

Be smart in a SNAP!



SMARTCITY EXPO WORLD CONGRESS

15 - 17 NOV 2022 BARCELONA & ONLINE

Visit our stand: Pavillon 2, stand B86

Snap4City Deploy & Smart City Setup

December 2022, Course <https://www.snap4city.org/577>

SCALABLE SMART ANALYTIC APPLICATION BUILDER FOR SENTIENT CITIES



UNIVERSITÀ DEGLI STUDI FIRENZE

DINFO DEPARTAMENTO DI FISICINA DELL'INFORMAZIONE

DISIT DISTRIBUTED SYSTEMS MULTIMEDIA E TECHINICAL LAB



UNIVERSITÀ
DEGLI STUDI
FIRENZE

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DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB



SNAP4CITY



Powered by

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

<https://www.Snap4City.org>



December 2022, Course
<https://www.snap4city.org/577>

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<https://www.Km4City.org>
<https://www.disit.org>





SMART SOLUTIONS AND DECISION SUPPORT SYSTEMS

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



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



DASHBOARDS, WIDGETS
TEMPLATES

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

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

ANY: DATA, BROKER, NETWORK AND VERTICAL

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

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

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

Native and External
Applications

Smart Parking

Smart Light

Smart Waste

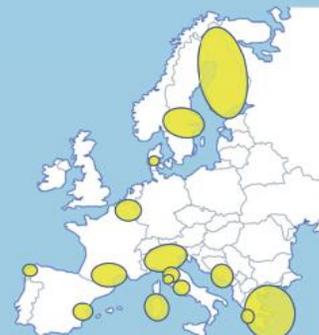
Smart Energy

Social Media Analysis

...



METHODOLOGIES
LIVING LABS
COURSES AND COMMUNITY
DEVELOPMENT TOOLS



Powered by
FIWARE

FREE
TRIAL

PEN Test
Passed

EU GDPR
COMPLIANT

SNAP4
Appliances and Dockers
Installations

EUROPEAN OPEN
SCIENCE CLOUD

Node-RED

JS Foundation

E015
digital ecosystem

NVIDIA

Snap4City/Industry structure

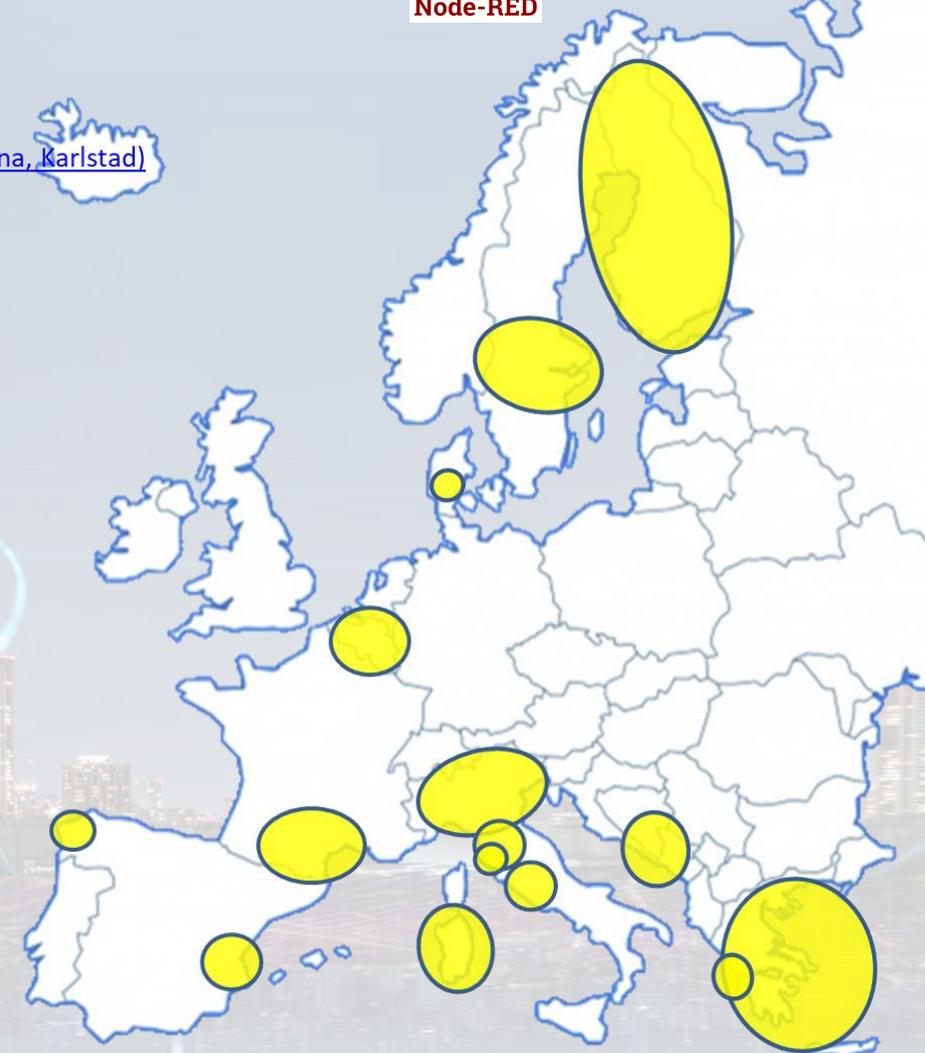
- The **Snap4xxxx** solution is released in Open Source, VM and Docker with fully support of MultiTenant/multiple-Organizations
 - Each Organization may be configured for a separate environment with a set of Maps, Menus, Users, Data, Dashboards, IOT Apps, MicroApplications, Custom Widgets, Models, resources, open data, etc.
- <https://www.Snap4City.ORG> is the main instance of Snap4xxxx solution managed by DISIT Lab. The main documentation is located and updated on Snap4City.org, GitHUB, dockerHub and Node-Red Library. Snap4City.org is where the last tools are tested and news published.
 - Organizations on Snap4City.org have been created with contracts as for *Platform as a Service*, for testing and for providing *SmartCity as a Service* as well as *Industry 4.0 as a Service*



- 8 running installations in Europe
 - Toscana, Pisa, Sweden, ISPRA, Snap4.eu,
 - Altair, Italmatic, Denmark,
- 13 projects, 12 pilots on 10 Countries
 - >40 cities/area
- **Wide MULTI-tenant deploy, e.g.,**
 - 18 Organizations / tenant
 - > 7400 users on
 - > 1400 Dashboards
 - > 16 mobile Apps
 - > **2 Million of structured data per day**
 - > 520 IoT Applications/node-RED
 - > 700 web pages with training
 - > 60 videos, training videos

Main Organizations/areas

- [Antwerp area \(Be\)](#)
- [Bologna \(I\)](#)
- [Capelon \(Sweden: Västerås, Eskilstuna, Karlstad\)](#)
- [DISIT demo \(multiple\)](#)
- [Dubrovnik, Croatia](#)
- [Firenze area \(I\)](#)
- [Garda Lake area \(I\)](#)
- [Greece \(Gr\)](#)
- [Helsinki area \(Fin\)](#)
- [Livorno area \(I\)](#)
- [Lonato del Garda \(I\)](#)
- [Modena \(I\)](#)
- [Mostar, Bosnia-Herzegovina](#)
- [Oslo & Padova \(Impetus\)](#)
- [Pisa area \(I\)](#)
- [Pistoia \(I\)](#)
- [Pont du Gard, Occitanie \(Fr\)](#)
- [Prato \(I\)](#)
- [Roma \(I\)](#)
- [Santiago de Compostela \(S\)](#)
- [Sardegna Region \(I\)](#)
- [Siena \(I\)](#)
- SmartBed (multiple)
- [Toscana Region \(I\), SM](#)
- [Valencia \(S\)](#)
- [Venezia area \(I\)](#)
- [WestGreece area \(Gr\)](#)

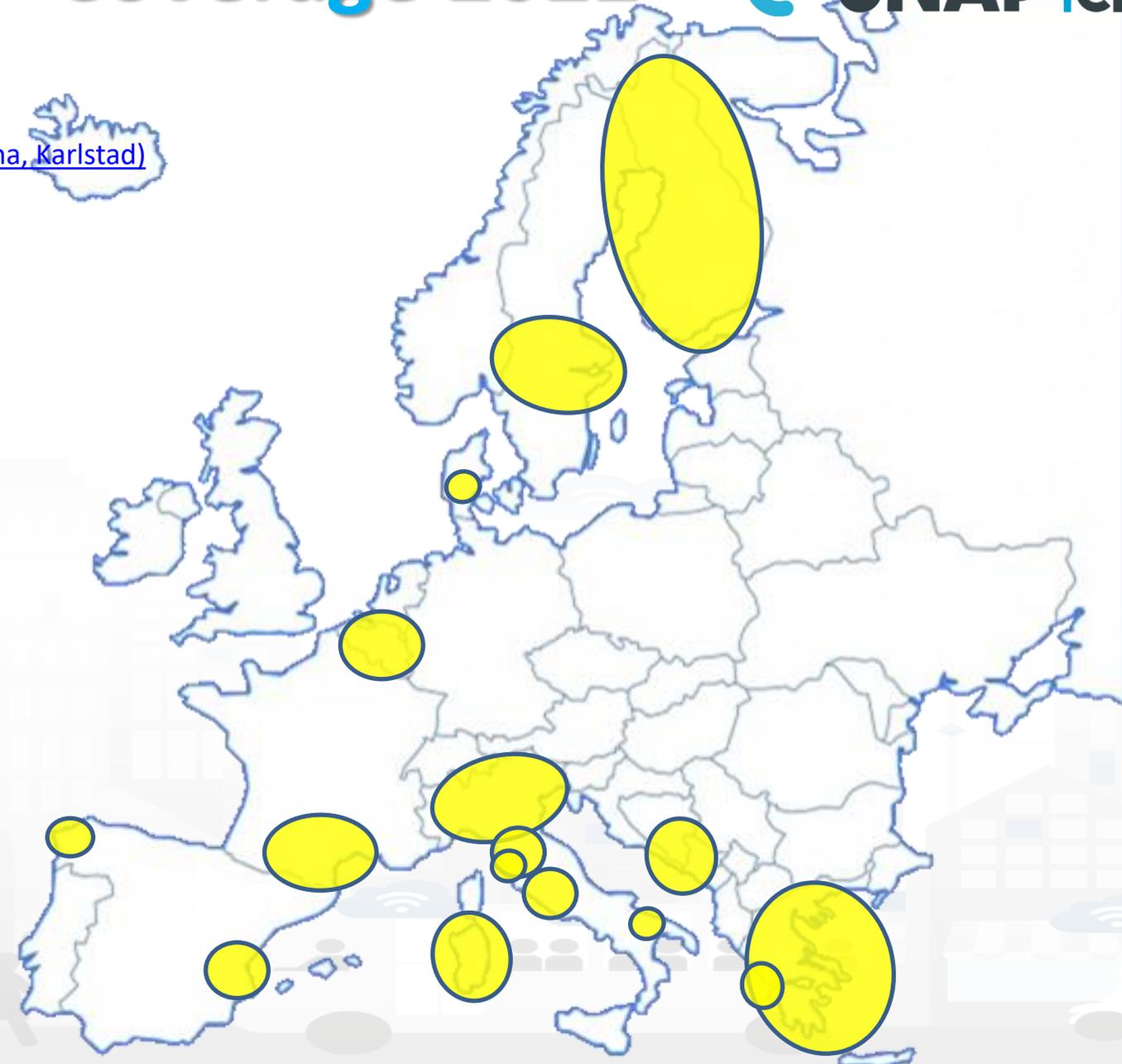


- **Trials in Israel, Colombia, Brasile, Australia, India, Romania, etc.**



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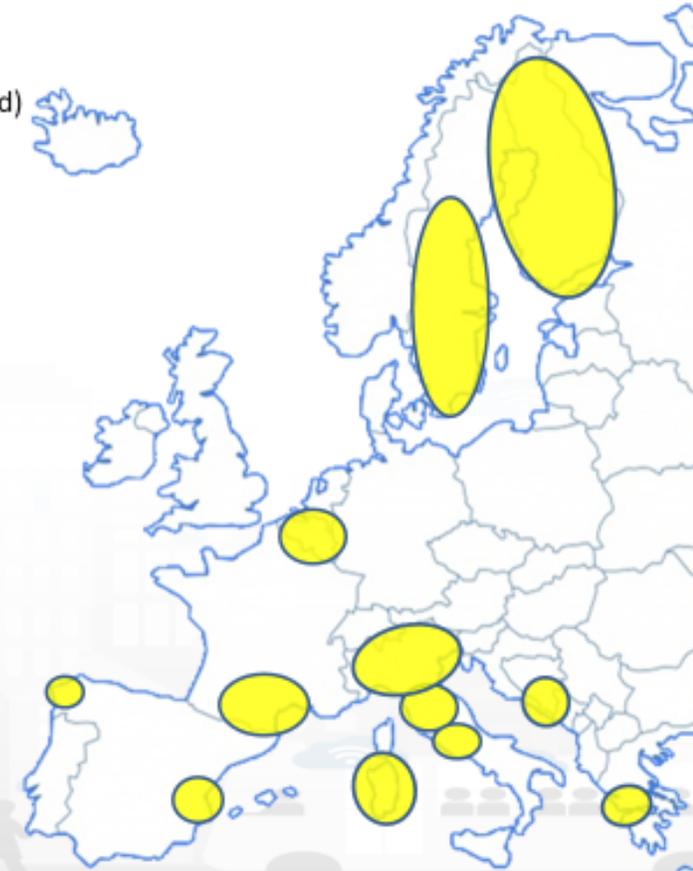


Snap4City/Industry Community

- Most of Organizations on Snap4City.org also correspond to companies or institutions that have an installation of Snap4City tools on their Premise,
 - such as: Pisa, SmartGarda Lake, Snap4, ALTAIR, etc.
- This double way allows them to:
 - test the news,
 - share experiences with other groups,
 - get visibility,
 - work in the collaborative environment, and
 - be better supported by Snap4City.org and DISIT Lab personnel.
- Each instance of Snap4xxxx solution **can decide to join the federation** of SmartCity API to exploit shared data.
 - This allows to exploit regional data for city installations applications (web, mobile, dashboards, etc.) without reloading them for example.

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Snap4City (C), October 2020

How to adopt Snap4City



Smart City as a Service

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



On your premise



Installation on your premise

- Virtual Machines or Docker
 - Different configurations
 - From small to scalable
 - Exploiting your legacy tools
 - Interoperable with any tool
 - No vendor lock-in, No tech lock-in
- Mixed solutions! For example:**
- Start on Cloud as Smart City as a Service
 - Migrate on premise on the fly
 - Start on Cloud into a sand box
 - Pass to install on premise what you need

<https://www.snap4city.org/577>



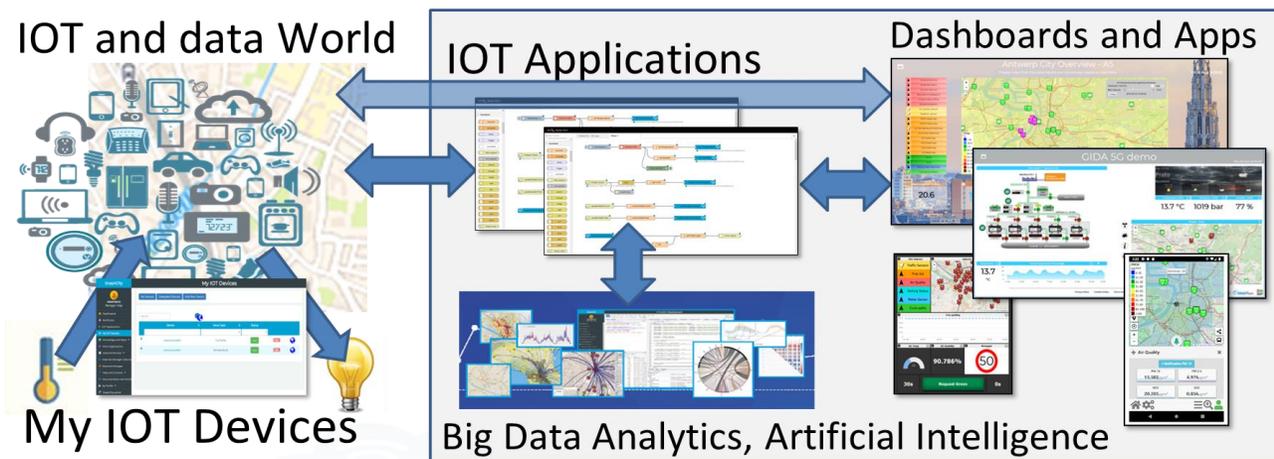
On Line Training Material (free of charge)

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

Video1								
Video2								
Video3								
Video4				none		none	none	none

Free Trial

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



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

General Overview of the full Course

1. *General Overview*
2. ***Dashboards** Creation and Management, **Business Intelligence***
3. ***IOT Applications** development, **IOT Devices**, **IOT Networks***
4. ***Data Analytics**, in R Studio, in Python, how to Exploit and Manage Data Analytics in IOT Applications*
5. ***Data Ingestion**, Data Warehouse, Data Gate, IOT Device Data ingestion, IOT App for Data Ingestion, **Interoperability**, etc.*
6. ***Snap4City Installation, Extension, Administration***
7. ***Smart city API** (internal and external) **Web and Mobile App development** tool kit*
8. ***How to Design and Develop Smart Solutions***

A number of the training sections include esercitazioni

Updated versions on: <https://www.snap4city.org/577>

See also courses in ITALIANO: <https://www.snap4city.org/485>

6th part Agenda

- GO • **Snap4City/Industry Architecture**
- GO • **Snap4City technology for Industry 4.0 → Snap4Industry**
- GO • **Snap4City & FIWARE, IoT Device Models**
- GO • **Snap4City vs State of the Art Solutions**
- GO • **Smart City in a Snap, How to become smart**
 - GO – **Smart City Development Life Cycle**
 - GO – **Analysis and Design for Innovation (Co-Creation and Co-Working)**
 - GO – **Analysis for Innovation, the workshops for innovation, co-creation; Data Discovery**
- GO • **Snap4City: Overview of Development Tools**
 - **IOT Network Interoperability**
 - **Integration via IoT Apps and processes**
 - **Integration via IoT Apps on IoT Edge**
 - **Integration with GIS and ArcGIS**
 - **API, and Federation of Smart Cities via API**
 - **Linked Open Data**
- GO • **Platform How to Add new features capability and constraints**
- GO • **Snap4City/Industry: Smart Solution IOT as a Service vs Consulting and Developing**
- GO • **Snap4City Living Lab For Collaborative Work**
- GO • **The view of the Administrator**
 - **Main menu, User Management, Auditing, Platform Management, Customer Relationship Management and Living Lab**
 - **AMMA traffic Analyzer, Data Analyzer, Back Office Platform Scalability**
 - **Monitoring Resources and API Traffic; DISCES; reports**
 - **Mng. Photos and comments, Mobile App Monitoring, IoT App management, Data-City small example, ..**
- GO • **Installing Snap4City**
- GO • **Acknowledgement**

LOGIN

Dashboards (Public)

Knowledge and Maps

- Service Map (Toscana)
- Service Map 3D (Firenze)
- Helsinki Service Map
- Garda Lake Service Map
- Cagliari Service Map
- Service Map 3D (Helsinki)

Micro Applications

External Services

Data Set Manager: Data Gate

Resource Manager

Development Tools

Management

Help and Contacts

Documentation and Articles

Km4City portal

DISIT Lab portal



Home / Snap4City - scalable Smart aNalytic APplication builder for sentient Cities

Snap4City - scalable Smart aNalytic APplication builder for sentient Cities



Tutorials



Scenarios



Innovations



Interoperability



Installations



What People say



Mobile Apps



IOT Devices



IOT Applications



Data Analytics



Dashboards



Living Lab



Smart City API

Smart City
Ontology

Articles



See you at Stand A118

EUROPEAN OPEN
SCIENCE CLOUD
MARKETPLACESNAP4CITY
HACKATHON
BUILD YOUR APP FOR A CONNECTED CITY

Smart Cities need to set up a flexible Living Lab to cope with the city evolution in terms of services and city users' needs and sustainability. Snap4City solution (<https://www.snap4city.org>) provides a flexible method and solution to quickly create a large range of smart city applications exploiting heterogeneous data and enabling services for stakeholders by IOT/IOE, data analytics and big data technologies. Snap4City applications may exploit multiple paradigms as data driven, stream and batch processing, putting co-creation tools in the hands of: (i) Smart Living Lab users and developers a plethora of solutions to develop applications without vendor lock-in nor technology lock-in, (ii) final users customizable / flexible mobile Apps and tools, (iii) city operators and decision makers specialized / sophisticated city dashboards and IOT/IOE applications for city status monitoring, control and decision support. Snap4City satisfies all the expected requirements of Select4Cities challenge PCP and much more, and it is 100% open source, scalable, robust, respects user needs and privacy; provides MicroServices and easily replaceable tools; compliant with GDPR; provides a set of tools for knowledge and living lab management, and it is compliant with more than 60 protocols including and its end user oriented communication. Snap4City is an official platform of FiWare, an official library of 3C Foundation, Node-RED, registered on

Login

Registration

- [New Registration](#)
- Request a new password

Search

Search

-Any-

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www.km4city.org

FI-WARE

Virtual
Assistant

TOP

Snap4City/Industry: Architecture

SNAP4
Appliances and Dockers
Installations

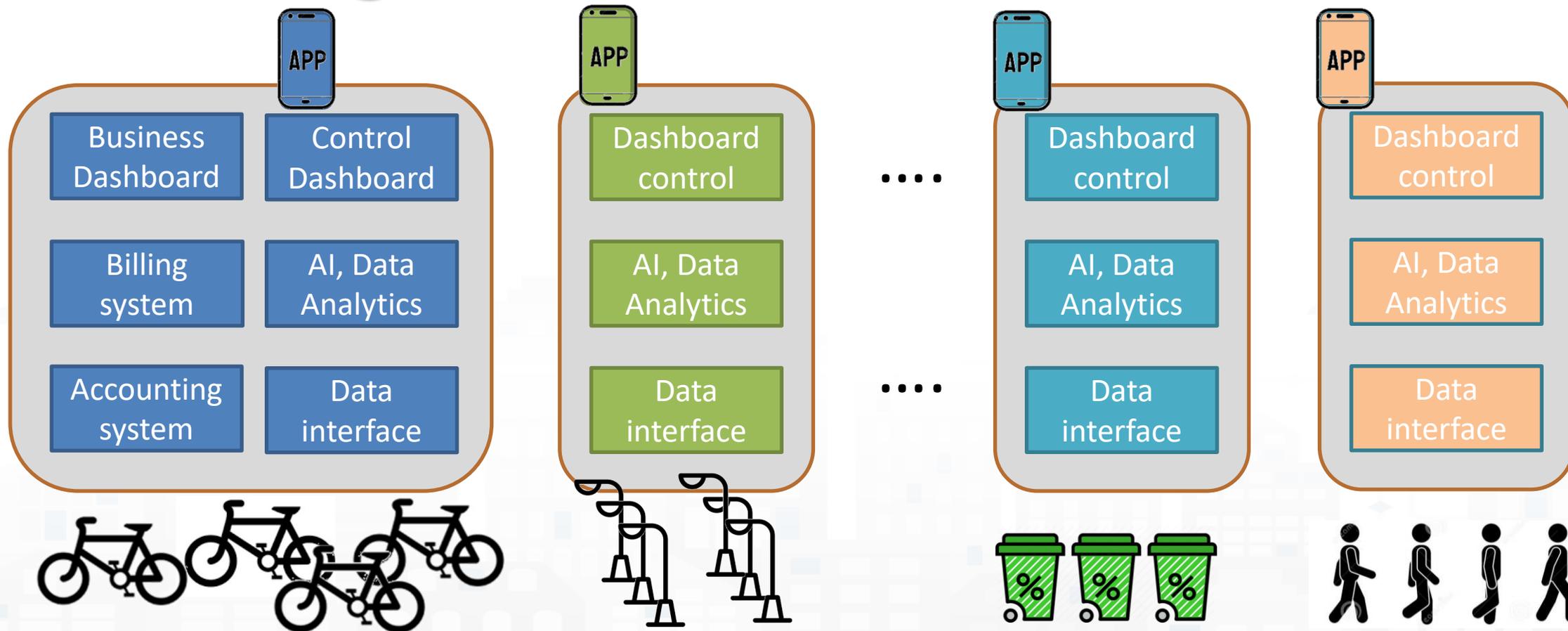


EU GDPR
COMPLIANT

PEN Test
Passed

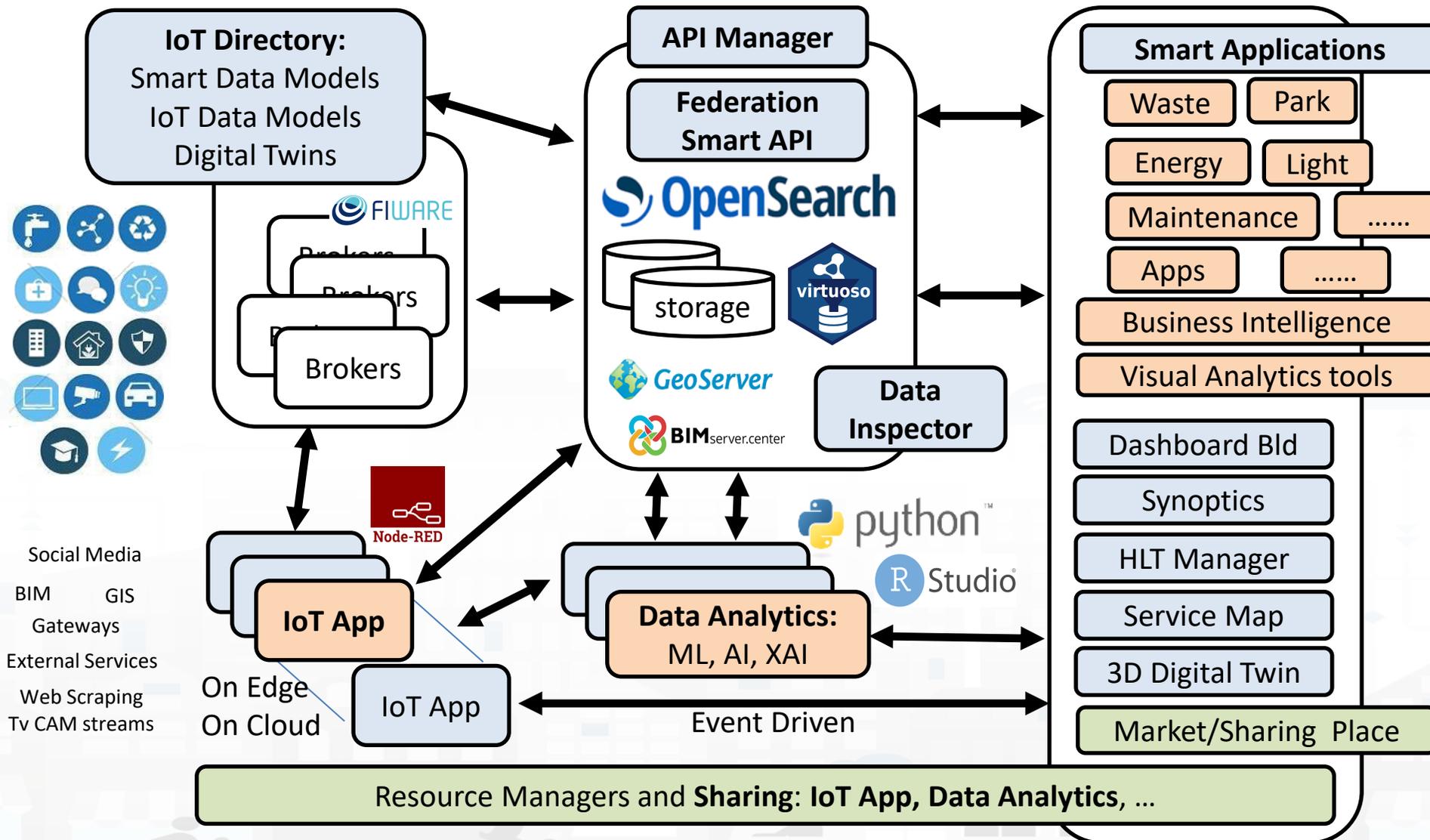
on
EUROPEAN OPEN
SCIENCE CLOUD
MARKETPLACE

Avoiding to have a collection of verticals

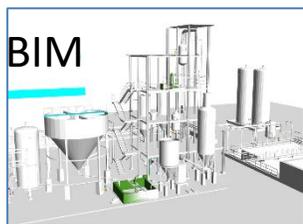


Simplifying the development and integration of verticals

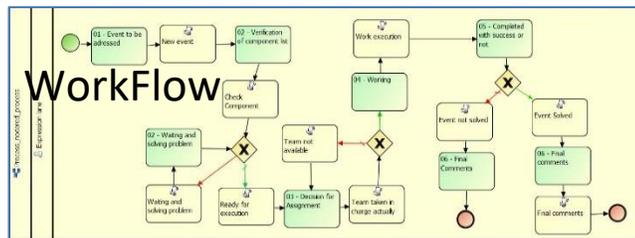
Tech Arch



Concept



KPI, POI, MyKPI, ...
API, External Services
Web Scraping





IOT Brokers
IOT Broker
IOT Broker



LD, LOD



Dashboards and Apps



Smart City Functional Architecture

Transport systems
Mobility, parking



Public Services,
Govern, events, ...



Sensors, IOT Cameras,
Wi-Fi



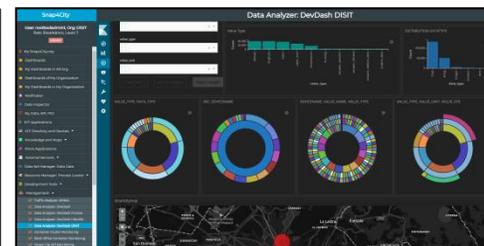
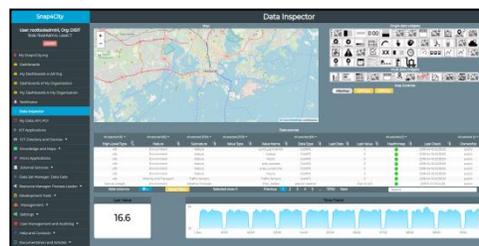
Environment, Water,
energy



Shops, services,
operators

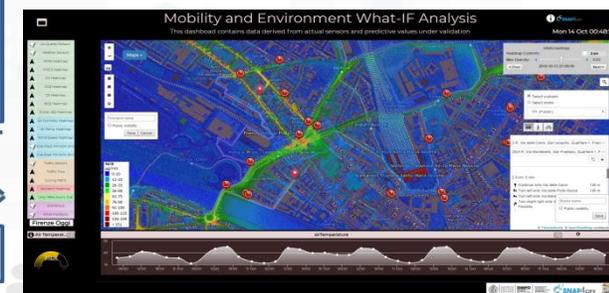
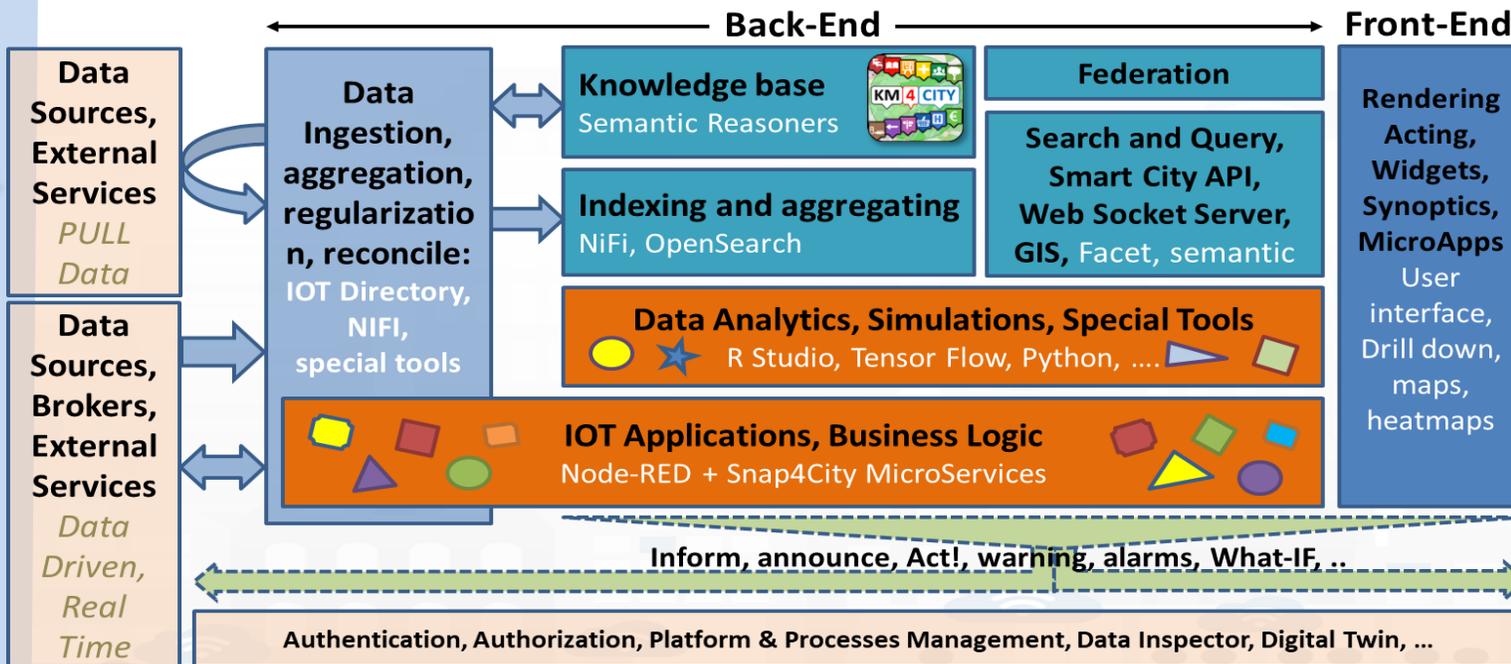
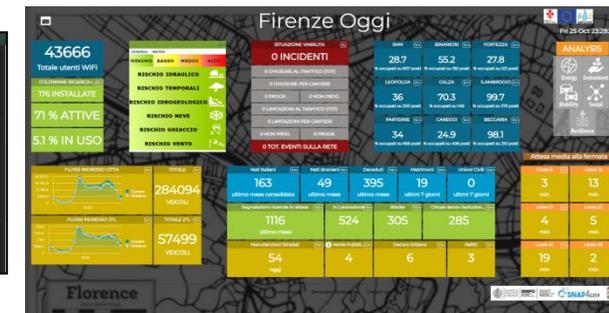


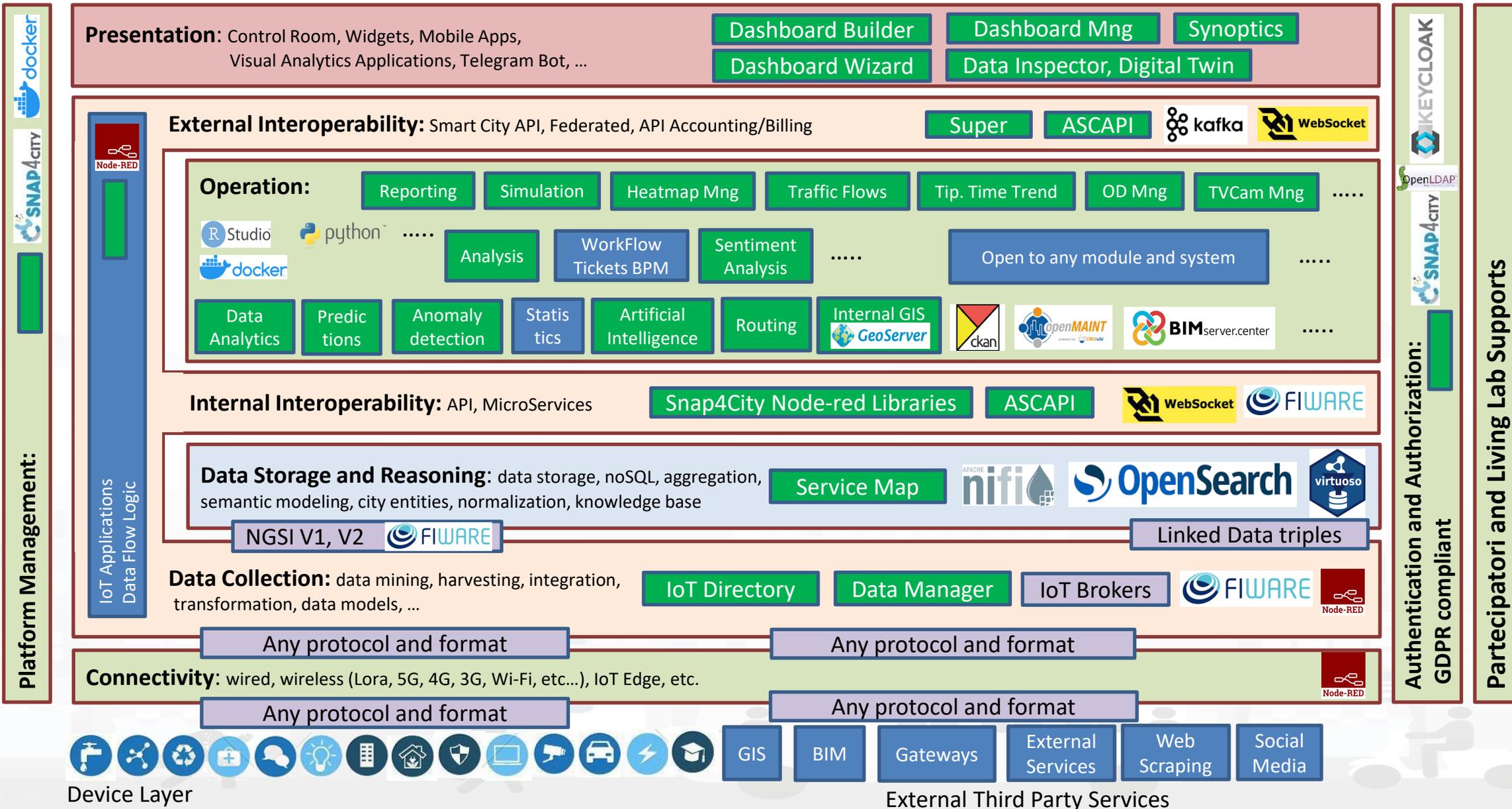
Social Media



Back office tool

Dashboards, visual tools,
Web and Mobile Apps





Snap4City

Protocols Interoperability



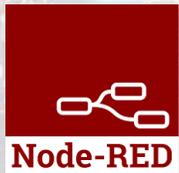
Standards and Interoperability (9/2022)



Compliant with:

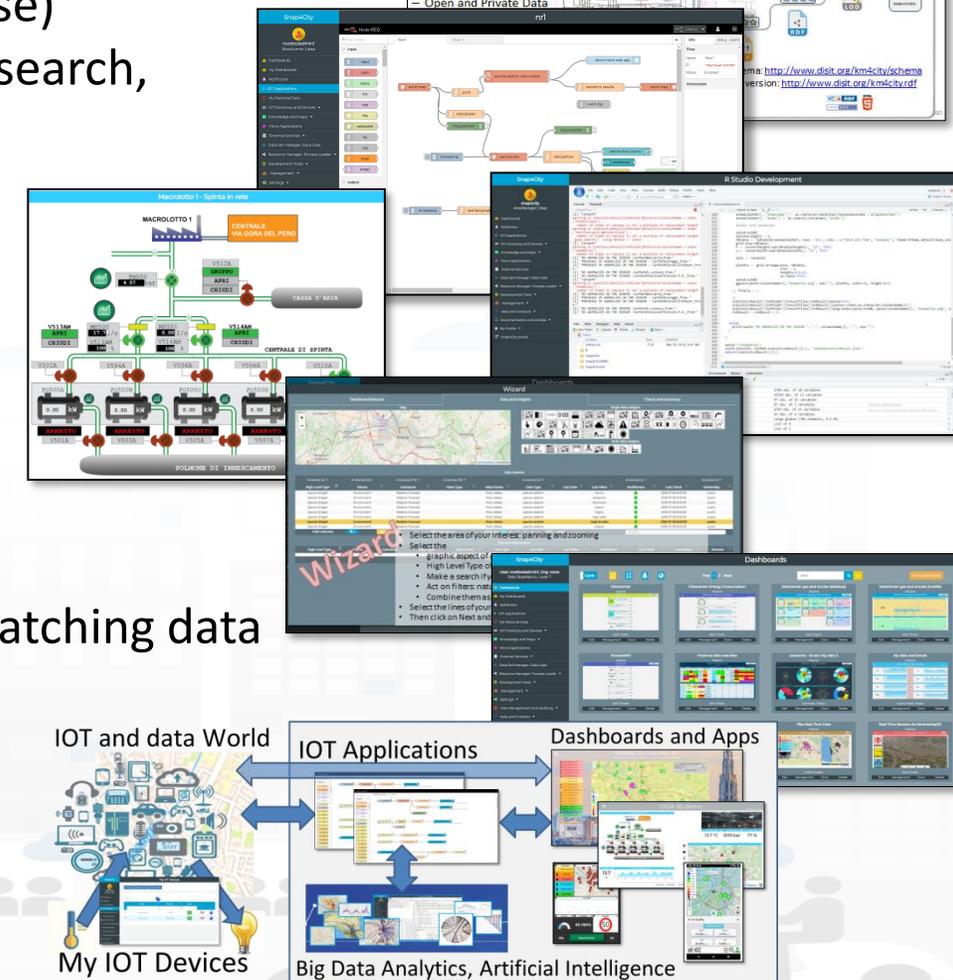
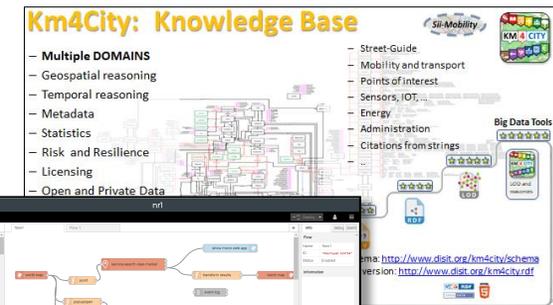
- **IoT:** NGSI V2/LD, LoRa, LoRaWan, MQTT, AMQP, COAP, OneM2M, TheThingsNetwork, SigFOX, Libelium, IBIMET/IBE, Enocean, Zigbee, DALI, ISEMC, Alexa, Sonoff, HUE Philips, Tplink, BACnet, TALQ, Protocol Buffer, KNX, OBD2, Proximus, ..
- **IoT model:** FIWARE Smart Data Model, Snap4City IoT Device Models
- **General:** HTTP, HTTPS, TLS, Rest Call, SMTP, TCP, UDP, SOAP, WSDL, FTP, FTPS, WebSocket, WebSocket Secure, GML, WFS, WMS, RTSP, ONVIF, AXIS TVCam, CISCO Meraki, OSM, Copernicus, The Weather Channel, Open Weather, OLAP,
- **Formats:** JSON, GeoJSON, XML, CSV, GeoTIFF, OWL, WKT, KML, SHP, db, XLS, XLSX, TXT, HTML, CSS, SVG, IFC, XPDL, OSM, Enfuser FMI, Lidar, gITF, GLB, DTM, GDAL, Satellite, D3 JSON, ...
- **Database:** Open Search, MySQL, Mongo, HBASE, SOLR, SPARQL, ODBC, JDBC, Elastic Search, Phoenix, PostGres, MS Azure, ..
- **Industry:** OPC/OPC-UA, OLAP, ModBUS, RS485, RS232,..
- **Mobility:** DATEX, GTFS, Transmodel, ETSI, ..
- **Social:** Twitter, FaceBook, Telegram, ..
- **Events:** SMS, EMAIL, CAP, RSS Feed, ..
- **OS:** Linux, Windows, Android, Raspberry Pi, Local File System, AXIS, ESP32, etc.

<https://www.snap4city.org/65>



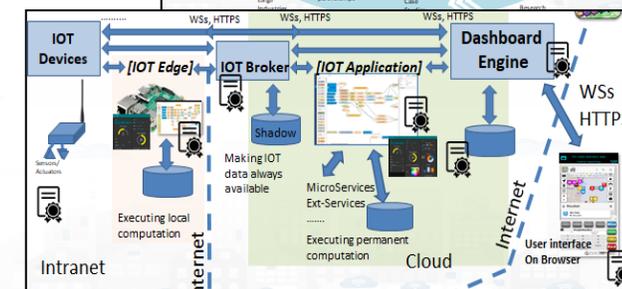
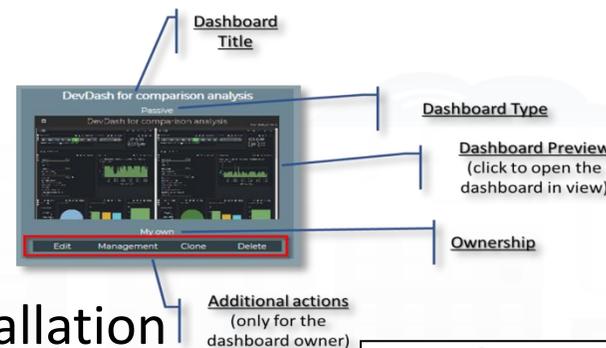
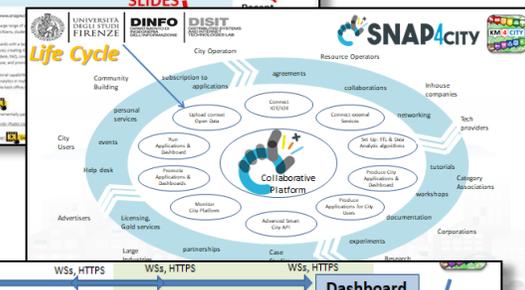
Unique of Snap4City Platform (1)

- Data ingestion and model
 - **Unified data model** (exploited in the Wizard and Knowledge base)
 - **Semantic Reasoner** modelling city entities, supporting semantic search, expert system, digital Twin, etc.
 - **Data loader, accelerators**
 - **IOT Directory** abstracting complexity of IOT Devices, Edge, Brokers, protocols and data formats
- Data Analytics and Data Processes
 - **Flexible and extensible IOT Applications**
 - **Data Analytic:** multiple programming languages, AI, XAI
- Visual Analytics, dashboarding, Apps
 - **Wizard: expert system** for immediate dashboard production matching data vs graphics representation
 - **Dashboards specialized** multidomain for Smart Cities
 - Integrated Global and Local **Digital Twin**
 - **Custom Widgets and Synoptics**
 - **Ready to use Mobile App, instant App, MicroApplication**
 - **Strategies** formalization supports



Unique of Snap4City Platform (2)

- Openness to any developers
 - Living Lab support for co-working, sharing, and delegating
 - Advanced Smart City APIs and MicroServices
 - 100% Open Source, open, Open hardware
- Security and Privacy
 - End-2-end encrypted communication, on devices, platform, ... dashboards
 - **GDPR compliant** privacy/security
- Non functional
 - on cloud and on premise, your private installation
 - On IOT edge and on cloud/premise
 - Multi-tenancy, multiple organization
 - Multiple smart solution on a single platform
 - Ready to use Appliance Virtual Machines and/or Containers for a modules and tools, IOT edge, OpenSource code on GITHUB.
 - Flexible, Modular, Elastic, open, scalable and robust



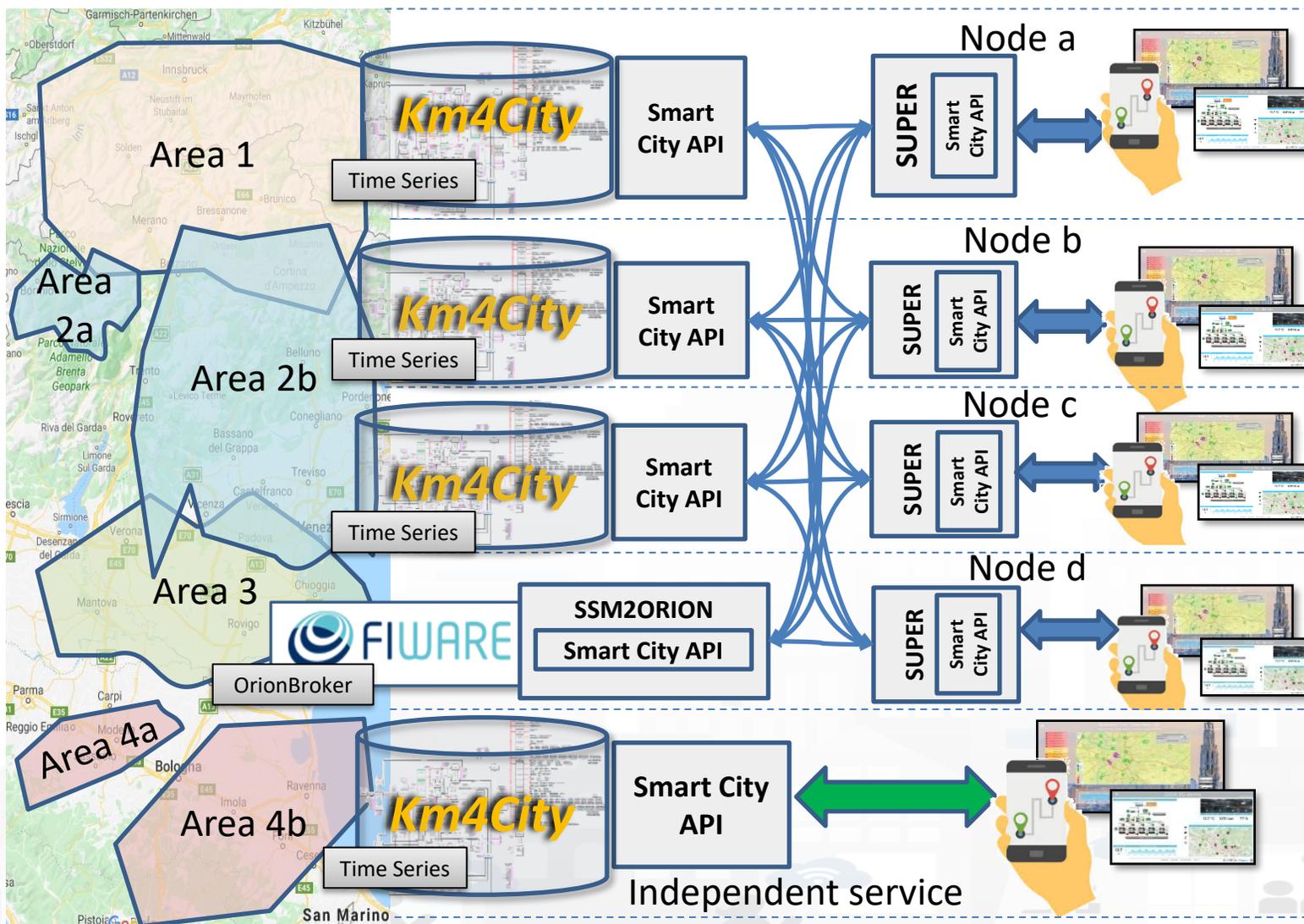
SNAP4
Appliances and Dockers
Installations



TOP

Multi Snap4City Platform Interoperability



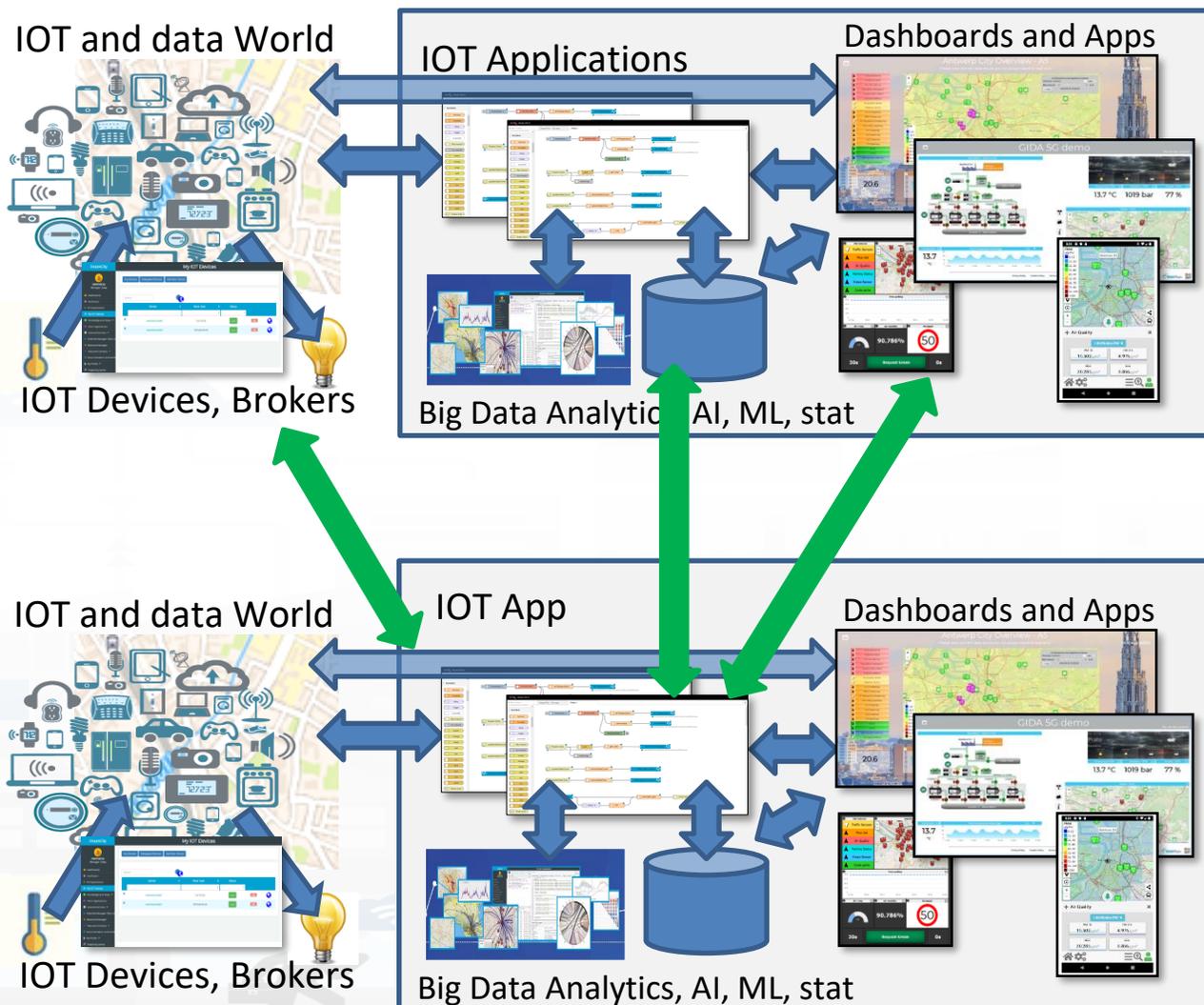


- **Km4City Semantic Reasoner**
- **ServiceMap interoperability**
- **Seamless for multiple Mobile Apps**
- **Smart City API**
- **Super:**
 - distributed access and sharing services
 - Each city control its own data
 - Final user can pass from one city / area to another in seamless manner: without changing the mobile Apps

Distributed Computing

- The Snap4City Libraries on Node-RED support the management of Multiple Snap4City Platforms Installations
- It is possible to:
 - Have in different Blocks/nodes, different registrations to different Snap4City Installations/platforms or Users
 - Get/Send data from/to a Snap4City Installations/Users and send/get to/from another
 - Have Multiple Brokers on multiple installations and users
 - Creating collaborative distributed processing that work and share data and processing in multiple platforms based on Snap4City or different.

Snap4City Multidomain Applications



Any Snap4City Installation
Different domain
Different user
Different auth./authoriz. System
Etc..

Any Snap4City Installation
Different domain
Different user
Different auth./authoriz. System
Etc..

TOP

Snap4City

Authentication Interoperability



Authentication and SSO

- Authentication in Snap4Tech is based on KeyCloak which is based on SAML, <https://auth0.com/blog/how-saml-authentication-works/>
- Different Versions of interoperability Authentication and Single Sign On, SSO, are available on demand, with
 - Spid, Public Digital Identity System, <https://www.spid.gov.it/en/>
 - EIDAS (electronic IDentification Authentication and Signature), <http://www.agid.gov.it/en/platforms/eidas>, <https://digital-strategy.ec.europa.eu/en/policies/eidas-regulation>
 - CIE, Electronic Identity Card https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-digital-identity_en
 - RealMe NZ, <https://www.realme.govt.nz/>



TOP



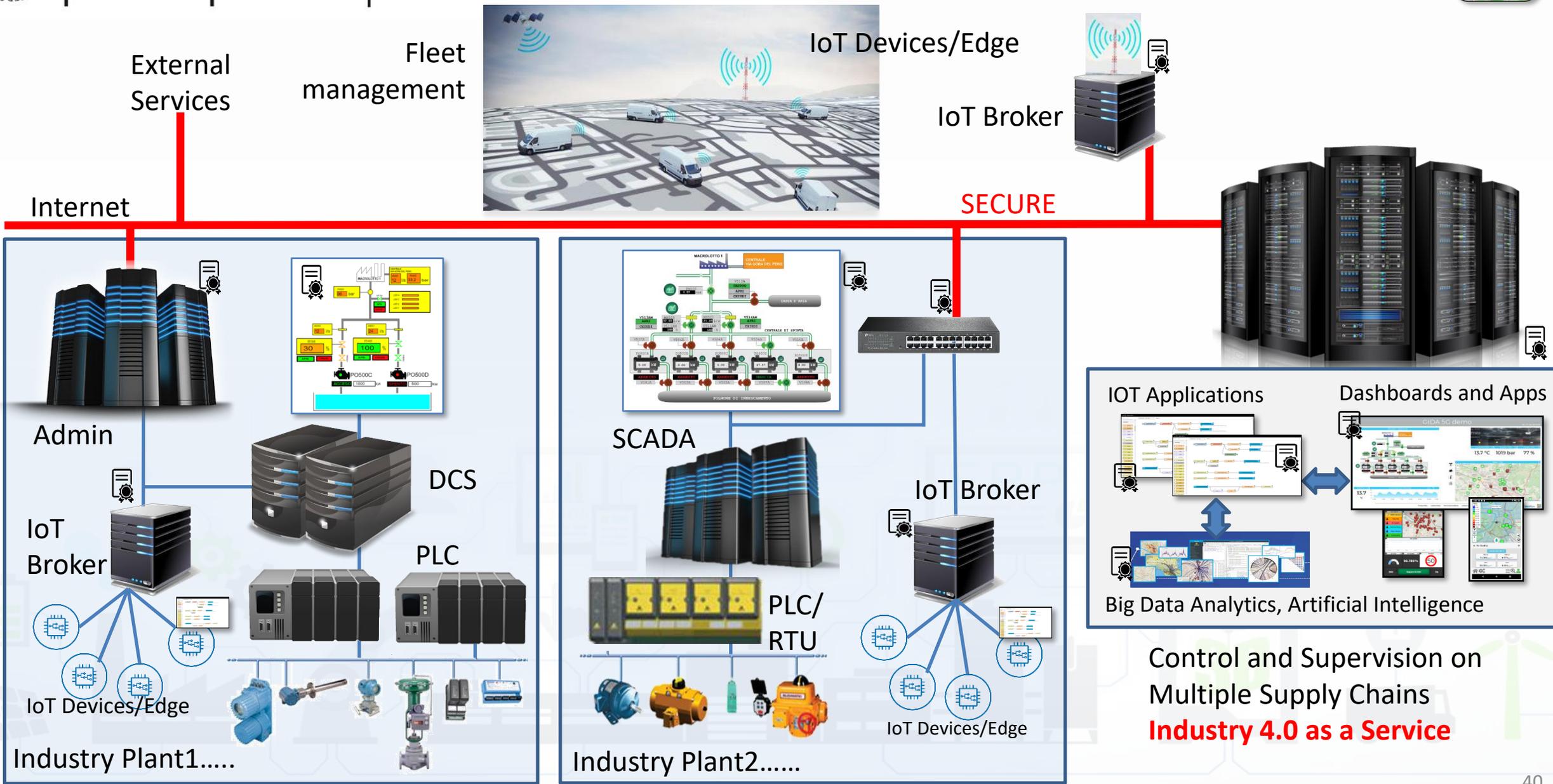
 **SNAP4**
Appliances and Dockers
Installations

Snap4City tech. for Industry 4.0

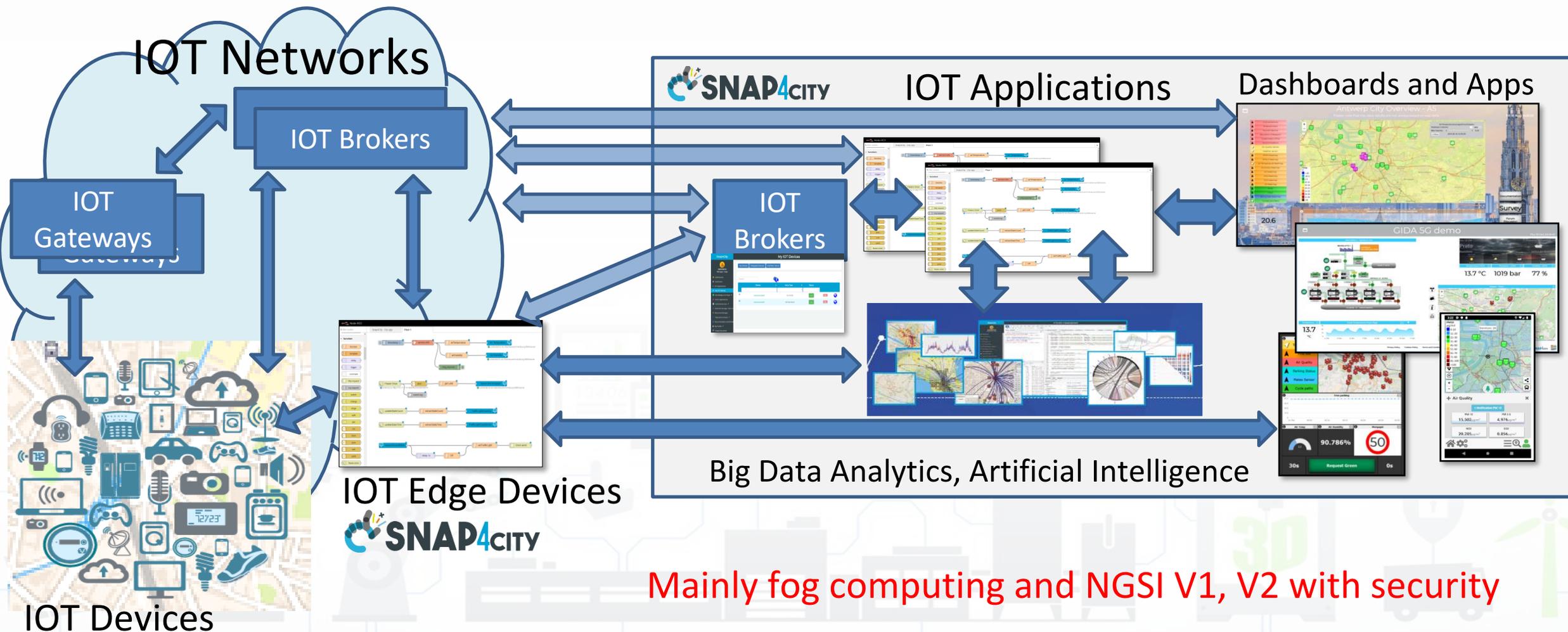
<https://www.snap4city.org>



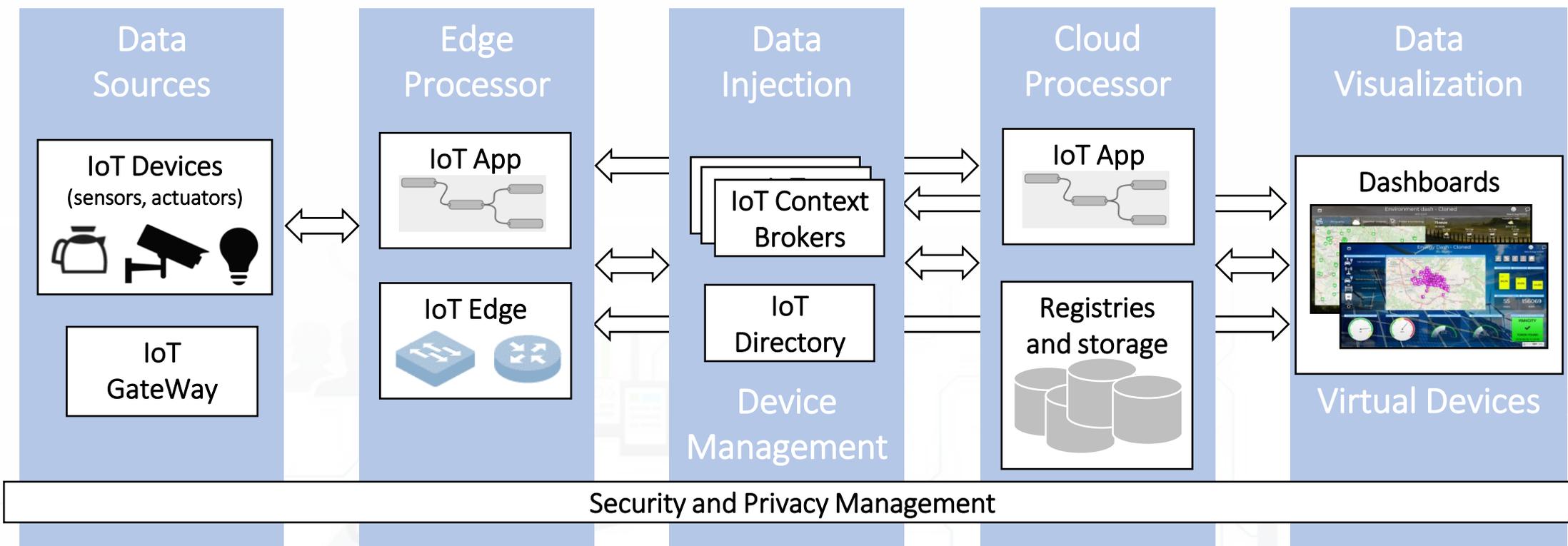
- [See more on https://www.snap4city.org/369](https://www.snap4city.org/369)
- Snap4City technology can be exploited on Industry and IOT solutions:
 - [Snap4Industry: Snap4City for Industry 4.0 \(SLIDES\)](#)
 - [Scenario: 5G Enabled Water Cleaning Control](#)
 - [Scenario: High Level Control of Industrial Plant](#)
 - [Custom Synoptics and Widgets for Dashboards](#)
 - [The integration between data and devices: the Snap4City solution](#)



Snap4City Services also on IOT Edge!!!



Security Architecture at a glance



GIDA set up



GESTIONE IMPIANTI DEPURAZIONE ACQUE S.p.A.

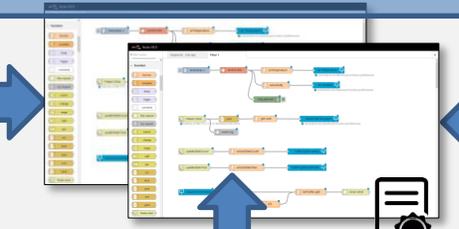


Smart City data from many sources

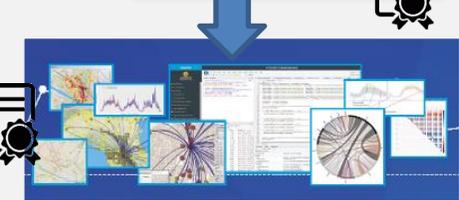


IOT Applications

Dashboards and Apps



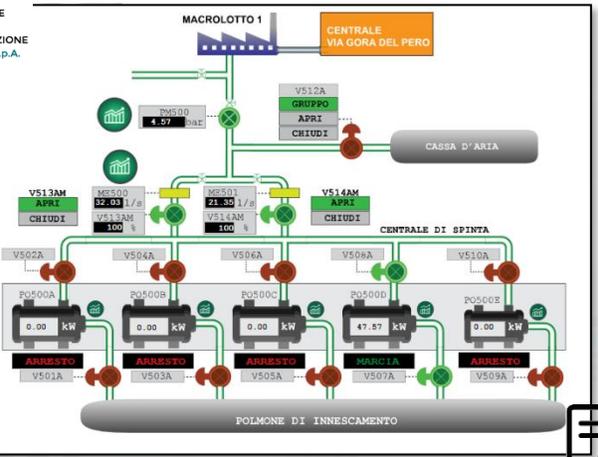
IOT Data Shadow Snap4City



Big Data Analytics, Artificial Intelligence



GIDA GESTIONE IMPIANTI DEPURAZIONE ACQUE S.p.A.



ModBus to Snap4City Gateway Edge

5G network devices

Telemonitoring Telecontrol





GIDA 5G demo

Wed 16 Oct 23:01:00

Details Absorption

Full Screen

Mer 16 Ott Powered by LaMMA

Prato

Nuvoloso 16°C / 21°C

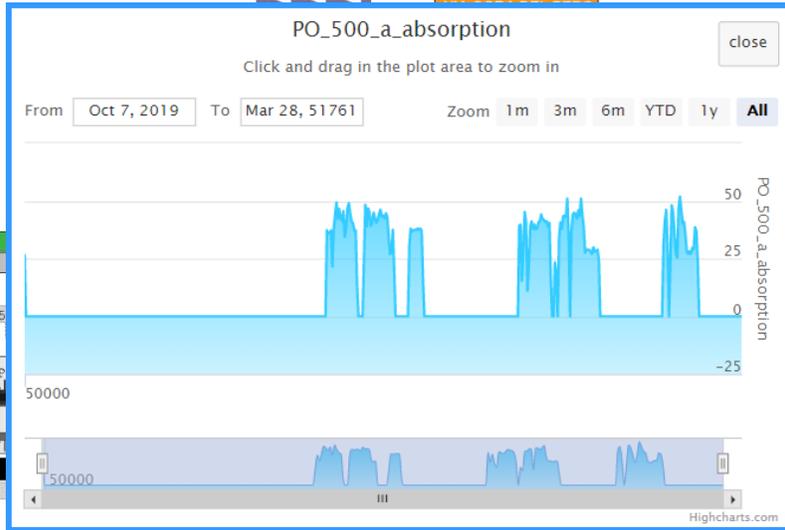
Gio 17 Ott 12°C / 21°C Nuvoloso	Ven 18 Ott 11°C / 22°C Nuvoloso	Sab 19 Ott Temp N/A Coperto	Dom 20 Ott Temp N/A Pioggia moderata o forte
---------------------------------------	---------------------------------------	-----------------------------------	--

tusc_weather_sensor_o... (8m) | Pressione - GIDA (8m) | Umidità - GIDA (8m)

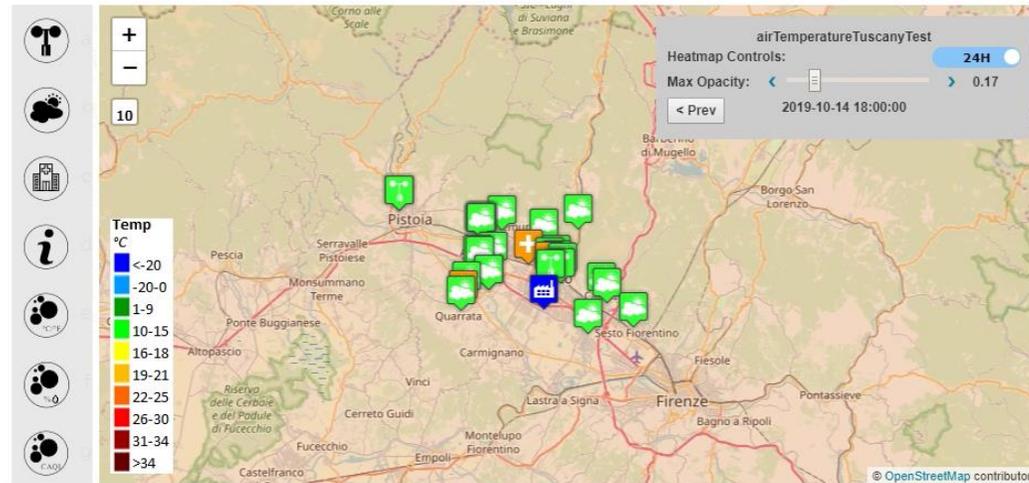
13.4°C 1020 bar 87%

MACROLOTTO 1

CENTRALE



POLMONE DI INNESCAMENTO



An aerial photograph of a chemical processing plant. The central focus is a large, white, rectangular industrial building with a gabled roof. Surrounding this building is a dense network of complex piping, metal walkways, and various types of storage tanks. Some tanks are tall and cylindrical, while others are shorter and wider. The tanks and pipes are painted in different colors, including white, green, and yellow. In the background, there are more industrial structures, including smaller buildings and additional storage tanks. The entire facility is situated in an open area with some trees and a clear sky. The lighting suggests it is daytime, with shadows cast across the ground and equipment.

*Altair
Chemical (1)*

Snap4Altair Decision Support supervision and control, Industry 4.0



reference

- **Multiple Domain Data**

- Distributed Control System: energy, flows, storage, chemical data, settings, ..
- Cost of energy, Orders, Production Parameters
- Maintenance data

- **Multiple Levels & Decision Makers**

- Optimized planning on chemical model
- Business Intelligence on Maintenance data

- **Historical and Real Time data**

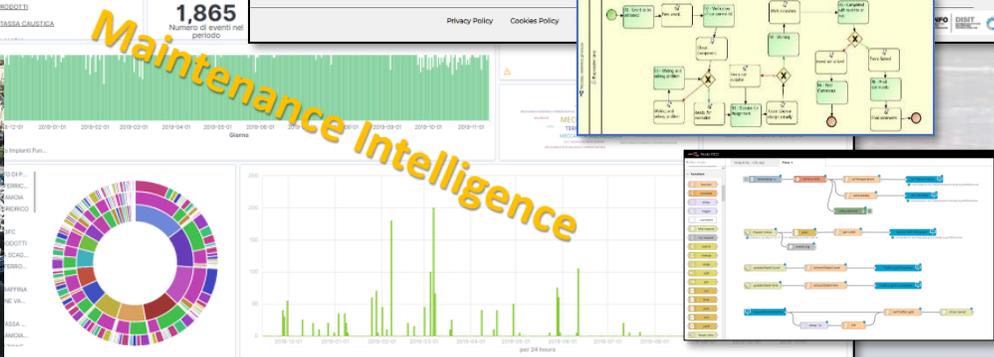
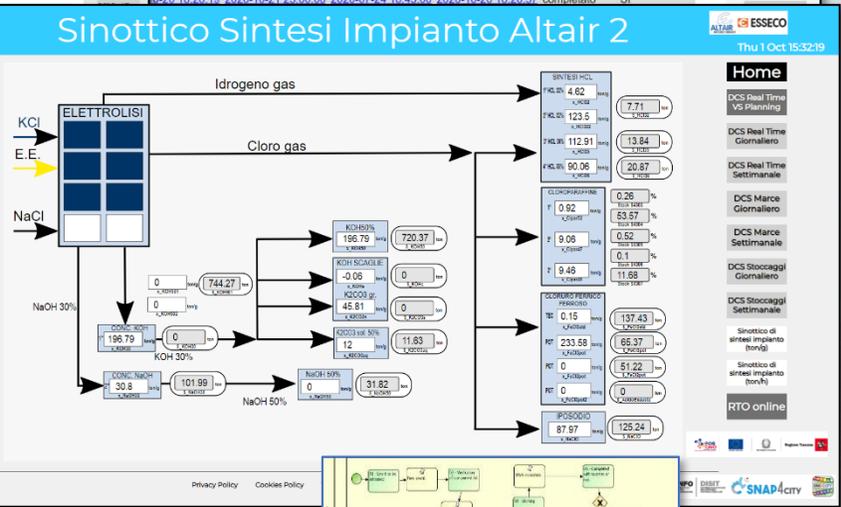
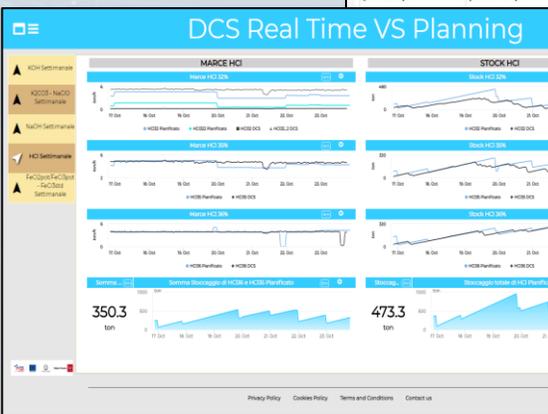
- Billions of Data

- **Services Exploited on:**

- Multiple Levels, Mobile Apps, API

- **Since 2020**

Snap4City (C), December 2022





Industry Plant Supervision and Maintenance



Aims

- **Control Room: Higher level supervision and monitoring (since 2020)**
 - Management of Production Plan *Optimization*
 - Control of Perimeter with drone and sensors
- **Maintenance ticketing (since 2017)**
 - *predictive* (in development)
 - 3D Digital Twin (in development)



MicroService Architecture



Energy Service



IoT App/DA: Real Time & Stream Processing

Predictive Maintenance

Prod. Plan Optimization

API/MicroServices

Maintenance Intelligence

Digital Twin Local / BIM

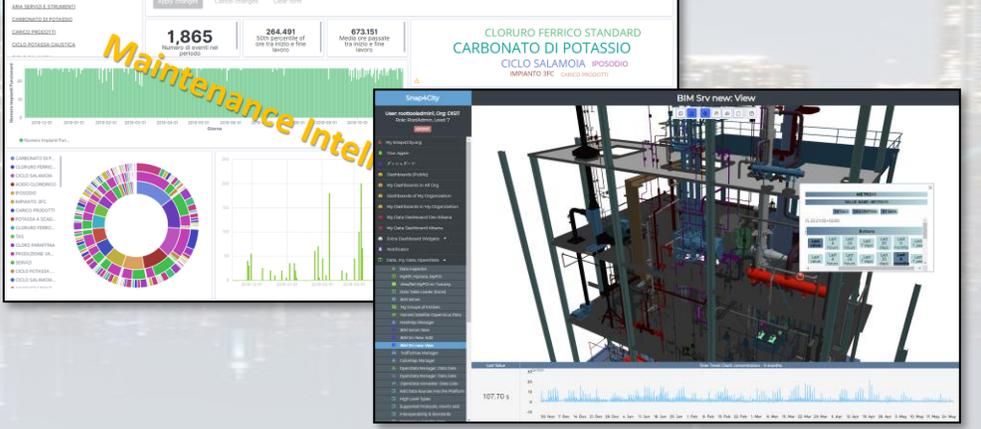
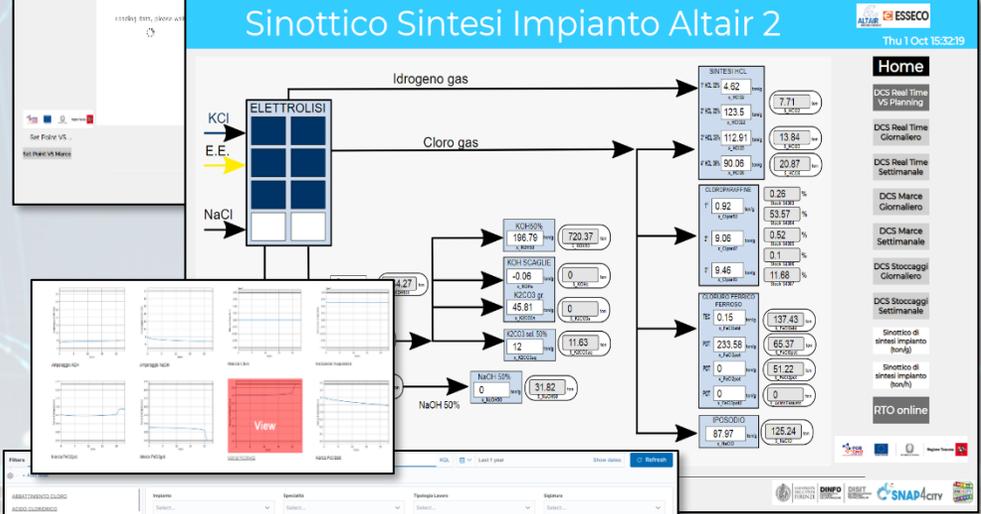
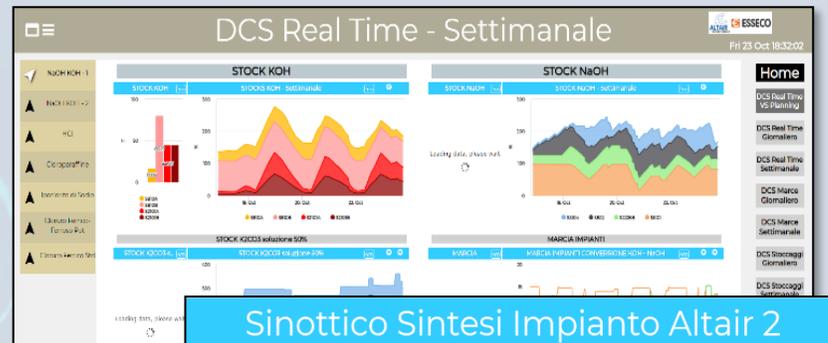
.....

Data Storage

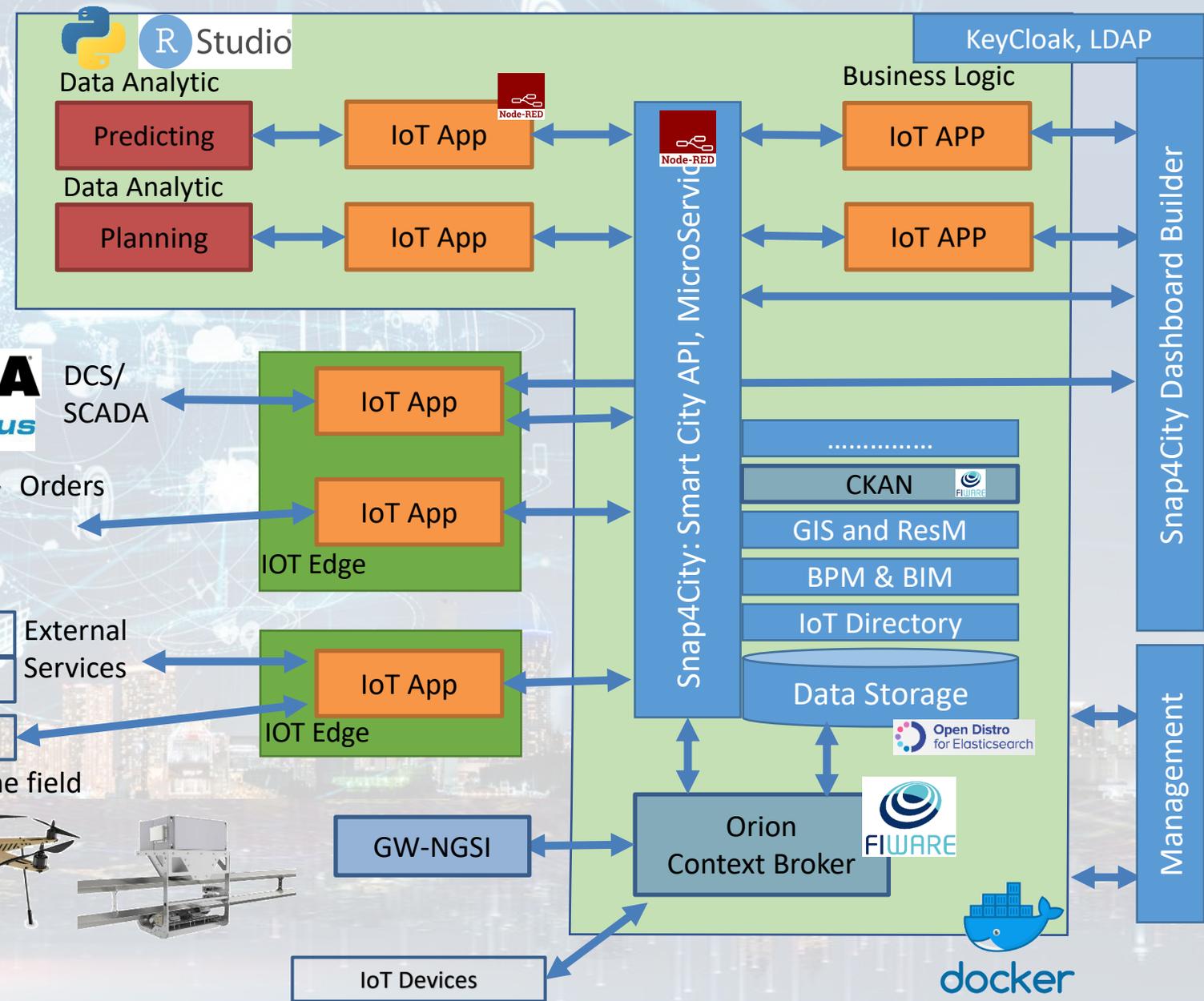
Management, Auth./Autoriz.

Data Connections and Transformation

Snap4City Dashboard Builder



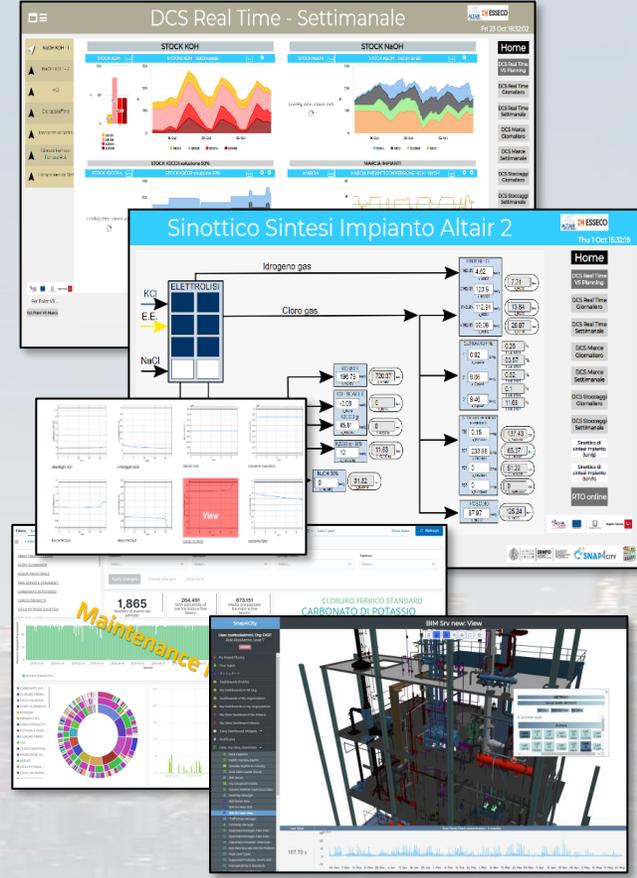
Snap4City/Industry Detailed Architecture



Production Parameters



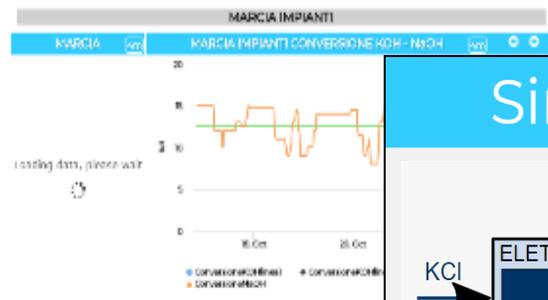
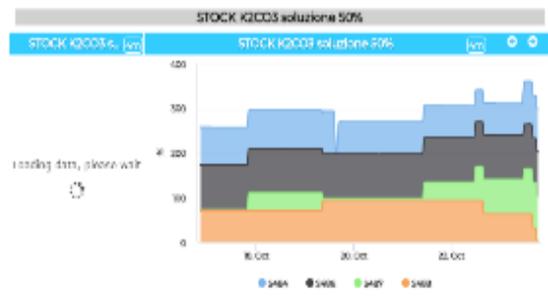
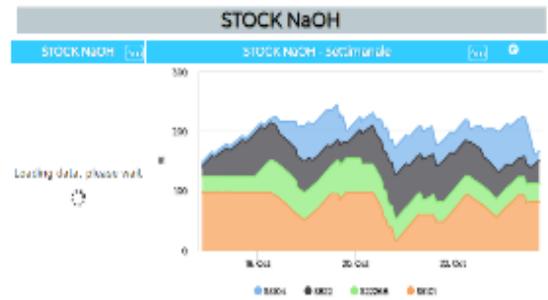
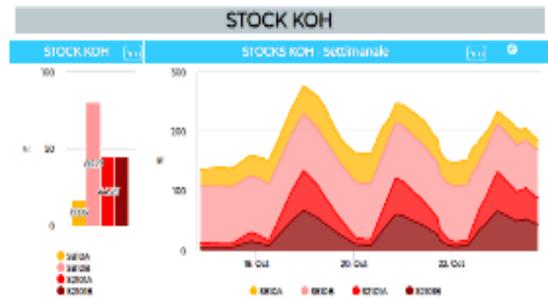
Dashboards, Visual Analytics, Synoptics, 3D, Maps



IoT Devices from the field



- ▲ NaOH KOH -1
- ▲ NaOH KOH -2
- ▲ HCl
- ▲ Cloroparaffine
- ▲ Cloruro di Ferro
- ▲ Cloruro Ferrico Ferroso Pot.
- ▲ Cloruro Ferrico Pot.



- Home
- DCS Real Time VS Planning
- DCS Real Time Giornaliero
- DCS Real Time Settimanale
- DCS Marce Giornaliero
- DCS Marce Settimanale
- DCS Stocaggi



RTO online

Localizzazione (id data)	Energia (PUN)	Altri Parametri	Pianificazione	Esito Pianificazione	In Produzione
0-01 09:32:54	2020-10-01 23:00:00	2020-07-24 18:43:00	2020-10-01 09:33:27	completato	<input type="checkbox"/>
0-30 17:20:50	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 17:21:00	completato	<input checked="" type="checkbox"/>
0-30 16:24:57	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 16:27:23	completato	<input type="checkbox"/>
0-30 14:54:11	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 14:56:22	completato	<input type="checkbox"/>
0-30 13:43:47	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 13:43:57	completato	<input type="checkbox"/>
0-29 19:03:27	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-29 19:03:43	completato	<input type="checkbox"/>
0-28 18:30:13	2020-09-29 23:00:00	2020-07-24 18:43:00	2020-09-28 18:30:23	completato	<input type="checkbox"/>
0-28 17:57:14	2020-09-29 23:00:00	2020-07-24 18:43:00	2020-09-28 17:57:23	completato	<input type="checkbox"/>
0-28 15:50:21	2020-09-28 23:00:00	2020-07-24 18:43:00	2020-09-28 15:50:45	completato	<input type="checkbox"/>
0-25 18:46:02	2020-09-26 23:00:00	2020-07-24 18:43:00	2020-09-25 18:47:46	completato	<input checked="" type="checkbox"/>

- Home
- DCS Real Time VS Planning
- DCS Real Time Giornaliero
- DCS Real Time Settimanale
- DCS Marce Giornaliero
- DCS Marce Settimanale
- DCS Stocaggi Giornaliero
- DCS Stocaggi Settimanale

Sinottico di sintesi impianto

Sinottico Sintesi Impianto Altair 2

Thu 1 Oct 15:32:19

- Home
- DCS Real Time VS Planning
- DCS Real Time Giornaliero
- DCS Real Time Settimanale
- DCS Marce Giornaliero
- DCS Marce Settimanale
- DCS Stocaggi Giornaliero
- DCS Stocaggi Settimanale
- Sinottico di sintesi impianto (ton/g)
- Sinottico di sintesi impianto (ton/h)
- RTO online



Optimized Production Planner



Fri 23 Oct 18:57:41

Home
Optimized Production Planner



Parameters (TabPar)	DCS (OPC-UA)	Administrative data (AS400)	Administrative Consolidated Planning data (AS400)	Energy data	Other Parameters	Planning result	Outcome	In production
2020-09-25 18:47:36	2020-10-23 18:49:02	2020-10-23 18:49:29	2020-10-23 18:49:29	2020-10-24 23:00:00	2020-07-24 18:43:00	2020-10-23 18:49:39		<input checked="" type="checkbox"/> SI
2020-09-25 18:47:36	2020-10-23 17:22:03	2020-10-23 17:21:46	2020-10-23 17:21:46	2020-10-23 23:00:00	2020-07-24 18:43:00	2020-10-23 17:22:08	completato	<input type="checkbox"/> NO
2020-09-25 18:47:36	2020-10-22 18:36:02	2020-10-22 18:36:27	2020-10-22 18:36:27	2020-10-23 23:00:00	2020-07-24 18:43:00	2020-10-22 18:36:54	completato	Si
2020-09-25 18:47:36	2020-10-22 17:09:02	2020-10-22 17:08:59	2020-10-22 17:08:59	2020-10-22 23:00:00	2020-07-24 18:43:00	2020-10-22 17:09:13	completato	No
2020-09-25 18:47:36	2020-10-21 18:00:02	2020-10-21 17:59:47	2020-10-21 17:59:47	2020-10-22 23:00:00	2020-07-24 18:43:00	2020-10-21 18:00:12	completato	Si
2020-09-25 18:47:36	2020-10-21 06:52:02	2020-10-21 06:52:41	2020-10-21 06:52:41	2020-10-21 23:00:00	2020-07-24 18:43:00	2020-10-21 06:52:59	completato	No
2020-09-25 18:47:36	2020-10-20 18:26:02	2020-10-20 18:26:19	2020-10-20 18:26:19	2020-10-21 23:00:00	2020-07-24 18:43:00	2020-10-20 18:26:37	completato	Si
2020-09-25 18:47:36	2020-10-20 09:47:03	2020-10-20 09:47:05	2020-10-20 09:47:05	2020-10-20 23:00:00	2020-07-24 18:43:00	2020-10-20 09:47:21	completato	No
2020-09-25 18:47:36	2020-10-19 18:13:02	2020-10-19 18:13:09	2020-10-19 18:13:09	2020-10-20 23:00:00	2020-07-24 18:43:00	2020-10-19 18:13:21	completato	Si
2020-09-25 18:47:36	2020-10-19 09:51:02	2020-10-19 09:51:08	2020-10-19 09:51:08	2020-10-19 23:00:00	2020-07-24 18:43:00	2020-10-19 09:51:59	completato	No

<< 1 2 3 4 5 6 7 8 9 10 11 12 13 14 >>

Home

DCS Real Time VS Planning

DCS Real Time Giornaliero

DCS Real Time Settimanale

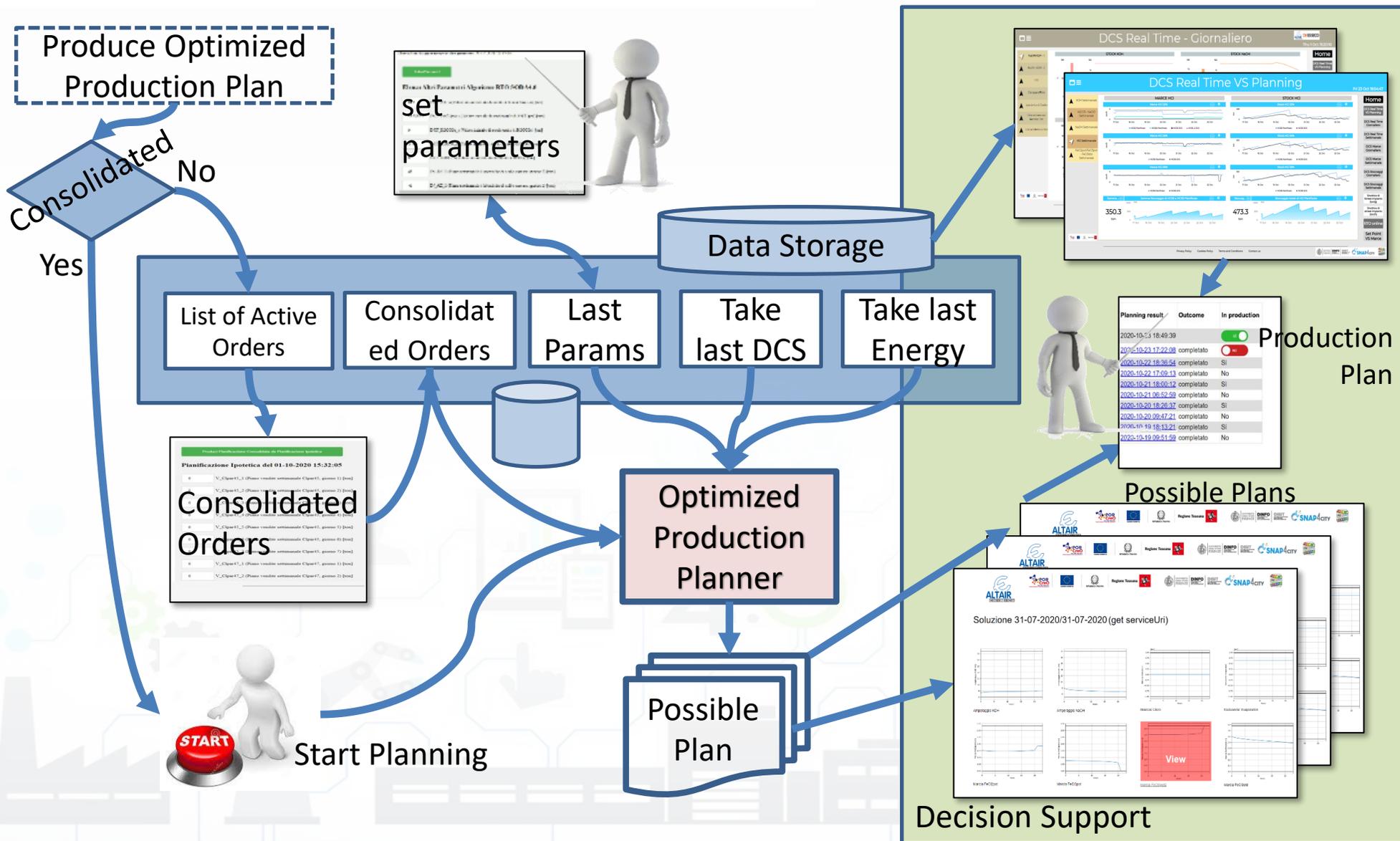
DCS Marce Giornaliero

DCS Marce Settimanale

DCS Stoccaggi Giornaliero

DCS Stoccaggi Settimanale

Business Logic



Some Flows

Snap4Altair

User: userrootadmin, Org: Organization
Role: RootAdmin, Level: **Logout**

IoT Application nodered2

Snap4Altair

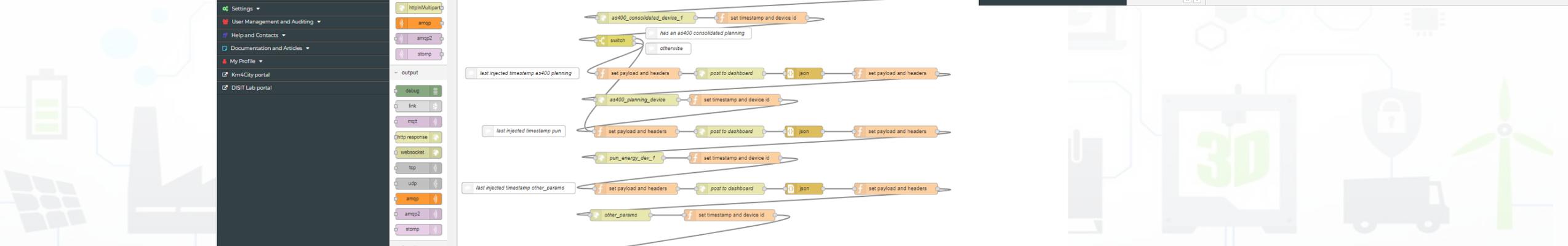
User: userrootadmin, Org: Organization
Role: RootAdmin, Level: **Logout**

IoT Application nodered2

Snap4Altair

User: userareamanager, Org: Organization
Role: AreaManager, Level: **Logout**

IoT Application nodered2

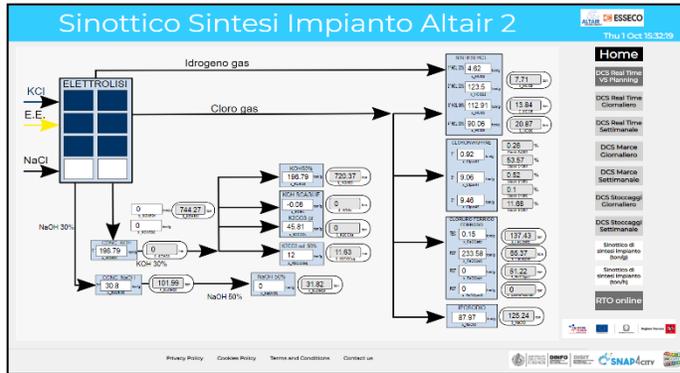




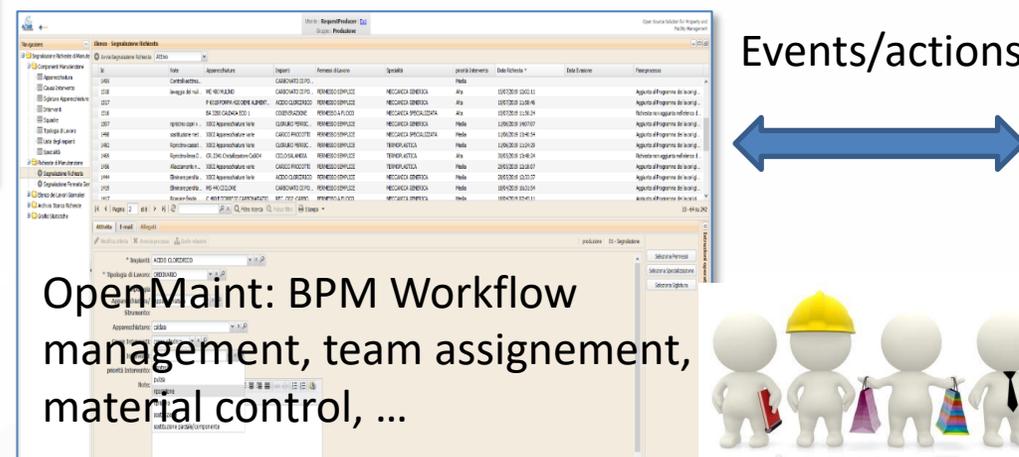
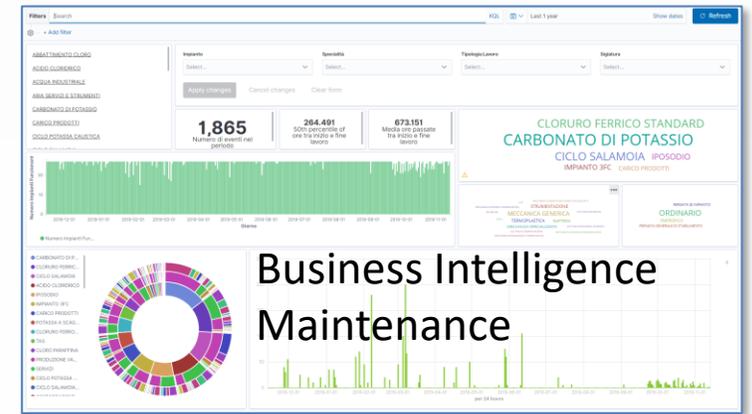
Green Impact Capacity (GIC) Altair Control room



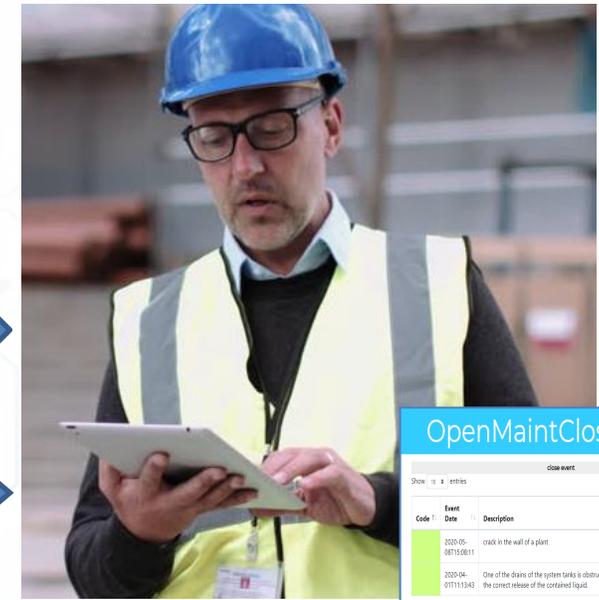
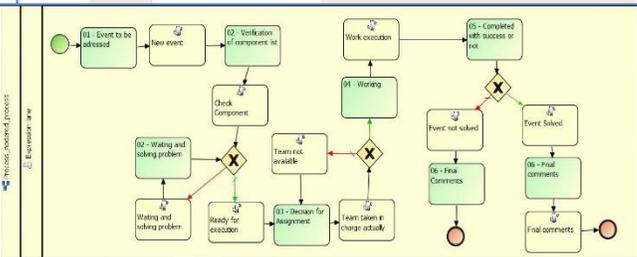
Workflow for Ticket management



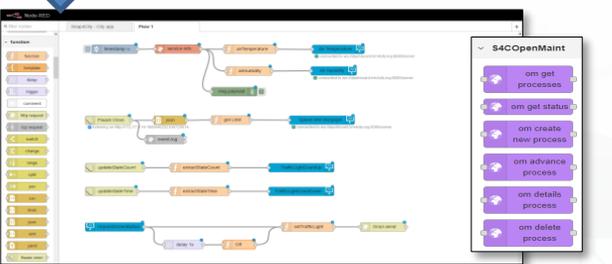
Consumptions/productions



OpenMaint: BPM Workflow management, team assignment, material control, ...



Dashboards and actions



IOT App, Data event firing, event detection and firing
Critical event management

Green Impact Capacity (GIC)

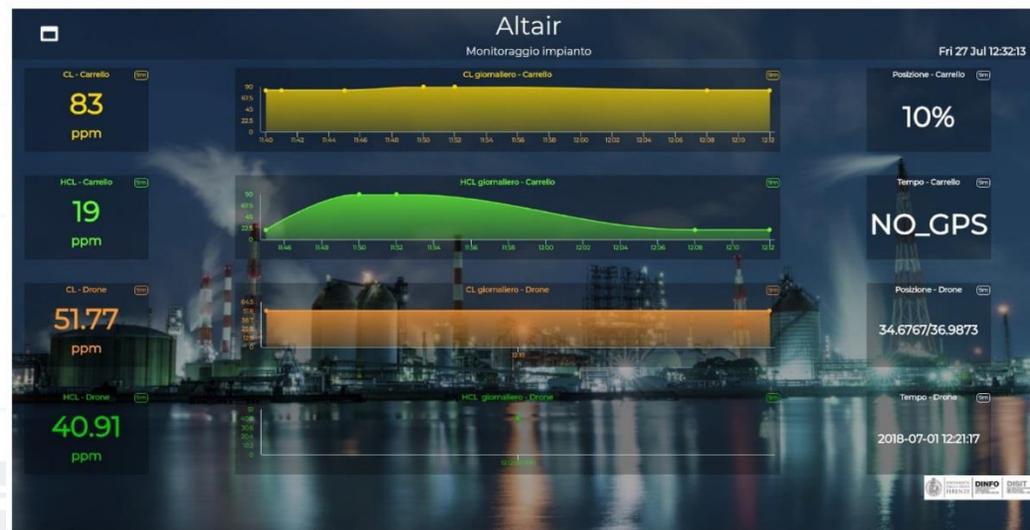
- Improve productivity of chemical plant
- Keep GREEN the environmental impact
- Exploiting innovative technologies
- Diversify the production
- Monitoring environmental conditions



TRY



Sigma ingegneria



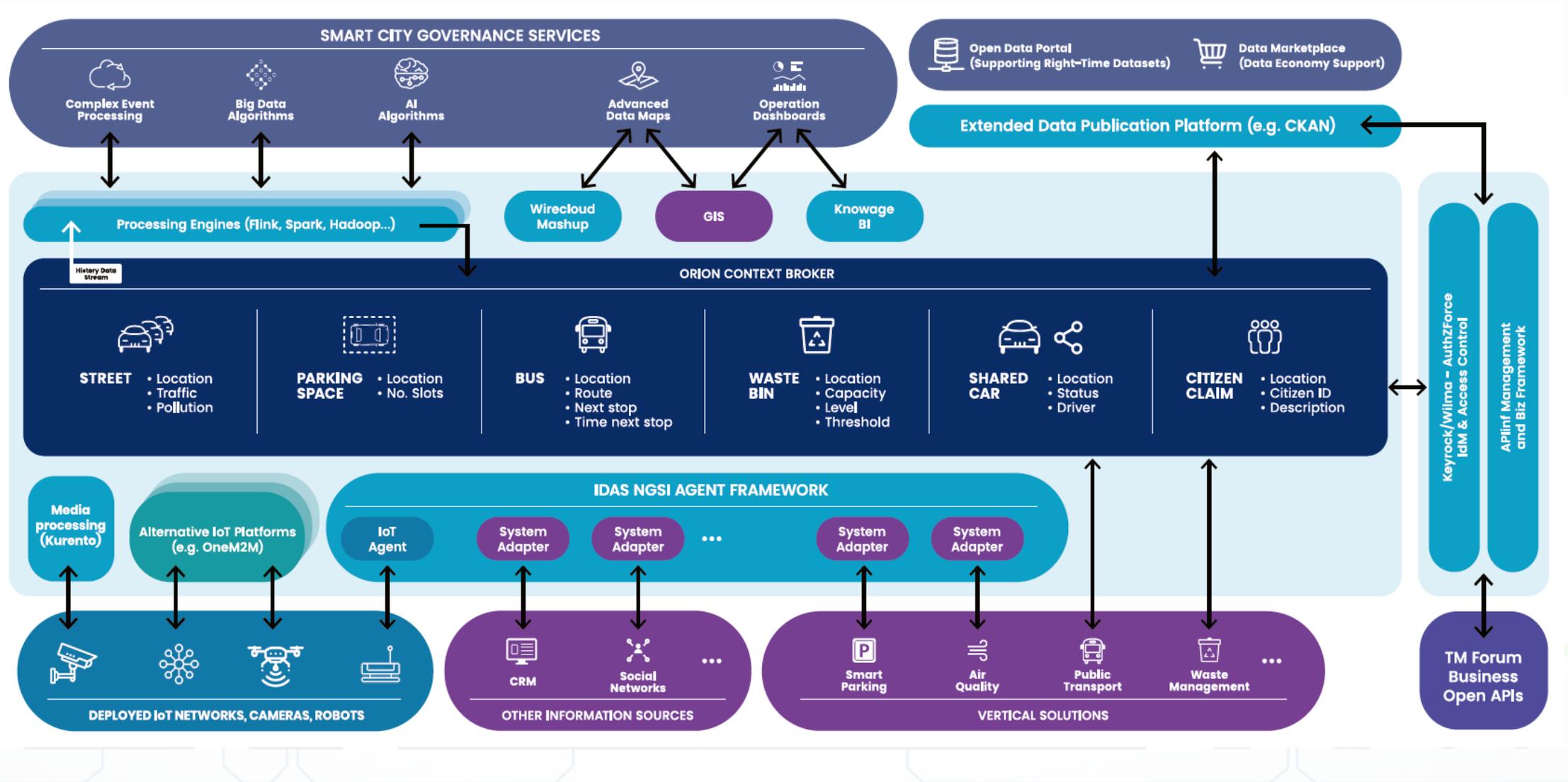
TOP



& Snap4City



>>> THE FIWARE SMART CITIES REFERENCE ARCHITECTURE



- Snap4City - Powered by **FIWARE** Solution & Platform:
 - <https://marketplace.fiware.org/pages/solutions/b8905e91973b420189cce972>
 - <https://marketplace.fiware.org/pages/solutions/d68534ec827500f1bde8720f>
 - NGSI V1, V2 The IOT Orion Broker
 - IOT Orion Broker can connect JSON, MQTT, Lightweight M2M, LoraWAN, OPC, SigFOX, etc. see FiWare <https://www.fiware.org>
- Snap4City - **FIWARE** Training Services:
 - <https://marketplace.fiware.org/pages/solutions/03bccd83a0e1b0398ba7a0bf>
- Snap4City - **FIWARE** Consultancy Services:
 - <https://marketplace.fiware.org/pages/solutions/907f5ecc63927f643dd8421b>
- **Snap4City is compatible** with all the above protocols
 - via IOT Orion Broker,
 - via IOT Applications.
 - via direct connection on ETL processes on their corresponding IOT brokers, and/or
- **Snap4City is also compatible** with many other protocols, see the table reported in page: <https://www.snap4city.org/65>



Open APIs for Open Minds



FIWARE
IMPACT
STORIES



SMART CITIES AND SMART INDUSTRY

Snap4City: FIWARE powered smart app builder for sentient cities

With the contribution of



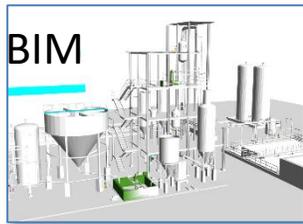
- <https://fiware-foundation.medium.com/snap4city-fiware-powered-smart-app-builder-for-sentient-cities-acfe24df49d5>
- https://www.snap4city.org/drupal/sites/default/files/files/FF_ImpactStories_Snap4City.pdf



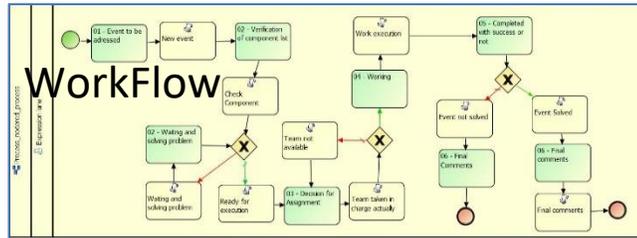


- In Snap4City you can chose to connect your devices at Snap4City Platform in different manners:
 - (a) directly to Snap4City with some Broker, or on IOT App, Brokers, MyKPI
 - (b) via an IOT Orion Broker (external IOT Broker or those provided by Snap4City), or
 - (c) via any third party IOT Brokers in any protocol you have.
- **Snap4City has**
 - **Improved IOT Orion Broker** with the so called Orion Broker Filter (Orion Broker Filter, NGSI Security Wrapper) which is a secure wrapper for NGSI V1 and V2 protocol for enforcing Mutual Authentication, Security, roles, etc.
 - **Produced open hardware and open software NGSI Compliant:** as
 - **IOT Devices** with mutual authentication and security based for NGSI on: Android, Arduino and ESP32, IOT Button, etc.
 - **IOT Edge** devices with mutual authentication and security based for NGSI on: Raspberry PI, Windows, Linux.

Concept



KPI, POI, MyKPI, ...
API, External Services
Web Scraping



Artwerp City Overview - A5
GIDA 5G demo
13.7 °C 1019 bar 77 %
Air Quality
My Data Dashboard Kibana
7,642,593
Dashboards and Apps

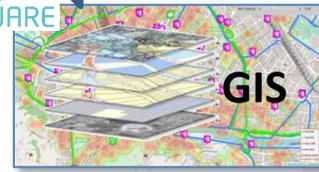


IOT Apps

Data Analytics,
Artificial Intelligence



IOT Brokers
IOT Broker
IOT Broker



Functional: FIWARE ref arc wrt Snap4City solutions

	FIWARE ref arc smart city	Smart City
Multiple Protocols: IoT, Databases, etc..	10 on IOT, Limited on databases, etc.	More than 200, very very wide
Large set of high level types: maps, trends, heatmaps, traffic, trajectories, scenarios,...	No	Yes:
Integration with workflows, BPM	Not Supported	Yes: bidirectional
Integration and Modeling Digital Twin BIM	Not Supported	Yes: bidirectional
Integration with GIS: WFS, WMS	Not fully supported	Yes: bidirectional
Integration with Heatmaps and Satellite	Partially, not calibrated	Yes: fully; calibrate and multiple versions, animations
Integration with Satellite	not supported	Yes: fully
Smart City API	no	Yes
Open Data Management	Partial with CKAN	Yes, Fully automated with CKAN
Federation of platforms	Partial on brokers	Full on Brokers and Knowledge base and API
Semantic model and queries	No, probably with NGSI-LD in the future	Yes since 2013
Multiple kinds of IoT Brokers	No, only agents	Yes: NGSI, COAP, AMQP, MQTT, SigFOX, etc.

*Interoperability
Openness*

Functional: FIWARE ref arc wrt Snap4City solutions

	FIWARE ref arc smart city	Snap4City
Data Transformation	Coding	Yes: IOT App, Node.JS, Visual Programming, scalable
Data Analytics	No	Yes
on line development	No, limited	Yes: Rstudio, Python, Tensor Flow, MapReduce, etc.
Dashboard on data	Grafana no LDAP	Yes: Dashboard Builder, Kibana with GDPR, LDA (Open Distro)
Dashboard Widgets	Limited, no custom, coding needed	Yes: A wide range including custom widgets, secure compliant, animations, configuration, also open to new development
Real Time end-to-end from Dashboards to any other channel, event driven	No, very limited	Yes, fully supported
Multi Data Map	Limited with non OS	Very extensive, with multiple widgets and sync
MicroApplications	No	Yes
Auditing, Assessment, accounting	No, no, no	Yes, Yes, Yes
Multitenacy on data management	No only on broker	Yes: on Broker, on data management, on dashboards, etc..
Living Lab for creating/managing communities/groups	Not supported	Yes: provided in the open source
Report generation/management	No	Yes

Process

Graphics

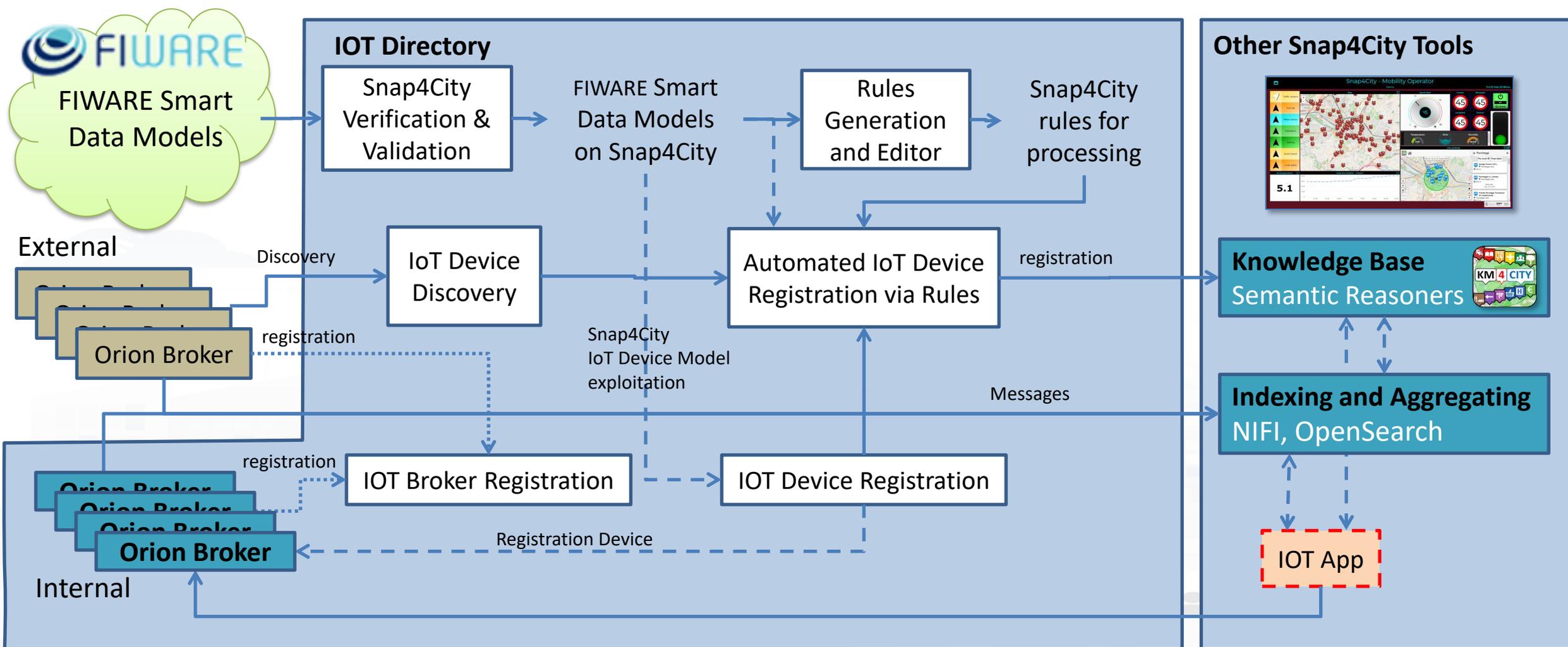
Manag.



Snap4City

- Is a solution and platform of FIWARE
- Is open to the Development of Applications leaving large space and providing a **large set of ready to use applicative tools** and solutions to build their solutions on top or aside.
- Is fully distributed, **any kind of data source** can be ingested, automatically to form the Data Shadow.
- **Orion Broker is core part of Snap4City and main Brokers.** It can be also protected by Snap4City tech, with Mutual Authentication
 - Other protocols and Brokers can be attached to the solution please see the compatibility page <https://www.snap4city.org/65>
- **Visual Flexible IOT processing is provided** as IOT App that is Node-RED plus Snap4City MicroServices suites
- **Advanced Smart City API** are provided on top of Knowledge Base
- **Dashboard Builder** has been designed for Smart City Data and automated dashboards' production
- **Storage** based on OpenDistro x ElasticSearch + Kibana or HBase/Phoenix
- **Market Place** for promoting, publishing and sharing Open Data, tools, processes, experiences
- Passed PEN test, GDPR compliant, **published security** on IEEE Access
- **Interoperable** with huge number of protocols and formats
- Full Support for **Living Lab** of the city, coworking, tutorials
- Fully support for **Multi-tenancy**
- Fully support **federation of smart cities, smart factories**
- Deployed as VM and Dockers, on cloud and on premise
- 100% open Source, including the management and applicative aspects

Exploiting FIWARE Smart Data Models



High Level Types

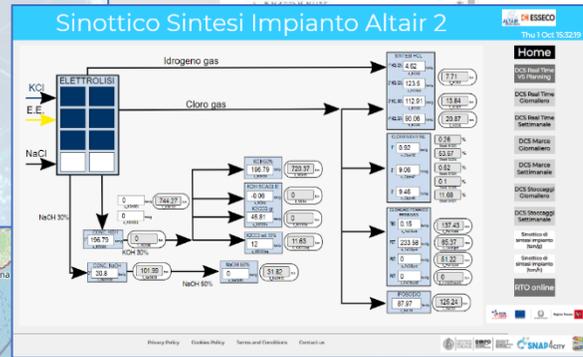
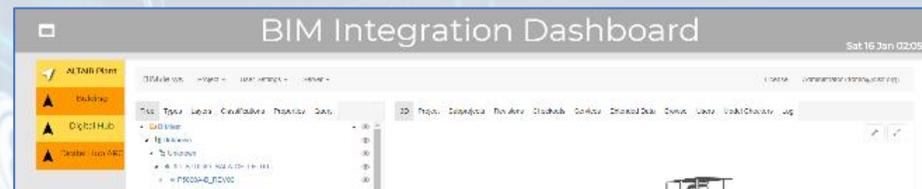
- POI, IOT Devices, shapes,..
- FIWARE Smart Data Models,
- IoT Device Models
- GIS, maps, orthomaps, WFS/WMS, GeoTiff, calibrated heatmaps, ..
- Satellite data, ..
- traffic flow, typical trends, ..
- trajectories, events, Workflow, ..
- 3D Models, BIM, Digital Twins, ..
- OD Matrices of several kinds,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



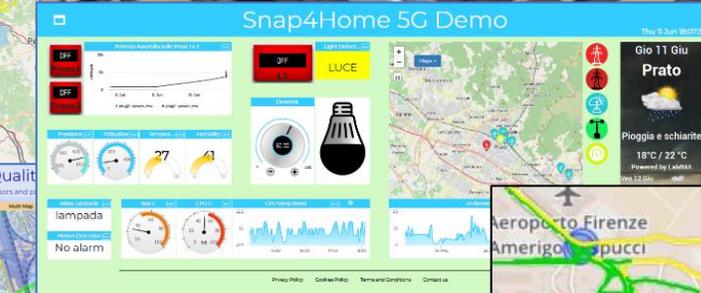
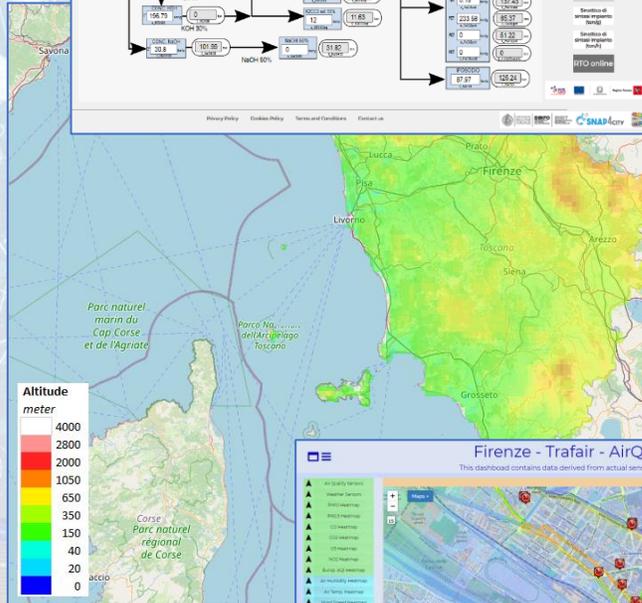
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TECHNOLOGIES LAB

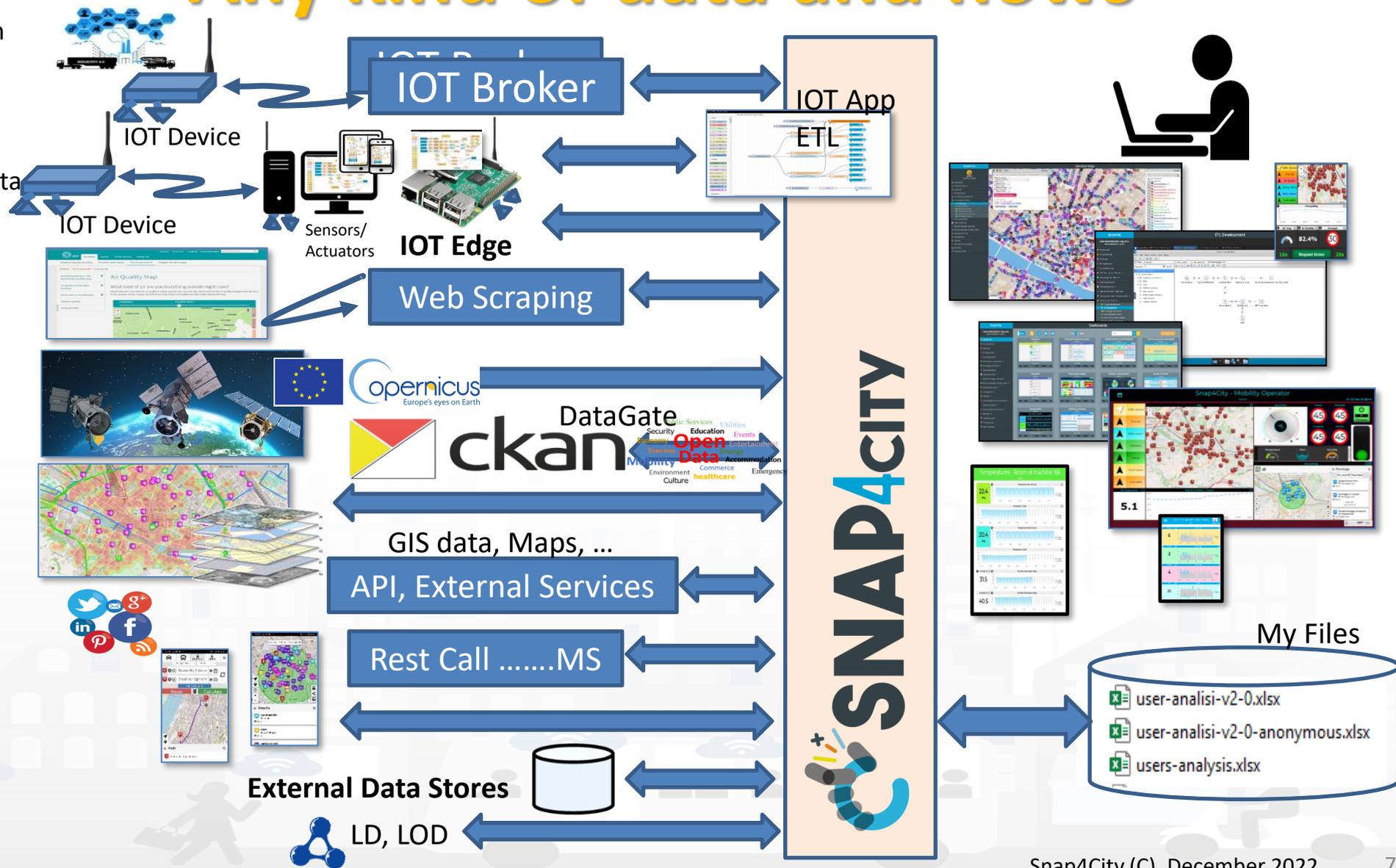


SNAP4CITY
- Digital Twin Global - Fire
demonstrator



Any kind of data and flows

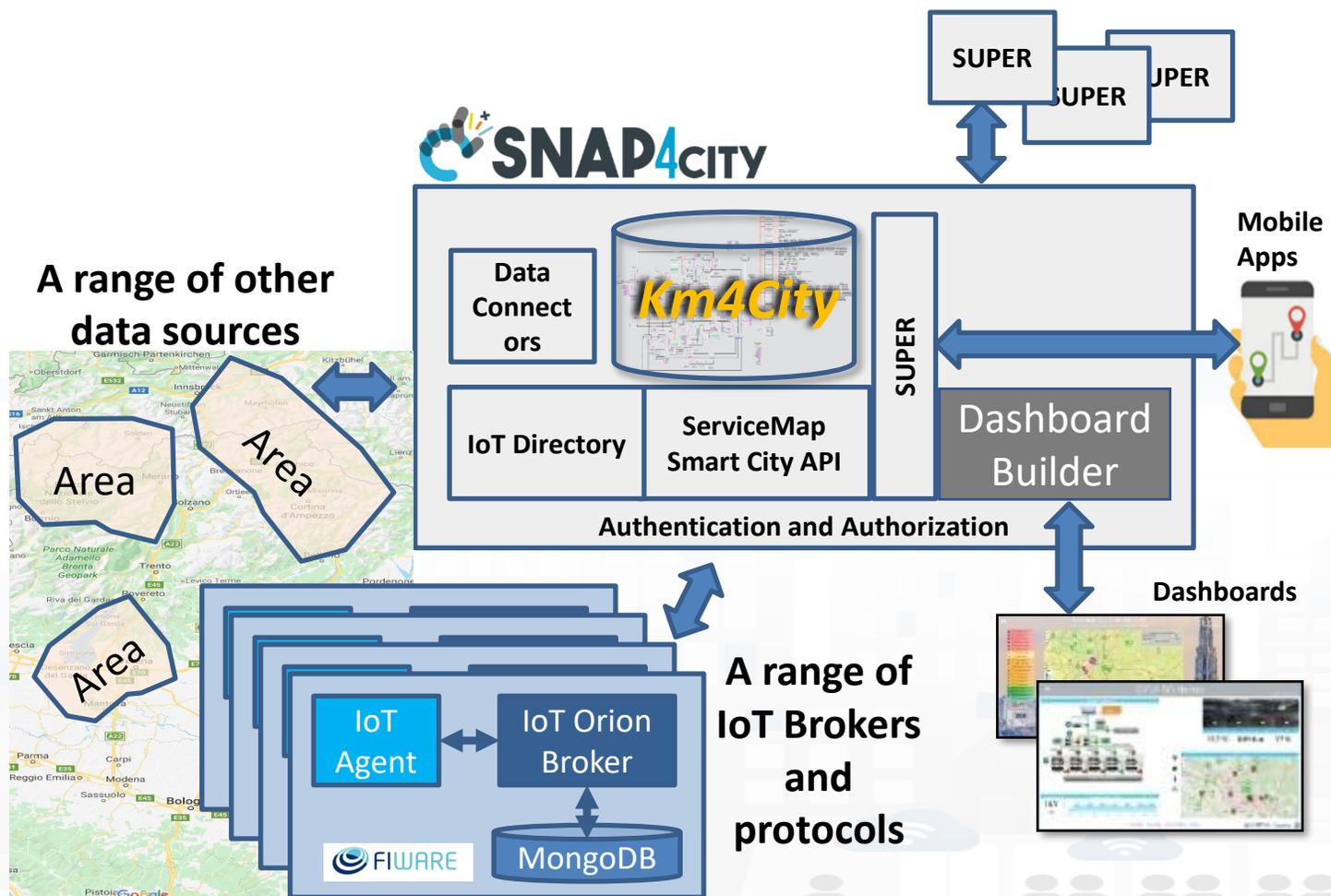
- **Open Data:**
 - Data gate, federation of Open Data Portals
 - IOT App, ETL proc(PULL)
- **IOT Networks:**
 - IOT Application processes, data driven or PULL
 - IOT Brokers (Push) → IOT Shadow
- **Web Pages:**
 - Web scraping, crawling processes
- **Satellite data**
- **Social media: Twitter, Facebook,...**
 - Twitter Vigilance, IOT App
- **Mobile Apps**
 - Smart City API
- **Files upload: CSV, Excel, etc.**
 - IOT Applications, ETL
- **REST API, WS, FTP, LD, LOD, etc.**
 - IOT Applications, ETL
- **Data base accesses**
 - GIS: WFS, WMS
 - ETL, IOT Application



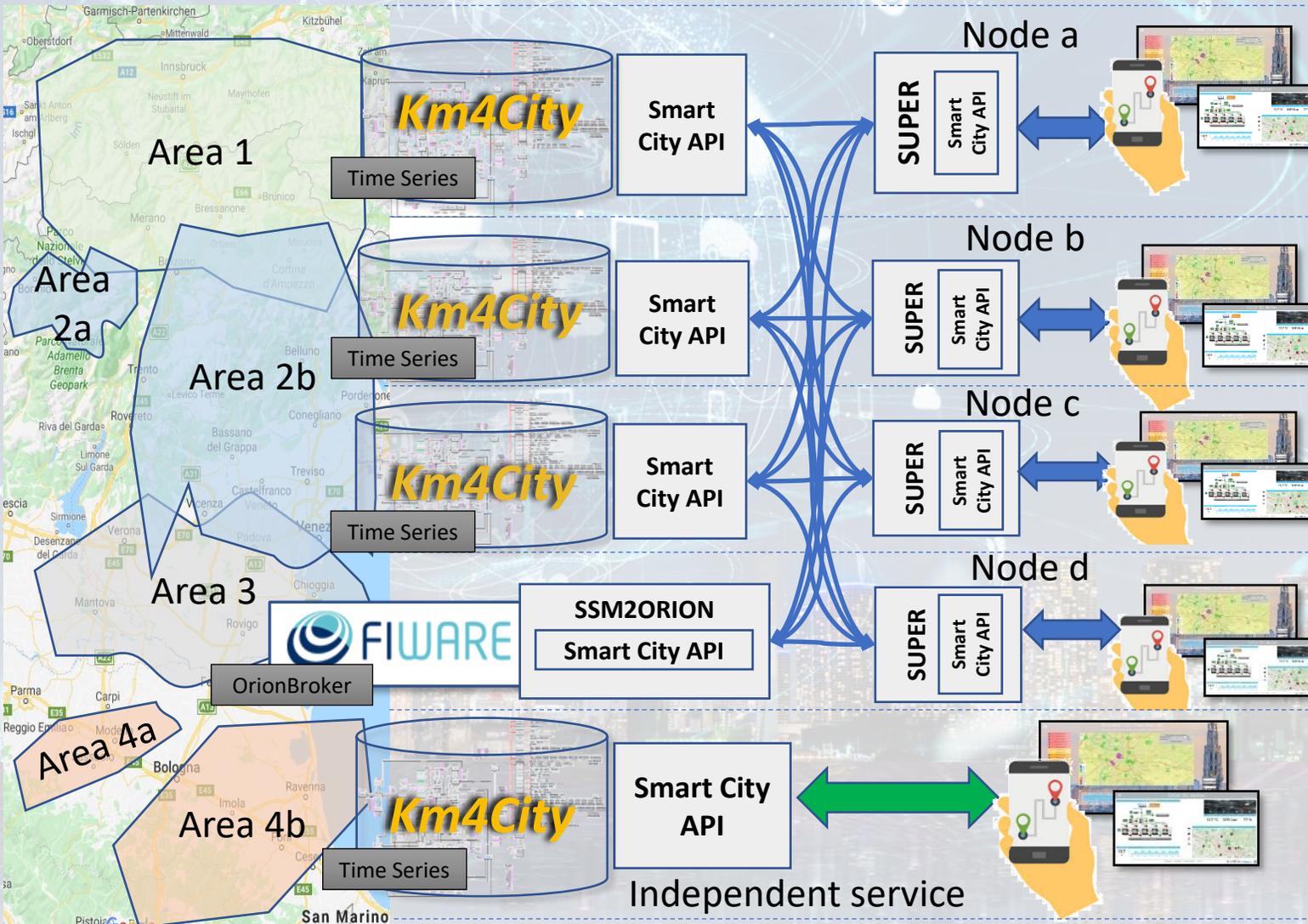
Snap4City and FiWare integration

- **A) IoT Orion Broker as an External Broker** of a Snap4City platform
 - Devices are mainly managed by Orion Broker only
 - IoT Directory can harvest devices on Broker to register them
- **B) IoT Orion Broker is an Internal Broker** of a Snap4City platform
 - This implies that Snap4City facilities are exploited for:
 - IoT Devices registration, IoT discovery, Ontology, Bulk registration, optimization of stored data, adaptation, filtering control, etc.
 - All the devices are registered into IoT Directory that performs the registration on both IoT Orion Broker and KB automatically
- **C) Federation of an IoT Orion Broker** with storage by using SSM2ORION
 - Devices are managed by Orion Broker only
- **D) hybrid solutions** in which Web and Mobile App can exploit both Orion API and Snap4City services and API

Snap4City IoT Registration and Access

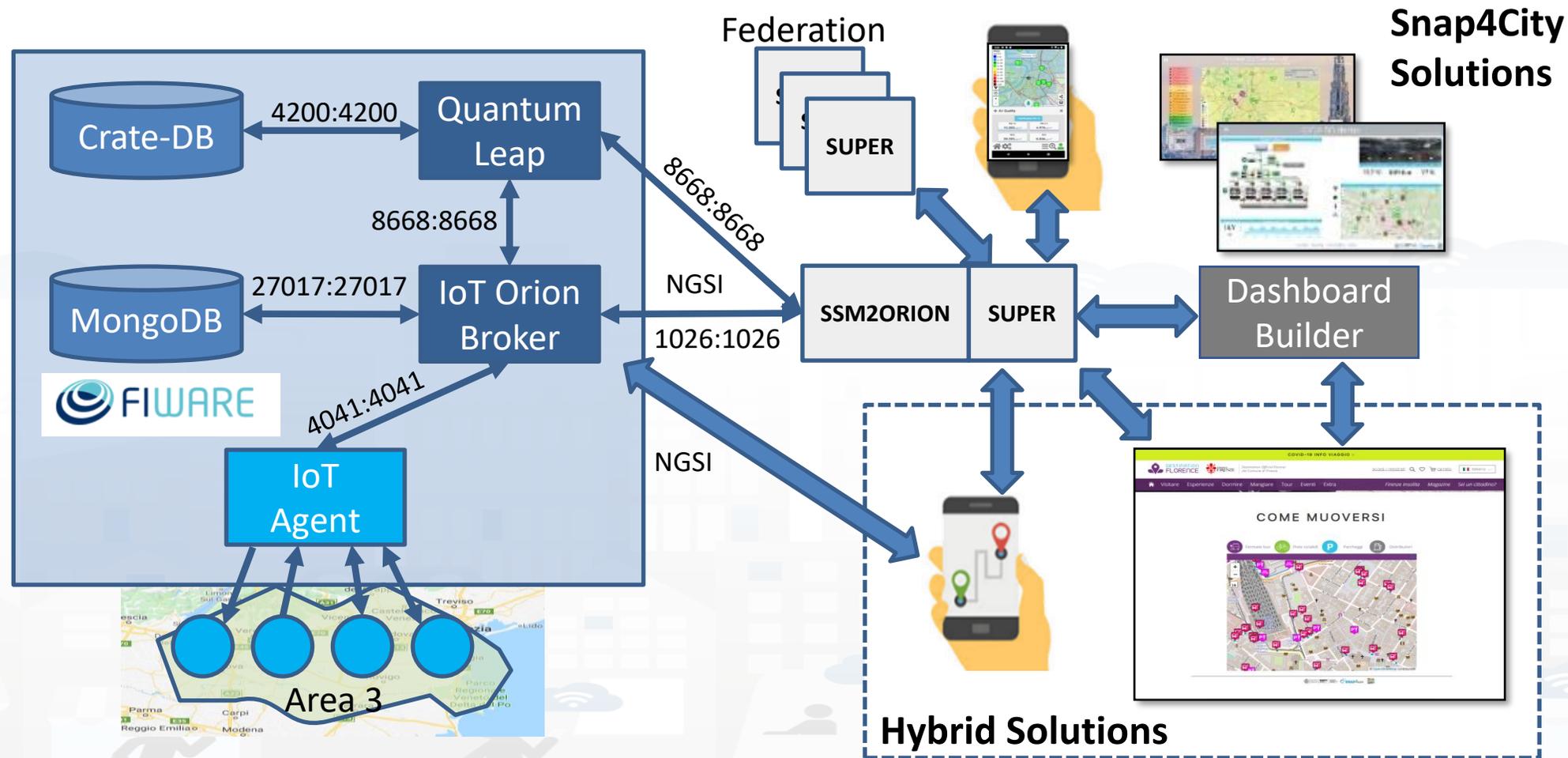


Federation of Smart City Services



- **Km4City Semantic Reasoner**
- **ServiceMap interoperability**
- **Seamless for multiple Mobile Apps**
- **Smart City API**
- **Super:**
 - distributed access and sharing services
 - Each city control its own data
 - Final user can pass from one city / area to another in seamless manner: without changing the mobile Apps

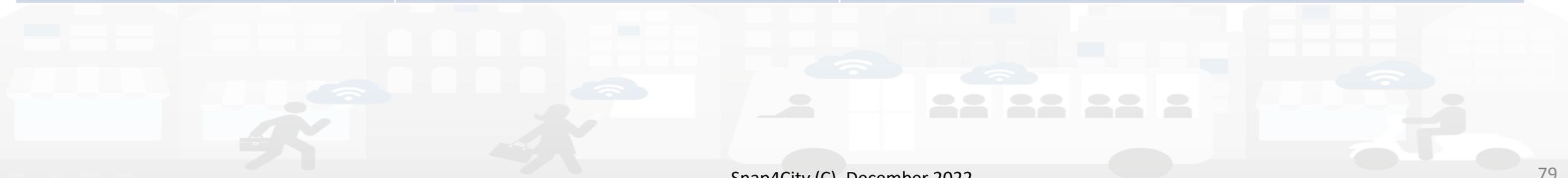
Federation of Snap4City vs IOT ORION Broker



Non Functional

FiWare OS Solutions wrt Snap4City solutions

	FiWare	Snap4City
Security	TLS	Yes: End to end, TSL and dashboards, event driven, mutual authentication, Access Token, OpenID Connect
Privacy	Not on all data	Yes: GDPR compliant full stack
Access Control, authorization	To be done, Partial	Yes: User Roles, and management tools
Scalability	Limited on data No on processes	Yes
Full stack Open Source	No (proprietary applicative levels)	Yes: open source also application level
Full Modular	Not all modules are Open Source	Yes
Interoperable	Partial, see previous table	Yes at all levels, in all modules, 100% open source
Full training course	Partial	Yes
Examples and code shared	Partial	Yes



Two Main Lines for Dashboarding are present

Dashboard Builder of Snap4City

- For accessing and browsing data on: OpenDistro x ElasticSearch, Mongo, MySQL, Smart City API, Super and thus from federated Smart City API, etc.
- Supports sensors/actuators: data driven data, maps in extended manner, data driven widgets, large collection of widgets, direct IoT Connections, custom widgets, animated PIN on maps, a large set of panel/widgets, etc.
- Very simple to be used for control room, decision makers, situation rooms, operators, etc.
- Very well integrated with IoT App, Custom widgets, animation, external services.
- Very simple to be customized for non programmers since all the tools are visual.
- Support for GDPR and deep control of access.
- Can integrate Kibana/Grafana Views into a Widget

Kibana (so called DevDash, AMMA and recently My Dashboard (Dev Kibana)), also accessible as Grafana

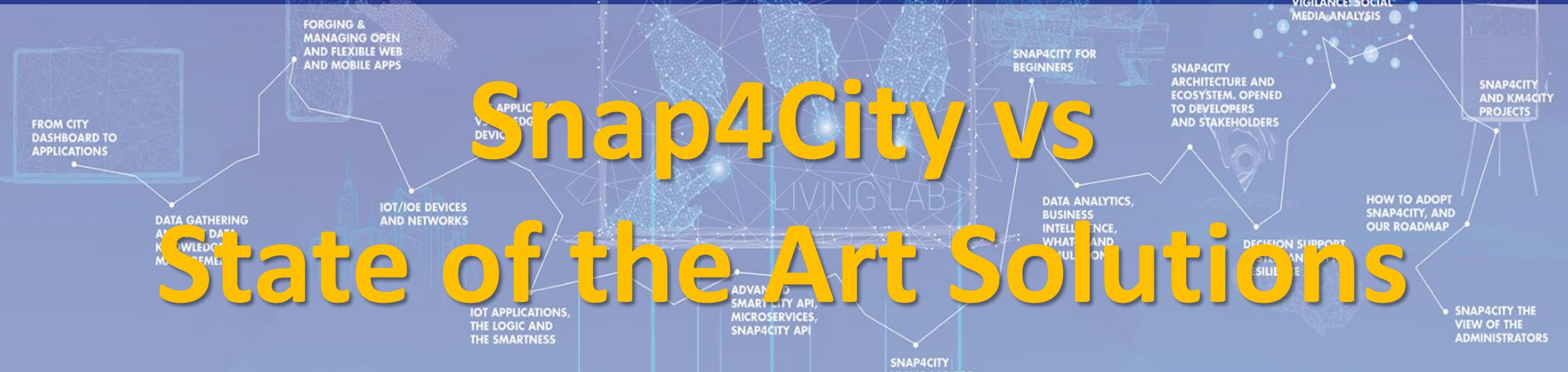
- For accessing and browsing data on OpenDistro x ElasticSearch storage and other sources supported
- No Support for real time event driven widgets/panels, actuators and synoptics, no sophisticated maps, etc.
- Not simple for control room, decision makers, etc.
- Not integrated with IoT App, Custom widgets, animation, external services.
- Oriented to developers, complex production of custom views, etc.
- Partial support of GDPR and deep control of access.



Snap4City Dashboard Builder (2022) vs Kibana/Grafana

Features	Snap4City Dashboard Builder	Kibana, Grafana
Large Collection of Widgets, also from D3 library	YES	Nothing
Custom Widgets SVG of any kind, full defined process for customization	YES	Nothing
Real time event driven widgets and data	YES	Nothing
Business Logic for data transformation with visual programming: Node-RED	YES: visual/coding	coding
Maps with custom PIN, bubbles, animated and moving, etc.	YES	Nothing
Maps with paths, shapes, traffic flow, scenarios, routing, heatmaps, what-if, Origin Destination Matrix, ...	YES	Nothing
Maps with Orthomaps from WFS, WMS, GIS connection, etc.	YES	Nothing
TV camera integration and selection	YES	Nothing
Widgets for business logic integration on real time: buttons, selector, switch, etc.	YES	Nothing
Kiviat, Spider net, Calendar (also any other D3 Widgets)	YES	Nothing
Typical Time Trends: day hours, month week, month days,	YES	Nothing
Time Trend Compare: day, eek, month, year	YES	Nothing
Selectors/Menus: text, icons, etc., also in connection with IOT APP, Node-RED	YES	Nothing
Full control of graphic layout, font, colours, refresh per widget, etc.	YES	Nothing
Iframe integration of third party widgets and web pages, nesting dashboards, embedding Kibana	YES	Nothing
Connection among multiple Dashboards and Widgets	YES	Nothing
Synchronization with Video Wall, and Operators Views	YES	Nothing
Multiseries, bar lines, charts, pie, donut, simple selectors, trends, etc., also from business logic	YES	Limited
Single content, string, html, any data, etc.	YES	Limited
Special widgets: Weather forecast, civil protection, road plates, Twitter, etc...	YES	Nothing
Digital Twin Local (BIM) and Global (3D city representation) with 3D traffic, Heatmaps, Devices, ...	YES	Nothing
Faceted search	YES: selectors, forms, buttons	YES

TOP



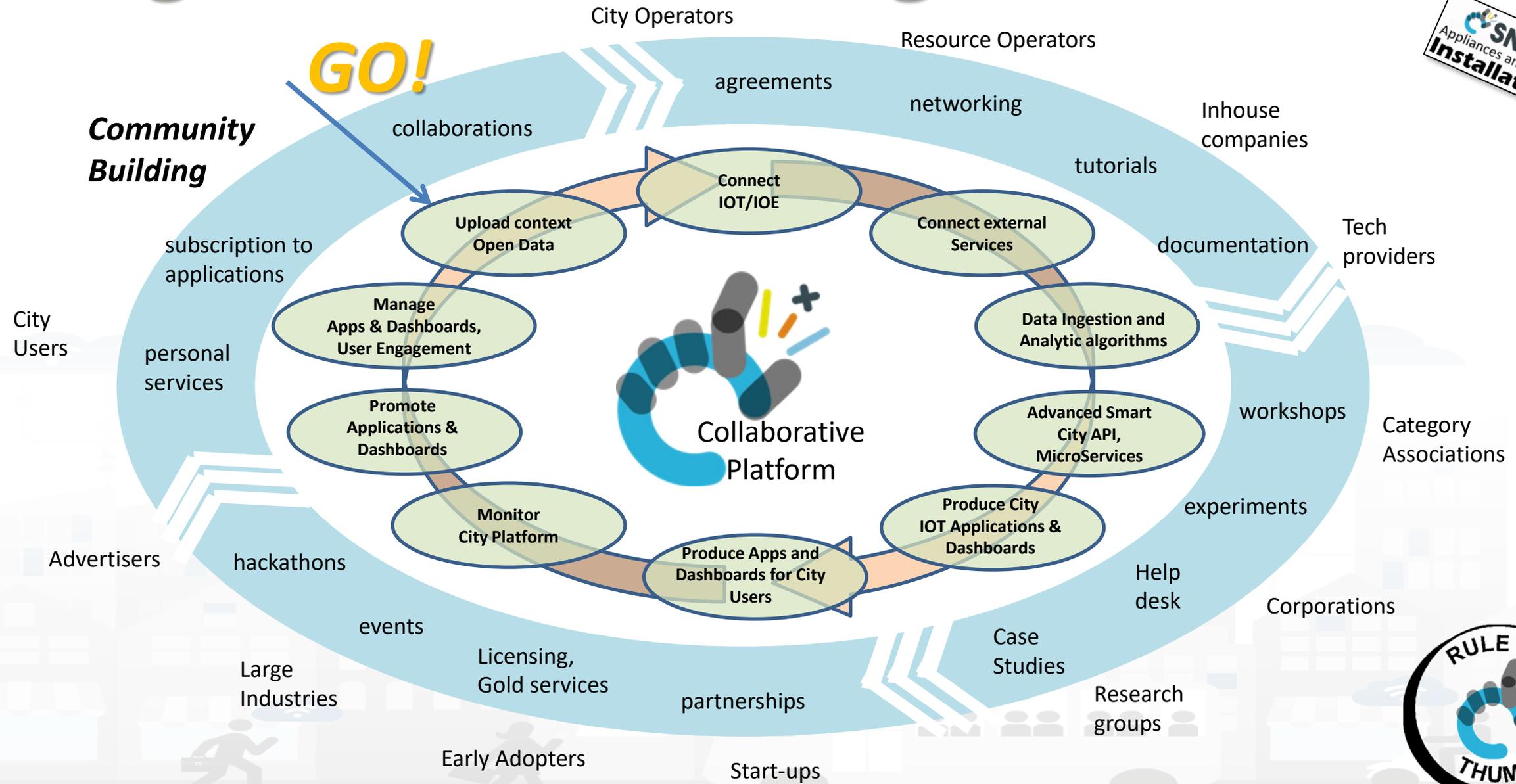
Snap4City vs State of the Art Solutions



Market Solutions

	OT Discovery Abstraction	Authentication, Authorization	Security end-2-end, secure on OT and Dashboards	Open HW and Open SW	Integrated Community management	Data Type: IOT Devices, IOT App, Dashboard, Data	Data Type: Publish/share, Delegation, Consent and change	Data Type: Download and Delete	Auditing on Data Type Access	Open Source end-to-end	Scalability IOT	Visual Programming end-to-end applications	Advanced Smart City API, MicroServices	Multi Domain Semantic Platform	Standard based Modules and OT, Open Devices	Resource Sharing	Data Analytics integrated	Dashboard H24/7, protected connection	Multi-protocol on IOT
Snap4City	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
KAAs [53]	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	N	(Y)	N	N	Y	Y
Thingsboard [55]	Y	Y	Y	Y	N	Y	N	Y	Y	Y	Y	N	N	N	N	N	N	Y	MQTT, coap, http
IOT eclipse.org [56]	N	N	N	(Y)	N	Y	N	N	N	Y	Y	N	N	N	Y	N	N	N	Y
IOT IGNITE [57]	N	Y	N	Y	N	Y	N	Y	Y	Y	Y	Y	N	N	N	N	N	Y	MQTT
FIWARE [47]	N	Y	N	Y	N	N	N	Y	N	Y	(Y)	(N)	Y	N	Y	N	N	Y	Y
ARM mbed IoT [48]	Y	Y	Y	Y	Y	N	(N)	N	Y	Y	Y	N	N	N	Y	N	N	Y	Limited
Airvantage [51]	Y	Y	Y	Y	N	Y	N	Y	Y	Y	Y	N	N	N	N	N	N	Y	MQTT, HTTP
AWS [43]	Y	Y	Y	Y	N	Y	(N)	Y	Y	N	Y	N	N	N	Y	Y	(Y)	Y	Limited
Azure IOT [44]	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N	N	Y	Y	(Y)	Y	Limited
PTC ThingWorkx [59]	N	Y	Y	Y	Y	Y	N	N	Y	N	Y	Y	N	N	Y	N	N	Y	Y
Bosch IoT Suite [58]	Y	Y	Y	Y	Y	(Y)	(N)	Y	Y	N	Y	Y	Y	N	Y	N	Y	Y	Y
CISCO Jasper [55]	Y	Y	Y	Y	N	(Y)	(N)	N	Y	N	Y	N	N	N	N	--	(Y)	Y	N
Siemens MindSphere [60]	Y	Y	Y	(Y)	N	Y	(N)	Y	Y	N	Y	Y	N	N	Y	N	Y	Y	Y
Carriots [54]	Y	Y	Y	(Y)	N	Y	N	N	Y	N	Y	N	N	N	--	N	N	Y	MQTT
Google IOT [45]	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N	N	N	N	N	(Y)	(Y)	MQTT, HTTP
Homekit Apple [50]	Y	Y	Y	Y	N	Y	N	N	Y	N	(Y)	N	N	N	N	Y	N	Y	Limited
Smarthings Samsung [52]	Y	Y	Y	Y	Y	Y	(Y)	Y	Y	N	(Y)	N	N	N	N	N	N	Y	Limited

Living Lab Accelerating



Smart City in a Snap Acceleration for Innovation

- **Organization/City analysis**

- requirements analysis, identification of domains
- Snap4City Innovation Process → Report of Scenarios vs Data
- Data Analysis → Report as Data Table



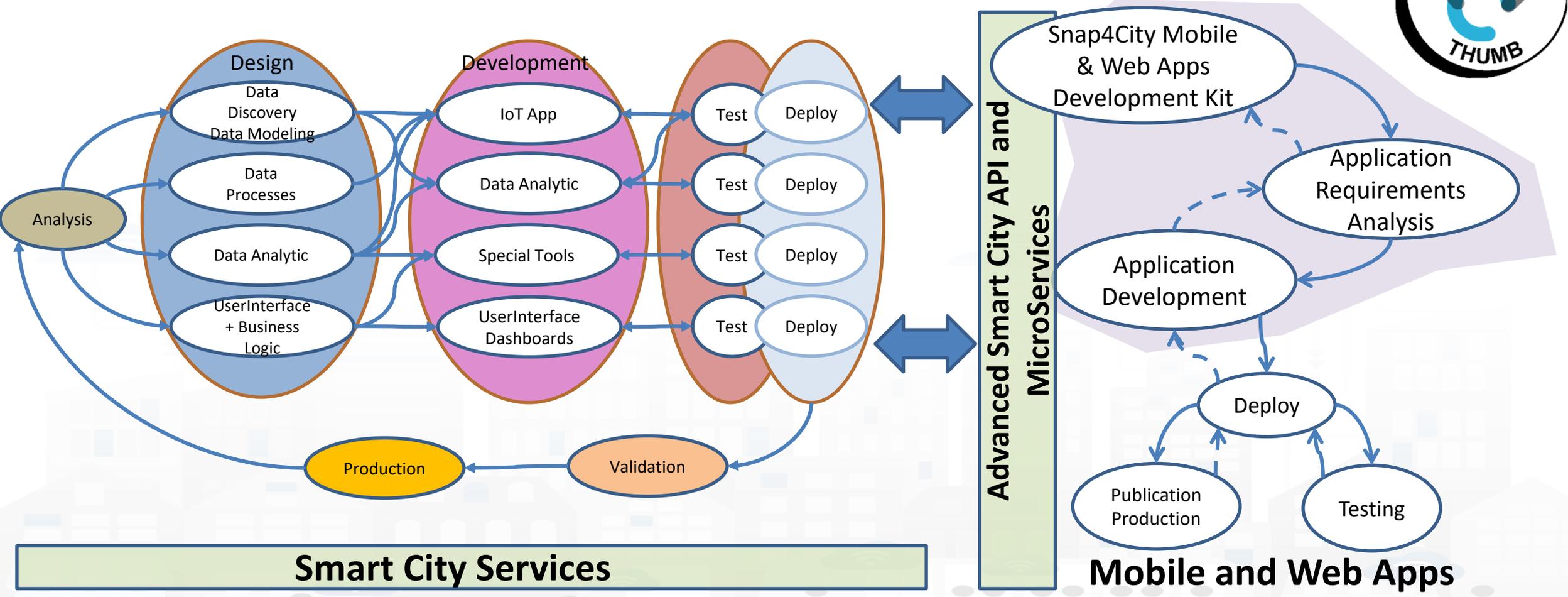
- **Smart City Design for Innovation:**

- Design of main Scenarios and Tools (Dashboard, SCCR, Apps, IOT Network, new data, etc.) → Report as Mock-up Design

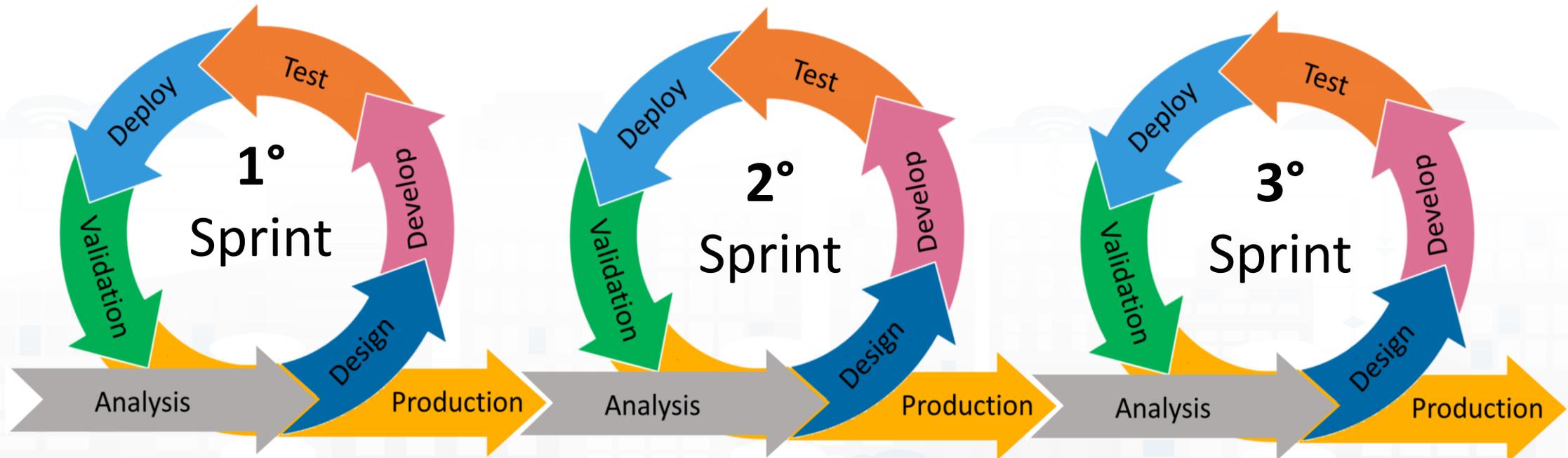
- **Next phases**

- Data Ingestion and Data Warehouse
- Scenarios Implementation

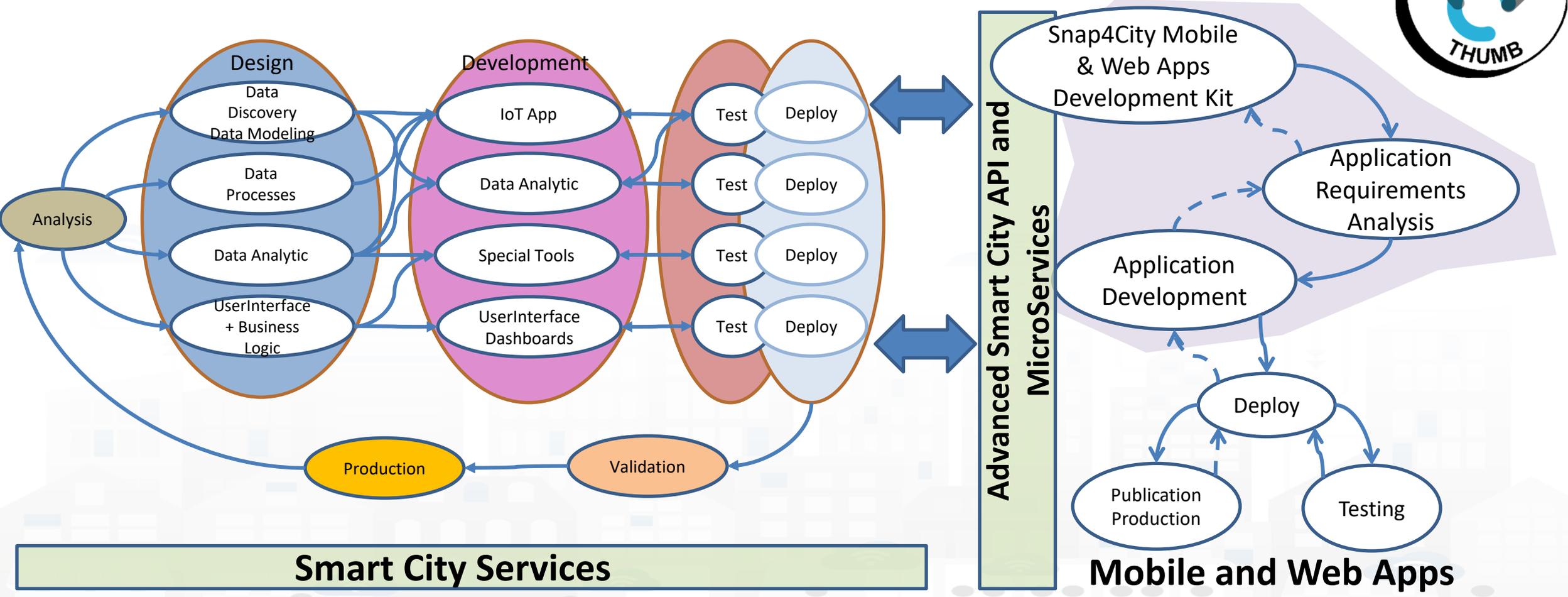
Develop Mobile & Web Applications Exploiting Snap4City Smart City Services



Development Life Cycle Smart Solutions



Develop Mobile & Web Applications Exploiting Snap4City Smart City Services

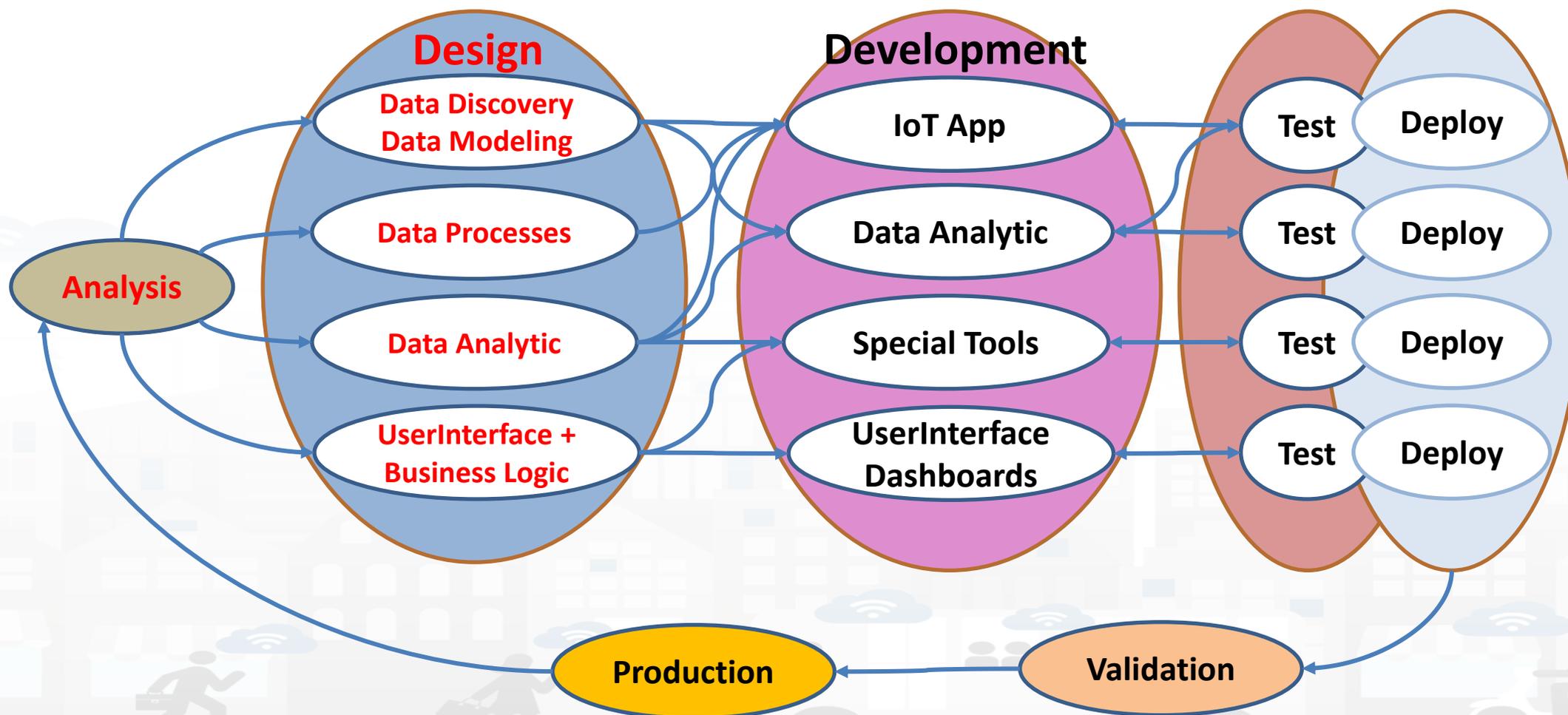


TOP

Analysis and Design for Innovation (Co-Creation and Co-Working)



Development Life Cycle Smart Solutions



Analysis & Design for Innovation



- **Analysis**

- The analysis starts with a number of meetings/interviews with stakeholders
- The identification of the target stakeholders/actors/users (target Segments) and their definition/description
- The meetings/workshops are focused on filling the **Snap4City Innovation Matrix** which is an evolution of the INNOVATRIX approach of IMEC
- See the schema of the **Snap4City Innovation Matrix** reported in the next slide, on the basis of the kind of Meeting for example: (a) starting a smart city, (b) starting a smart city Living Lab

- **Data Discovery**

- Production of the Data Table (Snap4City)
- Data discovery is performed on analysis of the: (i) identified scenarios, (ii) data of the stakeholders, (iii) international sources, (iv) Snap4City experience, etc.
- Performed by following the Snap4City guidelines on Data Search on web and world.

- **Design**

- Focused on creating a large number of Use Cases and/or Scenarios for development
- The design starts by taking into account the Snap4City development life cycles and tools. Thus shortening all the boring activities and following the typical Snap4City rapid prototyping described in these slides!!

Snap4City Innovation Matrix and Process



Snap4City Innovation Matrix

	Parameters	Commons	Operators	360°	Visitors
Current State	Needs	[Sticky notes]	[Sticky notes]	[Sticky notes]	[Sticky notes]
	Current Practices	[Sticky notes]	[Sticky notes]	[Sticky notes]	[Sticky notes]
	Value proposition (Current)	[Sticky notes]	[Sticky notes]	[Sticky notes]	[Sticky notes]
Future State	Value proposition (Future)	[Sticky notes]	[Sticky notes]	[Sticky notes]	[Sticky notes]
	Solution	[Sticky notes]	[Sticky notes]	[Sticky notes]	[Sticky notes]
	Value Capture	[Sticky notes]	[Sticky notes]	[Sticky notes]	[Sticky notes]
	Key Partners	[Sticky notes]	[Sticky notes]	[Sticky notes]	[Sticky notes]
	Barriers	[Sticky notes]	[Sticky notes]	[Sticky notes]	[Sticky notes]

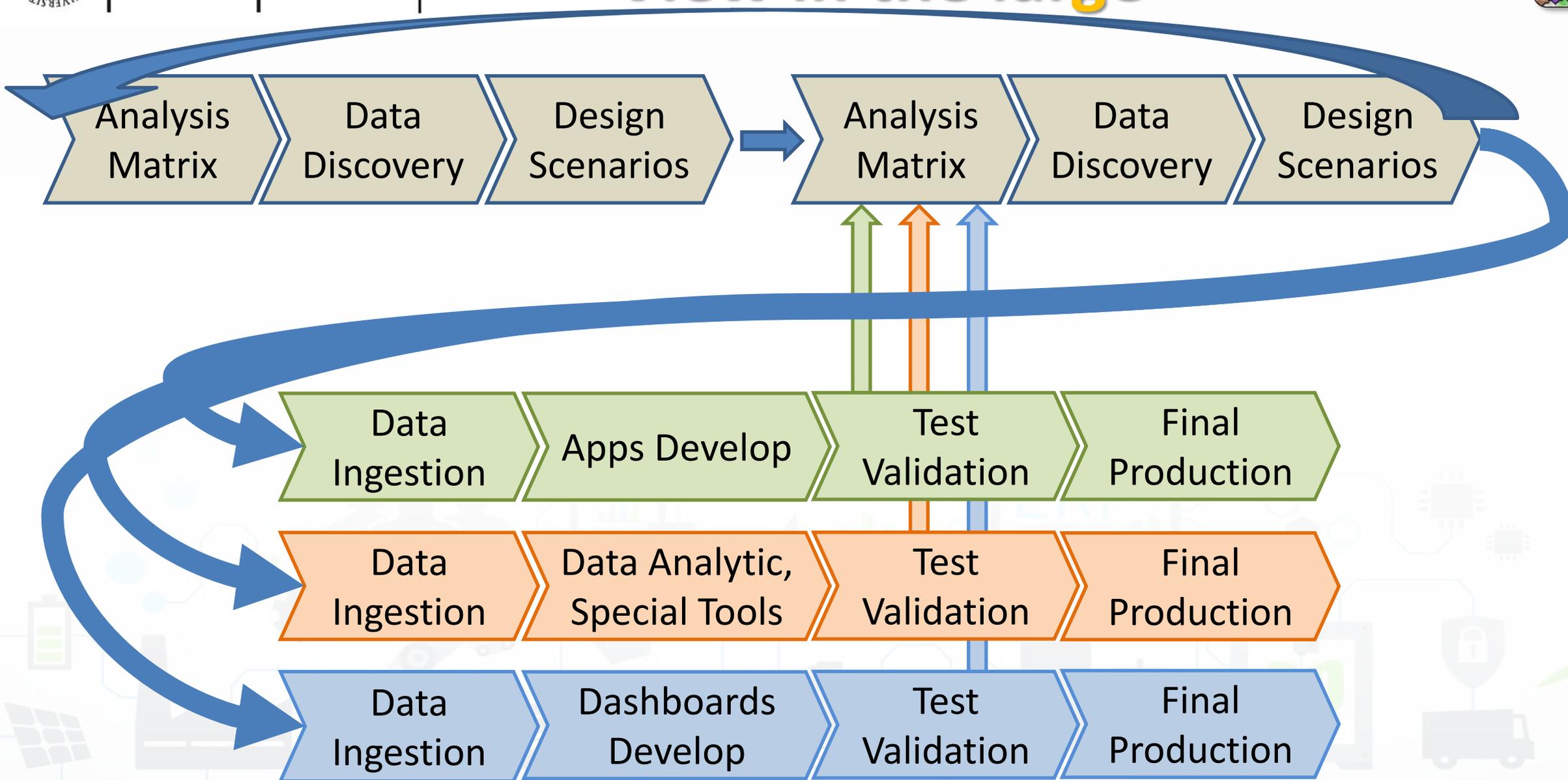
Snap4City Innovation Matrix

	Parameters	Commons
Needs		
Current Practices		
Value proposition (current)		
Value proposition (Future)		
Solution		
Value Capture		
Key Partners		



Design Scenarios

View in the large



Analysis for Innovation



Snap4City Analysis for Innovation



- **Analysis**

- The analysis starts with a number of meetings/interviews with stakeholders
- The identification of the target stakeholders/actors/users (target Segments) and their definition/description
- The meetings/workshops are focused on filling the **Snap4City Innovation Matrix** which is an evolution of the INNOVATRIX approach of IMEC
- The schema of the **Snap4City Innovation Matrix** is reported in the next slide,
 - It may be different depending on the kind of action: (a) starting a smart city, (b) starting a smart city Living Lab, (c) both actions at the same time.

- **Two main goals:**

- Data Discovery (see later)
- Identification of User Cases, Scenarios (see later)

- Defined by IMEC for Living Lab according to ENOLL

CUSTOMER SEGMENT		What customer segments to focus on? What are key characteristics? What is the use-context?		
NEEDS		What are the needs of the customer segment? How do we prioritize these needs?		
CURRENT PRACTICES		Who or what are competitors, alternatives, customer behavior? What are the pains and gains of these current practices?		
VALUE PROPOSITION		What (measurable) impact will you create for this customer segment?		
SOLUTION		What are the components of your (digital) solution? How do these components differ for the different customer segments?		
BARRIERS		What are the barriers for adoption, usage and market entry?		
VALUE CAPTURE		What value (monetary and non-monetary) do I receive in return? What price should I set (and how)?		
KEY PARTNERS		Who are your key partners? How to interact with stakeholders?		

Why Innovation Fail...

- <https://hbr.org/2006/06/eager-sellers-and-stony-buyers-understanding-the-psychology-of-new-product-adoption>
- Many innovate and good products failed on conquering the market/ deploy, due to the psychology of behaviour change.
 - To understand why may fail is the first step.
- One aspects is the **Psychological bias**:
 - Current users overvalue the benefits of what they are using
 - *endowed effect*, which is estimated to be of the 100%.
The new should be at least twice better than the current to convince to change.
 - *status quo effect*, if the ownership of the current has been for long time (years) it may need a factor of 4 to change.
 - Developers overvalue the benefits of what they have developed, of a factor of 3

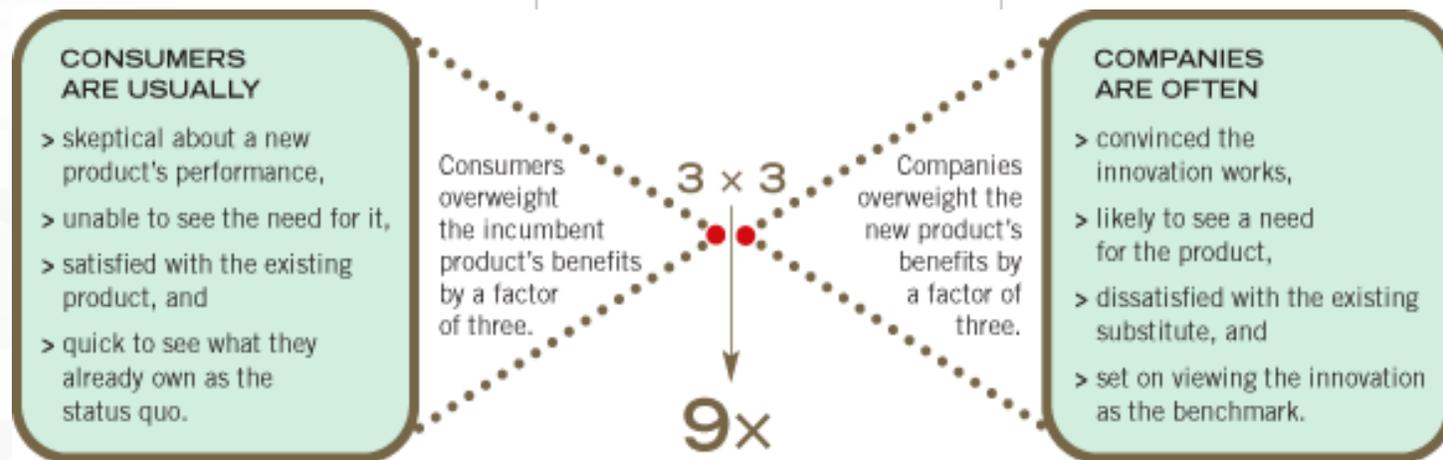


Reasons to remain vs change

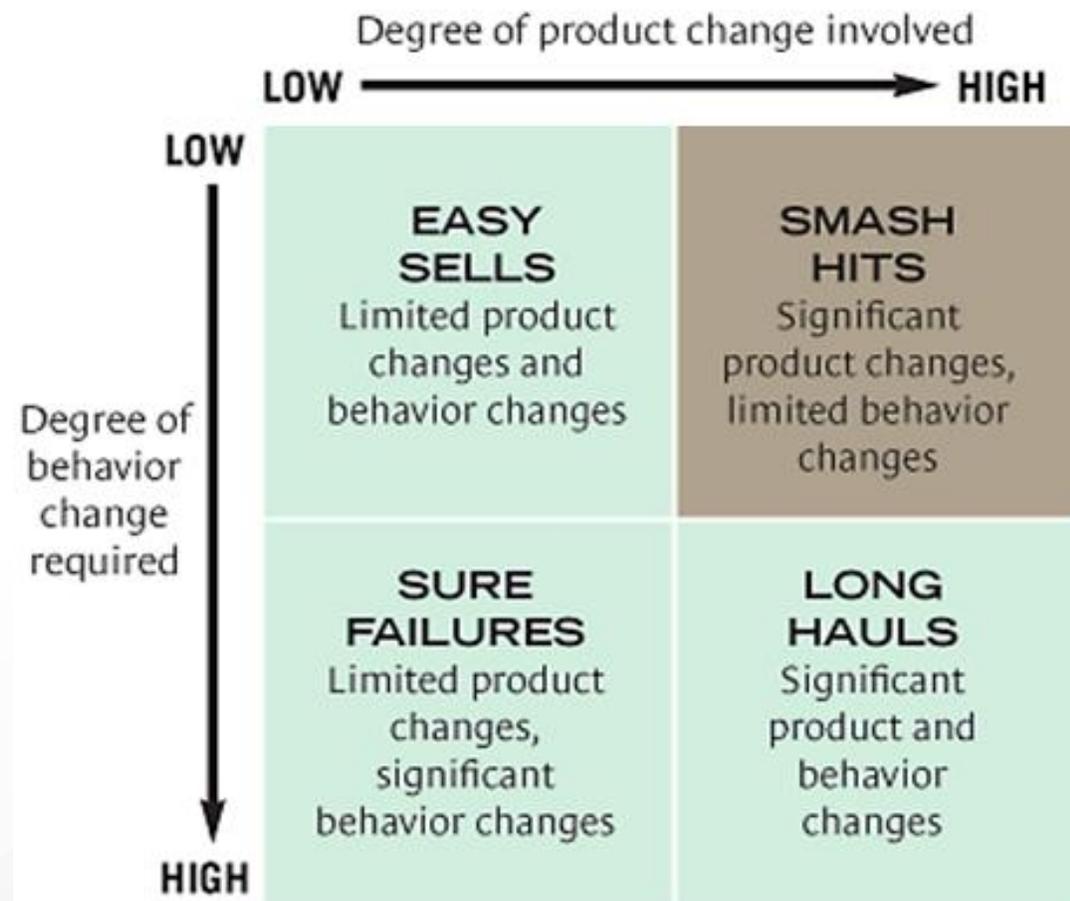
- Attractiveness of the product
 - Is subjective as perceived value
- They compare the new with respect to what they know
 - Any improvement is a Gain, any lack is seen as a Loss
 - Where losses have a larger appearance of gains
- Cost to change product in:
 - Learning, Time and Money
- Rational vs Irrational impulse to change/buy
- → *Is a Recipes for a disaster*

THE TRADE-OFFS INNOVATIONS DEMAND

Innovation	What Consumers Gain by Buying	What Consumers Lose by Buying
Electric cars	Clean environment	Easy refueling
Digital video recorders	Easy recording	Ability to play rented movies
DVD rentals by mail	Broad selection	Spontaneity
E-books	Easy portability	Durability
Online grocery shopping	Home delivery	Ability to select freshest products
Satellite radio	Broad selection	Free music
Screw-top wine caps	Less spoilage	Elegance of the experience
Segway scooter	Mobility	Health benefits of walking
Wind turbines	Nonpolluting energy	Unobstructed views



- **Easy Sells/Accept**
 - Acceptance high but new benefits low
- **Sure Failures**
 - Limited benefits and high changes, hard to be accepted
- **Long hauls, a marathon**
 - May be great new value, but associated with big changes. Consumer resistance is high. It may take time to go (e.g., Linux, mobile phones).
- **Smash hits**
 - Are those that have the major probability to be accepted in short or long term.
 - High benefits and innovations, with limited changes in behaviour



TOP

The Workshops for Innovation, Co-Creation



Pre-Conditions

- **Motivations identified:** domains/**thematic-areas**, actors/**segments**,
 - e.g.: Mobility and transport, energy, security, environment, etc.
- The customer **Segments** describe the position of the different *Actors Categories* with respect to the same needs, problem, action, scenario..
 - Two examples:
 - the **Citizens/Tourists** would like to have an overview of what is going on in the area, while the **City Officials** would be afraid to provide too much information since some information can be sensitive to security issues.
 - the **Mobile App users** would have this and that....., and the **City App Provider** would monitor their movements to provide ads, etc.



Schedule of Workshops and activities



- **1st Workshop** finalized to
 - definition of the first version of the **Snap4City Innovation Matrix (Report)**
 - Identification of the **Data Table**
- **Intermediate work on**
 - Knowing the **ICT** infrastructure and viable solutions
 - Refining **Data Table** details by email
 - Improving the **Report** with more descriptive scenarios
 - Presenting **Report** and TABLE 1 week in advance wrt the 2nd workshop (if it is possible)
- **2nd Workshop** finalized to
 - Discussing a reasoned version of the scenarios with problems pending
 - Solving pending aspects of the **Snap4City Innovation Matrix and Data Table**
 - **Identification of the main Scenarios to be developed and feasible according to feasibility and priority**
 - Corresponding consolidation of the development teams
- **Conclusive work on**
 - Refining Data Table details
 - Creating Final Report with Descriptive Scenarios
 - Designing of the Minimum Snap4City architecture to cope with scenarios, scenario feature table wrt to Snap4City modules
 - Development of mock-up for Dashboards with fake data to show the concept
- **Final Meeting**
 - Presentation of the final report with: 1 mock-up of a scenario, early design of the Snap4City solution vs modules according to the scenarios
 - further discussion on the next steps

Snap4City Innovation Matrix

Parameters		Commons
Current State	Needs				
	Current Practices				
	Value proposition (current)				
Future State	Value proposition (Future)				
	Solution				
	Value Capture				
	Key Partners				
	Barriers				



Meeting Organization

Snap4City Innovation Matrix

	Parameters	Commons
Needs				
Current State				
Current Practices				
Value proposition (current)				
Value proposition (Future)				
Future State				
Solution				
Value Capture				
Key Partners				



Mobility and Transport

Energy & Safety



Security & Resilience

Snap4City Innovation Matrix

	Parameters	Commons
Needs				
Current State				
Current Practices				
Value proposition (current)				
Value proposition (Future)				
Future State				
Solution				
Value Capture				
Key Partners				
Barriers				

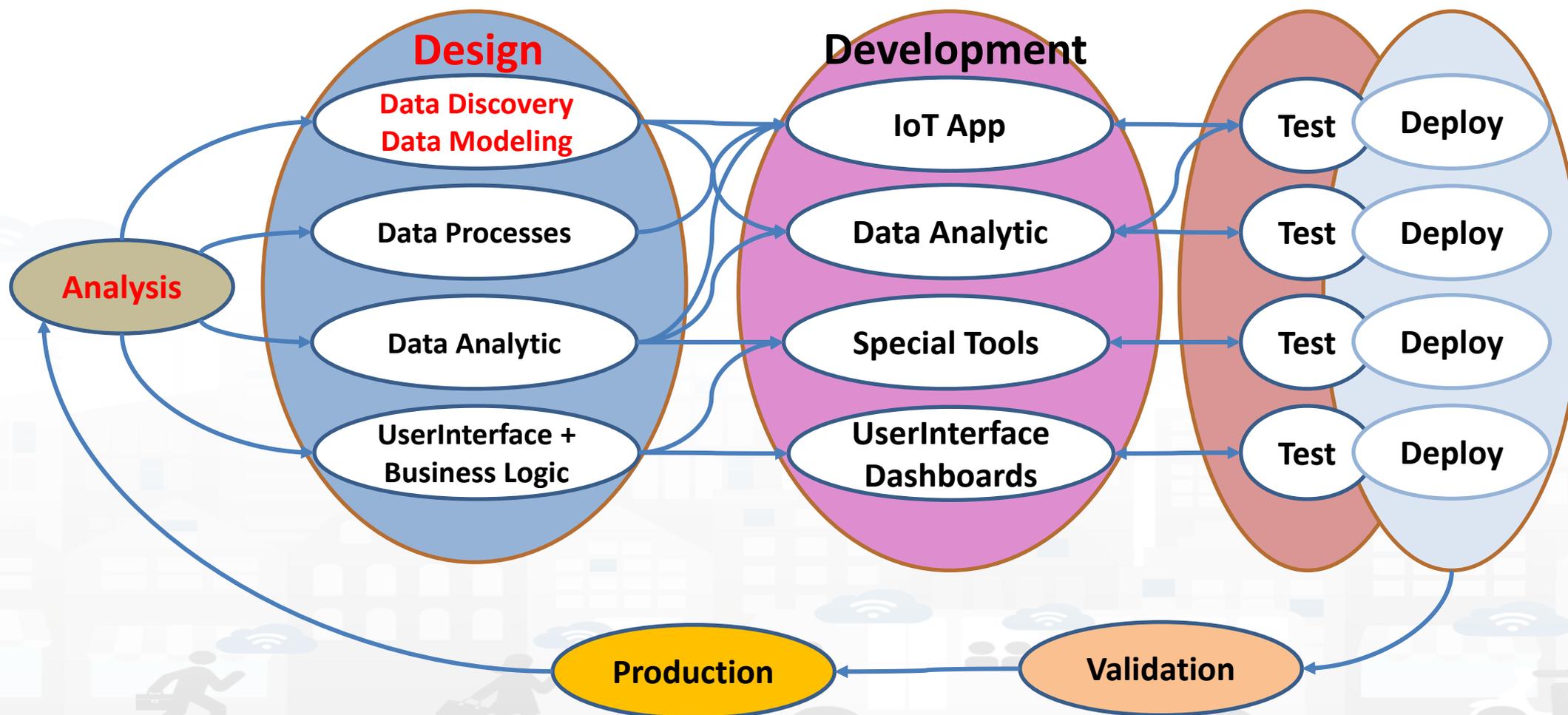
For each table:

- Experts of the domain specific
- Experts of different customers segment
- Operative people
- ICT people
- Decision Makers
- Etc.

Design: Data Discovery



Development Life Cycle Smart Solutions



Data Discovery



- Performed by analyzing data from:
 - I. identified scenarios from the **Snap4City Innovation Matrix**
 - II. main organizations (via interviews)
 - III. other stakeholders (via interview and web pages)
 - IV. regional, national and international sources:
 - I. open data portals, weather sources,
 - II. IOT networks, etc. via web pages and sites
 - V. Mobile Applications (via Snap4City API)
 - VI. Snap4City portal <https://www.snap4city.org>
 - VII. etc.
- Exploiting Snap4City experience, data and tools
- By following the Snap4City guidelines on Data Search on web and world reported in the training course and on Snap4City.org portal.

Design: Data Modeling



Snap4City, the Data Models can be simply instantiated from

- a) **FIWARE Smart Data Models**, versioning, and harvesting the standard repository
- b) **IoT Device Model** which are accessible into the Snap4City environment
- c) **Excel files by using Data Table tool**, which extract the model from the table and automatically help the user to create IoT Device Model, IoT Devices and data attached to them
- d) Creating a **custom IoT Device Model** in standard Snap4City format

Example 1

IoT Device Model: Driver
Nature:.....
Subnature:

Lat,lon: Default (they do not need to be specified in the variables, they are provided by default, but values have to be imposed at the instantiation of the device from model), they are float

Device in Mobility: No (the variable do not need to be specified, while the value has to be set to state if the Lat,Lon are going to change, moving the device or not)

Value_name	Value Type	Value Unit	Data Type
dateObserved	Timestamp	Timestamp in ms	String
identifier	ID	text	String
name	entity	text	String
surname	entity	text	String
age	age	number	Integer
sex	status	some coded status	String
language	entity	text	String
email	entity	text	String
phone	entity	text	String
address	entity	text	String
locality	entity	text	String
city	entity	text	String
nationality	entity	text	String
civicNmber	entity	text	String
dateofBorn	DateTime	Timestamp in ms	String
gender	status	some coded status	String
driverHelthiness	Identifier	ServiceURI	String
driverEvent	Identifier	ServiceURI	String
driverAnalysis	Identifier	ServiceURI	String
Vechicle	Identifier	ServiceURI	String

Example 2

IoT Device Model: driverHelthiness

Nature:.....

Subnature:

Lat,lon:

Device in Mobility:

Value_name	Value Type	Value Unit	Data Type
dateObserved	Timestamp	Timestamp in ms	String
kind			
levelAttentionFactor1			
levelAttentionFactor2			
driver	Identifier	ServiceURI	String

Example 3

IoT Device Model: Vehicle			
Nature:.....			
Subnature:			
Lat,lon:			
Device in Mobility:			
Value_name	Value Type	Value Unit	Data Type
dateObserved	Timestamp	Timestamp in ms	String
producer	entity	text	String
model	entity	text	String
plate	entity	text	String
companyID	entity	text	String
velocity	velocity	km/h	float
acceleration	acceleration	m/s ²	float
Status	status	some coded status	String
energyLevel	energy level	percentage	Float
kmTotal	distance	km	Float
thankLevel	energy level	percentage	Float
vehicleEvent	Identifier	ServiceURI	String

Example 4

IoT Device Model: VehicleEvent

Nature:.....

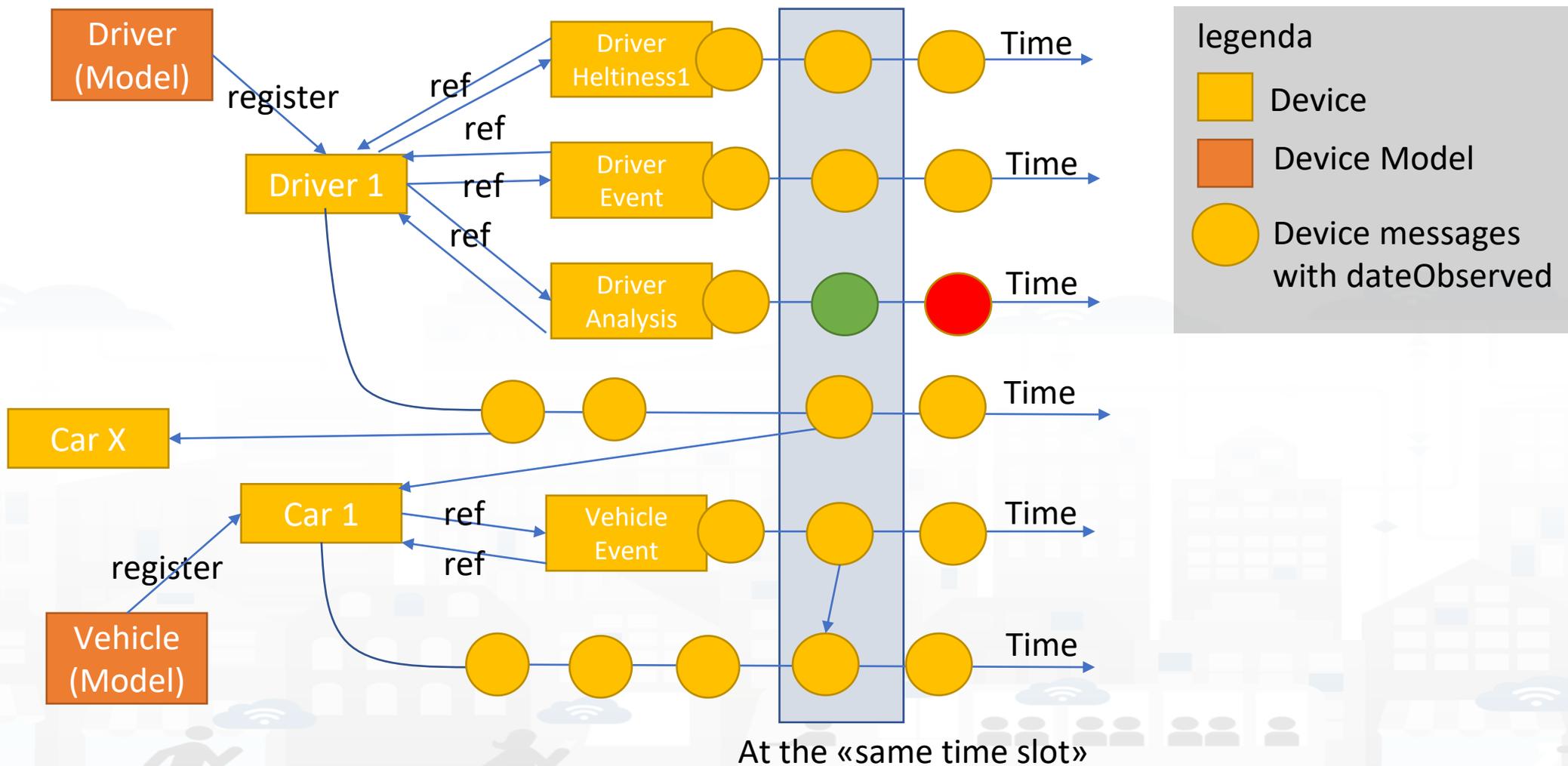
Subnature:

Lat,lon:

Device in Mobility:

Value_name	Value Type	Value Unit	Data Type
dateObserved	Timestamp	Timestamp in ms	String
eventID	ID	text	String
eventKind	status	some coded status	String
status	status	some coded status	String
vehicle	Identifier	ServiceURI	String

Example of Data Model Diagram

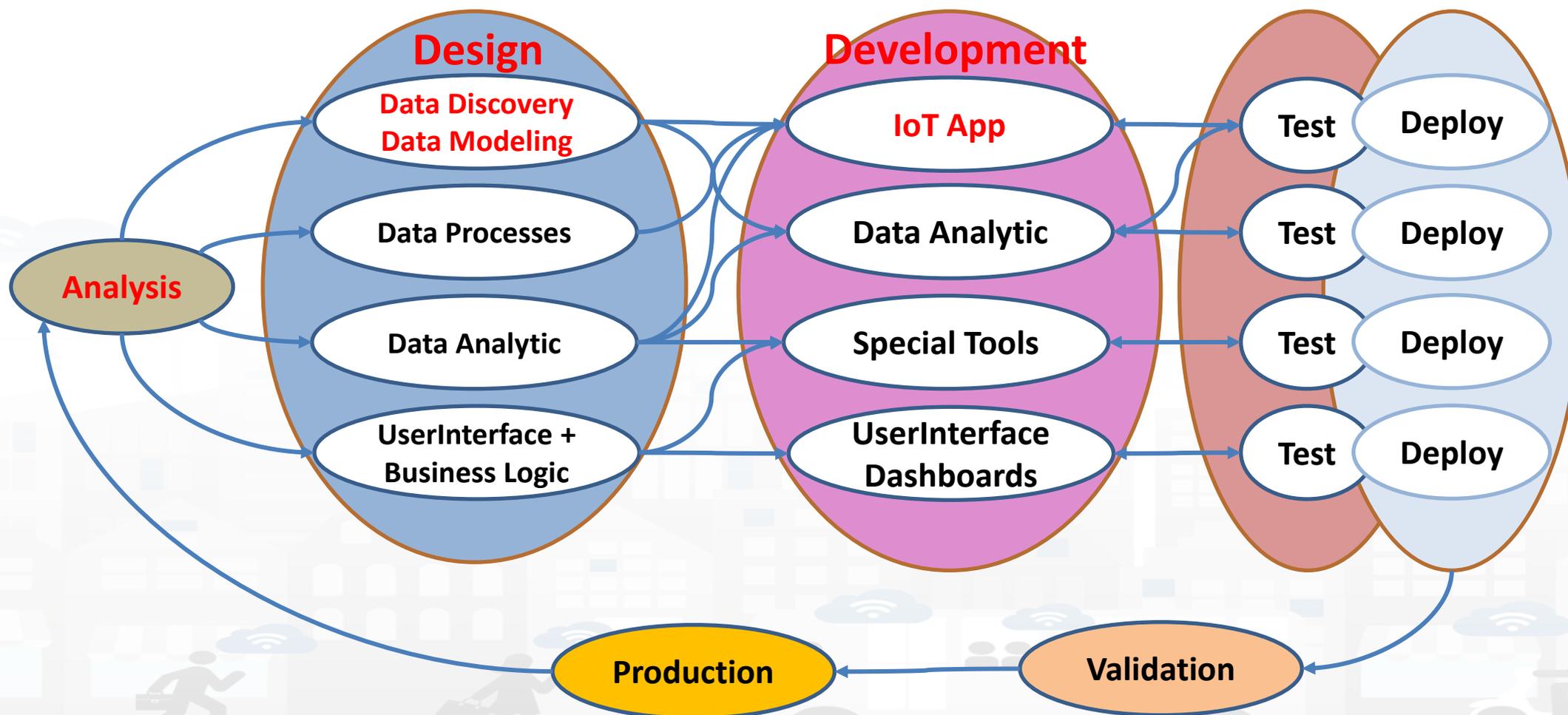


TOP

Design & Develop: Data Ingestion



Development Life Cycle Smart Solutions



Data Ingestion

- For Data Warehouse mechanisms (IOT App, IOT Brokers, **ETL**, DataGate, etc.) and related tools please see slides of the 5th PART of the Snap4City course.

Dashboard manager for RootAdmin

Snap4City

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

[LOGOUT](#)

- My Snap4City.org
- Tour Again
- ダッシュボード
- Dashboards (Public)**
- My Dashboards in All Org.
- Dashboards of My Organization
- My Dashboards in My Organization
- My Data Dashboard Dev Kibana
- My Data Dashboard Kibana
- Extra Dashboard Widgets
- Notifier
- Data, my Data, OpenData
- Knowledge and Maps
- IOT Applications
- IOT Directory and Devices
- Resource Manager
- Development Tools
- Management
- Decision Support Systems
- Deploy and Installation
- SuperSetting
- User Management and Auditing

Dashboards (Public by (ORG))

Table
Prev 1 2 3 ... 71 Next

Filter by dashboard title,

New dashboard

Title	Creator	Creation date	Last edit date	# Access Today	Minutes Opened Today	Status	Edit	View	Organizations
3D Multi Data Map - Digital Twin Global - Firenze	gpantaleo1	2020-02-05 13:22:03	2021-11-03 09:03:10	2	1199	On	EDIT	VIEW	DISIT
15 minuti index - Bologna Città Metropolitana (beta)	paolo.bol2	2021-01-22 10:06:06	2021-05-05 20:34:11	3	1199	On	EDIT	VIEW	DISIT
ALERTS IN FLORENCE REGION	gulla	2019-02-28 17:13:49	2020-03-13 17:46:47	1	1199	On	EDIT	VIEW	DISIT
Lonato del Garda	nikolas	2019-11-13 14:14:17	2021-11-03 16:48:29	5	1196	On	EDIT	VIEW	LonatoDelGarda
Andamento Regione Toscana e Province, COVID-19	paolo.disit	2020-03-16 00:05:35	2020-10-28 15:38:51	5	88	On	EDIT	VIEW	DISIT
Andamenti Nazionali e Regionali infezione COVID-19	paolo.disit	2020-03-16 00:05:35	2020-04-19 16:46:36	3	85	On	EDIT	VIEW	DISIT
Herit-Data - Pont du Gard Main	nicola_pontdugard	2021-05-24 14:47:08	2021-08-05 17:32:12	1	72	On	EDIT	VIEW	PontDuGard-Occitanie
DIDA data 2	paolo.disit	2021-10-25 17:19:18	2021-10-29 11:47:26	3	58	On	EDIT	VIEW	DISIT
Firenze	disit	2016-06-29 11:15:58	2020-05-09 09:53:29	5	30	On	EDIT	VIEW	DISIT
DIDA Data OLAP and Calendar	paolo.disit	2021-10-06 17:27:05	2021-10-27 23:41:49	2	29	On	EDIT	VIEW	DISIT
DIDA single trends	paolo.disit	2021-10-06 14:56:29	2021-10-07 09:56:30	2	29	On	EDIT	VIEW	DISIT
SVG Custom Widgets Examples	nicolatooladmin	2020-09-08 17:42:59	2021-08-23 07:55:02	1	26	On	EDIT	VIEW	DISIT
Monitoring Cross Road Venaria - (AXIS Camera)	roottooladmin1	2021-11-04 17:39:26	2021-11-17 08:53:46	2	12	On	EDIT	VIEW	DISIT
Snap4City - DataCenter gas and smoke-desktop	snap4city	2018-01-22 15:05:22	2018-05-06 22:25:42	2	9	On	EDIT	VIEW	DISIT
Satellite (Copernicus) vs IOT Data	roottooladmin1	2020-11-11 09:35:57	2021-04-02 12:11:48	2	8	On	EDIT	VIEW	DISIT
Convention Bureau - Mobility for integration	disit	2017-11-22 15:40:50	2020-03-13 18:16:09	2	4	On	EDIT	VIEW	DISIT
Herit-Data Dubrovnik KPIs data	nicola.dubrovnik	2021-11-24 17:56:55	2021-11-26 12:08:23	1	1	On	EDIT	VIEW	Dubrovnik
Herit-Data - Dubrovnik Main	nicola.dubrovnic	2021-05-18 17:53:33	2021-11-26 10:34:56	1	1	On	EDIT	VIEW	Dubrovnik
Environment dash	disit	2017-10-16 17:44:06	2021-03-09 17:05:39	1	1	On	EDIT	VIEW	DISIT
Citizens Engagement	disit	2018-07-09 17:35:14	2019-08-07 16:28:38	1	1	On	EDIT	VIEW	DISIT

Semantic Reasoning on Smart Applications

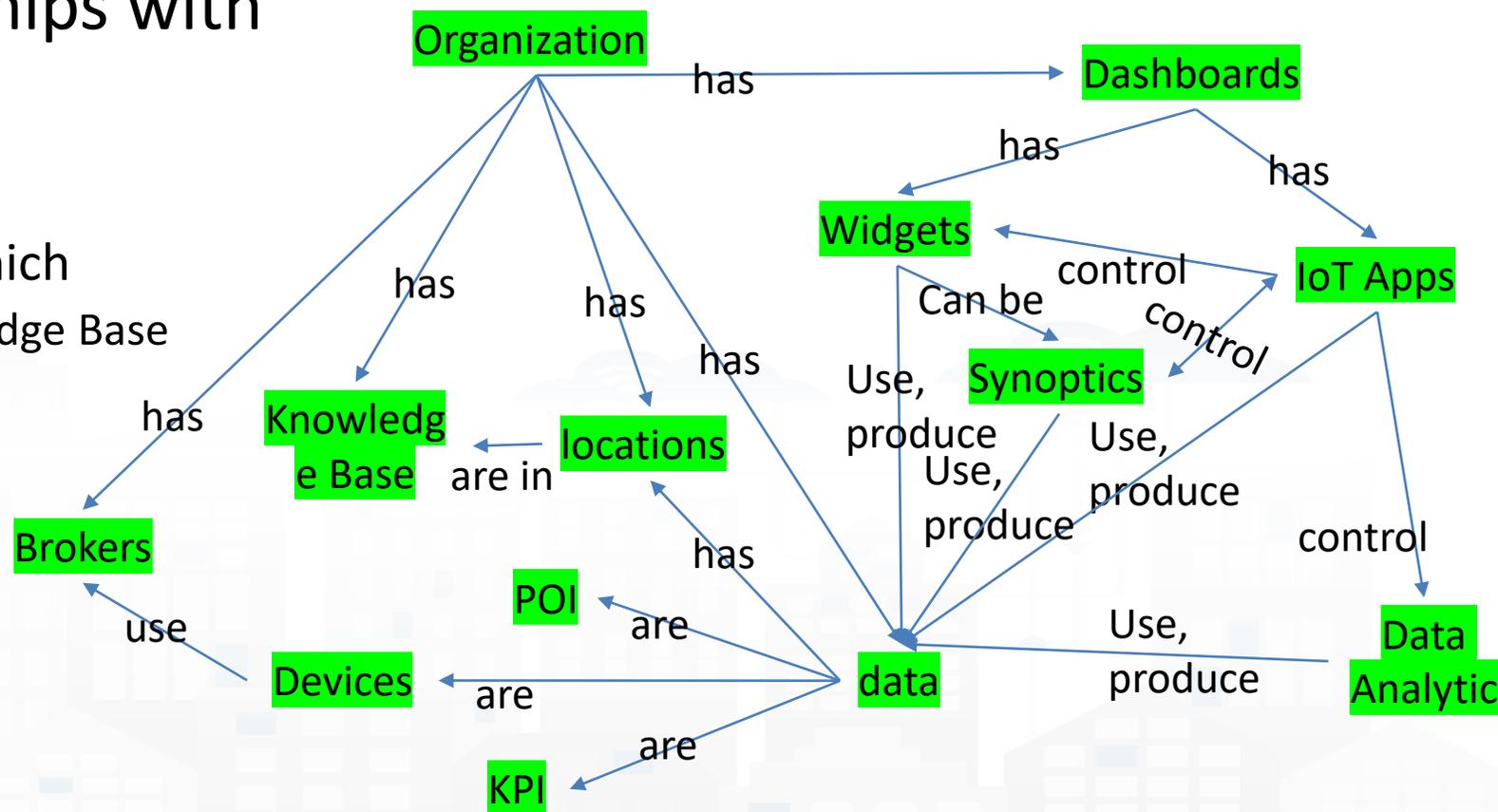
- Dashboards have relationships with

- Org. at which they belong
- Widgets with
 - data they use, and each of which
 - is connected with the Knowledge Base
 - May be: device, kpi, etc.

- IoT Apps with

- Data they use
- Data Analytic
- Widget they control

–



For All Dashboard owners: Graph and Structure

- Go on Dashboard Management

Management

Ownership | Visibility | Delegations | Group Delegations | Accesses Trends | **Structure** | Organization | Thumbnail

Link to Graph

Dashboard Hierarchy

Dashboard: - Energy -

- Widget: N. of App Users - (*widgetSingleContent*)
- Use Data:
- Widget: bench-icon - (*widgetButton*)
- Use Data:
 - Query: <https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasbo...>
 - Link to Data Inspector (root)
 - Link to Graph log
- Widget: Piazza Francia - (*widgetSingleContent*)
- Use Data:
 - my-kpi: 17057099
 - Query: <http://model.snap4city.org/17057099>
 - Link to Data Inspector
 - Link to Graph log

Linked Open Graph

Identifier: <http://www.dist.org/km4city/resource/00/CarCount>

Image:

Info: no other informations

SPARQL Query:

```
select { ?uri rdfs:label ?label }
WHERE {
  SELECT ?subject ?property ?object
}
```

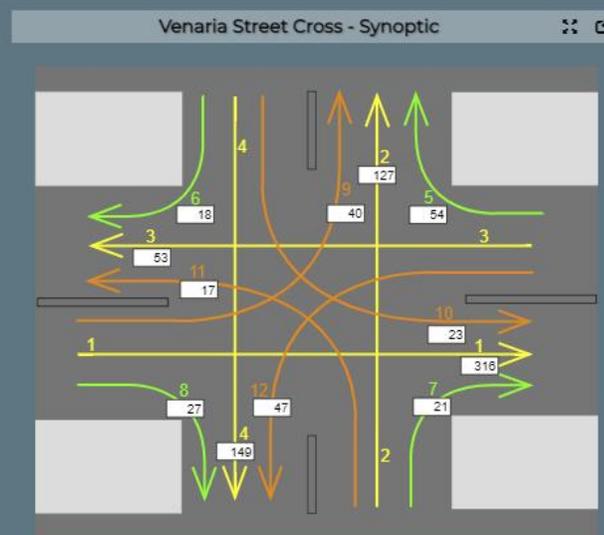
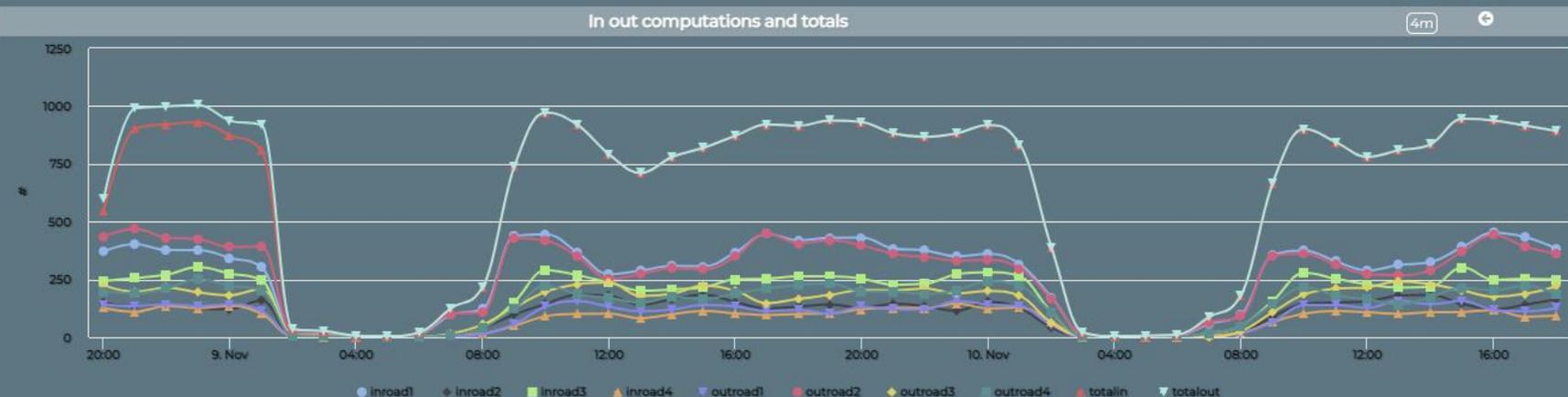
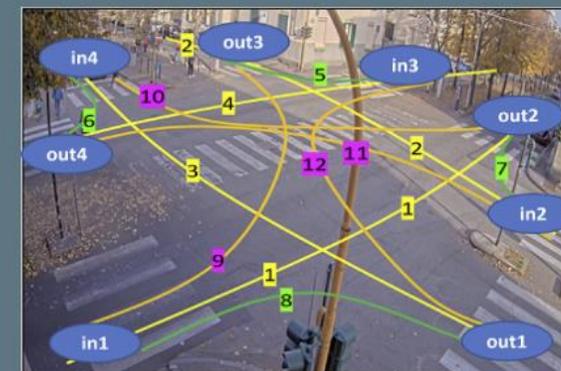
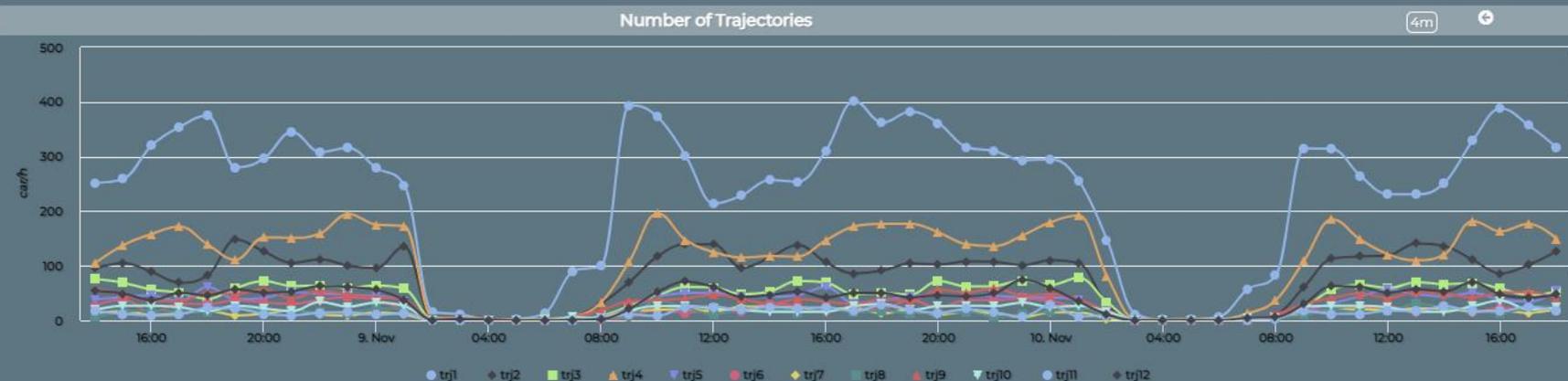
Type of relations

<input type="checkbox"/> exposedBy	<input type="checkbox"/> hasDeposition
<input checked="" type="checkbox"/> hasAttribute	<input checked="" type="checkbox"/> hasDashboard
<input checked="" type="checkbox"/> hasSystemCapability	<input checked="" type="checkbox"/> hasWidget
<input checked="" type="checkbox"/> implements	<input checked="" type="checkbox"/> observes
<input type="checkbox"/> owl:sameAs	<input checked="" type="checkbox"/> rdf:type
<input checked="" type="checkbox"/> rdfs:seeAlso	<input checked="" type="checkbox"/> useData
<input checked="" type="checkbox"/> usedByWidget	



Monitoring Cross Road Venaria - (AXIS Camera)

Wed 10 Nov 18:50:53



<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddashboard=MzI5Ng==>

Linked Open Graph

Shown: 47
Entities: 31
Relations: 16

Show Endpoints Show User Status Hide Relations

Embed

CarCount Close

Identifier:
http://www.disit.org/km4city/resource/iot/CarCount

Image:

Info:

no other informations

Sparql Query:

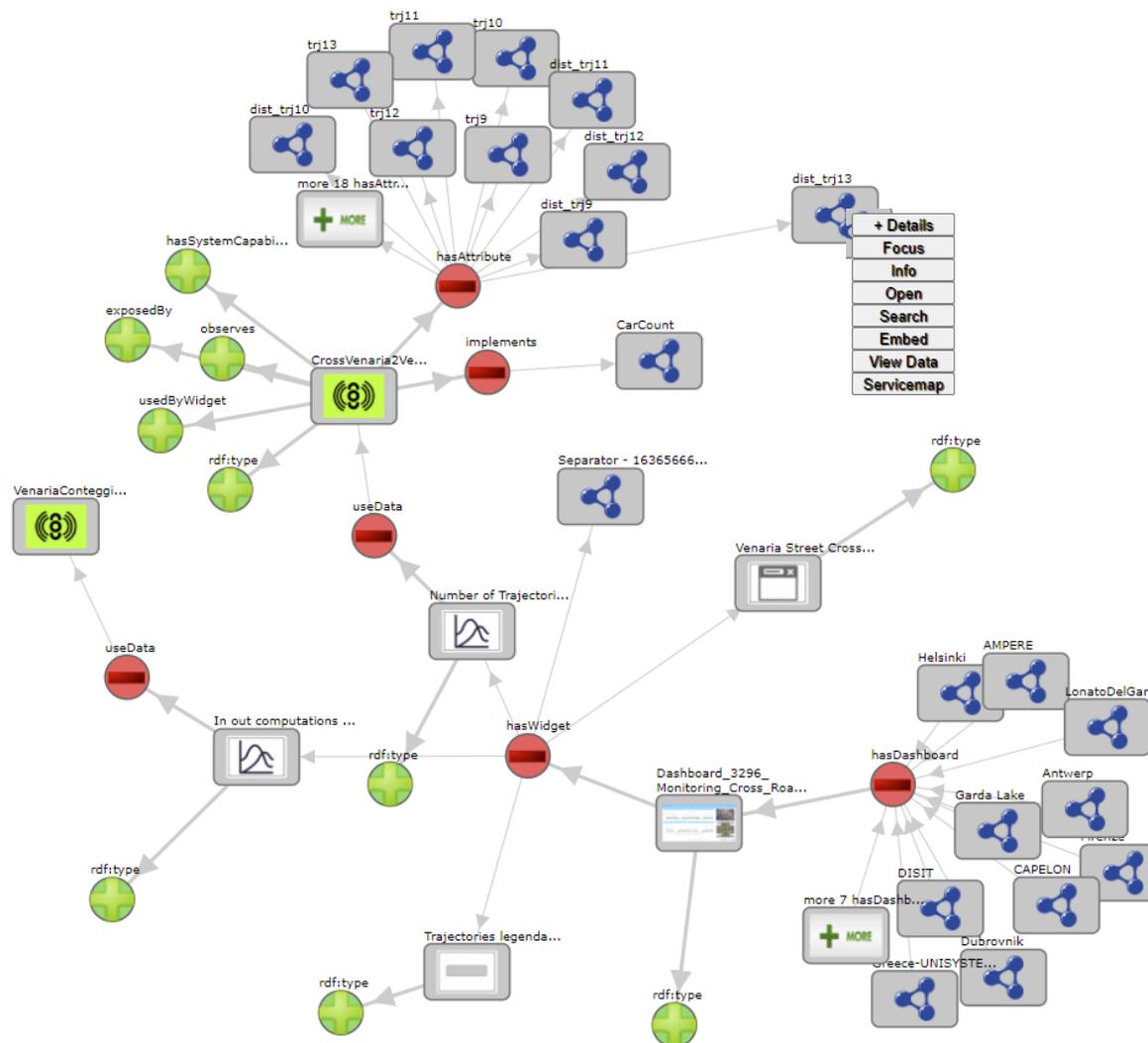
ENDPOINT:
http://virtuoso-kb:8890/sparql

QUERY:
SELECT ?subject ?property ?object

Type of relations

Select all Deselect all Invert Hide all inverse

<input checked="" type="checkbox"/> exposedBy	<input type="checkbox"/> foaf:depiction
<input checked="" type="checkbox"/> hasAttribute	<input checked="" type="checkbox"/> hasDashboard
<input checked="" type="checkbox"/> hasSystemCapability	<input checked="" type="checkbox"/> hasWidget
<input checked="" type="checkbox"/> implements	<input checked="" type="checkbox"/> observes
<input type="checkbox"/> owl:sameAs	<input checked="" type="checkbox"/> rdf:type
<input checked="" type="checkbox"/> rdfs:seeAlso	<input checked="" type="checkbox"/> useData
<input checked="" type="checkbox"/> usedByWidget	



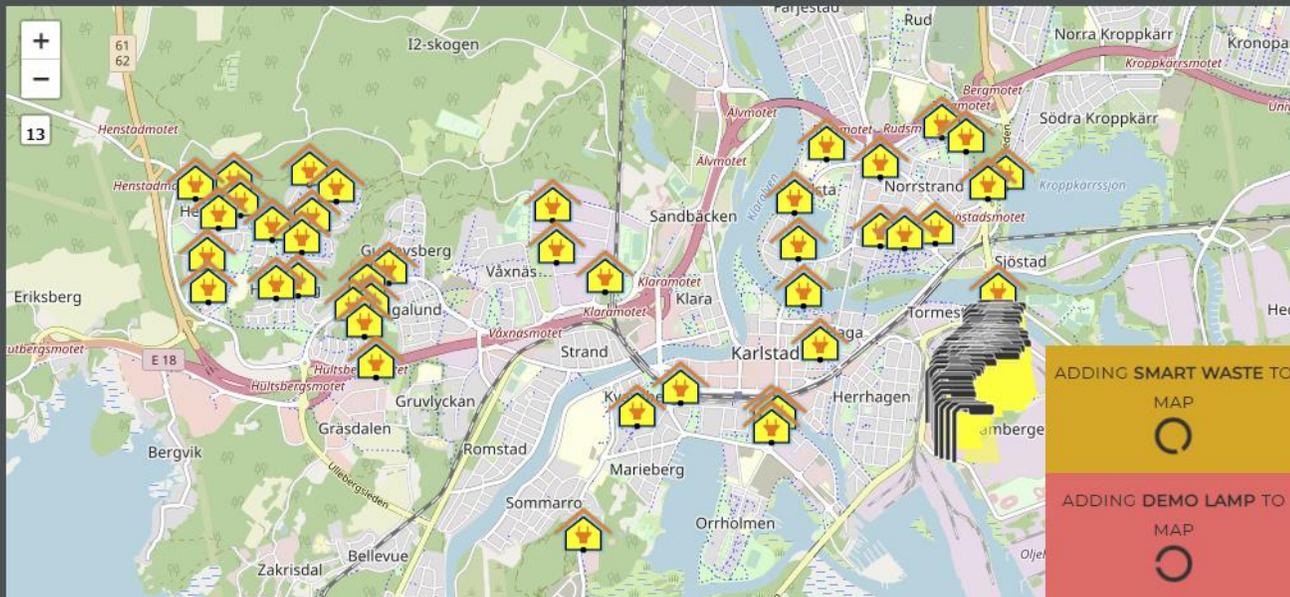


Karlstad - Capelon

CAPELON

Sun 28 Nov 20:02:16

- Cabinet
- Smart Light
- Demo Lamp
- Smart Waste



Lamp ON

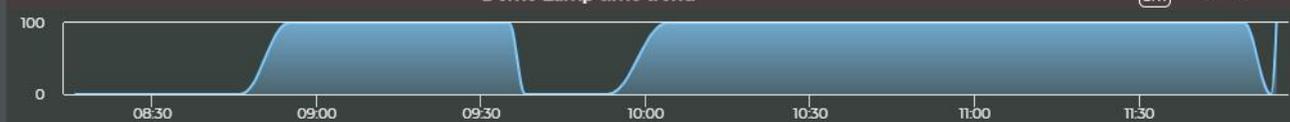
Lamp OFF



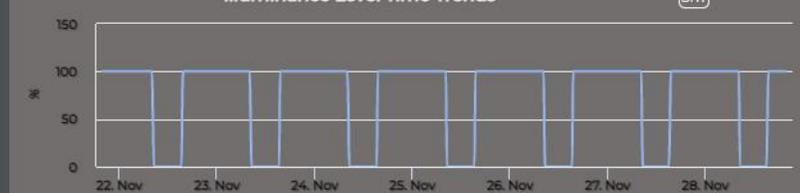
CAPELON:orionCAPELON-UNIFI:5C0272FFFE9F4CD6 - illuminanceLevel



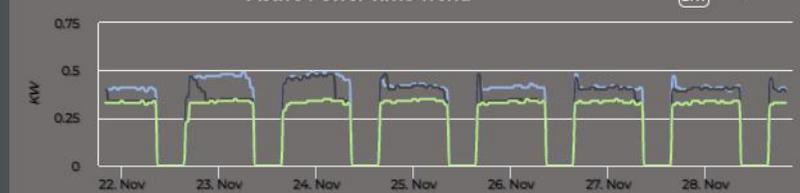
Demo Lamp time trend



Illuminance Level Time Trends



Active Power Time Trend



Street Light ON/OFF Trend



Linked Open Graph

Shown: 45
Entities: 31
Relations: 14

Select a SPARQL endpoint:

Examples:
uri:

Multiple endpoint search

Your data

sparql endpoint: (optional)

uri:

Multiple endpoint search

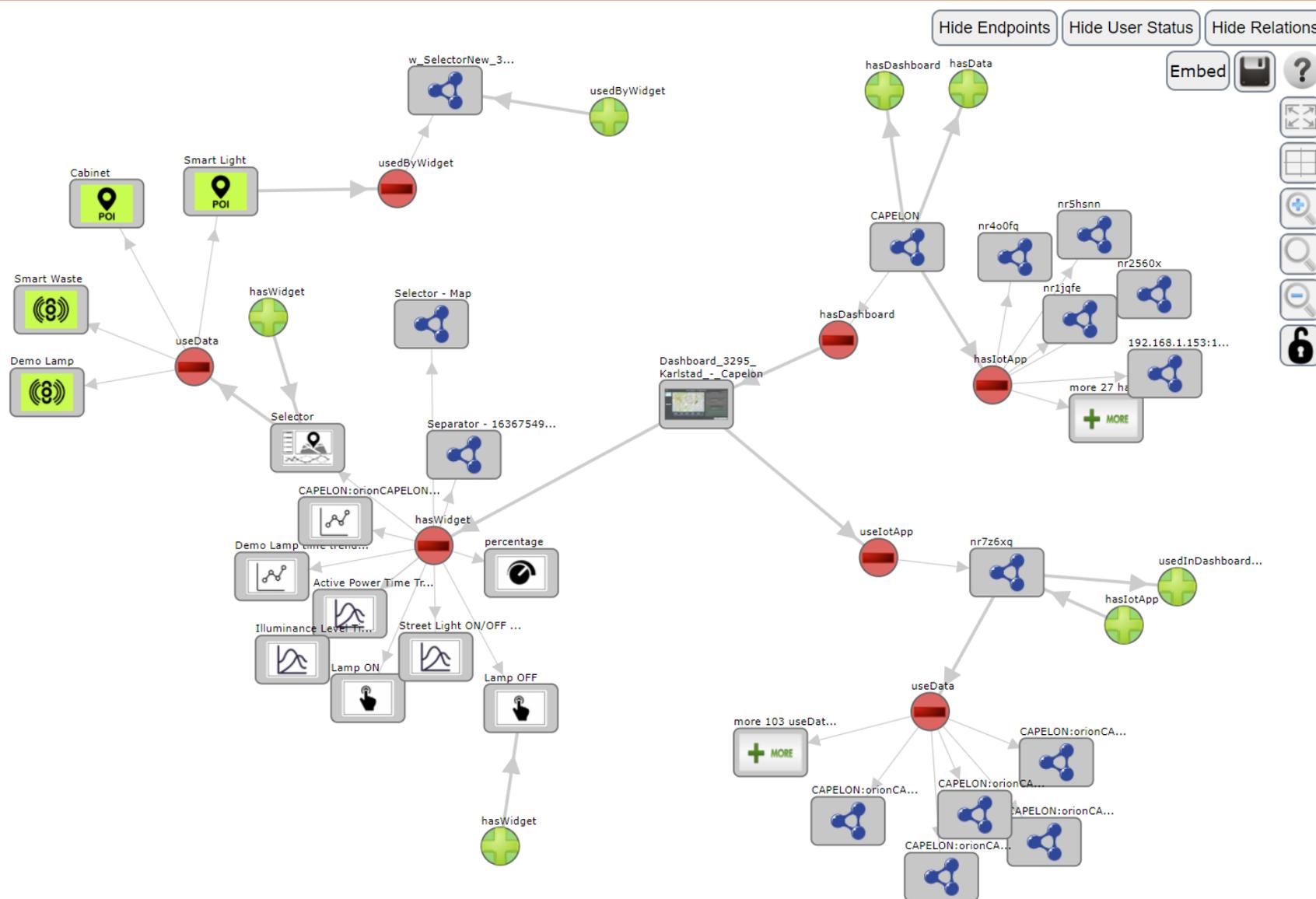
Status

Requests:

Type of relations

Select all Deselect all Invert Hide all inverse

<input type="checkbox"/> foaf:depiction	<input checked="" type="checkbox"/> hasDashboard
<input checked="" type="checkbox"/> hasData	<input checked="" type="checkbox"/> hasIoTApp
<input checked="" type="checkbox"/> hasWidget	<input type="checkbox"/> owl:sameAs
<input type="checkbox"/> rdf:type	<input checked="" type="checkbox"/> rdfs:seeAlso
<input checked="" type="checkbox"/> useData	<input checked="" type="checkbox"/> useIoTApp
<input checked="" type="checkbox"/> usedByWidget	<input checked="" type="checkbox"/> usedInDashboard



Hide Endpoints Hide User Status Hide Relations

Embed

<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddashboard=MTk2Mw==>

Check Data Analytics Tuscany

Testing - Irene

Sun 28 Nov 22:43:30

Air Quality

AirQualityNO2-Tuscany 9m

Interpolation and Heatmap Completed 2021-09-30T14:00:00

AirQualityPM10-Tuscany 9m

Interpolation and Heatmap Completed 2021-09-30T14:00:00

AirQualityPM2.5-Tuscany 9m

Interpolation and Heatmap Completed 2021-09-30T14:00:00

Tuscany CAQI 9m

Interpolation and EAQI/CAQI Heatmap Completed 2021-09-30T14:00:00

Tuscany EAQI 9m

Interpolation and EAQI/CAQI Heatmap Completed 2021-09-30T14:00:00

Weather

AirHumidity-Tuscany 9m

Interpolation and Heatmap Completed 2021-09-05T02:00:00

AirQualityO3-Tuscany 9m

Interpolation and Heatmap Completed 2021-09-30T14:00:00

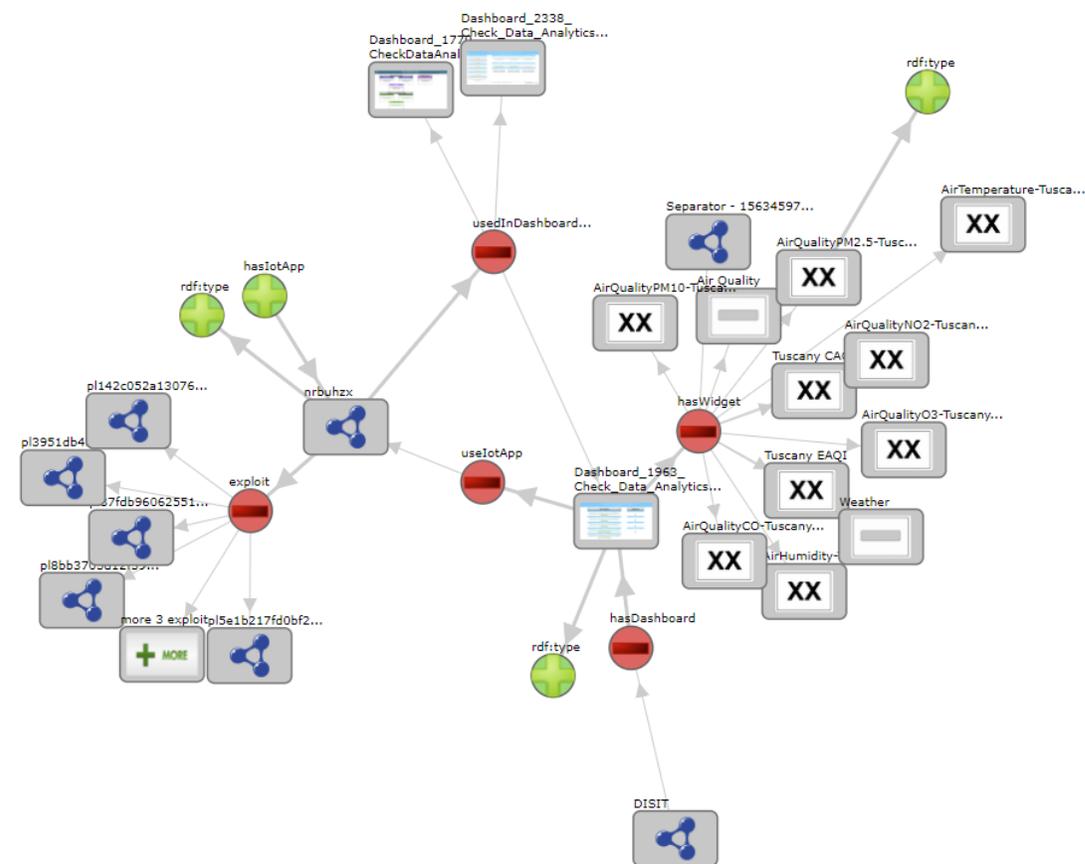
AirTemperature-Tuscany 9m

Interpolation and Heatmap Completed 2021-09-30T14:00:00

AirQualityCO-Tuscany 9m

Interpolation and Heatmap Completed 2021-09-30T14:00:00

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TOP

Sanity Check of Platform Models: Processes and Relationships



<https://www.snap4city.org/s4c-query/view.html>

SPARQL Query Results

	dashboard
EMPTY_DASHBOARDS	http://model.snap4city.org/Dashboard_1188_AzioneNewDashboardNR
MOST_USED_DASHBOARD	http://model.snap4city.org/Dashboard_1263_fromArduinoNR
LEAST_USED_DASHBOARD	http://model.snap4city.org/Dashboard_1316_IoT_device(1)
MOST_USED_DATA	http://model.snap4city.org/Dashboard_1328_Sonne_test_IOT_Device
MOST_CRUCIAL_IOTAPP_FOR_DATA	http://model.snap4city.org/Dashboard_1329_Sonne_test_IOT_Device
MOST_CRUCIAL_IOTAPP_FOR_DASHBOARD	http://model.snap4city.org/Dashboard_1330_Sonne_test_IOT_Device
MOST_ACTIVE_ORGANISATION	http://model.snap4city.org/Dashboard_1331_sonne_test_IOT_Device
PRIVATE_DASHBOARDS	http://model.snap4city.org/Dashboard_1332_sonne_test_IOT_Device
AVG_DATA_FOR_DASHBOARD	http://model.snap4city.org/Dashboard_1390_water
MOST_CRITICAL_IOTAPP_FOR_DA	http://model.snap4city.org/Dashboard_1478_Monitoraggio
DASHBOARD_COMPLEXITY	

TOP

Dashboard Structure for all users



Snap4City

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

LOGOUT

- My Snap4City.org
- Tour Again
- ダッシュボード
- Dashboards (Public)**
- My Dashboards in All Org.
- Dashboards of My Organization
- My Dashboards in My Organization
- My Data Dashboard Dev Kibana
- My Data Dashboard Kibana
- Extra Dashboard Widgets

Dashboards (Public by (ORG))

Cards [Sort icons] [Refresh] [Share]

Prev 1 Next

Venaria [Search] [Close]

Monitoring Cross Road Venaria

IOT apps

testaxisvenaria: Private - DISIT

Edit Management Clone Delete

Monitoring Cross Road Venaria - (AXIS Cam...

Passive

testaxisvenaria: Public (DISIT)

Edit Management Clone Delete

Management

- Ownership
- Visibility
- Delegations
- Group Delegations
- Accesses Trends
- Structure**
- Organization

Monitoring Cross Road Venaria - (AXIS Camera)

Change ownership

New owner username Confirm

New owner username can't be empty

Close

Dashboard Structure and Components

4 Widgets

- Button
 - It is the image
- Curved LineSeries
 - Set of data....
- Curved LineSeries
 -set of data...
- External Content
 - With synoptic

The screenshot shows the 'Management' section of the dashboard, with tabs for Ownership, Visibility, Delegations, Group Delegations, Accesses Trends, Structure, Organization, and Thumbnail. The 'Structure' tab is active, displaying a 'Dashboard Hierarchy' for 'Monitoring Cross Road Venaria - (AXIS Camera)'. The hierarchy lists three widgets and their associated data sources and links.

```
Dashboard Hierarchy

Dashboard: Monitoring Cross Road Venaria - (AXIS Camera)
  • Widget: Trajectories legenda - (widgetButton)
  • Use Data:

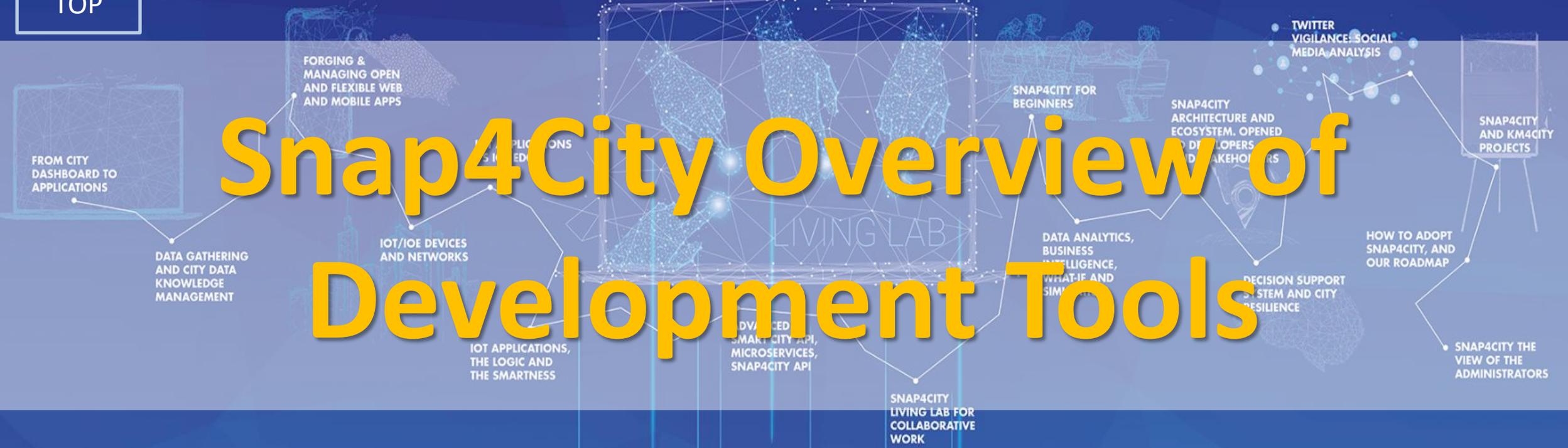
  • Widget: Number of Trajectories per hour - (widgetCurvedLineSeries)
  • Use Data:
    ◦ sensor: CrossVenaria2VehicleFlowTrajectoriesV2
    ◦ Query: http://www.disit.org/km4city/resource/iot/orionUNIFI/DISIT/CrossVen...
    ◦ Link to Data Inspector
    ◦ Link to Graph log
    ◦ Link to Servicemap

  • Widget: In out computations and totals per hour - (widgetCurvedLineSeries)
  • Use Data:
    ◦ sensor: VenariaConteggio
    ◦ Query: http://www.disit.org/km4city/resource/iot/orionUNIFI/DISIT/VenariaC...
    ◦ Link to Data Inspector
    ◦ Link to Graph log
    ◦ Link to Servicemap

  • Widget: Venaria Street Cross - per hour - (widgetExternalContent)
  • Use Data:
    ◦ Query: https://www.snap4city.org/synoptics/v2/synoptic.html?id=135648299
    ◦ Link to Data Inspector (root)
    ◦ Link to Graph log
```

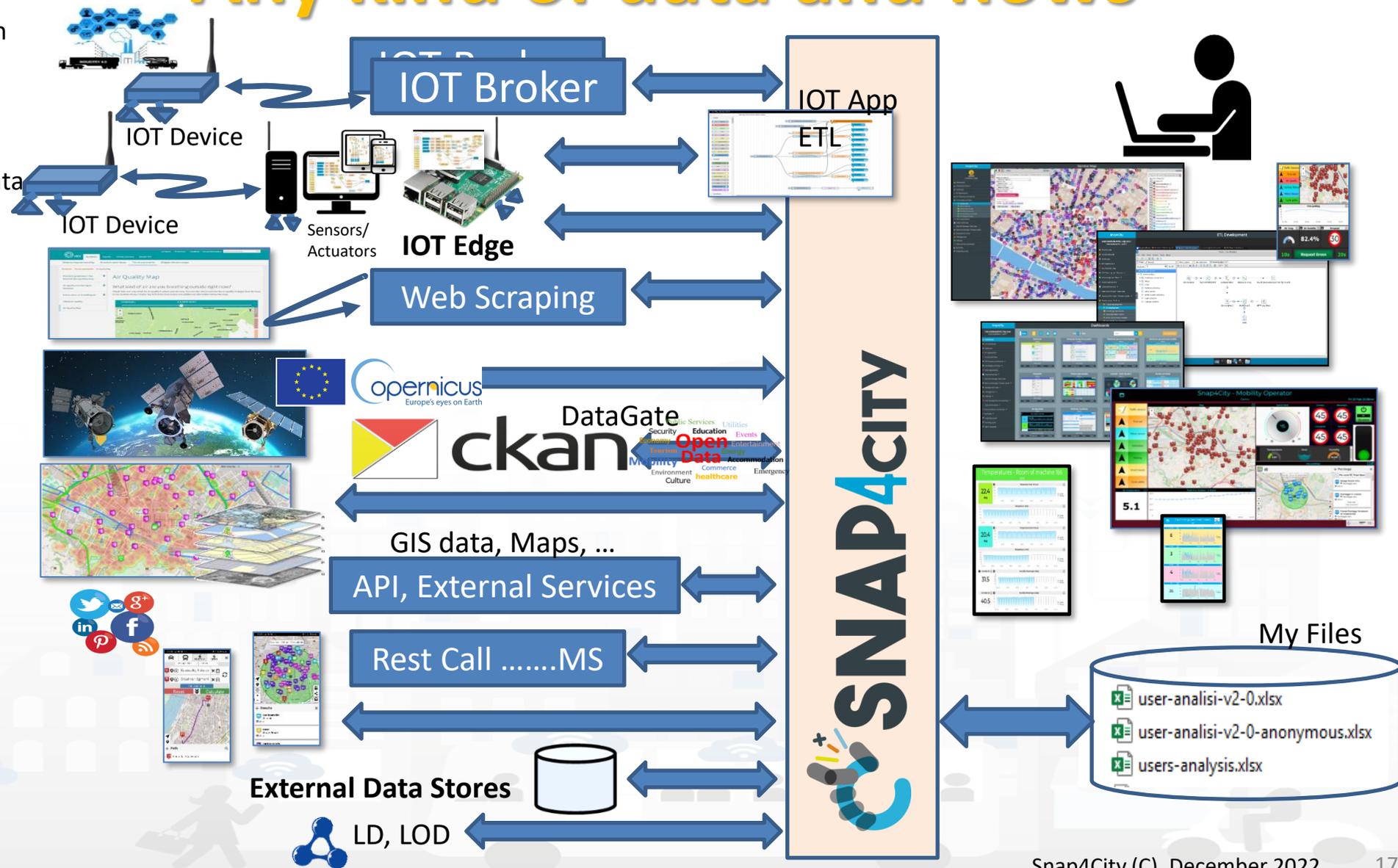
TOP

Snap4City Overview of Development Tools

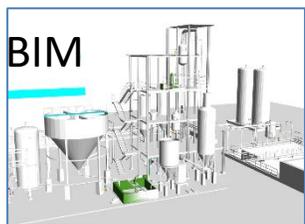


Any kind of data and flows

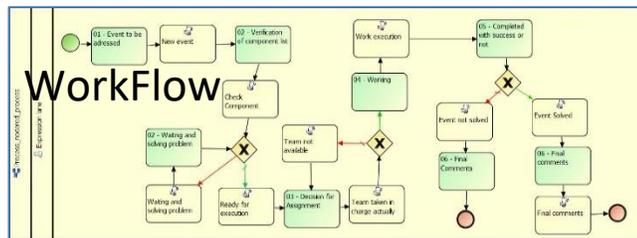
- **Open Data:**
 - Data gate, federation of Open Data Portals
 - IOT App, ETL proc(PULL)
- **IOT Networks:**
 - IOT Application processes, data driven or PULL
 - IOT Brokers (Push) → IOT Shadow
- **Web Pages:**
 - Web scraping, crawling processes
- **Satellite data**
- **Social media: Twitter, Facebook,...**
 - Twitter Vigilance, IOT App
- **Mobile Apps**
 - Smart City API
- **Files upload: CSV, Excel, etc.**
 - IOT Applications, ETL
- **REST API, WS, FTP, LD, LOD, etc.**
 - IOT Applications, ETL
- **Data base accesses**
 - GIS: WFS, WMS
 - ETL, IOT Application



Concept



KPI, POI, MyKPI, ...
API, External Services
Web Scraping



Antwerp City Overview - A5

GIDA 5G demo

Air Quality

My Data Dashboard Kibana

SnapCity

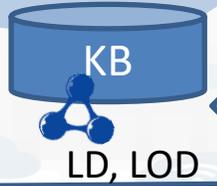


IOT Apps

Data Analytics, Artificial Intelligence



IOT Brokers
IOT Broker
IOT Broker

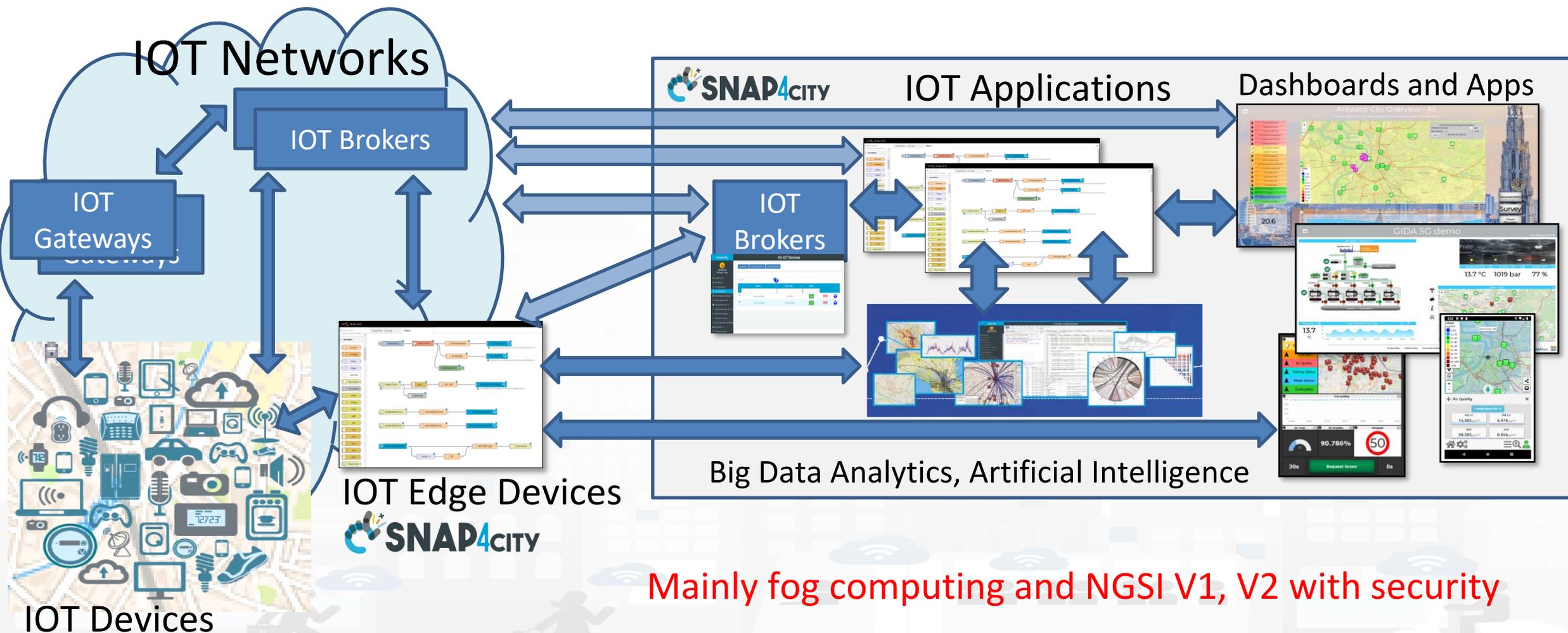


LD, LOD



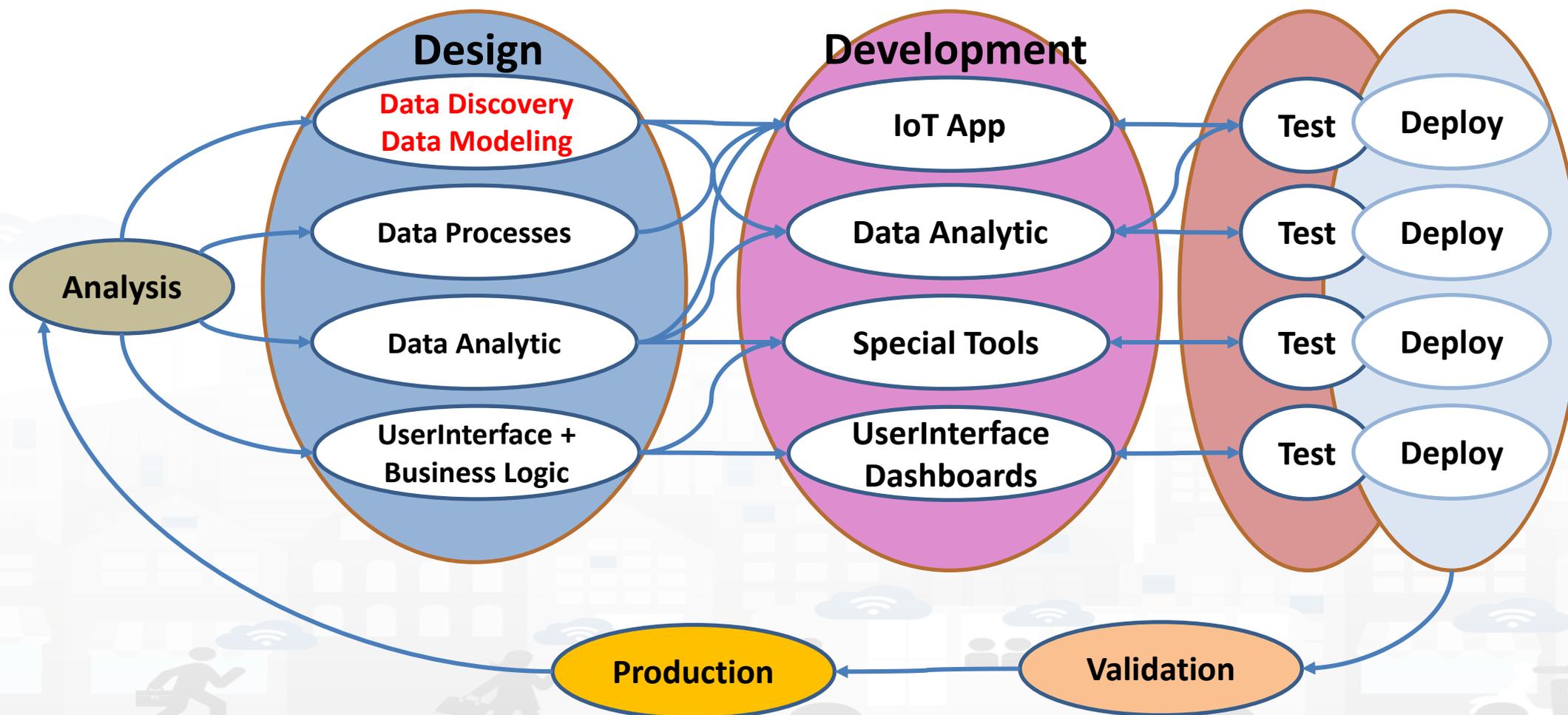
Dashboards and Apps

Snap4City Services also on IOT Edge!!!

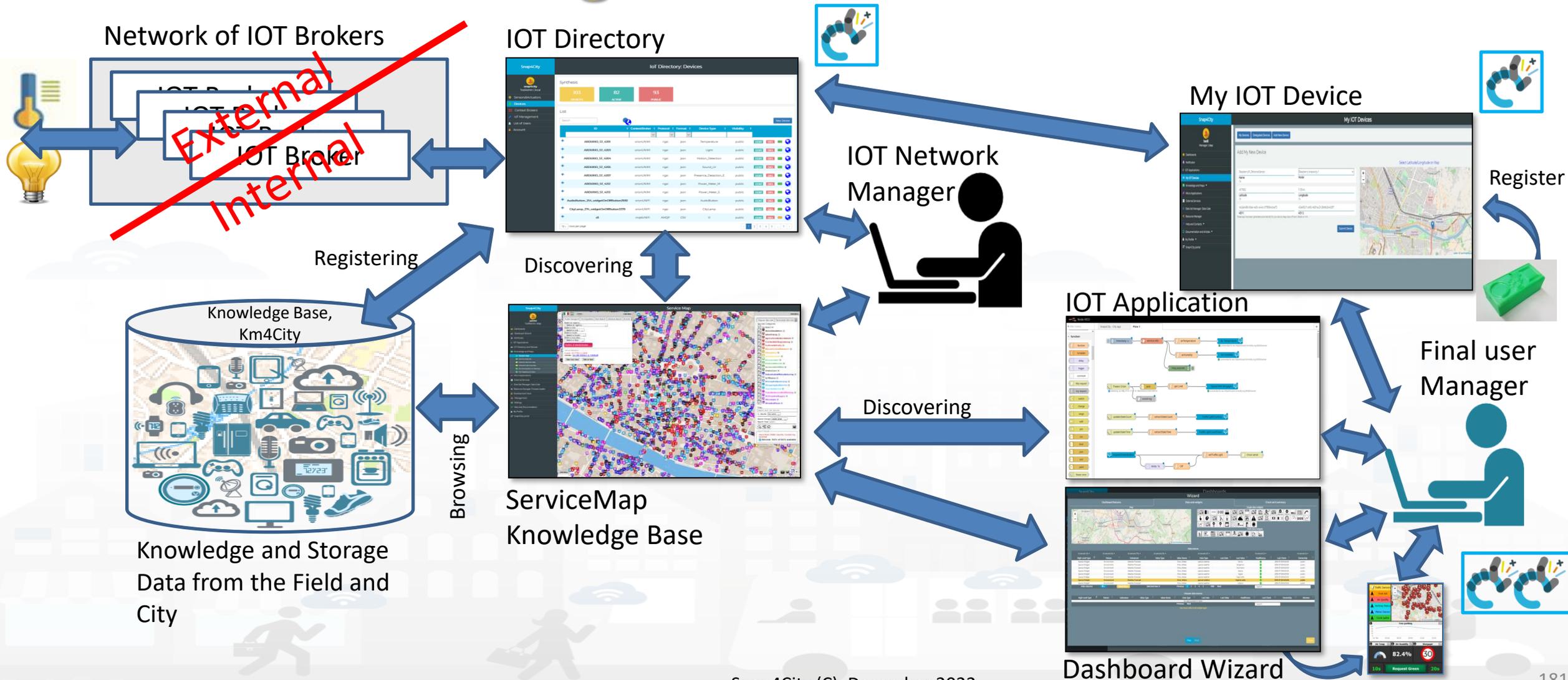


Mainly fog computing and NGSI V1, V2 with security

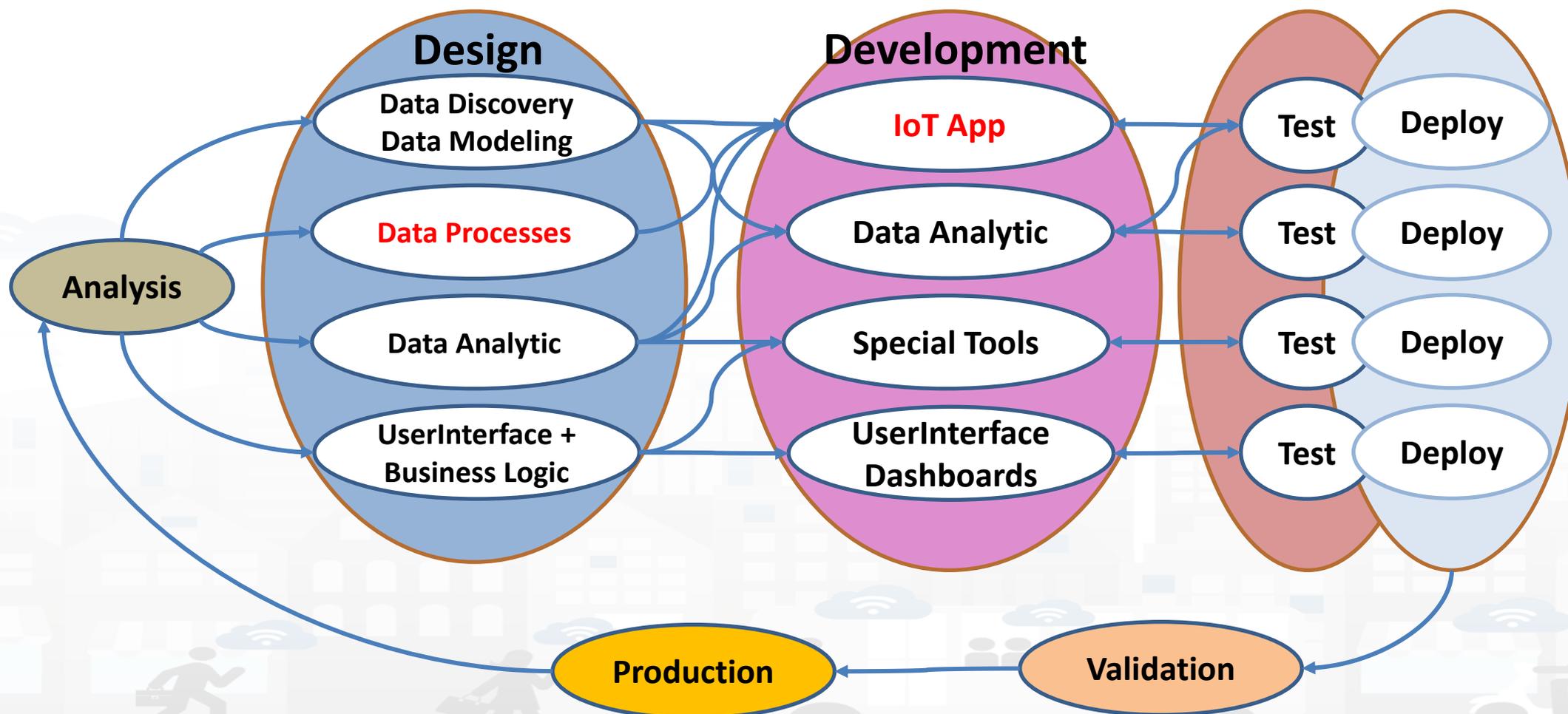
Development Life Cycle Smart Solutions



IOT Network Manager vs Final User



Development Life Cycle Smart Solutions





roottooladmin1
RootAdmin | Idap

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

Node-RED

filter nodes

flow1

Flow 1

Deploy

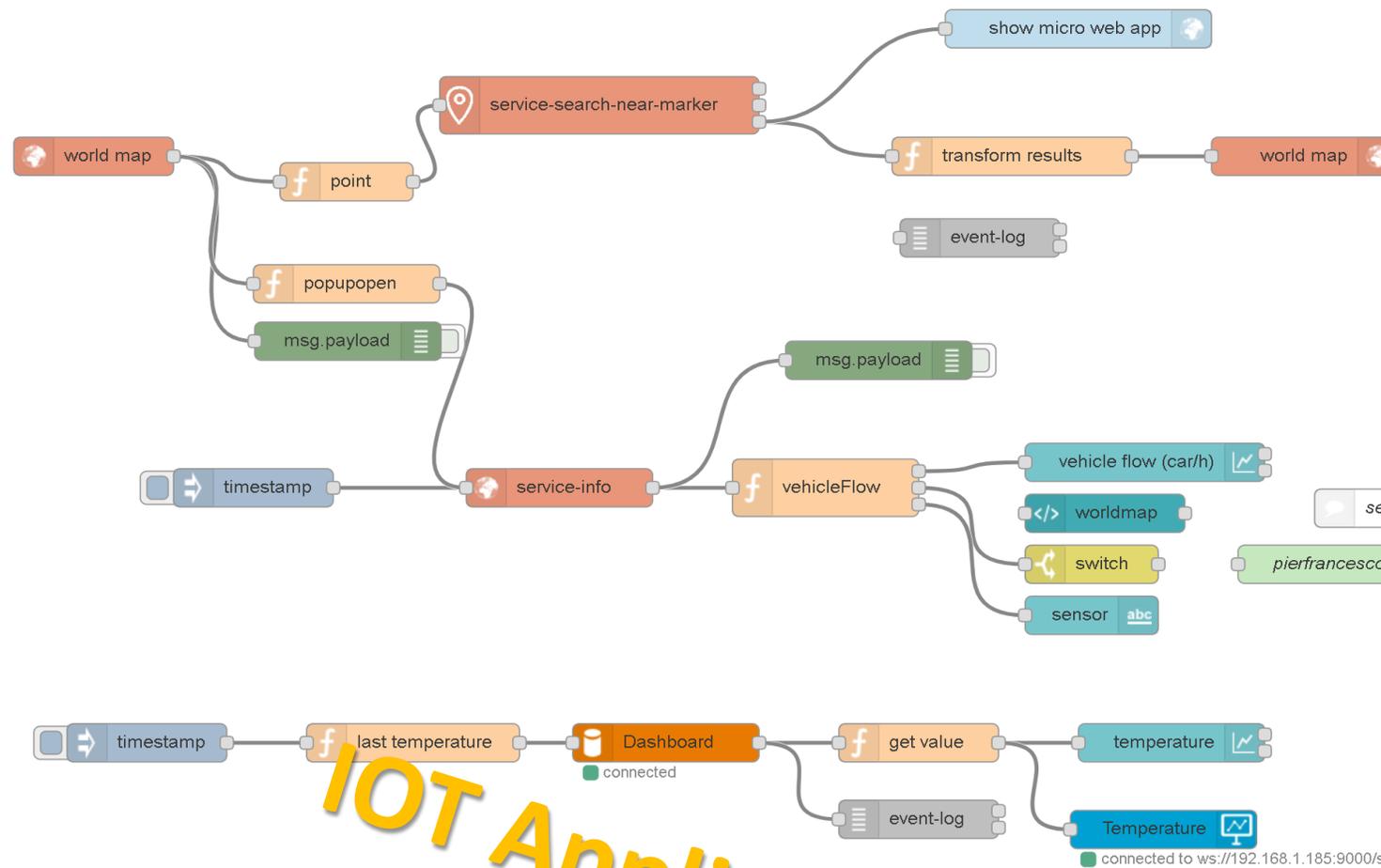


input

- inject
- catch
- status
- link
- mqtt
- http
- websocket
- tcp
- udp
- amqp
- amqp2

output

- debug
- link
- mqtt
- http response
- websocket
- tcp
- udp
- amqp
- amqp2



info debug dashb

Flow

Name	flow1
ID	"49a71aa0.b297b4"
Status	Enabled

Information

IOT Application Editor

Search for nodes using
ctrl+f

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7



Prev 1 2 3 ... 9 Next

Filter

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

● 2018-09-14T04:44

IOT Edge App

owner: badii

● 2018-09-21T03:19

IOT Edge App

owner: panesi

● 2018-10-19T16:07

IOT Edge App

owner: pb3

● 2018-10-19T17:17

IOT Edge App

owner: pb3

● 2018-10-22T11:57

IOT Edge App

owner: semolarudy

● application

IOT Application

owner: tester5

● Bib APP

IOT Application

owner: semolarudy

● ChargingStations

IOT Application

owner: comunedashres

● Deprecated - SiIMobilityControlRoom

IOT Application

owner: badii

● SamsungGalaxyS4Barcode

IOT Edge App

owner: badii

● esercitazione

IOT Application

owner: tester2

● Iot-App

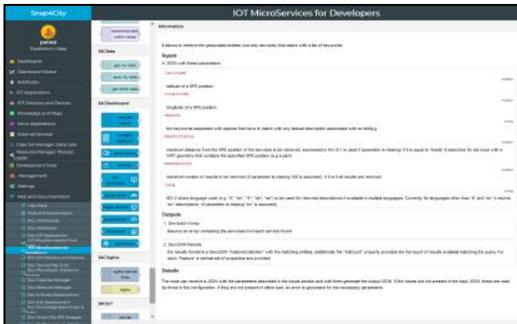
IOT Application

owner: tester14

Developing IOT Applications

IOT Discovering

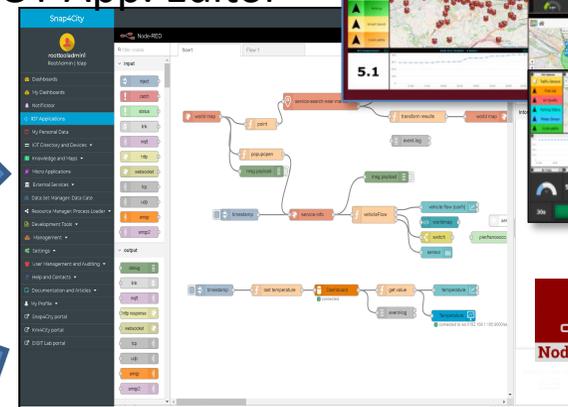
MicroServices collections



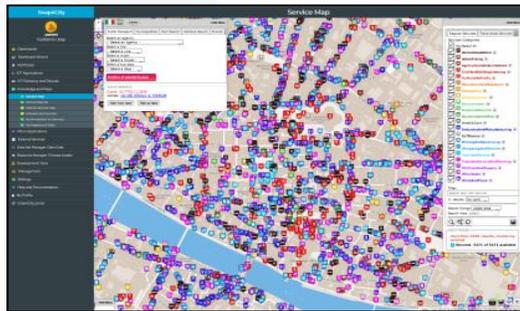
My IOT Applications



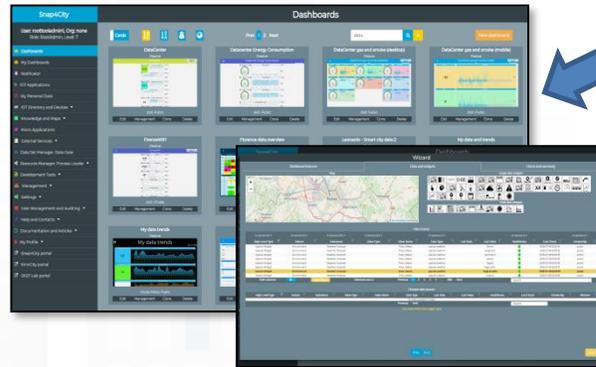
IOT App. Editor



Generating IOT App With Dashboard



ServiceMap Discovery



Dashboard Collection,
Editor and Wizard

Sharing/saving
reusing IOT App



Resource Manager



How it works: HeatMap Manager

GeoTiff

IOT App

Name
ColorMap
Unit of Measure
...

<https://www.km4city.org/swagger/external/index.html?urls.primaryName=Heatmap%20API>
API and MicroServices

Heatmap Manager

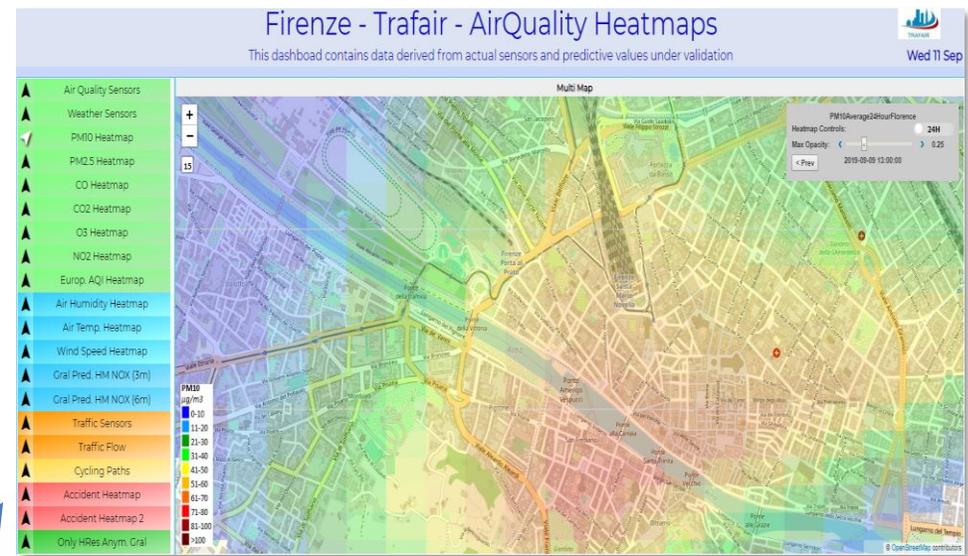
Flux Name	Locality	Organization	Scenario	Instances	View Data	Metric	ColorMap	Delete	Unit of Measure
FirenzePDUTrafficBesttime	FirenzePDU	Toscana	TrafficBesttime	548	VIEW	TrafficDensity	densoTrafficMap	DEL	vehicle per 20m
FirenzePDUTrafficSensorBesttime	FirenzePDU	Toscana	senso2	4	VIEW	TrafficDensity	densoTrafficMap	DEL	vehicle per 20m
FirenzeTrafficBesttime	Firenze	Toscana	TrafficBesttime	950	VIEW	TrafficDensity	densoTrafficMap	DEL	vehicle per 20m
LivornoTrafficBesttime	Livorno	Toscana	TrafficBesttime	915	VIEW	TrafficDensity	densoTrafficMap	DEL	vehicle per 20m
ModenaTrafficBesttime	Modena	DIST	TrafficBesttime	352	VIEW	TrafficDensity	densoTrafficMap	DEL	vehicle per 20m
PisaTrafficBesttime	Pisa	Toscana	TrafficBesttime	538	VIEW	TrafficDensity	densoTrafficMap	DEL	vehicle per 20m
SarsenagoTrafficBesttime	Sarsenago	DIST	TrafficBesttime	966	VIEW	TrafficDensity	densoTrafficMap	DEL	vehicle per 20m

Heatmap GeoTIF
Generation

JSON

WMS

GeoServer



Web Scraping

www.snap4city.org

Portia beta Portia 2.0 Documentation

PROJECT: politieantwerpen

SPIDER: www.politieantwerpen.be

START PAGES: https://www.politieantwerpen.be

LINK CRAWLING: Don't follow links

SAMPLE PAGES: Nieuwsberichten Politiezoo...

Extracted items JSON

```
{
  "date": [
    "05/05/2019"
  ],
  "title": [
    "Resultaten Wodca"
  ],
  "img": [
    "https://www.politieantwerpen.be/894f-4cfb-8419-8f946b2bad65.jpg"
  ],
  "link": [
    "https://www.politieantwerpen.be/itcm/resultaten-wodca-2"
  ],
  "url": [
    "https://www.politieantwerpen.be/en-be/nieuws"
  ]
}, {
  "date": [
    "03/05/2019"
  ],
  "title": [
    "Stagiairs houden verkeersacties"
  ]
}
```



portia-crawler-police-antwerp

Flow 1

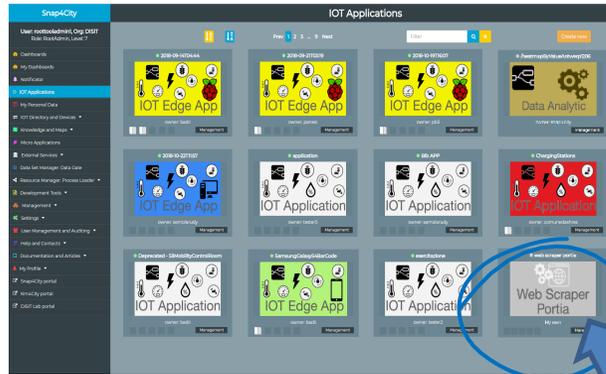
```
graph LR
  timestamp[timestamp] --> portia[portia crawl police antwerp]
  portia --> msg[msg payload]
  portia --> last_data_json[last_data json]
  portia --> http[http]
```

:(
Frames are not supported by Portia

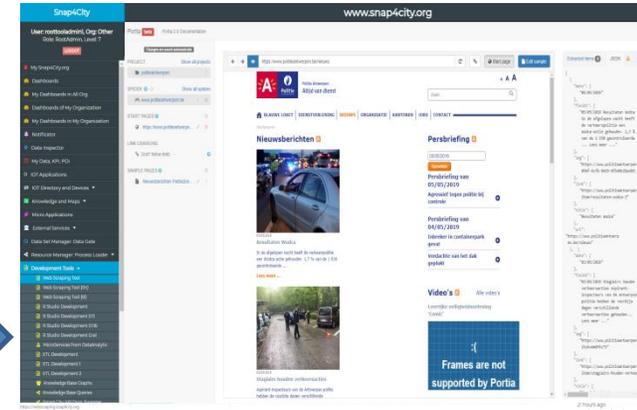


Web Scraping

My Scraping processes



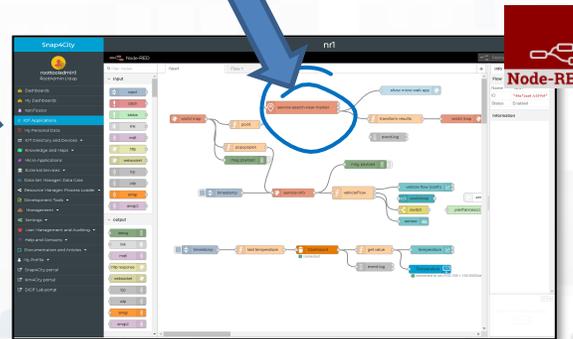
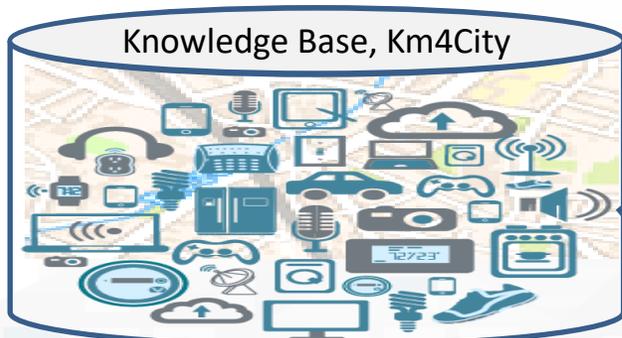
Web Scraper PORTIA



Generating WEB Scraping



Knowledge Base, Km4City



IOT App. Editor

Sharing/saving
reusing Scraping



Resource Manager



Snap4City vs CKAN

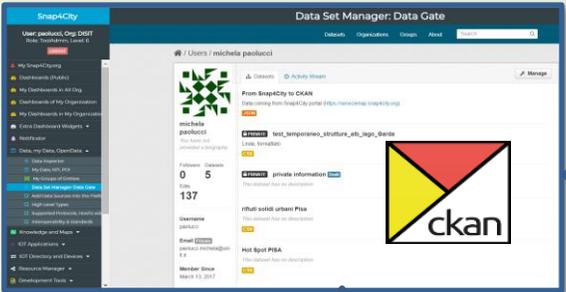
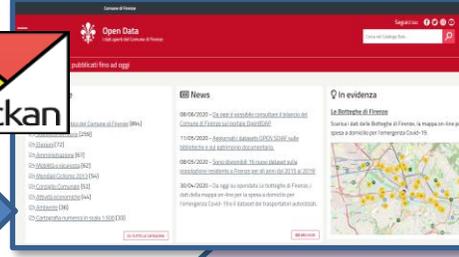


Snap4City Portal and Integrated tools

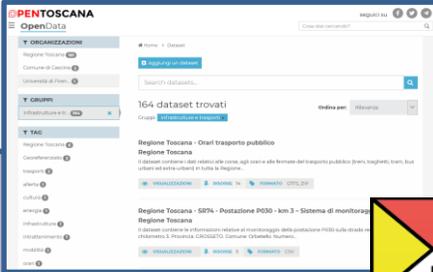


Advanced Snap4City APIs and Micro Services

Datagate

ckan

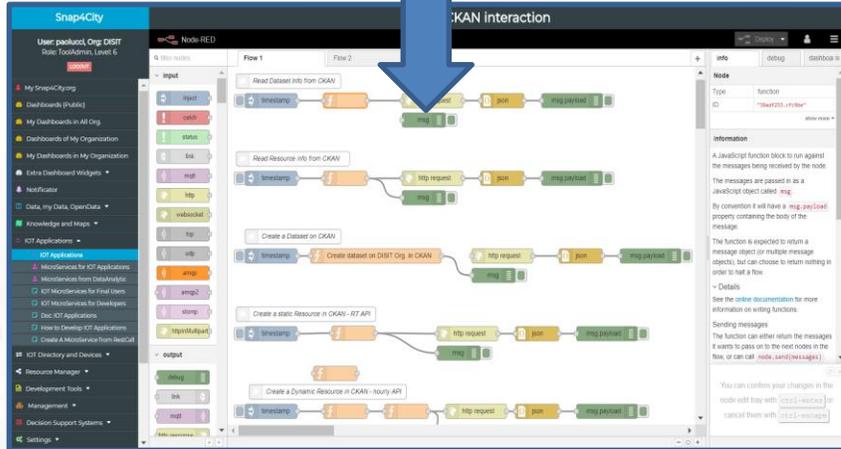


ckan

Harvesting and Publishing

Open or Private External CKAN Data Portals

CKAN interaction



Automatize:

- Import data from CKAN to Snap4City
- Upload Public Data from Snap4City to CKAN
- Data Harvesting
- Dashboards and Mobile/Web Apps creation

Snap4City

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

- Dashboards
- My Dashboards
- Notificator
- IOT Applications
- My Personal Data
- IOT Directory and Devices
- Knowledge and Maps
- Micro Applications
- External Services
- Data Set Manager: Data Gate
- Resource Manager: Process Loader
- Development Tools
 - R Studio Development
 - ETL Development**
 - Knowledge Base Graphs
 - Knowledge Base Queries
 - Smart City API Docs: Swagger
 - Internal API Docs: Swagger
 - Testing API by Postman
 - Source Code Access
- Management
- Settings
- User Management and Auditing
- Help and Contacts
- Documentation and Articles
- My Profile
- Snap4City portal
- Km4City portal

ETL Development



Batch Processing for dynamic data ingestion

Resource Manager: public and sharing

Snap4City

User: rootooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

- Dashboards
- My Dashboards
- Notifier
- IOT Applications
- My Personal Data
- IOT Directory and Devices
- Knowledge and Maps
- Micro Applications
- External Services
- Data Set Manager: Data Gate
- Resource Manager: Process Loader
- View Resources**
- Managing Resources
- MicroServices for IOT Applications
- Process Models
- Processes in Execution
- Process execution Archive
- Development Tools
- Management
- Settings
- User Management and Auditing
- Help and Contacts
- Documentation and Articles
- My Profile
- Snap4City portal

View Resources

Pages: Prev 1 2 3 ... 12 Next

dev

Reset Username Nature Sub_nature License Resource_type Format

- IoTApp (118)
- ETL (53)
- MicroService (8)
- AMMA (4)
- R (3)
- DevDash (2)
- IoTBlocks (2)

Florence_Pharmacies_CSV.zip

developer1: Public
Username: developer1
Resource type: ETL
Nature: geolocated
Description: Florence Pharmacies o...
★★★★★
View Edit Unpublish Owner

AMMA Tool

developer1: Private
Username: developer1
Resource type: AMMA
Nature: ToBeDefined
Description: AMMA snap4city dash...
★★★★★
View Edit Publish Owner

Dev Dashboard

snap4city: Private
Username: snap4city
Resource type: DevDash
Nature: data category (ie: geolocat...
Description: Snap4city Developer D...
★★★★★
View Edit Publish Owner

node-red-contrib-snap4city-developer.rar

snap4city: Private
Username: snap4city
Resource type: IoTBlocks
Nature: data category (ie: geolocat...
Description: Snap4city NodeRed Li...
★★★★★
View Edit Publish Owner

PaoloApplication.json

developer1: Private
Username: developer1
Resource type: IoTApp
Nature: data category (ie: geolocat...
Description: NodeRed Flow Shared ...
★★★★★
View Edit Publish Owner

AMMADashSnap4City-30minview-v2-152...

developer1: Private
Username: developer1
Resource type: AMMA
Nature: ToBeDefined
Description: AMMA snap4city dash...
★★★★★
View Edit Publish Owner

Developer Dashboard New-1526308876256

developer1: Private
Username: developer1
Resource type: DevDash
Nature: ToBeDefined
Description: Developer Dashboard ...
★★★★★
View Edit Publish Owner

ResDash Docker-1526308998809

developer1: Private
Username: developer1
Resource type: ResDash
Nature: ToBeDefined
Description: Resource Dashboard: ...
★★★★★
View Edit Publish Owner

94

Data Gathering and Knowledge Management

- Data ingestion can be performed by using multiple tools:
 - ETL processes, IOT Applications, Data Gate, WebScraping. We suggest:
 - ETL for static / periodic data in PULL
 - IOT App for real time data and flow, from IOT Brokers/Devices
 - DataGate for Static Data, upload them as files, or collected from other CKAN
 - WebScraper for scraping data from Web Pages, when authorized!
- See how to test cases:
 - [HOW TO: add data sources to the Snap4City Platform](#)
 - [HOW TO: define privacy rules for personal data, produced by the end-users own device](#)
 - [US6. Developing and using processes for data transformation](#)
 - [TC6.1 - Managing DataSets via DataGate: ingest, search, download, upload, annotate, share](#)
 - [TC6.3 - Creating ETL processes for automated data ingestion and data transformation](#)
 - [TC6.5 - Managing Heterogeneous File Ingestion via ETL processes](#)
 - [TC6.9 - ETL processes for multiprotocol and format data ingestion, see on GITHUB for library](#)
 - [TC9.2 - Managing heterogeneous File Ingestion, protocols, formats via IOT applications, and open standards](#)

Linked Open Data

Linked Open Graph

LOG: <https://log.disit.org>

Linked Open Graph

SiiMobility (by DISIT)

Examples:

- VIA GIACOMO MATTEOTTI
- Bagno a ripoli
- Florence

Choose a class:

Search for keyword

keyword:

uri: <http://...> Request

Your data

sparql endpoint: (optional)

<http://...>

uri: <http://...> Request

Status

Requests:

<http://www.disit.dinfo.unifi.it/SiiMobility/MUSE...>

Remove Clear

Type of relations

Select all Deselect all Invert Hide all inverse

- belongTo
- contains
- ends
- has
- hasExternalAccess
- hasProvince
- hasStreetNumber
- isIn
- isPartOfProvince
- managingAuthority
- placedIn
- seeAlso
- coincideWith
- depiction
- forming
- hasAccess
- hasMunicipality
- hasRule
- inMunicipalityOf
- isPartOf
- isPartOfRegion
- ownerAuthority
- sameAs
- starts

Linked Open Graph

more 5 hasProvince...
Entities: 16
Relations: 32

TOSCANA

PISTOIA

FIRENZE

FIRENZE

RT04801702380TO...

RT048017017682A...

RT04801708991ET...

RT04801724784ES...

RT04801724785ES...

relationships: belongTo, isIn, isPartOf, contains, hasStreetNumber, coincideWith, isPartOfProvince, inMunicipalityOf, hasProvince, isPartOfRegion, hasMunicipality..., ownerAuthority, managingAuthority, type, hasExternalAcce..., hasAccess, placedIn, forming, hasRule, managingAuthority

museo ferragamo

DESCRIPTION

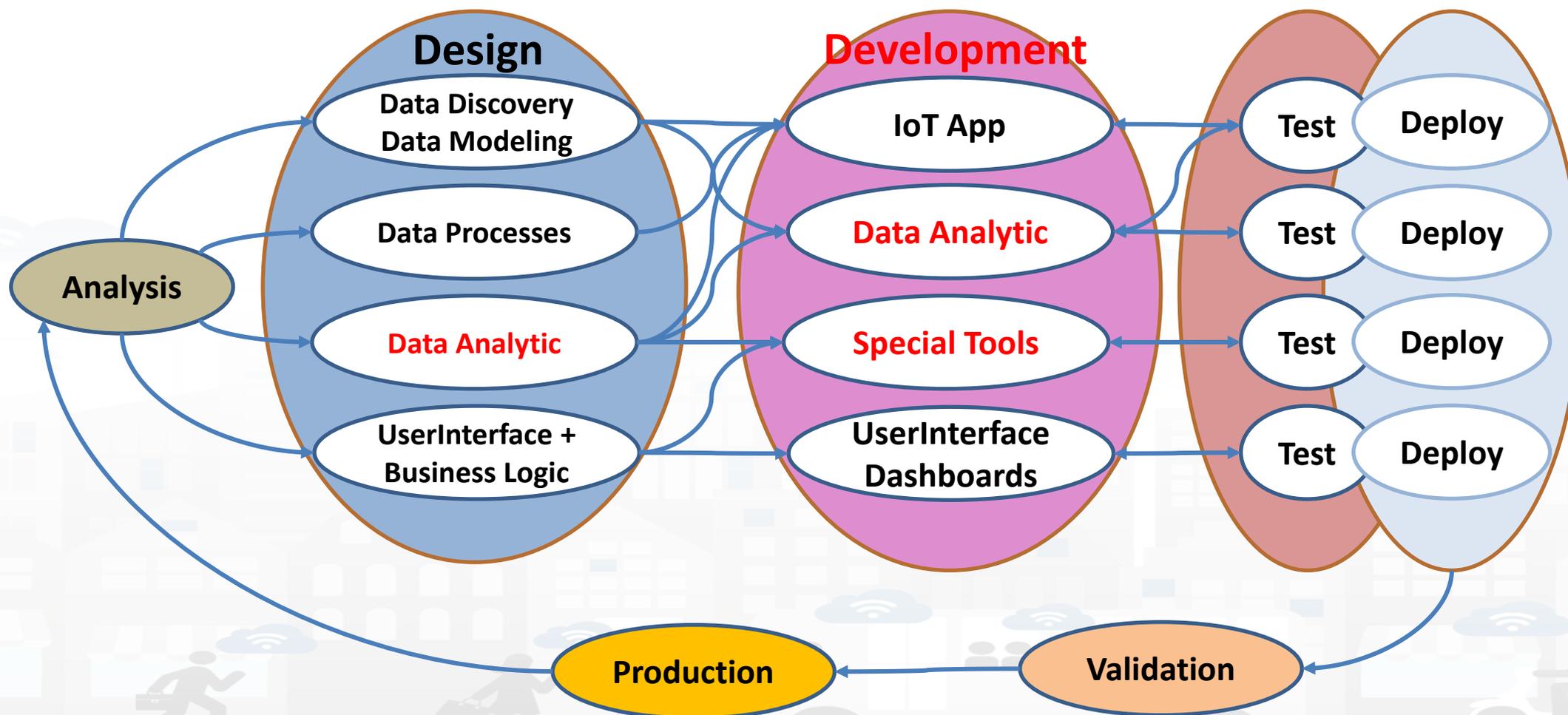
Relations of Museo Ferragamo with the road graph

Schema: <http://www.disit.org/km4city/schema>

RDF version: <http://www.disit.org/km4city.rdf>

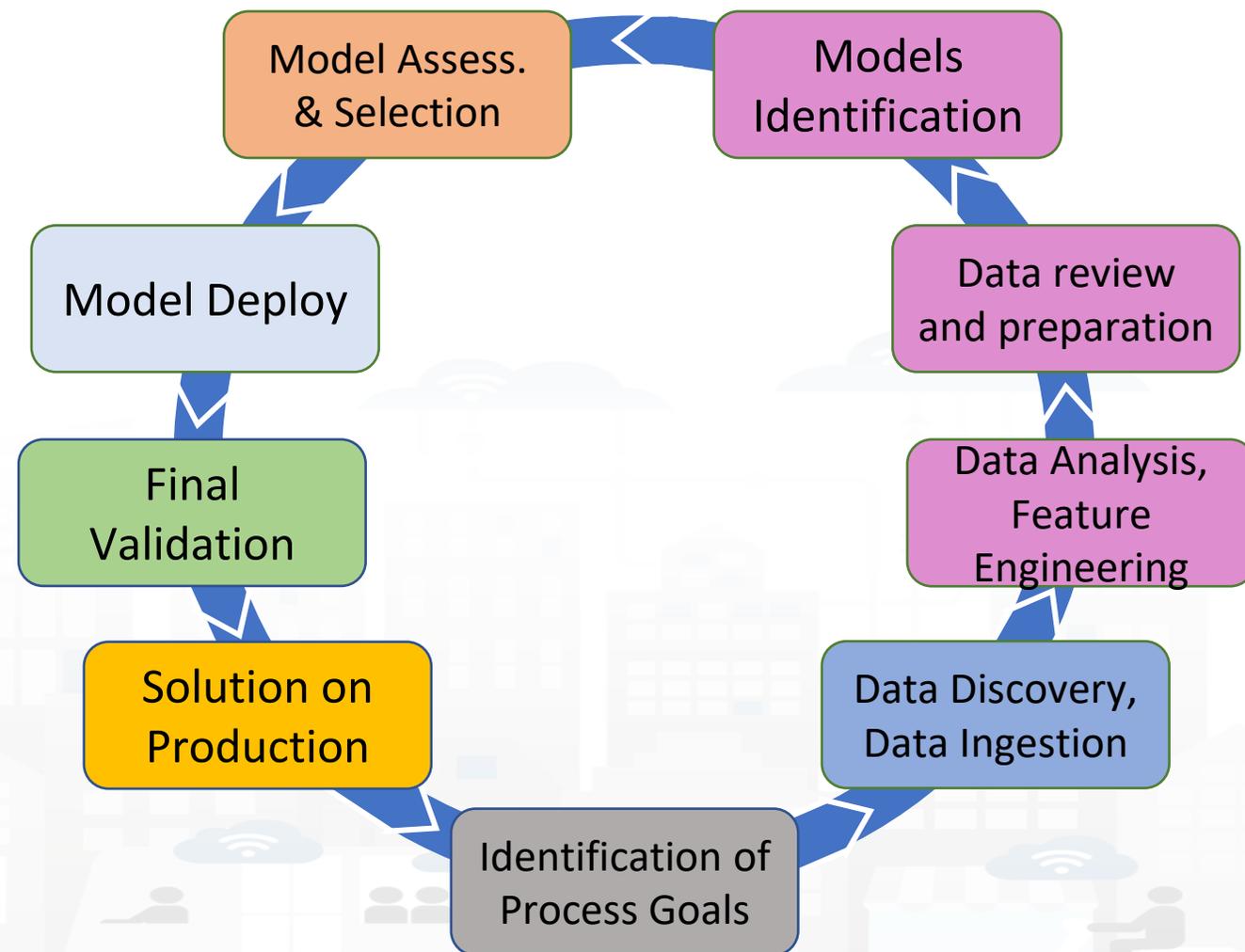
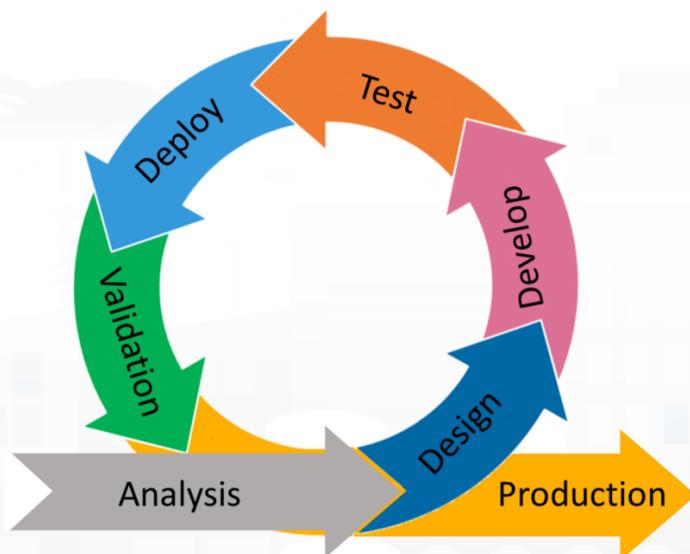
Copyright (c) December 2012

Development Life Cycle Smart Solutions



Data Analytics Development Life Cycle

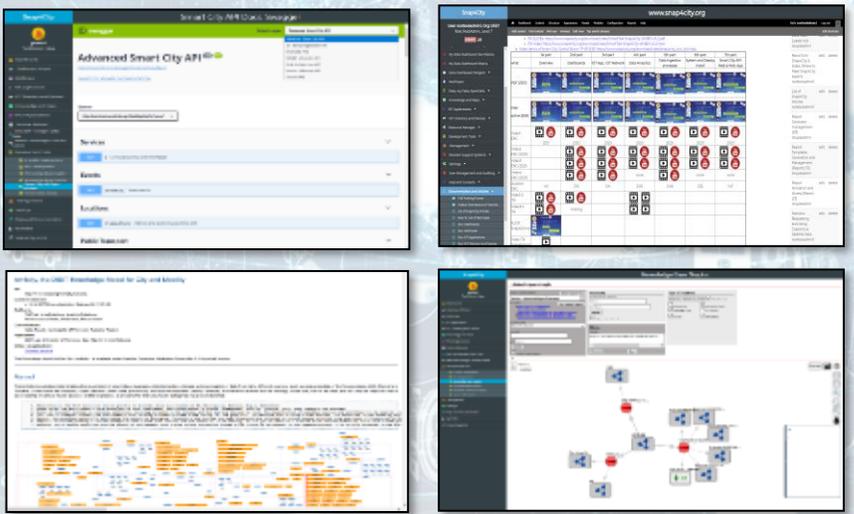
- Detailed development process



Data Analytics on Snap4City platform



Swagger

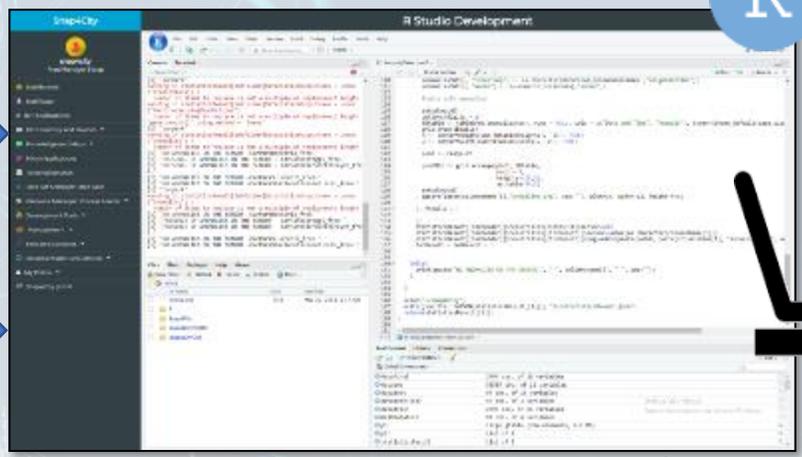


Ontology Schema

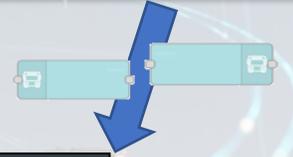
LOG.disit.org



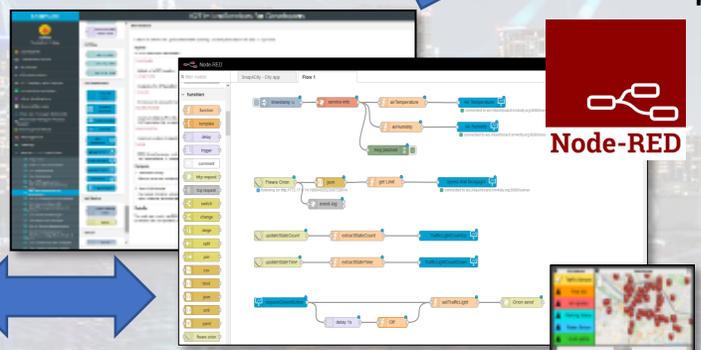
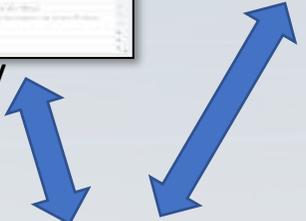
Smart City API from Knowledge Base and other tools



Creating MicroServices



Saving / Sharing reusing



Using them into IOT Applications



Resource Manager

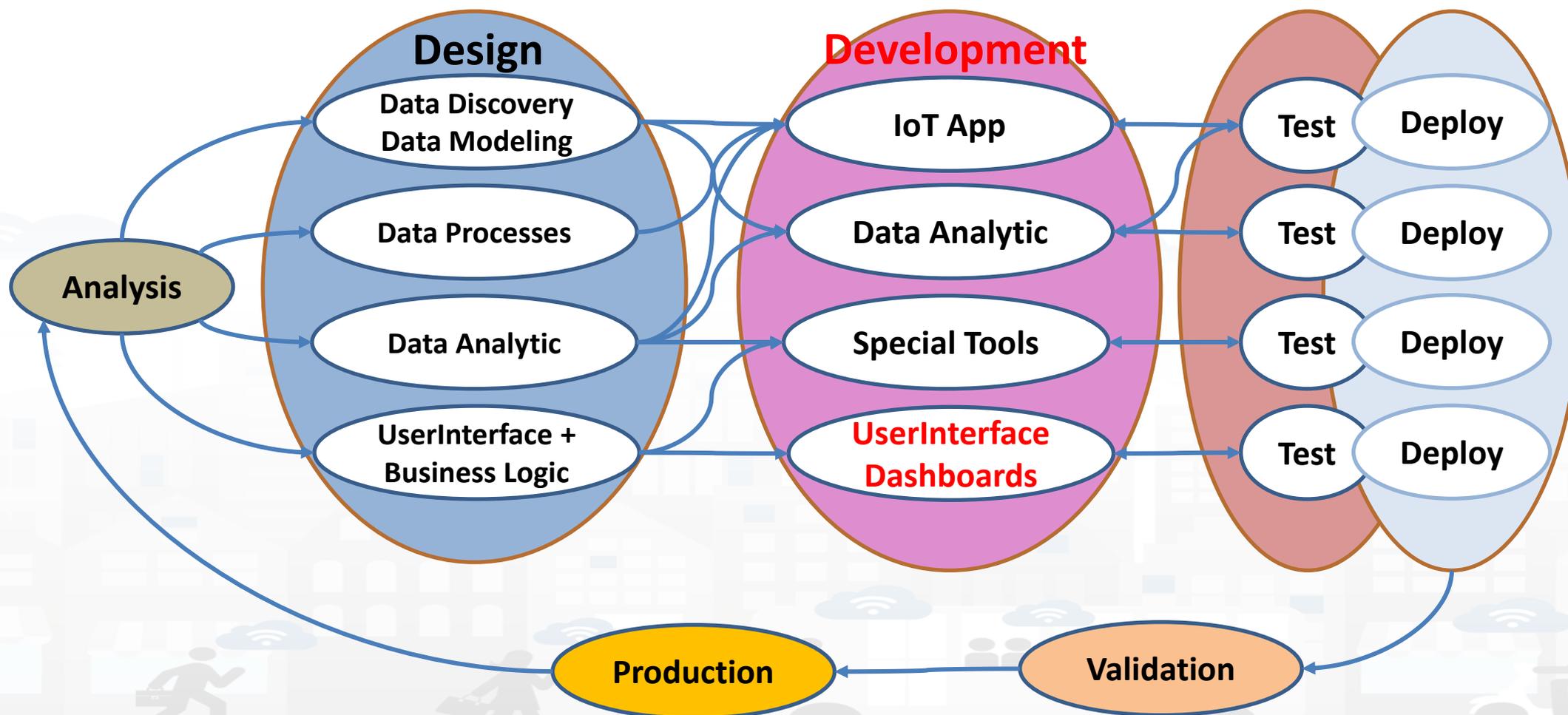




Loading new Node-RED nodes/microservices from external Palet

- In the case of problems:
 - Ask to RootAdministrator to have your custom Node-RED nodes/modules added to your IOT Applications
 - <https://www.snap4city.org/drupal/contact>
 - A validation of requested Node-RED nodes will be performed to avoid violation of security and privacy for all
 - Administrators may load custom Node-RED nodes/modules
- This limitation is not present in your on premise installations of Snap4City

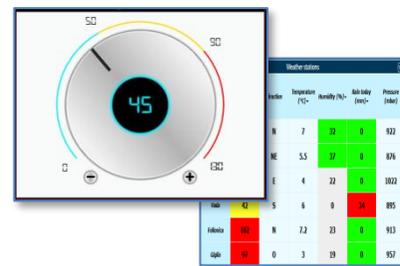
Development Life Cycle Smart Solutions



Dashboard List and Editor

Snap4City Dashboards

- DataCenter
- Datacenter Energy Consumption
- DataCenter gas and smoke (desktop)
- DataCenter gas and smoke (mobile)
- FlorenceWiFi
- Florence data overview
- Leonardo - Smart city data 2
- My data and trends
- My data trends
- Notifier monitoring
- Plus Real Time Data
- Real Time Sensors via ServiceMap3D



CRID	2018-000530	S.P.N. 73 DI MALLMANTILE - ISTITUZIONE TEMPORARY TRAFFIC LIGHTS	16/03/2018	00:00:00	5
CRID	2018-000531	S.P.N. 105 DI TORRANCIPRESTINO - ISTITUZIONE TEMPORARY TRAFFIC LIGHTS	12/03/2018	00:00:00	5
INCIDENTI SOLO DANNI					
AGGIUNTA(S)					
	11/03/2018		10:06:12	1	
INCIDENTI CON FERITI					
AGGIUNTA(S)					
	11/03/2018		08:30:23	1	
INCIDENTI SOLO DANNI					
AGGIUNTA(S)					
	11/03/2018		05:58:48	1	
INCIDENTI CON FERITI					
AGGIUNTA(S)					
	11/03/2018		05:38:41	1	



Snap4City - Mobility Operator

Map showing traffic sensors (First aid, Metro sensor, Pollution, Parking, Smart bench, Cycle paths) and speed limit signs (45, 5.1).

PeopleNumber

Grid of cameras: Cam Duomo, Cam Firenze 1, Cam Firenze 2, Cam Piazza, Cam S. Croce, Cam S. Marco, Cam S. Lorenzo, Cam S. Maria, Cam S. Spirito, Cam S. Trinita, Cam S. Vito.

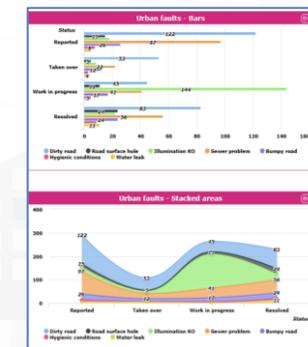
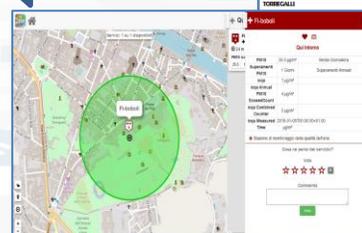
Current status: Blue

Grid: 7 8 9, 4 5 6, 1 2 3, 0 . Canc

Buttons: Antwerp, Helsinki, Firenze, Current, Blue, Green, Yellow, Red



Principali Ospedali	Red code	Yellow code	Green code	Blue code	White code
PIAZZALE CAVESCHI	7	9	43	25	0
PICCOLI GIOVANNINI SIO TORREGGIALI	1	6	20	6	0



Dashboard List and Editor

Snap4City

User: roottooladmin1, Org: none
Role: RootAdmin, Level: 7

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

Dashboards

Cards [A-Z] [Z-A] [Filter] [Refresh]

Prev 1 2 Next

data [Search] [Close]

New dashboard

DataCenter

Passive

disit: Public

Edit Management Clone Delete

Datacenter Energy Consumption

Passive

disit: Public

Edit Management Clone Delete

DataCenter gas and smoke (desktop)

Passive

disit: Public

Edit Management Clone Delete

DataCenter gas and smoke (mobile)

Passive

disit: Public

Edit Management Clone Delete

FirenzeWiFi

Passive

disit: Private

Edit Management Clone Delete

Florence data overview

Passive

disit: Public

Edit Management Clone Delete

Leonardo - Smart city data 2

Passive

Leonardo: Public

Edit Management Clone Delete

My data and trends

Passive

nicola.mitolo: Public

Edit Management Clone Delete

My data trends

Passive

nicola.mitolo: Public

Edit Management Clone Delete

Notificator monitoring

Passive

disit: Public

Edit Management Clone Delete

Pisa Real Time Data

Passive

mitolo: Public

Edit Management Clone Delete

Real Time Sensors via ServiceMap3D

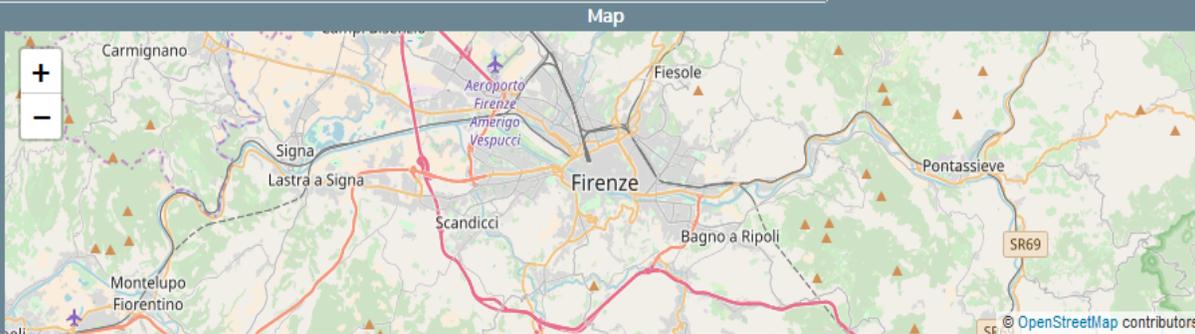
Passive

disit: Public

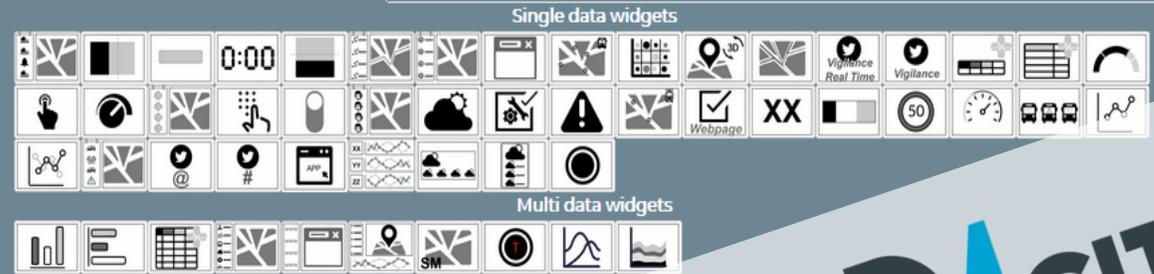
Edit Management Clone Delete

Wizard

Dashboard features



Data and widgets



Check and summary

Data sources

High-Level Type	Nature	Subnature	Value Type	Value Name	Data Type	Last Date	Healthiness	Last Check	Ownership
Special Widget	Environment	Weather Forecast	Previ_Meteo	Previ_Meteo	special weather			2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	Previ_Meteo	special weather			2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	Previ_Meteo	special weather			2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	Previ_Meteo	special weather			2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	Previ_Meteo	special weather			2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	Previ_Meteo	special weather			2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	Previ_Meteo	special weather			2018-07-08 16:00:18	public
Special Widget	Environment	Weather Forecast	Previ_Meteo	Previ_Meteo	special weather			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, health, owner, ...
- Combine them as you like

• Select the lines of your interest

• Then click on Next and get the Dashboard by wizard

Close

SNAP4CITY Dashboards Wizard

Dashboard features | Data and widgets | Check and summary

Map

Single data widgets

Multi data widgets

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

Chosen data sources

High-Level Type | Subnature | Value Type | Value Name | Data Type | Last Date | Last Value

Prev Next

You must select one widget type

Dashboard Wizard

Wizard

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)

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

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

Dashboard Builder: Development

Data Transformation
Business Logic

IOT Applications

Knowledge Base,
Km4City

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

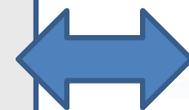


Widget Collection

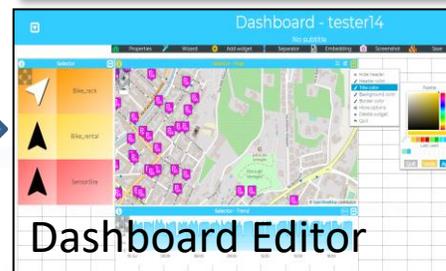
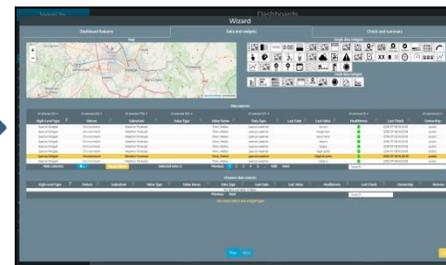
Micro Applications

External Services

Custom Widgets/
Synoptics



Dashboard Wizard



Public
Dashboard
Collection

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



My Own Dash/App



Developing new Dashboard Graphic Widget

- The development of new Widget is feasible for programmers
 - in PHP, JavaScript and CSS



- The starting point is the Core Snap4City Virtual Machine Appliance StartSNAP4CITYVM:

<https://www.snap4city.org/471>

- While the source code is also accessible on GitHub/DISIT
- see [TC3.11 - New graphics widget can be easily created, Dashboard Widget Creation](#)

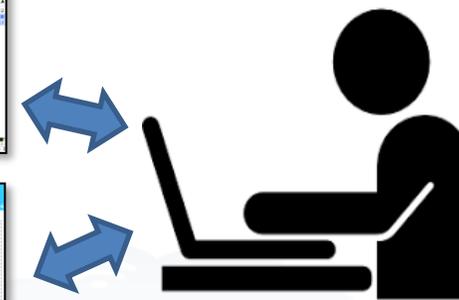
- creating a new Graphic widget via SVG and programming: [Custom Synoptics and Widgets for Dashboards](#) <https://www.snap4city.org/504>

Custom Widget / Synoptic / PIN Development

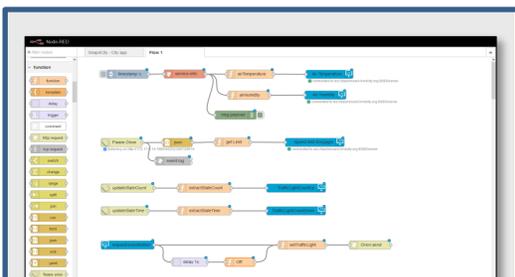
Inkscape editor on your computer



Create, save a Custom Widget in SVG



Create, save, load, delegate, grant access

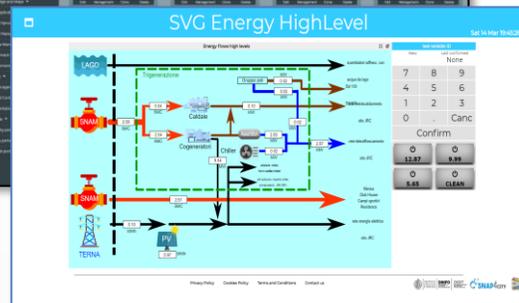
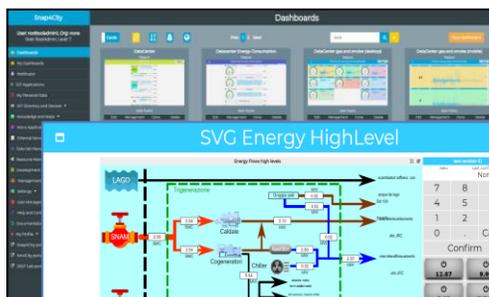
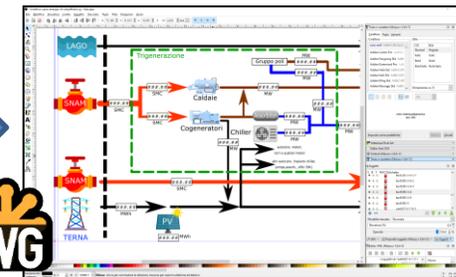
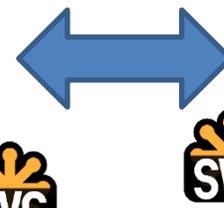
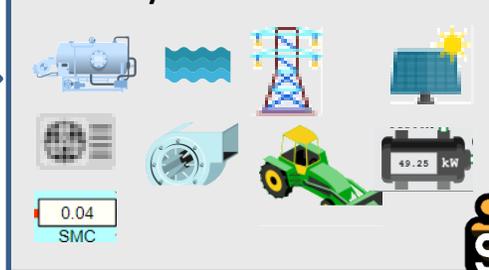


IOT Applications



Knowledge and Storage Data from the Field and City

SVG Symbols Collection



Public

Dashboard Collection

My Own Dash/App

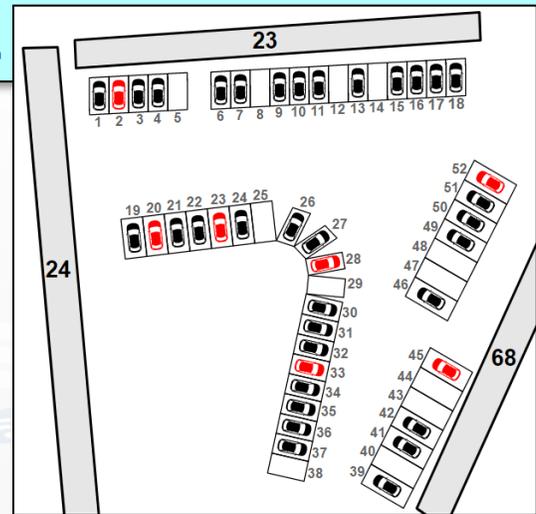
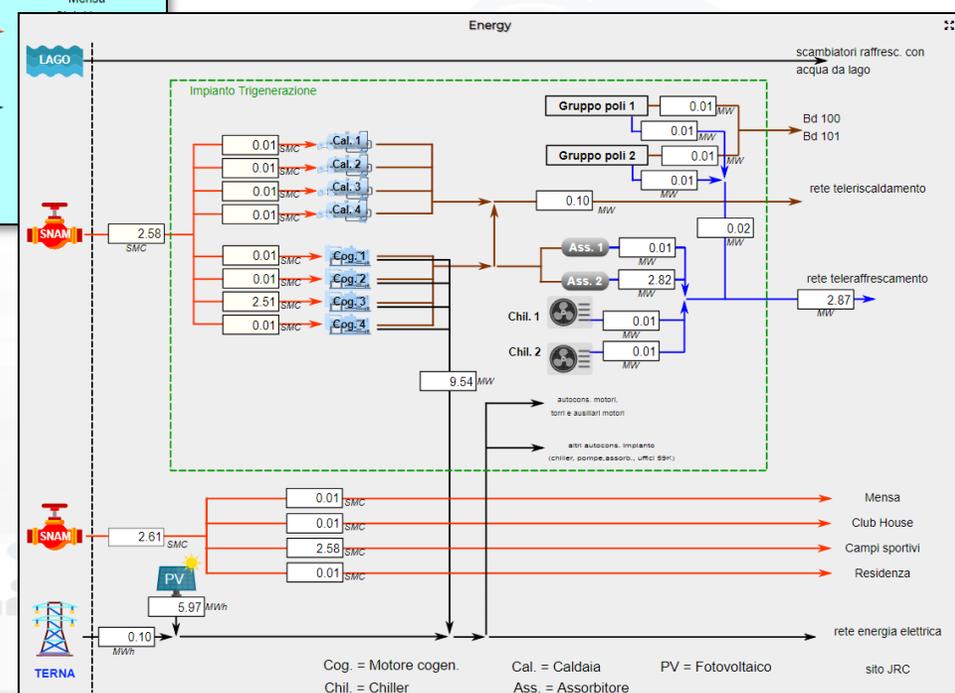
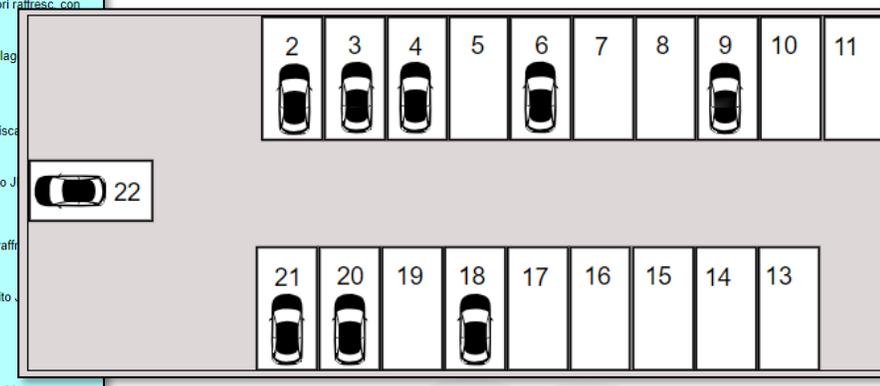
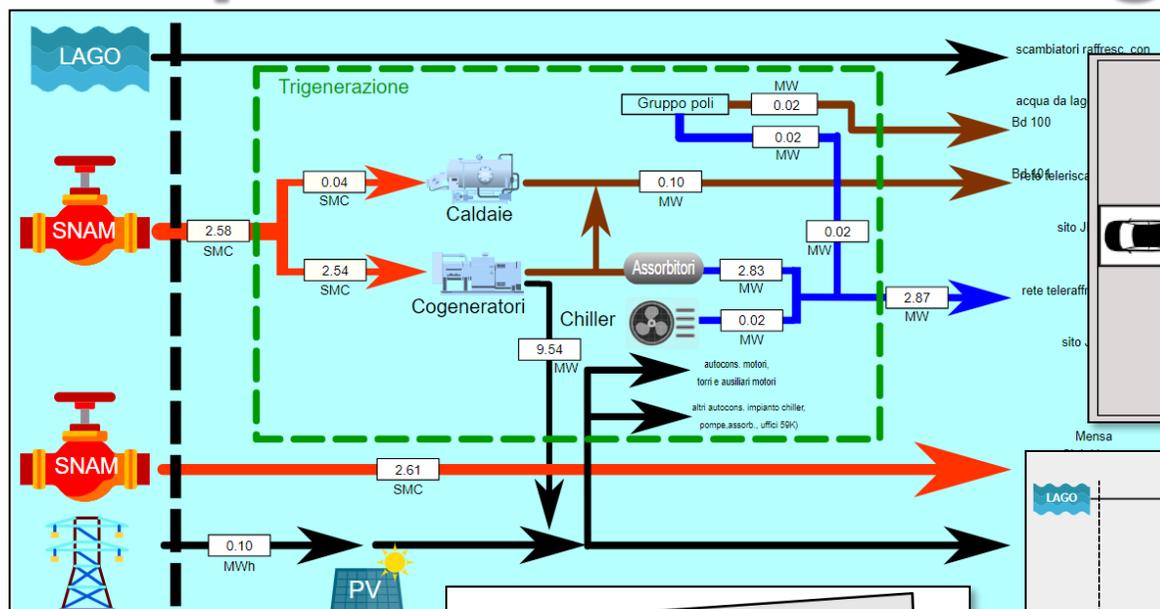


1. Create and Load a Custom SVG
2. Select/Reuse an SVG
3. Make and Instance of Synoptic by Associate Variables with MyKPI
4. Create on Dashboard a Widget based on Synoptic HLT such as Ext. Srv.:

- <https://www.snap4city.org/synoptic/v2/synoptic.html?id=xxxx>

Special Custom Widgets

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



Custom Controls widget showing a row of five smiley faces (from sad to happy) and two data boxes:

- Total clicks: 6
- Mean rate value: 0.00

Custom Controls widget showing a time selection interface:

- Begin: 17:00
- Finish: 4:00

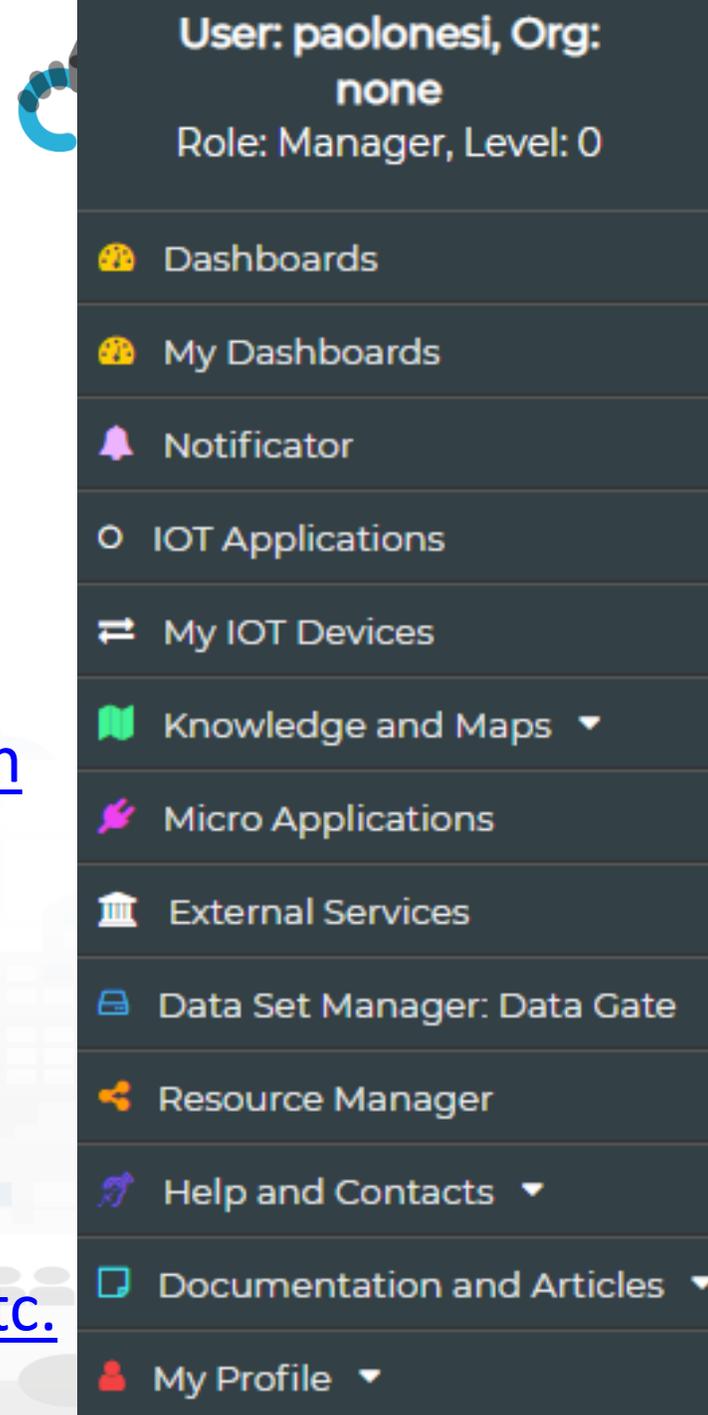
Below the time selection are two rows of smiley faces (from sad to happy).

Dashboards

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

Level 1 Users: using dashboards

- TC1.3. Accessing and using Dashboards with any device
- TC1.4. Dashboards Showing Data Real Time and Historical/trends, comparison
- TC1.5. Dashboards showing a range of different High Level Types: KPI, POI, IOT dev, MicroApp, Maps using different kind of Graphics Widget. Monitor city status with Dashboards
- TC1.6. Dashboards using different kind of graphics Widgets matching with High Level Types, Monitor city status with Dashboards
- TC1.12. Dashboard with MicroApplications
- TC4.1. Dashboard and Notificator
- TC4.6. Dashboard with city events, ESB, police, traffic, etc.

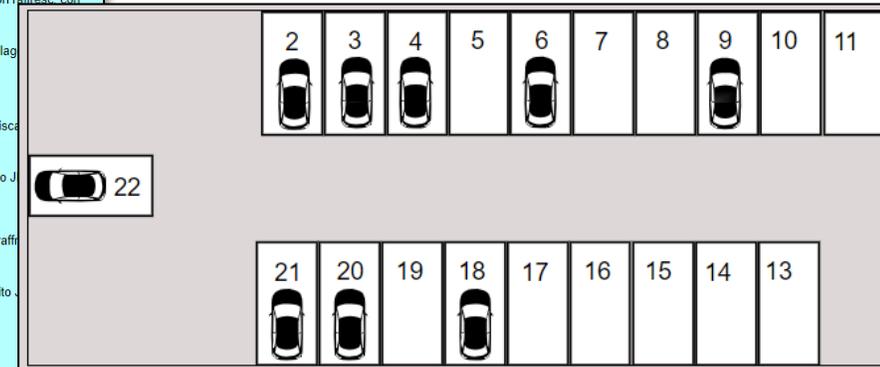
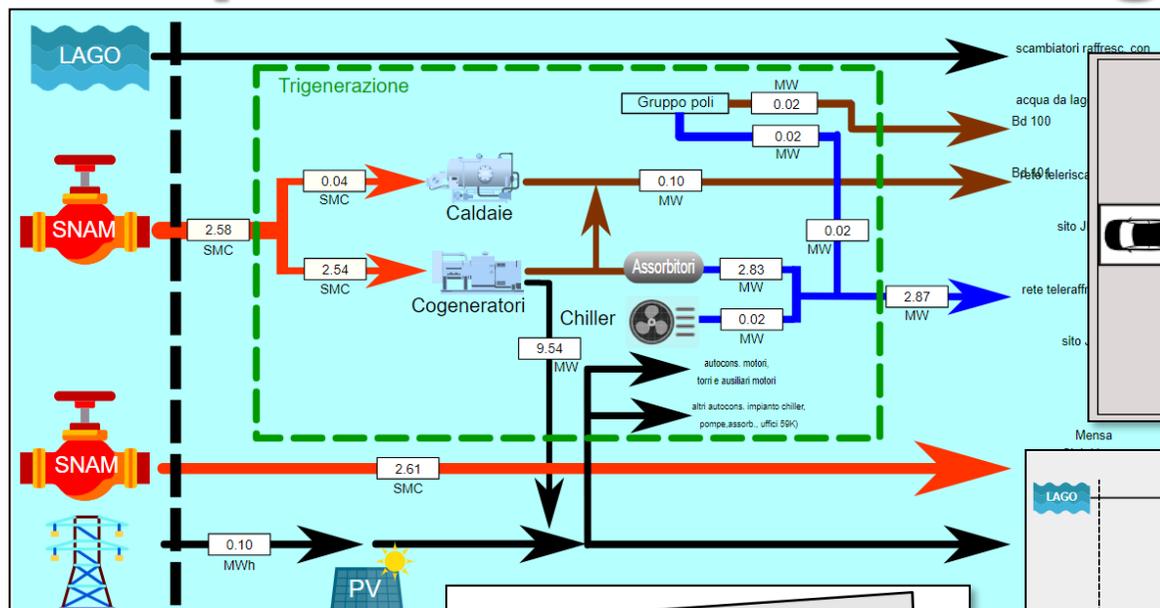


User: paolonesi, Org: none
Role: Manager, Level: 0

- 🗺 Dashboards
- 🗺 My Dashboards
- 🔔 Notificator
- 📄 IOT Applications
- ↕ My IOT Devices
- 📖 Knowledge and Maps ▾
- 👉 Micro Applications
- 🏛 External Services
- 📁 Data Set Manager: Data Gate
- 🔗 Resource Manager
- 👤 Help and Contacts ▾
- 📄 Documentation and Articles ▾
- 👤 My Profile ▾

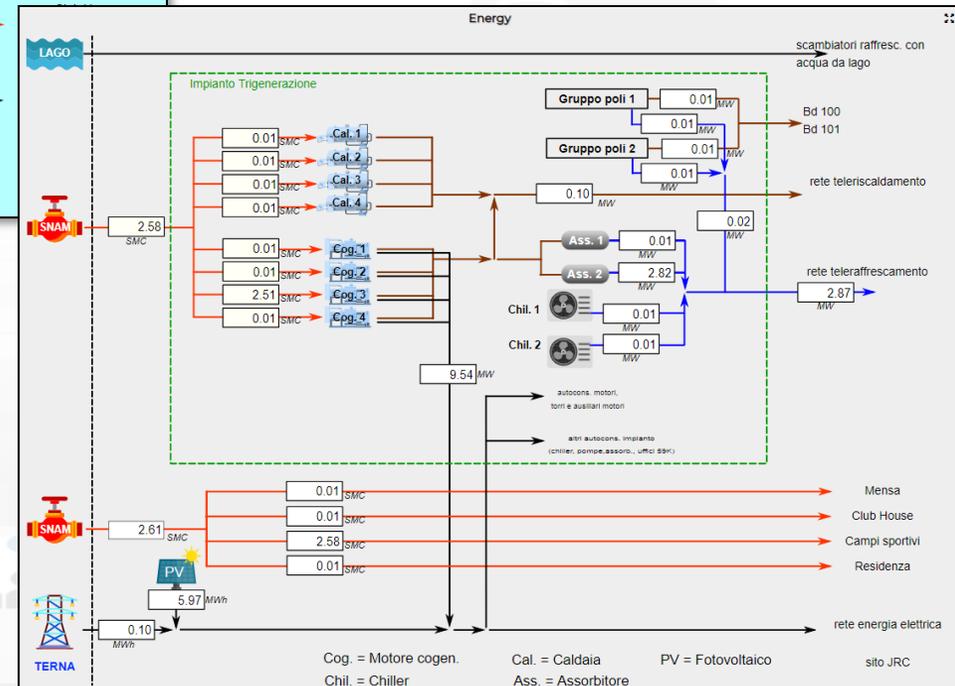
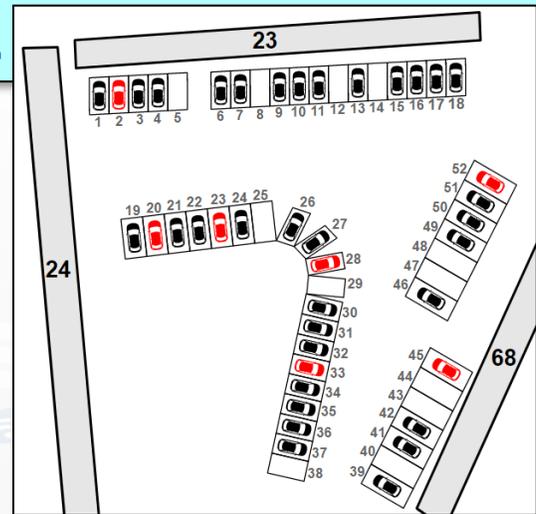
Special Custom Widgets

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



Custom Controls widget showing a row of five smiley faces (from sad to happy) and two data boxes:

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Begin: 17:00

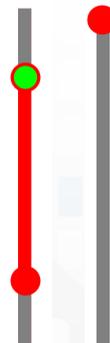
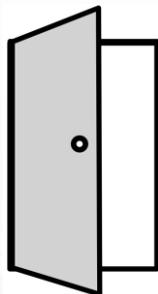
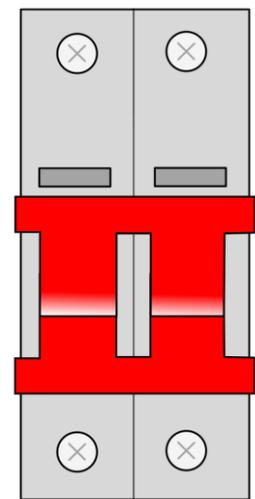
Finish: 4:00

Custom Controls widget showing a row of five smiley faces (from sad to happy) and two data boxes:

- Total clicks: 6
- Mean rate value: 0.00

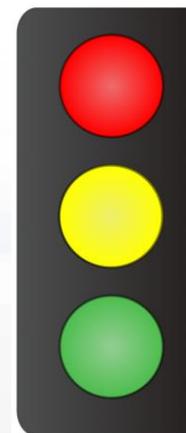
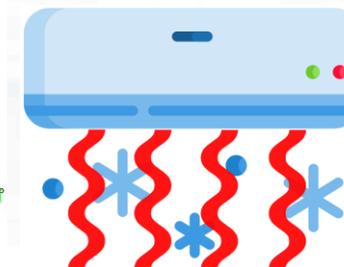
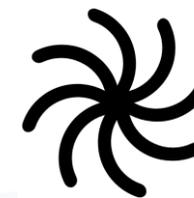
• Virtual Actuators (sensor-actuator)

- From: Dashboard
- To: IOT App, MyKPI, other Synoptics



• Virtual Sensors

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



<https://www.snap4city.org/663>

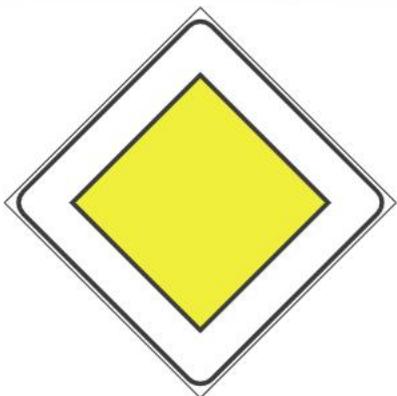




SVG Custom Widgets Examples

Sat 16 Jan 01:07:39

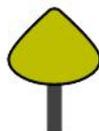
Precedence Italians Road signals



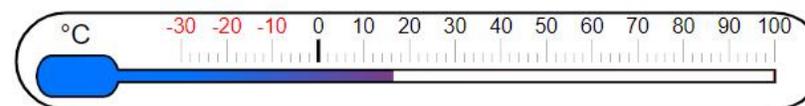
Select a code from 0 to 11 to change the road sign

New			Last confirmed		
			None		
7	8	9			
4	5	6			
1	2	3			
0	.	Canc			
Confirm					

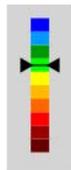
Smart Light Luminosity



Air Temperature in Florence



PM10 level - Bologna



fan

Fan velocity



Symbols Legenda

open/... M...



Dynamic Prohibition...



Prohibition Traffic Signs Co...

New			Last confirmed		
			None		
7	8	9			
4	5	6			
1	2	3			
0	.	Canc			
Confirm					

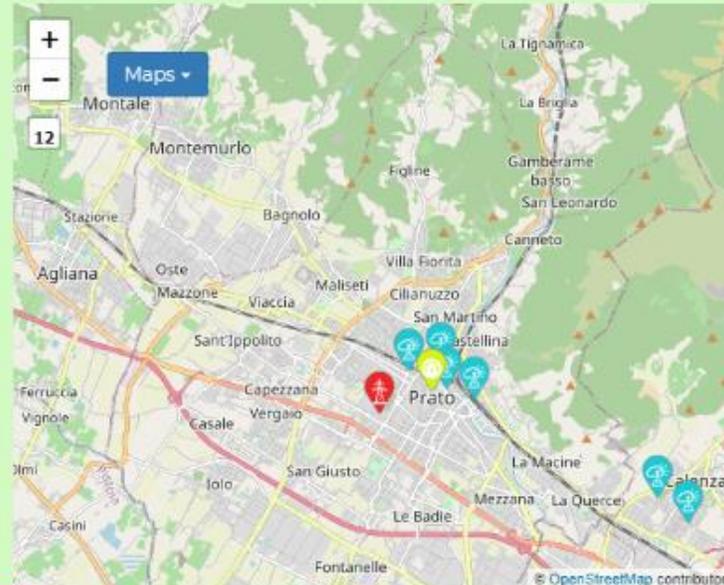


Prohibition Traffic Signs Legenda



Snap4Home 5G Demo

Thu 11 Jun 18:07:32



Gio 11 Giu

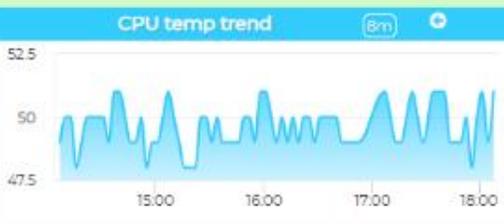
Prato

Pioggia e schiarite

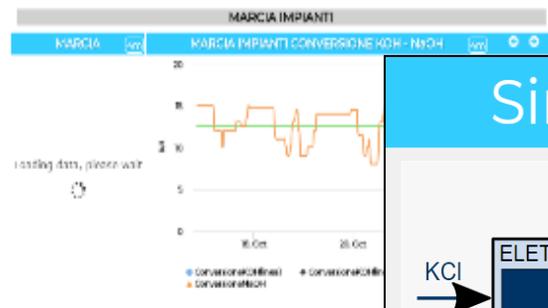
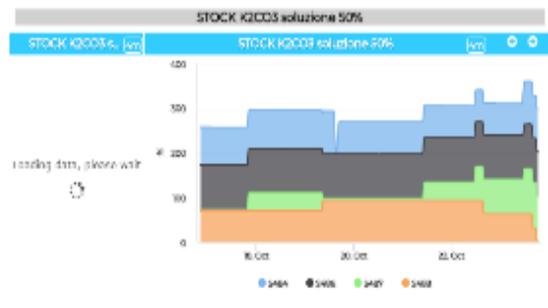
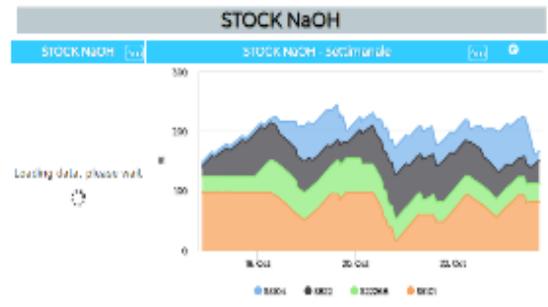
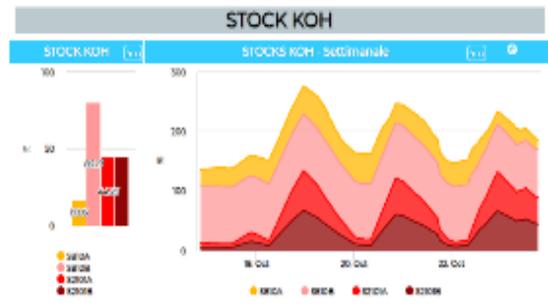
18°C / 22°C

Powered by LaMMA

Ven 12 Giu	14°C / 27°C	Nuvoloso
Sab 13 Giu	13°C / 23°C	Nuvoloso
Dom 14 Giu	Temp N/A	Nuvoloso
Lun 15 Giu	Temp N/A	Nuvoloso



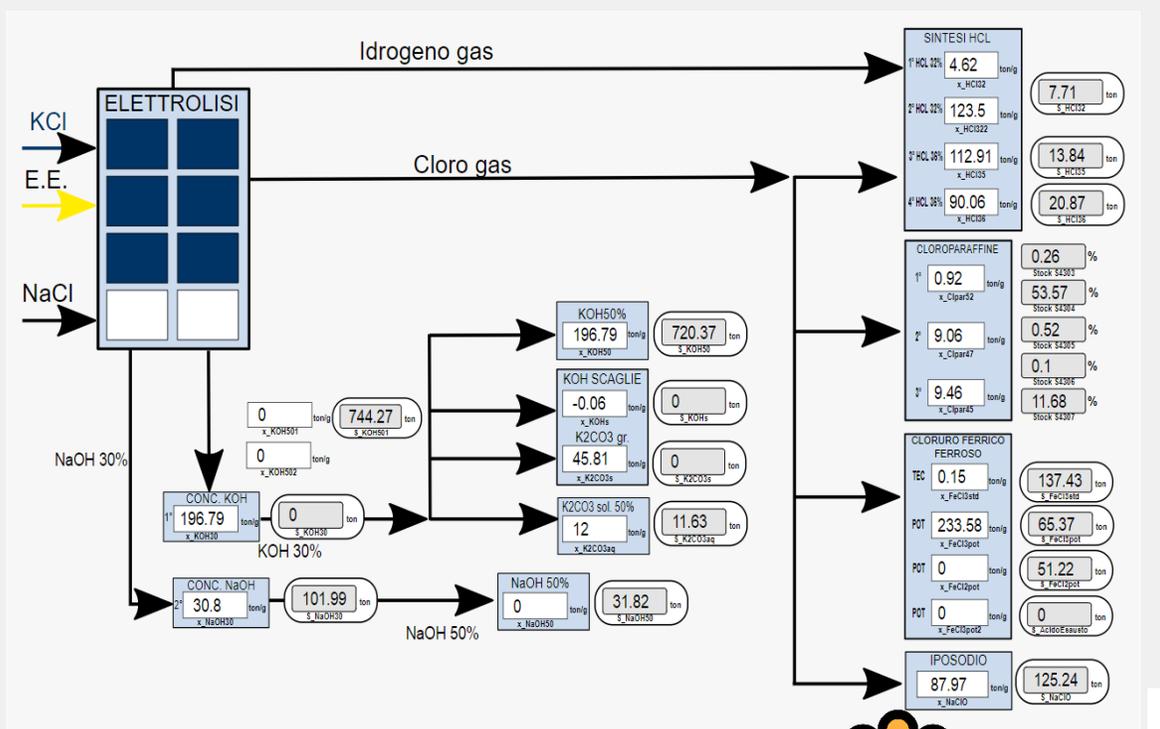
- ▲ NaOH KOH -1
- ▲ NaOH KOH -2
- ▲ HCl
- ▲ Cloroparaffine
- ▲ Cloruro di Ferro
- ▲ Cloruro Ferrico Ferrosio Pot.
- ▲ Cloruro Ferrico Ferrosio



- Home
- DCS Real Time VS Planning
- DCS Real Time Giornaliero
- DCS Real Time Settimanale
- DCS Marce Giornaliero
- DCS Marce Settimanale
- DCS Stocaggi



Sinottico Sintesi Impianto Altair 2



- Home
- DCS Real Time VS Planning
- DCS Real Time Giornaliero
- DCS Real Time Settimanale
- DCS Marce Giornaliero
- DCS Marce Settimanale
- DCS Stocaggi Giornaliero
- DCS Stocaggi Settimanale
- Sinottico di sintesi impianto (ton/g)
- Sinottico di sintesi impianto (ton/h)
- RTO online

RTO online

Localizzazione (id data)	Energia (PUN)	Altri Parametri	Pianificazione	Esito Pianificazione	In Produzione
0-01 09:32:54	2020-10-01 23:00:00	2020-07-24 18:43:00	2020-10-01 09:33:27	completato	<input type="checkbox"/>
0-30 17:20:50	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 17:21:00	completato	<input checked="" type="checkbox"/>
0-30 16:24:57	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 16:27:23	completato	<input type="checkbox"/>
0-30 14:54:11	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 14:56:22	completato	<input type="checkbox"/>
0-30 13:43:47	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-30 13:43:57	completato	<input type="checkbox"/>
0-29 19:03:27	2020-09-30 23:00:00	2020-07-24 18:43:00	2020-09-29 19:03:43	completato	<input type="checkbox"/>
0-28 18:30:13	2020-09-29 23:00:00	2020-07-24 18:43:00	2020-09-28 18:30:23	completato	<input type="checkbox"/>
0-28 17:57:14	2020-09-29 23:00:00	2020-07-24 18:43:00	2020-09-28 17:57:23	completato	<input type="checkbox"/>
0-28 15:50:21	2020-09-28 23:00:00	2020-07-24 18:43:00	2020-09-28 15:50:45	completato	<input type="checkbox"/>
0-25 18:46:02	2020-09-26 23:00:00	2020-07-24 18:43:00	2020-09-25 18:47:46	completato	<input checked="" type="checkbox"/>

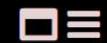
- Home
- DCS Real Time VS Planning
- DCS Real Time Giornaliero
- DCS Real Time Settimanale
- DCS Marce Giornaliero
- DCS Marce Settimanale
- DCS Stocaggi Giornaliero
- DCS Stocaggi Settimanale
- Sinottico di sintesi impianto



Alerting Generation

This dashboard contains data derived from actual sensors and predictive values under validation

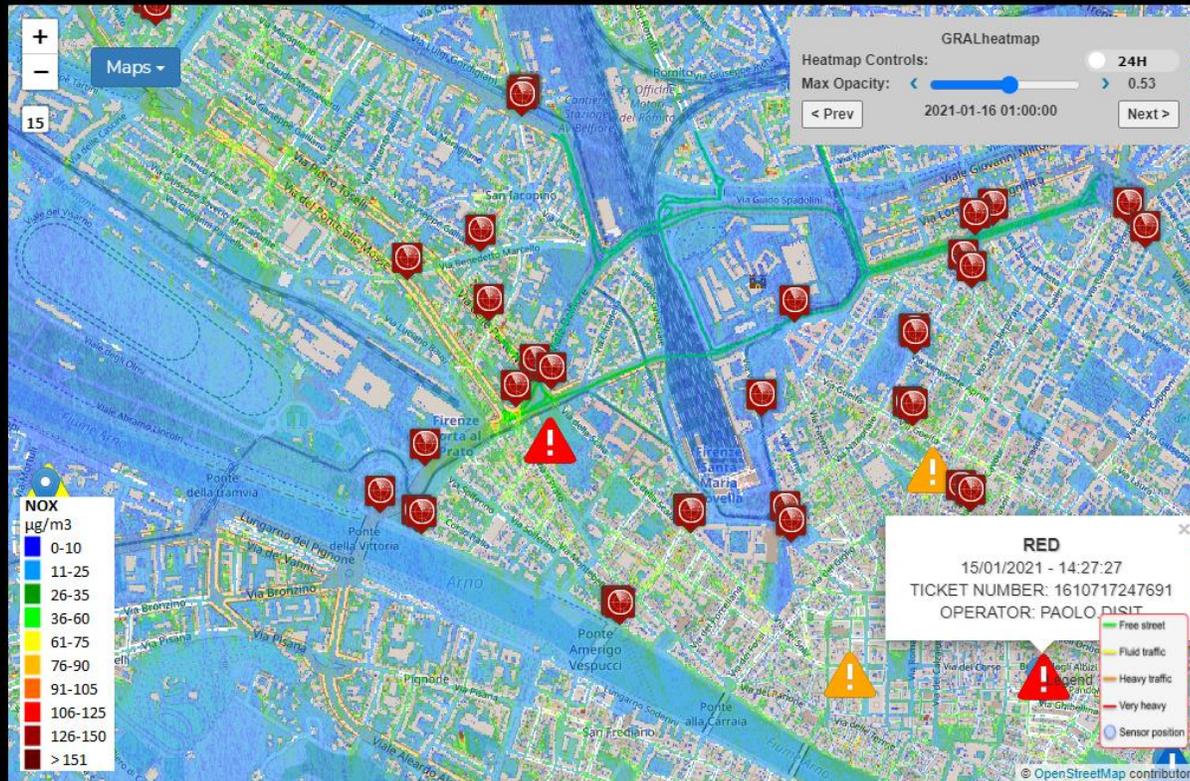
Sat 16 Jan 01:03:27



- ▲ Air Quality Sensors
- ▲ Weather Sensors
- ▲ PM10 Heatmap
- ▲ PM2.5 Heatmap
- ▲ CO Heatmap
- ▲ CO2 Heatmap
- ▲ NO2 Heatmap
- ▲ Europ. AQI Heatmap
- ▲ Air Humidity Heatmap
- ▲ Air Temp. Heatmap
- ▲ Gral Pred. HM NOX (3m)
- ▲ Traffic Sensors
- ▲ Traffic Flow
- ▲ Traffic Bubble
- ▲ Cycling Paths
- ▲ Accident Heatmap
- ▲ Scenarios
- ▲ What-if analysis
- ! Area Alerts

Firenze Oggi

Air Temperat... (7m)



tusc_weathe... (7m)

airTemperature (7m)



Incident Kind: RIVER FLOODING

Severity: RELEVANT

People Involved: <=10

Short Term Impact: PEOPLE DISEASE

Long Term Impact: POLLUTANT

Clean

Register Alert

Alarm Description (7m)

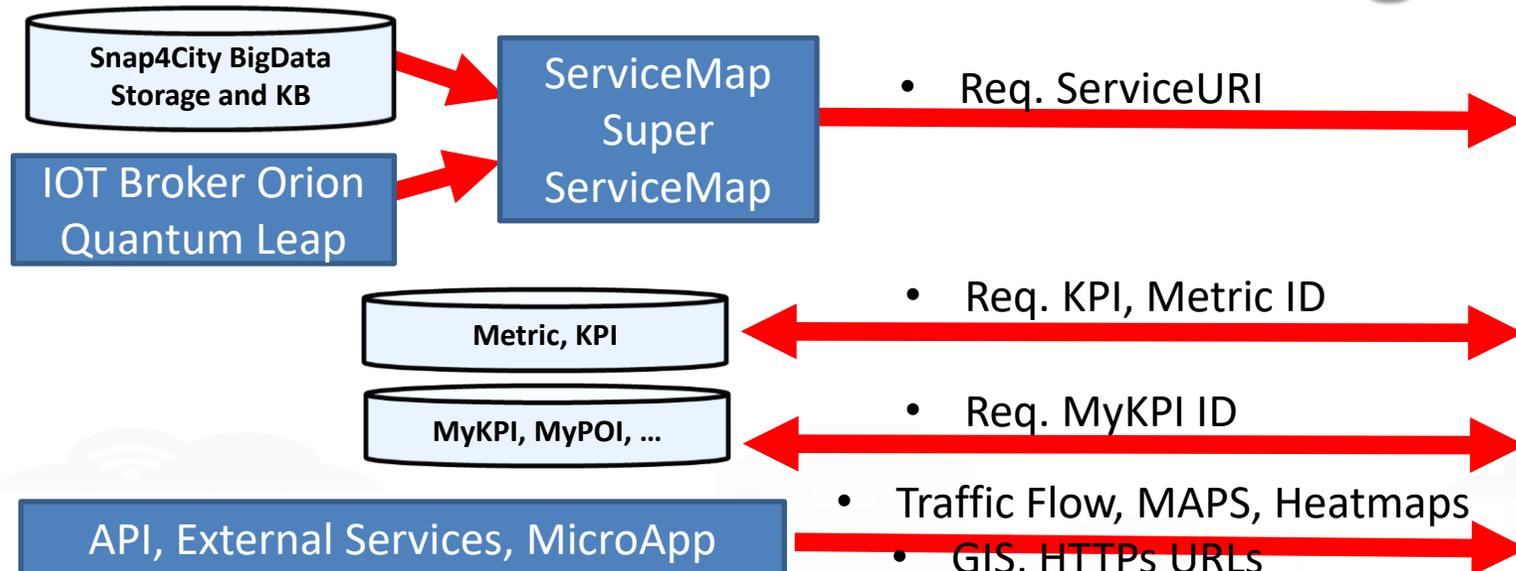
Kind: River Flooding
Severity: Relevant
#People: 10
Impact 1: People Disease
Impact 2: Pollutant
GPS: 43.776114;11.210861
City: FIRENZE
Adr: VIA ADRIANO CECIONI N.undefined
Registered:Green:1610755283309

Alert Events (7m)

TICKET	OPERATOR
1610755283309	PAOLO.DISIT
1610717428876	PAOLO.DISIT
1610717247691	PAOLO.DISIT
1610717002089	PAOLO.DISIT



How the Dashboards exchange data



Dashboards

SENSOR	VALUE	UNIT	STATUS
PM10	10.2	µg/m³	OK
PM2.5	5.8	µg/m³	OK
NO2	21.5	ppb	OK
CO	0.8	ppm	OK
O3	12.1	ppb	OK
TEMP	15.2	°C	OK
HUMIDITY	65	%	OK

MACROLOTTO 1

TRAFIC SENSORS

- ▲ First Aid
- ▲ Air Quality
- ▲ Parking Status
- ▲ Meteo Sensor
- ▲ Cycle paths

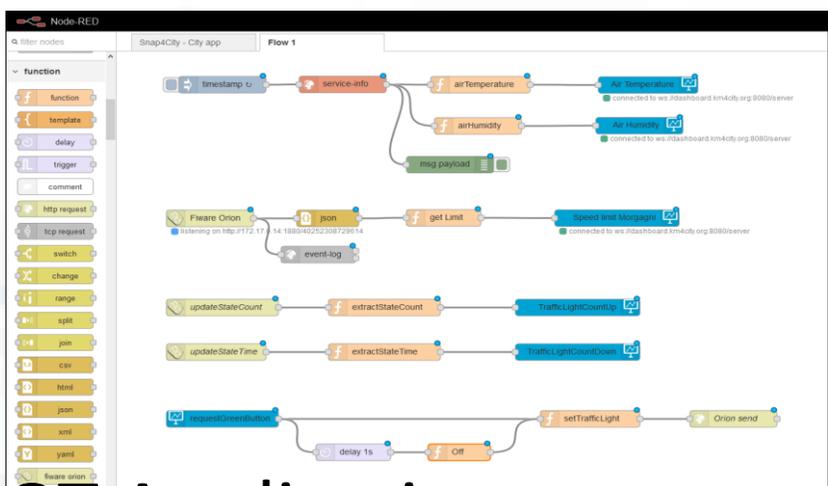
Free parking

Air Temp 15.2

Air Humidity 90.786%

Morgagni 50

30s **Request Green** **0s**



- ServiceURI (ID)
- MyKPI, Metric (ID)
- Dynamic Data, computed into IOT Application
- Rx. Dynamic Data
- Event Driven Synoptics
- Actions, Show

IOT Application

Dashboard-IOT App



PeopleNumber		
time	Last confirmed	
7	8	9
4	5	6
1	2	3
0	.	Cancel

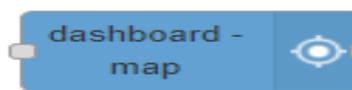
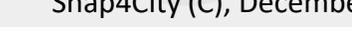
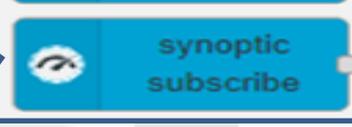
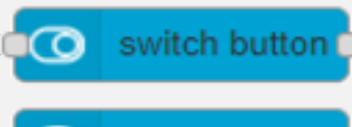
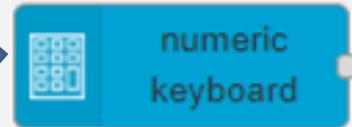
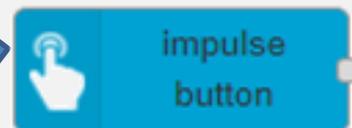
Confirm



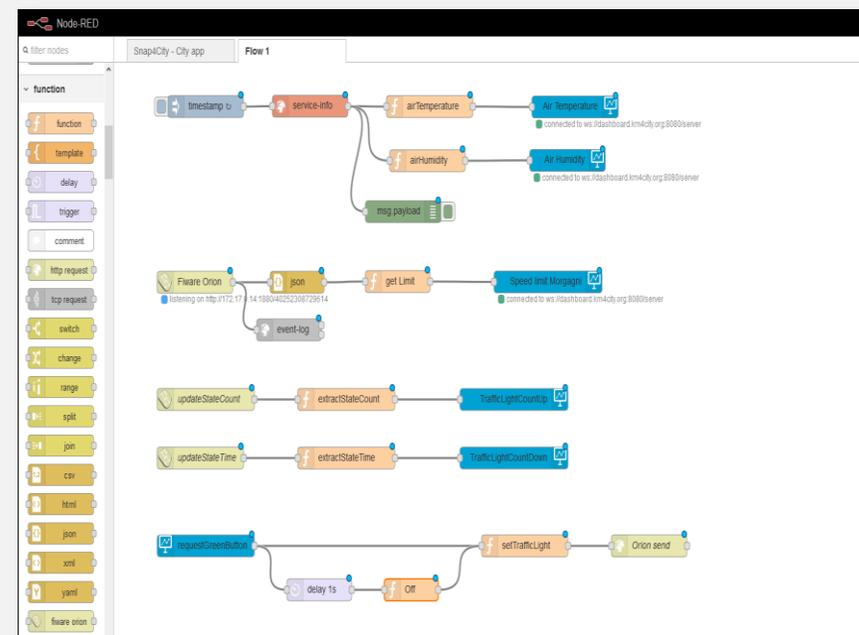
MapClick

MyKPI variable onchange

Synoptics



From Dashboard to IOT App



IOT Application

Dashboard-IOT App

From IOT App to Dashboard

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

Snap4D3

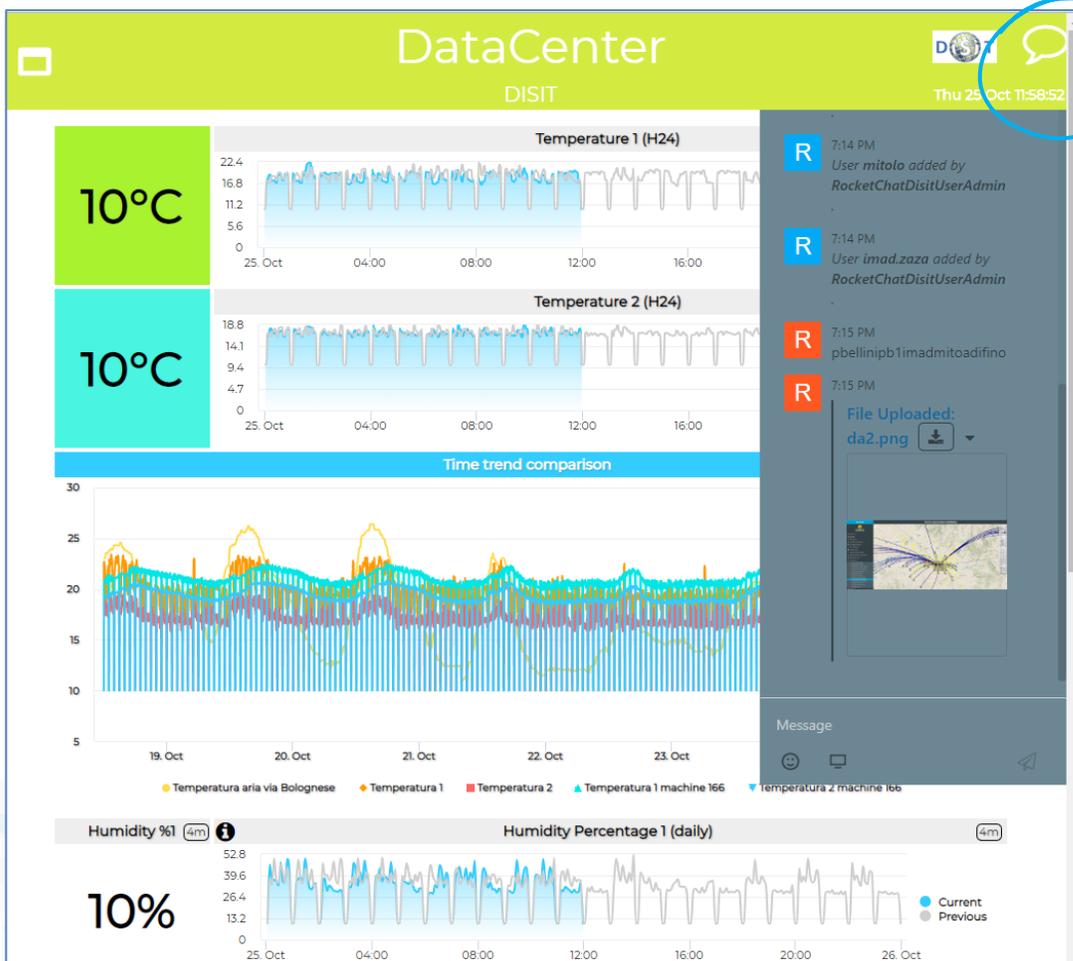
event table

dashboard - map

device table

value name	airHumidity	airTemperature	PM2_5	O3
IBMET_SMART3 - PM2_5	10.8	17.0	235.36	0.14
IBMET_SMART3 - PM2_5	48	13.3	97.96	0.16
IBMET_SMART3 - PM2_5	56.2	13.4	0	0.17
IBMET_SMART3 - PM2_5	17.1	16.3	16.47	0.16
IBMET_SMART3 - PM2_5	84	16.2	13.33	0.15
IBMET_SMART3 - PM2_5	0	21.9	3.7	0.14
IBMET_SMART3 - PM2_5	11.1	9.5	13.03	0.12

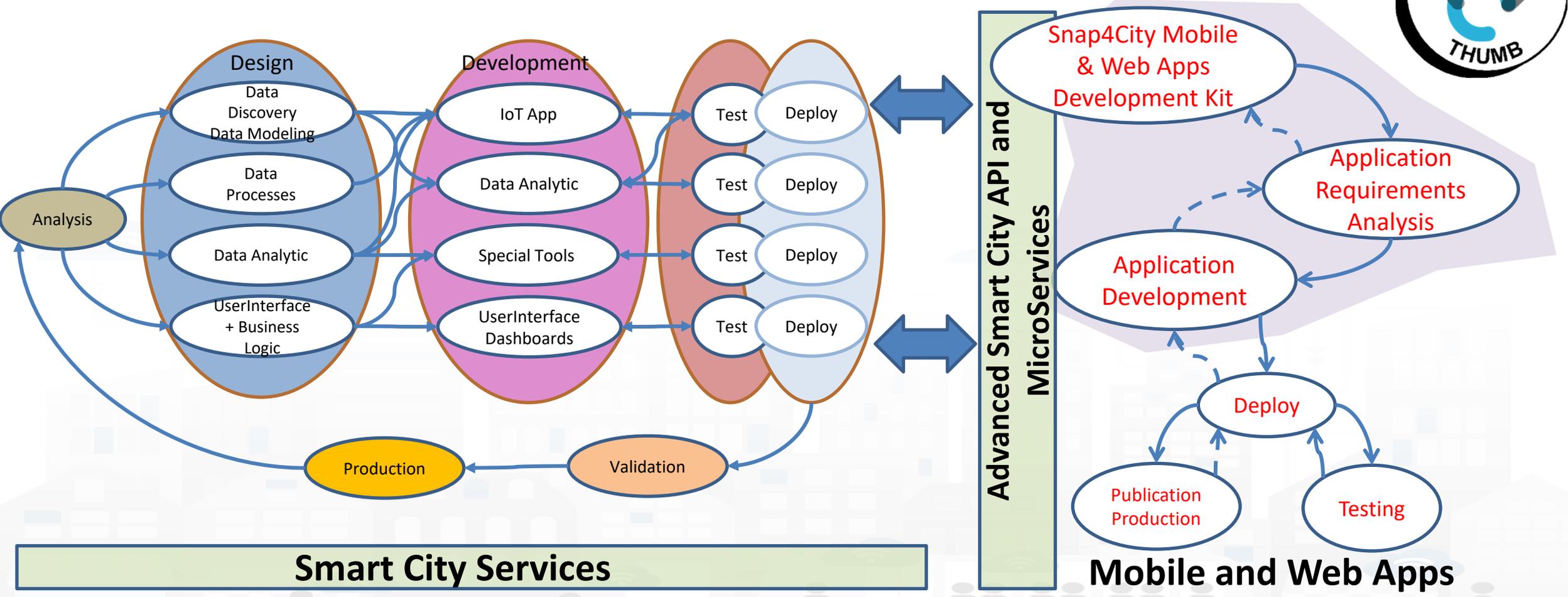
Private ChatRoom per Dashboard

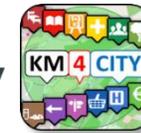


Chat Management

The screenshot shows a chat management interface. On the left, there is a sidebar menu with various options including "Dashboards", "My Dashboards", "Notifier", "IOT Applications", "My Personal Data", "IOT Directory and Devices", "Knowledge and Maps", "Micro Applications", "External Services", "Data Set Manager: Data Gate", "Resource Manager: Process Loader", "Development Tools", "Management", "Settings", "User Management and Auditing", "User Management", "User Role Management via LDAP", "Manage Resource Ownership", "User Chats Management", "Auditing Data Access Try-out", "Auditing Elements vs Ownership", "Auditing Personal Data", "Auditing Accesses", "Auditing User Activities", "Dashboard Builder Local Users", and "Help and Contacts". The main area shows a chat window with a list of channels and a message history. The message history includes several messages from "User mitolo" and "User imad.zaza" added by "RocketChatDisitUserAdmin", and a file upload of "da2.png".

Develop Mobile & Web Applications Exploiting Snap4City Smart City Services



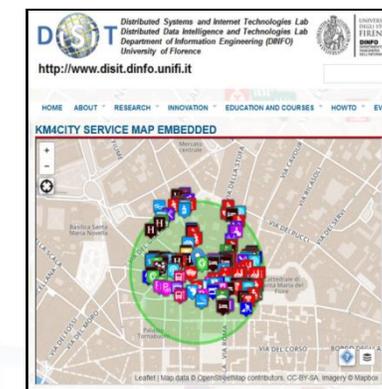


Developing Web and Mobile Apps, MicroApps,..

Mobile Apps

Web App HTML5, MicroApplications

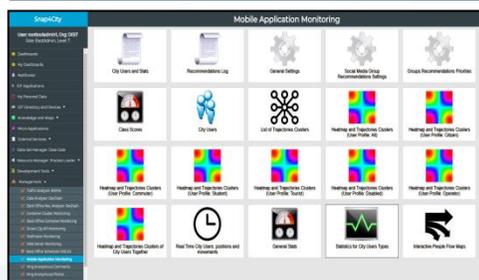
Embed into Web pages



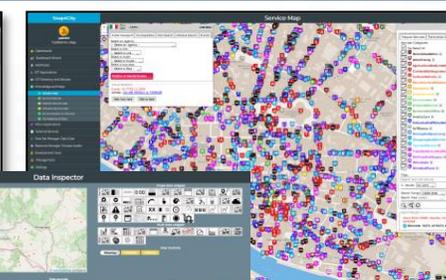
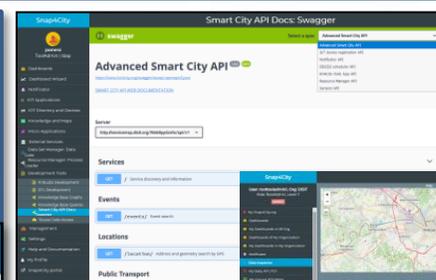
City User



Advanced Smart City API



Snap/Km4City
Open Source
development
tool kit



Developer



Mobile Application
Monitoring
Administrator



Swagger

DataInspector

ServiceMap

TOP

IOT Network Interoperability



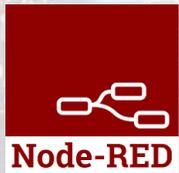
Standards and Interoperability (9/2022)



Compliant with:

- **IoT:** NGSI V2/LD, LoRa, LoRaWan, MQTT, AMQP, COAP, OneM2M, TheThingsNetwork, SigFOX, Libelium, IBIMET/IBE, Enocean, Zigbee, DALI, ISEMC, Alexa, Sonoff, HUE Philips, Tplink, BACnet, TALQ, Protocol Buffer, KNX, OBD2, Proximus, ..
- **IoT model:** FIWARE Smart Data Model, Snap4City IoT Device Models
- **General:** HTTP, HTTPS, TLS, Rest Call, SMTP, TCP, UDP, SOAP, WSDL, FTP, FTPS, WebSocket, WebSocket Secure, GML, WFS, WMS, RTSP, ONVIF, AXIS TVCam, CISCO Meraki, OSM, Copernicus, The Weather Channel, Open Weather, OLAP,
- **Formats:** JSON, GeoJSON, XML, CSV, GeoTIFF, OWL, WKT, KML, SHP, db, XLS, XLSX, TXT, HTML, CSS, SVG, IFC, XPDL, OSM, Enfuser FMI, Lidar, gITF, GLB, DTM, GDAL, Satellite, D3 JSON, ...
- **Database:** Open Search, MySQL, Mongo, HBASE, SOLR, SPARQL, ODBC, JDBC, Elastic Search, Phoenix, PostGres, MS Azure, ..
- **Industry:** OPC/OPC-UA, OLAP, ModBUS, RS485, RS232,..
- **Mobility:** DATEX, GTFS, Transmodel, ETSI, ..
- **Social:** Twitter, FaceBook, Telegram, ..
- **Events:** SMS, EMAIL, CAP, RSS Feed, ..
- **OS:** Linux, Windows, Android, Raspberry Pi, Local File System, AXIS, ESP32, etc.

<https://www.snap4city.org/65>



Communication Patterns



Broker
Gateway

Discovery

Discover, register and "thrust" new devices on the network

Registration



Broker
Gateway

Telemetry

Information Flows From device to another system for conveying status changes in the device

Push



Brokers
Gateways

Inquiries

Requests from devices looking to gather required information or asking to initiate activities



Broker
Gateway

Commands

Commands from other systems to a device or a group of devices to perform specific activities

Bulk action



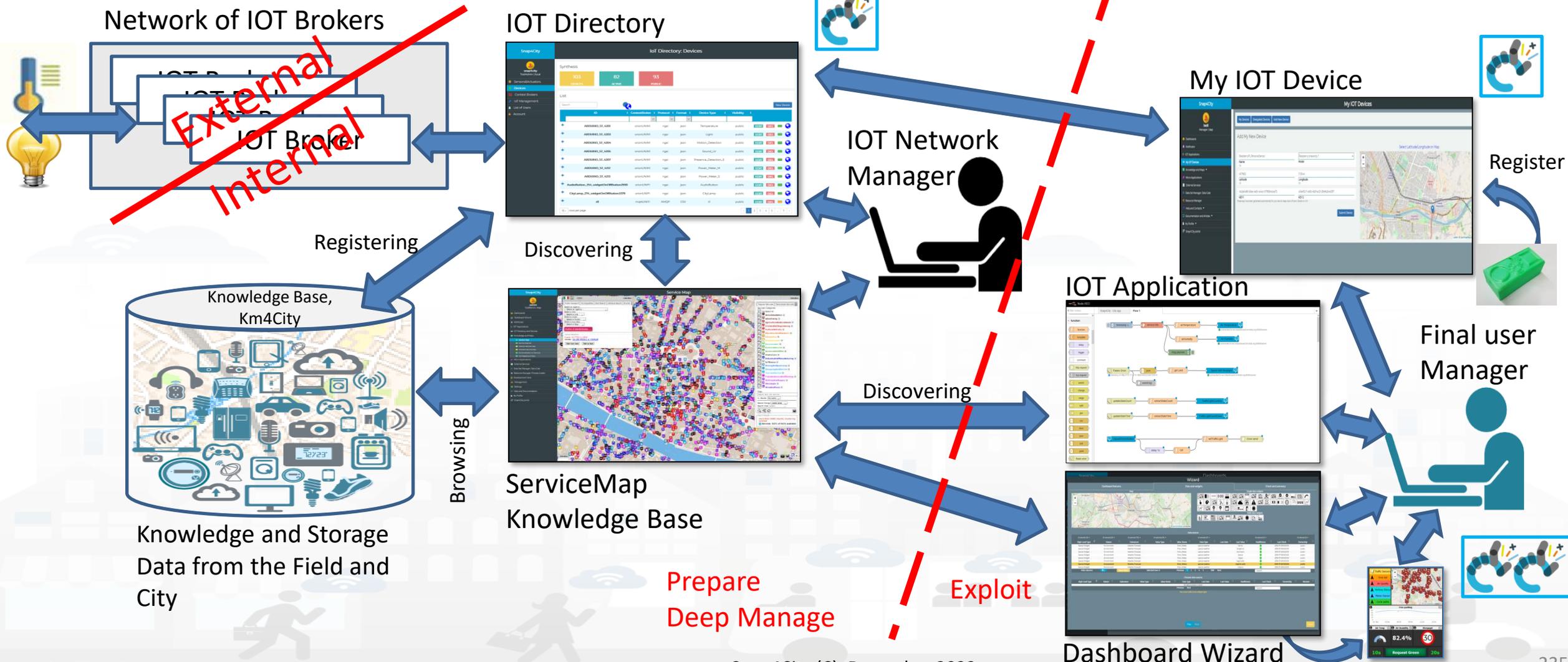
Broker
Gateway

Notifications

Information flows from other systems to a device or a group for conveying status changes in the world

- MQTT
- HTTP(s)
- AMQP
- COAP
- NGSI
- OneM2M
- WebSockets
-
- Etc.

IOT Network Manager vs Final User

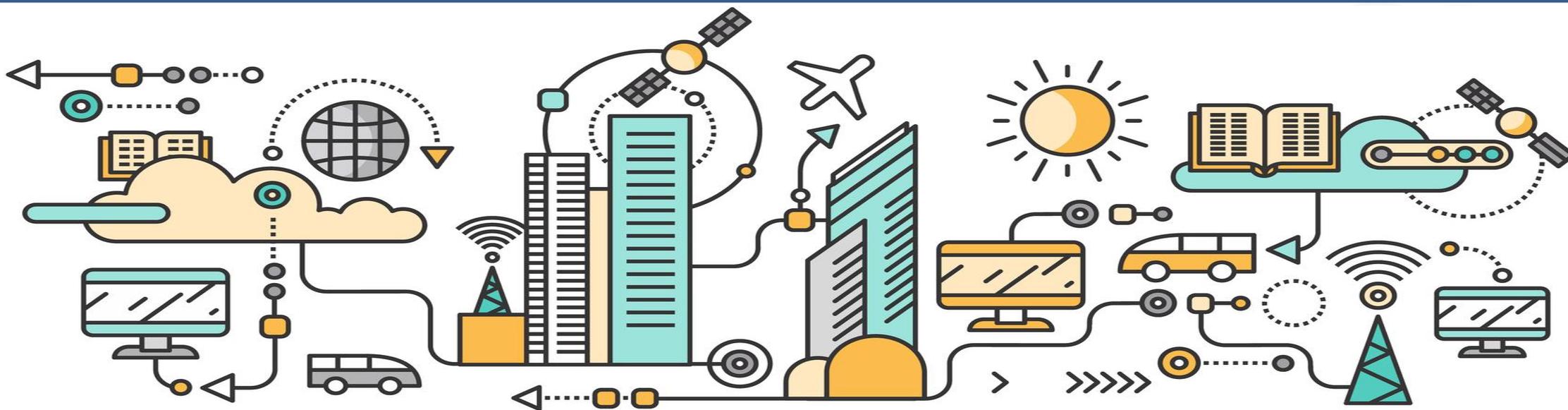


IOT Directory Features vs Users Roles (10/21)

Entities	what	By using IOT Directory and:	Manager	AreaManager	ToolAdmin/ RootAdmin	IOT App microservices
IOT Sensor/Actuator	Browse, use	Several Tools	X	X	X	Yes
	Delegate	API, ..	X	X	X	
	Discovery	KB, API, ..	X	X	X	Yes
IOT Devices	Browse, use	Several Tools	X	X	X	Yes (use)
	Create, change, delete	API, ..	X	X	X	Yes
	Register in Bulk	API, ..		X	X	Yes
	Delegate, Change Owner	API, ..	X	X	X	Yes
	Discovery	KB, API, ..	X	X	X	Yes
IOT Device Model	Browse, Use		X	X	X	(Yes)
	Create, change, delete			X	X	(Yes)
	delegate, change ownership			X	X	
IOT Broker	Browse, use		use	Browse, use	X	Yes (use)
	Register/change/Delete				X	
	Deploy Orion Broker				ToolAdmin	
	Delegate				X	
	Periodic Update				X	

TOP

Integration via IoT Apps and processes



IOT Application Listing, they can be

- Basic (white)
- Advanced (red)
- IOT Edge
 - Raspberry Pi
 - Android
 - Win/Linux
- Data Analytic (Plumber)
- Web Scraper (Portia)

The screenshot shows the Snap4City web interface. On the left is a navigation sidebar with a dark grey background and white text. The main area is titled 'IOT Applications' and features a grid of application cards. Each card has a colored header, a set of icons, a title, an owner name, and a 'Management' button. The cards are arranged in a grid with pagination and search controls at the top.

Application Name	Owner	Category
IOT Edge App	badii	IOT Edge
IOT Edge App	panesi	IOT Edge
IOT Edge App	pb3	IOT Edge
Data Analytic	snap4city	Data Analytic
IOT Edge App	semolarudy	IOT Edge
IOT Application	tester5	IOT Application
IOT Application	semolarudy	IOT Application
ChargingStations	comunedashres	IOT Application
IOT Application	badii	IOT Application
IOT Edge App	badii	IOT Edge
IOT Application	tester2	IOT Application
Web Scraper Portia	My own	Web Scraper



Integrated Node-RED development

rootooladmin1
RootAdmin | ldap

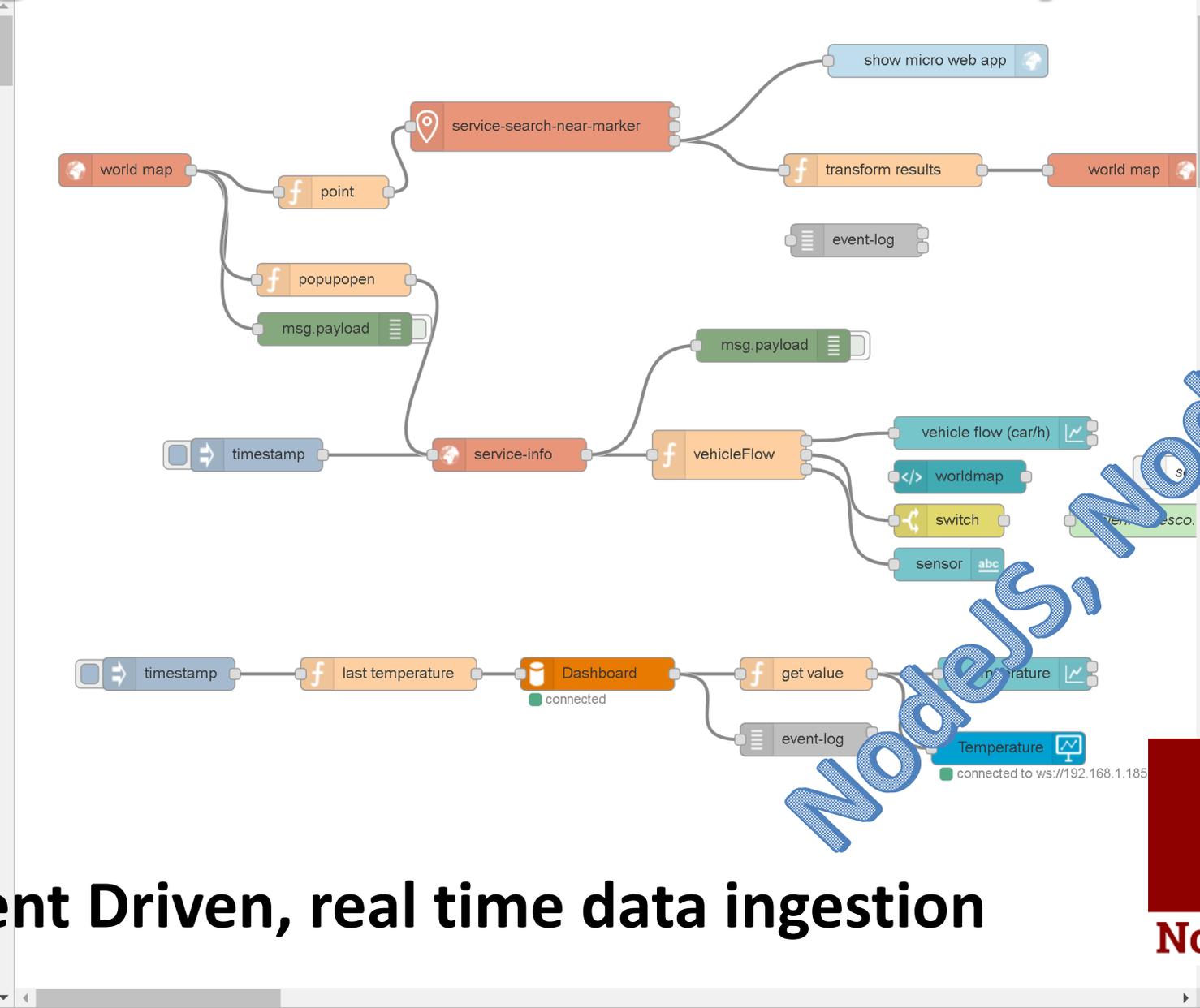
- Dashboards
- My Dashboards
- Notificator
- IOT Applications**
- My Personal Data
- IOT Directory and Devices
- Knowledge and Maps
- Micro Applications
- External Services
- Data Set Manager: Data Gate
- Resource Manager: Process Loader
- Development Tools
- Management
- Settings
- User Management and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

input

- inject
- catch
- status
- link
- mqtt
- http
- websocket
- tcp
- udp
- amqp
- amqp2

output

- debug
- link
- mqtt
- http response
- websocket
- tcp
- udp
- amqp
- amqp2



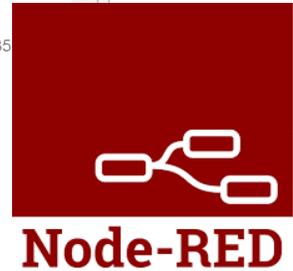
Flow

Name	flow1
ID	"49a71aa0.b297b4"
Status	Enabled

Information

Event Driven, real time data ingestion

Nodes, Node-RED



IoT Applications

- **Data ingestion:** more than 70 protocols IOT and Industry 4.0, web Scraping, external services, any protocol database, etc.
- **Data access:** save/retrieve data, query search on expert system, georeverse solution, search on expert system Km4City ontology, etc.
- **Data Transformation/transcoding:** binary, hexadecimal, XML, JSON, String, any format
- **Integration:** CKAN, Web Scraping, FTP, Copernicus satellite, Twitter Vigilance, Workflow OpenMaint, Digital Twin BIMServer, any external service REST Call, etc.
- **Manipulation of complex data:** heatmaps, scenarios, typical time trend, multi series, calendar, maps, etc.
- **Access to Smart City Entities and exploitation of Smart City Services:** transport, parking, POI, KPI, personal data, scenarios, etc.
- **Data Analytic:** managing Python native, calling and scheduling Python/Rstudio containers as snap4city microservices (predictions, anomaly detection, statistics, etc.)
- **User interaction on Dashboard:** get data and message from the user interface, providing messages to the user (form, buttons, switches, animations, selector, maps, etc.)
- **Custom Widgets:** SVG, synoptics, animations, dynamic pins on maps, etc
- **Event management:** Telegram, Twitter, Facebook, SMS, WhatsApp, CAP, etc.
- **Hardware Specific Devices:** Raspberry Pi, Android, Philips, video wall management, etc.



Sept 2022 collection

Two Snap4City Libraries



Navigation menu on the left:

- > common
- > function
- > network
- > input
- > output
- > sequence
- > parser
- > storage
- > social
- > advanced
- > Advanced FTP
- > location
- > NGSi
- > Iwm2m
- > S4C SearchDev
- > S4C Utility
- > S4C Mapping
- > S4C Management
- > S4C DataAnalytic
- > S4C BigData
- > S4C IoTApp
- > S4C OpenMaint
- > S4C IoT
- > S4C Whatif
- > S4C Search
- > S4C Data
- > S4C KPiData
- > S4C Dashboard
- > S4C Sigfox
- > S4C LogDev
- > S4C View
- > S4C Social
- > dashboard
- > time

Library categories and their contents:

- S4C SearchDev**
 - service search
 - service search near gps position
 - service search near service
 - service search within gps area
 - service search within wkt area
 - service search within stored wkt area
 - service search by municipality
 - service search by queryid
 - full text search dev
 - full text search within wkt area
- S4C Utility**
 - full text search within gps area
 - full text search near gps position
 - full text search exp
 - event search dev
 - event search exp
 - event search within wkt area
 - event search within gps area
 - event search near gps position
 - address search near gps position
 - geometry search near gps position
 - address poi search by text
- S4C Mapping**
 - address poi search by text exp
 - address poi search by text near gps position
 - bus routes search
 - bus routes search near gps position
 - bus routes search within gps area
 - bus routes search within wkt area
 - bus routes
- S4C DataAnalytic**
 - point within polygon
 - routing
 - heatmap picker
 - coordinates to address
 - service info
 - edge-tunnel-to-cloud
 - service info mapped
 - mapping
 - set mapping
 - check exist job
 - check exist trigger
 - is in standby mode
 - is shutdown
 - is started
 - get currently executing jobs
- S4C Search**
 - service search near marker
 - service search within circle
 - service search within polygon
 - service search along path
 - full text search within circle
 - full text search within polygon
 - full text search along path
 - full text search usr
 - event search near marker
 - event search within circle
 - event search near marker
 - event search within circle
 - bus routes search near marker
 - bus routes search within circle
 - bus routes search within polygon
 - tpl agencies
 - tpl lines
- S4C Data**
 - tpl routes by agency
 - tpl routes by line
 - tpl stops by route
 - tpl stop timeline
 - recommendatio within circle
 - value type search near marker
 - value type search within circle
 - value type search within polygon
 - value type search along path
 - get my data
 - get my delegator
 - get my delegated
 - get my activity
- S4C IoTApp**
 - portia crawler
 - iotapp restart
 - iotapp upgrade
 - ownership

Watermark URL: <https://flows.nodered.org/search?term=snap4city>

Web Scraping

www.snap4city.org

Portia beta Portia 2.0 Documentation

PROJECT Show all projects
politieantwerpen

SPIDER Show all spiders
www.politieantwerpen.be

START PAGES
https://www.politieantwerpen.be

LINK CRAWLING
Don't follow links

SAMPLE PAGES
Nieuwsberichten Politiezoo...

https://www.politieantwerpen.be/nieuws

Politie Antwerpen
Altijd van dienst

BLAUWE LOKET DIENSTVERLENING NIEUWS ORGANISATIE KANTOREN JOBS CONTACT

Nieuwsberichten

Persbriefing

05/05/2019
Opzoeken

Persbriefing van 05/05/2019
Agressief tegen politie bij controle

Persbriefing van 04/05/2019
Inbreker in containerpark gevat

Verdachte van het dak geplukt

Video's Alle video's

Leerrijke veiligheids oefening 'Comic'

Frames are not supported by Portia

```

{
  "date": [
    "05/05/2019"
  ],
  "fileId": [
    "05/05/2019 Resultaten Wodca"
  ],
  "img": [
    "https://www.politieantwerpen.be/894f-4cfb-8419-8fb46b2bad65.jpg"
  ],
  "link": [
    "https://www.politieantwerpen.be/itwm/resultaten-wodca-2"
  ],
  "title": [
    "Resultaten Wodca"
  ],
  "url": [
    "https://www.politieantwerpen.be/nieuws"
  ]
}, {
  "date": [
    "03/05/2019"
  ],
  "fileId": [
    "03/05/2019 Stagiairs houden
  
```



portia-crawler-police-antwerp

Flow 1

```

graph LR
    timestamp[timestamp] --> crawler[portia crawl police antwerp]
    crawler --> payload[msg payload]
    crawler --> last_data_file[last_data.json]
    last_data_file --> json[json]
    json --> http[http]
  
```

Snap4City vs CKAN

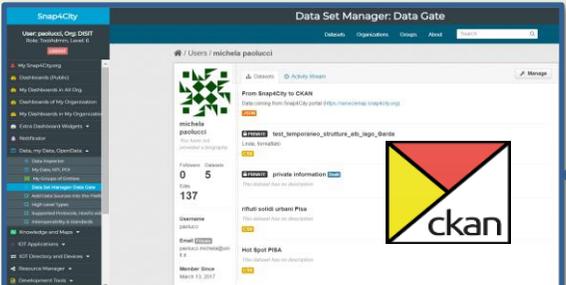
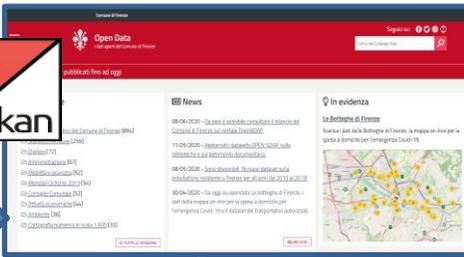


Snap4City Portal and Integrated tools

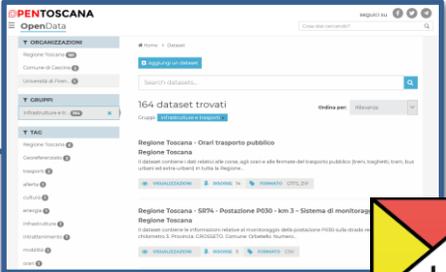


Advanced Snap4City APIs and Micro Services

Datagate

ckan

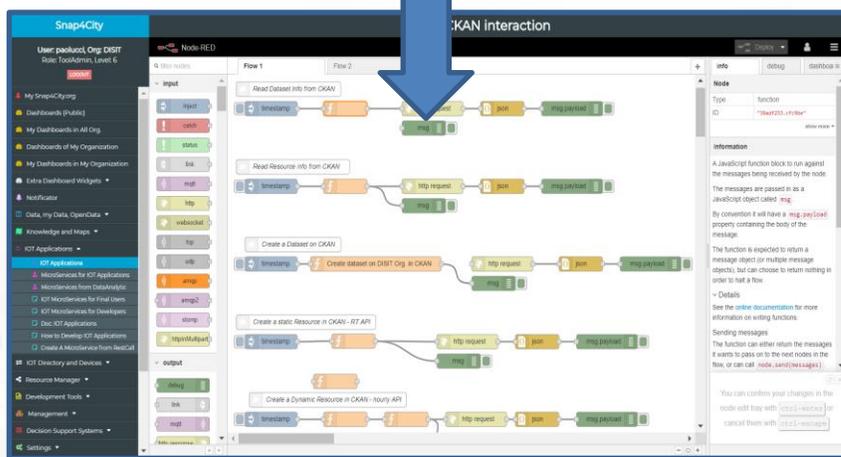


ckan

Harvesting and Publishing

Open or Private External CKAN Data Portals

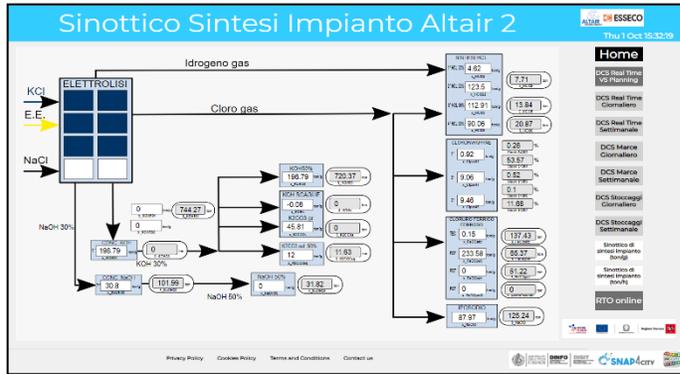
CKAN interaction



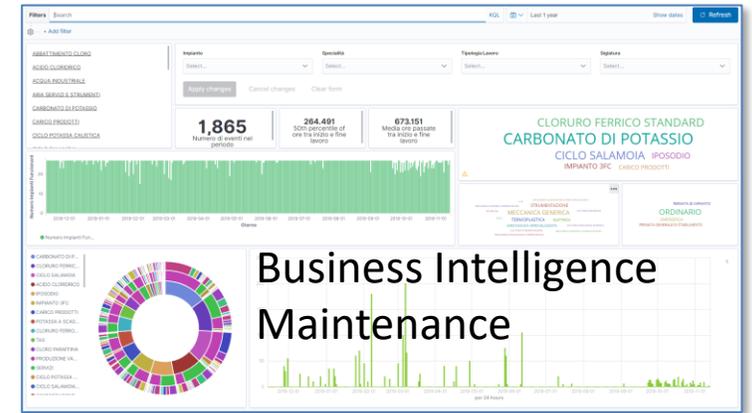
Automatize:

- Import data from CKAN to Snap4City
- Upload Public Data from Snap4City to CKAN
- Data Harvesting
- Dashboards and Mobile/Web Apps creation

Example of Integrated workflow



Consumptions/productions

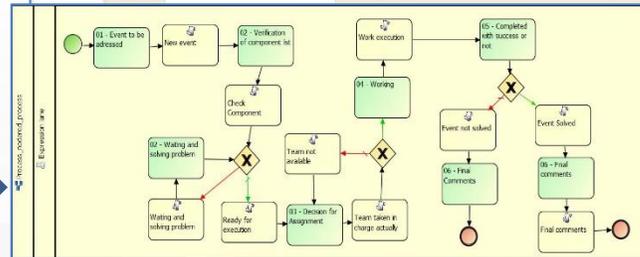


Events/actions

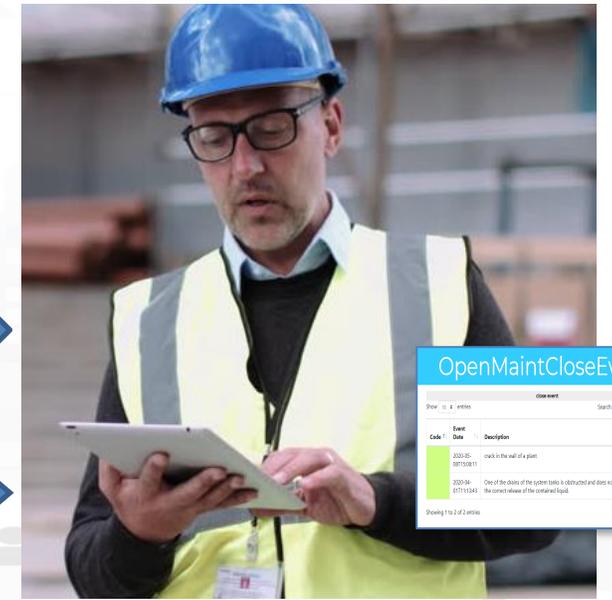
Business Intelligence
Maintenance

Dashboards and actions

OpenMaint: BPM Workflow
management, team assignment,
material control, ...



IOT App, Data
event firing,
event detection
and firing
Critical event
management



OpenMaintControlRoom

Tue 28 Jul 18:35:35

status

Code	Event Date	Description	Controls
301157	2020-05-08T15:08:11	crack in the wall of a plant	Work Execution Delete Details
300182	2020-04-01T11:13:43	One of the drains of the system tanks is obstructed and does not allow the correct release of the contained liquid.	Work Execution Delete Details
301019	2020-05-08T14:41:44	An overheating of the 3fc system was found	Event not solved Delete Details
301045	2020-05-08T14:45:19	liquid leaking from a tank of the system	Event not solved Delete Details
301069	2020-05-08T14:50:29	System overheating	Event not solved Delete Details
300170	2020-04-01T10:42:50	A leak was found in one of the pipes on the ceiling of the system.	Event not solved Delete Details

S4COpenMaint

- om get processes
- om get status
- om create new process
- om advance process
- om details process
- om delete process

- Snap4City can
 - Create new tickets
 - Manage steps, workflow
 - Collecting feedbacks and results from teams
 - Manage all phases of the workflow on the fields via IOT Apps and logics
 - The integration if via API and MicroServices into IOT App.

OpenMaintCreateEvent

create event

Create Ticket

Description

Plant

3fc system

Submit

OpenMaintCloseEvent

close event

Show 10 entries Search:

Code	Event Date	Description	Controls
301157	2020-05-08T15:08:11	crack in the wall of a plant	Advance
300182	2020-04-01T11:13:43	One of the drains of the system tanks is obstructed and does not allow the correct release of the contained liquid.	Advance

Showing 1 to 2 of 2 entries

Previous 1 Next

BIM Server

BIM Integration Dashboard

Sat 16 Jan 02:05:21

- ALTAR Plant
- Building
- Digital Hub
- Digital Hub ARC

BIMvie.ws Project User Settings Server

License Administrator (admin@disit.org)

- | Tree | Types | Layers | Classifications | Properties | Query |
|---------------------------|-------|--------|-----------------|------------|-------|
| ▶ BIMtest | | | | | |
| ▶ Unknown | | | | | |
| ▶ Unknown | | | | | |
| ▶ 3D_STUDIO_SALA-CELLE_R0 | | | | | |
| ▶ P5000A-B_REV00 | | | | | |
| ▶ P5000A-B_REV00 | | | | | |
| ▶ P5321_REV00 | | | | | |
| ▶ P5105A-B | | | | | |
| ▶ P5105A-B | | | | | |
| ▶ P5102A-B_REV00 | | | | | |
| ▶ P5102A-B_REV00 | | | | | |
| ▶ E-5333_REV00 | | | | | |
| ▶ P5334_REV00 | | | | | |
| ▶ P5324A-B_REV00 | | | | | |
| ▶ P5324A-B_REV00 | | | | | |
| ▶ S5360_REV00 | | | | | |
| ▶ S5358_REV00 | | | | | |
| ▶ P5350_REV00 | | | | | |
| ▶ E-5313_REV00 | | | | | |
| ▶ P5302A-B_REV00 | | | | | |
| ▶ P5302A-B_REV00 | | | | | |
| ▶ P5302A-B_REV00 | | | | | |
| ▶ MAN | | | | | |
| ▶ S5306_REV00 | | | | | |
| ▶ P-5306_REV00 | | | | | |
| ▶ F-5306_REV00 | | | | | |



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Integration Dashboard

Sat 16 Jan 02:03:57

License Administrator (admin@disit.org)

Subprojects Revisions Checkouts Services Extended Data Browse Users Model Checkers Log



Privacy Policy Cookies Policy Terms and Conditions Contact us



<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddashboard=MzA1NA==>

External REST Call API vs MicroServices

- Each Rest Call API can be automatically transformed into a MicroService for the IOT Applications

Snap4City

User: root@tooladm1n, Org: DISIT
Role: RootAdmin, Level: 7

MicroServices for IOT Applications

Add MicroService

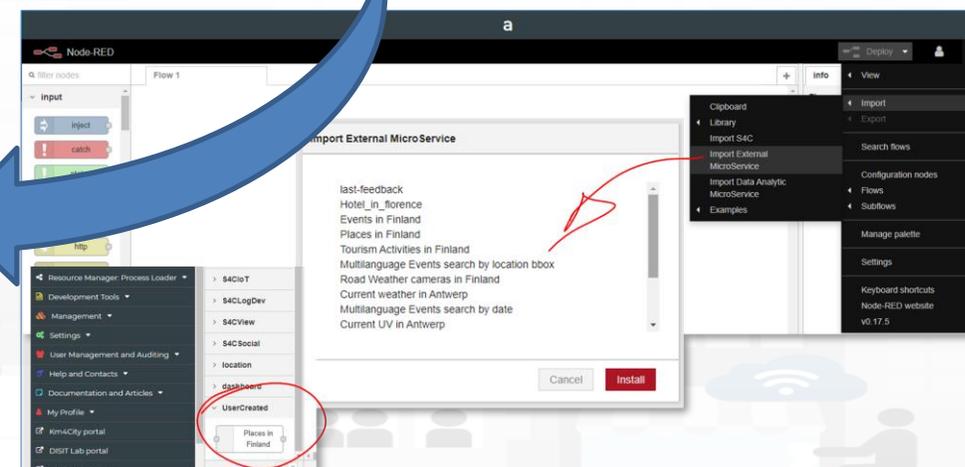
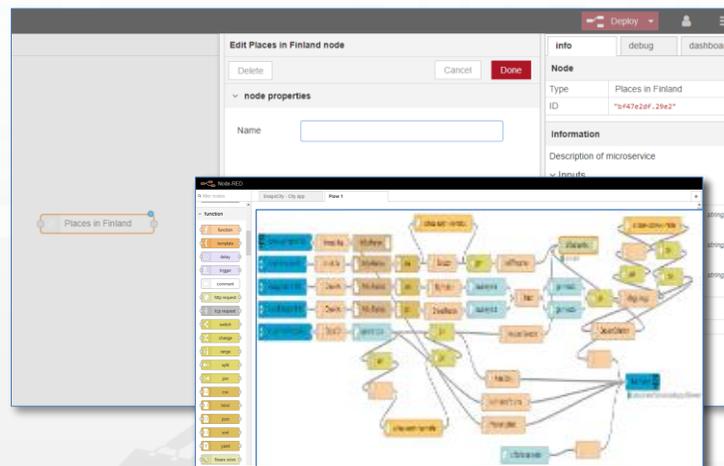
File Name	Upload Date	Description	Control Status	View	Metadata	Published	Delete
Air quality.zip	2018-05-25 13:10:35	Air quality Microservice	OK - 2018-05-25 13:10:35	VIEW	EDIT	NO	DEL
Antwerp cameras location.zip	2019-01-13 17:22:06	Antwerp cameras location from A Open Data	OK - 2019-01-13 17:22:06	VIEW	EDIT	YES	DEL
Antwerp museum.zip	2019-01-13 17:27:08	Antwerp museum (data coming from the A Open Data API)	OK - 2019-01-13 17:27:08	VIEW	EDIT	NO	DEL
Antwerp velo stations.zip	2019-01-13 17:32:17	Antwerp Velo stations ocation (data coming from A Open Data API)	OK - 2019-01-13 17:32:17	VIEW	EDIT	NO	DEL
Car Park Prediction.zip	2018-06-21 16:55:28	Free Parking Lots Prediction	OK - 2018-06-21 16:55:28	VIEW	EDIT	NO	DEL
Current UV in Antwerp.zip	2019-01-13 15:38:13	Current UV in Antwerp (data coming from the openweather API)	OK - 2019-01-13 15:38:13	VIEW	EDIT	YES	DEL
Current weather in Antwerp.zip	2019-01-13 15:25:55	Current weather in Antwerp (Openweather API)	OK - 2019-01-13 15:25:55	VIEW	EDIT	YES	DEL
Events in Finland.zip	2019-01-07 17:43:47	Cultural and educational events (Frequently updated events from multiple cultural event organizers including concerts, sports events, museum exhibitions and many more.) only in Finnish	OK - 2019-01-07 17:43:47	VIEW	EDIT	YES	DEL
Firenze Getico.zip	2019-02-13 12:33:31	Statistiche	OK - 2019-02-13 12:33:31	VIEW	EDIT	NO	DEL
Firenze_getico_interni.zip	2019-02-12 13:00:30	Ticket Getico interni	OK - 2019-02-12 13:00:30	VIEW	EDIT	NO	DEL

Edit MicroService: Antwerp cameras location.zip

Nature: Transfer service and renting
Sub Nature: Monitoring camera
Licence: Public
Description: Antwerp cameras location from A Open Data
Select Image: Nessun file selezionato
Method: GET
Do you want create a Microservice with Authentication?
Url: http://datasets.antwerpen.be/v4-public/gis/politie.json

Help:

Description of microservice
The service gives the camera location (lat, lon)
Inputs
Microservice input description:
No Parameter
Outputs
json
Details
More details here: https://opendata.antwerpen.be/datasets/kaart
body



<https://www.snap4city.org/129>

TOP

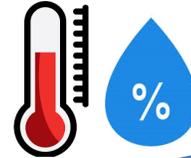
Integration via IoT Apps on IoT Edge



Measuring any kind of sensors values

Controlling Energy Power

Measuring
Energy Consumption



Any kind of notification channel

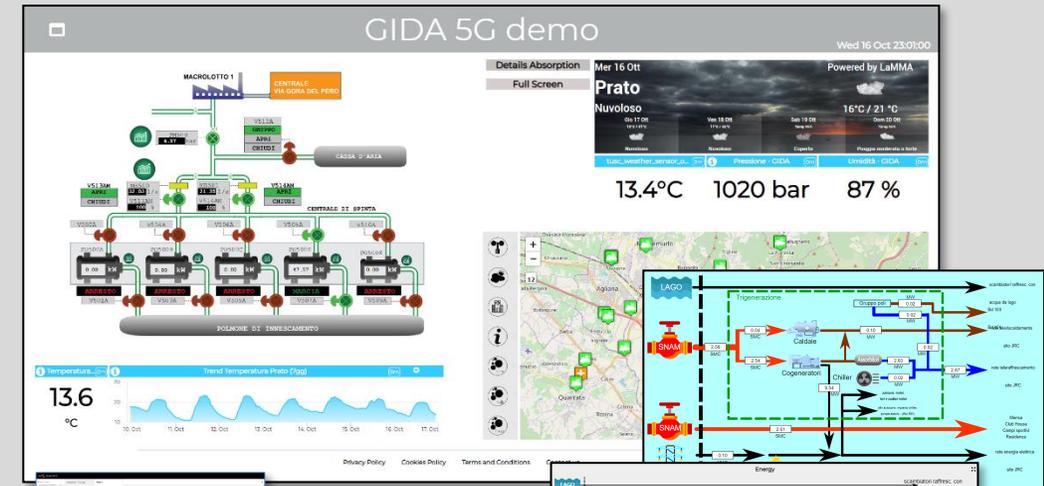


IOT Edge:
Node-RED
+
Snap4City

Contextual (smart city/home) data, Data Analytics
Historical Data, Remote Control, Mobile App



Local Control



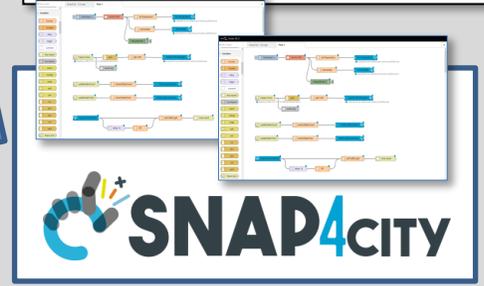
Administrative Servers



ODBC



Alexa: Voice Commands





UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

Snap4Home

SNAP4CITY



Sonoff: Controlling Energy Power



Philips Hue: Controlling Lights



Hue: Motion Control / Alarm



Measuring
Energy Consumption



TP Link: Controlling / Measuring Energy Plugs



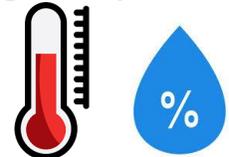
Alexa: Voice Control



IOT Edge:
Raspberry
pi: Node-
RED +
Snap4City

Local Control

Measuring Temperature and Humidity



Controlling Motors



Controlling Irrigators



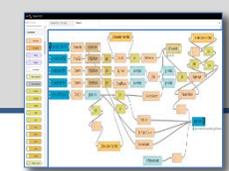
Garage Door



Window
Roller Shutters



Alarm sound
and light

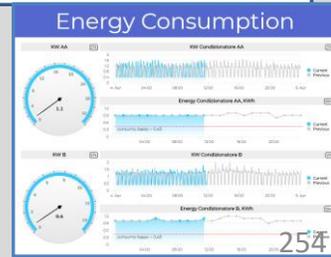


SNAP4CITY

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

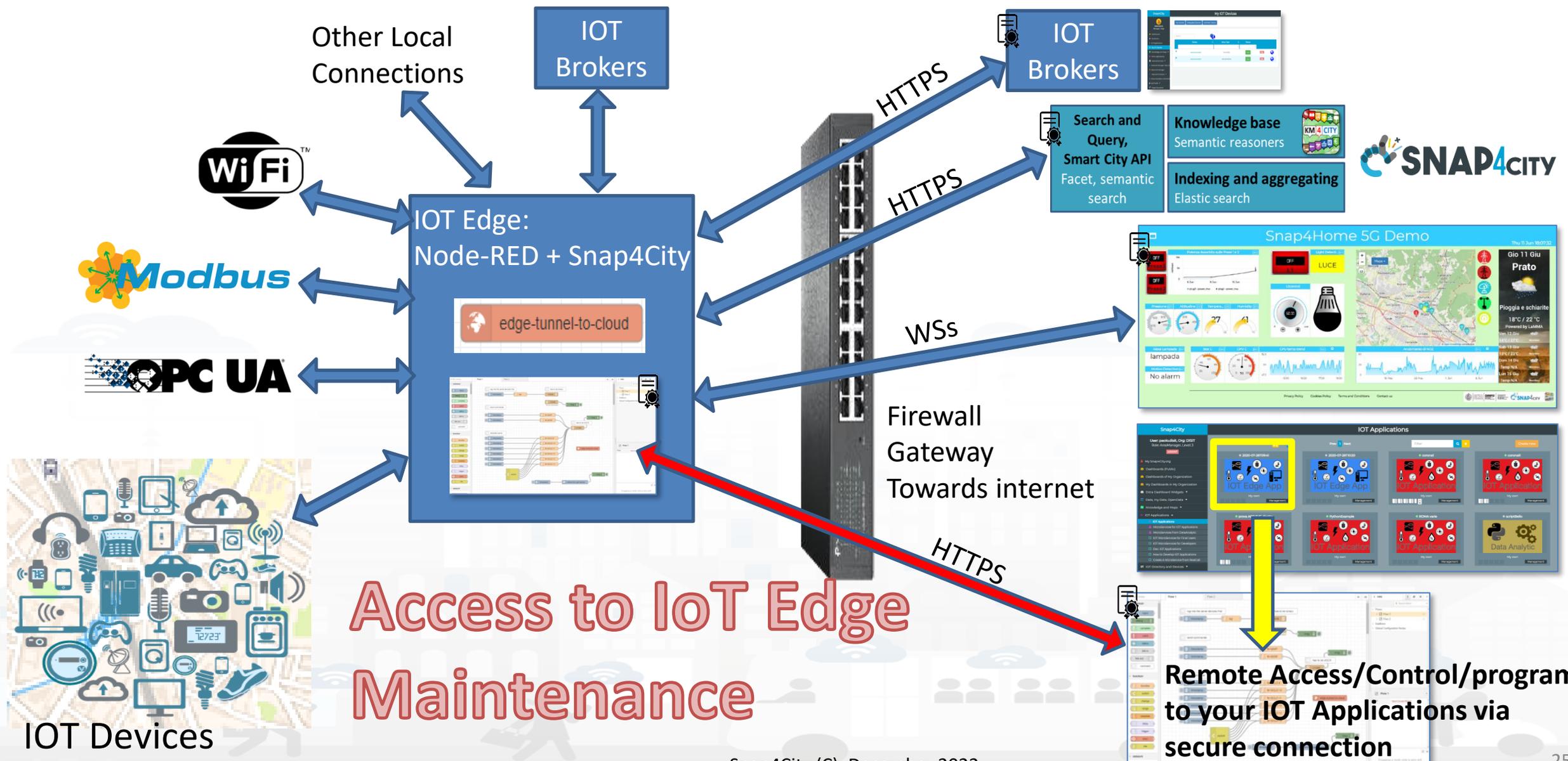
My house

Living	Room1	Room2	Garden	Alexa	Garage	Windows
Plug1	Plug2	Plug3	Plug4	Garden	Alarms	Energy



<https://www.snap4city.org/620>

IOT Edge Device



Access to IoT Edge Maintenance

Remote Access/Control/program to your IOT Applications via secure connection

TOP

Integration with GIS and ArcGIS

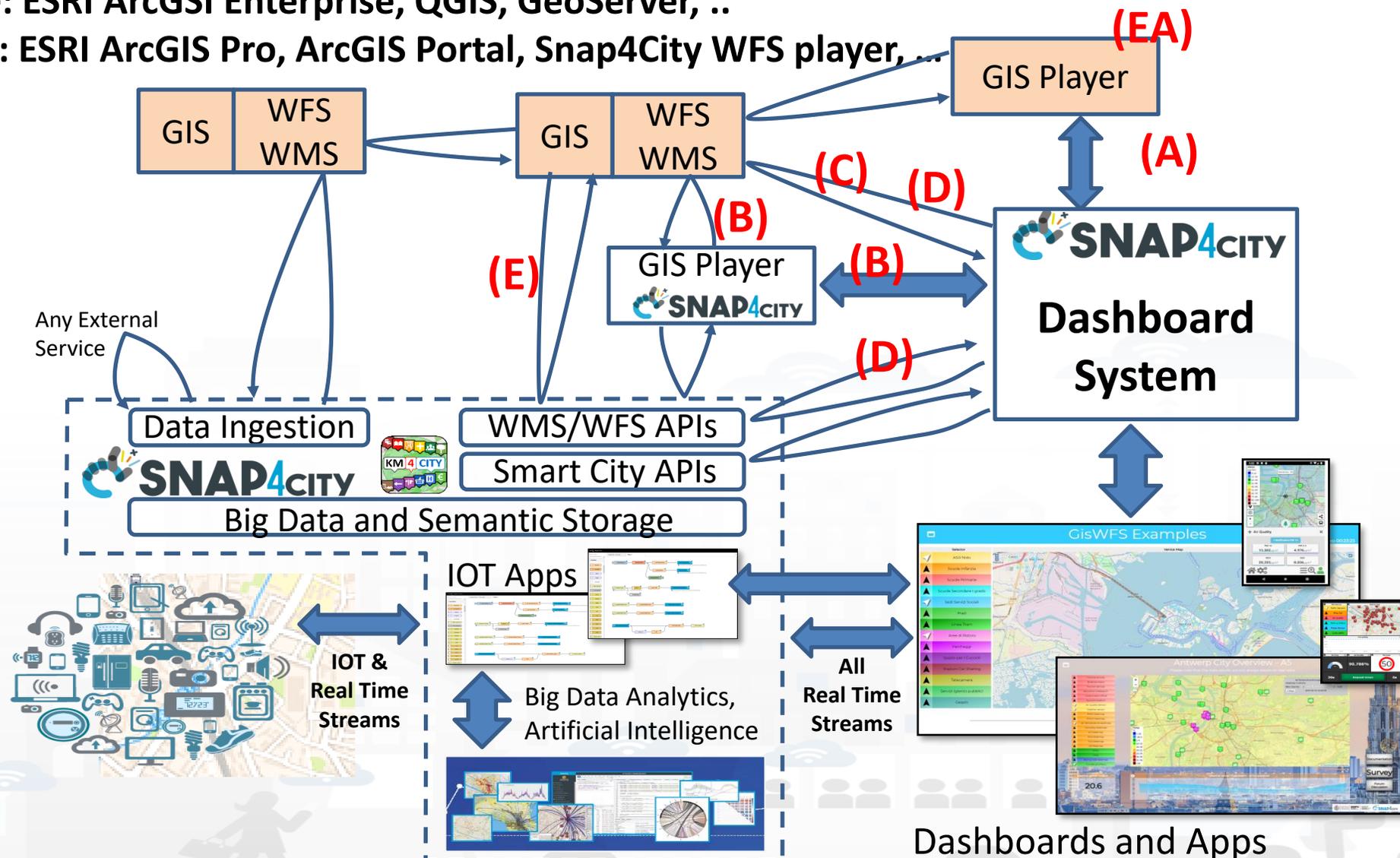
<https://www.snap4city.org/drupal/node/368>



GIS vs Sna4City

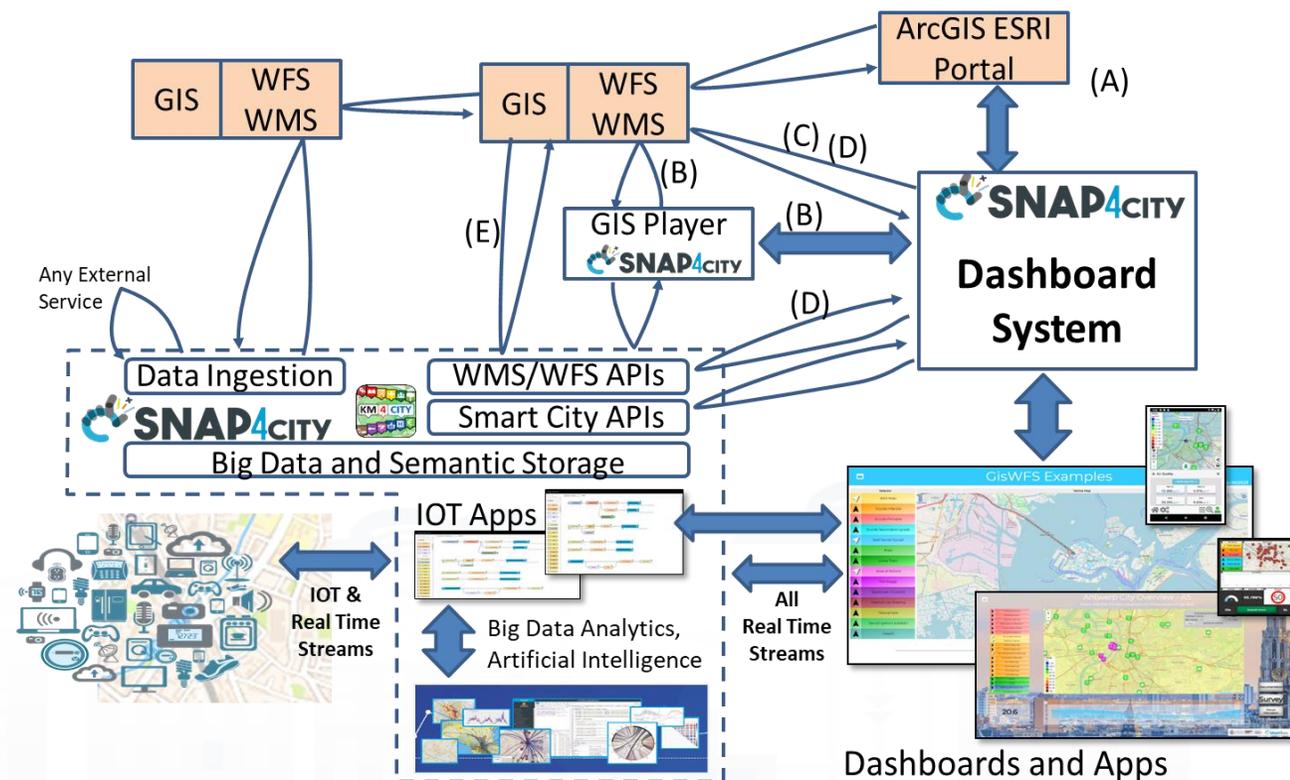
GIS Server can be: ESRI ArcGSI Enterprise, QGIS, GeoServer, ..

GIS Player can be: ESRI ArcGIS Pro, ArcGIS Portal, Snap4City WFS player, ...



- **GIS:**
 - Geographic Information System
- **WMS:**
 - Web Map Service
- **WFS:**
 - Web Feature Services

- **Snap4City is interoperable with**
 - ESRI ArcGIS Enterprise, Portal, Pro/MAP, ...
 - other GIS tools supporting WFS, WMS, GeoJSON, GML
- **Snap4City is interoperable since:**
 - **Provides** info/data in WFS, WMS
 - **Exploits** data/info from WFS, WMS
 - **Import** data/info from WFS/WMS
- The Snap4City platform can be installed on premise using **Snap4City Appliance**
<https://www.snap4city.org/drupal/node/471>
 - **StartSNAP4CITYVM** includes the Dashboard Builder that is capable to work with WFS WMS protocols for the integration with GIS platforms as ESRI ArcGIS, QGIS, directly or using **Snap4City GIS player**.
 - **KBSSMVM** includes the Smart City API and WFS API which can be used to data harvest from any GIS servers and GIS desktop tool



TOP

API, and Federation of Smart Cities via API



Internal and External Smart City API

The screenshot shows the Swagger UI for the 'Advanced Smart City API'. The interface includes a sidebar with navigation options like 'External Services', 'Data Set Manager', and 'Development Tools'. The main content area displays the API title 'Advanced Smart City API' with version '4.0.0' and 'GA53'. Below the title, there is a 'Servers' section with a dropdown menu showing 'https://servicemap.disit.org/WebAppGrafo/api/v1'. The 'Services' section lists several endpoints:

- GET** / Service discovery and information
- GET** /events/ Event search
- GET** /location/ Address and geometry search by GPS
- GET** /tpl/agencies/ Agency list
- GET** /tpl/bus-lines/ (Bus) Lines list
- GET** /tpl/bus-routes/ (Bus) Routes list

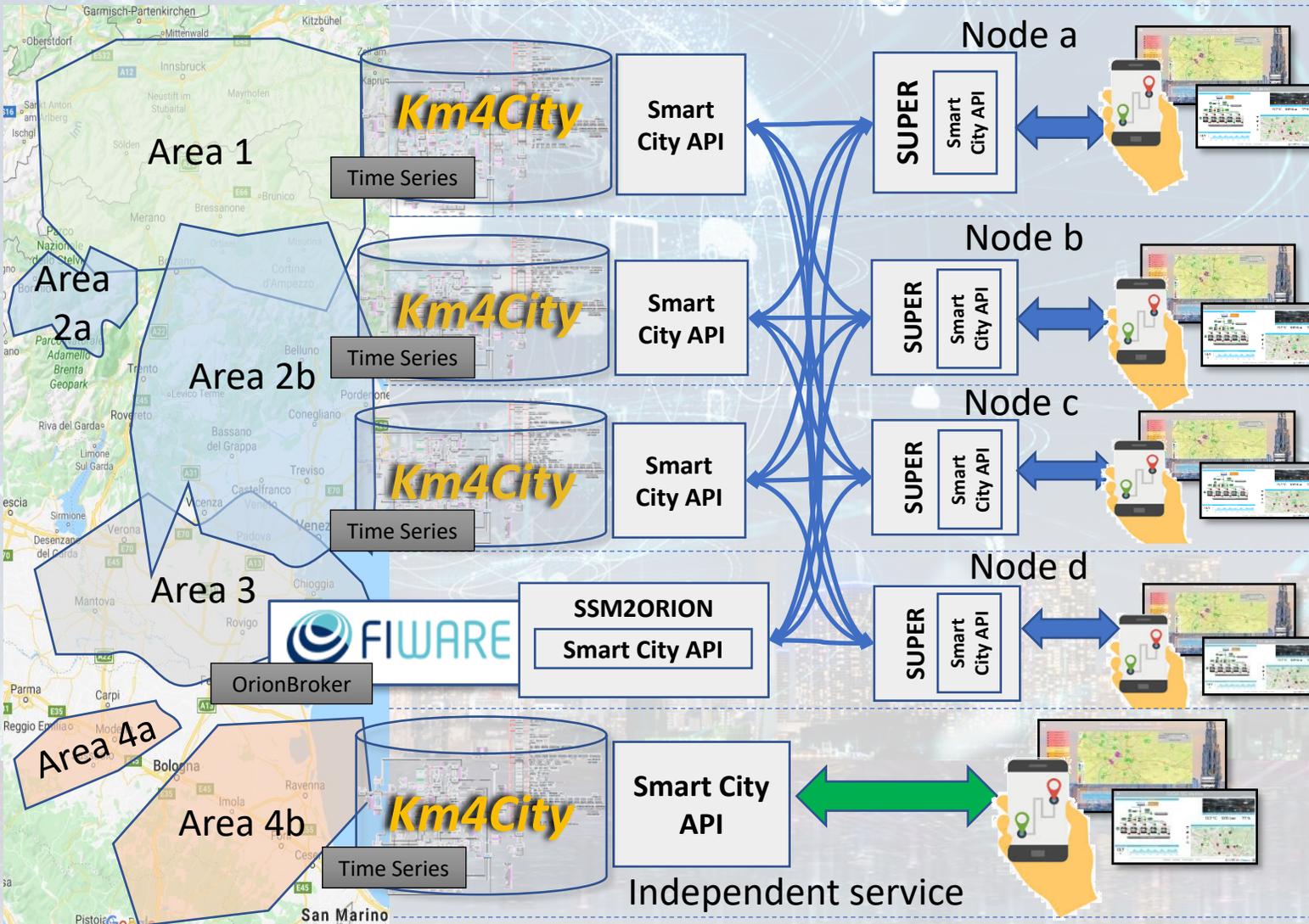
The screenshot shows the Swagger UI for the 'Internal API Docs'. The interface includes a sidebar with navigation options like 'External Services', 'Data Set Manager', and 'Development Tools'. The main content area displays the API title 'Internal API Docs: Swagger'. Below the title, there is a 'Servers' section with a dropdown menu showing 'https://servicemap.disit.org/WebAppGrafo/api/v1'. The 'Services' section lists several endpoints:

- GET** /iot-device-registration/ IoT device registration API
- GET** /notificator/ Notificator API
- GET** /disces-scheduler/ DISCES scheduler API
- GET** /resource-manager/ Resource Manager API
- GET** /sensors/ Sensors API
- GET** /event-logger/ Event Logger API
- GET** /ownership/ Ownership API
- GET** /data-manager/ Data Manager API
- GET** /device-broker-value-mgmt/ Device, Broker and Value Mgmt API
- GET** /snap4city-application/ Snap4City Application API
- GET** /engager/ Engager API
- GET** /wallet/ Wallet API
- GET** /user-profiler/ User Profiler API
- GET** /my-kpi/ My KPI API
- GET** /snap-vs-openmaint/ Snap vs Openmaint API
- GET** /device-groups/ Device Groups API
- GET** /sci-hub-processing/ Sci-Hub Processing API

<https://www.km4city.org/swagger/external/index.html>

<https://www.km4city.org/swagger/internal/index.html>

Federation of Smart City Services



- **Km4City Semantic Reasoner**
- **ServiceMap interoperability**
- **Seamless for multiple Mobile Apps**
- **Smart City API**
- **Super:**
 - distributed access and sharing services
 - Each city control its own data
 - Final user can pass from one city / area to another in seamless manner: without changing the mobile Apps

Federated ServiceMap and Smart City API

To improve scalability, fault tolerance and federation among cities:

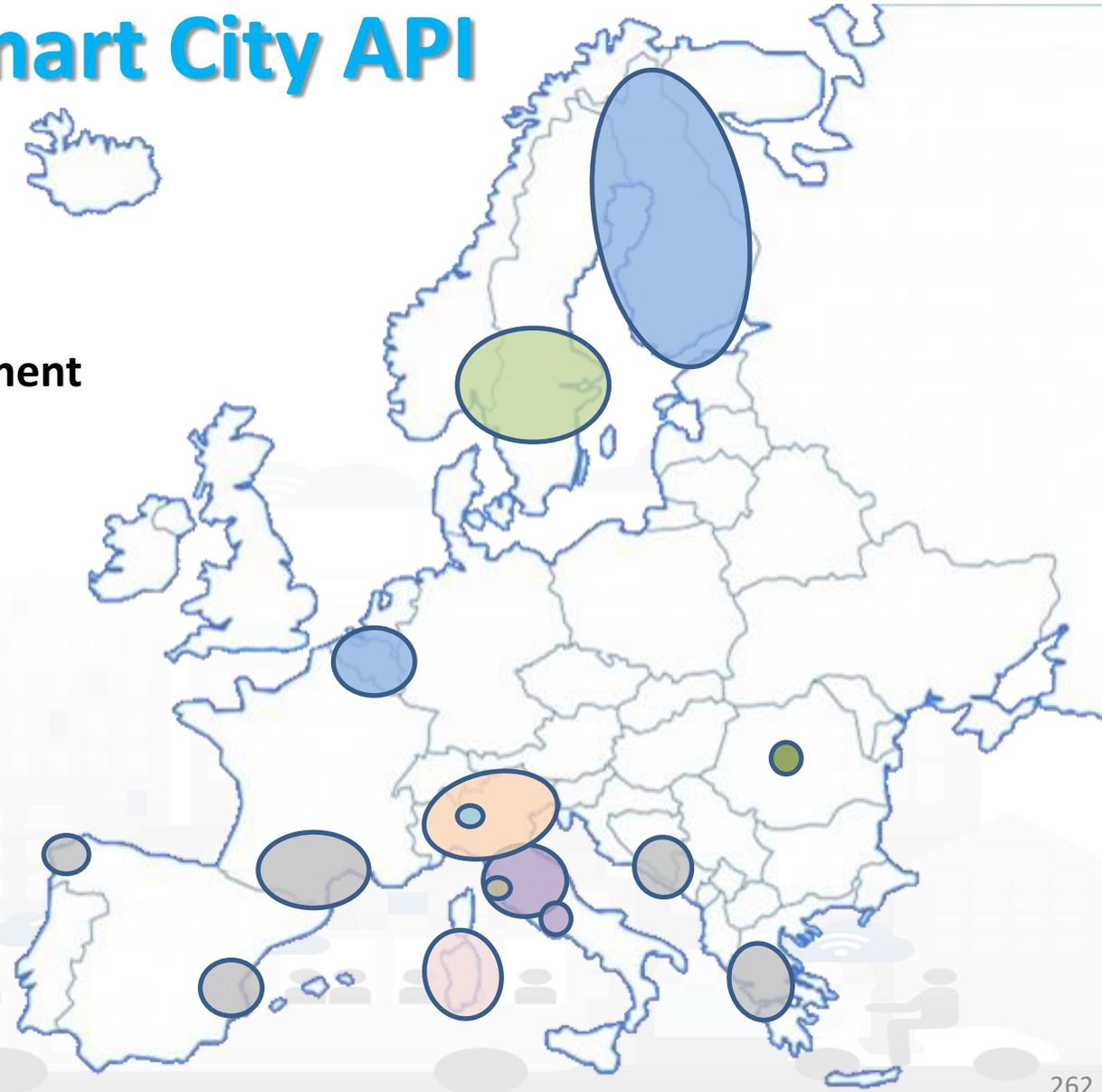
- One entry point Smart City API for all zones
- Multiple Knowledge base See performance assessment

At different levels:

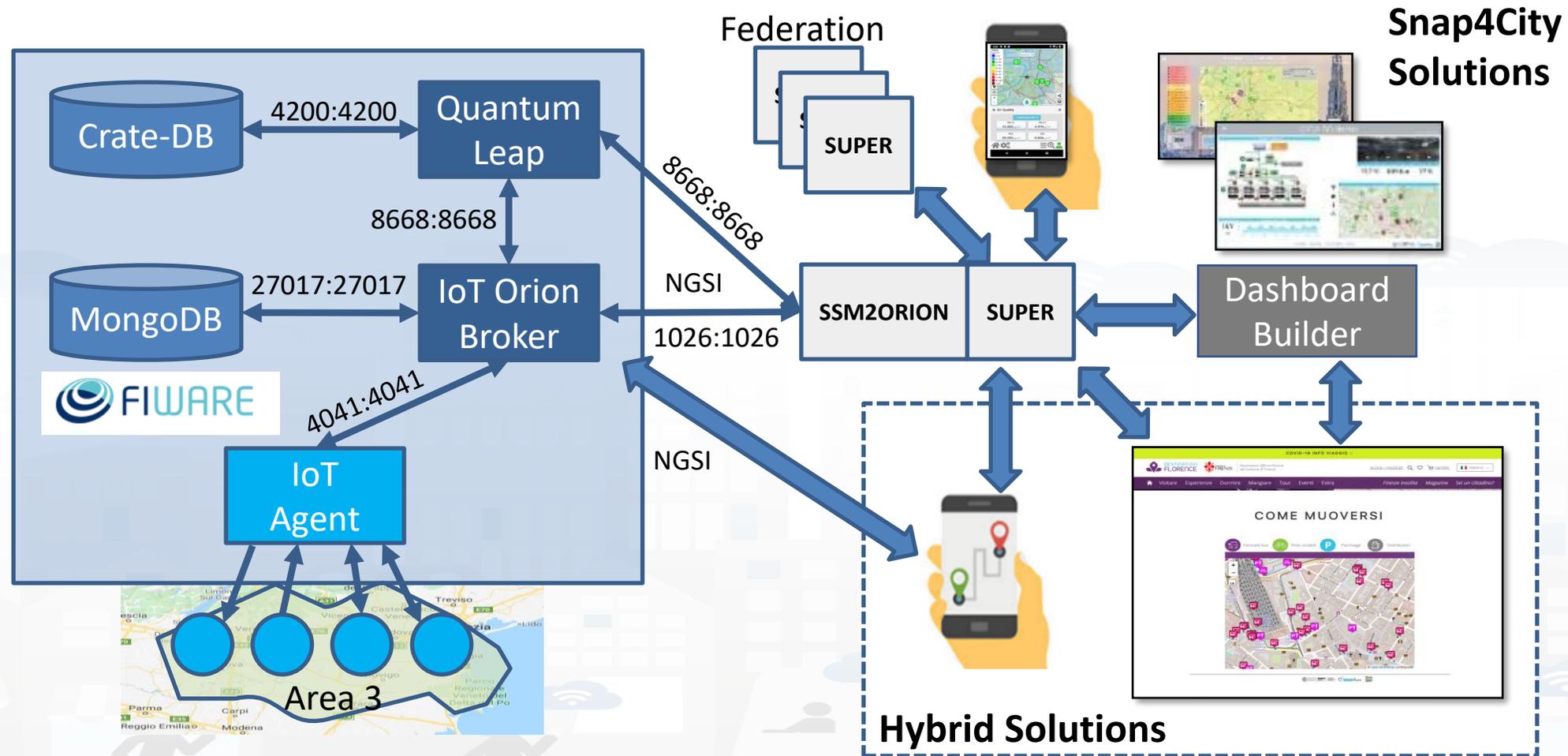
- Among cities/regions
- Among data providers, Operators

By Means of:

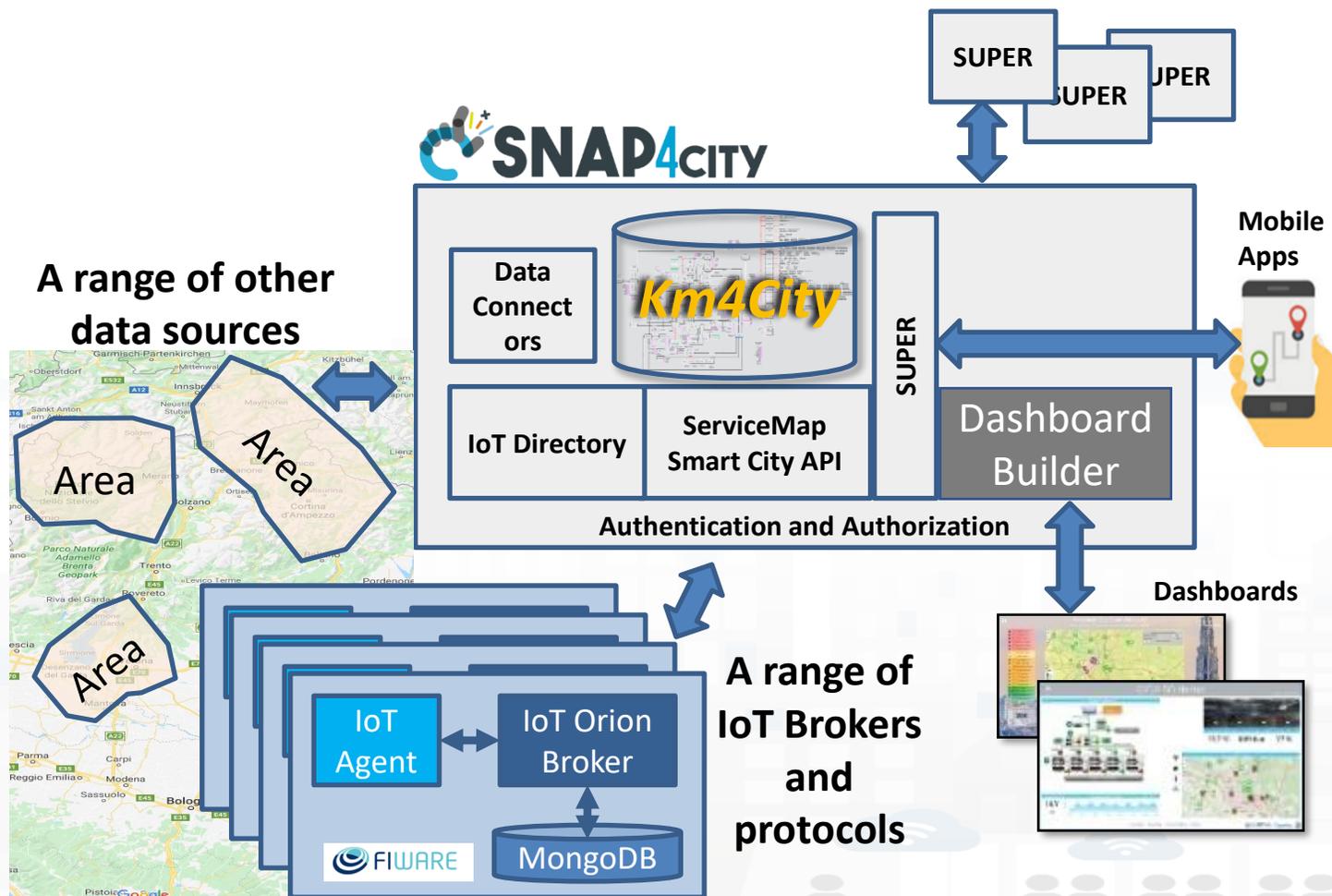
- Smart City API → Apps
- Smart City Ontology
- Dashboards/data analytics
- Organization independent
- CKAN via harvesting



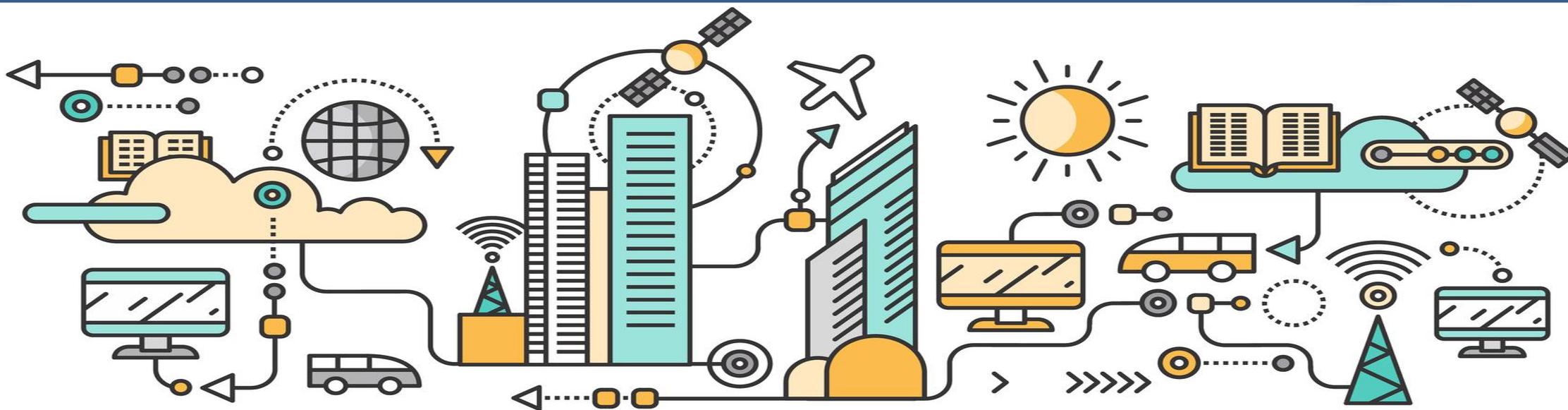
Federation of Snap4City vs IOT ORION Broker



Snap4City IoT Registration and Access



Linked Open Data

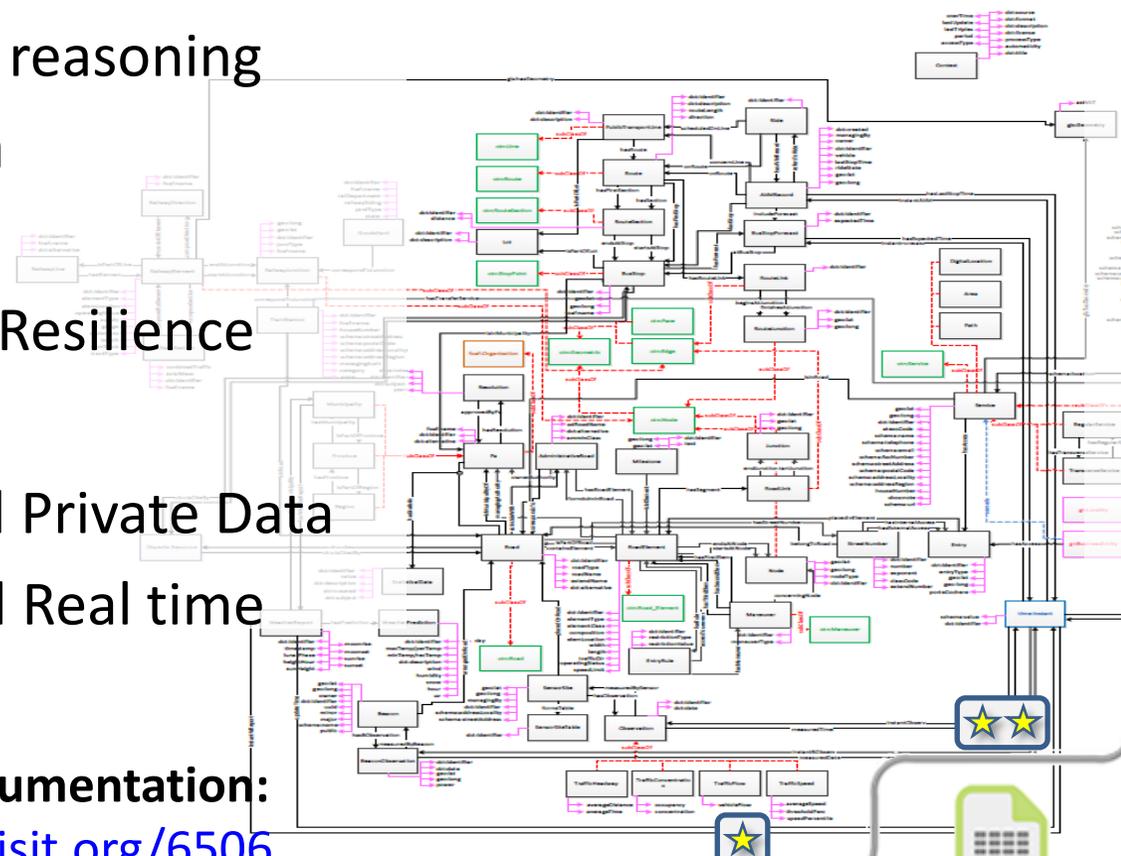


Km4City: Knowledge Base



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

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



Big Data Tools



LOD and reasoners



Schema: <http://www.disit.org/km4city/schema>
RDF version: <http://www.disit.org/km4city.rdf>



OPEN DATA





Smart-city Ontology km4city

License Free
1.6.7

Linked Open Data

<https://www.snap4city.org/19>

Views of the Knowledge Base

Knowledge Base
Semantic Reasoners

- How pass from ServiceMap to Linked Open Graph, Linket Data view tool

Linked Open Graph

LOG: <https://log.disit.org>

Linked Open Graph

SiiMobility (by DISIT)

Examples:

- VIA GIACOMO MATTEOTTI
- Bagno a ripoli
- Florence

Choose a class:

Search for keyword

keyword:

uri: Request

Your data

sparql endpoint: (optional)

uri: Request

Status

Requests:

Remove Clear

Type of relations

Select all Deselect all Invert Hide all inverse

- belongTo
- contains
- ends
- has
- hasExternalAccess
- hasProvince
- hasStreetNumber
- isIn
- isPartOfProvince
- managingAuthority
- placedIn
- seeAlso
- coincideWith
- depiction
- forming
- hasAccess
- hasMunicipality
- hasRule
- inMunicipalityOf
- isPartOf
- isPartOfRegion
- ownerAuthority
- sameAs
- starts

Linked Open Graph

more 5 hasProvince
Entities: 16
Relations: 32

TOSCANA

hasProvince

isPartOfRegion

PISTOIA

FIRENZE

hasMunicipality...

ownerAuthority

managingAuthori...

isPartOfProvinc...

FIRENZE

managingAuthori...

type

coincideWith

isIn

type

hasStreetNumber

RT04801702380TO...

inMunicipalityO...

type

belongTo

type

MUSEO_SALVATORE...

hasExternalAcce...

type

RT048017017682A...

hasAccess

placedIn

RT048017223494ES...

type

placedIn

RT04801708991ES...

RT04801724784ES...

RT04801724785ES...

forming

hasRule

managingAuthori...

museo ferragamo

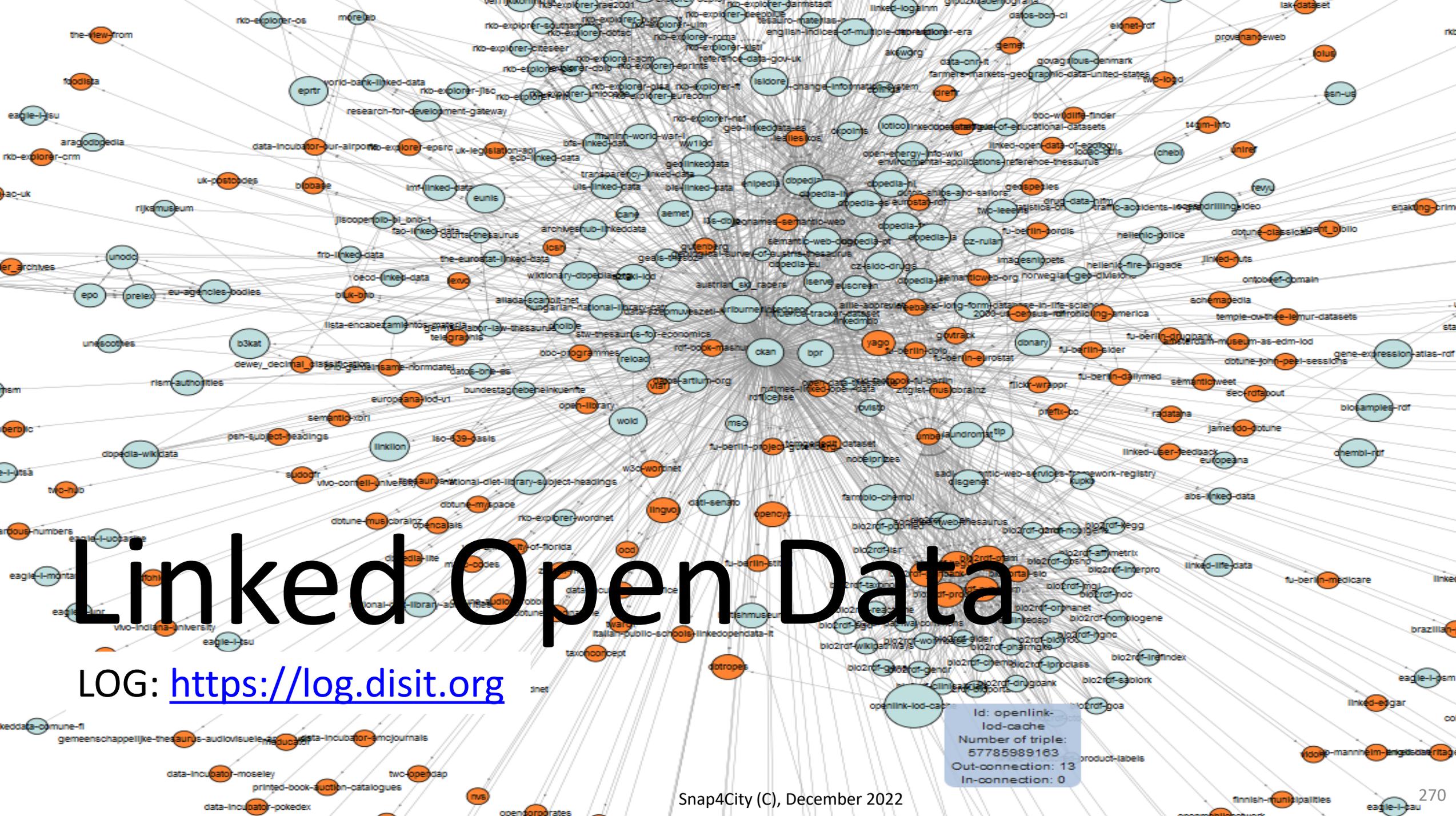
DESCRIPTION

Relations of Museo Ferragamo with the road graph

Schema: <http://www.disit.org/km4city/schema>

RDF version: <http://www.disit.org/km4city.rdf>

269



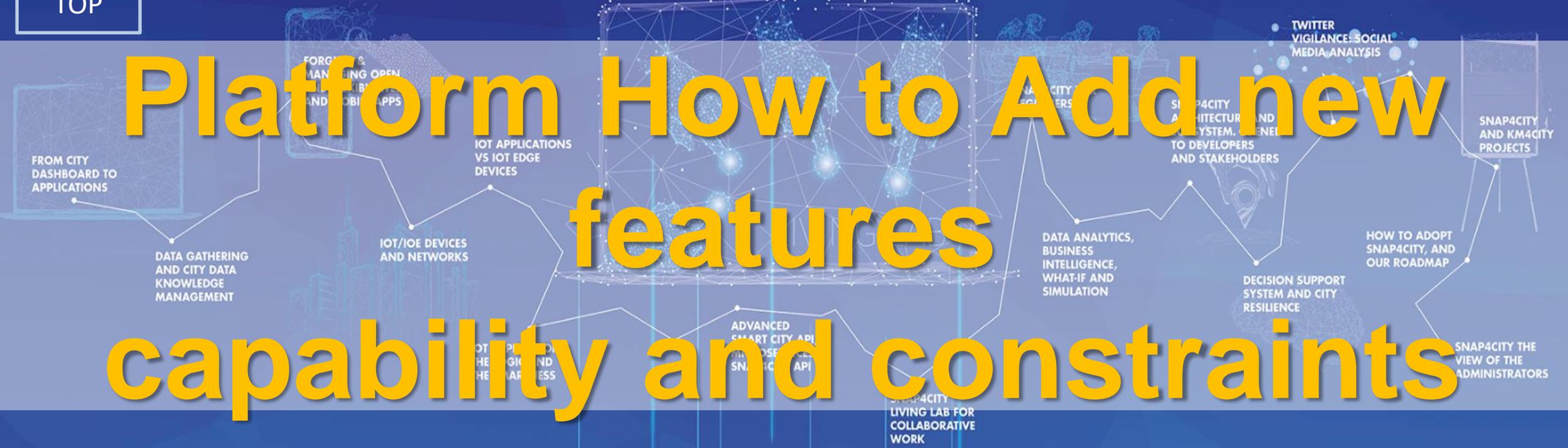
Linked Open Data

LOG: <https://log.disit.org>

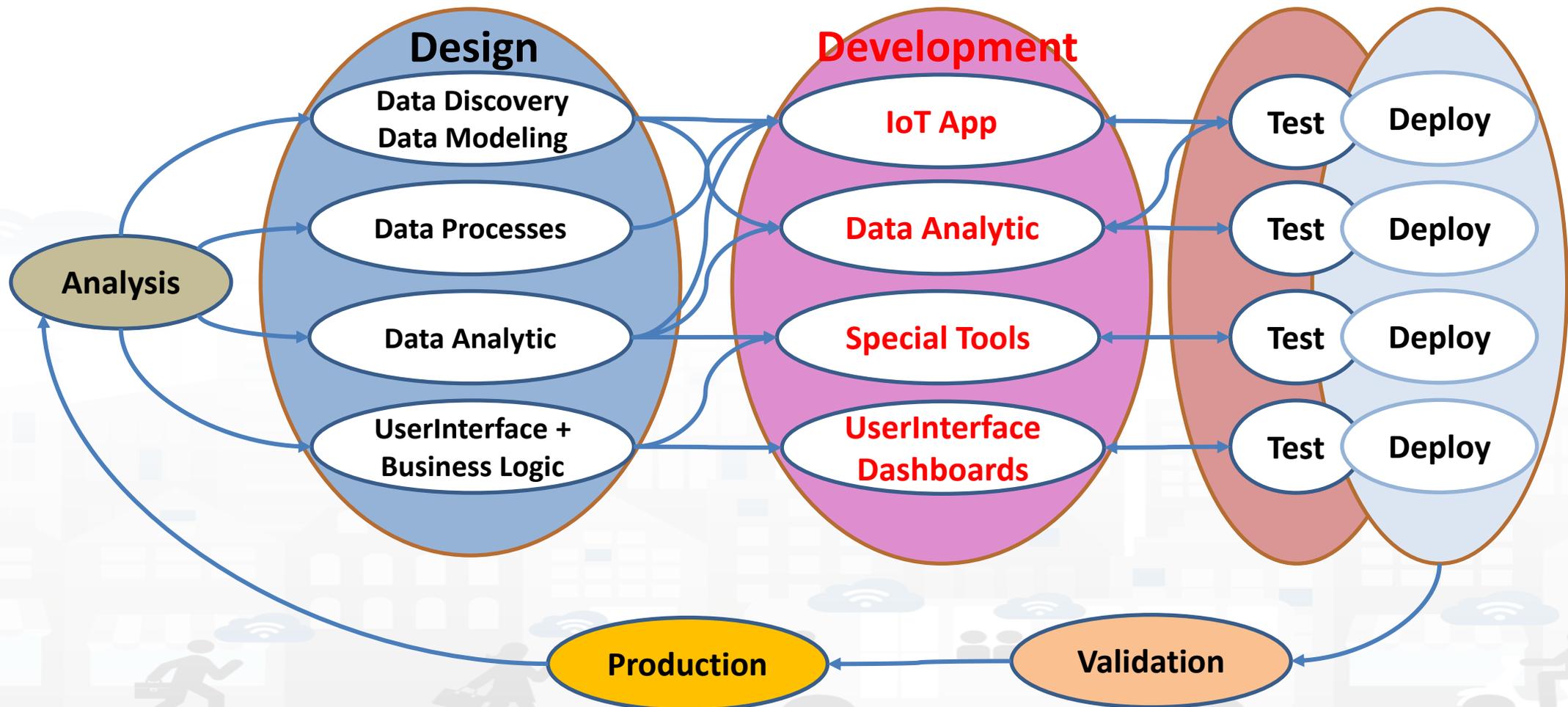
Id: openlink-lod-cache
Number of triple:
57785989163
Out-connection: 13
In-connection: 0

TOP

Platform How to Add new features capability and constraints



Development Life Cycle Smart Solutions



Adding new Features

- **Dashboard Features** --> Custom Widgets, Widgets
- **Connectors, adapters, IoT protocols, data transformations, etc.** --> by creating new MicroServices, new flows or new IoT Apps ...
- **Applications, Modules** --> for management, for verticals, in the core by using
- **IoT Devices** --> for collecting new data kind or acting on the field
- **Processes** --> Data Analytic of any kind, also exploiting machine learning, gpu, etc.
- **Web and Mobile Apps** --> new end-users services
- **Dashboards**
- **IoT Applications**
- **Data ingestion process, integration, etc.**
- **External Services** to be exploited on Dashboards
- etc. etc.

Adding new Features

- **Dashboard Features** --> Custom Widgets, Widgets
 - they can be created by using the Custom Widget SVG approach
 - [TC1.22a: Create and configure a Snap4City SVG Custom Widget for real-time interaction](#)
 - [TC1.22b: Create and configure a Snap4City SVG Custom Widget for real-time interaction](#)
 - [Custom Widgets: Table explanation, as SVG](#)
 - [TC1.26: Use customised SVG pins in a map](#)
 - [TC9.19: Custom Widgets / Synoptics controlled by IOT Applications](#)
 - they can be created by developing new elements programming in PHP, JavaScript, Angular, D3, etc..
 - [Custom Synoptics and Widgets for Dashboards](#)
- **connectors, adapters, IoT protocols, data transformations, etc.** --> by creating new MicroServices, new flows or new IoT Apps ...
 - <https://www.snap4city.org/download/video/course/di/>
 - [HOW TO: Develop an IOT Application for Data Ingestion](#)
 - they have to be in Node.JS, JavaScript according to Node-RED
 - [Snap4City Supported Protocols, adding new protocols](#)
 - how to create a flow and nodes in Node-red: <https://nodered.org/docs/creating-nodes/first-node>
 - They can be automatically created from API rest call
 - [TC2.25. Registering external MicroService calling RestCall services, using it on IOT applications](#)
 - business logic behind a dashboard
 - [TC9.19: Custom Widgets / Synoptics controlled by IOT Applications](#)

<https://www.snap4city.org/692>

Adding new Features

- **Applications, Modules** --> for management, for verticals, in the core by using
 - any language you prefer, preferably exposing API for integration with other modules
 - <https://www.km4city.org/swagger/external/index.html>
 - <https://www.km4city.org/swagger/internal/index.html>
 - See Tutorial on how to transform any REST API in a MicroService
 - [TC2.25. Registering external MicroService calling RestCall services, using it on IOT applications](#)
- **IoT Devices** --> for collecting new data kind or acting on the field
 - [HOW TO: add a device to the Platform](#)
 - [HOW TO: Manage IOT Network Components on Snap4City](#)
 - you can add to the platform any kind of IoT Device, with any kind of IoT Protocol
 - You can exploit the open source for Android and raspberry for creating your safely connected IoT device with Snap4City using NGSI V1, V2 and exploiting our secure communication approach

Adding new Features

<https://www.snap4city.org/692>

- **Processes --> Data Analytic** of any kind, also exploiting machine learning, gpu, etc.
 - see tutorial on Data Analytics
 - <https://www.snap4city.org/download/video/course/da/>
- **Web and Mobile Apps --> new end-users services**
 - <https://www.snap4city.org/download/video/course/app/>
- **Dashboards: Dashboard Builder and Kibana**
 - <https://www.snap4city.org/download/video/course/das/>
- **IoT Applications in Node-RED**
 - <https://www.snap4city.org/download/video/course/iot/>
- **data ingestion process, integration, etc.**
 - <https://www.snap4city.org/download/video/course/di/>
- **External Services to be exploited on Dashboards**
 - by simply registering their URLs on the portal
 - <https://www.snap4city.org/55>
- **Workflows:** via OpenMaint
 - [TC 1.24 – Integrated Ticketing and Facility Management system](#)
- **BIM models** via Bim Editor for IFC production → Bim Server
 - [HOW To: Manage BMP and BIM: main features of openMAINT, BMP, BIM](#)
- etc. etc.

<https://www.snap4city.org/692>

- **new version modules**
 - **to be integrated in the main version**, have to be tested and validated by DISIT Lab. They have to:
 - be in Affero GPL
 - do not affect the functionalities of other modules in negative manner
 - provide the needed quality, in terms of test cases, documentation, etc.
 - **If they are not part of the core**,
 - can be based on proprietary model, and exploit the Snap4City tools via APIs
 - no constraints
 - **but forked, they need to be published version on Internet and linked to main according to Affero GPL.**
- **Snap4City modules are mainly in Affero GPL**
 - platform rebranding is not allowed

Smart Solution IOT as a Service

- Snap4xxxx applications may exploit multiple paradigms as data driven, stream and batch processing, putting co-creation tools in the hands of:
 - **Smart Living Lab** users and developers a plethora of solutions to develop applications without vendor lock-in nor technology lock-in,
 - **final users** customizable / flexible mobile Apps and tools,
 - **city operators** and decision makers specialized / sophisticated city dashboards and IOT/IOE applications for city status monitoring, control and decision support. Open to Organizations
- Training and manuals: <https://www.snap4city.org/108>
- Help Desk: <https://www.snap4city.org/3>
- SLA: <https://www.snap4city.org/497>
- Terms of Use: <https://www.snap4city.org/drupal/legal>

Snap4xxxx as Smart Solution IOT as a Service for

- **Who would like to create** Living Labs as community exchanging experience with other cities as well;
- **Research Institutions, Departments and Projects** which would like to perform research and experiments in the area of Smart City and IOT, without the needs of setting up the infrastructure, exploiting open data, collaborating, accessing to Data Analysis on demands, etc. This is the spirit of **EOSC**, European Open Science Cloud Marketplace at which Snap4City is registered as DISIT Lab, see [\[EOSC\]](#).
- **Public Administrations**, as small cities that would like to offer smart services and does not have economic power to manage service on their premise from them self.

- <https://www.snap4city.org/drupal/contact>
- Bug Reporting
 - <https://docs.google.com/forms/d/e/1FAIpQLSfDQtKqgLllyycNXiazeYEh1SsRG1YL8Ze4ThD8nZoA5jsoXw/viewform>
- For Service Level Agreement see:
 - [Service Level Agreement](#)
- Help Desk and Contact:
 - <https://www.snap4city.org/3>
- Availability rates:
 - <https://www.snap4city.org/388>

Home / Contact us

Contact us

Your name *

Your e-mail address *

Subject *

Category *

Message *

Send yourself a copy.

Periodo di riferimento:	09 / 2019
Disponibilita' media:	99.91%
MTTR:	00G 00:10.00
MTBF:	04G 14:04.24
# down tot.	4
max(t_down):	00G 00:10.01

Providing consulting, customization, training, and developments

- Snap4City solution can be installed on premise and one cloud, private and public.
- **Snap4City (DISIT Lab and/or Snap4 SRL (INC.), or other companies as well), provide support, if needed, for design and/or Develop, set up:**
 - Training and tutoring;
 - Snap4xxxx infrastructures and architectures;
 - **data analytics**, that could be developed as proprietary solutions for the customer or as open source;
 - **data ingestion processes**, to enable them to have data into the platform;
 - **adaptor for some specific protocol or legacy/third part Tool**, that we prefer to release as open source, but if the connection is with some proprietary tool, the buyer could be interested to keep these solutions as private;
 - **IOT devices, full solutions, dashboards, specific dashboard widgets, etc.**

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7



Prev 1 2 3 ... 9 Next

Filter

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

● 2018-09-14T04:44

IOT Edge App

owner: badii

● 2018-09-21T03:19

IOT Edge App

owner: panesi

● 2018-10-19T16:07

IOT Edge App

owner: pb3

● 2018-10-19T17:17

IOT Edge App

owner: pb3

● 2018-10-22T11:57

IOT Edge App

owner: semolarudy

● application

IOT Application

owner: tester5

● Bib APP

IOT Application

owner: semolarudy

● ChargingStations

IOT Application

owner: comunedashres

● Deprecated - SiIMobilityControlRoom

IOT Application

owner: badii

● SamsungGalaxyS4Barcode

IOT Edge App

owner: badii

● esercitazione

IOT Application

owner: tester2

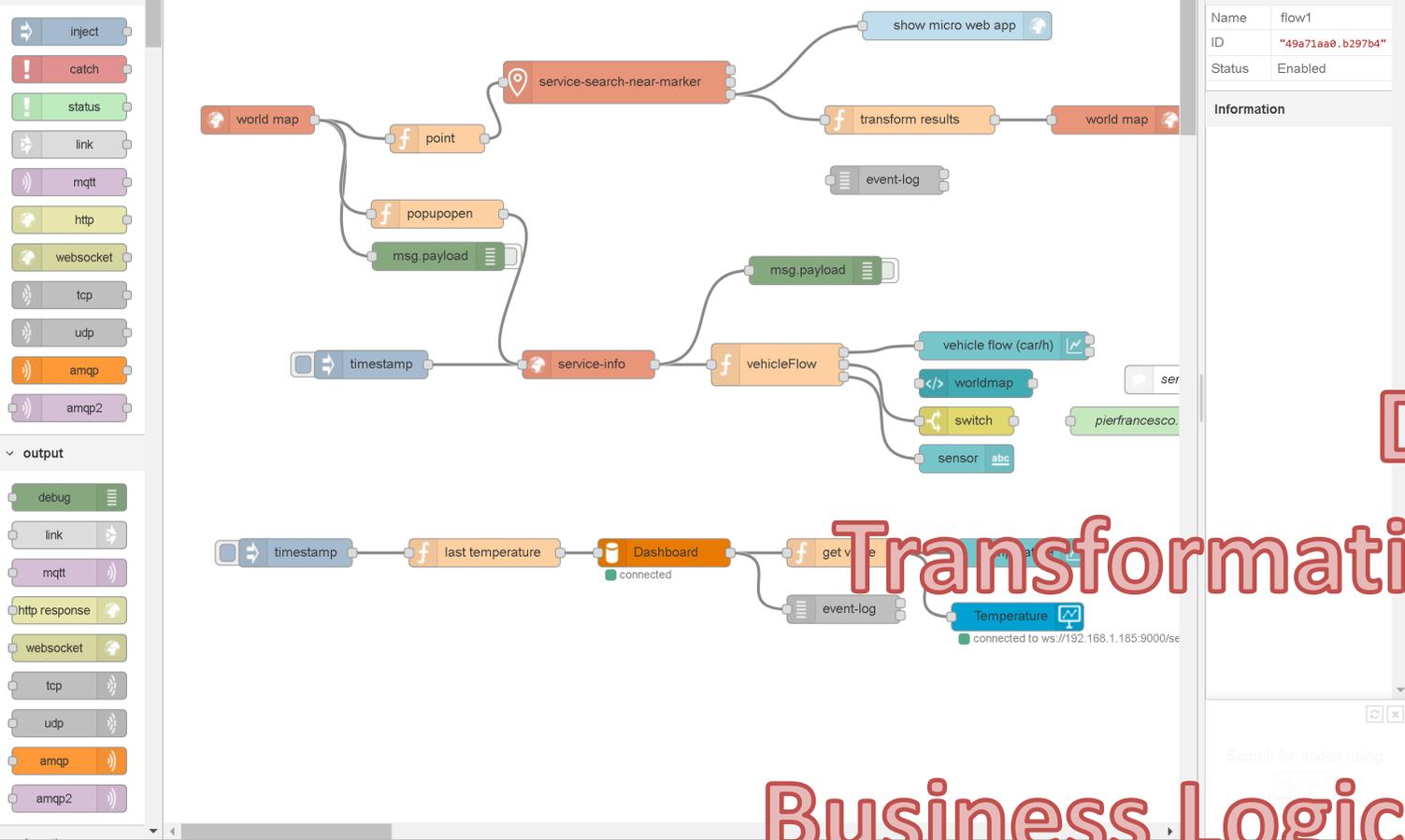
● Iot-App

IOT Application

owner: tester14

roottooladmin1
RootAdmin | ldap

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



S

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

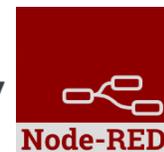
IoT Applications

- **Data ingestion:** more than 70 protocols IOT and Industry 4.0, web Scraping, external services, any protocol database, etc.
- **Data access:** save/retrieve data, query search on expert system, georeverse solution, search on expert system Km4City ontology, etc.
- **Data Transformation/transcoding:** binary, hexadecimal, XML, JSON, String, any format
- **Integration:** CKAN, Web Scraping, FTP, Copernicus satellite, Twitter Vigilance, Workflow OpenMaint, Digital Twin BIMServer, any external service REST Call, etc.
- **Manipulation of complex data:** heatmaps, scenarios, typical time trend, multi series, calendar, maps, etc.
- **Access to Smart City Entities and exploitation of Smart City Services:** transport, parking, POI, KPI, personal data, scenarios, etc.
- **Data Analytic:** managing Python native, calling and scheduling Python/Rstudio containers as snap4city microservices (predictions, anomaly detection, statistics, etc.)
- **User interaction on Dashboard:** get data and message from the user interface, providing messages to the user (form, buttons, switches, animations, selector, maps, etc.)
- **Custom Widgets:** SVG, synoptics, animations, dynamic pins on maps, etc
- **Event management:** Telegram, Twitter, Facebook, SMS, WhatsApp, CAP, etc.
- **Hardware Specific Devices:** Raspberry Pi, Android, Philips, video wall management, etc.



Sept 2022 collection

Two Snap4City Libraries



- > common
- > function
- > network
- > input
- > output
- > sequence
- > parser
- > storage
- > social
- > advanced
- > Advanced FTP
- > location
- > NGSi
- > Iwm2m
- > S4C SearchDev
- > S4C Utility
- > S4C Mapping
- > S4C Management
- > S4C DataAnalytic
- > S4C BigData
- > S4C IoTApp
- > S4C OpenMaint
- > S4C IoT
- > S4C Whatif
- > S4C Search
- > S4C Data
- > S4C KPiData
- > S4C Dashboard
- > S4C Sigfox
- > S4C LogDev
- > S4C View
- > S4C Social
- > dashboard
- > time

S4C SearchDev

- service search
- service search near gps position
- service search near service
- service search within gps area
- service search within wkt area
- service search within stored wkt area
- service search by municipality
- service search by queryid
- full text search dev
- full text search within wkt area

full text search within gps area

full text search near gps position

full text search exp

event search dev

event search exp

event search within wkt area

event search within gps area

event search near gps position

address search near gps position

geometry search near gps position

address poi search by text

address poi search by text exp

address poi search by text near gps position

bus routes search

bus routes search near gps position

bus routes search within gps area

bus routes search within wkt area

bus routes

tpl routes

tpl stops

S4C Utility

- service info dev
- distance from coordinates

point within polygon

routing

heatmap picker

coordinates to address

service info

edge-tunnel-to-cloud

S4C Mapping

- service info mapped
- mapping
- set mapping

get job detail

get triggers of job

get job group names

get trigger group names

get paused trigger groups

get job fire times

get system status

trigger job

pause all

pause trigger

pause triggers

resume all

resume job

resume jobs

resume trigger

resume triggers

notifier history events

S4C DataAnalytic

- descriptive statistics
- trend plot
- time series predictions
- machine learning predictions
- anomaly detection
- plumber data analytic
- python data analytic

S4C Search

- service search near marker
- service search within circle
- service search within polygon
- service search along path
- full text search within circle
- full text search within polygon
- full text search along path
- full text search usr
- event search near marker
- geometry search near marker
- address poi search by text usr
- address poi search by text near marker
- address poi search by text within circle
- bus routes search near marker
- bus routes search within circle
- bus routes search within polygon
- tpl agencies
- tpl lines

event search within polygon

event search along path

event search usr

address search near marker

geometry search near marker

address poi search by text usr

address poi search by text near marker

address poi search by text within circle

bus routes search near marker

bus routes search within circle

bus routes search within polygon

tpl agencies

tpl lines

tpl routes by agency

tpl routes by line

tpl stops by route

tpl stop timeline

recommendatio within circle

value type search near marker

value type search within circle

value type search within polygon

value type search along path

S4C Data

- get my data
- get my delegator
- get my delegated
- get my activity

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



-Search and management of Services, POI, Parking, Public Transport, etc.

-Event management, ticket management

-Routing, Data Analytic, Open Data processing

-IOT adaptation, network management

-Dashboard management

-Personal data management, KPI, etc.

Registering Alerting events



Alerting Generation

This dashboard contains data derived from actual sensors and predictive values under validation

Sat 16 Jan 01:03:27

- ▲ Air Quality Sensors
- ▲ Weather Sensors
- ▲ PM10 Heatmap
- ▲ PM2.5 Heatmap
- ▲ CO Heatmap
- ▲ CO2 Heatmap
- ▲ NO2 Heatmap
- ▲ Europ. AQI Heatmap
- ▲ Air Humidity Heatmap
- ▲ Air Temp. Heatmap
- ▲ Cral Pred. HM NOX (3m)
- ▲ Traffic Sensors
- ▲ Traffic Flow
- ▲ Traffic Bubble
- ▲ Cycling Paths
- ▲ Accident Heatmap
- ▲ Scenarios
- ▲ What-if analysis
- ▲ Area Alerts

Firenze Oggi

Air Temperat... [7m]

5.9

GRALheatmap

Heatmap Controls: Max Opacity: 0.53

24H

2021-01-16 01:00:00

Next >

RED

15/01/2021 - 14:27:27

TICKET NUMBER: 1610717247691

OPERATOR: PAOLO DISIT

Incident Kind

RIVER FLOODING

Severity

RELEVANT

People Involved

<=10

Short Term Impact

PEOPLE DISEASE

Long Term Impact

POLLUTANT

Clean

Register Alert

Alarm Description

Kind: River Flooding

Severity: Relevant

#People: 10

Impact 1: People Disease

Impact 2: Pollutant

GPS: 43.776114;11.210861

City: FIRENZE

Adr: VIA ADRIANO CECIONI N.undefined

Registered:Green:1610755283309

Alert Events

16/01/2021 01:03:23

TICKET	OPERATOR
1610755283309	PAOLO DISIT
15/01/2021 14:30:28	
1610717428876	PAOLO DISIT
15/01/2021 14:27:27	
1610717247691	PAOLO DISIT
15/01/2021 14:23:22	
1610717002089	PAOLO DISIT
15/01/2021 14:06:37	

Closest WebCAM

Sat 16 Jan 01:15:33

Start of conversation

January 14, 2021

- R 2:52 PM User rootooladmin1 added by RocketChatDisitUserAdmin.
- R 2:52 PM rootooladmin1 was set owner by RocketChatDisitUserAdmin
- R 2:52 PM Room announcement changed to: [Dashboard] (https://main.snap4city.org/view/index.php?iddasboard=MzA0OQ==) by RocketChatDisitUserAdmin
- R 2:52 PM User paolo disit added by RocketChatDisitUserAdmin.
- R 2:53 PM what you can do on 703
- P 2:54 PM Please go ahead
- R 2:56 PM Ok ack
- R 2:57 PM User nicolaroot added by RocketChatDisitUserAdmin.
- R 2:57 PM User gpaatoeol added by RocketChatDisitUserAdmin.

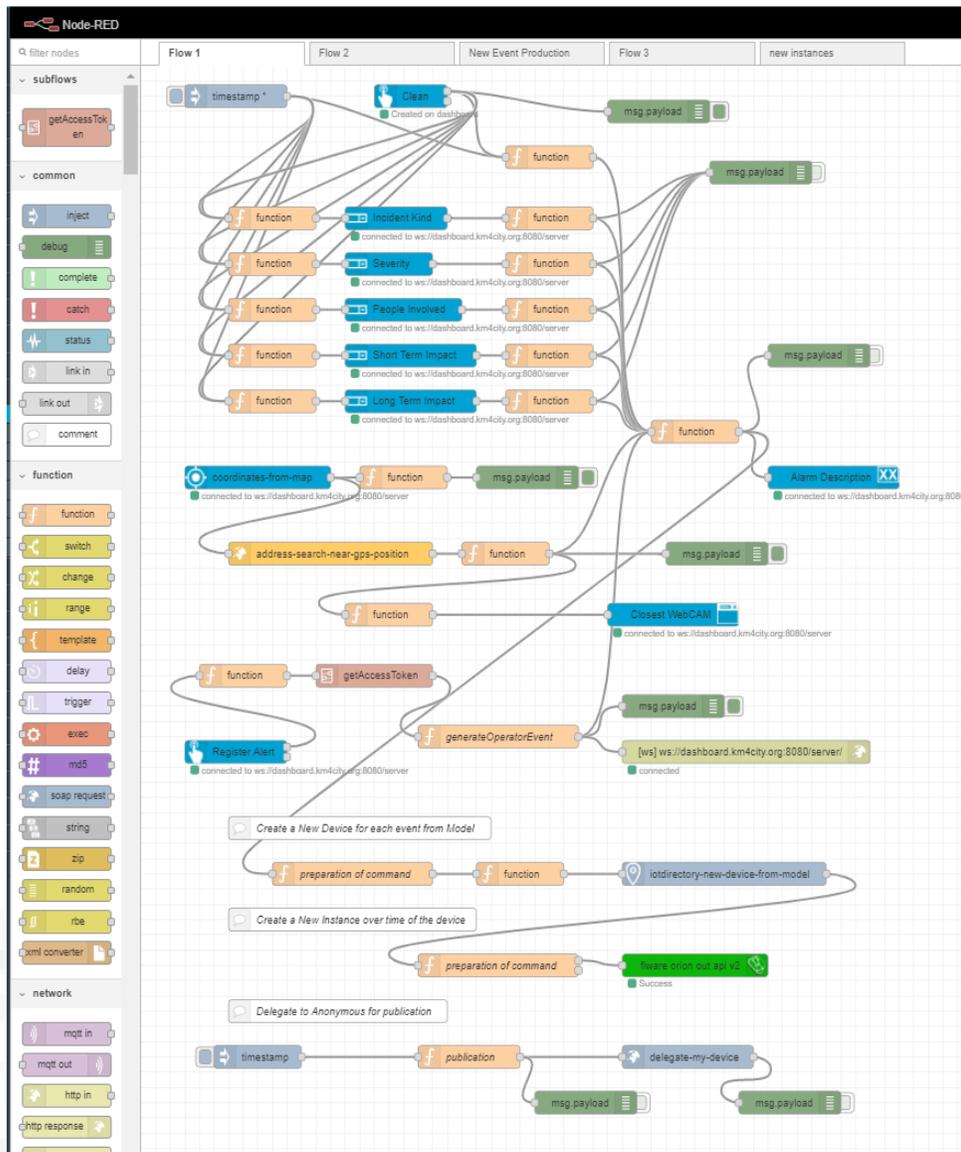
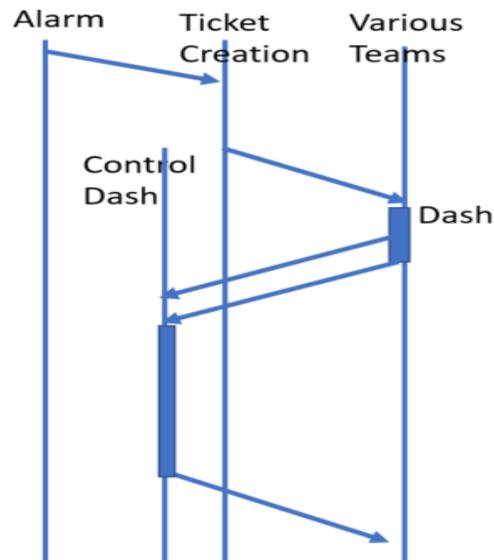
Message

Control Room Operator

- Monitor traffic flow, Environment, Car parking, Cycling, First aid, temp., ...
- Registering Events: classification
- Changing status
- Acting

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

Flow Mng



Change Alert Color Status

Refresh List of events

Active Events

Change Color

Alarm Description

```

    Ticket id: alert_1610717428876
    Last Color Code: Red
    Date Time: 2021-01-15T15:17:30.800Z
    Last data time: 2021-01-15T16:17:30.800+01:00
    Kind: Fire
    Severity: Low
    #People: 100
    Impact 1: Pollutant
    Impact 2: Noise
    GPS: 43.775494;11.222878
  
```

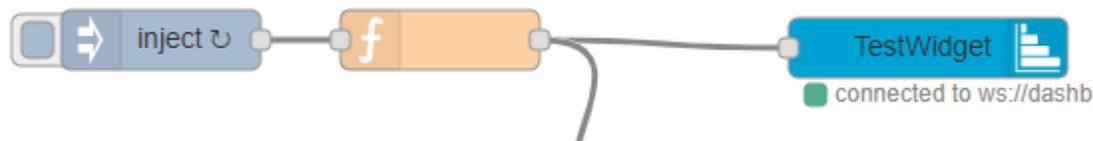
Florence: Events in the city

Social Events, Traffic Events and Critical Events

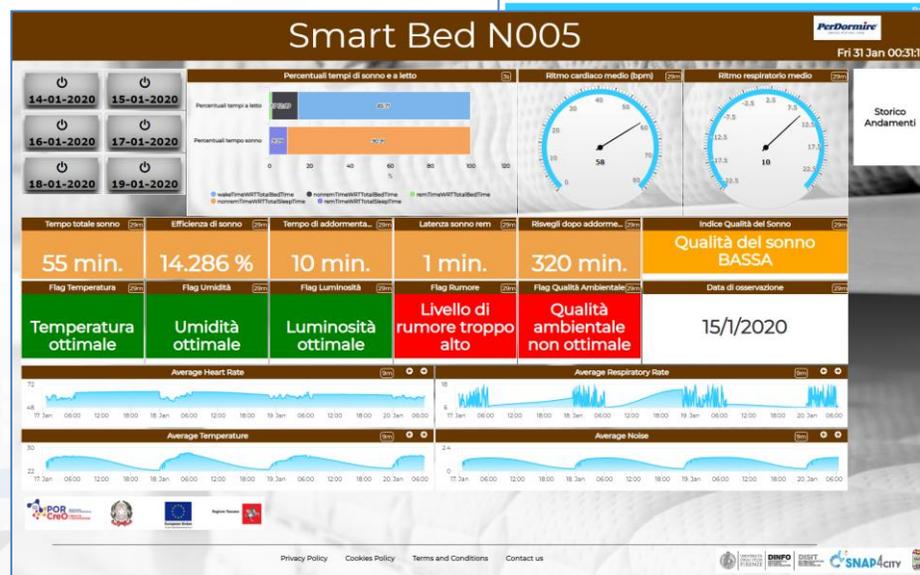
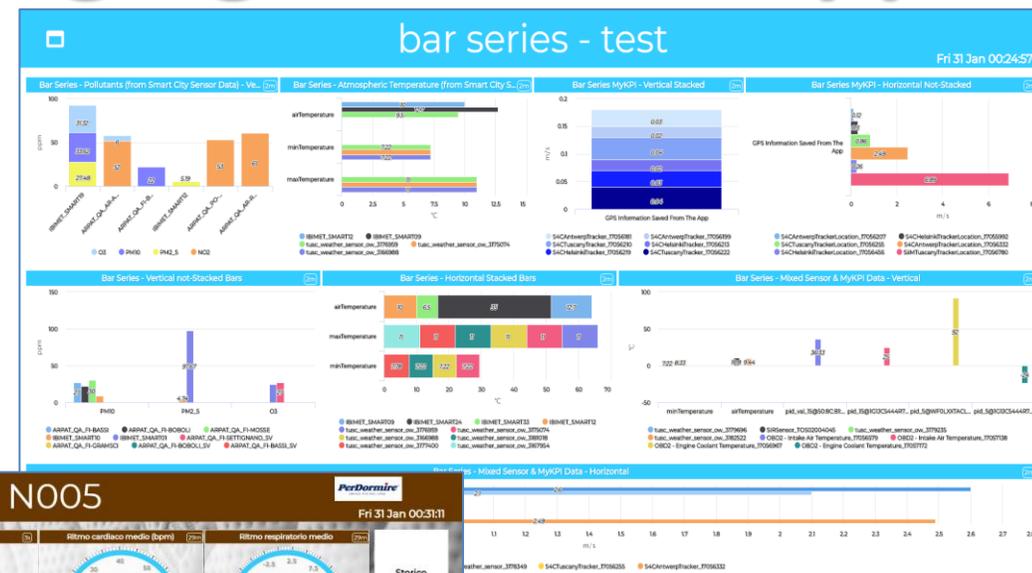
Sat 16 Jan 01:27:28

<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddashboard=MjM1Ng==>

Dynamic Dashboards: changing from IOT App

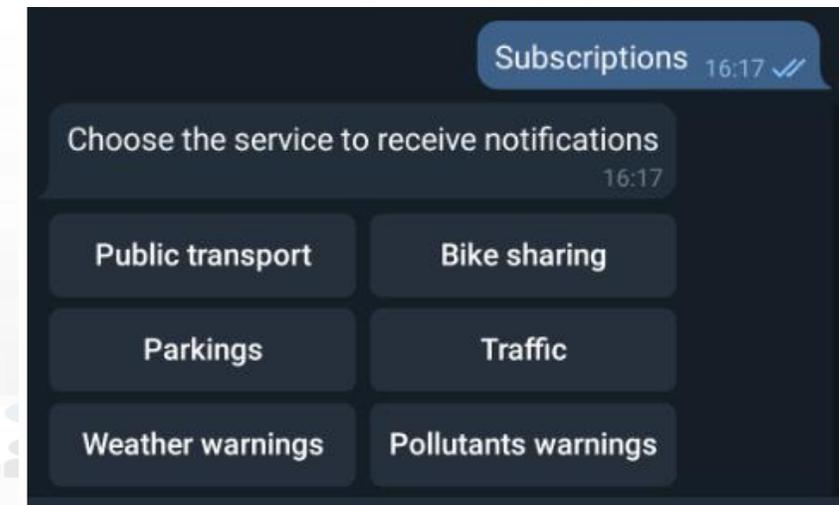
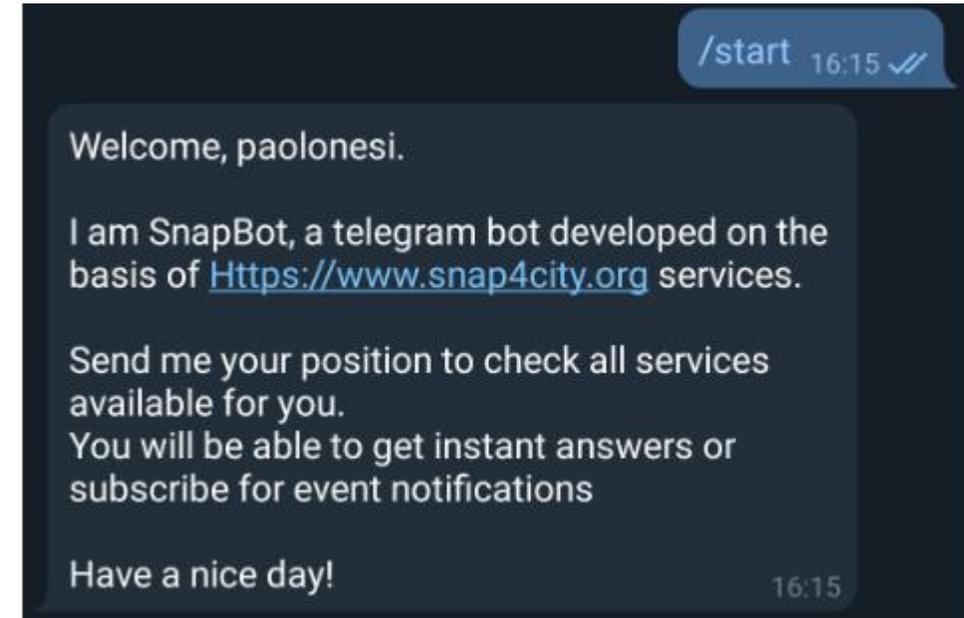
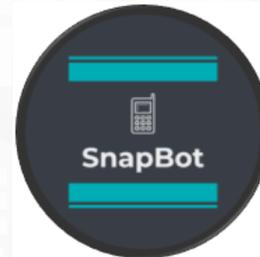


- Dynamic Creation of Widget Content: BarSeries, trends, maps, single content, etc.
- Temporary data pushed on Dashboards

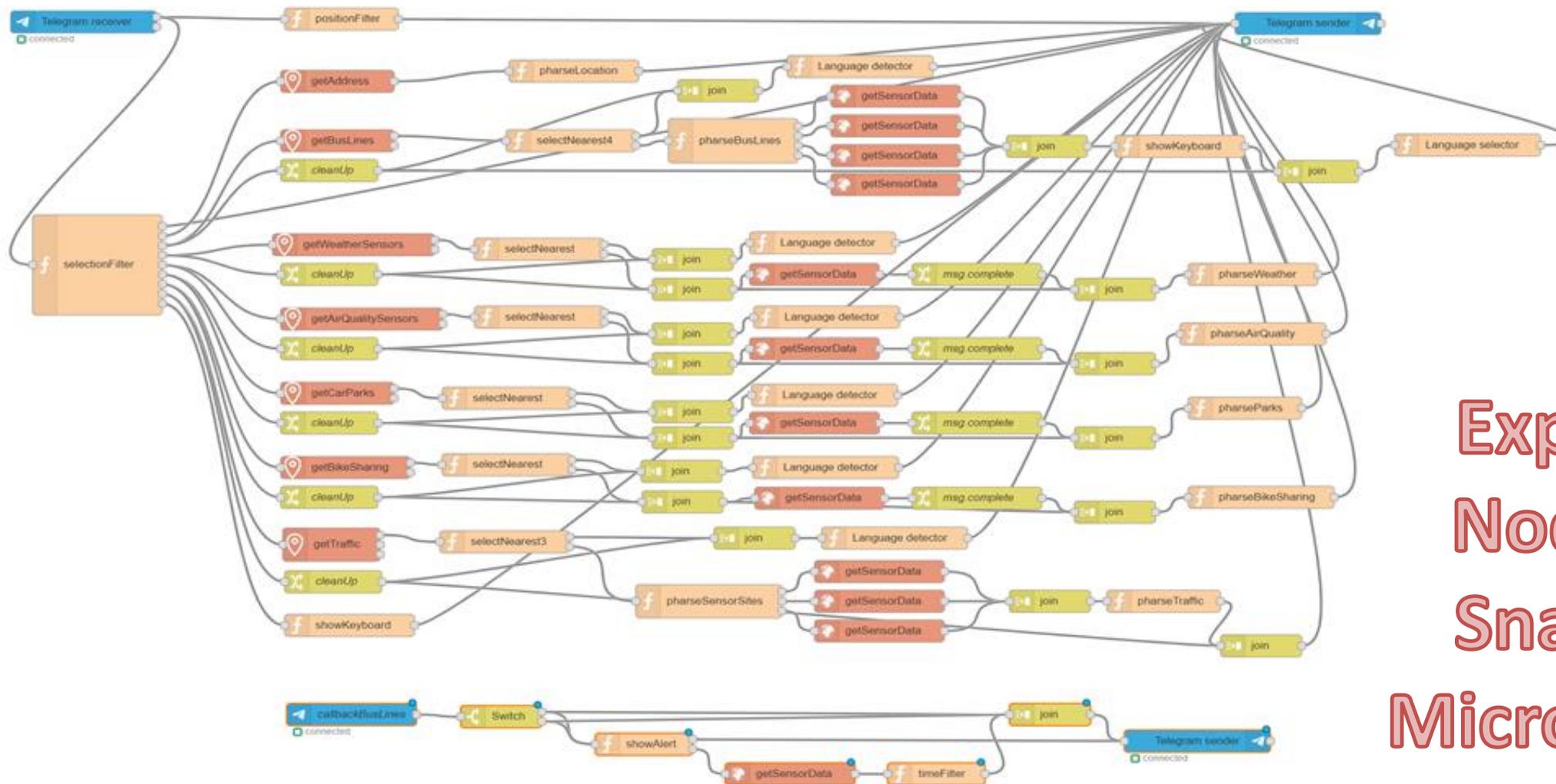




- provides real time smart city services to **Telegram** users, geolocalized, when you like, what you like
- active on Tuscany in all provinces and cities according to the data accessible on <https://www.snap4city.org>
- Services on
 - Public Transport (more than 10 different operators),
 - bike sharing, parking lots,
 - traffic flow, weather warnings,
 - Air quality, pollutant,
 - find your location, etc.



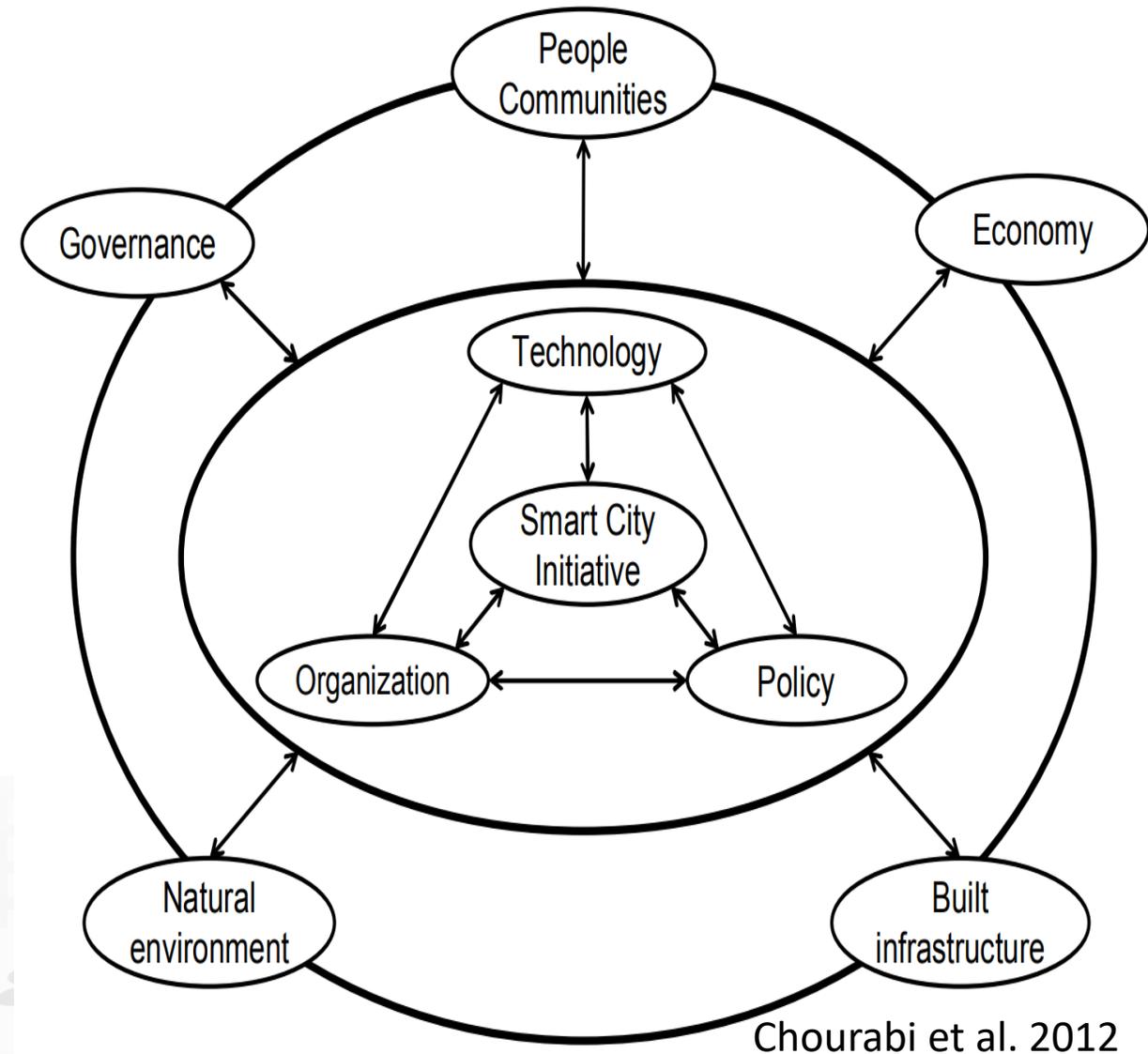
IOT App of SnapBot: OneShot Services



Exploiting
Node-RED
Snap4City
MicroServices

Smart City Process

- Many aspects should be taken into account for a successful Smart City transformation
- → *The influence of each of them depends on context, attitude of the institutions, internal structure, etc.*
 - *Parallel actions can conflict, compete ...*
 - *Spreading of efforts may distance the goals*
 - *.....*
- → *The process may become sustainable, harmonized and faster with a Living Lab Strategy and Support*



TOP

The Living Lab

Concepts and Organization



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



- **ENOLL:** <https://www.openlivinglabs.eu/>
 - [European Network of Living Labs](https://www.openlivinglabs.eu/)



- **EIP-SCC:** European Innovation Partnership on Smart Cities and Communities
 - <https://eu-smartcities.eu/>



- **Select4Cities:** Pre-Commercial Procurement Project to develop a data-driven, Internet-of-Everything (IoE) platform for large-scale urban co-creation
 - <https://www.select4cities.eu/>

SELECT

for Cities

CERTIFICATE OF ACHIEVEMENT

1° place award to

**UNIVERSITY OF FLORENCE -
DEPARTMENT OF
INFORMATION ENGINEERING**

for



SNAP4CITY

<https://www.snap4city.org/558>

for successfully completing the
SELECT for Cities PCP competition
19.11.2019



This project has received funding from the European
Union's Horizon 2020 research and innovation
programme under grant agreement No 688196

**DIGIPOLIS
FORUM VIRIUM HELSINKI
CITY OF COPENHAGEN**
Buyers Group



Requirements and Objectives

- Serve as a **City Dashboard, App User Interface**, etc.
 - Real time and historical data, any device, sensors and actuators
 - Sensors, KPI, maps, data trends, real time data, charts, etc.
 - Multi domain, smart city + industry 4.0 scenarios
- Referral / **historical data, and Open Data**:
 - shadow, access (API, storage, any protocol), production of OD, export
- **Data Driven Real Time communication & processing**:
 - IOT Applications, IOT edge, multiple operating systems, embedded systems, **MicroServices**
 - in/out data driven from/to the field into: applications, notifications, etc.
- **Data Analytics**: Machine Learning, statistics, reasoning, ...
- **Serve as Living Lab**: open innovation, co-working; collaborative work; sharing: data, processes, dashboard, experiences, solutions,
- Experimented on **large scale cases**

SELECT
for Cities



Non functional requirements

- **Open Source** based 100%
 - Open **Standard** for communication and API for In/Out
- **Interoperability**: protocols, internal API, Smart City API, ca , integrate with legacy conditions in place, modular, reusable,...
 - Open to proprietary protocols as well, any protocol, any format
- **Data driven**, for reading and data analytic
- **Scalable, Robust, Distributed** and Decoupled, modular, Service Oriented, open to external services and data sets, big data
- **Heterogeneous**: any device, private and public, custom and..
- **Security** by Design: HTTPS, TLS, ... compliant with EC
- **User Centric** Design: privacy by Design (and **GDPR**), personalized, personal data management, ...



Security/Privacy Requirements



- **Managing** private data together with public data
- **Private data management** according to GDPR
 - Browsing, downloading, controlling rights, delegating access, revoking accesses, etc.
 - Keep them safe
- Secure enough to delegate management of data regarding public security:
 - Data that could be used against us by some terrorist, or anyway by someone with some bad intention, for example to access in our home when we are far away, etc.

Aspects of the Living Labs

- **Living lab capabilities and supports**
 - Organizations are supported in the user management and persecuting their goals
 - Projects can be launched and targeted with groups, hackathons, tools, etc.
 - Individual (user interaction), are supported by tools and training material
- **Instruments of the Living Lab**
 - **Real-life context:** data and solutions to be taken as examples, from devices to IOT Applications, and Dashboards. A large set of **real scenarios described**
 - **Multi-stakeholder:** mainly apply to organizational, a community from where anybody can take advantage
 - **Multimethod:** the same results can be obtained by using multiple methods
 - **Active user co-creation:** the platform cansupports: collaborative work, supervising by the teachers, sharing and delegation.
 - **Secure:** it is GDPR compliant and passed PENTest and Vulnerability Test

Living Lab Flexibility

*Snap4City Satisfies all
Requirements of ENOLL
Select4Cities and EIP-SCC*

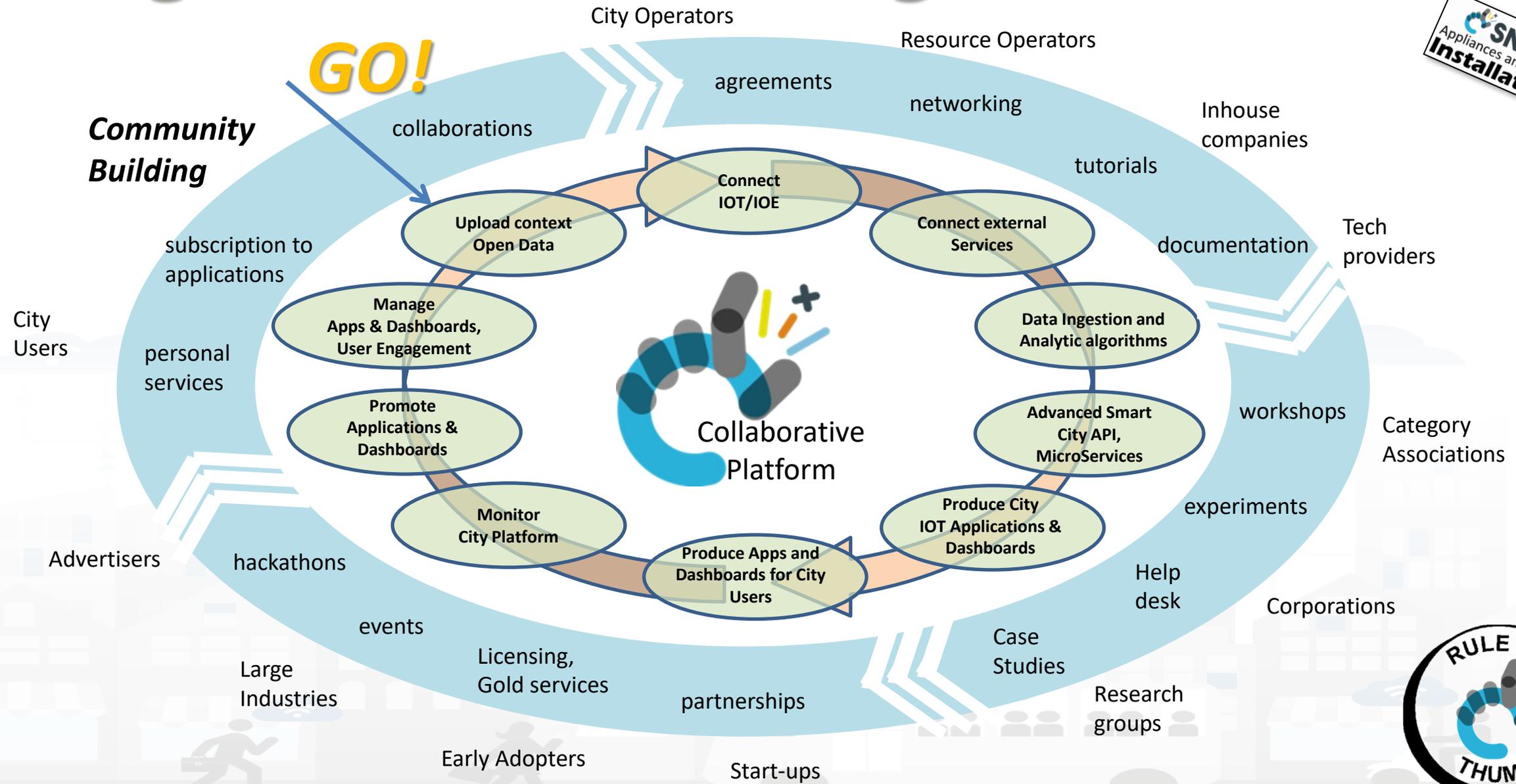
European
Network of
Living Labs

SELECT
for Cities



- **Multiple modalities to perform the same activities**
- **Tuned for Beginners and Skilled people**
- **Visual interface and programming tools**
- **Resources and artefacts sharing for learn acceleration and co-working**
- **Open Living and co-working Portal:**
<https://www.Snap4City.org>

Living Lab Accelerating



Engagement

- **Finding the right participants to the Living Lab**
 - Campaigns tailored to the right audience according to the role: testing, developers, requirements collections, etc.
 - Finding specific profiles via stakeholders
 - And/OR: Web based recruitments, App Based, etc.
 - Motivation to participate, eventual incentives
- **Inform/educate the Participants about the project:**
 - after and before testing/validations, etc.
- **Protect the Participants privacy**, ask to NDA and provide the NDA, GDPR compliant
- **Support:** during the project, SPOC, Help-Desk, web portal, logistic

TOP

The Living Lab *Snap4City Tools*

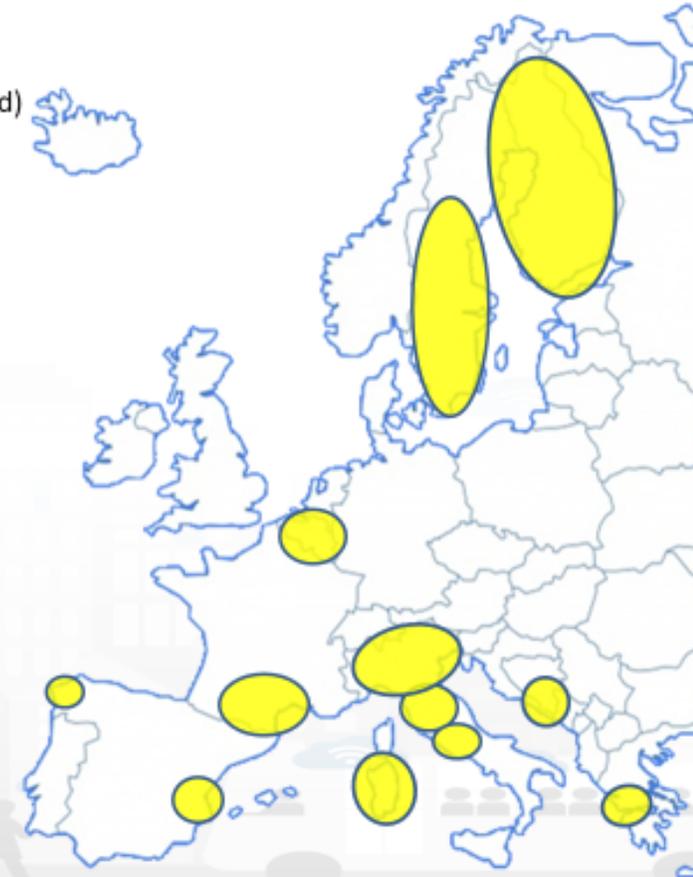


Snap4City/Industry Community

- Most of Organizations on Snap4City.org also correspond to companies or institutions that have an installation of Snap4City tools on their Premise,
 - such as: Pisa, SmartGarda Lake, Snap4, ALTAIR, etc.
- This double way allows them to:
 - test the news,
 - share experiences with other groups,
 - get visibility,
 - work in the collaborative environment, and
 - be better supported by Snap4City.org and DISIT Lab personnel.
- Each instance of Snap4xxxx solution **can decide to join the federation** of SmartCity API to exploit shared data.
 - This allows to exploit regional data for city installations applications (web, mobile, dashboards, etc.) without reloading them for example.

Main Organizations/areas

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



Snap4City (C), October 2020

Who is using the Living Lab of Snap4City today

- **Snap4City.org**: multiple Organizations
 - **DISIT**: Univ. Milano, Univ. Firenze, Univ. Cagliari, etc.
 - **Firenze**: City Firenze, and inhouse companies
 - Multiple Organizations for **HeritData pilots**:
 - Firenze, Valencia, Dubrovnik, Mostar, WestGreece, Pont Du Gard
 - **CAPELON**: Capelon Sweden
 - ...Antwerp, Helsinki, ...
- **Snap4Pisa** on MOBIMART: AEDIT, Pisa, PISAMO,
- **SmartGardaLake**: SmartEA, Univ. Brescia

Snap4City: Living Lab supporting tools

- **All 100% Open Source**
- **Snap4City web portal**
 - **Scenarios** with ready to use solutions
 - **Organization/Groups** and co-working support
 - Developing tools and Documentation, training, tutorials, HOW TO...
 - Self Assessment tools to monitor your progresses to get suggestion
 - Assistants: to get training and problem solving
 - **Developing tools**
 - All of them are Web-Based developing tools (except for the Mobile App on Android and iOS)
 - **Resource Manager for Sharing:**
 - experiences, data warehouse tools, IOT Applications, Data Analytics, etc.
- **Hackathons:**
 - IOT Apps, Dashboards, Mobile Applications, Data Analytics, etc.

User: adifino, Org: DISIT
Role: Manager, Level: 4

Your Level

Home / Tutorials and Videos / Welcome: how to start using Snap4City for beginners

Welcome: how to start using Snap4City for beginners

Personalized Suggestions

Snap4City developers suggest you reading:

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

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

See this [document](#) to learn more on the above possibilities:

[TC110. Dashboard delegation to access and passage of ownership, and/or cloning](#)

Exercises

Full Search

Search

Search

Organization Groups

DISIT
• Operative

Recent comments

• 1 month 6 days ago

Recent content

Ti Sugeriamo di realizzare la tua prima Dashboard (Step 1) new
roottooladmin1

Benvenuto al nostro Sindaco ed al suo Team new
roottooladmin1

We suggest to Antwerp Developers: How to manage my Dashboards

SLIDES



News

Your Org

Last Art.

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

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

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

Suggested Activities to be performed in a few minutes to use Snap4City:



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

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

VIDEOS

Flyer

All Tools



MultiOrganization, Groups and Profiles

Organizations may have their distinct :

- menus and functionalities, GeoArea, Data, Dashboard, Groups of users, managers, Knowledge Base, repositories, etc.

Users may:

- Have personal IOT Devices/Models, Data, IOT brokers, Dashboards, IOT App,..
- Have access to multiple Groups of Multiple Org.
- Delegate them in usage or access
- Change ownership and Clone to pass a copy
- Assesses their usage and themselves, share

Level 1 Users: creating dashboards



See how Dashboards can be created using the wizard: dashboards with selectors, time trends, maps, etc.

- [TC1.8. Visual production of Dashboard via Wizard](#)
- [TC1.9. Search on Wizard for any kind of data managed into the platform, from POI to sensors, KPI, social, etc.](#)
- [TC1.10. Dashboard delegation to access, and passage of ownership, and/or cloning](#)
- [TC1.11. IOT Discovery, on Dashboard Wizard](#)
- [TC1.13. Dashboard Builder External Services and Widgets](#)

User: paolonesi, Org:
none
Role: Manager, Level: 0

Dashboards

My Dashboards

Notificator

IOT Applications

My IOT Devices

Knowledge and Maps

Micro Applications

External Services

Data Set Manager: Data Gate

Resource Manager

Help and Contacts

Documentation and Articles

My Profile

Snap4City portal

Km4City portal

DISIT Lab portal

Home / TC1.8 - Visual production of Dashboard via Wizard

TC1.8 - Visual production of Dashboard via Wizard

Test Case Title	TC1.8 - Visual production of Dashboard via Wizard
Goal	<p>As a any user I can</p> <ul style="list-style-type: none"> • Create a Dashboard, composing it on the basis of data vs widgets, with large collection of data kind and corresponding graphics widgets, including: map, table, graphs, timetrend, weather, and many special widgets. • Modify an available Dashboard, editing general information and widgets, via Dashboard Builder
Prerequisites	<p><i>The user is registered and logged in the system</i></p> <p><i>Using a PC or Mobile with a web browser.</i></p> <p><i>Access to the Dashboard Builder.</i></p>
Expected successful result	<p><i>See changes performed on the modified dashboard. Your user account into the Dashboard Builder has been endowed of a number of dashboard for using them, changing them without problem for the system.</i></p> <p><i>See the created dashboard and play with them.</i></p>
Steps	

Example 1: Creating a City Dashboard

The creation of a dashboards has been strongly simplified with the im matching data vs graphics representation, thus arriving at creating au

You can start testing this requirement by following the sequence of ac

1. Enter in the main application <https://main.snap4city.org> and log
 - Main --> dashboards
2. On the left column main menu click on [Dashboards](#) item. The preview of the dashboards available for the user will be shown.
3. The Dashboards page shows the preview of dashboards created by the user (identified as "My own"), public dashboards accessible only in view, private dashboards that the user can see he has been delegated by the original dashboard owner, and also eventual dashboard someone that someone has de

All Text on the Portal are Hypertext with Links for navigation among major concepts



Username: PaoloNesi

Powered by
www.km4city.org

Search



Recent comments

- 1 week 1 day ago

Recent content

Welcome: how to start using Snap4City for beginners
drupaladmin

Snap4City - scalable Smart aNalytic APplication builder for sentient Cities

drupaladmin

For the user: different levels of engagement

- **Manager: Final Users**

- Level 1: create Dashboards
- 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

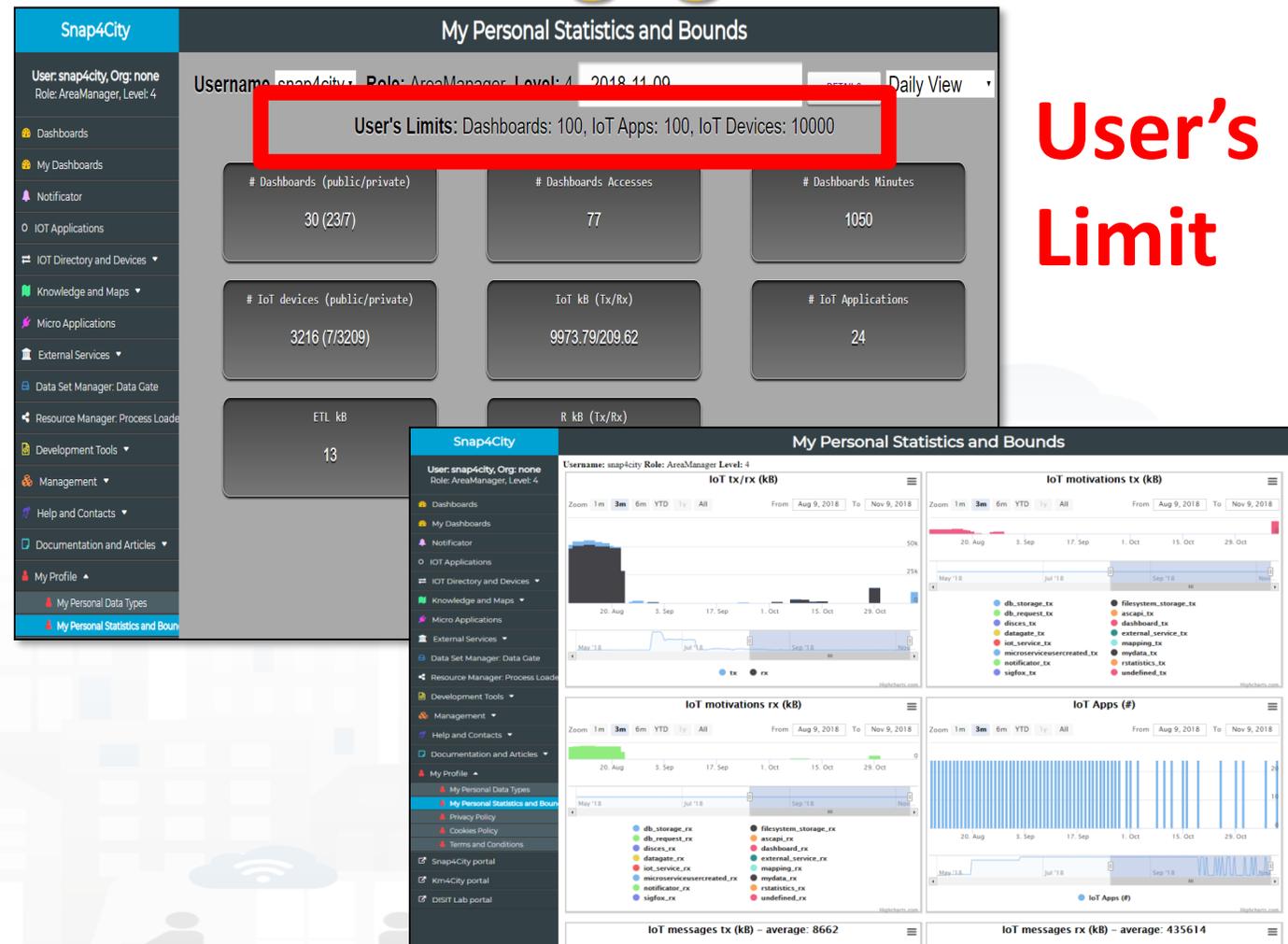


- **Area Manager: Developers, Researchers, Operators (Level 5):**

- Developer of complex services exploiting: R Studio, ETL, External Services, ...
- Creating: MicroApplications, MicroServices, web and mobile application exploiting Advanced Smart City APIs, ...

For the user: different levels of engagement

- **Multiple Organizations**
- **Roles:**
 - Managers
 - AreaManagers (developers): special access to computing resources
- **Levels for self-assessment**
 - Suggestions on next steps to learn on the basis of personal progresses



**User's
Limit**

Snap4City

User: snap4city, Org: none
Role: AreaManager, Level: 4

Username **snap4city** Role: AreaManager Level: 4 2018-11-09 [DETAILS](#) Daily View ▾

User's Limits: Dashboards: 100, IoT Apps: 100, IoT Devices: 10000

# Dashboards (public/private)	# Dashboards Accesses	# Dashboards Minutes
30 (23/7)	77	1050
# IoT devices (public/private)	IoT kB (Tx/Rx)	
3216 (7/3209)	9973.79/209.62	
ETL kB	R kB (Tx/Rx)	
13	0/0	

Self Assessment

Snap4City

User: snap4city, Org: none
Role: AreaManager, Level: 4

My Personal Statistics and Bounds

Username: snap4city Role: AreaManager Level: 4

IoT tx/rx (kB)

IoT motivations tx (kB)

IoT motivations rx (kB)

IoT Apps (#)

IoT messages tx (kB) – average: 8662

IoT messages rx (kB) – average: 435614



- <https://www.snap4city.org/drupal/contact>
- Bug Reporting
 - <https://docs.google.com/forms/d/e/1FAIpQLSfDQtKqgLllyycNXiazeYEh1SsRG1YL8Ze4ThD8nZoA5jsoXw/viewform>
- For Service Level Agreement see:
 - [Service Level Agreement](#)
- Help Desk and Contact:
 - <https://www.snap4city.org/3>
- Availability rates:
 - <https://www.snap4city.org/388>

Home / Contact us

Contact us

Your name *

Your e-mail address *

Subject *

Category *

Message *

Send yourself a copy.

Periodo di riferimento: 09 / 2019	
Disponibilita' media:	99.91%
MTTR:	00G 00:10.00
MTBF:	04G 14:04.24
# down tot.	4
max(t_down):	00G 00:10.01

Resource Manager: public and sharing

Snap4City

User: rootooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

- 🏠 Dashboards
- 🏠 My Dashboards
- 🔔 Notificator
- 📄 IOT Applications
- 📄 My Personal Data
- 📁 IOT Directory and Devices
- 📄 Knowledge and Maps
- 📄 Micro Applications
- 📄 External Services
- 📄 Data Set Manager: Data Gate
- 📄 Resource Manager: Process Loader
- 📄 View Resources
- 📄 Managing Resources
- 📄 MicroServices for IOT Applications
- 📄 Process Models
- 📄 Processes in Execution
- 📄 Process execution Archive
- 📄 Development Tools
- 📄 Management
- 📄 Settings
- 📄 User Management and Auditing
- 📄 Help and Contacts
- 📄 Documentation and Articles
- 📄 My Profile
- 📄 Snap4City portal

View Resources

Pages: Prev 1 2 3 ... 12 Next

Reset
Username ▾
Nature ▾
Sub_nature ▾
License ▾
Resource_type ▾
Format ▾

🔍
✕

Florence_Pharmacies_CSV.zip

developer1: Public

Username: developer1
Resource type: ETL
Nature: geolocated
Description: Florence Pharmacies o...

★★★★★

View Edit Unpublish Owner

S...

developer1: Public

Username: developer1
Resource type: ETL
Nature: sensors
Description: Smart bench

★★★★★

View Edit Unpublish Owner

DeveloperDash-V3-1523555417880

snap4city: Private

Username: snap4city
Resource type: DevDash
Nature: data category (ie: geolocat...
Description: Snap4city Developer D...

★★★★★

View Edit Publish Owner

node-red-contrib-snap4city-developer.rar

snap4city: Private

Username: snap4city
Resource type: IoTBlocks
Nature: data category (ie: geolocat...
Description: Snap4city NodeRed Li...

★★★★★

View Edit Publish Owner

PaoloApplication.json

developer1: Private

Username: developer1
Resource type: IoTApp
Nature: data category (ie: geolocat...
Description: NodeRed Flow Shared ...

★★★★★

View Edit Publish Owner

AMMADashSnap4City-30minview-v2-152...

developer1: Private

Username: developer1
Resource type: AMMA
Nature: ToBeDefined
Description: AMMA snap4city dash...

★★★★★

View Edit Publish Owner

Developer Dashboard New-1526308876256

developer1: Private

Username: developer1
Resource type: DevDash
Nature: ToBeDefined
Description: Developer Dashboard ...

★★★★★

View Edit Publish Owner

ResDash Docker-1526308998809

developer1: Private

Username: developer1
Resource type: ResDash
Nature: ToBeDefined
Description: Resource Dashboard: ...

★★★★★

View Edit Publish Owner

TOP

Living Lab *Snap4City Hackathons*



[LOGIN](#)

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



SNAP4CITY HACKATHON

BUILD YOUR APP FOR A CONNECTED CITY

*Open from
Jan 21 - Mar 15*

[CLICK HERE TO SEE THE HACKATHON WINNERS](#)

see interim winner Fast Rabbit

Hackathon Organization

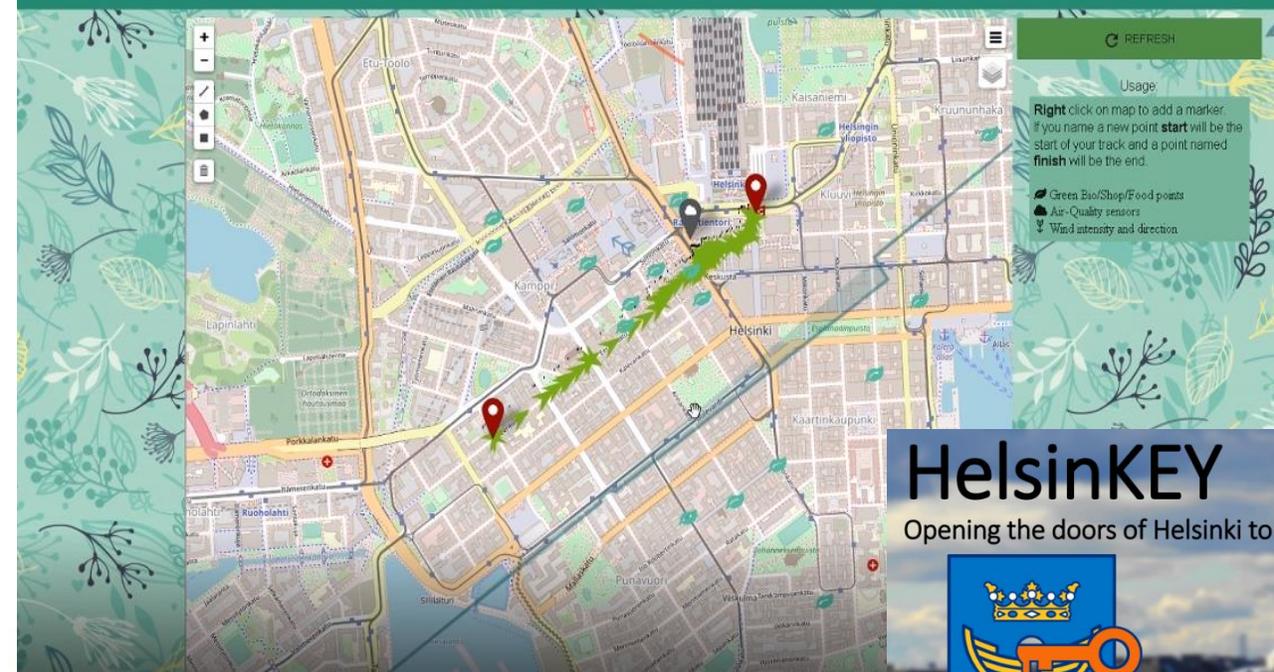
- OnLine Hackathon 2019
 - **Call 2019.** <https://www.snap4city.org/370>
 - **Multiple Categories** to avoid mixing companies with students, professionals with lovers, etc.
 - **Locations:** Helsinki, Antwerp and Tuscany at the same time
 - Multidisciplinary judges
 - Intermediated checkpoint(s) to help teams to improve and strive them toward the goals.
- **Support:** 100% online
 - All training already accessible
 - All online tools and support
- Several Teams have been engaged
 - Engagement via social network and on the area
- Multiple selections to refine the solutions, :
 - <https://www.snap4city.org/416>
- Awards and price of different kinds
 - <https://www.snap4city.org/449>



Validation with developers

- Helsinki and Antwerp, plus Florence Training, CINI Challenge, ..
- 65 performed operational activities:
 - dashboards, IOT Applications, registering IOT devices, etc.
 - More than the 80% created both Dashboards and IOT Applications, thus validating the solution and the process of engaging them in working on the platform

The 65 users	left on platform	Average per day over last 90 days	Total activity 90 days
Number of IOT Applications	117	81,6	7341
Number of private IOT devices	27	25,5	2296
Number of public dashboards	11	6,2	562
Number of private dashboards	173	135,1	12159
Number of accesses to dashboards	--	33,9	3048
Number of minutes	--	337,1	30337



- The End
- Details
- Data
- App
- Context
- About

Greenifiers

BIG DATA FOR SMART CITIES

An app for sustainable mobility



HelsinKEY

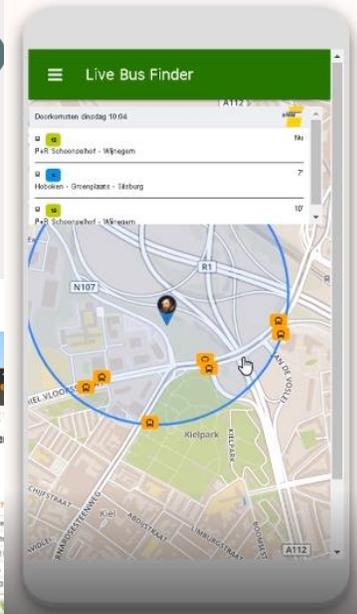
Opening the doors of Helsinki to people



Team: The Unlocker
Snap4City Hackathon - Finals
30th April 2019



Andrea Pescetti



Antwerp @ First Sight



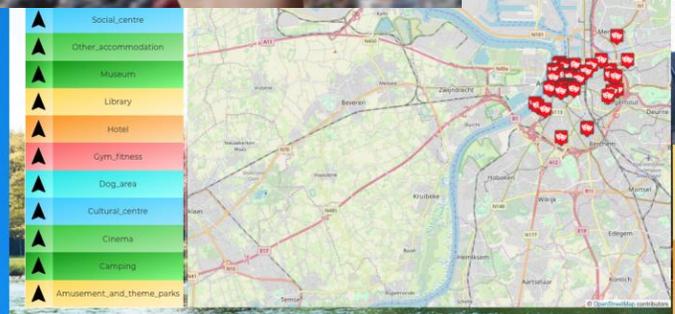
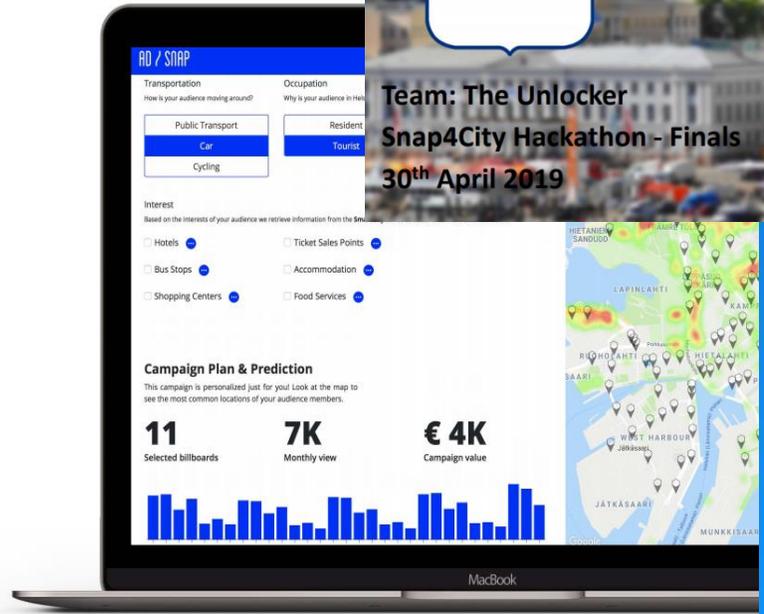
Data-driven design platform for offline advertising

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

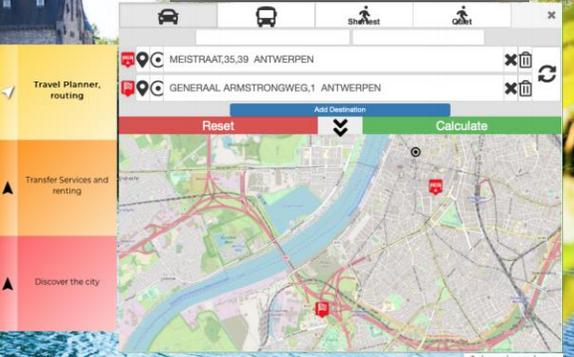
Automatically select billboards with the highest traction. The platform is capable of predicting the reach of every location on a city based on big data analytics.

Skyrocket the traction of offline campaigns

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



- East west, DeWaterbus is best
- Smart Ways to Antwerp
- Traffic via Michelin
- De Lijn routeplanner
- Safety on Bike





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DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB



Hackathon

6500 Euro di Premi



**IEEE ITSS - Italian Chapter
&
DISIT LAB of Università di Firenze**

present

**IEEE Intelligent Transportation
Systems Snap4City Hackathon**
<https://www.snap4city.org/757>

Hackathon Data Focus



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AND INTERNET
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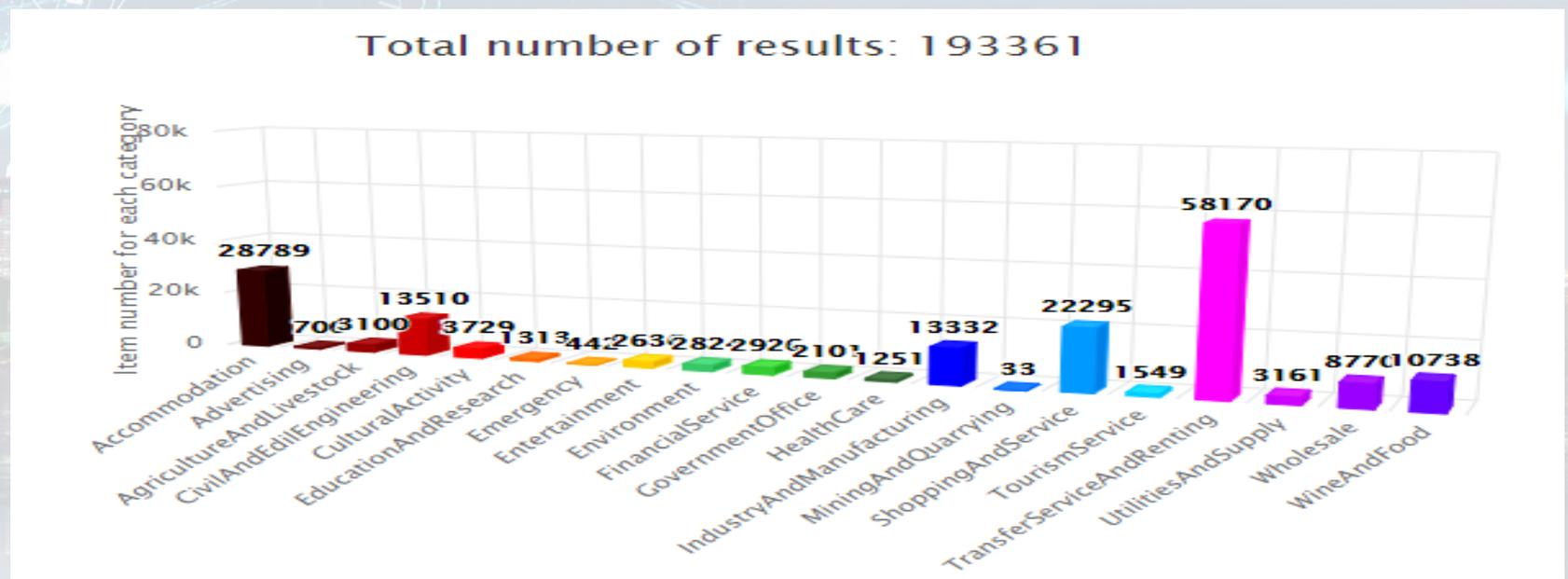
<https://www.snap4city.org/755>

Tuscany region which is a region with more than 3.5 M of inhabitants.

MicroService, API and services for routing and multimodal routing in Tuscany, etc. regarding:

- Road model for the whole Tuscany, plus routing
- car parking status,
- public transport operators,
- bike sharing,
- Pollutant sensors,
- traffic flow sensors,
- Weather sensors,
- points of interests,
- Pollination sensor,
- Heatmaps of several kind
- picking from heatmaps,

- Tuscany: <https://www.snap4city.org/760>
- Florence: <https://www.snap4city.org/747>
- Pisa: <https://www.snap4city.org/746>
- Livorno: <https://www.snap4city.org/751>
- Siena: <https://www.snap4city.org/759>
- Prato: <https://www.snap4city.org/758>
- Pistoia: <https://www.snap4city.org/761>



Challenges



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DELL'INFORMAZIONE

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DISTRIBUTED SYSTEMS
AND INTERNET
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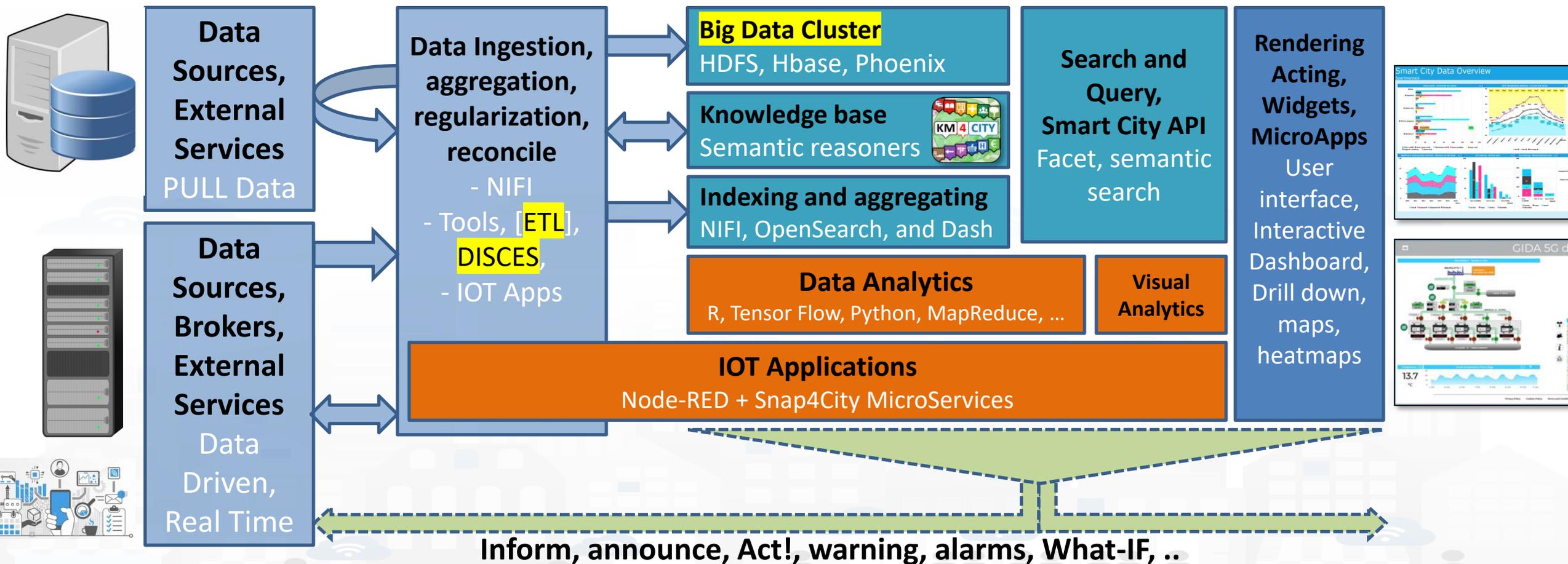
- **full freedom** for creating new and innovative solutions
 - to improve the future of mobility and transportation systems in the cities in which we live.
- **For example:**
 - sustainable mobility and transport
 - services for ITS
 - addition of devices and data and their usage
 - interesting [data analytics](#) on accessible data
 - predictive models and solutions
 - services for the final users in city or rural areas
 - event driven solution and early warning
 - anomaly detections of critical conditions.
 - etc.

TOP

THE VIEW OF THE ADMINISTRATORS



Snap4City/Industry Architecture, V1 and V2/22



Roles in Snap4City/Industry solutions

- **RootAdmin**
 - The gods of the specific installation, access to all tools for all Organizations
- **ToolAdmin**
 - The administrators of an Organization with some capabilities on single tools
- **AreaManager**
 - Typical developer capabilities, access to development tools, access to a wider number of resources, IOT with both basic and advanced, IOT Models, etc.
- **Manager**
 - Final users, limited access to development, IOT App development with Basic library.
- **Users of any Role** have full control on their own resources: data, devices, dashboards, IOT App, etc., which may control according to GDPR rules,
 - providing access, revoking, etc.
- **All users start as Manager roles**
 - All users have also a Level (numeric). A score about what they have exploited in the platform. Higher scores correspond to wider exploitation of capabilities.
- **RootAdmin users may**
 - pass Users to higher roles. Ask to snap4city@disit.org to become an AreaManager for testing
 - Provide/grant specific authorizations to data access on Tool usage
- In the Installation onPremise, you become the RootAdmin of it, you decide ALL.

Management by Organization

- **Organizations** may have
 - name, ID, GPS center, a number of Groups on Snap4City.org (living lab support Drupal)
 - users of different kinds and may impose early bounds on the resourced used by users (IOT Dev, IOT App, Dash)
 - on cloud user kinds up to level of Tool Administrator
 - One or more ServiceMap and boundaries for the federation
- **ToolAdmin** users (requested by Organizations) may
 - control processes, consumption of resources, healthiness, etc.
 - manage tools exploited in your configuration
- **24H/7D Help Desk and Assistance**

The screenshot shows the Snap4City user interface. At the top, it displays the user's name 'panesi', organization 'DISIT', and role 'ToolAdmin, Level: 6'. A 'LOGOUT' button is visible. The sidebar menu includes the following items: 'My Snap4City.org', 'Dashboards (Public)', 'My Dashboards in All Org.', 'Dashboards of My Organization', 'My Dashboards in My Organization', 'Extra Dashboard Widgets', 'Notificator', 'Data, my Data, OpenData', 'Knowledge and Maps', 'IOT Applications', 'IOT Directory and Devices', 'Resource Manager', 'Development Tools', 'Management', 'Decision Support Systems', 'Settings', 'User Management and Auditing', 'Help and Contacts', 'Documentation and Articles', 'My Profile', 'Km4City portal', and 'DISIT Lab portal'.

- RootAdmin on Snap4City.org has a very large set of tools
 - My Snap4City,Tour, etc.
 - Dashboards
 - **My Data Dashboard (Kibana)**
 - **Extra Dashboard Widgets**
 - Notificator
 - **Data, My Data, OpenData**
 - **Knowledge and Maps**
 - **IOT Applications**
 - **IOT Directory and Devices**
 - **Resource Manager**
 - **Development Tools**
 - **Management**
 - **Decision Support Systems**
 - **Settings**
 - **User Management and Auditing**
 - Help and Contacts
 - Documentation and Articles
 -

*In this section
of the slides,
those market
in bold are
presented.*

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

LOGOUT

- My Snap4City.org
- Tour Again
- ダッシュボード
- Dashboards (Public)
- My Dashboards in All Org.
- Dashboards of My Organization
- My Dashboards in My Organization
- My Data Dashboard Dev Kibana
- My Data Dashboard Kibana
- Extra Dashboard Widgets
- Notificator
- Data, my Data, OpenData
- Knowledge and Maps
- IOT Applications
- IOT Directory and Devices
- Resource Manager
- Development Tools
- Management
- Decision Support Systems
- Settings
- User Management and Auditing
- Help and Contacts
- Documentation and Articles
- My Profile
- Km4City portal

Extra Dashboard Widgets

MicroApplic.

Extra Dashboard Widgets

- Micro Applications
- External Services, WebPages
- Register External Service, WebPage
- Custom Widgets / Synoptics
- My Data Selection for Synoptics
- Register Custom Widget Template
- Doc: MicroApplications
- Doc: External Services, WebPages
- Doc: Synoptics, Custom Widgets

Snap4City Micro Applications

Snap4City External Services, WebPages

Snap4City External services upload

Snap4City Register Custom Widget Template

Snap4City My Data Selection for Synoptics

Snap4City New Synoptic

Snap4City Custom Widgets / Synoptics

External Services

Synoptics, Custom

Data, my Data, OpenData
Data Inspector
MyKPI, MyData, MyPOI
My Groups of Entities
View/Set MyPOI on Tuscany
Data Table Loader (Excel)
POI Loader (Excel)
Harvest Satellite Copernicus Dat...
HeatMap Manager
ColorMap Manager
TrafficFlow Manager
BIM Server old
BIM Server New
BIM Srv New: Add
BIM Srv new: View
OpenData Manager: Data Gate
OpenData Manager: Data Gate
OpenData Harvester: Data Gate...

- **Data Inspector:** to understand and see Digital Twin details of data
- **MyKPI, MyData, MyPOI:** to model and save your personal data
- **My Groups of Entities:** to create an aggregation of Snap4City artefacts, entities to manage them in one shot
- **Data Table Loader:** fast load excel File as IOT Devices, IOT Device Model and instances
- **POI Loader:** fast load of Excel file with POI
- **Harvesting satellite:** to request data from Satellite services and make from them heatmaps
- **Heatmap Manager:** management of GeoTiff heatmaps as sequence of complex data
- **Traffic Flow Manager:** management of Traffic Flows as sequence of complex data
- **Color Map:** to code rendering colors of other Managers
- **BIM:** support 3D for the Digital Twin Local
- **Open Data, CKAN:** harvesting and publishing open data

- **My Groups of Entities**
– Licensing group of Entities in One Click

My Groups of Entities

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

10 | My | Public in Org. | Delegated | Filter Table | Search | New Group

No.	High Level Type	Name	Description	Content	Last Change	Owner Username	Ownership	Visibility	Group Controls
25	MyGroup	Prova		1 item VIEW EDIT	8/9/2020, 18:03:40	msoderi	private MAKE PUBLIC	DELEGATE USERS CHANGE OWNERSHIP	VIEW EDIT EMPTY DELETE
24	MyGroup	test2		2 items VIEW EDIT	8/9/2020, 18:02:33	pb3	private MAKE PUBLIC	DELEGATE USERS CHANGE OWNERSHIP	VIEW EDIT EMPTY DELETE
23	MyGroup	wifi_affollamento_numeric		12 items VIEW EDIT	11/7/2020, 21:43:11	fabio.pazzaglia	private MAKE PUBLIC	DELEGATE USERS CHANGE OWNERSHIP	VIEW EDIT EMPTY DELETE
20	MyGroup	Florence_Wifi	Wifi averages	231 items VIEW EDIT	7/7/2020, 17:46:46	michela.toscana	public MAKE PRIVATE	DELEGATE USERS CHANGE OWNERSHIP	VIEW EDIT EMPTY DELETE
19	MyGroup	Mitali		Empty EDIT	18/2/2020, 07:19:19	namankapoor	private MAKE PUBLIC	DELEGATE USERS CHANGE OWNERSHIP	VIEW EDIT EMPTY DELETE
18	MyGroup	Lonato	Reverberi	37 items VIEW EDIT	26/2/2020, 16:04:26	disit_lonatodelgarda	private MAKE PUBLIC	DELEGATE USERS CHANGE OWNERSHIP	VIEW EDIT EMPTY DELETE
17	MyGroup	Prova-Mirco	Descrizione del gruppo di prova	4 items VIEW EDIT	8/9/2020, 18:04:36	msoderi	private MAKE PUBLIC	DELEGATE USERS CHANGE OWNERSHIP	VIEW EDIT EMPTY DELETE
14	MyGroup	nuovo--gruppo		Empty EDIT	30/1/2020, 11:42:23	angelo.difino2	private MAKE PUBLIC	DELEGATE USERS CHANGE OWNERSHIP	VIEW EDIT EMPTY DELETE
13	MyGroup	nuovo--gruppo		2 items VIEW EDIT	30/1/2020, 12:34:04	angelo.difino	private MAKE PUBLIC	DELEGATE USERS CHANGE OWNERSHIP	VIEW EDIT EMPTY DELETE
12	MyGroup	TestMyKPI		6 items VIEW EDIT	22/1/2020, 15:53:53	snap4city	private MAKE PUBLIC	DELEGATE USERS CHANGE OWNERSHIP	VIEW EDIT EMPTY DELETE

Showing 1 to 10 of 18 Device Groups | First < - - 1 2 - > Last | Page Number | Go

- For non admin tools see other Training parts:
<https://www.snap4city.org/577>

Group of entities

- A group may include a number of:
 - IOT Devices, Dashboards, MyPOI, MyKPI, Synoptics, IOT DeviceModels, MyData, Synoptics Templates, IOT Brokers, IOT Sensors/actuators,..
- Once the Group is created, the group owner can:
 - Produce a license to grant access at all the Group Entities in one click

Device Group ID 23 Name wifLaffollamento_numeric Description

10

Filter Table Search

No. +	Username	Element ID	Element Type	Element Name	Added	Controls
340			MyKPI	wifLaffollamento_numeric_SANLORENZO	11/7/2020, 21:43:11	REMOVE
341			MyKPI	wifLaffollamento_numeric_PMICHELANGELO	11/7/2020, 21:43:11	REMOVE
342			MyKPI	wifLaffollamento_numeric_SANTACROCE	11/7/2020, 21:43:11	REMOVE
343			MyKPI	wifLaffollamento_numeric_CASCINEPIAZZALE	11/7/2020, 21:43:11	REMOVE
344			MyKPI	wifLaffollamento_numeric_PZZASMN	11/7/2020, 21:43:11	REMOVE
345			MyKPI	wifLaffollamento_numeric_PONTEVECCHIO	11/7/2020, 21:43:11	REMOVE
346			MyKPI	wifLaffollamento_numeric_SIGNORIA	11/7/2020, 21:43:11	REMOVE
347			MyKPI	wifLaffollamento_numeric_REPUBBLICA	11/7/2020, 21:43:11	REMOVE
348			MyKPI	wifLaffollamento_numeric_PIAZZASSANNUNZIATA	11/7/2020, 21:43:11	REMOVE
349			MyKPI	wifLaffollamento_numeric_DUOMO	11/7/2020, 21:43:11	REMOVE
350			MyKPI	wifLaffollamento_numeric_PORTAROMANA	11/7/2020, 21:43:11	REMOVE
351			MyKPI	wifLaffollamento_numeric_SSPIRITO	11/7/2020, 21:43:11	REMOVE

Showing 1 to 10 of 12 My Device Group Elements

First < - - 1 2 - > Last

Page Number Go

Knowledge and Maps

- Knowledge and Maps
 - Service Map (Toscana)
 - Service Map 3D (Firenze)
 - Helsinki Service Map
 - Antwerp Service Map
 - Garda Lake Service Map
 - Cagliari Service Map
 - Lonato Del Garda Service Map
 - Valencia Service Map
 - Pont Du Gard Service Map
 - Dubrovnik Service Map
 - WestGreece Service Map
 - Mostar-Bosnia Service Map
 - Svealand Service Map
 - Roma Service Map
 - Pisa Service Map
 - Creating WKT
 - Service Map 3D (Antwerp)
 - Service Map 3D (Helsinki)
 - Producing POI triples for KB
 - Load WKT on ServiceMap (Helsinki)
 - Load WKT on ServiceMap (Toscana)
 - Load WKT on ServiceMap (Antwerp)
 - My Annotation on Services/Data
 - Mapping Services Data
 - ArcGIS DISIT Service
 - Static GTFS Manager

- A number of ServiceMaps, Knowledge bases, KB
- Tools for creating WKT, shapes
- Access to ServiceMap 3D, if any
- **Service for Loading triples on KB**
- My Annotations (deprecated)
- **Mapping Tool (partial)**
- GIS servers, if any
- **Static GTFS editor and manager (if any)**

Producing POI triples for KB

This page is a service for generating triples from CSV files of POI
 please upload a CSV file according to the instructions of page <https://www.snap4city.org/589> :
 you are going to receive an email with a file to be loaded in your KB:

email:

ITA:

Nessun file selezionato

Mapping Services Data

Search

Source:ServiceURI	Destination:ServiceURI	Id	Actions
mangalore View	bangalore View	20	EDIT DEL
http://www.disit.org/km4city/resource/CarParkS.Lorenzod View	http://www.disit.org/km4city/resource/CarParkBeccan View	19	EDIT DEL
http://www.disit.org/km4city/resource/la9ac45596a724b61e5a8dcd2287fcd View	http://www.disit.org/km4city/resource/CarParkPartene View	18	EDIT DEL
http://www.disit.org/km4city/resource/CarParkCareg View	http://www.disit.org/km4city/resource/CarParkPieracciniMeyer View	11	EDIT DEL

Showing 1 to 4 of 4 entries

Static GTFS Manager

static **GTFS** Manager

An open source tool for managing and creating public transit schedules data in static GTFS format.

Instructions

Current GTFS data

Display stats on current data:

```

Agency: ATAP
1. Main tables: (*)
agency          : 1 entries
calendar       : 0 entries
stops          : 2,380 entries
modes          : 0 entries
trips          : 81,372 entries
stop_times    : 1,658,837 entries
2. Additional tables: (X)
calendar_dates : 18,798 entries
fare_attributes : 0 entries
fare_rules     : 0 entries
shapes        : 88,446 entries
frequencies   : 0 entries
transfers     : 0 entries
feed_info     : 0 entries
  
```

Import GTFS

1. Import an existing GTFS feed (zip file)

Nessun file selezionato

Export GTFS Feed

If you feel like your data is ready, choose a commit name and press the button to create a freshly minted GTFS feed!

- IOT Applications
 - IOT Applications
 - MicroServices for IOT Applications
 - MicroServices from DataAnalytic
 - IOT MicroServices for Final Users
 - IOT MicroServices for Developers
 - Doc: IOT Applications
 - How to Develop IOT Applications
 - Create A MicroService from RestCall

The dashboard displays a grid of IOT Applications. Each application card includes an icon, a title, and the owner's name. The applications shown include 'Data Analytic', 'IOT Application', and 'IOT Edge App' with various IDs and owners.

- IOT Applications:** a view to manage Containers / IOT Edge Apps: IOT Apps, Data Analytics (R and Python), WebScraping, IOT edge, etc.

Managing also

- MicroServices for IOT App exploiting REST Call**
- MicroServices from DataAnalytics**

File Name	Upload Date	Description	Control Status	View	Metadata	Published	Delete
Air quality.zip	2018-05-25 13:10:35	Air quality Microservice	OK - 2018-05-25 13:10:35	VIEW	EDIT	NO	DEL
Antwerp cameras location.zip	2019-01-13 17:22:06	Antwerp cameras location from A Open Data	OK - 2019-01-13 17:22:06	VIEW	EDIT	YES	DEL
Antwerp museum.zip	2019-01-13 17:27:08	Antwerp museum (data coming from the A Open Data API)	OK - 2019-01-13 17:27:08	VIEW	EDIT	NO	DEL
Antwerp Velo stations.zip	2019-01-13 17:32:17	Antwerp Velo stations location (data coming from A Open Data API)	OK - 2019-01-13 17:32:17	VIEW	EDIT	NO	DEL
Car Park Prediction.zip	2018-06-21 16:55:28	Free Parking Lots Prediction	OK - 2018-06-21 16:55:28	VIEW	EDIT	NO	DEL
Current UV in Antwerp.zip	2019-01-13 15:58:13	Current UV in Antwerp (data coming from the openweather API)	OK - 2019-01-13 15:58:14	VIEW	EDIT	YES	DEL
Current weather in Antwerp.zip	2019-01-13 15:58:13	Current weather in Antwerp (Openweather API)	OK - 2019-01-13 15:58:13	VIEW	EDIT	YES	DEL
Events in Finland.zip	2019-01-07 17:43:47	Cultural and educational events (frequently updated events from multiple cultural event organizers including concerts, sports events, museum exhibitions and many more.), only in finnish	OK - 2019-01-07 17:43:47	VIEW	EDIT	YES	DEL
Finence Getico.zip	2019-02-13 12:33:31	Statistiche	OK - 2019-02-13 12:33:31	VIEW	EDIT	NO	DEL
Finence_getico_interni.zip	2019-02-12 13:00:30	Ticket Getico Interni	OK - 2019-02-12 13:00:30	VIEW	EDIT	NO	DEL

For non admin tools see Training parts 3 and 5: <https://www.snap4city.org/577>

File Name	Upload Date	Description	Control Status	View	Metadata	Published	Delete
CreateHeatMapByValue.zip	2019-01-25 12:09:57	last 2 hours mean on a chosen measure about a specific sensor categor	OK - 2019-01-25 12:09:58	VIEW	EDIT	YES	DEL
TrendCarPark.zip	2019-01-11 12:16:26	TrendCarPark	OK - 2019-01-11 12:16:27	VIEW	EDIT	YES	DEL

IOT Directory and Devices

- IOT Directory and Devices
- My IOT Sensors and Actuators
- IOT Sensors and Actuators
- IOT Devices
- IOT Devices Management
- IOT Brokers
- IOT Device Models
- IOT Devices Bulk Registration
- IOT Broker Periodic Update setting
- IOT Orion Broker Mapping Rules
- Doc: IOT Directory and Devices
- Create an IOT Device Instance
- Create an IOT Device Model
- Add an IOT Device into Snap4City

Snap4City

User: roottooladmin, Org: DISIT
Role: RootAdmin, Level: 7
[Logout](#)

- My Snap4City.org
- Dashboards
- My Dashboards in All Org.
- Dashboards of My Organization
- My Dashboards in My Organization
- Extra Dashboard Widgets
- Notifier
- Data, my Data, OpenData
- Knowledge and Maps

IOT Devices Management

1739 DEVICES | 1728 ACTIVE | 495 PUBLIC | 1212 PRIVATE

Show 5 entries

IOT Device	IOT Broker	Device Type	Model	Ownership	Organization	Owner	Status	Edit	Delete	Location
ISEP2ZT2AA15000022	orionFinenze-UNIFI	ChargingStation	ChargingStationModel	PUBLIC	Firenze	michela_firenze	active	EDIT	DELETE	
373773207E330100	orionFinland	AirQualityObserved	custom	PUBLIC	Helsinki	iottdirectory.helsinki	active	EDIT	DELETE	
373773207E330101	orionFinland	AirQualityObserved	custom	PUBLIC	Helsinki	iottdirectory.helsinki	active	EDIT	DELETE	
373773207E330103	orionFinland	AirQualityObserved	custom	PUBLIC	Helsinki	iottdirectory.helsinki	active	EDIT	DELETE	
373773207E330104	orionFinland	AirQualityObserved	custom	PUBLIC	Helsinki	iottdirectory.helsinki	active	EDIT	DELETE	

Previous 1 2 3 4 5 ... 337 Next

IOT Device Models and Instances

IOT Devices Bulk Registration

0 VALID DEVICES | 0 INVALID DEVICES

no file is selected yet

IOT Broker: Antwerp | Device Model: Raspberry snap4city1

Edge-Gateway Type: | Edge-Gateway URI: | [upload](#)

Massive management of IOT Devices

Showing 0 to 0 of 0 entries

[Insert Valid Devices](#)

IOT Broker Periodic Update setting

0 VALID DEVICES | 0 INVALID DEVICES

Contact broker: rabbitUNIM

Model: AccessPointLunato

Edge-Gateway Type: | Edge-Gateway URI: | [Show active brokers](#) | [Retrieves devices](#)

Showing 0 to 0 of 0 entries

[Delete All](#) | [Update Devices](#) | [Update Values](#) | [Insert Valid Devices](#)

IOT Directory manages multiple internal and external IoT Context Brokers

IOT Orion Broker Mapping Rules

134 TOTAL RULES

Show 10 entries

Name	IOT Broker	Selector	Format	Kind	Edit	Delete
address	Antwerp	["param":{"\$": "\$address", "type": "JSON"}]	json	property	EDIT	DELETE
address	orionFinland	["param":{"\$": "\$address", "type": "JSON"}]	json	value	EDIT	DELETE
BC	Antwerp	["param":{"\$": "BC", "type": "JSON"}]	json	value	EDIT	DELETE
charging_level	Antwerp	["param":{"\$": "charging_level", "type": "JSON"}]	json	property	EDIT	DELETE
dateObserved	Antwerp	["param":{"\$": "dateObserved", "type": "JSON"}]	json	value	EDIT	DELETE
dateObserved	orionFinland	["param":{"\$": "dateObserved", "type": "JSON"}]	json	value	EDIT	DELETE
dateObservedFrom	orionFinland	["param":{"\$": "dateObservedFrom", "type": "JSON"}]	json	value	EDIT	DELETE
dateObservedTo	orionFinland	["param":{"\$": "dateObservedTo", "type": "JSON"}]	json	value	EDIT	DELETE
description	Antwerp	["param":{"\$": "description", "type": "JSON"}]	json	value	EDIT	DELETE
devicetype	orionFinland	["param":{"\$": "type", "type": "JSON"}]	json	property	EDIT	DELETE

Showing 1 to 10 of 134 entries

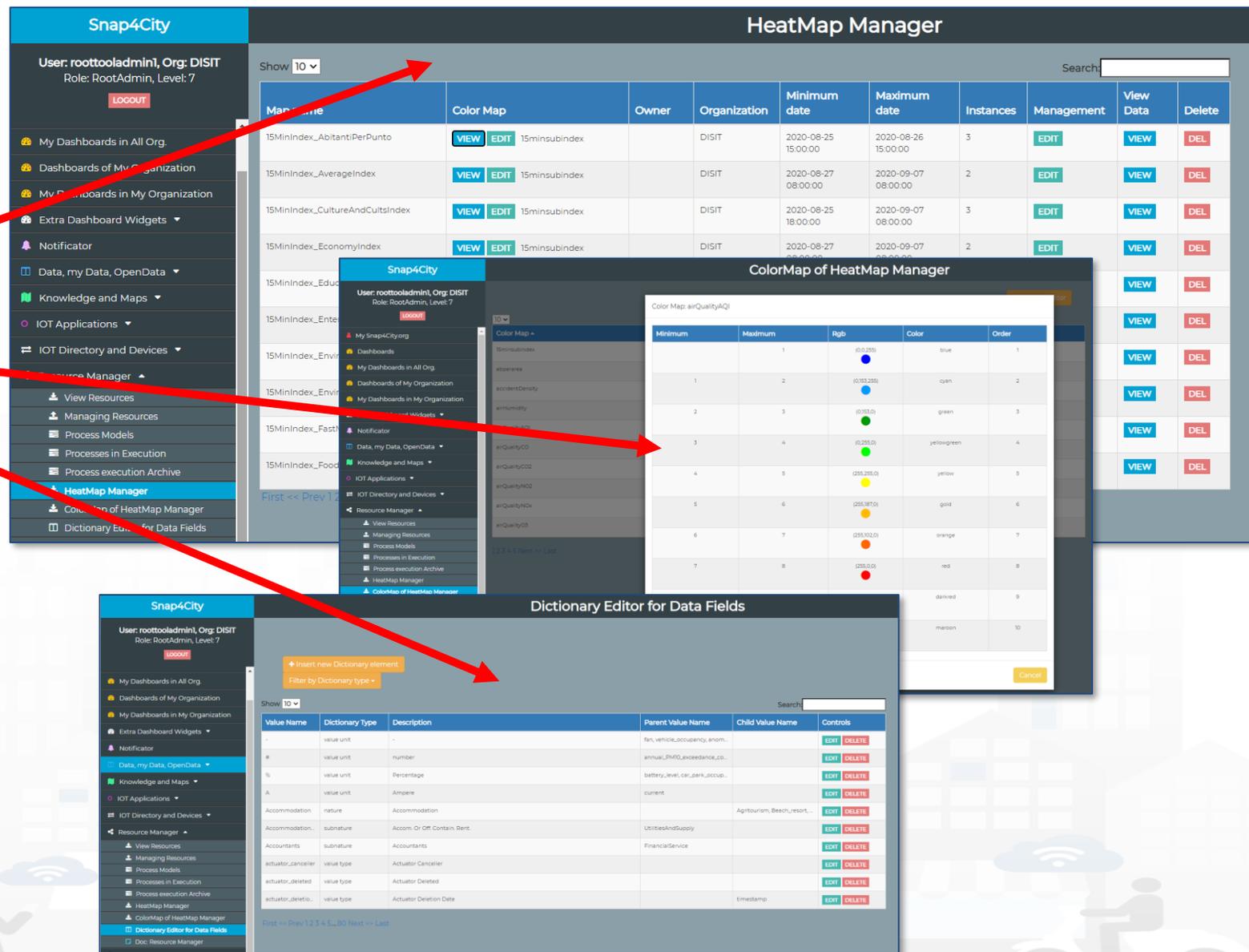
Automated NGSI V2 brokers harvesting and registration

- For non admin tools see Training parts 3 and 5: <https://www.snap4city.org/577>

- Resource Manager
- View Resources
- Managing Resources
- Process Models
- Processes in Execution
- Process execution Archive
- HeatMap Manager
- ColorMap of HeatMap Manager
- Dictionary Editor for Data Fields
- Doc: Resource Manager

- Tools for managing shared resources among Organizations and Users

- For non admin tools see Training parts:
<https://www.snap4city.org/577>



HeatMap Manager

Man name	Color Map	Owner	Organization	Minimum date	Maximum date	Instances	Management	View Data	Delete
15MinIndex_AbitantiPerPunto	VIEW EDIT	15minsubindex	DISIT	2020-08-25 15:00:00	2020-08-26 15:00:00	3	EDIT	VIEW	DEL
15MinIndex_AverageIndex	VIEW EDIT	15minsubindex	DISIT	2020-08-27 08:00:00	2020-09-07 08:00:00	2	EDIT	VIEW	DEL
15MinIndex_CultureAndCultisIndex	VIEW EDIT	15minsubindex	DISIT	2020-08-25 18:00:00	2020-09-07 08:00:00	3	EDIT	VIEW	DEL
15MinIndex_EconomyIndex	VIEW EDIT	15minsubindex	DISIT	2020-08-27 08:00:00	2020-09-07 08:00:00	2	EDIT	VIEW	DEL
15MinIndex_Educa	VIEW EDIT	15minsubindex	DISIT	2020-08-27 08:00:00	2020-09-07 08:00:00	2	EDIT	VIEW	DEL
15MinIndex_Enter	VIEW EDIT	15minsubindex	DISIT	2020-08-27 08:00:00	2020-09-07 08:00:00	2	EDIT	VIEW	DEL
15MinIndex_Enviv	VIEW EDIT	15minsubindex	DISIT	2020-08-27 08:00:00	2020-09-07 08:00:00	2	EDIT	VIEW	DEL
15MinIndex_Enviv	VIEW EDIT	15minsubindex	DISIT	2020-08-27 08:00:00	2020-09-07 08:00:00	2	EDIT	VIEW	DEL
15MinIndex_Enviv	VIEW EDIT	15minsubindex	DISIT	2020-08-27 08:00:00	2020-09-07 08:00:00	2	EDIT	VIEW	DEL
15MinIndex_Fast	VIEW EDIT	15minsubindex	DISIT	2020-08-27 08:00:00	2020-09-07 08:00:00	2	EDIT	VIEW	DEL
15MinIndex_Food	VIEW EDIT	15minsubindex	DISIT	2020-08-27 08:00:00	2020-09-07 08:00:00	2	EDIT	VIEW	DEL

ColorMap of HeatMap Manager

Minimum	Maximum	Rgb	Color	Order
	1	(0,0,255)	blue	1
1	2	(0,183,255)	cyan	2
2	3	(0,151,0)	green	3
3	4	(0,255,0)	yellowgreen	4
4	5	(255,255,0)	yellow	5
5	6	(255,187,0)	gold	6
6	7	(255,102,0)	orange	7
7	8	(255,0,0)	red	8
	9		darkred	9
	10		maroon	10

Dictionary Editor for Data Fields

Value Name	Dictionary Type	Description	Parent Value Name	Child Value Name	Controls
-	value unit	-	fer_vehicle_occupancy_shom...		EDIT DELETE
#	value unit	number	annual_pm10_exceedance_co...		EDIT DELETE
%	value unit	Percentage	battery_level_car_park_occup...		EDIT DELETE
A	value unit	Ampere	current		EDIT DELETE
Accommodation	nature	Accommodation	Agritourism, Beach_resort...		EDIT DELETE
Accommodation	subnature	Accom. Or Off-Contain. Rest.	UnitedAndSupply		EDIT DELETE
Accountants	subnature	Accountants	FinancialService		EDIT DELETE
actuator_cancelled	value type	Actuator Cancelled			EDIT DELETE
actuator_deleted	value type	Actuator Deleted			EDIT DELETE
actuator_deleted	value type	Actuator Deletion Date	timestamp		EDIT DELETE

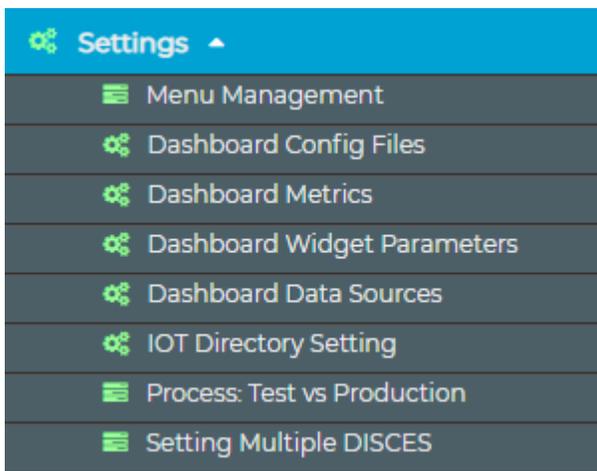
Development Tools ▾
Web Scraping Tool
Jupyter Hub - Python
Web Scraping Tool (0n)
Web Scraping Tool (6l)
R Studio Development
R Studio Development 0.11
R Studio Development 0.116
R Studio Development TF
R Studio Development GFF
R Studio Development Gral
ETL Development
ETL Development 1
ETL Development 2
Knowledge Base Graphs
Knowledge Base Queries
Smart City API Docs: Swagger
Internal API Docs: Swagger
Testing API by Postman
Source Code Access
How to Develop Smart Applications

- *All these tools are well described into Training parts:*
<https://www.snap4city.org/577>
- *The Administrators may*
 - *access to all instances of them*
 - *Grant access to them at specific AreaManager users*
- **API and Swagger documentation**
- **Model Knowledge Base Graphs (LOG.disit.org)**
- **Python online dev. Environment**
- **R Studio Online dev. Environment**
- WebScraping tool
- SPARQL Editor and tools (custom FLINT)
- ETL OnLine dev. Environment (deprecated)

Decision Support Systems

- All these tools are well described into Training parts:
<https://www.snap4city.org/577>
- Some of these tools need special VM / appliances, services to be activated
- Most of them are accessible to the public at least with guest account
- The Administrators may
 - access to all instances of them
 - Grant access to them at specific AreaManager users

Decision Support Systems ▲
□ Smart City Control Room
↗ Workflow Management Ticketing
■ Altair Maintenance
■ Altair Ticket Management
■ Altair Ticket Close Event
■ BIM Dashboard
□ Workflow Management, Ticketing
□ BIM Management and Dashboards
↗ DORAM Public Transport Analyzer
□ Doc: DORAM Pub Transp. Analyzer
↗ Twitter Vigilance
↗ Twitter Vigilance Real Time
↗ Twitter Vigilance Antwerp
↗ Twitter Vigilance Helsinki
↗ Twitter Vigilance WestGreece
↗ Twitter Vigilance Valencia
↗ Twitter Vigilance Firenze HeritData
↗ Twitter Vigilance Pont Du Gard
↗ Twitter Vigilance Dubrovnik
□ Twitter Vigilance Notes
↗ What-If Analysis
□ Doc: What-If Analysis
□ Origing Destination Matrices
□ Traffic Flow Reconstruction
□ High Res. Pollutant Predictions
↗ Resilience Decision Support Sys
↗ Smart Decision Support Sys
□ Doc: Smart & Resilience DSS



- **Menu Management:** for managing main menu and submenu, on web and mobile, and those of the Organizations on Dashboards
- A number of configurations for the Dashboard Manager (most of them are valid only for OnPremise solutions, and/or V1 infrastructure approach)

TOP

Multilingual Support and Translation Management

- Settings ▾
 - Menu Management
 - Translation Manager
 - XML SiteMapGenerator



Multilingual Support, Any Language, UTF8

- Fully supported on CRM (drupal), Node-RED (IOT App)
 - See modules of those tools
- Partially developed for:
 - Dashboard Builder
 - Resource Manager
 - Other Tools..
 - Menu Manager
 - JavaScript Strings

to add a new language use
POEDITOR (open version)

Ask for last file to

snap4city@disit.org

You can contribute on GitHub

<https://poeditor.com/>

to add a new language use
Translation Manager as
Administrator

Translation Manager

Translation manager

[+ Create New Text translation](#) [Import menu](#) [Filter by language](#)

Show Search:

Id	Reference Text	Language	Traslated text	Edit
1	Settings	it_IT	Impostazioni	EDIT
2	Dashboards (Public)	it_IT	Dashboards (Pubbliche)	EDIT
3	Dashboards	it_IT	Dashboards	EDIT
4	Notificator	it_IT	Notificatore	EDIT
5	My Snap4City.org	it_IT	My Snap4City.org	EDIT
6	Resource Manager	it_IT	Gestore Risorse	EDIT
7	Data Set Manager: Data Gate	it_IT	Data Set Manager: Data Gate	EDIT
8	IOT Applications	it_IT	Applicazioni IOT	EDIT
9	My IOT Devices	it_IT	I miei Dispositivi IOT	EDIT
10	Documentation and Articles	it_IT	Documentazione e Articoli	EDIT
11	Micro Applications	it_IT	Micro Applicazioni	EDIT

Add new translation

Reference Text:

Language:

Translated text:

[Close](#) [Confirm](#)

Import menu

Select menu type:

Translate in language:

- en_US
- it_IT
- ja_JP**
- ar_SA
- el_GR

Snap4City

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

LOGOUT

Il mio Snap4City.org

Rifai Tour

ダッシュボード

Dashboard (Pubbliche)

Le mie Dashboards nelle Org.

Dashboards della mia Org.

Le Mie Dashboard nella mia Org.

La mia Data Dashboard Dev Kibana

The screenshot shows a dashboard with a grid of 12 cards. Each card has a title, a subtitle, a main visualization (map or chart), and a footer with navigation links: Επεξεργασία, Διαχείριση, Κλώνος, Διαγραφή. The cards include:

- Energy - Παθητικός Energy
- Energy - with custom pins Παθητικός Energy
- Environment - Παθητικός Environment data
- Mobility - Παθητικός Mobility - Cloned2
- Smart Lonato del Garda - Εφαρμογές IOT smart_lonatoDelGarda
- Social - Παθητικός Citizens Engagement
- 1 Παθητικός
- 11 Παθητικός
- 15 minuti index - Bologna Città Metropolitana... Εφαρμογές IOT 15min Bologna
- 15MinCityIndex Dashboard Εφαρμογές IOT 15Min Index Dashboard
- 3D Map beta Testing Παθητικός 3D Map Test
- 3D Map beta Testing 2 Παθητικός

- Keywords as Main Tools names should remain in English
- Names of the resources remain in the language in which they have been created/defined

User Management



User Management and Auditing

- All that the RootAdmin needs to manage:
 - **User Management: for managing**
 - accounts and profiles
 - limits of the users in exploiting resources
 - Accesses and providing special authorization
 - Organization vs Groups of users
 - Users vs Organizations
 - **Users vs Web and Mobile Applications**
 - Engaging and monitoring users on platform and devices
 - **Users on Chats room of Dashboards**
 - Managing Users on Chats of Dashboards
 - **Auditing of the data and resource accesses**
 - Auditing all the activities on the platform (see next section)
 - Personal auditing

User Management and Auditing ▾

User Management

User Limits Management

User Engagement

User Engagement Dash

User Role Management via LDAP

Manage Resource Ownership

User Chats Management

Auditing Data Access Try-out

Auditing Elements vs Ownership

Auditing Personal Data

Auditing Accesses Authentication

Auditing User Activities

Auditing Activities on Queries

Auditing Activities on Articles

Auditing IOT Directory Data

Dashboard Builder Local Users

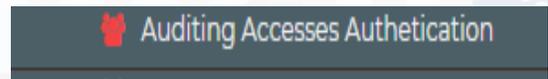
Organizations vs Groups

Users vs Organizations

User Management



- User Management via Drupal or Local Users Management without CRM.
- User Limits con controlling resource consumption
- User Engagement: see mobile App training part
- Roles and LDAP management
- Managing Resources vs Users' Ownerships and granted accesses to the resources
- Organizations and their Groups of users
- Users vs Organizations
- ..
- AND User Access Authentication via KeyCloak



User Management and Users' Limits

Controlling exploitation of resources

Element type	Organization	Username	Role	Limits	Controls
AppID	any		any	10	EDIT DEL
DashboardID	any		any	20	EDIT DEL
IOTID	any		any	99	EDIT DEL
IOTID	any		any	500	EDIT DEL
AppID	any		any	0	EDIT DEL
BrokerID	any		any	1	EDIT DEL
DAAppID	any		any	0	EDIT DEL
DashboardID	any		any	5	EDIT DEL
IOTID	any		any	0	EDIT DEL
ModelID	any	any	any	1	EDIT DEL
SynopticID	any	any	any	10	EDIT DEL
SynopticTmpID	any	any	any	0	EDIT DEL
AppID	any	any	AreaManager	3	EDIT DEL
DAAppID	any	any	AreaManager	3	EDIT DEL
DashboardID	any	any	AreaManager	10	EDIT DEL
IOTID	any	any	AreaManager	20	EDIT DEL
PortalID	any	any	AreaManager	1	EDIT DEL
SynopticID	any	any	AreaManager	10	EDIT DEL
SynopticTmpID	any	any	AreaManager	10	EDIT DEL

Managing roles and authorizations

TOP

Auditing Activities

- Auditing Data Access Try-out
- Auditing Elements vs Ownership
- Auditing Personal Data
- Auditing Accesses Authentication
- Auditing User Activities
- Auditing Activities on Queries
- Auditing Activities on Articles
- Auditing IOT Directory Data





Snap4City

User: rootooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

LOGOUT

- Knowledge and Maps
- Micro Applications
- External Services
- Data Set Manager: Data Gate
- Resource Manager: Process Loader
- Development Tools
- Management
- Settings
- User Management and Auditing
 - User Management
 - User Engagement
 - User Engagement Dash
 - User Role Management via LDAP
 - Manage Resource Ownership
 - User Chats Management
 - Auditing Data Access Try-out**
 - Auditing Elements vs Ownership
 - Auditing Personal Data
 - Auditing Accesses Authentication
 - Auditing User Activities
 - Auditing Activities on Queries
 - Auditing Activities on Articles
 - Auditing IOT Directory Data
 - Dashboard Builder Local Users
 - Organizations vs Groups
 - Users vs Organizations
- Help and Contacts
- Documentation and Articles
- My Profile

Auditing Data Access Try-out

Reset Filters

Id	Date and Time		Username	App Name	Source request	Variable name	Motivation	Access Type	Query	Error Message	Stacktrace	ip_address
	From...	To...	Search...	Search...	Search	Search	Search	Search				Search
3576876	2019-10-16 15:40:08							WRITE	/datamanager/ap	The passed DELEGATION has	edu.unifi.disit	192.168.0.37
3557811	2019-10-12 13:12:12							READ	/datamanager/ap	The logged user is not th	edu.unifi.disit	192.168.1.82
3557813	2019-10-12 13:12:13							READ	/datamanager/ap	The logged user is not th	edu.unifi.disit	192.168.1.82
3557814	2019-10-12 13:12:13											

Auditing Personal Data

Reset Filters

Id	Date and Time		Username	App Name	Delegated Username	Delegated AppName	Source request	Variable name	Motivation	Access Type	Domain
	From...	To...	Search...	Search...	Search...	Search...	Search	Search	Search	Search	Search
17295228	2019-10-19 18:17:48						orionbrokerfilter			READ	DELEGATION
17295227	2019-10-19 18:17:36					ChargingStations	dashboardmanager	Num_Utenti_distinti_globali		READ	DATA
17295226	2019-10-19 18:17:36						dashboardmanager	Num_Utenti_distinti_globali		READ	DATA
17295225	2019-10-19 18:17:34						dashboardmanager	Num_Utenti_distinti_globali		READ	DATA
17295224	2019-10-19 18:17:25						orionbrokerfilter			READ	DELEGATION
17295223	2019-10-19 18:17:17						dashboardmanager			READ	DELEGATION
17295222	2019-10-19 18:17:04						dashboardmanager			READ	DELEGATION
17295221	2019-10-19 18:17:01						engager		ASSISTANCE_ENABLED	READ	DATA
17295220	2019-10-19 18:16:32					ChargingStations	dashboardmanager	Num_Utenti_distinti_globali		READ	DATA
17295219	2019-10-19 18:16:32						dashboardmanager	Num_Utenti_distinti_globali		READ	DATA
17295218	2019-10-19 18:16:31						engager		ASSISTANCE_ENABLED	READ	DATA
17295217	2019-10-19 18:16:28						dashboardmanager			READ	DATA
17295216	2019-10-19 18:16:28						dashboardmanager			READ	DATA
17295215	2019-10-19 18:16:28						dashboardmanager			READ	DATA
17295214	2019-10-19 18:16:28						dashboardmanager			READ	DATA

1 2 3 4 5 6 7 8 9 10 ... 15970 15971 15972 15973 Next >>

TOP

Management ▾

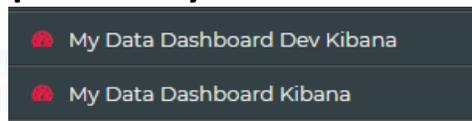
- Traffic Analyzer: AMMA
- Container Cluster Monitoring
- Container Cluster Intelligence
- Back Office Container Monitoring
- IOT App Version Management
- Smart City API Monitoring
- MyKPI Monitoring
- Notifier Monitoring
- Web Server Monitoring
- Back Office DWH Sched DISCES
- Back Office DA Sched DISCES
- Back Office DISCES monitor
- Mobile Application Monitoring
- Mng Anonym. Photos Comments
- Mng Photos Comments HelAnt
- Mng Online Helps
- Config ResDash
- Mesos view
- DISCES-EM
- DISCES-EM tail
- IOT App for Conf Clust Monitor

Platform Management



Management
Traffic Analyzer: AMMA
Container Cluster Monitoring
Container Cluster Intelligence
Back Office Container Monitoring
IOT App Version Management
Smart City API Monitoring
MyKPI Monitoring
Notificator Monitoring
Web Server Monitoring
Back Office DWH Sched DISCES
Back Office DA Sched DISCES
Back Office DISCES monitor
Mobile Application Monitoring
Mng Anonym. Photos Comments
Mng Photos Comments HelAnt
Mng Online Helps
Config ResDash
Mesos view
DISCES-EM
DISCES-EM tail
IOT App for Conf Clust Monitor

- **Tools for Platform Management.**
 - Most of them only accessible for RootAdmin and OnPremise
- Tools can be **grouped in the following families**
 - AMMA Traffic Analyzer as OpenDistro(Elastic Search, Kibana)
 - DataAnalyzer (DevDash): monitoring and browsing data ingested into OpenDistro (ElasticSearch, via Kibana (see on top as My Data ..))
 - Container Monitoring and Management
 - IOT App Version Management of Snap4City tools
 - Smart City API traffic monitoring
 - MyKPI Monitoring
 - DISCES schedulers monitoring and management (V1 infrastructure versions)
 - Mobile Applications Monitoring
 - Management of Images and Comments from Smart City API, Mobile and Web Apps
 - Management of Online Helps (not active)



TOP

Customer Relationship Manager Integration and Living Lab basic



Living Lab vs DRUPAL

- **Based on Drupal 7 and only**
 - A Few Custom modules have been adapted and are distribution on GITHUB/DISIT
 - Full Customizable by adding Drupal modules as usual
- **User Management** registration and mailing
 - LDAP connection for role management
 - KeyCloak connection for SSO / Authentication (OpenID Connect)
 - Management of user profile
 - Authorization to access at the web pages..
 - User profile management for Role and Details + statistics
- **Content management** for Organizations and Groups
 - Indexing of all content and search
 - Content Distribution: web pages, newsletters, articles, comments, Video, technical notes, training
 - Statistics on their usage
 - Reports and views regarding living lab usage, and web pages
 - Organizations vs Users
 - Organizations vs Groups
 - Tracking and monitoring
 - Production and distribution of NewsLetters
- **Open to full contributions and comments**
 - Comments on web pages, ...
- Etc.

The screenshot shows the Snap4City user interface. The top navigation bar includes 'Dashboard', 'Content', 'Structure', 'Appearance', 'People', 'Modules', 'Configuration', 'Reports', and 'Help'. Below this, there are links for 'Add content', 'Find content', 'Add user', 'Antwerp', 'Edit view', and 'Top search phrases'. The main navigation menu on the left lists various sections such as 'My Snap4City.org', 'Dashboards', 'My Dashboards in All Org.', 'Dashboards of My Organization', 'My Dashboards in My Organization', 'My Data Dashboard Dev Kibana', 'My Data Dashboard Kibana', 'Extra Dashboard Widgets', 'Notificator', 'Data, my Data, OpenData', 'Knowledge and Maps', 'IOT Applications', 'IOT Directory and Devices', 'Resource Manager', 'Development Tools', 'Management', 'Decision Support Systems', 'Settings', 'User Management and Auditing', 'Help and Contacts', 'Documentation and Articles', 'My Profile', 'Km4City portal', and 'DISIT Lab portal'.

The screenshot shows the Snap4City Content management interface. The top navigation bar includes 'Dashboard', 'Content', 'Structure', 'Appearance', 'People', 'Modules', 'Configuration', 'Reports', and 'Help'. Below this, there are links for 'Add content', 'Find content', 'Add user', 'Antwerp', 'Edit view', and 'Top search phrases'. The main content area shows a search filter with 'SHOW ONLY ITEMS WHERE' and 'Filter' buttons. Below the filter, there are 'UPDATE OPTIONS' and 'Update' buttons. The content list includes items such as 'ServiceMap and ServiceMap3D, Knowledge Model, Km4City Ontology', 'Training Snap4City 2020 edition: Smart City IOT Course from data gathering to smart applications and Control Rooms', 'Scenario: Copernicus Satellite Data', 'HOW TO: extend Snap4City Platform with new modules and tools', 'HOW To: Manage BMP and BIM: main features of openMAINT, BMP, BIM', 'Tutorials, How to: User Scenarios and their List of Test Cases', 'News from Snap4City & slides, Where to Meet Snap4City experts', 'We are hiring, on research, also supporting your PhD course', 'Custom Widgets: Table explanation, as SVG', and 'Work with us at DISIT Lab, Cerchi Lavoro al DISIT/Snap4City'.

- Each Organization may have:
 - A number of groups to which the users can subscribe
 - A number of dashboards produced by the users
 - A number of IoT Devices, IoT Device Models,
 - A number of POI
 - Etc.
 - A dedicated Splash Page
 - It can be customized by an user of the Organization
 - Ask to activate one
 - Etc.

Organizations vs Groups vs Users

Organizations vs Groups

Dashboard Content Structure Appearance People Modules Configuration Reports Help

Add content Find content Add user Antwerp Edit view Top search phrases People

Home How and Why To Use it Tools Tutorials and Videos All o

Home / All Organization with related group

All Organization with related group

Search:

Organization	Group	State
Antwerp	Business Owners	Active
CAPELON	City of Karlstad	Active
CAPELON	City of Eskilstuna	Active
CAPELON	City Of Västerås	Active
DISIT	Developer	Active
DISIT	Operativo	Active
Dubrovnik	Developers	Active
Dubrovnik	Users	Active
Firenze	Sindaco	Active
Garda Lake	Operativo	Active
Helsinki	Citizens with respiratory problems	Active
Helsinki	Business Owners	Active
Helsinki	Tourists	Active
Helsinki	Third party developers	Active
LonatoDelGarda	Sviluppatori	Active
LonatoDelGarda	Utenti	Active
Mostar-BosniaHerzegovina	Developers	Active
Mostar-BosniaHerzegovina	Users	Active
PontDuGard-Occitanie	Developers	Active
PontDuGard-Occitanie	Users	Active
Sardegna	Cagliari	Active

Users vs Organizations

Dashboard Content Structure Appearance People Modules Configuration Reports Help

Add content Find content Add user Antwerp Edit view Top search phrases People

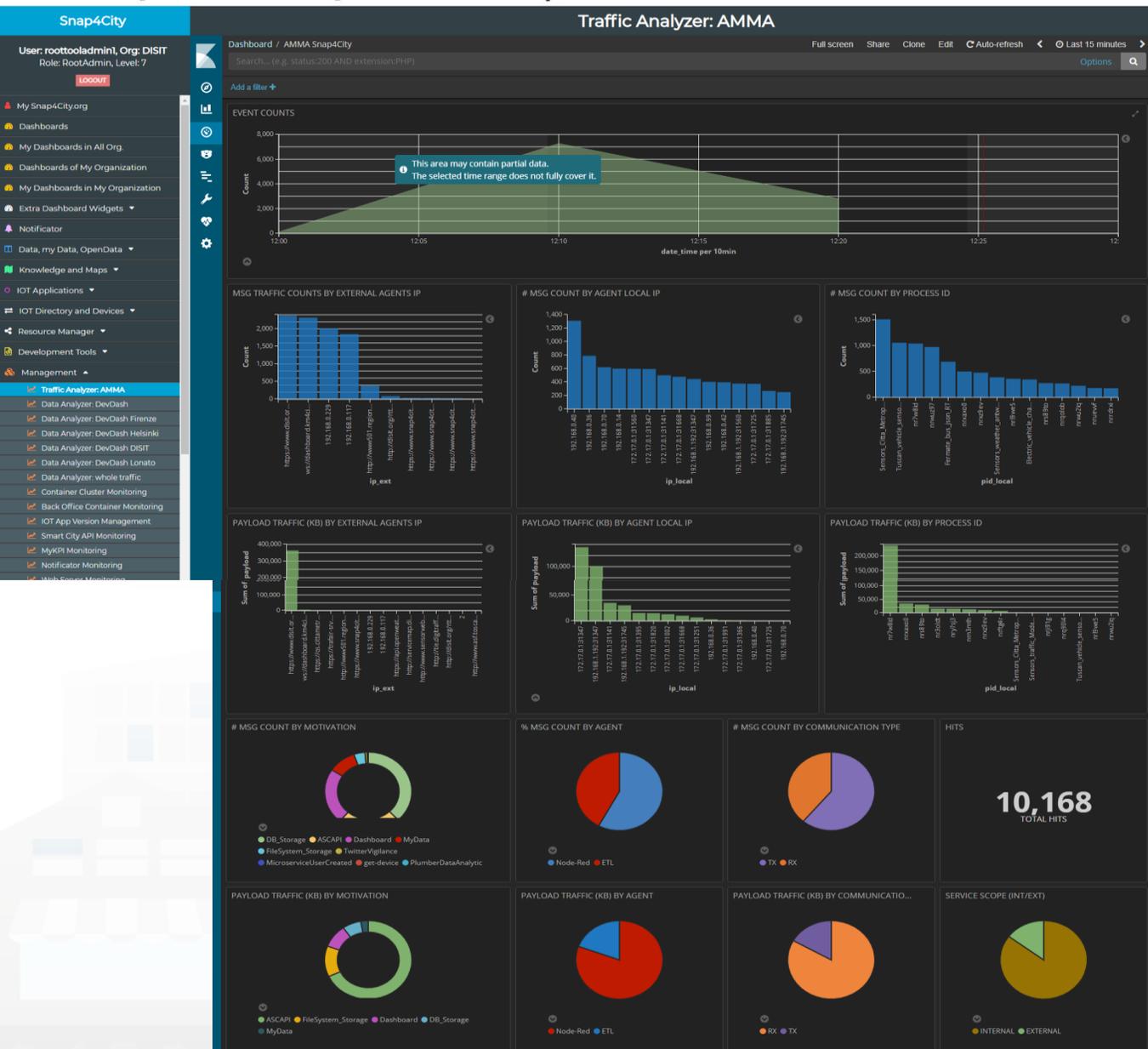
Home How and Why To Use it Tools Tutorials and Vid

Home / Users vs their Organization

Users vs their Organization

Name	Group membership	Roles	Last access	Active status
	DISIT	Manager	Fri, 09/25/2020 - 17:05	Yes
	Helsinki	Manager		Yes
	Mostar-BosniaHerzegovina	Manager	Sat, 04/25/2020 - 17:40	Yes
	DISIT	AreaManager	Mon, 03/04/2019 - 17:21	Yes
	DISIT	Manager	Wed, 09/23/2020 - 22:57	Yes
	DISIT	AreaManager	Wed, 09/16/2020 - 11:55	Yes
	Helsinki	Manager	Wed, 05/20/2020 - 12:30	Yes
	Helsinki	Manager	Mon, 08/05/2019 - 05:58	Yes
	DISIT	Manager	Wed, 09/02/2020 - 14:45	Yes
	DISIT	Manager	Thu, 04/16/2020 - 14:50	Yes
	DISIT	AreaManager		Yes
	Mostar-BosniaHerzegovina	Manager	Wed, 05/13/2020 - 14:45	Yes
	Helsinki	Manager		Yes
	Valencia	Manager	Sat, 05/09/2020 - 06:10	Yes
	LonatoDelGarda	Manager	Tue, 05/05/2020 - 05:41	Yes

1 2 3 4 5 6 7 8 9 ... next



- **Managing and Monitoring Data-Traffic in the BackOffice**

- **Data Traffic Analyzer**
 - Business intelligence
 - Faceted searches
 - Drill down on time

- **Several different views and details on data traffic among the main entities in the platform:**

- IOT APP
- Storage
- Data sources,
-

Event Logger

- There are API for Event Logger, REST API
 - They are automatically used by most of the Snap4City MicroServices
 - They log in standard Rsyslog API
 - <https://www.snap4city.org/56>
- The Logs regarding messages passed and usage are logged and accessed with the AMMA tools that is based on OpenDistro per Elastic Search and Kibana.
 - Former version was made in Hbase and SOLR, and Banana
- Additional Logs events can be logged by using a dedicated MicroService in Node-RED, IOT Apps



User: rootooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

LOGOUT

- Micro Applications
- External Services
- Data Set Manager: Data Gate
- Resource Manager: Process Loader
- Development Tools
- Management
 - Traffic Analyzer: AMMA
 - Data Analyzer: DevDash
 - Container Cluster Monitoring
 - Back Office Container Monitoring
 - Smart City API Monitoring
 - MyKPI Monitoring
 - Notifier Monitoring
 - Web Server Monitoring
 - Back Office DWH Sched DISCES
 - Back Office DA Sched DISCES
 - Back Office DISCES monitor
 - Mobile Application Monitoring
 - Mng Anonymous Photos Comments
 - Mng Photos Comments HelAnt
 - Mng Online Helps
 - Config ResDash
 - Mesos view
 - DISCES-EM
 - DISCES-EM tail
 - IOT App for Conf Clust Monitor
 - Smart Decision Support Sys
 - Resilience Decision Support Sys
 - DataGate Harvester
 - Settings
 - User Management and Auditing
 - Help and Contacts
 - Documentation and Articles
 - My Profile
 - Km4City portal
 - DISIT Lab portal

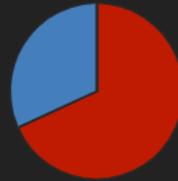


MSG COUNT BY MOTIVATION



DB_Storage ASCAPI Dashboard FileSystem_Storage MyData
PlumberDataAnalytic MicroserviceUserCreated

% MSG COUNT BY AGENT



ETL Node-Red

MSG COUNT BY COMMUNICATION TYPE



TX RX

HITS

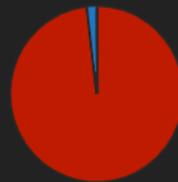
1,922,214
TOTAL HITS

PAYLOAD TRAFFIC (KB) BY MOTIVATION



ASCAPI FileSystem_Storage Dashboard DB_Storage MyData

PAYLOAD TRAFFIC (KB) BY AGENT



Node-Red ETL

PAYLOAD TRAFFIC (KB) BY COMMUNICATION TYPE



RX TX

SERVICE SCOPE (INT/EXT)



INTERNAL EXTERNAL

FACET FIELDS

motivation
Select...

agent
Select...

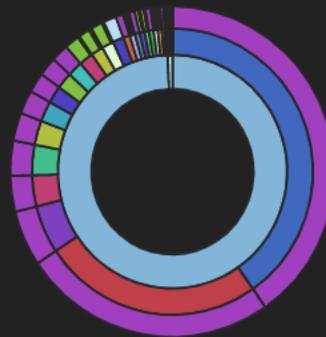
service_scope
Select...

ip_ext
Select...

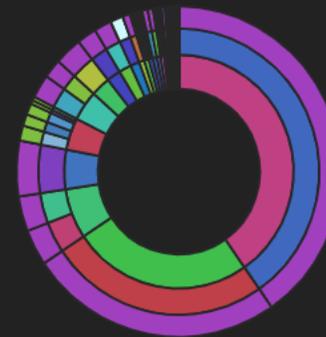
lang
x x

ip_local
Select...

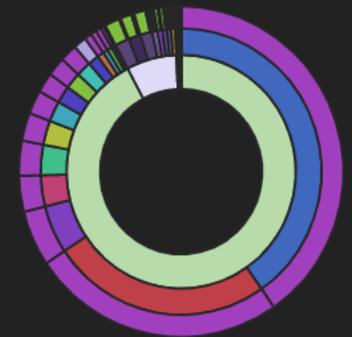
IP TRAFFIC (KB) BY COMMUNICATION MODE



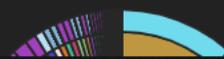
IP TRAFFIC (KB) BY PID_LOCAL



IP TRAFFIC (KB) BY MOTIVATION



IP TRAFFIC (COUNTS) BY COMMUNICATION MODE



IP TRAFFIC (COUNTS) BY PID_LOCAL



IP TRAFFIC (COUNTS) BY MOTIVATION



Snap4City

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

LOGOUT

- My Snap4City.org
- Dashboards
- My Dashboards in All Org.
- Dashboards of My Organization
- My Dashboards in My Organization
- Extra Dashboard Widgets ▾
- Notificator
- Data, my Data, OpenData ▾
- Knowledge and Maps ▾
- IOT Applications ▾
- IOT Directory and Devices ▾
- Resource Manager ▾
- Development Tools ▾
- Management ▾

Traffic Analyzer: AMMA

- Data Analyzer: DevDash
- Data Analyzer: DevDash Firenze
- Data Analyzer: DevDash Helsinki
- Data Analyzer: DevDash DISIT
- Data Analyzer: DevDash Lonato
- Data Analyzer: whole traffic
- Container Cluster Monitoring
- Back Office Container Monitoring
- IOT App Version Management
- Smart City API Monitoring
- MyKPI Monitoring
- Notificator Monitoring
- Web Server Monitoring

Traffic Analyzer: AMMA

● MyData

● Node-Red ● ETL

● RX ● TX

● INTERNAL ● EXTERNAL

FACET FIELDS

motivation
Select...

agent
Select...

service_scope
Select...

ip_ext
Select...

lang
x x

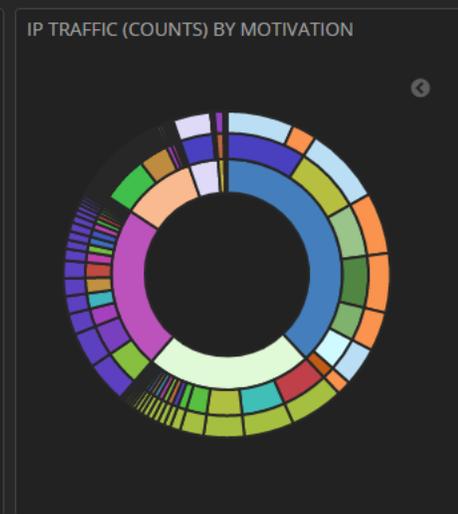
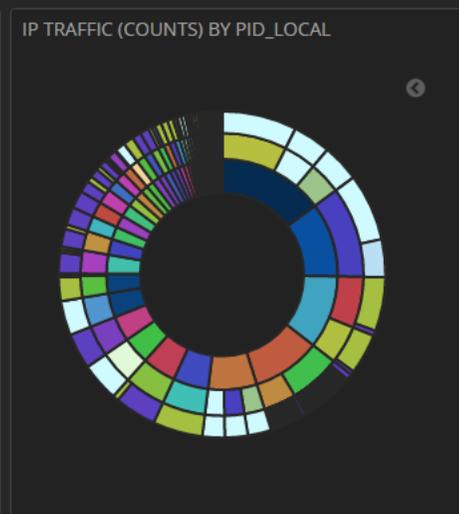
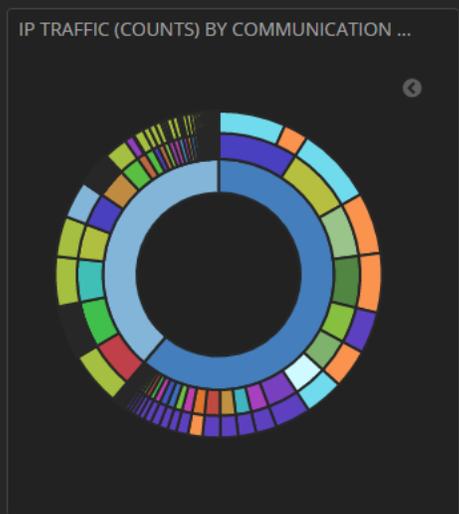
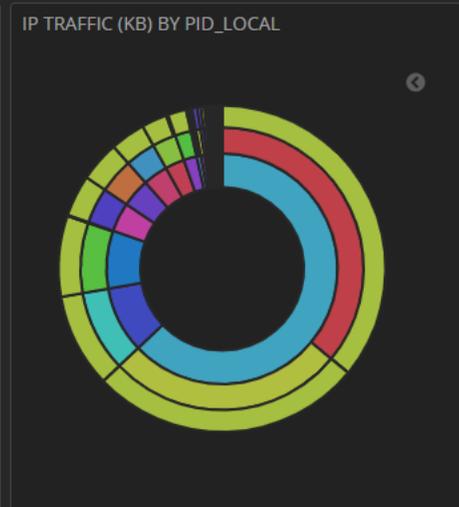
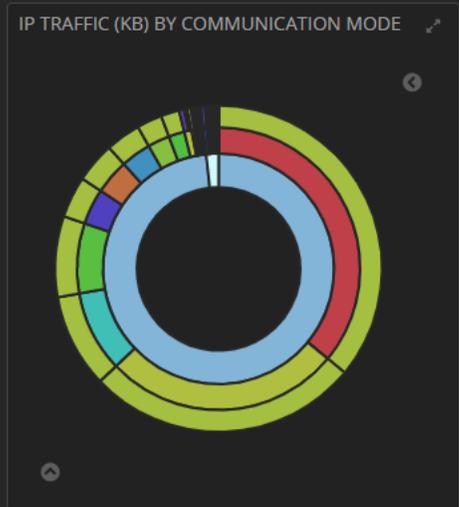
ip_local
Select...

pid_local
Select...

com_mode
Select...

service_uri
x x

Clear form Cancel changes Apply changes





Snap4City

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

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- Back Office DWH Sched DISCES
- Back Office DA Sched DISCES

Traffic Analyzer: AMMA

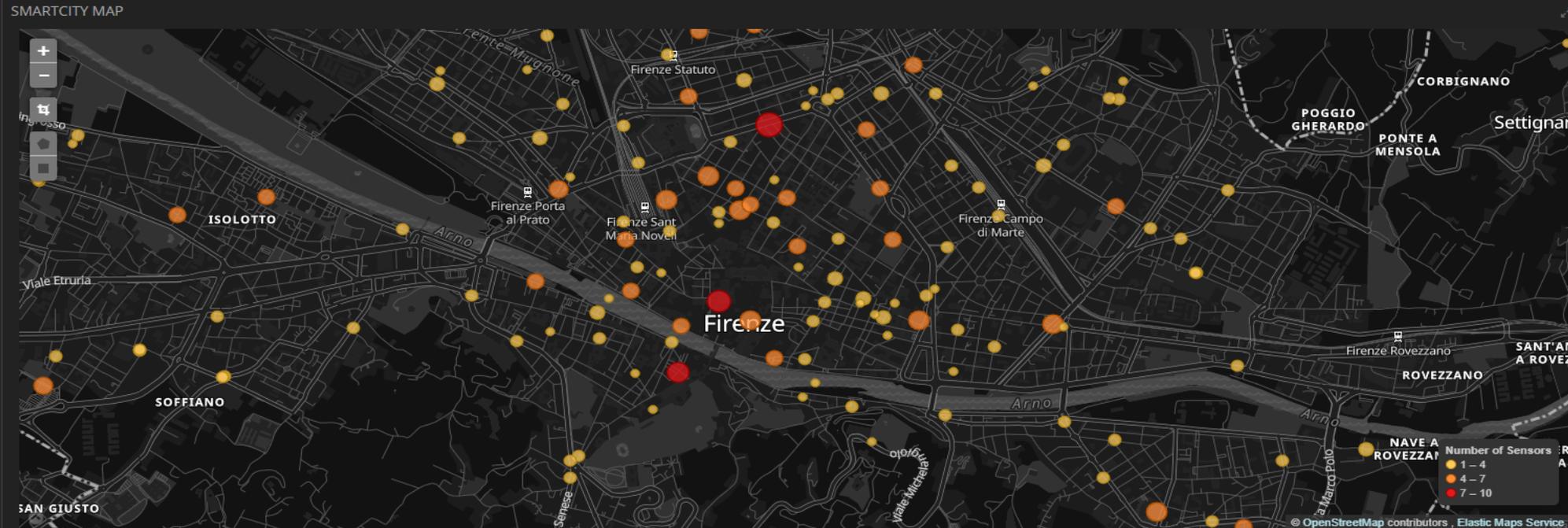


TABLE PANEL

1-50 of 10,167

Time	agent	com_mode	ip_ext	ip_local	lang	lat	lon	message	motivation	payload	service_uri	pid_local
October 11th 2020, 12:24:31.128	Node-Red	RX	https://www.disit.org/super-servicemap/api/v1	172.17.0.1:31809		43.799	11.254	undefined	ASCAPI		undefined	nr82yu8
October 11th 2020, 12:24:30.595	Node-Red	TX	ws://dashboard.km4city.org:8080/server	172.17.0.1:31668	undefined	43.799	11.254	undefined	Dashboard	1.775	undefined	nrxz9ev
October 11th 2020, 12:24:30.413	Node-Red	TX	ws://dashboard.km4city.org:8080/server	172.17.0.1:31668	undefined	43.799	11.254	undefined	Dashboard	1.795	undefined	nrxz9ev
October 11th 2020, 12:24:30.234	Node-Red	TX	ws://dashboard.km4city.org:8080/server	172.17.0.1:31668	undefined	43.799	11.254	undefined	Dashboard	1.776	undefined	nrxz9ev
October 11th 2020, 12:24:30.226	Node-Red	TX	ws://dashboard.km4city.org:8080/server	172.17.0.1:31725	undefined	43.799	11.254	undefined	Dashboard	1.764	undefined	nr19we5



Snap4City

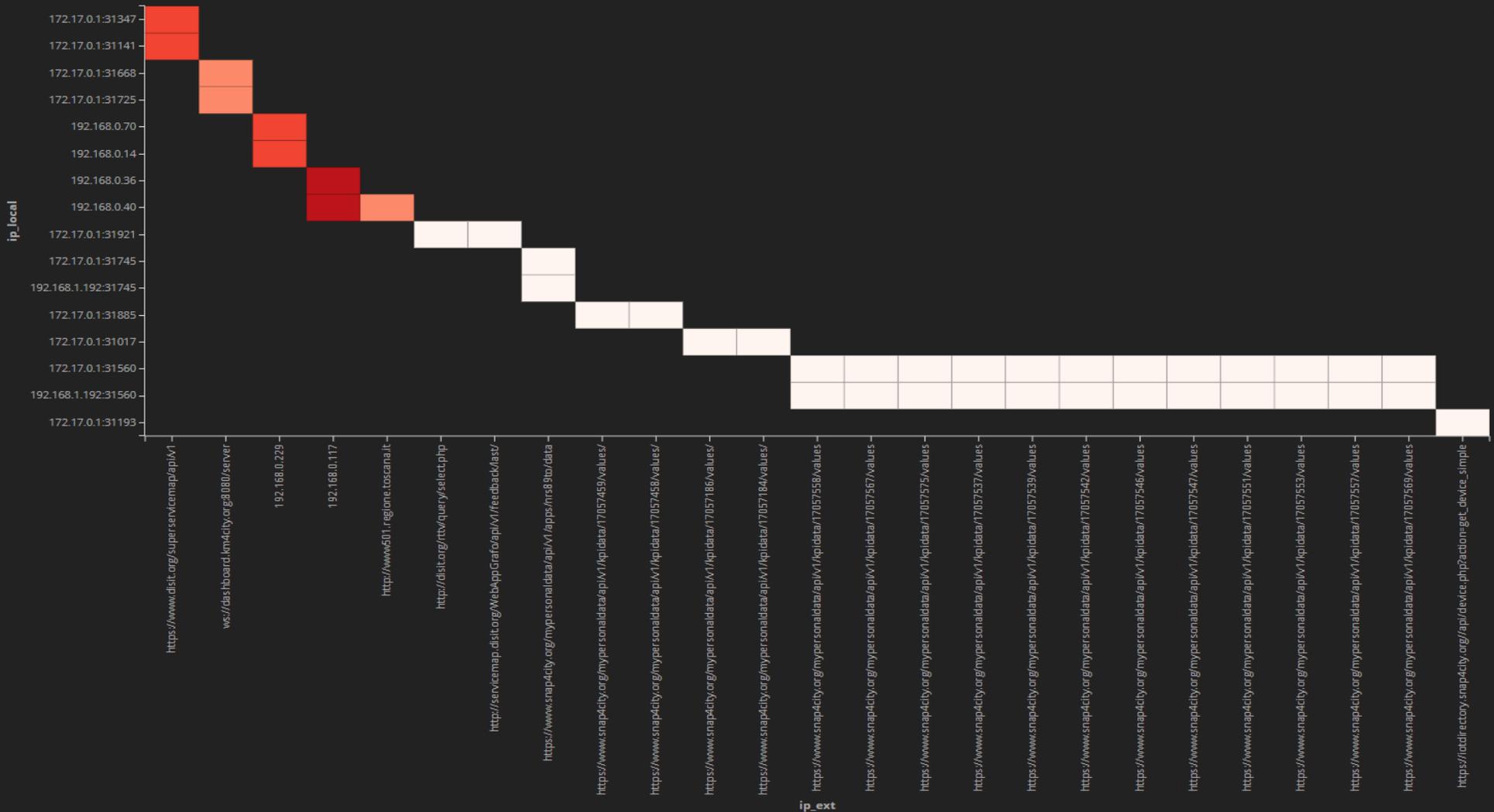
User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

LOGOUT

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- Dashboards
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- Dashboards of My Organization
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Traffic Analyzer: AMMA

HEATMAP



AMMA (1)

Monitor data traffic flows among IoT devices, services, applications etc. and detect potential anomalies

Unexpected behaviors can be revealed by inspecting the data flow time trend:

a) detecting peaks or valleys in the trend

b) drill-down on data to identify single/more malfunctioning devices and/or services

quantitatively monitoring data/message traffic and flows



AMMA (2)

Make drill-down activities on data related to a single Process ID and check for unexpected behavior in the Time Trend panel:

c) Filtering data by the Process ID (e.g. for example those related to a SmartWaste container)

d) Detect a peak with more data traffic than expected during its scheduled activity, by properly filtering on time, the single data portion corresponding to the unexpected data flow can be viewed

e) Locate on map the single involved device or service



TOP

DataAnalyzer (DevDash): monitoring and browsing data ingested into OpenDistro per Elastic Search, via Kibana



- Data Analyzer: DevDash
- Data Analyzer: DevDash Firenze
- Data Analyzer: DevDash Helsinki
- Data Analyzer: DevDash DISIT
- Data Analyzer: DevDash Lonato
- Data Analyzer: whole traffic

DevDash: My Data Dashboard Kibana



Snap4City

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

[LOGOUT](#)

- [My Snap4City.org](#)
- [Dashboards](#)
- [My Dashboards in All Org.](#)
- [Dashboards of My Organization](#)
- [My Dashboards in My Organization](#)
- [My Data Dashboard Dev Kibana](#)
- [My Data Dashboard Kibana](#)
- [Extra Dashboard Widgets](#)
- [Notificator](#)
- [Data, my Data, OpenData](#)
- [Knowledge and Maps](#)
- [IOT Applications](#)
- [IOT Directory and Devices](#)
- [Resource Manager](#)
- [Development Tools](#)
- [Management](#)
- [Decision Support Systems](#)
- [Settings](#)
- [User Management and Auditing](#)
- [Help and Contacts](#)
- [Documentation and Articles](#)
- [My Profile](#)
- [Km4City portal](#)
- [DISIT Lab portal](#)

My Data Dashboard Kibana

+ Add filter

COUNTEVENTS

HITS

7,642,593

TOTAL HITS

EVENT COUNTS

FACET FIELDS v1

organization
Select...

nature
Select...

sub nature
Select...

groups
Select...

kind
Select...

value name
Select...

device name
Select...

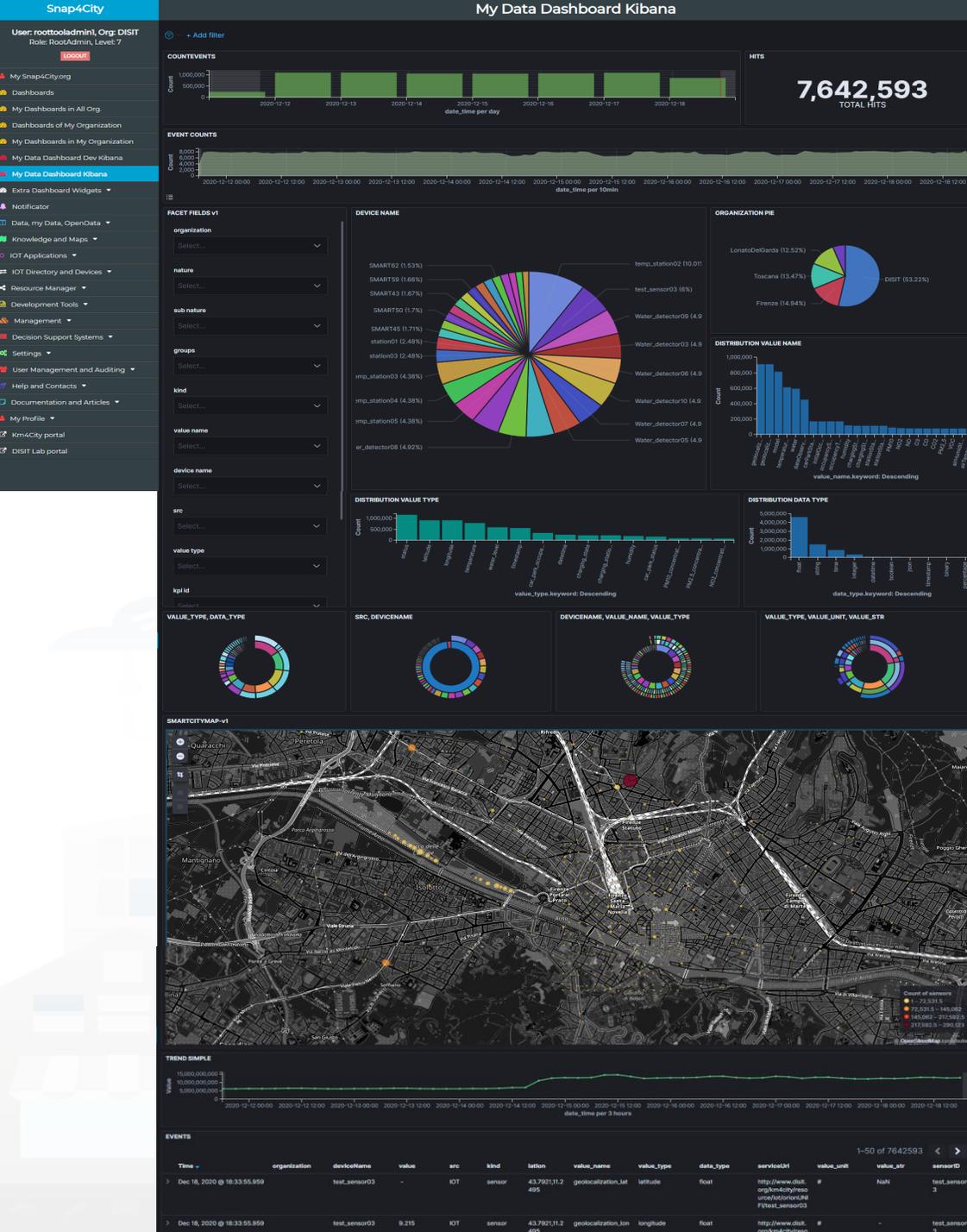
DEVICE NAME

Device Name	Percentage
temp_station02	10.01%
test_sensor03	6%
Water_detector09	4.9%
Water_detector03	4.9%
Water_detector06	4.9%
Water_detector10	4.9%
Water_detector07	4.9%
Water_detector05	4.9%
er_detector08	4.92%
mp_station03	4.38%
mp_station04	4.38%
mp_station05	4.38%
station01	2.48%
station03	2.48%
SMART45	1.71%
SMART43	1.67%
SMART59	1.66%
SMART62	1.53%
SMART50	1.7%

ORGANIZATION PIE

Organization	Percentage
DISIT	53.22%
Toscana	13.47%
Firenze	14.94%
LonatoDelGarda	12.52%

DISTRIBUTION VALUE NAME



Business Analysis Dashboards For all kind of users: DevDash

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



- Multi faceted Search by
 - Devices
 - Organization
 - Drill on Time
 - Drill on Map
 - Value Types
 - Data Type
 - Value name
 - Data table
 - Etc.



- Respect Privacy and GDPR



VALUE_TYPE, DATA_TYPE

SRC, DEVICENAME

DEVICENAME, VALUE_NAME, VALUE_TYPE

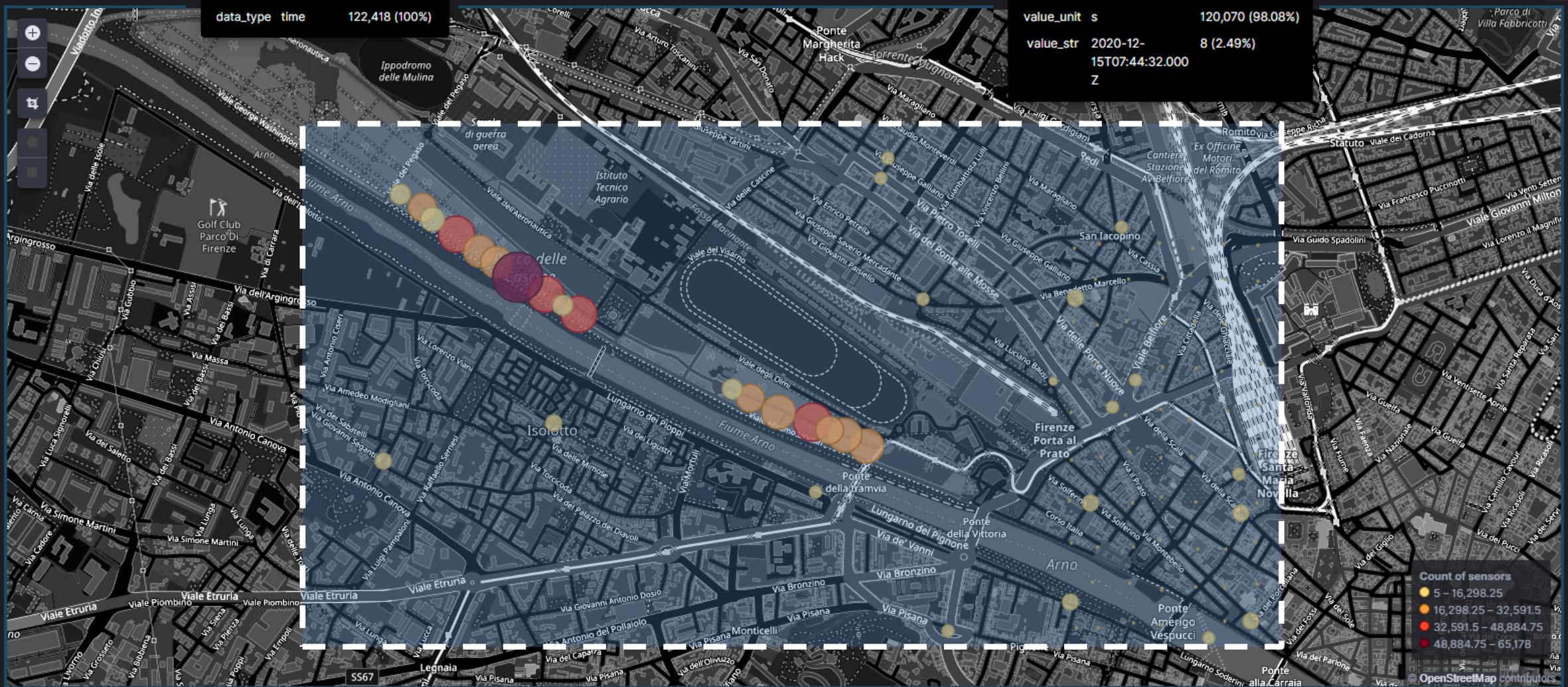
VALUE_TYPE, VALUE_UNIT, VALUE_STR



SMARTCITYMAP-v1

field	value
value_type	timestamp 122,418 (22.9%)
data_type	time 122,418 (100%)

field	value
value_type	timestamp 122,418 (33.17%)
value_unit	s 120,070 (98.08%)
value_str	2020-12-15T07:44:32.000Z 8 (2.49%)



Count of sensors

5 - 16,298.25
16,298.25 - 32,591.5
32,591.5 - 48,884.75
48,884.75 - 65,178

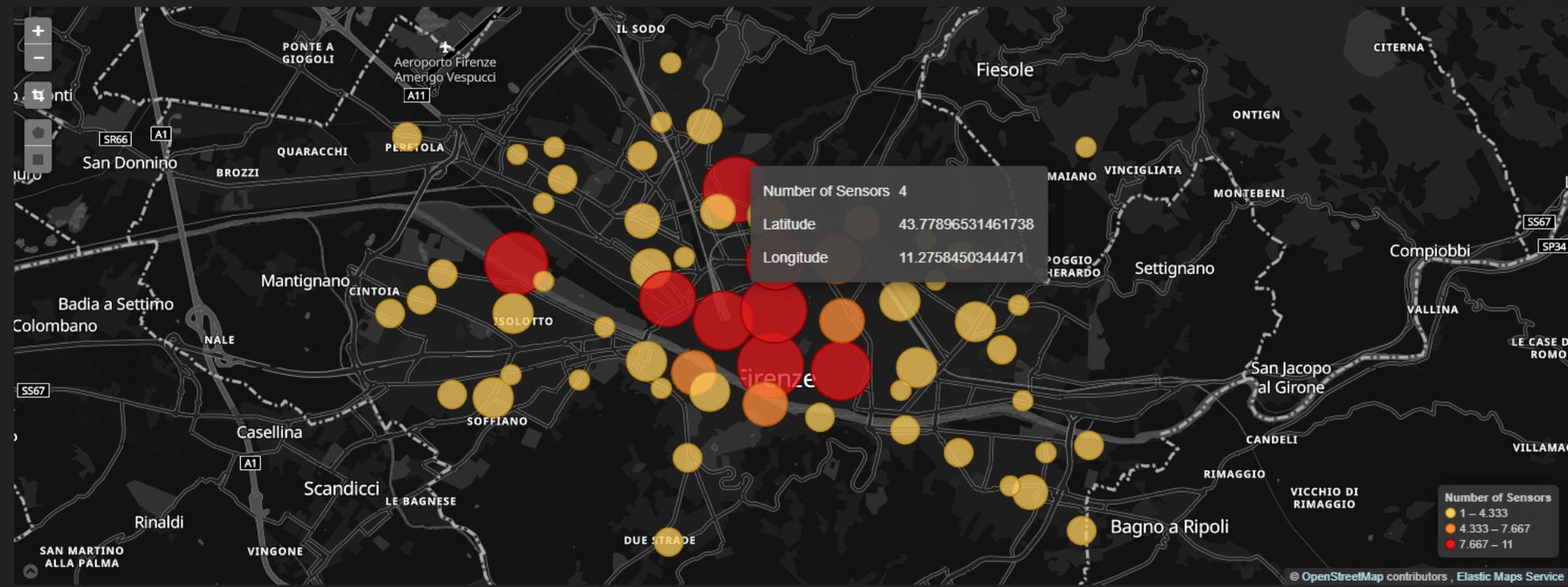
User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

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- Notificator Monitoring
- Web Server Monitoring
- Back Office DWH Sched DISCES
- Back Office DA Sched DISCES
- Back Office DISCES monitor
- Mobile Application Monitoring

SMARTCITYMAP



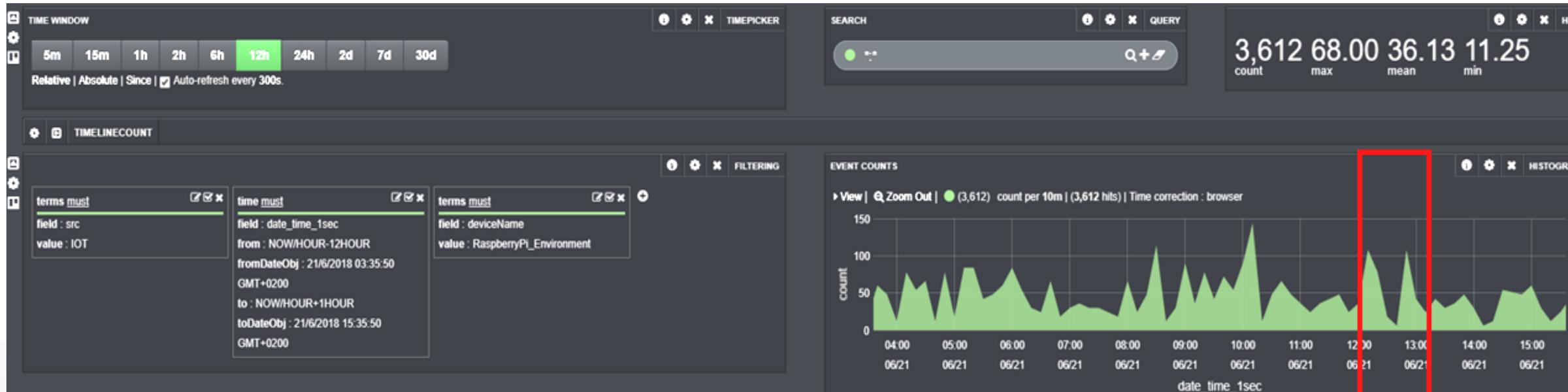
EVENTS

1-50 of 176,794

Time	organization	deviceName	value	src	kind	latlon	value_name	value_type	data_type	serviceUri	value_unit	value_str
▶ October 11th 2020, 12:33:52.790		test_sensor03	9,215	IOT	sensor	43.7921,11.2495	geolocalization_lon	longitude	float	http://www.disit.org/km4city/resource/iot/orionUNIFI/test_sensor03	#	-
▶ October 11th 2020, 12:33:52.790		test_sensor03	24	IOT	sensor	43.7921,11.2495	temperature	temperature	float	http://www.disit.org/km4city/resource/iot/orionUNIFI/test_sensor03	°C	-
▶ October 11th 2020, 12:33:52.790		test_sensor03	-	IOT	sensor	43.7921,11.2495	geolocalization_lat	latitude	float	http://www.disit.org/km4city/resource/iot/orionUNIFI/test_sensor03	#	NaN
▶ October 11th 2020, 12:33:52.492	DISIT	tesbox3	1,602,412,480,000	IOT	sensor	43.79737,11.3063	timestamp	timestamp	timestamp	http://www.disit.org/km4city/reso	#	-

DevDash Case Study (2)

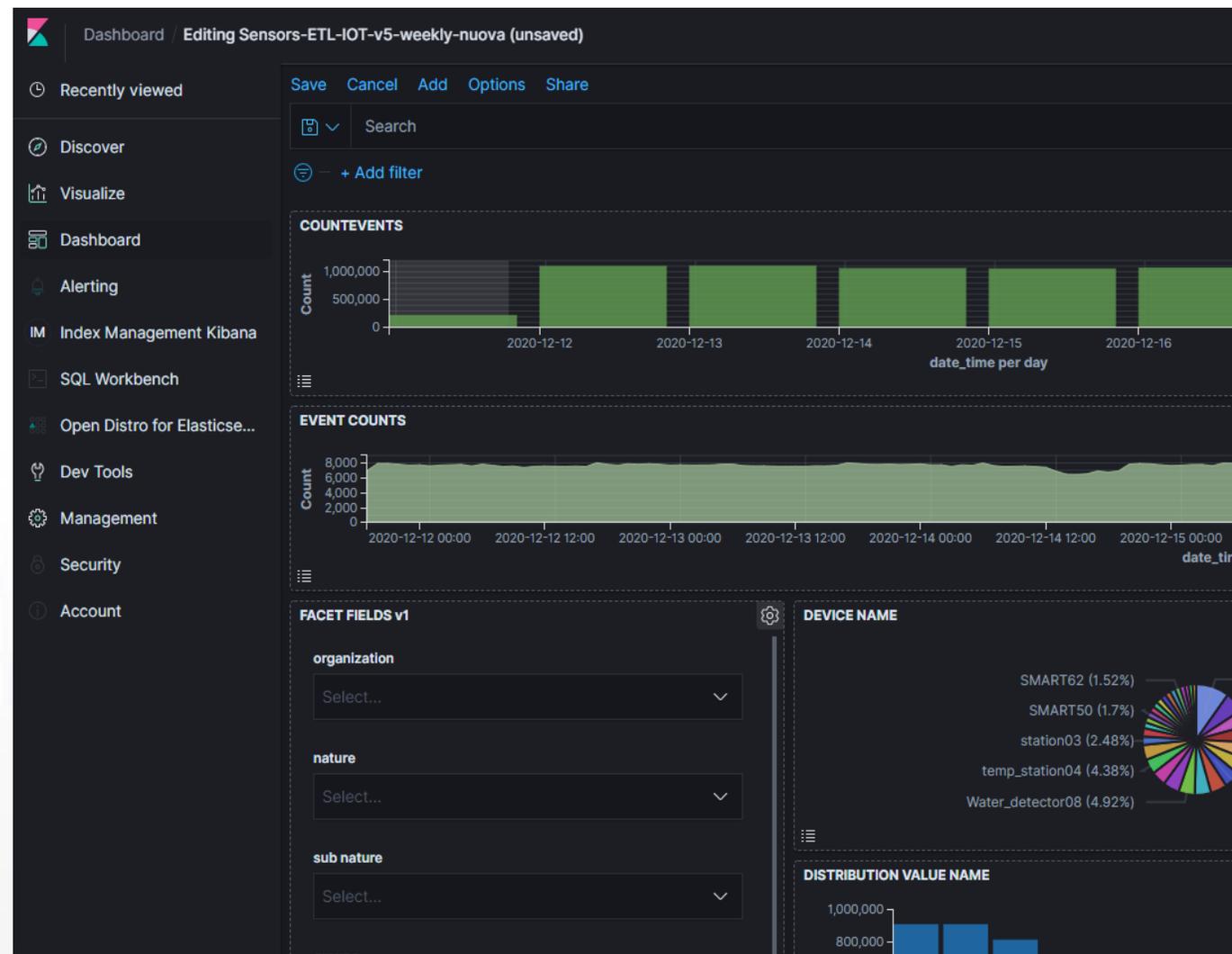
- Detect potential anomalies or disfunctions by inspecting the DevDash tool time trend





My Data Dashboard Customization

- My Data Dashboards (for Developers and for Managers) can be customized by RootAdmin.
 - Authority for Customization can be also extended to other role on Premise solutions
- Customizations is based on Full editing Capabilities of Kibana OpenDistro per Elastic Search 7.1, and with multiple indexes of Snap4City



TOP

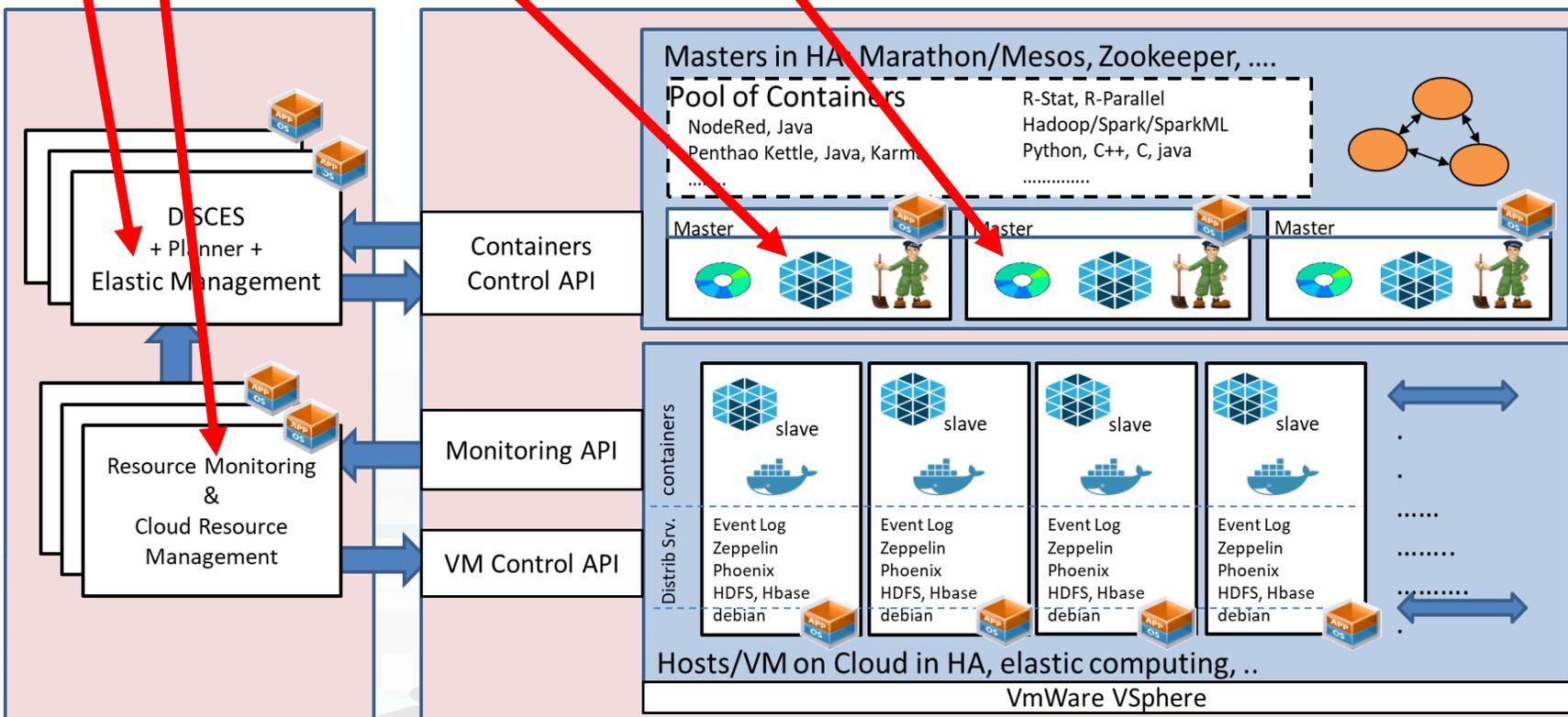
Back office Platform Scalability Containers Management and Monitoring



Managing Back Office Processes on Containers

- Container Cluster Monitoring
- Back Office Container Monitoring
- Mesos view
- DISCES-EM
- DISCES-EM tail

- Containers:
 - IOT App,
 - Web Crawling,
 - (ETL processes),
 - Data Analytics in R Studio,
 - Data Analytics in Python
- Elastic management
- Management via
 - Marathon
 - Mesos
 - DISCES EM
- Possible on Kubernetes



Elastic Scaling: allocating / deallocating

- Allocation/ deallocation, Rebalancing vs compacting
 - Vertical of resources: Docker and/or VM: CPU, Mem
 - NodeJS multi-flow for each Docker, the user request data flows and IOT App, Snap4City allocates them dynamically on demand and perform workload optimization
 - VM: management of Mem, CPU; transparent and automatic in DRS VMware
 - Horizontal of resources of Dockers and/or VM and/or [Host]:
 - Docker: addition of containers, migrations/moving, balancing (per moving) of IOT App
 - VM: on/off
- Monitoring resources:
 - VM via VMware API, Docker via Marathon and Mesos APIs
- Algorithm in Python for scaling, actions via APIs: VMware, Marathon,...



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB



Container

SNAP4CITY



- Container Cluster Monitoring
- Back Office Container Monitoring
- Mesos view
- DISCES-EM
- DISCES-EM tail

MARATHON Applications Deployments

Search all applications

STATUS: Running 209, Deploying, Suspended, Delayed, Waiting 1, HEALTH: Healthy 209, Unhealthy, Unknown, LABEL: Select, RESOURCES: Volumes

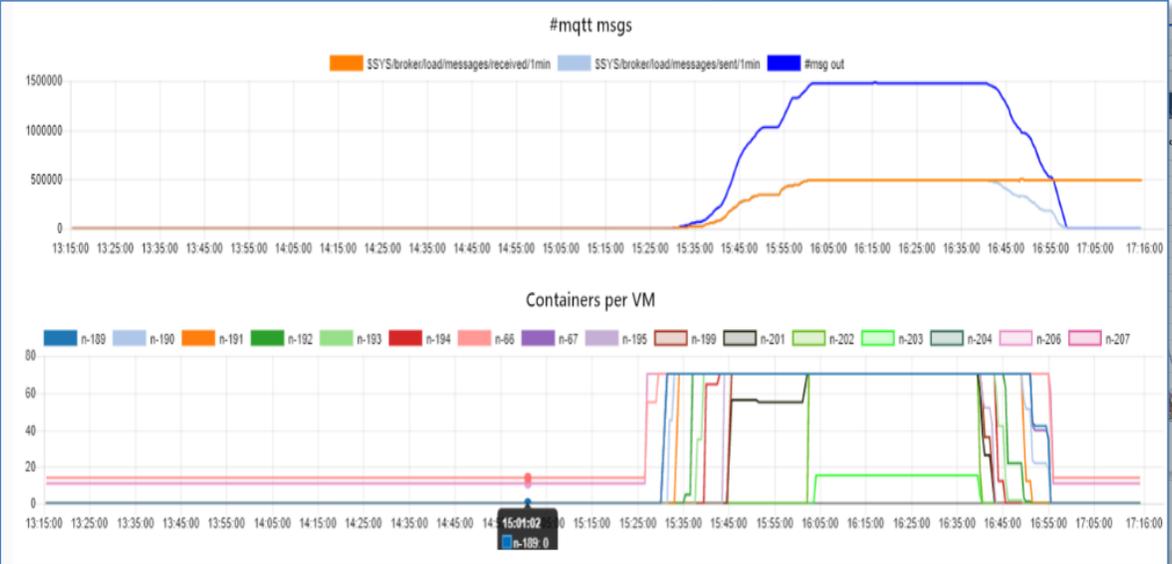
Name	CPU	Memory	Status	Running Instances	Health
nr11zbl	0.1	140 MIB	Waiting	1 of 1	
nr1g3ng	0.1	140 MIB	Running	1 of 1	
nr7ccn	0.1	140 MIB	Running	1 of 1	
nr4mrs	0.1	140 MIB	Running	1 of 1	
nrhraq	0.1	140 MIB	Running	1 of 1	
nr-test-001	0.1	140 MIB	Running	1 of 1	
nr-test-002	0.1	140 MIB	Running	1 of 1	
nr-test-003	0.1	140 MIB	Running	1 of 1	
nr-test-004	0.1	140 MIB	Running	1 of 1	
nr-test-005	0.1	140 MIB	Running	1 of 1	
nr-test-006	0.1	140 MIB	Running	1 of 1	
nr-test-007	0.1	140 MIB	Running	1 of 1	
nr-test-008	0.1	140 MIB	Running	1 of 1	
nr-test-009	0.1	140 MIB	Running	1 of 1	
nr-test-010	0.1	140 MIB	Running	1 of 1	
nr-test-011	0.1	140 MIB	Running	1 of 1	

MESOS Frameworks Agents Roles Offers Maintenance

Master Agents

Agents

ID	Host	CPUs (Allocated / Total)	GPUs (Allocated / Total)	Mem (Allocated / Total)	Disk (Allocated / Total)	Registered	Re-Registered
...ed7e77068927-S7	192.168.1.195	5.95 / 6	0 / 0	9.6 GB / 15.3 GB	8.8 GB / 23.2 GB	18 hours ago	18 hours ago
...ed7e77068927-S6	192.168.1.207	5.95 / 6	0 / 0	9.6 GB / 15.3 GB	8.8 GB / 23.2 GB	14 hours ago	14 hours ago
...ed7e77068927-S5	192.168.1.206	5.95 / 6	0 / 0	9.6 GB / 15.3 GB	8.8 GB / 23.2 GB	13 hours ago	13 hours ago
...ed7e77068927-S4	192.168.1.204	5.95 / 6	0 / 0	9.6 GB / 15.3 GB	8.8 GB / 23.2 GB	13 hours ago	13 hours ago
...ed7e77068927-S1	192.168.1.201	5.95 / 6	0 / 0	9.6 GB / 15.3 GB	8.8 GB / 23.2 GB	13 hours ago	13 hours ago
			0 / 0	5.6 GB / 15.3 GB	5.1 GB / 23.2 GB	44 minutes ago	44 minutes ago



Resource Allocation Performance Configuration Tasks & Events Alarms Permissions Maps Storage Views Hardware Status

07/2017 18:23:04 Chart Options... Switch to: CPU

Rollup	Units	Latest	Maximum	Minimum	Average
Average	MHz	26368	28717	2600	15541.294
Average	Percent	25.16	25.16	3.04	1
Average	Percent	21.18	26.82	3.97	1
Average	Percent	20.08	26.77	1.08	1
Average	Percent	23.62	30.14	4.23	1
Average	Percent	15.71	23.44	6.61	1

vmware vSphere



Cluster status

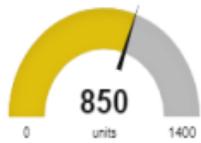


panesi

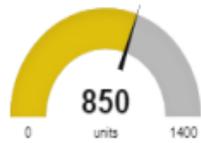
ToolAdmin | Idap

- Dashboards
- Notifier
- IOT Applications
- IOT Directory and Devices
- Knowledge and Maps
- Micro Applications
- External Services
- Data Set Manager: Data Gate
- Resource Manager: Process Loader
- Development Tools
- Management
 - Traffic Analyzer: AMMA
 - Data Analyzer: DevDash
 - Back Office Res. Analyzer: ResDash
 - Container Cluster Monitoring**
 - Back Office Container Monitoring
 - Smart City API Monitoring
 - Notifier Monitoring
 - Web Server Monitoring
 - Back Office Scheduler DISCES
 - Mobile Application Monitoring
 - Auditing Elements vs Ownership
 - Auditing Personal Data
 - Auditing Data Access Try-out
 - Auditing Accesses
- Settings

Containers



Tasks



#Healthy



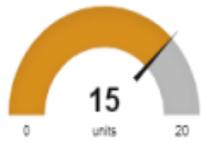
#Unhealthy



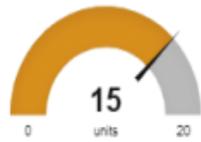
CPU trend



#VMs running



#VMs up



CPU



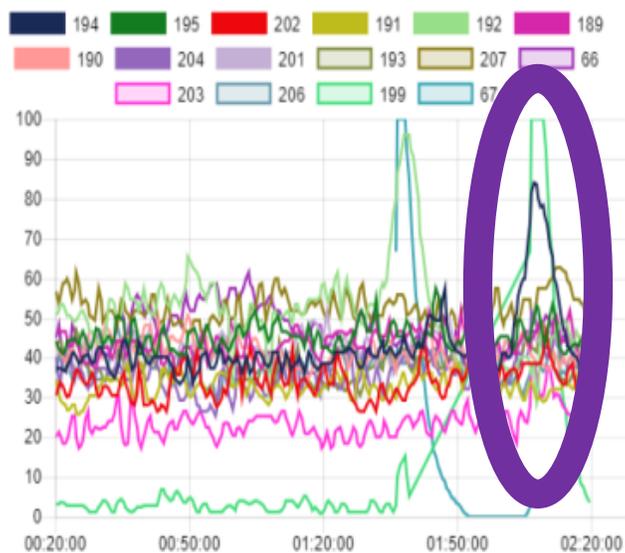
Memory



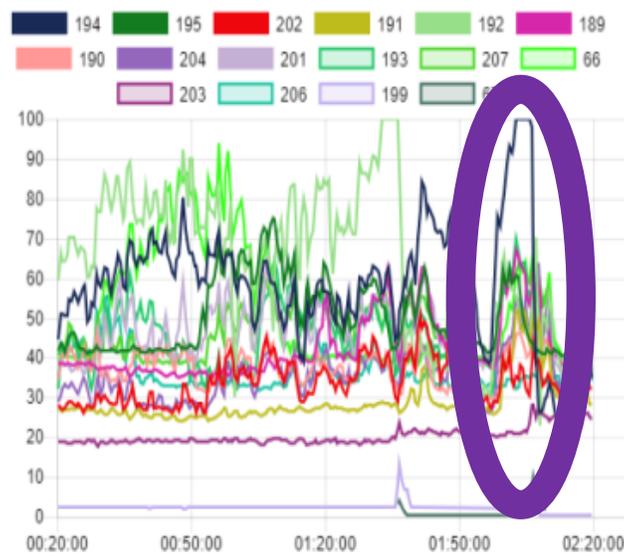
memory trend



Memory usage %



CPU usage %



#Containers



RESET GRAPH CPU/MEM USAGE

RESET GRAPH TASKS



panesi
ToolAdmin | ldap

- Dashboards
- Notifier
- IOT Applications
- IOT Directory and Devices
- Knowledge and Maps
- Micro Applications
- External Services
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 - Auditing Personal Data
 - Auditing Data Access Try-out
 - Auditing Accesses
- Settings
- Help and Contacts
- Documentation and Articles
- My Profile
- Snap4City portal

#mqtt msg rcvcd/min



#mqtt msg sent/min



#msg in output/min



Total MSG: 1.054.566.71

RESET TOTAL

RESET CHART

START 100 TEST APPS

test apps 837

STOP 100 TEST APPS

START MQTT MSGS /2

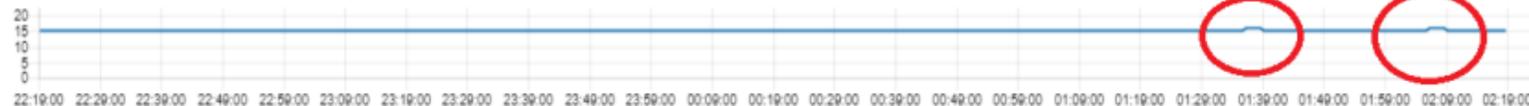
START MQTT MSGS

#mqtt gens: 22

STOP LAST MQTT GEN

STOP ALL MQTT MSGS

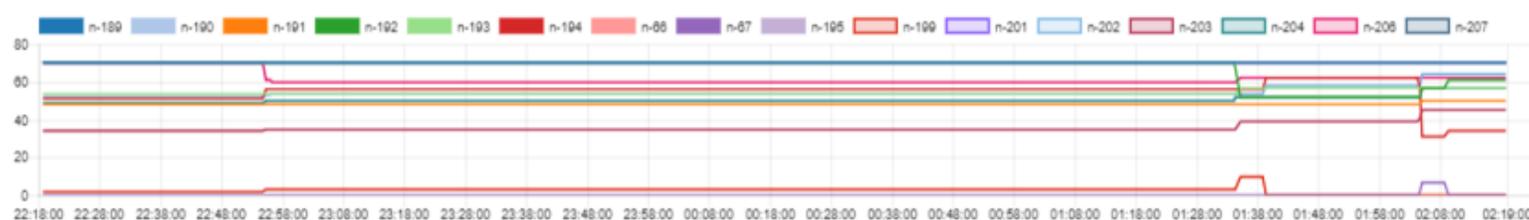
#VMs



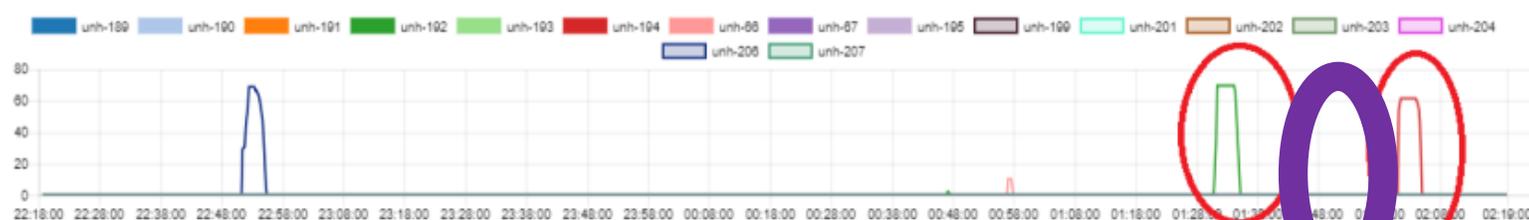
#mqtt msgs



Containers per VM



Unhealthy Containers per VM

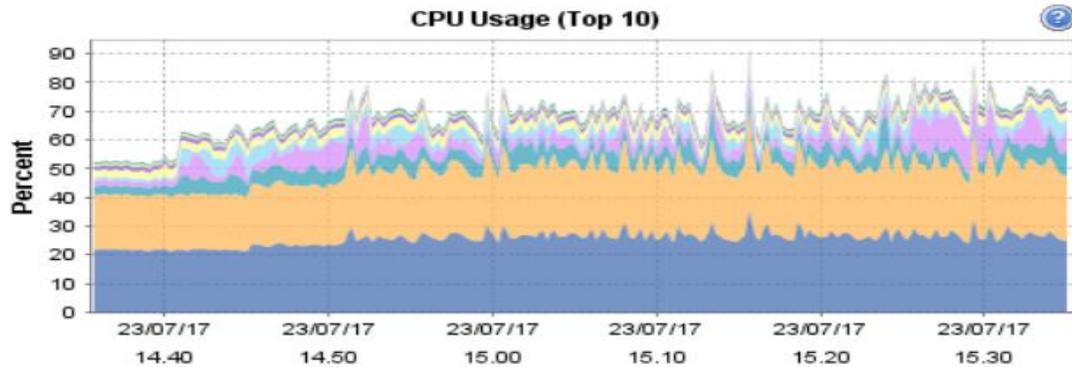


Docker Containers per VM

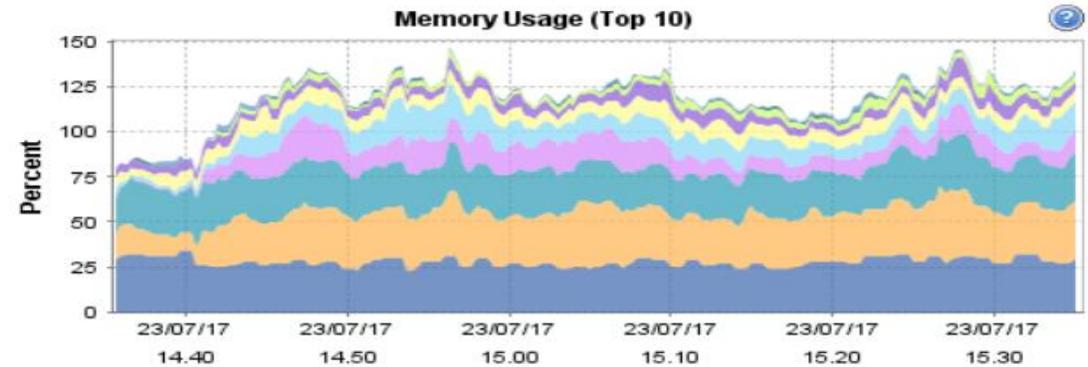
Computational Capabilities of Snap4City

- **Managing:**
 - **Periodic Processes** → ETL, IOT App (Node-RED)
 - **Asynchronous processes**, data driven, real time → Node-RED, IOT Applications
- **Scalability**
 - **Horizontal:** Increasing processes performing activities, demand on new processes for new users, for new applications, for new IOT applications: VM, Hosts, clusters, Storage SAN
 - **Vertical:** Increasing resources on processes: CPU, MEM, Storage, Network

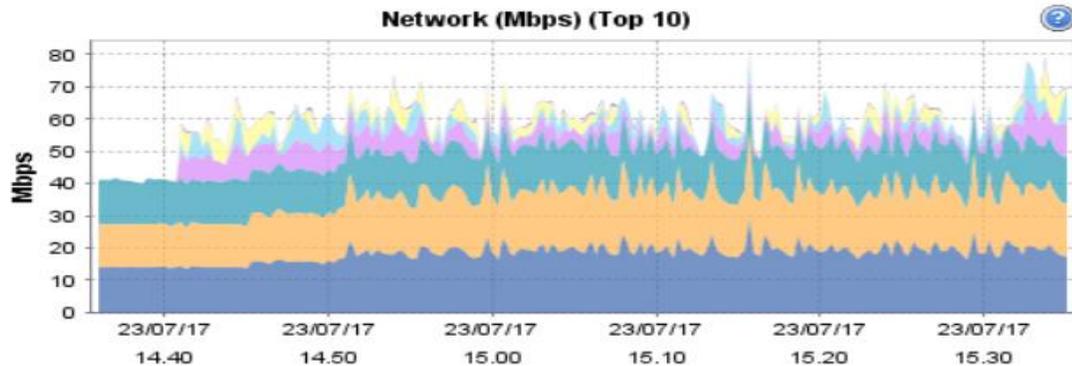
Monitoring on Cloud



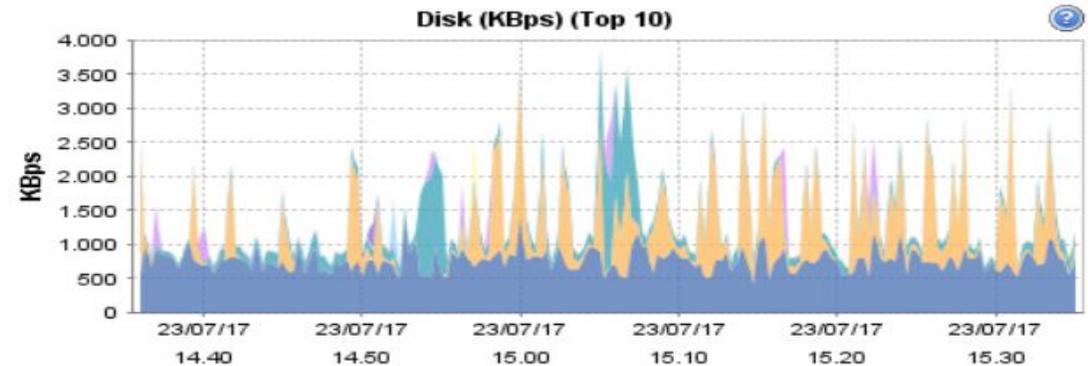
- Mesosphere-Slave-6-Debian8-194-...
- eclap.eu-db-running
- eclap-bp64net.eclap.eu-132-running
- TwitterVigilance-MasterHadoop-2...
- Mesos-Marathon-Development-Ubun...
- Mesosphere-Slave-5-Debian8-193-...
- eclap2-64bit.eclap.eu-54-running
- openmind.disit.org-1-25-running
- ebos0-eclap-bo-scheduler-39-run...
- ECLAP-LOD-Solr-INDEX-Ubuntu-125...



- Mesosphere-Slave-5-Debian8-193-...
- Mesosphere-Slave-6-Debian8-194-...
- eclap2-64bit.eclap.eu-54-running
- openmind.disit.org-1-25-running
- ebos0-eclap-bo-scheduler-39-run...
- eclap.eu-db-running
- eclap-bp64net.eclap.eu-132-running
- TwitterVigilance-MasterHadoop-2...
- ECLAP-LOD-Solr-INDEX-Ubuntu-125...
- eclap.eu-balancer-ubuntu-133-ru...



- Mesosphere-Slave-5-Debian8-193-...
- TwitterVigilance-MasterHadoop-2...
- eclap2-64bit.eclap.eu-54-running
- eclap.eu-balancer-ubuntu-133-ru...
- openmind.disit.org-1-25-running
- Mesosphere-Slave-6-Debian8-194-...
- eclap.eu-db-running
- eclap-bp64net.eclap.eu-132-running
- ECLAP-LOD-Solr-INDEX-Ubuntu-125...
- ebos0-eclap-bo-scheduler-39-run...



- TwitterVigilance-MasterHadoop-2...
- eclap.eu-db-running
- eclap2-64bit.eclap.eu-54-running
- eclap-bp64net.eclap.eu-132-running
- eclap.eu-balancer-ubuntu-133-ru...
- Mesosphere-Slave-6-Debian8-194-...
- Mesosphere-Slave-5-Debian8-193-...
- openmind.disit.org-1-25-running
- ECLAP-LOD-Solr-INDEX-Ubuntu-125...
- TwitterVigilance-Solr-PostgreSQL...

Container Cluster Intelligence via Zabbix

- Via ZABBIX
 - OpenDistro
 - Elastic Search
 - Kibana
- By VM/Host
- By Container
- By CPU, MEM, I/O
- Over time

The dashboard displays various metrics and visualizations for container cluster intelligence, including:

- Statistics of Containers:** Line graphs showing metrics over time for multiple hosts.
- Container table statistics:** Tables showing container status (pausa, esecuzione) with filters for host_ip.keyword.
- Pie chart for VM-application-mesos-id:** A donut chart showing the distribution of VMs across different applications.
- Time series - cpu-sum:** A line graph showing the sum of CPU values over time.
- Tag cloud for applications:** A visualization of application tags, with larger text indicating higher frequency.



Snap4City

Container Cluster Intelligence

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

Logout

- My Snap4City.org
- Tour Again
- ダッシュボード
- Dashboards (Public)
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Dashboard / Mesos-marathon-docker dashboard-nesi-non buttare

Full screen Share Clone Edit

Search

KQL

Last 4 hours

Show dates

Refresh

+ Add filter

Control

Application name

Select...

Instance

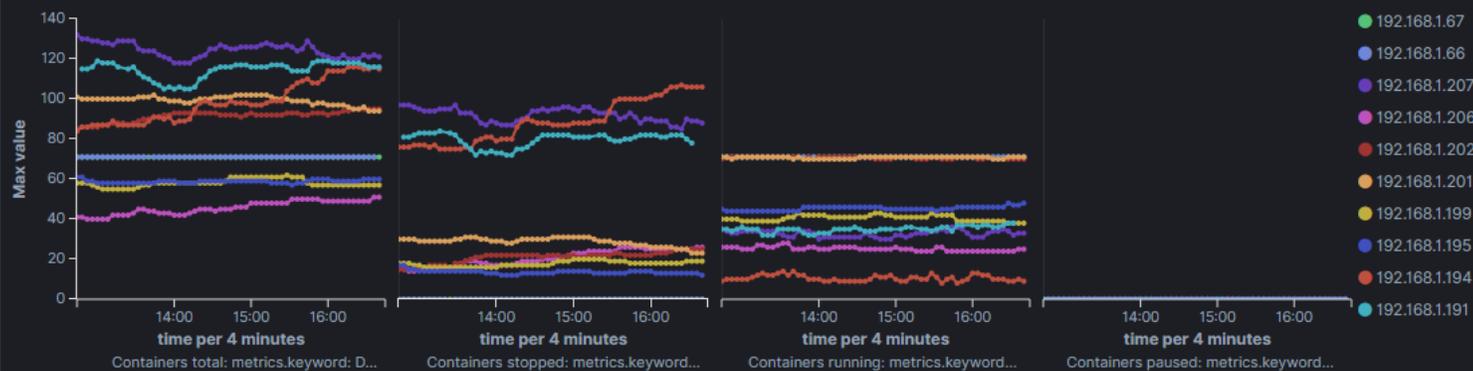
Select...

Apply changes

Cancel changes

Clear form

Statistics of Containers



Container table statistics

Container in pausa: filters

Container in esecuzione: filters

Container in totale: filters

Container stoppati: filters

host_ip.keyword: Descending	time per 4 minutes	Max value									
192.168.1.207	12:44	0	192.168.1.207	12:44	35	192.168.1.207	12:44	132	192.168.1.207	12:44	97
192.168.1.207	12:48	0	192.168.1.207	12:48	34	192.168.1.207	12:48	130	192.168.1.207	12:48	97
192.168.1.207	12:52	0	192.168.1.207	12:52	33	192.168.1.207	12:52	130	192.168.1.207	12:52	97
192.168.1.207	12:56	0	192.168.1.207	12:56	33	192.168.1.207	12:56	129	192.168.1.207	12:56	96
192.168.1.207	13:00	0	192.168.1.207	13:00	34	192.168.1.207	13:00	129	192.168.1.207	13:00	95
192.168.1.207	13:04	0	192.168.1.207	13:04	34	192.168.1.207	13:04	128	192.168.1.207	13:04	94
192.168.1.207	13:08	0	192.168.1.207	13:08	34	192.168.1.207	13:08	128	192.168.1.207	13:08	94
192.168.1.207	13:12	0	192.168.1.207	13:12	34	192.168.1.207	13:12	127	192.168.1.207	13:12	94

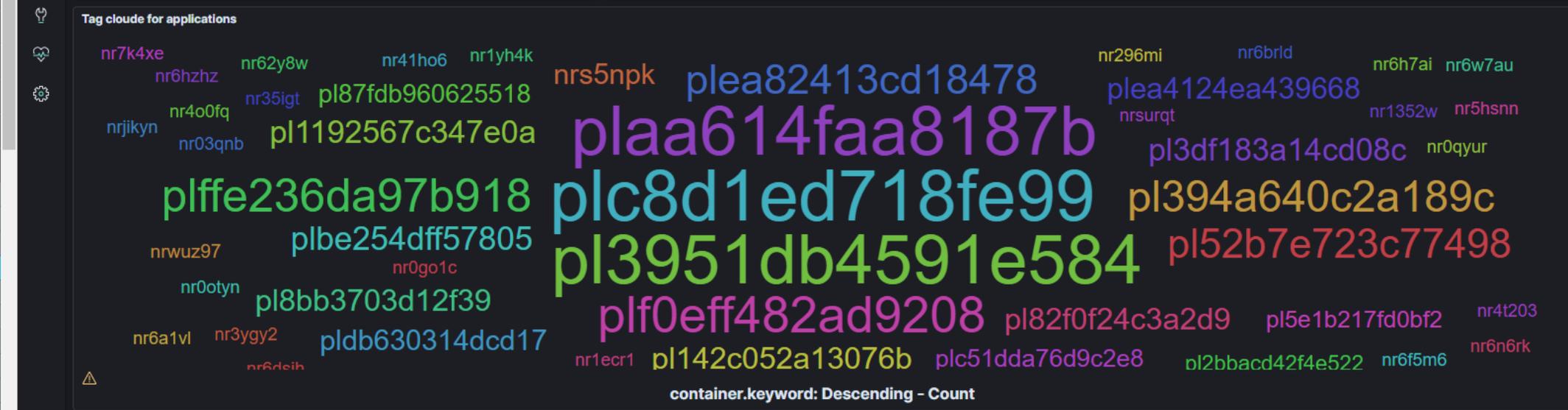
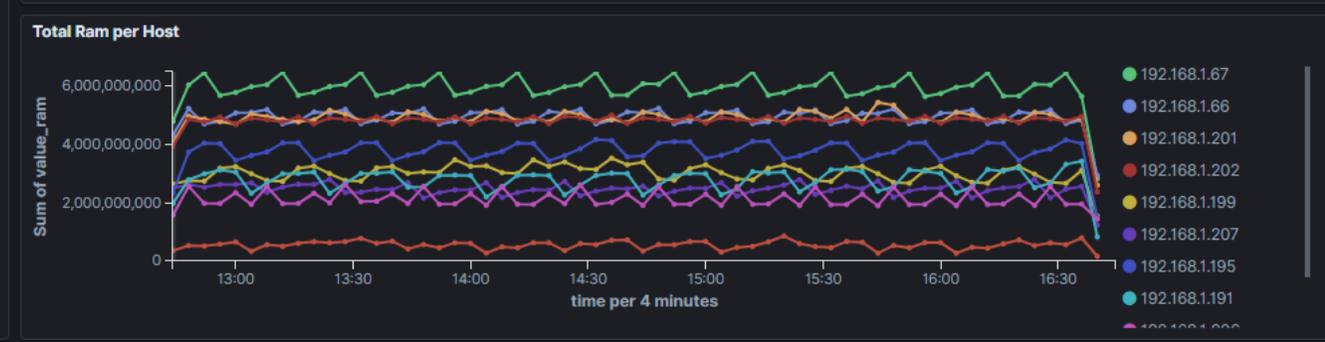
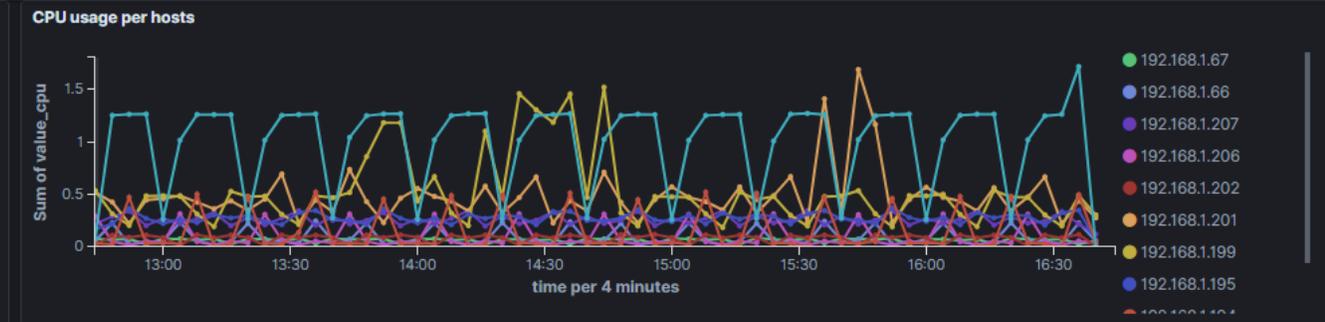
Snap4City

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

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 - Notificator Monitoring
 - Web Server Monitoring

Dashboard / Mesos-marathon-docker dashboard-nesi-non buttare



Snap4City

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

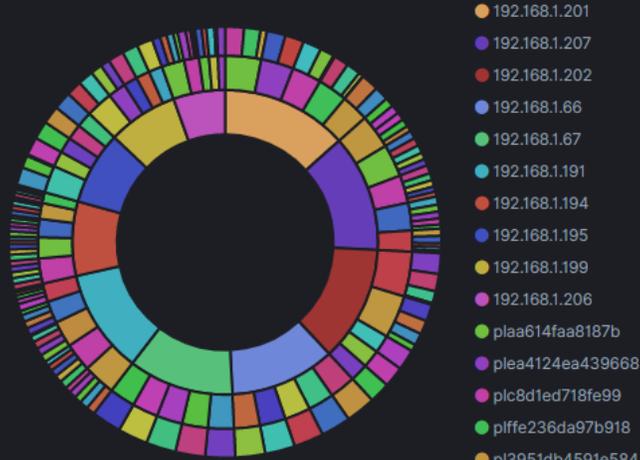
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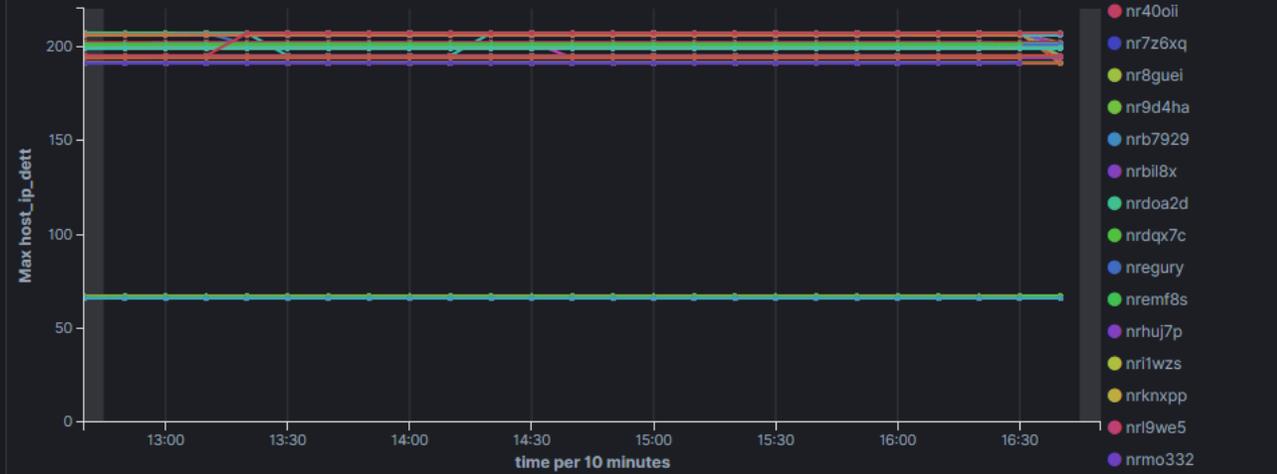
Container Cluster Intelligence

Dashboard Mesos-marathon-docker dashboard-nesi-non buttare

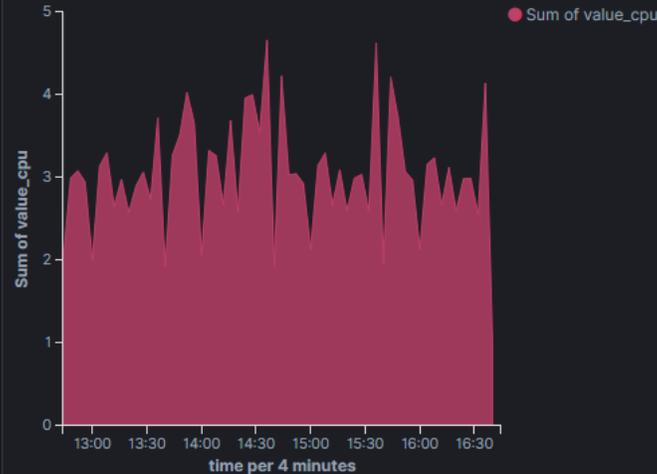
Pie chart for VM-application-mesos-ld



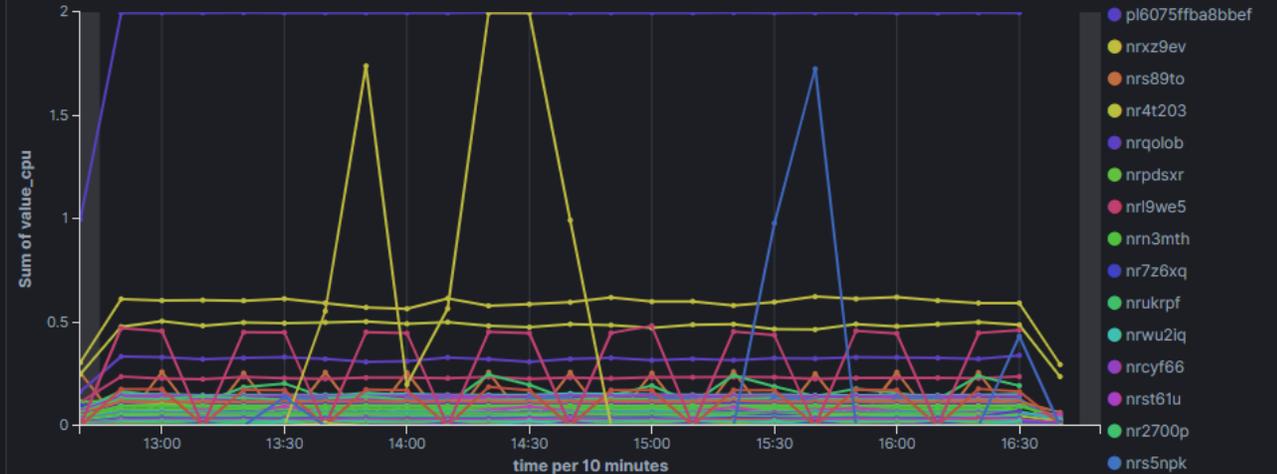
Spostamenti applicazioni tra i vari host-vm



Time series -cpu-sum



Time series -cpu-all



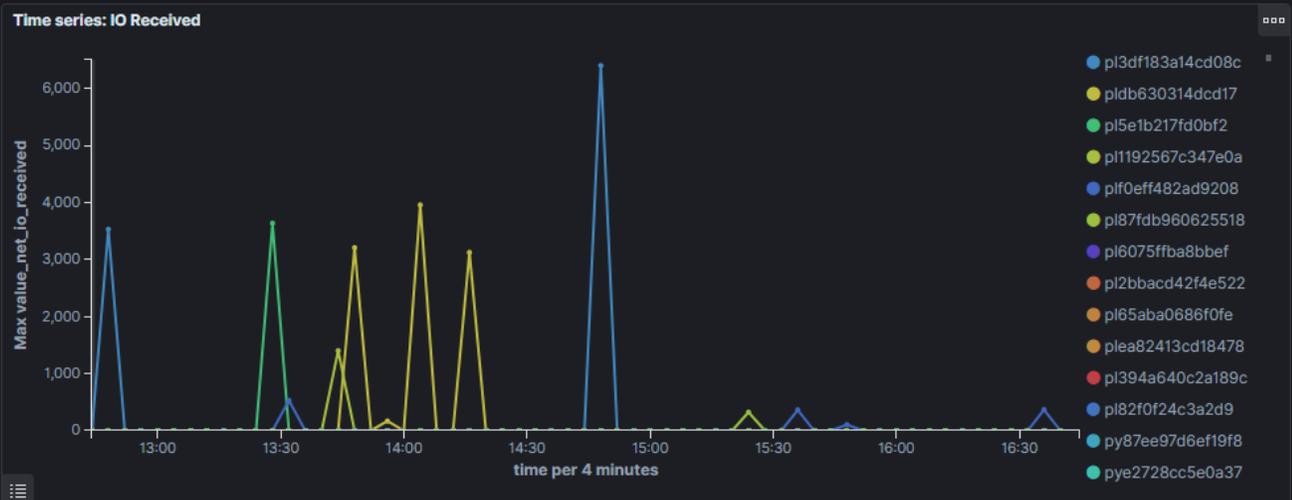
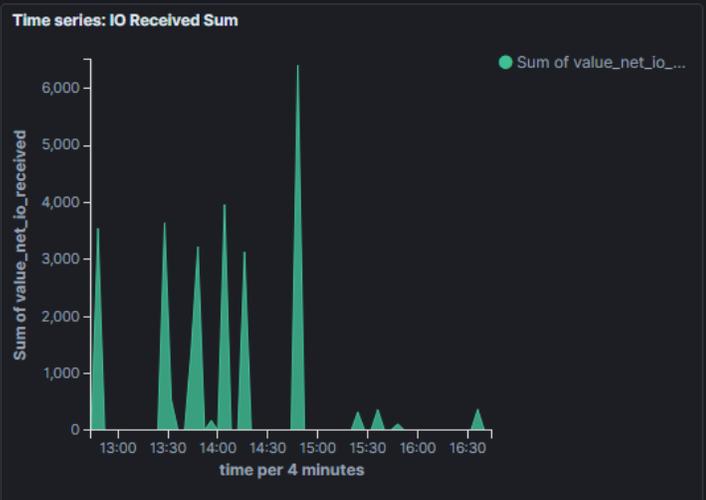
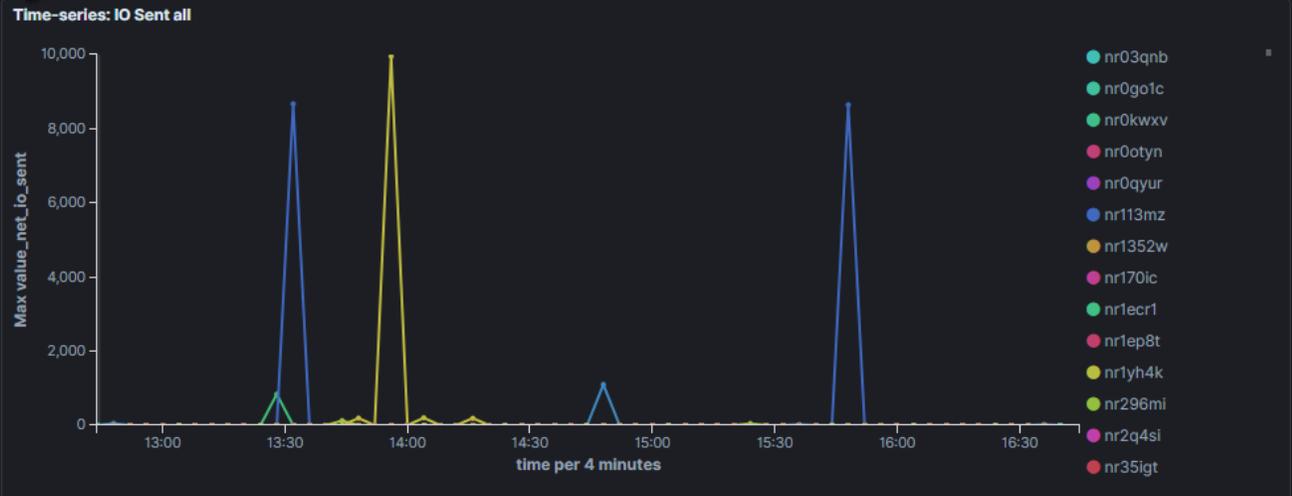
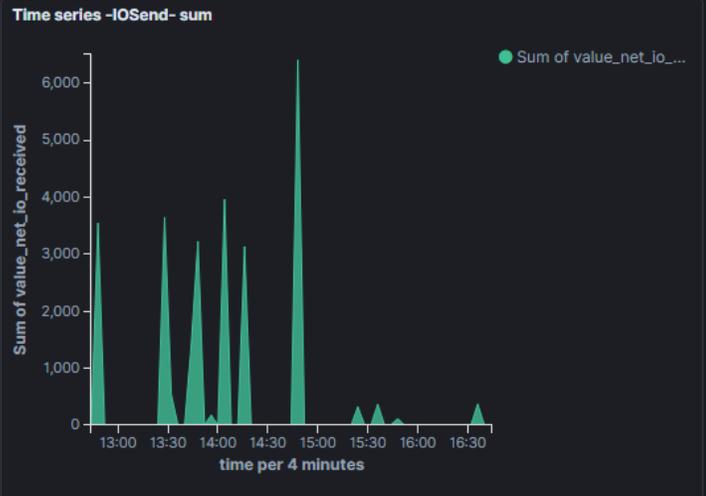
User: roottooladmin1, Org: DISIT
 Role: RootAdmin, Level: 7

LOGOUT

Dashboard Mesos-marathon-docker dashboard-nesi-non buttare

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 - MyKPI Monitoring
 - Notificator Monitoring
 - Web Server Monitoring
 - Back Office DWH Sched DISCES
 - Back Office DA Sched DISCES



TOP

Monitoring Resources and API Traffic



Smart City API Monitoring



MyKPI Monitoring



Notificator Monitoring

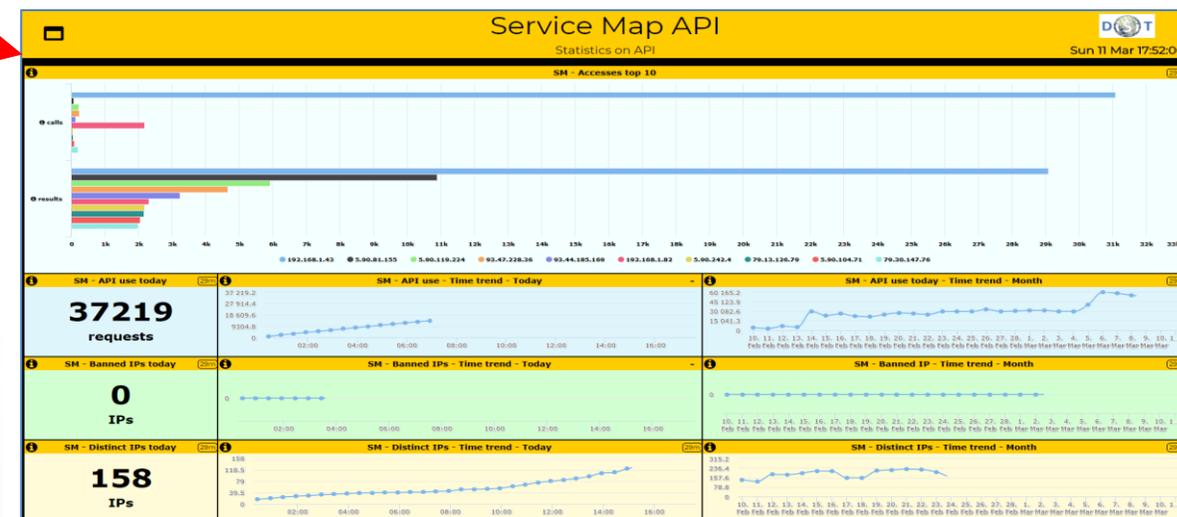
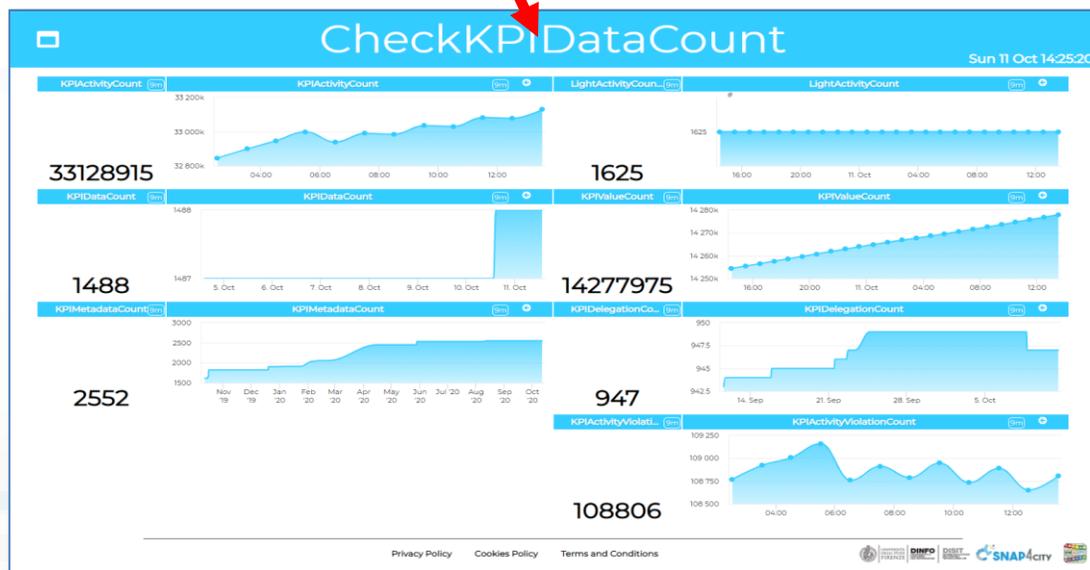


Web Server Monitoring

Monitoring Smart City API Usage

- Smart City API Monitoring
- MyKPI Monitoring
- Notificator Monitoring
- Web Server Monitoring

<http://www.disit.org/dashboardSmartCity/view/index.php?iddashboard=MTkw>

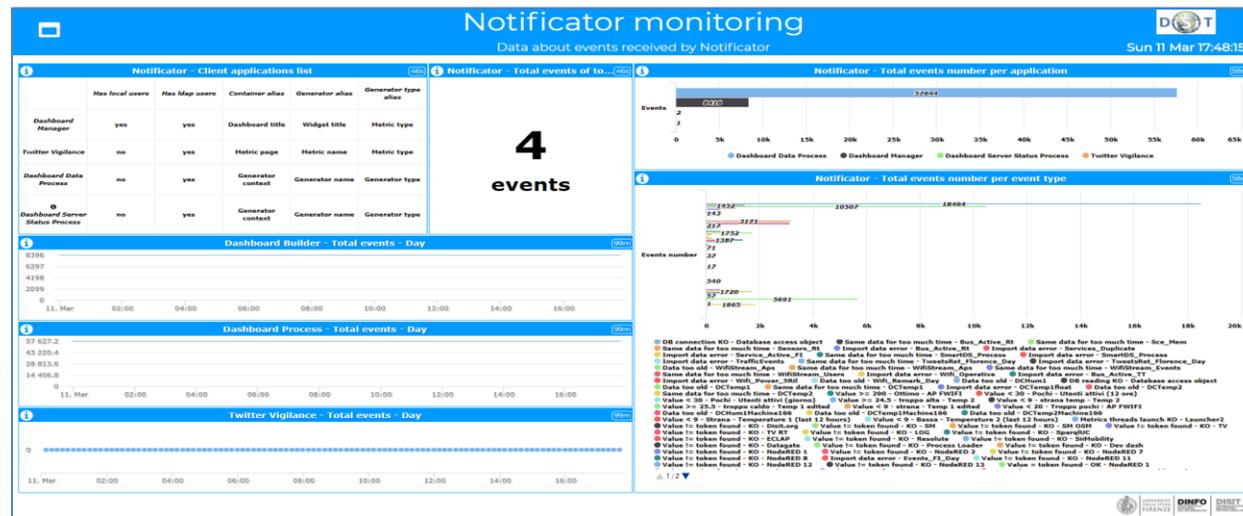


<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddashboard=MTY0NA==>

Monitoring Resources and Traffic

<http://www.disit.org/dashboardSmartCity/view/index.php?iddashboard=MTQ4>

- Smart City API Monitoring
- MyKPI Monitoring
- Notifier Monitoring
- Web Server Monitoring



<http://www.disit.org/dashboardSmartCity/view/index.php?iddashboard=MjQ5>

TOP

Monitoring Schedulers via DISCES

Processes and **ETL tasks**

In Yellow alternative & legacy solutions

- Back Office DWH Sched DISCES
- Back Office DA Sched DISCES
- Back Office DISCES monitor

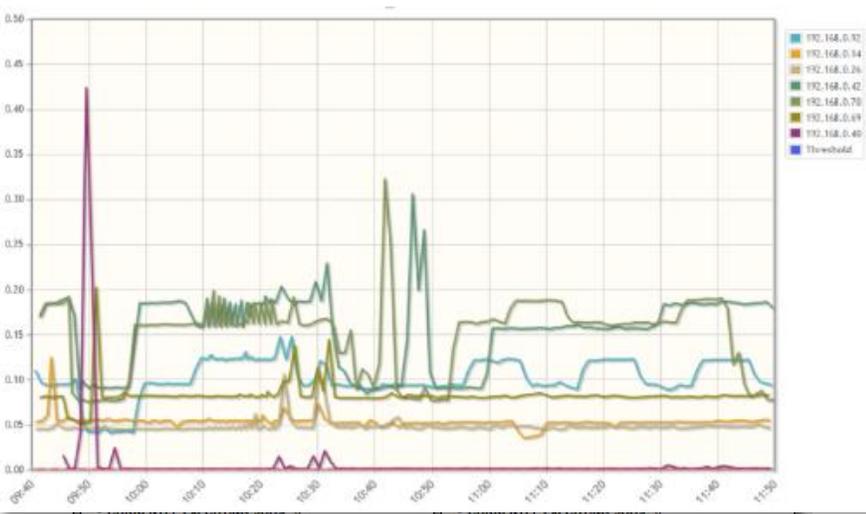
DISCES: Distributed SCE Scheduler

SCHEDULER NAME	ID	FIRE INSTANCE ID	DATE	JOB NAME	JOB GROUP	JOB DATA	STATUS
SCE	297230	hadoopnode01d14183 077042351418307705 019	2014-12-15 15:25:33	sensori47_A	sensori47	#processParameter s=	RUNNING
SCE	297229	hadoopnode06c14183 076279641418307629 359	2014-12-15 15:25:33	sensori44_A	sensori44	#processParameter s=	RUNNING
SCE	297228	hadoopnode02141830 838738214183083917 58	2014-12-15 15:22:39	ZTL_notturna_shp_I	ZTL_notturna_shp	#processParameter s=null;	SUCCESS
SCE	297227	hadoopnode02141830 838738214183083917 57	2014-12-15 15:22:39	ZTL_notturna_kmz_I	ZTL_notturna_kmz	#processParameter s=null;	SUCCESS
SCE	297226	hadoopnode01c14183 085186101418308520 365	2014-12-15 15:21:49	sensori45_A	sensori45	#processParameter s=	RUNNING
SCE	297225	hadoopnode06141830 832370214183083258 68	2014-12-15 15:21:49	sensori40_A	sensori40	#processParameter s=	RUNNING
SCE	297224	hadoopnode01b14183 075646221418307566 749	2014-12-15 15:21:49	sensori46_A	sensori46	#processParameter s=	RUNNING
SCE	297223	hadoopnode02141830 838738214183083917 56	2014-12-15 15:21:37	ZTL_notturna_kmz_I	ZTL_notturna_kmz	#processParameter s=null;	SUCCESS
SCE	297222	hadoopnode02141830 838738214183083917 55	2014-12-15 15:21:00	sensori31_C	sensori31	#processParameter s=	SUCCESS
SCE	297221	hadoopnode06c14183 076279641418307629 358	2014-12-15 15:21:00	sensori30_C	sensori30	#processParameter s=	SUCCESS
SCE	297220	hadoopnode02141830 838738214183083917 54	2014-12-15 15:18:58	ZTL_notturna_shp_I	ZTL_notturna_shp	#processParameter s=null;	SUCCESS

168.0.42

192.168.0.69

- LAST_CHECK: 2016-10-26 19:14:18
- SCHEDULER_INSTANCE_ID: hadoopnode0214175
- CPU_LOAD: 3.77%
- FREE_PHYSICAL_MEMORY: 4.45 GB
- JOBS_EXECUTED: 14770
- SCHEDULER_NAME: SCE
- CURRENT_TIME: 2016-10-26 19:14:36
- JOB \$/h: 31.89
- RUNNING SINCE: 2016-10-07 12:04:15
- CLUSTERED: 1
- PERSISTENCE: 1
- REMOTE_SCHEDULER: 0
- CURRENTLY_EXECUTING_JOBS: 1
- CPU_LOAD_JVM: 0.01%
- SYSTEM_LOAD_AVERAGE: 0.58
- OPERATING_SYSTEM_VERSION: 3.13.0-24-generic
- COMMITTED_VIRTUAL_MEMORY: 8.38 GB
- OPERATING_SYSTEM_NAME: Linux
- FREE_SWAP_SPACE: 11.98 GB
- PROCESS_CPU_TIME: 10180410000000
- TOTAL_PHYSICAL_MEMORY: 11.73 GB
- NUMBER_OF_PROCESSORS: 16
- OPERATING_SYSTEM_ARCHITECTURE: amd64



- CPU_LOAD_JVM: 0.02%
- SYSTEM_LOAD_AVERAGE: 0.02
- OPERATING_SYSTEM_VERSION: 3.13.0-24-generic
- COMMITTED_VIRTUAL_MEMORY: 8.38 GB
- OPERATING_SYSTEM_NAME: Linux
- FREE_SWAP_SPACE: 11.97 GB
- PROCESS_CPU_TIME: 14778010000000
- TOTAL_PHYSICAL_MEMORY: 11.73 GB
- NUMBER_OF_PROCESSORS: 16
- OPERATING_SYSTEM_ARCHITECTURE: amd64
- CPU_LOAD_JVM: 0.02%
- SYSTEM_LOAD_AVERAGE: 0.27
- OPERATING_SYSTEM_VERSION: 3.13.0-24-generic
- COMMITTED_VIRTUAL_MEMORY: 8.32 GB
- OPERATING_SYSTEM_NAME: Linux
- FREE_SWAP_SPACE: 11.97 GB
- PROCESS_CPU_TIME: 14778010000000
- TOTAL_PHYSICAL_MEMORY: 11.73 GB
- NUMBER_OF_PROCESSORS: 16
- OPERATING_SYSTEM_ARCHITECTURE: amd64

CPU	CPU Load	Mem Total	Mem Free	Cores	Jobs/h	Jobs Executed	Jobs Failed/Success (24 h)	Jobs Failed/Success (7 days)
244.07 GHz	5.41 GHz (2.22%)	70.41 GB	20.36 GB	84	203.56	94283	221 (4.45%) 4742 (95.55%)	2879 (8.41%) 31356 (91.59%)

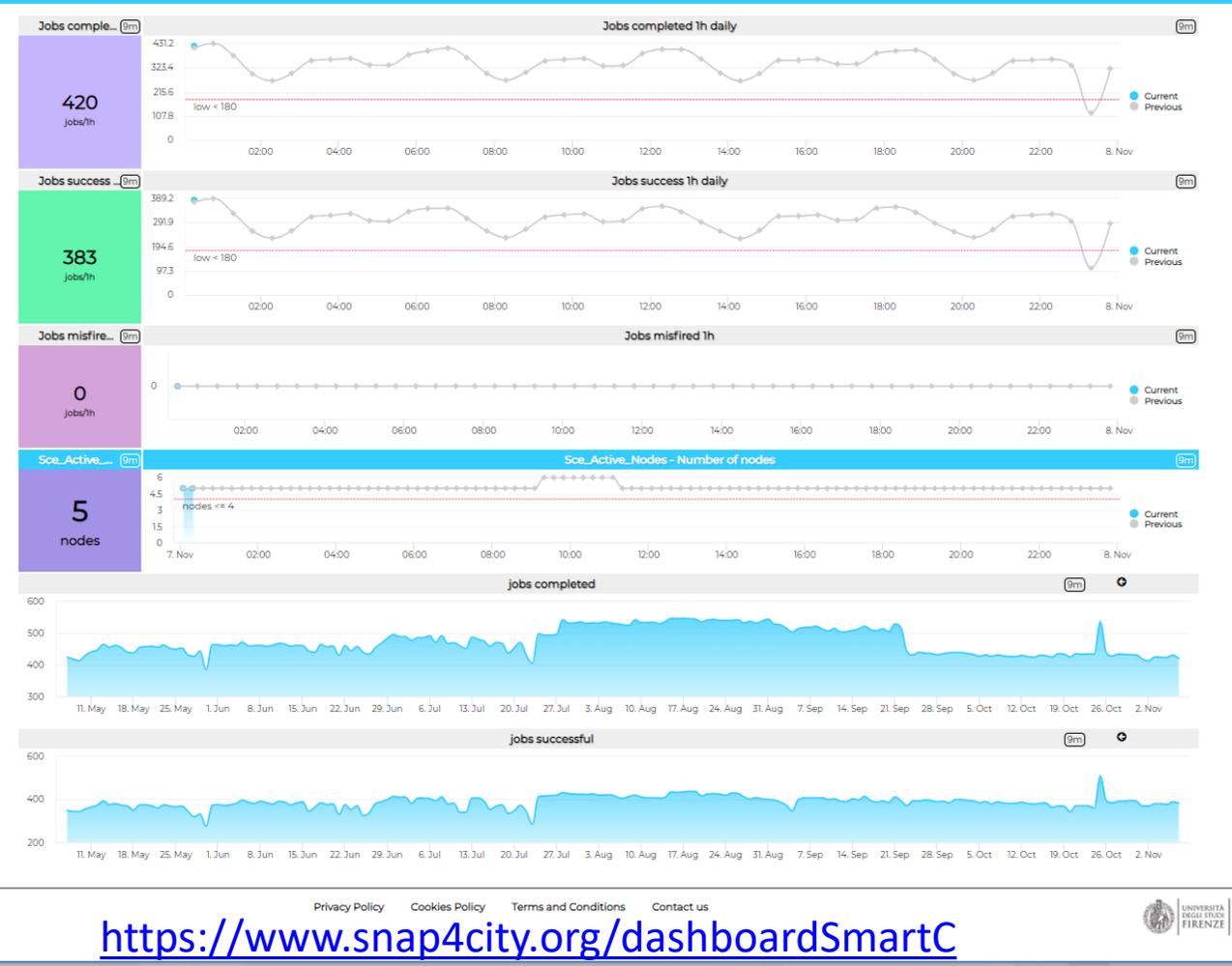
DISCES Monitoring - Annuale

Sat 7



<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddashboard=MjM5Mw==>

DISCES Monitoring



<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddashboard=MjE3Mw==>

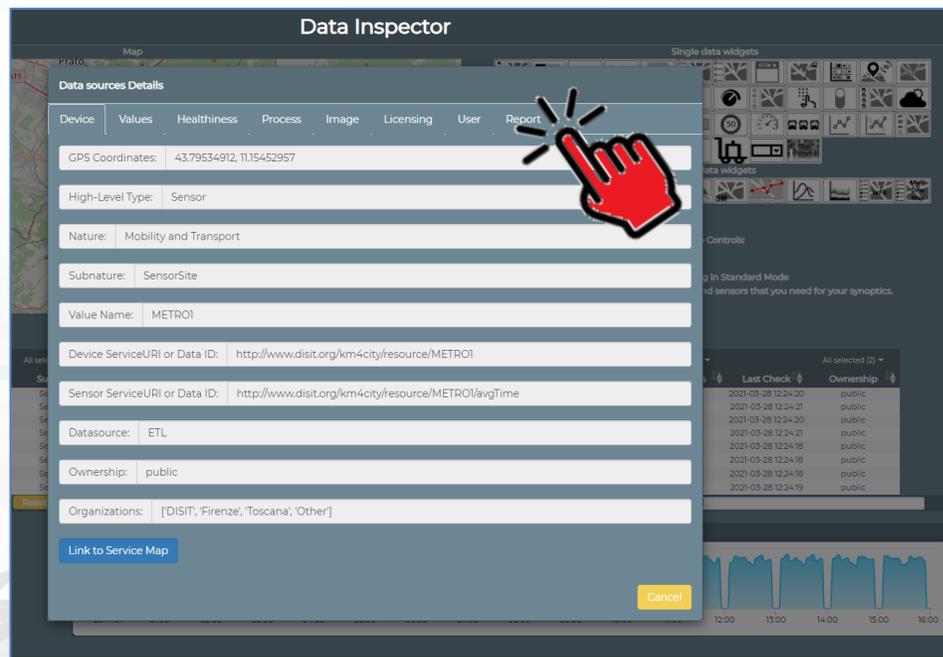
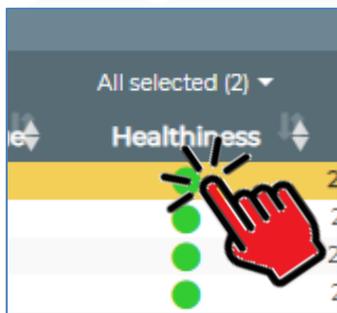
TOP

Report Generation and Management (*admin tool*)

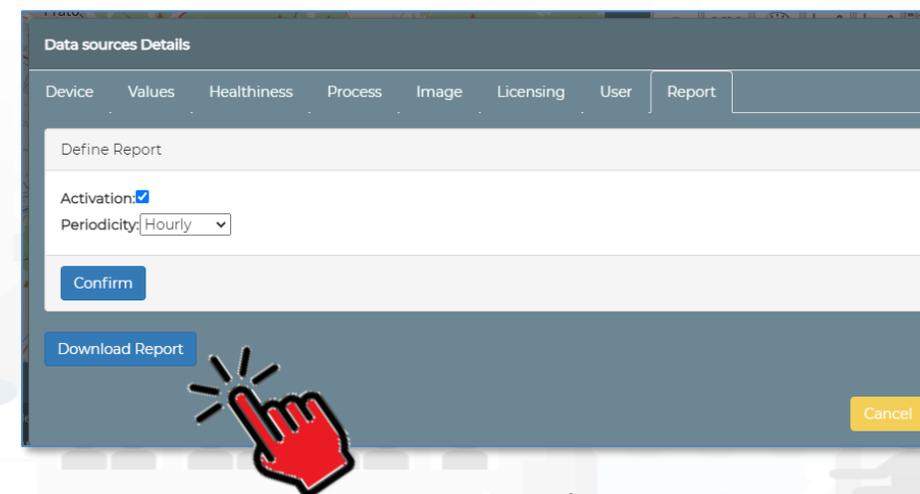


Report Generation and Management

- **Device/data** owner may have their reports: **monthly or 3-monthly**
 - Ready to use reports are available for:
 - Single Device: ETL and IOT
 - Ask to your RootAdmin to activate the production of reports (and also **hourly report for testing only**).



3. Click on report



4. Get the Last Report

1. Open data Inspector
2. Click on Device or sensor

Take the last report

Data sources Details

Device Values Health

Define Report

Activation:

Periodicity: Hourly

Confirm

Download Report

Time trends Graphics:

Process:

Knowledge Base IP: 192.168.0.206
 IoT Broker: Not available
 IoT Device: Not available
 Device Set name: METRO1
 DISCES Ip: 192.168.0.89
 Discos Process file path: \\media\I\Trasformazioni\I\Phoenix_ETL...
 Phoenix Table: SENSORSITEOBSERVATION
 Graph Uri: Not available
 Link to Knowledge Base: <https://servicemap.disit.org/WebAppGrafico/resource/METRO1&format=json>
 Link to IoT Broker: Not available
 List of Devices:

Images: Not available

Licensing:

Licence: Not available
 Provider: citta Metropolitana di Firenze
 Address: Not available
 E Mail: nicola.mitolo@unifi.it
 Reference Person: nicola mitolo
 Telephone: Not available
 Website: [Not available](http://www.unifi.it)

User:

User Creator: Not available
 Status: Not available
 E-mail creator: Not available

Values:

Last Date: 2021-03-28 12:11:00
 Last Value: Not available

Value Type	Healthy	Data Type	Unit	Value
avgTime	true	float	s	19.5
concentration	true	float	car/km	0.0
averageSpeed	true	float	km/h	60.0
vehicleFlow	true	float	car/h	0.0
thresholdPerc	true	float	%	Not Available
speedPercentile	true	float	%	Not Available
occupancy	true	float	%	Not Available
avgDistance	true	float	m	Not Available

Healthiness:

Status Healthiness: Healthy
 Value Type: Not available
 Healthiness Criteria: Not available
 Delay: Not available
 Data Type: sensor_map
 Period: Not available
 Last Update:
 Healthiness Criteria 1: true(2021-03-28 14:00:08)
 Healthiness Criteria 2:

Snap4City Device Report

Period:

Periodicity: Hourly
 Date of report creation: 2021-03-28 14:00:07
 Report time interval: From 2021-03-28 13:00:00 to 2021-03-28 14:00:00

Device:

GPS Coordinates: 43.79534912, 11.15452957
 High-Level-Type: Sensor
 Nature: TransferServiceAndRenting
 Subnature: SensorSite
 Value Name: METRO1
 Device ServiceURI or Data ID: <http://www.disit.org/km4city/resource/METRO1>
 Sensor ServiceURI or Data ID: <http://www.disit.org/km4city/resource/METRO1>
 Data source: ETL
 Ownership: public
 Organization: ['DISIT', 'Firenze', 'Toscana', 'Other']
 Link to Service Map: <https://servicemap.disit.org/WebAppGrafo/api/v1/?serviceUri=http://www.disit.org/km4city/resource/METRO1&format=html>

How to Customize/Manage the Report Model

The screenshot displays the IIBCO JasperSoft Studio interface. The central workspace shows a report titled "Snap4City Device Report" with various data fields and a logo header. On the left, the "Data Adapters" and "Servers" panels are visible. The "Data Adapters" panel is highlighted with a green box, and the "Servers" panel is highlighted with a blue box. On the right, the "Palette" panel is highlighted with a red box, showing a list of "Layout elements" such as Note, Text Field, Static Text, Image, Break, Rectangle, Ellipse, Line, Generic, Frame, Subreport, Barcode, List, and Chart. The "Properties" panel at the bottom right shows a table with "Property" and "Value" columns.

Data Adapters:

- Api_day
- api_example
- Api_month
- api_servicemap
- Api_week
- Dashboard
- Dashboard2
- Devices_data_details
- One Empty Record
- Quartz
- reportServiceMapAdapter
- SiiMobility
- Test_API
- test_reportAdapter
- userHarsh

Servers:

- JasperReports Server
- Snap4City Server
- Pending ...

Layout elements:

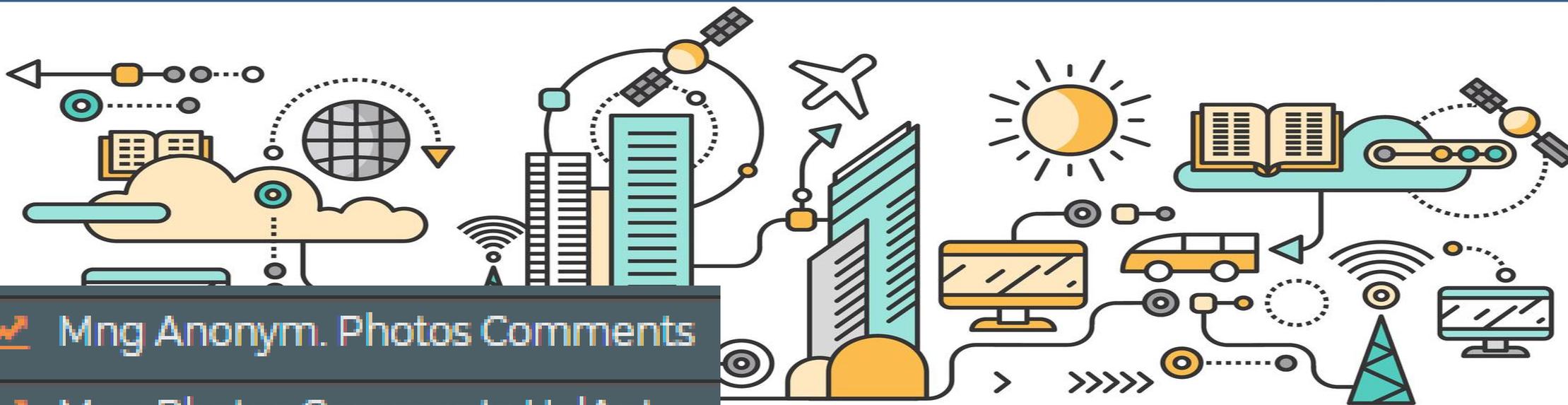
- Note
- Text Field
- Static Text
- Image
- Break
- Rectangle
- Ellipse
- Line
- Generic
- Frame
- Subreport
- Barcode
- List
- Chart
- Crosstab

Properties:

Property	Value

TOP

Managing Photos and Comments from Web and Mobile Apps



 Mng Anonym. Photos Comments

 Mng Photos Comments HelAnt

Photo and Comments Management

Snap4City

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

[LOGOUT](#)

- 🔔 Notificator
- 📄 Data, my Data, OpenData ▾
- 🗺 Knowledge and Maps ▾
- 📍 IOT Applications ▾
- 🔧 IOT Directory and Devices ▾
- 🔗 Resource Manager ▾
- 🛠 Development Tools ▾
- ⚙ Management ▾
 - 📊 Traffic Analyzer: AMMA
 - 📊 Data Analyzer: DevDash
 - 📊 Data Analyzer: DevDash Firenze
 - 📊 Data Analyzer: DevDash Helsinki
 - 📊 Data Analyzer: DevDash DISIT
 - 📊 Data Analyzer: DevDash Lonato
 - 📊 Data Analyzer: whole traffic
 - 📊 Container Cluster Monitoring
 - 📊 Back Office Container Monitoring
 - 📊 IOT App Version Management
 - 📊 Smart City API Monitoring
 - 📊 MyKPI Monitoring
 - 📊 Notificator Monitoring
 - 📊 Web Server Monitoring
 - 📊 Back Office DWH Sched DISCES
 - 📊 Back Office DA Sched DISCES
 - 📊 Back Office DISCES monitor
 - 📊 Mobile Application Monitoring
 - 📊 Mng Anonym. Photos Comments
 - 📊 Mng Photos Comments HelAnt
 - 📊 Mng Online Helps
 - 📊 Config ResDash

Mng Photos Comments HelAnt

Photos: [Reset](#) [Filters ▾](#)

© OpenStreetMap contributors

Timestamp	Status	Image
2019-08-06 13:53:06	validated ▾	
2019-08-06 10:46:36	validated ▾	
2019-08-06 10:31:20	validated ▾	
2019-08-06 08:56:04	validated ▾	
2019-08-06 08:09:19	validated ▾	
2019-08-06 08:08:53	submitted ▾	
2019-08-05 17:31:45	validated ▾	

Comments: [Reset](#) [Filters ▾](#)

Timestamp	Status	Text
2020-01-11 15:13:15	submitted ▾	La cigale d'Argent
2019-08-15 10:23:05	rejected ▾	Is this a bar? This is a bakery!
2019-08-15 10:16:49	rejected ▾	Is this a 'cultural activity'? It's a church!
2019-08-15 10:12:09	rejected ▾	Doesn't exist
2019-08-05 15:53:52	rejected ▾	There ar two theater rooms from the "Fakkeltheater" The
2019-08-05 15:53:46	validated ▾	There ar two theater rooms from the "Fakkeltheater" The
2019-08-05 15:30:40	validated ▾	Hotels and Accommodation Hotel Anna Good position

TOP

Mobile App Monitoring and Management



 Mobile Application Monitoring

Mobile App Monitoring and Management

Snap4City

User: roottooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

[LOGOUT](#)

- IoT Applications
- IoT Directory and Devices
- Resource Manager
- Development Tools
- Management
 - Traffic Analyzer: AMMA
 - Data Analyzer: DevDash
 - Data Analyzer: DevDash Firenze
 - Data Analyzer: DevDash Helsinki
 - Data Analyzer: DevDash DISIT
 - Data Analyzer: DevDash Lonato
 - Data Analyzer: whole traffic
 - Container Cluster Monitoring
 - Back Office Container Monitoring
 - IOT App Version Management
 - Smart City API Monitoring
 - MyKPI Monitoring
 - Notifier Monitoring
 - Web Server Monitoring
 - Back Office DWH Sched DISCES
 - Back Office DA Sched DISCES
 - Back Office DISCES monitor
 - Mobile Application Monitoring**
 - Mng Anonym. Photos Comments
 - Mng Photos Comments HelAnt
 - Mng Online Helps
 - Config ResDash

Mobile Application Monitoring

 City Users and Stats	 Recommendations Log	 General Settings	 Social Media Group Recommendations Settings	 Groups Recommendations Priorities
 Class Scores	 City Users	 List of Trajectories Clusters	 Heatmap and Trajectories Clusters (User Profile: All)	 Heatmap and Trajectories Clusters (User Profile: Citizen)
 Heatmap and Trajectories Clusters (User Profile: Commuter)	 Heatmap and Trajectories Clusters (User Profile: Student)	 Heatmap and Trajectories Clusters (User Profile: Tourist)	 Heatmap and Trajectories Clusters (User Profile: Disabled)	 Heatmap and Trajectories Clusters (User Profile: Operator)
 Heatmap and Trajectories Clusters of City Users Together	 Real Time City Users: positions and movements	 General Stats	 Statistics for City Users Types	 Interactive People Flow Maps

TOP

IOT Apps Version Management

Management ▾

IOT App Version Management



IOT App Versions Monitor and Upgrade

lotAppControlRoom

Sat 14 Nov 16:56:20

lotAppControlRoom

Show 10 entries Search:

ElementID	ElementName	ElementType	Username	Type	Image	Controls
fa777	[REDACTED]	AppID	[REDACTED]			
node	[REDACTED]	AppID	[REDACTED]	advanced	snap4city-nodered-v1.1.3-advv4	Update
node	[REDACTED]	AppID	[REDACTED]	basic	snap4city-nodered-v1.1.3-basicv4	Update
nr03c	[REDACTED]	AppID	[REDACTED]	basic	snap4city-nodered-basicv90	Update
nr0kv	[REDACTED]	AppID	[REDACTED]	basic	snap4city-nodered-basicv90	Update
nr0nz	[REDACTED]	AppID	[REDACTED]	basic	snap4city-nodered-basicv90	Update
nr0ot	[REDACTED]	AppID	[REDACTED]	basic	snap4city-nodered-basicv90	Update
nr0qy	[REDACTED]	AppID	[REDACTED]	basic	snap4city-nodered-basicv90	Update
nr113	[REDACTED]	AppID	[REDACTED]	basic	snap4city-nodered-basicv90	Update
nr11c	[REDACTED]	AppID	[REDACTED]	basic	snap4city-nodered-basicv90	Update

Showing 71 to 80 of 445 entries

Previous 1 ... 7 8 9 ... 45 Next

adv-v90 1	adv.v56 1	adv.v66 2	adv.v71 1	adv.v76 3	adv.v90 70	basic-v90 1	basic.v90 270	v1.1.3-adv:v4 1	v1.1.3-adv:v5 1	v1.1.3-adv:v6 2
v1.1.3-adv:v8 3	v1.1.3-basic:v11 3	v1.1.3-basic:v4 6	v1.1.3-basic:v5 7	v1.1.3-basic:v7 1	v1.1.3-basic:v8 1	undefined 46				

Data-City Small example



Snap4

User: userrootadmin, Org: Organization
Role: RootAdmin, Level: [LOGOUT](#)

- Dashboards
- My Dashboards in All Org.
- Dashboards of My Organization
- My Dashboards in My Organization
- Extra Dashboard Widgets**
 - Micro Applications
 - External Services, WebPages
 - Register External Service, WebPage
 - Custom Widgets / Synoptics
 - Register Custom Widget Template
- Notificator
- Data, my Data, OpenData
 - Data Inspector
 - My Data, KPI, POI
 - My Groups of Entities
- Knowledge and Maps
 - Service Map
 - Creating WKT
 - Mapping Services Data
- IOT Applications**
- IOT Directory and Devices
 - Resource Manager
 - Dictionary Editor for Data Fields
- Management
 - Mng Anonym. Photos Comments
- Settings
- User Management and Auditing
 - User Management
 - Auditing Accesses Authentication
 - Auditing IOT Directory Data

Snap4

User: userrootadmin, Org: Organization
Role: RootAdmin, Level: [LOGOUT](#)

- Dashboards
- My Dashboards in All Org.
- Dashboards of My Organization
- My Dashboards in My Organization
- Extra Dashboard Widgets
- Notificator
- Data, my Data, OpenData
- Knowledge and Maps
- IOT Applications**
 - IoT Application nodered1**
 - IoT Application nodered2
 - IoT Application nodered3

IoT Application nodered1

Node-RED

Flow 1

```
graph LR; timestamp --> function; function --> wind2; function --> Save_on_light; function --> msg_payload[msg.payload]; function --> wind1; function --> status; function --> Write_On_s4csvg_bulb_luminosity;
```

Snap4

User: userrootadmin, Org: Organization
Role: RootAdmin, Level: [LOGOUT](#)

- Dashboards
- My Dashboards in All Org.
- Dashboards of My Organization
- My Dashboards in My Organization
- Extra Dashboard Widgets
- Notificator
- Data, my Data, OpenData
- Knowledge and Maps
- IOT Directory and Devices**
 - My IOT Sensors and Actuators
 - IOT Sensors and Actuators
 - IOT Devices
 - IOT Devices Management**
 - IOT Brokers
 - IOT Device Models
 - IOT Devices Bulk Registration
 - IOT Broker Periodic Update setting
 - IOT Orion Broker Mapping Rules
- Resource Manager

IOT Devices Management

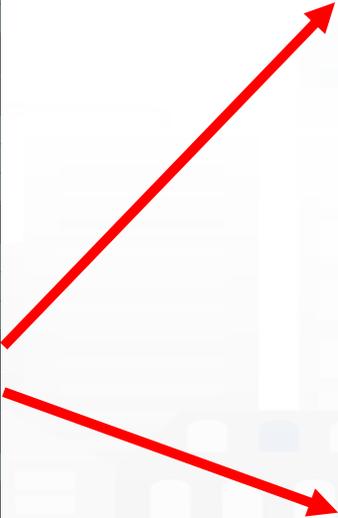
20 DEVICES 20 ACTIVE 13 PUBLIC 7 PRIVATE

Show 5 entries Search:

	IOT Device	IOT Broker	Device Type	Model	Ownership	Organization	Owner	Status	Edit	Delete	Location
+	copernicus_test	iotbsf	Test	custom	PRIVATE	GardaLake	sgLareamanager	active	EDIT	DELETE	🌐
+	Gardesana-Albisano-Direzione-Nord	iotbsf	Traffic	Traffic-FLOUD	PRIVATE	GardaLake	sgLareamanager	active	EDIT	DELETE	🌐
+	Gardesana-Albisano-Direzione-Sud	iotbsf	Traffic	Traffic-FLOUD	PRIVATE	GardaLake	sgLareamanager	active	EDIT	DELETE	🌐
+	Gardesana-Baia stanca-Direzione-Nord	iotbsf	Traffic	Traffic-FLOUD	PUBLIC	GardaLake	sgLareamanager	active	EDIT	DELETE	🌐
+	Gardesana-Baia stanca-Direzione-Sud	iotbsf	Traffic	Traffic-FLOUD	PUBLIC	GardaLake	sgLareamanager	active	EDIT	DELETE	🌐

Showing 1 to 5 of 20 entries

Previous 1 2 3 4 Next



TOP

User Registration for DataCity-Small without Living Lab



User registration

Snap4

User: userrootadmin, Org: Organization
Role: RootAdmin, Level:

LOGOUT

- Dashboards
- My Dashboards in All Org.
- Dashboards of My Organization
- My Dashboards in My Organization
- Extra Dashboard Widgets ▾
- Notificator
- Data, my Data, OpenData ▾
- Knowledge and Maps ▾
- IOT Applications ▾
- IOT Directory and Devices ▾
- Resource Manager ▾
- Management ▾
- Settings ▾
- User Management and Auditing ▾**
 - User Management
 - Auditing Accesses Authentication
 - Auditing IOT Directory Data

Users

Synthesis

8
USERS

List

Search +

Username	Role	Organization	Email		
	AreaManager	Organization		EDIT	DEL
	RootAdmin	Organization		EDIT	DEL
	ToolAdmin	Organization		EDIT	DEL
	Manager	Organization		EDIT	DEL
	Manager	GardaLake		EDIT	DEL
	AreaManager	GardaLake		EDIT	DEL
	AreaManager	GardaLake		EDIT	DEL
	ToolAdmin	GardaLake		EDIT	DEL

Showing 1 to 8 of 8 rows

TOP

Installing Snap4City 2022, VM and Containers



- Deploy and Installation
- Doc: Installing Snap4City/Indust...
- Doc: DataCity-Large
- Docker Config Generator x Snap...
- Doc: Docker Config Generator
- Doc: Some Config FAQ

<https://www.snap4city.org/738>
To get an updated version read it!

How to adopt Snap4City

On your premise

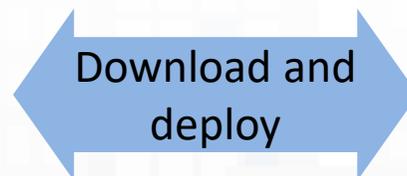


Installation on your premise

- Virtual Machines or Docker
 - Different configurations
 - From small to scalable
 - Exploiting your legacy tools
 - Interoperable with any tool
 - No vendor lock-in, No tech lock-in
- Mixed solutions! For example:**
- Start on Cloud as Smart City as a Service
 - Migrate on premise on the fly
 - Start on Cloud into a sand box
 - Pass to install on premise what you need

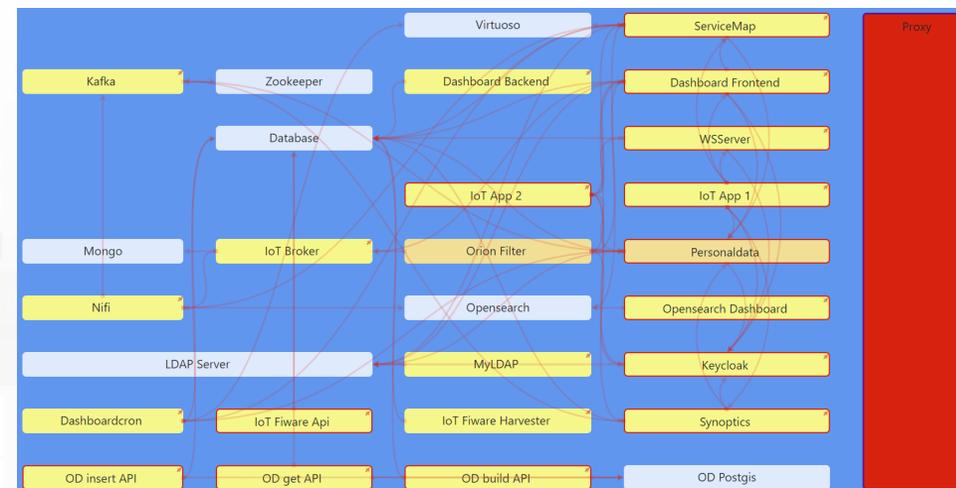
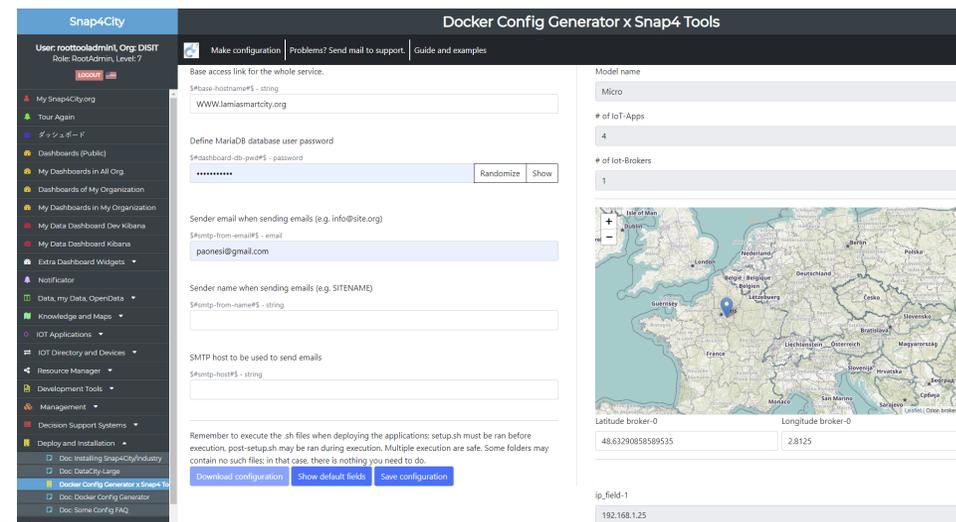
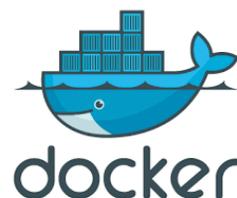
Smart City as a Service

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



Installations, different models a TOOL to get them

- **Micro X:**
 - 1 VM of dockers
- **Normal X,Y:**
 - 2 VM of dockers
- **Small X,Y:** scalable
 - 4 VM of dockers
- **DataCitySmall X,Y,Z:** scalable
 - 6 VM of dockers
- **DataCityMid X,Y,Z,T:** scalable
 - # VM + X/70 VM + Y/3 VM + Z VM + T VM of dockers
- **DataCityLarge:** scalable
 - depending on your needs



https://www.snap4city.org/docker-generator/selecting_model

Config Generator Tools

Snap4City

User: rootooladmin1, Org: DISIT
Role: RootAdmin, Level: 7

[LOGOUT](#)

- My Snap4City.org
- Tour Again
- ダッシュボード
- Dashboards (Public)
- My Dashboards in All Org.
- Dashboards of My Organization
- My Dashboards in My Organization
- My Data Dashboard Dev Kibana
- My Data Dashboard Kibana
- Extra Dashboard Widgets
- Notificator
- Data, my Data, OpenData
- Knowledge and Maps
- IOT Applications
- IOT Directory and Devices
- Resource Manager
- Development Tools
- Management
- Decision Support Systems
- Deploy and Installation
 - Doc: Installing Snap4City/Industry
 - Doc: DataCity-Large
 - Docker Config Generator x Snap4 Tools**
 - Doc: Docker Config Generator
 - Doc: Some Config FAQ
- SuperSetting

Docker Config Generator x Snap4 Tools

Make configuration
Problems? Send mail to support.
Guide and examples

Base access link for the whole service.

`$#base-hostname#$ - string`

Define MariaDB database user password

`$#dashboard-db-pwd#$ - password`

Sender email when sending emails (e.g. info@site.org)

`$#smtp-from-email#$ - email`

Sender name when sending emails (e.g. SITENAME)

`$#smtp-from-name#$ - string`

SMTP host to be used to send emails

`$#smtp-host#$ - string`

Remember to execute the .sh files when deploying the applications; setup.sh must be ran before execution, post-setup.sh may be ran during execution. Multiple execution are safe. Some folders may contain no such files; in that case, there is nothing you need to do.

docker

Model name

of IoT-Apps

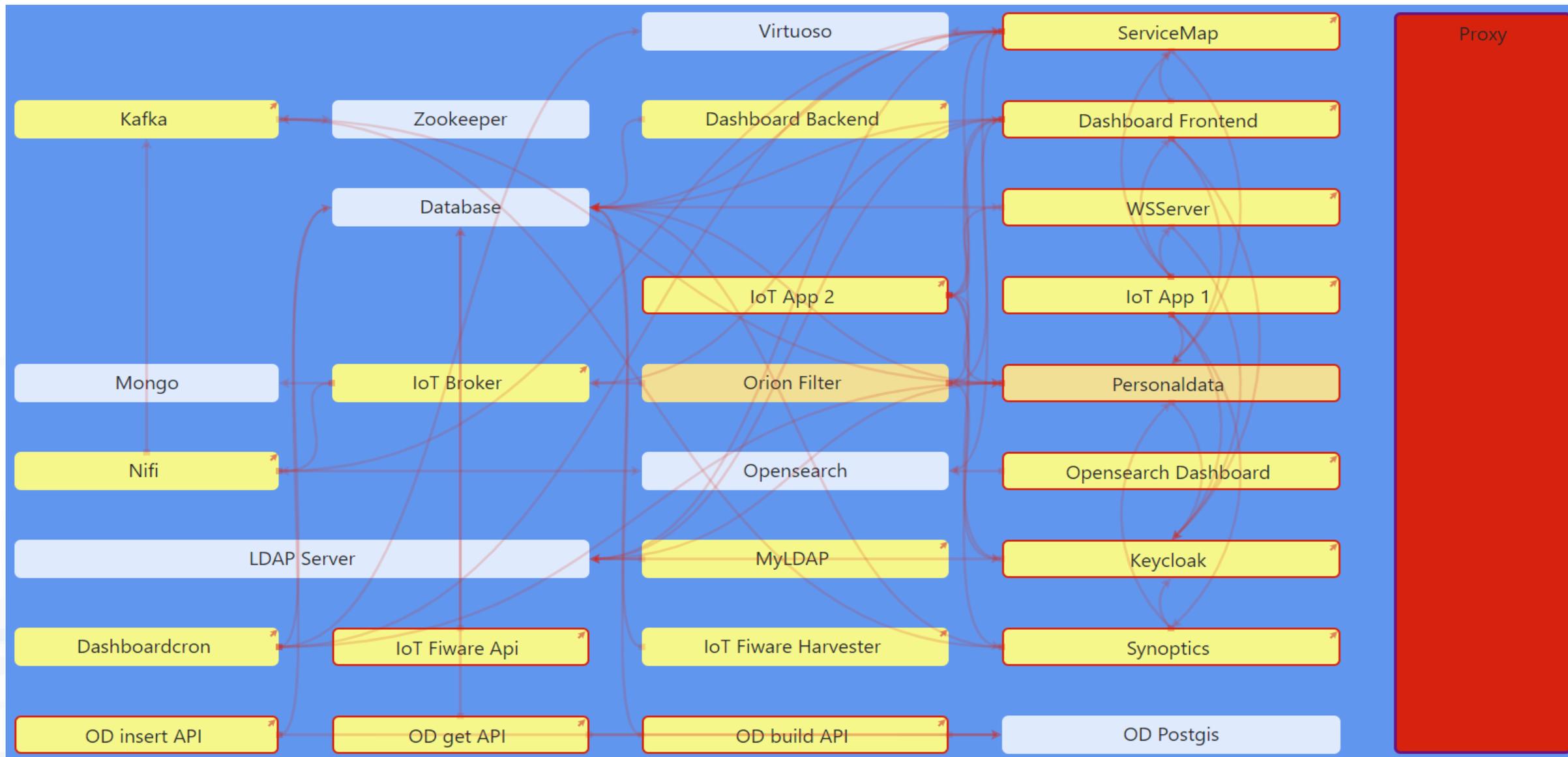
of IoT-Brokers

Latitude broker-0

Longitude broker-0

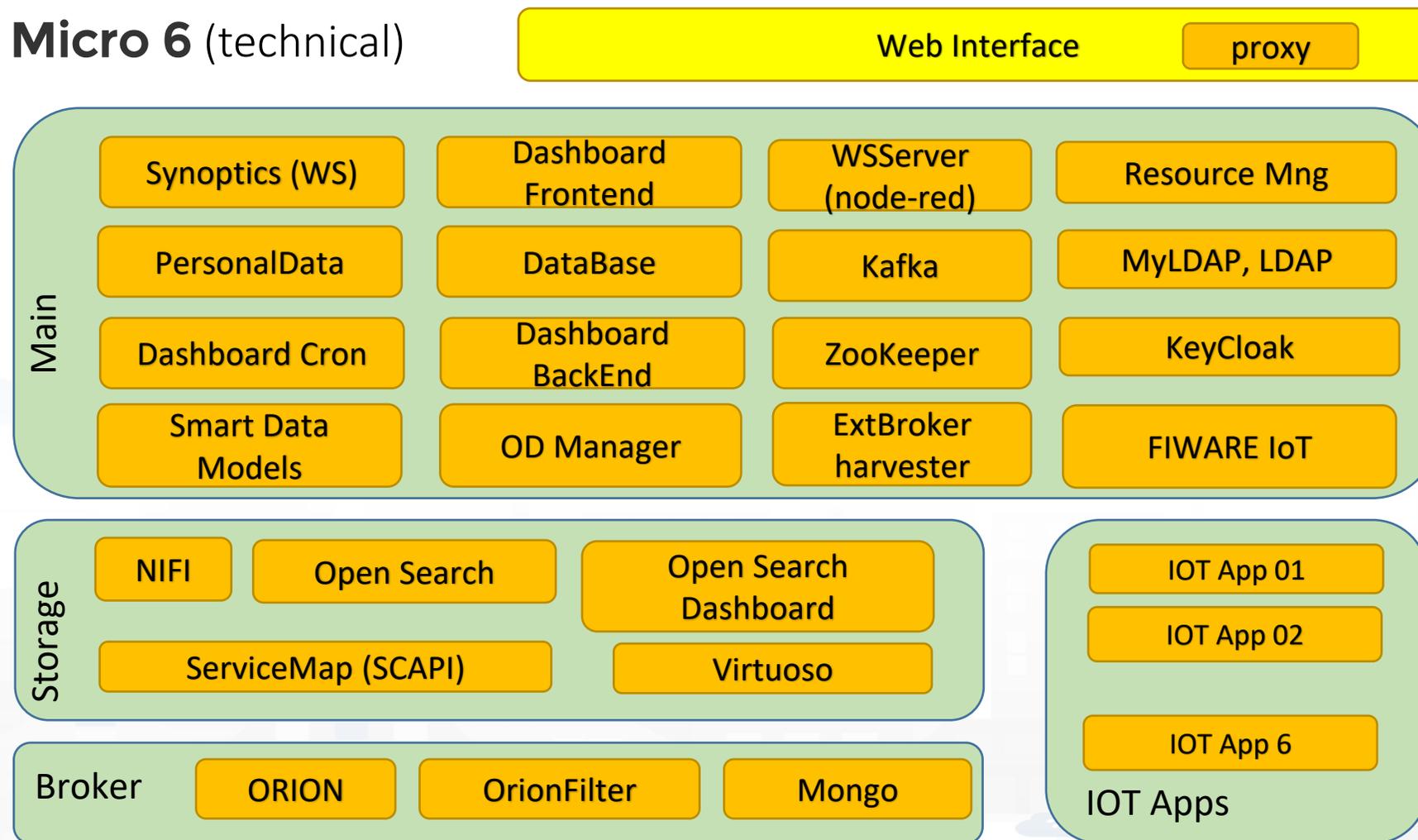
ip_field-1

https://www.snap4city.org/docker-generator/selecting_model



Micro 6 model

Micro 6 (technical)

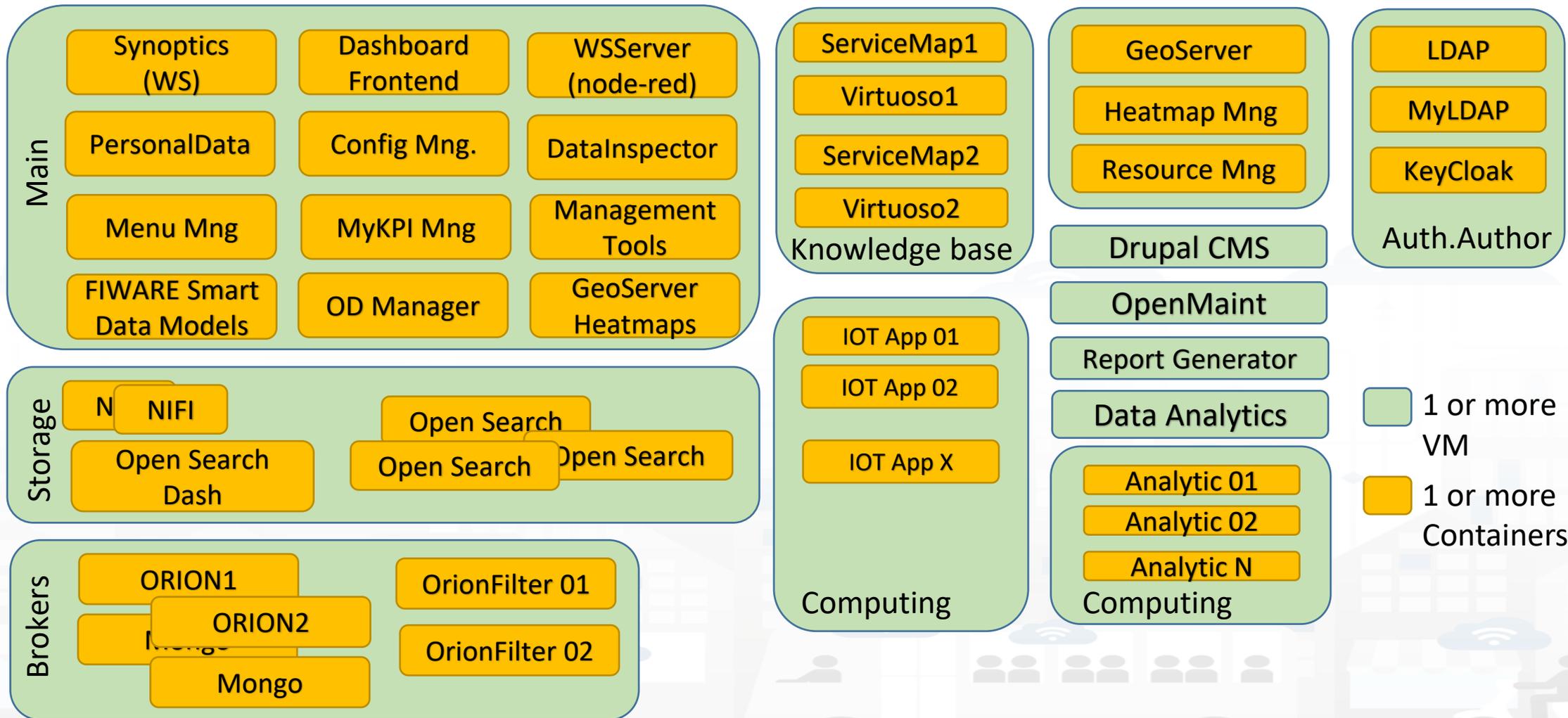


1Hour
installation
and
ready to use

DataCitySmall X-2-2

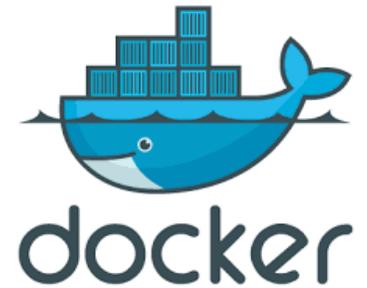
Web Interfaces

proxy



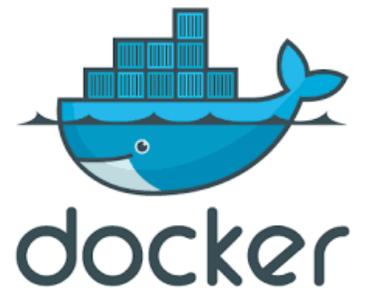
Container Based Installations, different models

- **Micro X:** configurations suitable for solutions for small verticals and industries, single VM, see in the following for the details.
 - it is more complete than the **Alone** configuration of <https://www.snap4city.org/471>
- **Normal X,Y:**
 - it is more complete than the **Basic** configuration of <https://www.snap4city.org/471>
 - 2 VM: X IOT App, Y Brokers
- **Small X,Y:** solutions in which the storage is growing and can be managed into a separate VM, and may be clustered later on.
 - 4 VM: VM1 MAIN:, VM2: authentication and authorization: LDAP, KeyCloak,
 - **VM3 STORAGE:** NIFI, Open Search (version of AWS of Elastic Search)
 - **VM4 IOT APPS and Brokers:** X IoT Apps, [Node-RED](#), [MicroServices](#); and Y IoT Brokers.



Container Based Installations, different models

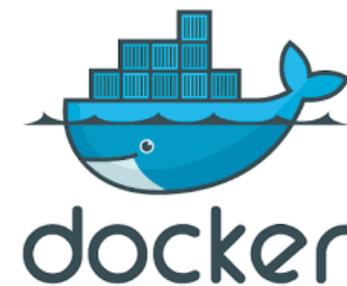
- **DataCitySmall X,Y,Z:** more powerful than the 2020 version based on VM
 - suitable for more scalable solutions in which the storage is growing and thus can be managed into a separate VM, also [IoT App](#) can be managed separately, such as the [IoT Brokers](#).
 - It is the perfect starting point for replicating VM for storage, Brokers and IoT according to the needs, and thus for starting point on large MultiTenant solutions.
 - 6 VM, but you can expand later cloning the same VM4-6 and manually configuring clusters
- **VM:**
 - **VM1 MAIN:**, **VM2:** authentication and authorisation: LDAP, KeyCloak, ...
 - **VM3 STORAGE:** NIFI, Open Distro for Elastic Sarch/Kibana,
 - **VM4:** X IoT Apps, [Node-RED](#), [MicroServices](#).
 - **VM5:** Y [IoT Brokers](#), secure filter, etc.
 - **VM6:** Z [KB](#), [ServiceMap](#), one for each organization, they can be [federated](#) each other.
- **For wider and more complete configurations, see the solutions of the 2020**
 - <https://www.snap4city.org/471>



Providing ZIP files with Docker Compose

- Load on Server, one for each VM and follow the instruction for executing the docker compose
- You get the deployed version in few minutes according to:
 - Your domain
 - Your password
 - Your preferred parameters

dashboard-backend-conf	06/10/2021 16:21
dashboard-builder-conf	06/10/2021 16:21
dashboard-cron-conf	06/10/2021 16:21
database	06/10/2021 16:21
iotapp-001	06/10/2021 16:21
iotapp-002	06/10/2021 16:21
iotapp-003	06/10/2021 16:21
iot-directory-certificate	06/10/2021 16:21
iot-directory-conf	06/10/2021 16:21
ldap	06/10/2021 16:21
mariadb-conf	06/10/2021 16:21
nginx-proxy-conf	06/10/2021 16:21
nifi	06/10/2021 16:21
notificator-conf	06/10/2021 16:21
orionbrokerfilter-001-conf	29/06/2021 17:50
orionbrokerfilter-001-logs	29/06/2021 17:50
ownership-conf	06/10/2021 16:21
processloader-conf	06/10/2021 16:21
servicemap-conf	06/10/2021 16:21
servicemap-iot-conf	06/10/2021 16:21
servicemap-superservicemap-conf	06/10/2021 16:21
synoptics-conf	06/10/2021 16:21
apache-proxy.conf	06/10/2021 16:21
docker-compose.yml	06/10/2021 16:21
post-setup.sh	06/10/2021 16:21
setup.sh	06/10/2021 16:21



Micro 3, all in!

- **FrontEnd:**

- Creating 192168125_dashboard-builder_1 ... Done, 192168125_dashboarddb_1 ... done
- Creating 192168125_dashboard-backend_1 ... Done, 192168125_dashboard-cron_1 ... Done
- Creating 192168125_synoptics_1 ... Done
- Creating 192168125_wssserver_1 ... done
- Creating 192168125_kafka_1 ... Done
- Creating 192168125_zookeeper_1 ... Done

- **Storage**

- Creating 192168125_personaldata_1 ... Done
- Creating 192168125_nifi_1 ... done
- Creating 192168125_elasticsearch_1 ... Done, 192168125_kibana_1 ... Done
- Creating 192168125_servicemap_1 ... Done, 192168125_virtuoso-kb_1 ... done

- **Authentication and Authorisation**

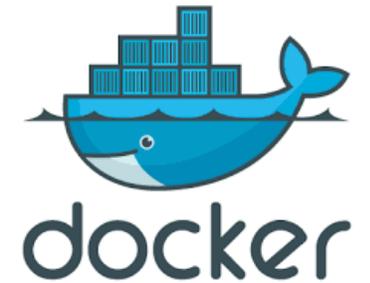
- Creating 192168125_myldap_1 ... Done, 192168125_ldap-server_1 ... Done
- Creating 192168125_proxy_1 ... Done
- Creating 192168125_keycloak_1 ... Done

- **IOT**

- Creating 192168125_orionbrokerfilter-001_1 ... done
- Creating 192168125_orion-001_1 ... Done, 192168125_mongo-001_1 ... done

- **IOT APP**

- Creating 192168125_iotapp-001_1 ... done
- Creating 192168125_iotapp-002_1 ... done
- Creating 192168125_iotapp-003_1 ... done





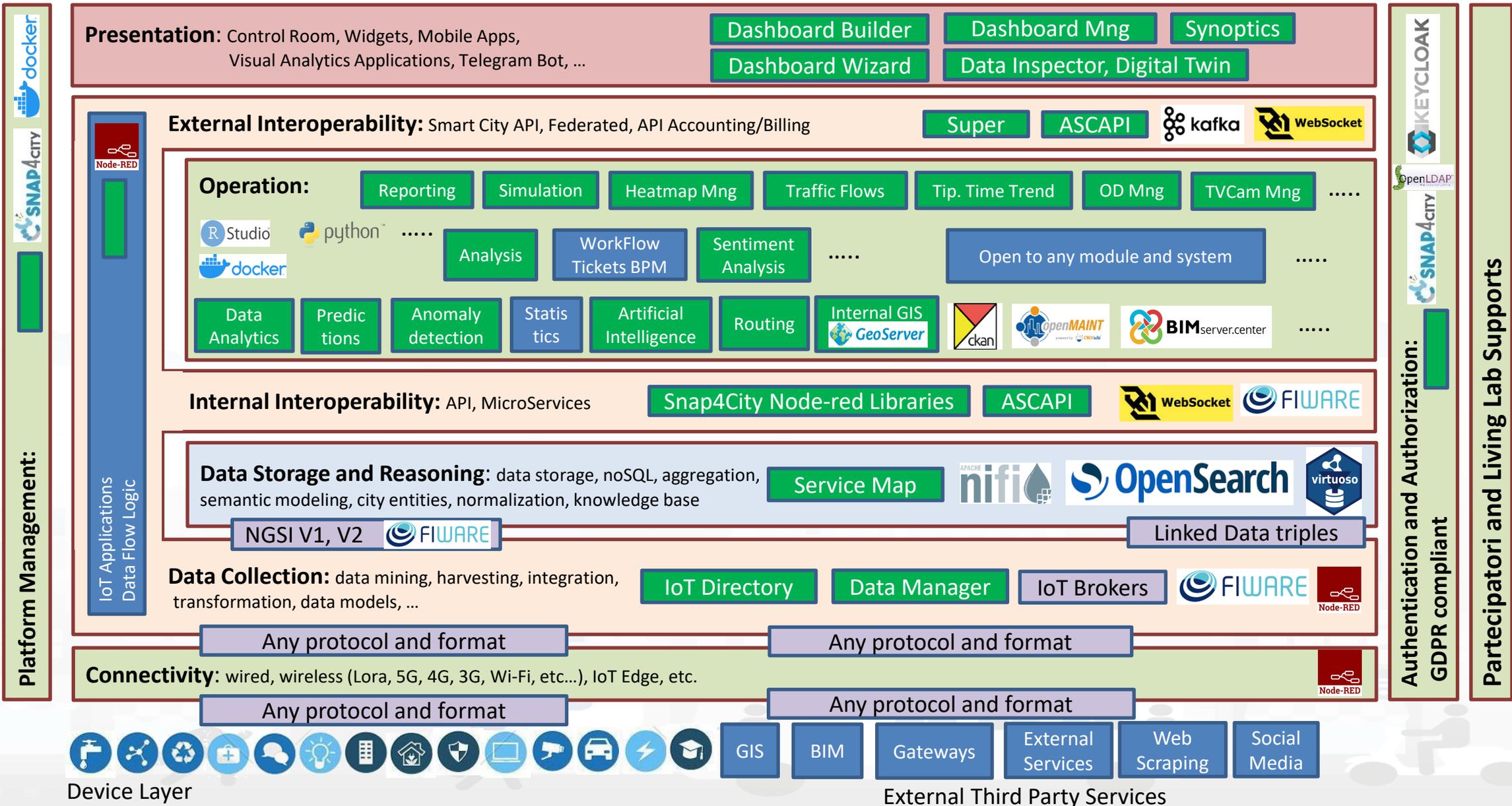
docker

Monitoring status

- EARLY: Via an IOT App inside the composition of dockers
- Via specific applications provided
- Via dashboards that can be installed and setup
- Also via Zabbix or Nagios



ServiceMap	200 at: Wed, 27 Oct 2021 18:26:16 GMT Should be: 200
WSserver	400 at: Wed, 27 Oct 2021 18:26:19 GMT Should be: 400
Super Servicemap	400 at: Wed, 27 Oct 2021 18:26:22 GMT Should be: 400
Auth	200 at: Wed, 27 Oct 2021 18:26:25 GMT Should be: 200
Datamanager Pers.Data.	200 at: Wed, 27 Oct 2021 18:26:28 GMT Should be: 200
Kibana	200 at: Wed, 27 Oct 2021 18:26:31 GMT Should be: 200
Synoptic	200 at: Wed, 27 Oct 2021 18:26:34 GMT Should be: 200
IOT App 01	200 at: Wed, 27 Oct 2021 18:26:37 GMT Should be: 200
IOT App 02	200 at: Wed, 27 Oct 2021 18:26:40 GMT Should be: 200
IOT App 03	200 at: Wed, 27 Oct 2021 18:26:43 GMT Should be: 200
ZooKeeper	Error: socket hang up : http://zookeeper:2181/
Virtuoso	200 at: Wed, 27 Oct 2021 18:26:49 GMT Should be: 200
ElasticSearch	200 at: undefined Should be: 200
OrionBroker	400 at: Wed, 27 Oct 2021 18:26:58 GMT Should be: 400
OrionFilter	200 at: Wed, 27 Oct 2021 18:26:55 GMT Should be: 200
MyLDAP	200 at: Wed, 27 Oct 2021 18:27:04 GMT Should be: 200
Mongo	200 at: undefined Should be: 200
LDAP	Error: ESOCKETTIMEDOUT : http://ldap-server:389/
Kafka	Error: socket hang up : http://kafka:9092/
IOT Directory	200 at: Wed, 27 Oct 2021 18:26:46 GMT Should be: 200
dashboard front end	200 at: Wed, 27 Oct 2021 18:26:13 GMT Should be: 200



Notes

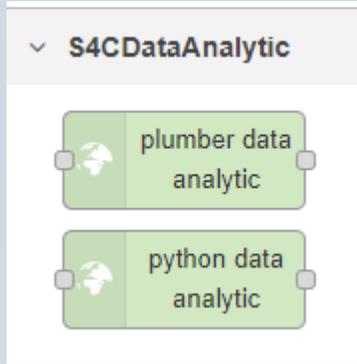
- [Heatmap manager](#), [Traffic Flow Manager](#) and GeoServer can be installed separately (VM)
- [Open Data](#) in CKAN and [Data Gate](#), you can install it on any CKAN, and direct connection of IoT App toward CKAN is possible anyway (VM, or container), to be updated
- [Data Analytic](#) development environment (RStudio, Python), but you can develop and put them in execution outside, or in some specific containers
- Data Table Loader, POI loader, they can be installed into some IoT App in a second phase
- **BIM server** for [Digital Twin](#) Local, ask to snap4city@disit.org (container)
 - <https://www.snap4city.org/730>
 - BIM server is also used into the OpenMaint while we use a direct version.
 - BIMServer - <https://github.com/opensourceBIM/BIMserver>
 - BIMSurfer - <https://github.com/opensourceBIM/BIMsurfer>
- OpenMaint for [ticketing](#) maintenance, and be added, or any ticket management system integrated
 - if also include a BIM [manager](#) while in Snap4City we use a direct one
- [Living Lab](#) based on DRUPAL can be added with separate VM, any other CMS can be integrated as well.
- **API accounting** tools, APIMAN can be installed separately
- **TV Cam Manager** based on Kurento and Turn (container)
- Routing Server based on GraphHopper can be added as separate VM, and any routing server can be integrated
- [SSM2ORION](#) can be added into [IoT Broker](#) containers if needed.
- See more on <https://www.snap4city.org/738>



Data Analytic Container



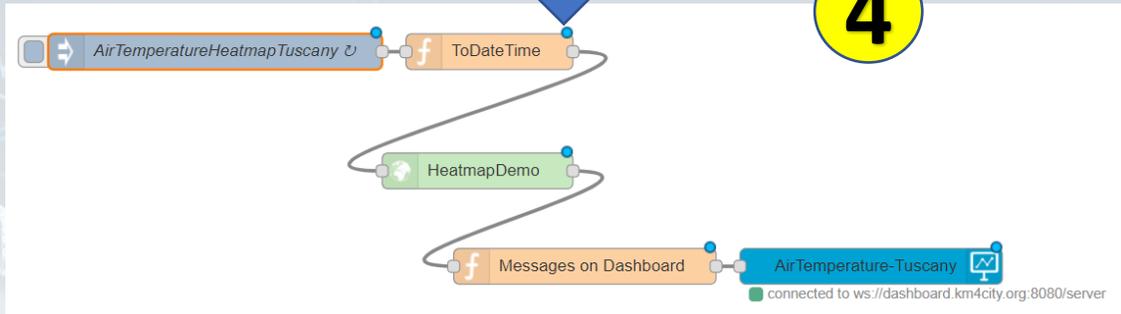
2 Open an advanced IoT App / Node-RED



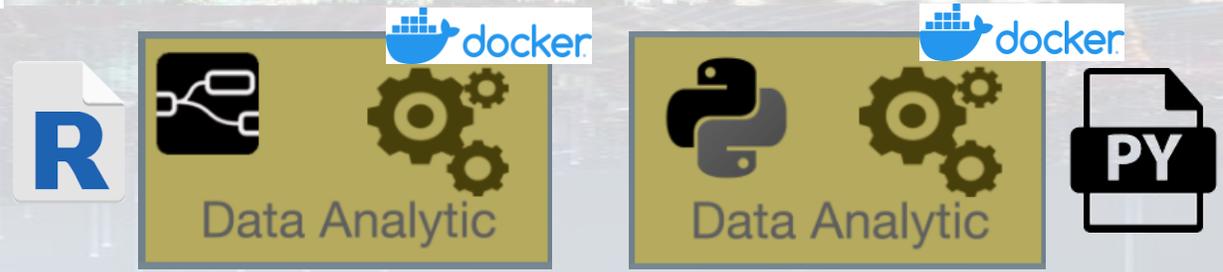
3 Use Snap4City Data Analytic Node, and load in the code you developed

1 Develop .py or .r program on (i) Snap4City platform online, or (ii) your Development Machine.
The code has to respect the guidelines provided. For examples see:

<https://www.snap4city.org/641>
<https://www.snap4city.org/645>



5 Deploy the IoT App → Snap4City Container Manager based on Marathon/Mesos is creating a Container for your Data Analytic code



Data Analytics

You can develop Data Analytic algorithms on RStudio and Python, which can be installed

- 1) on your servers or on your local desktops.
 - if the servers are into the same intranet of the Micro X snap4city installation, the processes can use the smart city API to access at the information you collected into Micro X .
 - Rstudio and Python may exploit any kind of publicly accessible libraries on data analytics, statistics and machine learning. They are open-source tools so that the development environment is free of charge as all in snap4city.
- 2) on cloud Snap4city.org, making an agreement with us. In this case, the data can be located on our cloud and outside. Once developed the .R / .Py you can create the container on snap4city.org platform on our cloud the container to use them as microservices. The tool for creating the container mentioned in point (5) of the above slide.

The Micro X solution presently does not contain the container Marathon/Mesos tools so that we are working on it to provide it to you and all, but not immediately. The Marathon/Mesos is included into the full size [Snap4City Large Solution as described in these slides](#) and which is presently distributed in VM (not integrated with container-based solution as Micro X which is newer in terms of tools and functionalities provided).

For the while, you can develop the R and PY programs in your premise and put them in execution on some server. you can schedule them with chron for example. And also use the Micro X data and save data into... and also to exploit or activate the processes from some message from IoT App, etc... you can even create your container working on the Open-Source.

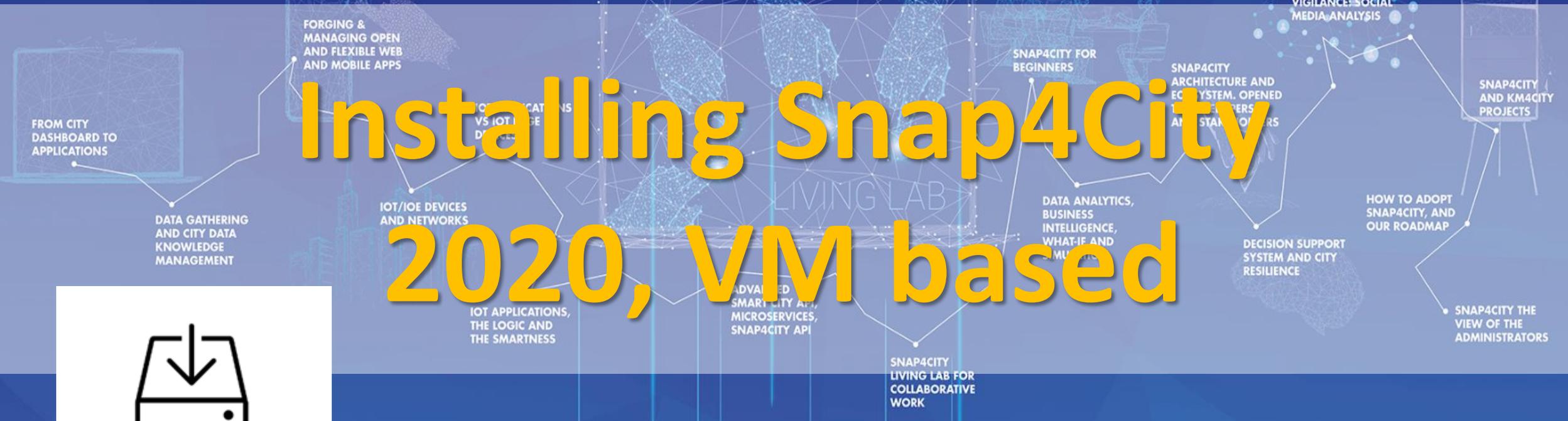
- **SLA:**
 - Including: Direct Contact, POC; Help Desk
 - may be an Organization on our cloud to test new tools, and work with the community, this is typically 5-12Keuro first 2years and 1-2keuro for each successive year depending on the feature and number of users you are placing.
 - Similar to: <https://www.snap4city.org/497> with some adaptation on the basis of your deploy and critical conditions, if any
 - Updates, help desk, etc.
- **Our support can be valued on:**
 - The basis of the complexity of your solution: 10% of the cost
 - Or
 - Block of: 16 hours, for 3000 euro / 50 hours, for 6000 euro
 - larger packages can be negotiated
- **Support can be provided by:** Snap4, DISIT Lab, and other companies
- **Customizations can be assessed separately**

Costs

- **The solution is 100% open source**
 - Licensing cost is 0 (zero) euro
- **Recurrent costs are**
 - **HighCharts**
 - Proprietary for commercial, Free of use for non-profit organizations.
 - Perpetual licence is about 5350Euro for 10 developer, then 171 euro for each developer for the successive years.
 - **Eventual SLA with us for**
 - Corrective maintenance
 - Updates when performed by us
- **Services:** customisation, development of data analytics, development of IoT Apps.

TOP

Installing Snap4City 2020, VM based



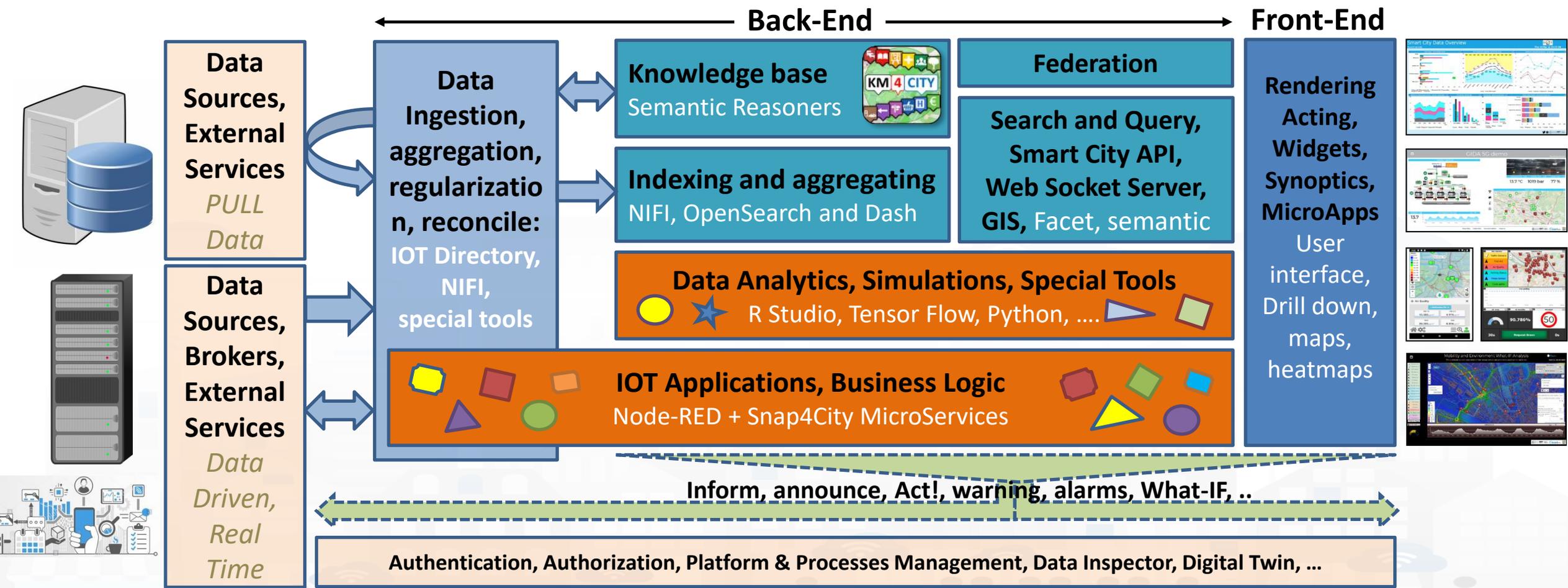
Installations

<https://www.snap4city.org/471>
To get an updated version read it!

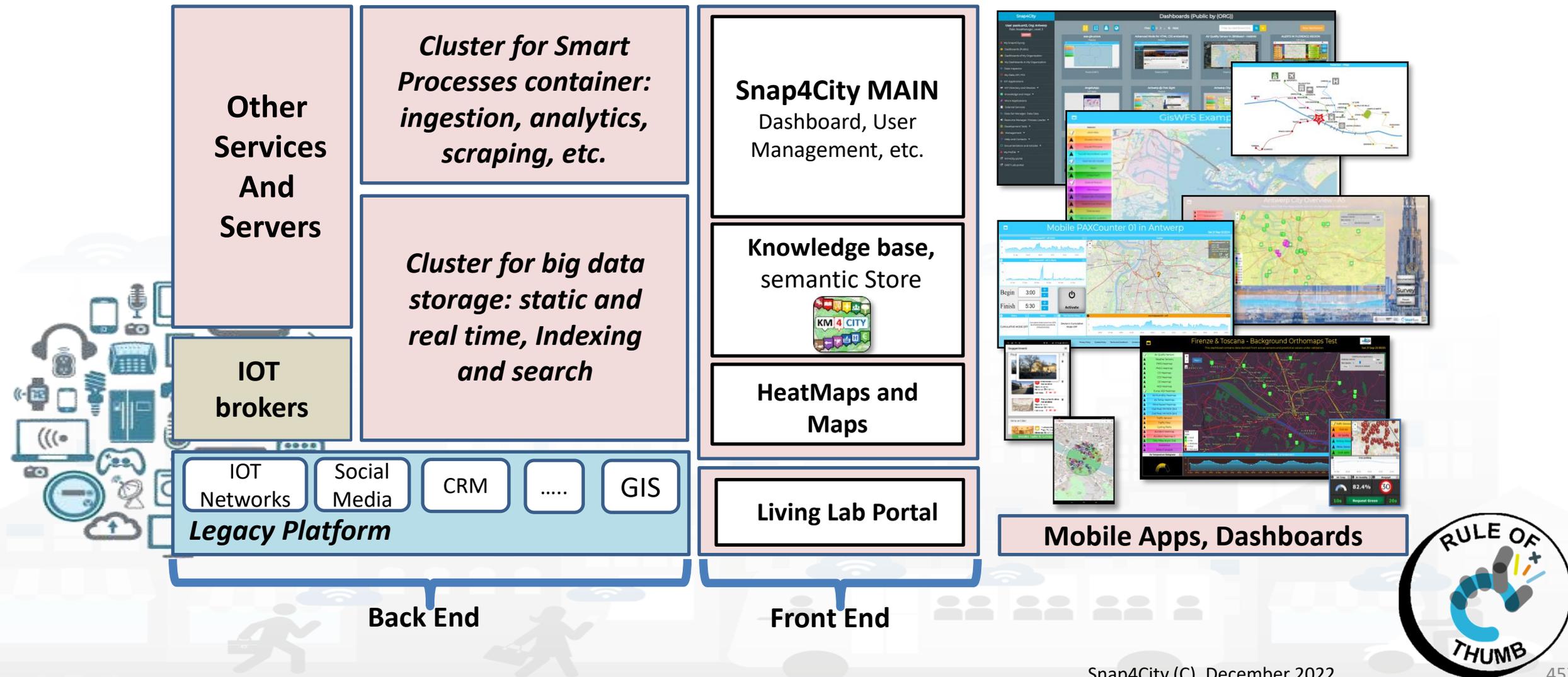
What we suggest since October 2020

- Exploit trial on Snap4City.org of your early solutions and concept, also exploiting the full support of Snap4 experts and community, on DISIT Organization or Multiple Org as you prefer
 - Please note that each Organization need a distinct email address and registration, and applies their own restriction to data and dashboards. So that maximum access to demonstrations is on DISIT Organization into Snap4city.org portal
- Ask/book for an Organization if you would like to test in a separate environment
- Once tested and convinced, start deploy your version on your premise by using «DataCity-Small» on Docker or VM

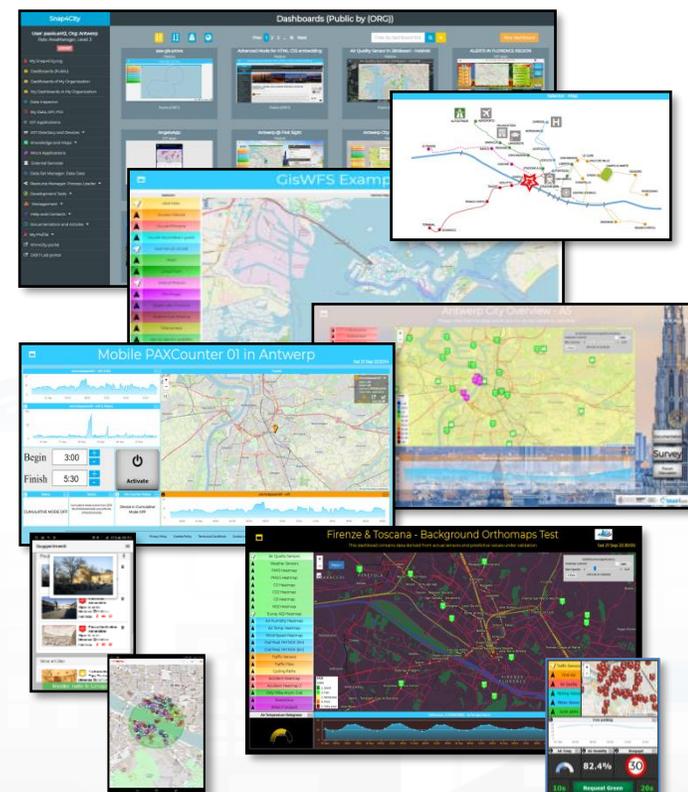
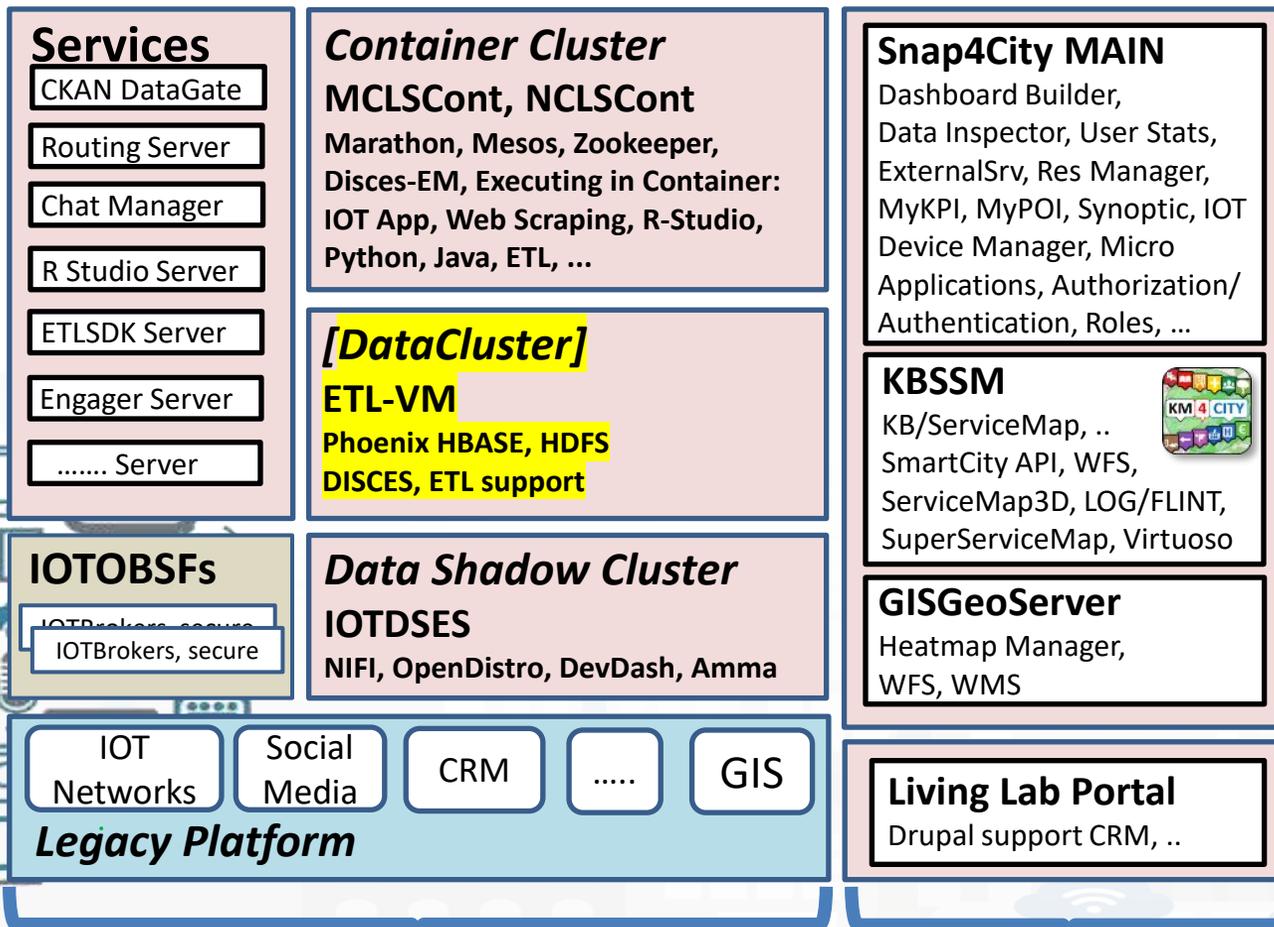
Snap4City, Snap4Industry Architecture, V2 (2022)



Overview of Snap4City platform, for Buyers, for all



Overview of Snap4City platform, for Buyers, for all



Mobile Apps, Dashboards



What is included in the Buyers / Full Platform

- **IOTOBSF**
 - IOT Orion Broker
 - Fi-Ware
 - Secure Filter (Snap4City)
- **IOT Edge support**
 - Linux Ubuntu
 - Windows
 - Raspberry Pi
 - Android
- **IOT Devices support**
 - ESP32
 - Arduino
- **IOT Application**
 - Node-RED
 - Snap4City Library of nodes
- **Other Services**
 - Routing Server
 - DataGate CKAN
 - Chat as Rocket
 - ETL SDK VM
 - Engager ..
 -
- **Data Analytics**
 - Heatmap production MS
 - Rstudio
 - OD production
 - Predictions MS
 - RStudio
 - Anomaly detection MS
 - RStudio
 - ETL Collection
 -
- **MCLSCount, NCLSCount Container[Cluster]**
 - Containers models
 - DISCES-EM
 - Monitoring App
- **ETL Server Data[Cluster]**
 - DISCES
 - Phoenix Drivers
 - Hbase Model
 - ETL processes
- **IOTDSES DataShadow[Cluster]**
 - NIFI process, Squid
 - OpenDistro
 - Elastic Search Model
 - Kibana
 - AMMA data flow
 - DevDash data store
- **KBSSM**
 - Knowledge Base Km4City
 - ServiceMap
 - ServiceMap3D
 - SuperServiceMap
 - LOG/Flint
 - OSM2Km4City
 - Smart City API
 - WFS API
- **GIS GeoServer**
 - GeoServer
 - Heatmap Manager
- **Living Lab Portal**
 - CRM Drupal
 - LDAP Snap4City
 - Registration mng
 - Etc. etc.
- **Snap4City MAIN**
 - Dashboard Builder, Wizard
 - Dashboard Engine
 - Data Inspector, Notificator
 - External Srv manager
 - Menu Manager
 - Ownership Manager
 - Authentication and Authorisation
 - WS server
 - Resource Manager
 - User Stats
 - JavaScript Web App in a Snap, MicroApplications
 - Synoptics, custom Widgets
 - IOT device manager: IOT Directory
 - Snap4City MicroServices on IOT Applications: basic and advanced
 - Snap4City GIS Player
 - What-IF tools

All in source code, and most of components in Appliances/VMs

Platform Maintenance, K3.14

- **Snap4City modules** are released on GITHUB/DISIT and can be updated from:
 - GITHUB/DISIT into VM Appliance or Servers in which they are installed
 - <https://github.com/disit>
 - Node-RED tool, using official Library regarding: Snap4City Libraries
 - Drupal for the Living-Lab Portal aspects
 - Other tools from their corresponding providers
- **Maintenance** would not be a problem, all users should be capable to perform the updates autonomously
- Updates on new versions will be provided by Snap4City periodically, Notification will be provided on NEWS and GitHUB

Keeping Platform at the State of The Art

- **Updates** will be provided by Snap4City periodically and released on GITHUB, and other portals.
- **Snap4City team** is involved in contracts since now, so that this will guarantee that the solution will be evolved to anticipate the state of the art as we have done in Iteration 3, in which we released a number of developments.
 - See also the activity of dissemination and updated roadmap
 - See the presence of Snap4City on EOSC, BeeSmartCity, EO15, etc.
 - See the list of concrete developments
 - See the list of supporters on the Stand with respect to those of the 2018
 - See the planned new developments

Set-up of Open Source version from Scratch

- **Guidelines reported on:**
 - <https://www.snap4city.org/471>
- **How to proceed:**
 - We have presented 7 Configurations models from **A:Alone** to **F:FullPlatform+LivingLab**, but **they can be customized as you like.**
 - **By follow the Configurations** the Customers are guided to identify the most suitable according to their needs;
 - Once the most suitable Configuration has been identified, they are supported into the:
 - i. Download and deploy of the Appliances provided as Virtual Machines or Containers, or
 - ii. Download and install modules from GITHUB according to the recipes for VM/Container and the user manual of the single tools, or
 - iii. Mixt of the above (i) and (ii) approaches.
 - **IOT Edge** can created by (1) installing Node-RED, (2) adding Snap4City library of Nodes from the Palette Manager of Node-RED, (3) registering on Snap4City:
<https://nodered.org/docs/user-guide/editor/palette/manager>

Note that some of the material we are presenting has not been published on the portal yet, for the competition.

Snap4City Scalable Platform with your business

Configuration Kind	Min #VM	Dockers	IOT Broker int	IOT Broker Ext	MAP	KBSM	IOT APP, MicroServices	Storage & IOT Data Shadow	SSO, Roles	IOT Security	Dash + Wizard	GIS in	GIS out	Heatmap	Mob. App	ASCAPI	Living Lab Sup.	Options supported by the configuration
A: Alone	1	6	X	X			1 mf		X	X	X	X				(x)		ETL, DG, CM
B: Basic	2	7	X	X	X		1 mf	Small	X	X	X	X				(x)		ETL, DG, CM
C: CityStart	3-4	8-9	X	X	X	X	1 mf	Small	X	X	X	X	X	X	X	X		ETL, DG, R, CM, Eng
D: DataCity	5-6	Ask	X	X	X	X	70	Medium	X	X	X	X	X	X	X	X		ETL, DG, R, CM, Eng, LL
E: ExtensiveCity	6-8+	Ask	X	X	X	X	70	Scalable	X	X	X	X	X	X	X	X		ETL, DG, R, CM, Eng, LL
F: FullPlatform	12-14+	Ask	X	X	X	X	Scalable	Scalable	X	X	X	X	X	X	X	X		ETL, DG, R, RS, CM, Eng, LL
F: FullPlatform + LivingLab	13-15+	Ask	X	X	X	X	Scalable	Scalable	X	X	X	X	X	X	X	X	X	ETL, DG, R, RS, CM, Eng

mf: multiple flows for each IOT App

Read next slide for the other notes and legenda

Legenda and Notes on the previous table

- **In all configurations you:**
 - **have:** Multiple IOT Brokers; unlimited number of data sources; interoperability support; KB
 - **may have:** HA, DRS, FT, Balancing, cloning and configuring additional VM;
 - **may pass** at the next configuration without reinstalling the VM;
 - **may add** one or more Optional Services as VM/Containers: ETL, DataGate, Routing, Engager, Data Analytics, etc. etc.
- **From Config. E:ExtensiveCity and upper the number of VMs depends on the volume of DataStorage and the volume of Data Stream in input.**
 - These two aspects are managed by two independent clusters of VMs and scale independently each other. This allows to satisfy any different combination of volumes in streams and data storage.
- **We suggest** using Living Lab support only on FullPlatform, while it can be installed on Smaller Configurations with some limitations in terms of features

Optional Services

- **DG: DataGate**
CKAN
- **R: Routing**
- **ETL: ETL SDK**
VM
- **RS: R Studio**
Server
- **Eng: Engager**
- **CM: Chat**
Manager
- **LL: Living Lab**
- ..
- ..

Computational and Storage Costs

- **The VM** is considered (appliances are provided) as 16/24 cores 2.2 Ghz, 16-24 GB Ram, 500 GB HD in thin provisioning, with 25-40 GB HD used at the start, in most cases Debian.
 - to estimate the needed CPU, RAM, Storage for each configuration it is easy from the #of VM in the configuration.
 - Please note that configurations A and B can be executed on 4 cores, 4 GB Ram, ..
- **In solutions**, with a very large number of users on the Front End: Smart City API (mobile App users, Dashboard users, a frontend balancer and more FrontEnd servers would be needed). Please note that the Smart City API are also used by DataAnalytics processes and by MicroServices in the IOT Applications.
 - Typically a thousand of simultaneous users on the front end can be sustained for each VM
 - More precise estimations can be performed by knowing the actual workload

TOP

Ds) DataCity-small Configuration and its evolution in DataCity-Large



Smart City Functional Architecture

Transport systems
Mobility, parking



Public Services,
Govern, events, ...



Sensors, IOT Cameras,
Wi-Fi



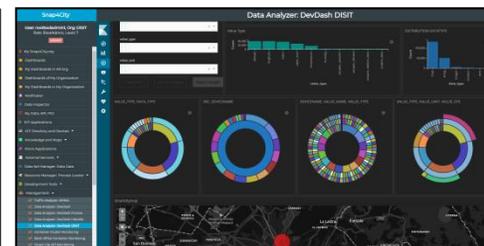
Environment, Water,
energy



Shops, services,
operators

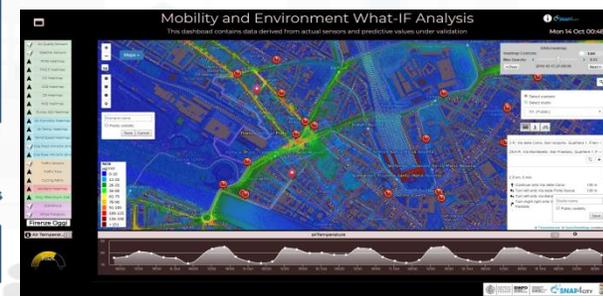
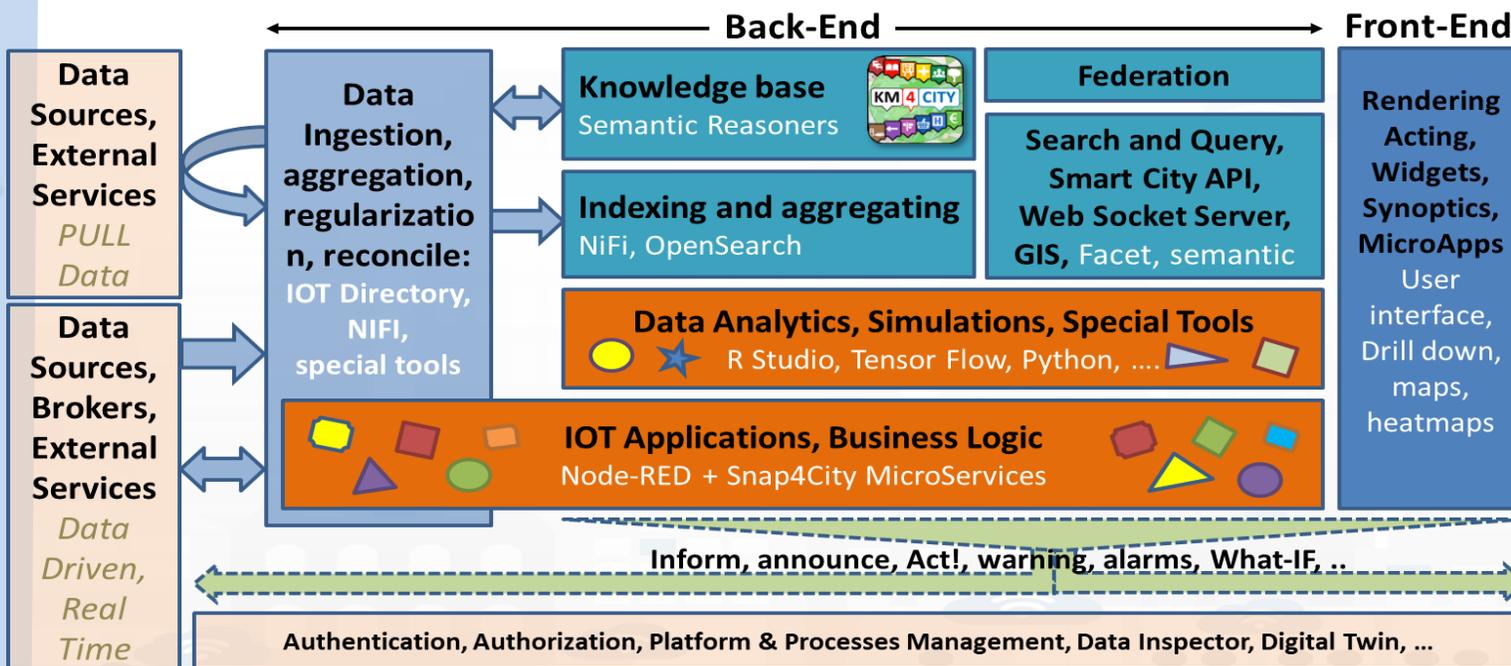


Social Media

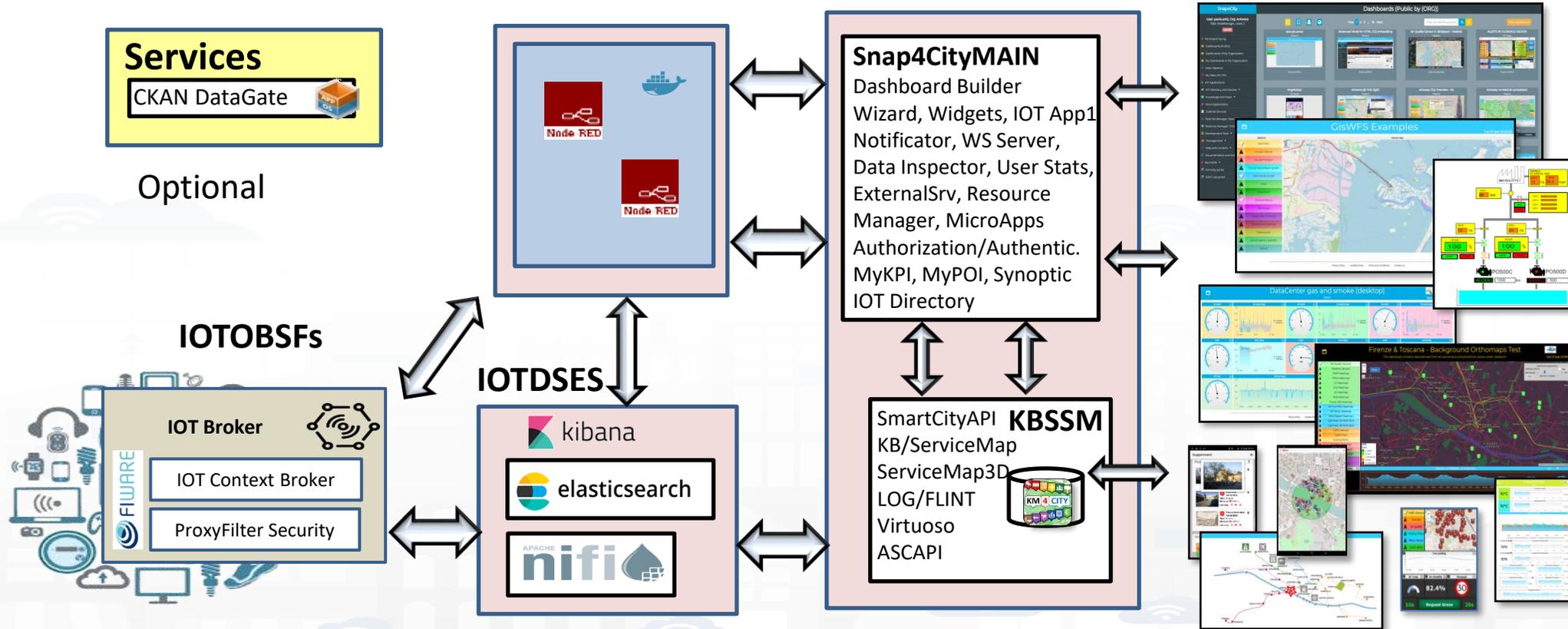


Back office tool

Dashboards, visual tools,
Web and Mobile Apps



D: DataCity-Small) A small size Smart City with a 4 smart applications on cloud and 2 of IOT brokers, limited volume of data entering into the cloud.



D: DataCity) A medium/large size Smart City with a number of smart applications on cloud and a number of IOT brokers, relevant volume of data entering into the cloud.

For Managing

Beyond C:CityStart Configuration

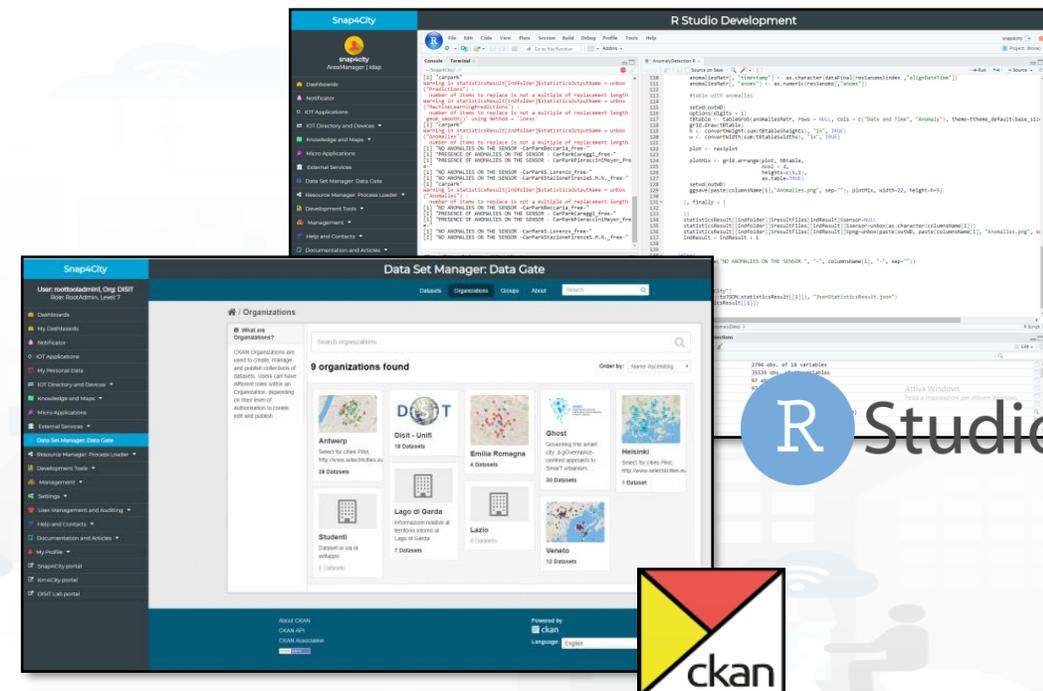


- + A limited number of IOT Applications for data transformation and Analytics
- + A small sized Data Shadow for IOT data management

- **IOTDSES DataShadow[Cluster]**
 - NIFI process
 - Elastic Search Model
 - AMMA and DevDash

Optionally:

- Data Gate CKAN for Open Data



DCL: DataCity-Large (2020 edition)

Opt. Services

- Chat Manager
- Routing Server
- Engager Server
- Server
- Server

External Services

- Energy
- Mobility
- GIS
- Waste
- ...
- Digital Signage
- Security
- Environment
- Weather

Servers

- R Studio Server
- Python Server
- OpenMaint
- CKAN DataGate

MCLSCont

Snap4CityMAIN

Dashboard Builder,
Wizard, Widgets, IOT App1
Notifier, WS Server,
Data Inspector, User Stats,
ExternalSrv, Resource
Manager, MicroApps,
Authorization/Authentic,
MyKPI, MyPOI, Synoptic,
IOT Directory

SuperServiceMap

SuperServiceMap,
ASCAP, KB/ServiceMap
LOG/FLINT
Virtuoso **KBSSM**

HeatMap Server
Manager [GeoServer]

Living Lab support
Drupal, CRM

Balancers

IOTOBSFs

IOT Broker

FIWARE

IOT Orion Broker

IOT Context Broker

ProxyFilter Security

IOTDSES

Balancer

APACHE nifi

ESSTORE kibana

elasticsearch

Other Brokers

Other Brokers

FIWARE

IOT ORION Broker

Quantum Leap

SSM2ORION

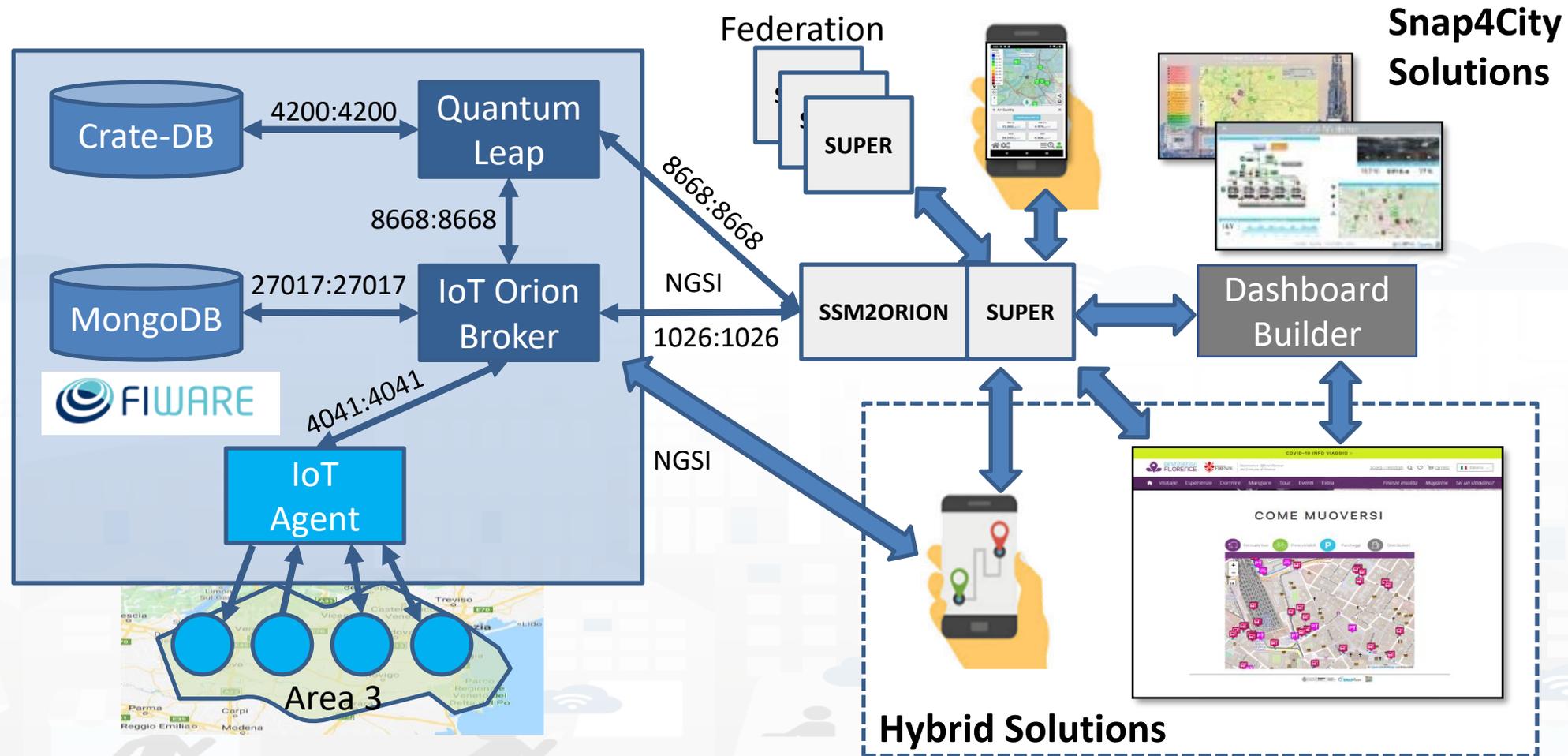
Example of Deploy in different configurations

	Cores			Gbyte			Production				Staging/Support				System Integration				User Acceptance Test				Development			
	CPU	MEM	HD	Redun	CPU	MEM	HD	Redun	CPU	MEM	HD	Redun	CPU	MEM	HD	Redun	CPU	MEM	HD	Redun	CPU	MEM	HD	Redun	CPU	MEM
Snap4City Main	12	24	250	2	24	48	500	1	12	24	250	1	8	18	250	1	12	24	250	1	12	24	250			
KBSSM	12	40	250	2	24	80	500	1	12	40	250	1	8	24	250	1	12	40	250	1	12	40	250			
HeatMap Server	4	24	200	2	8	48	400	1	4	24	200	1	4	12	200	1	4	24	200	1	4	24	200			
Living Lab Support	4	24	200	2 FT	8	48	200	1	4	24	200	1	4	12	200	1	4	24	200	1	4	24	200			
OpenMaint	4	16	400	2 FT	8	32	400	1	4	16	400	1	4	12	400	1	4	16	400	1	4	16	200			
IOTOBSF	8	16	200	2	16	32	400	1	8	16	200	1	4	12	200	1	8	16	200	1	8	16	200			
IOTDSES	8	12	200	2	16	24	400	1	8	12	200	1	8	12	200					1	8	12	200			
ESSTORE	12	24	500	8	96	192	4000	3	36	72	1500	3	36	72	1500					3	36	72	1500			
MCLSCount	12	24	200	6	72	144	1200	3	36	72	600	3	36	72	600					3	36	72	600			
Rstudio Server	12	24	200					1	12	24	200	1	4	12	100					2	24	48	400			
Python Server	12	24	200					1	12	24	200	1	4	12	100					2	24	48	400			
CKAN DataGate	4	12	200	2 FT	8	24	200	1	4	12	200	1	4	12	100					1	4	24	400			
User profile Mng	12	24	1000	2	24	48	2000	1	12	24	1000	1	4	12	300	2	4	12	300	1	12	24	250			
				32	304	720	10200	17	164	384	5400	17	128	294	4400	8	48	156	1800	19	188	444	5050			

legenda

- CPU are reported in number of Cores at xxx GHz min
- MEM is in GByte
- HD are in GByte are high speed HD or SSD for Production while medium speed for the other configurations
- Red: is the level of redundancy, number of VMs. They can be launched in FT or not
- IOTOBSF could be dockers
- MCLSCount is a cluster with dockers. If the solution has no access to orchestrator VMware, then a VM with Nagios/Zabbix has to installed to control the On/Off of VM from DISCES_EM. The alternative could be to manage the small cluster with always one VM.
- IOTDSES a cluster of federated NIFI on Dockers and their balancer
- ESSTORE VM a cluster of OpenDistro per ElasticSearch and Kibana VMs. The number of VM depends on the size of the global storage which can increase elastically with the need along the operation.

Federation of Snap4City vs IOT ORION Broker



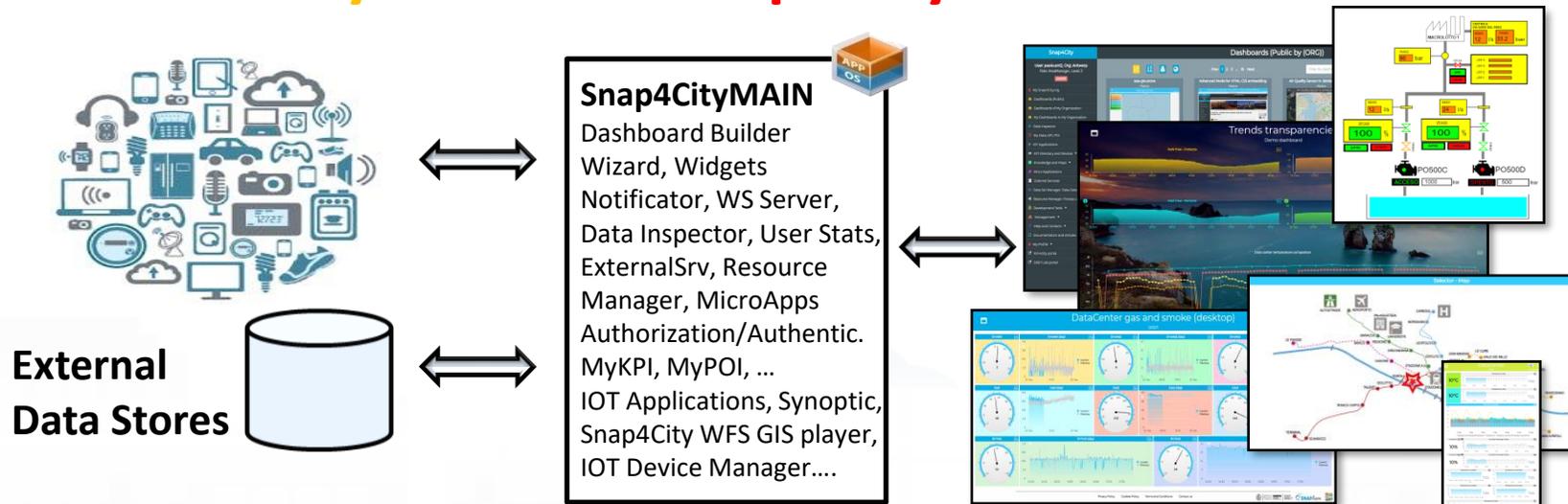
A) Alone Configuration



A: Alone) For Small Size Business, for example an industry 4.0 application you can need to install only one VM: Snap4CityMAINVM

Snap4City MAIN VM

- Dashboard Builder, Wizard
- Dashboard Engine
- Data Inspector, Notificator
- External Srv manager
- Menu Manager
- Ownership Manager
- Authentication and Authorisation
- WS secure server
- Resource Manager
- User Stats
- JavaScript Web App in a Snap, MicroApplications
- Synoptics, custom Widgets
- IOT device manager: IOT Directory
- Snap4City MicroServices on IOT Applications: basic and advanced
- Snap4City WFS player
- What-IF tools



- **For connecting data sources to Dashboards onpremise!**
 - *Data driven solution, no large data store*
 - *Industry 4.0*
 - *Small Smart City business, no knowledge base, no servicemap*
 - *Start with Snap4City platform as seeding element*
 - *Storage: ODBC, JDBC, Mongo, SPARQL, MySQL, etc.*

Snap4CityMAIN: Alone Configuration

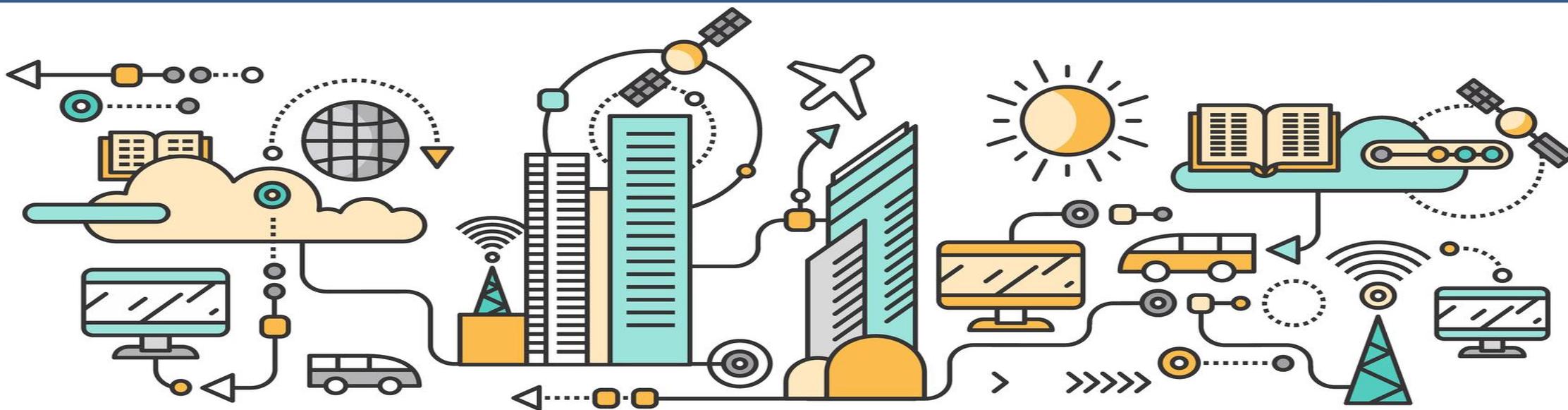
- **As Virtual Machine:**

- [HOW TO: configure/install StartSNAP4CITYVM: starting appliance of Snap4City](#)
- <https://www.snap4city.org/487>

- **As Container Composer:**

- [HOW TO: configure/install StartSNAP4CITYVM: starting appliance of Snap4City](#)
- <https://github.com/disit/snap4city-docker/tree/master/Alone>

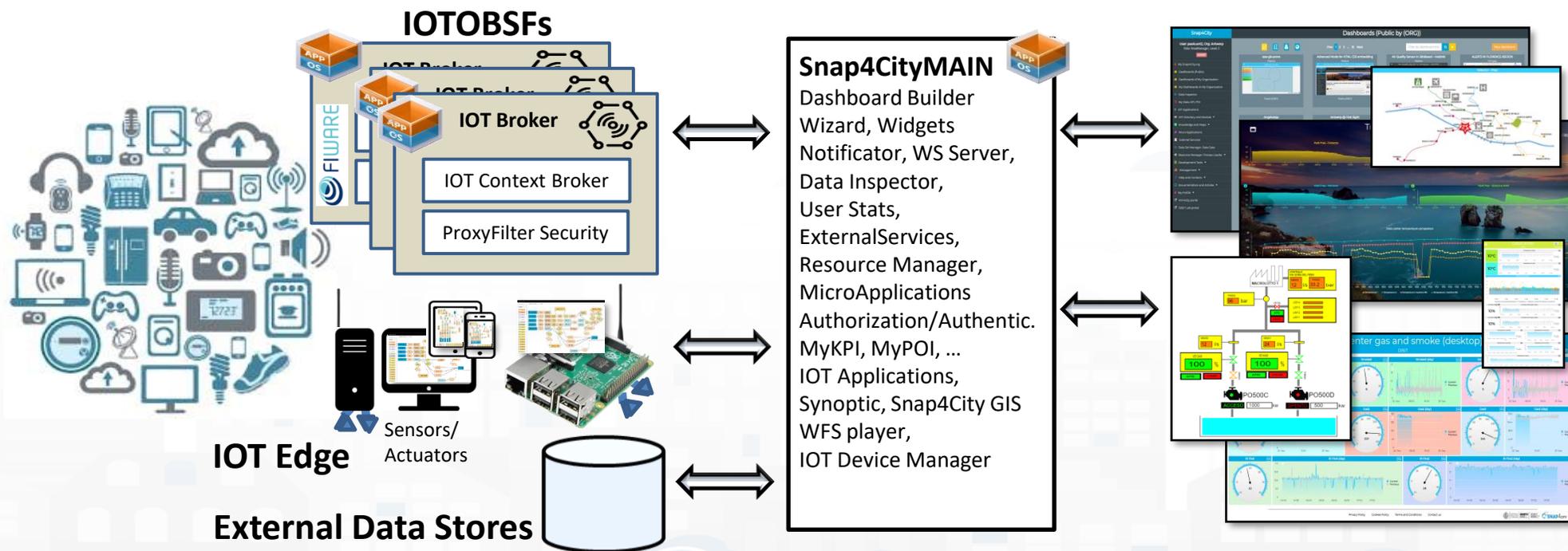
B) Basic Configuration



B: Basic) Addressing a relevant number of IOT devices/ IOT brokers in your smart city or industry 4.0, a few smart Applications with multiple flows

For managing *beyond A: Alone Configuration*

- + large number of IOT devices and brokers, any protocol, format
- + IOT Devices
- + IOT Edge
- + Etc.



B: Basic) Addressing a relevant number of IOT devices/ IOT brokers, a few smart Applications

• IOTOBSF VM

- IOT Orion Broker
Fi-Ware
- Secure Filter
(Snap4City)

• IOT Edge support

- Linux Ubuntu
- Windows
- Raspberry
- Android
- Snap4City Library
of nodes

• IOT Devices support

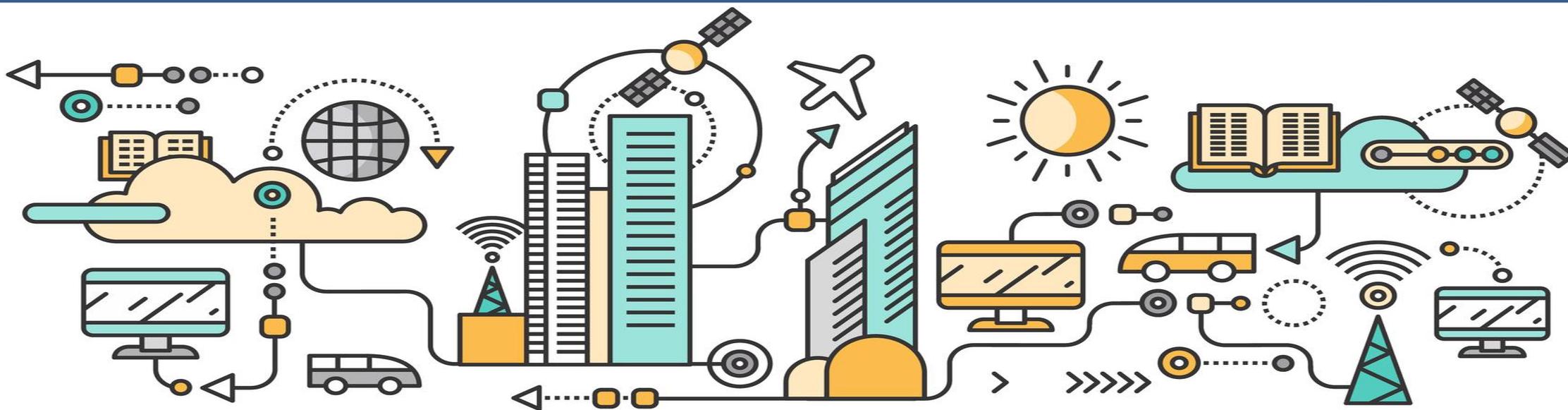
- ESP32
- Arduino

• IOT Application

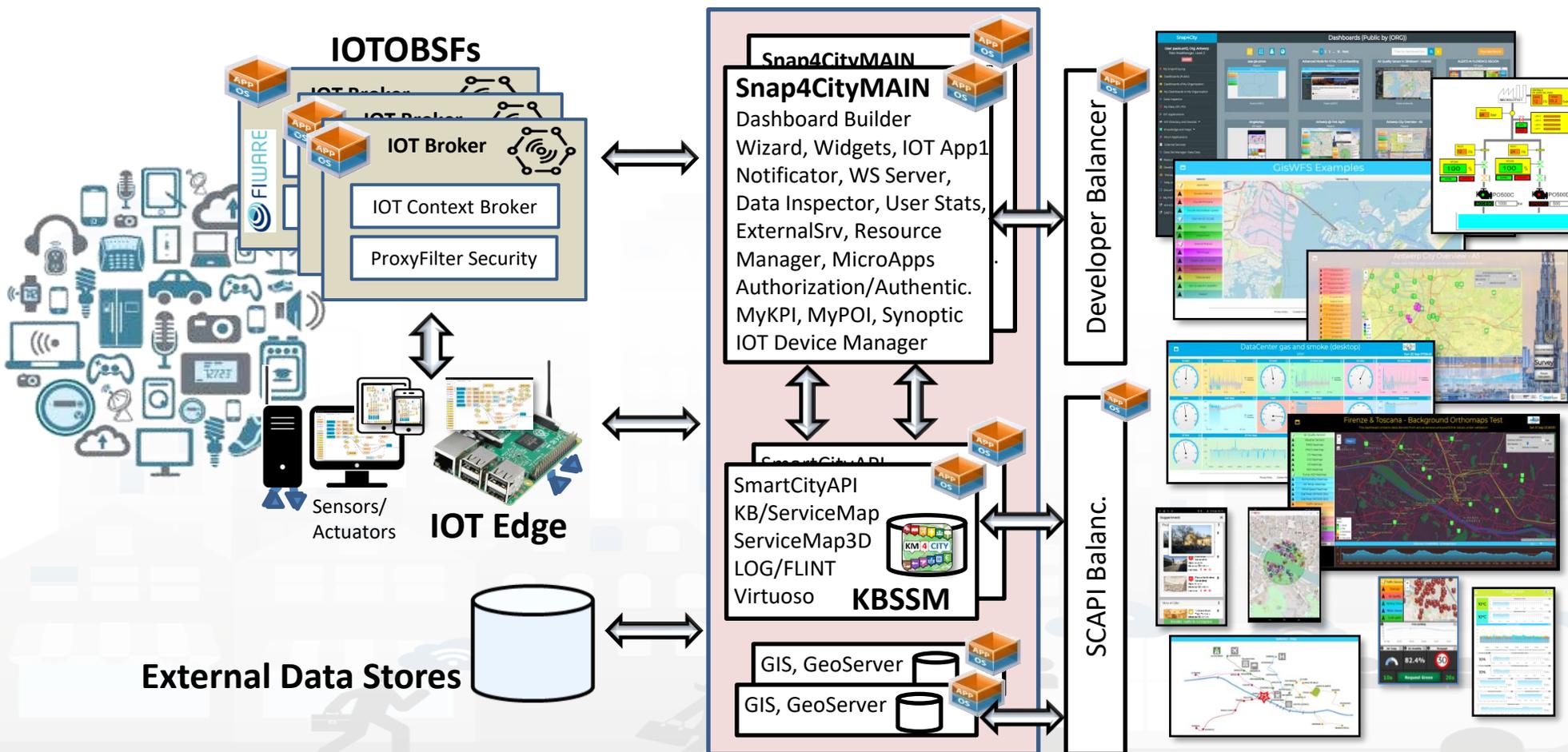
- Node-RED
- Snap4City Library
of nodes

- **IOT Edge:** local intelligence, processes and Applications located on the field, on premise. Those autonomous smart tools can be implemented by IOT Applications working on IOT Edge:
 - **Linux Ubuntu Appliance VM:** <https://www.snap4city.org/drupal/node/298>
 - **Android as IOT Edge** <https://www.snap4city.org/drupal/node/278> and
 - **Raspberry Pi as IOT Edge:** <https://www.snap4city.org/drupal/node/77> You can install Snap4City library in any Node-RED from the official Node-RED library
- **IOT Applications = Node-RED + Snap4City libs of Nodes/MicroServices,**
 - Available in **Snap4CityMAIN VM**, so that in any installation
 - any installation of Node-RED add Snap4City Library from the official Library of Node-RED, add new Nodes into the Palette as
 - <https://nodered.org/docs/user-guide/editor/palette/manager>
 - Snap4City MicroService collection from the JS foundation with full documentation inside <https://flows.nodered.org/?term=snap4city>
 - **BASIC: suitable for Final User**
 - **ADVANCED: DEVELOPER** (you have to install both libraries: basic and advanced)

C) CityStart Configuration



C: CityStart) Addressing a relevant number of GeoLocated Points of Interest, PIN on maps, and eventually heatmaps, a Small Smart City with a few smart IOT applications on cloud and many on edge



For managing
Beyond B:Basic Configuration

- + Large number of GEO elements on maps
- + Heatmaps
- + Geo shapes
- + GIS,

C: CityStart) Addressing a relevant number of GeoLocated

Points, heatmaps, ...

- **KMSSM VM:**

- knowledge base, KB, positioning elements on maps, enabling geo-spatial and temporal reasoning
- Ingestion OSM to load on KB, ServiceMap and reasoning on it
- GeoReverse data, from street to data and vice versa
- WFS export and import

- **GIS GeoServer VM:**

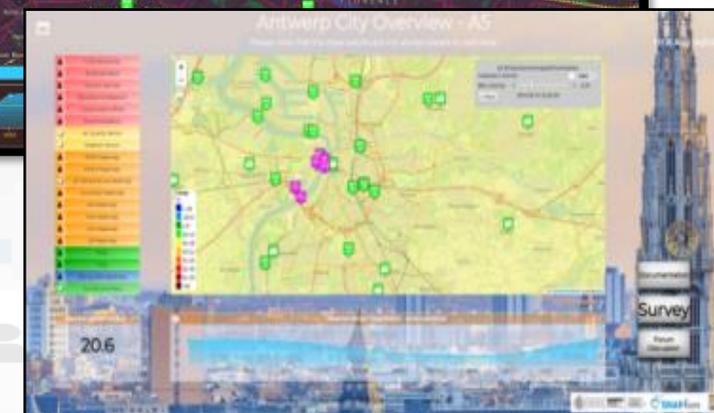
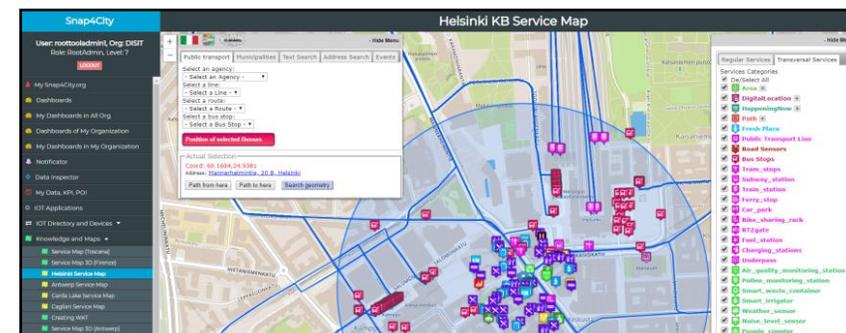
- Producing and providing heatmaps
- Managing Heatmaps colour maps.
- WMS, WFS export, distribution

- **KBSSM VM**

- Knowledge Base Km4City
- ServiceMap
- ServiceMap3D
- SuperServiceMap
- LOG/Flint
- OSM2Km4City
- Smart City API
- WFS API

- **GIS GeoServer VM**

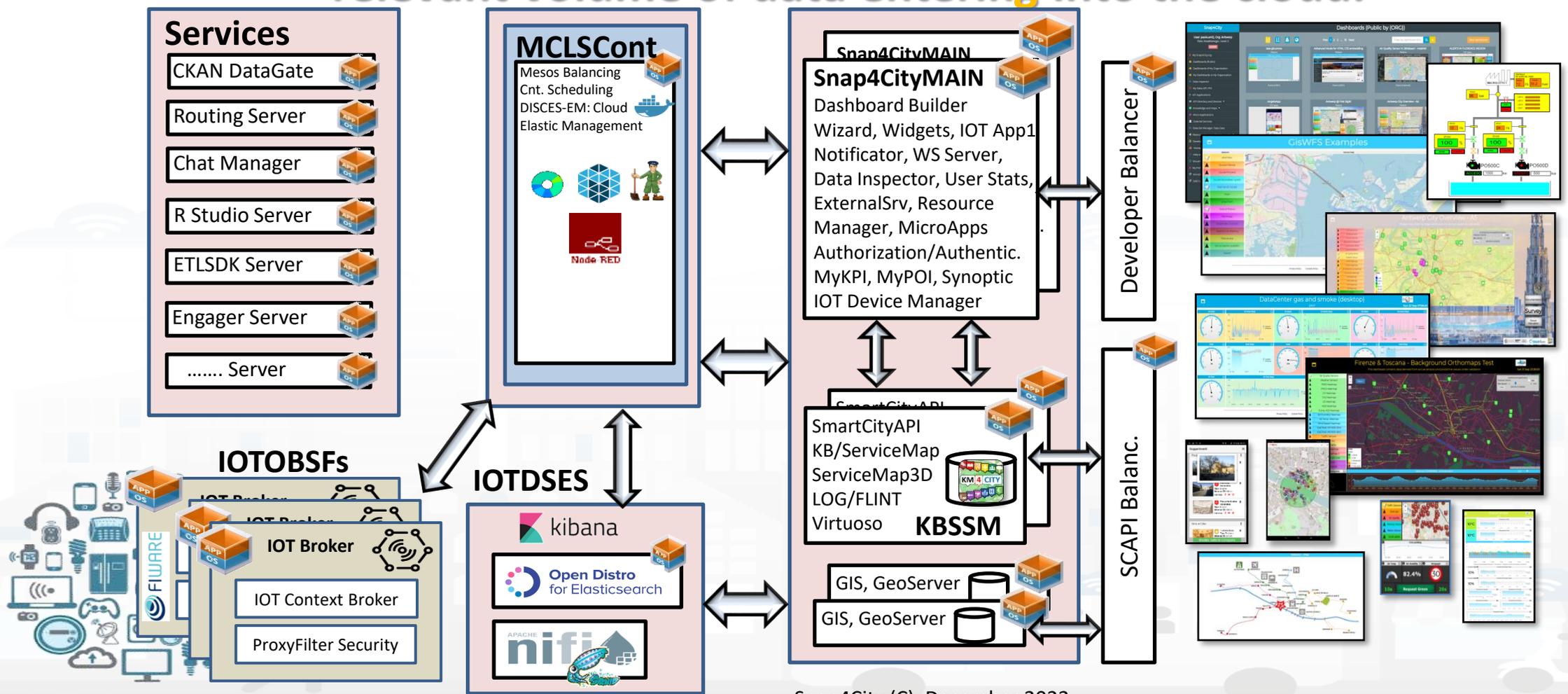
- GeoServer
- Heatmap Manager



D) DataCity Configuration



D: DataCity) A medium/large size Smart City with a number of smart applications on cloud and a number of IOT brokers, relevant volume of data entering into the cloud.



D: DataCity) A medium/large size Smart City with a number of smart applications on cloud and a number of IOT brokers, relevant volume of data entering into the cloud.

- **MCLSCount Container[Cluster]**
 - Containers models
 - DISCES-EM
 - Monitoring App

- **ETL Server Data[Cluster]**
 - DISCES
 - Phoenix Drivers
 - Hbase Model
 - ETL processes

- **IOTDSES DataShadow[Cluster]**
 - NIFI process
 - OpenDistro
 - Elastic Search Model
 - AMMA and DevDash

For Managing *Beyond C:CityStart Configuration*

- + A relevant number of IOT Applications for data transformation and Analytics
- + A small sized Data Shadow for IOT data management

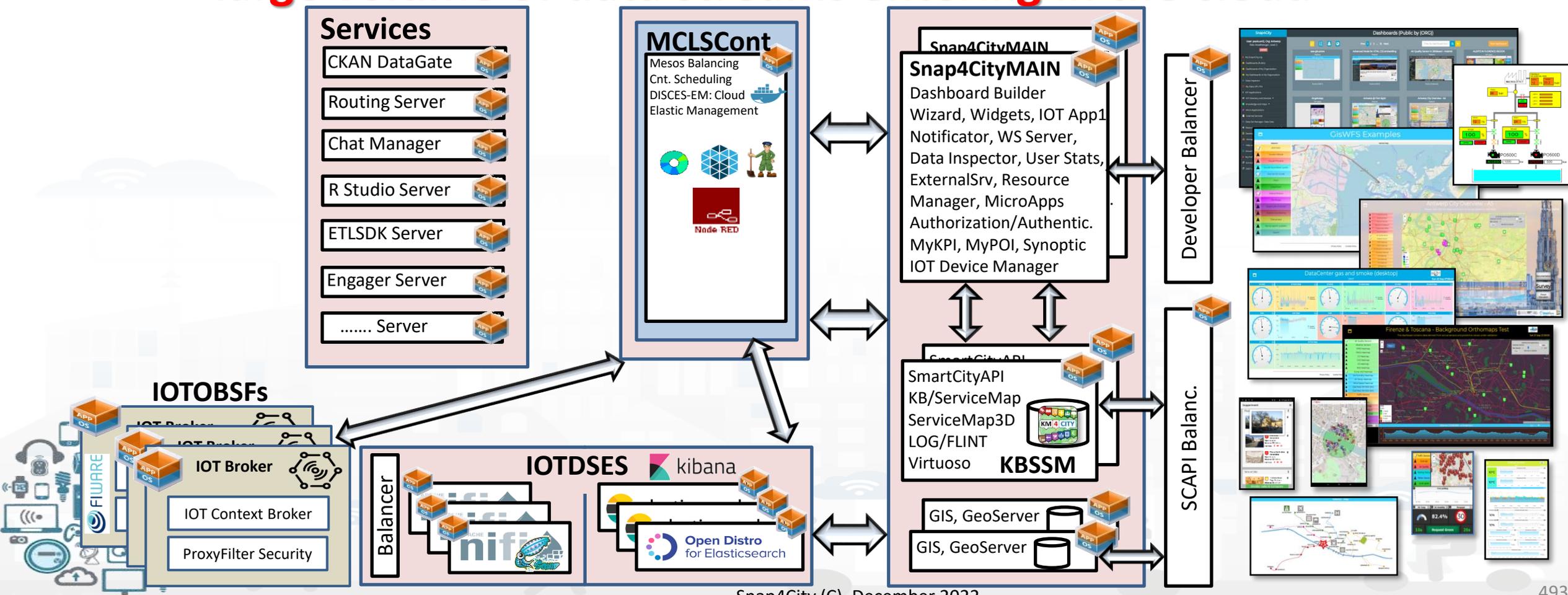
Optionally:

- Data Analytics in R Studio, Tensor Flow (NVIDIA)
- **Hbase / Phoenix Big Data Store**
- Data Gate CKAN for Open Data
- Chat Manager on Dashboard
- Routing Solutions

E) ExtensiveCity Configuration



E: ExtensiveCity) A Large size Smart City with smart applications on cloud and a number of IOT brokers, large volume of data streams entering in the cloud



E: ExtensiveCity) A Large size Smart City with smart applications on cloud and a number of IOT brokers, large volume of data streams entering in the cloud

IOTDSES

DataShadow Cluster

- NIFI process
- Squid cache on SCAPI
- OpenDistro
 - Elastic Search Model extended API
 - Kibana
- AMMA data flow
- DevDash data monitor
- ...

For Managing

Beyond D:DataCity Configuration

- + A relevant number of data streams entering in the platform
- + A scalable Data Shadow for IOT data management

Optionally:

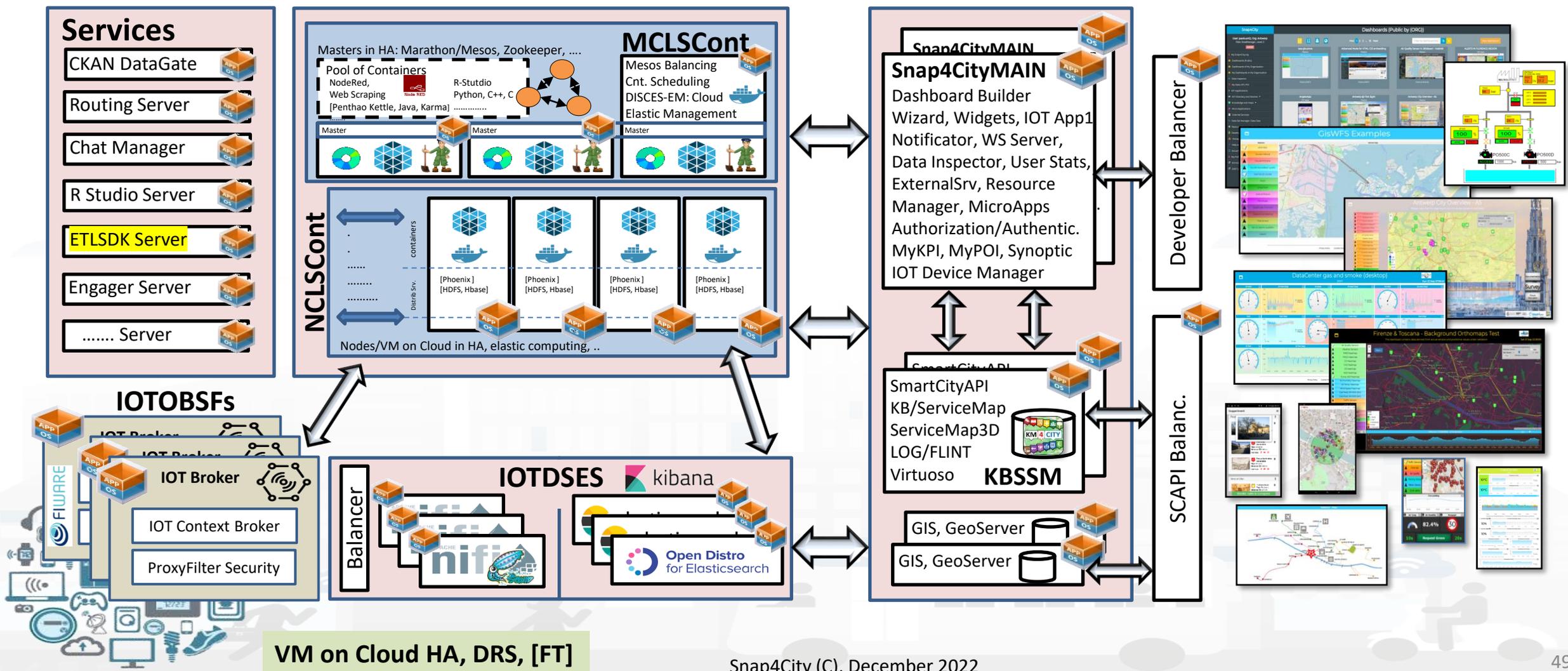
- Data Analytics in R Studio, Tensor Flow (NVIDIA)
- Hbase / Phoenix Big Data Store
- Data Gate CKAN for Open Data
- Chat Manager on Dashboard
- Routing Solutions



F) FullPlatform Configuration



F: FullPlatform) For Huge scale Smart City with a Huge number of smart applications and processes on cloud (thousands), any number of IOT brokers



F: FullPlatform) For Huge scale Smart City with a Huge number of smart applications and processes on cloud (thousands), any number of IOT brokers

- MCLSCount
- NCLSCount
- Container[Cluster]
 - Marathon, Mesos Cluster
 - Containers models
 - IOT App
 - Web Scraping
 - Data Analytics
 - ETL
 - Python
 - ..
 - DISCES-EM
 - Elastic management of containers
 - Monitoring App

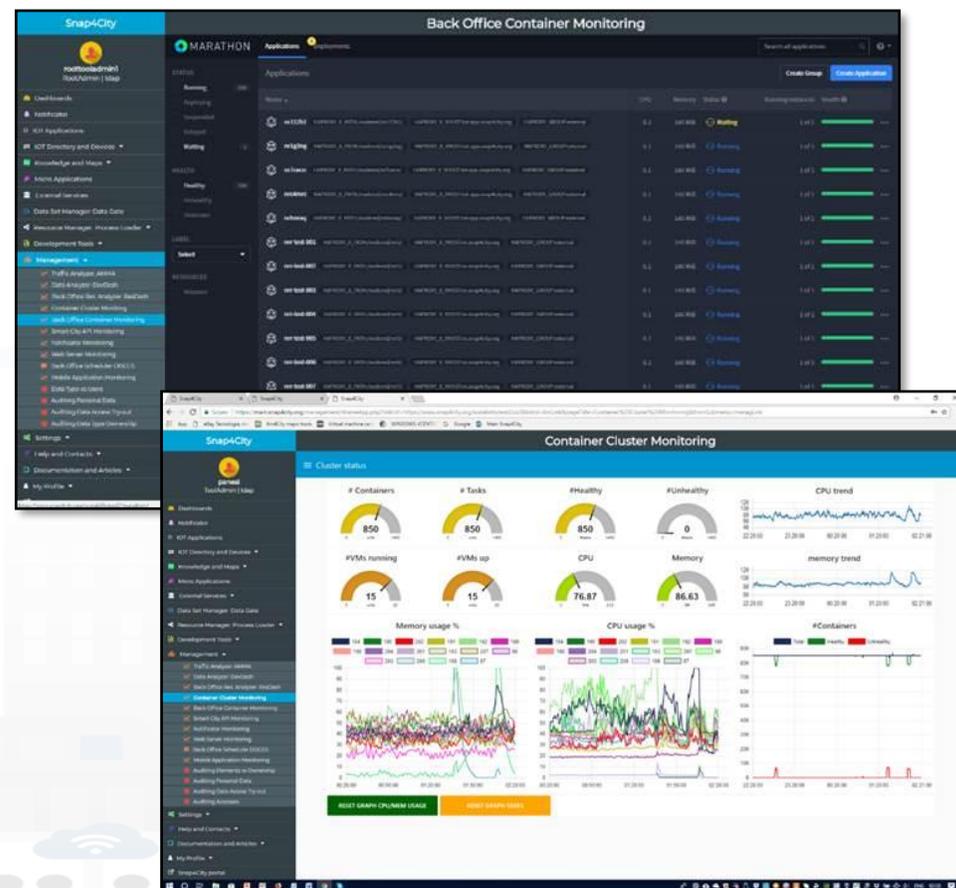
For Managing

Beyond E:ExtendedCity Configuration

- + A scalable huge number of Containers including different kind of processes: IOT, ETL, data analytics, scraping
- + A scalable Data Shadow for IOT data management

Optionally:

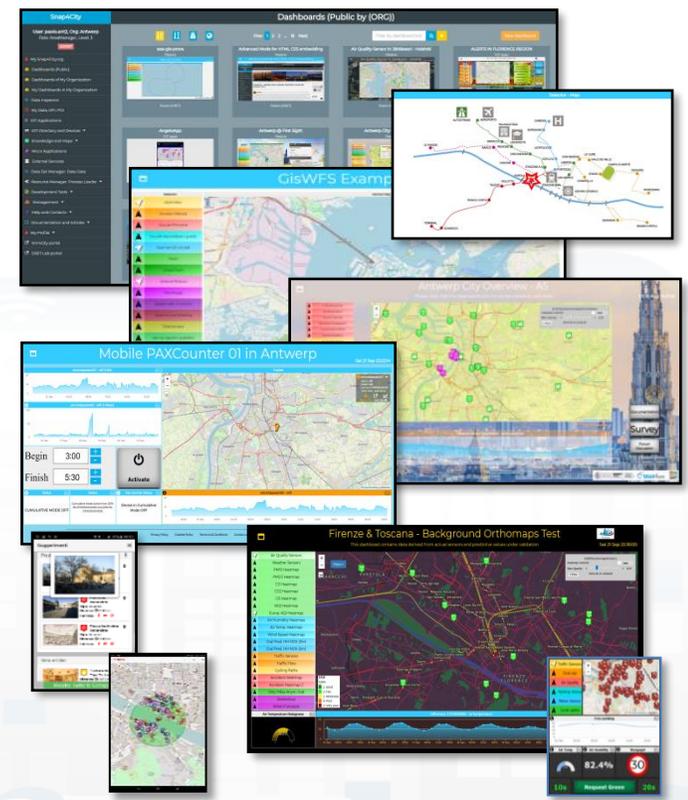
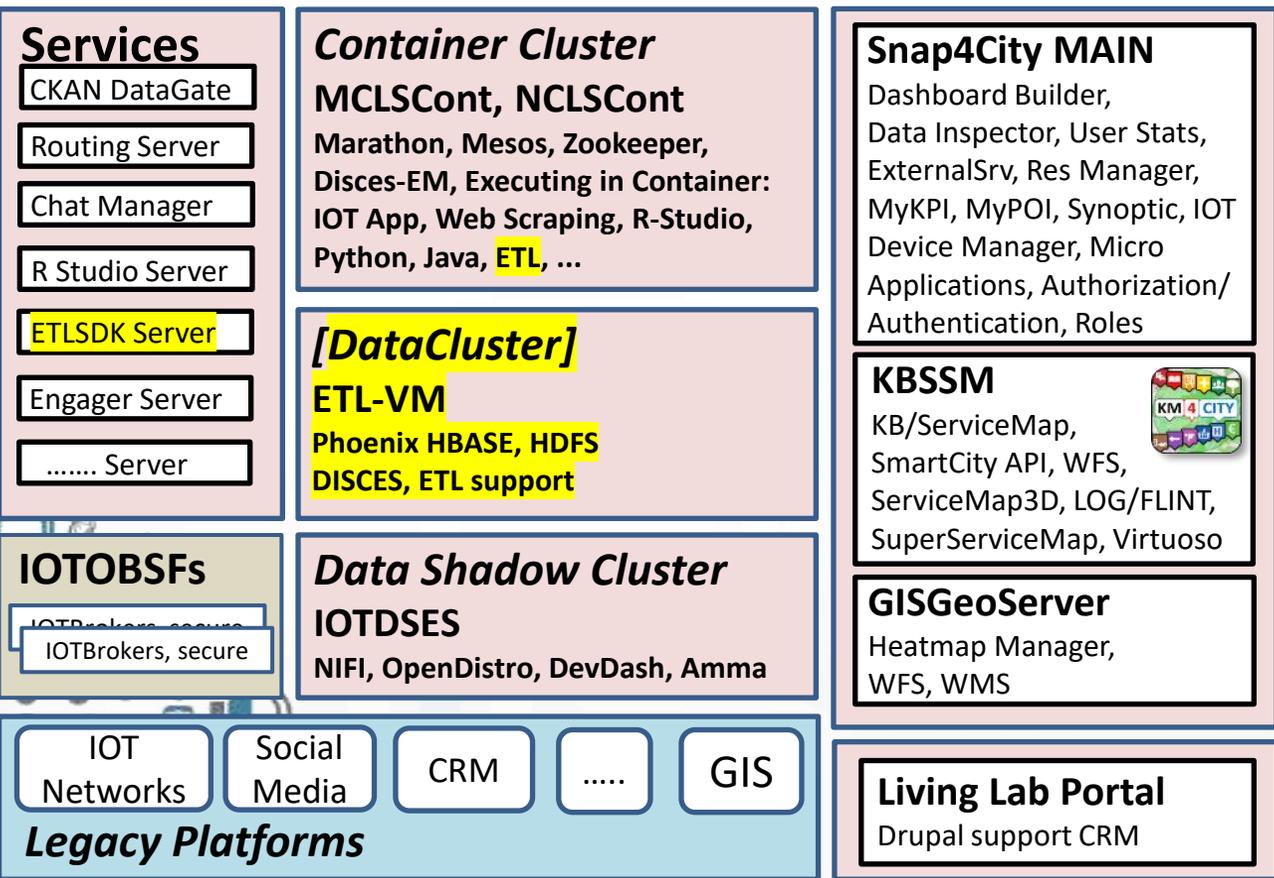
- Data Analytics in R Studio, Python, Tensor Flow (NVIDIA), etc.
- Hbase / Phoenix Big Data Store
- Data Gate CKAN for Open Data
- Chat Manager on Dashboard
- Routing Solutions



F+) LivingLab Configuration



F-LivingLab: FullPlatform + LivingLab) For Huge scale Smart City as Full Platform plus Living lab Support



Mobile Apps, Dashboards

In Yellow alternative & legacy solutions including ETL

F-LivingLab: FullPlatform + LivingLab) For Huge scale Smart City as Full Platform plus Living lab Support

Living Lab Portal

- CRM Drupal
- LDAP Snap4City
- Blogs, Articles, comments, etc.
- Multiple Organization
- Multiple Groups
- SSO with Snap4City tools
- Automated Registration management
- SOLR indexing on content
- Monitoring activity
- Reporting and statistics

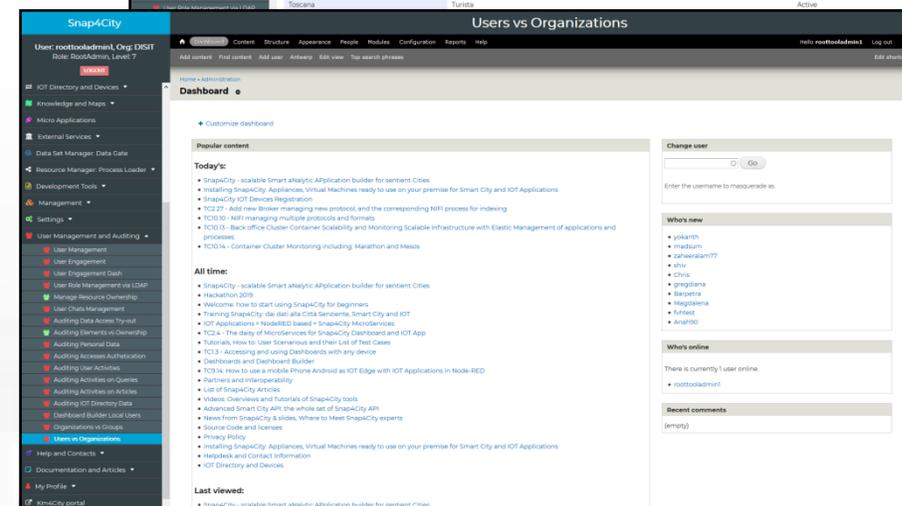
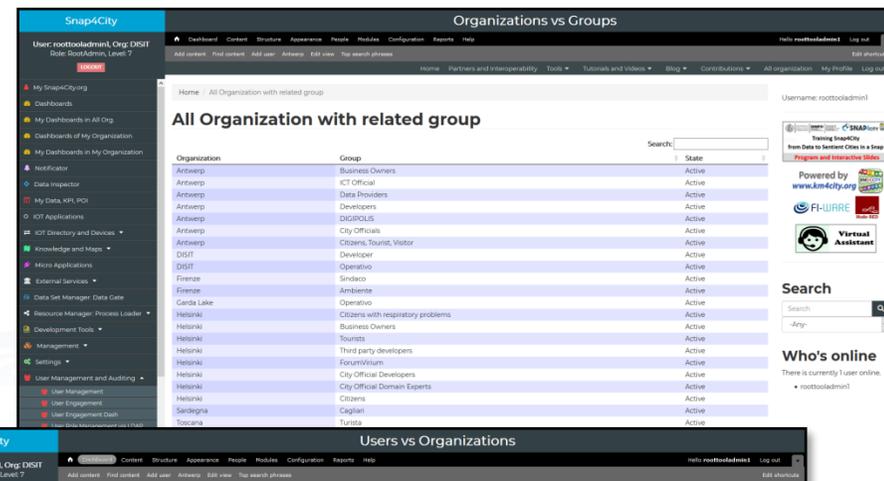
For Managing

Beyond F: FullPlatform Configuration

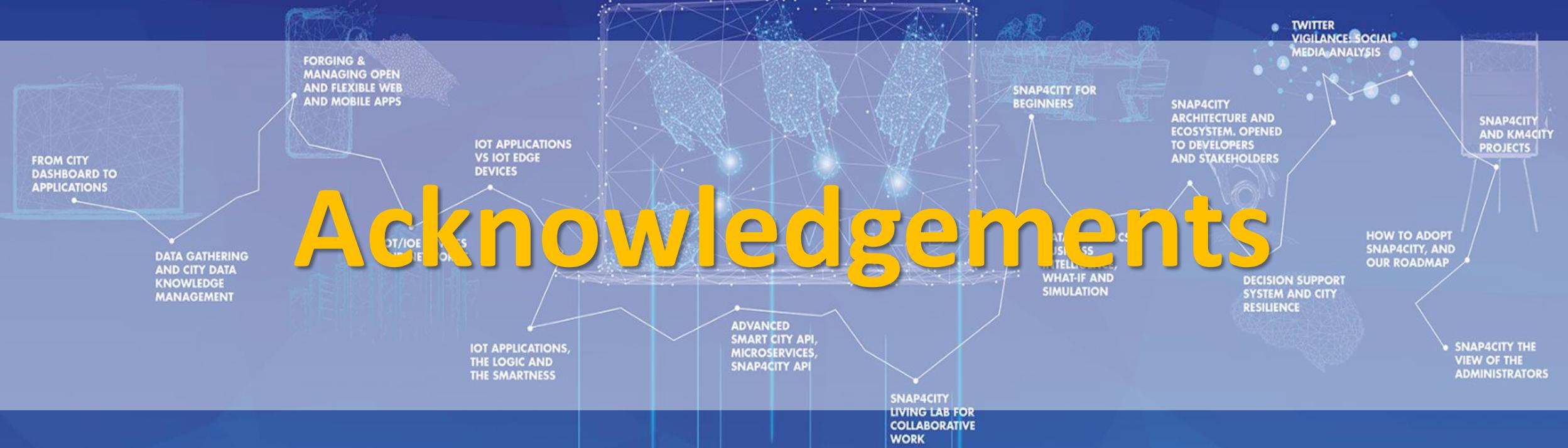
+ Providing Living Lab Support, a full CRM for stakeholder, co-working, collaborative work, discussion environment, chart, forum, etc.

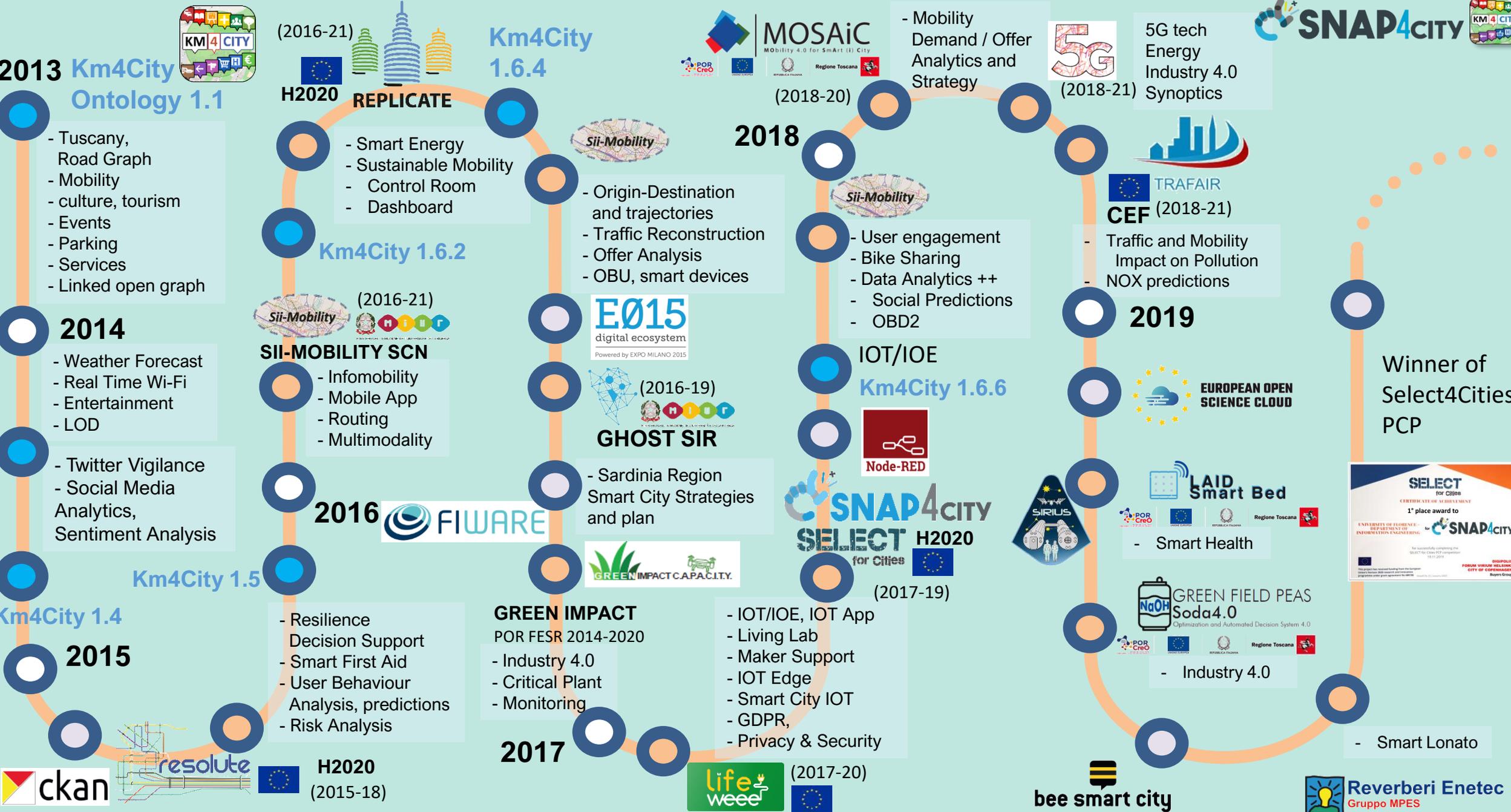
Strongly suggested:

- Data Analytics in R Studio, Python, Tensor Flow (NVIDIA), etc.
- Hbase / Phoenix Big Data Store
- Data Gate CKAN for Open Data
- Chat Manager on Dashboard
- ETL SDK servers
- User Engagement Server
- Routing Solutions



Acknowledgements





2013 Km4City Ontology 1.1

- Tuscany, Road Graph
- Mobility
- culture, tourism
- Events
- Parking
- Services
- Linked open graph

2014

- Weather Forecast
- Real Time Wi-Fi
- Entertainment
- LOD

- Twitter Vigilance
- Social Media Analytics, Sentiment Analysis

Km4City 1.4

2015

- Resilience Decision Support
- Smart First Aid
- User Behaviour Analysis, predictions
- Risk Analysis



(2016-21) H2020 REPLICATE

- Smart Energy
- Sustainable Mobility
- Control Room
- Dashboard

Km4City 1.6.2



- SII-MOBILITY SCN**
- Infomobility
 - Mobile App
 - Routing
 - Multimodality

2016 FIWARE

Km4City 1.5

- GREEN IMPACT**
POR FESR 2014-2020
- Industry 4.0
 - Critical Plant
 - Monitoring



Km4City 1.6.4

- MOSAiC**
MOBILITY 4.0 FOR SMART (II) CITY
(2018-20)
- Origin-Destination and trajectories
 - Traffic Reconstruction
 - Offer Analysis
 - OBU, smart devices



- GHOST SIR**
- Sardinia Region Smart City Strategies and plan

2017

Km4City 1.6.6

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



2018

- Mobility Demand / Offer
- Analytics and Strategy
- User engagement
- Bike Sharing
- Data Analytics ++
- Social Predictions
- OBD2



2019

- Smart Health
- Industry 4.0



5G tech Energy Industry 4.0 Synoptics

- TRAFAIR CEF (2018-21)**
- Traffic and Mobility Impact on Pollution
 - NOX predictions



DISIT lab roadmap vs model and tools' usage



SODA

2020



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



- Smart Mobility
- PISA, PUMS
- Living lab

2021



PC4City (2020-21)
Monitoring Terrain

Winner of Open Data Challenge of
enel x

CAPELON
- Smart Light
- Sweden

Km4City 1.6.7

enel x
Contract

Smart Ambulance
(2021-22)

Enterprise
(2021-22)
Industry 4.0

Almafluida
Industry 4.0
(2021-22)

AMPERE (2021-22)
Industry 4.0

SYN-RG-AI
SmartCity



2022



enel x
Contract

Filippi
Contract

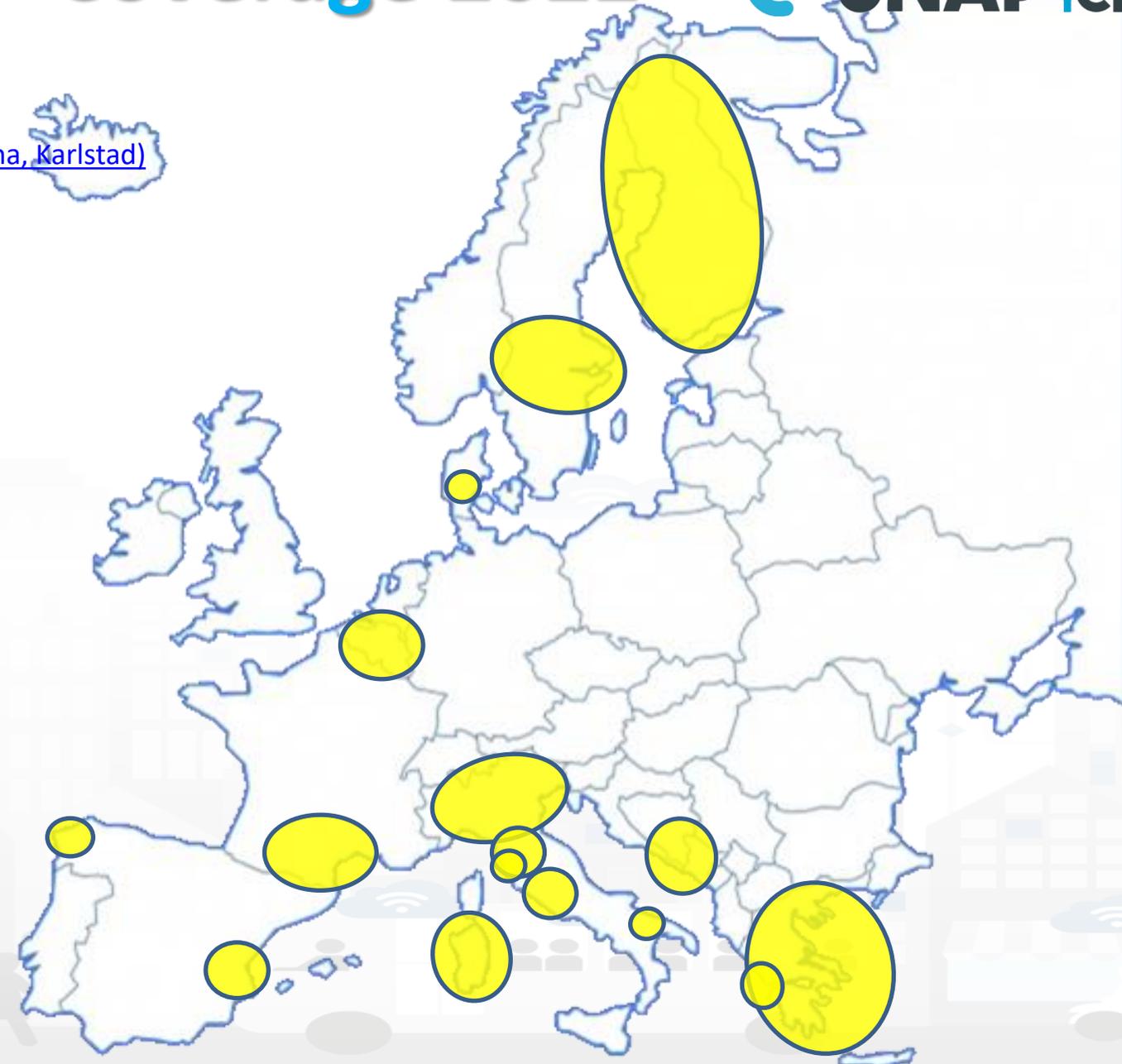
ART-ER
ATTRATTIVITÀ
RICERCA
TERRITORIO
Contract

Some agreements



Main Organizations/areas

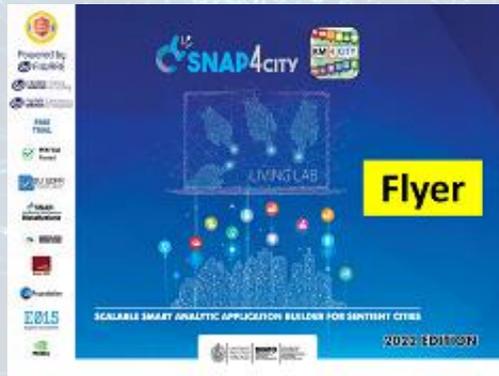
- [Antwerp area \(Be\)](#)
- [Bologna \(I\)](#)
- [Capelon \(Sweden: Västerås, Eskilstuna, Karlstad\)](#)
- [DISIT demo \(multiple\)](#)
- [Dubrovnik, Croatia](#)
- [Firenze area \(I\)](#)
- [Garda Lake area \(I\)](#)
- [Greece \(Gr\)](#)
- [Helsinki area \(Fin\)](#)
- [Livorno area \(I\)](#)
- [Lonato del Garda \(I\)](#)
- [Modena \(I\)](#)
- [Mostar, Bosnia-Herzegovina](#)
- [Oslo & Padova \(Impetus\)](#)
- [Pisa area \(I\)](#)
- [Pistoia \(I\)](#)
- [Pont du Gard, Occitanie \(Fr\)](#)
- [Prato \(I\)](#)
- [Roma \(I\)](#)
- [Santiago de Compostela \(S\)](#)
- [Sardegna Region \(I\)](#)
- [Siena \(I\)](#)
- [SmartBed \(multiple\)](#)
- [Toscana Region \(I\), SM](#)
- [Valencia \(S\)](#)
- [Venezia area \(I\)](#)
- [WestGreece area \(Gr\)](#)



2022 booklets

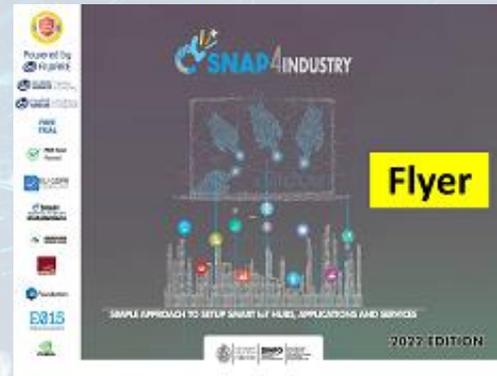


- Snap4City



https://www.snap4city.org/download/video/DPL_SNAP4CITY_2022-v02.pdf

- Snap4Industry



https://www.snap4city.org/download/video/DPL_SNAP4INDUSTRY_2022-v03.pdf

- Solutions
- Data Analytics



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

Snap4City Platform

Technical Overview

From: DINFO dept of University of Florence, with its
DISIT Lab, <https://www.disit.org> with its Snap4City solution

Snap4City:

- Web page: <https://www.snap4city.org>
- <https://twitter.com/snap4city>
- <https://www.facebook.com/snap4city>

Contact Person: Paolo Nesi, Paolo.nesi@unifi.it

- Phone: +39-335-5668674
- LinkedIn: <https://www.linkedin.com/in/paolo-nesi-849ba51/>
- Twitter: <https://twitter.com/paolonesi>
- Facebook: <https://www.facebook.com/paolo.nesi2>

Access Level: Public.

Date: 05-04-2021

Version: 5.3

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





Development Life-Cycle

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

From Snap4City:

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

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

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

Access Level: public

Date: 21-10-2022

Version: 1.4

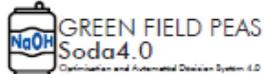


<https://www.snap4city.org/download/video/Snap4Tech-Development-Life-Cycle.pdf>



Main running instances (11/21)

SELECT
for Cities



- Sii-Mobility → mobility and transport, sustainability
- REPLICATE → ICT, smart City Control room, Energy, IOT
- RESOLUTE → Resilience, ICT, Big Data
- GHOST → Strategies, smart city
- TRAFair → Environment & transport
- MOSAIC → mobility and transport
- WEEE Life → Smart waste, environment
- Smart Garda Lake → Castelnuovo del Garda, SMARTEA
- 5G → Industry 4.0 vs SmartCity
- Green Impact → Industry 4.0, Chemical Plant, control and plan
- SmartBed (Laid) → smart health
- Green Field Peas (Soda) → Industry 4.0, Chemical plant
- MobiMart and PISA Agreement → data aggregation, mobility and transport, Living Lab
- Lonato del Garda → smart parking, environment
- Herit Data → tourism, culture and management
- ISPRA JRC → site management and services
- Capelon (Sweden) → smart light solutions
- PC4City → land slide monitoring and predictions
- Italmatic → industry 4.0 production control

Acknowledgements

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- **Km4City** is an open technology and research line of DISIT Lab exploited by a number of projects. Some of the innovative solutions and research issues developed into projects are also compliant and contributing to the Km4City approach and thus are released as open sources and are interoperable, scalable, modular, standard compliant, etc.



<https://www.snap4city.org/577>



NAP4CITY



On Line Training Material (free of charge)

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

Video1								
Video2								
Video3								
Video4				none		none	none	none

TOP



Be smart in a SNAP!

CONTACT

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Università degli Studi di Firenze - School of Engineering

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Fax.: +39-055-2758570



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INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB