



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB



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

present

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



IEEE Intelligent Transportation Systems Snap4City Hackathon

Quando si svolge

Evento di lancio
11 Ottobre 2021
ore 09:30 - 13:00

Apertura ufficiale
Venerdì 15 ottobre 2021

Scadenza sottomissione soluzioni
13 Dicembre 2021

Come partecipare

- Registrandosi alla piattaforma Snap4City come «DISIT organization»
- Compilando il form di registrazione
- Seguendo le istruzioni per la sottomissione finale delle soluzioni alla pagina ufficiale dell'Hackathon
- Gli eventi si svolgeranno online

Chi può partecipare

- Individualmente
- Gruppi composti da massimo 5 persone

Aperto a studenti o privati residenti in Italia e/o soggetti appartenenti ad istituzioni/amministrazioni pubbliche

Open PreHackathon Training and QnA: 11 Ottobre 2021 at 09:30
If interested send an email to Nicola.Mitolo@unifi.it



Challenge

A

Richiede l'utilizzo della tecnologia Snap4City per lo sviluppo di soluzioni di mobilità urbana ITS. I partecipanti potranno utilizzare:

- una IoT App con più flussi/processi;
- uno o più dashboard;
- al massimo un processo di analisi dei dati in Python o Rstudio, da eseguire in automatico da IoT App, ma più funzioni, e.g.: training off line, ed execution on line...

Challenge

B

Sviluppo di un'idea progettuale senza implementare effettivamente la soluzione o fornire un mock-up, utilizzando gli strumenti e i dati della piattaforma Snap4City. Sarà sufficiente la presentazione di una dashboard Demo.

La sfida offre piena libertà per creare soluzioni innovative per migliorare il futuro della mobilità e dei sistemi di trasporto nelle città in cui viviamo.

Hackathon Data Focus

<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,



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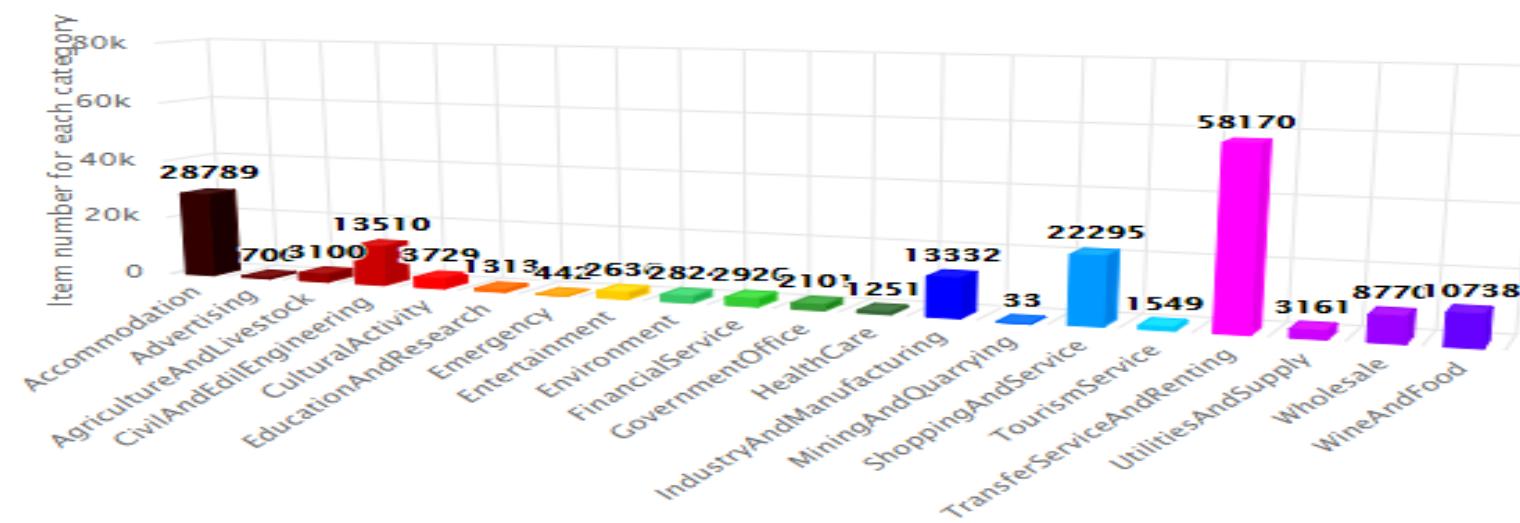
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- Tuscany: <https://www.snap4city.org/760>
- Florence: <https://www.snap4city.org/747>
- Pisa: <https://www.snap4city.org/746>
- Livorno: <https://www.snap4city.org/751>
- Siena: <https://www.snap4city.org/759>
- Prato: <https://www.snap4city.org/758>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

Total number of results: 193361





Premi

Challenge A

- 1° classificato 3000 euro
- 2° classificato 2000 euro

Challenge B

- 1° classificato 1000 euro
- 2° classificato 500 euro

Promozione delle soluzioni più meritevoli attraverso Snap4City.org e IEEE ITSS – Italian Chapter

Criteri di valutazione

La soluzione sarà valutata da una giuria sulla base dei seguenti criteri:

- **Utilità e Valore** della soluzione nel contesto ITS
- **Pertinenza** agli obiettivi proposti;
- **Progettazione/Esperienza Utente**;
- **Creatività e Innovazione** della soluzione;
- **Chiarezza e Completezza** della presentazione;



Snap4 Tools for
rapid implementation of
- Sustainable Smart Solutions
- Decision Support Systems
as a no-coding, low-coding

snap4city@disit.org
<https://www.Snap4city.org>





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

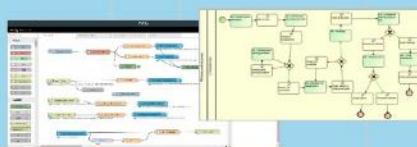
NVIDIA.

Tools for rapid implementation of sustainable Smart Solutions and Decision Support Systems



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

PREDICTION - ANOMALY DETECTION - ENVIRONMENTAL MODEL - 3D MODEL
KPI - SIMULATION - EARLY WARNING - SYNOPTIC - DIGITAL TWIN - VIRTUAL REALITY

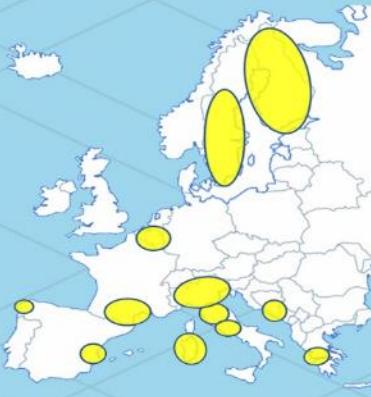


EXPERT SYSTEM
KNOWLEDGE BASE
STORAGE

BIG DATA ANALYTICS
EXPLAINABLE ARTIFICIAL INTELLIGENCE
BUSINESS INTELLIGENCE
MACHINE LEARNING

DATA FLOWS, DATA DRIVEN
WORKFLOWS, MICROSERVICES
PARALLEL DISTRIBUTED PROCESSING

METHODOLOGIES
COURSES AND COMMUNITY
LIVING LABS
DEVELOPMENT TOOLS



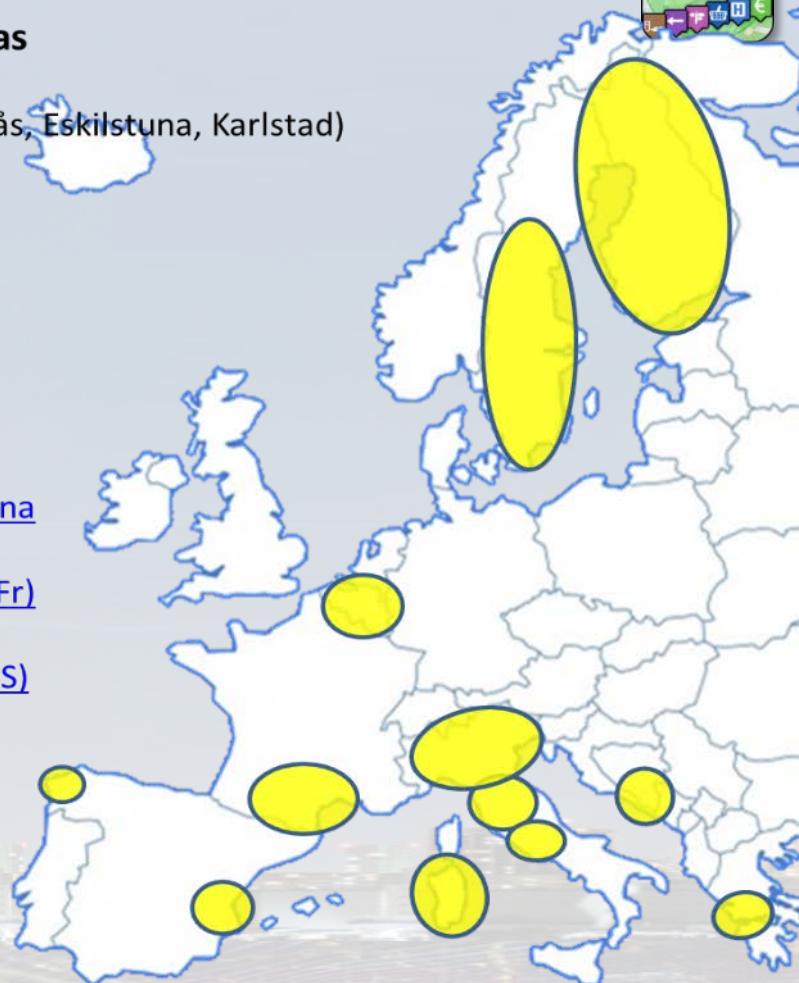


2021: Snap4City Numbers

- > 100 Protocols
- *Mobility, energy, people flow, environment, Industry 4.0, tracking, smartbed, smart ambulance, Tourism, smart light, culture, etc...*
 - 5 running installations
 - 13 projects, 12 pilots on 9 Countries
- **On the largest deploy**
 - 17 Organizations / tenant
 - > 4800 users on <https://www.Snap4City.org>
 - > 1200 Dashboards
 - > 15 mobile Apps
 - > 2 Million of structured data per day
 - > 500 IoT Applications/node-RED /Docker
 - > 680 web pages with training
 - > 40 videos, training videos

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 \(Gr\)](#)

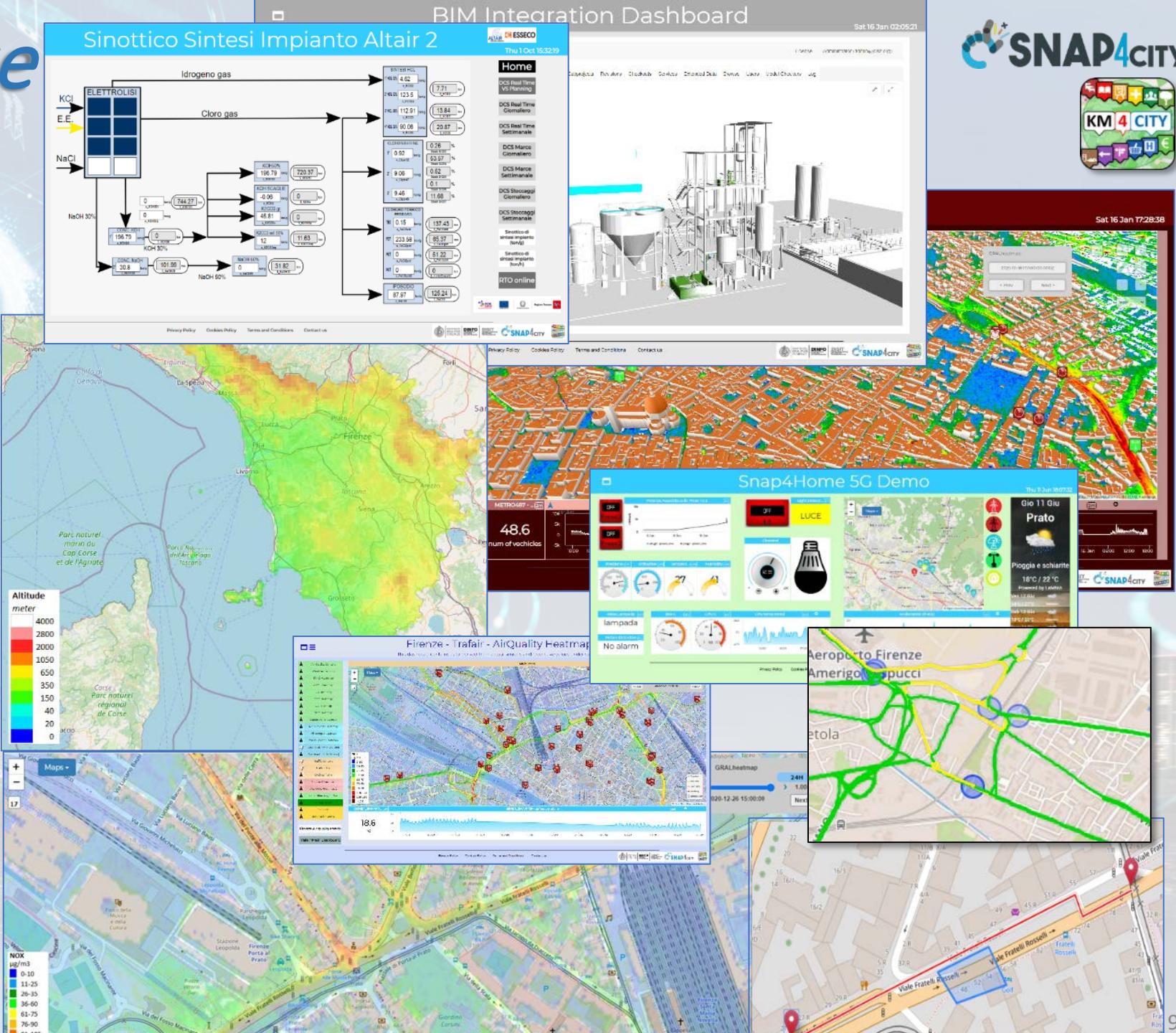


Last minute:

- Installation in Israel
- Training in Japan in July
- Coverage of all Greece is coming

Data Type Coverage

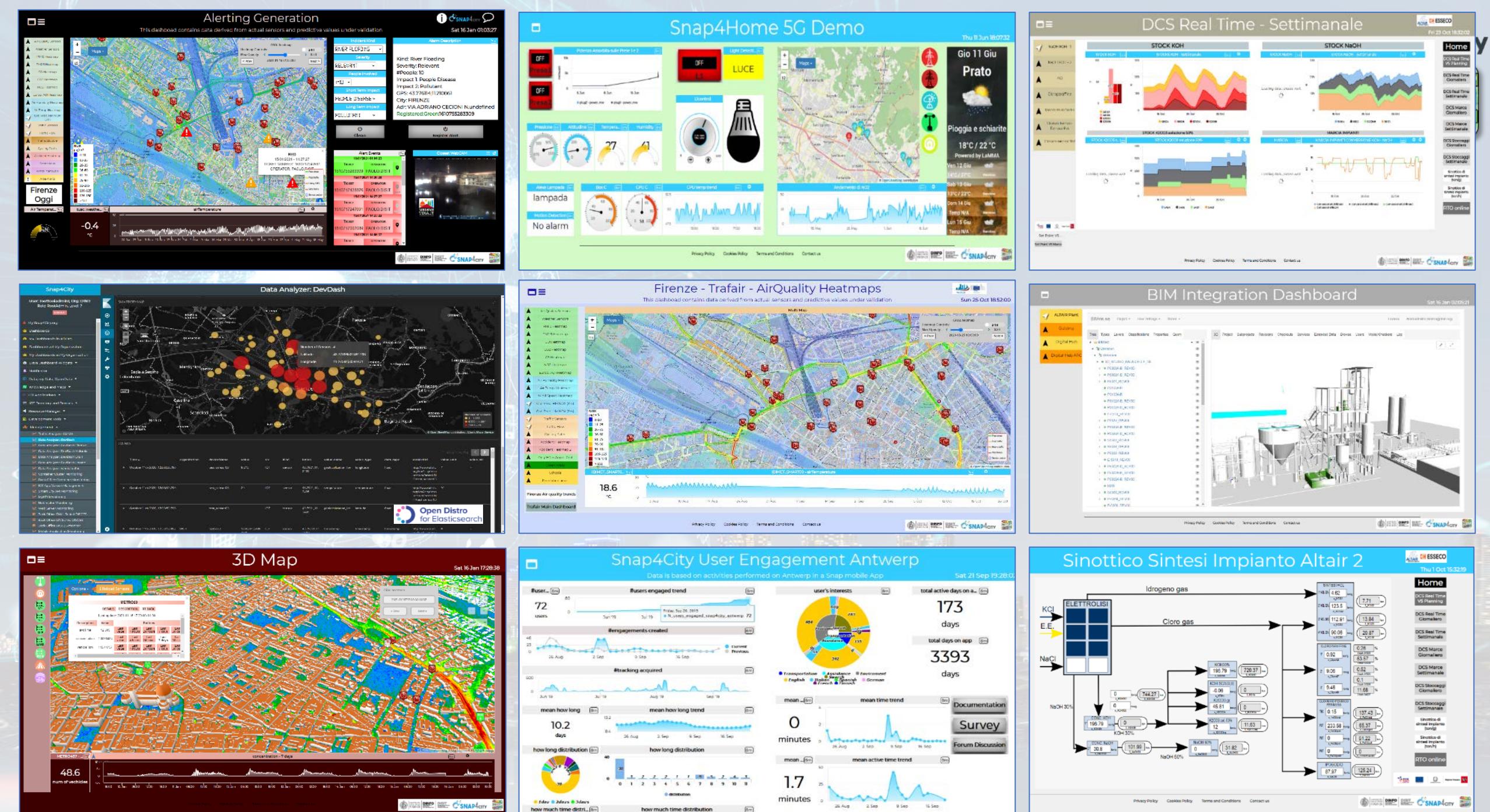
- POI, IOT, shapes,..
- maps, orthomaps, GTFS, GIS WFS/WMS, GeoTiff, ..
- calibrated heatmaps, ..
- traffic flow, typical trends, ..
- trajectories, events, ..
- 3D, BIM, Workflow, ..
- Dynamic icons/pins, ..
- OD Matrices, scenarios, ..
- prediction models,
- decision support,
- Synoptics, animations, ..
- social media, Routing, ..
- Satellite data, ..
- KPI, personal KPI,..
- etc.



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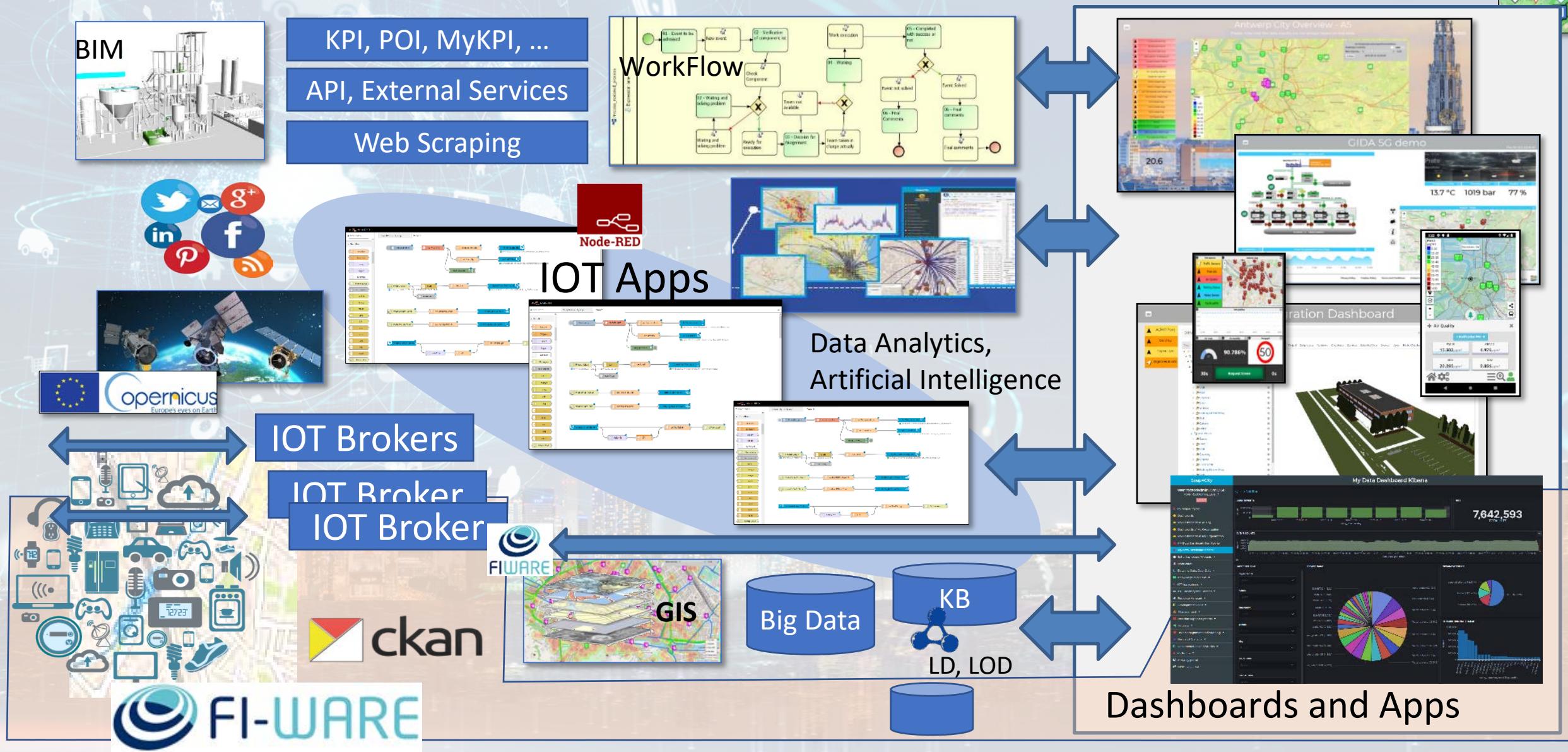
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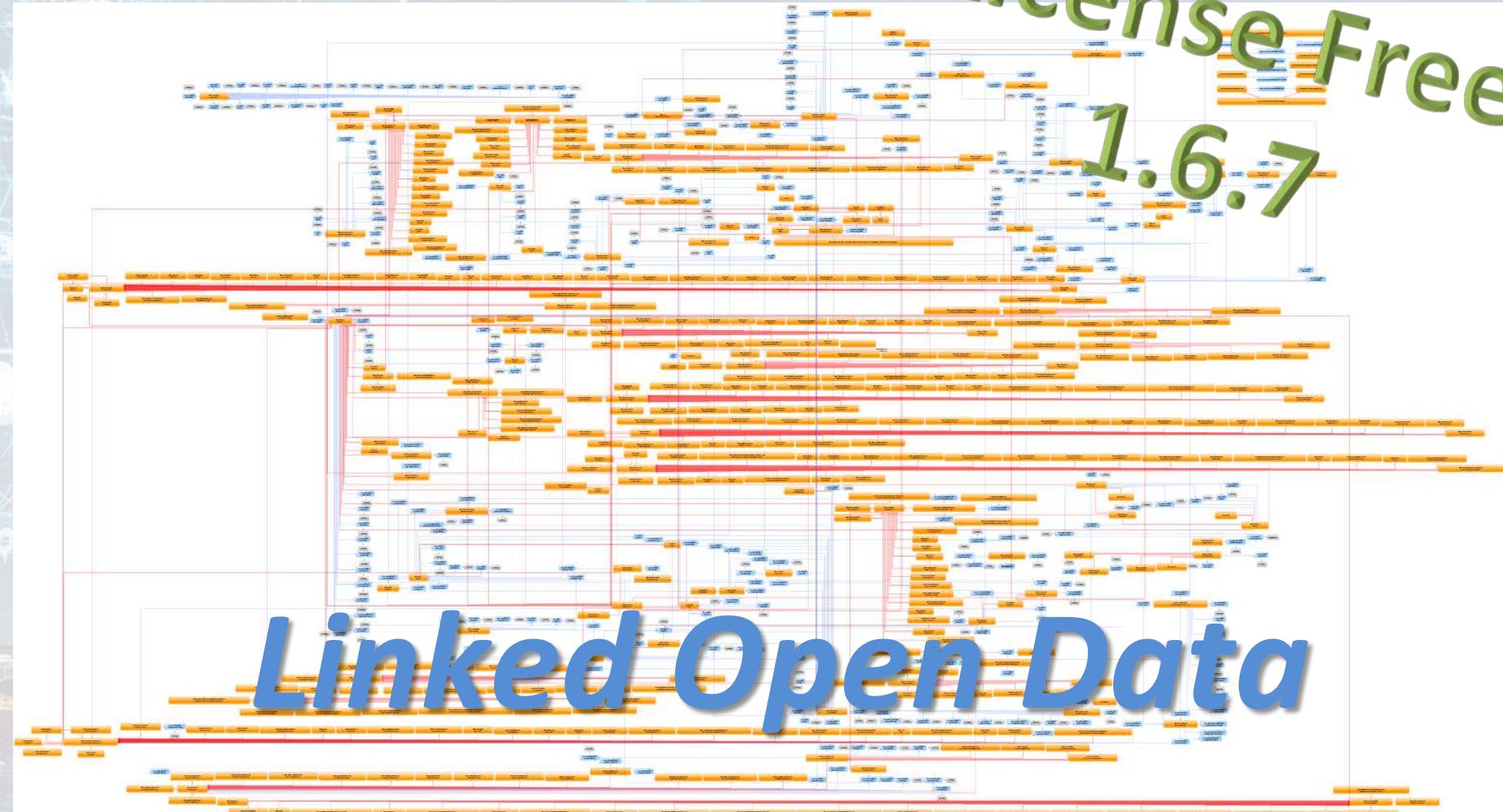
Snap4City (C), September 2021

Snap4City: Architettura funzionale



Expert System semantic queries

- via:
- **Smart City API**
for
Apps and third
party
- **MicroServices**
data driven
develop via
visual language
Node-RED



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

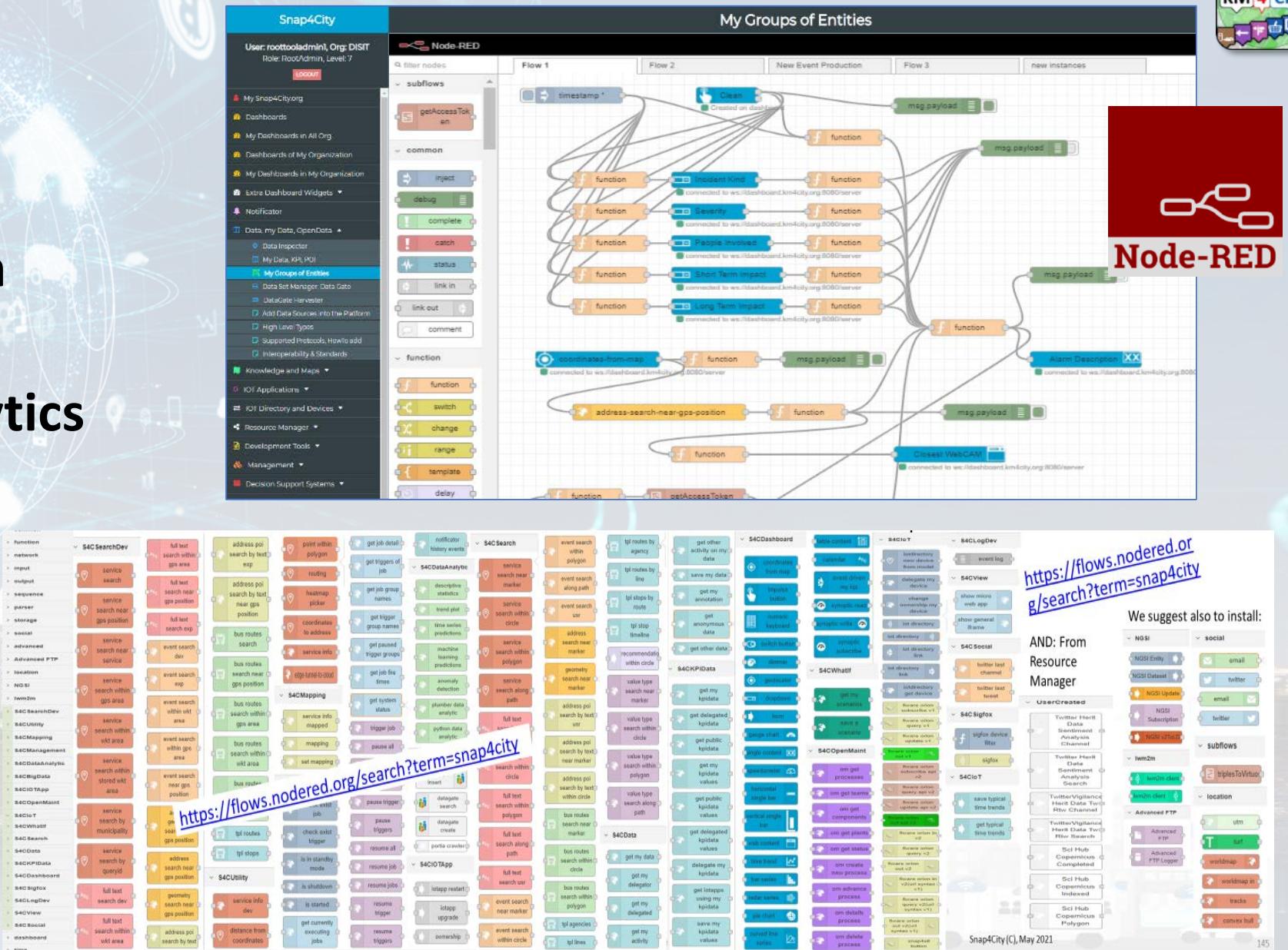
Ingestion, aggreg. → exploitation



- IoT App Visual Programming, no coding

- Data transformation
- Integration
- Scripting Data Analytics
- Data ingestion
- Business logic

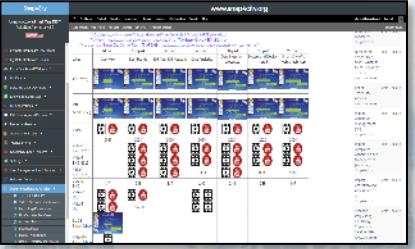
- MicroServices data driven develop via visual language Node-RED



Data Analytics on Snap4City platform

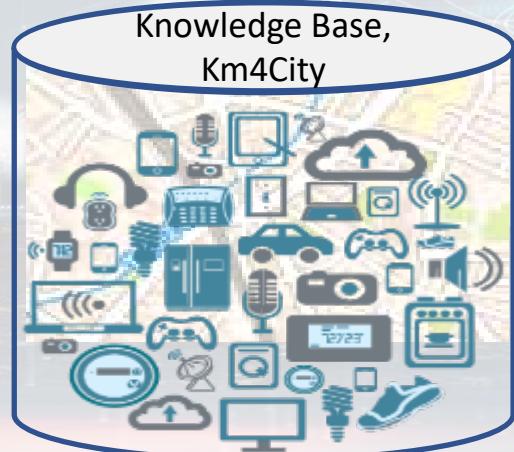


Swagger



Ontology Schema

LOG.digit.org



Smart City API from Knowledge Base and other tools



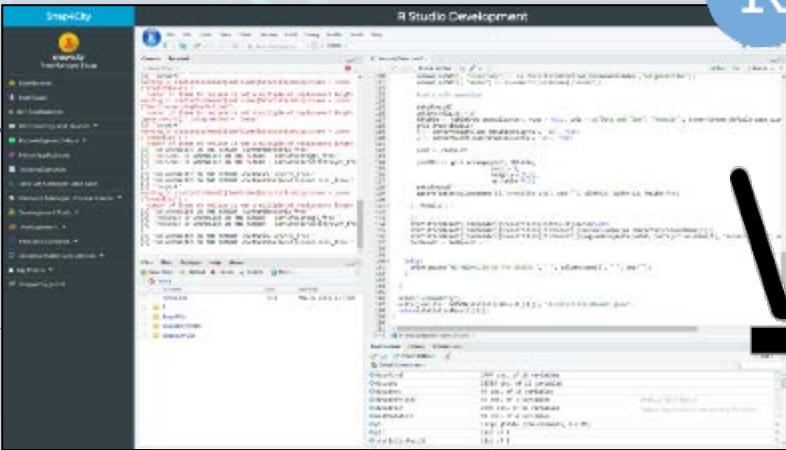
TensorFlow



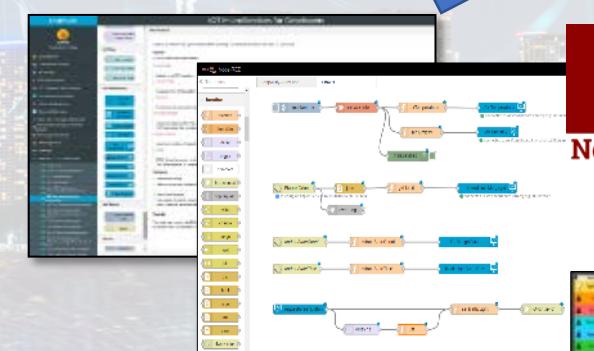
CUDA



R Studio[®]



Creating
MicroServices



Node-RED



Resource Manager

Saving /
Sharing
reusing

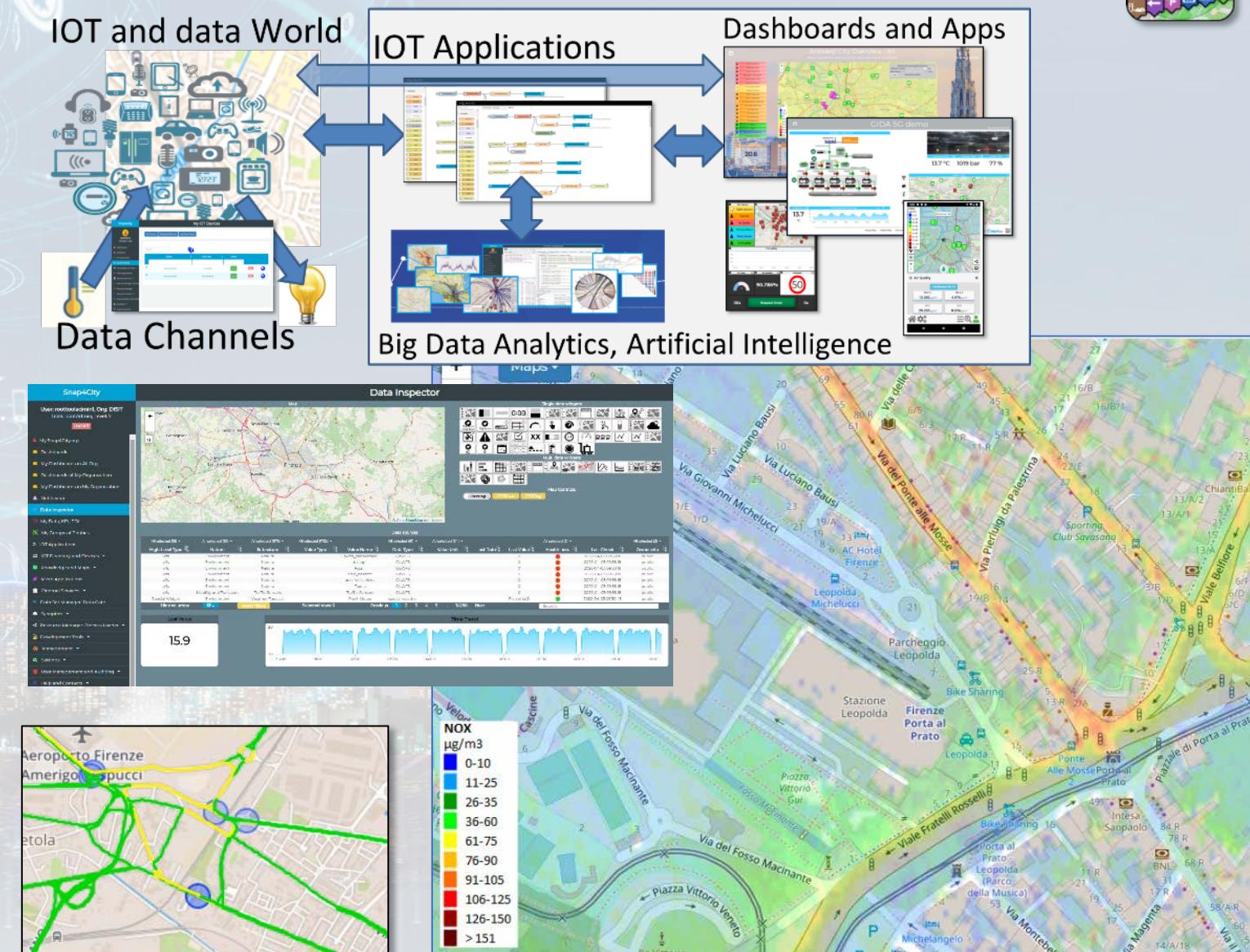


Using them into
IOT Applications



Fast to realize reliable & secure Solutions

- Via Snap4City tools
 - Dashboard Wizard
 - Dashboard Builder
 - Data/Visual Analytic
- Smart Solutions results to be
 - Real time data drive
 - Secure end-to-end
 - GDPR compliant
 - Reliable, interoperable
 - Auditable, marketable

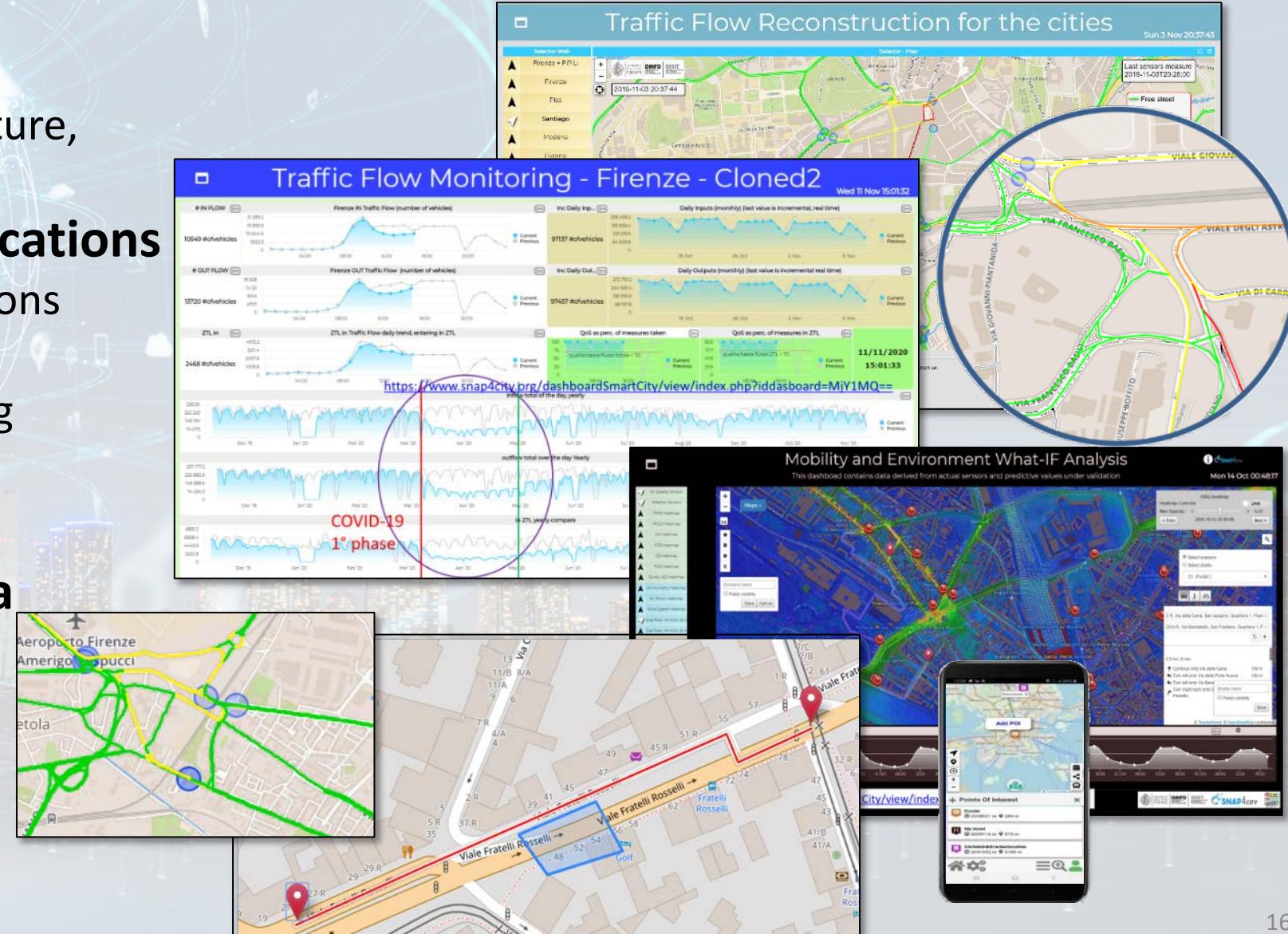


Mobility and Transport Traffic Flow Analysis



- **Multiple Domain Data**
 - Traffic Flow sensors, city structure, weather
- **Decision Makers Multiple Locations**
 - Real time Monitoring, predictions
 - Traffic Flow Predictions,
 - Traffic Reconstructions, routing
 - Dashboards, What-IF analysis
 - Mobile App, people flows
- **Historical and Real Time data**
- **Services Exploited on:**
 - Dashboards, Mobile App
- **Since 2017, 2019**

Cities: Firenze, Pisa, Livorno, Modena, Santiago di Compostela



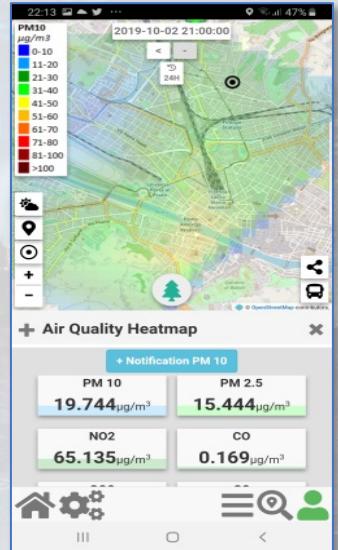
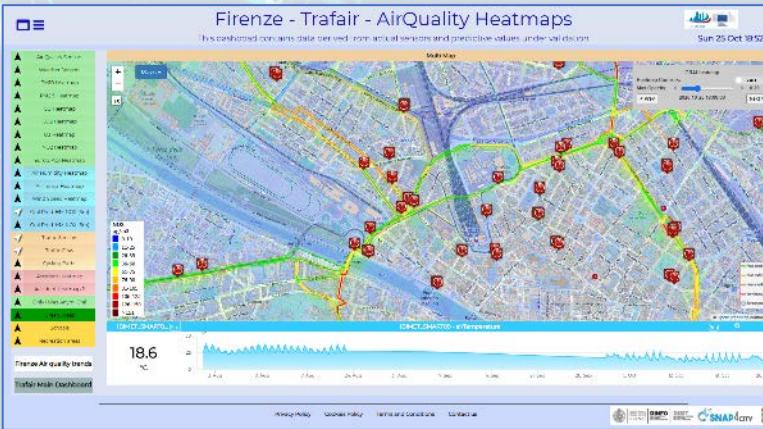
Environment and Quality of Life Air Quality Predictions

Cities of: reference
Firenze, Pisa, Livorno

SNAP4CITY



- Multiple Domain Data
 - Traffic Flow data, Pollutant: NOX, CO2, PM10, PM2.5, O3,
 - 3D City structure, weather, ...
- Multiple Decision Makers
 - Pollutant Predictions: NOX, NO2, ..
 - City officers, energy industries
 - Dashboards, What-IF analysis
 - Traffic Flow Reconstruction
- Historical and Real Time data
 - Billions of Data
- Services Exploited on:
 - Dashboards, Mobile App
- Since 2020



KPI of EC

Air Quality Directive		WHO guidelines			
Pollutant	Averaging period	Objective and legal nature and concentration	Comments	Concentration	Comments
PM _{2.5}	One day			25 µg/m ³ (*)	99 th percentile (3 days/year)
PM _{2.5}	Calendar year	Target value, 25 µg/m ³	The target value will come a year 2015	10 µg/m ³	
PM ₁₀	One day	Limit value, 50 µg/m ³ Not to be exceeded on more than 35 days per year.		50 µg/m ³ (*)	99 th percentile (3 days/year)
PM ₁₀	Calendar year	Target value, 40 µg/m ³ (*)		20 µg/m ³	
O ₃	Maximum daily 8-hour mean	Not to be exceeded on more than 25 days per year, averaged over three years		100 µg/m ³	
NO ₂	One hour	Limit value, 200 µg/m ³ (*) Not to be exceeded more than 18 times a calendar year		200 µg/m ³ (*)	
NO ₂	Calendar year	Limit value, 40 µg/m ³		40 µg/m ³	





On Line Training Material (free of charge)

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



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Link utili - IEEE Intelligent Transportation Systems Snap4City Hackathon

- Pagina Web ufficiale Hackathon
 <https://www.snap4city.org/757>
- Dati:
 <https://www.snap4city.org/755>
- Form di registrazione
<https://docs.google.com/forms/d/e/1FAIpQLSeEhs2atacvQRAvBRMOYdSYIL7DB260WICDxKv29GR5aLIOg/viewform?vc=0&c=0&w=1&flr=0>
- Regole da seguire per la sottomissione finale delle soluzioni
<https://www.snap4city.org/756>

