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

SNAP4CITY

Powered by KM4CITY

scalable Smart aNalytic APplication builder for sentient Cities

Overview -- September 2018

https://www.snap4City.org https://www.Km4City.org

https://www.disit.org/

Paolo Nesi, *paolo.nesi@unifi.it*

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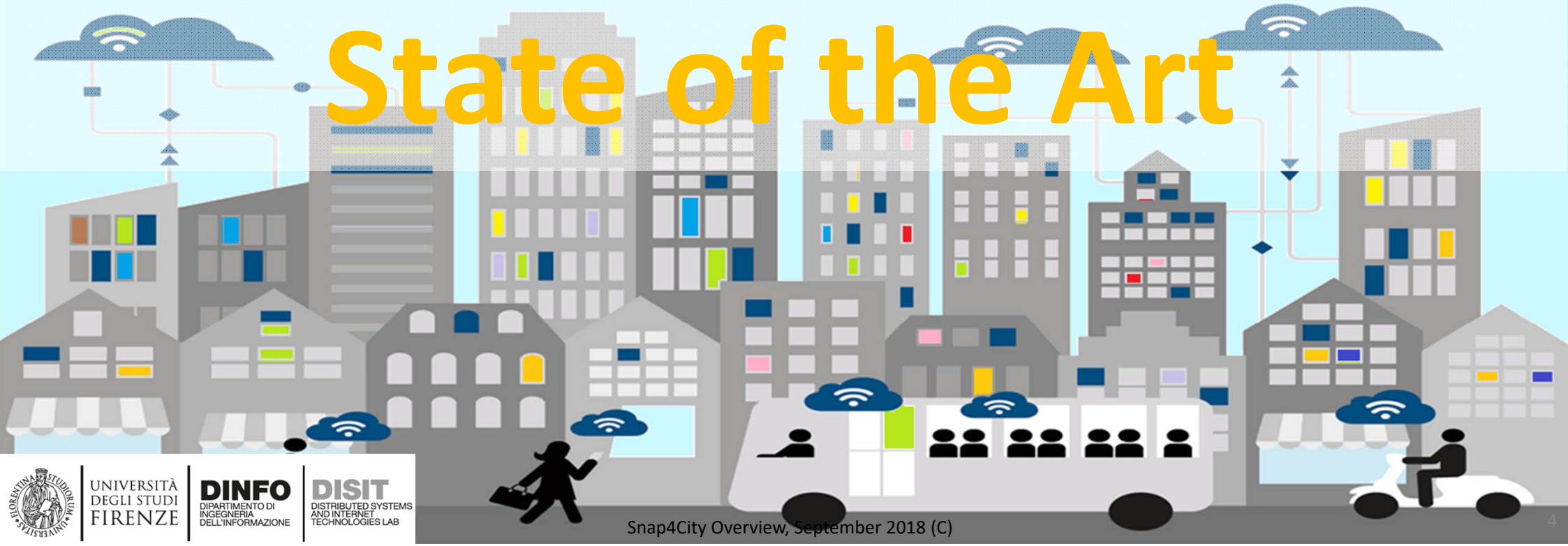
- Snap4City has been created in response to Select4Cities PCP (http://www.select4cities.eu/) call as an open, standardized, data-driven, service-oriented, user-centric platform enabling large-scale co-creation IOT/IOE applications and services for Helsinki, Copenhagen and Antwerp.
- Snap4City is a fully open source, robust, scalable, easy to use solution, provides tools for co-creation of mixt data driven, stream and batch processing, extending the powerful semantic reasoner of Km4City https://www.km4city.org, with IOT/IOE, GDPR, and city dashboards.
  - Km4City has been validated in multiple devices (PC, Android, Raspberry, ..), and domains: mobility and transport, tourism, health, welfare, social and cities such as Florence, Pisa, Arezzo, and large area of millions on inhabitants as Tuscany and million of data per day.
- The innovation is mainly related to semantic reasoning, IOT interoperability, microservices, automated dashboard production, .. thus
- ***setting up smart city solutions in a*** SNAP

Agenda

- Comparison of Snap4City with state of the art
- Services for the city users, stakeholders
- From Level 1 to developers
- Snap4City Living Lab

Comparison with State of the Art



Confronto: lo stato dell'arte

	Open Source end-to-end	Scalability IOT	Execution scalability	Visual Programming end-to-end applications	Advanced Smart City API, MicroServices	Multi Domain Semantic Platform	External sevices via API	Standard based Modules and IOT, Open Devices	Integrated Community manmagement	Resoruce Sharing	Referral data management	Security end-2-end	Dashboard H24/7	Falxible and easy dashboard creation	Multi-protocol on IOT
Snap4City	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
KAA	Y	Y	Y[1]	N	Y	N	Y	N/Y	Y	N	--	Y	Y	N	Y
AWS	N	Y	Y	N	N	N	Y	Y	N	Y	Y	Y	Y	(Y)	Limited
Azure IOT	N	Y	Y	(Y)	N	N	Y	Y	(Y)	Y	Y	Y	Y	(Y)	Limited
IOT IGNITE	Y	Y[2]	N	Y	N	N	Y	N	N	N	--	N	Y	(Y)	MQTT
PTC ThingWorkx	N	Y	(Y)	Y	N	N	Y	Y	N	N	--	Y	Y	(Y)	Y
BEZIRK	Y	N	N	N	N	Y	--	Y	N	N	--	N	N	N	Y
Bosch IoT Suite	N	Y	(Y)	Y	Y	N	Y	Y	N	N	Y	Y	Y	(Y)	Y
FIWARE	Y	(Y)	N	N	Y	N	N	Y	N	N	N	N	Y	N	Y
CISCO Jasper	N	Y	N	N	N	N	Y	N	--	--	Y	--	Y	--	N[3]
IBM Watson IoT	(N)	Y	(Y)	Y	Y	Y	Y	Y	N	Y	(y)	Y	Y	Y	Y
Siemens MindSphere	N	Y	--	Y	N	N	N	Y	N	N	Y	N	Y	N	Y
Carriots	N	Y	--	N	N	N	Y	--	N	N	--	N	Y	Y	MQTT
Thingsboard	Y	Y[4]	N	N	N	N	N	N	N	N	--	Y	Y	Y	(MQTT, CoAP, http)
IOT eclipse.org	Y	Y	N	N	N	N	Y	Y	N	N	N	N	N	N	Y
Google IOT	N	Y	Y	N	N	N	Y	N	N	N	N	Y	N	N	MQTT, HTTTP

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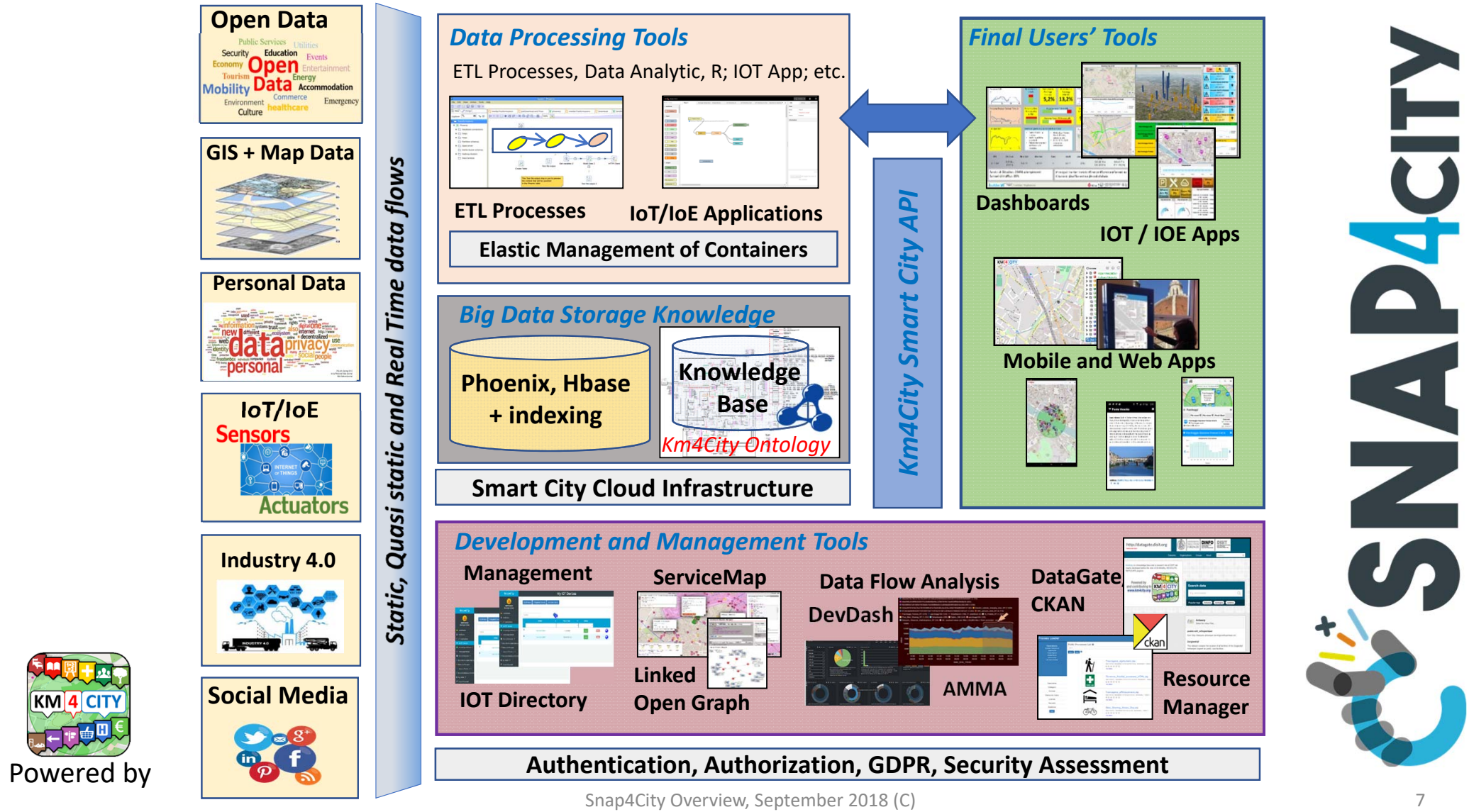
unique about our platform vs competitors?

- flexible and IOT **smartcity-oriented dashboards**, **visual editor** and **wizard** for creating dashboards, large collection of widgets, (addressing: sensors and actuators, selectors, maps, etc.);
- **Visual tool for IOT Applications** (not rule based, largely avoiding coding), large number of MicroServices, easy to expand;
- management of **any kind of data and resources (High Level Types)** by using Km4City Expert system and semantic indexing;
- providing tools for **managing the Living** Lab community;
- **Coworking** for: IOT applications, dashboards, back office processes, microservices, external services, etc.;
- **end-2-end encryption and security/privacy with GDPR**: several data types: My Personal Data, My Annotations, etc.;
- **integrated management** of referral data, historical data, traffic analyzer;


Open Data
GIS + Map Data
Personal Data
IoT/IoE
Sensors
Actuators
Industry 4.0
Social Media
Static, Quasi static and Real Time data flows
Data Processing Tools
ETL Processes, Data Analytic, R; IOT App; etc.
ETL Processes
IoT/IoE Applications
Elastic Management of Containers
Big Data Storage Knowledge
Phoenix, Hbase + indexing
Knowledge Base
Km4City Ontology
Smart City Cloud Infrastructure
Km4City Smart City API
Final Users' Tools
Dashboards
IOT / IOE Apps
Mobile and Web Apps
Development and Management Tools
Management
IOT Directory
ServiceMap
Linked Open Graph
Data Flow Analysis
DevDash
AMMA
DataGate
CKAN
Resource Manager
Authentication, Authorization, GDPR, Security Assessment

Powered by

Requirements and Objectives

Requirements and Objectives

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

Non functional requirements

- Open Source and based on Open Source Tools and OS
- Open Standard for communication and API for In/Out
- Scalable, Robust, Distributed and Decoupled, modular, Service Oriented, open to external services and data sets
- Data driven, for reading and data analytic
- Heterogeneous: any device, private and public, custom and..
- Interoperability: protocols, internal API, Smart City API, capable to integrate with legacy conditions in place, modular, reusable,…
- Communication with things: any protocol, any format, …
- Security by Design: HTTPS, TLS, …
- User Centric Design: privacy by Design (and GDPR), personalized, personal data management, ...

Services for City users and Stakeholders

For the user: different levels of engagement

- **Observer:**
  - Level 0: observers of data with private access
- **Manager: Final Users**
  - Level 1: create Dashboards and IOT Applications
  - Level 2: create Dashboards that get and produce data, act on city
  - Level 3: add your own IOT Device, create Dashboards with them and city data
  - Level 4: create IOT Applications to make smarter your Dashboards, services, notifications, exploiting MicroServices
- **Area Manager: Developers, Researchers, Operators**
  - Level 5: Developer of complex services: R, ETL, External Srv, MicroApp, web and mobile application exploiting Smart City API…

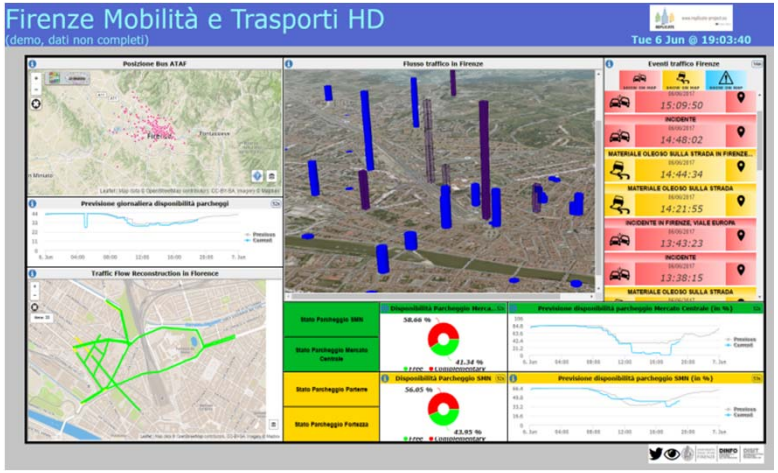
Level 0 users

Level 0 user: Observer (public or invited)

- Access to the Portal, view Dashboards with public data

IOT and City data World

City Dashboard



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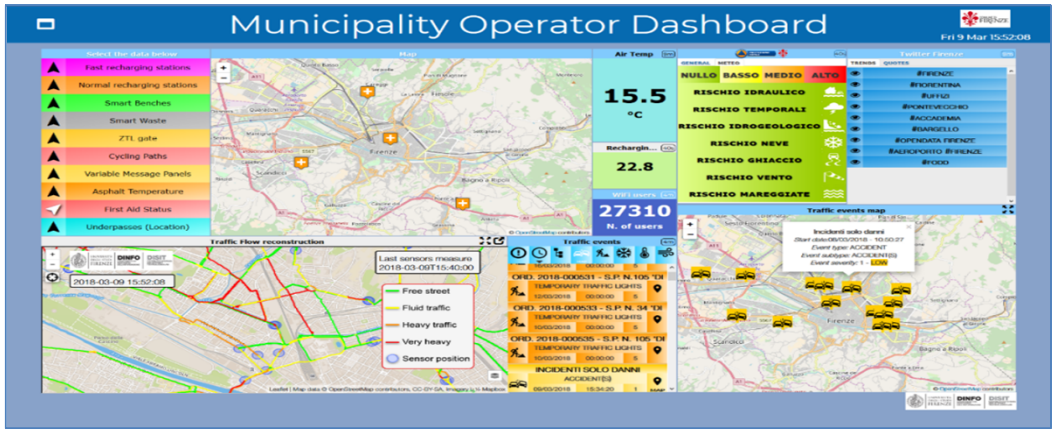
https://dashboard.km4city.org/view/index.php?iddasboard=MjY1



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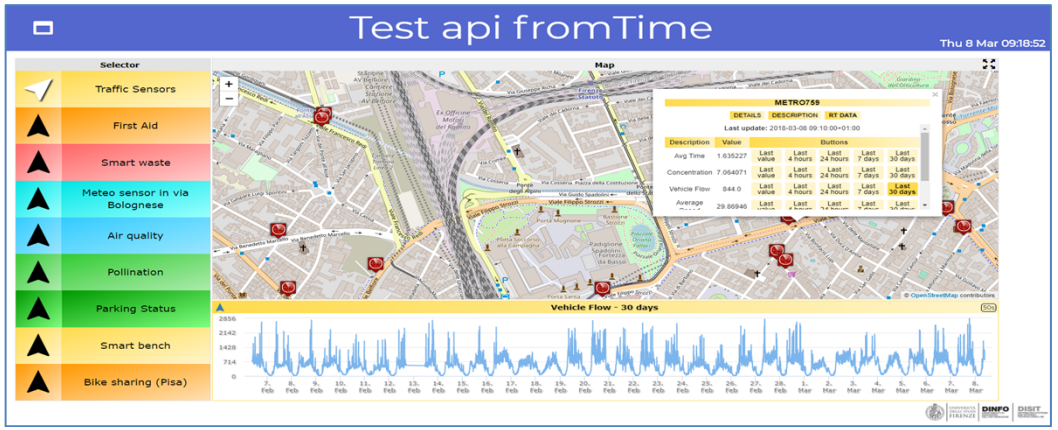

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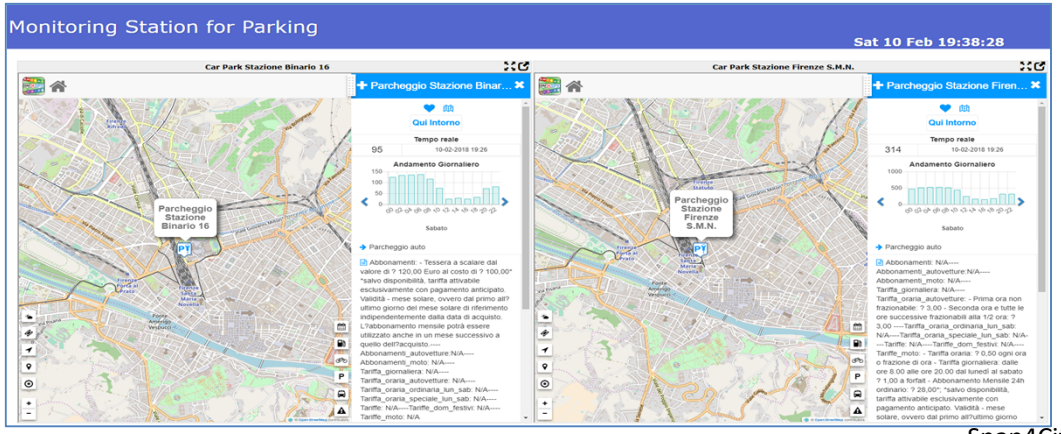

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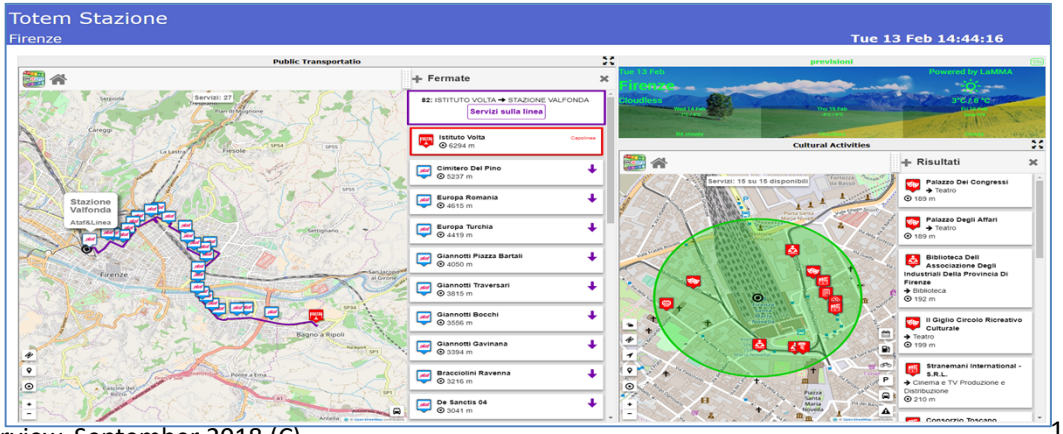

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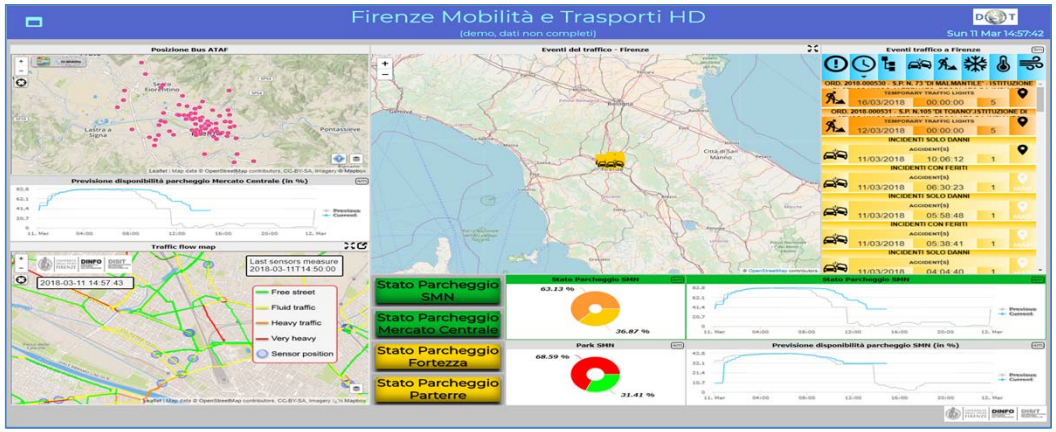
SNAP4CITY

KM4CITY

https://dashboard.km4city.org/dashboardSmartCity/view/index.php?iddasboard=MTE5



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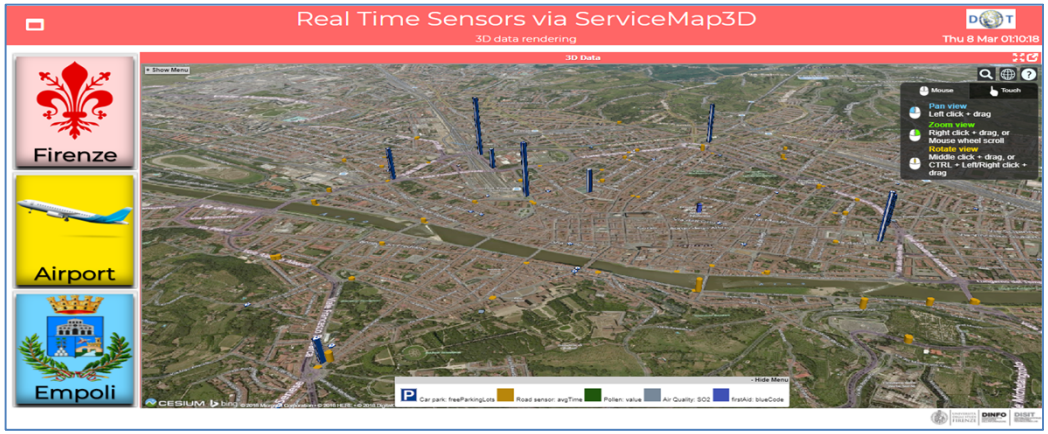

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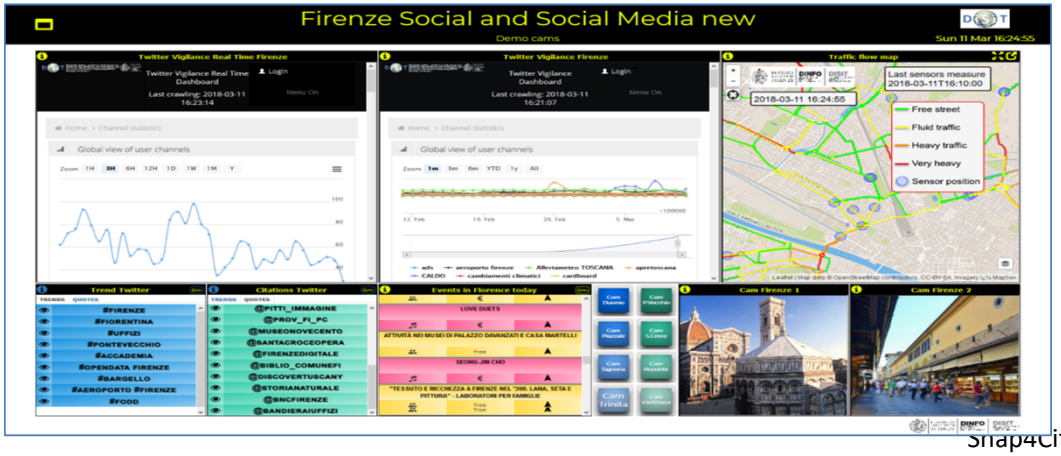

https://dashboard.km4city.org/view/index.php?iddasboard=MjQ3

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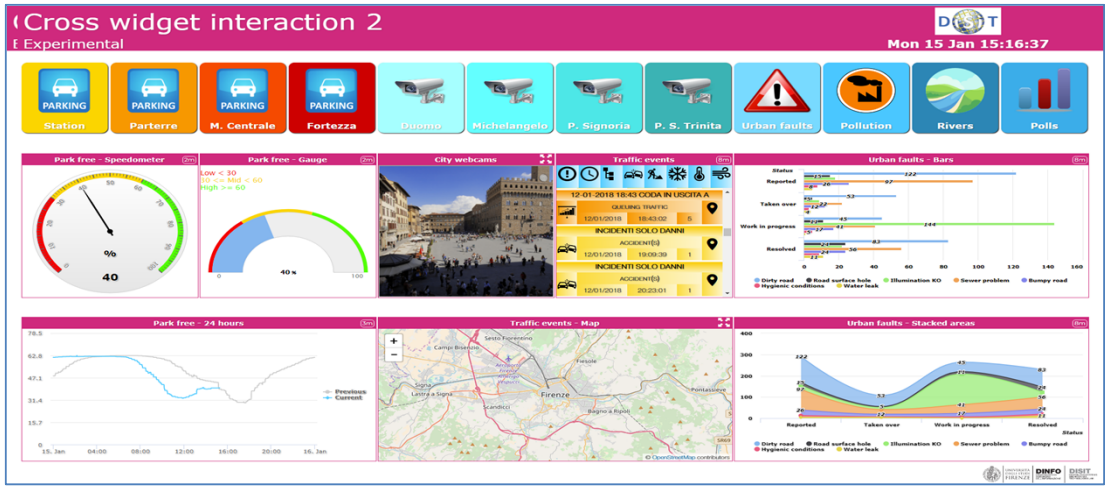
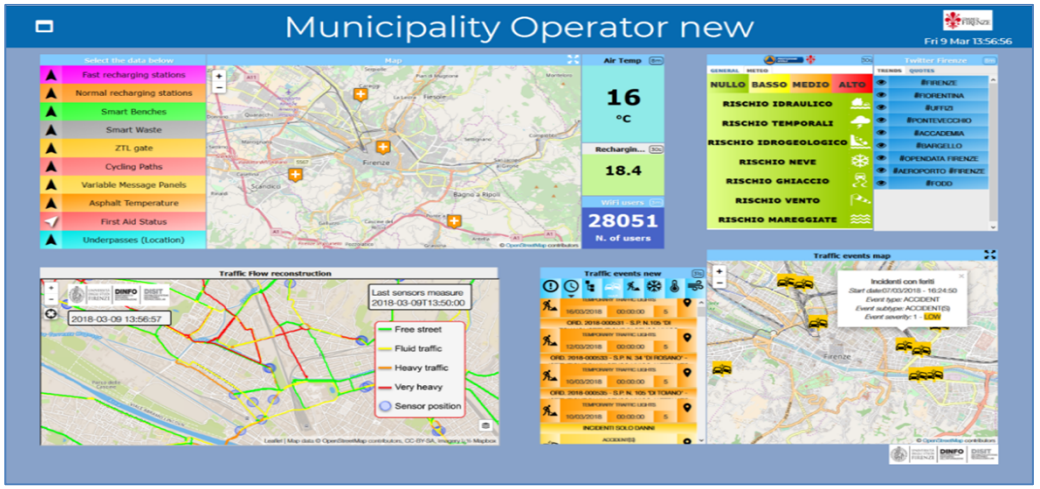
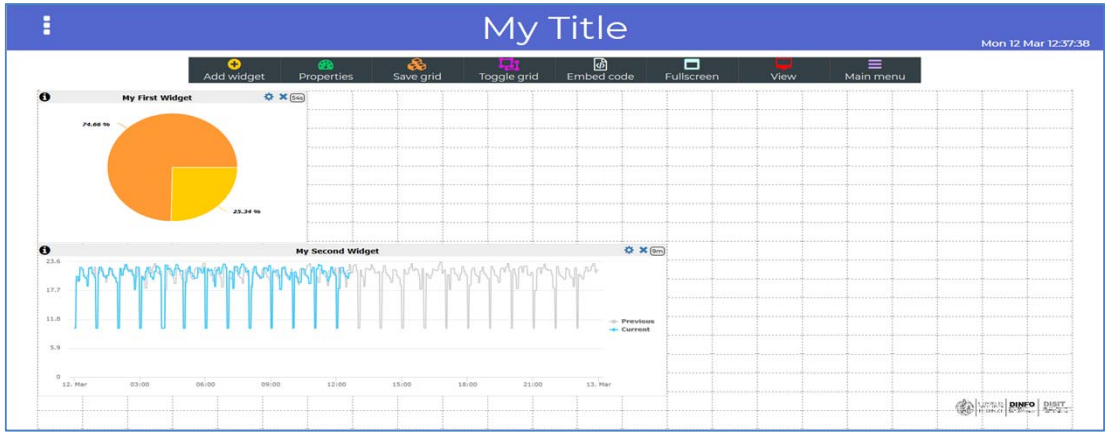
KM4CITY

https://dashboard.km4city.org/view/index.php?iddasboard=MTU1

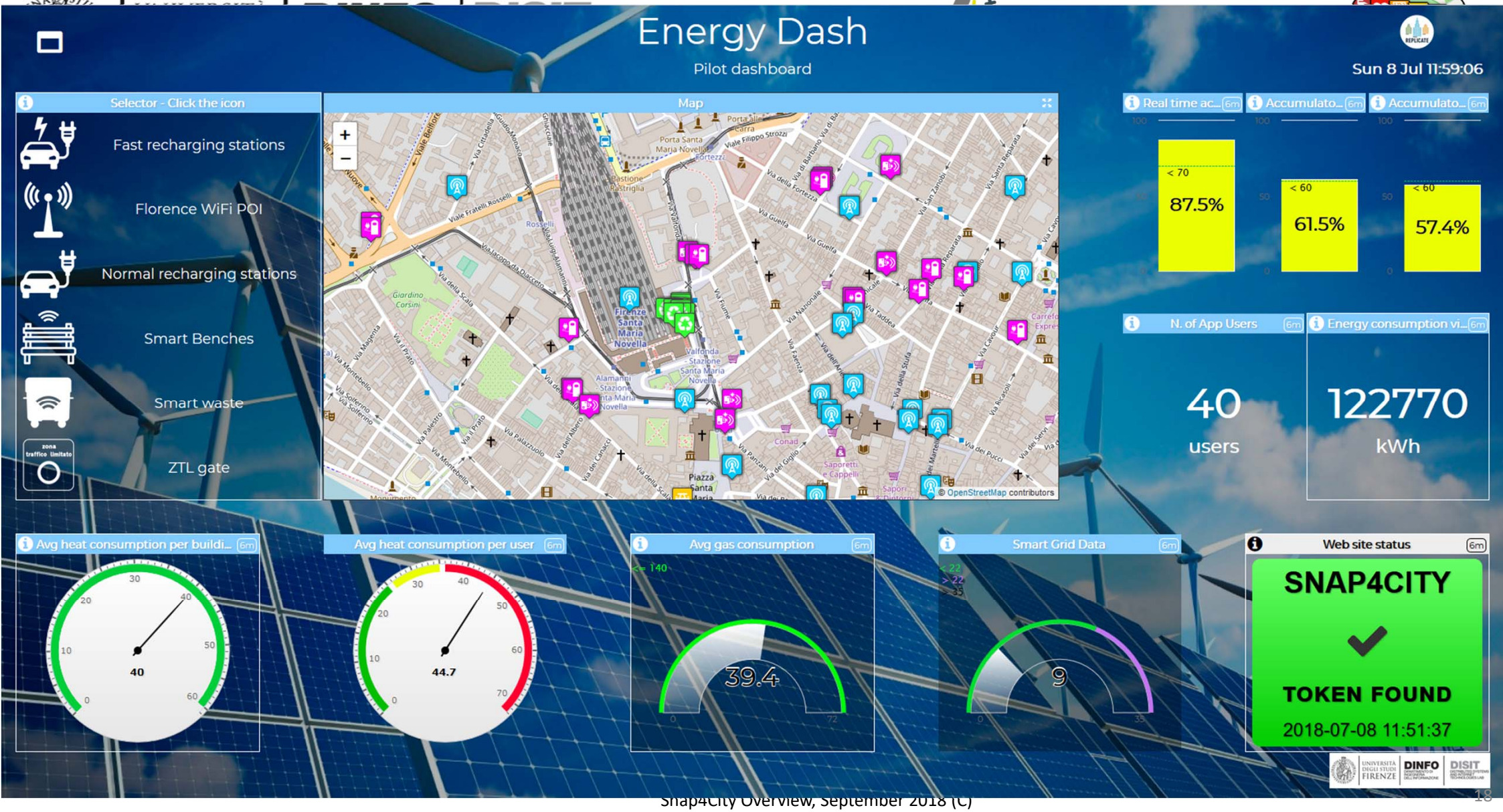
https://dashboard.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjY2







- Grid on the frame to simplify the sizing of dash and widgets
- Spaces among widgets to simplify the reading
- Full set of colour, which can be used more moderately than us ☺


Energy Dash
Pilot dashboard
Sun 8 Jul 11:59:06
Selector - Click the icon
Fast recharging stations
Florence WiFi POI
Normal recharging stations
Smart Benches
Smart waste
ZTL gate
Map
Real time ac... 6m
Accumulato... 6m
Accumulato... 6m
< 70
87.5%
< 60
61.5%
< 60
57.4%
N. of App Users 6m
40
users
Energy consumption vi... 6m
122770
kWh
Avg heat consumption per buildi... 6m
40
Avg heat consumption per user 6m
44.7
Avg gas consumption 6m
39.4
Smart Grid Data 6m
9
Web site status 6m
SNAP4CITY
TOKEN FOUND
2018-07-08 11:51:37

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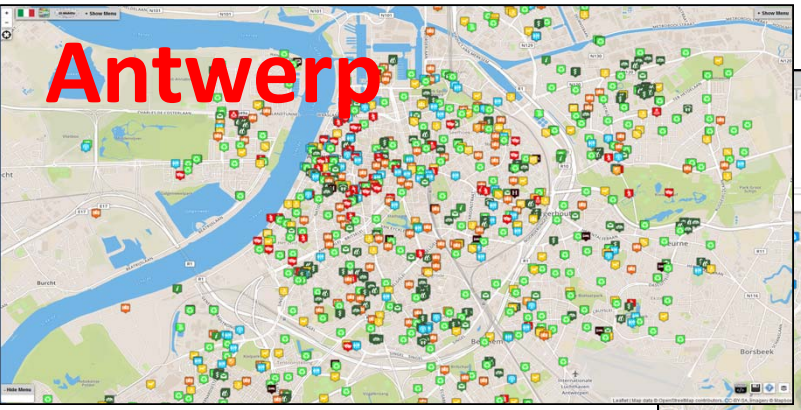
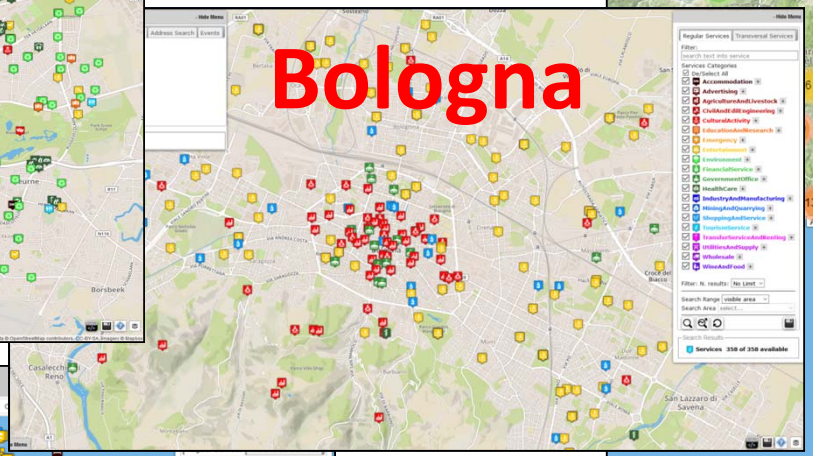
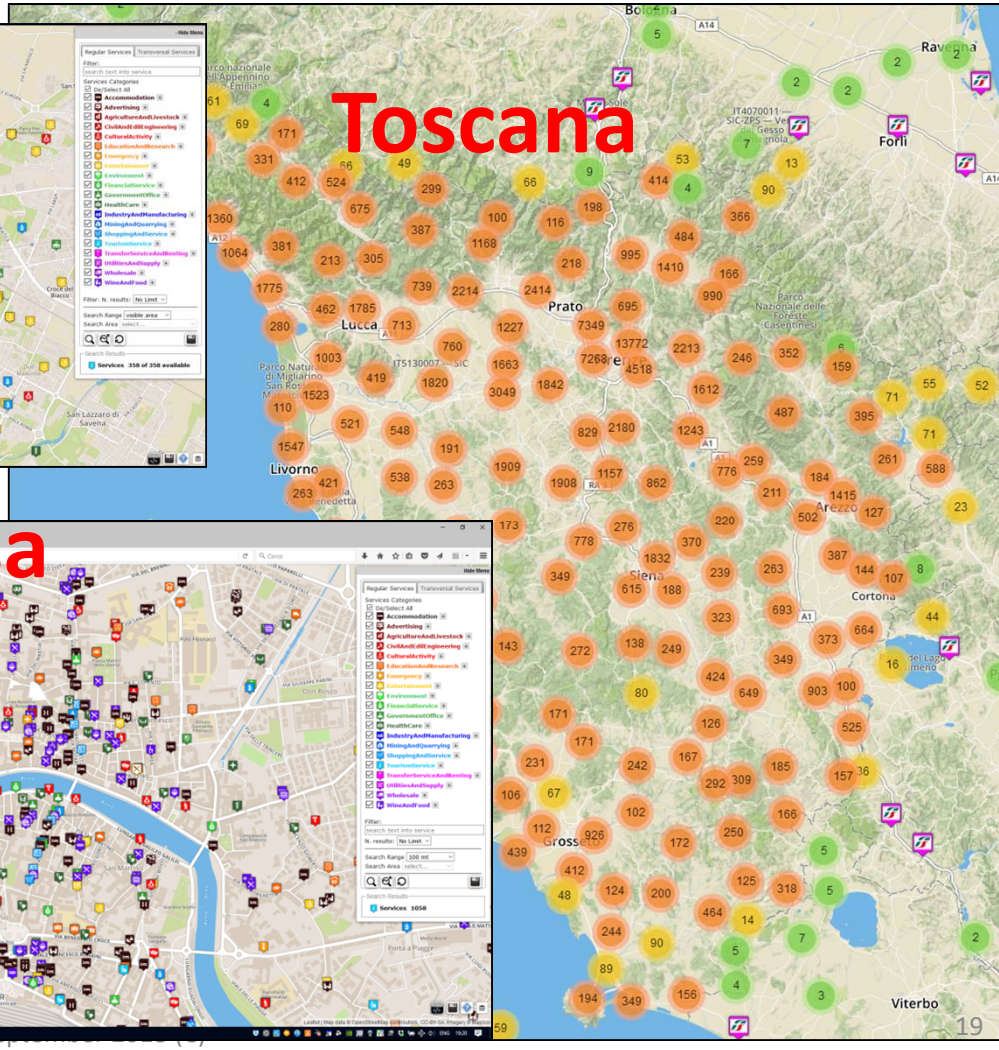
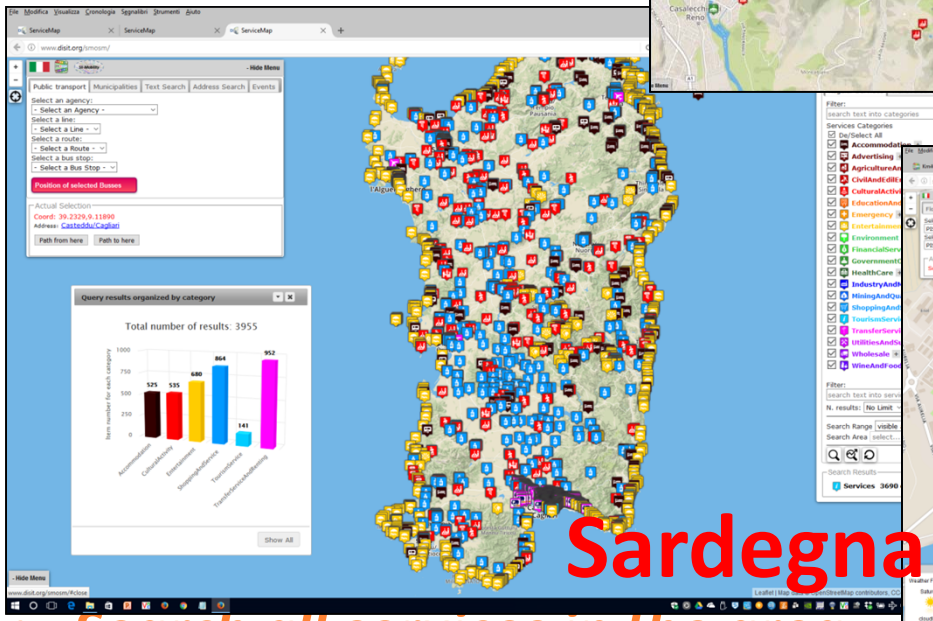
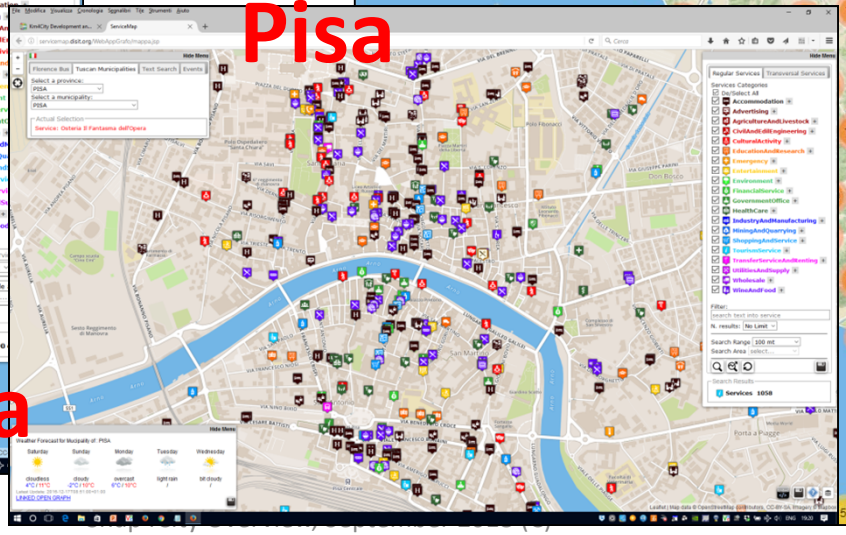
Coverage: examples



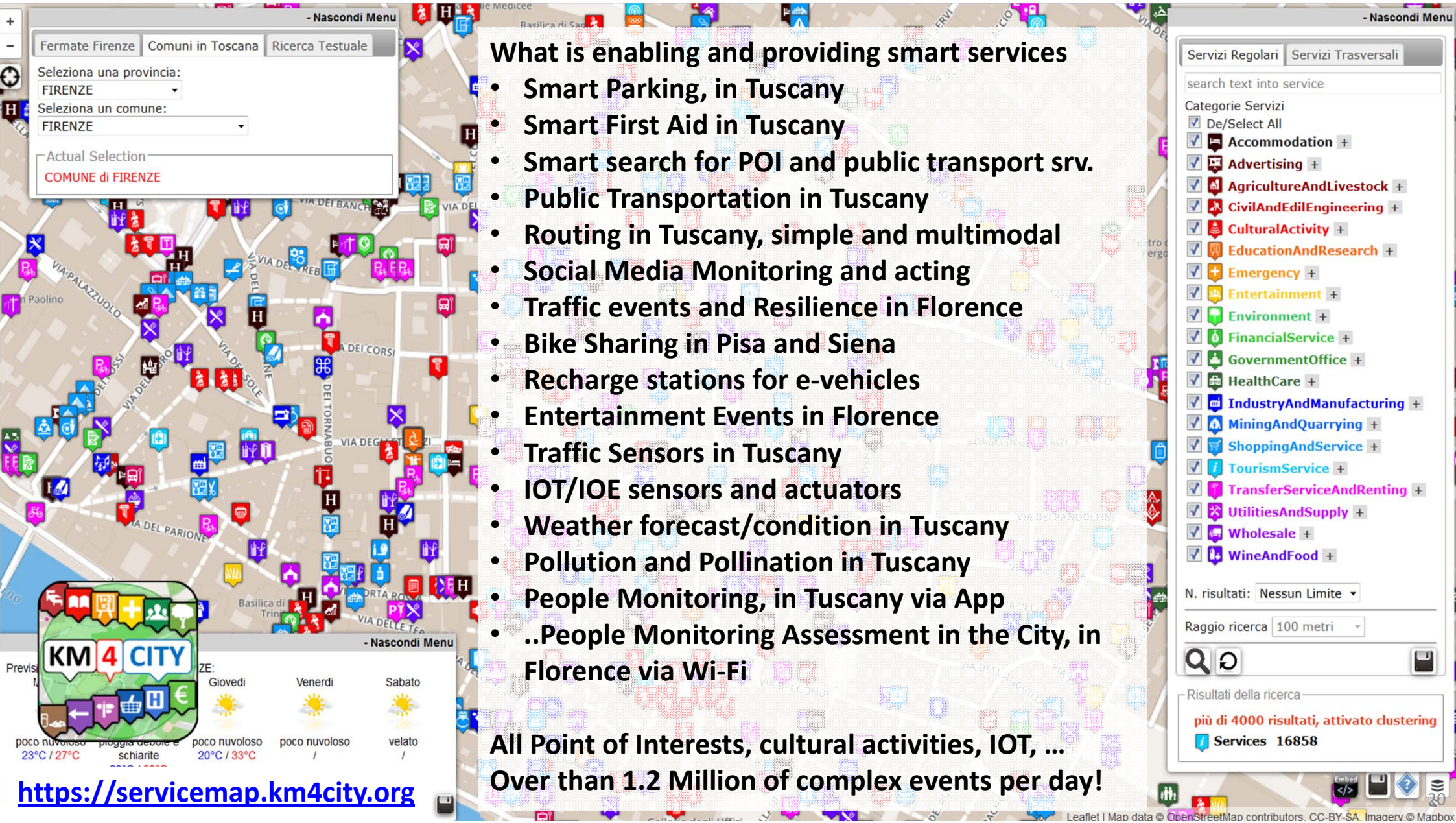








- *Search all services in the area*



What is enabling and providing smart services

- Smart Parking, in Tuscany
- Smart First Aid in Tuscany
- Smart search for POI and public transport srv.
- Public Transportation in Tuscany
- Routing in Tuscany, simple and multimodal
- 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
- IOT/IOE sensors and actuators
- Weather forecast/condition in Tuscany
- Pollution and Pollination in Tuscany
- People Monitoring, in Tuscany via App
- ..People Monitoring Assessment in the City, in Florence via Wi-Fi

All Point of Interests, cultural activities, IOT, …
Over than 1.2 Million of complex events per day!

https://servicemap.km4city.org

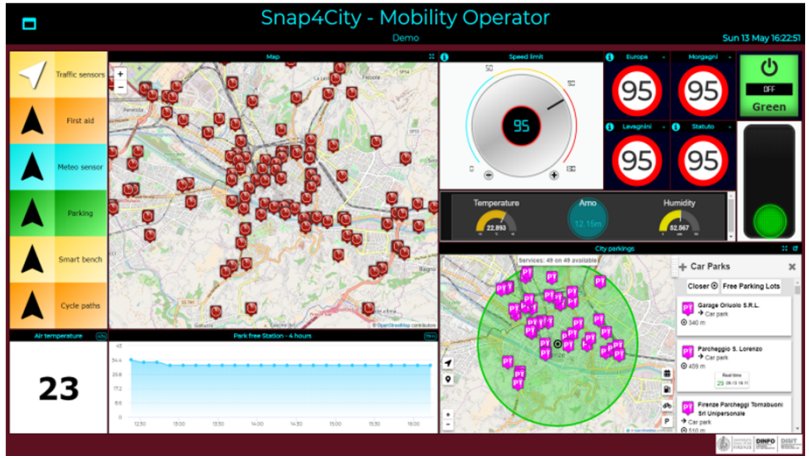
Level 2 users

Level 2 users: Create their own Dashboards

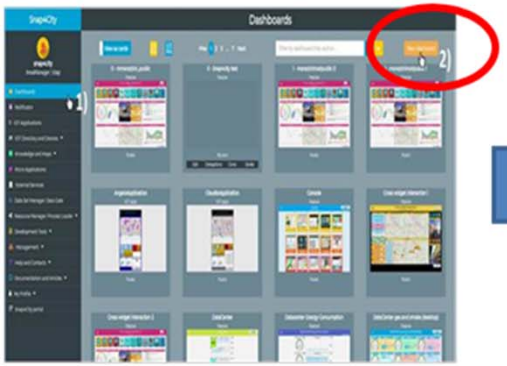
- With smart city data, and
- Sensor/actuator: info/IOT/IOE, if any provided by infrastruct. (e.g., Meter)
- → create events/notifications from them

IOT and City data World

City Dashboard

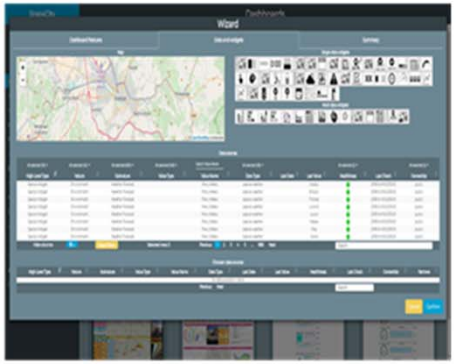


From Data to Dashboards by Wizard

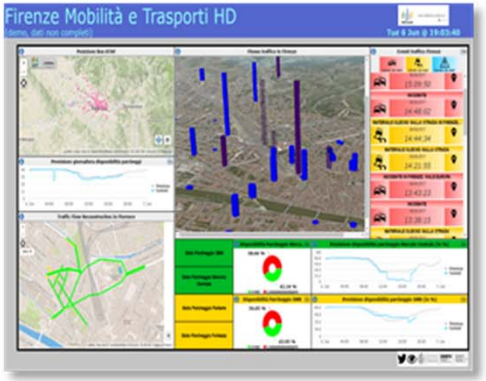


Dashboard List

Dashboard Model Selection



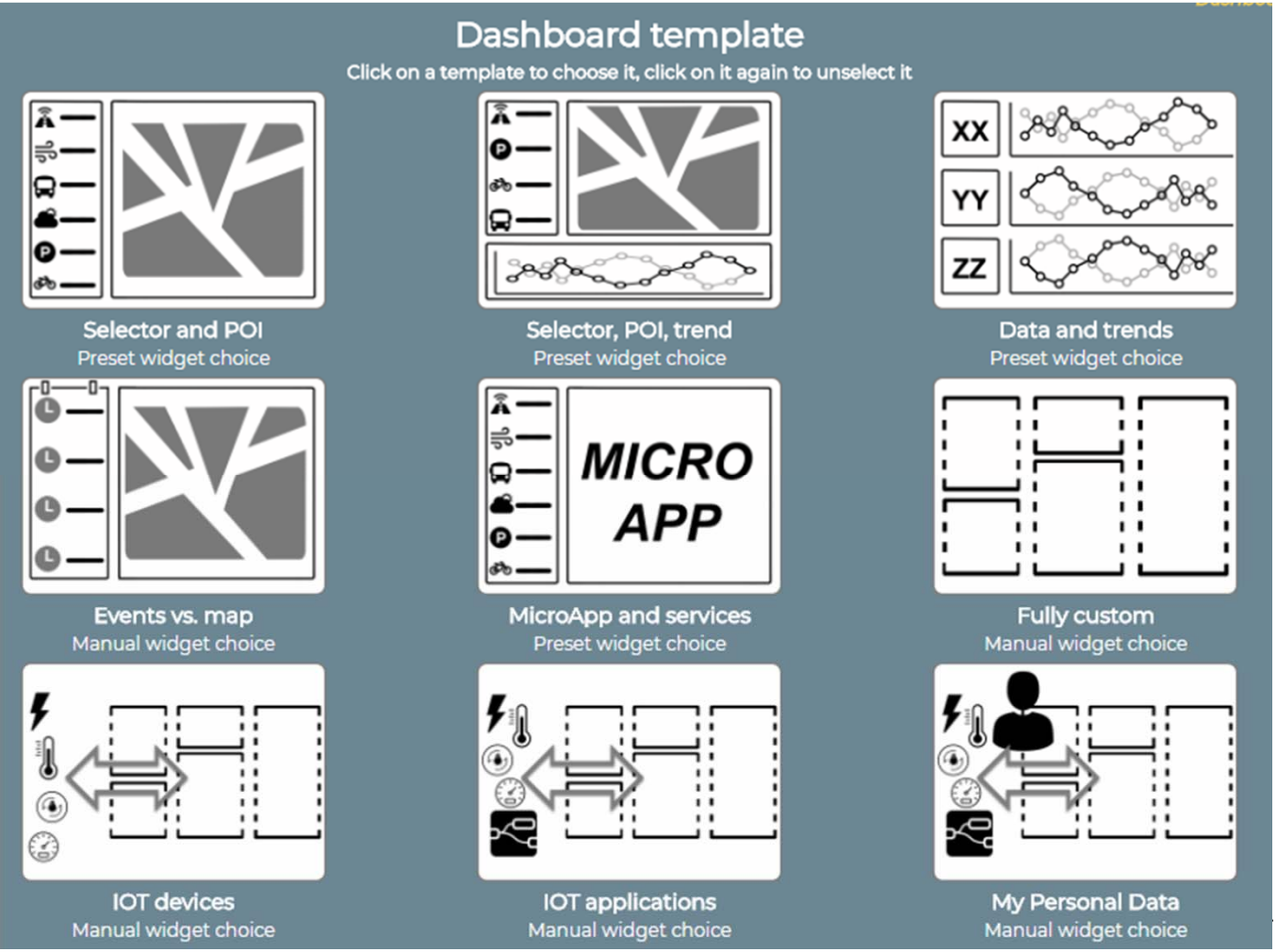
Wizard



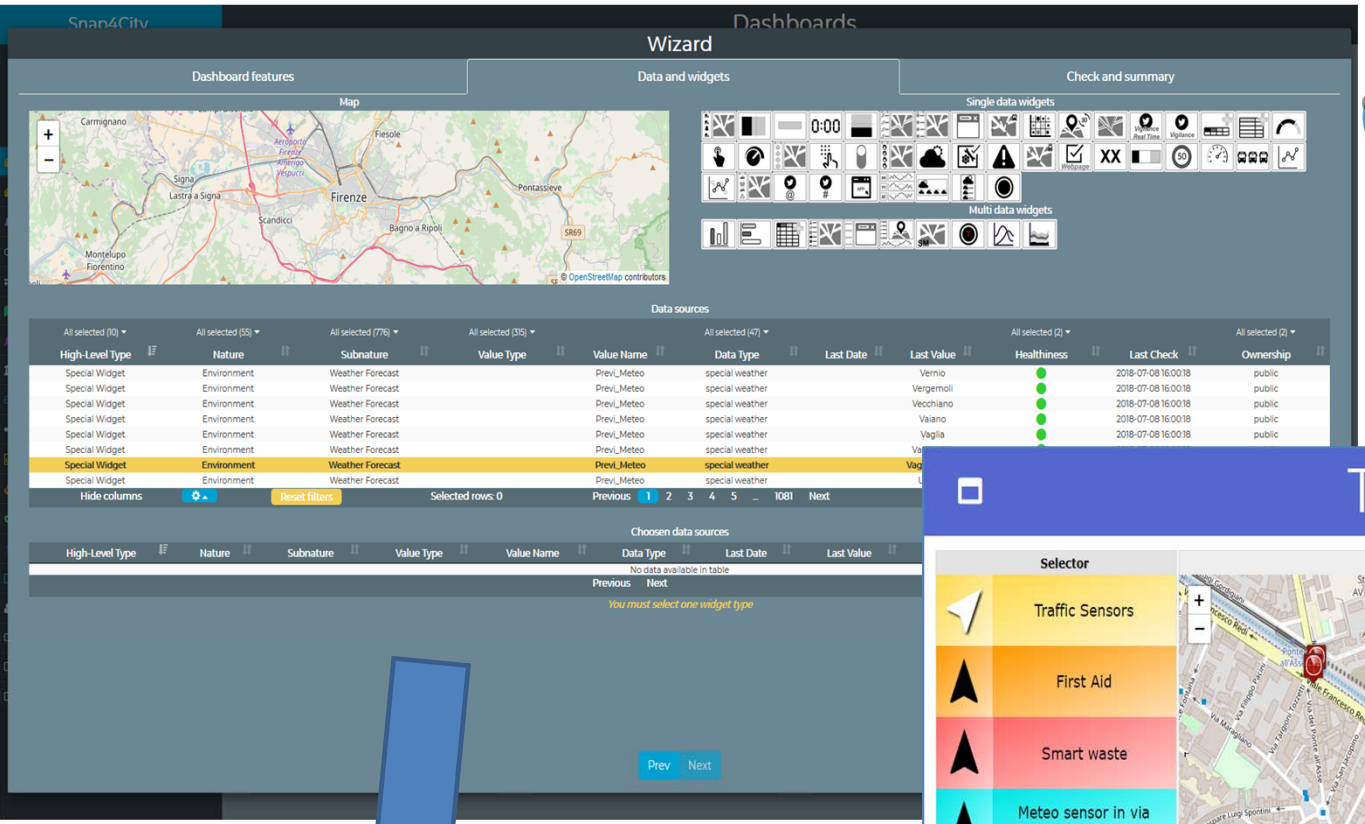
Examples:

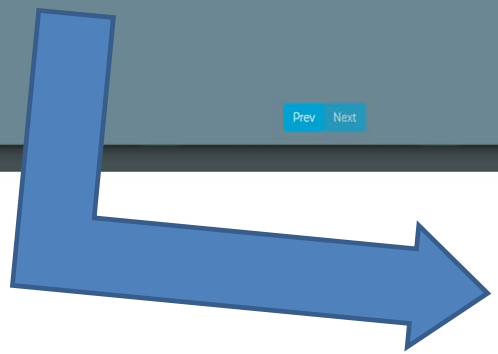
- Official environmental data compared with temperature of the house
- Weather actual/forecast vs the consumption of energy in the company
- Number invoices and revenues vs energy

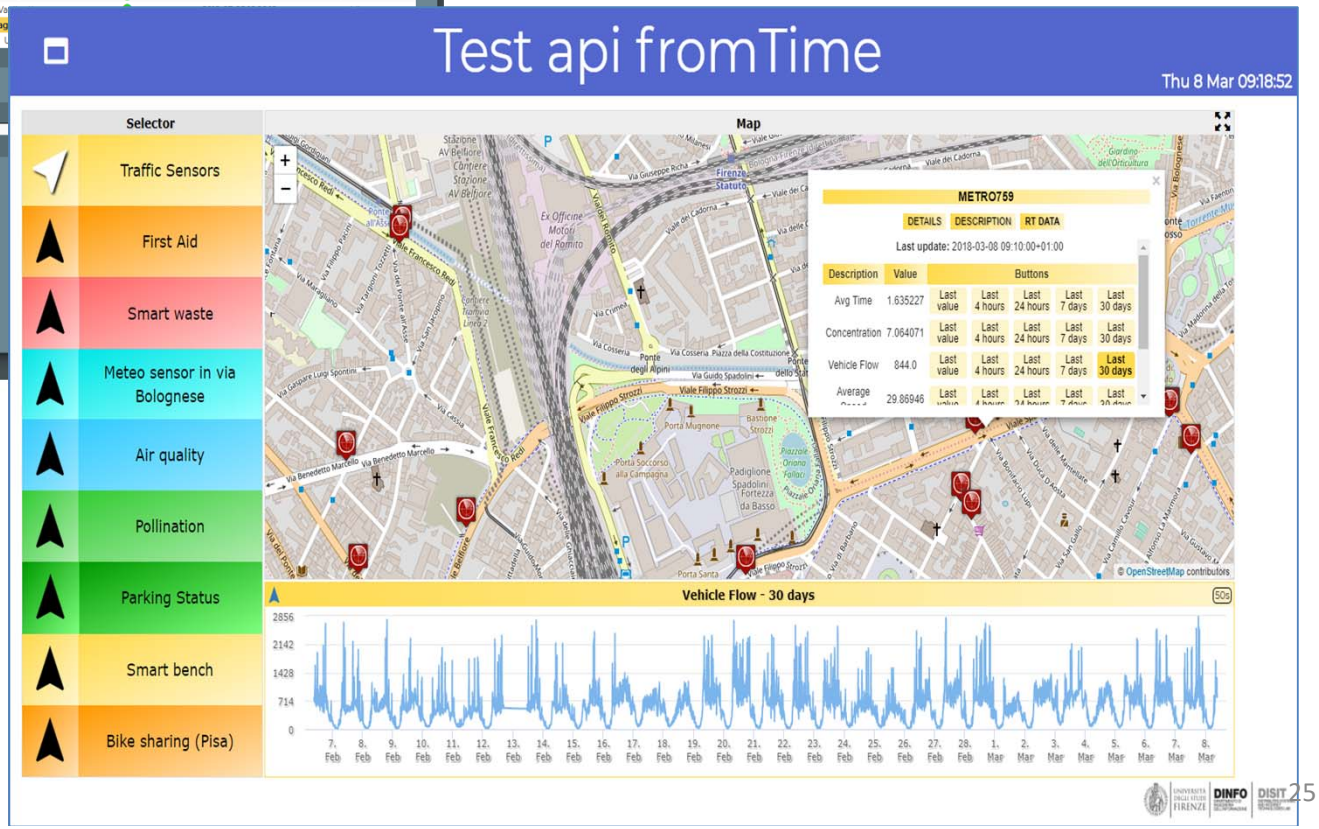
From Templates to Wizard and Dashboards



- From the scratch to create a new Dashboad
- From a Dashboard to Add widgets and groups of them


Snap4City
Dashboards
Wizard
Dashboard features
Data and widgets
Check and summary
Map
Single data widgets
Multi data widgets
Data sources
Choosen data sources
Prev
Next




Test api fromTime
Thu 8 Mar 09:18:52
Selector
Traffic Sensors
First Aid
Smart waste
Meteo sensor in via Bolognese
Air quality
Pollination
Parking Status
Smart bench
Bike sharing (Pisa)
Map
METRO759
DETAILS
DESCRIPTION
RT DATA
Vehicle Flow - 30 days

- 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, healthi, owner, …
  - Combine them as you like
- Select the lines of your interest
- Then click on Next and get the Dashboard by wizard

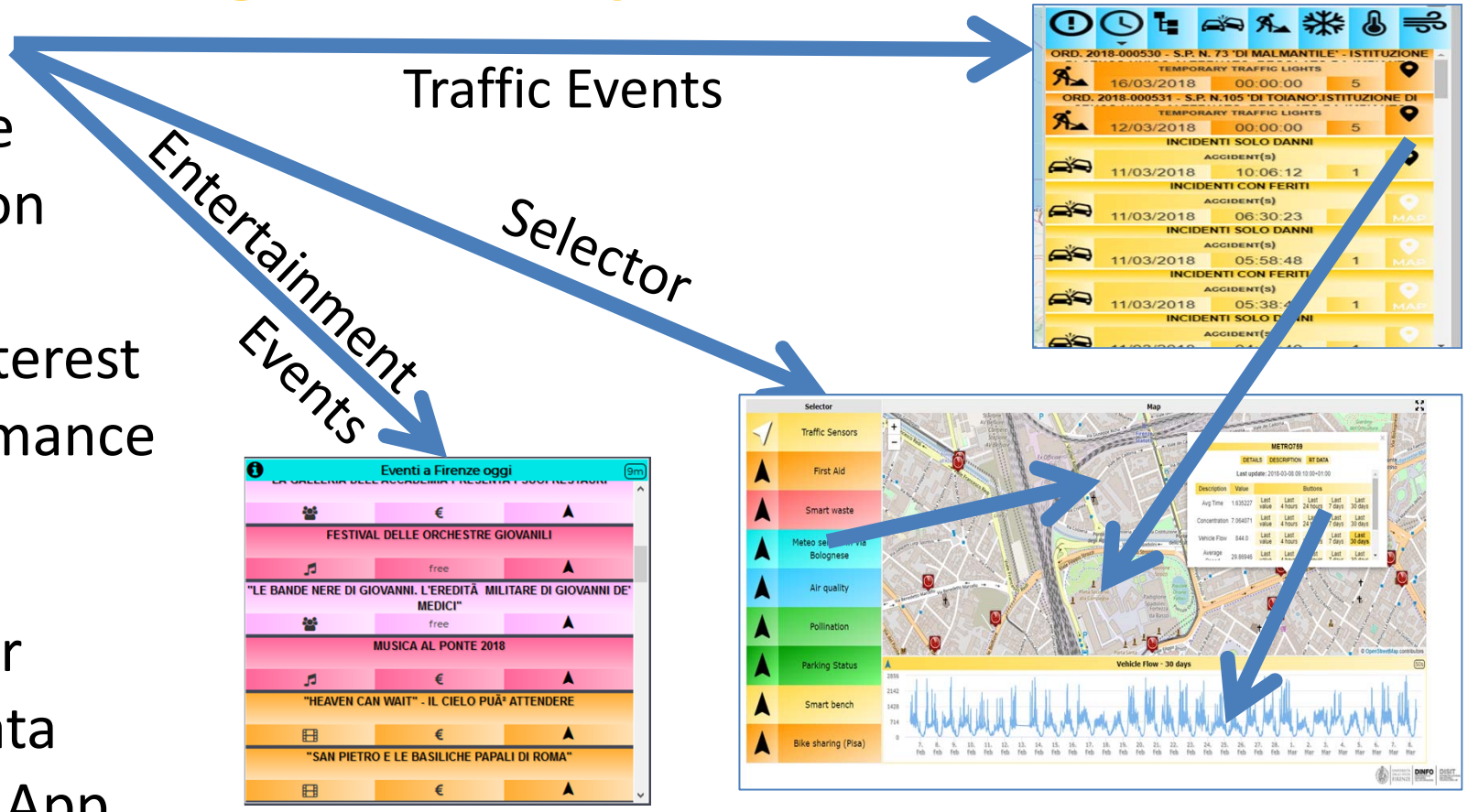
Filtering data to reach selection

- **High Level Types**: sensors, special, KPI, POI, etc.
- **Nature**: accommodation, mobility, financial, wine, health, etc.
  - Dashboard ←→ IOT APP, IOT Device to system
- **SubNature**: a subclassification of the nature
- **ValueType**: temperature, humidity, memory, pressure, glucose, etc…
- **ValueName**: name of variable of the: IOT sensor, data, etc.
- **DataType**: integer, text, Boolean, float, webpage
- **LastDate**: last date and time of data acquisition
- **LastValue**: the last value, an example; in some case a parameter
- **Healthiness**: green or red according to the data quality criteria defined
- **LastCheck**: date and time of the last valid data
- **Ownership**: Public or Private; it may be: private, private (Delegated), private (MyOwn)

Data Kinds vs Widgets: Complex events

High Level Types

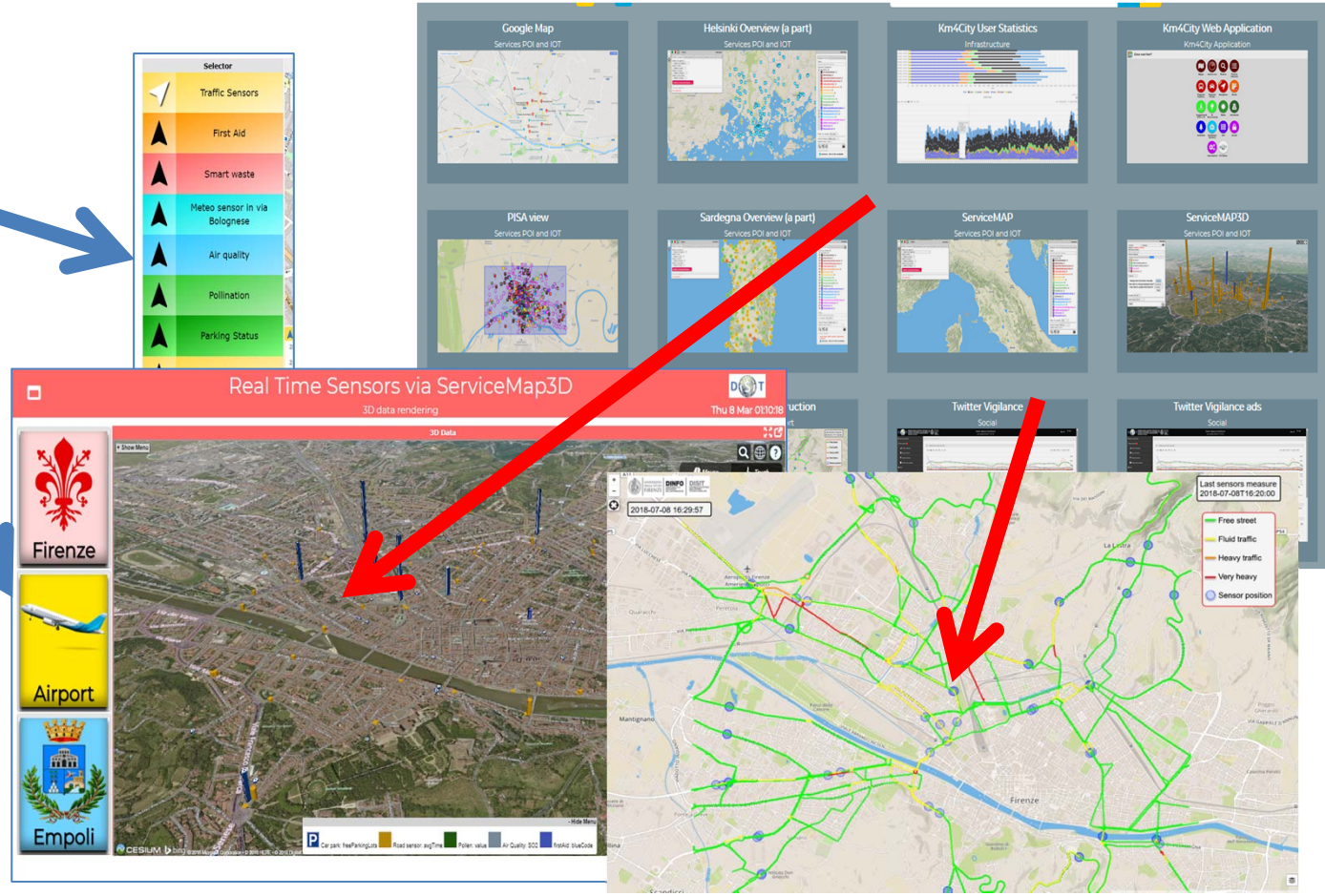
- **Complex Event**
- External Service
- MicroApplication
- Special Widget
- POI, Point of Interest
- KPI, Key Performance Indicator
- Sensor
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App



Data Kinds vs Widgets: external services

High Level Types

- Complex Event
- **External Service**
- MicroApplication
- Special Widget
- POI, Point of Interest
- KPI, Key Performance Indicator
- Sensor
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App



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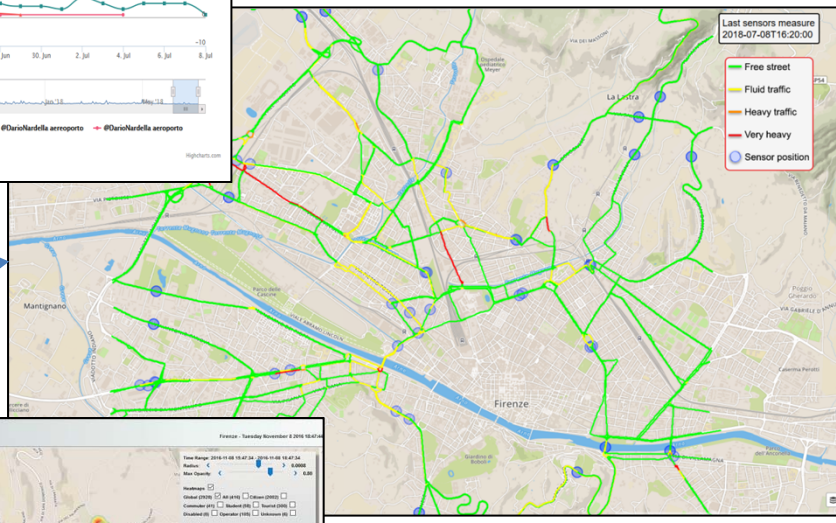
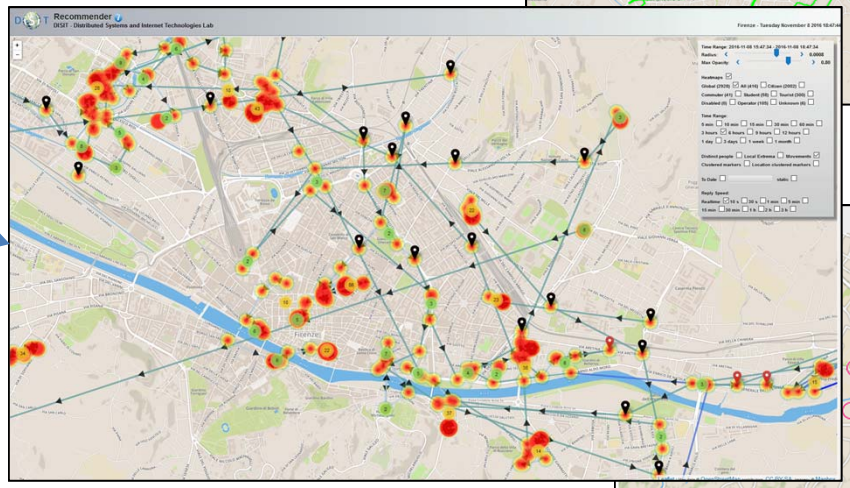
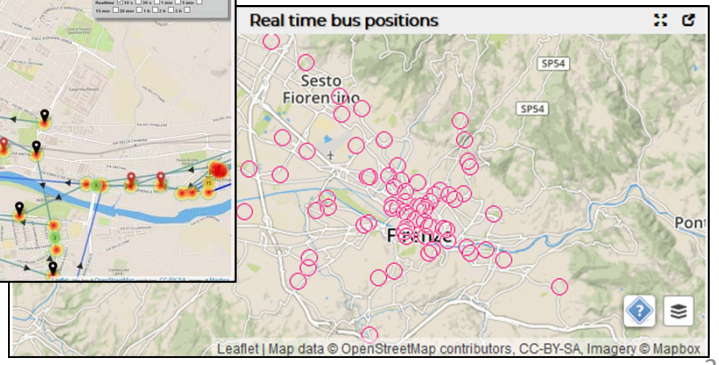
External Services

- Twitter Vigilance:
  - daily and real time
  - Volume and sentiment analysis
- Traffic Flow
- Services on Maps
- Tracking vehicles
- Real time sensors on 3D
- Web HTML5 Applications
- User behaviour monitoring







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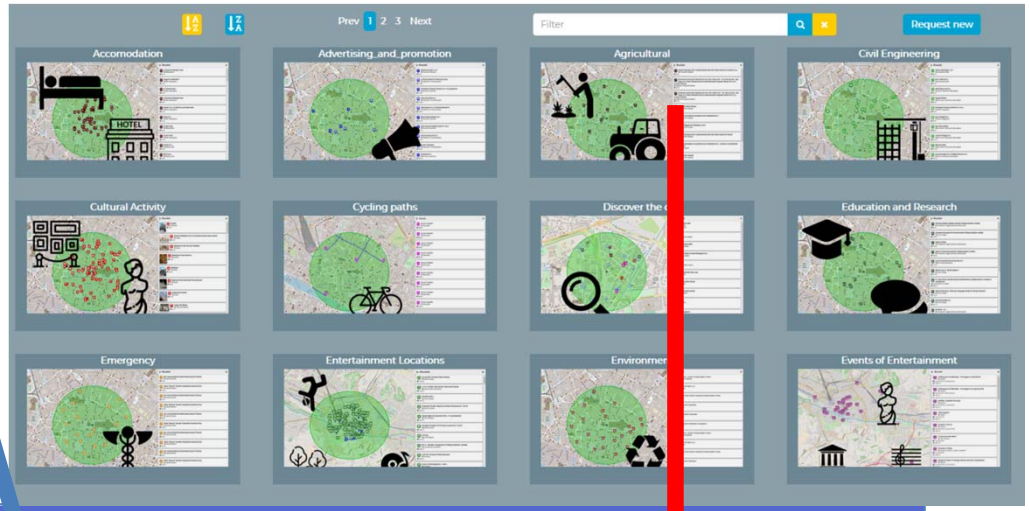
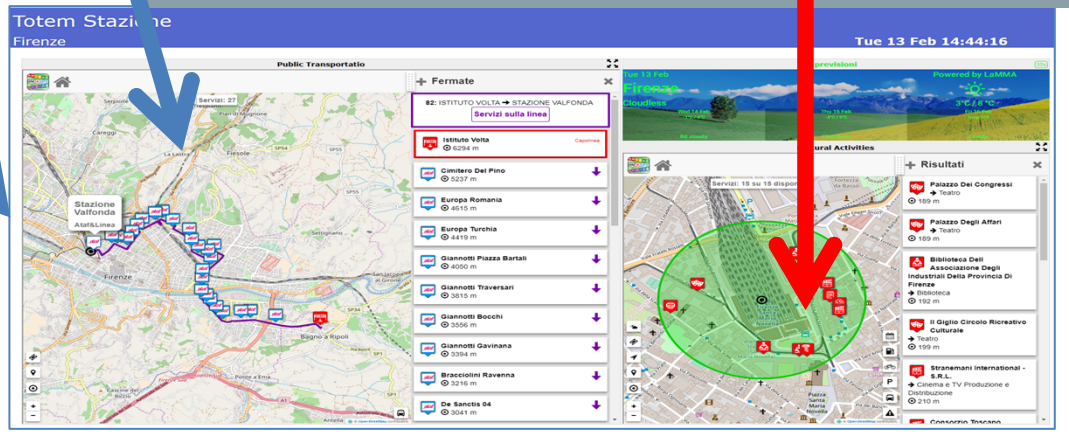
Data Kinds vs Widgets: MicroApplications

High Level Types

- Complex Event
- External Service
- **MicroApplication**
- Special Widget
- POI, Point of Interest
- KPI, Key Performance Indicator
- Sensor
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App

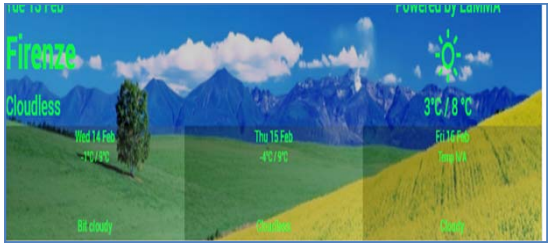


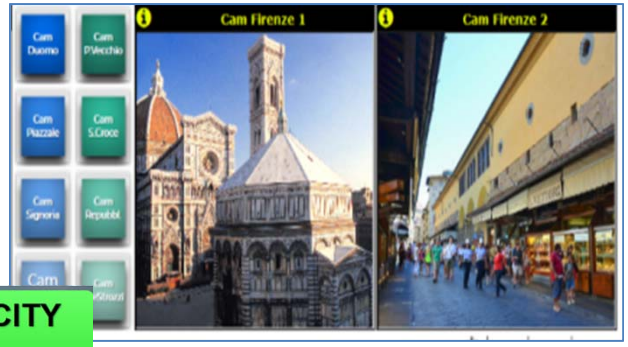


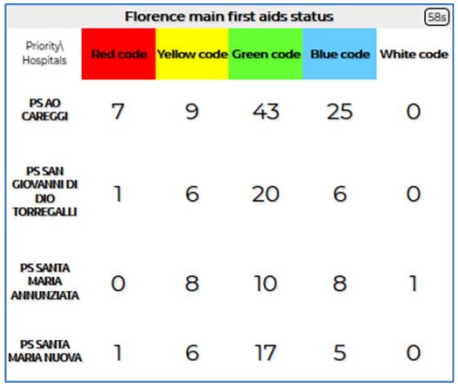
Data Kinds vs Widgets: Special Widgets

High Level Types

- Complex Event
- External Service
- MicroApplication
- **Special Widget**
- POI, Point of Interest
- KPI, Key Performance Indicator
- Sensor
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App



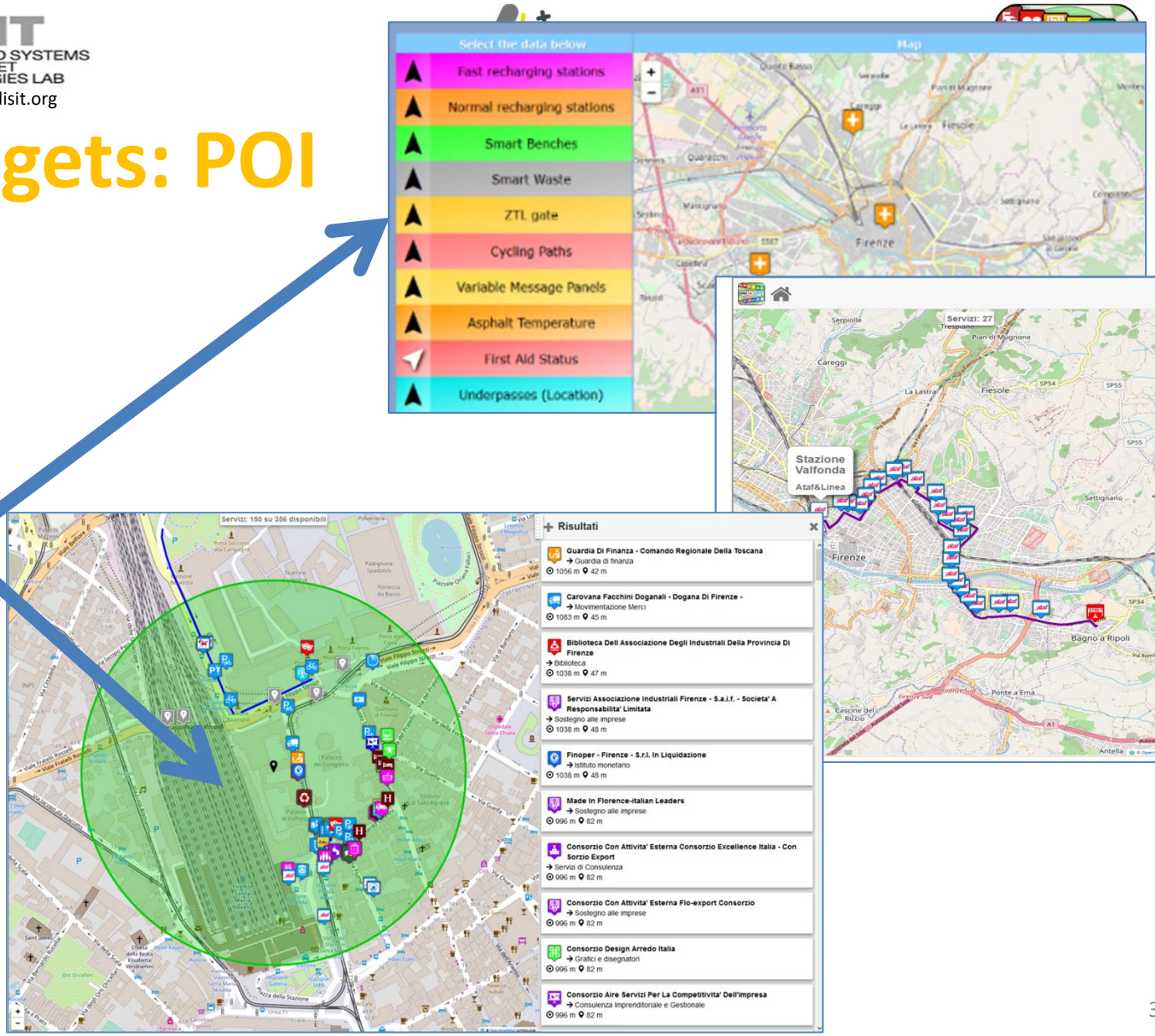




Data Kinds vs Widgets: POI

High Level Types

- Complex Event
- External Service
- MicroApplication
- Special Widget
- **POI, Point of Interest**
- KPI, Key Performance Indicator
- Sensor
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App



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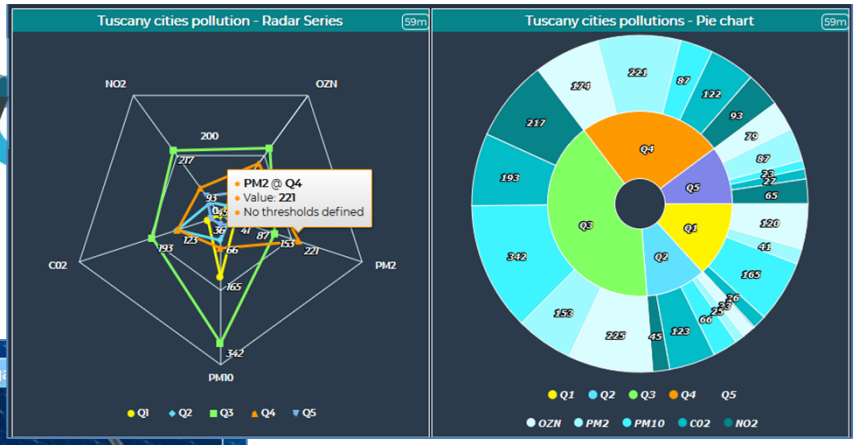
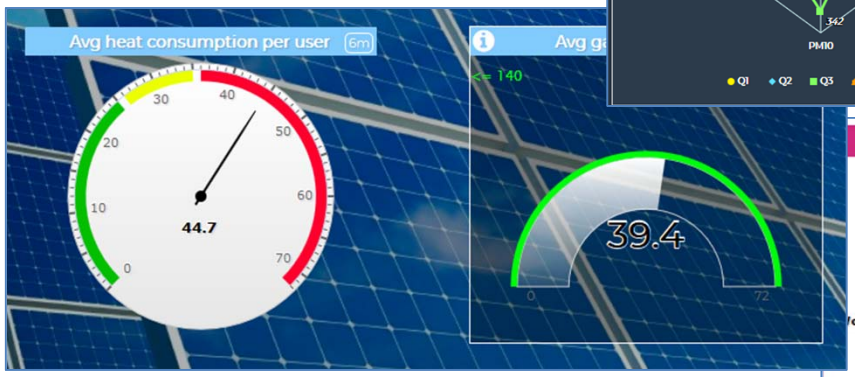
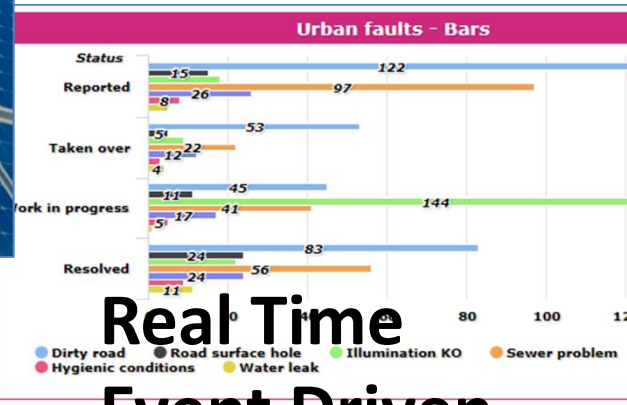
Data Kinds vs Widgets: KPI

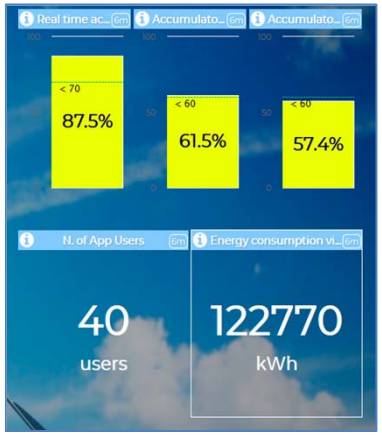
High Level Types

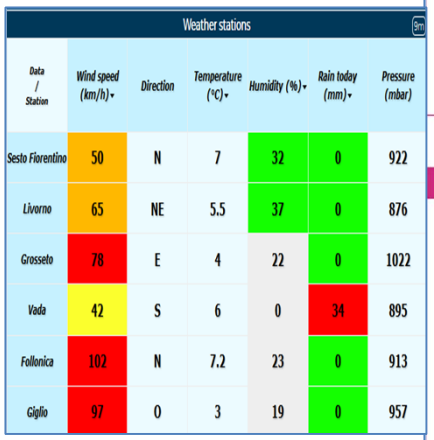
- Complex Event
- External Service
- MicroApplication
- Special Widget
- POI, Point of Interest
- **KPI, Key Performance Indicator**
- Sensor
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App





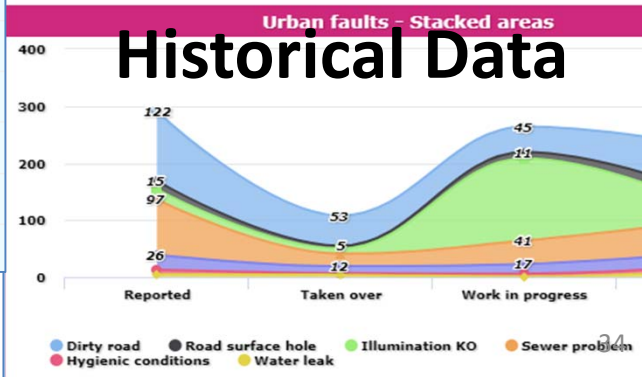






Real Time

Event Driven



Historical Data

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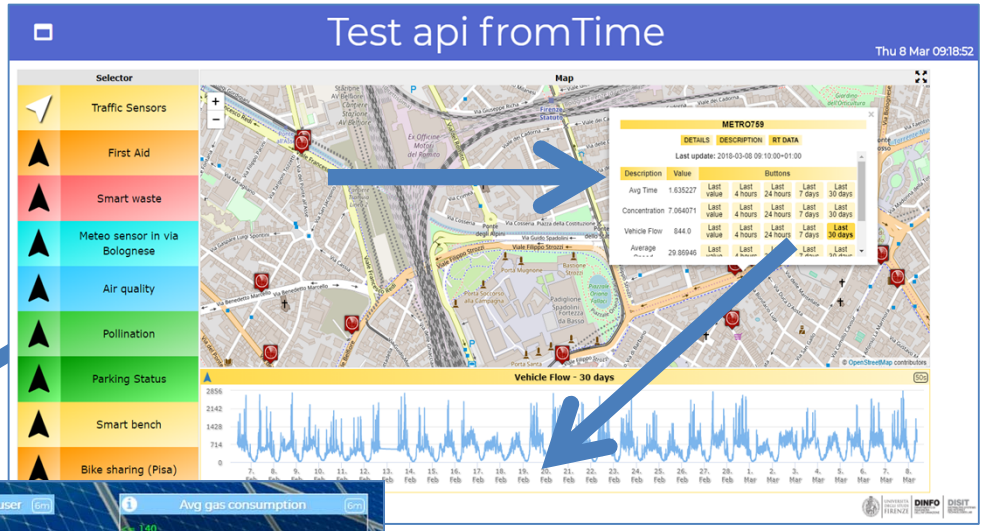
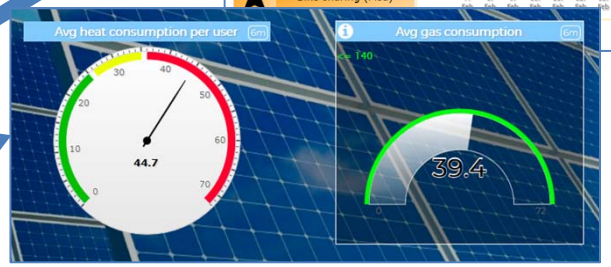
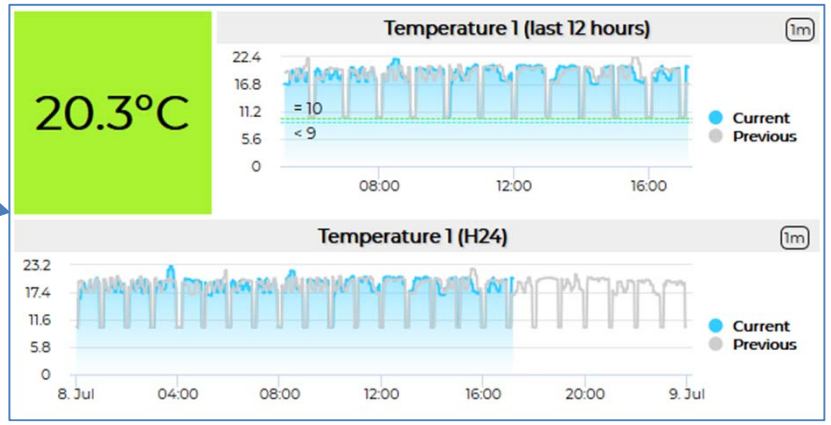
Data Kinds vs Widgets: Sensors

High Level Types

- Complex Event
- External Service
- MicroApplication
- Special Widget
- POI, Point of Interest
- KPI, Key Performance Indicator
- **Sensor**
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App







Real Time
Event Driven
Historical Data

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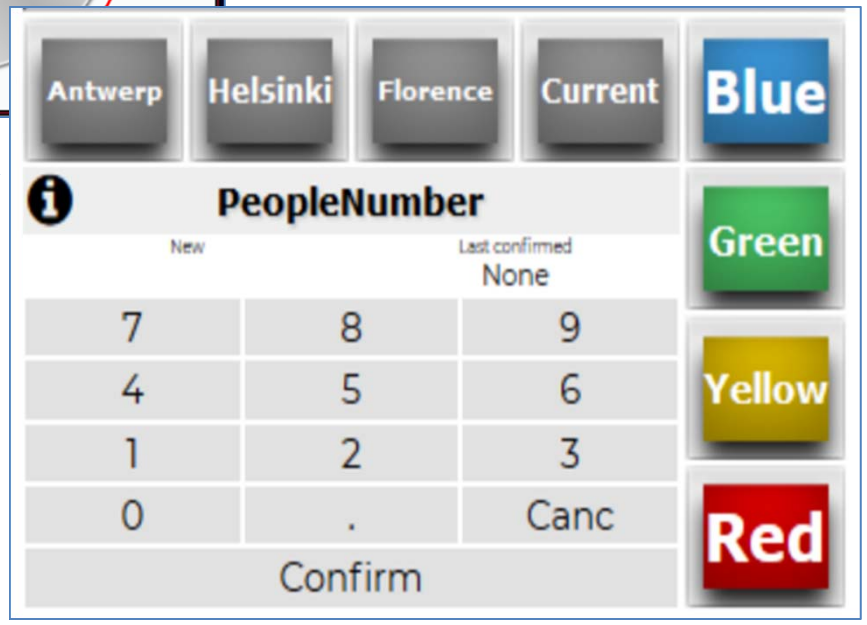
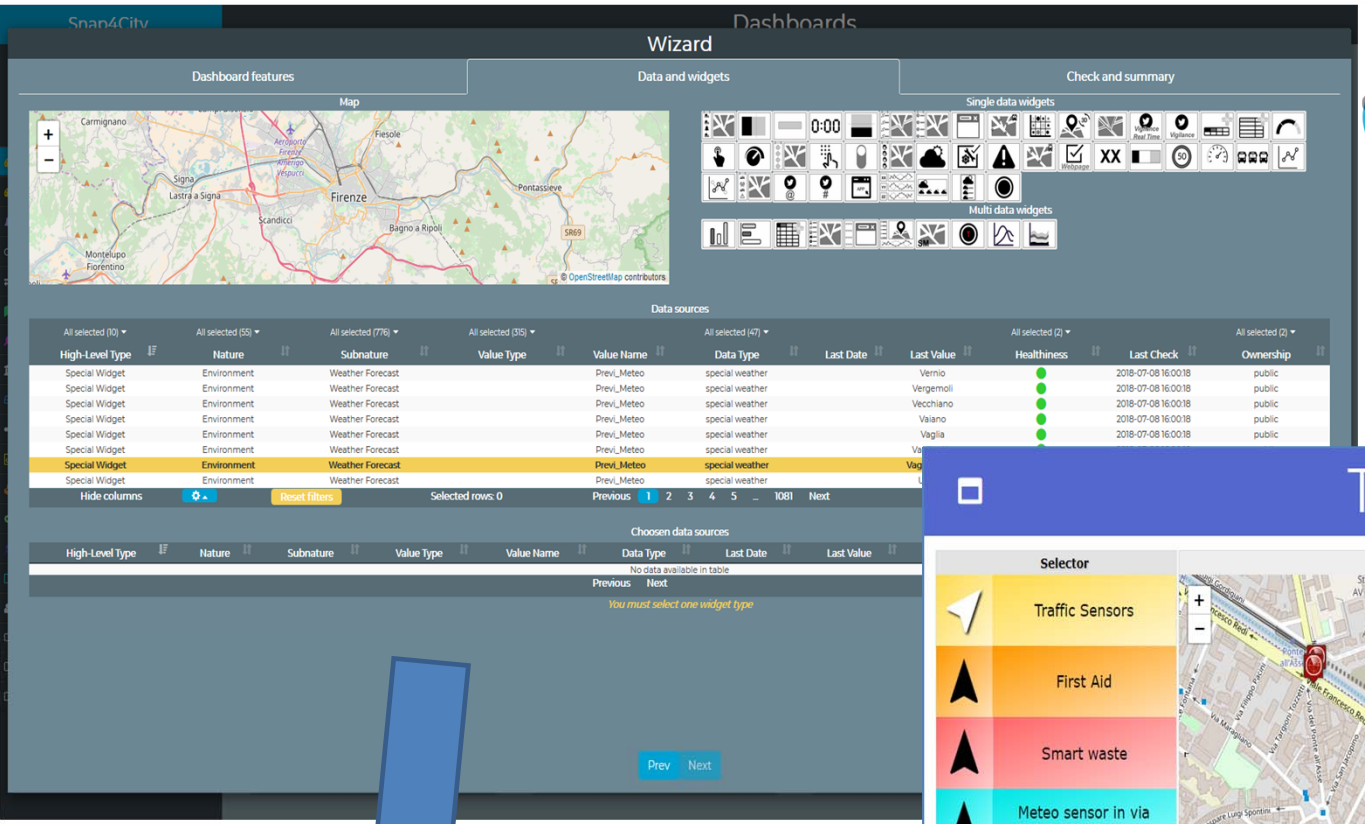
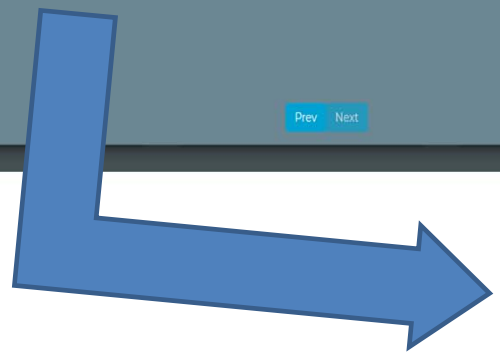
Data Kinds vs Widgets: KPI

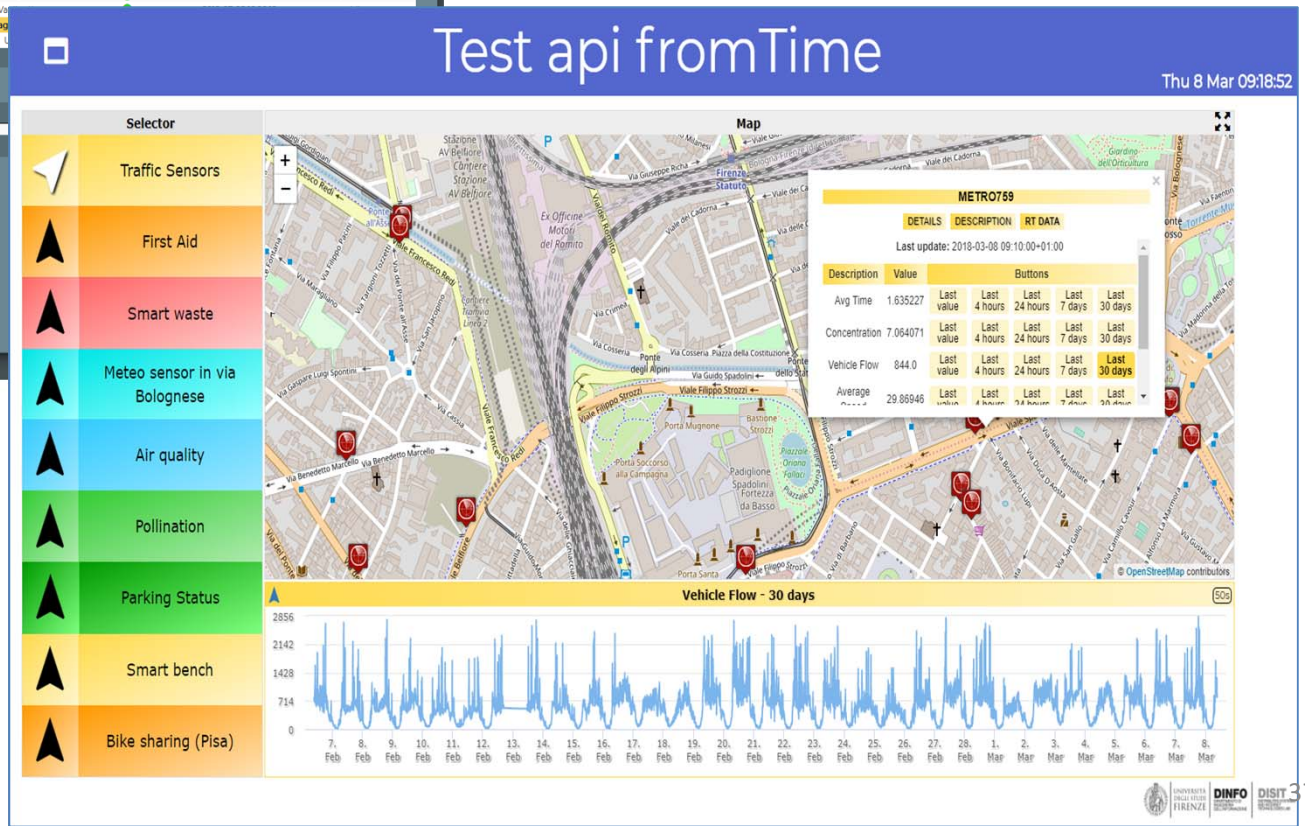
High Level Types

- Complex Event
- External Service
- MicroApplication
- Special Widget
- POI, Point of Interest
- KPI, Key Performance Indicator
- Sensor
- **Sensor-Actuator**
- My Personal Data
- Dashboard-IOT App




Snap4City
Dashboards
Wizard
Dashboard features
Data and widgets
Check and summary
Map
Single data widgets
Multi data widgets
Data sources
Choosen data sources
Hide columns
Reset filters
Selected rows: 0
Previous
Next
You must select one widget type
Prev
Next




Test api fromTime
Thu 8 Mar 09:18:52
Selector
Traffic Sensors
First Aid
Smart waste
Meteo sensor in via Bolognese
Air quality
Pollination
Parking Status
Smart bench
Bike sharing (Pisa)
Map
METRO759
DETAILS
DESCRIPTION
RT DATA
Last update: 2018-03-08 09:10:00+01:00
Vehicle Flow - 30 days

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edit mode

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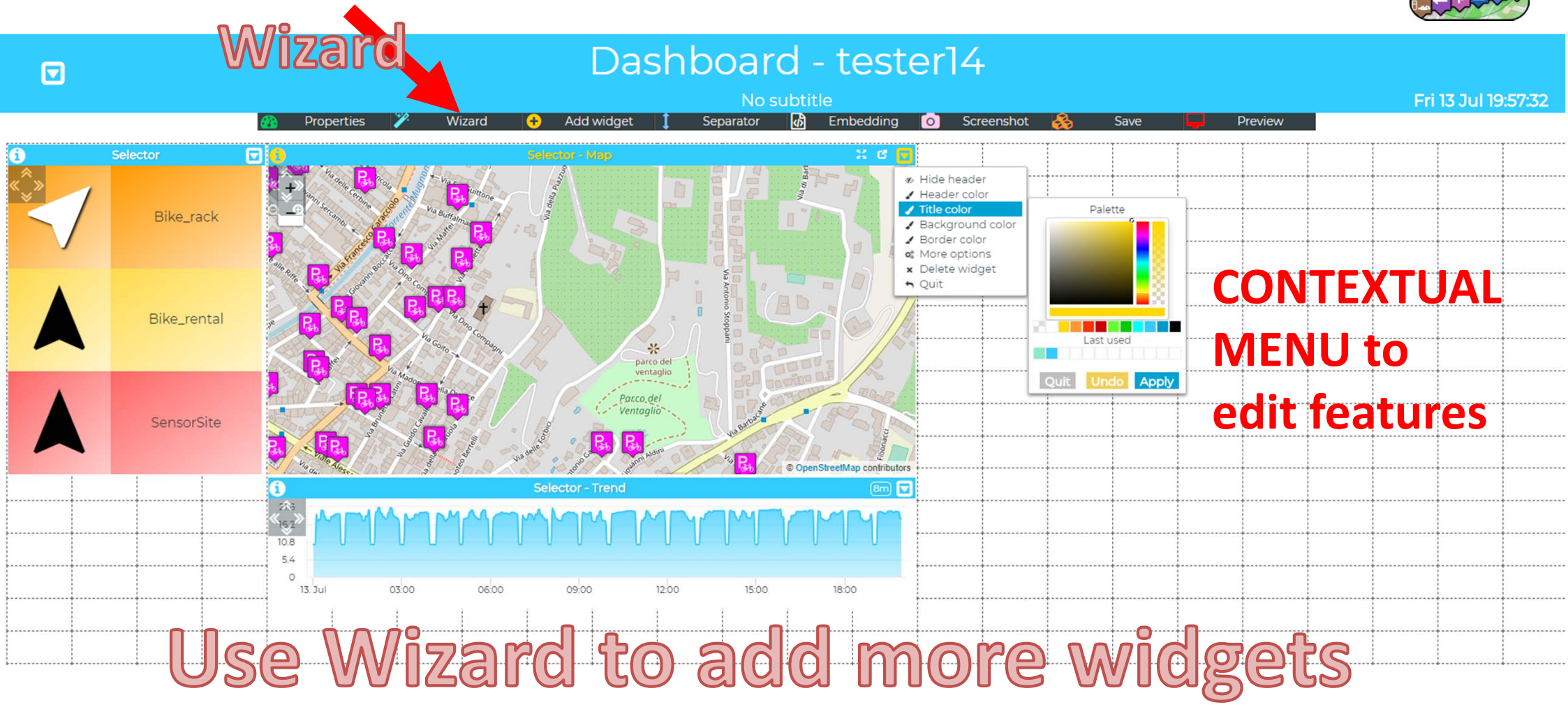
KM 4 CITY

Wizard



CONTEXTUAL MENU to edit features

Use Wizard to add more widgets

Level 3 users

Level 3 user: add personal devices and create Dash

- With Smart city data and information +
- Personal IOT/IOE, which can be registered and created

IOT and City data World

My Dashboard

Registration of My IOT Devices

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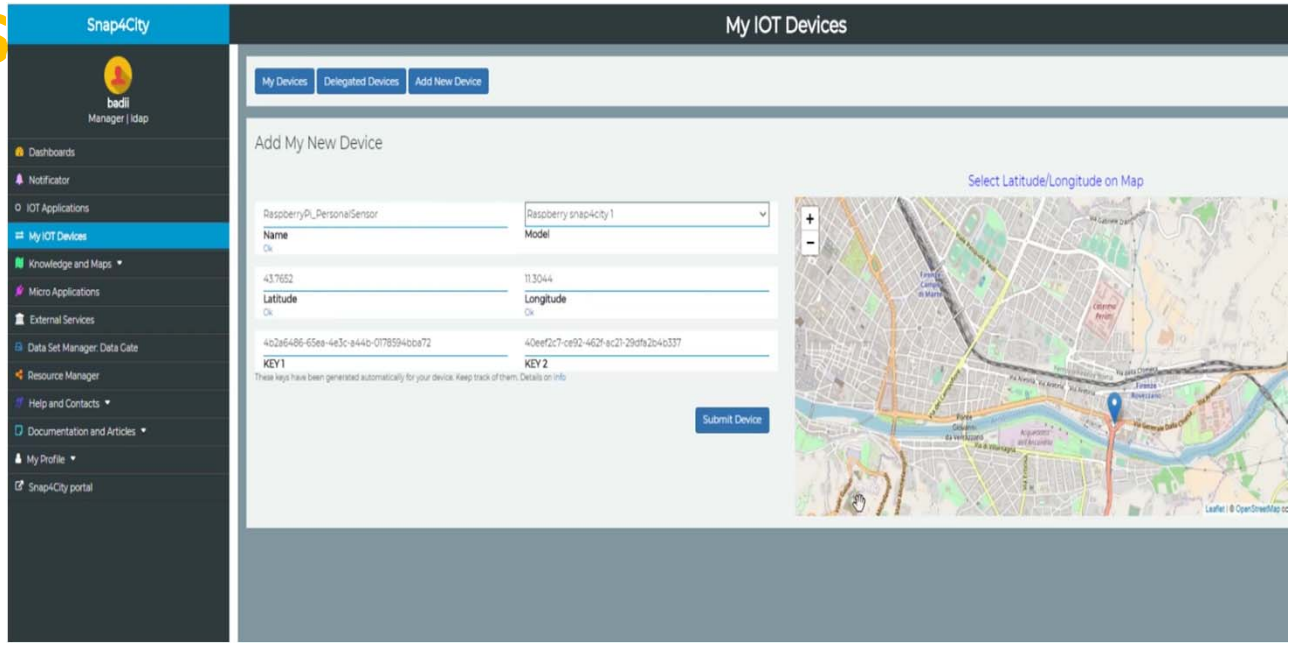
Add IOT/IOE Devices

- From Models
- From SigFOX standard
- A range of protocols, formats, approaches
- Create your own devices:
  - Arduino,
  - Raspberry,
  - Android,
  - LoraWAN + Arduino,
  - etc.



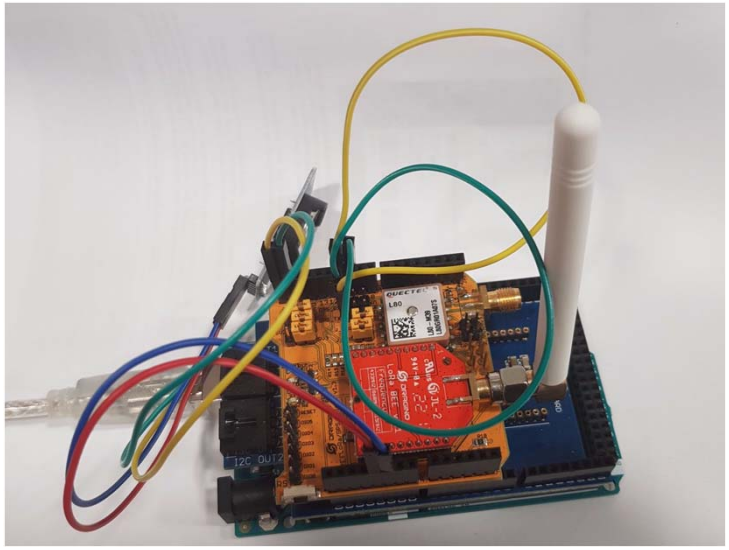
Secure Communication:
HTTPS, TLS (K1, K2)

Custom IOT Edge, and IOT Devices

SigFOX
Arduino

Sensors/
Actuators

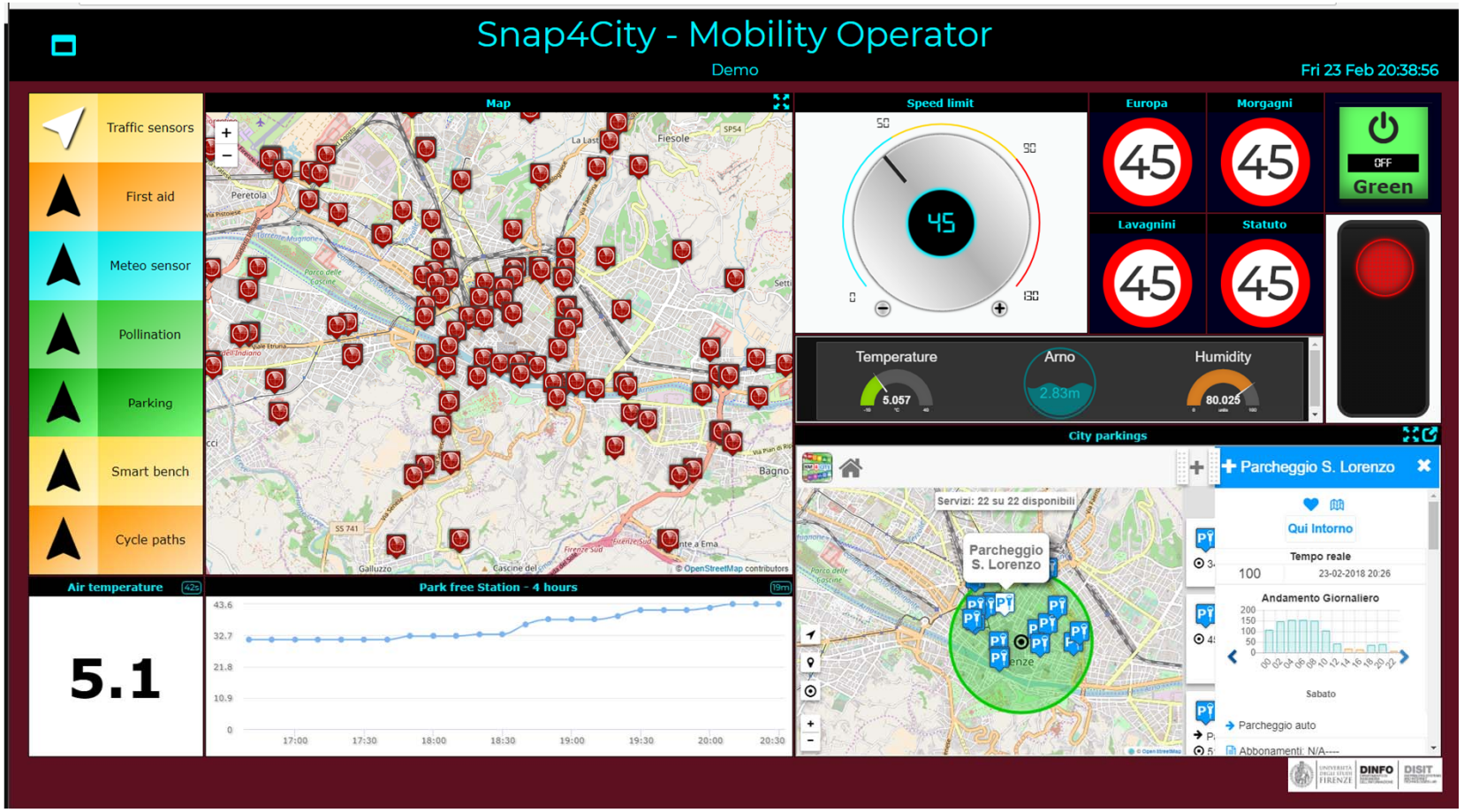
LoraWAN + Arduino + I2C



IOT Edge NodeRED:
Raspberry

Dash with city data and your data/actuators

- Sensors
  - Values
  - status
- Actuators:
  - Buttons
  - Dimers
  - Etc.



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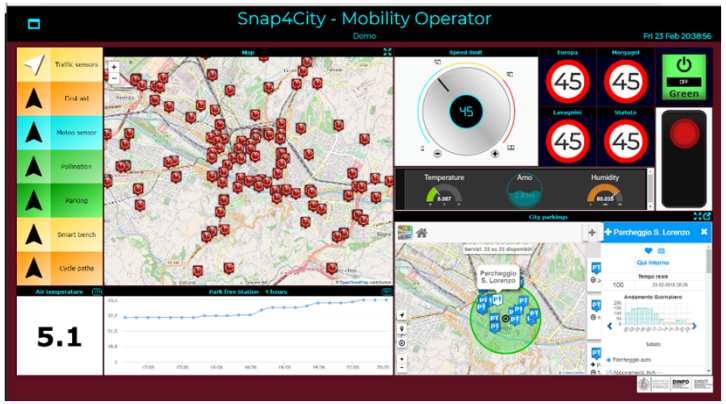
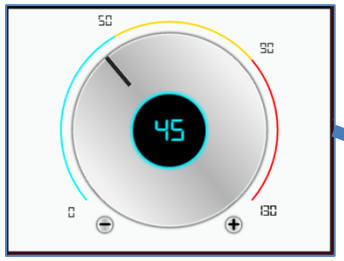
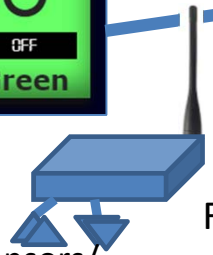


Dashboard vs IOT Devices





Sensors/
Actuators

From any IOT Device
and/or Dashboard

Snap4city Platform

Snap4City
IOT Brokers

**Managing Public and
Private IOT/IOE Devices**

Towards any IOT Device
and/or Dashboard

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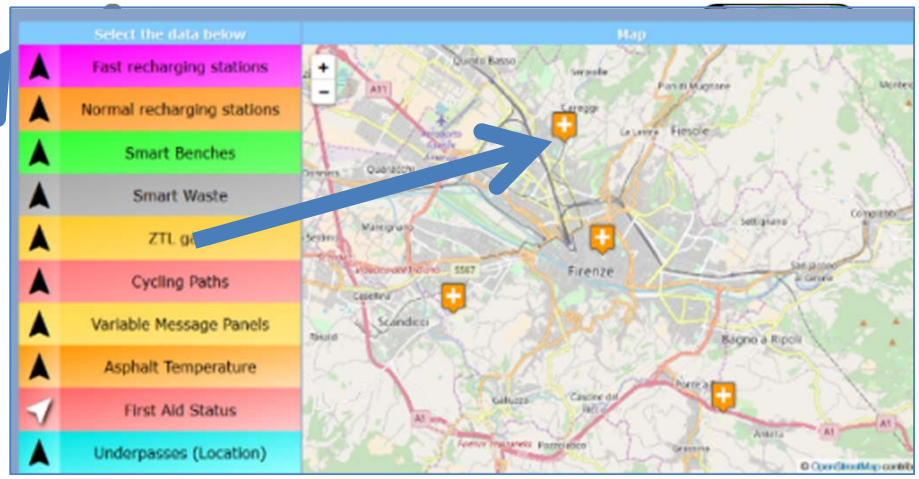
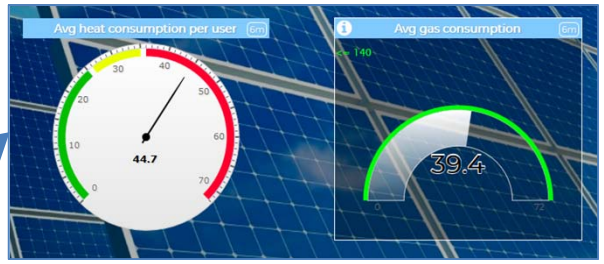
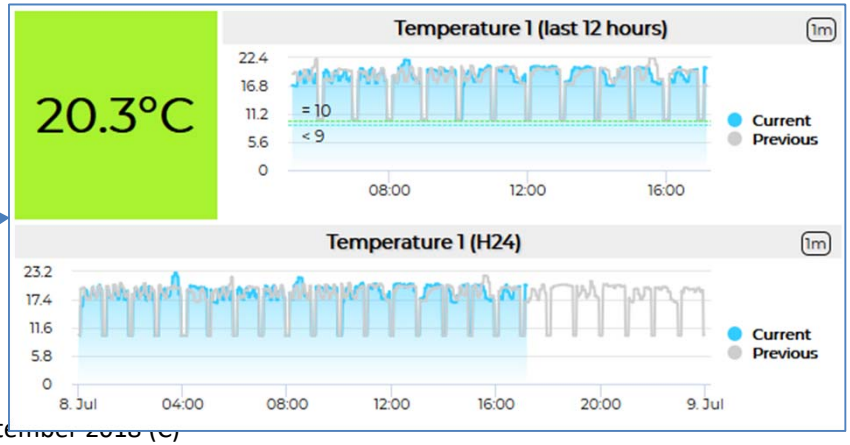
Data Kinds vs Widgets:

- Complex Event **MyPersonalData**
- External Service
- MicroApplication
- Special Widget
- POI, Point of Interest
- KPI, Key Performance Indicator
- Sensor
- Sensor-Actuator
- **My Personal Data**
- Dashboard-IOT App

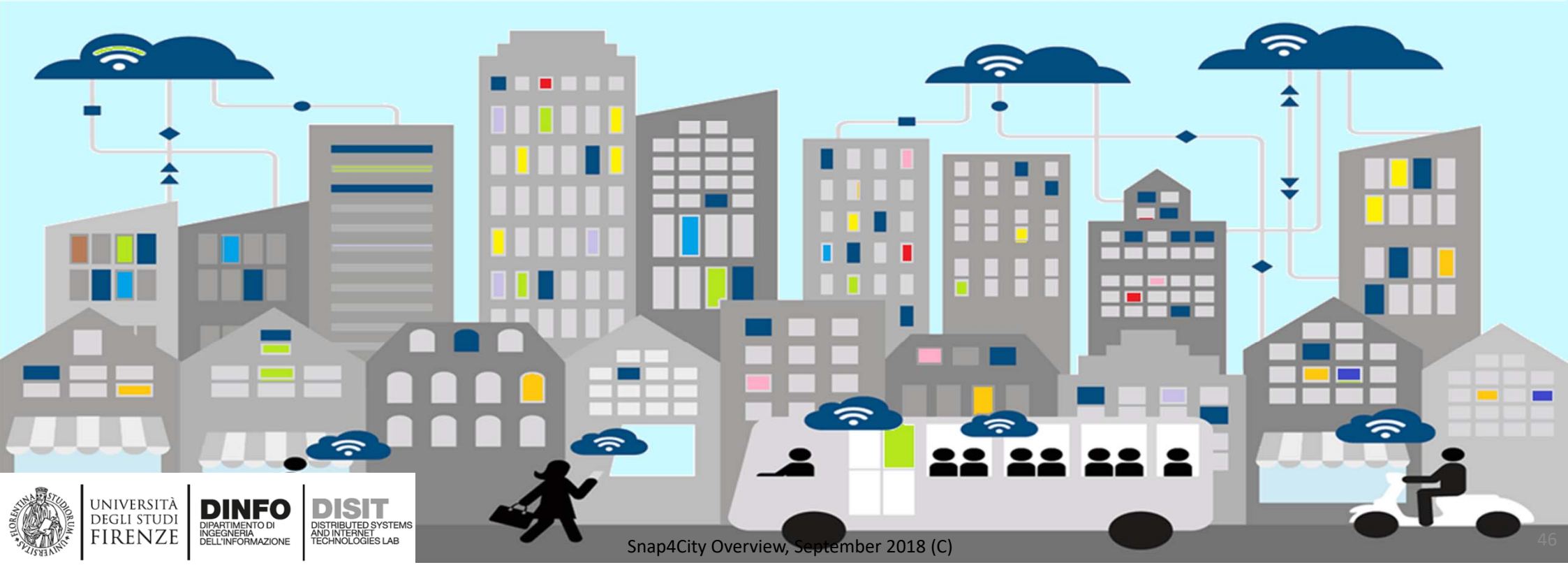




Real Time
Event Driven
Historical Data



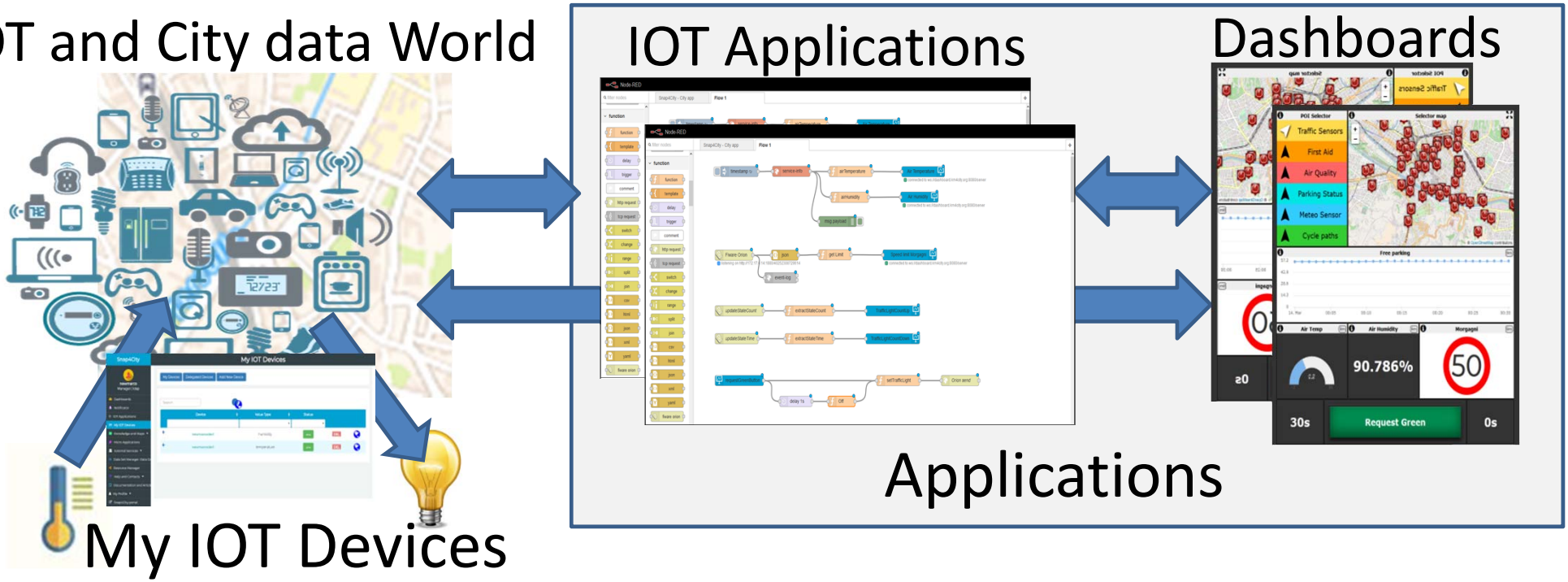
Level 4 users



Level 4 users: dashboard with intelligence App

- Dashboards with IOT Applications for enforcing smart and intelligence into them.

Dashboard-IOT App

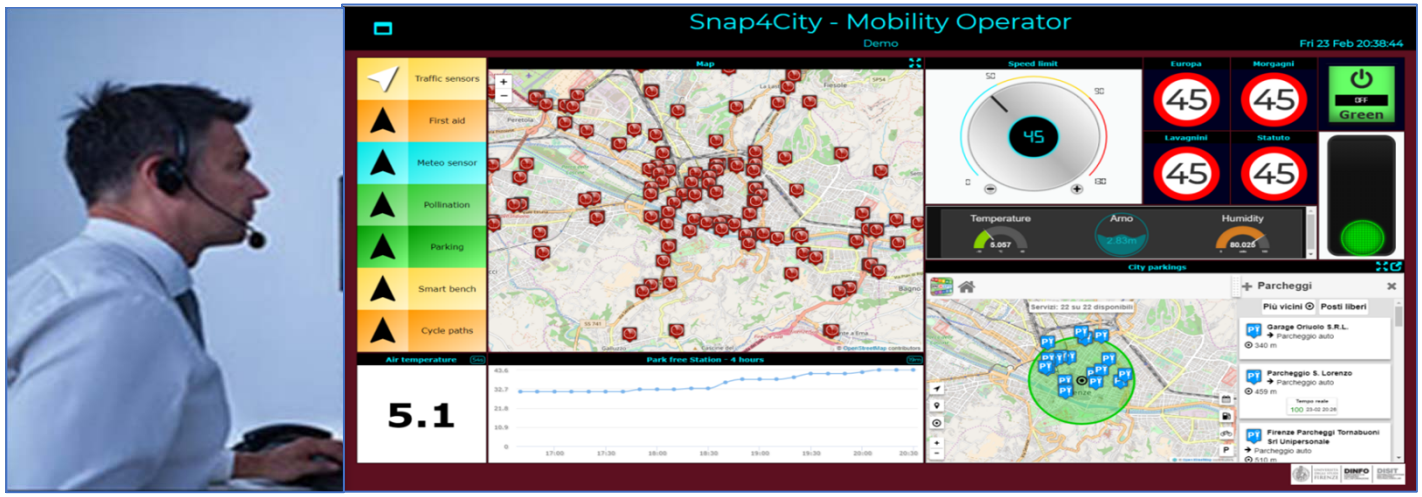


City Dashboard + IOT App

Control Room Operator

Would like to:

- **Monitor** traffic flow, Environment, Car parking, Cycling, First aid, temp., ..
- **Act and** monitor Dynamic Plates
- **Act and** monitor red lights

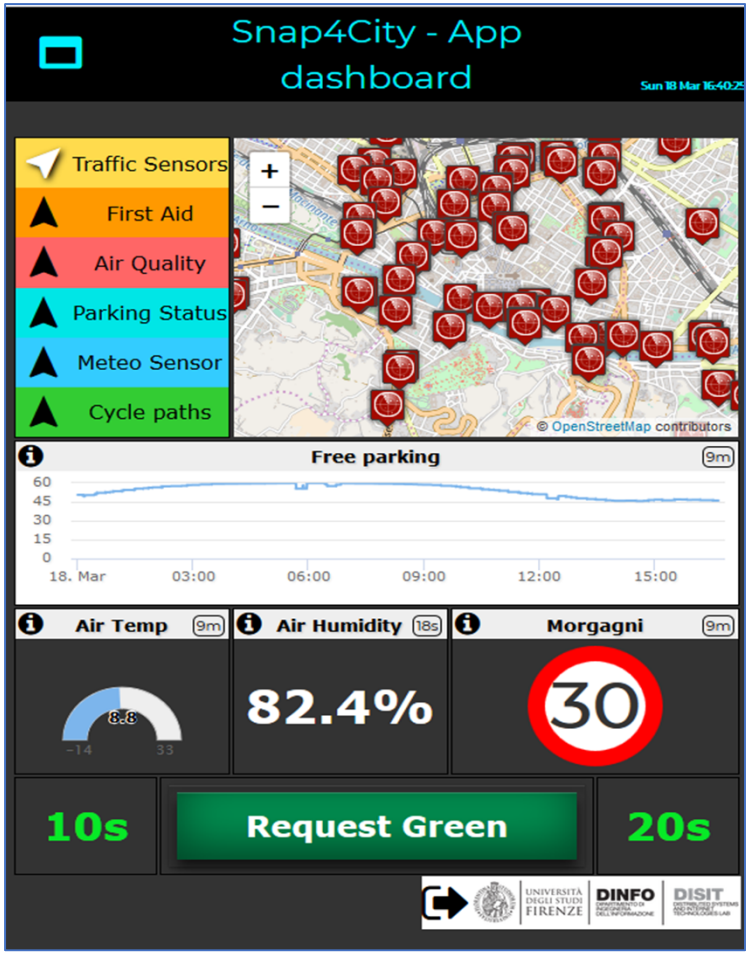


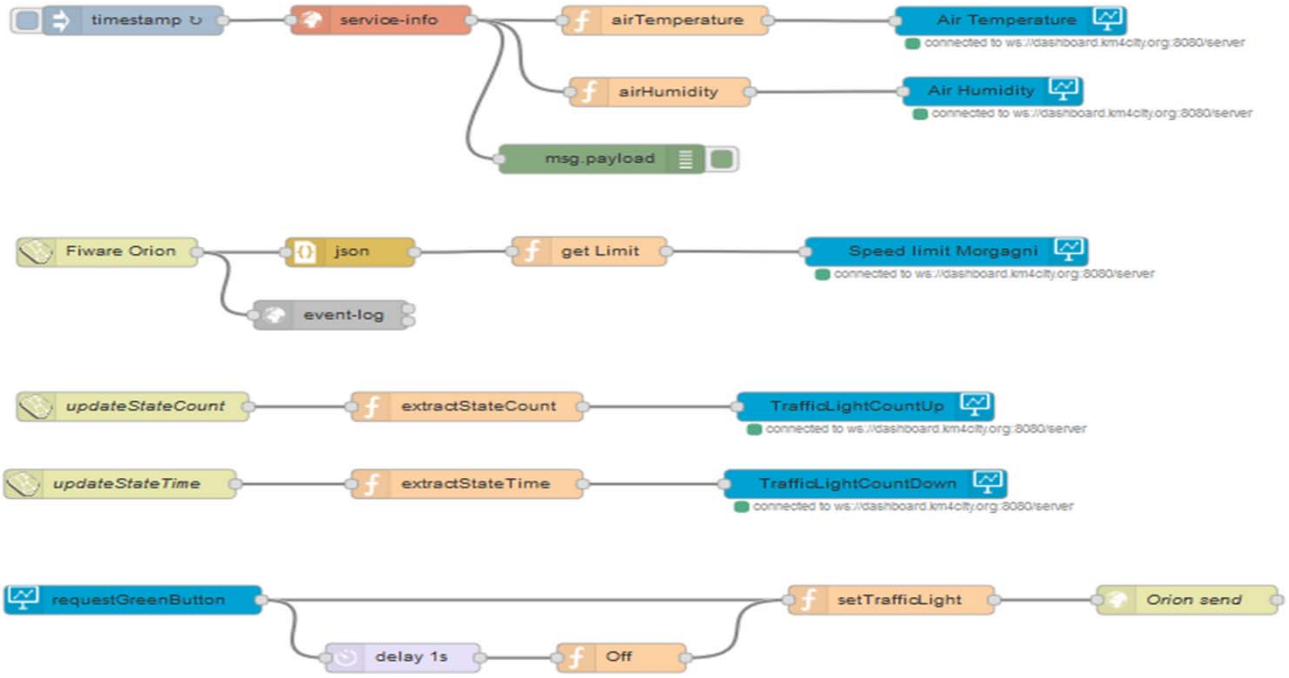
Driver, Policeman

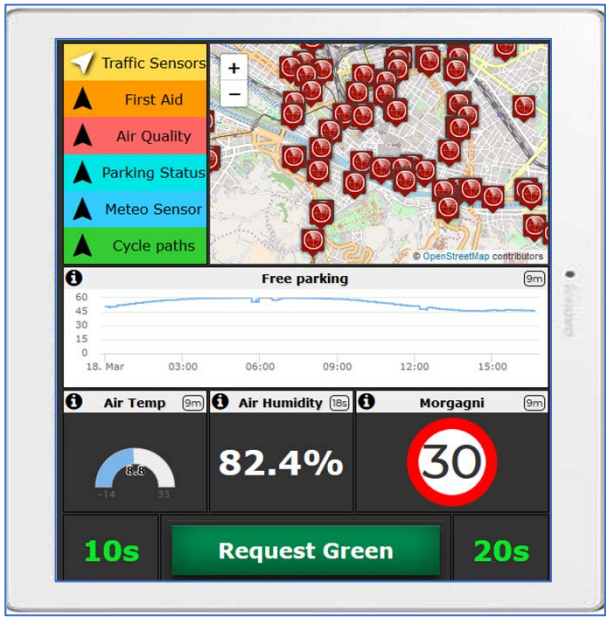
Would like to:

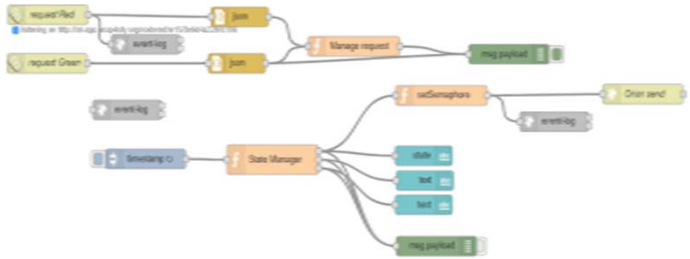
- Monitor traffic, Parking, env., speed limit, …
- **Act and** monitor red lights

IOT Application with City Dash simpler development






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
82.4%
Morgagni
9m
30
10s
Request Green
20s



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30

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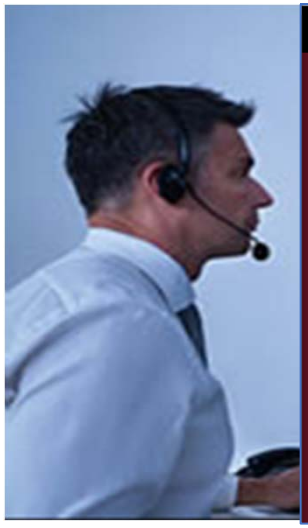
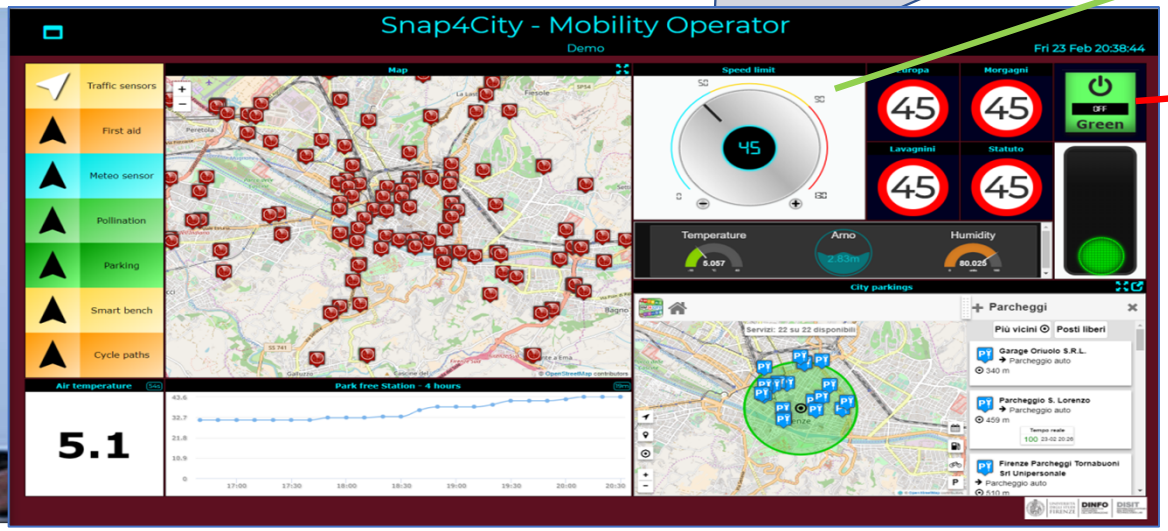
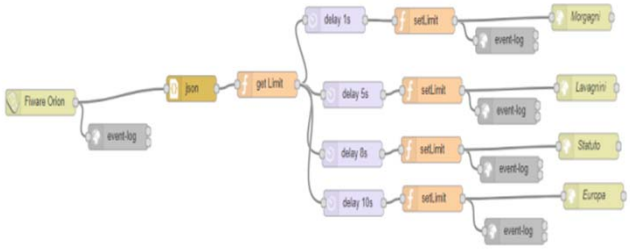



Snap4City - Mobility Operator
Demo
Fri 23 Feb 20:38:44
Traffic sensors
First aid
Meteo sensor
Pollination
Parking
Smart bench
Cycle paths
Map
Speed limit
45
Europa
45
Morgagni
45
OFF
Green
Lavagnini
45
Statuto
45
Temperature
Arno
Humidity
City parkings
Parcheggi
Più vicini
Posti liberi
Garage Oriuolo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

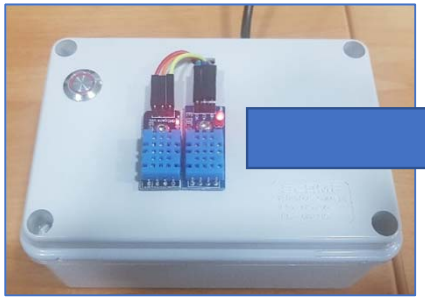

Fiware Orion
event-log
json
get Limit
delay 1s
setLimit
event-log
Morgagni
delay 5s
setLimit
event-log
Lavagnini
delay 8s
setLimit
event-log
Statuto
delay 10s
setLimit
event-log
Europa

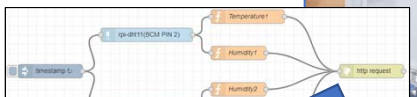
TC: Edge Computing

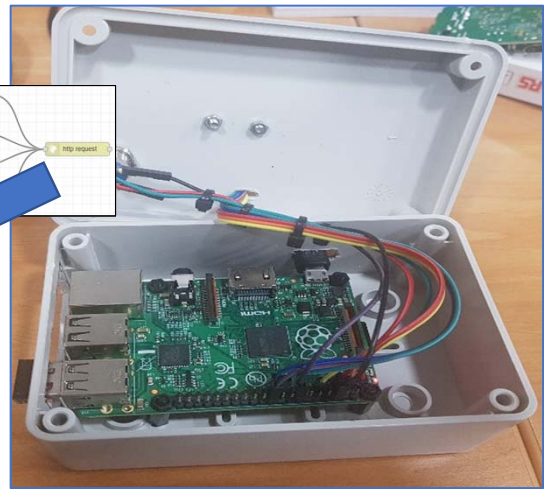
City user

Would like to:

- **Monitor and exploit temperature and humidity**
- **Manage sensors**
- **Perform edge computing**
- **Using these data for multiple applications**





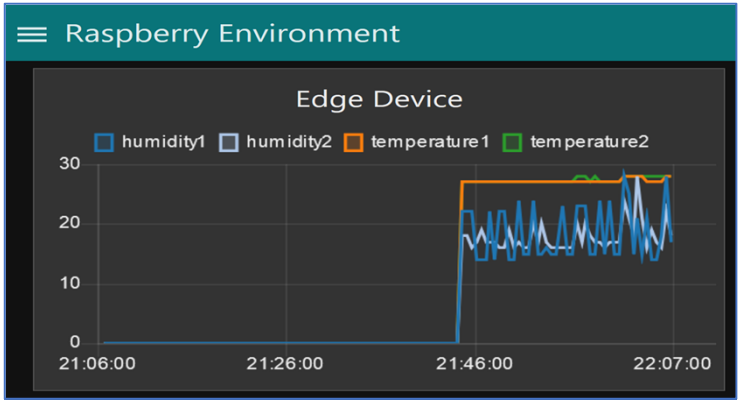


IOT Broker

Click here

Steps:

1. **Registering the device and sensors**
2. **Create flow on edge device using NodeRed with Snap4City, sending data to Broker**
3. **Use data from Broker on Snap4City IOT App**

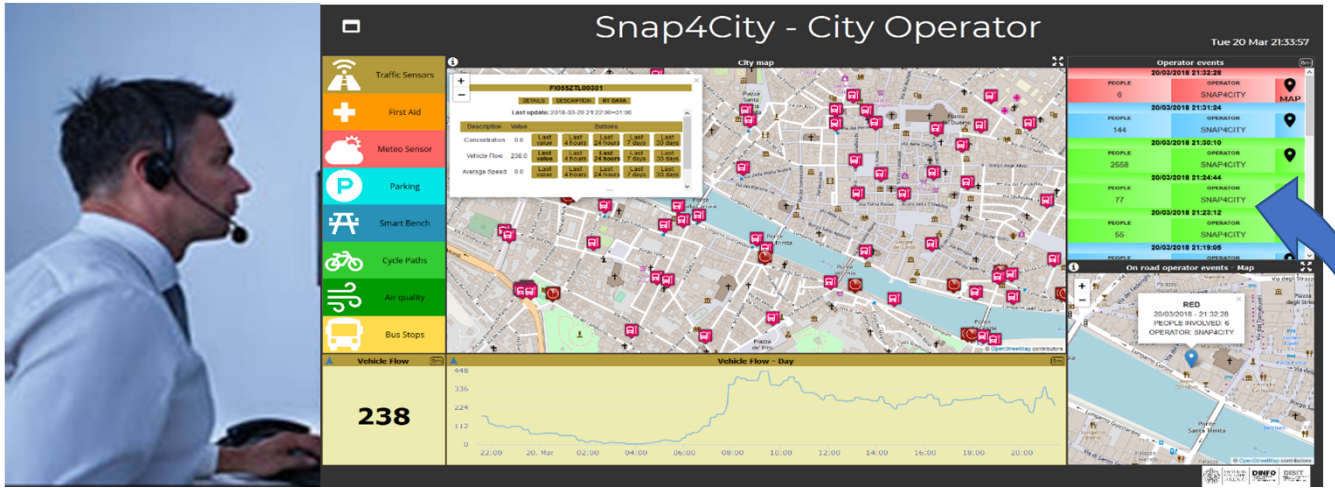


Reporting Critical Events

Control Room Operator

Would like to:

- **Monitor** events vs services in the city and receive critical event notifications from on the road operators.
- **Assess contextual condition,** services status

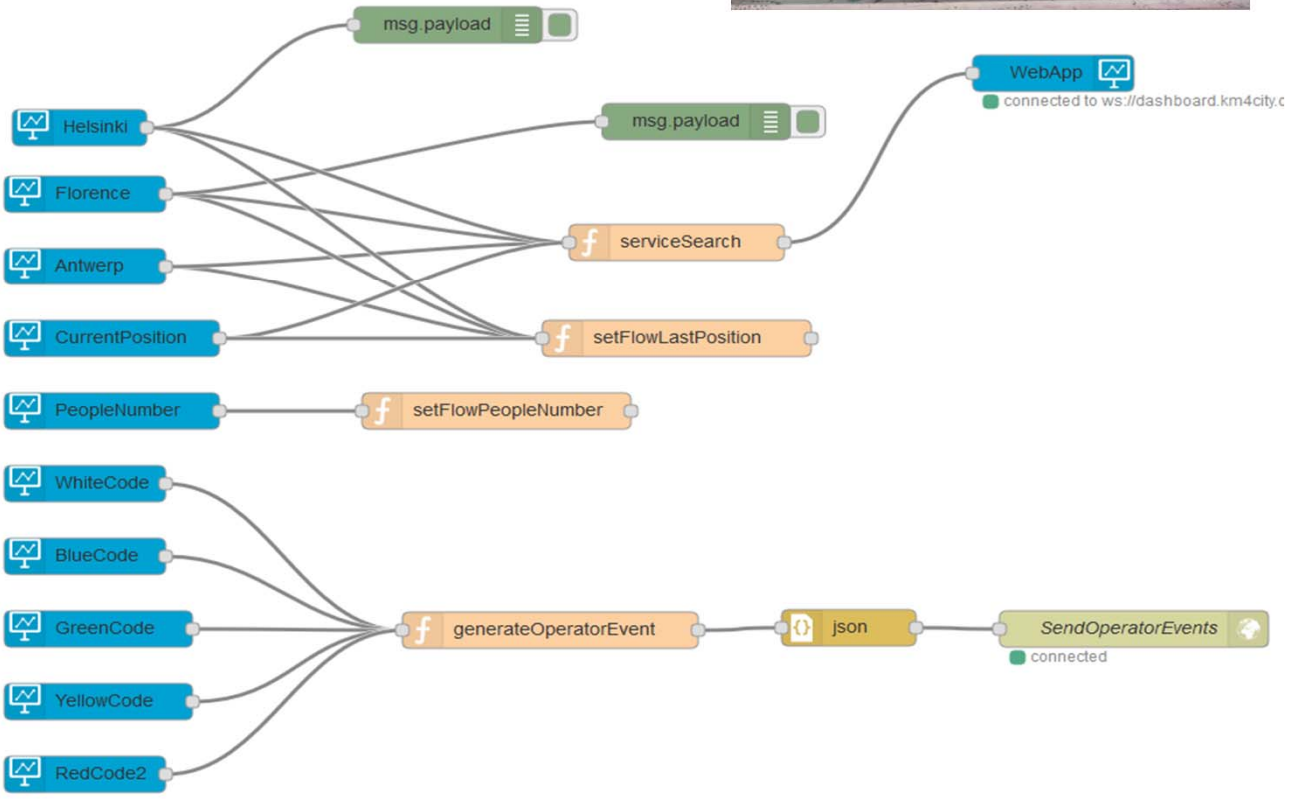


On the road operator

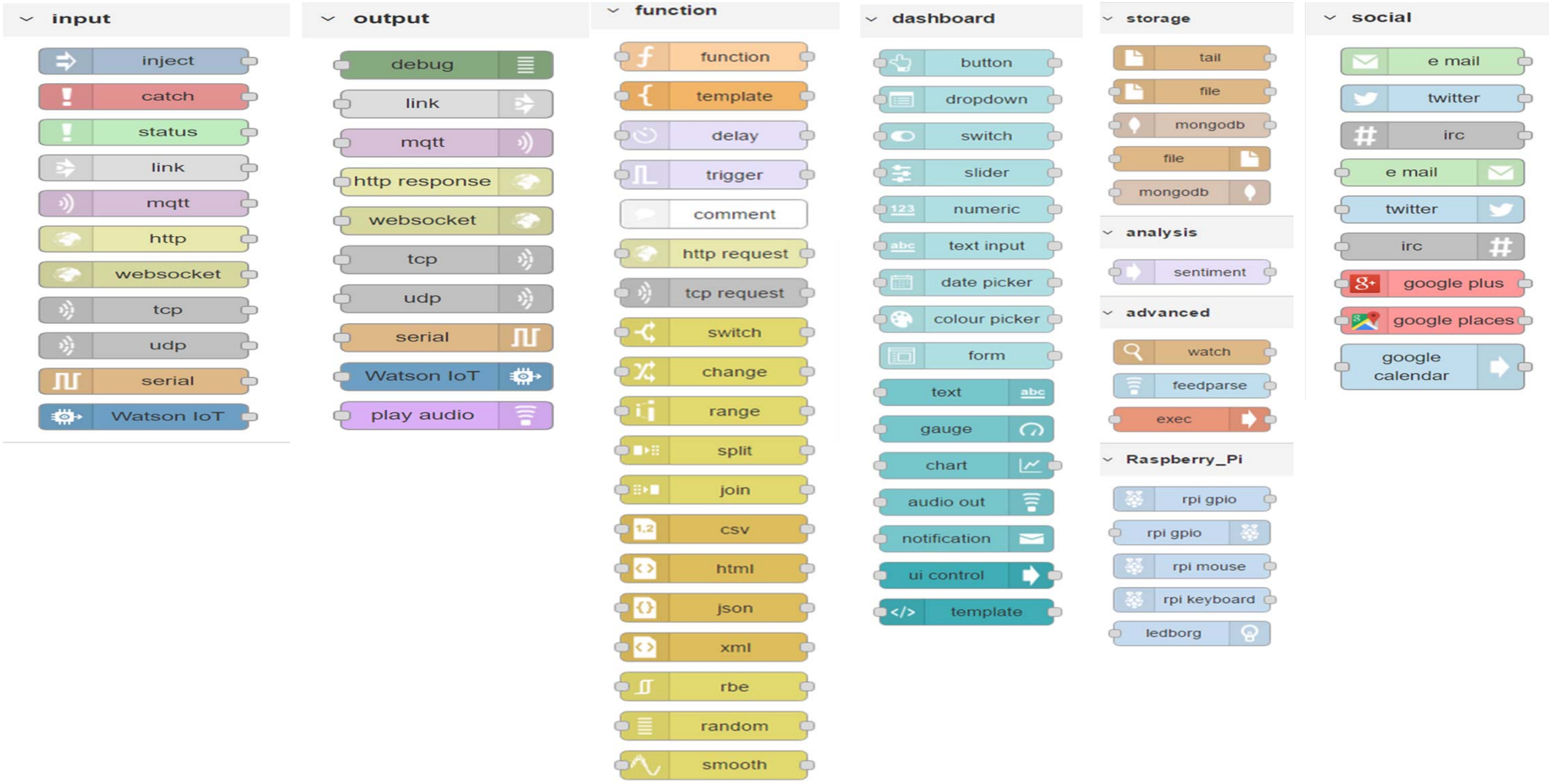
Would like to:

- Monitor traffic, Parking, env., speed limit, services,
- **Send critical event notifications via coded description**

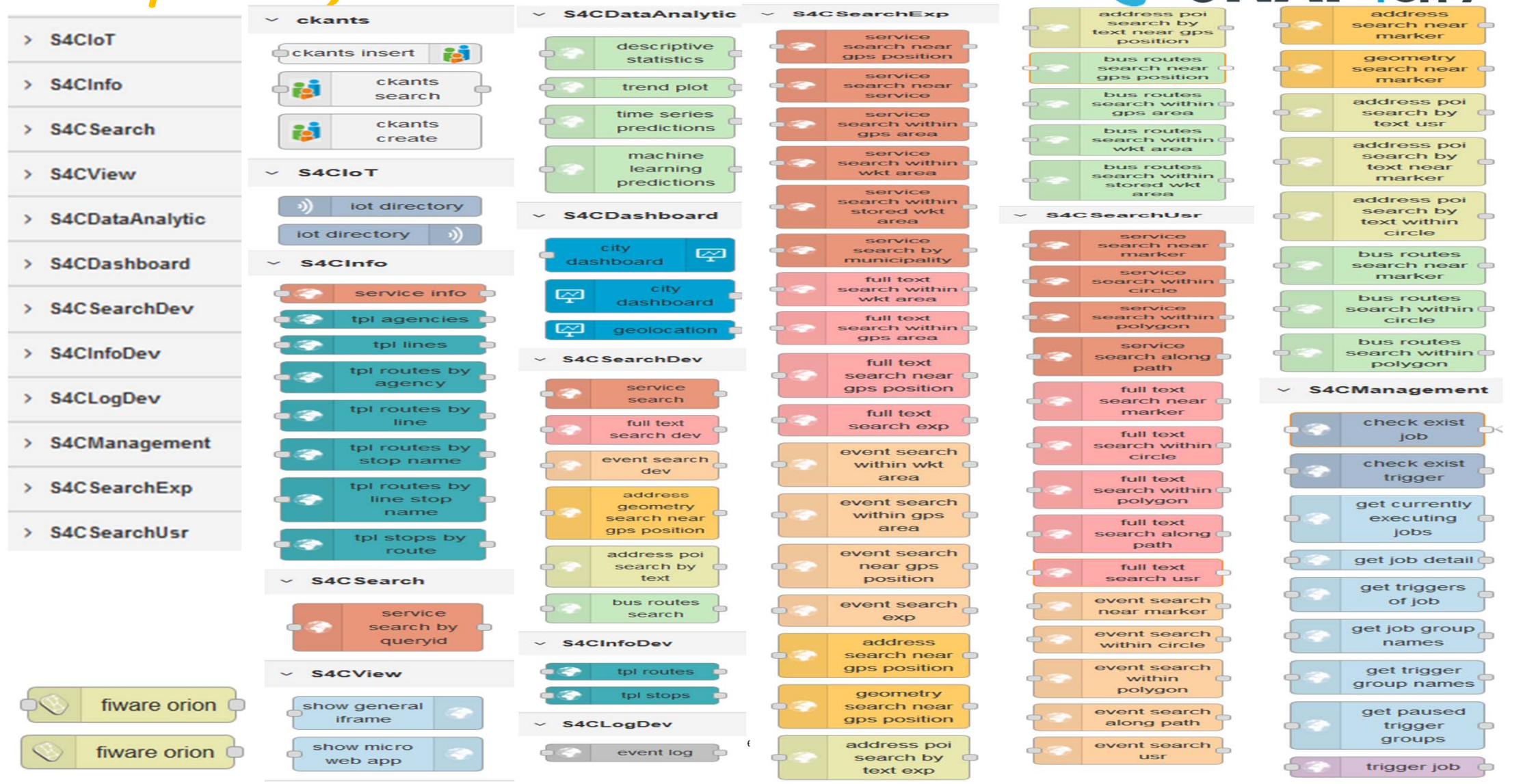
IOT Application with City Dash simpler development



Node.js Blocks on NodeRed SotA



Snap4City MicroServices



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SNAP4CITY KM 4 CITY

Managing MyPersonalData in secure manner

Examples:

- 1) Social IOT: A group of friends share some data with other according to GDPR: GPS position, Medical parameters as Glucose, etc.
- 2) saving and retrieve personal sensitive information.

The users manage their Personal data via personal mobile Dash and IOT App, and configuration on the portal and/or Mobile App

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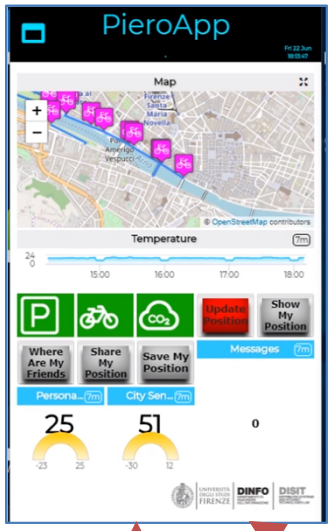
SNAP4CITY

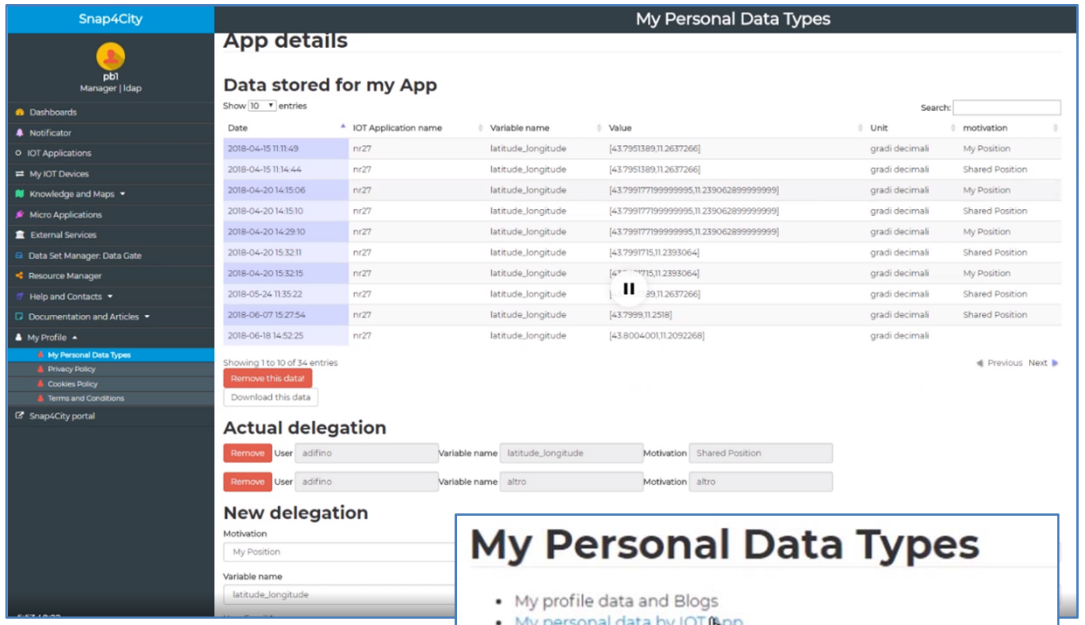
KM 4 CITY

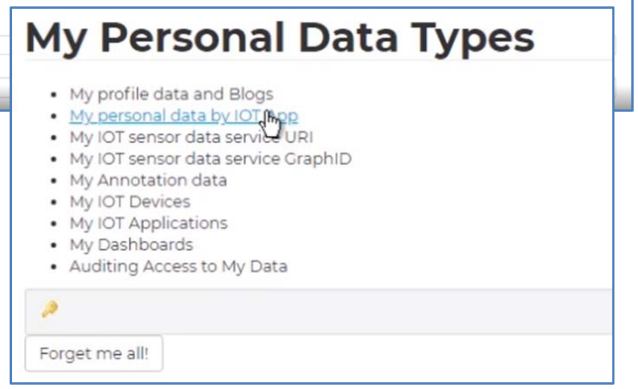
Managing MyPersonalData in secure manner

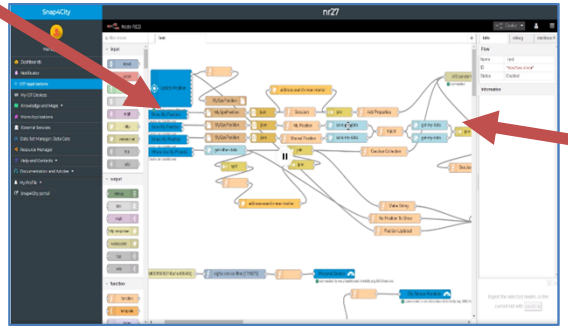


Example:

- Piero shares some data with selected friends according to GDPR: GPS position
- He managed the data via personal mobile Dashboard and IOT Application







Smart City Services and IOT/IOE

Encrypted Data Storage

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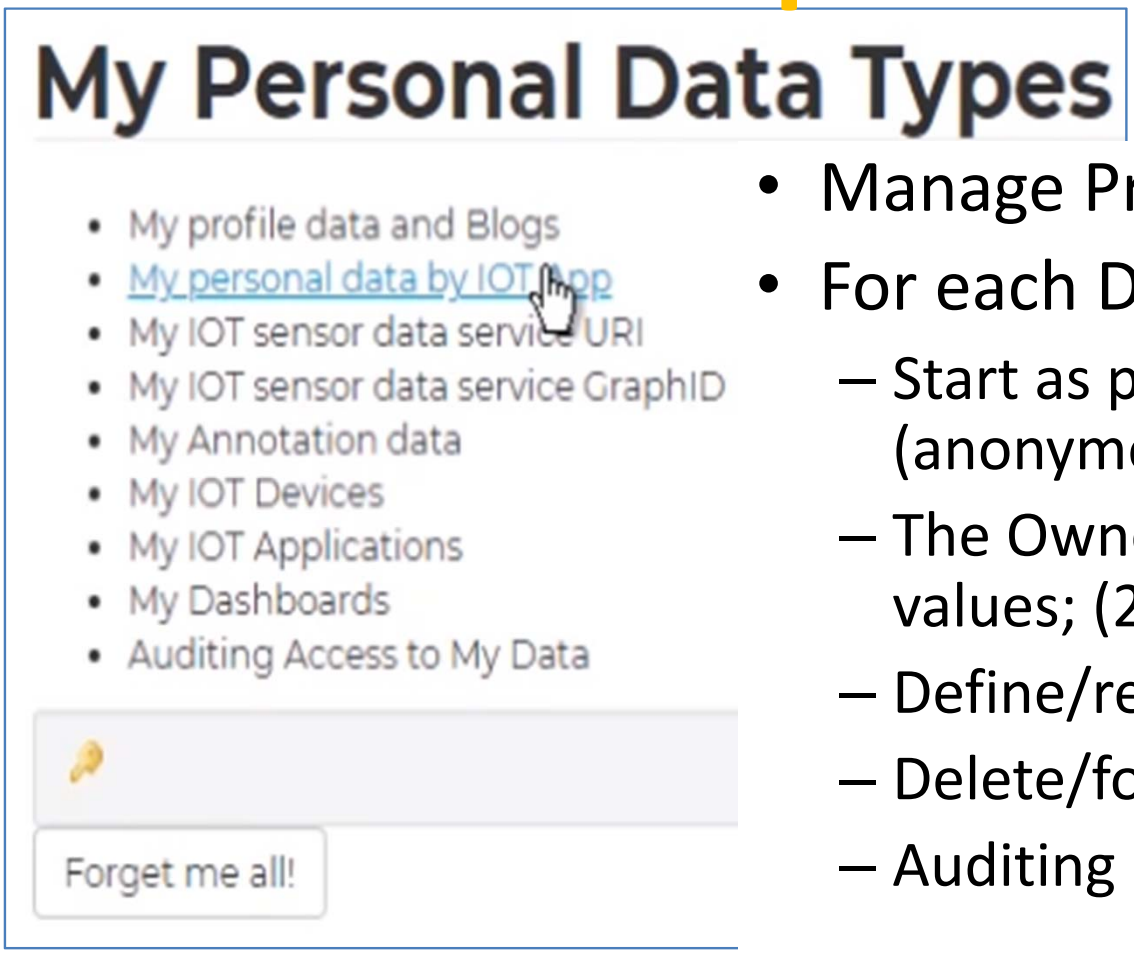
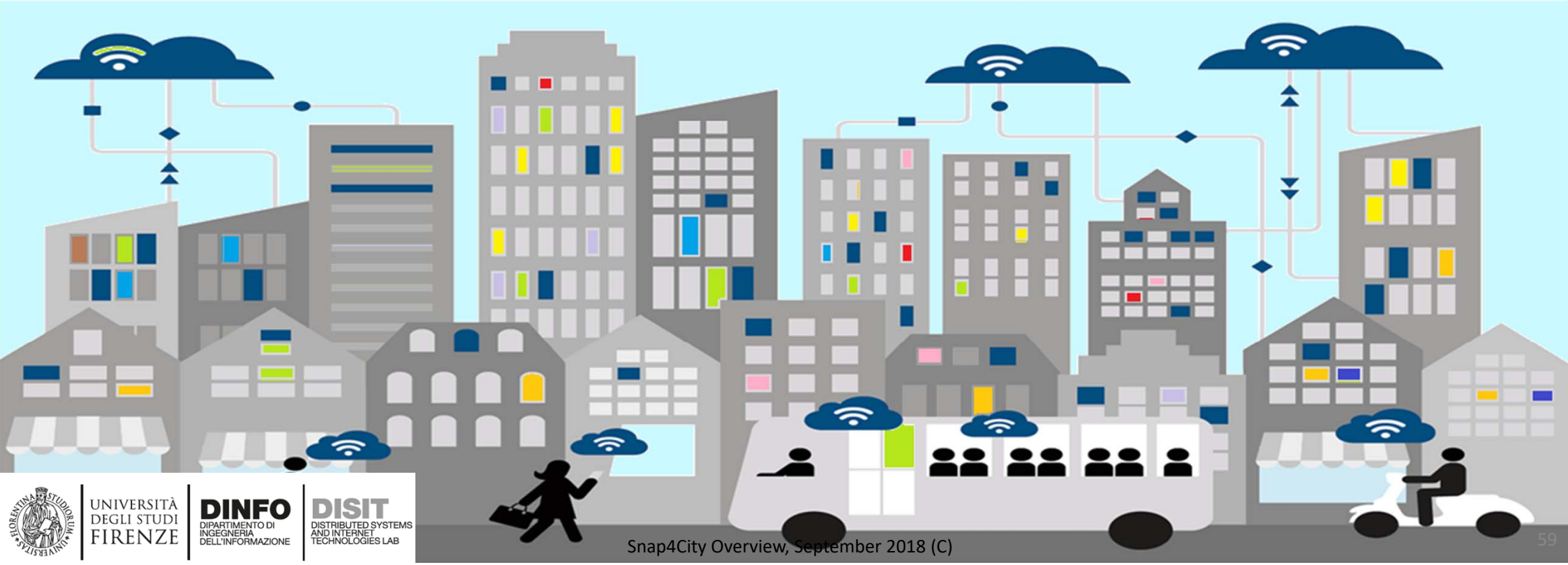
GDPR Compliant

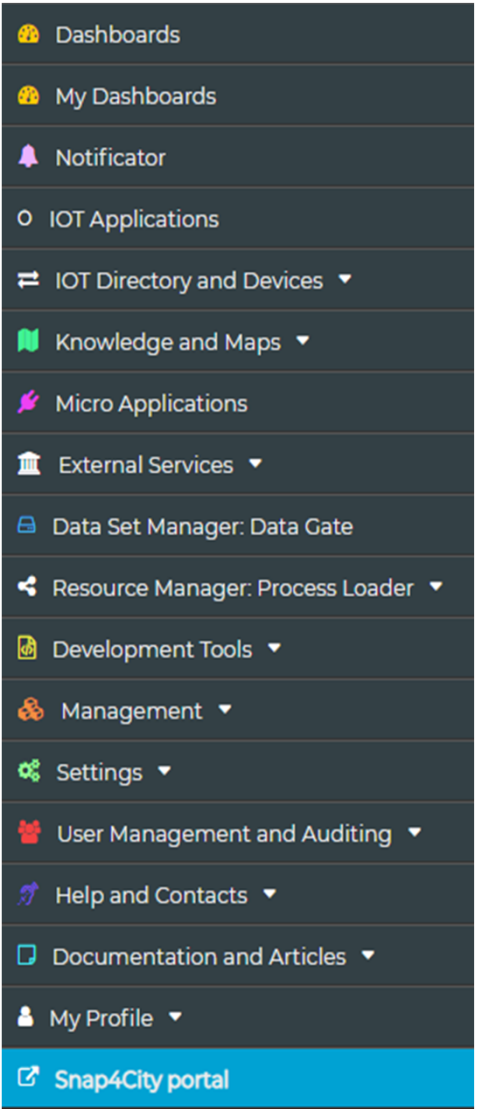


- Manage Profile and MyPersonalData
- For each Data Type:
  - Start as private → making them public (anonymous) and revoke
  - The Owner is the only one that can: (1) modify values; (2) change the ownership
  - Define/revoke Delegation to Access
  - Delete/forget per Data Type and "me all!".
  - Auditing

Level 5 users and above



AreaManager: Level 5, the developers



- Creation of External Services
- Management of IOT Devices, IOT edges
- Development tools, for example:
  - Creation of Data Analytic, Machine Learning in: R, Tensor Flow
  - Creation of massive ingestion, data transformation processes in ETL Penthao kettle
  - Creation of MicroServices for IOT Applications, from REST Call or from Data Analytics
  - Management of resources and their sharing
  - Open Source with many examples
  - Smart City API with Swagger & Postman documentation/test
- Many tools for monitoring and control

SNAP4CITY

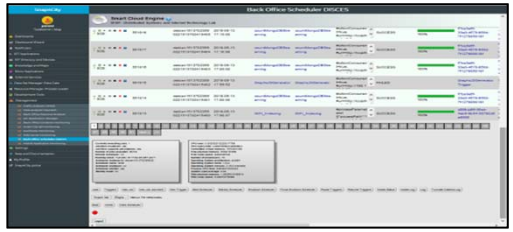
IOT Directory

IOT Broker

ETL Process

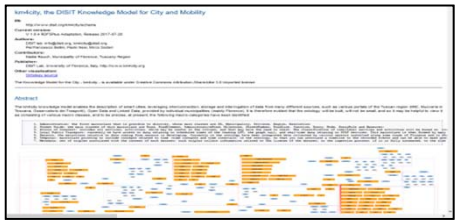
Data Analytics

Back Office Processes

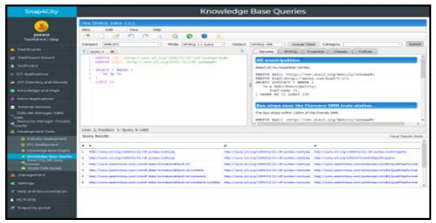


DISCES and back office management tools

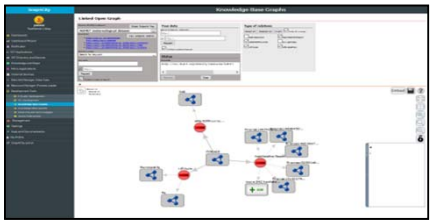
Ontology



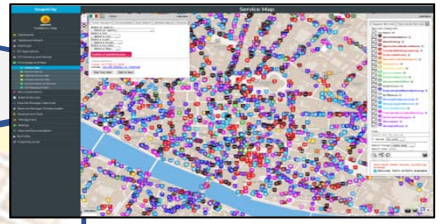
SPARQL, FLINT



LOG.disit.org



Knowledge Base, Km4City

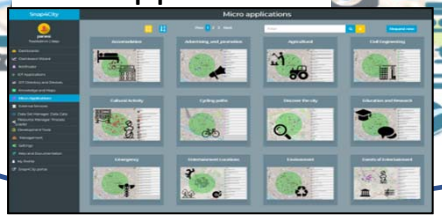


ServiceMap

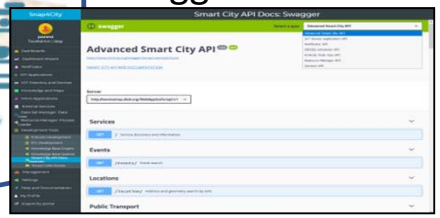
ServiceMap3D

Smart City API from Knowledge Base and other tools

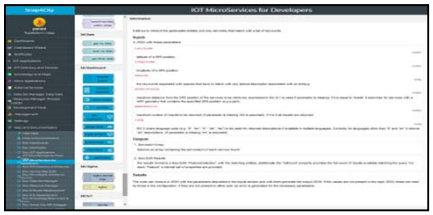
MicroApplications



Swagger

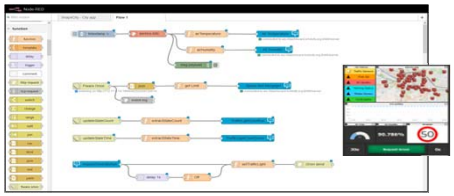


MicroServices



Resource Manager

Web and Mobile Apps



IOT Applications

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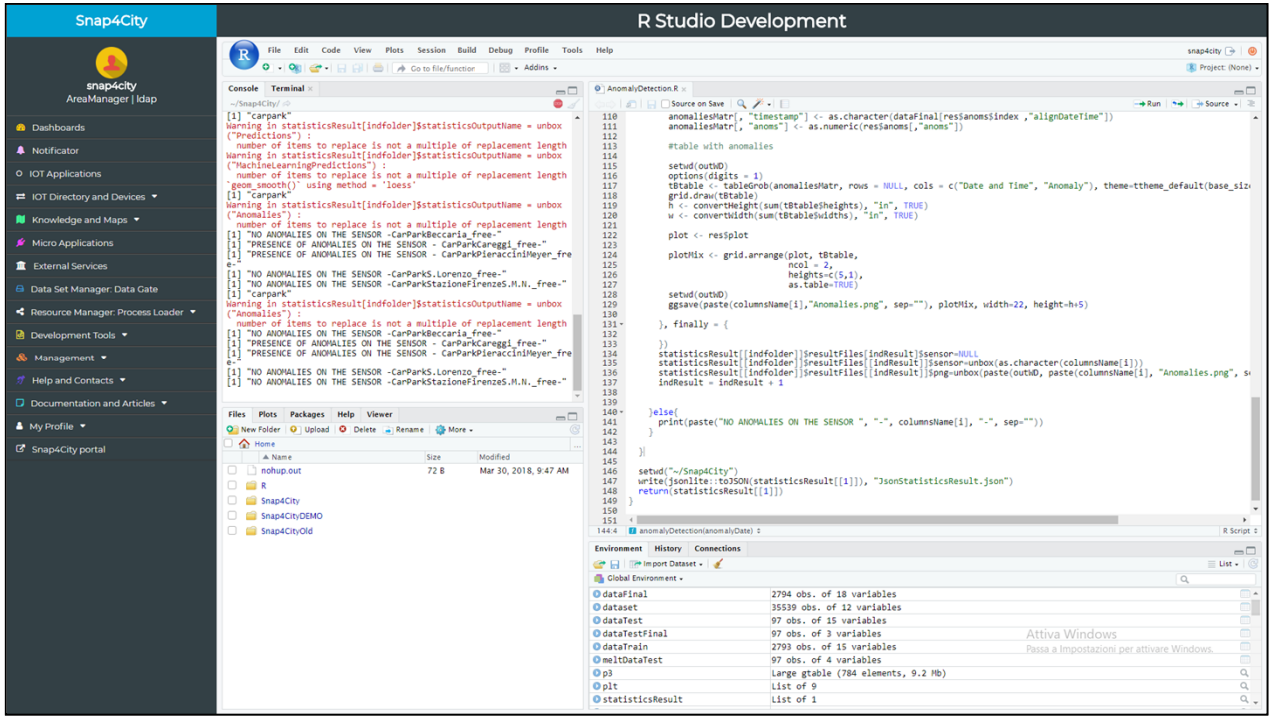
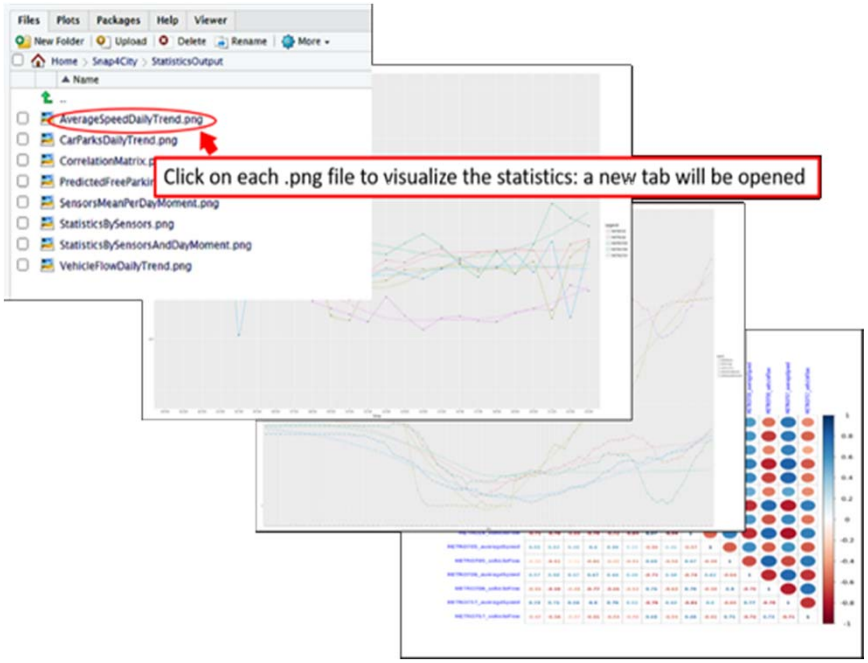
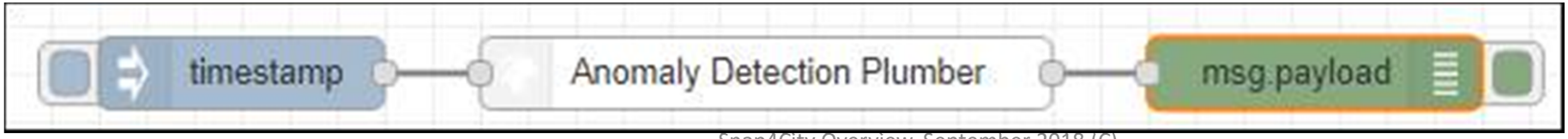
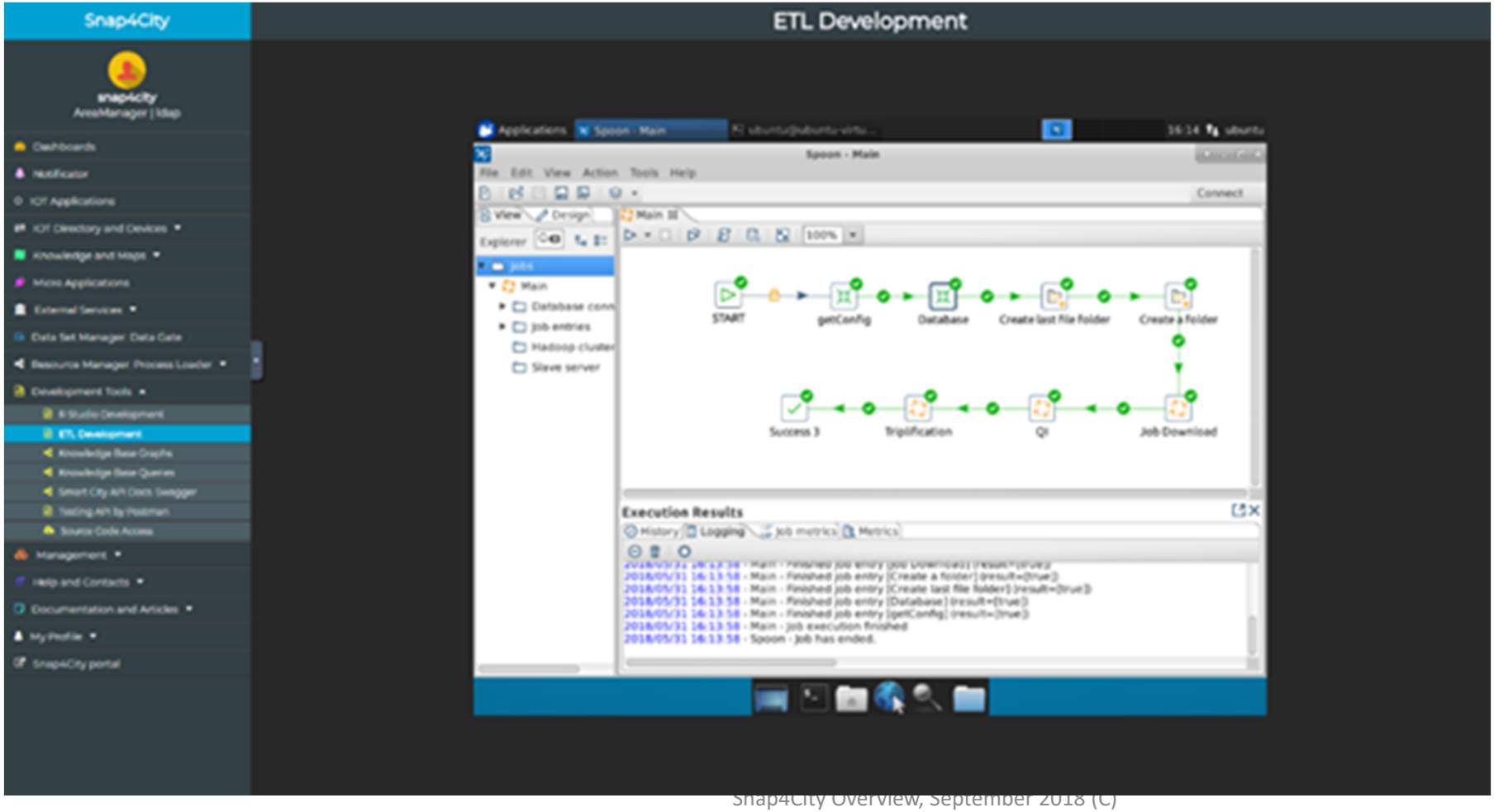
Developer in R Studio + Tensor Flow



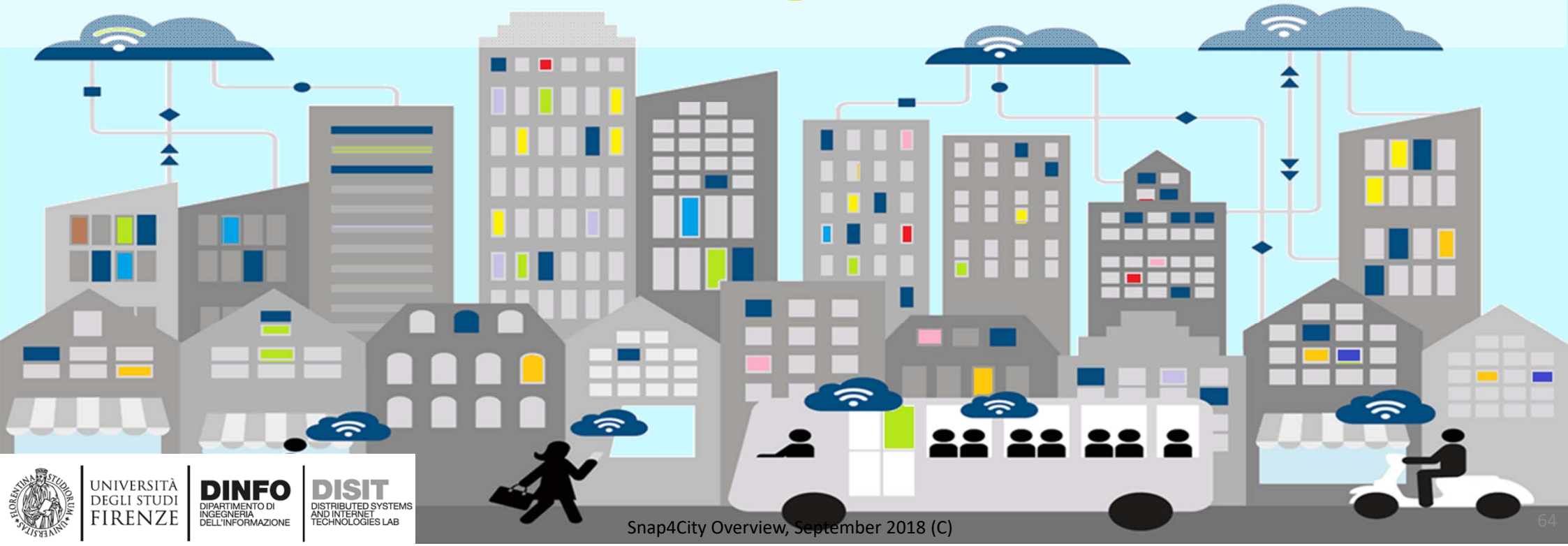




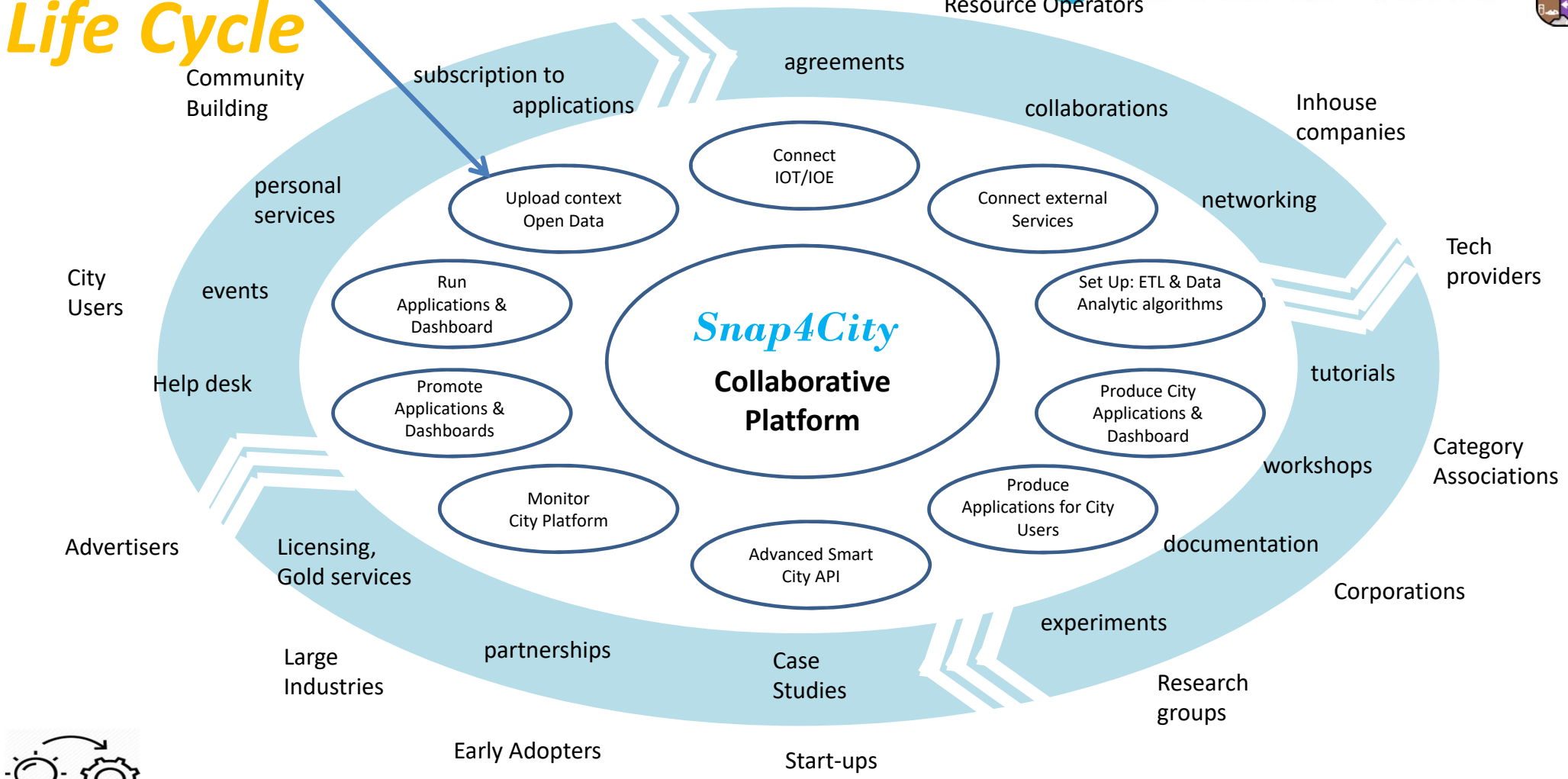
Developer in ETL: Penthao Kettle

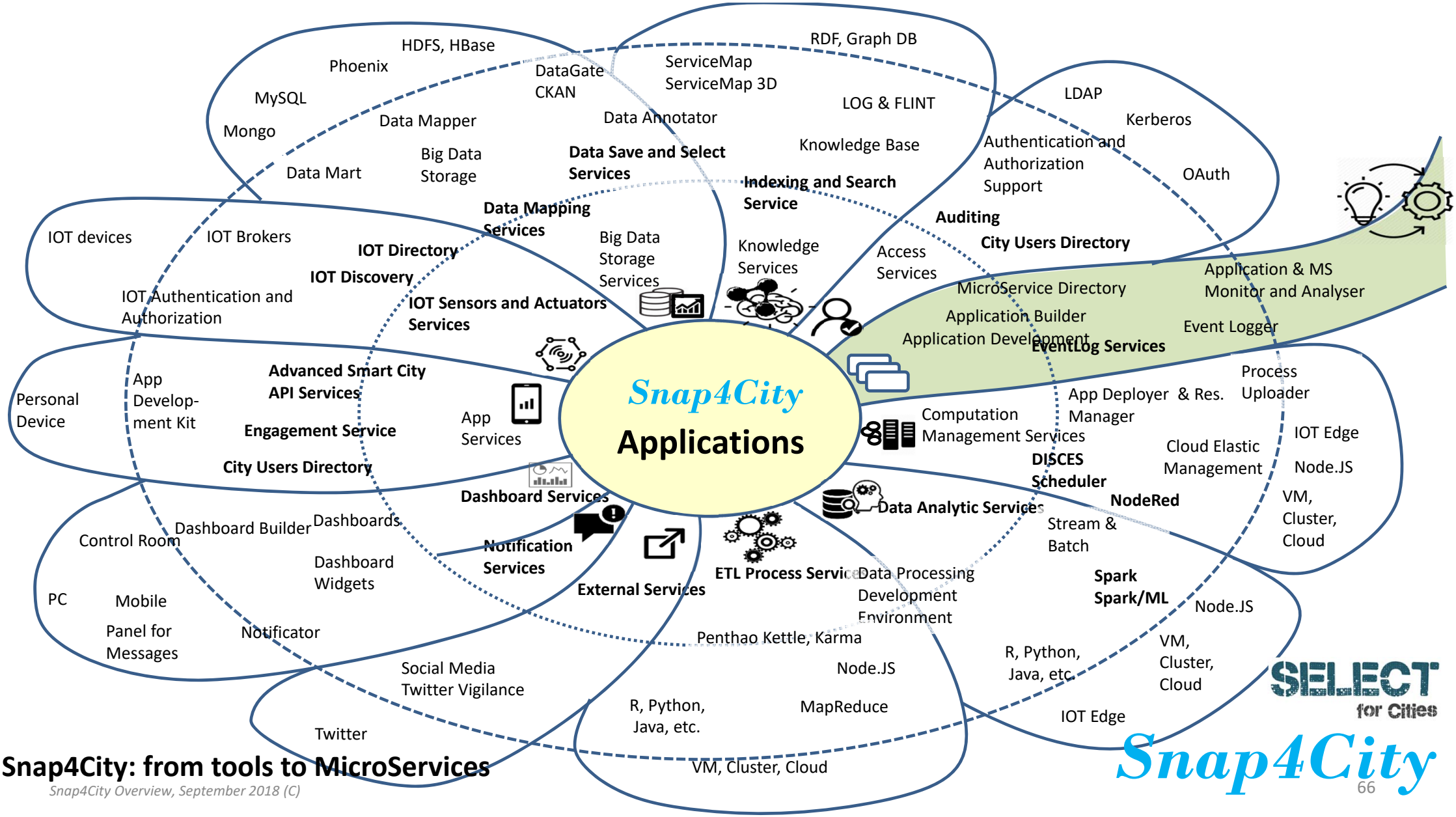


Living Lab



Life Cycle


Community Building
subscription to applications
agreements
collaborations
Inhouse companies
personal services
networking
Tech providers
City Users
events
tutorials
Help desk
workshops
Category Associations
documentation
Advertisers
Licensing, Gold services
Corporations
experiments
partnerships
Large Industries
Case Studies
Research groups
Early Adopters
Start-ups
Connect IOT/IOE
Upload context Open Data
Connect external Services
Run Applications & Dashboard
Set Up: ETL & Data Analytic algorithms
Snap4City
Collaborative Platform
Promote Applications & Dashboards
Produce City Applications & Dashboard
Monitor City Platform
Produce Applications for City Users
Advanced Smart City API



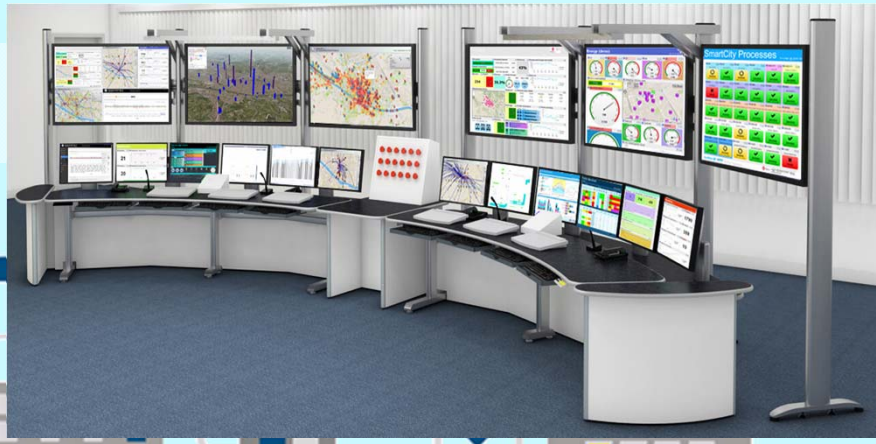
Snap4City: from tools to MicroServices

Snap4City Overview, September 2018 (C)

SELECT for Cities

Snap4City

Data & Model



http://www.km4city.org/?infoDocs

http://www.km4city.org/?controlRoom

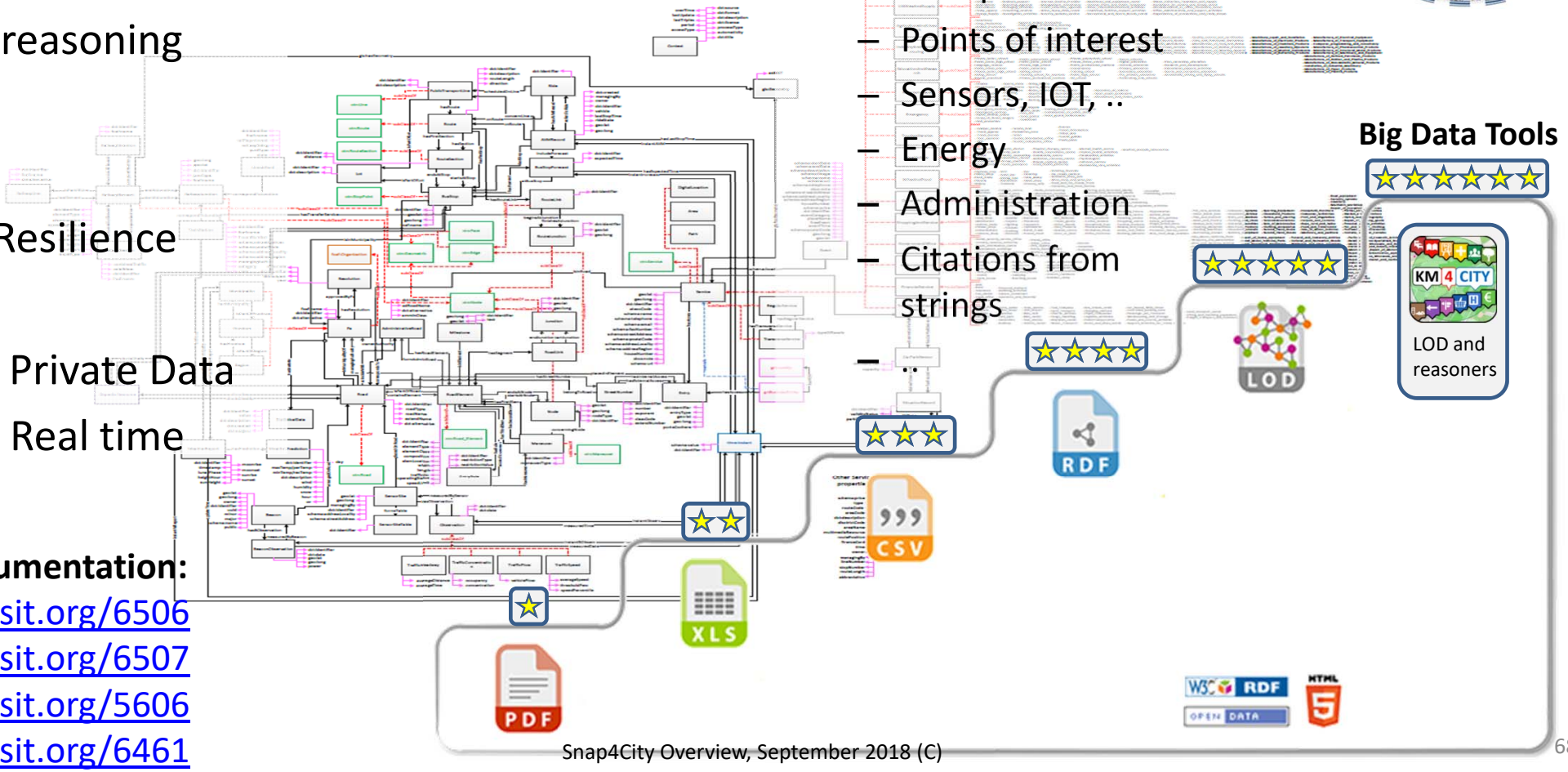
http://www.km4city.org/?devTools

http://www.km4city.org/?app

Km4City: Knowledge Base

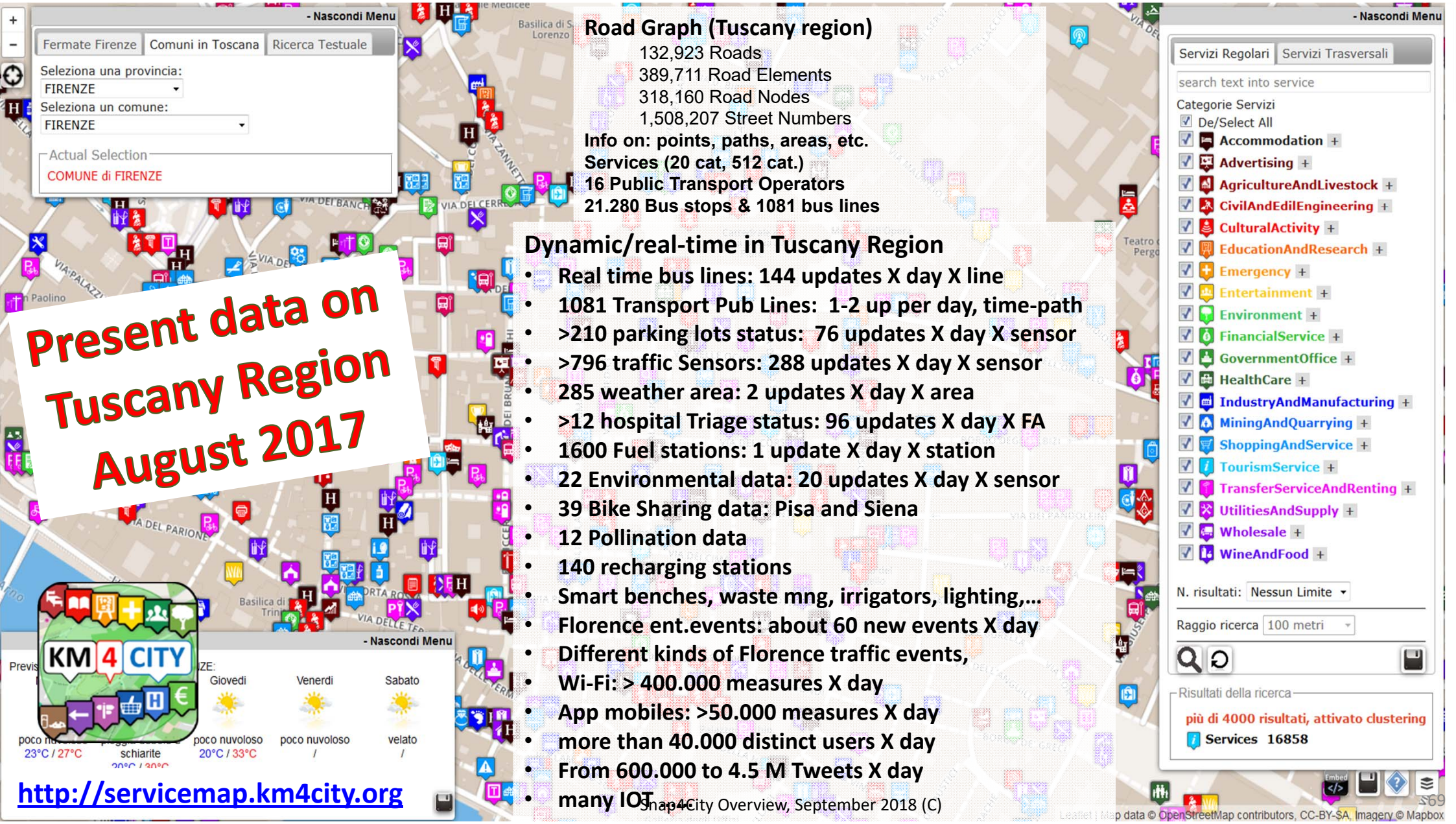
- **Multiple DOMAINS**
- Geospatial reasoning
- Temporal reasoning
- Metadata
- Statistics
- Risk and Resilience
- Licensing
- Open and Private Data
- Static and Real time

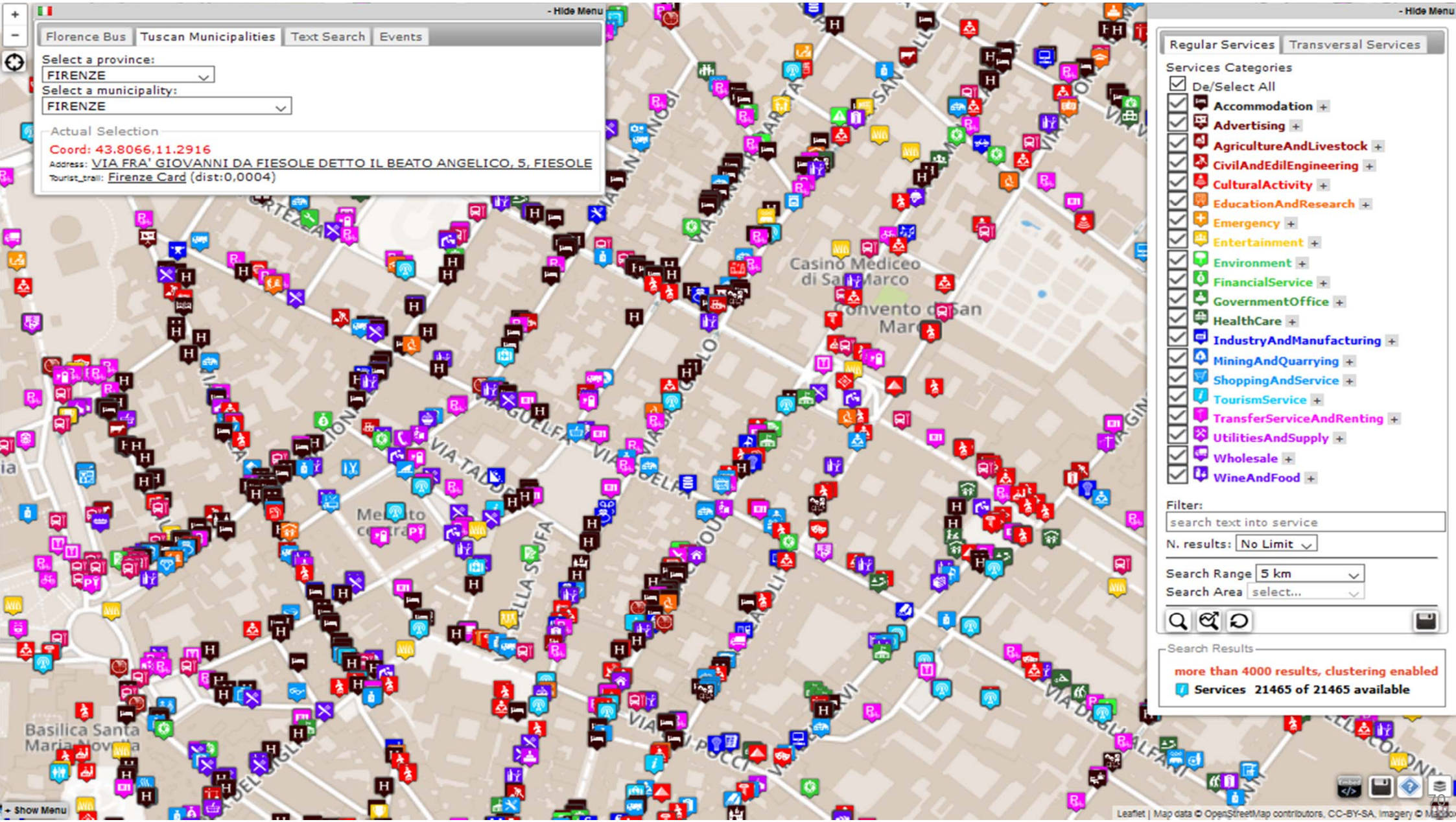
- Street-Guide
- Mobility and transport
- Points of interest
- Sensors, IOT, ..
- Energy
- Administration
- Citations from strings
- ..



Ontology Documentation:

http://www.disit.org/6506
http://www.disit.org/6507
http://www.disit.org/5606
http://www.disit.org/6461


- Nascondi Menu
Fermate Firenze
Comuni in Toscana
Ricerca Testuale
Seleziona una provincia:
FIRENZE
Seleziona un comune:
FIRENZE
Actual Selection
COMUNE di FIRENZE
Present data on Tuscany Region August 2017
KM 4 CITY
- Nascondi Menu
Giovedi
Venerdi
Sabato
poco nuvoloso
20°C / 33°C
poco nuvoloso
/
velato
/
23°C / 27°C
schiarite
http://servicemap.km4city.org
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
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
1600 Fuel stations: 1 update X day X station
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,
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
- 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


- Hide Menu
Florence Bus
Tuscan Municipalities
Text Search
Events
Select a province:
FIRENZE
Select a municipality:
FIRENZE
Actual Selection
Coord: 43.8066,11.2916
Address: VIA FRA' GIOVANNI DA FIESOLE DETTO IL BEATO ANGELICO, 5, FIESOLE
Tourist_trail: Firenze Card (dist:0,0004)
Casino Mediceo di San Marco
Convento di San Marco
Mercato centrale
Basilica Santa Maria Novella
+ Show Menu
- Hide Menu
Regular Services
Transversal Services
Services Categories
De/Select All
Accommodation
Advertising
AgricultureAndLivestock
CivilAndEdilEngineering
CulturalActivity
EducationAndResearch
Emergency
Entertainment
Environment
FinancialService
GovernmentOffice
HealthCare
IndustryAndManufacturing
MiningAndQuarrying
ShoppingAndService
TourismService
TransferServiceAndRenting
UtilitiesAndSupply
Wholesale
WineAndFood
Filter:
search text into service
N. results: No Limit
Search Range 5 km
Search Area select...
Search Results
more than 4000 results, clustering enabled
Services 21465 of 21465 available
Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

Other Sensors and Actuators, IOT

- Restricted Traffic Zone Gates
  - Passages, payment, alerts,
  - Wi-Fi control, RFI control, etc.
- Road Direction manager: panel, red-light, etc.
  - Status and action
- Environmental Sensors:
  - Air quality, pollution, rain, allergens, temperature,
  - humidity,…
- Public Light Pillar
  - Traffic flows, environment,
  - Wi-Fi, Tv-Camera, BT servers, on/off, percentage of light, ..
- Waste Manager
  - Level, kind, status, on/off
- Recharge station, column
  - Free slots, consumption, next time slot, …

- **Environmental Sensors**:
  - Air, temperature, humidity,
  - water level in rivers
  - Status of underpass and bridges
- **Risk assessment**
  - Value of the buildings,
  - hydrogeological risk map,
  - earthquake risk map, …
  - people distribution and location
  - Position of recover places,
- **Traffic Zone Gates**
  - Passages, alerts,
  - etc.

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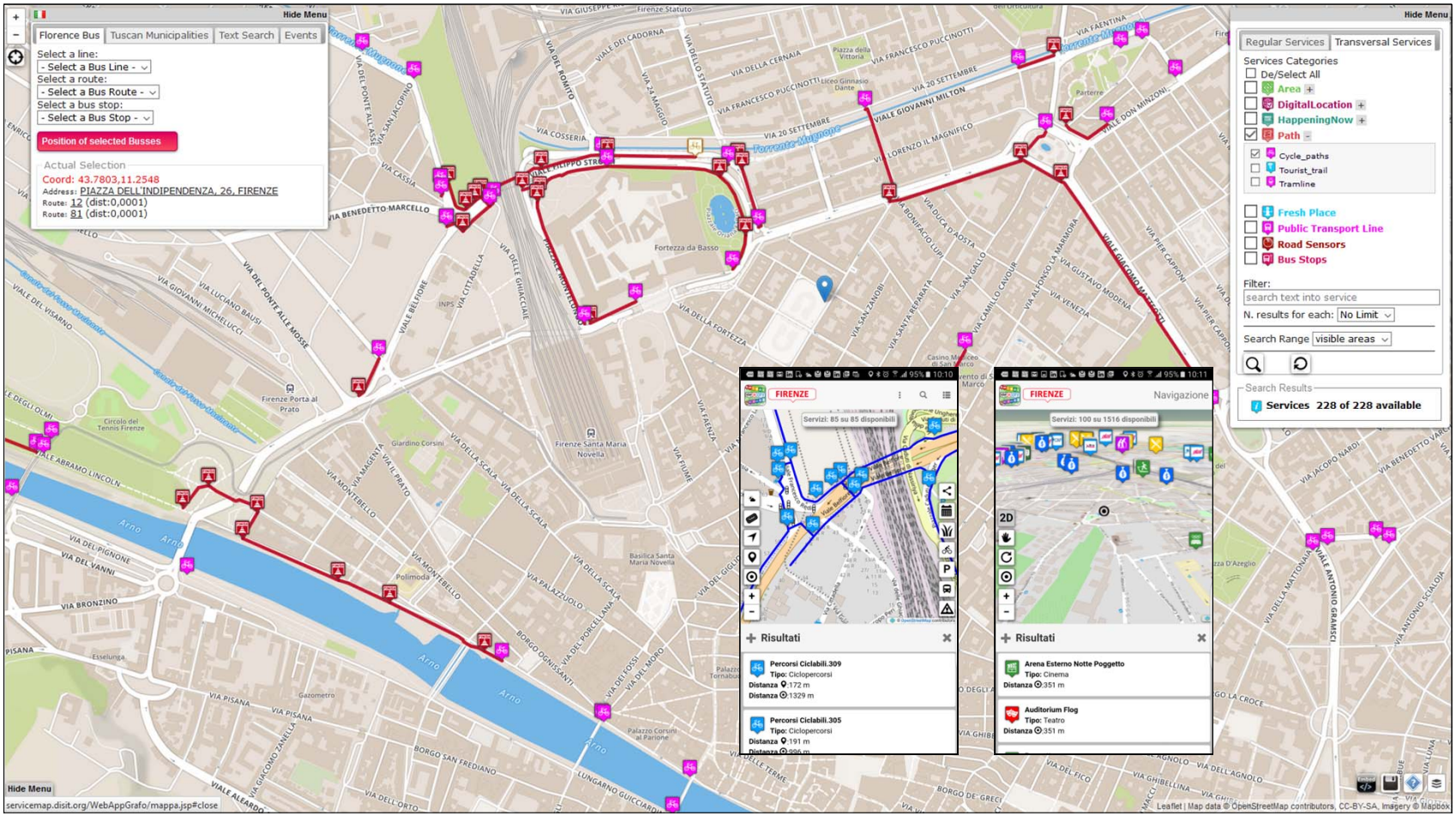
http://www.disit.org

Cycling Paths



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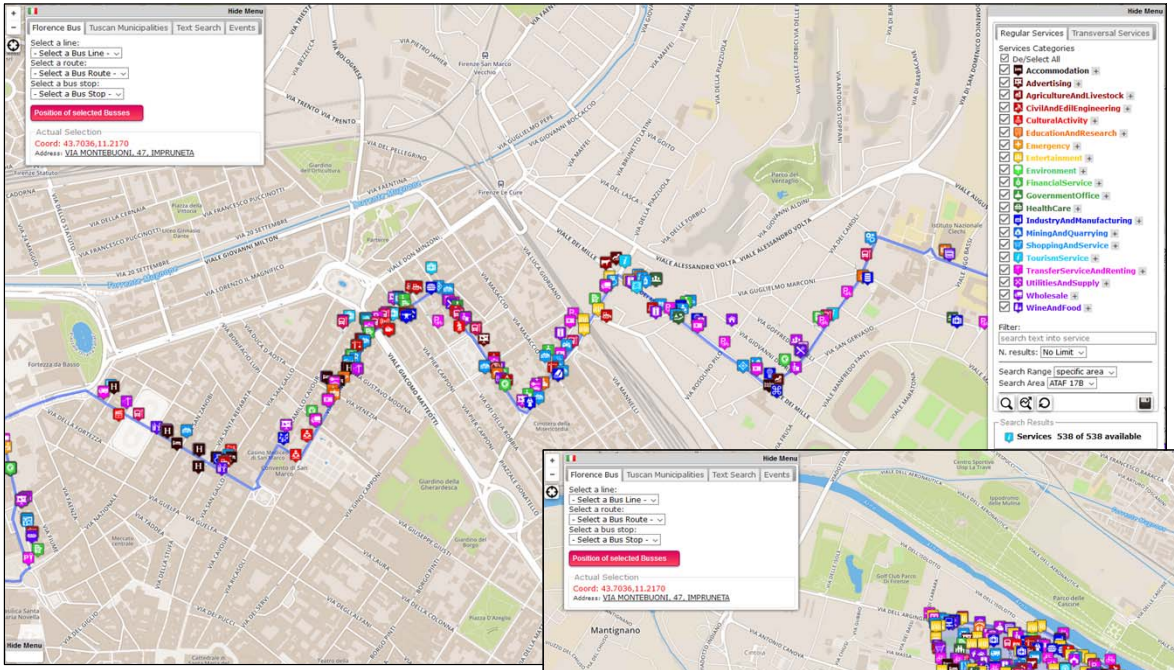
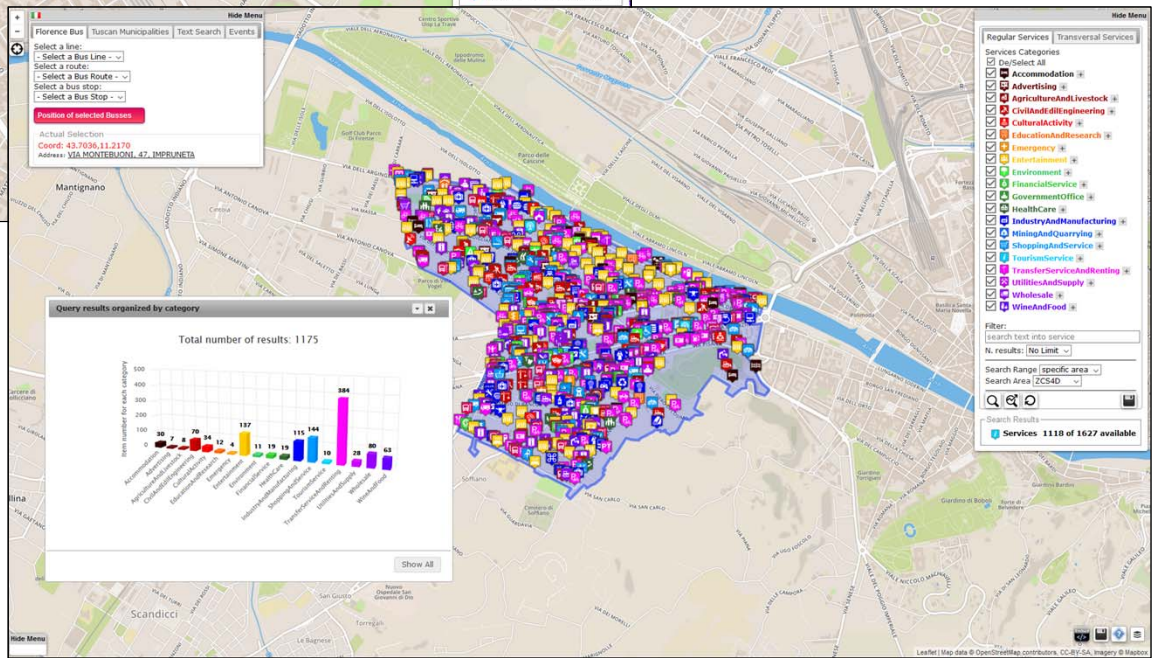
Along a Line



Into an Area



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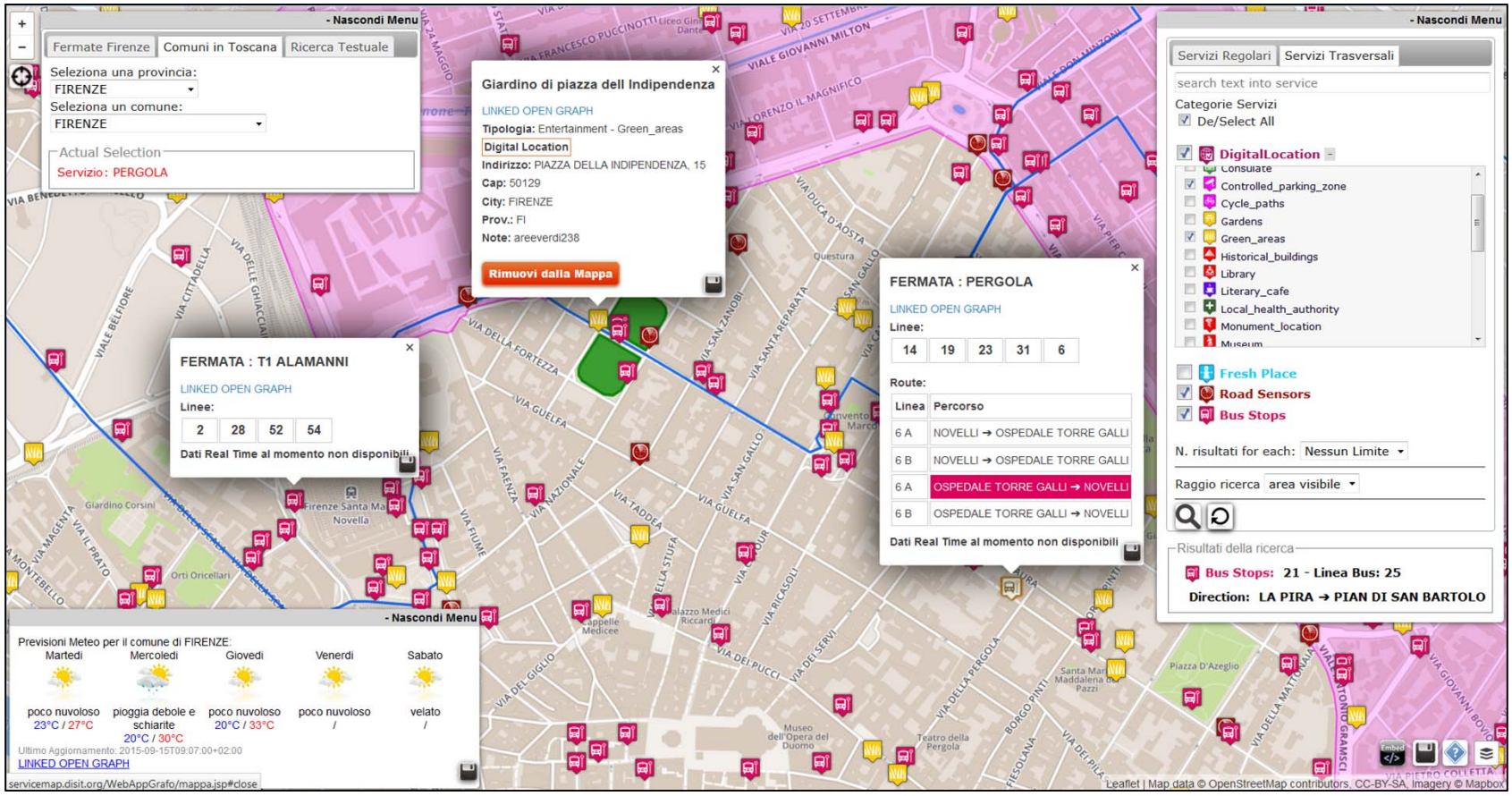
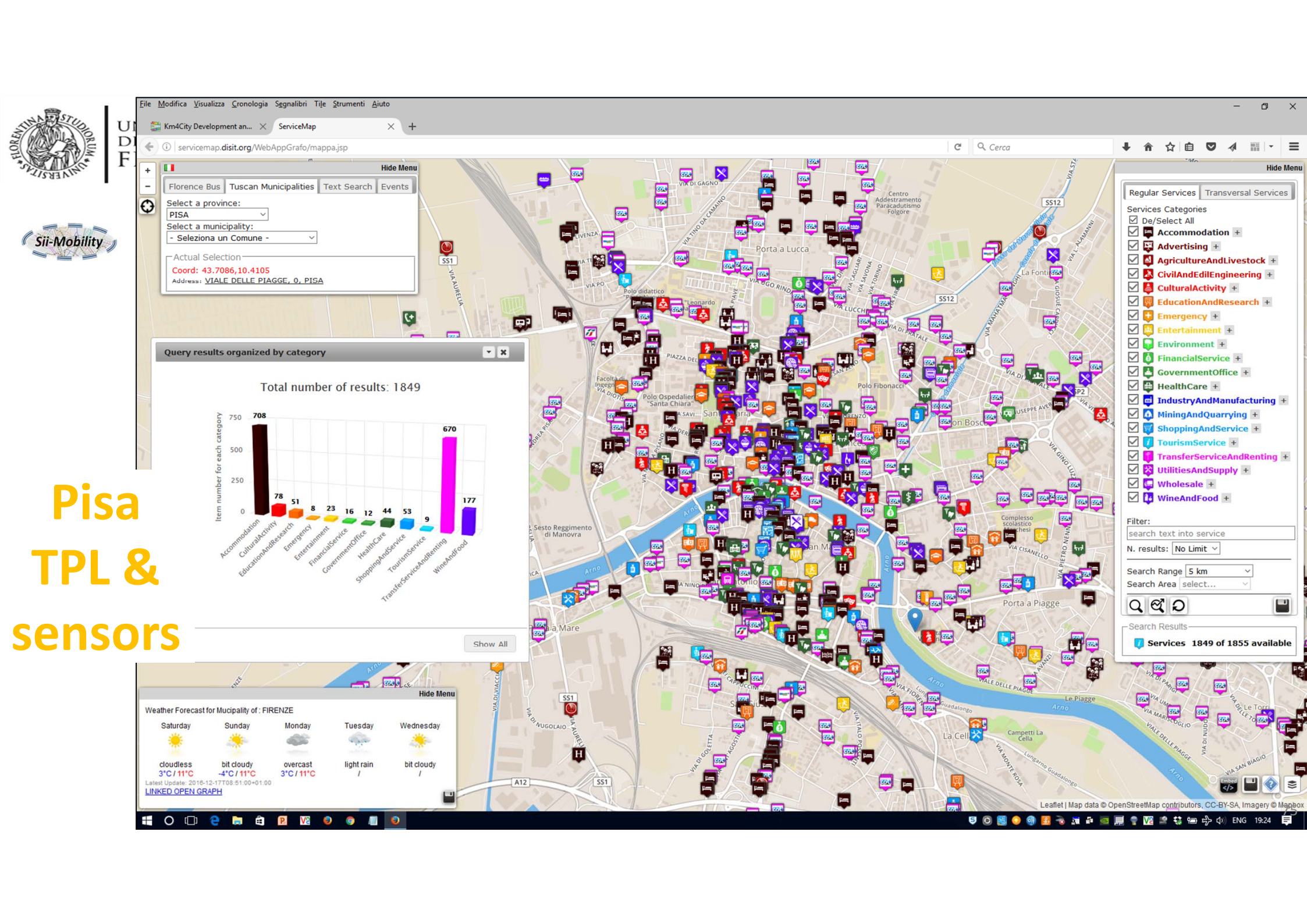
Km4City in Firenze



- **Areas, Bus lines, bike lanes, tram, RTZ, etc.**


Sii-Mobility
Pisa
TPL &
sensors
Hide Menu
Florence Bus
Tuscan Municipalities
Text Search
Events
Select a province:
PISA
Select a municipality:
- Seleziona un Comune -
Actual Selection
Coord: 43.7086,10.4105
Address: VIALE DELLE PIAGGE, 0, PISA
Query results organized by category
Total number of results: 1849
Item number for each category
Accommodation 708
CulturalActivity 78
EducationAndResearch 51
Emergency 8
Entertainment 23
FinancialService 16
GovernmentOffice 12
HealthCare 44
ShoppingAndService 53
TourismService 9
TransferServiceAndRenting 670
WineAndFood 177
Show All
Hide Menu
Weather Forecast for Mucipality of : FIRENZE
Saturday cloudless 3°C / 11°C
Sunday bit cloudy -4°C / 11°C
Monday overcast 3°C / 11°C
Tuesday light rain /
Wednesday bit cloudy /
Latest Update: 2016-12-17T08:51:00+01:00
LINKED OPEN GRAPH
Hide Menu
Regular Services
Transversal Services
Services Categories
De/Select All
Accommodation
Advertising
AgricultureAndLivestock
CivilAndEdilEngineering
CulturalActivity
EducationAndResearch
Emergency
Entertainment
Environment
FinancialService
GovernmentOffice
HealthCare
IndustryAndManufacturing
MiningAndQuarrying
ShoppingAndService
TourismService
TransferServiceAndRenting
UtilitiesAndSupply
Wholesale
WineAndFood
Filter:
search text into service
N. results: No Limit
Search Range 5 km
Search Area select...
Search Results
Services 1849 of 1855 available
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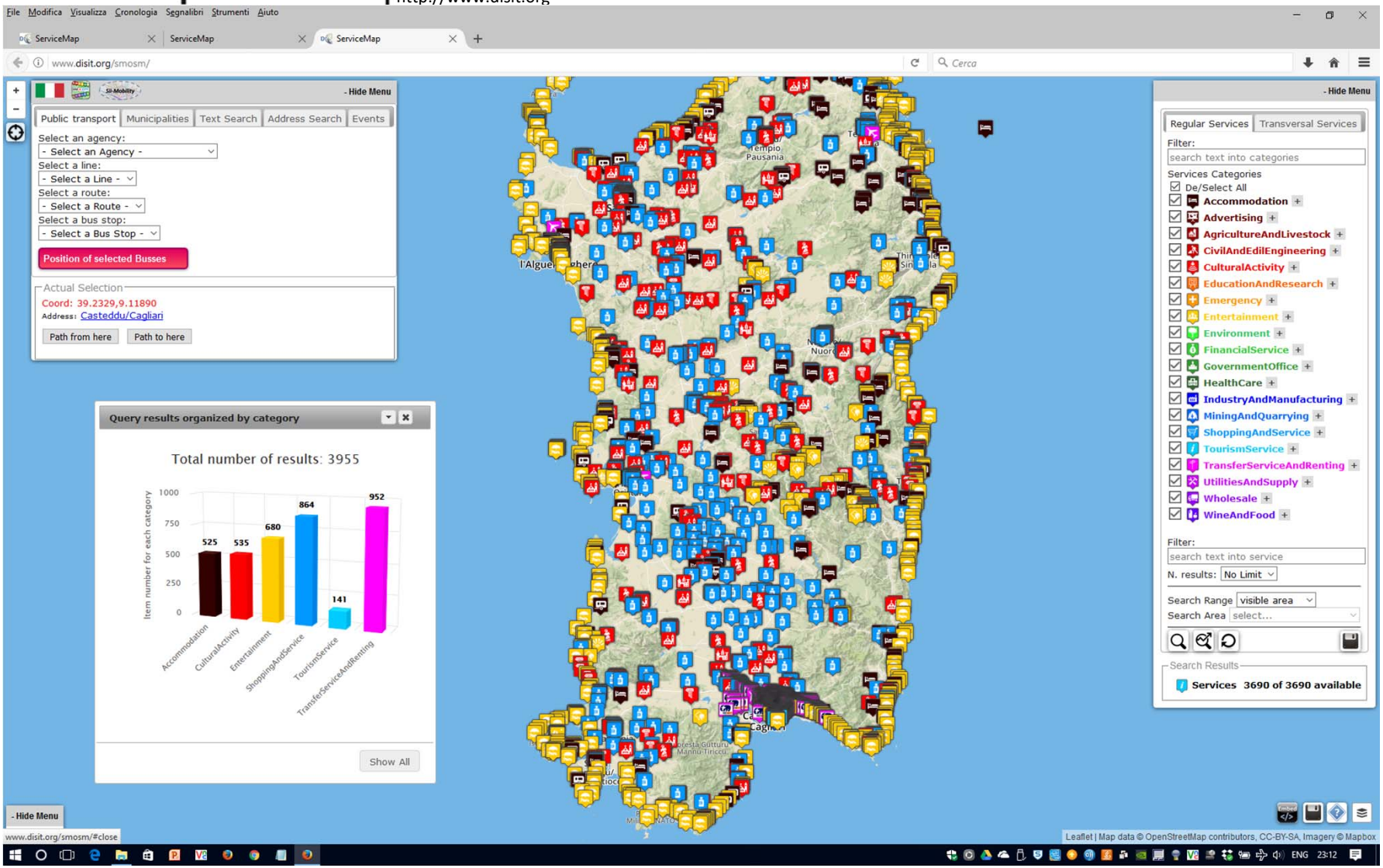
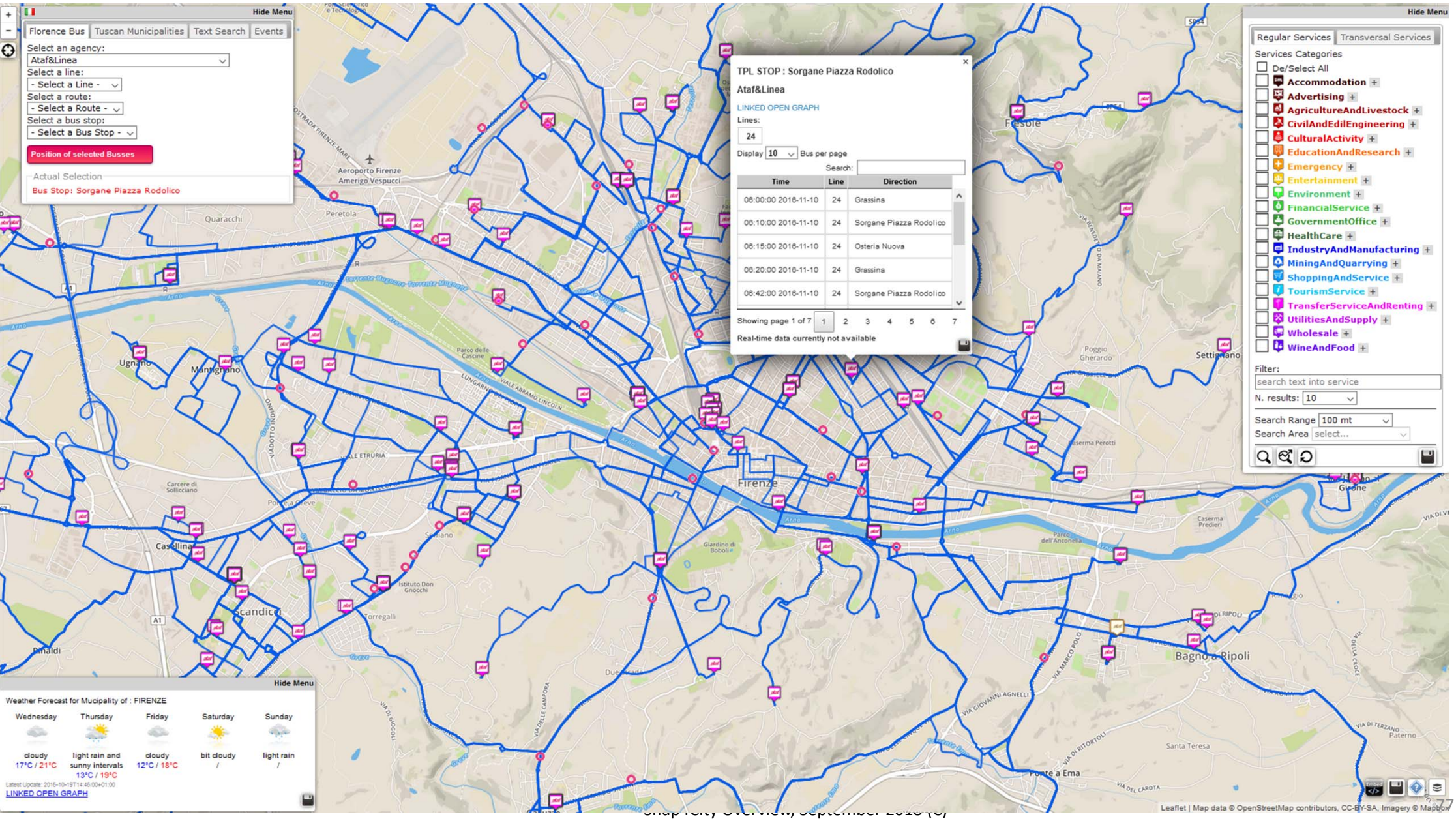
Km4City in Sardegna




Hide Menu
Florence Bus
Tuscan Municipalities
Text Search
Events
Select an agency:
Ataf&Linea
Select a line:
- Select a Line -
Select a route:
- Select a Route -
Select a bus stop:
- Select a Bus Stop -
Position of selected Busses
Actual Selection
Bus Stop: Sorgane Piazza Rodolico
TPL STOP : Sorgane Piazza Rodolico
Ataf&Linea
LINKED OPEN GRAPH
Lines:
24
Display 10 Bus per page
Search:
Time
Line
Direction
06:00:00 2016-11-10 24 Grassina
06:10:00 2016-11-10 24 Sorgane Piazza Rodolico
06:15:00 2016-11-10 24 Osteria Nuova
06:20:00 2016-11-10 24 Grassina
06:42:00 2016-11-10 24 Sorgane Piazza Rodolico
Showing page 1 of 7
1 2 3 4 5 6 7
Real-time data currently not available
Hide Menu
Regular Services
Transversal Services
Services Categories
De/Select All
Accommodation
Advertising
AgricultureAndLivestock
CivilAndEdilEngineering
CulturalActivity
EducationAndResearch
Emergency
Entertainment
Environment
FinancialService
GovernmentOffice
HealthCare
IndustryAndManufacturing
MiningAndQuarrying
ShoppingAndService
TourismService
TransferServiceAndRenting
UtilitiesAndSupply
Wholesale
WineAndFood
Filter:
search text into service
N. results: 10
Search Range 100 mt
Search Area select...
Hide Menu
Weather Forecast for Mucipality of : FIRENZE
Wednesday Thursday Friday Saturday Sunday
cloudy 17°C / 21°C
light rain and sunny intervals 13°C / 19°C
cloudy 12°C / 18°C
bit cloudy /
light rain /
Latest Update: 2016-10-19T14:46:00+01:00
LINKED OPEN GRAPH
Aeroporto Firenze Amerigo Vespucci
Quaracchi
Peretola
Fiesole
Ugnano
Mantignano
Parco delle Cascine
Firenze
Poggio Gherardo
Settignano
Carcere di Sollicciano
Scandicci
Rinaldi
Giardino di Boboli
Bagno a Ripoli
Santa Teresa
Ponte a Ema
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Smart City Control Room

http://www.km4city.org/?controlRoom

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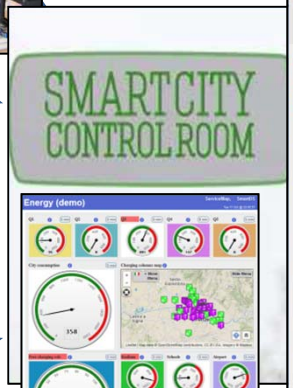
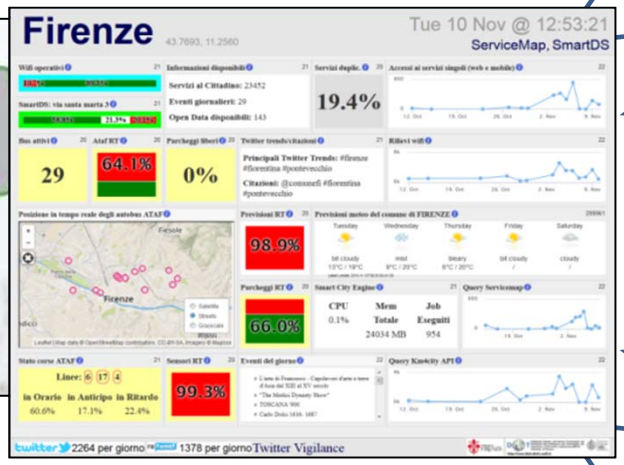
REPLICATE

Horizon 2020
European Union Funding
for Research & Innovation

Transport systems, Mobility, Parking





Shops, services, operators

Sensors, IOT Cameras, ..

Social Media, WiFi, Network

Public services, Govern, Events

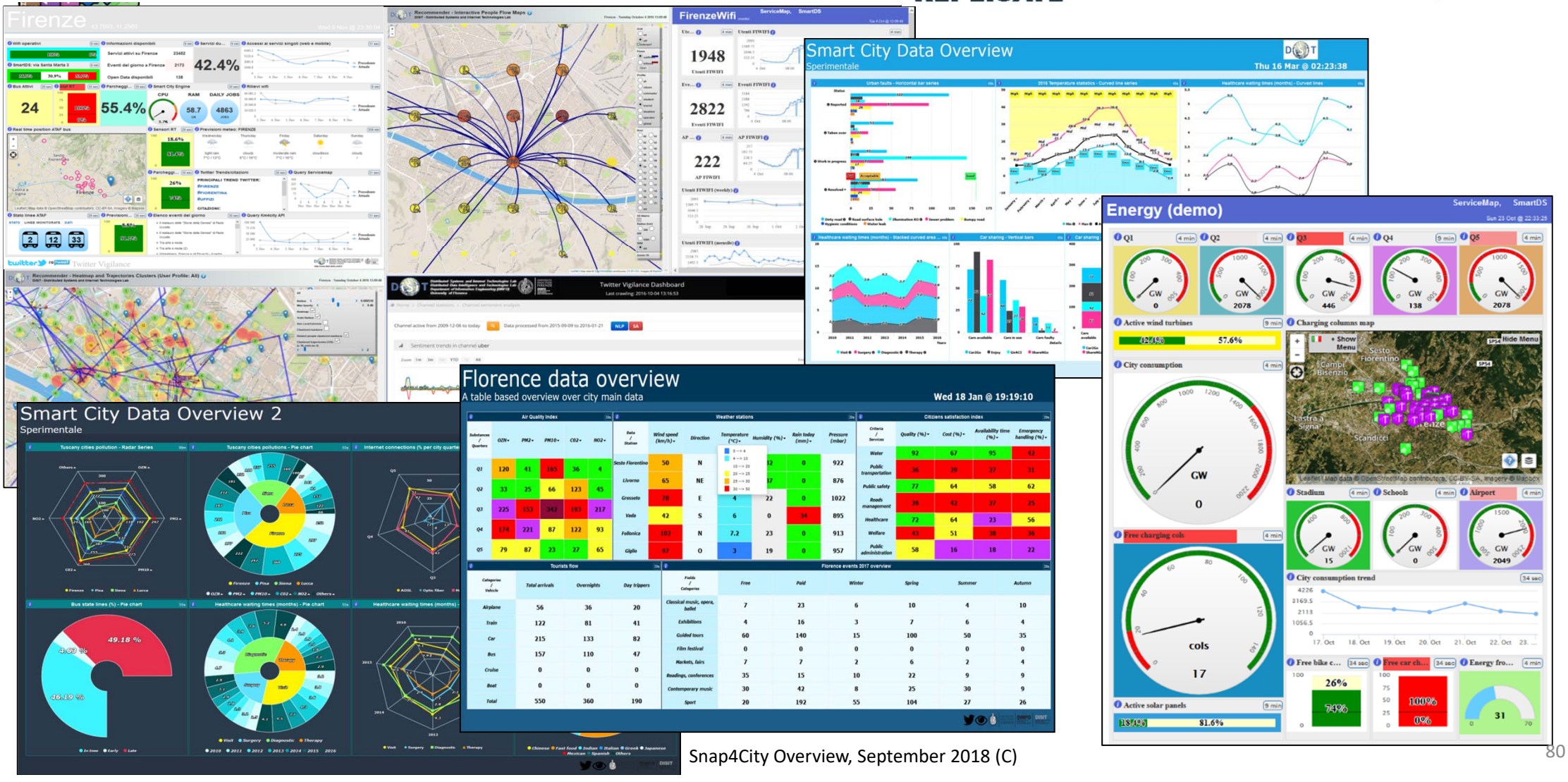
Environment, Water, energy

Dashboards

Smart City Dashboard

REPLICATE

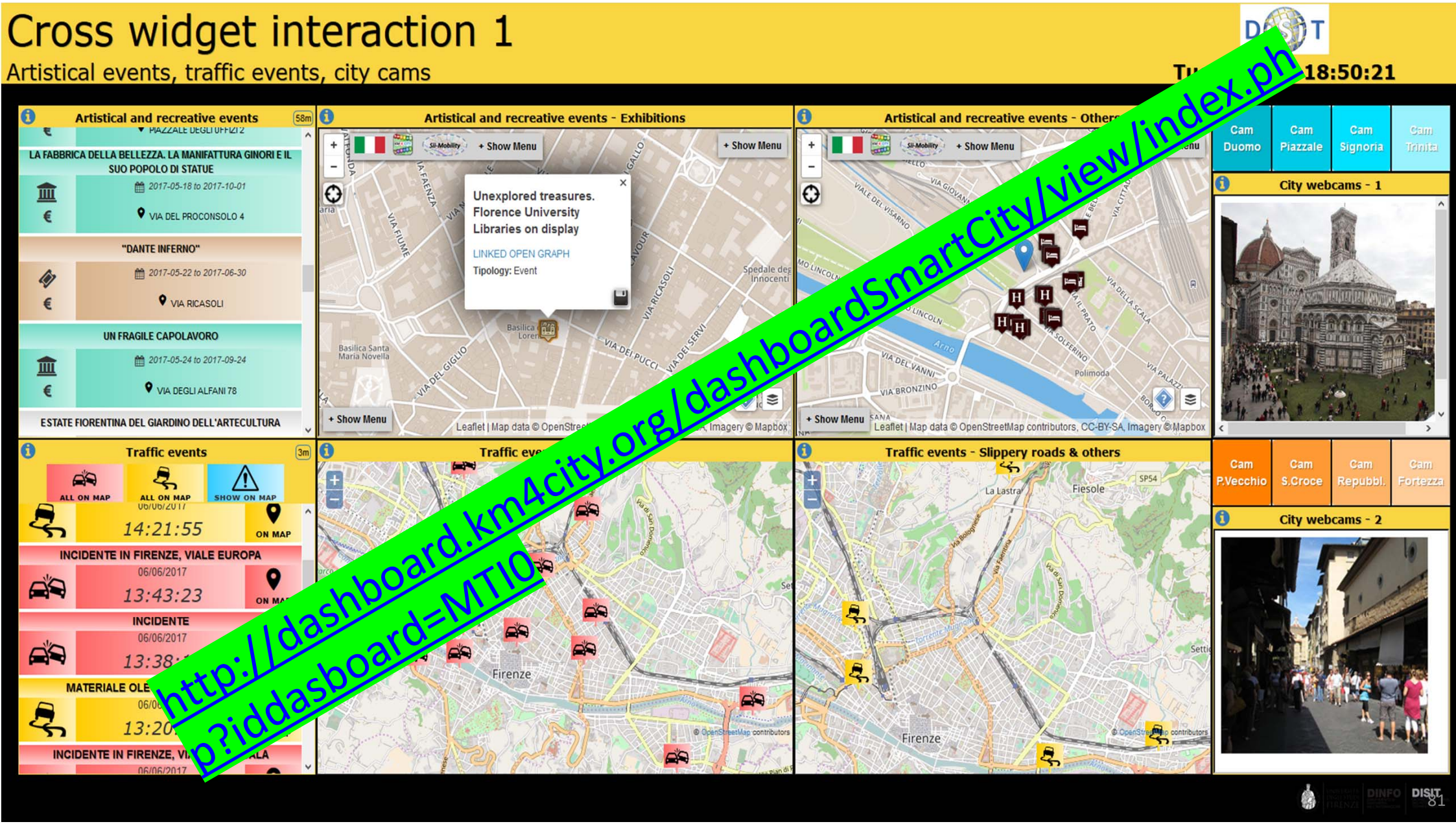
Horizon 2020
European Union Funding
for Research & Innovation



Snap4City Overview, September 2018 (C)

Cross widget interaction 1

Artistical events, traffic events, city cams



http://dashboard.km4city.org/dashboardSmartCity/view/index.php?iddasboard=MTI0

First aids overview - Tuscany

Service status of main first aids

...ay @ 11:00:34

Careggi hospital (Florence) - Details 9m

Priority\Status	Red code	Yellow code	Green code	Blue code	White code
Addressed	1	4	3	0	0
Waiting	0	2	9	2	0
In visit	1	9	18	3	0
In observation	4	19	2	0	0
Totals	6	34	32	5	0

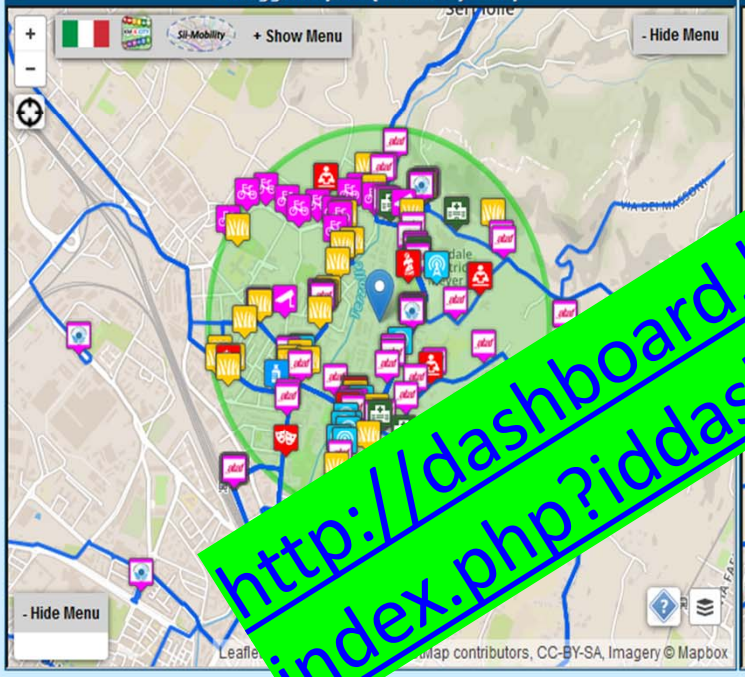
Santa Chiara hospital (Pisa) - Details 9m

Priority\Status	Red code	Yellow code	Green code	Blue code	White code
Waiting	0	1	7	9	3
In visit	0	7	1	1	
Totals	0	8	8		9

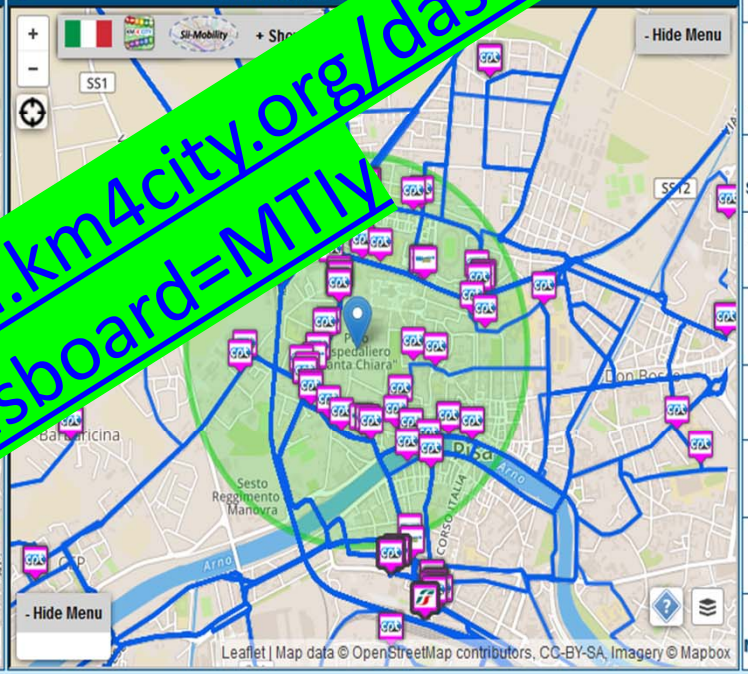
...spitals - Summary 9m

Priority\Ho...	...llow code	Green code	Blue code	White code
...EGALLI	1	16	20	1	0
PS SANTA MARIA NUOVA	1	14	12	3	0
PS AO CAREGGI	6	34	32	5	0
PS SANTA MARIA ANNUNZIATA	1	8	11	1	0
PS BORGO SAN LORENZO	0				0
PS OSPEDALI RIUNITI	3				1
PS CASENTINO					
PS SANTA CROCE					
PI PO CORTONA					
PS CIVILE PIOMBINO					
PS LA MISERICORDIA					

Careggi hospital (Florence) - Map



Santa Chiara ho...



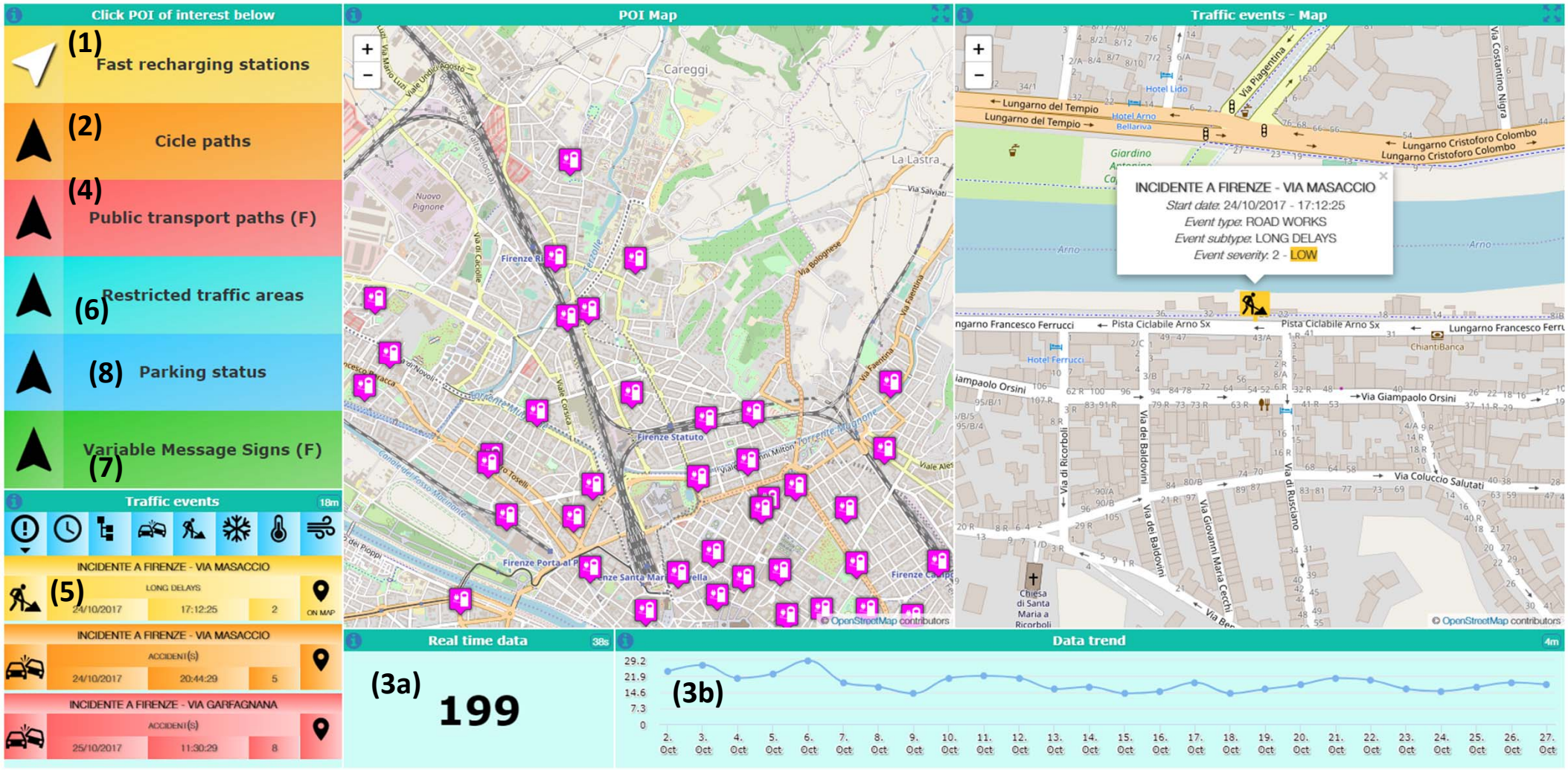
http://dashboard.km4city.org/dashboardSmartCity/view/index.php?iddasboard=MTIy

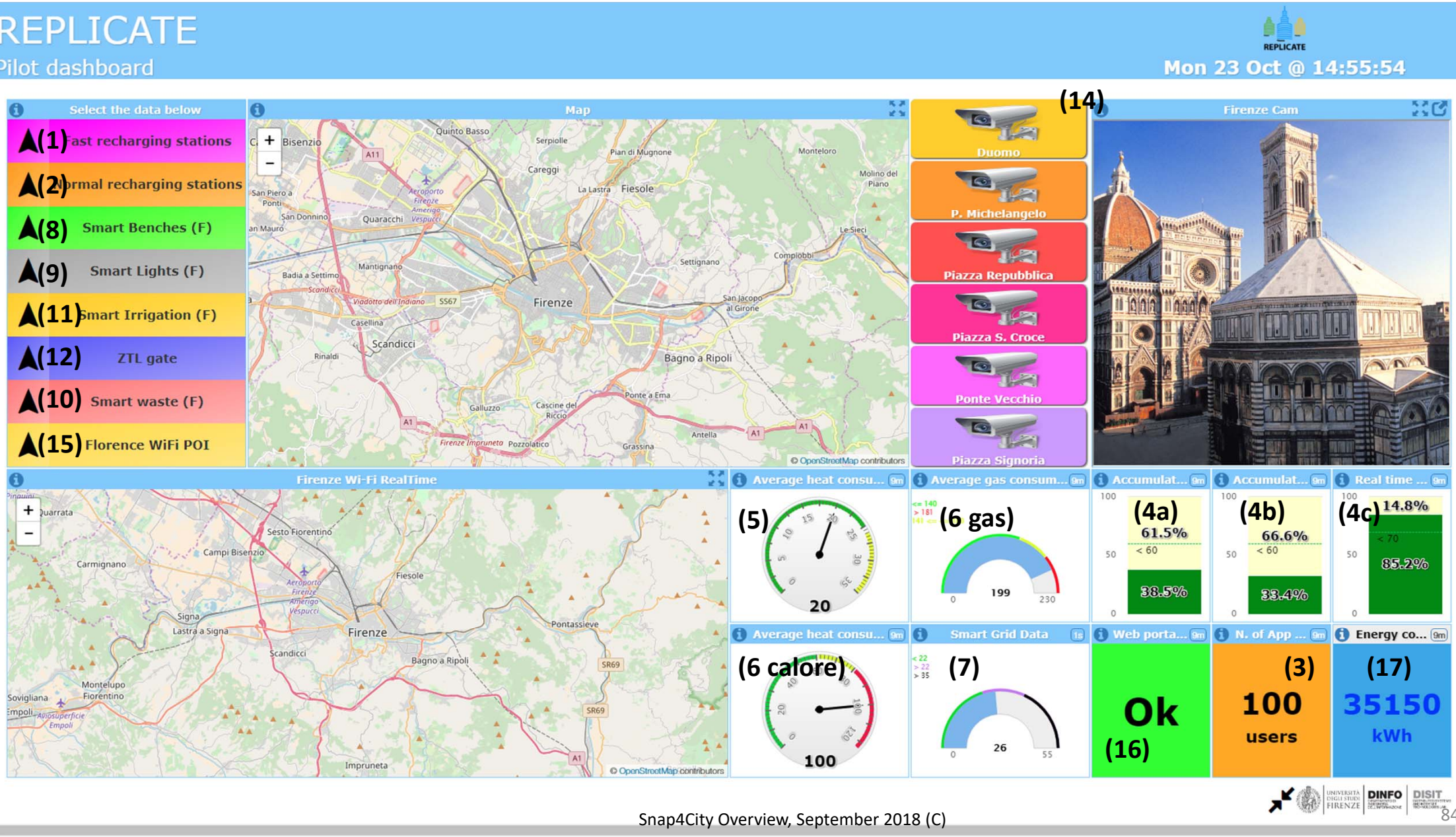
REPLICATE

Mobility and Transport

REPLICATE

Mon 23 Oct @ 15:13:21



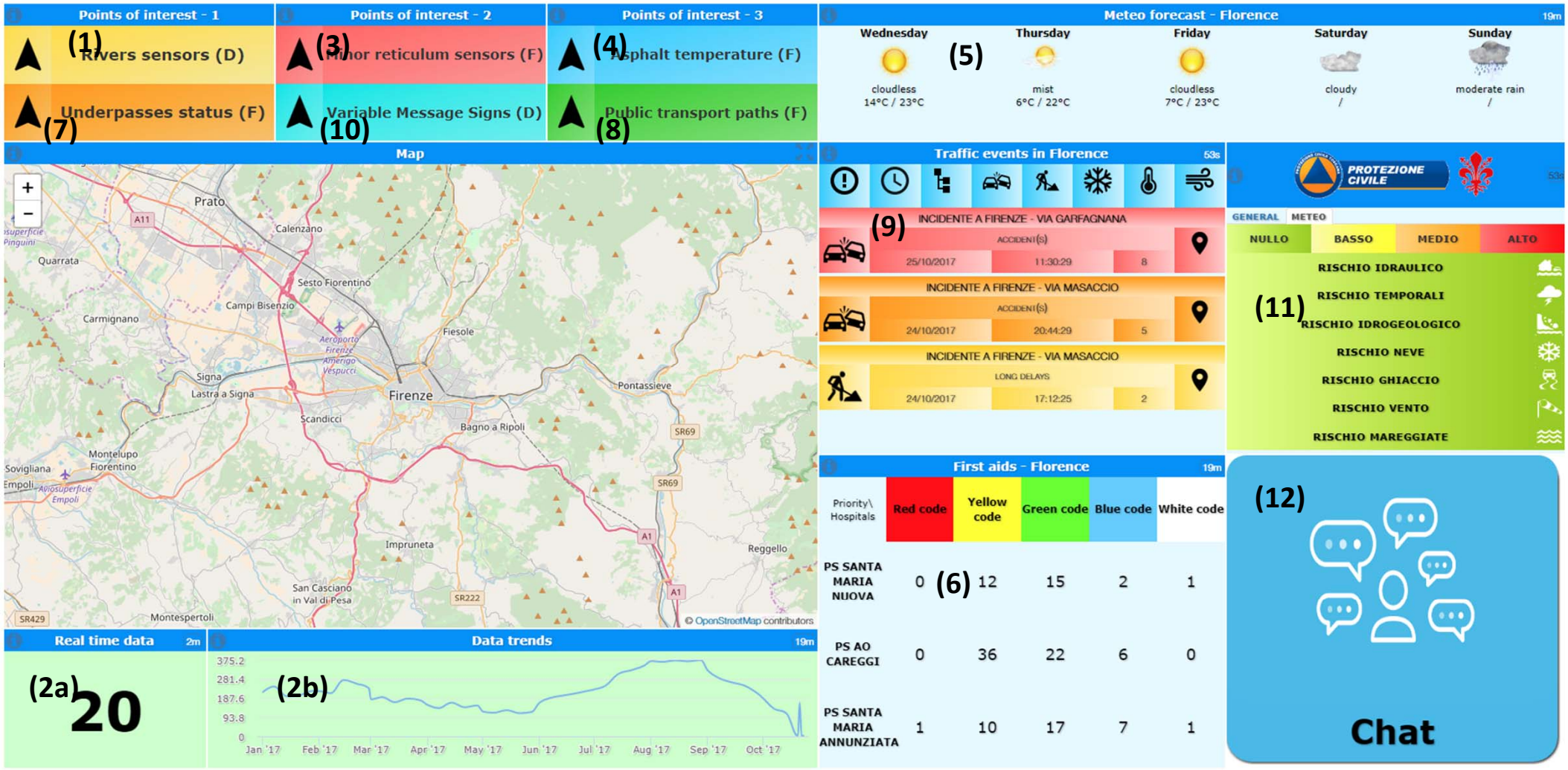

REPLICATE
Pilot dashboard
REPLICATE
Mon 23 Oct @ 14:55:54
Select the data below
(1) Fast recharging stations
(2) Normal recharging stations
(8) Smart Benches (F)
(9) Smart Lights (F)
(11) Smart Irrigation (F)
(12) ZTL gate
(10) Smart waste (F)
(15) Florence WiFi POI
Map
Quinto Basso
Serpiolle
Pian di Mugnone
Monteloro
Careggi
Molino del Piano
La Lastra
Fiesole
Bisenzio
San Piero a Ponti
San Donnino
Quaracchi
Aeroporto Firenze Amerigo Vespucci
Le Sieci
Compiobbi
Settignano
Mantignano
Badia a Settimo
Scandicci
Viadotto dell'Indiano
SS67
Firenze
San Jacopo al Girone
Casellina
Scandicci
Rinaldi
Bagno a Ripoli
Galluzzo
Cascine del Riccio
Ponte a Ema
Firenze Impruneta
Pozzolatico
Grassina
Antella
© OpenStreetMap contributors
(14)
Duomo
P. Michelangelo
Piazza Repubblica
Piazza S. Croce
Ponte Vecchio
Piazza Signoria
Firenze Cam
Firenze Wi-Fi RealTime
Carmignano
Sesto Fiorentino
Campi Bisenzio
Signa
Lastra a Signa
Scandicci
Pontassieve
Montelupo Fiorentino
Sovigliana
Empoli
Impruneta
SR69
Average heat consu...
(5)
20
Average gas consum...
(6 gas)
199
Accumulat...
(4a)
61.5%
< 60
38.5%
Accumulat...
(4b)
66.6%
< 60
33.4%
Real time ...
(4c)
14.8%
< 70
85.2%
Average heat consu...
(6 calore)
100
Smart Grid Data
(7)
26
Web porta...
Ok
(16)
N. of App ...
(3)
100
users
Energy co...
(17)
35150
kWh

REPLICATE

Resilience

REPLICATE

Mon 23 Oct @ 15:40:51



Acknowledgement

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- **Km4City** is an open technology exploited by those projects and line of research of DISIT Lab. Some of the innovative solutions and research issues developed into the above mentioned projects are also compliant and contributing to the Km4City approach and thus are contributing to the open Km4City model of DISIT lab.