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SNAP4CITY



Powered by

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*** 



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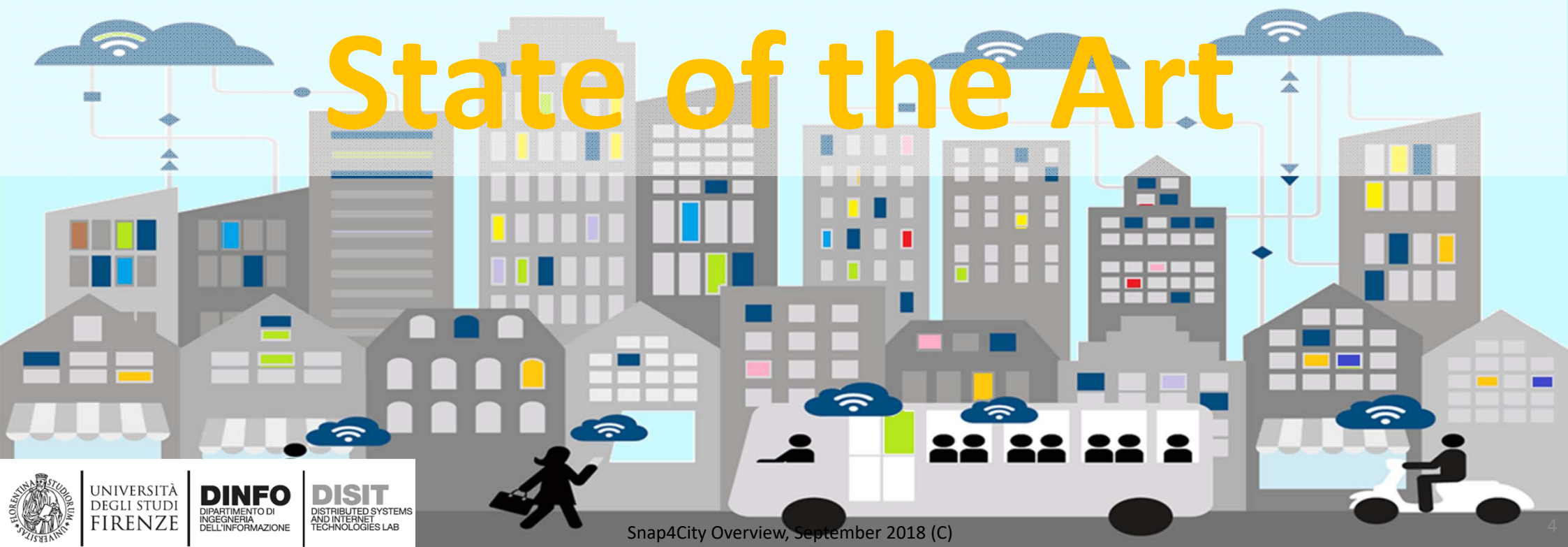
<http://www.disit.org>



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 services via API	Standard based Modules and IOT, Open Devices	Integrated Community management	Resource Sharing	Referral data management	Security end-2-end	Dashboard H24/7	Flexible 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, HTTP



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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

Public Services, Security, Education, Utilities, Events, Entertainment, Energy, Accommodation, Environment, Culture, Healthcare, Emergency, Tourism, Mobility, Commerce, Open Data

GIS + Map Data

Personal Data

Information, System, Personal, Data, Privacy, Social, Personal

IoT/loE 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/loE Applications

Elastic Management of Containers

Big Data Storage Knowledge

Phoenix, Hbase + indexing

Knowledge Base

Km4City Ontology

Smart City Cloud Infrastructure

Development and Management Tools

Management ServiceMap Data Flow Analysis DataGate CKAN

IOT Directory Linked Open Graph DevDash AMMA Resource Manager

Authentication, Authorization, GDPR, Security Assessment

Km4City Smart City API

Final Users' Tools

Dashboards

IOT / IOE Apps

Mobile and Web Apps



Requirements and Objectives





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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**



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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





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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...

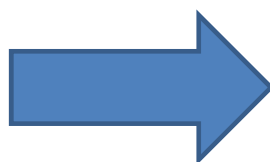
Level 0 users



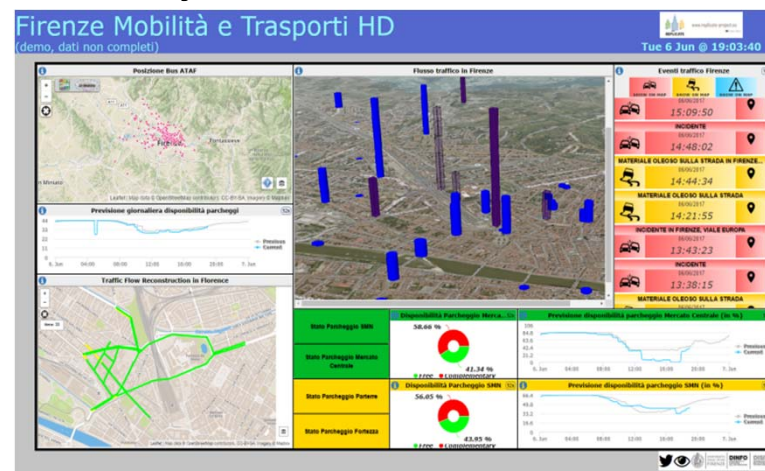
Level 0 user: Observer (public or invited)

- Access to the Portal, view Dashboards with public data

IOT and City data World



City Dashboard



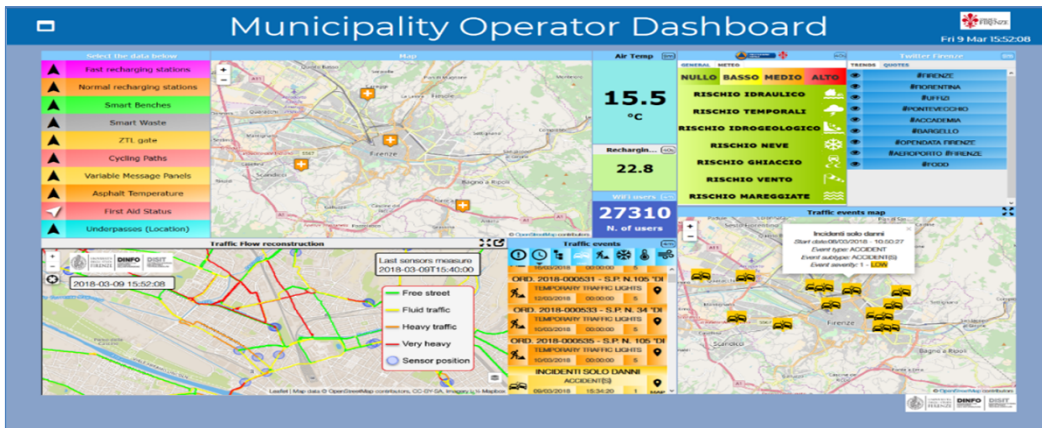


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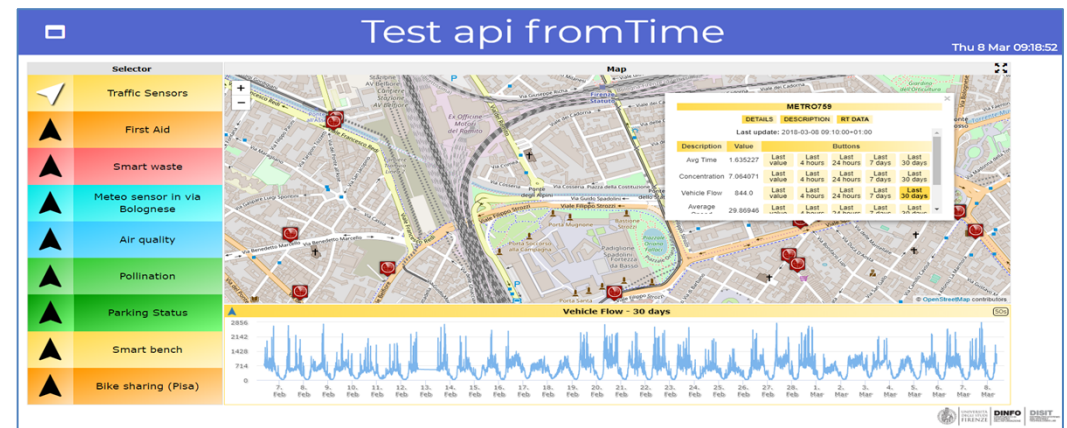
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<http://www.disit.org>

<https://dashboard.km4city.org/view/index.php?iddashboard=Mij1>

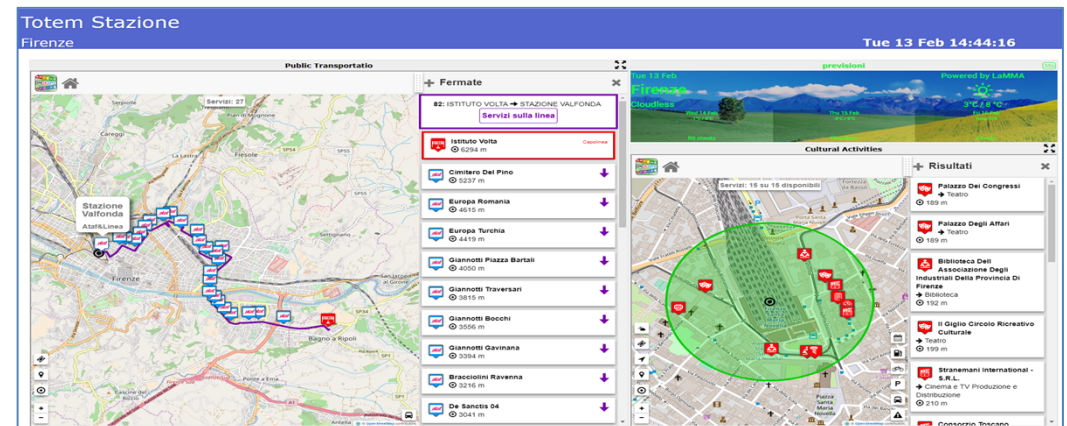
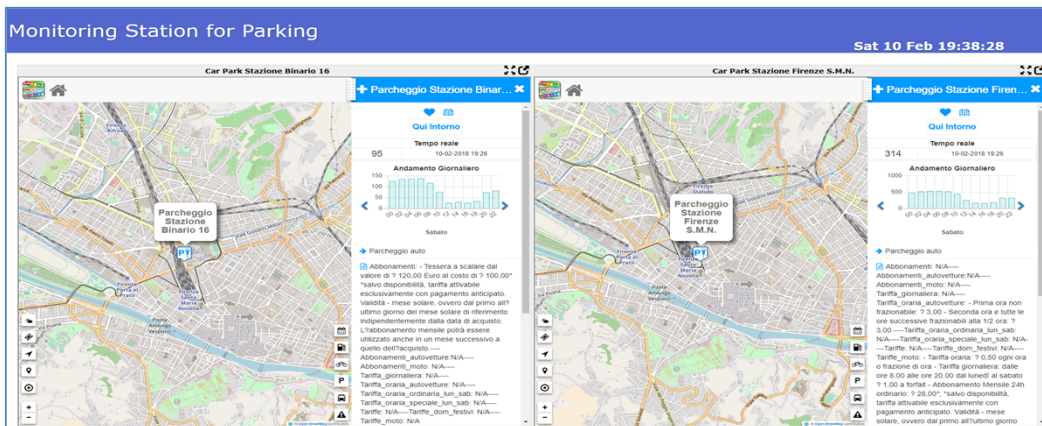


<https://www.disit.org/dashboardSmartCity/view/index.php?iddashboard=Mij5>



<https://www.disit.org/dashboardSmartCity/view/index.php?iddashboard=MijQ2>

<https://www.disit.org/dashboardSmartCity/view/index.php?iddashboard=MijUw>



Snap4City Overview, September 2018 (C)



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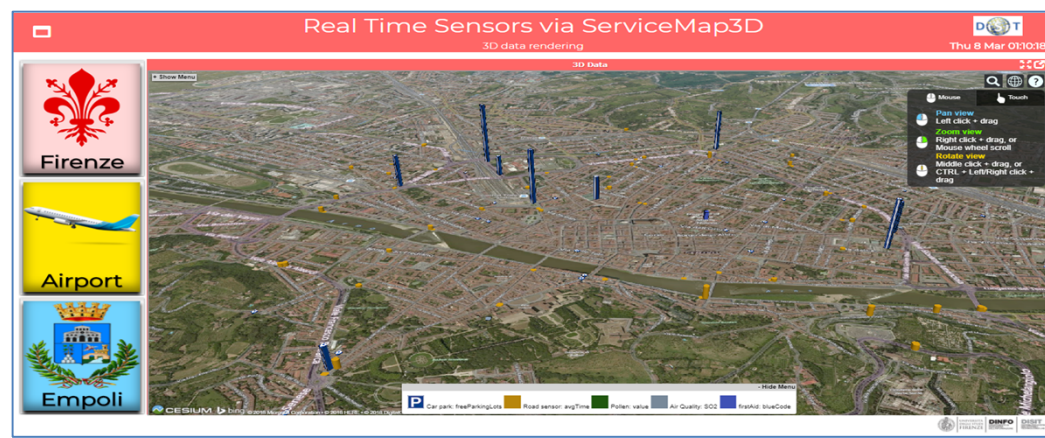
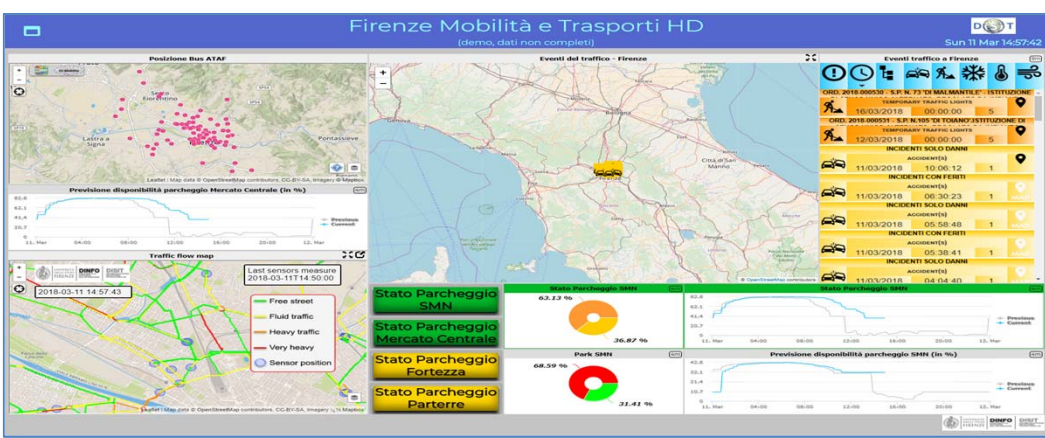
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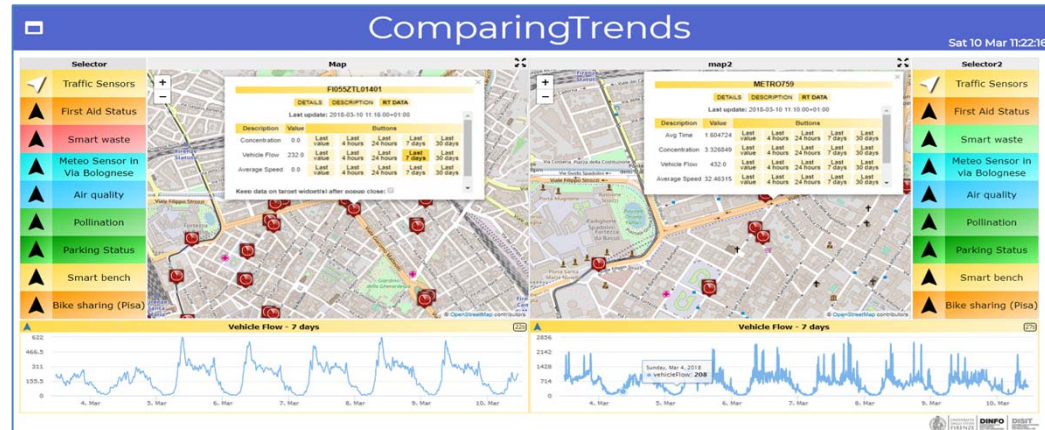
<https://dashboard.km4city.org/dashboardSmartCity/view/index.php?iddashboard=MTE5>

<https://dashboard.km4city.org/view/index.php?iddashboard=MTY2>



<https://dashboard.km4city.org/view/index.php?iddashboard=MjY3>

<https://dashboard.km4city.org/view/index.php?iddashboard=MjQ3>



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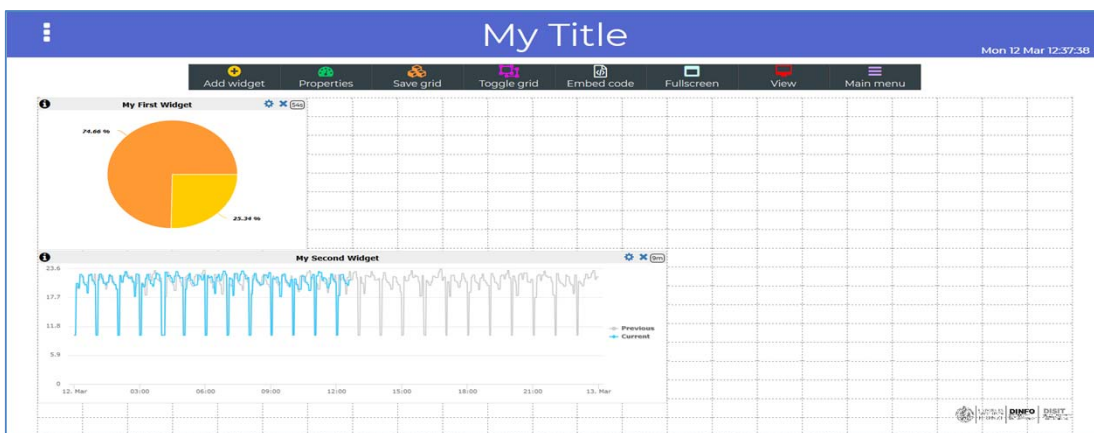
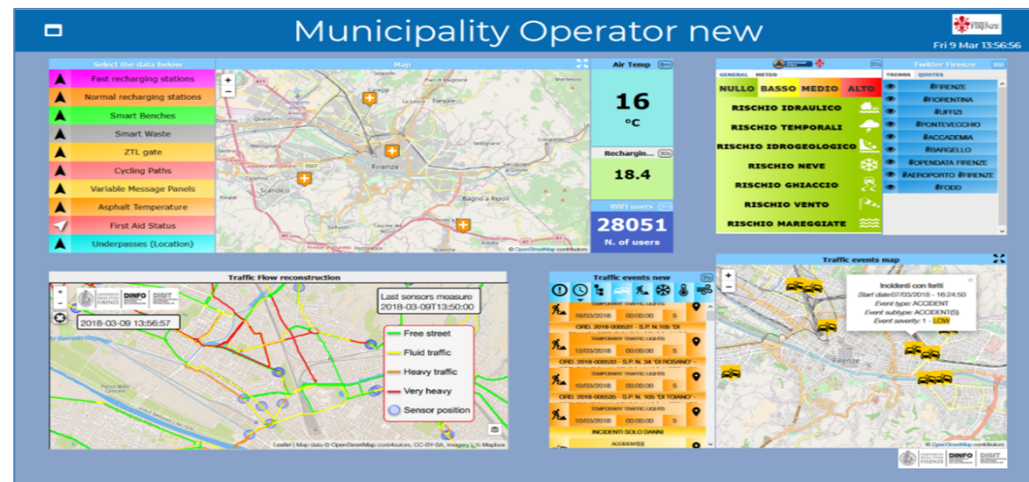
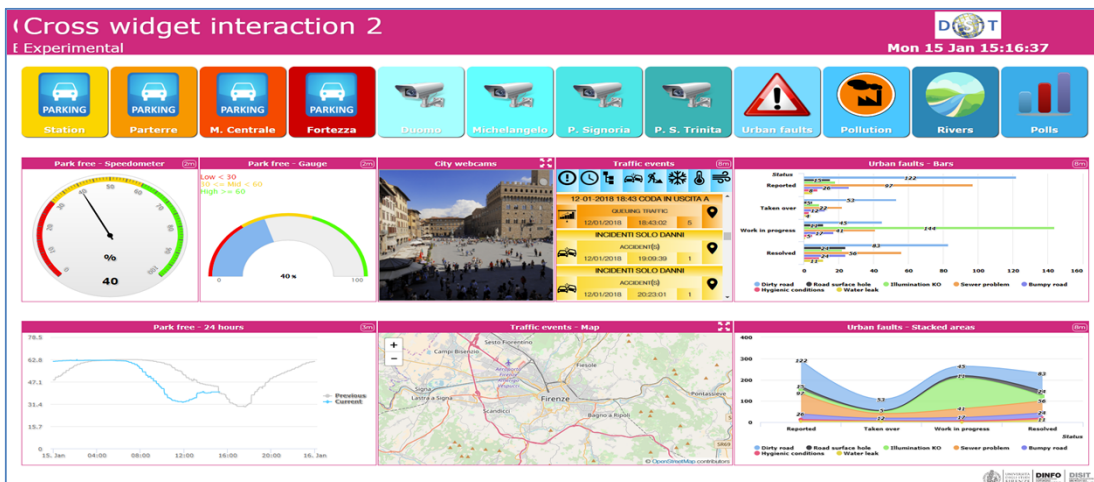
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<http://www.disit.org>

<https://dashboard.km4city.org/view/index.php?idashboard=MTU1>



<https://dashboard.snap4city.org/dashboardSmartCity/view/index.php?idashboard=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

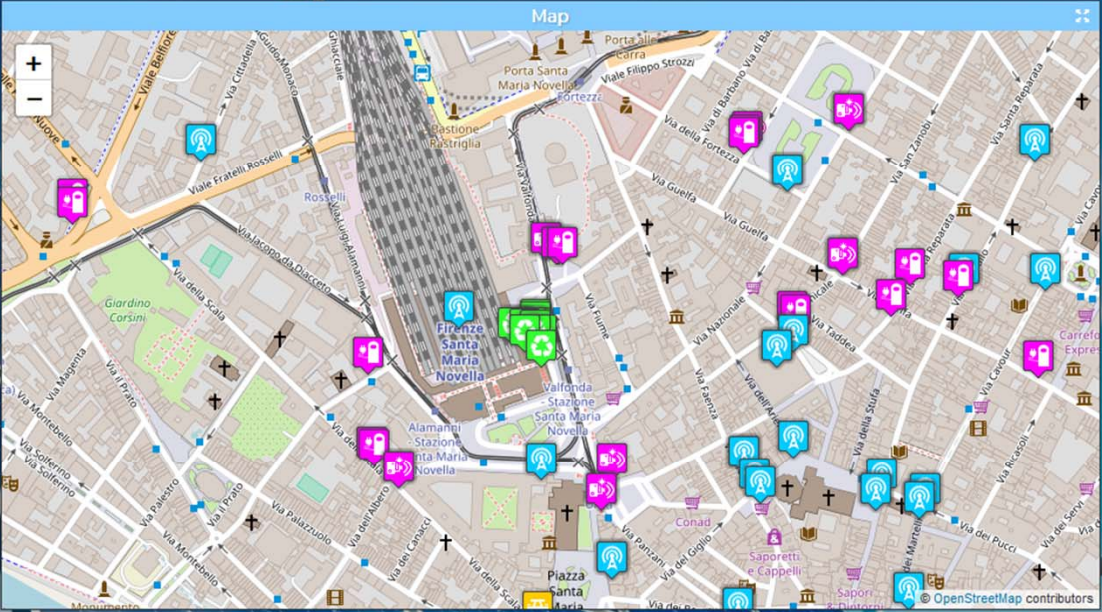
Pilot dashboard



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



Real time ac... Accumulato... Accumulato...



N. of App Users Energy consumption vi...

40 users
122770 kWh

Avg heat consumption per build...



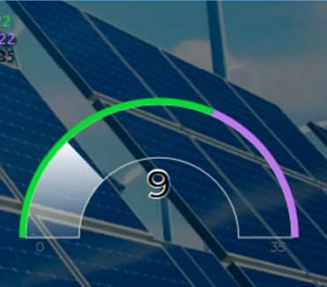
Avg heat consumption per user



Avg gas consumption



Smart Grid Data



Web site status

SNAP4CITY

TOKEN FOUND

2018-07-08 11:51:37



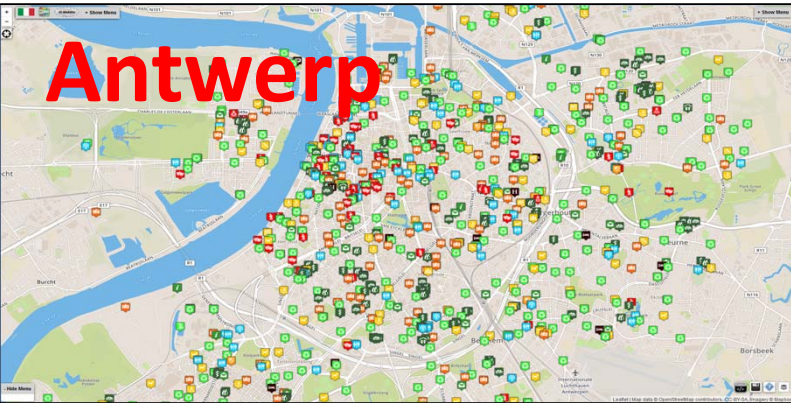
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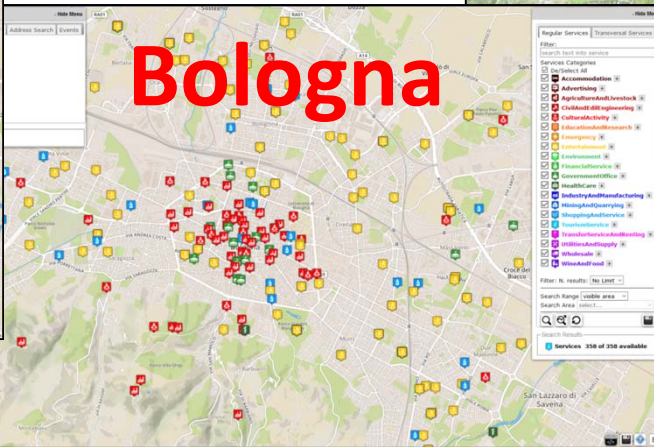
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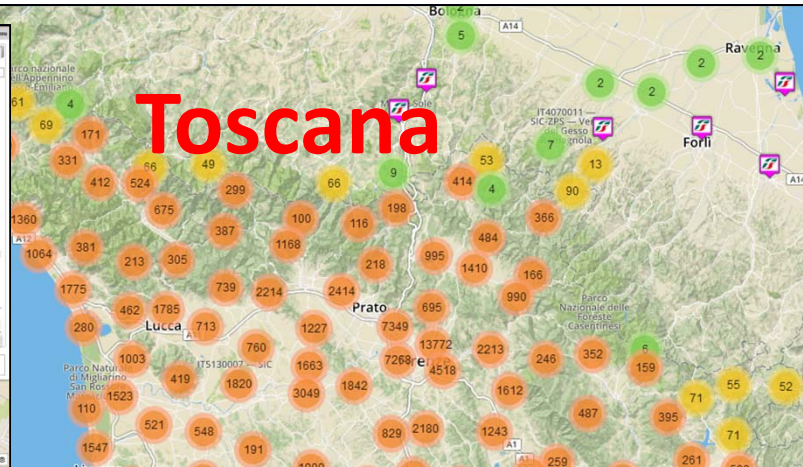
Coverage: examples



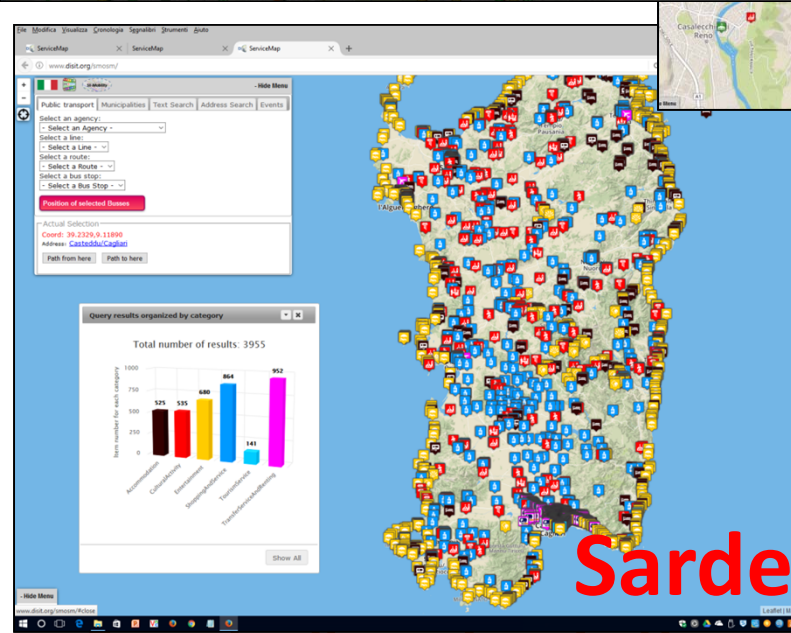
Antwerp



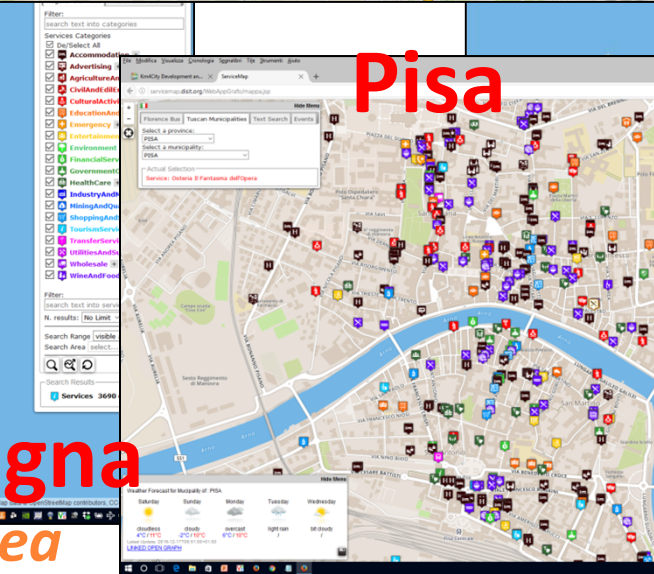
Bologna



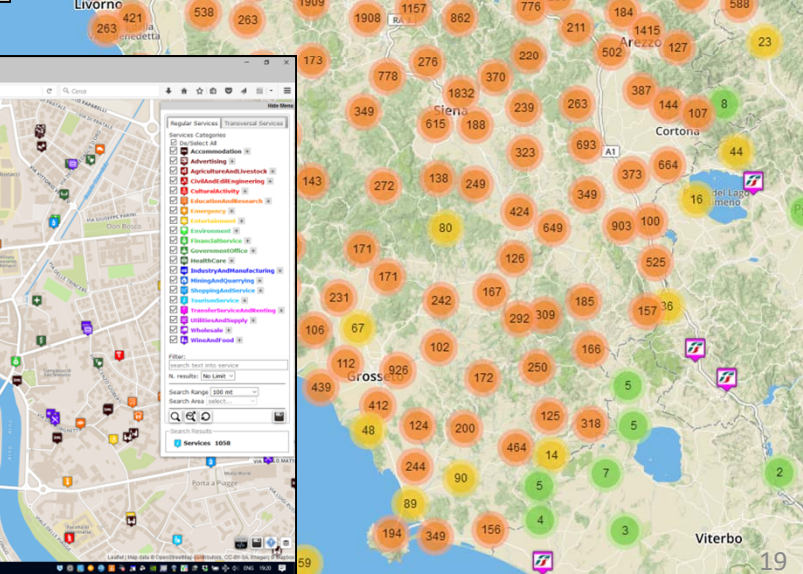
Toscana



Sardegnia



Pisa



- 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>

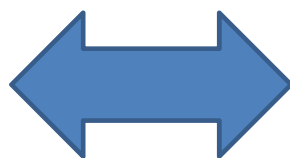
Level 2 users



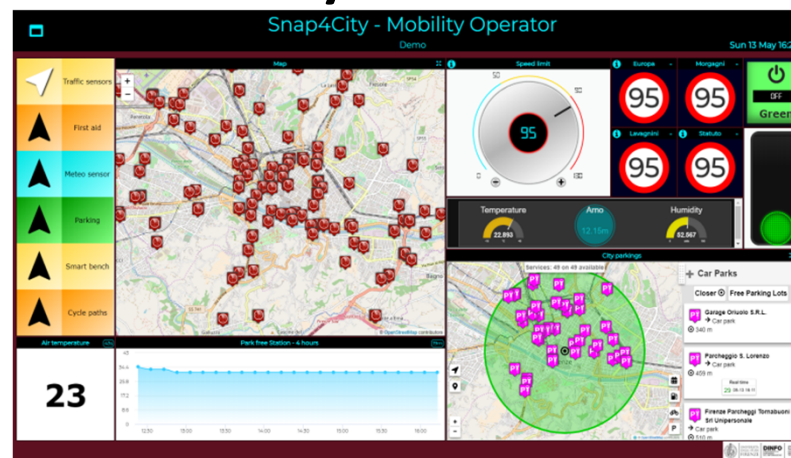
Level 2 users: Create their own Dashboards

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

IOT and City data World

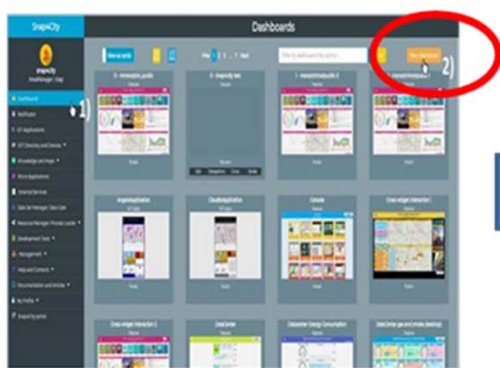


City Dashboard



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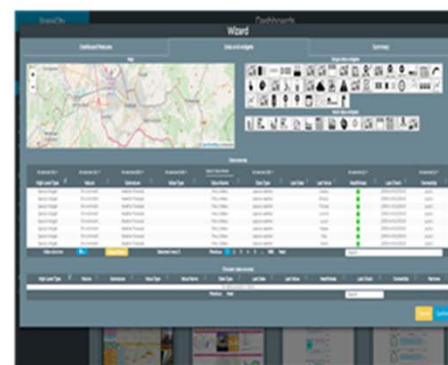
From Data to Dashboards by Wizard



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



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From Templates to Wizard and Dashboards

Dashboard template

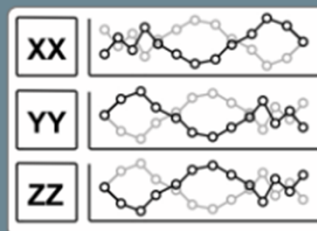
Click on a template to choose it, click on it again to unselect it



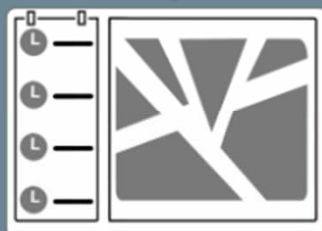
Selector and POI
Preset widget choice



Selector, POI, trend
Preset widget choice



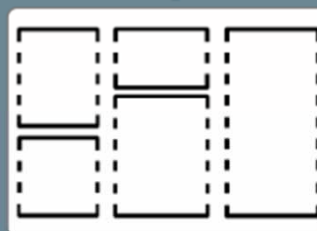
Data and trends
Preset widget choice



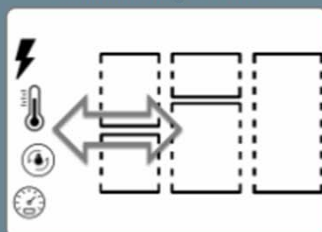
Events vs. map
Manual widget choice



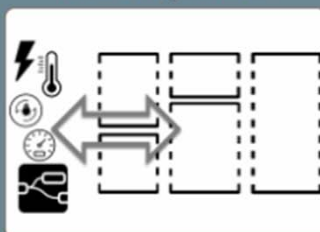
MicroApp and services
Preset widget choice



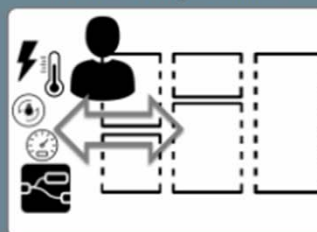
Fully custom
Manual widget choice



IOT devices
Manual widget choice



IOT applications
Manual widget choice



My Personal Data
Manual widget choice

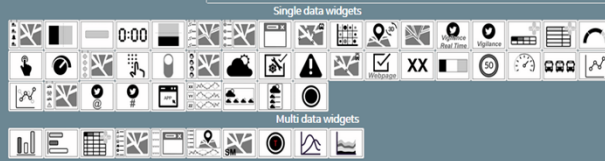
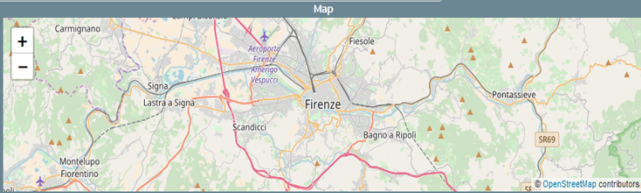
- From the scratch to create a new Dashboard
- From a Dashboard to Add widgets and groups of them

Wizard

Dashboard features

Data and widgets

Check and summary



Data sources

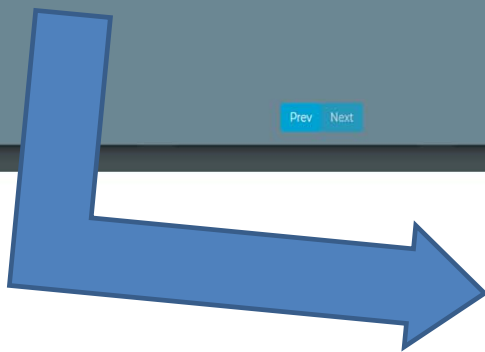
High-Level Type	Nature	Subnature	Value Type	Value Name	Data Type	Last Date	Last Value	Healthiness	Last Check	Ownership
Special Widget	Environment	Weather Forecast	Previ_Meteo	special weather	Vernio	2018-07-08 16:00:18		●●●	2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	special weather	Vergemoli	2018-07-08 16:00:18		●●●	2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	special weather	Vecchiano	2018-07-08 16:00:18		●●●	2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	special weather	Valiano	2018-07-08 16:00:18		●●●	2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	special weather	Vaglia	2018-07-08 16:00:18		●●●	2018-07-08 16:00:18	public

Chosen data sources

High-Level Type	Nature	Subnature	Value Type	Value Name	Data Type	Last Date	Last Value
No data available in table							

You must select one widget type

Prev Next



Test api from Time

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)

METRO759

DETAILS DESCRIPTION RT DATA

Last update: 2018-03-08 09:10:00-01:00

Description	Value	Buttons				
Avg Time	1.635227	Last value	Last 4 hours	Last 24 hours	Last 7 days	Last 30 days
Concentration	7.064071	Last value	Last 4 hours	Last 24 hours	Last 7 days	Last 30 days
Vehicle Flow	844.0	Last value	Last 4 hours	Last 24 hours	Last 7 days	Last 30 days
Average	29.86946	Last value	Last 4 hours	Last 24 hours	Last 7 days	Last 30 days

Vehicle Flow - 30 days

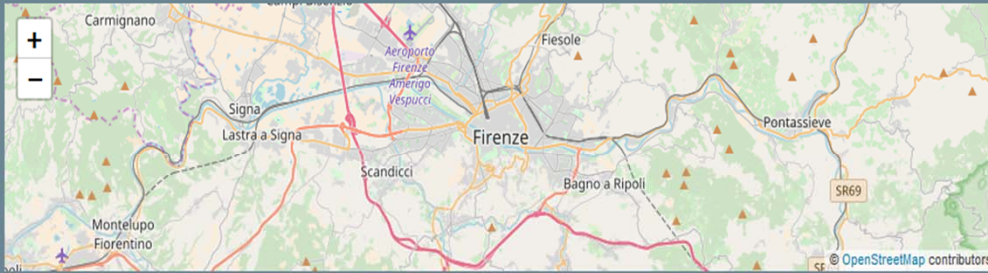
Wizard

Dashboard features

Data and widgets

Check and summary

Map



Single data widgets



Multi data wid



Data sources

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

• 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 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

Wizard



Close



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Filtering data to reach selection

- **High Level Types:** sensors, special, KPI, POI, etc.
- **Nature:** accommodation, mobility, financial, wine, health, etc.
 - Dashboard \leftrightarrow 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)



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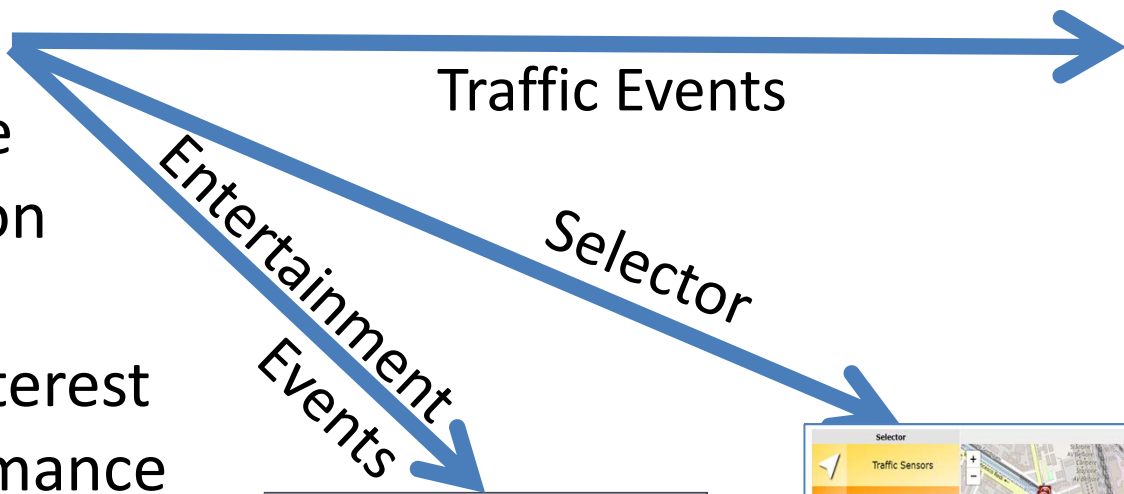
SNAP4CITY



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



ORD.	2018-000530	S.P. N. 73 'DI MALMANTILE'	ISTITUZIONE
TEMPORARY TRAFFIC LIGHTS			
16/03/2018	00:00:00	5	
ORD. 2018-000531 - S.P. N.105 'DI TOIANO' ISTITUZIONE DI			
TEMPORARY TRAFFIC LIGHTS			
12/03/2018	00:00:00	5	
INCIDENTI SOLO DANNI			
11/03/2018	10:06:12	1	
INCIDENTI CON FERITI			
ACCIDENT(s)			
11/03/2018	06:30:23		MAP
INCIDENTI SOLO DANNI			
ACCIDENT(s)			
11/03/2018	05:58:48	1	MAP
INCIDENTI CON FERITI			
ACCIDENT(s)			
11/03/2018	05:38:4	1	MAP
INCIDENTI SOLO DANNI			
ACCIDENT(s)			

Eventi a Firenze oggi		
€	▲	
FESTIVAL DELLE ORCHESTRE GIOVANILI		
free	▲	
"LE BANDE NERE DI GIOVANNI. L'EREDITÀ MILITARE DI GIOVANNI DE' MEDICI"		
free	▲	
MUSICA AL PONTE 2018		
€	▲	
"HEAVEN CAN WAIT" - IL CIELO PUÒ ATTENDERE		
€	▲	
"SAN PIETRO E LE BASILICHE PAPALI DI ROMA"		
€	▲	





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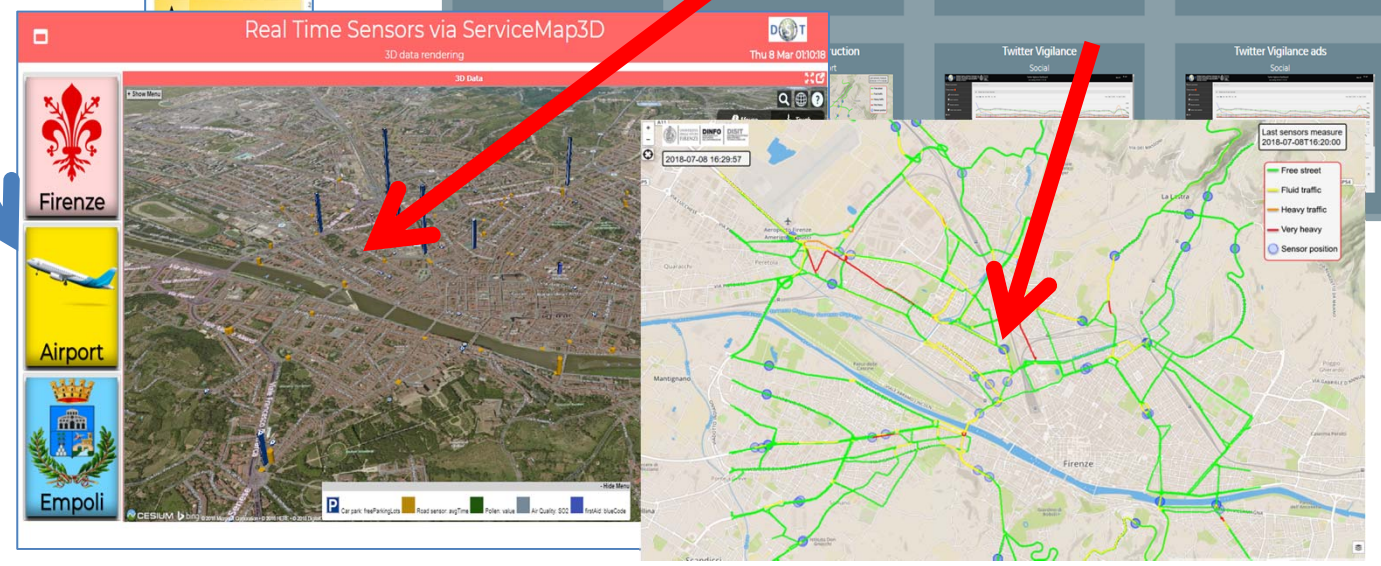
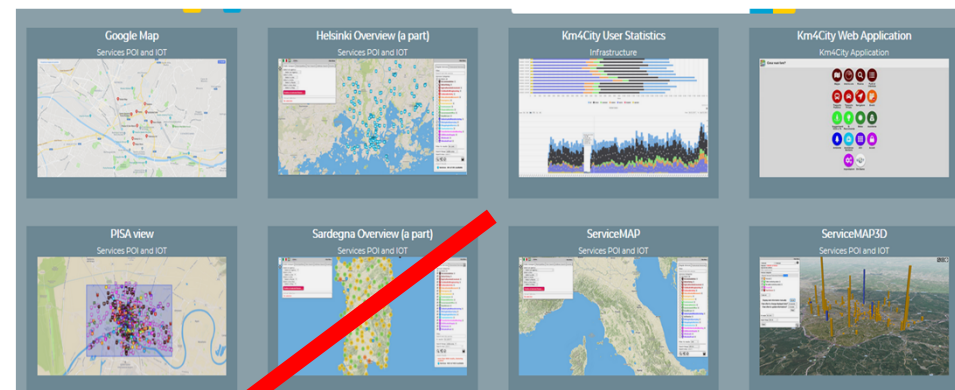
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Data Kinds vs Widgets: external services

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



Snap4City Overview, September 2018 (C)



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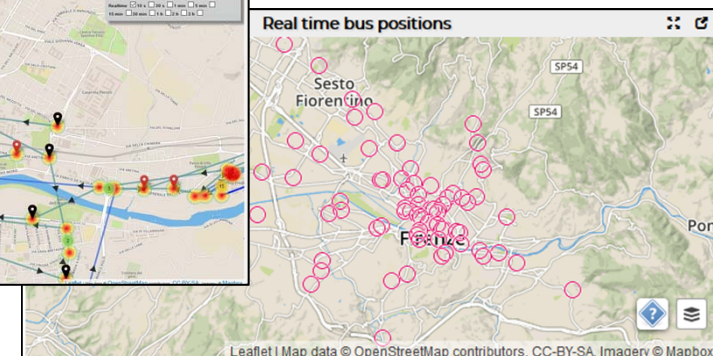
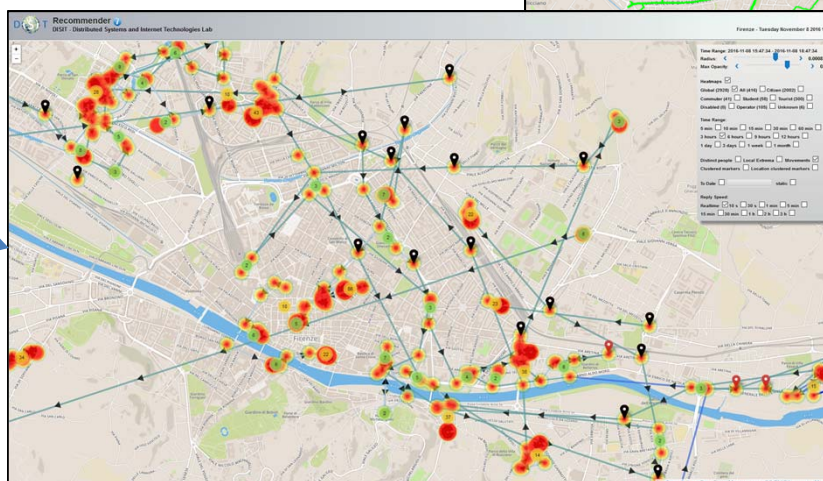
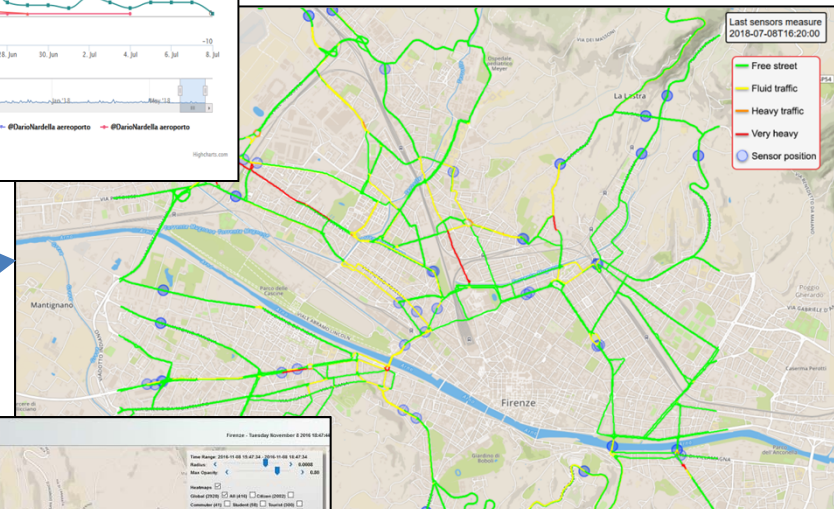
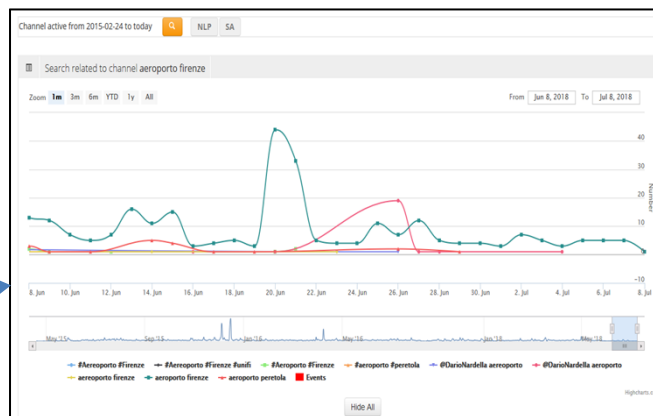
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AP4CITY



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



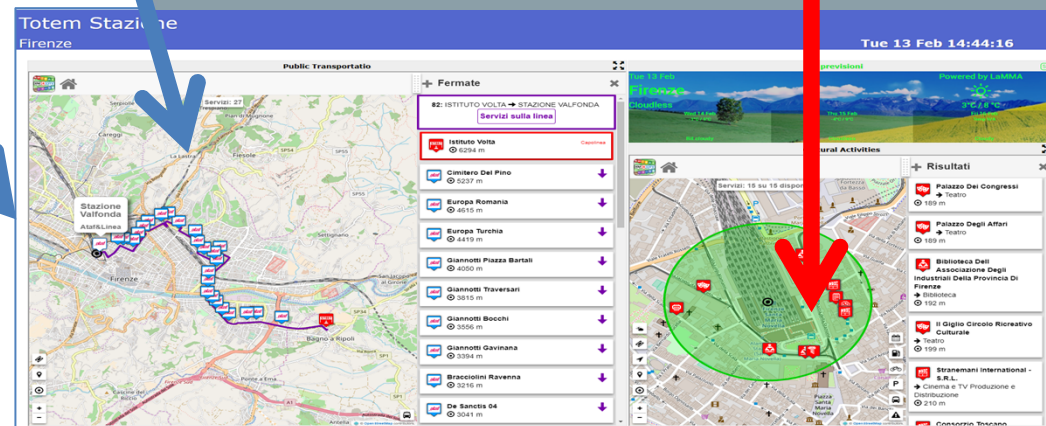
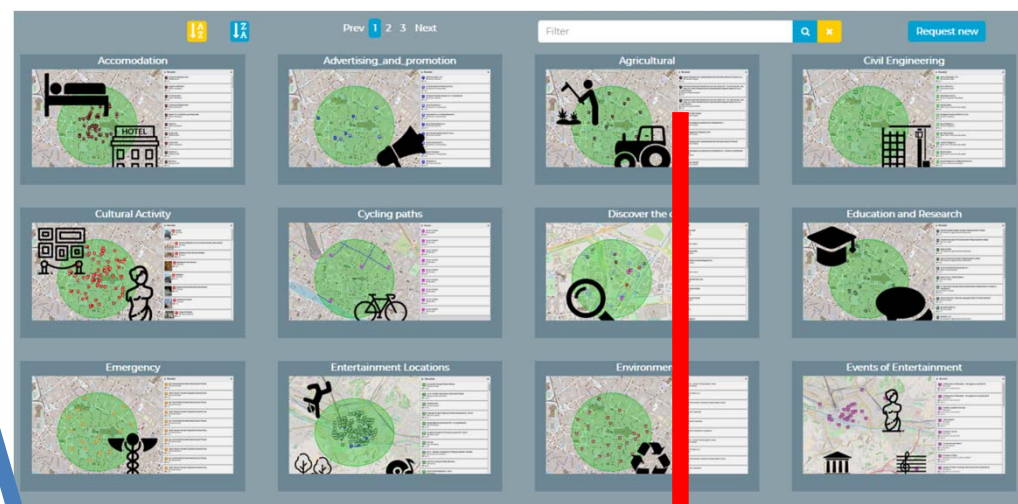
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Data Kinds vs Widgets: MicroApplications

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

High Level Types

Selector
Traffic Sensors
First Aid
Smart waste
Meteo sensor in via Bolognese
Air quality
Pollination
Parking Status
Smart bench
Bike sharing (Pisa)



Snap4City Overview, September 2018 (C)



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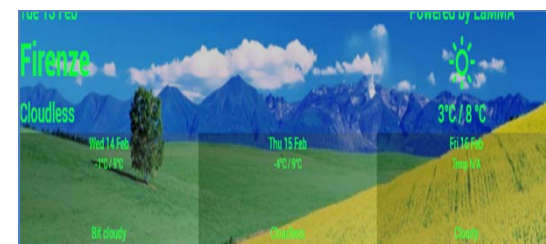
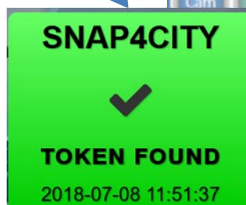
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Data Kinds vs Widgets: Special Widgets

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



Florence main first aids status

Priority/ Hospitals	Red code	Yellow code	Green code	Blue code	White code
PS AO CAREGGI	7	9	43	25	0
PS SAN GIOVANNI DI DIO TORREGALLI	1	6	20	6	0
PS SANTA MARIA ANNUNZIATA	0	8	10	8	1
PS SANTA MARIA NUOVA	1	6	17	5	0

Snap4City Overview, September 2018 (C)



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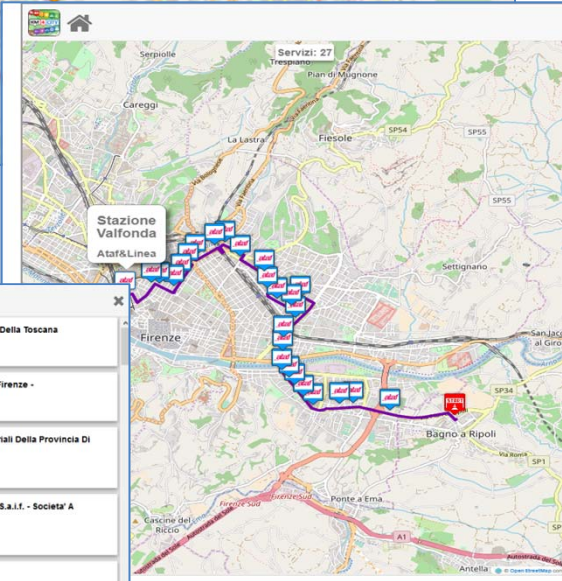
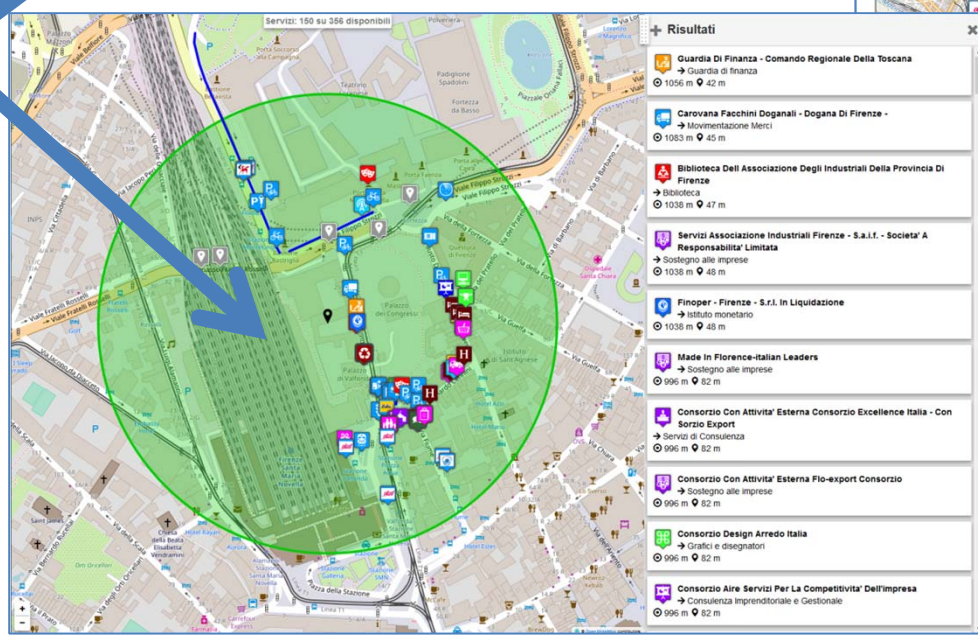
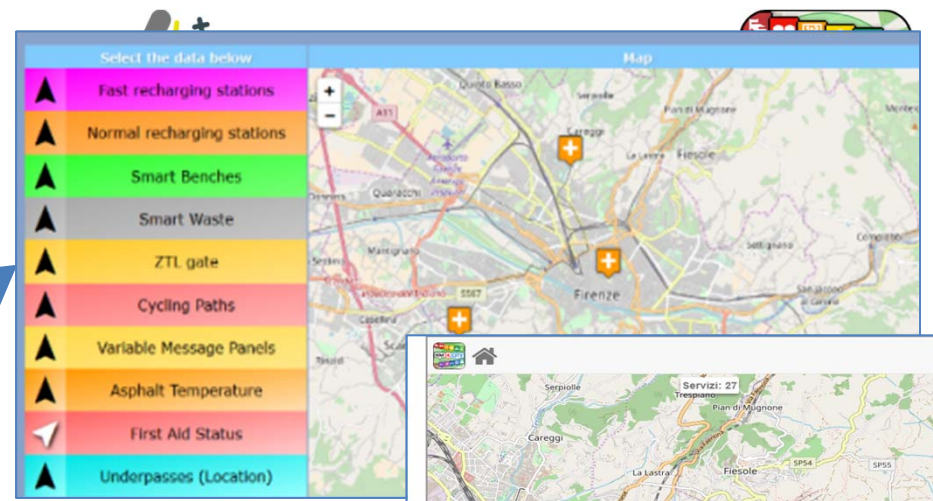
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Data Kinds vs Widgets: POI

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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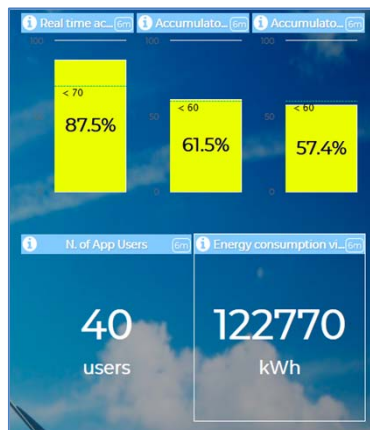
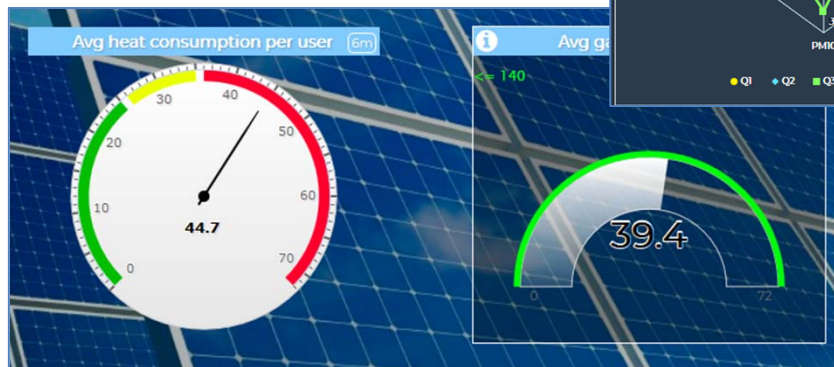
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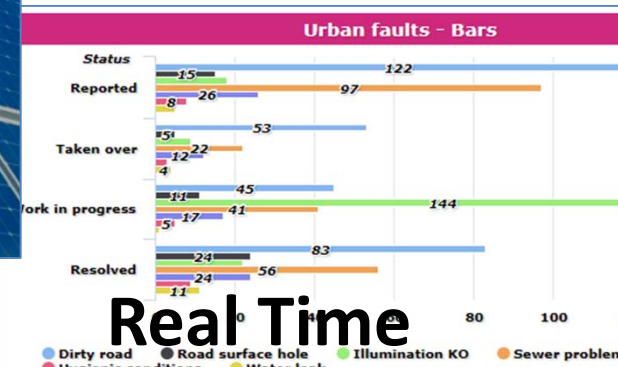
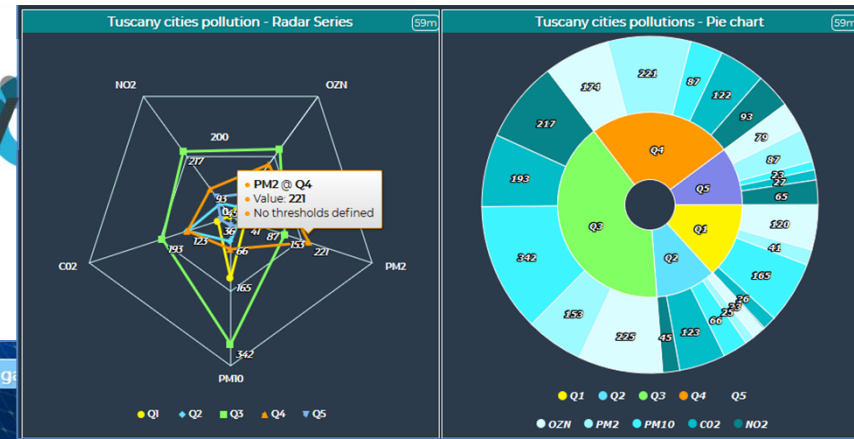
Data Kinds vs Widgets: KPI

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

High Level Types

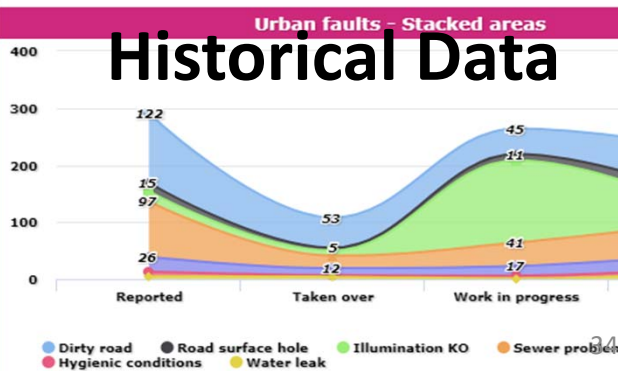


Weather stations						
Data / Station	Wind speed (km/h)	Direction	Temperature (°C)	Humidity (%)	Rain today (mm)	Pressure (mbar)
Sesto Fiorentino	50	N	7	32	0	922
Livorno	65	NE	5.5	37	0	876
Grosseto	78	E	4	22	0	1022
Vada	42	S	6	0	34	895
Follonica	102	N	7.2	23	0	913
Giglio	97	O	3	19	0	957



Real Time
Event Driven

Historical Data

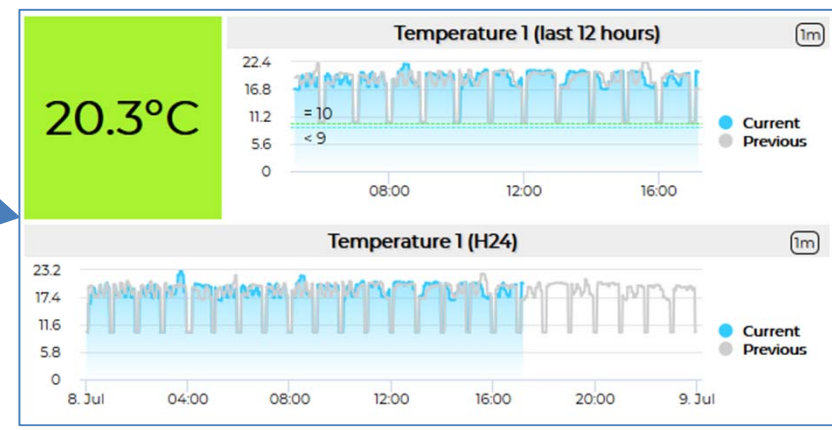
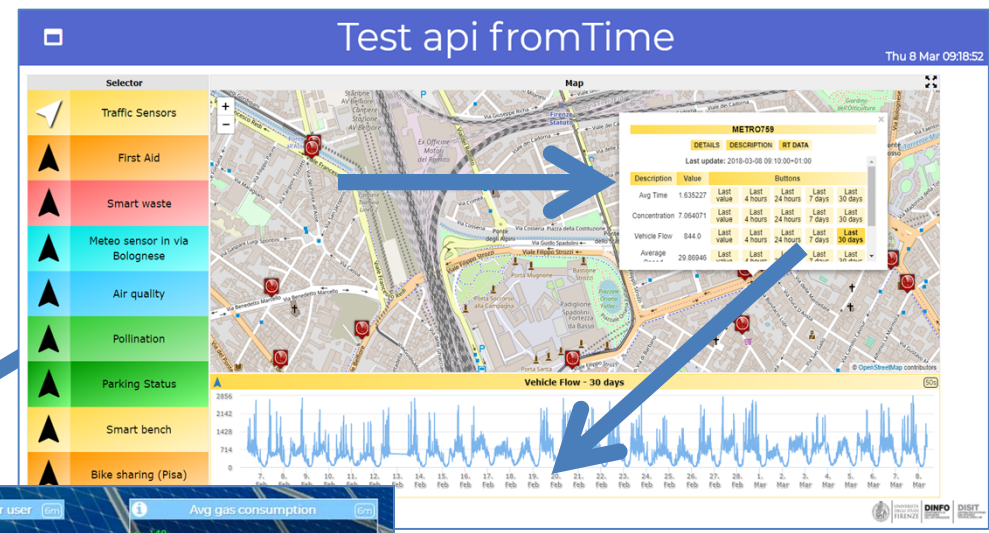




Data Kinds vs Widgets: Sensors

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

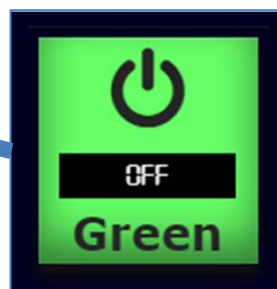


Data Kinds vs Widgets: KPI

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



Antwerp	Helsinki	Florence	Current	Blue
PeopleNumber				Green
New		Last confirmed		
		None		
7	8	9		
4	5	6		Yellow
1	2	3		
0	.	Canc		Red
Confirm				



Wizard

Dashboard features

Data and widgets

Check and summary



Data sources

High-Level Type	Nature	Subnature	Value Type	Value Name	Data Type	Last Date	Last Value	Healthiness	Last Check	Ownership
Special Widget	Environment	Weather Forecast	Previ_Meteo	special weather	Vernio	2018-07-08 16:00:18		●●●	2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	special weather	Vergemoli	2018-07-08 16:00:18		●●●	2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	special weather	Vecchiano	2018-07-08 16:00:18		●●●	2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	special weather	Valiano	2018-07-08 16:00:18		●●●	2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	special weather	Vaglia	2018-07-08 16:00:18		●●●	2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	special weather	V...					
Special Widget	Environment	Weather Forecast	Previ_Meteo	special weather	V...					

Chosen data sources

High-Level Type	Nature	Subnature	Value Type	Value Name	Data Type	Last Date	Last Value
No data available in table							

You must select one widget type

Prev Next



Test api from Time

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)

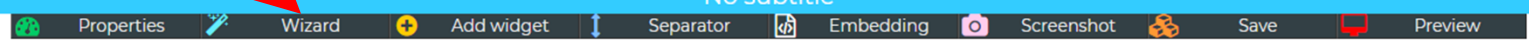
DETAILS		DESCRIPTION		RT DATA	
Last update: 2018-03-08 09:10:00-01:00					
Description	Value	Last value	Last 4 hours	Last 24 hours	Last 7 days
Avg Time	1.635227	Last 4 hours	Last 24 hours	Last 7 days	Last 30 days
Concentration	7.064071	Last 4 hours	Last 24 hours	Last 7 days	Last 30 days
Vehicle Flow	844.0	Last 4 hours	Last 24 hours	Last 7 days	Last 30 days
Average	29.86946	Last 4 hours	Last 24 hours	Last 7 days	Last 30 days






Wizard 

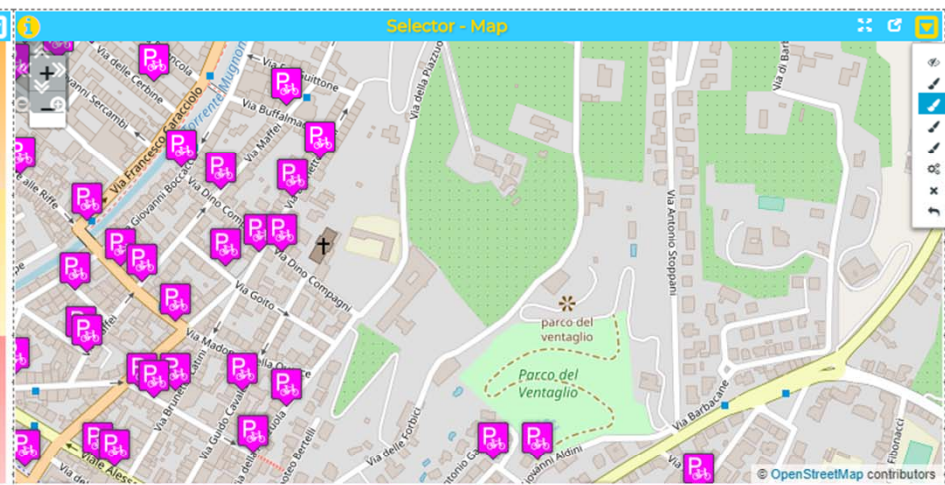
Dashboard - tester14

Fri 13 Jul 19:57:32



Selector

-  Bike_rack
-  Bike_rental
-  SensorSite



- Hide header
- Header color
- Title color
- Background color
- Border color
- More options
- Delete widget
- Quit

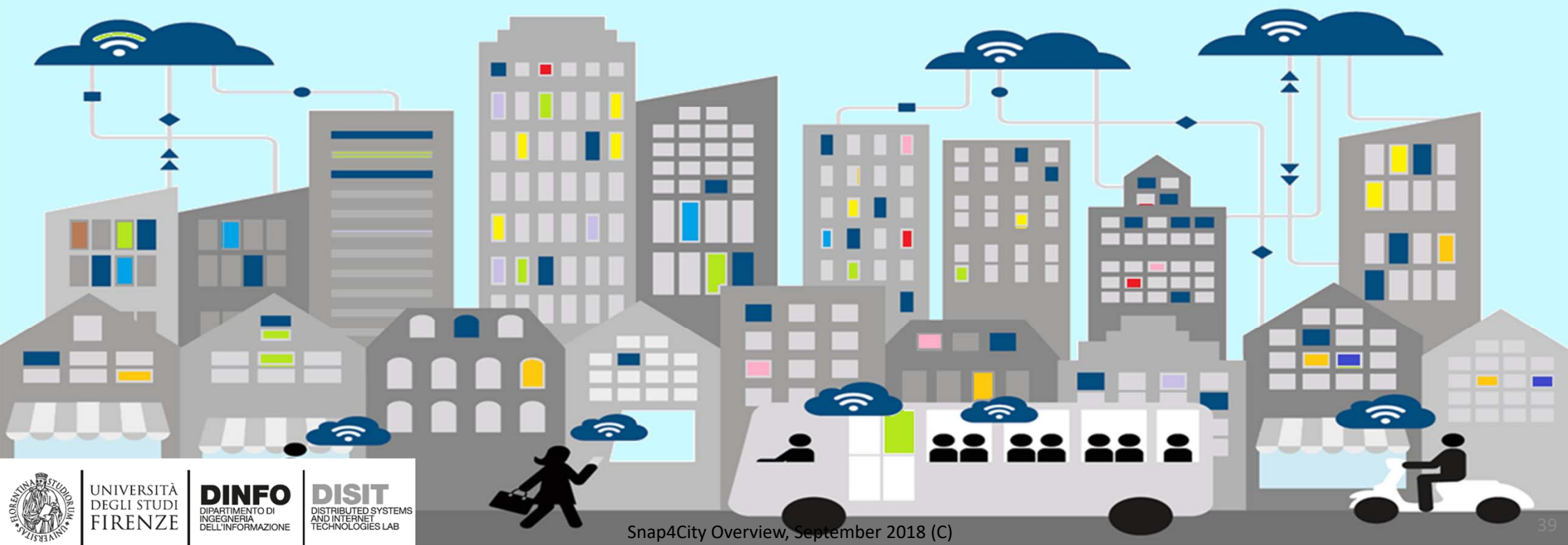
Palette

**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

Add IOT/IOE Devices

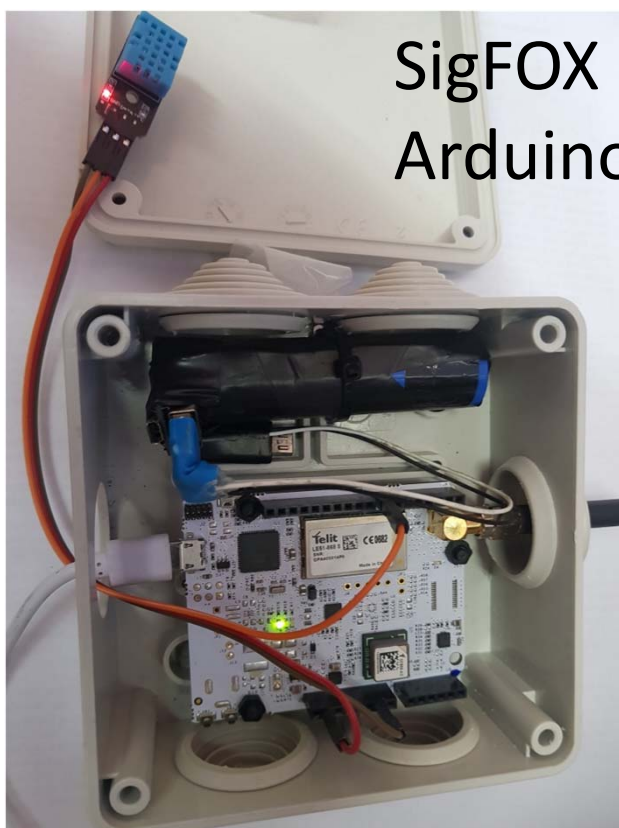
- From Models
- From SigFOX standard
- A range of protocols, formats, approaches
- Create your own devices:
 - Arduino,
 - Raspberry,
 - Android,
 - LoraWAN + Arduino,
 - etc.

The screenshot shows the 'Add My New Device' page in the Snap4City web interface. On the left is a dark sidebar with a 'bedii Manager | idap' header and a menu with items like 'Dashboards', 'Notifier', 'IOT Applications', 'My IOT Devices' (highlighted), 'Knowledge and Maps', 'Micro Applications', 'External Services', 'Data Set Manager Data Gate', 'Resource Manager', 'Help and Contacts', 'Documentation and Articles', 'My Profile', and 'Snap4City portal'. The main content area has a top bar with 'Snap4City' and 'My IOT Devices'. Below this are tabs for 'My Devices', 'Delegated Devices', and 'Add New Device'. The 'Add My New Device' form contains:

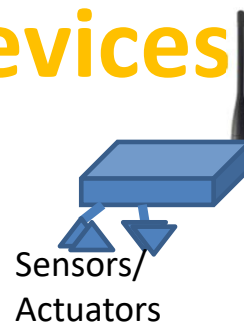
- A dropdown menu for 'Model' with 'Raspberry snap4city 1' selected.
- Input fields for 'Name' (containing 'Raspberry_PersonalSensor') and 'Latitude' (43.7652).
- Input fields for 'Longitude' (11.3044).
- Input fields for 'KEY1' (402a5486-650e-4e3c-9440-0785940ba72) and 'KEY2' (40eef2c7-0ef2-462f-9c21-29df92b40337).
- A 'Submit Device' button.
- A map on the right with the text 'Select Latitude/Longitude on Map' and a blue location pin.

Secure Communication:
HTTPS, TLS (K1, K2)

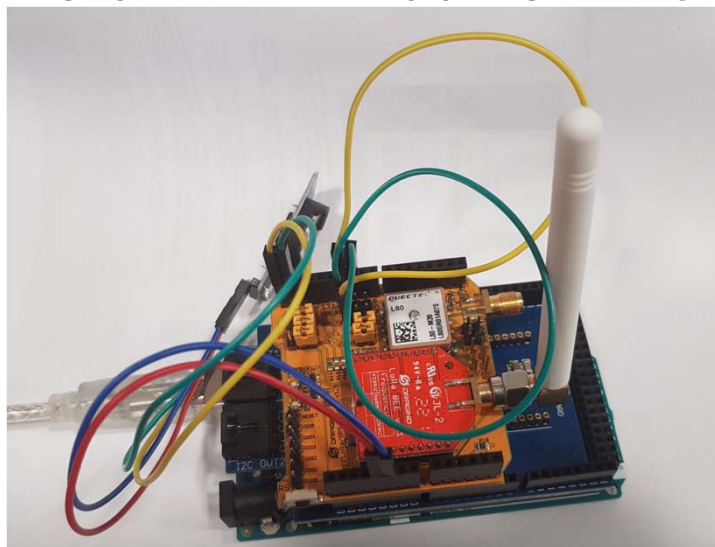
Custom IOT Edge, and IOT Devices



SigFOX
Arduino



LoraWAN + Arduino + I2C

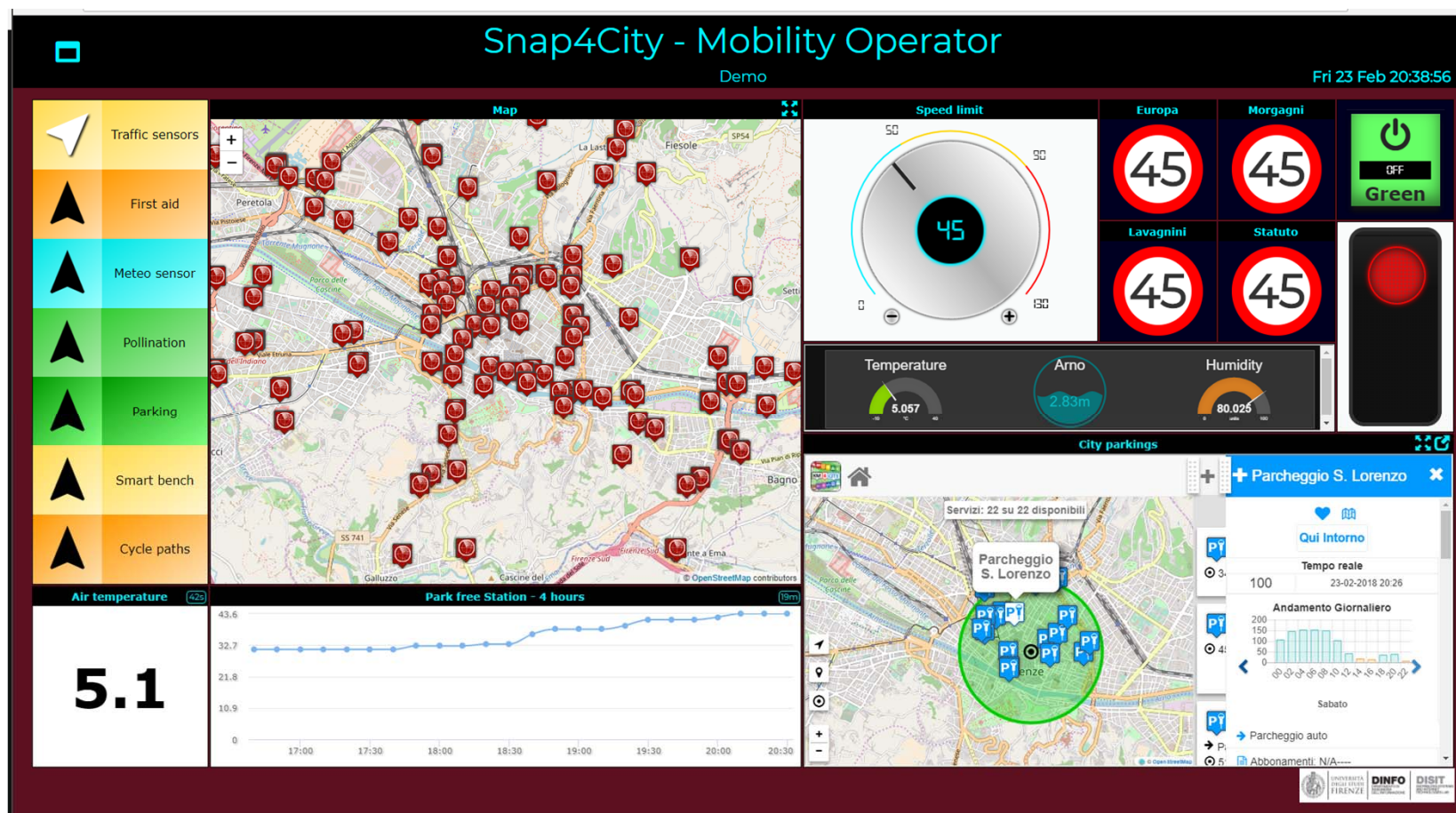


IOT Edge NodeRED:
Raspberry



Dash with city data and your data/actuators

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



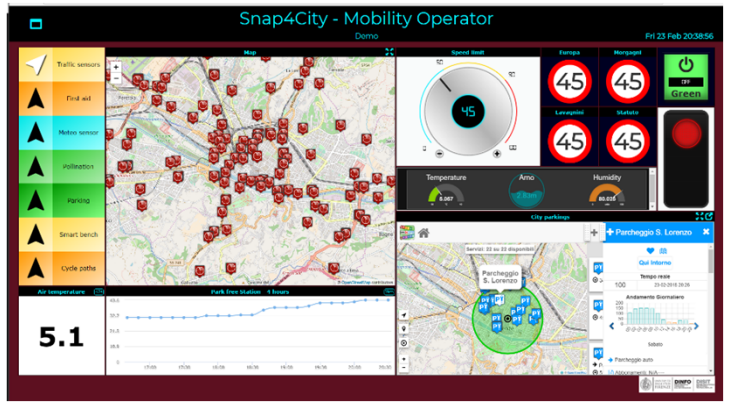
Snap4City Overview, September 2018 (C)



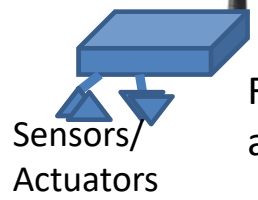
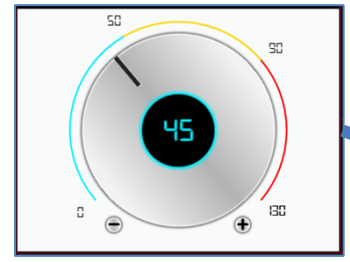
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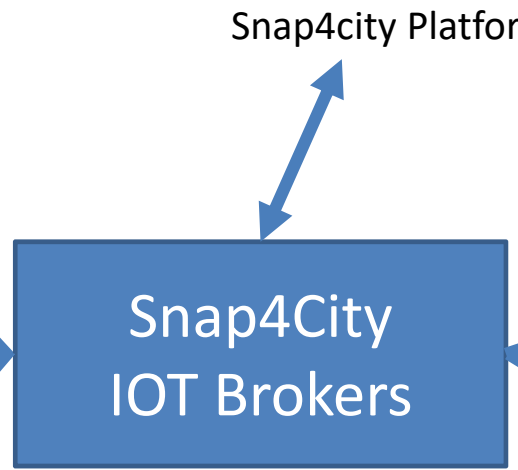
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Dashboard vs IOT Devices



From any IOT Device
and/or Dashboard



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



Towards any IOT Device
and/or Dashboard



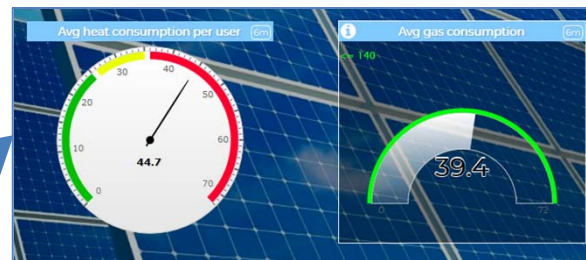
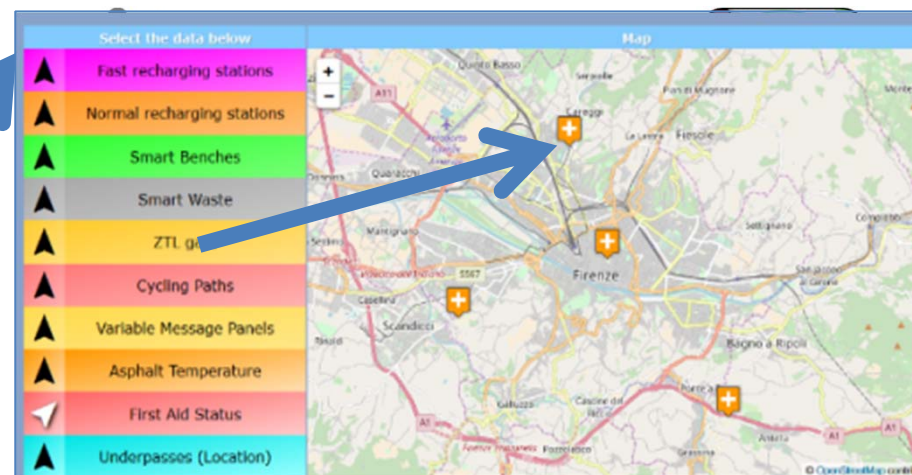
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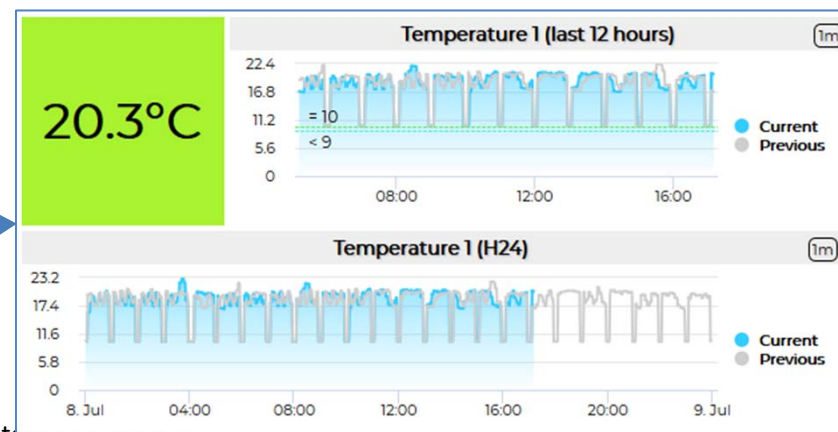
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Data Kinds vs Widgets:

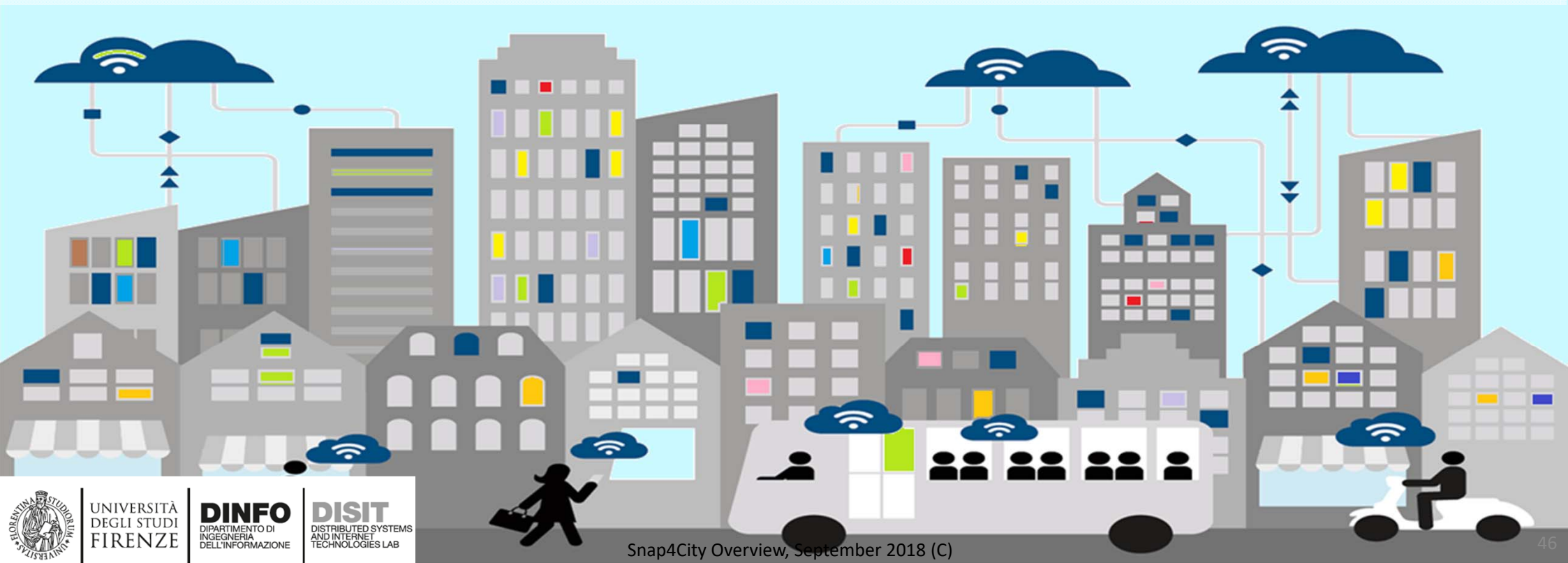
- Complex Event **MyPersonalData**
- External Service
- MicroApplication
- Special Widget
- POI, Point of Interest
- KPI, Key Performance Indicator
- Sensor
- Sensor-Actuator
- **My Personal Data**
- **Dashboard-IOT App**



**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.

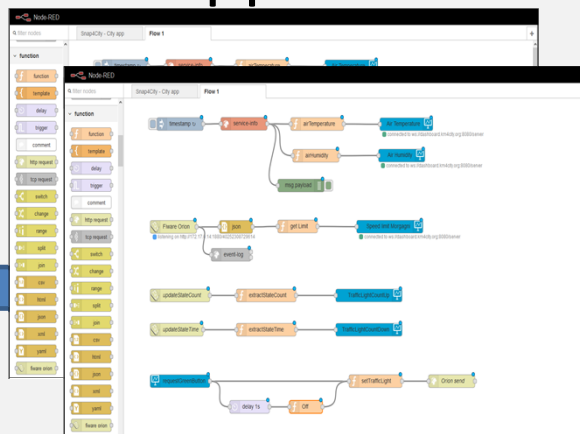
Dashboard-IOT App

IOT and City data World

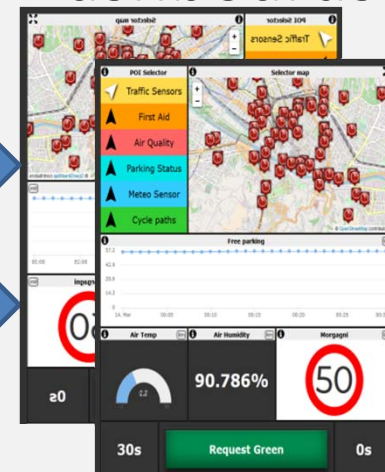


My IOT Devices

IOT Applications



Dashboards

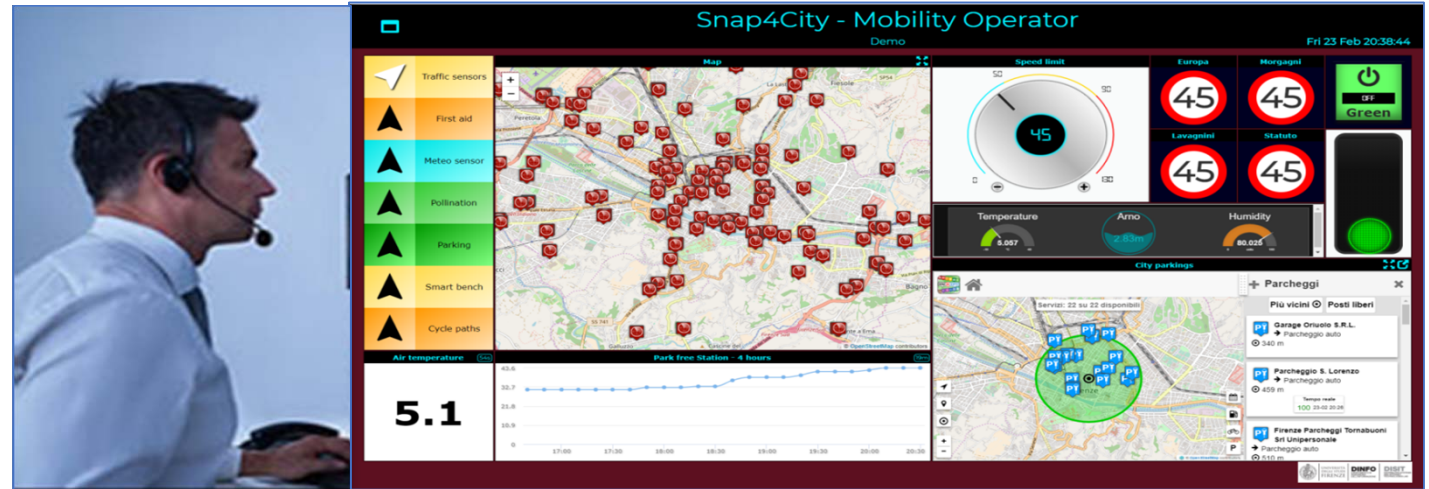


Applications

Control Room Operator

Would like to:

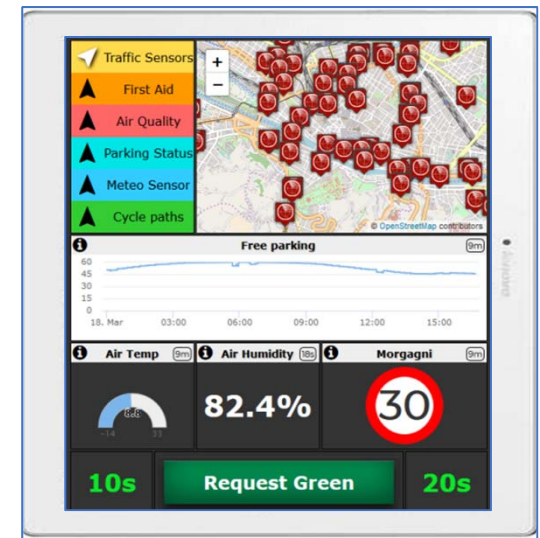
- **Monitor** traffic flow, Environment, Car parking, Cycling, First aid, temp., ..
- **Act and** monitor Dynamic Plates
- **Act and** monitor red lights



Driver, Policeman

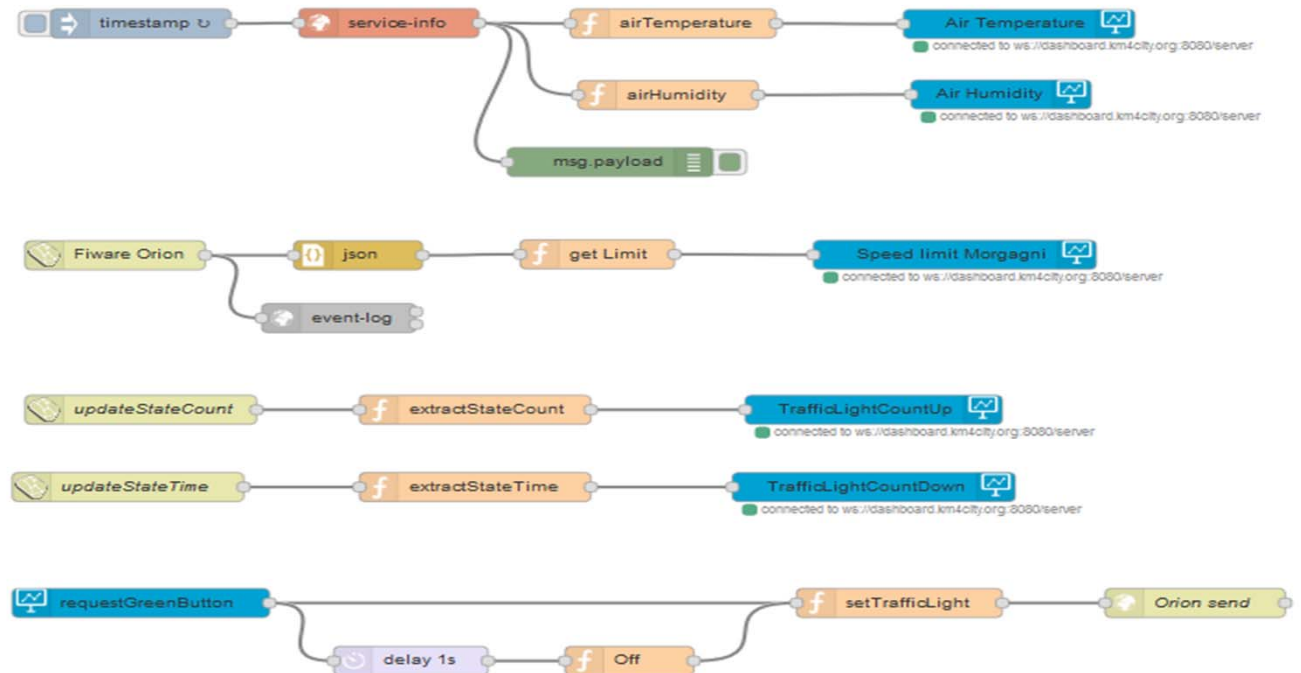
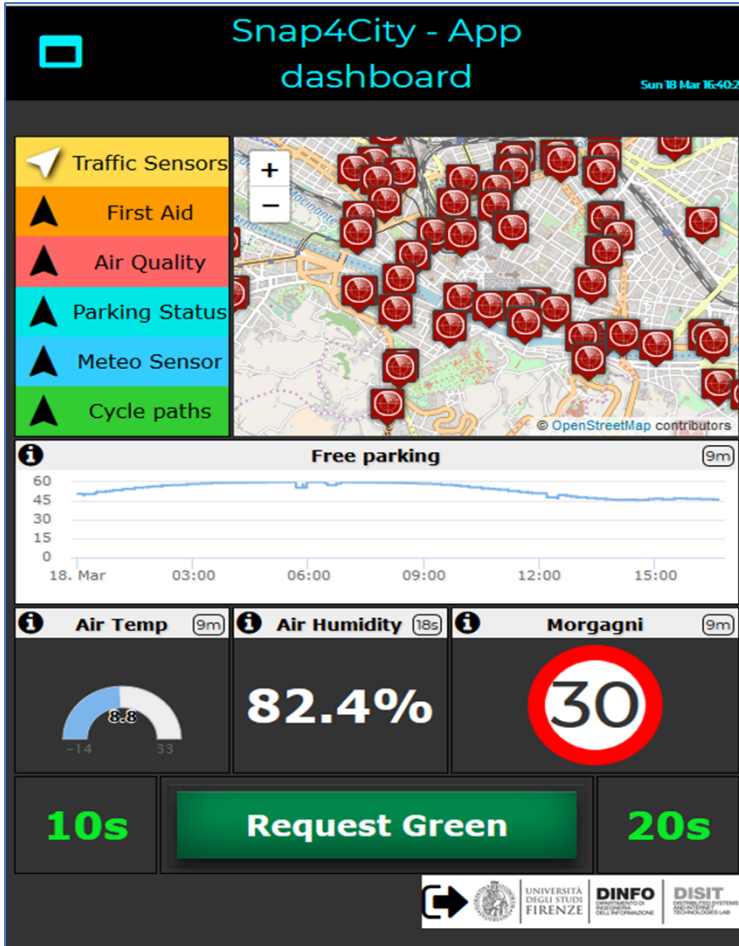
Would like to:

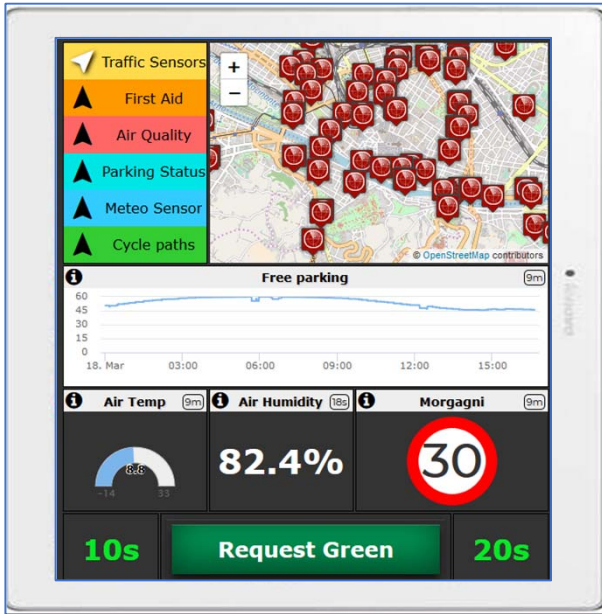
- Monitor traffic, Parking, env., speed limit, ...
- **Act and** monitor red lights



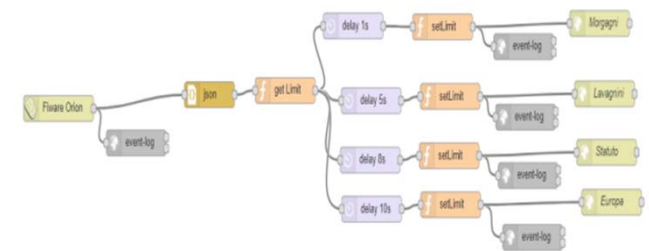
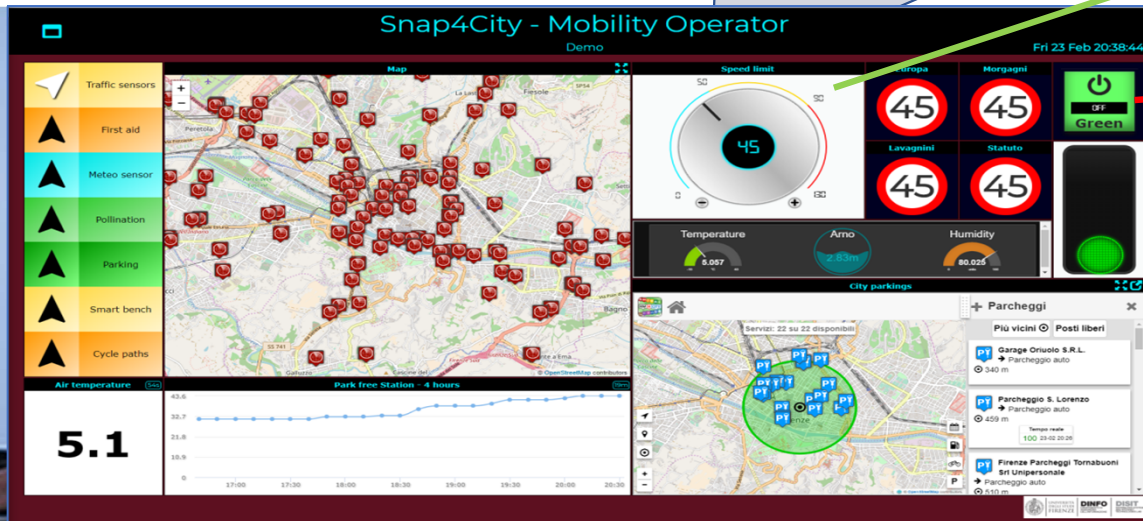
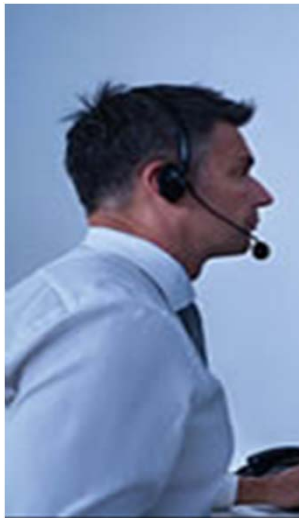
IOT Application with City Dash

simpler development





SNAP4CITY



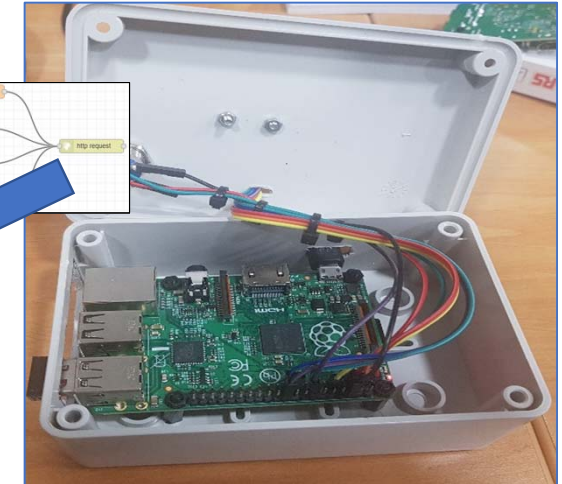
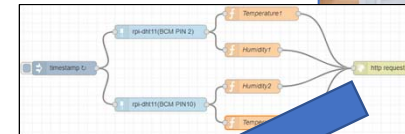
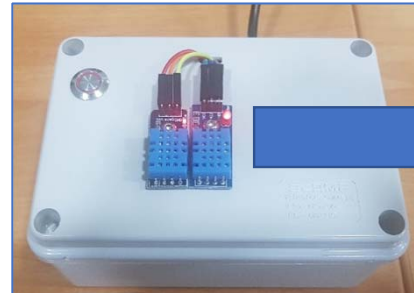
TC: Edge Computing



City user

Would like to:

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



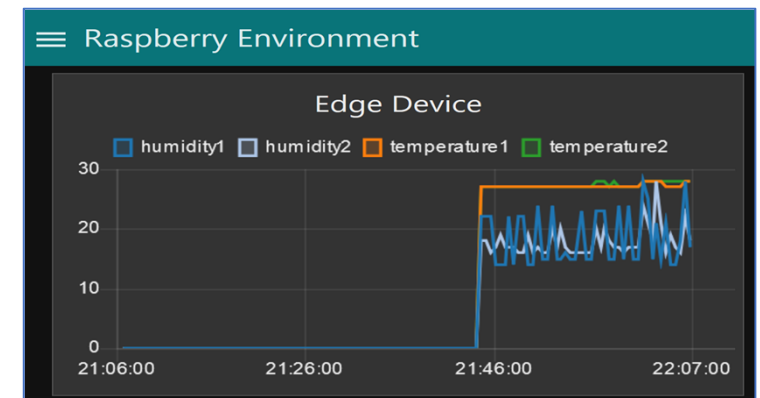
IOT Broker

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



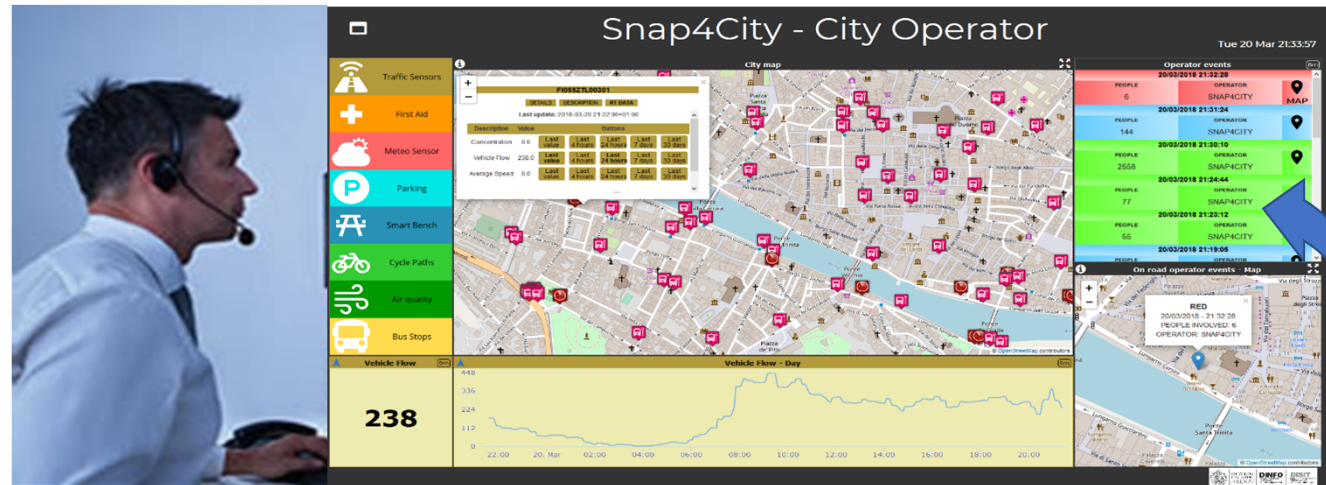
Reporting Critical Events



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

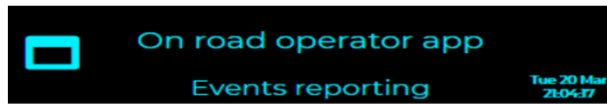
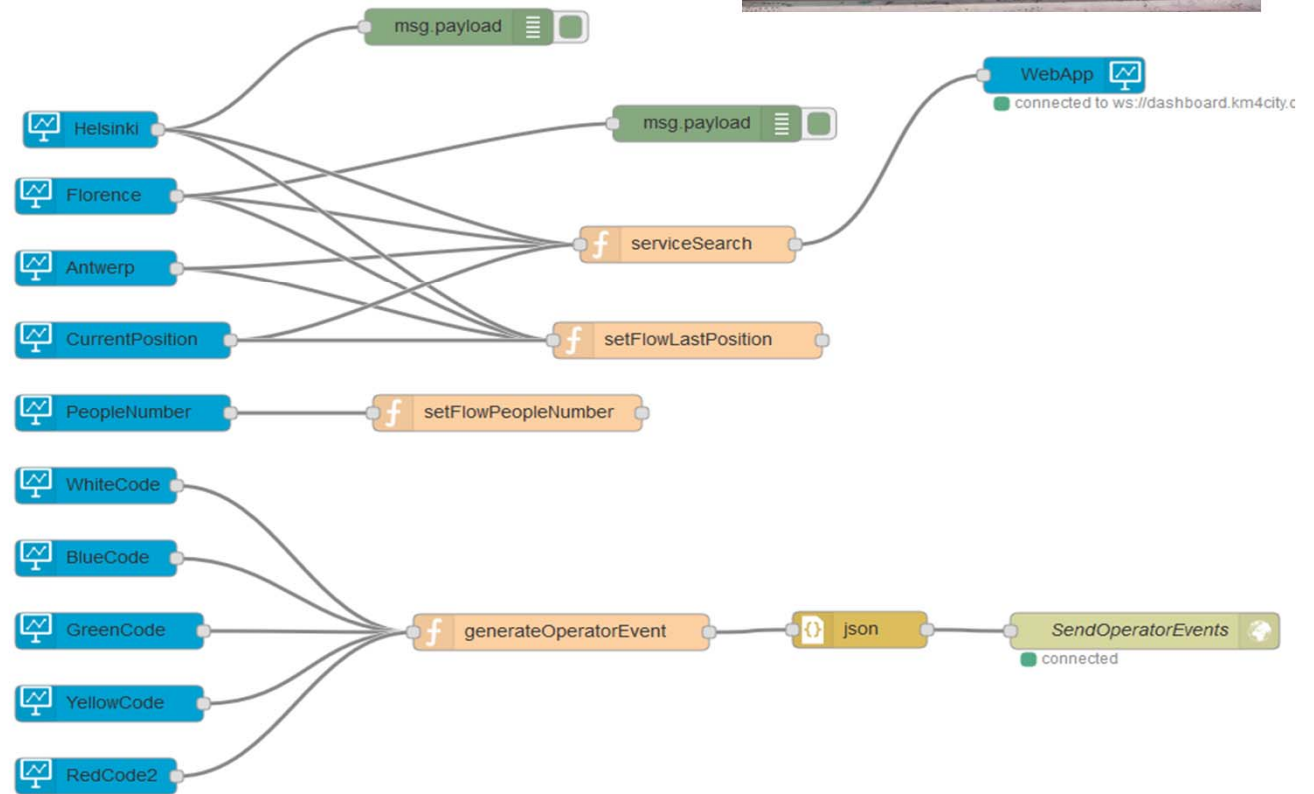
Would like to:

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



Snap4City Overview, September 2018 (C)

IOT Application with City Dash simpler development

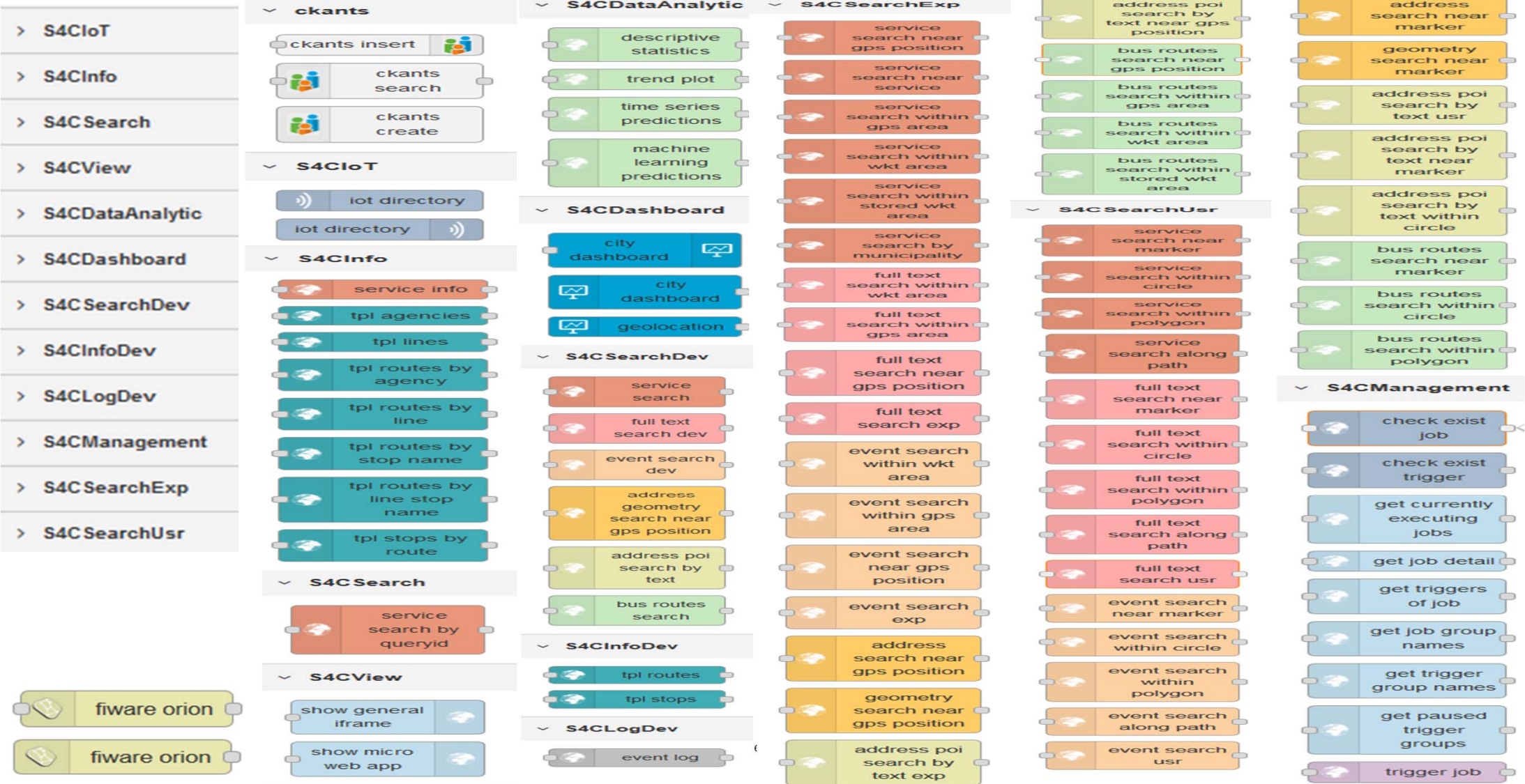
Node.js Blocks on NodeRed SotA



The image displays the Node-RED block palette, organized into several categories:

- input**: inject, catch, status, link, mqtt, http, websocket, tcp, udp, serial, Watson IoT
- output**: debug, link, mqtt, http response, websocket, tcp, udp, serial, Watson IoT, play audio
- function**: function, template, delay, trigger, comment, http request, tcp request, switch, change, range, split, join, csv, html, json, xml, rbe, random, smooth
- dashboard**: button, dropdown, switch, slider, numeric, text input, date picker, colour picker, form, text, gauge, chart, audio out, notification, ui control, template
- storage**: tail, file, mongodb, file, mongodb, analysis (sentiment), advanced (watch, feedparse, exec), Raspberry_Pi (rpi gpio, rpi mouse, rpi keyboard, ledborg)
- social**: e mail, twitter, irc, e mail, twitter, irc, google plus, google places, google calendar

Snap4City MicroServices



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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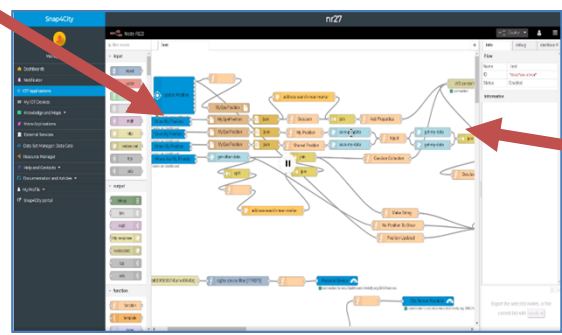
Managing **MyPersonalData** in secure manner

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



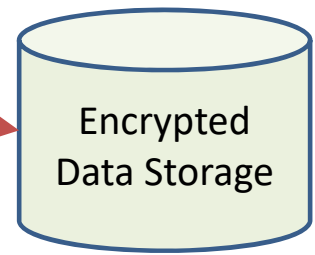
App details

Data stored for my App

Date	IOT Application name	Variable name	Value	Unit	Motivation
2018-04-15 11:14:49	nr27	latitude_longitude	[43.795389,11.2637266]	gradi decimali	My Position
2018-04-15 11:14:44	nr27	latitude_longitude	[43.795389,11.2637266]	gradi decimali	Shared Position
2018-04-20 14:15:06	nr27	latitude_longitude	[43.79977799999995,11.239042899999999]	gradi decimali	My Position
2018-04-20 14:15:10	nr27	latitude_longitude	[43.79977799999995,11.239042899999999]	gradi decimali	Shared Position
2018-04-20 14:29:10	nr27	latitude_longitude	[43.79977799999995,11.239042899999999]	gradi decimali	My Position
2018-04-20 15:32:11	nr27	latitude_longitude	[43.79977799999995,11.239042899999999]	gradi decimali	Shared Position
2018-04-20 15:32:15	nr27	latitude_longitude	[43.79977799999995,11.239042899999999]	gradi decimali	My Position
2018-05-24 11:35:22	nr27	latitude_longitude	[43.79977799999995,11.239042899999999]	gradi decimali	Shared Position
2018-06-07 15:27:54	nr27	latitude_longitude	[43.7999,11.2518]	gradi decimali	Shared Position
2018-06-18 14:52:25	nr27	latitude_longitude	[43.8004001,11.2092268]	gradi decimali	Shared Position

Actual delegation

New delegation



Encrypted
Data Storage

My Personal Data Types

- My profile data and Blogs
- [My personal data by IOT](#)
- My IOT sensor data service URI
- My IOT sensor data service GraphID
- My Annotation data
- My IOT Devices
- My IOT Applications
- My Dashboards
- Auditing Access to My Data

Forget me all!



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GDPR Compliant

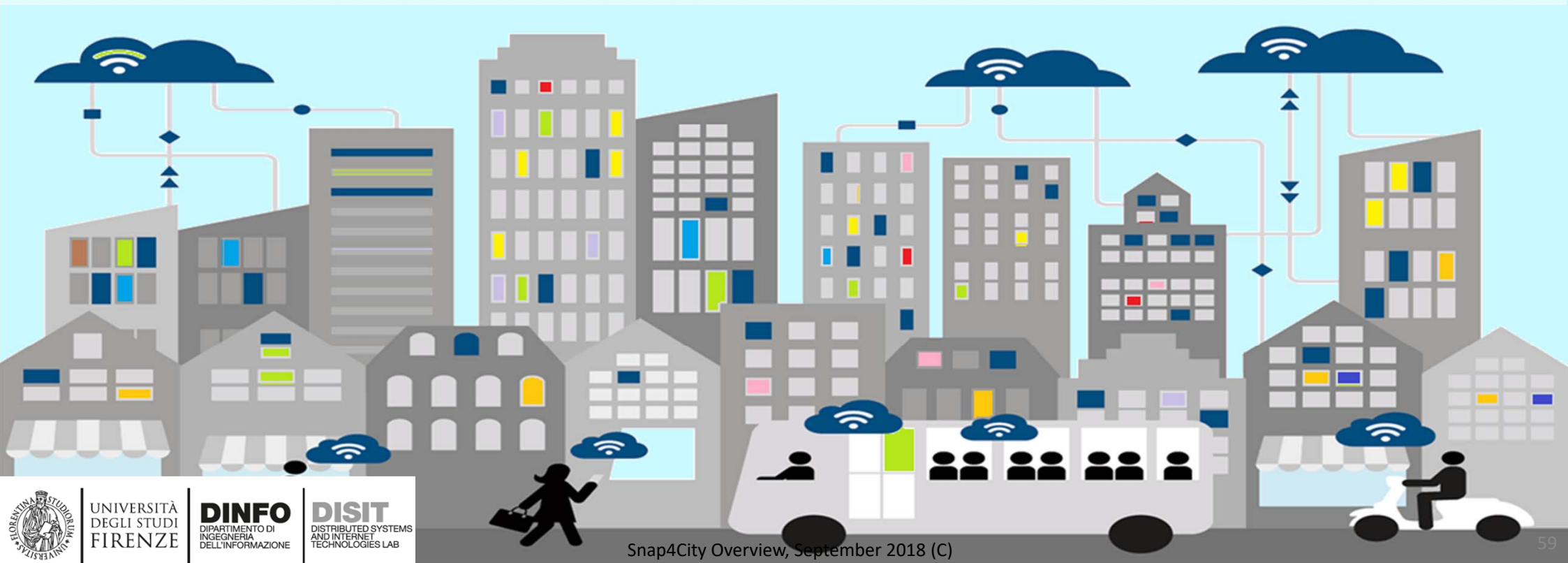
My Personal Data Types

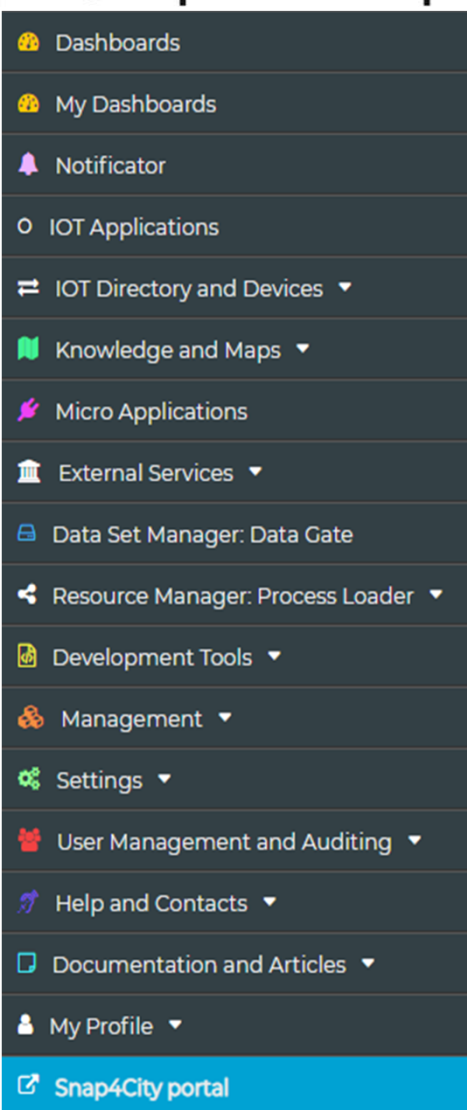
- My profile data and Blogs
- [My personal data by IOT App](#)
- My IOT sensor data service URI
- My IOT sensor data service GraphID
- My Annotation data
- My IOT Devices
- My IOT Applications
- My Dashboards
- Auditing Access to My Data

Forget me all!

- 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

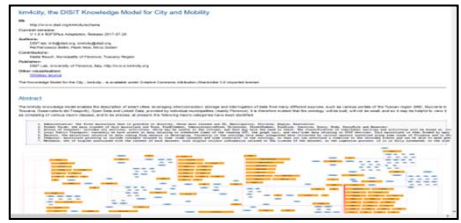
Data Analytics

Back Office Processes

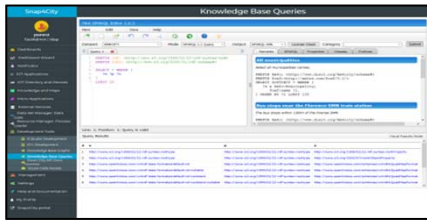


DISCES and back office management tools

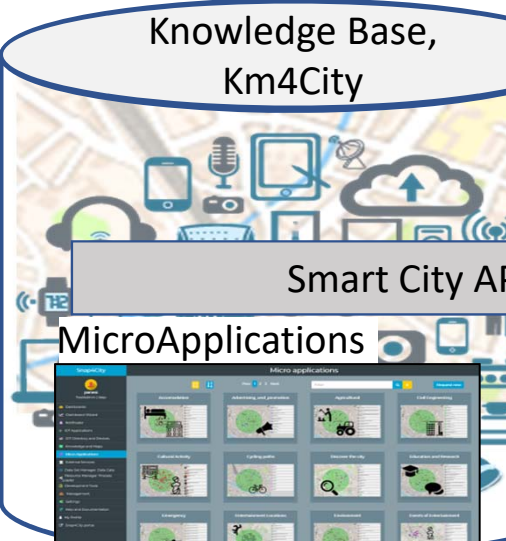
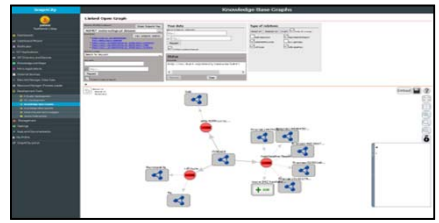
Ontology



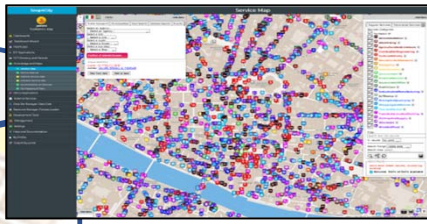
SPARQL, FLINT



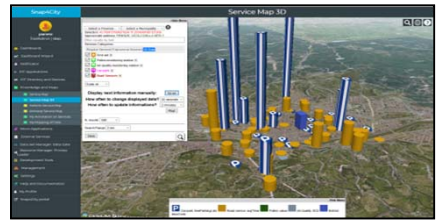
LOG.disit.org



ServiceMap

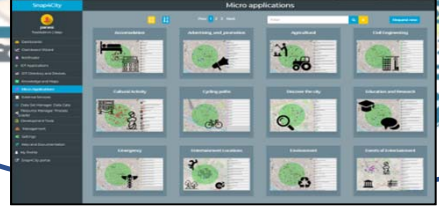


ServiceMap3D

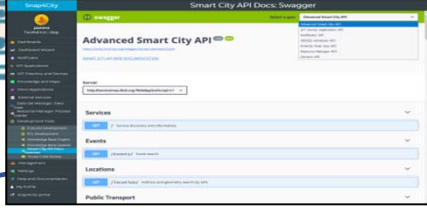


Smart City API from Knowledge Base and other tools

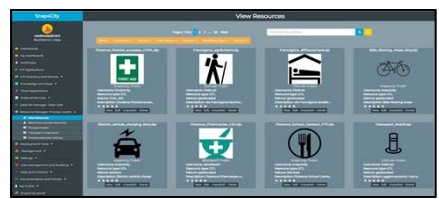
MicroApplications



Swagger



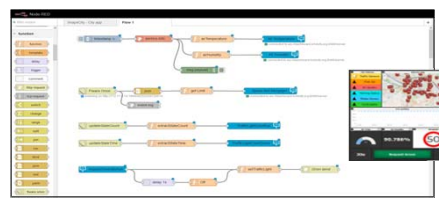
MicroServices



Resource Manager



Web and Mobile Apps



IOT Applications



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Developer in R Studio + Tensor Flow

R Studio Development

```

110 anomaliesMat[, "timestamp"] <- as.character(dataFinal[resianonssIndex, "alignDate"])
111 anomaliesMat[, "anoms"] <- as.numeric(resianonss[, "anoms"])
112
113 #table with anomalies
114
115
116 setwd(outDir)
117 options(digits = 1)
118 ttable <- tableProb(anomaliesMat, rows = NULL, cols = c("Date and Time", "Anomaly"), theme=ttheme_default(base_size=
119 grid.draw(ttable)
120 h <- convertHeight(sum(ttable$heights), "in", TRUE)
121 w <- convertWidth(sum(ttable$widths), "in", TRUE)
122
123 plot <- resplot
124
125 plotrix <- grid.arrange(plot, ttable,
126 ncol = 2,
127 heights=c(5,1),
128 as.table=TRUE)
129
130 setwd(outDir)
131 ggsave(paste(columnName[i], "Anomalies.png", sep=""), plotrix, width=22, height=h*5)
132
133 }, finally = {
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```

Environment History Connections

@dataFinal	2794 obs. of 18 variables
@dataset	35539 obs. of 12 variables
@dataTest	97 obs. of 15 variables
@dataTestFinal	97 obs. of 3 variables
@dataTrain	2793 obs. of 15 variables
@mlDataTest	97 obs. of 4 variables
@p1	Large ttable (764 elements, 9.2 Mb)
@plt	List of 9
@statisticsResult	List of 1

Click on each .png file to visualize the statistics: a new tab will be opened

- AverageSpeedDailyTrend.png
- CarParksDailyTrend.png
- CorrelationMatrix.png
- PredictedFreePark.png
- SensorsMeanPerDayMoment.png
- StatisticsBySensors.png
- StatisticsBySensorsAndDayMoment.png
- VehicleFlowDailyTrend.png



Snap4City Overview, September 2018 (C)



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Developer in ETL: Penthao Kettle

The screenshot displays the Snap4City ETL Development environment. On the left is a navigation sidebar with categories like Dashboards, IOT Applications, and Development Tools. The main area shows a workflow diagram with steps: START, getConfig, Database, Create last file folder, Create a folder, Job Download, QI, Trification, and Success 3. Below the diagram is an 'Execution Results' panel with a log of job execution events.

```

Execution Results
History | Logging | Job metrics | Metrics
2018/05/31 16:13:38 - Main - Finished job entry [Job Download] [result=true]
2018/05/31 16:13:38 - Main - Finished job entry [Create a folder] [result=true]
2018/05/31 16:13:38 - Main - Finished job entry [Create last file folder] [result=true]
2018/05/31 16:13:38 - Main - Finished job entry [Database] [result=true]
2018/05/31 16:13:38 - Main - Finished job entry [getConfig] [result=true]
2018/05/31 16:13:38 - Main - job execution finished
2018/05/31 16:13:38 - Spoon - Job has ended.
  
```

Snap4City Overview, September 2018 (C)

Living Lab





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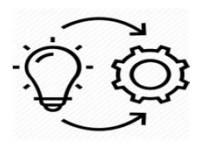
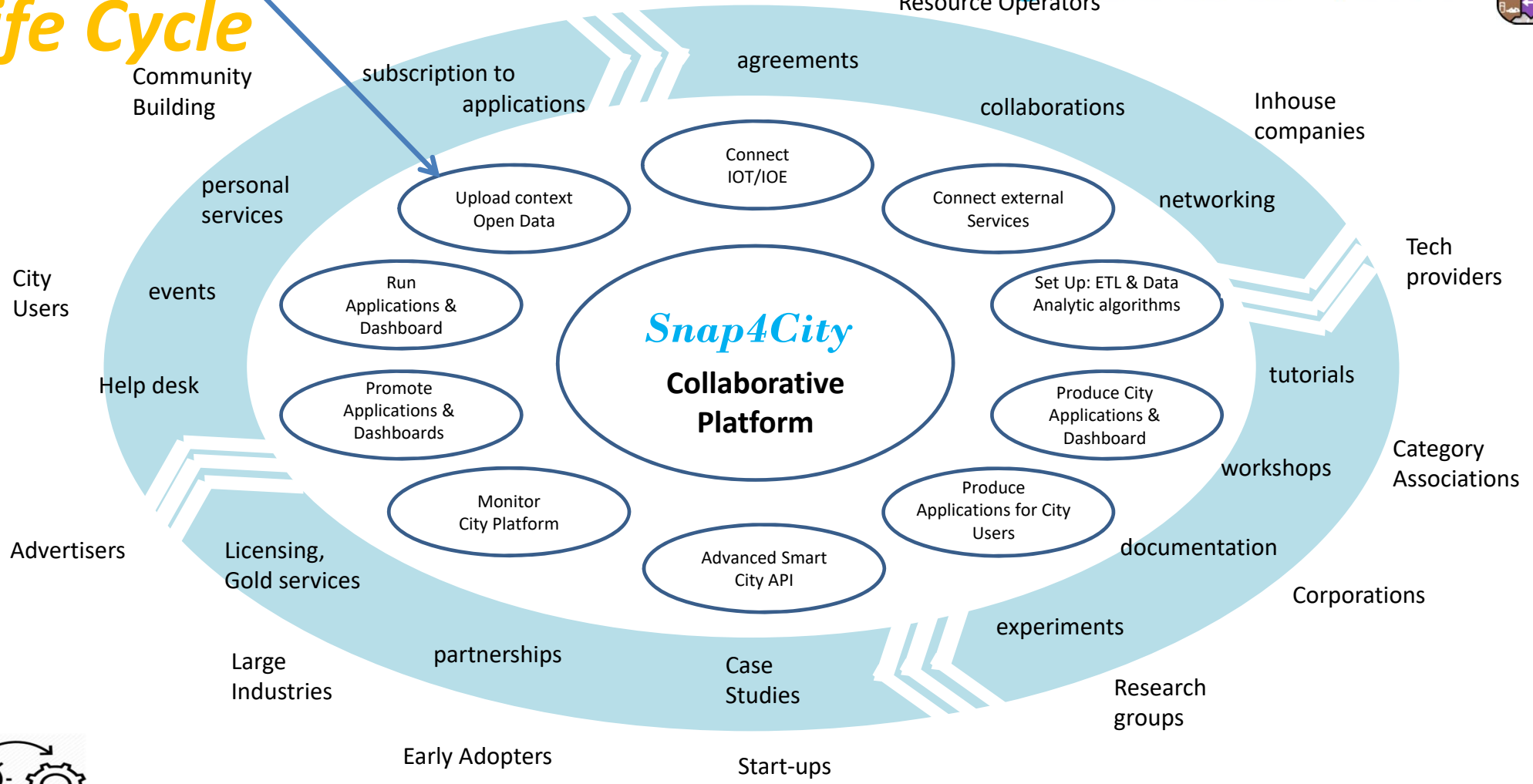
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TECHNOLOGIES LAB

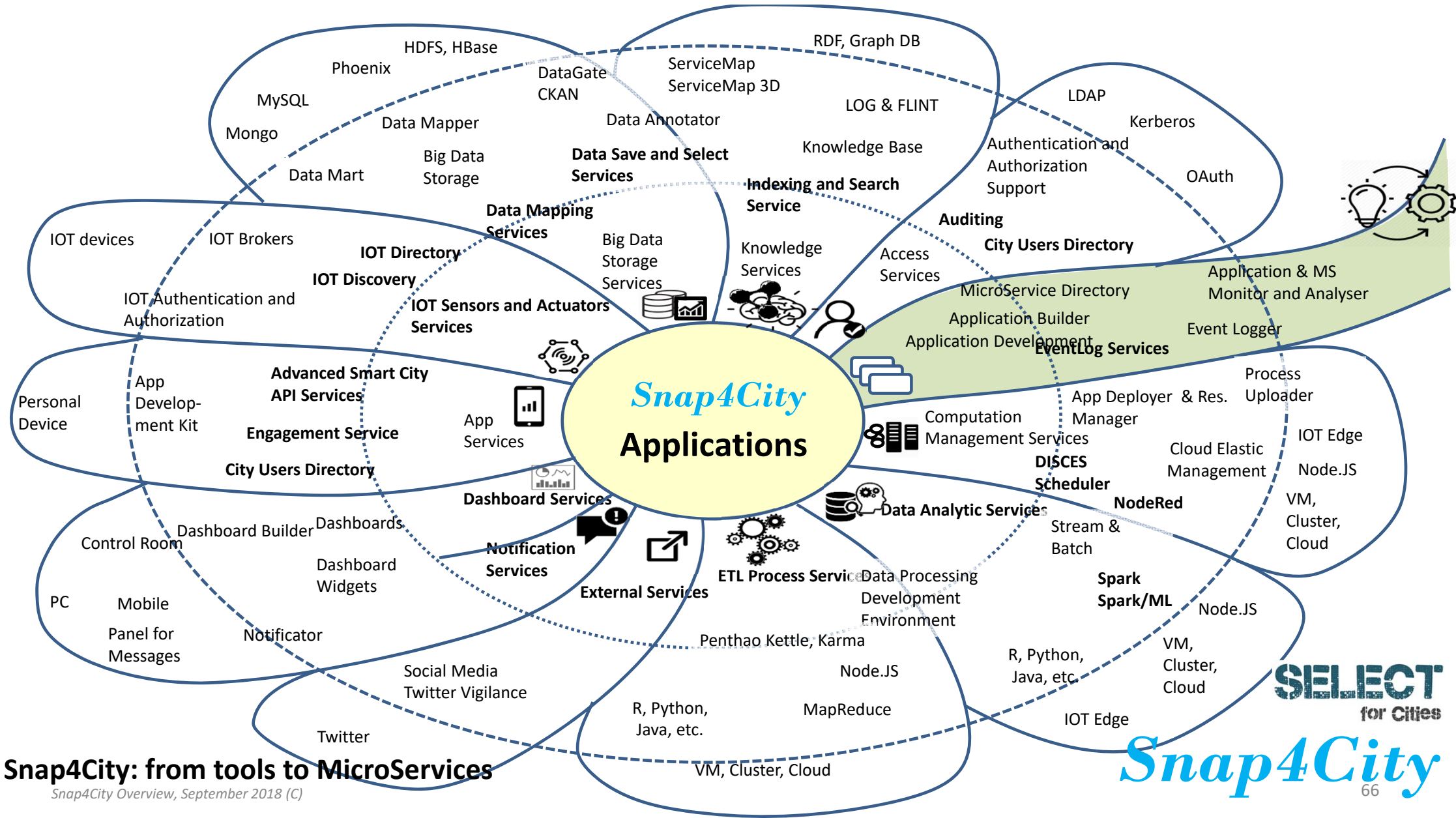
City Operators

 **SNAP4CITY**
Resource Operators



Life Cycle





Snap4City: from tools to MicroServices

Snap4City Overview, September 2018 (C)

SELECT
for Cities

Snap4City
66

Data & Model



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



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

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

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



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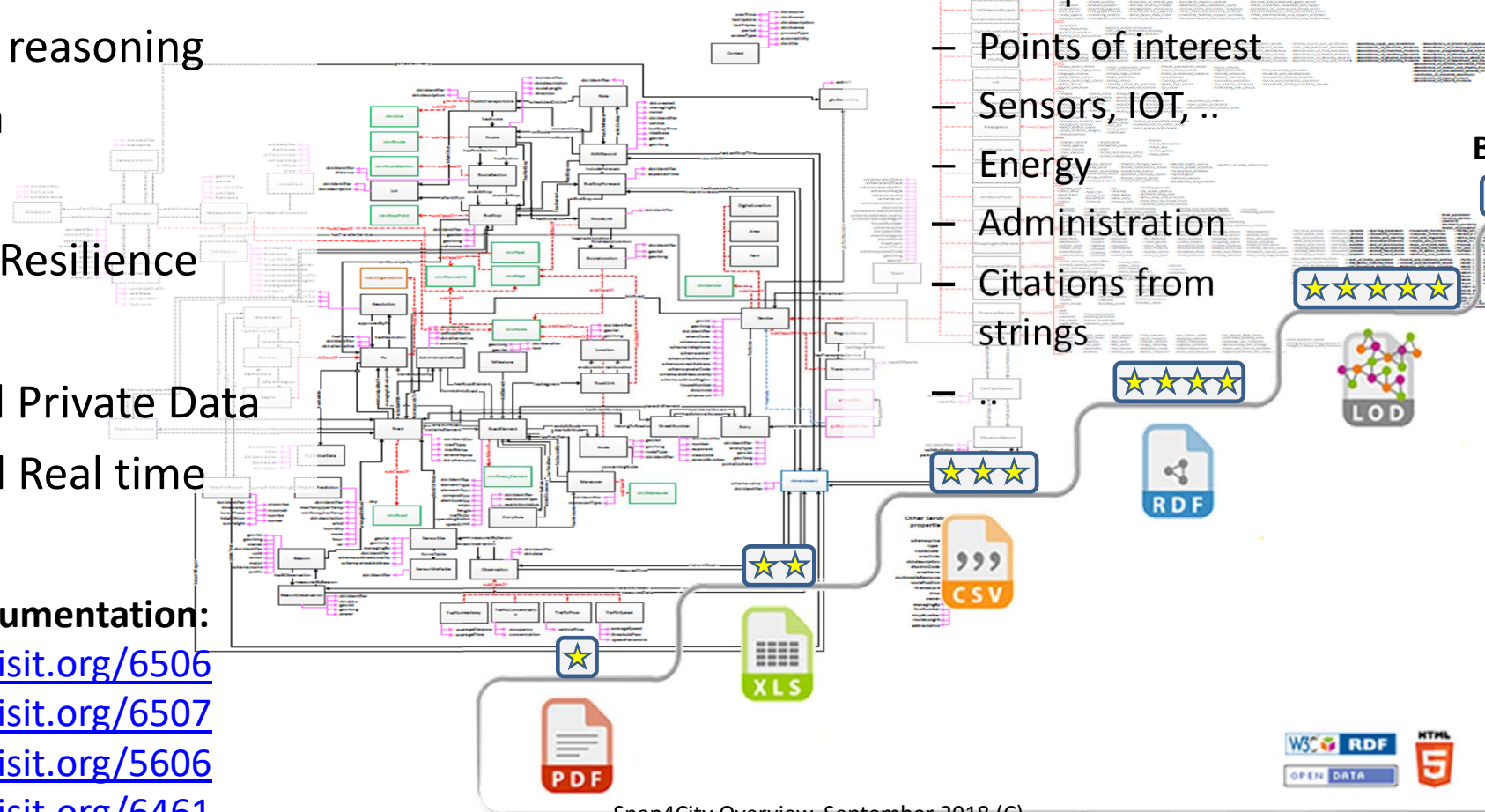
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Snap4City Overview, September 2018 (C)

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



Big Data Tools



LOD and reasoners



Snap4City Overview, September 2018 (C)

Ontology Documentation:

- <http://www.disit.org/6506>
- <http://www.disit.org/6507>
- <http://www.disit.org/5606>
- <http://www.disit.org/6461>

**Present data on
Tuscany Region
August 2017**

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

Source: Snap4City Overview, September 2018 (C)



<http://servicemap.km4city.org>

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 +

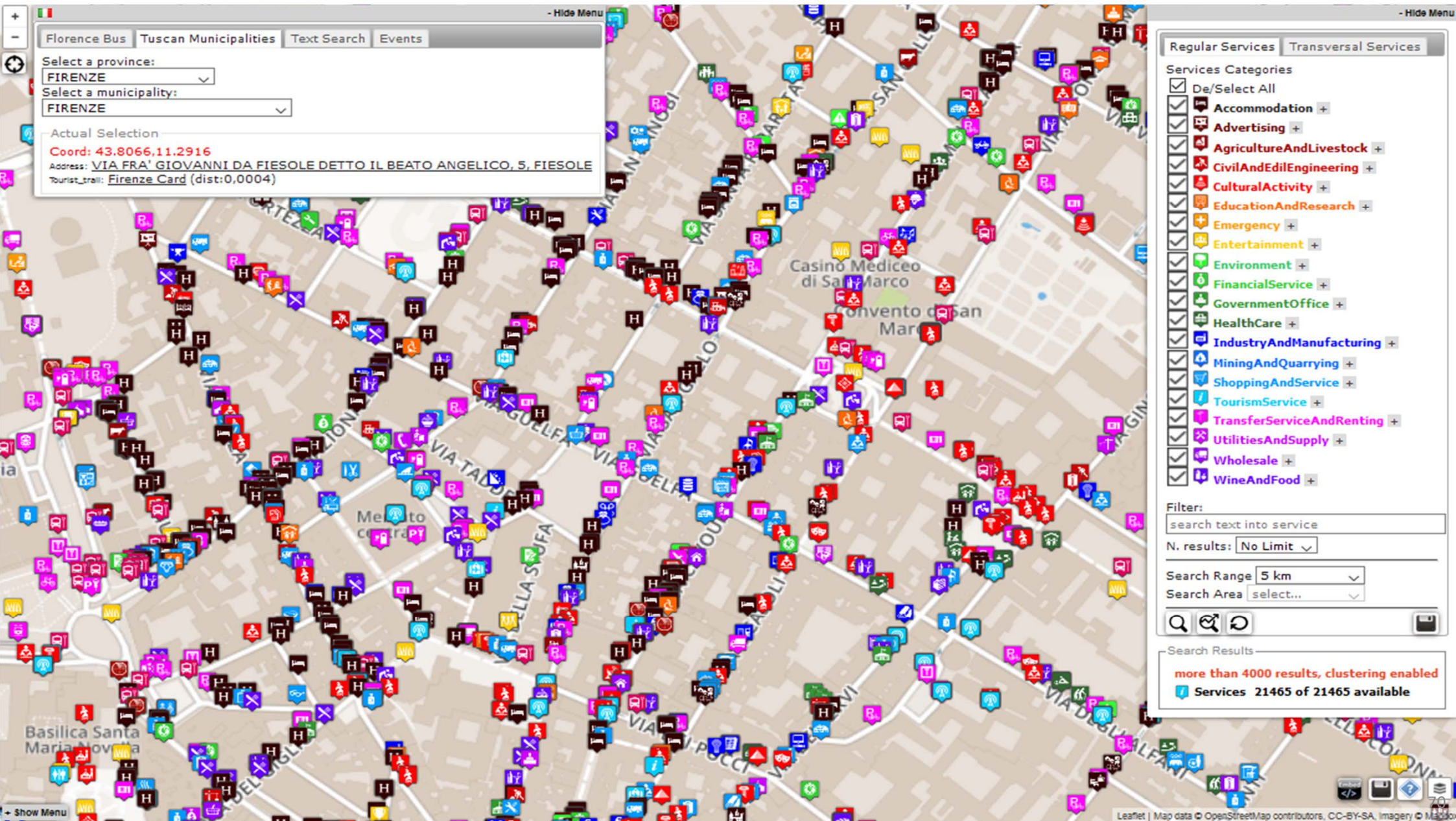
N. risultati: Nessun Limite

Raggio ricerca 100 metri

Risultati della ricerca

più di 4000 risultati, attivato clustering

Services 16858



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)

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

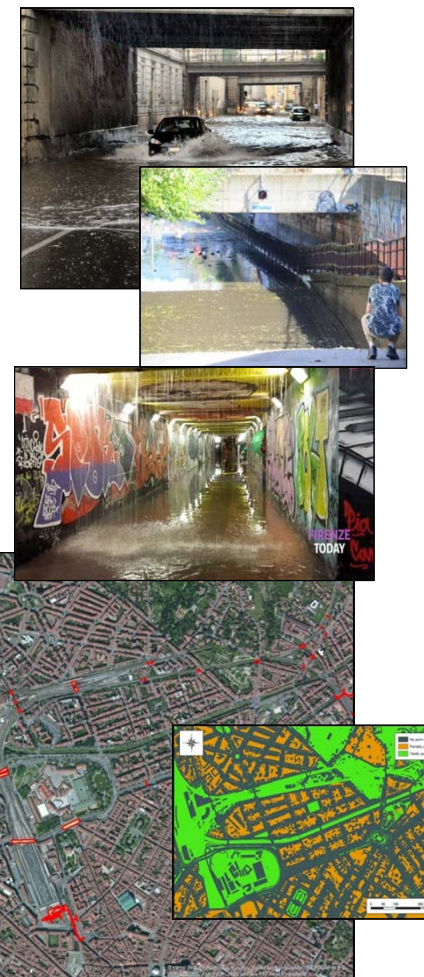


Other Sensors and Actuators, IOT

- **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



The screenshot displays a web application interface for cycling paths in Florence. The main map shows a red route through the city, with various icons representing different services and points of interest. On the left, there is a search and selection panel with the following options:

- Select a line: - Select a Bus Line -
- Select a route: - Select a Bus Route -
- Select a bus stop: - Select a Bus Stop -

The "Actual Selection" panel shows:

- Coord: 43.7803, 11.2548
- Address: PIAZZA DELL'INDIPENDENZA, 26, FIRENZE
- Route: 12 (dist:0,0001)
- Route: 81 (dist:0,0001)

On the right, there is a "Regular Services" and "Transversal Services" panel with the following options:

- De/Select All
- Area
- DigitalLocation
- HappeningNow
- Path
- Cycle_paths (checked)
- Tourist_trail
- Tramline
- Fresh Place
- Public Transport Line
- Road Sensors
- Bus Stops

Below the main map, there are two mobile app preview windows showing search results for cycling paths:

- Left Preview:** Shows search results for "Percorsi Ciclabili 309" (Cycling Paths 309) with a distance of 172 m and "Percorsi Ciclabili 305" (Cycling Paths 305) with a distance of 191 m.
- Right Preview:** Shows search results for "Arena Esterno Notte Poggetto" (Type: Cinema, Distance: 351 m) and "Auditorium Flog" (Type: Theatre, Distance: 351 m).

The bottom right of the main map shows a search results summary: "Services 228 of 228 available".

Snap4City Overview, September 2018 (C)

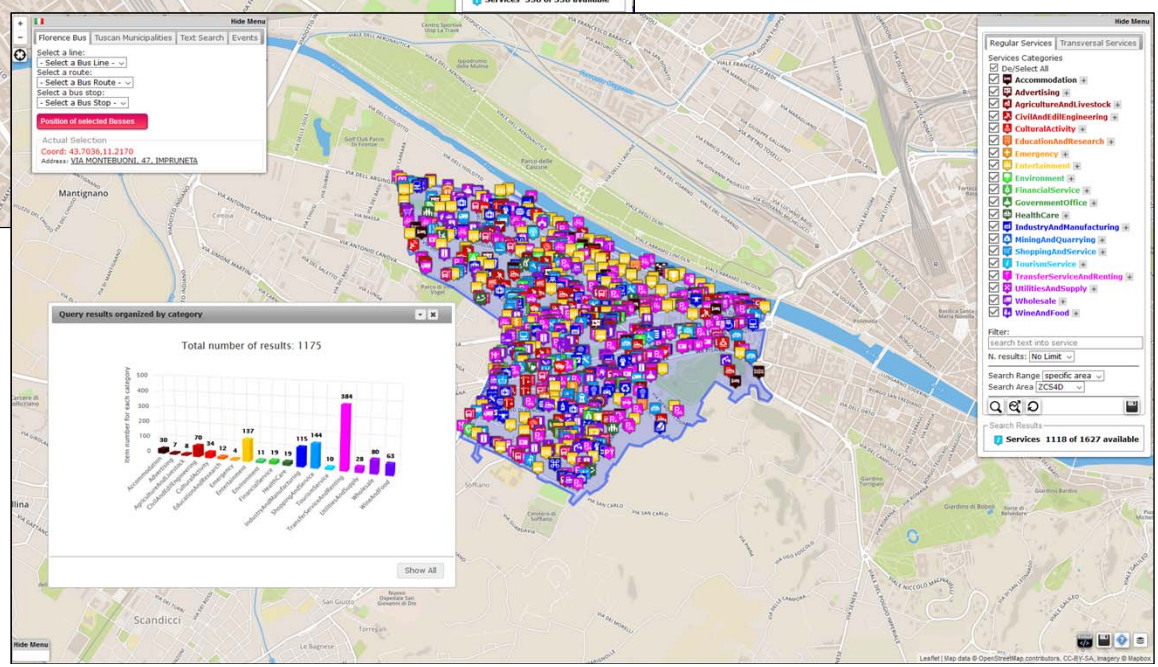
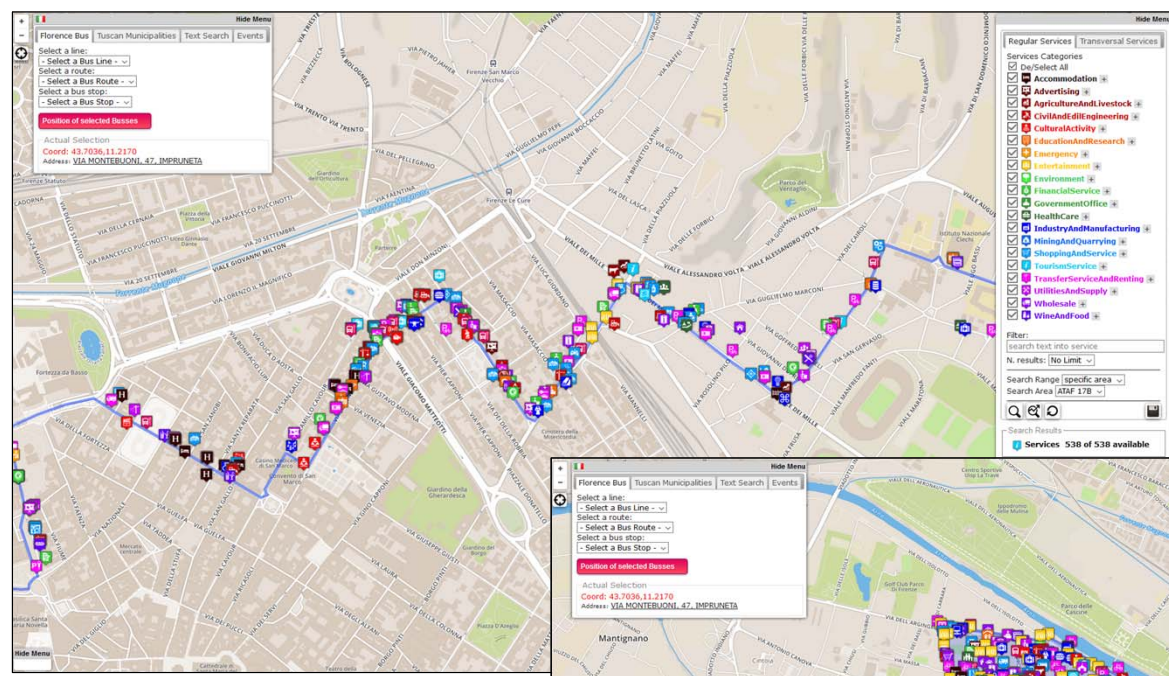


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Along a Line



Into an Area



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Km4City in Firenze



The screenshot displays the Km4City web application interface. The main map shows a street grid in Florence with various colored overlays representing different urban features. Several information panels are overlaid on the map:

- Left Panel (Navigation):** Includes a search bar, dropdown menus for province (FIRENZE) and commune (FIRENZE), and a service selection dropdown (Servizio: PERGOLA).
- Top Center Panel (Giardino di piazza dell'Indipendenza):** Provides details for a specific location, including its type (Entertainment - Green_areas), address (Piazza della Indipendenza, 15), capacity (50129), city (FIRENZE), province (FI), and a note (areaverdi238).
- Bottom Center Panel (FERMATA : T1 ALAMANNI):** Lists bus lines (2, 28, 52, 54) and indicates that real-time data is not available.
- Right Panel (FERMATA : PERGOLA):** Shows bus line numbers (14, 19, 23, 31, 6) and a route table:

Linea	Percorso
6 A	NOVELLI → OSPEDALE TORRE GALLI
6 B	NOVELLI → OSPEDALE TORRE GALLI
6 A	OSPEDALE TORRE GALLI → NOVELLI
6 B	OSPEDALE TORRE GALLI → NOVELLI
- Far Right Panel (Services):** A search interface for services, with categories like DigitalLocation, Fresh Place, Road Sensors, and Bus Stops. It shows search results for 'Bus Stops: 21 - Linea Bus: 25' and a direction 'LA PIRA → PIAN DI SAN BARTOLO'.
- Bottom Left Panel (Weather):** Provides weather forecasts for the next five days (Tuesday to Saturday) for the commune of Firenze.

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



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File Modifica Visualizza Cronologia Segnalibri Tile Strumenti Aiuto

Km4City Development an... ServiceMap

servicemap.dist.org/WebAppGrafo/mappa.jsp

Cerca

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

Category	Item number
Accommodation	708
CulturalActivity	78
EducationAndResearch	51
Emergency	8
Entertainment	23
FinancialService	16
GovernmentOffice	12
HealthCare	44
ShoppingAndService	53
TourismService	9
TransferServiceAndRenting	177
WineAndFood	670

Show All

Regular Services Transversal Services

Services Categories

- De/Select All
- Accommodation +
- Advertising +
- AgricultureAndLivestock +
- CivilAndEdiEngineering +
- 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

Weather Forecast for Municipality of: FIRENZE

Day	Weather	Temp
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](#)

Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

ENG 19:24

Pisa TPL & sensors



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Km4City in Sardegna



www.disit.org/smosm/

Public transport | Municipalities | Text Search | Address Search | Events

Select an agency:
- Select an Agency -

Select a line:
- Select a Line -

Select a route:
- Select a Route -

Select a bus stop:
- Select a Bus Stop -

Position of selected Buses

Actual Selection
Coord: 39.2329,9.11890
Address: [Casteddu/Cagliari](#)

Path from here | Path to here

Query results organized by category

Total number of results: 3955

Category	Item number for each category
Accommodation	525
CulturalActivity	535
Entertainment	680
ShoppingAndService	864
TourismService	141
TransferServiceAndRenting	952

Show All

Regular Services | Transversal Services

Filter:
search text into categories

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: visible area

Search Area: select...

Search Results
Services 3690 of 3690 available

Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

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 Buses

Actual Selection
Bus Stop: Sorgane Piazza Rodolico

TP1 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

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...

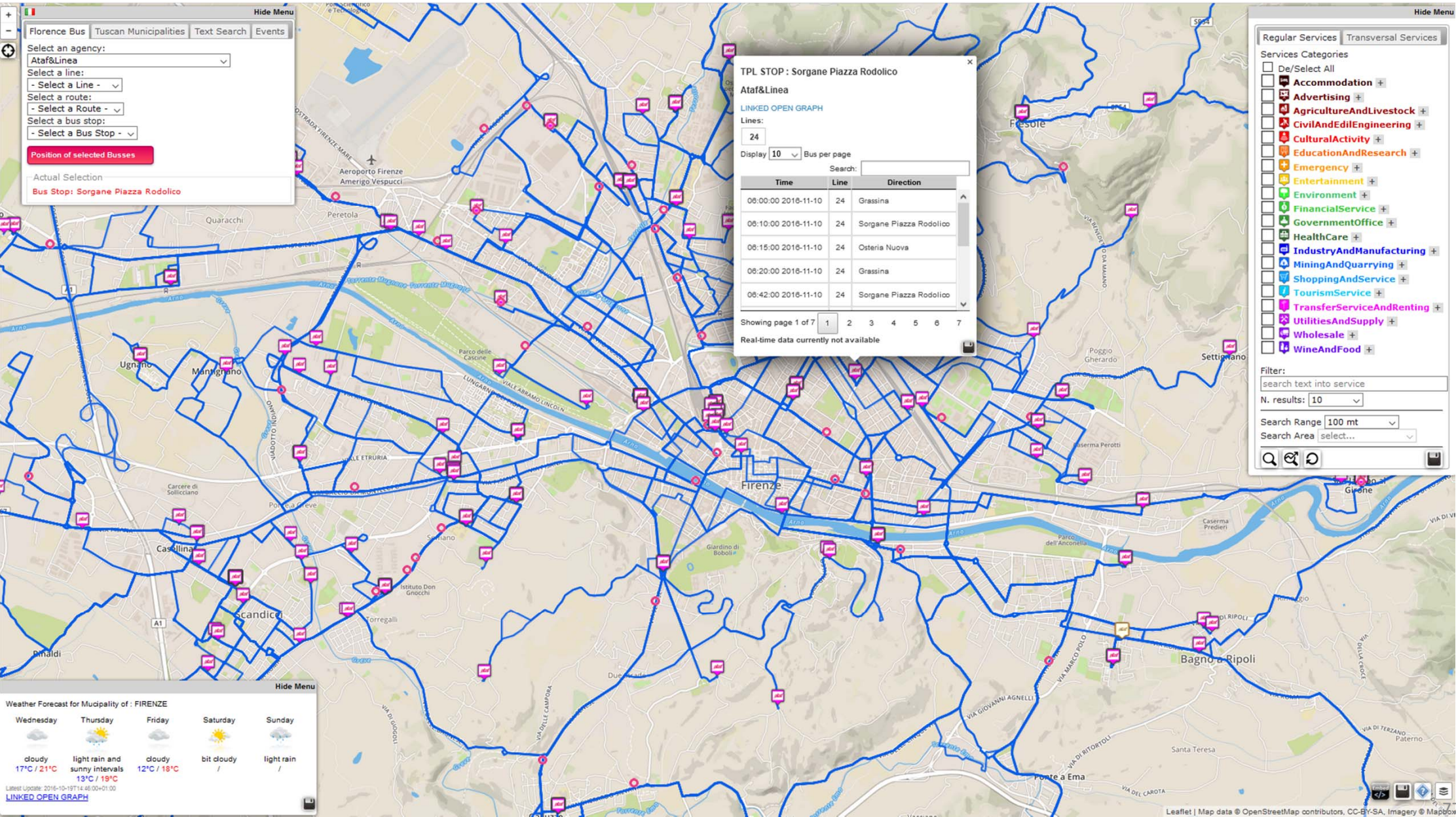
Hide Menu

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](#)



Smart City Control Room

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



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Horizon 2020
European Union Funding
for Research & Innovation

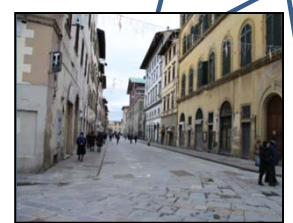


Transport
systems,
Mobility, Parking

Shops,
services,
operators



Sensors, IOT
Cameras, ..



Public services,
Govern, Events



Environment,
Water, energy



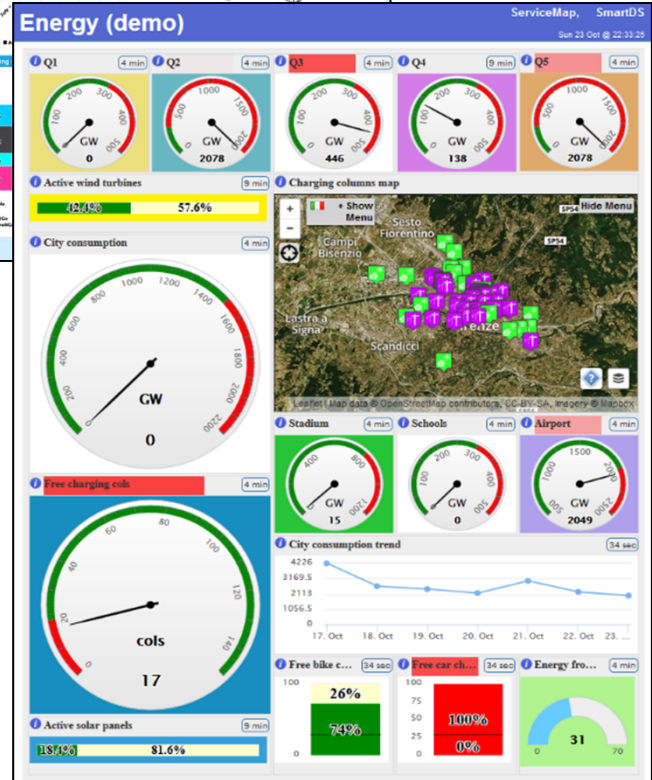
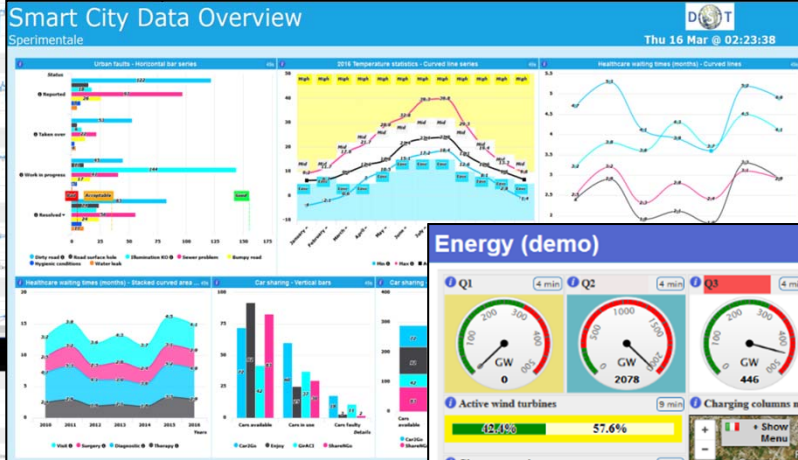
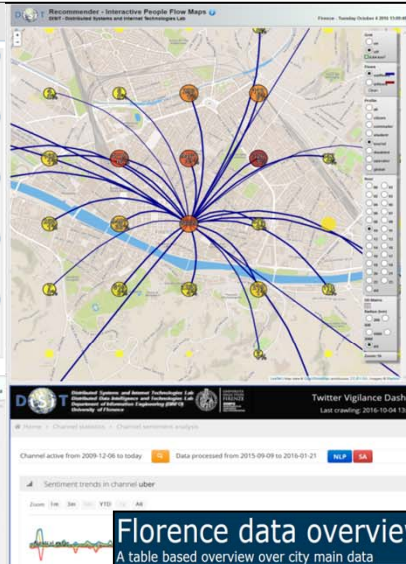
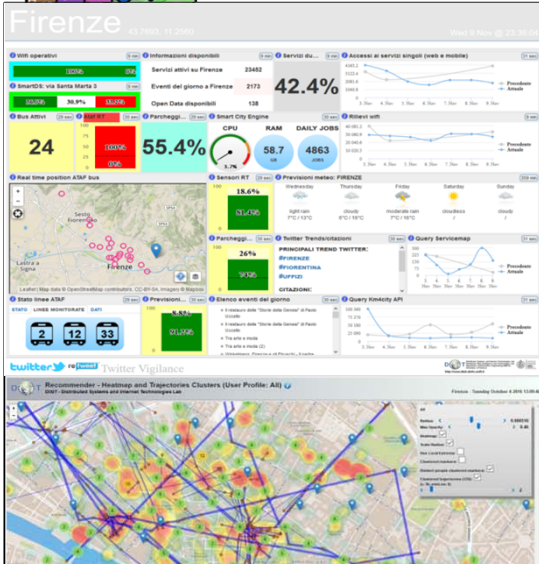
Social Media,
WiFi, Network

Dashboards

Smart City Dashboard



Horizon 2020
European Union Funding
for Research & Innovation



Florence data overview

A table based overview over city main data

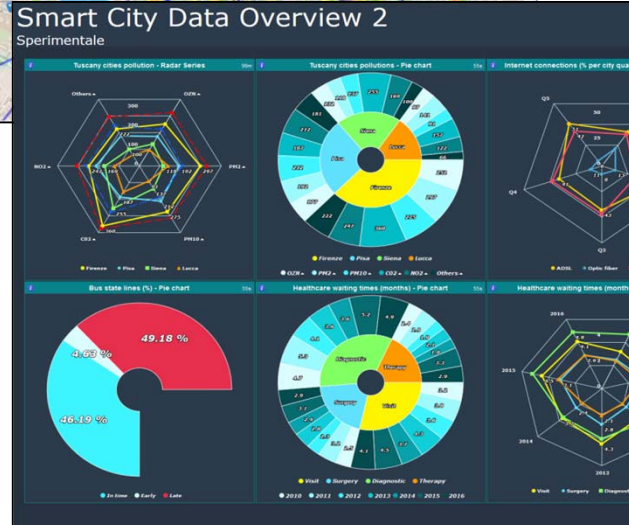
Wed 18 Jan @ 19:19:10

Substances / Quarters	Q1R+	PR2+	PR10+	CR2+	NO2+
Q1	120	41	183	36	4
Q2	33	25	66	123	45
Q3	225	153	184	191	212
Q4	124	221	87	122	93
Q5	79	87	23	27	65

Stations	Wind speed (km/h)	Direction	Temperature (°C)	Humidity (%)	Rain today (mm)	Pressure (mbar)
Sesto Fiorentino	50	N	12	0	922	
Livorno	65	NE	17	0	876	
Grosseto	28	E	4	22	1022	
Vado	42	S	6	0	895	
Falcoine	103	N	7.2	23	0	913
Ciglio	87	O	3	19	0	957

Category	Quality (%)	Cost (%)	Availability time (%)	Emergency handling (%)
Water	92	67	95	42
Public transportation	36	29	27	31
Public safety	77	64	58	62
Waste management	28	42	27	25
Healthcare	72	64	23	56
Welfare	63	51	38	36
Public administration	58	16	18	22

Category	Total arrivals	Overnights	Day trippers
Alpine	56	36	20
Train	122	81	41
Car	215	133	82
Bus	157	110	47
Crable	0	0	0
Boat	0	0	0
Total	550	360	190



Snap4City Overview, September 2018 (C)

Cross widget interaction 1

Artistical events, traffic events, city cams



Tue 06/06/2017 18:50:21

Artistical and recreative events

58m

PIAZZALE DEGLI UFFIZI 2

- LA FABBRICA DELLA BELLEZZA. LA MANIFATTURA GINORI E IL SUO POPOLO DI STATUE**
2017-05-18 to 2017-10-01
VIA DEL PROCONSOLO 4
- "DANTE INFERNO"**
2017-05-22 to 2017-06-30
VIA RICASOLI
- UN FRAGILE CAPOLAVORO**
2017-05-24 to 2017-09-24
VIA DEGLI ALFANI 78

ESTATE FIORENTINA DEL GIARDINO DELL'ARTECULTURA

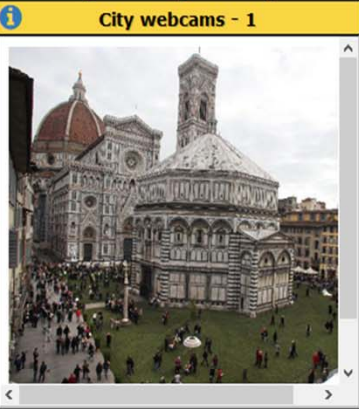
Artistical and recreative events - Exhibitions

Unexplored treasures. Florence University Libraries on display

LINKED OPEN GRAPH
Typology: Event

Artistical and recreative events - Others

Cam Duomo Cam Piazzale Cam Signoria Cam Trinita



Traffic events

3m

ALL ON MAP ALL ON MAP SHOW ON MAP

14:21:55

INCIDENTE IN FIRENZE, VIALE EUROPA
06/06/2017

13:43:23

INCIDENTE
06/06/2017

13:38:...

MATERIALE OLE
06/06/...

13:20:...

INCIDENTE IN FIRENZE, VIA...
06/06/2017

Traffic events

Traffic events - Slippery roads & others

Cam P.Vecchio Cam S.Croce Cam Repubbl. Cam Fortezza



<http://dashboard.km4city.org/dashboardSmartCity/view/index.php?iddashboard=MT10>

First aids overview - Tuscany

Service status of main first aids

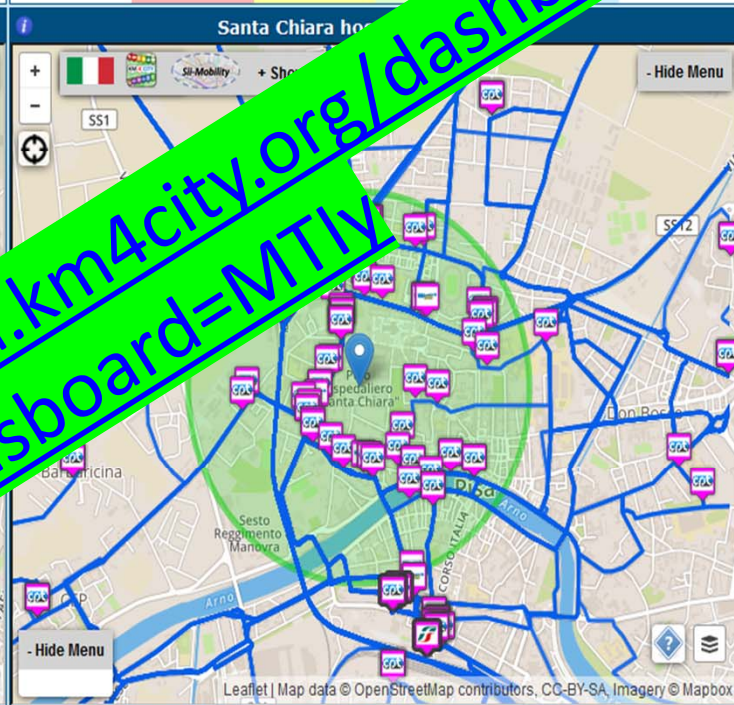
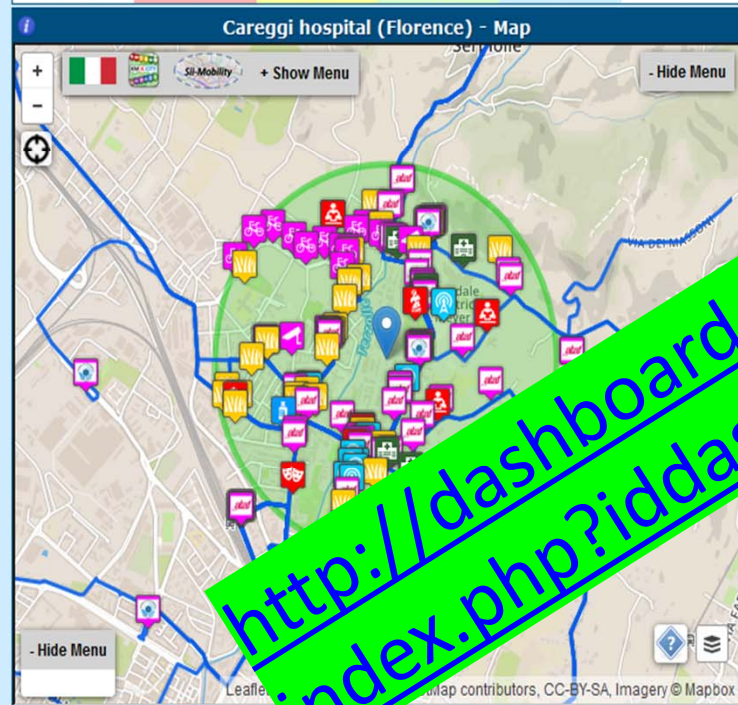


Day @ 11:00:34

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

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

Priority/Status	Red code	Yellow code	Green code	Blue code	White code
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	0	0	0
PS OSPEDALI RIUNITI	3	0	0	0	1
PS CASENTINO	0	0	0	0	0
PS SANTA CROCE	0	0	0	0	0
PI PO CORTONA	0	0	0	0	0
PS CIVILE PIOMBINO	0	0	0	0	0
PS LA MISERICORDIA	0	0	0	0	0



Pronto Soccorso Azienda Ospedaliera Careggi

Stato Priorità	1°	2°	3°	4°	5°
Con Destinazione	0	4	2	0	0
In Attesa	0	0	1	1	0
In Visita	1	5	4	3	0
Oss. Temporanea	1	17	7	1	0
Totalli	2	26	14	5	0

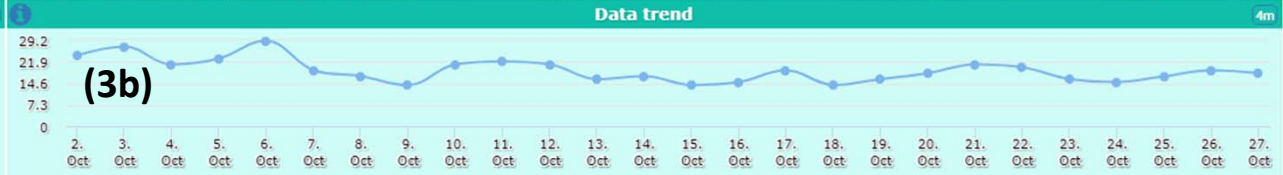
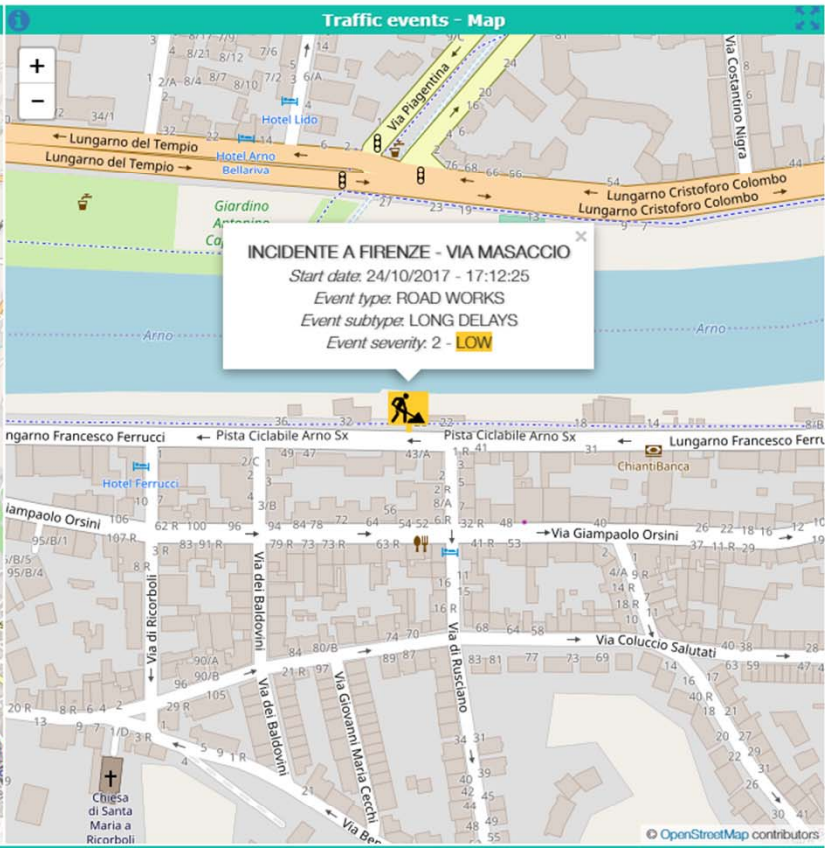
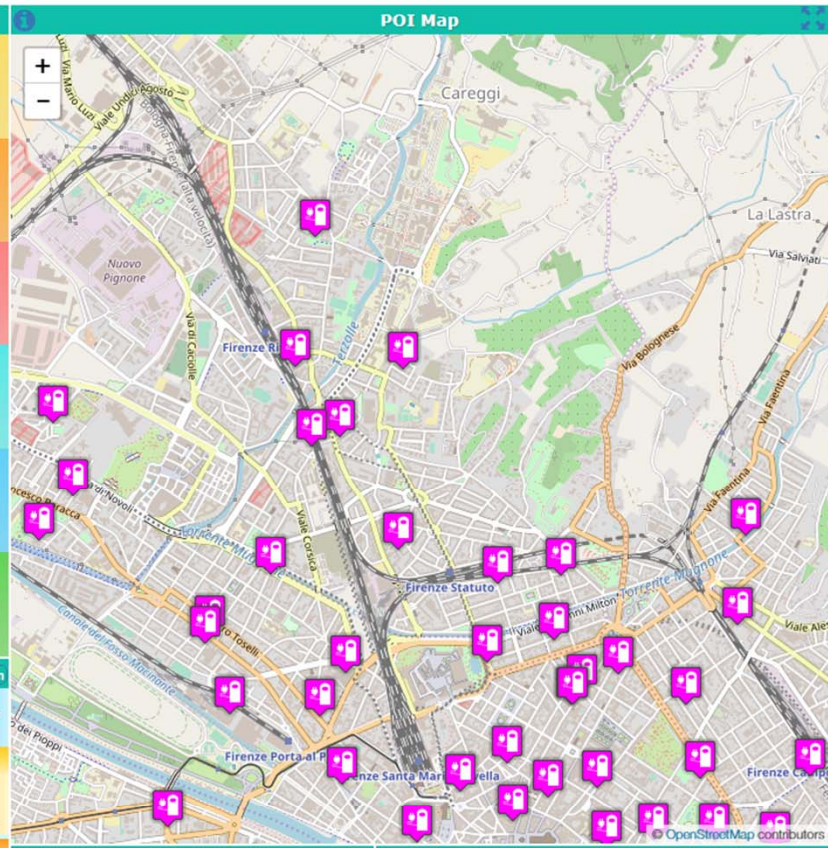
<http://dashboard.km4city.org/dashboardSmartCity/view/index.php?iddashboard=MTIV>

Click POI of interest below

- (1)** Fast recharging stations
- (2)** Cycle paths
- (4)** Public transport paths (F)
- (6)** Restricted traffic areas
- (8)** Parking status
- (7)** Variable Message Signs (F)

Traffic events 18m

	INCIDENTE A FIRENZE - VIA MASACCIO	LONG DELAYS	24/10/2017	17:12:25	2	ON MAP
	INCIDENTE A FIRENZE - VIA MASACCIO	ACCIDENT(S)	24/10/2017	20:44:29	5	
	INCIDENTE A FIRENZE - VIA GARFAGNANA	ACCIDENT(S)	25/10/2017	11:30:29	8	



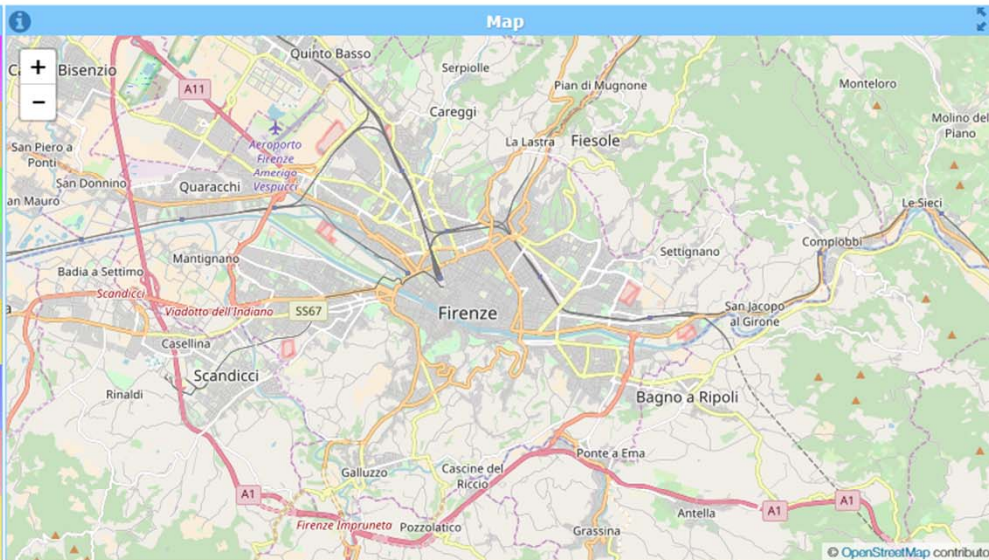
REPLICATE

Pilot dashboard

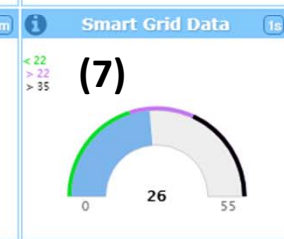
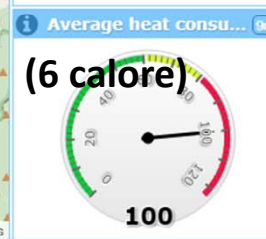
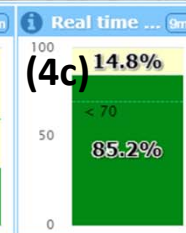
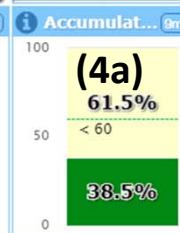
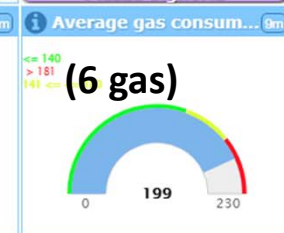
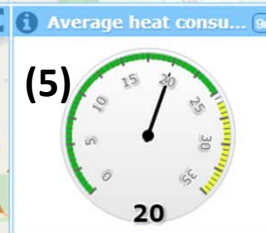
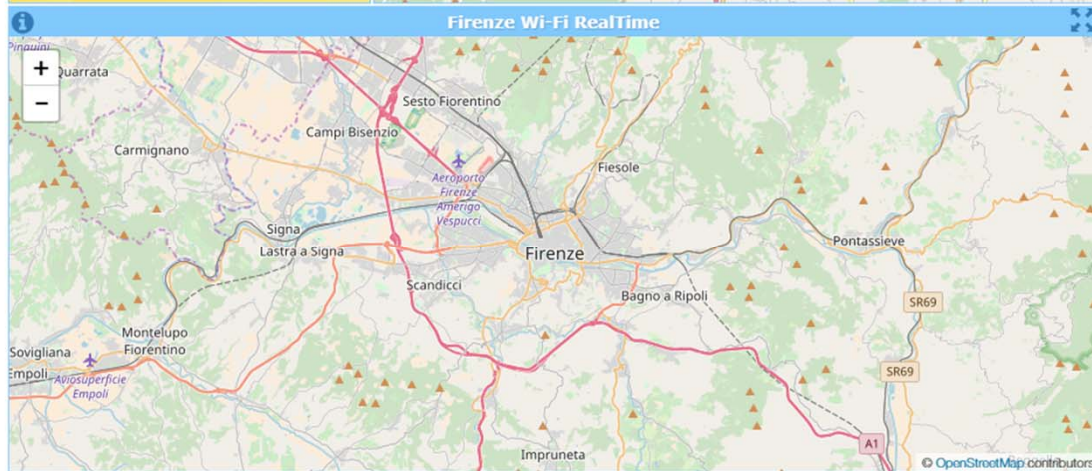


Mon 23 Oct @ 14:55:54

- 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



- (14)
- Duomo**
 - P. Michelangelo**
 - Piazza Repubblica**
 - Piazza S. Croce**
 - Ponte Vecchio**
 - Piazza Signoria**



REPLICATE

Resilience



Mon 23 Oct @ 15:40:51

Points of interest - 1

(1) Rivers sensors (D)

(7) Underpasses status (F)

Points of interest - 2

(3) Minor reticulum sensors (F)

(10) Variable Message Signs (D)

Points of interest - 3

(4) Asphalt temperature (F)

(8) Public transport paths (F)

Meteo forecast - Florence

Wednesday	Thursday	Friday	Saturday	Sunday
(5) cloudless 14°C / 23°C	 mist 6°C / 22°C	 cloudless 7°C / 23°C	 cloudy /	 moderate rain /

Map

Traffic events in Florence

(9) INCIDENTE A FIRENZE - VIA GARFAGNANA

ACCIDENTI(S)	TIME	COUNT
25/10/2017	11:30:29	8

INCIDENTE A FIRENZE - VIA MASACCIO

ACCIDENTI(S)	TIME	COUNT
24/10/2017	20:44:29	5

INCIDENTE A FIRENZE - VIA MASACCIO

LONG DELAYS	TIME	COUNT
24/10/2017	17:12:25	2

PROTEZIONE CIVILE

GENERAL METEO

NULLO	BASSO	MEDIO	ALTO

(11)

First aids - Florence

Priority\ Hospitals	Red code	Yellow code	Green code	Blue code	White code
PS SANTA MARIA NUOVA	0 (6)	12	15	2	1
PS AO CAREGGI	0	36	22	6	0
PS SANTA MARIA ANNUNZIATA	1	10	17	7	1

Real time data

(2a) 20

Data trends

(2b)

(12)

Chat

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.

