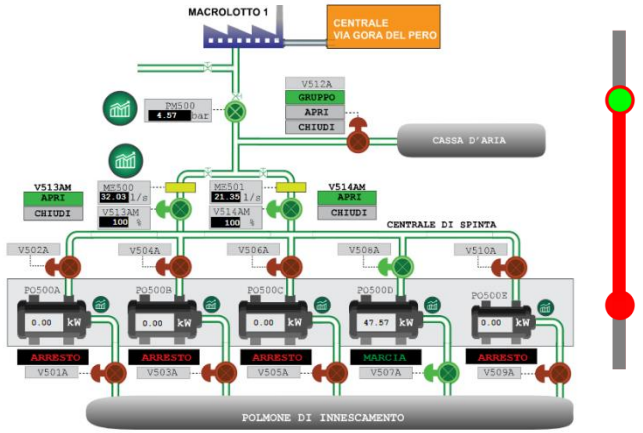
Sensor

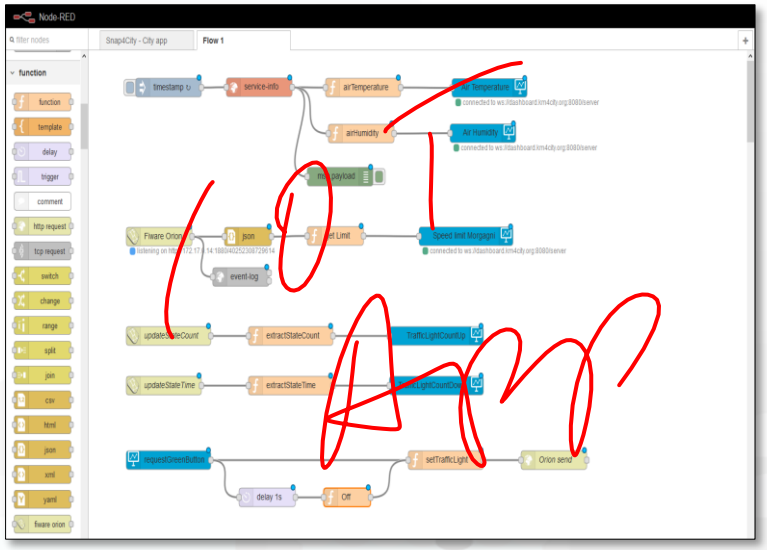
[ ]

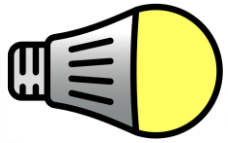
New Shared Variables

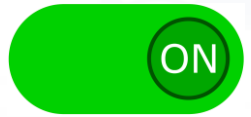
Constant Values

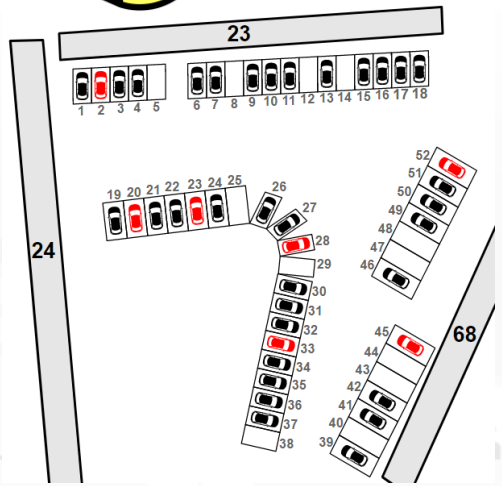


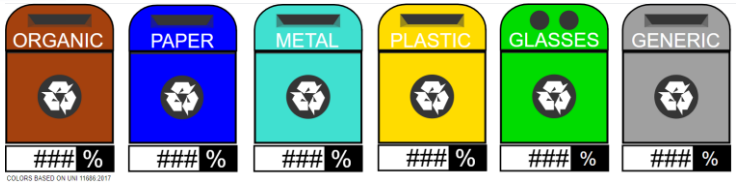


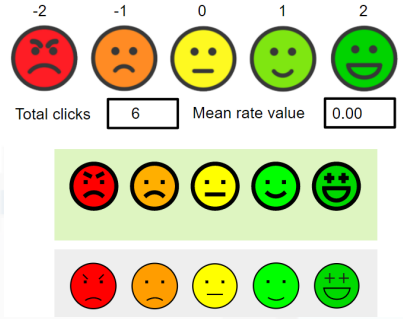


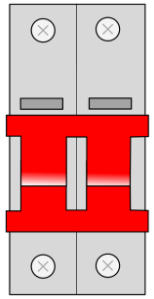


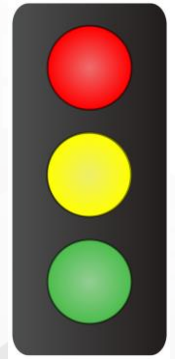


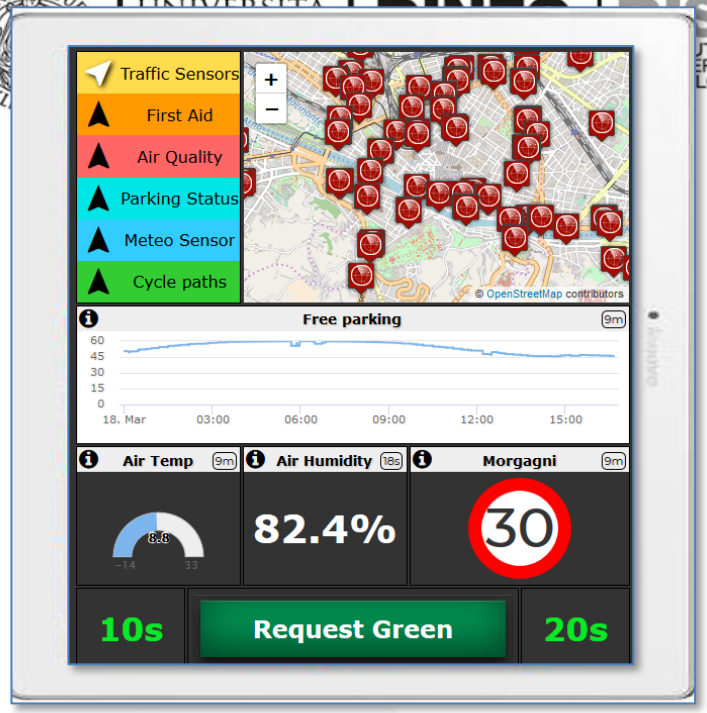


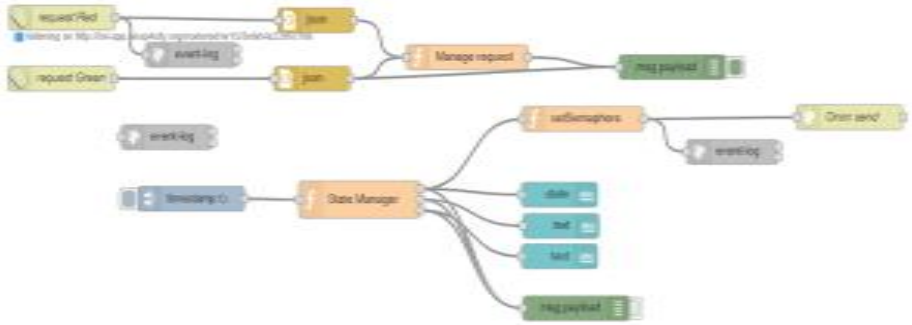


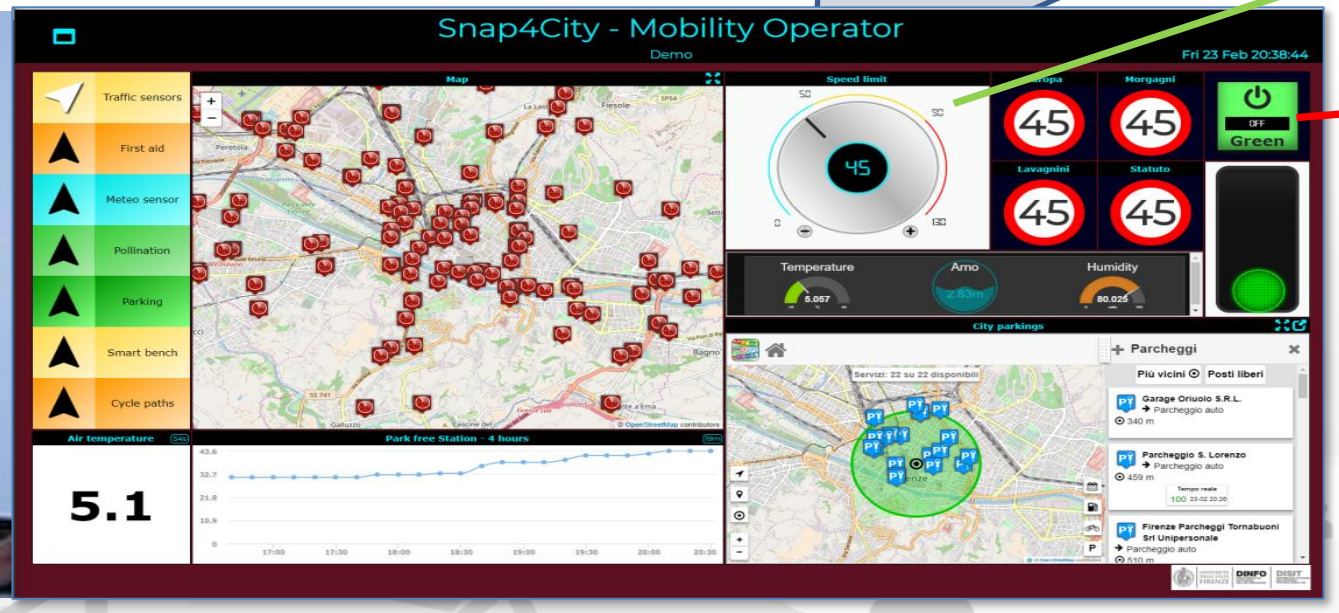







Traffic Sensors
First Aid
Air Quality
Parking Status
Meteo Sensor
Cycle paths
© OpenStreetMap contributors
Free parking
9m
60
45
30
15
0
18. Mar
03:00
06:00
09:00
12:00
15:00
Air Temp
9m
Air Humidity
18s
Morgagni
9m
82.4%
30
10s
Request Green
20s



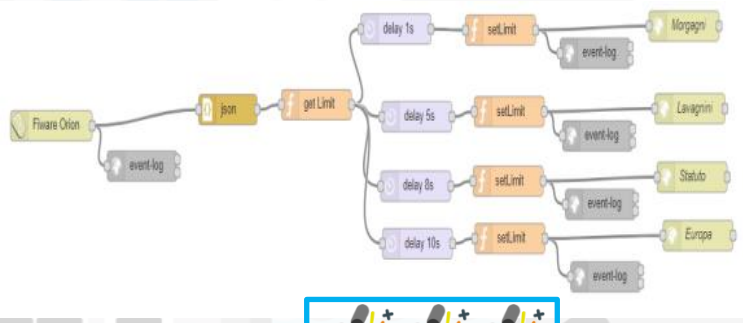

Snap4City - Mobility Operator
Demo
Fri 23 Feb 20:38:44
Traffic sensors
First aid
Meteo sensor
Pollination
Parking
Smart bench
Cycle paths
Map
Speed limit
45
Europa
Morgagni
Lavagnini
Statuto
OFF
Green
Temperature
Arno
Humidity
City parkings
Parcheggi
Più vicini
Posti liberi
Garage Oriuolo S.R.L.
Parcheggio S. Lorenzo
Firenze Parcheggi Tornabuoni Srl Unipersonale
Air temperature
5.1
Park free Station - 4 hours


30


30


30


30


Fiware Orion
event-log
json
get Limit
delay 1s
delay 5s
delay 8s
delay 10s
setLimit
setLimit
setLimit
setLimit
event-log
event-log
event-log
event-log
Morgagni
Lavagnini
Statuto
Europa

Web and Mobile App Development

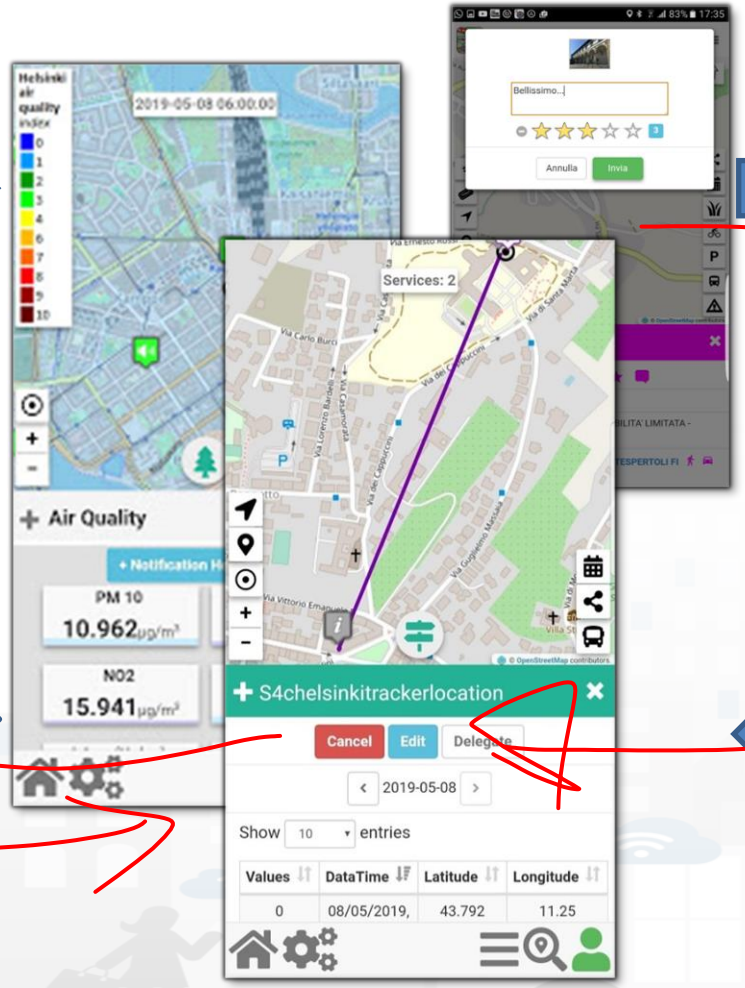
The App is a Bidirectional Device

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

Produced information

- Accepted ?
- Performed ?
- …

Users



Derived information

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

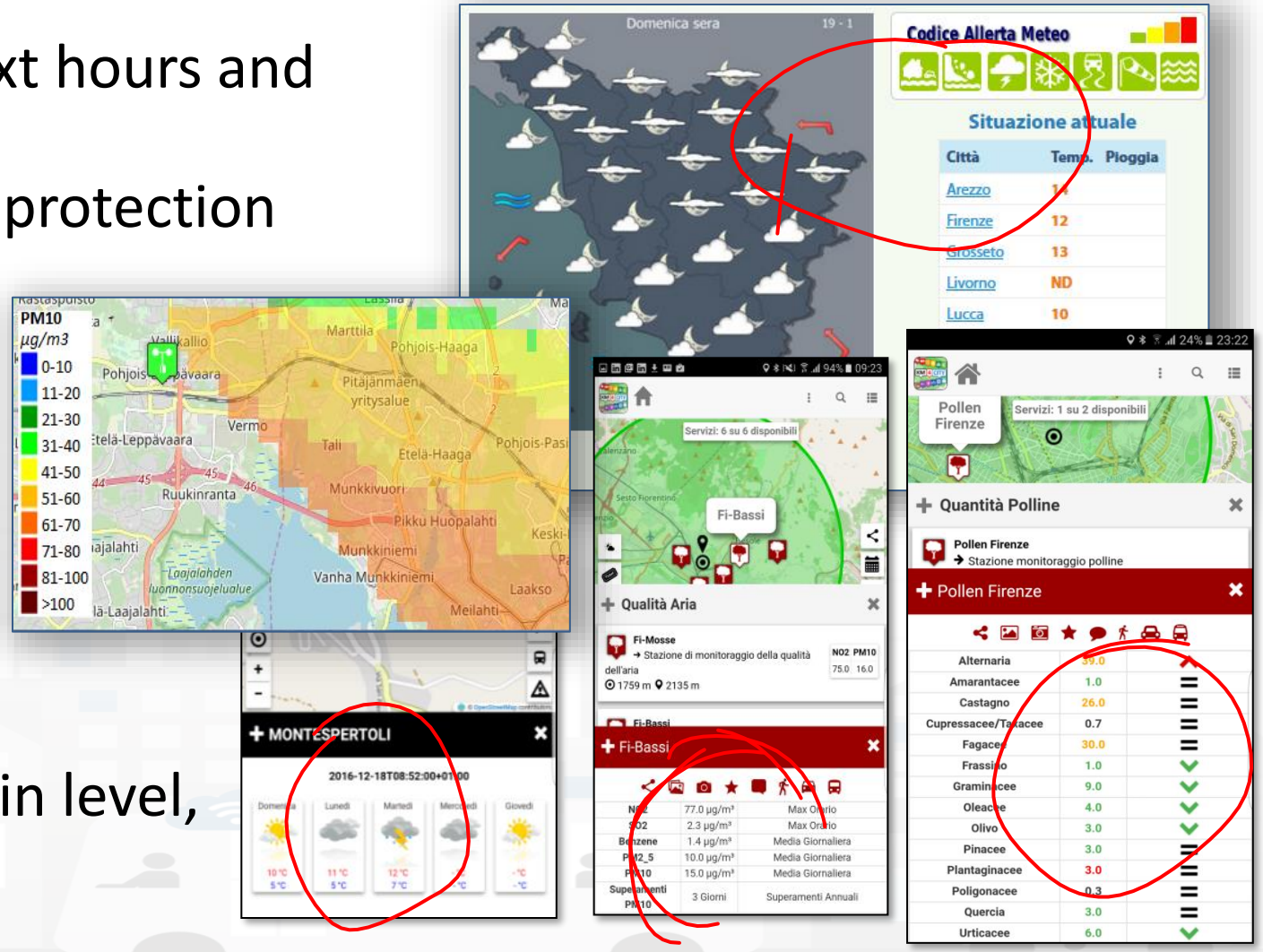
Produced information

- Suggestions
- Engagements
- Notifications
- …

System

Access at Environmental information

- Getting weather forecast for the next hours and days
- Getting alert information from Civil protection
- Getting air quality status
- Getting Air quality via heatmaps, heatmap animation
- Computing Air quality indexes
- Computing Air quality predictions
- Getting pollination status
- getting actual weather status: temperature, humidity, pressure, rain level,
- etc.



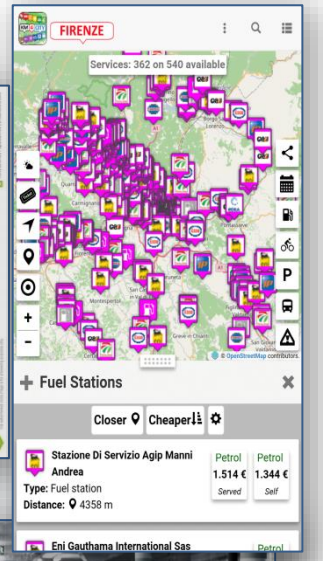
New way to access at health services

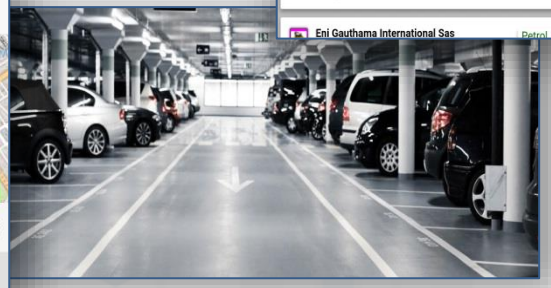
- Searching for pharmacies and hospitals
- Getting the closest hospital first aid locations and status
- Getting real time updated information about the first aid status of major hospitals (triage)

Supporting City Users using Private Mobility

Private Transport

- Parking status (DATEX II, …)
- Saving car park
- Getting **closer parking**
- **OBD2 data from your engine or fleet**
- **Getting parking forecast: short and long term**
- Getting **closer free space on parking**
- Getting **fuel stations** location and fuel product prices
- Getting bike sharing rack status
- Searching Services along a **path** or closer to a point or Service as Hotel, Restaurants, square, etc.
- Getting closer **cycling paths**
- Recharging stations: location and status
- Getting traffic information
- Heatmap where is safer to bike

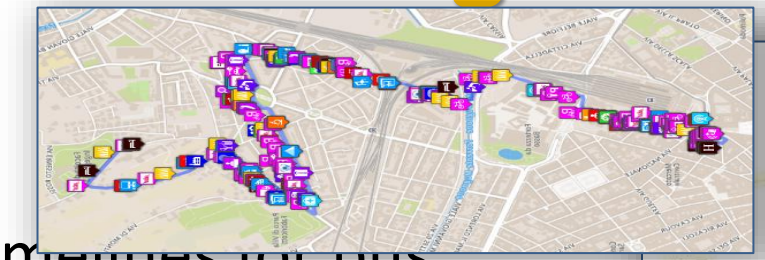


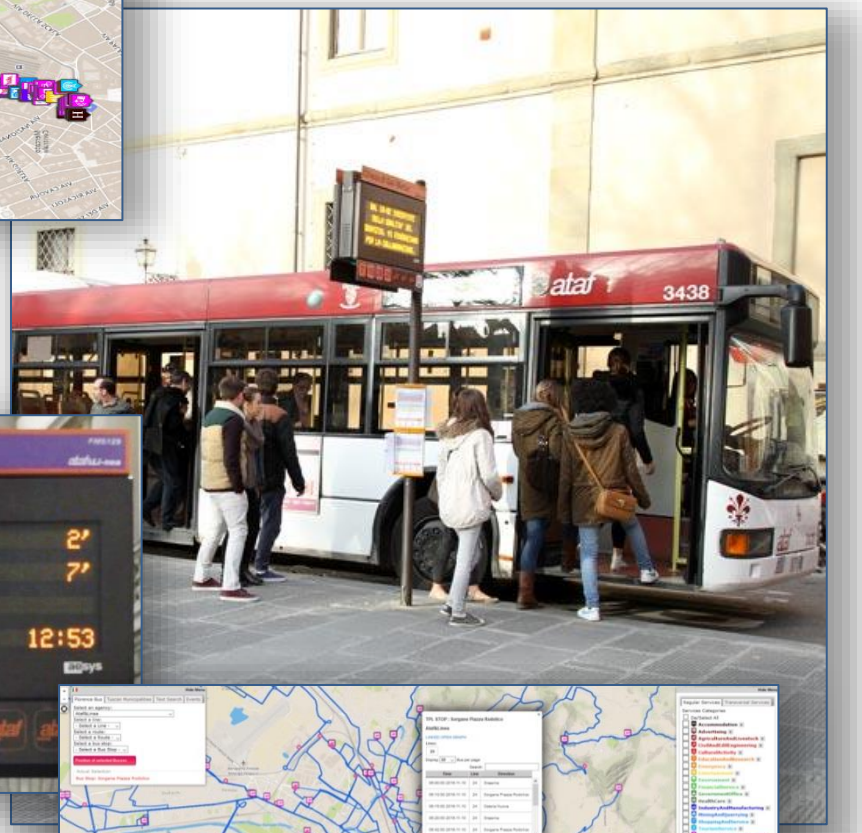


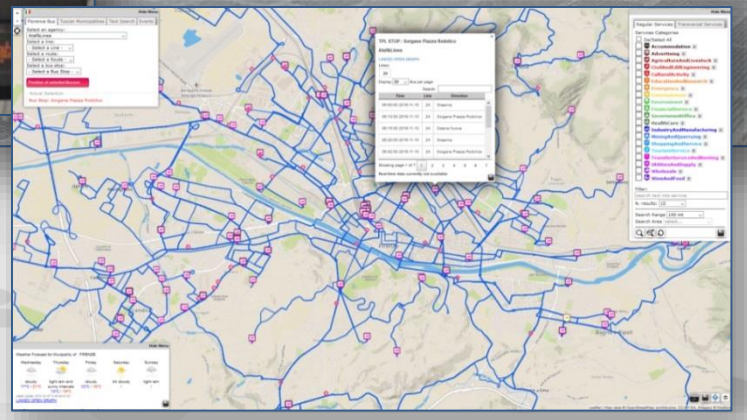
Supporting City Users in using Public Mobility

Public Transportation, PT

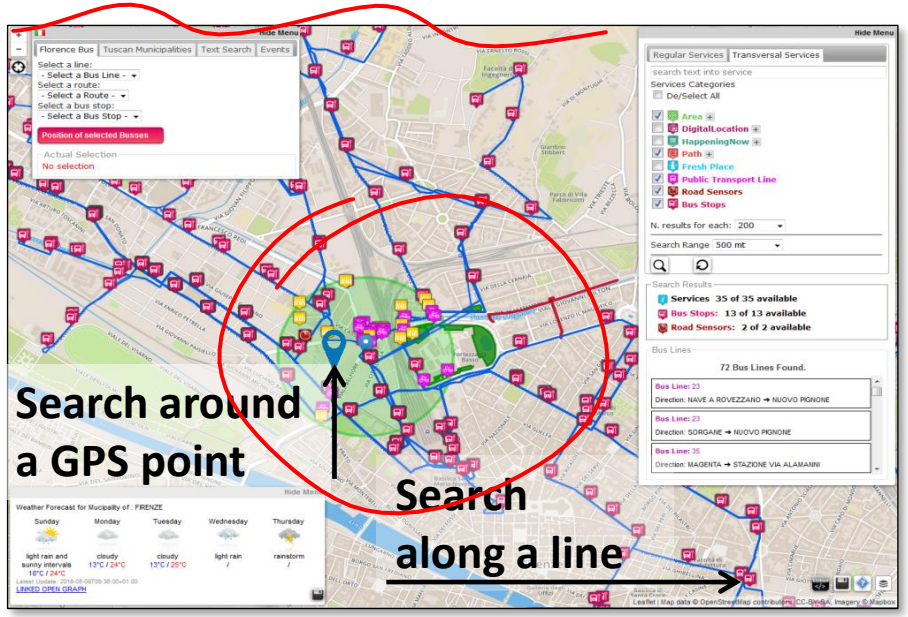
- Getting tickets
- Getting bus stops, lines, and timelines for bus, train and tramline (GTFS, ETL, ...)
- Getting Tunnel and Ferry Status
- Searching Services along a Pub. Transport line or closer to a stop
- Searching the closest bus stops
- searching for BUS stops via name
- real time delays of busses
- Modal/multimodal routing for Pub. Transport
- Tracking fleets, trajectories, etc.
- Get connected drive data

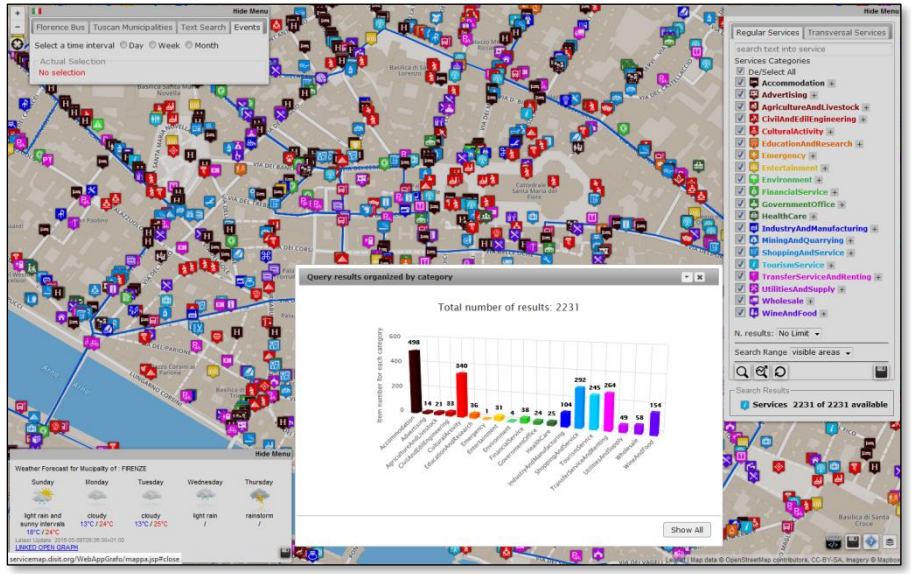






ServiceMap Dev Tool (knowledge & Map tool)



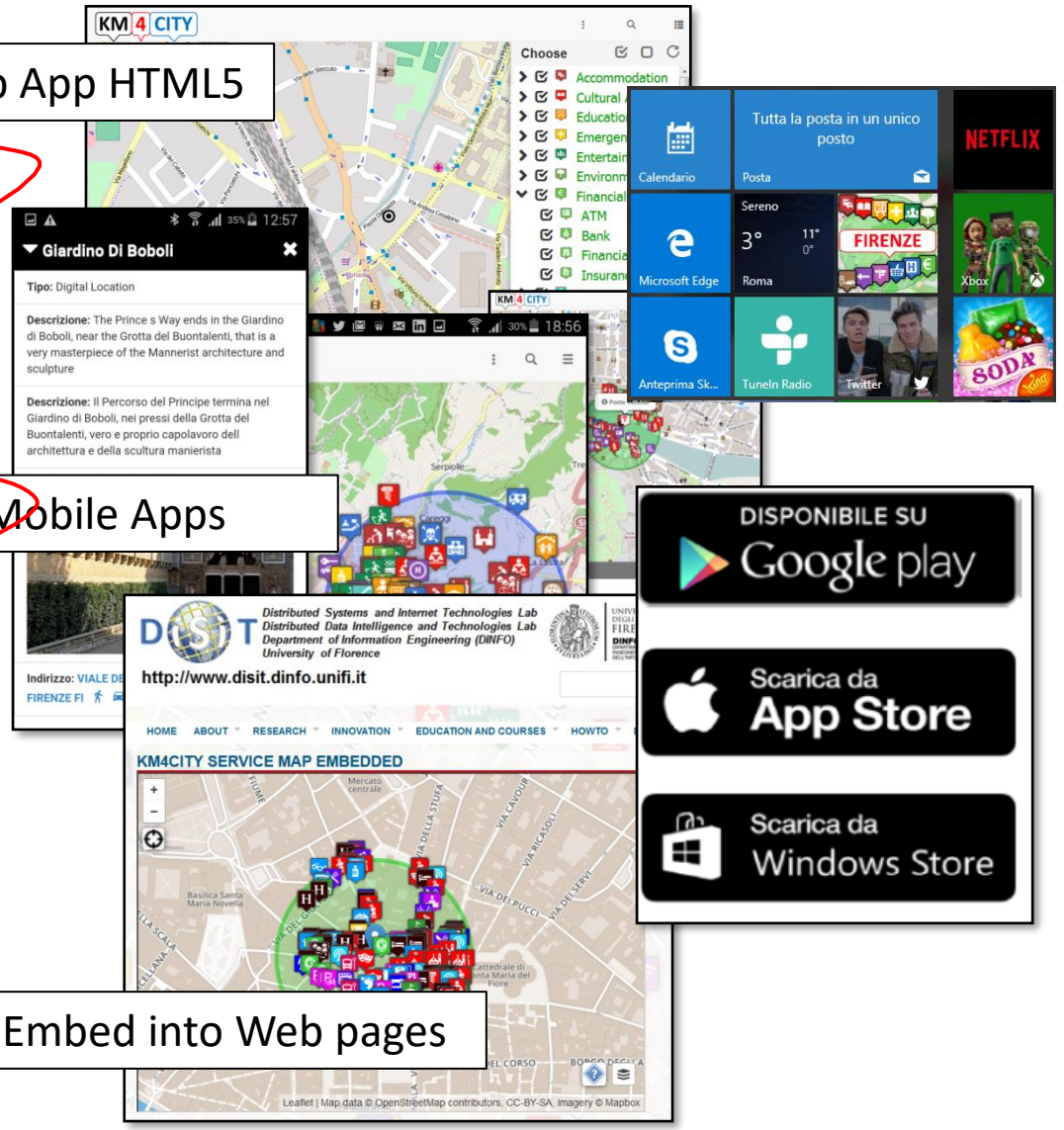


Smart City API call generation

Web App HTML5

Mobile Apps

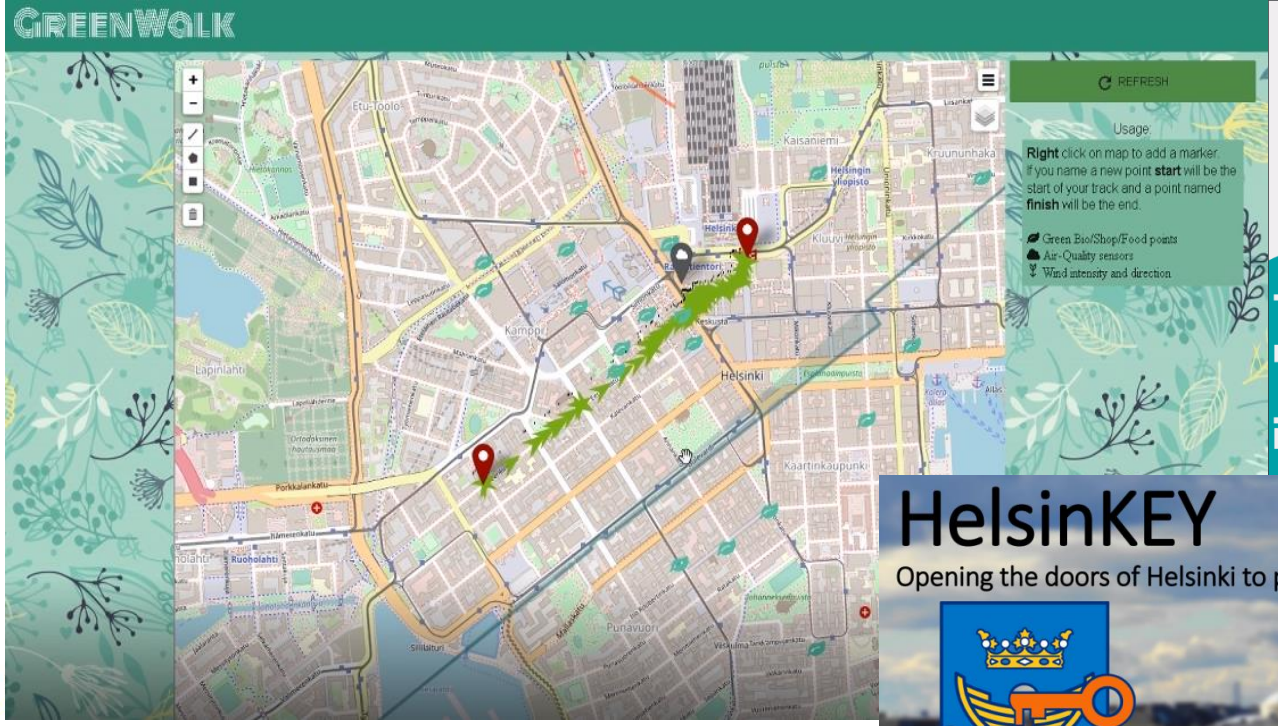
Embed into Web pages



Hackathons and Challenges

LOGIN

Dashboards (Public)
Knowledge and Maps
Micro Applications
External Services
Data Set Manager: Data Gate
Resource Manager
Development Tools
Knowledge Base Graphs
Smart City API Docs: Swagger
Testing API by Postman
Source Code Access
Management
Smart City API Monitoring
Web Server Monitoring
Smart Decision Support Sys
Resilience Decision Support Sys
Help and Contacts
Help Desk and contacts
Contact Us, Problem Reporting
FAQ
Help Us with Your Feedback!!!
Documentation and Articles
Km4City portal
DISIT Lab portal



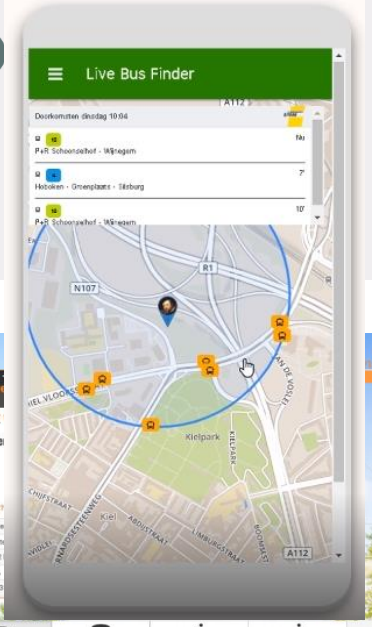
The End
Details
Data
App
Context
About

Greenifiers

BIG DATA FOR SMART CITIES

An app for sustainable mobility

ndrea Pescetti



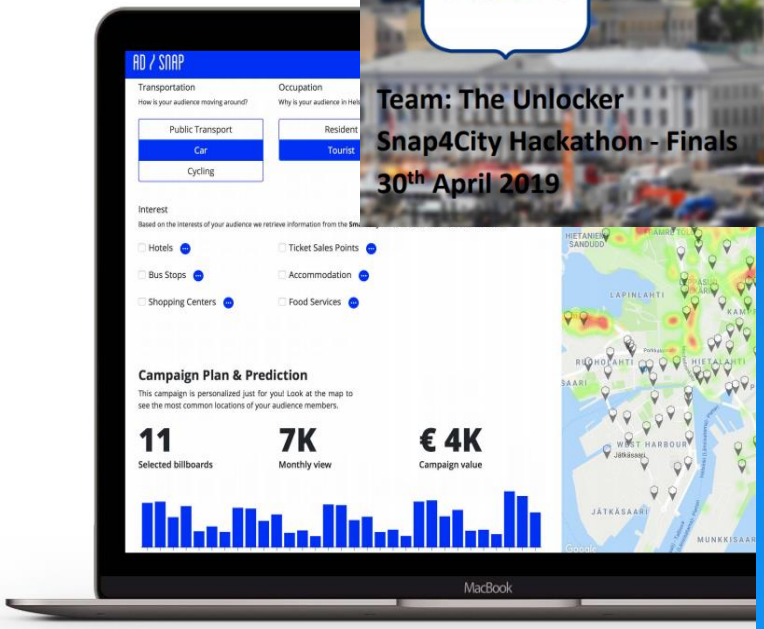
Data-driven design platform for offline advertising

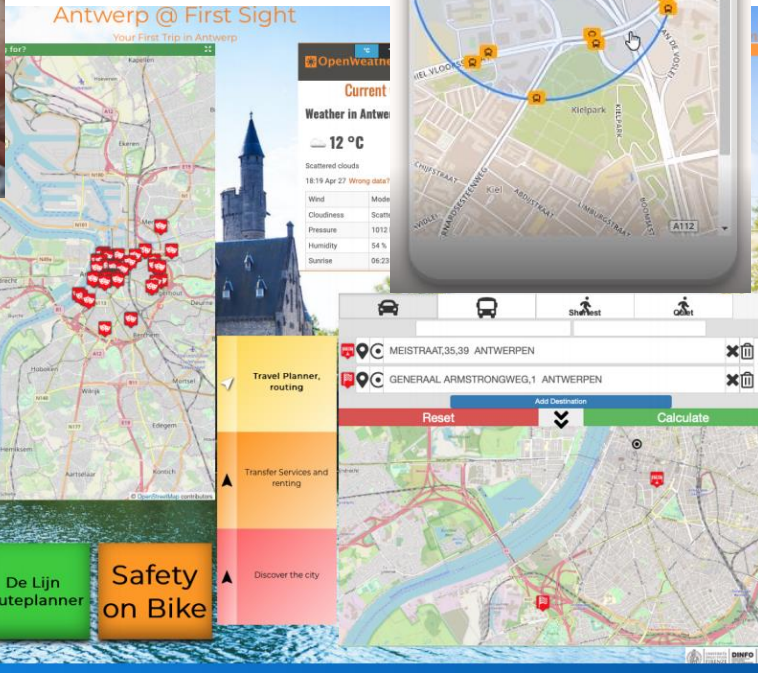
Built on big data to determine the most popular location for a customer group

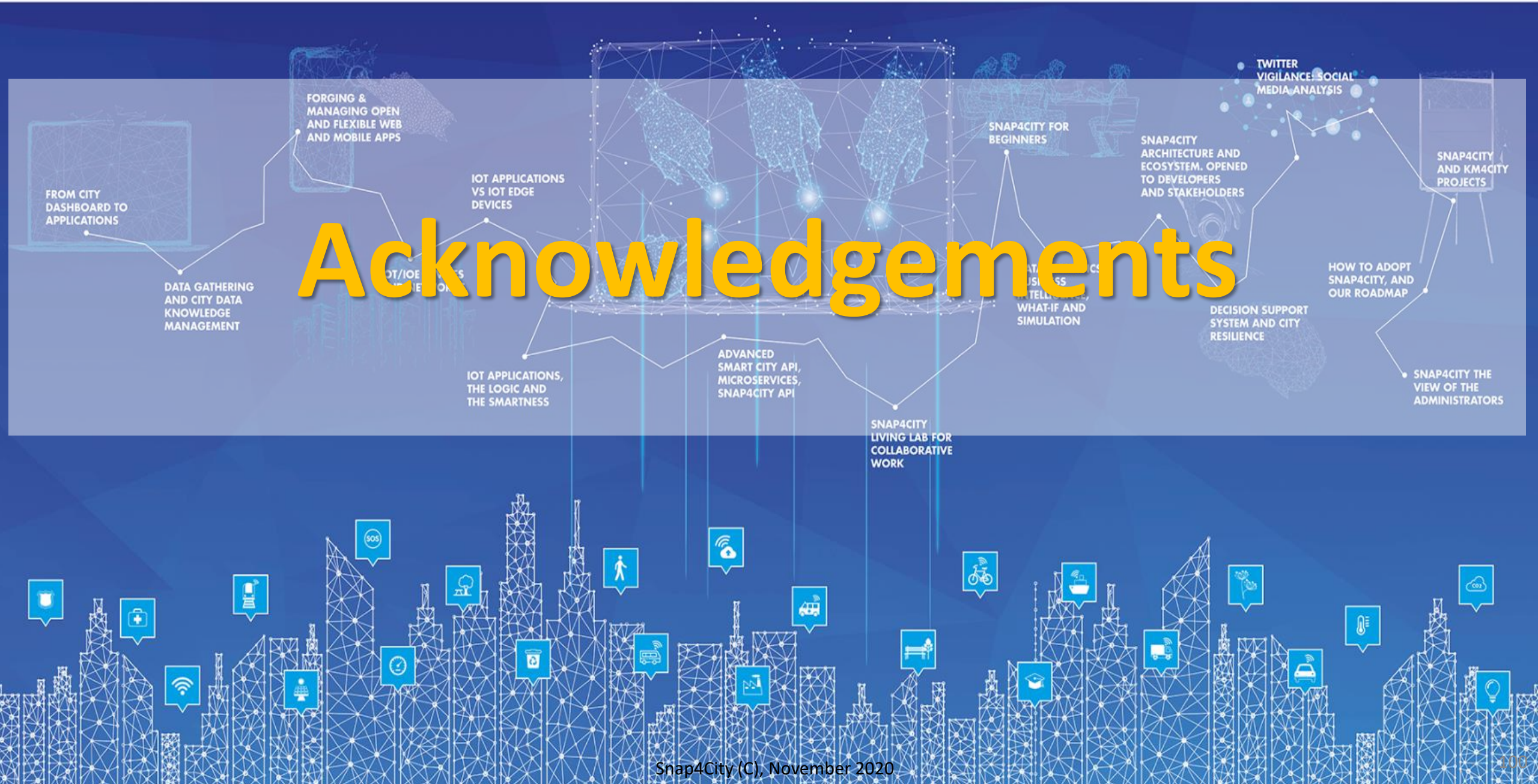
Automatically select billboards with the highest traction. The platform is capable of predicting the reach of every location on a city based on big data analytics.

Skyrocket the traction of offline campaigns

Citizens will run into more relevant advertisements resulting in higher conversion rates and more successful campaigns.







Acknowledgements

Standards and Interoperability

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

https://www.snap4city.org/65

Snap4City tools and Living lab Solution have been Created to satisfy requirements of international organizations as:

- **ENOLL**: https://www.openlivinglabs.eu/
  - European Network **of Living Labs**
- **EIP-SCC**: European Innovation Partnership on Smart Cities and Communities
  - https://eu-smartcities.eu/
- **Select4Cities**: Pre-Commercial Procurement Project to develop a data-driven, Internet-of-Everything (IoE) platform for large-scale urban co-creation
  - https://www.select4cities.eu/

https://www.snap4city.org/558

Main running instances

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

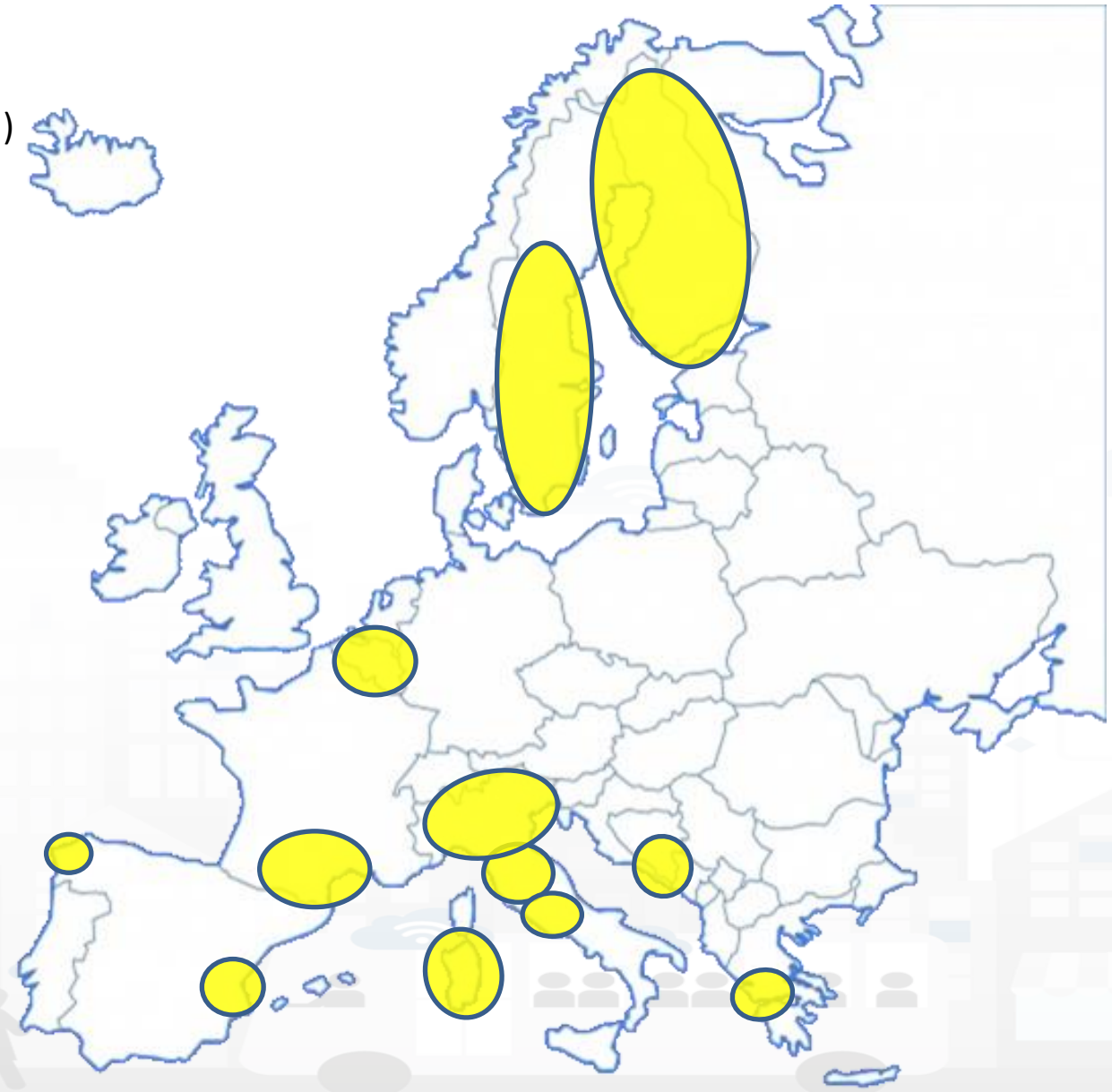
Acknowledgements

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

Coverage 2020

Main Organizations/areas

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



TOP

SNAP4CITY

KM 4 CITY

Be smart in a SNAP!

SNAP4
Appliances and Dockers
Installations

CONTACT

DISIT Lab, DINFO: Department of Information Engineering
Università degli Studi di Firenze - School of Engineering

Via S. Marta, 3 - 50139 Firenze, ITALY
https://www.disit.org

www.snap4city.org

Email: snap4city@disit.org

Office: +39-055-2758-515 / 517
Cell: +39-335-566-86-74
Fax.: +39-055-2758570

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