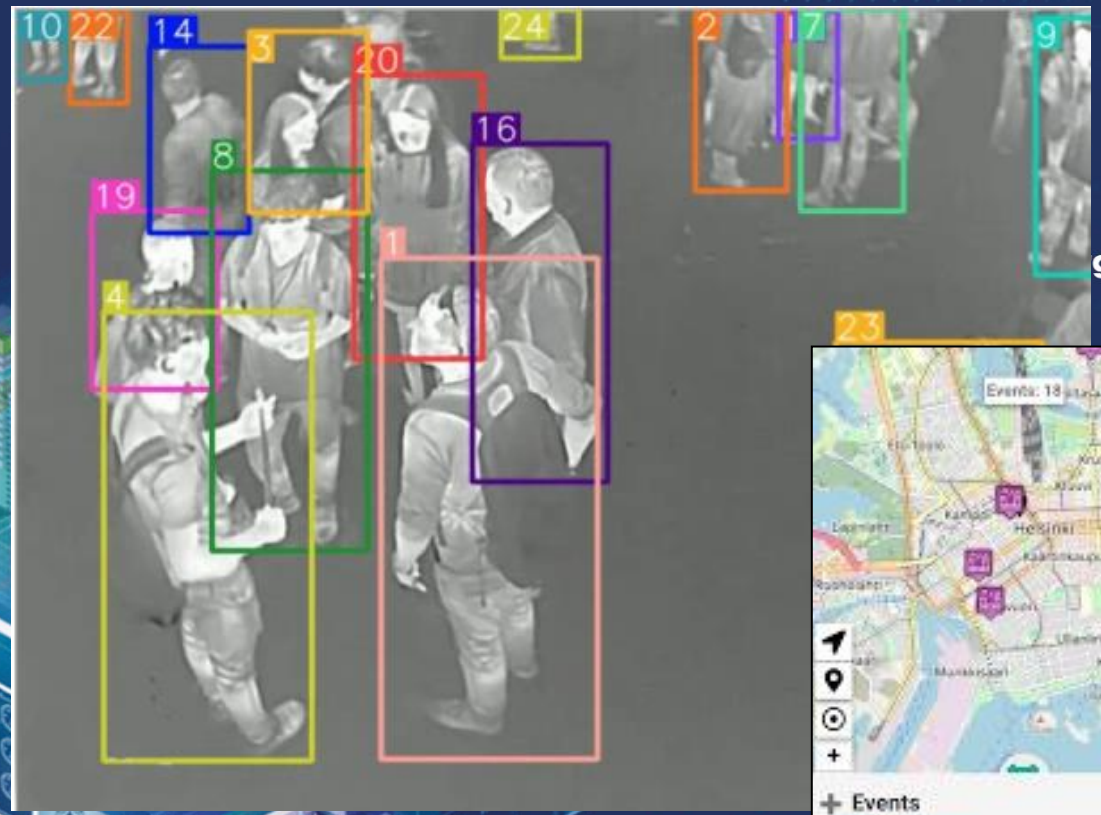
SNAP4CITY

www.snap4city.org
www.snap4solutions.org



Security, Safety and Tourism overview

DIGITAL TWIN SOLUTIONS TO SETUP SUSTAINABLE DECISON SUPPORT SYSTEMS AND BUSINESS INTELLIGENCE

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

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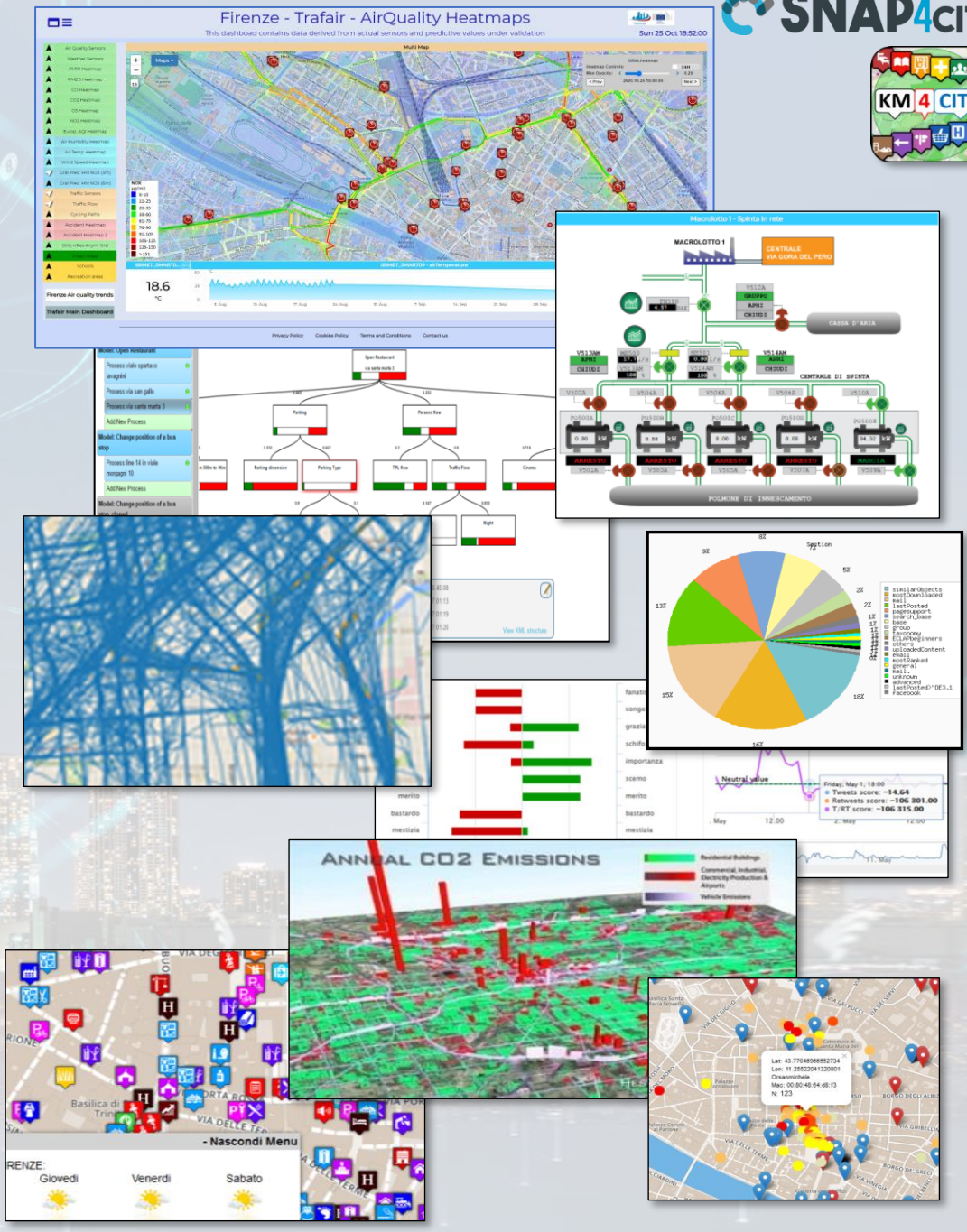
SNAP4CITY

KM4CITY

Data Driven Decision Support

- Decision Support system
- Assessment / Strategies
- Data Rendering,
  - visual analytics, business intel..
- Data Analytics, ML, AI
- Data aggregation, Storage, indexing
- Data Ingestion



Smart Solutions and Decision Support Systems

100% OPEN SOURCE

Powered by FIWARE

FREE TRIAL

PEN Test Passed

EU GDPR COMPLIANT

SNAP4 Appliances and Dockers Installations

EUROPEAN OPEN SCIENCE CLOUD

Node-RED

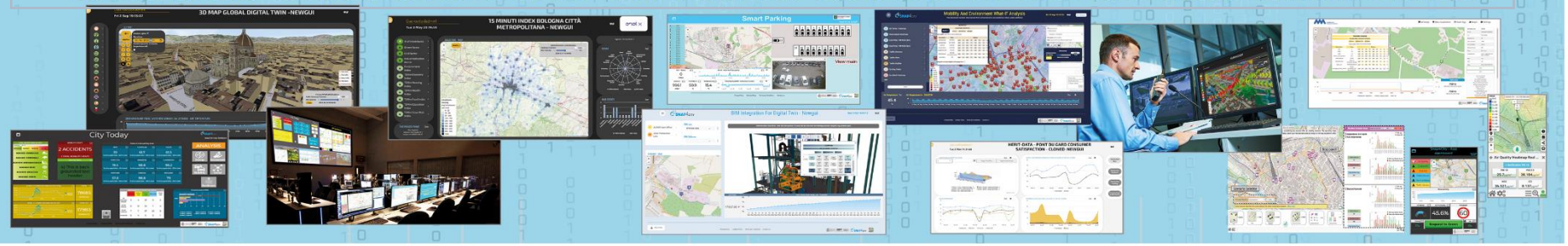
JS Foundation

E015 digital ecosystem

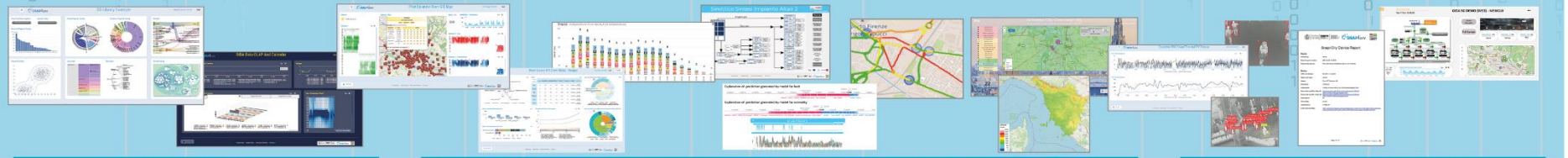
NVIDIA

UNIVERSITÀ DEGLI STUDI FIRENZE | DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE | DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB | SNAP4CITY | KM4CITY

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

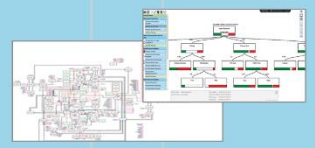


DASHBOARDS, WIDGETS
TEMPLATES

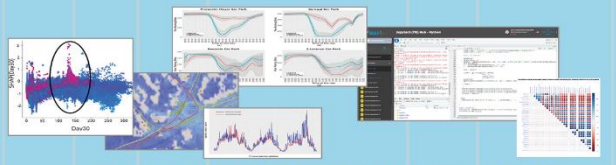
PREDICTION - ANOMALY DETECTION - CLUSTERING - ROUTING - SENTIMENT NLP - TRAFFIC FLOW
PEOPLE FLOWS - SDG - 15 MIN CITY INDEX - KPI - HEATMAPS - ORIGIN DESTINATION - ETC...

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

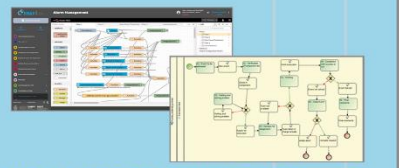
ANY: DATA, BROKER, NETWORK AND VERTICAL



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



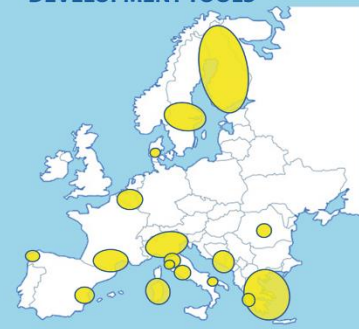
VISUAL PROGRAMMING, ADAPTERS
DATA FLOWS, WORKFLOWS
PARALLEL DISTRIBUTED PROCESSING
EVENT DRIVEN

Native and External Smart Applications

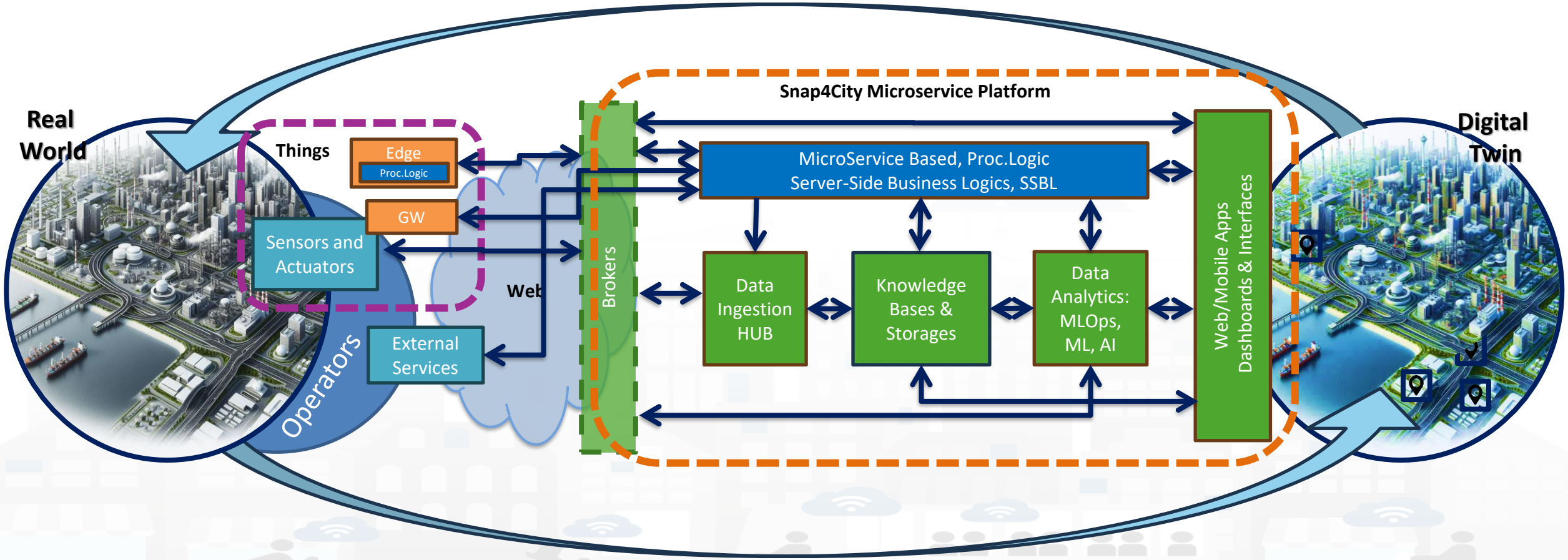
- Mobility & Transport
- Light & Energy
- Waste | Environment
- Building | Tourism
- Asset Management
- Security and Safety
- Social Media

...

METHODOLOGIES
LIVING LABS
COURSES AND COMMUNITY
DEVELOPMENT TOOLS

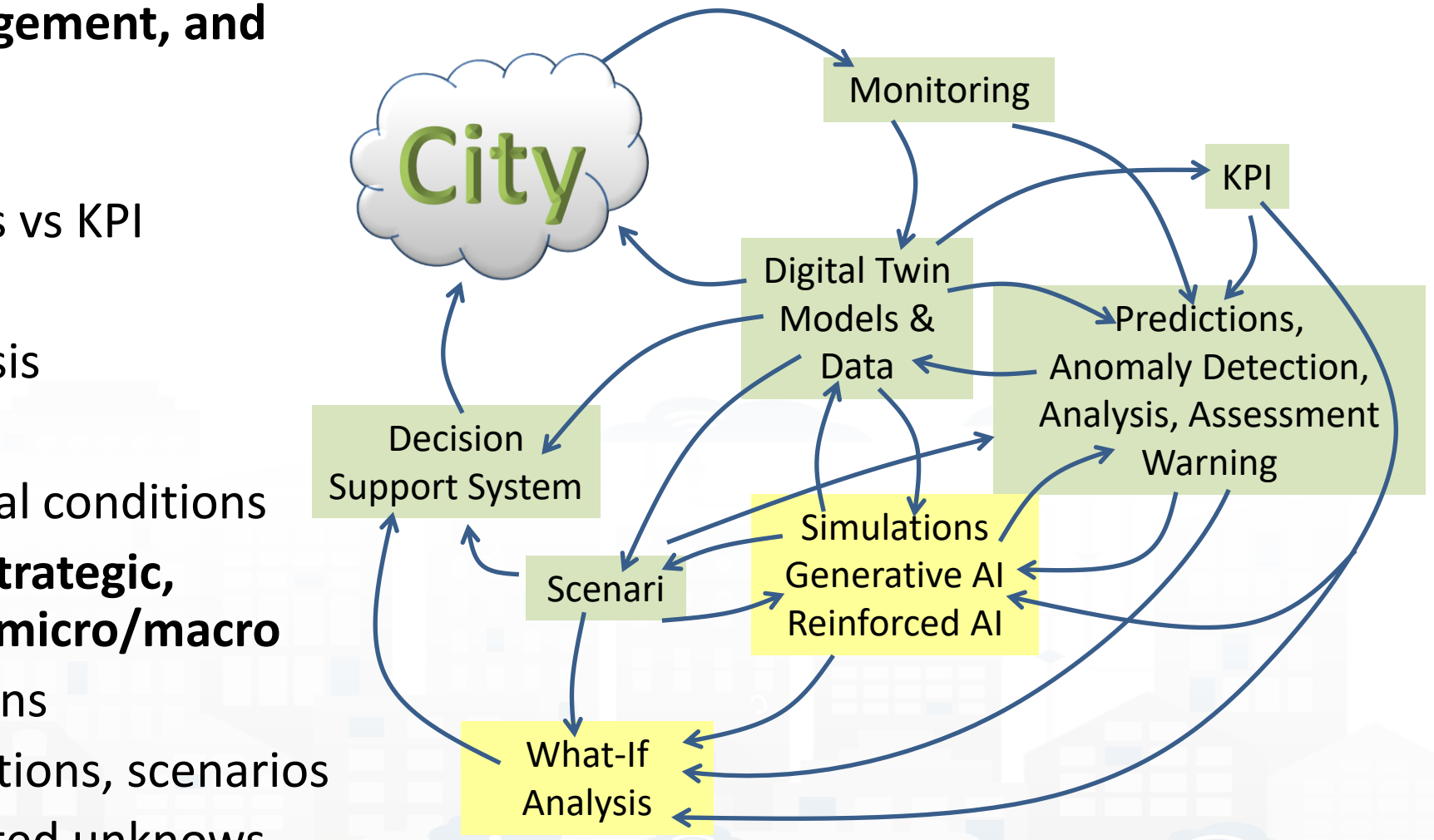


Digital Twin Development Platform



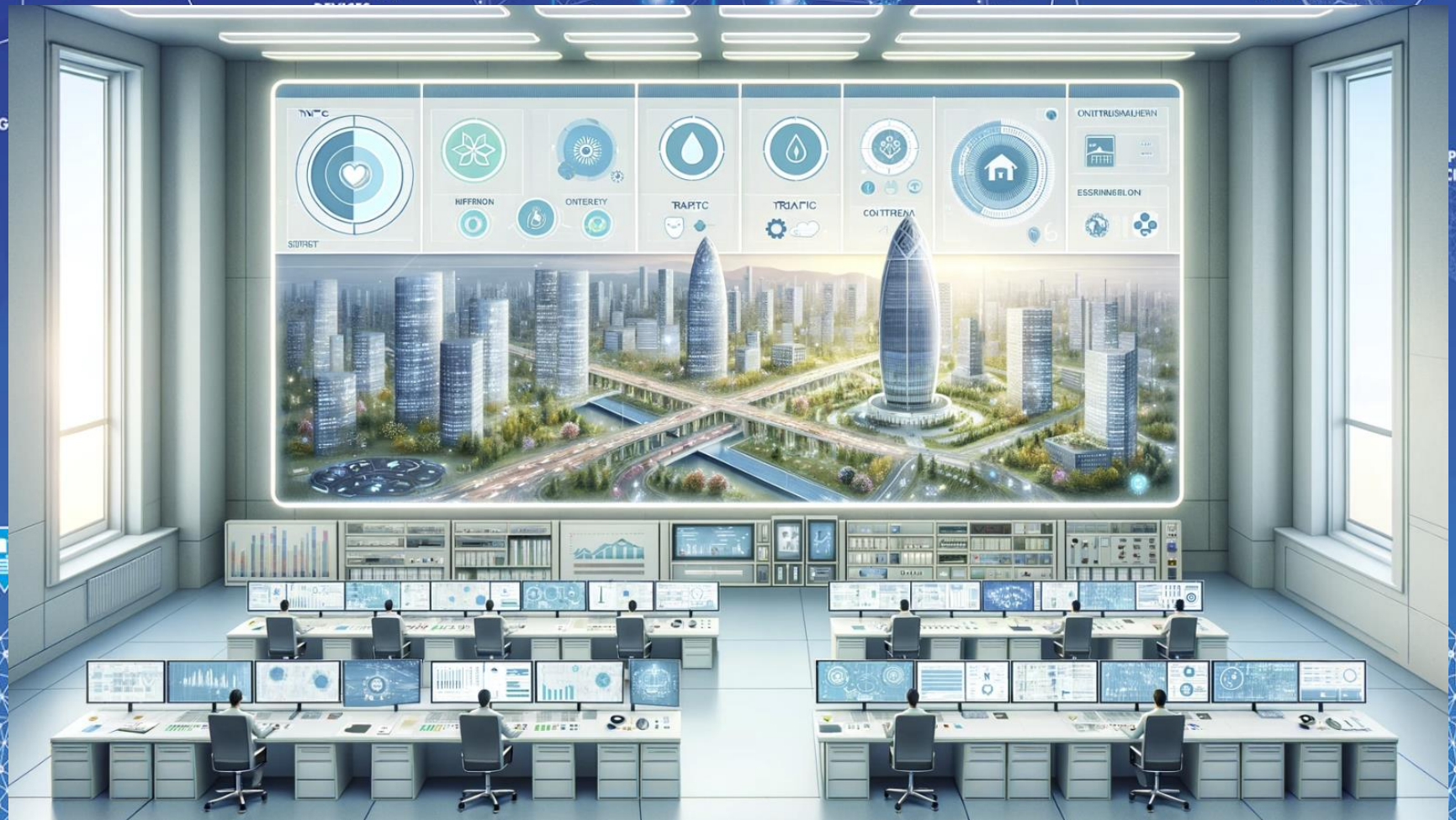
Main tasks

- **Controlling Status: management, and operational**
  - Monitoring via KPI
  - Computing predictions vs KPI
  - Anomaly detection
  - Neuro-Symbolic analysis
  - Risk assessment
  - Early warning on critical conditions
- **Making plan: tactic and strategic, medium and long range, micro/macro**
  - Simulation & predictions
  - Generative AI Prescriptions, scenarios
  - Resilience to Unexpected unknows
  - What-if analysis wrt scenarios



TOP

Monitoring and control



FROM CITY DASHBOARD TO APPLICATIONS

DATA GATHERING AND CITY DATA KNOWLEDGE MANAGEMENT

IOT APPLICATIONS VS IOT EDGE

TWITTER VIGILANCE: SOCIAL MEDIA ANALYSIS

SNAP4CITY AND KM4CITY PROJECTS

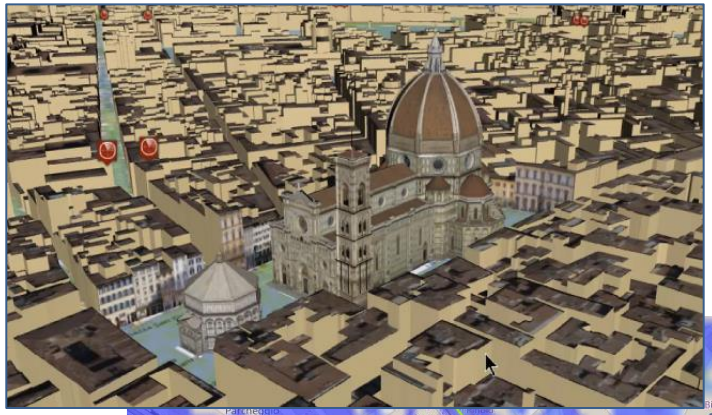
HOW TO ADOPT SNAP4CITY, AND OUR ROADMAP

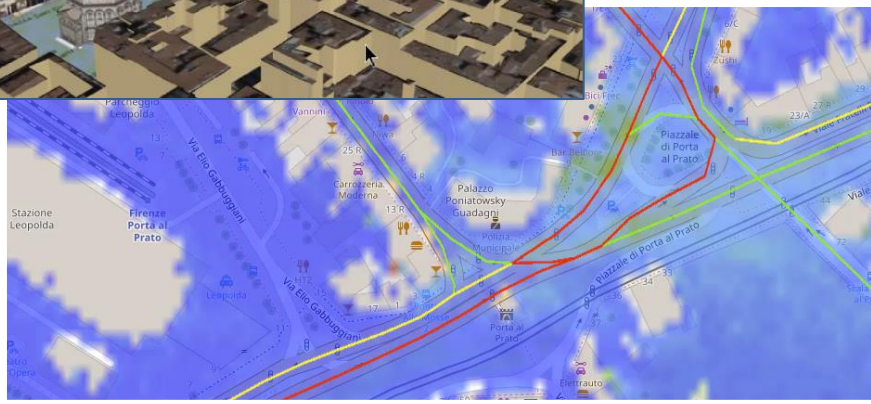
SNAP4CITY THE VIEW OF THE ADMINISTRATORS

100% OPEN SOURCE

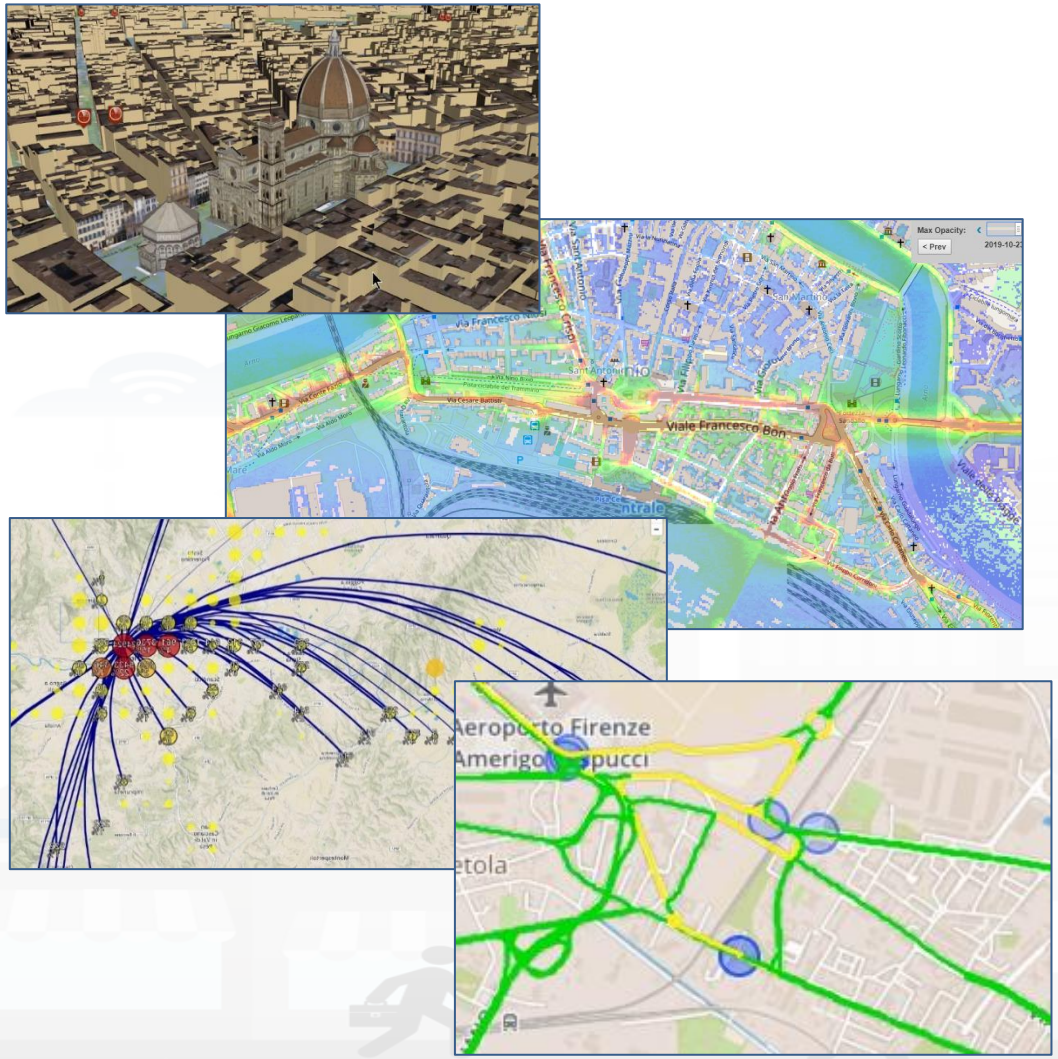
Monitoring

- **Controlling Status: management, and operational**
  - Monitoring via KPI
  - Computing predictions and KPI
  - Anomaly detection, Early warning
  - Control Rooms, situation rooms
- **Reacting: Computing in real time**
  - Changing semaphore maps
  - Changing Dynamic signage
  - Real time Info Mobility
  - User engagement via Mobile Apps
  - What-if analysis
  - etc.,





Smart City Digital Twin

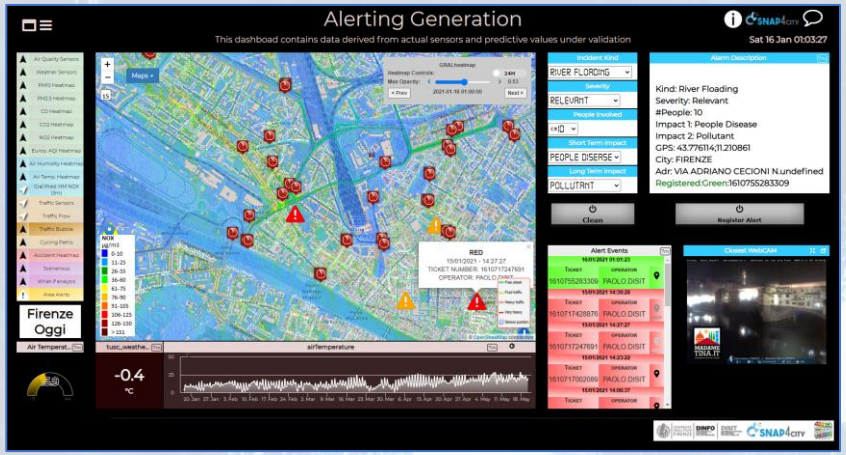


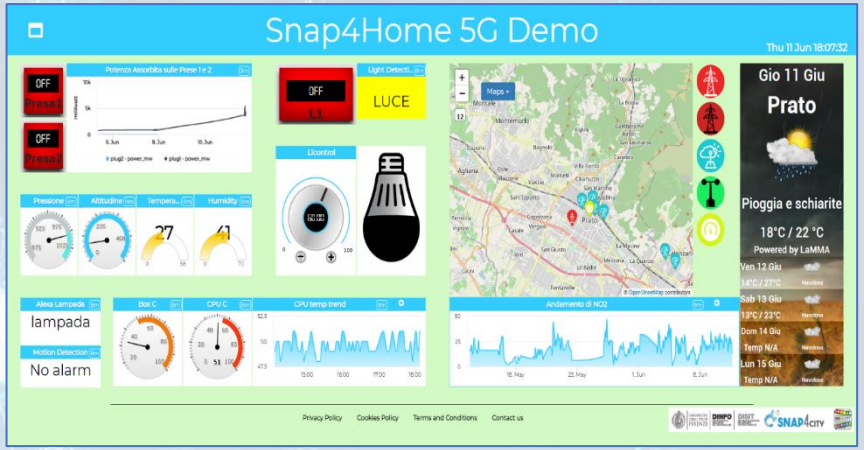
City Digital Model with…

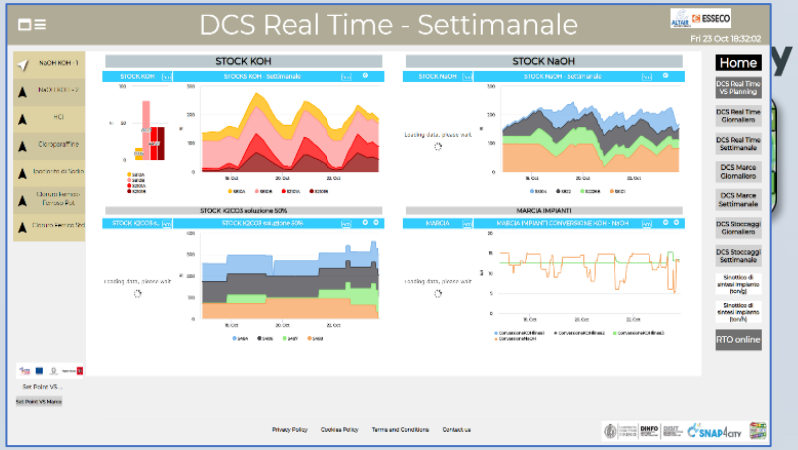
- Intuitive platform
- Any Data TYPE, any data source, any protocol
- Data storage seamless
- Data analytics → artificial intelligence, AI/XAI
- Data Ethics, AI Ethics, GDPR
- Data Representation, any kind
- Key Performance Indicators, any kind
- What-IF analysis – Simulation, prediction, 2D/3D
- Micro, Meso e macro scales
- Operation, planning tactic and strategic
- Collaborative and shared representation
- Sustainable, shared, open source 100%

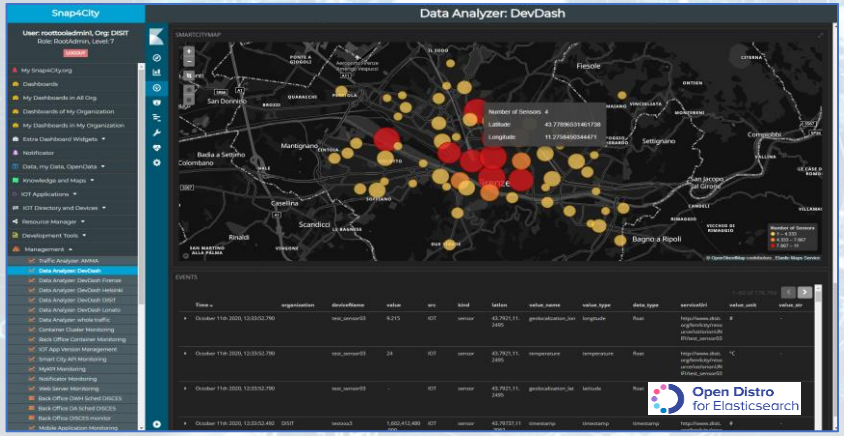
Complex and heterogeneous information, interoperability

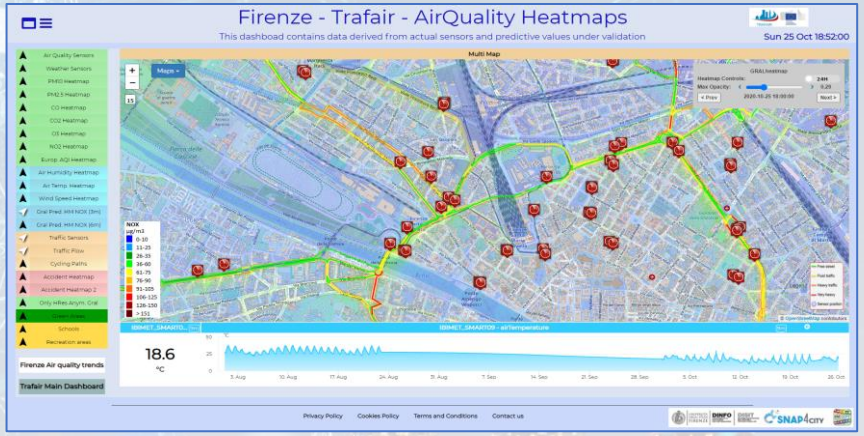
- GIS, ITS, AVM, IoT, BIM, CKAN, etc.
- Satellite services
- MaaS, last-mile delivery HUBs
- etc.

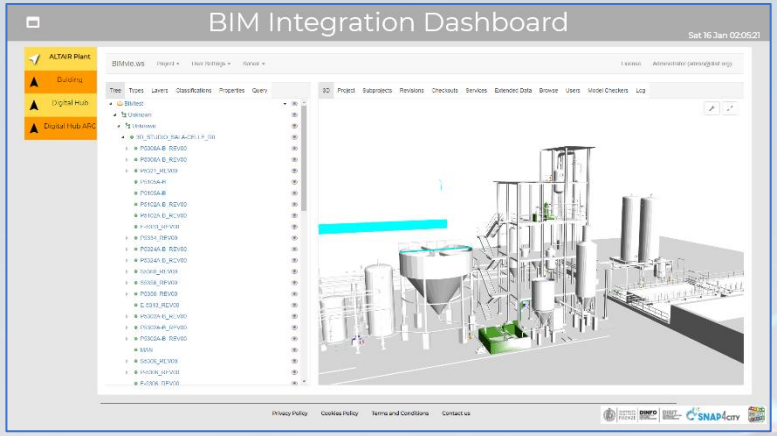

Alerting Generation
This dashboad contains data derived from actual sensors and predictive values under validation
Sat 16 Jan 01:03:27
Firenze Oggi
-0.4


Snap4Home 5G Demo
Thu 11 Jun 18:07:32
LUCE
lampada
No alarm
Gio 11 Giu
Prato
Pioggia e schiarite
18°C / 22 °C
Powered by LaMMA

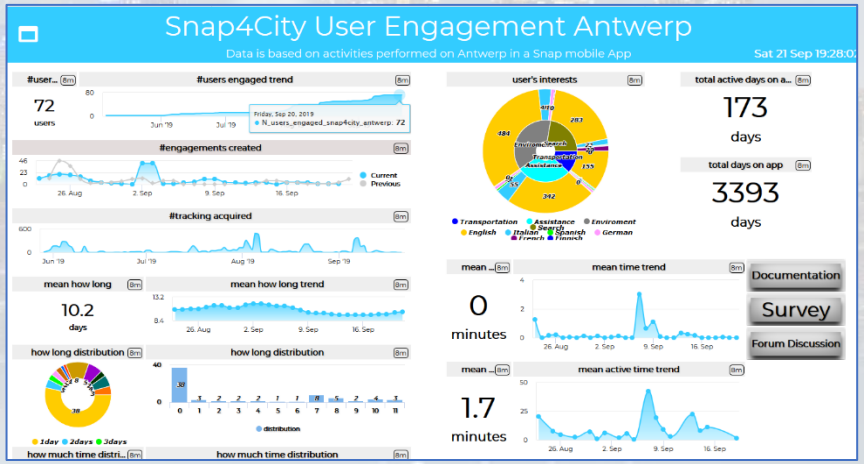

DCS Real Time - Settimanale
Fri 23 Oct 18:32:02
STOCK KOH
STOCK NaOH
Home

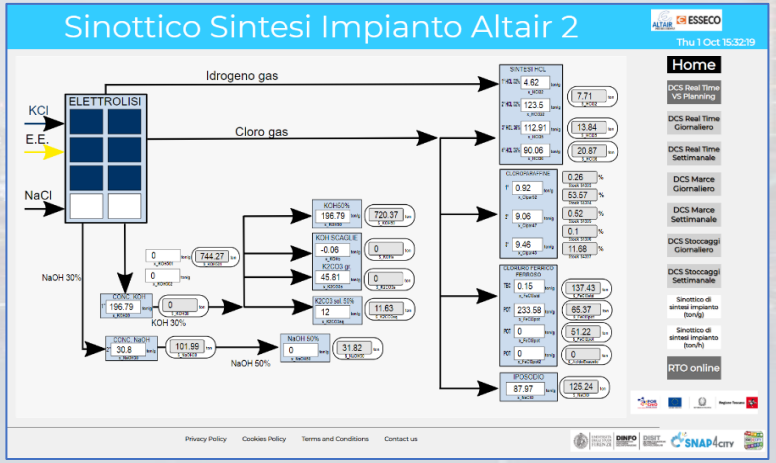

Data Analyzer: DevDash
Open Distro for Elasticsearch


Firenze - Trafair - AirQuality Heatmaps
This dashboad contains data derived from actual sensors and predictive values under validation
Sun 25 Oct 18:52:00
18.6

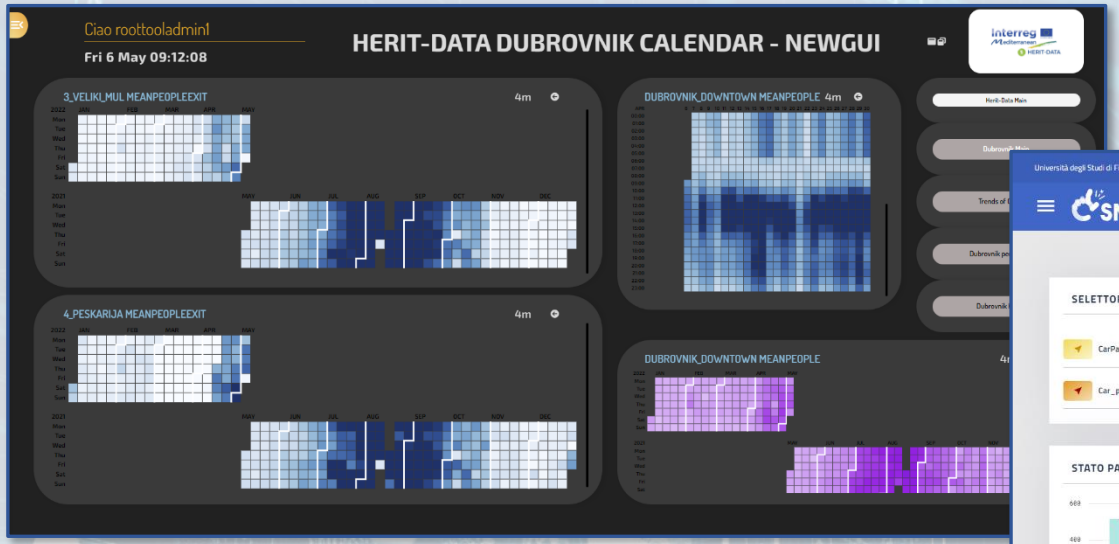

BIM Integration Dashboard
Sat 16 Jan 02:05:21

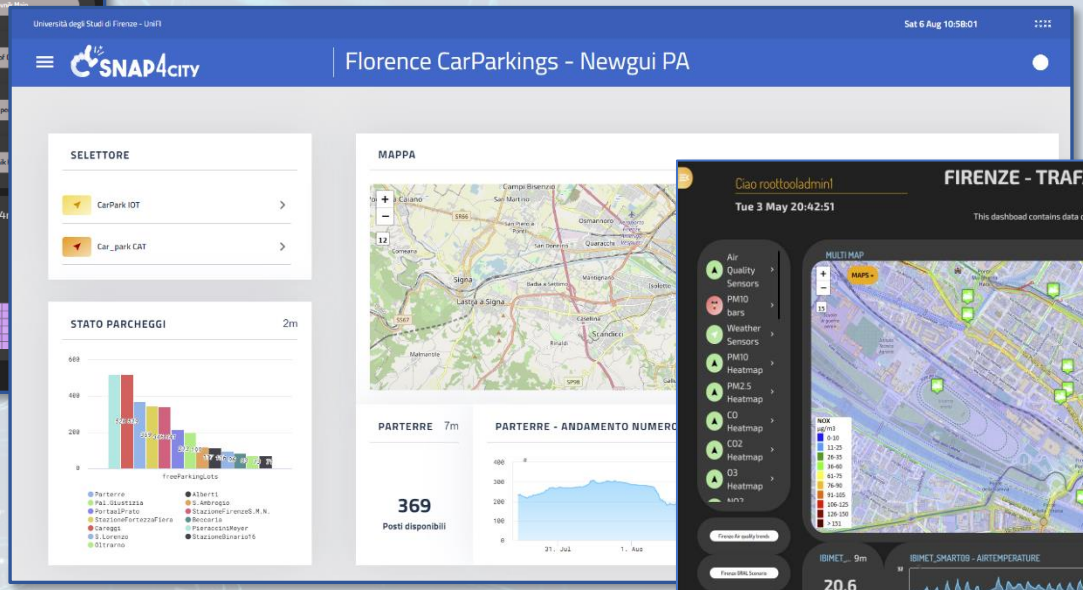
3D Multi Data Map - Digital Twin Global - Firenze
demonstrator
Sun 3 Apr 16:03:52
192

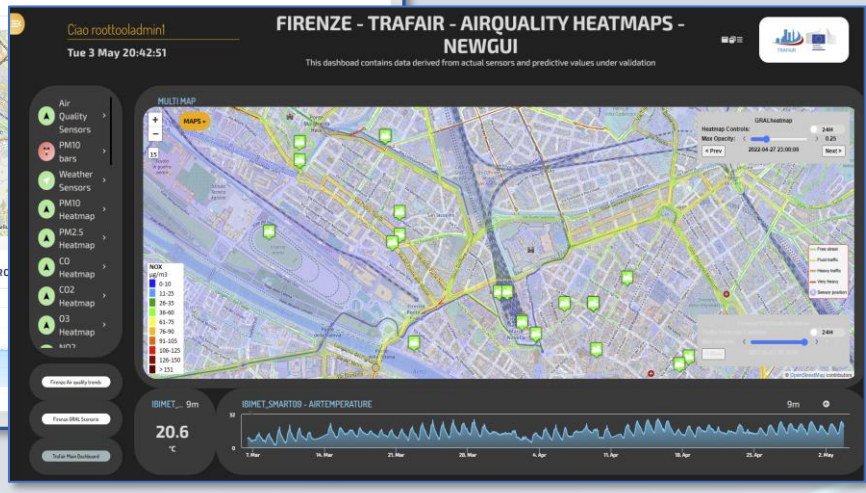

Snap4City User Engagement Antwerp
Data is based on activities performed on Antwerp in a Snap mobile App
Sat 21 Sep 19:28:0
72
users
173
days
3393
days
0
minutes
1.7
minutes
10.2
days
Documentation
Survey
Forum Discussion

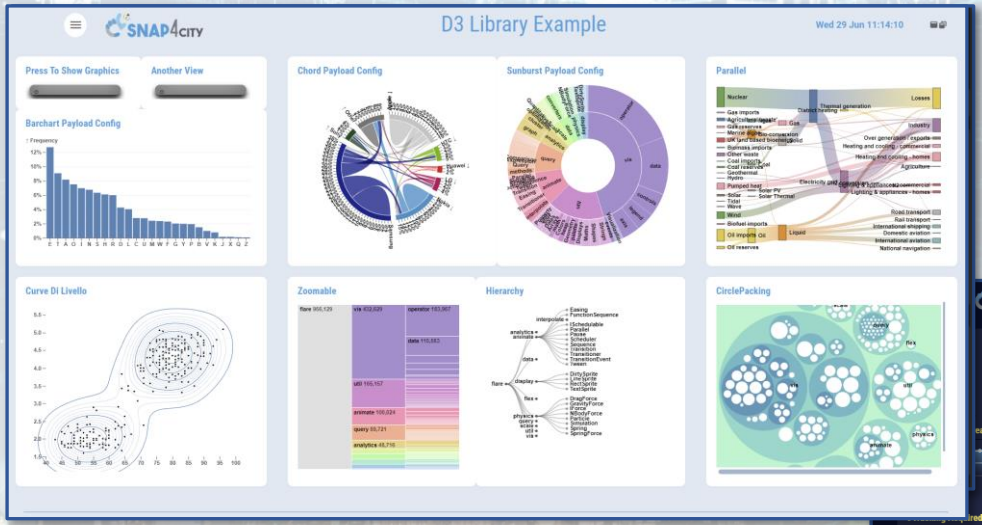

Sinottico Sintesi Impianto Altair 2
Thu 1 Oct 15:32:19
Home
Idrogeno gas
Cloro gas
ELETTROLISI
KCl
E.E.
NaCl
NaOH 30%
KOH 30%
NaOH 50%

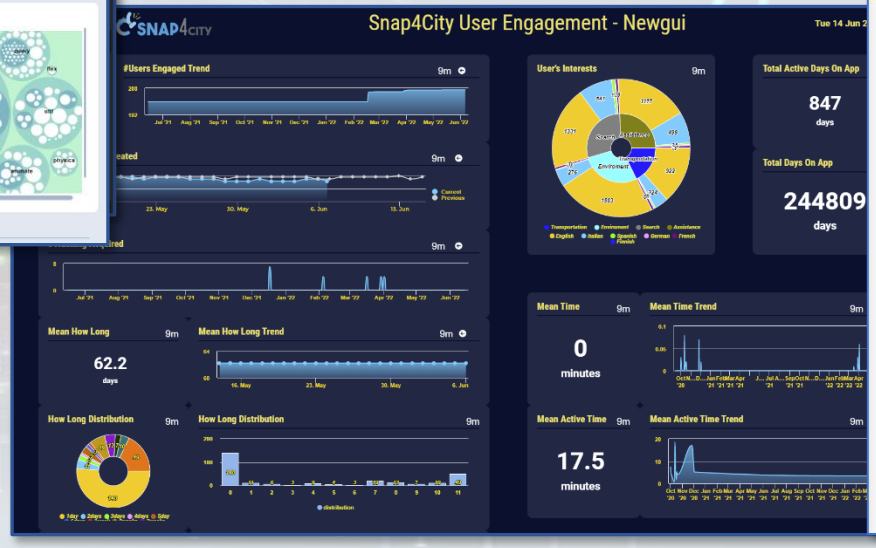
Different Themes

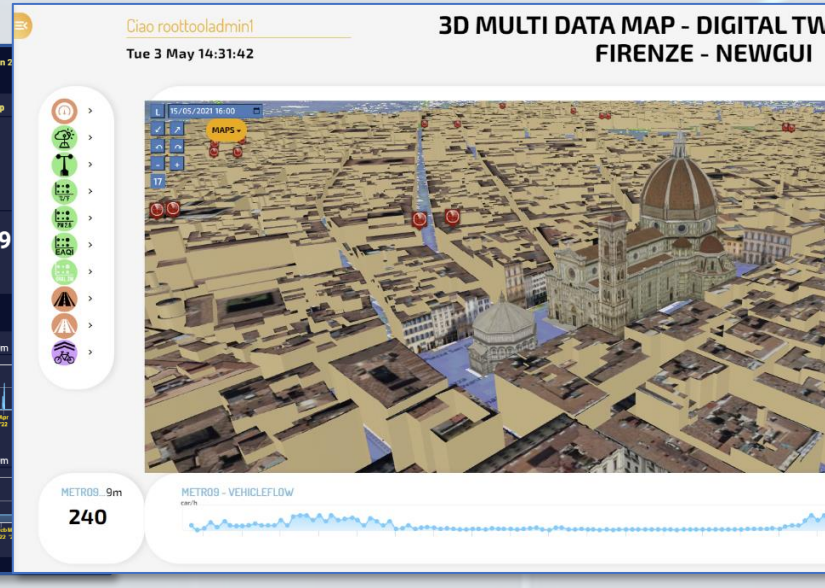












New styles/themes can be developed by specializing a few files from open source

https://www.snap4city.org/793

Control Room

Key Performance Indicators, KPI

Air Quality Directive				WHO guidelines	
Pollutant	Averaging period	Objective and legal nature and concentration	Comments	Concentration	Comments
$PM_{2.5}$	One day			25 µg/m³ (*)	99th percentile (3 days/year)
$PM_{2.5}$	Calendar year	Target value, 25 µg/m³	The target value has become a limit value since 1 January 2015	10 µg/m³	
PM_{10}	One day	Limit value, 50 µg/m³	Not to be exceeded on more than 35 days per year.	50 µg/m³ (*)	99th percentile (3 days/year)
PM_{10}	Calendar year	Limit value, 40 µg/m³ (*)		20 µg/m³	
O_3	Maximum daily 8-hour mean	Target value, 120 µg/m³	Not to be exceeded on more than 25 days per year, averaged over three years	100 µg/m³	
NO_2	One hour	Limit value, 200 µg/m³ (*)	Not to be exceeded more than 18 times a calendar year	200 µg/m³ (*)	
NO_2	Calendar year	Limit value, 40 µg/m³		40 µg/m³	

- **United Nations Sustainable Development Goals, SDGs** (for which cities can do more to achieve some of the 17 SDGs, https://sdgs.un.org/goals);
- **15 minutes cities** (where primary services must be accessible within 15 minutes on foot);
- **objectives of the European Commission** in terms of pollutant emissions for: NO2, PM10, PM2.5 (https://environment.ec.europa.eu/topics/air_en);
- **SUMI: mobility and transport vs env**
  - **https://www.snap4city.org/951**
- **SUMP/PUMS: mobility and transport vs env.**
- **ISO indicators:** city smartness, digitization, tech level.
- **Low Level/Real Time:** global traffic, quality of service, betweenness, centrality, queue, time to travel, etc.

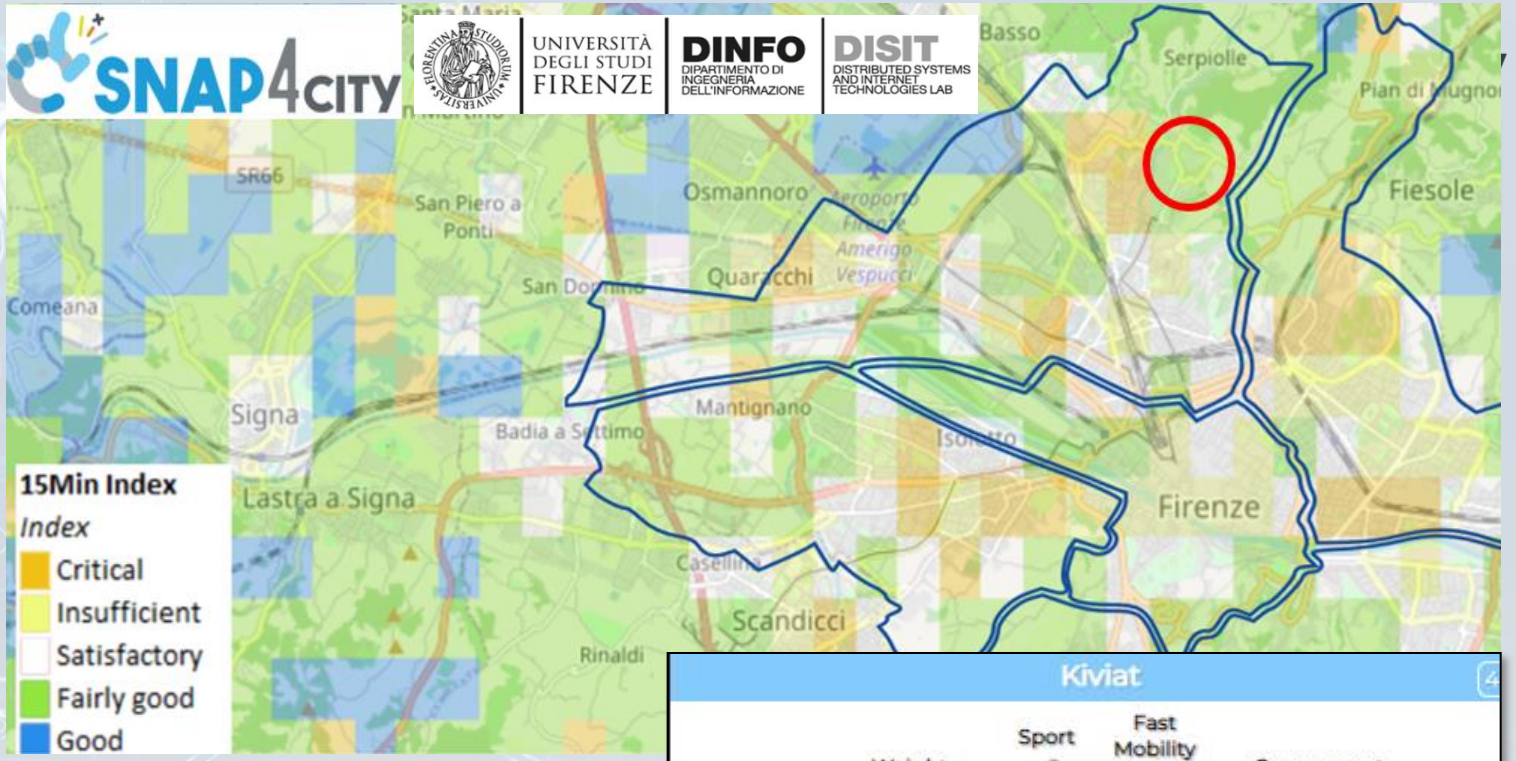
Global & Local

Periodic & Realtime

15MinCityIndex

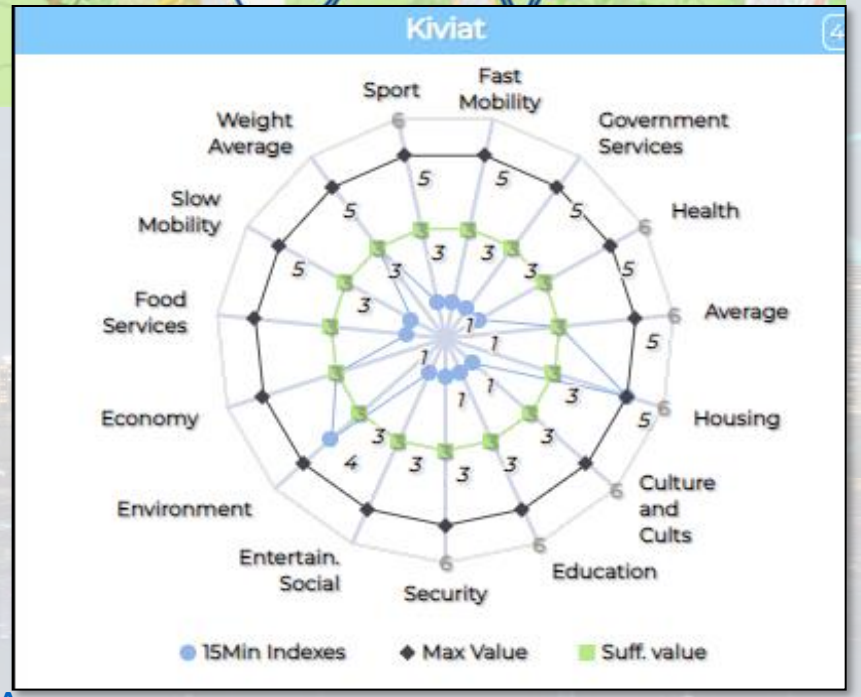
What would support my neighborhood to become a 15-Minute City?

Using the Open Data:
We developed a data analytic tool based on municipal and national open data to assess services adequacy for people living in each 15 minutes areas of the city.



Good public transport services: bus, new tram line, train stations, cycle paths.

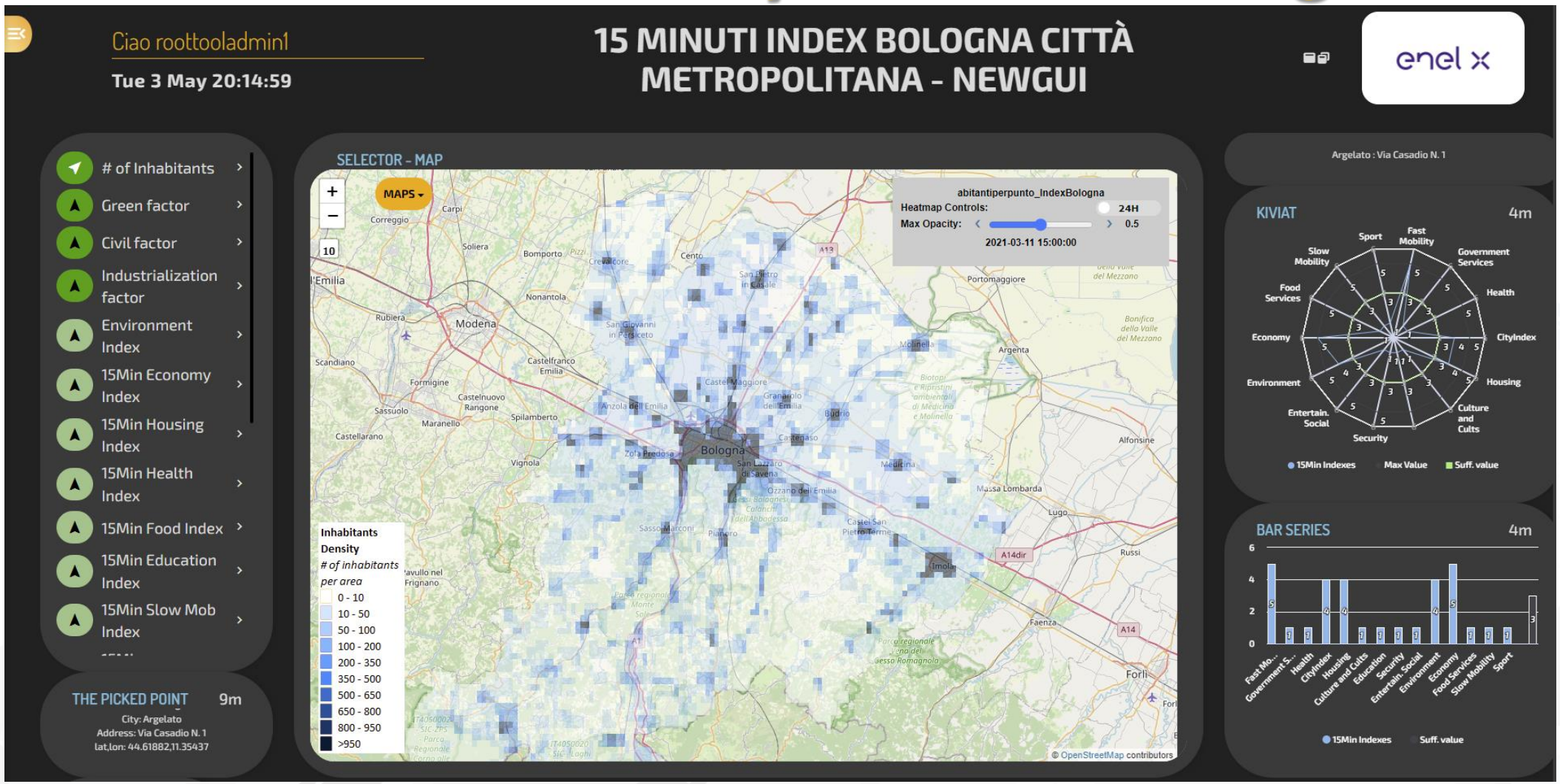
The tool supports the becoming of a 15-Minute city evaluating the service level in various domains.



Careggi/Rifredi is a relevant district in Florence because of hosting the main Florence/Tuscany hospitals Careggi and Meyer, but also university headquarters and many other workplaces.

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

15MinCityIndex on Bologna



https://www.snap4city.org/dashboardSmartCity/view/Baloon-Dark.php?iddasboard=MzQxMg==

- ***15 Minute City Index:***
  - 13 subindexes: energy, slow mobility, fast mobility, housing, economy education, culture and cults, health, entertainment, gov, food, security…

- Monitoring and Prediction of energy consumption
- Stimulating: Bike sharing, e-bikes, car charge, etc.
- Community of Energy, planning energy plant

- Smart City infrastructure: monitoring and resilience, long terms predictions
- Effective and Low cost smart solutions
- What-if analysis, Simulations
- Origin Destination matrices computation

- Monitoring and Predicting: NO2, NOX, CO2, Traffic flow, pollutant, landslide, waste, etc.
- Traffic flow reconstruction
- Demand vs Offer of Mobility analysis

- Industry 4.0 integrated solutions
- Decisions Support Systems
- Process optimization, control
- Predictive maintenance

- business intelligence tools for decision makers
- Reduction production costs
- Monitoring resource consumption
- Optimization of Waste Collection

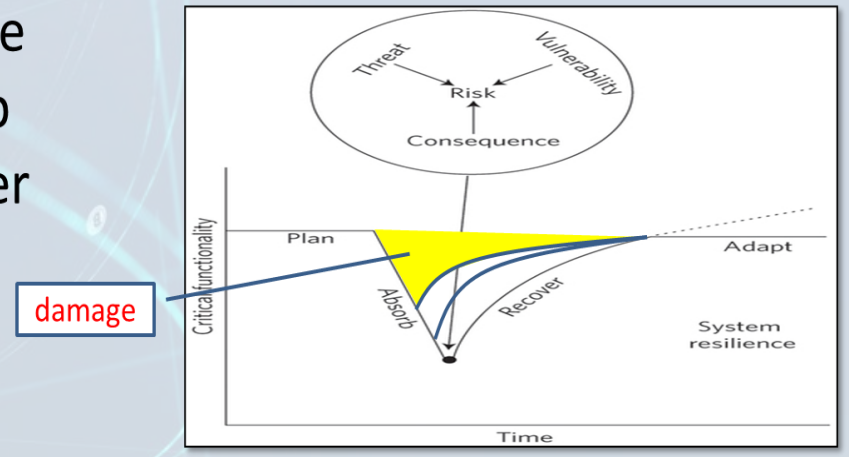
- Shortening justice time
- Anonymization and indexing legal docs.
- Prediction of mediation proneness
- Ethical Explainable Artificial Intelligence

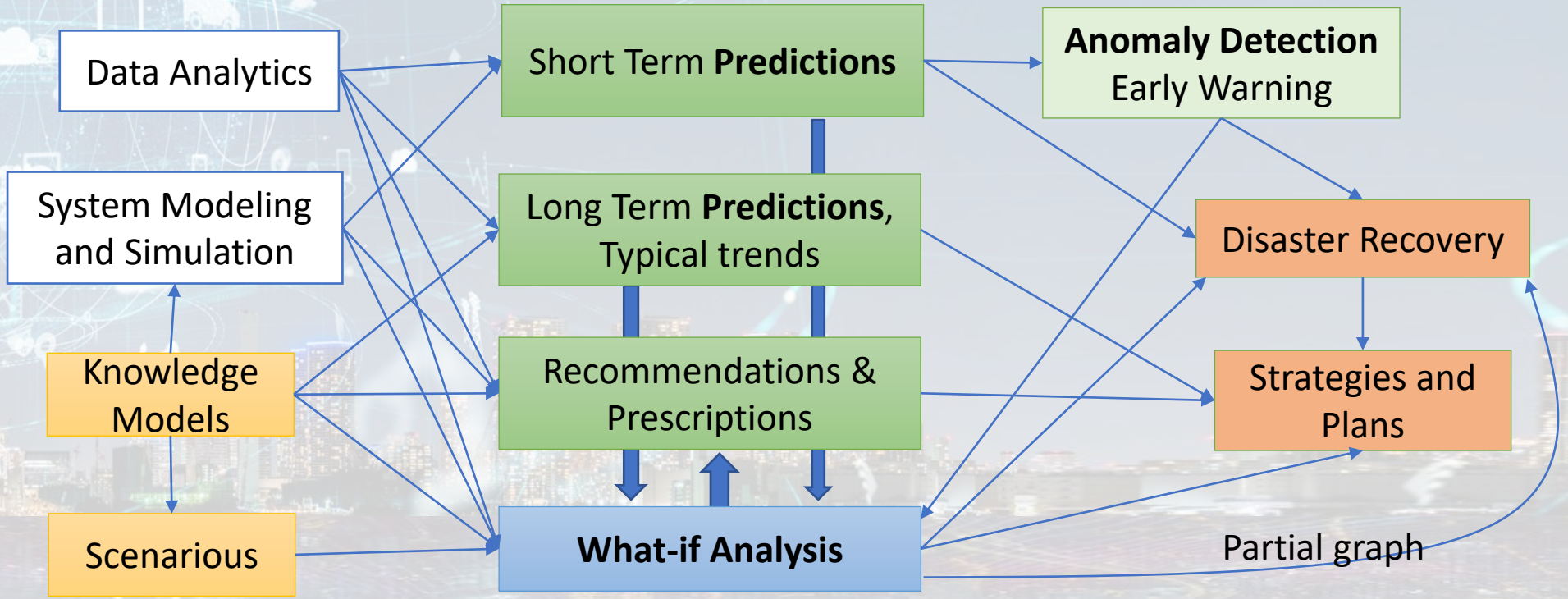
Decision Support System: Immediate response and Tactic and Strategic Plans, via What-if Analysis

Snap4City What-If

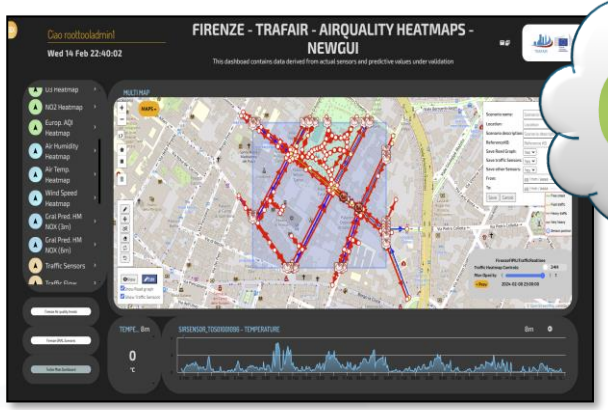
- Decision support systems
- Improvement of life quality
- Sustainable Solutions
- Reduction of costs
- Risk Assessment
- Resilience

Prepare
Absorb
Recover
Adapt





Decision Support System: neuro-symbolic reasoning
targeting Indicators: Quality of Life, PUMS, SUMI, KPI, SDG, 15MinIndex,…



City

Monitoring

KPI

Digital Twin Models & Data

Predictions, Anomaly Detection, Analysis, Assessment Warning

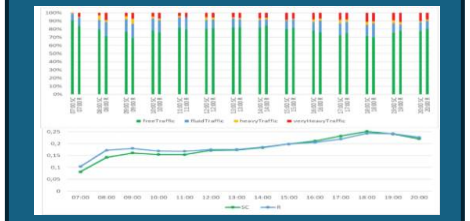
Decision Support System

Scenarious

Simulations, TFR, Crossroad, Public Transport, Routing, ..

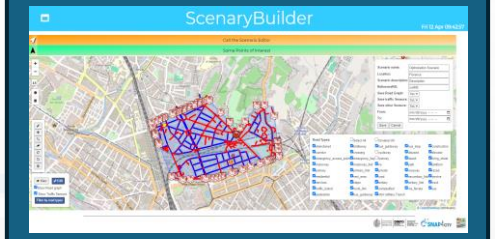
What-If Analysis, Optimization

KPI

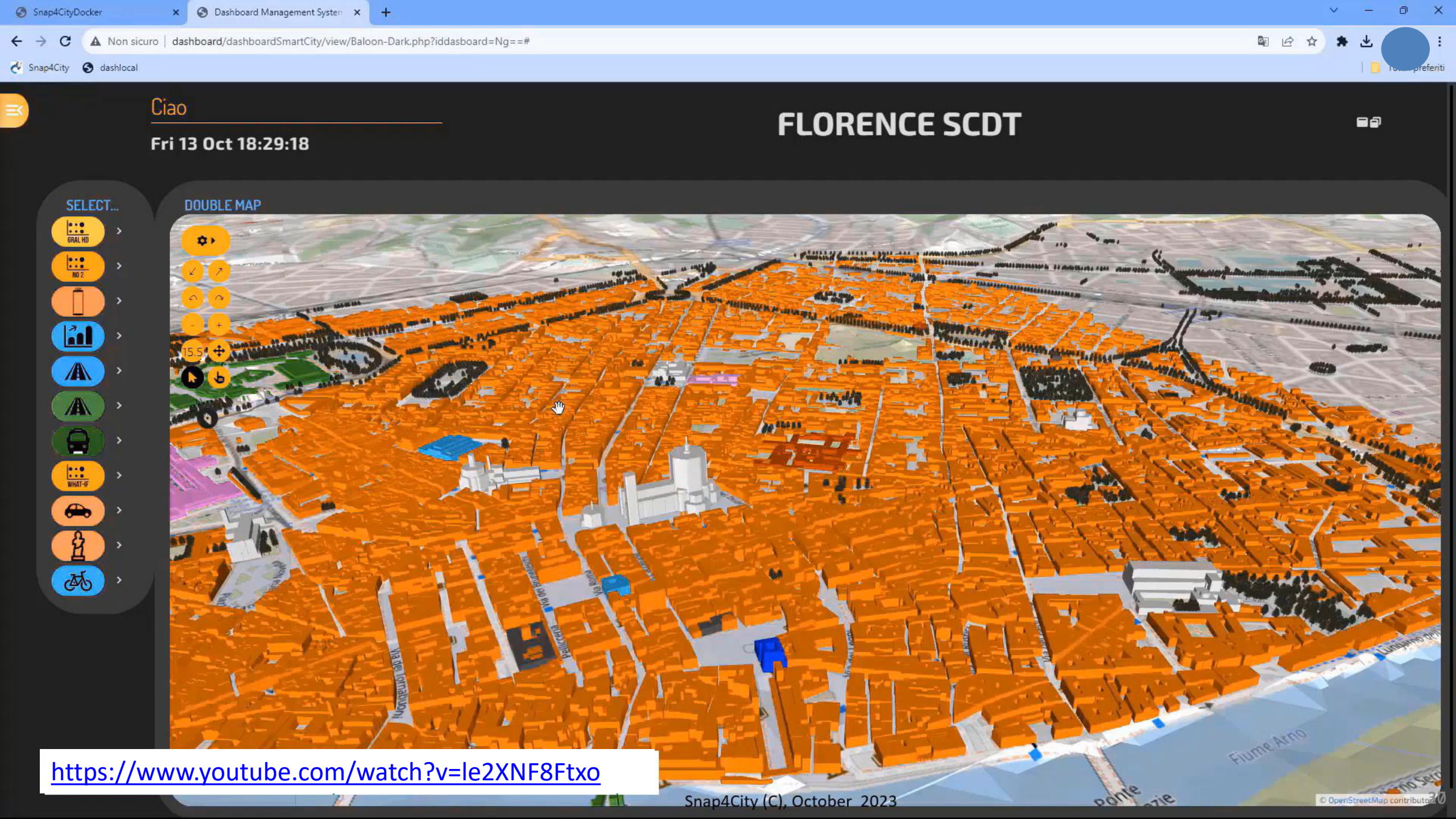


Traffic Lights plan optimization

Scenario Editor



Traffic Reconstruction


Snap4CityDocker
Dashboard Management Syster
Non sicuro | dashboard/dashboardSmartCity/view/Baloon-Dark.php?iddasboard=Ng==#
Snap4City
dashlocal
Ciao
Fri 13 Oct 18:29:18
FLORENCE SCDT
SELECT...
DOUBLE MAP
GRAL HD
NO 2
WHAT-IF
Fiume Arno
https://www.youtube.com/watch?v=le2XNF8Ftxo
Snap4City (C), October 2023
© OpenStreetMap contributors

TOP

Data Analytic Artificial Intelligence, XAI, Machine and Deep Learning

Available AI Solutions on Snap4City

- Mobility and Transport
- Environment, Weather, Waste, Water
- City Users Behaviour and Social analysis
- Energy and Control, Security, …..
- Tourism and People
- Security and Safety
- High Level Decision Support Solutions
  - Asset management
  - Resilience and Risks Analysis
- Low level Techniques

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

https://www.snap4city.org/download/video/course/p4/

TOP

Behaviour understanding and User Engagement Security and Safety

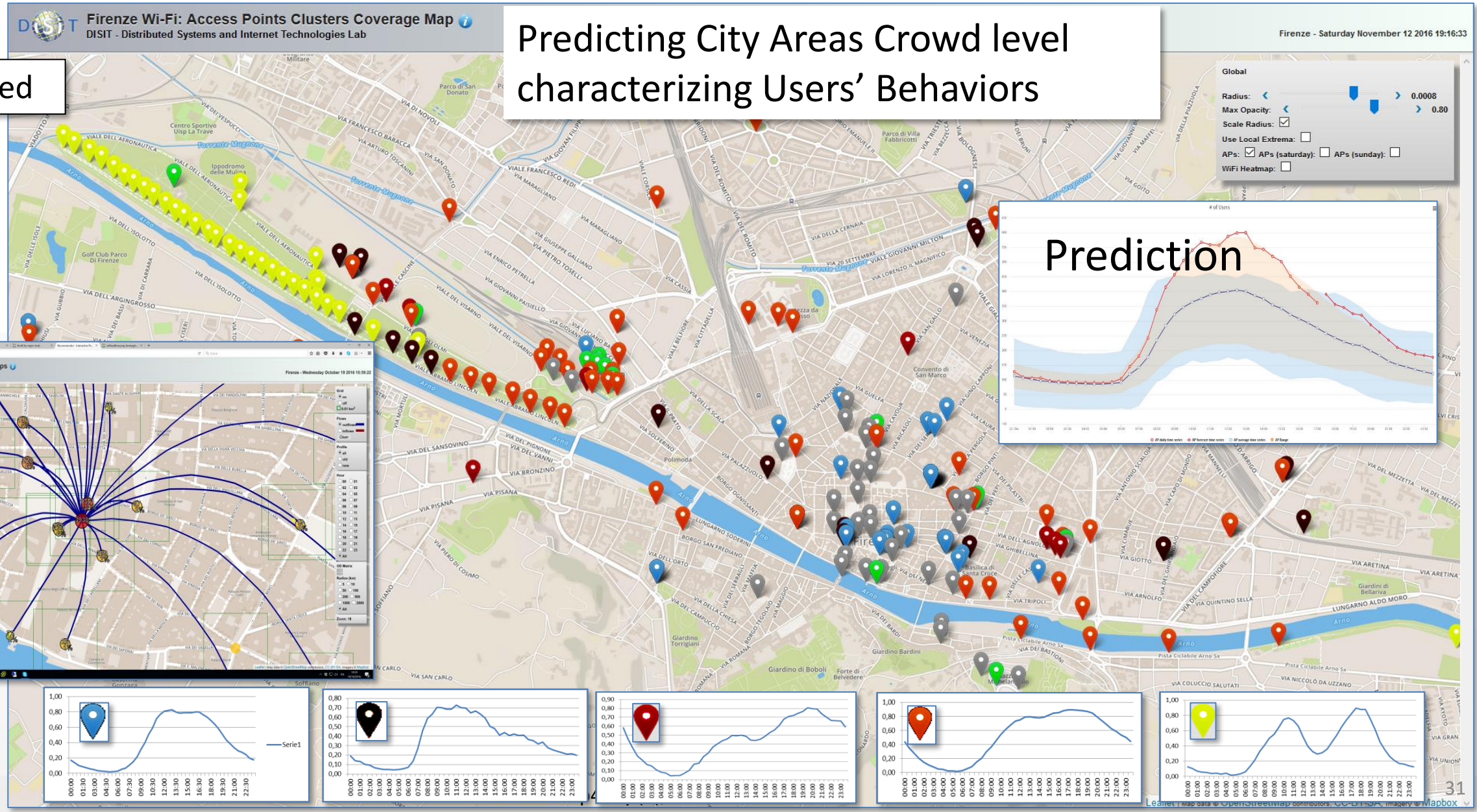
City Users Behaviour, Safety, Security and Social Analysis

- **People detection and classification**: persona, strollers, bikes, etc. (ML, DL)
- **people counting and tracking**, head counting, people trajectories (via thermal cameras, ML, DL)
- **People flows prediction** and reconstruction, (ML, DL)
  - Wi-Fi data, mobile apps data, Mobile Data, etc.
- **User's behaviour analysis**, **People flow analysis** from PAX Counters and heterogenous data sources (ML, AI)
  - origin destination matrices, hot places, time schedule,
  - Recency and frequency, permanence, typical trajectory, etc.
- **Computing User engagement and suggestions** for sustainable mobility (Rule Based, ML)
- **Social media analysis** on specific channel, specific keywords: see Twitter Vigilance,
  - Reputation, service assessment: MultiLingual NLP and Sentiment Analysis, SA
  - Tweet proneness, retweet-ability of tweets, impact guessing
  - Audience predictions on TV channels and physical events, locations
  - Prediction of attendance of events and on attractions
- **Virtual Assistant construction, LLM, NLP, Sentiment Analysis (DL, NLP)**
- **Video management System integration for security**
- **15 Minute City Index** , etc. (modeling and computability)
- Computing **SDG**, etc., (DP)
- Etc.

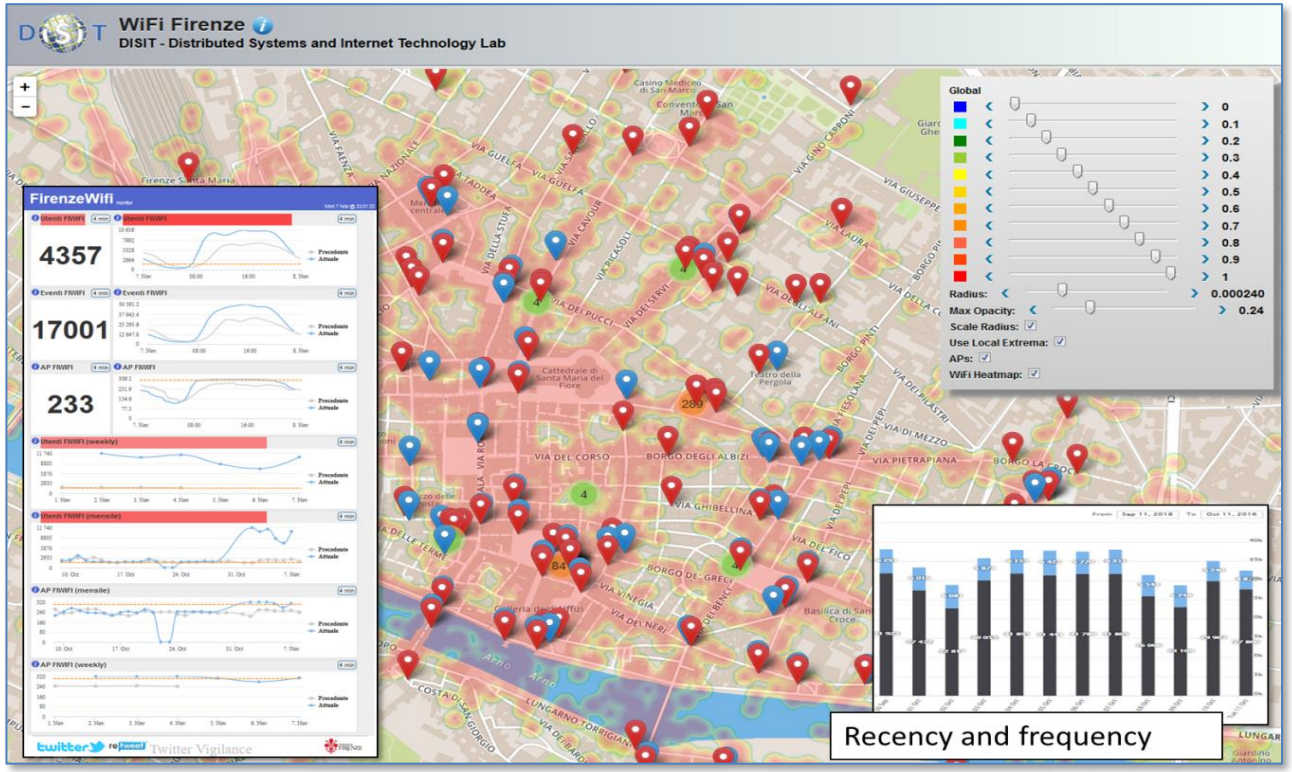
Characterizing City Areas

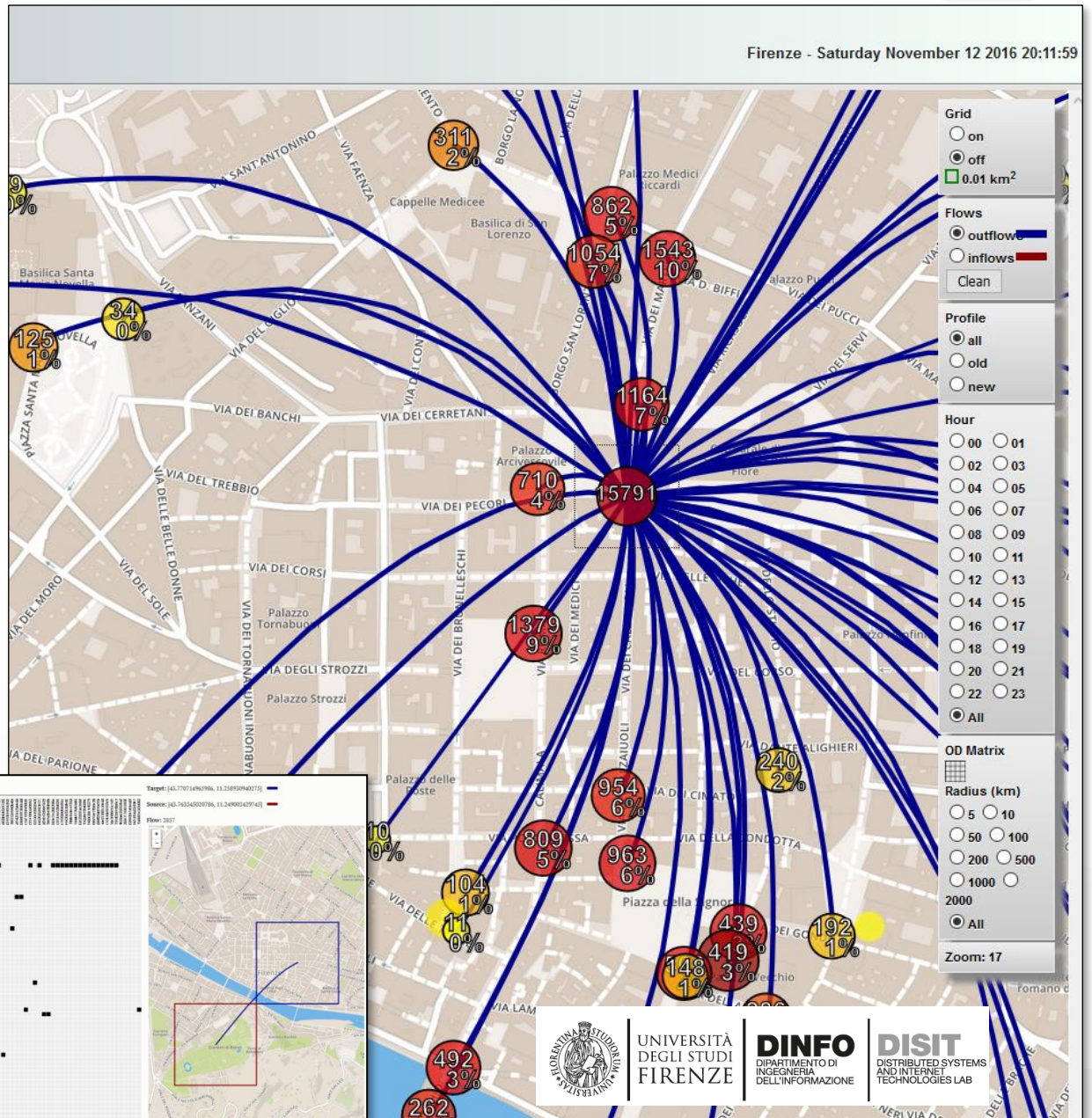
Wi-Fi based

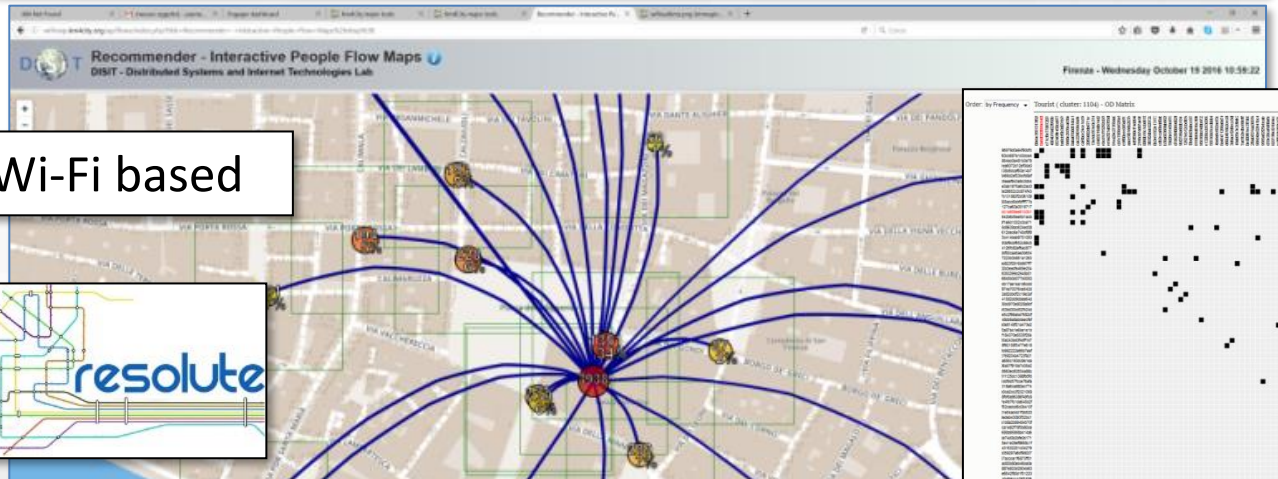
Predicting City Areas Crowd level characterizing Users' Behaviors

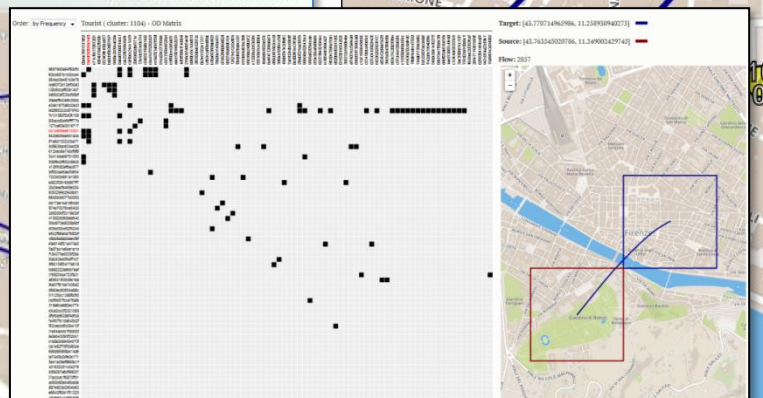


Origin Destination Matrix Estimation







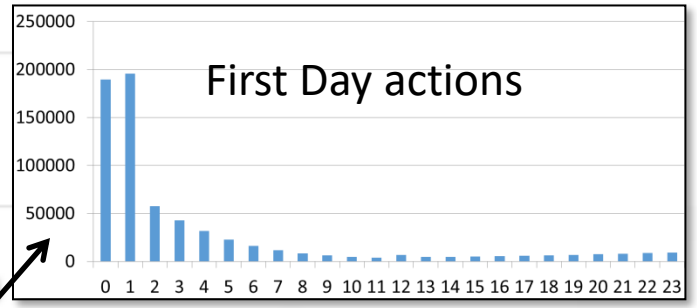


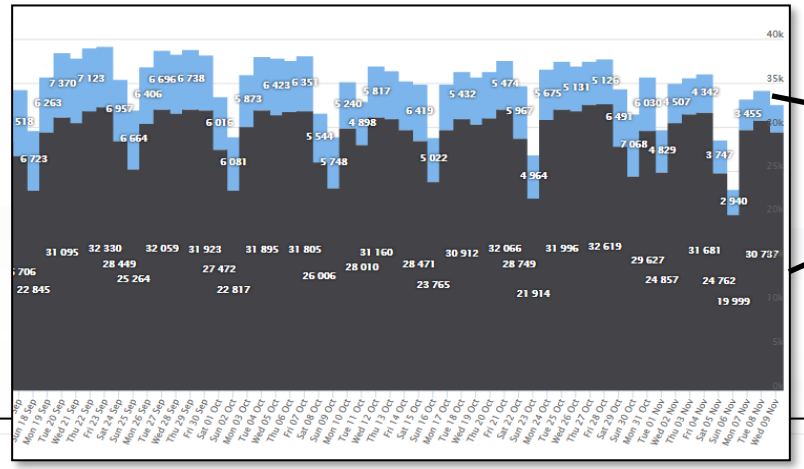
UNIVERSITÀ DEGLI STUDI FIRENZE | DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE | DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB

User Behaviour Analysis

Distinct APs: 343
Distinct APs (last 24 hours): 311
Distinct Users (last 180 days): 1102098
Distinct Excursionists (last 180 days, < 24 h): 687025

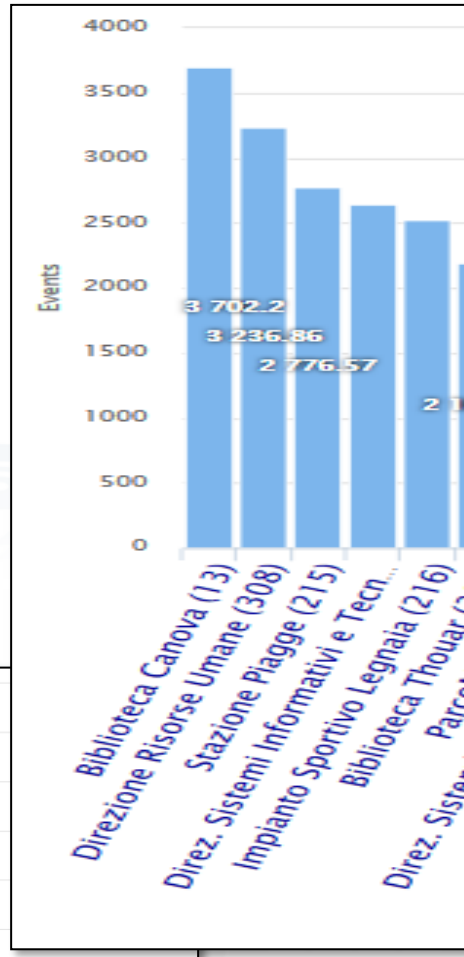
Excursionists



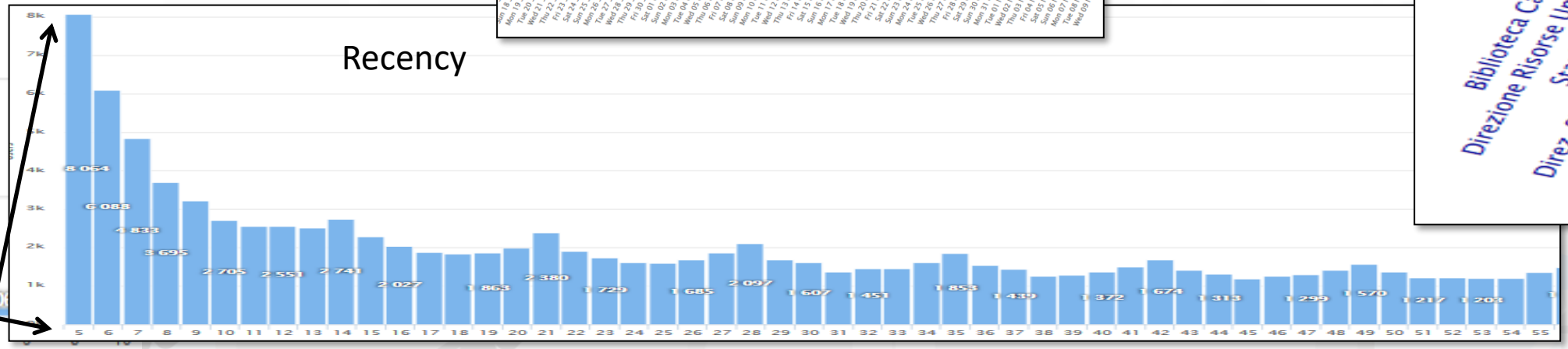


New City Users
VS
Returning

Where

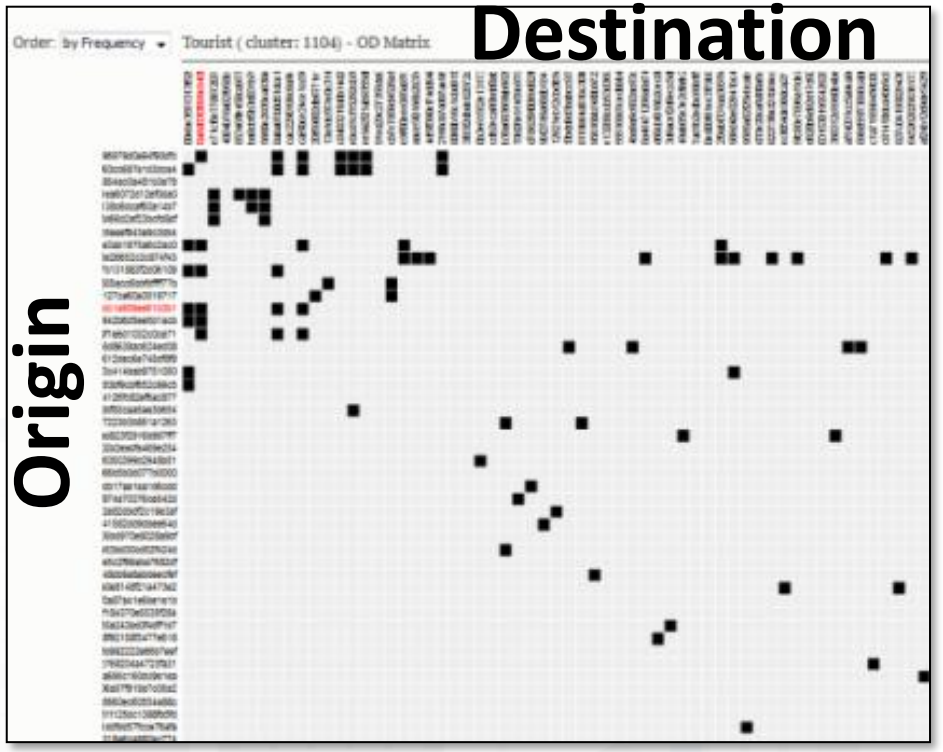


Recency

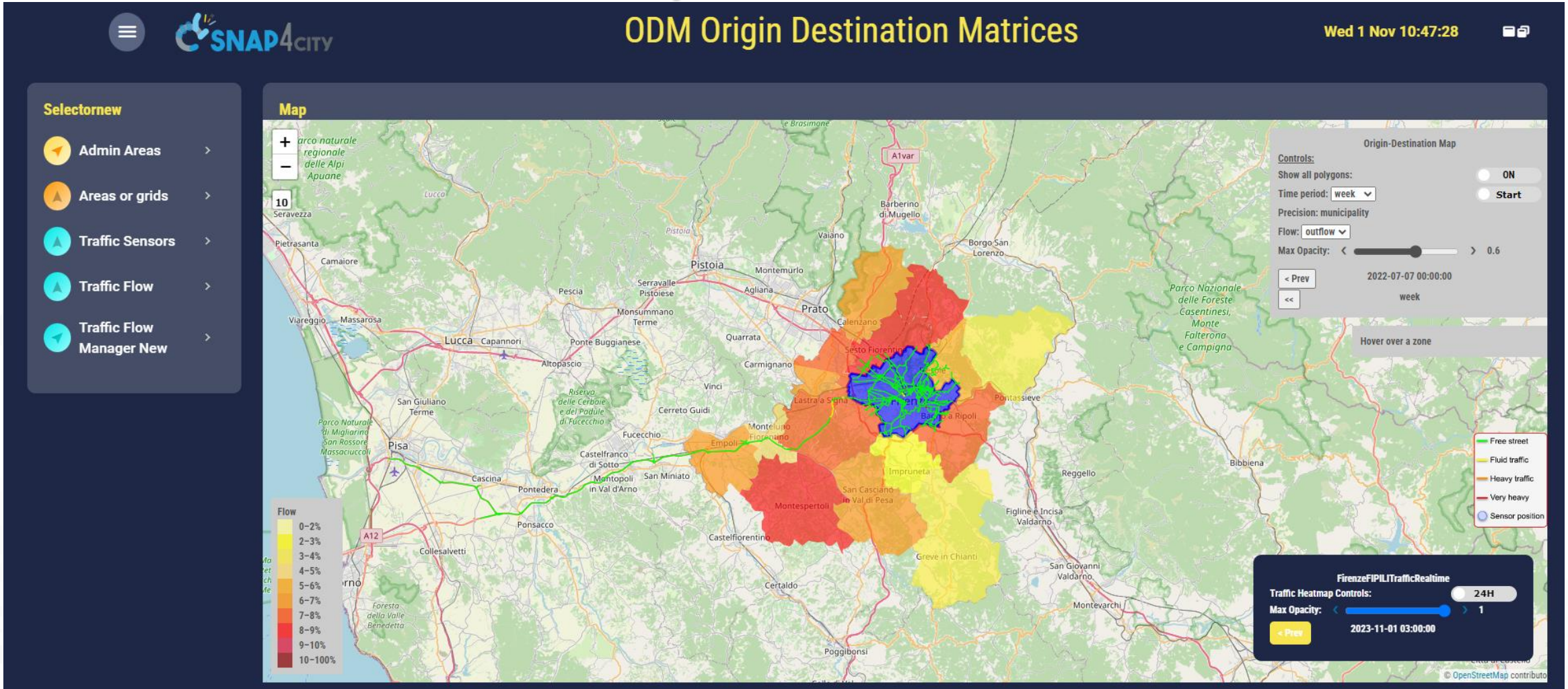


Origin Destination Matrices

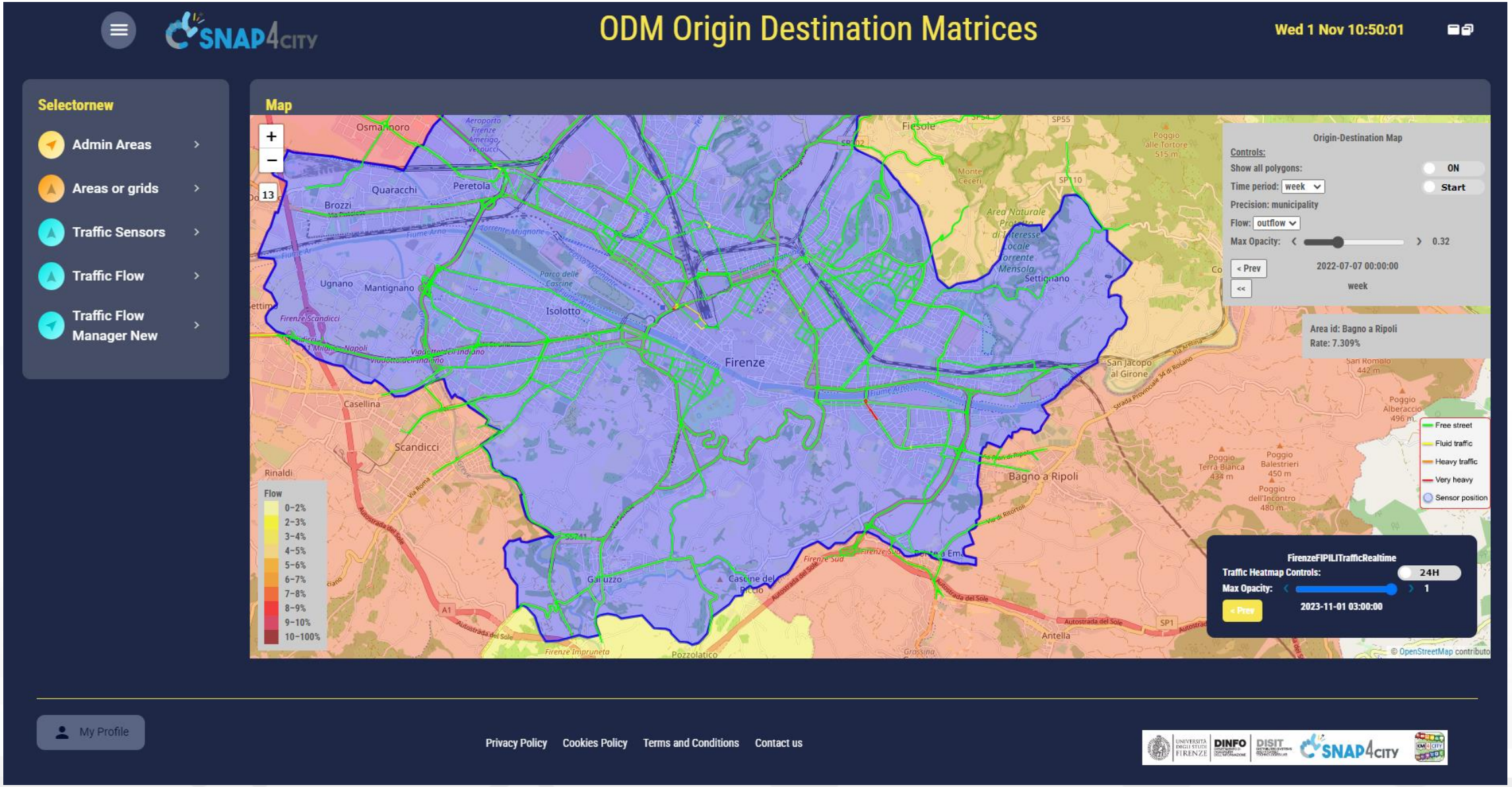
- **computed** from several kinds of data
  - Census Data
  - Cellular Mobile Data
  - Mobile App Data **trajectories**
  - OBU from vehicles **trajectories**
  - Composition of multiple sources: ODM + Trj
- **may represent:**
  - Demand of mobility
  - Offer of transportation
- **refer** to different area kinds for Origin and of Destination
  - Different kinds of OD areas
  - Different kinds of temporal resolutions → animations
    - Hourly, daily, weekly, monthly, etc…



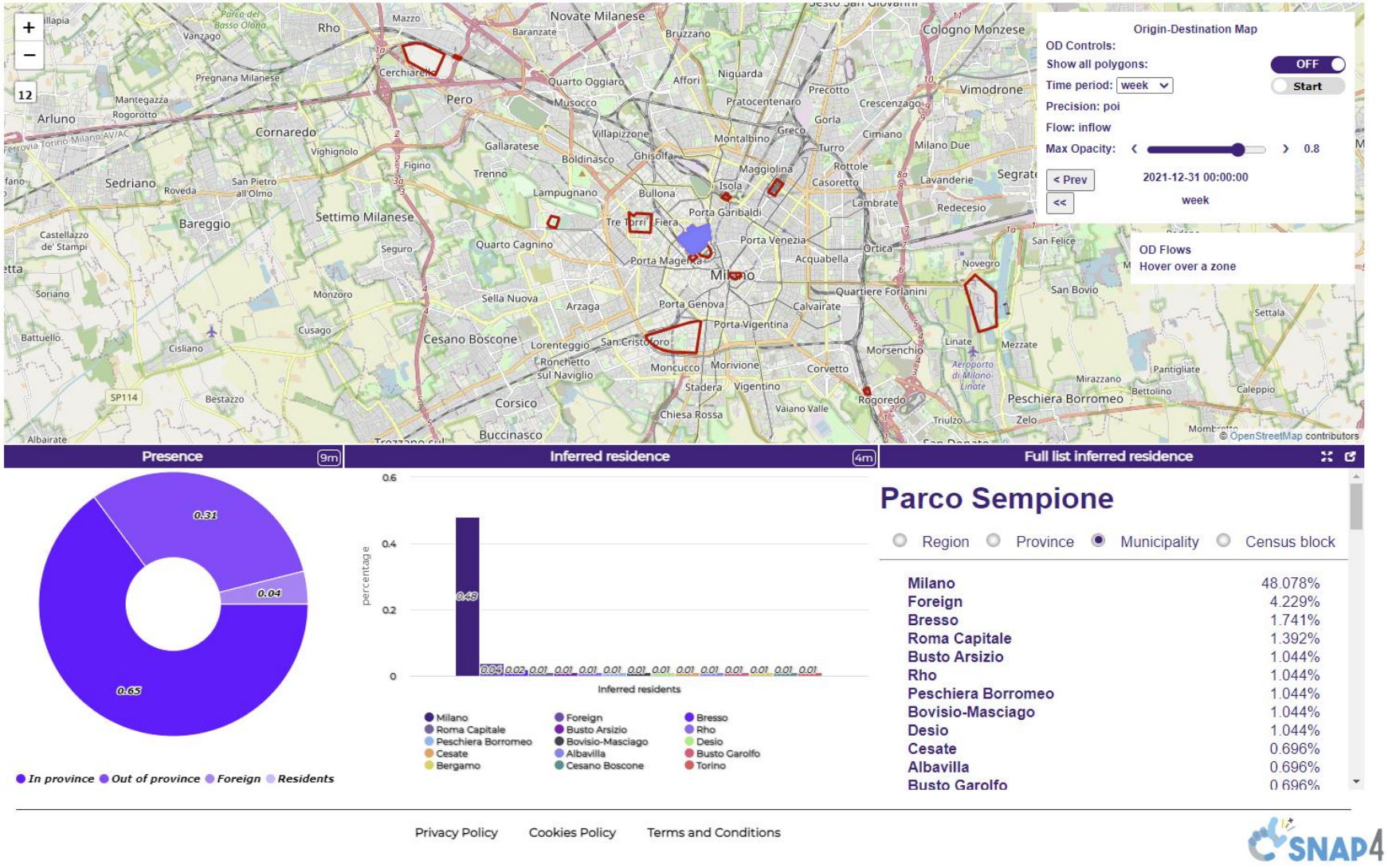
ODM, Traffic Flow



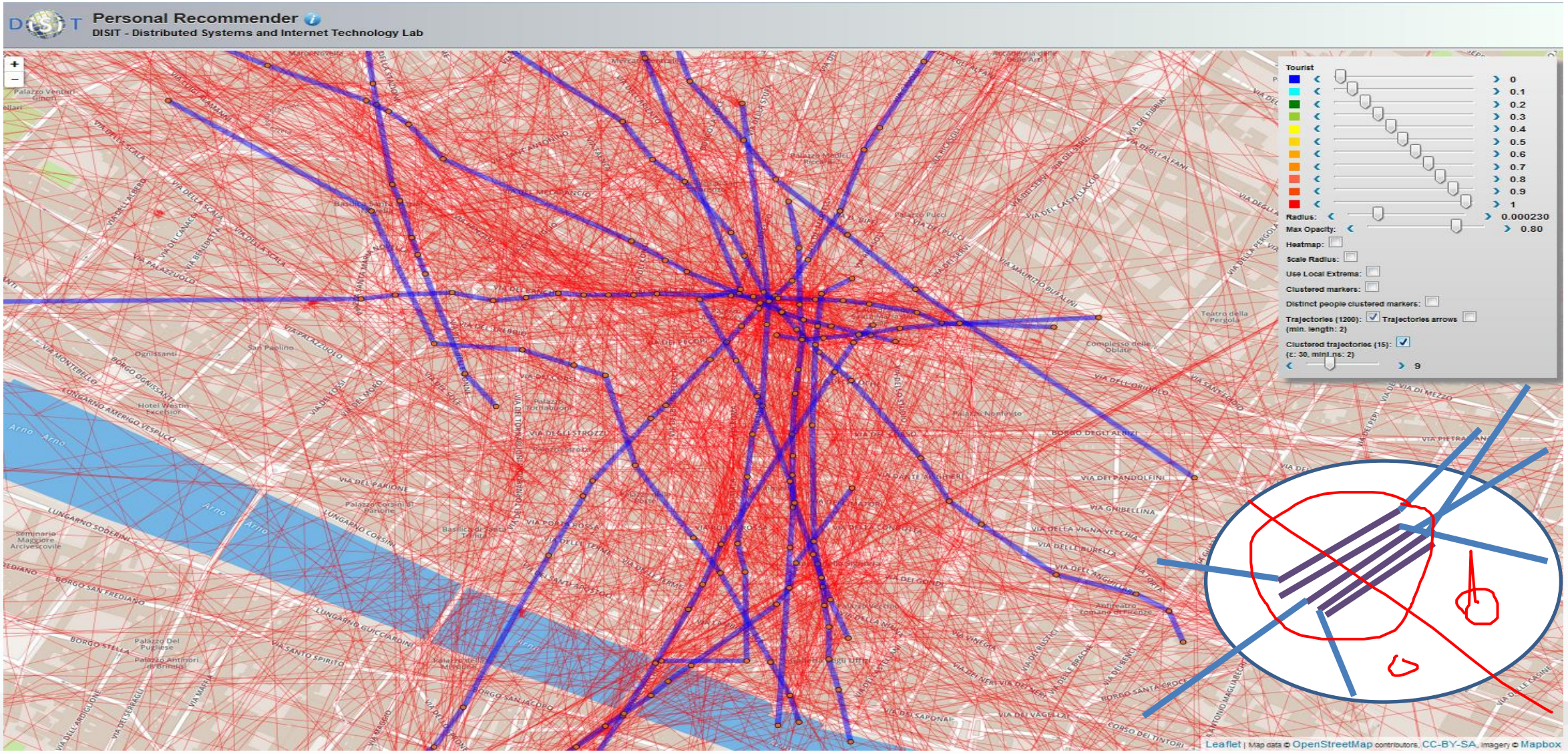
https://www.snap4city.org/dashboardSmartCity/view/Gea-Night.php?iddasboard=Mzk3Nw==


ODM Origin Destination Matrices
Wed 1 Nov 10:50:01
Selectornew
Admin Areas
Areas or grids
Traffic Sensors
Traffic Flow
Traffic Flow Manager New
Map
Origin-Destination Map
Controls:
Show all polygons:
ON
Time period: week
Start
Precision: municipality
Flow: outflow
Max Opacity:
0.32
< Prev
2022-07-07 00:00:00
week
Area id: Bagno a Ripoli
Rate: 7.309%
Free street
Fluid traffic
Heavy traffic
Very heavy
Sensor position
Flow
0-2%
2-3%
3-4%
4-5%
5-6%
6-7%
7-8%
8-9%
9-10%
10-100%
FirenzeFIPILITrafficRealtime
Traffic Heatmap Controls:
24H
Max Opacity:
1
< Prev
2023-11-01 03:00:00
© OpenStreetMap contributors
Firenze
Bagno a Ripoli
Scandicci
Isolotto
Quaracchi
Peretola
Brozzi
Ugnano
Mantignano
Casellina
Rinaldi
Fiesole
Settignano
San Jacopo al Girone
Antella
Pozzolatico
My Profile
Privacy Policy
Cookies Policy
Terms and Conditions
Contact us

ODM Visual Analytic on Milan Area

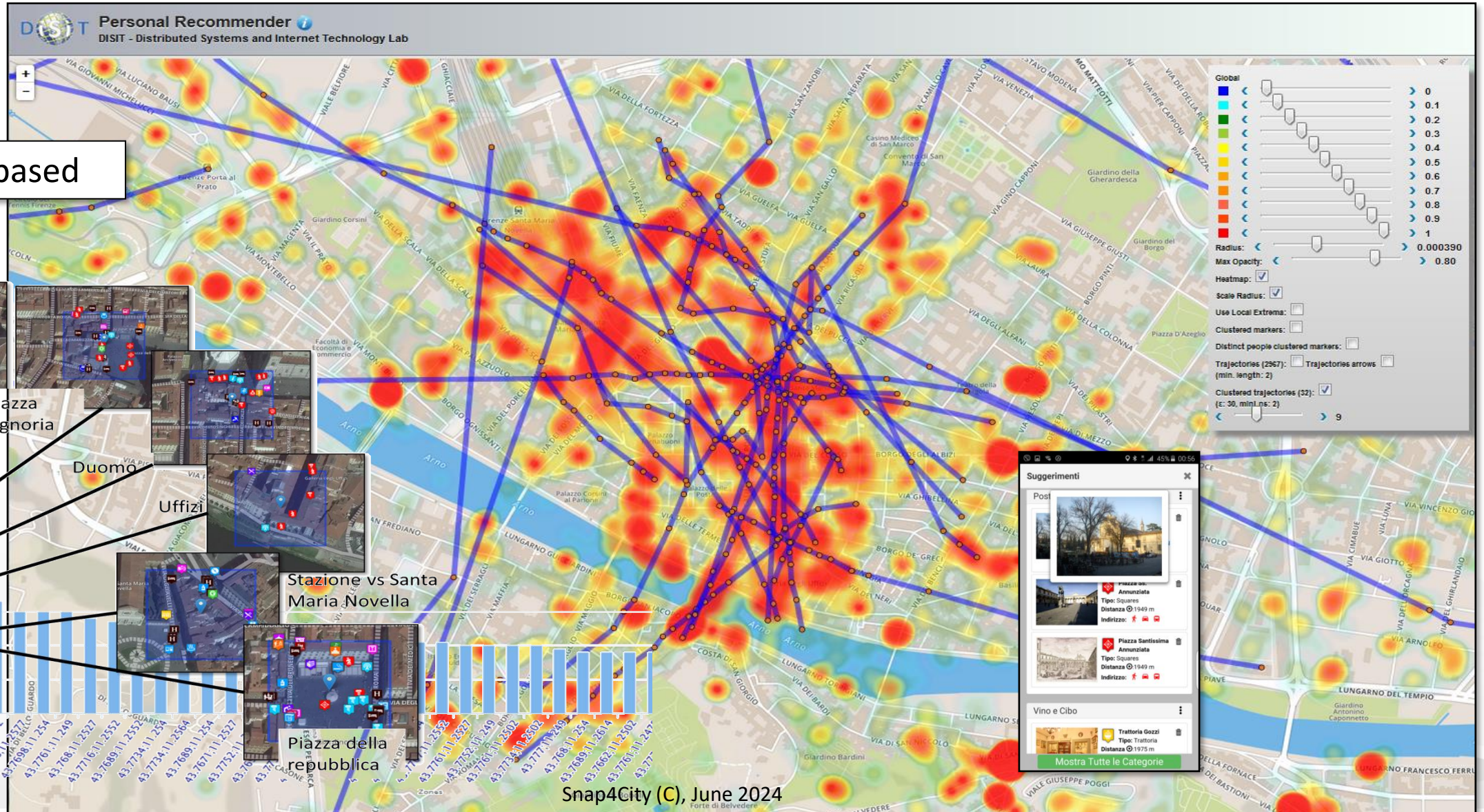


Cluster di Trajectories



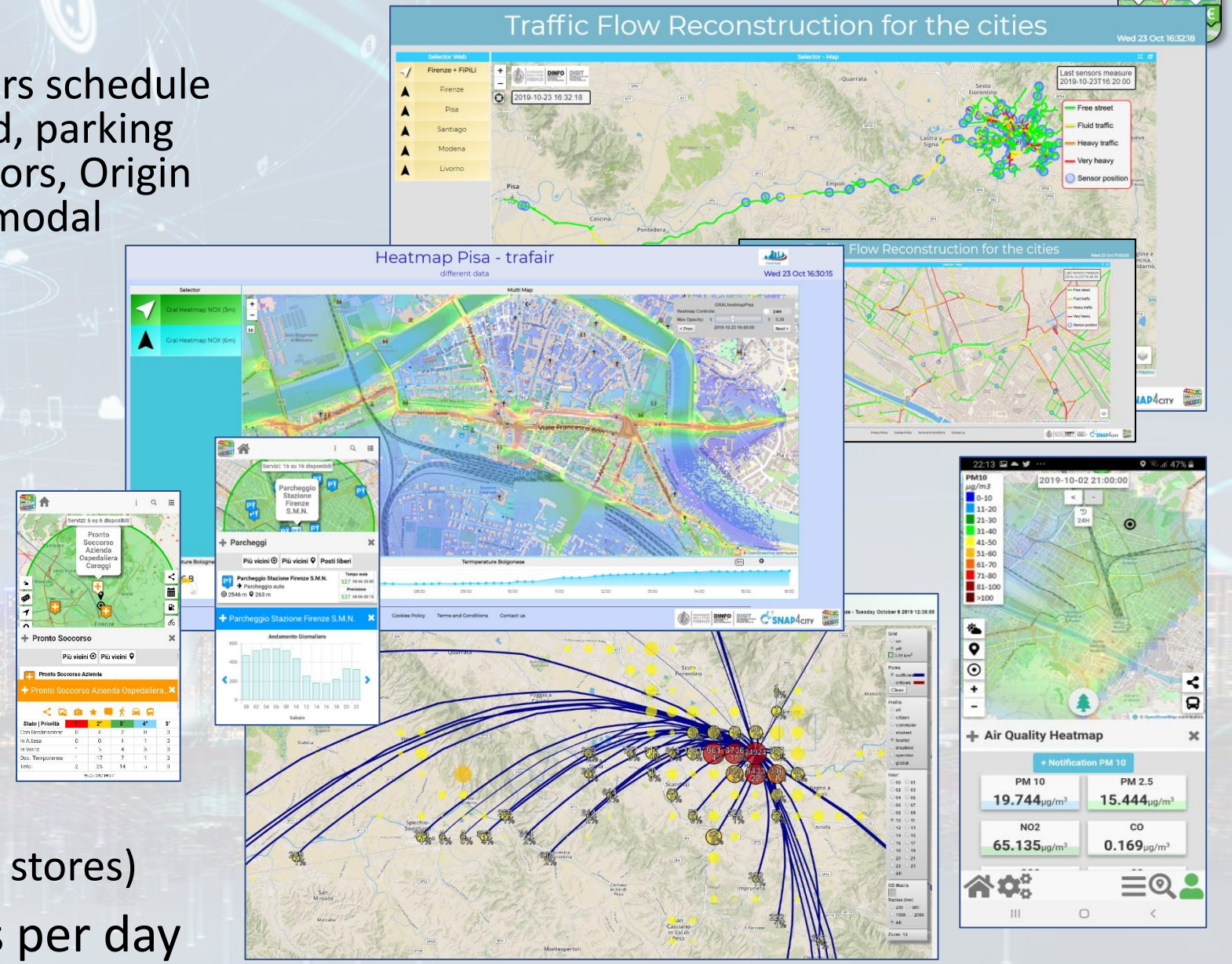
User Behavior Analyzer

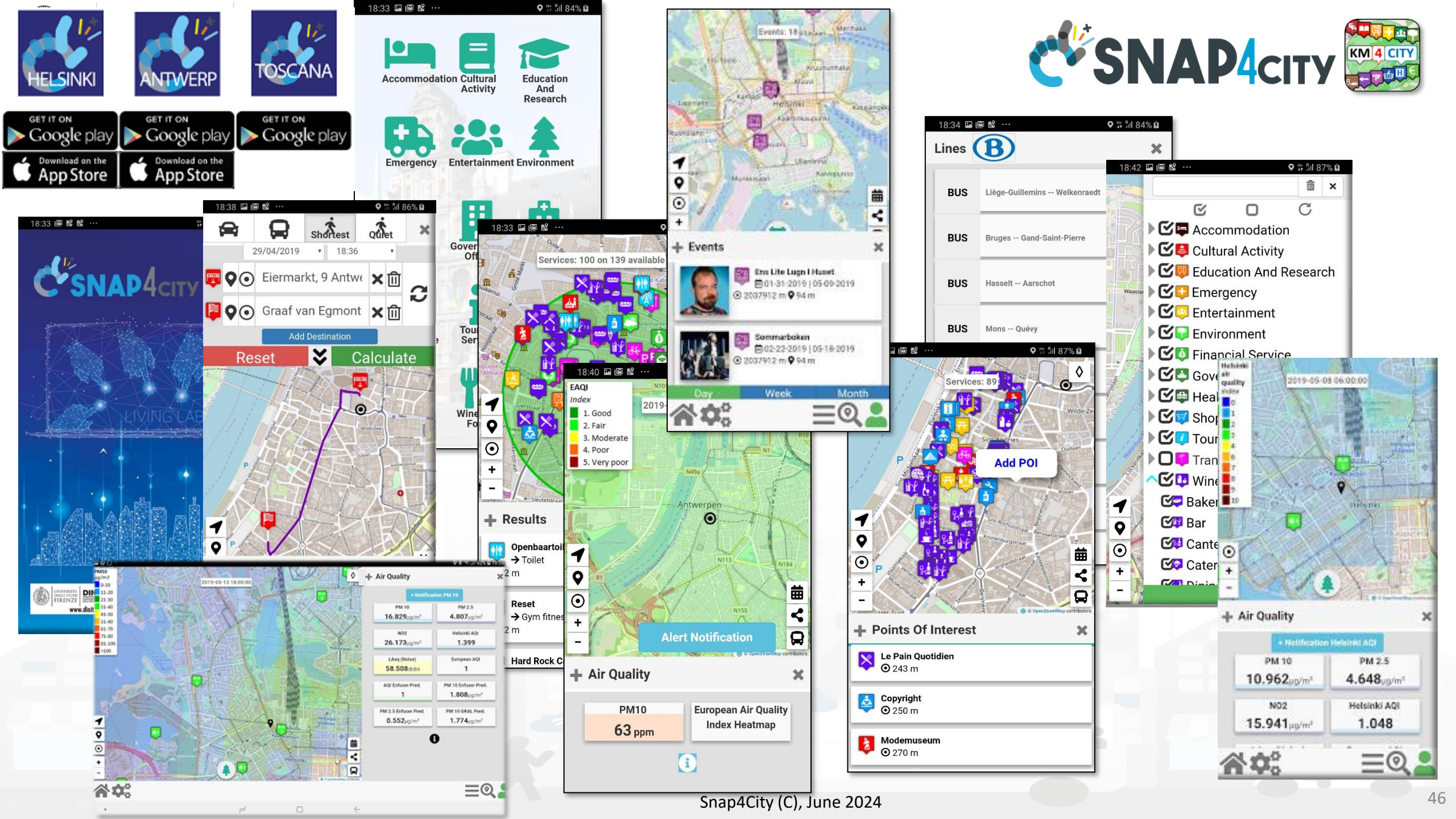
Mobile App based



Tuscany Region

- **Dashboards & Services**:
  - **Mobility**: public transport operators schedule and paths, traffic Fi-Pi-Li main road, parking status and predictions, traffic sensors, Origin Destination matrix, routing, multimodal routing, etc.
  - **Social**: Hospitals and triage, etc.
  - **Environment**: sensors, heatmaps,
  - alerting,
    - **Pollution** Forecast: NOX, NO2
    - **Weather** Forecast,
  - **Culture** and **Tourisms**
  - Etc.
- **Mobile App and MicroApplications:**
  - Tuscany in a Snap (all stores)
  - Tuscany where what… km4city (all stores)
- **Numbers**: 1.5 M complex events per day




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

The App is a Bidirectional Device

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

Produced information

- Viewed ?
- Accepted ?
- Performed ?
- …

Users

Derived information

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

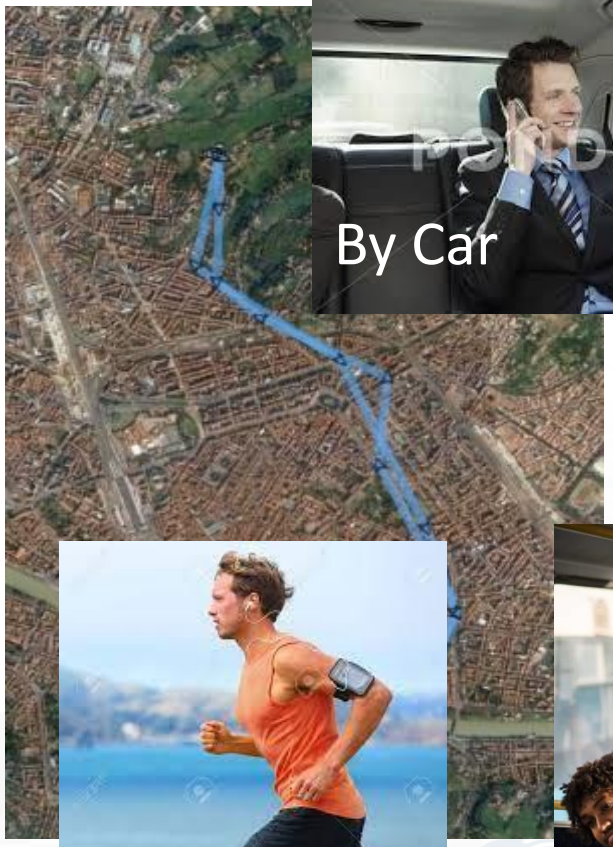
Produced information

- Suggestions
- Engagements
- Notifications
- …

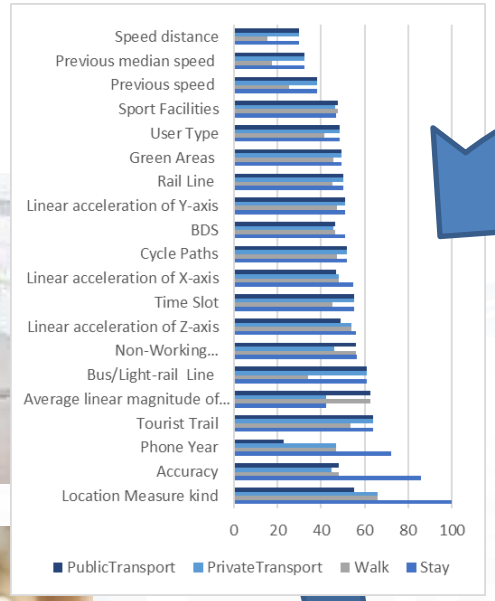
System

To propose suggestions and Engage city user

we need to know how they are moving

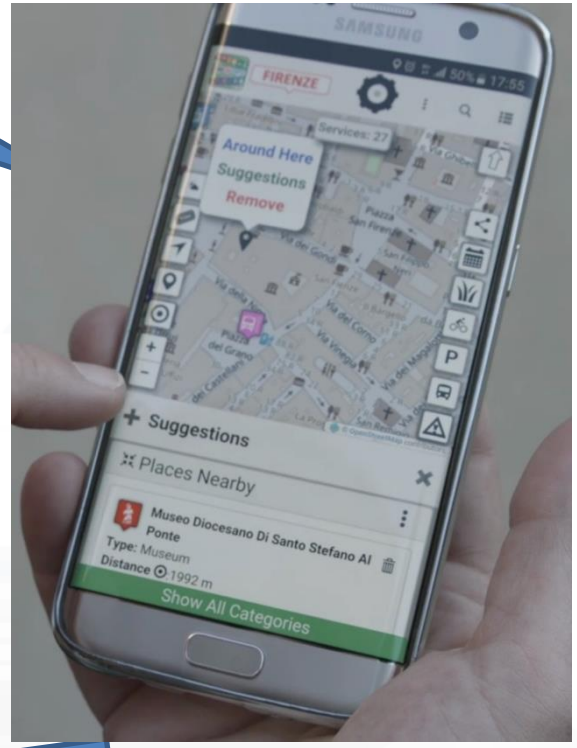


Walk

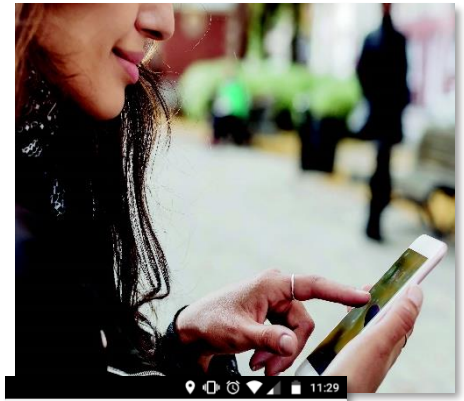


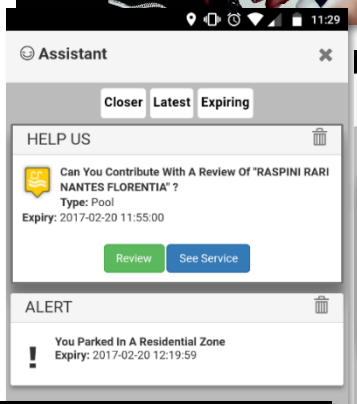
Artificial Intelligence Classification

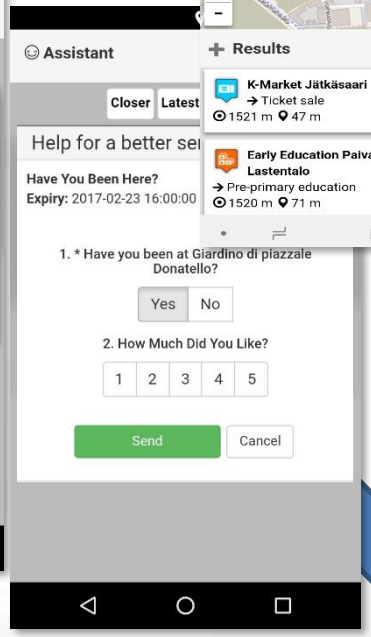
Suggestions

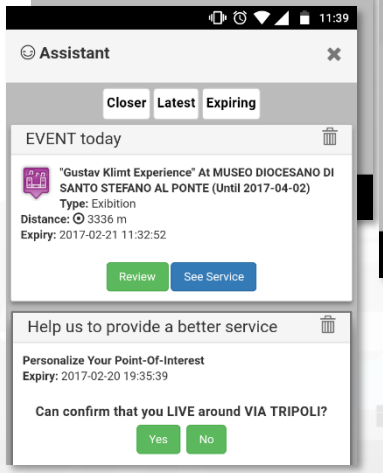


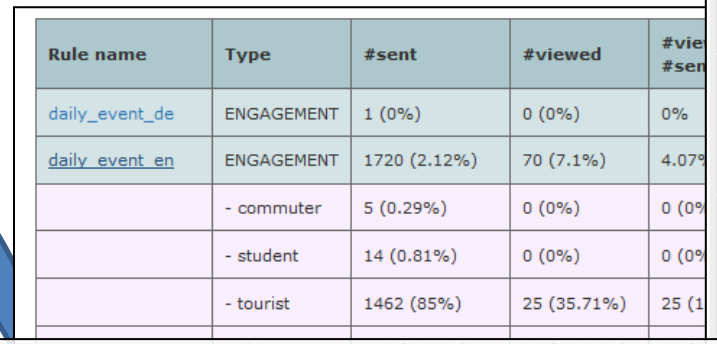
Users' Engagement



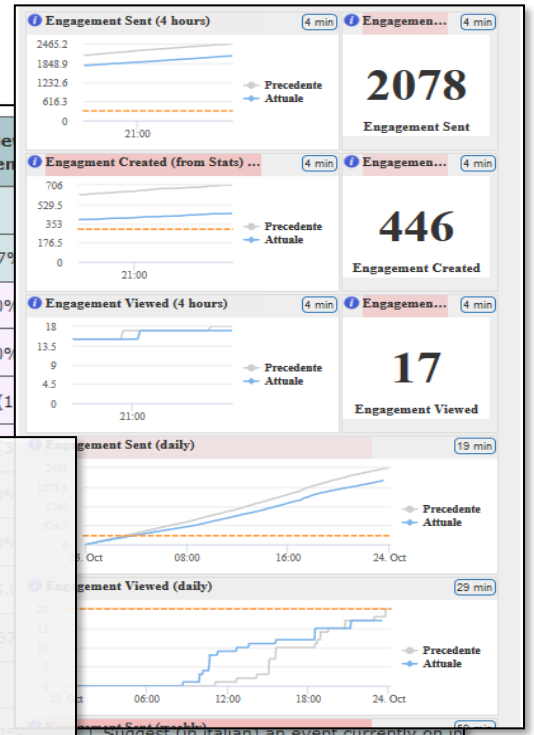


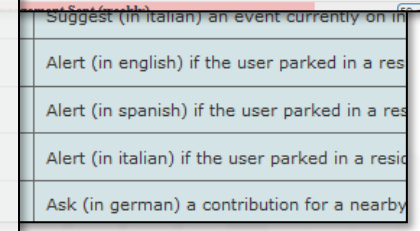






Rule name	Type	#sent	#viewed	#vie #sen
daily_event_de	ENGAGEMENT	1 (0%)	0 (0%)	0%
daily_event_en	ENGAGEMENT	1720 (2.12%)	70 (7.1%)	4.07%
	- commuter	5 (0.29%)	0 (0%)	0 (0%
	- student	14 (0.81%)	0 (0%)	0 (0%
	- tourist	1462 (85%)	25 (35.71%)	25 (1





Inform
- Air Quality forecast is not very nice
- You have parked out of your residential parking zone
- The Road cleaning is this night
- The waste in S.Andreas Road is full

Engage
- Provide a comment, a score, etc.

Stimulate / recommend
- Events in the city, services you may be interested, etc..

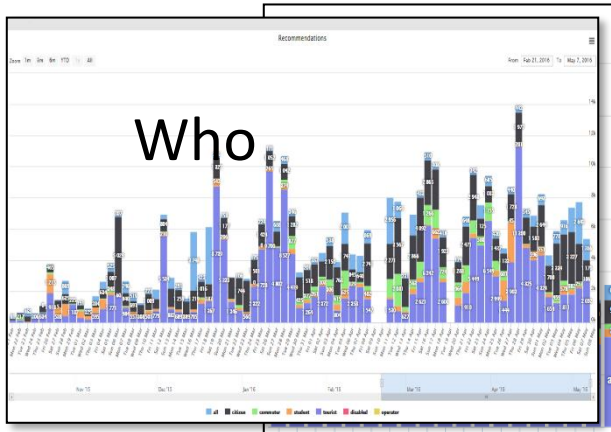
Provide Bonus, rewards if needed
- you get a bonus since you parked here
- We suggest: leave the car out of the city, this bonus can be used to buy a bus ticket

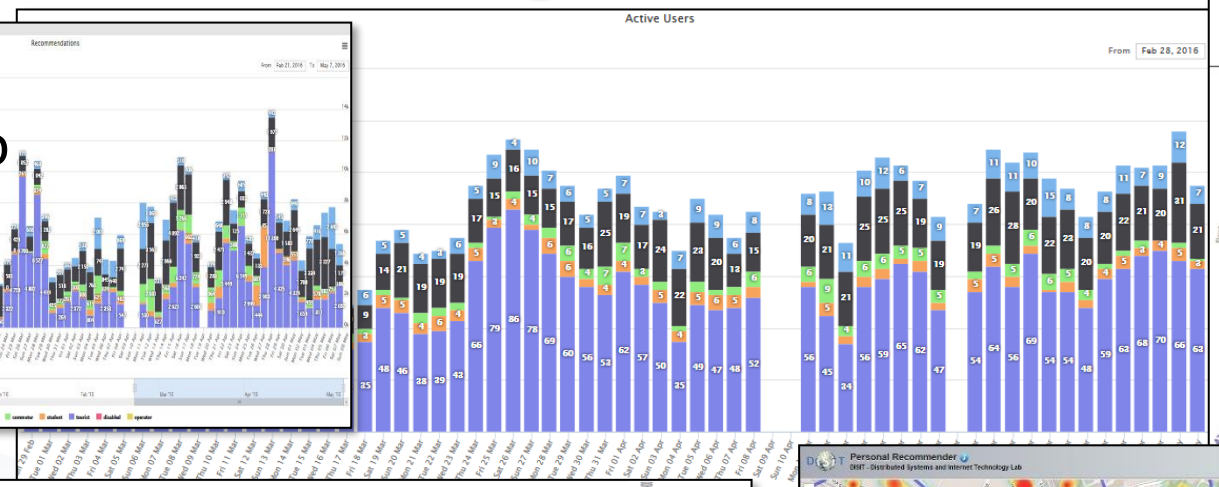
User context

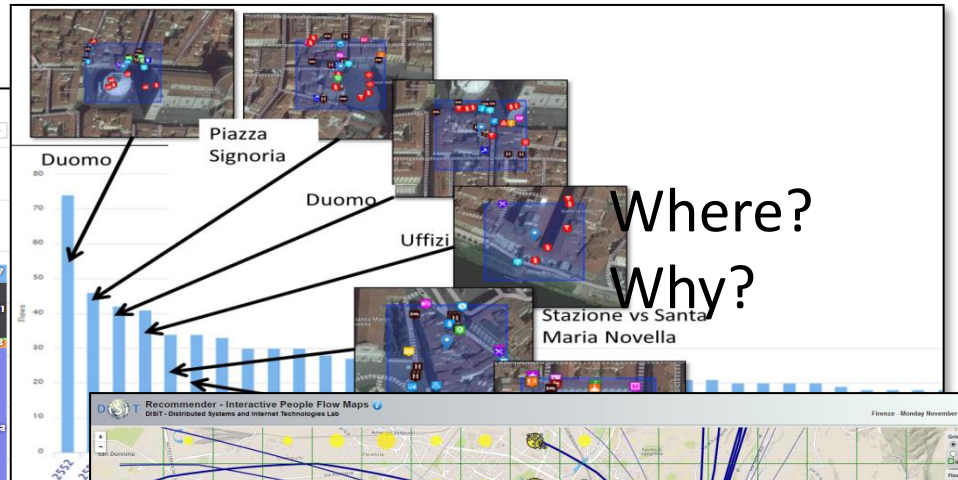
Rules

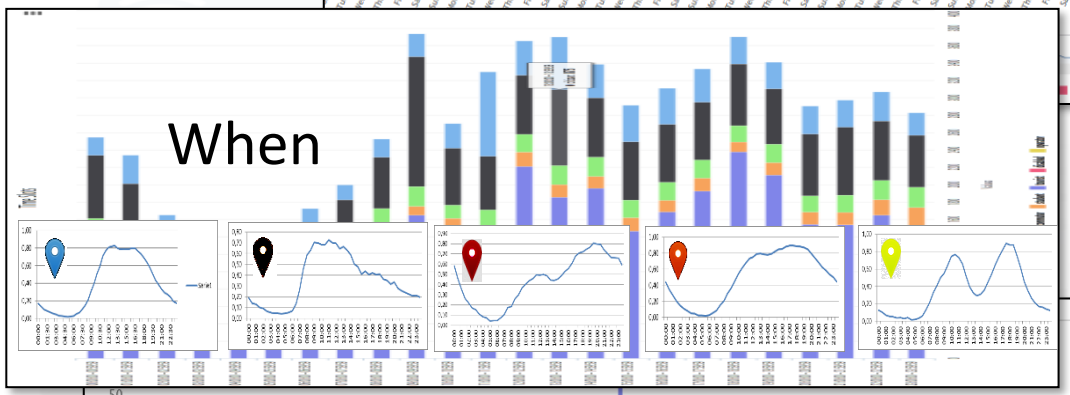
City context

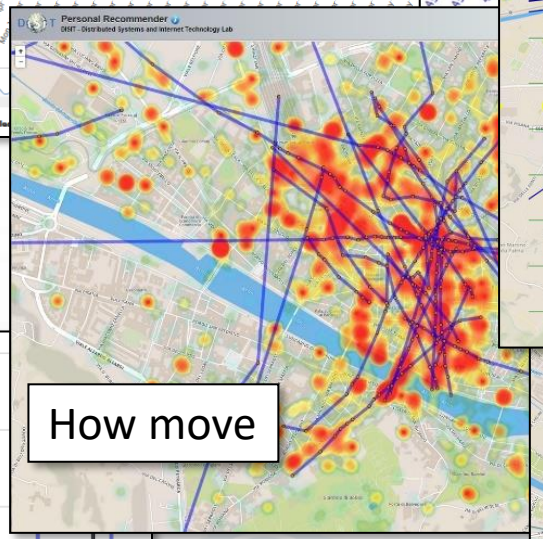
User Behavior Analyser for Collective Profiling

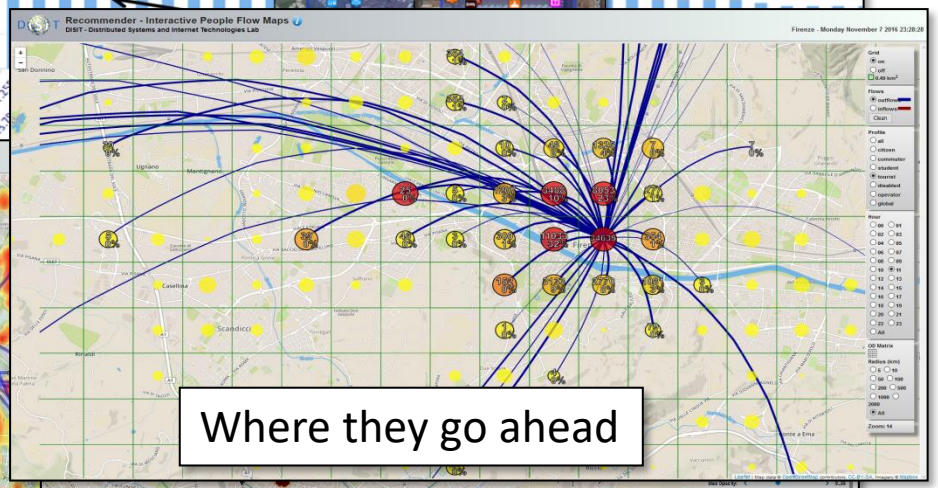


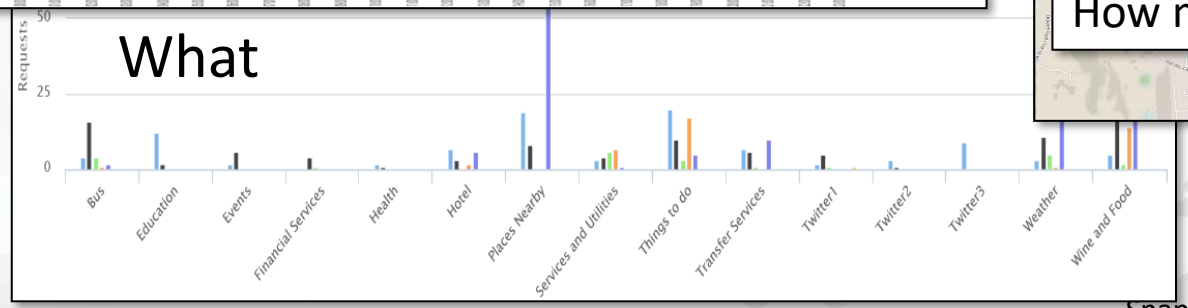


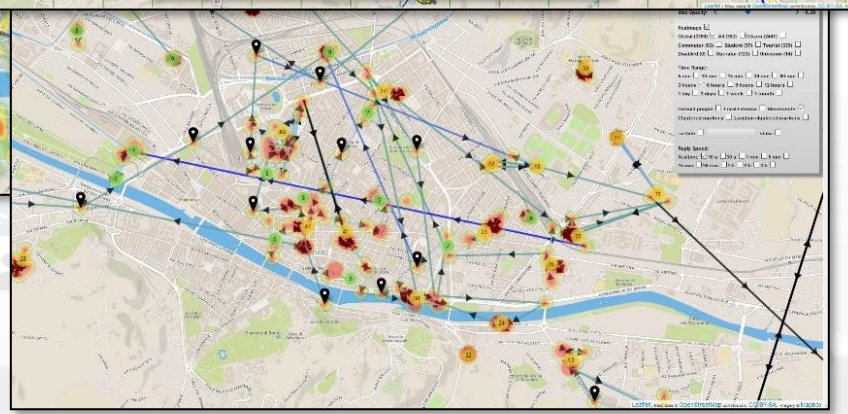






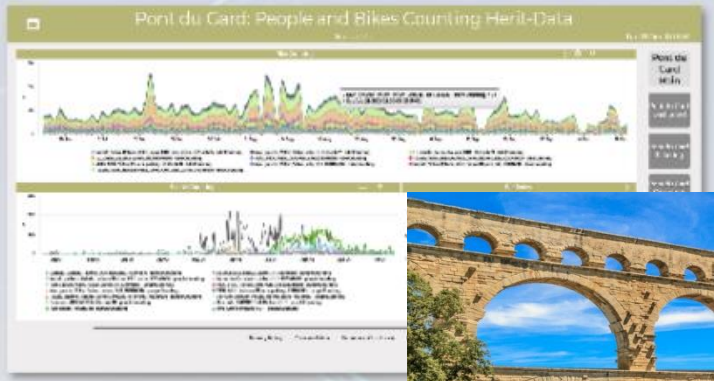


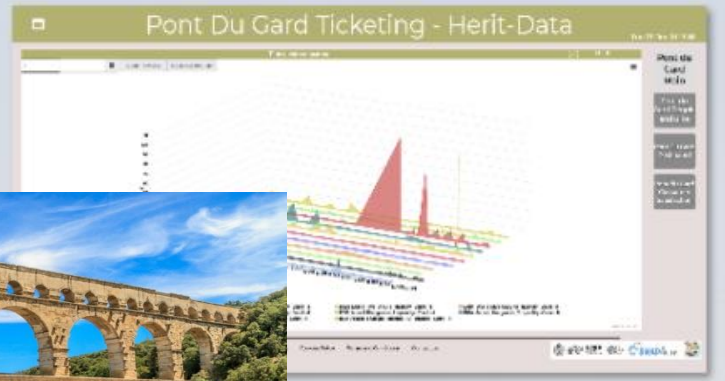


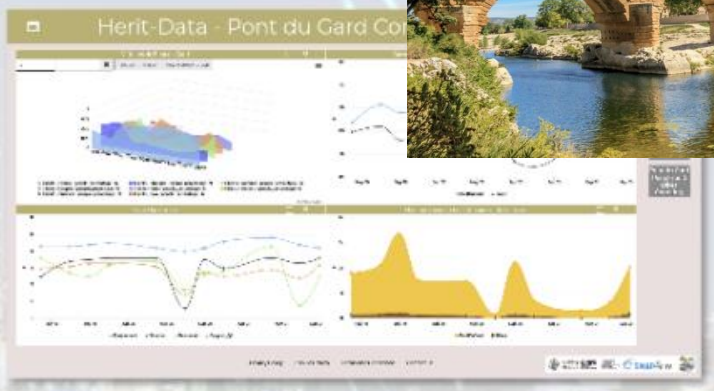


Pont du Gard

- **Tourism Domain**
  - KPIs
  - Social Media
  - People Flows
  - Bike Flows
- **Dashboards**
  - Monitoring KPI
  - People and bikes flows
  - Twitter Vigilance
- **Historical and updated data**
- **Services Exploited on:**
  - Dashboard
- **Since 2020**





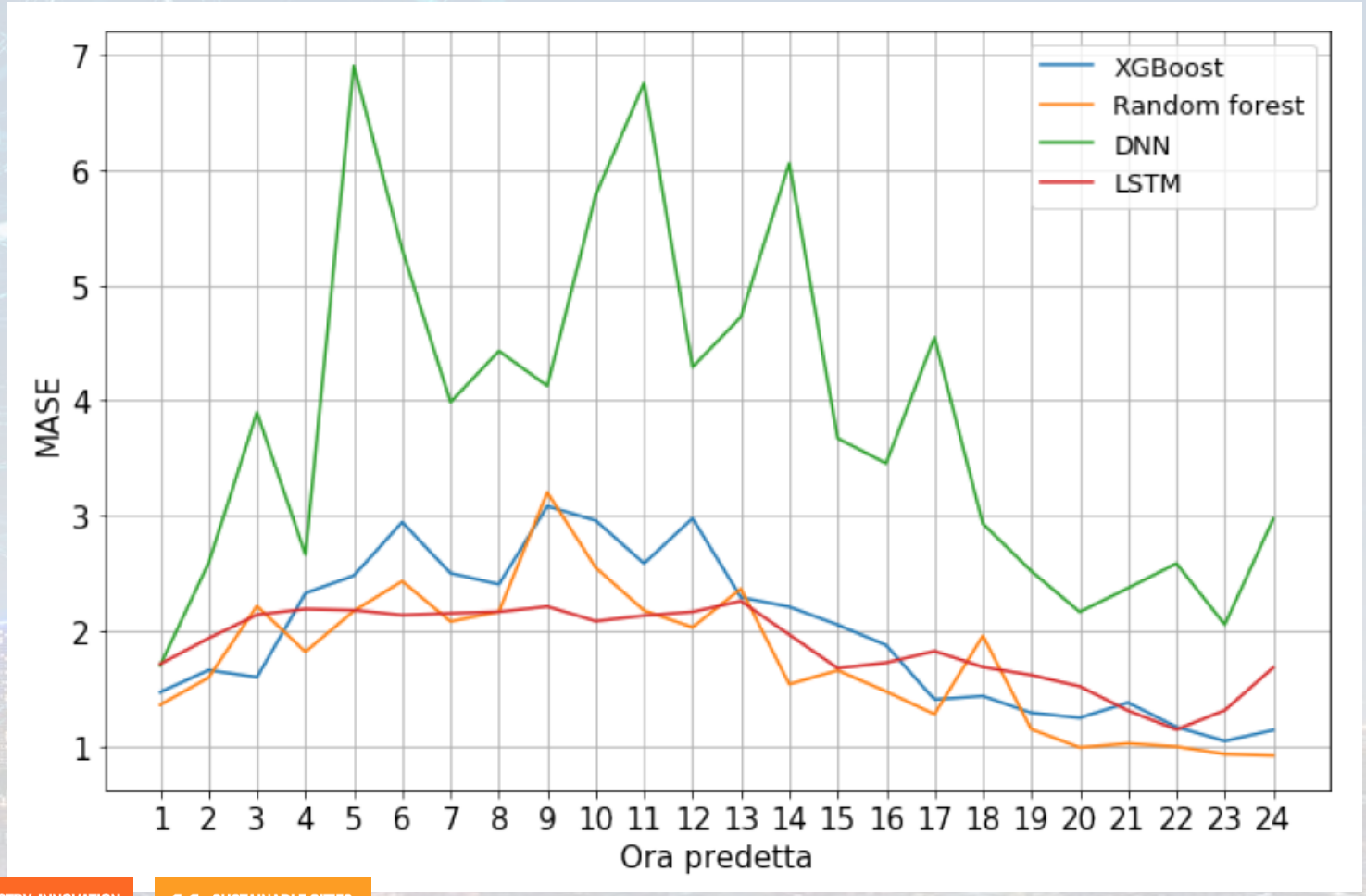


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzE1Mw==

Pont du Gard: data analytics

- Prediction of the number of sold tickets 24 hours in advance

- Using:
  - Historical data
  - Weather conditions
  - Social Media



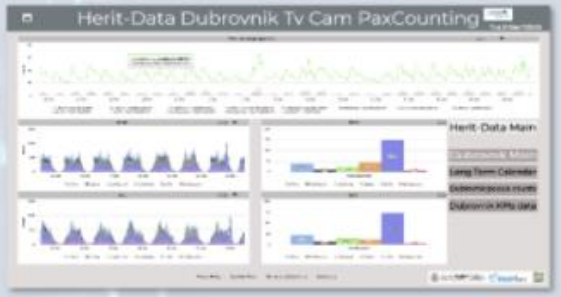
Twitter Vigilance

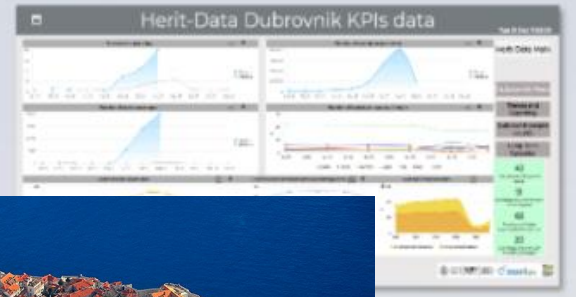
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

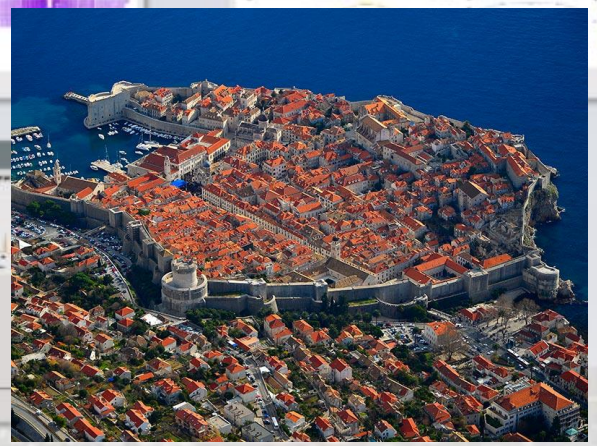
11 SUSTAINABLE CITIES AND COMMUNITIES

Dubrovnik

- **Tourism Domain**
  - Counting People
  - TV Cameras and WiFi
  - Social Media
- **Dashboards**
  - Monitoring and real time control
  - People flow
  - Twitter Vigilance
- **Historical and Real Time data**
- **Services Exploited on:**
  - Dashboard
- **Since 2020**





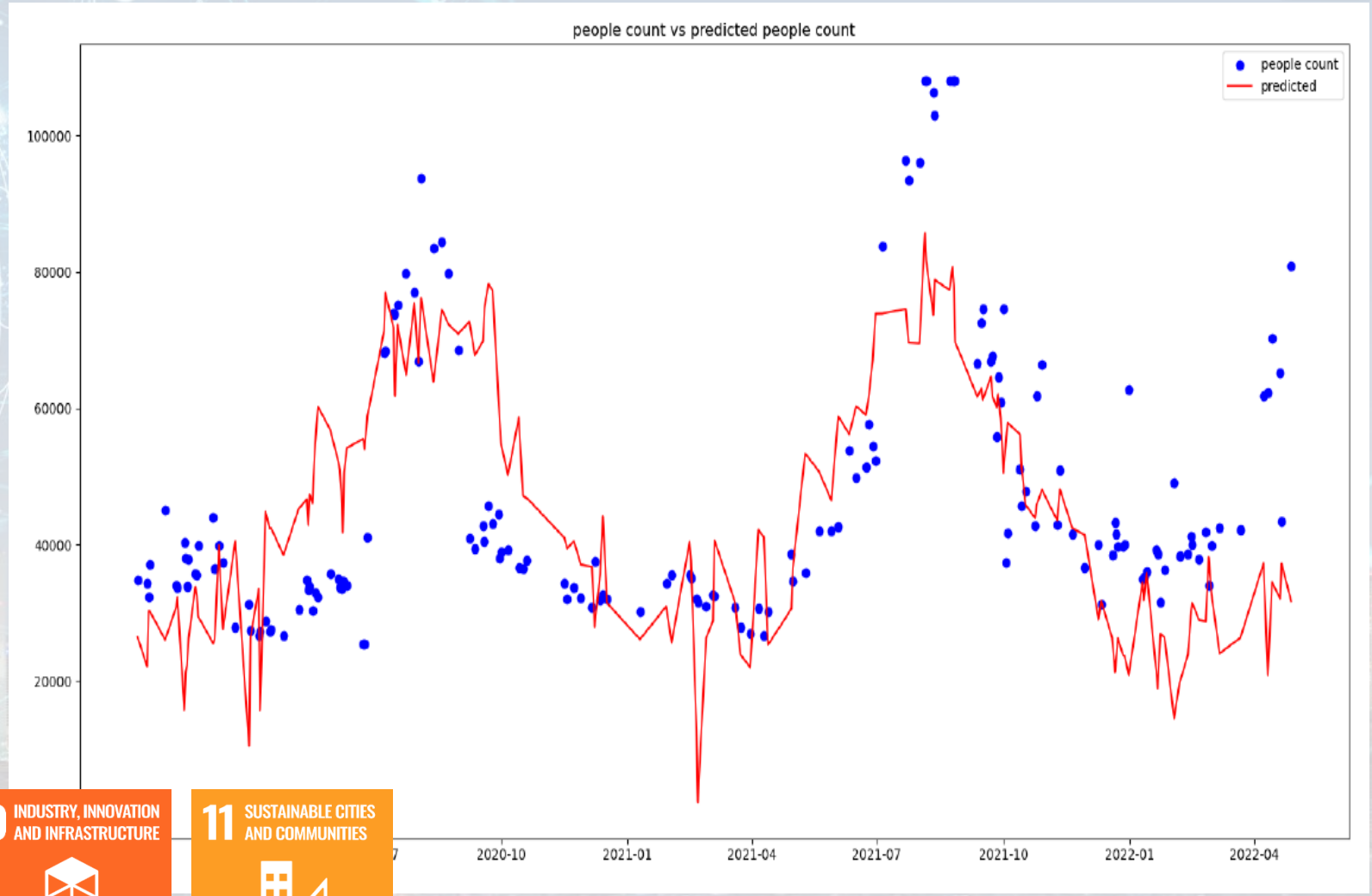


https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzE0Ng==

Dubrovnik: Data Analytics

- Assessing impact of advertising

- Prediction of presences on the basis of
  - Social Media Twitter Vigilance
  - weather conditions
  - Historical data



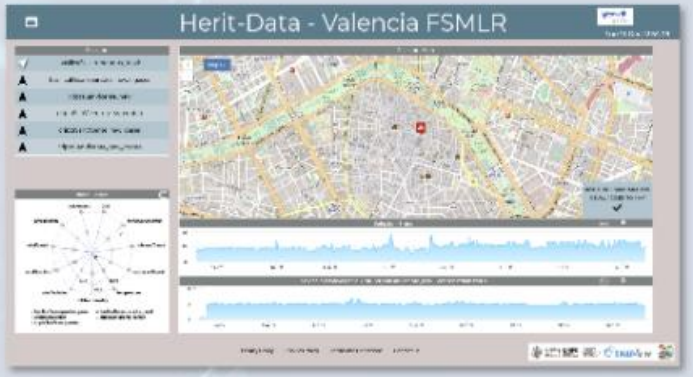
Twitter Vigilance

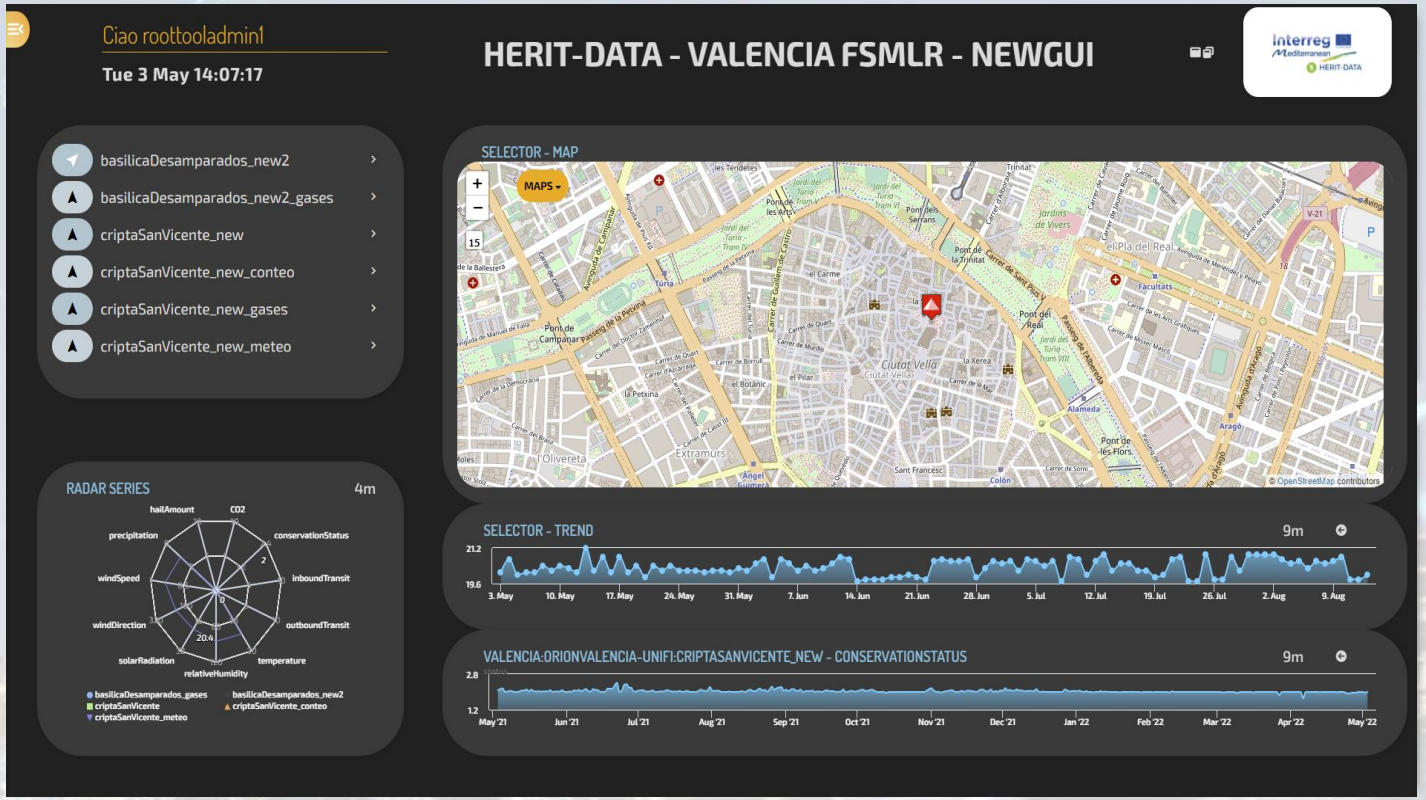
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

11 SUSTAINABLE CITIES AND COMMUNITIES

Valencia, FSMLR

- **Tourism Domain**
  - Counting People
  - Environmental data
  - Social Media
- **Dashboards**
  - Monitoring and real time control
  - People flow
  - Twitter Vigilance
- **Historical and Real Time data**
- **Services Exploited on:**
  - Dashboard
- **Since 2020**

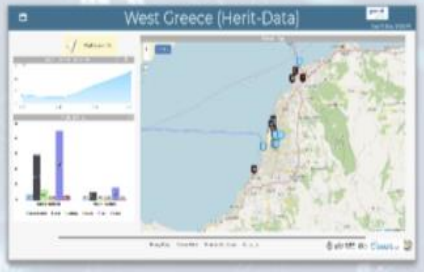


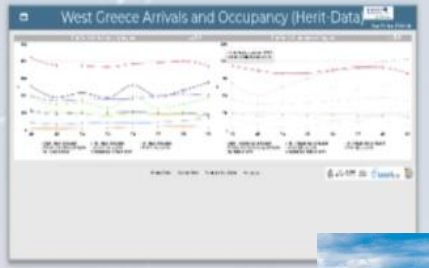


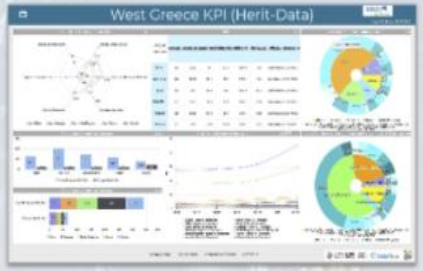
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzE1MA==

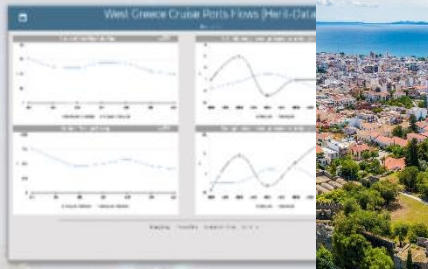
West Greece

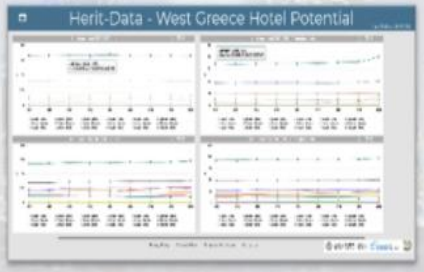
- **Tourism Domain**
  - KPIs: ODM, Flows, …
  - Social Media
  - People Flows
- **Dashboards**
  - Monitoring KPI
  - People flows
  - Twitter Vigilance
- **Historical and updated data**
- **Services Exploited on:**
  - Dashboard
- **Since 2020**











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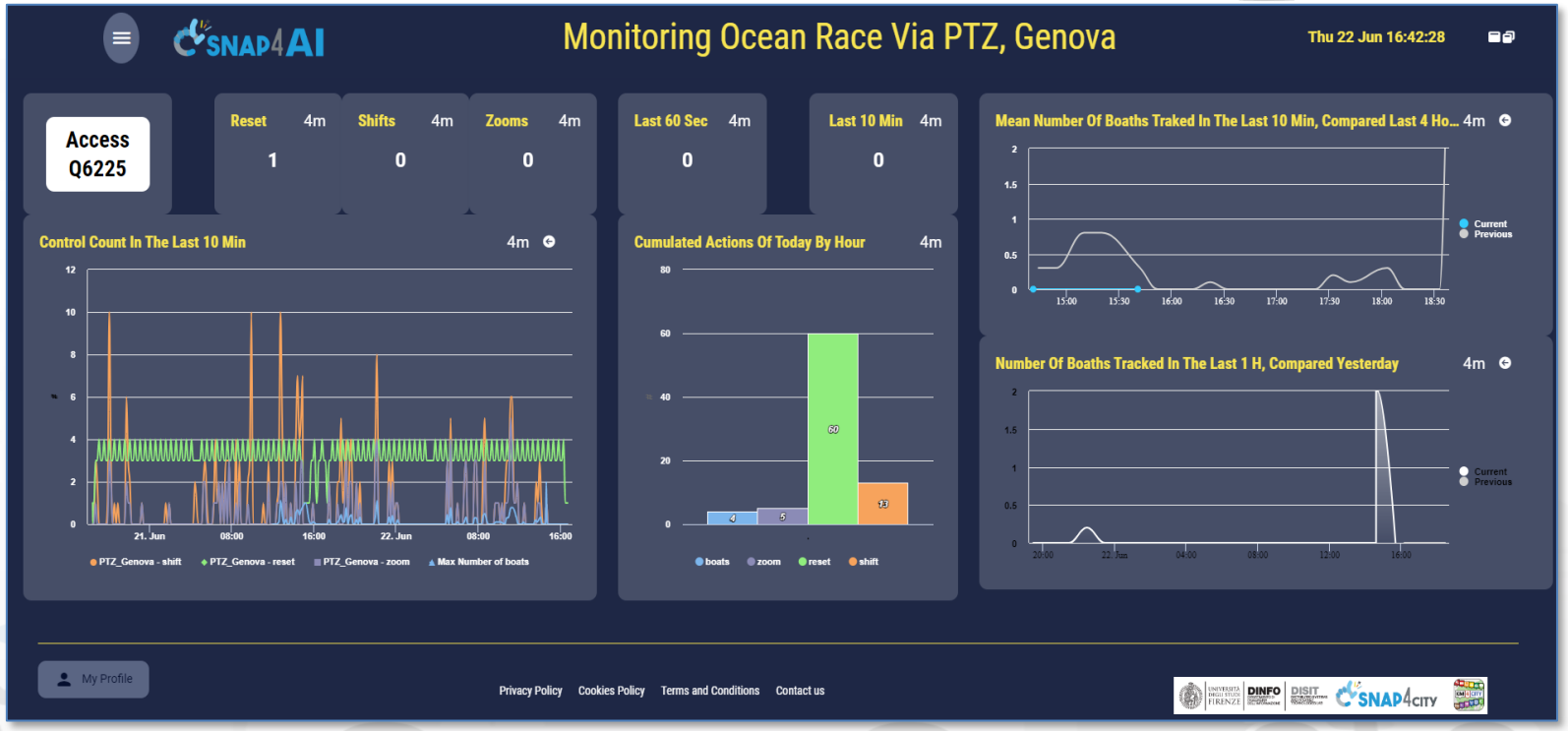
Monitoring Boats AXIS Q6225

- Genova: Ocean Race, 2023



11 SUSTAINABLE CITIES AND COMMUNITIES

SNAP4AI

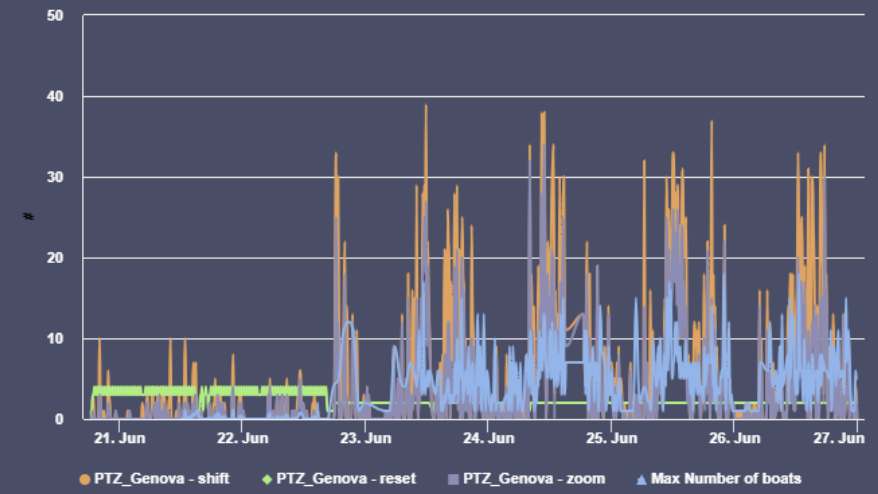
Monitoring Ocean Race Via PTZ, Genova

Mon 26 Jun 23:57:01

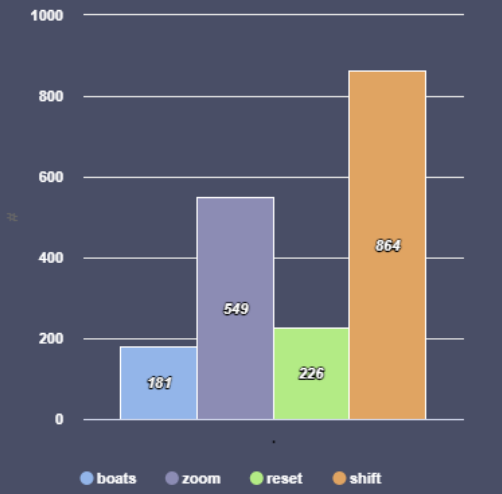
Access Q6225

Reset 9m	Shifts 9m	Zooms 9m	Last 60 Sec 9m	Last 10 Min 9m
2	0	0	2	5

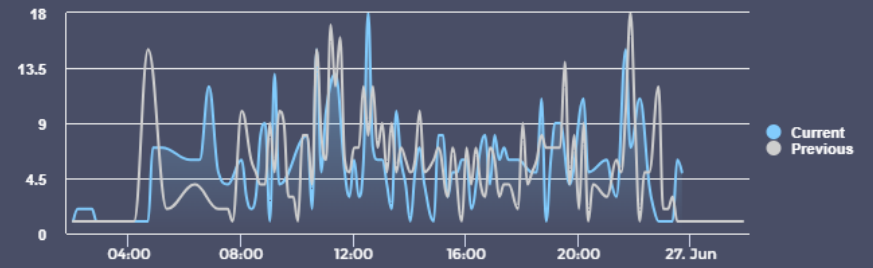
Control Count In The Last 10 Min 4m



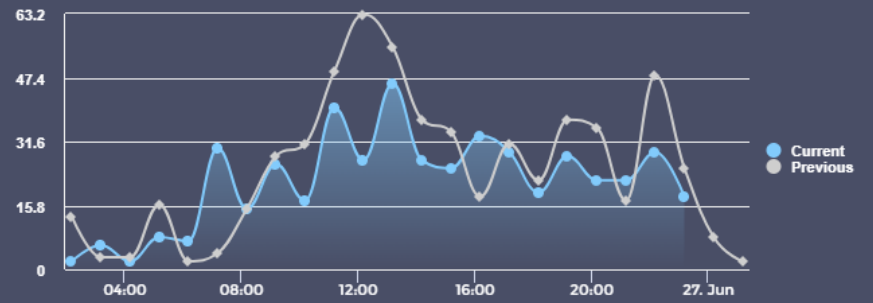
Cumulated Actions Of Today By Hour 4m



Mean Number Of Boaths Traked In The Last 10 Min, Compared Last 24 H... 9m



Number Of Boaths Tracked In The Last 1 H, Compared Last 24 Hours 9m



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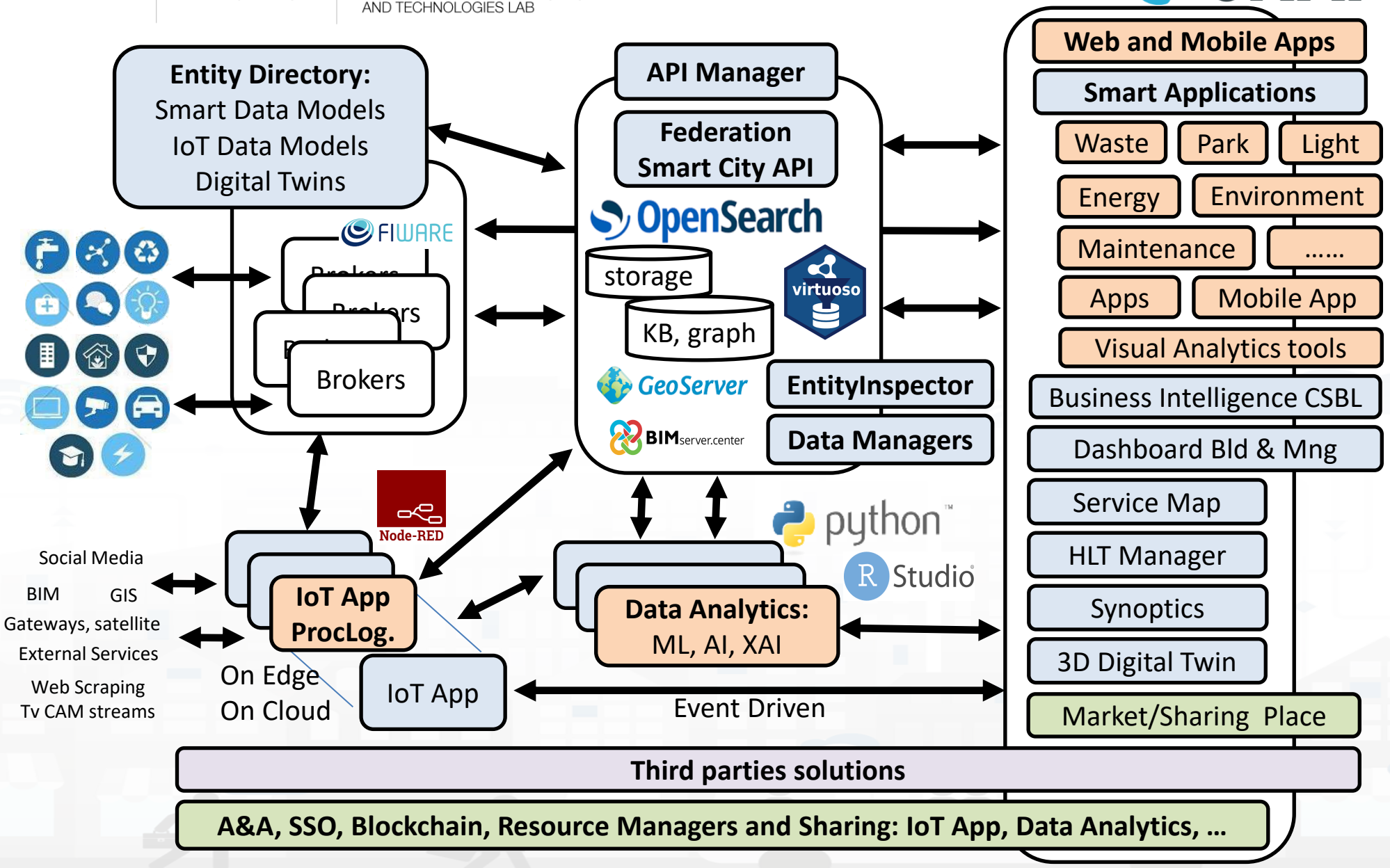
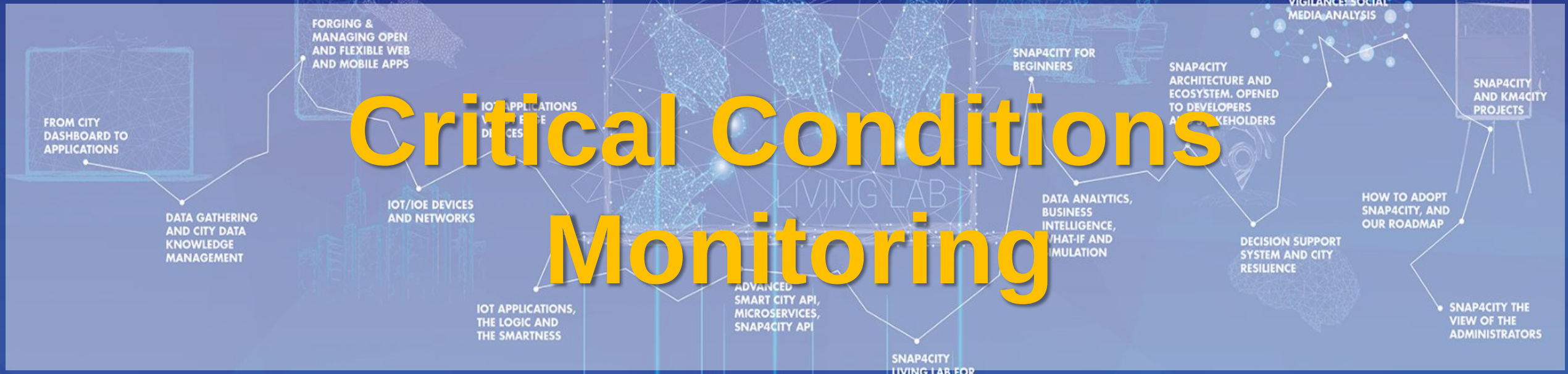
Tech Arch

SNAP4CITY KM4CITY



TOP

Critical Conditions Monitoring



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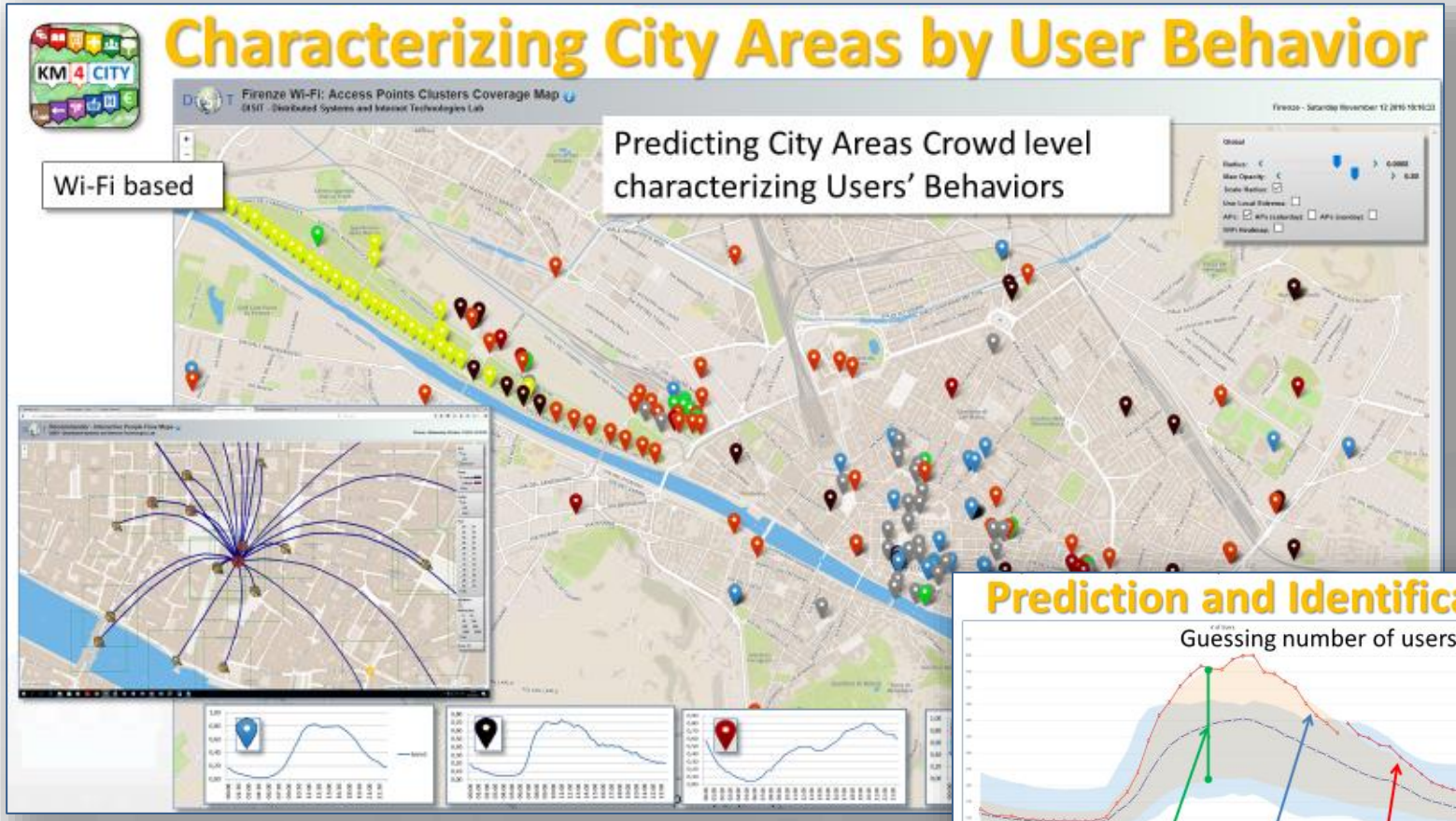
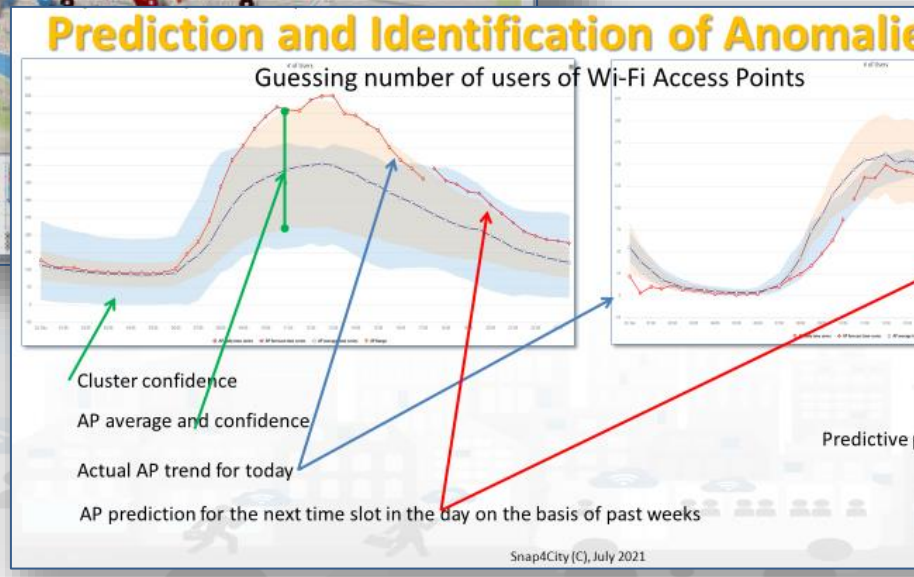
SNAP4 Appliances and Dockers **Installations**

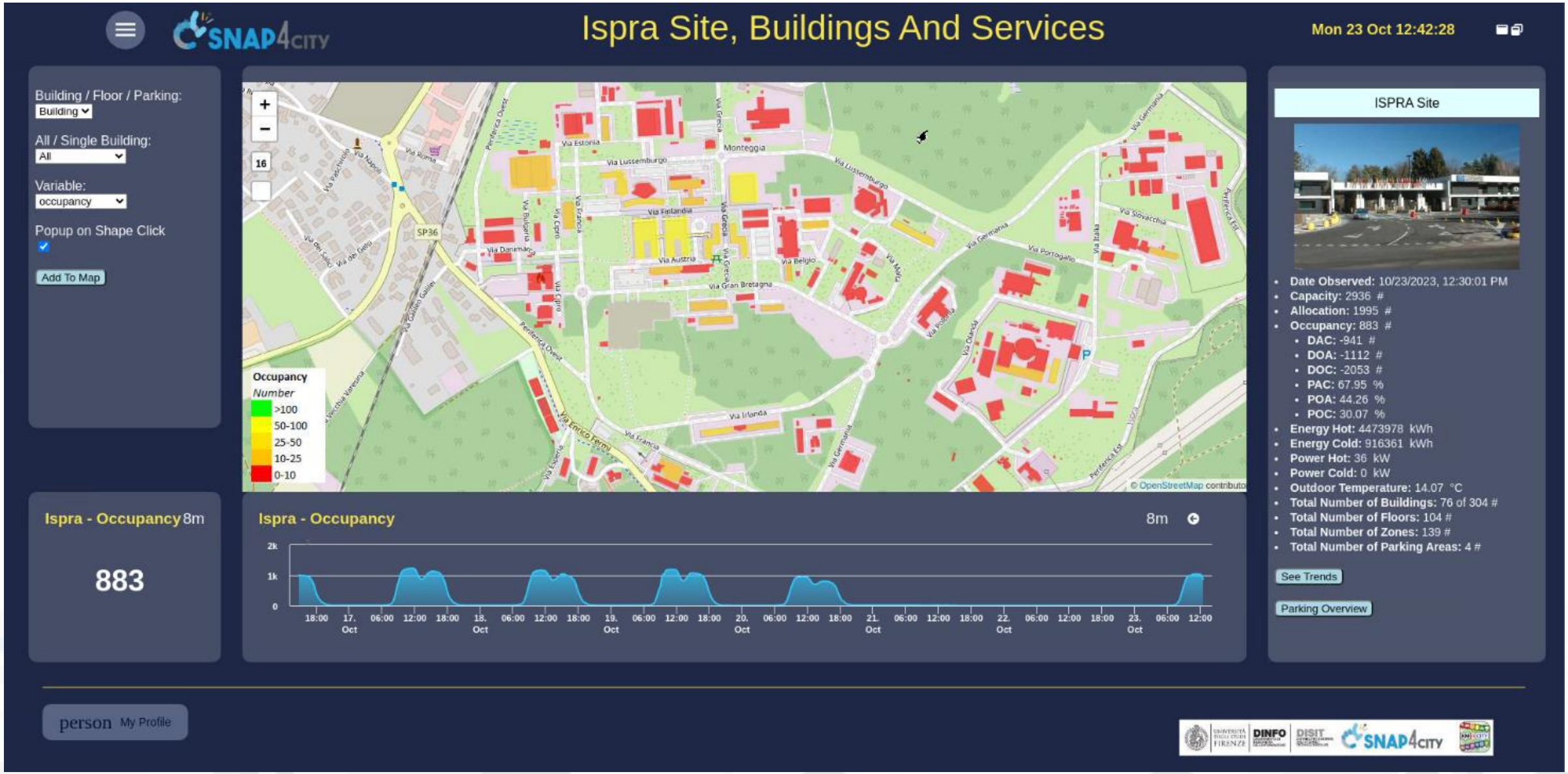
People Flows

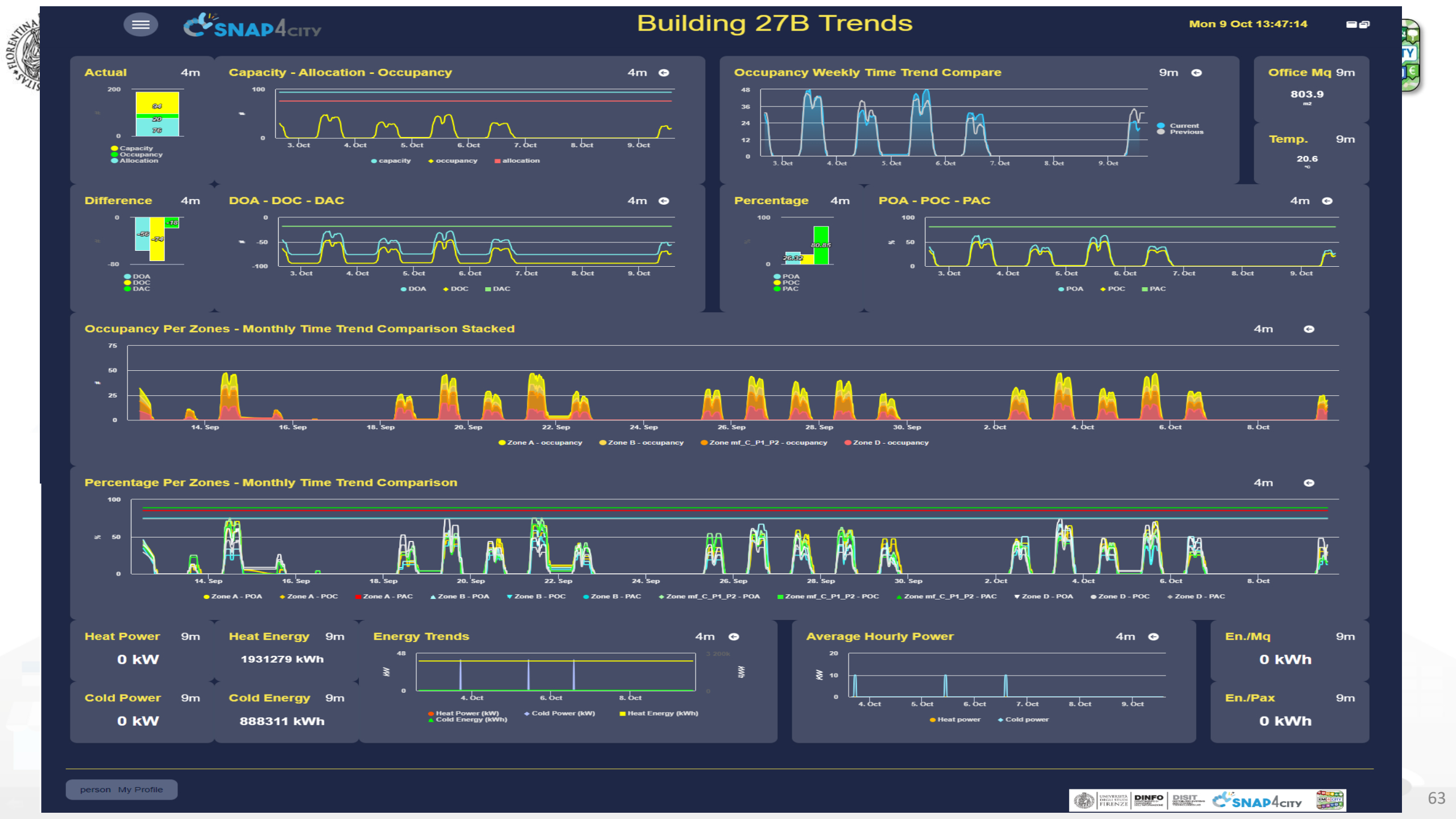
- **Prediction of people flows** on the basis of Wi-Fi data
- **Anomaly** detection
- **Resolute** H2020
- Classification of city areas



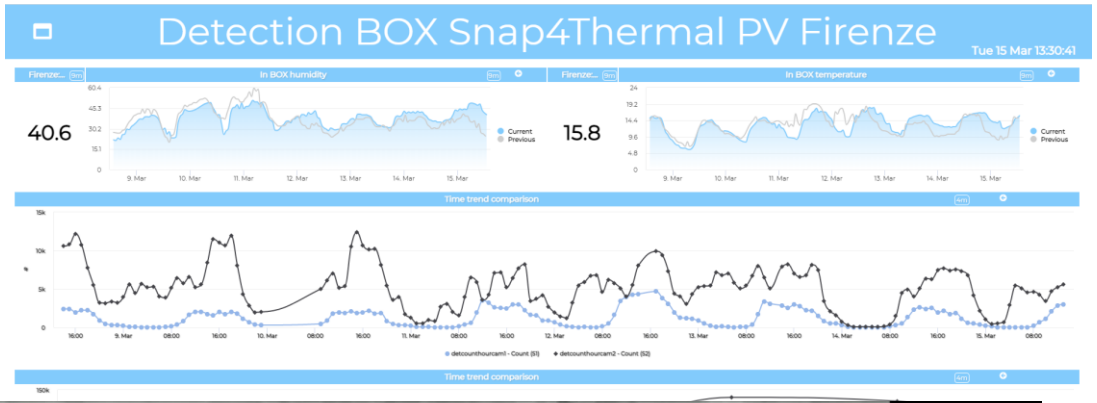


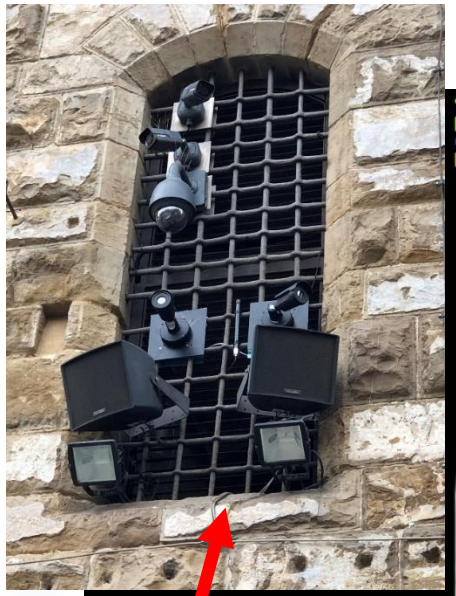
11 SUSTAINABLE CITIES AND COMMUNITIES

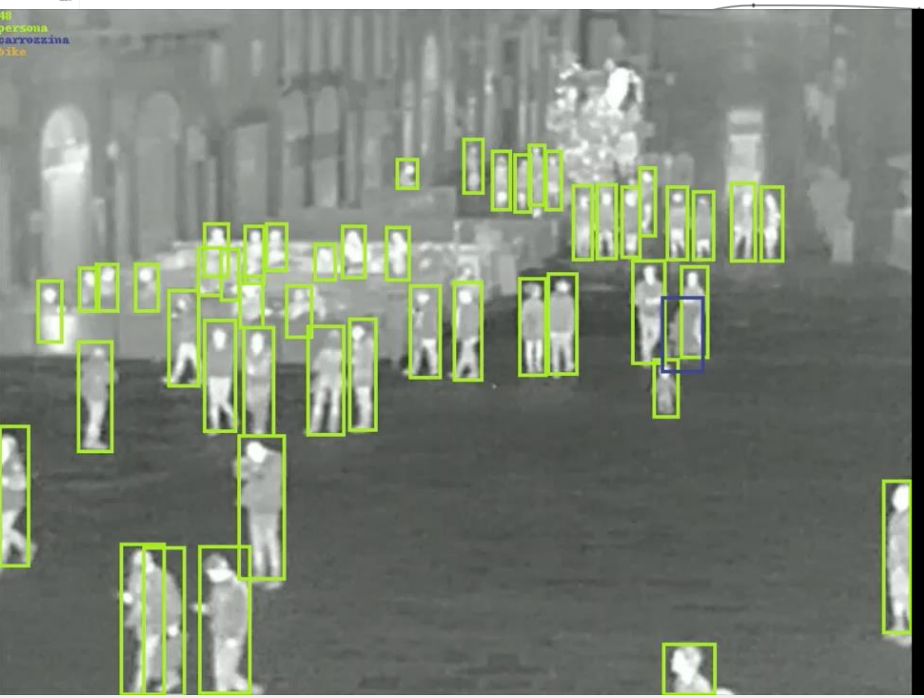

SNAP4CITY
Ispra Site, Buildings And Services
Mon 23 Oct 12:42:28
Building / Floor / Parking:
Building
All / Single Building:
All
Variable:
occupancy
Popup on Shape Click
Add To Map
Occupancy
Number
>100
50-100
25-50
10-25
0-10
© OpenStreetMap contributo
ISPRA Site
Date Observed: 10/23/2023, 12:30:01 PM
Capacity: 2936 #
Allocation: 1995 #
Occupancy: 883 #
DAC: -941 #
DOA: -1112 #
DOC: -2053 #
PAC: 67.95 %
POA: 44.26 %
POC: 30.07 %
Energy Hot: 4473978 kWh
Energy Cold: 916361 kWh
Power Hot: 36 kW
Power Cold: 0 kW
Outdoor Temperature: 14.07 °C
Total Number of Buildings: 76 of 304 #
Total Number of Floors: 104 #
Total Number of Zones: 139 #
Total Number of Parking Areas: 4 #
See Trends
Parking Overview
Ispra - Occupancy 8m
883
Ispra - Occupancy
8m
2k
1k
0
18:00 17. Oct 06:00 12:00 18:00 18. Oct 06:00 12:00 18:00 19. Oct 06:00 12:00 18:00 20. Oct 06:00 12:00 18:00 21. Oct 06:00 12:00 18:00 22. Oct 06:00 12:00 18:00 23. Oct 06:00 12:00
person My Profile


Building 27B Trends
Mon 9 Oct 13:47:14
Actual 4m
Capacity - Allocation - Occupancy 4m
Occupancy Weekly Time Trend Compare 9m
Office Mq 9m
803.9
Temp. 9m
20.6
Difference 4m
DOA - DOC - DAC 4m
Percentage 4m
POA - POC - PAC 4m
Occupancy Per Zones - Monthly Time Trend Comparison Stacked 4m
Percentage Per Zones - Monthly Time Trend Comparison 4m
Heat Power 9m
0 kW
Heat Energy 9m
1931279 kWh
Energy Trends 4m
Average Hourly Power 4m
En./Mq 9m
0 kWh
Cold Power 9m
0 kW
Cold Energy 9m
888311 kWh
En./Pax 9m
0 kWh
person My Profile

A view and data from the Thermal Camera







11 SUSTAINABLE CITIES AND COMMUNITIES

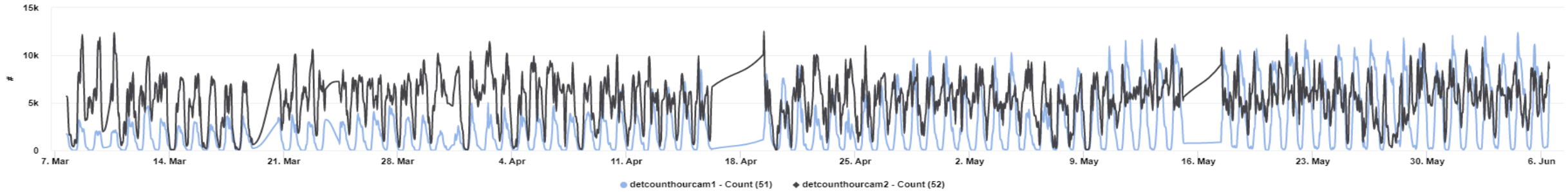
People Counting

https://www.snap4city.org/dashboardSmartCity/view/Gea.php?iddasboard=MzM3Ng==

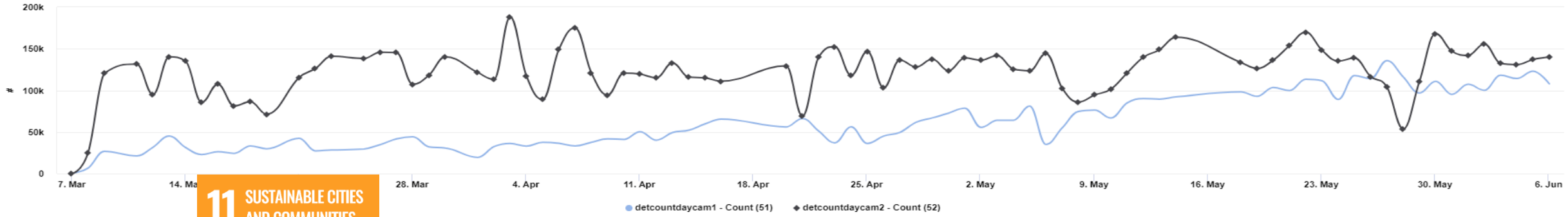
Detection BOX Snap4Thermal PV Firenze

Thu 30 Mar 23:55:16

Time Trend Comparison



Time Trend Comparison



11 SUSTAINABLE CITIES AND COMMUNITIES

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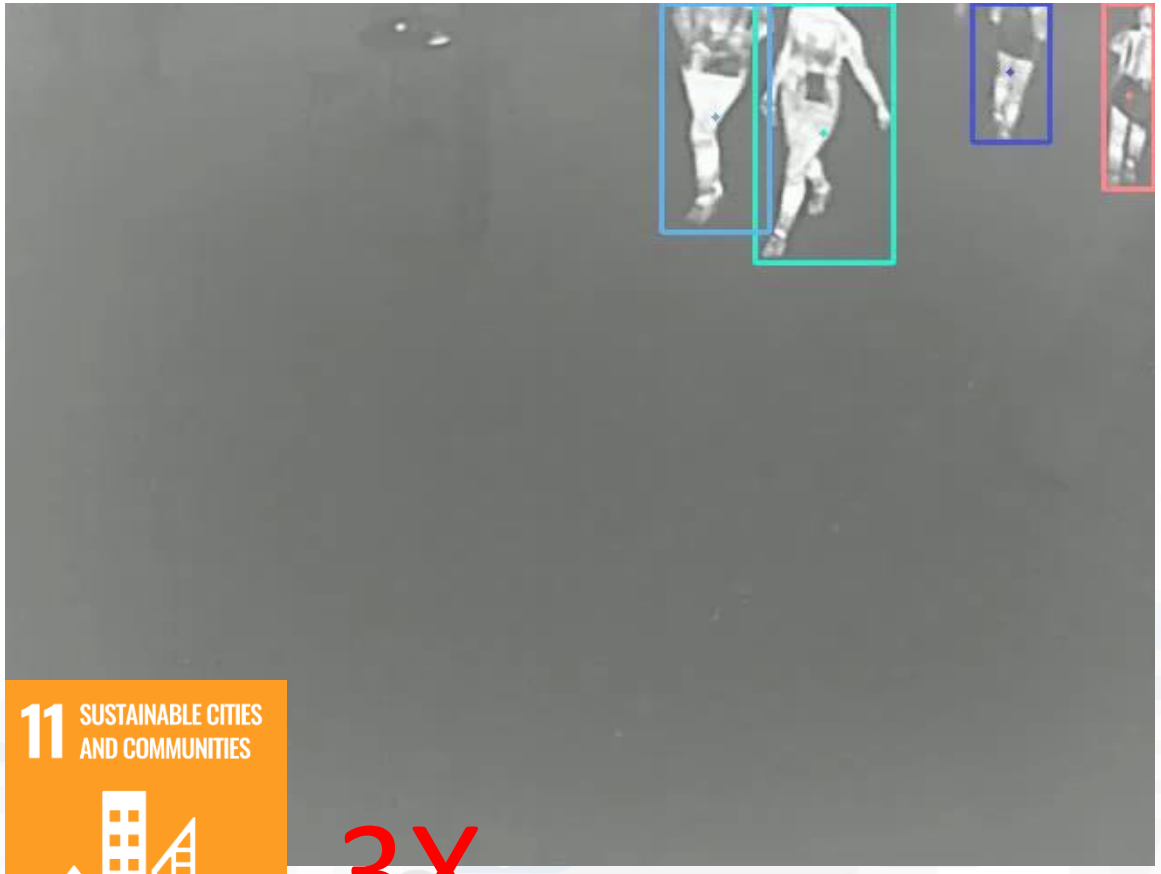
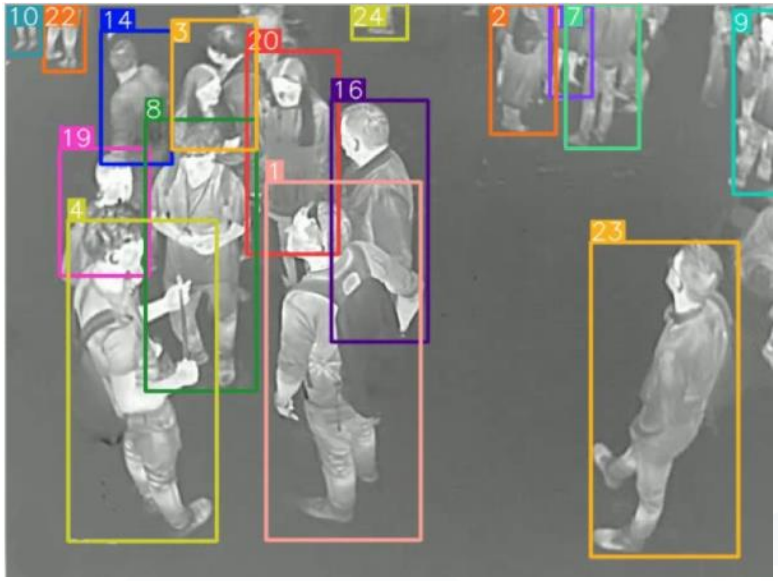
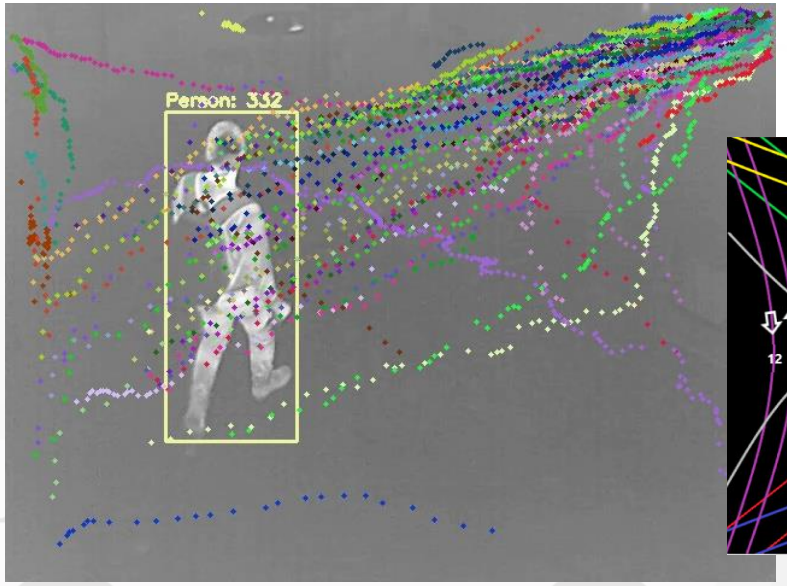
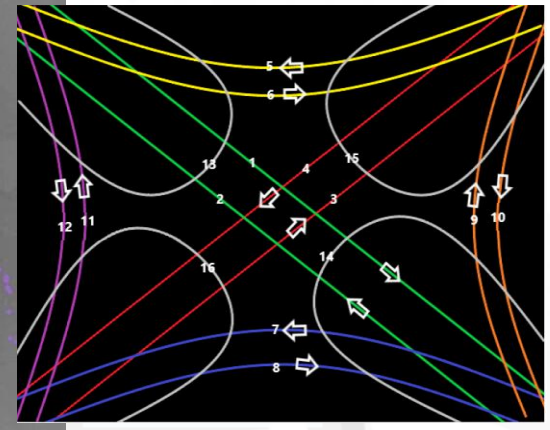
People Counting and Tracking



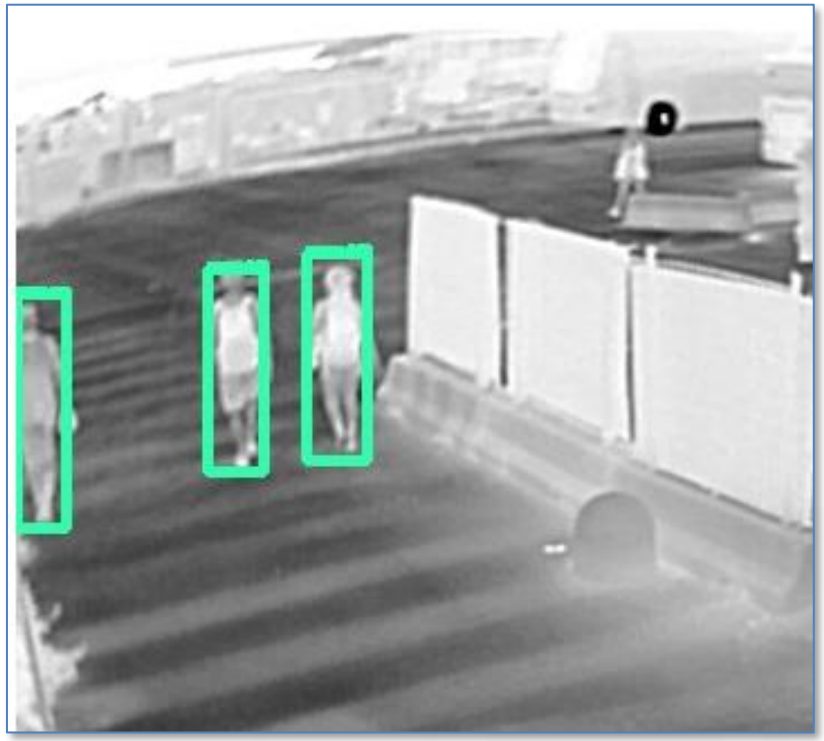






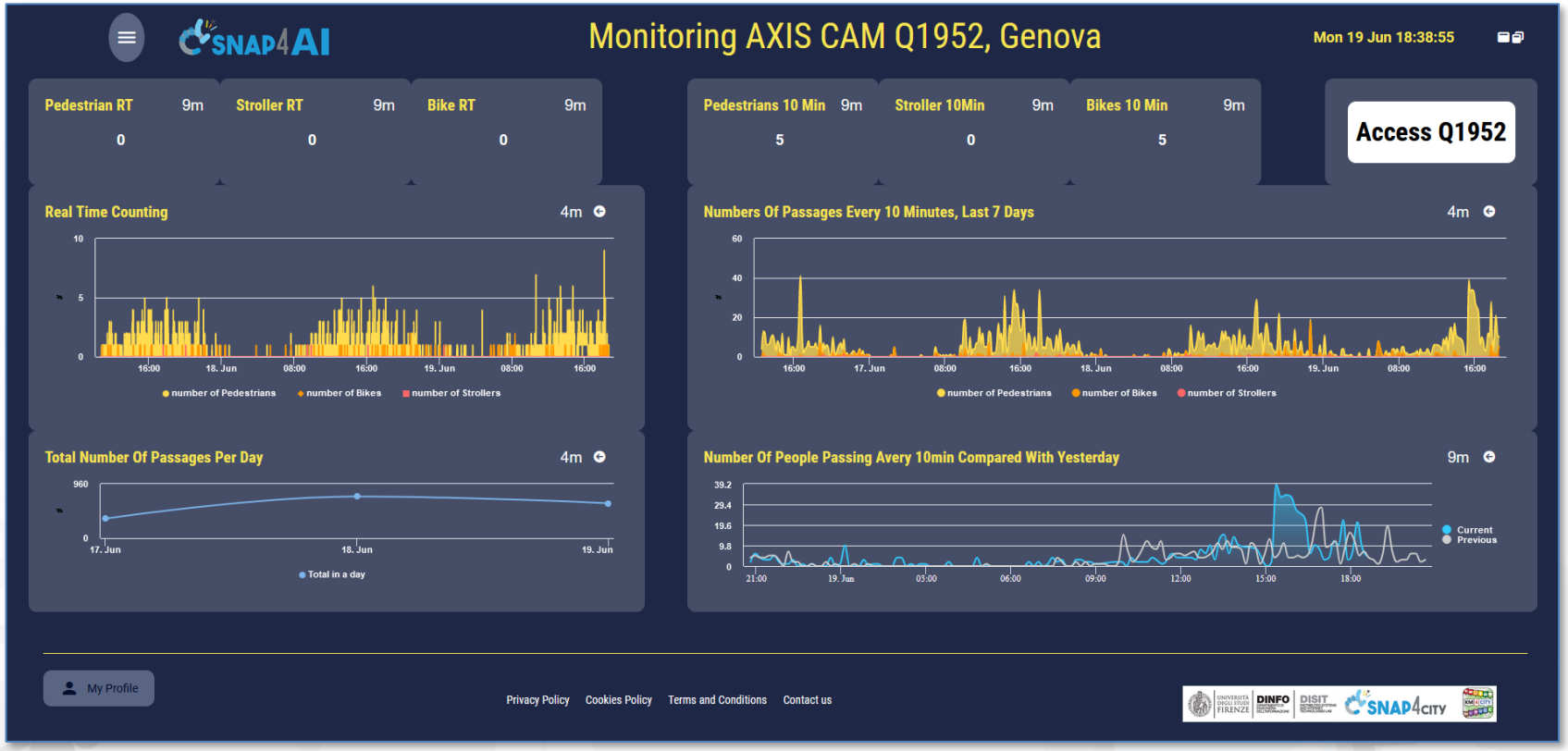
11 SUSTAINABLE CITIES AND COMMUNITIES

3X



Monitoring Passages AXIS Q1952

- Genova: Ocean Race, 2023



SNAP4AI

Monitoring AXIS CAM Q1952, Genova

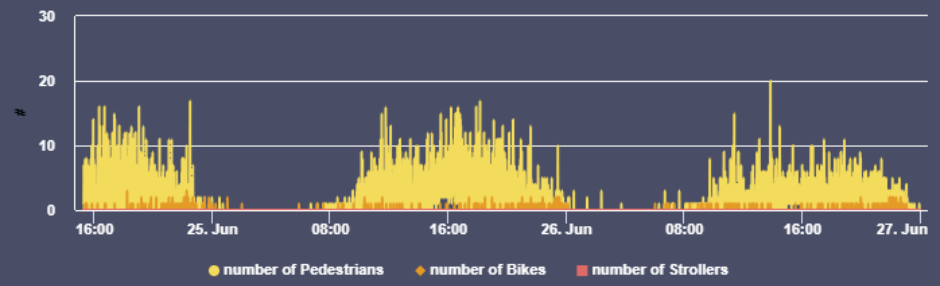
Mon 26 Jun 23:56:21

Pedestrian RT 9m	Stroller RT 9m	Bike RT 9m
0	0	0

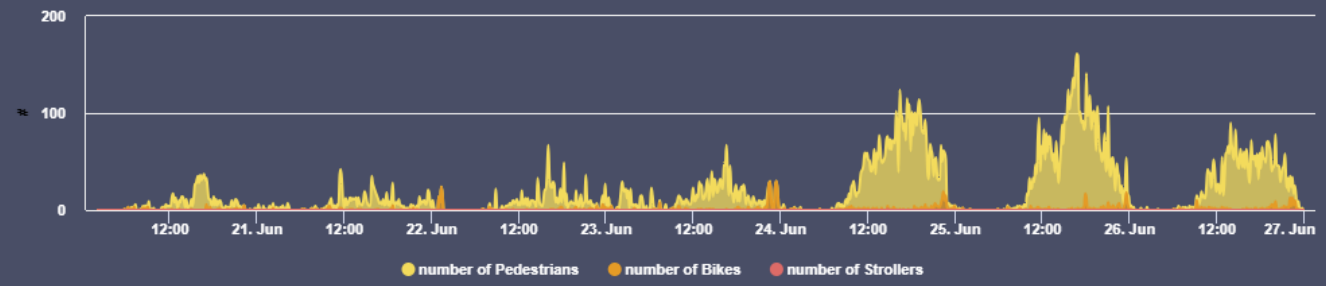
Pedestrians 10 Min 9m	Stroller 10Min 9m	Bikes 10 Min 9m
0	0	0

Access Q1952

Real Time Counting 4m

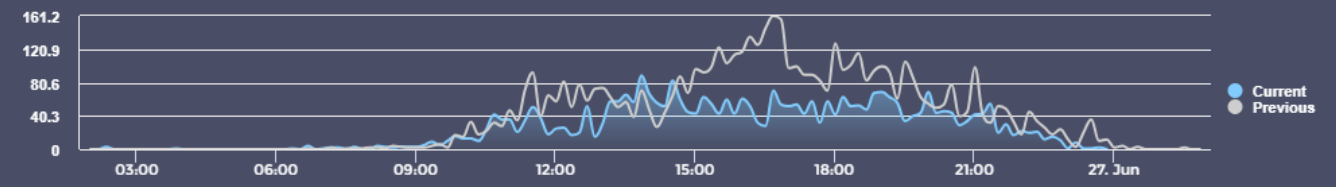


Numbers Of Passages Every 10 Minutes, Last 7 Days 4m



Total Number Of Passages Per Day 4m

Number Of People Passing Avery 10min Compared With Last 24 Hours 9m



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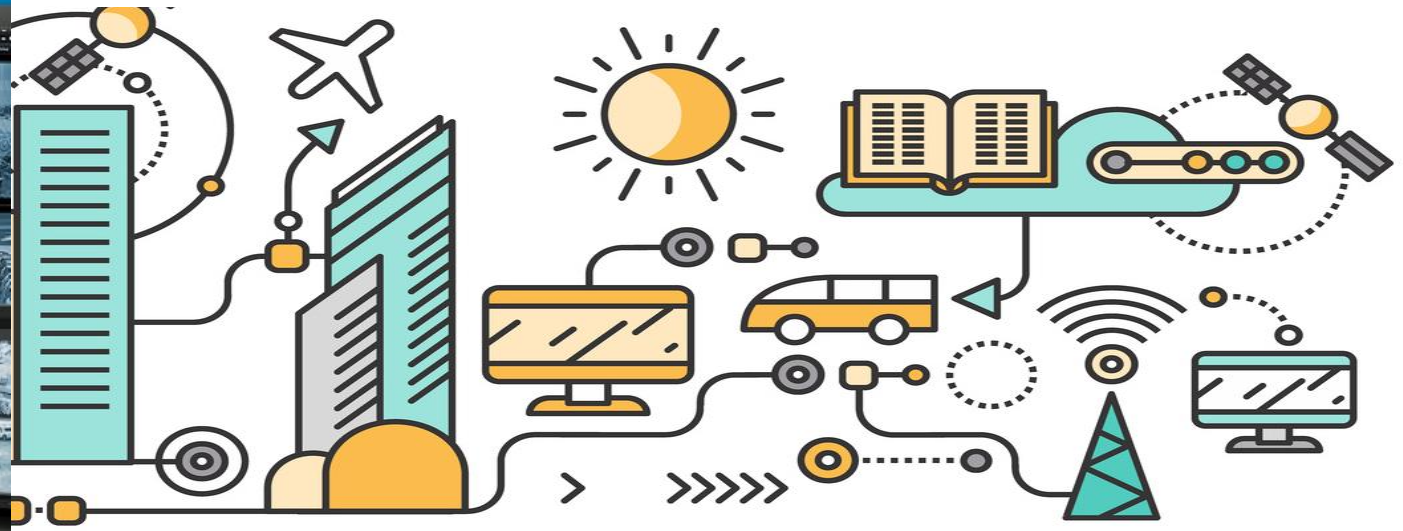
SCALABLE SMART ANALYTIC APPLICATION BUILDER FOR SENTIENT CITIES

TOP

Safety Control

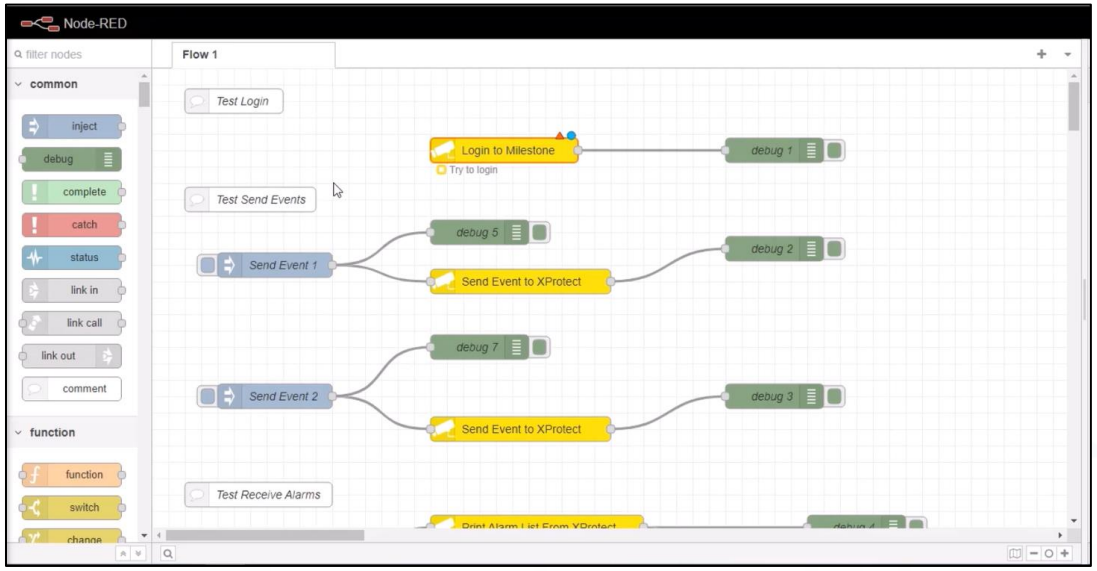
Integration with VMS

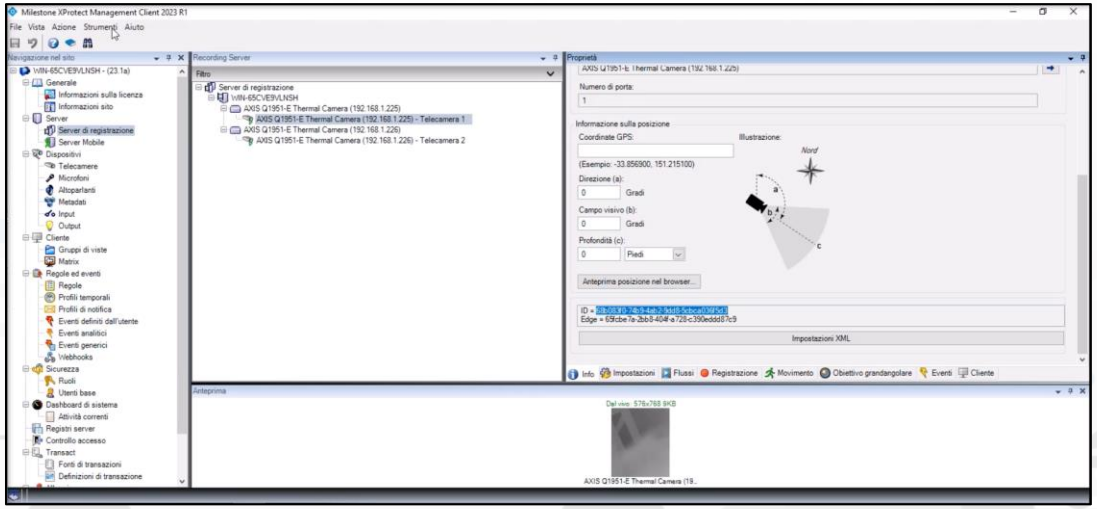
milestone



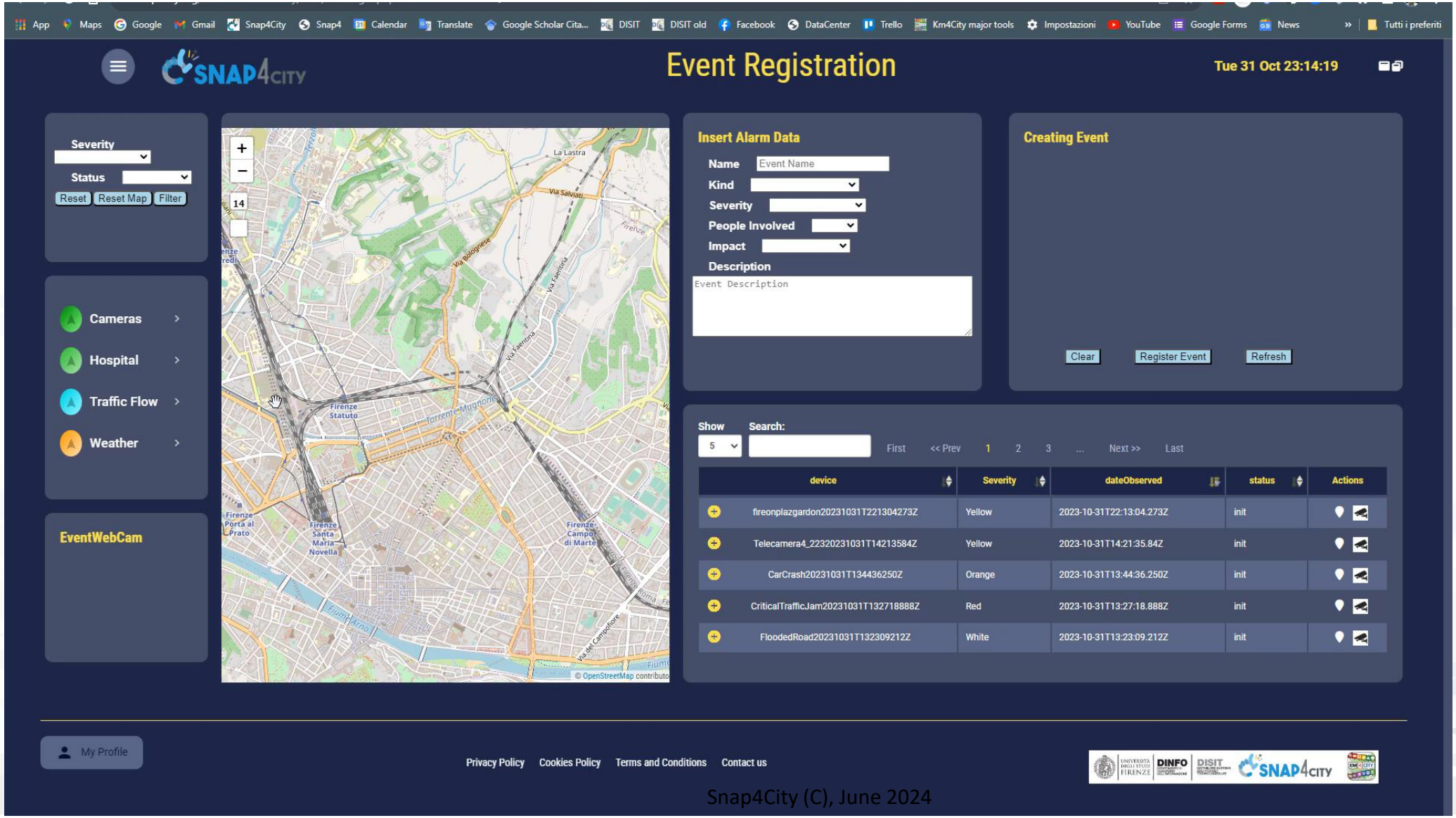
Snap4City ←→ Milestone Integration

- Snap4City VMS Library on Node-RED
- Functionalities:
  - Registering IoT App/Proc.Logic on VMS Milestone
  - Receving event of VMS into Snap4City platform via Node-RED, on cloud or on premise
  - Sending Snap4City Events into VMS Milestone



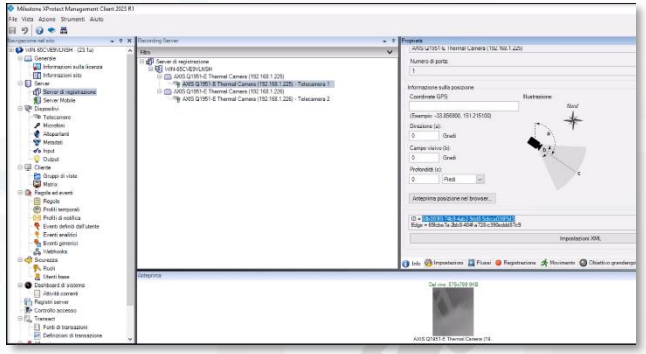


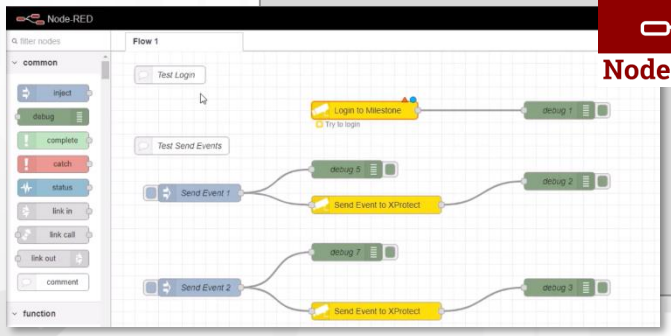
Event Management

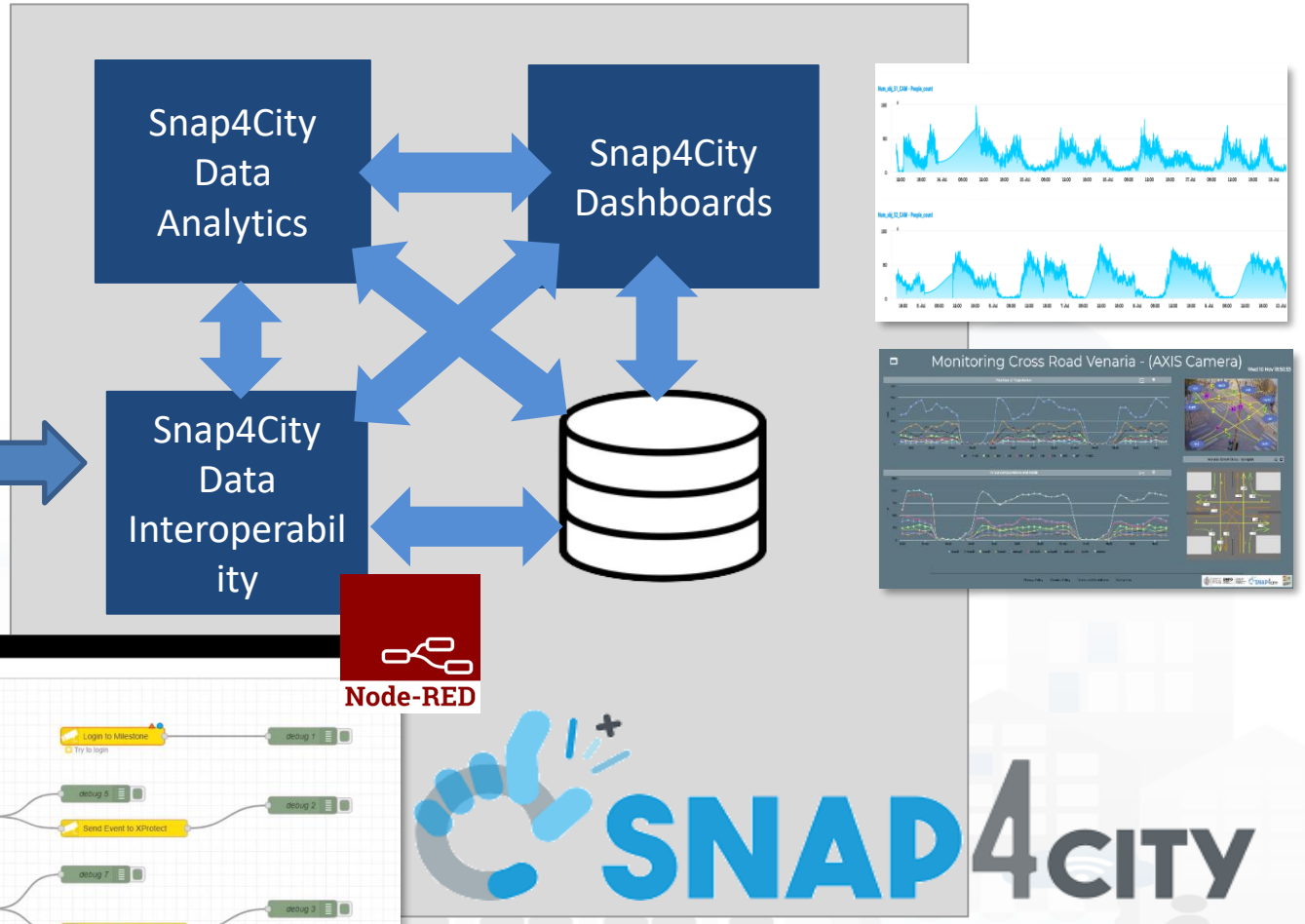


VMS vs Snap4City: sending and getting events, AI solutions

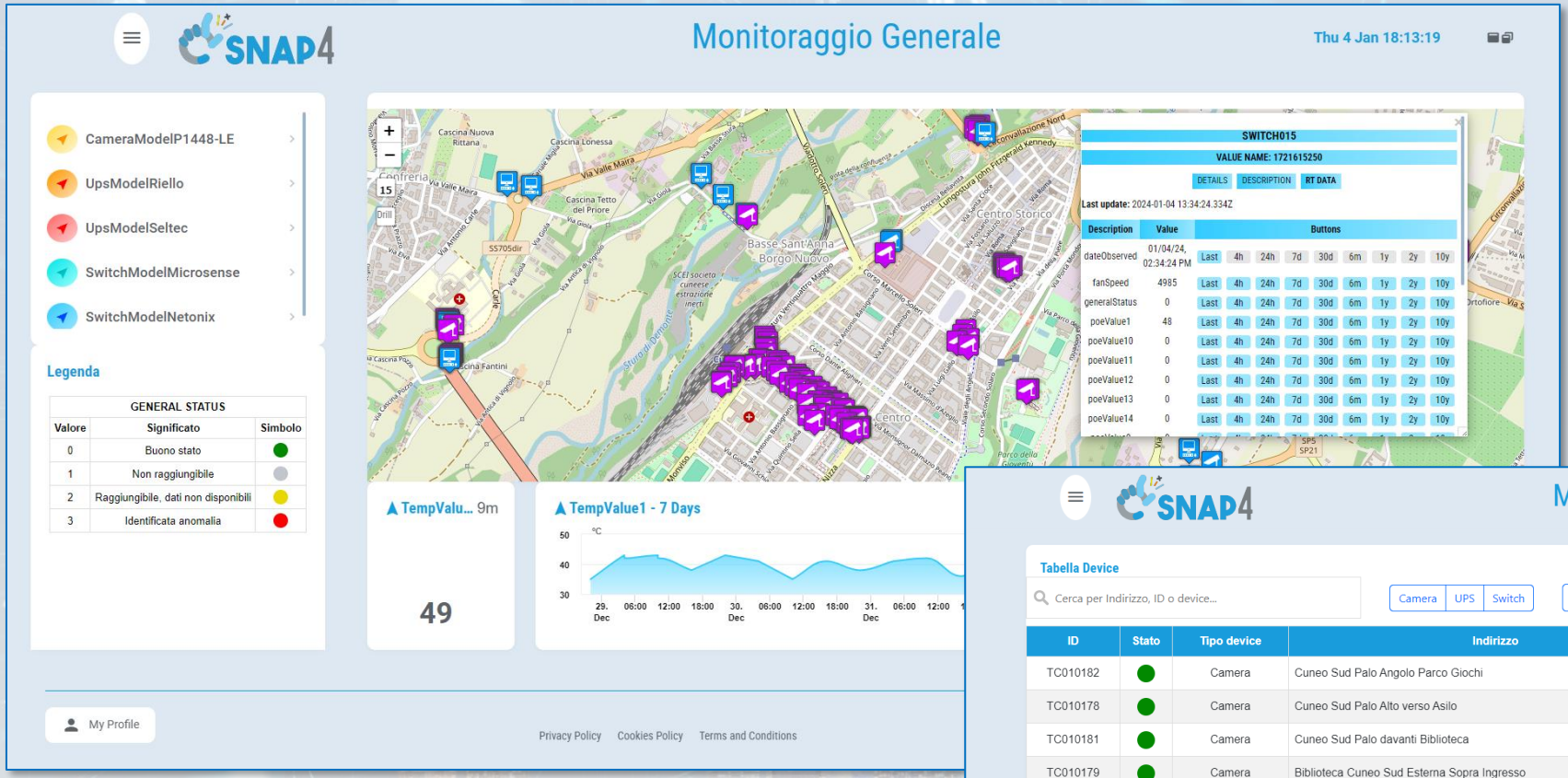
Events + info

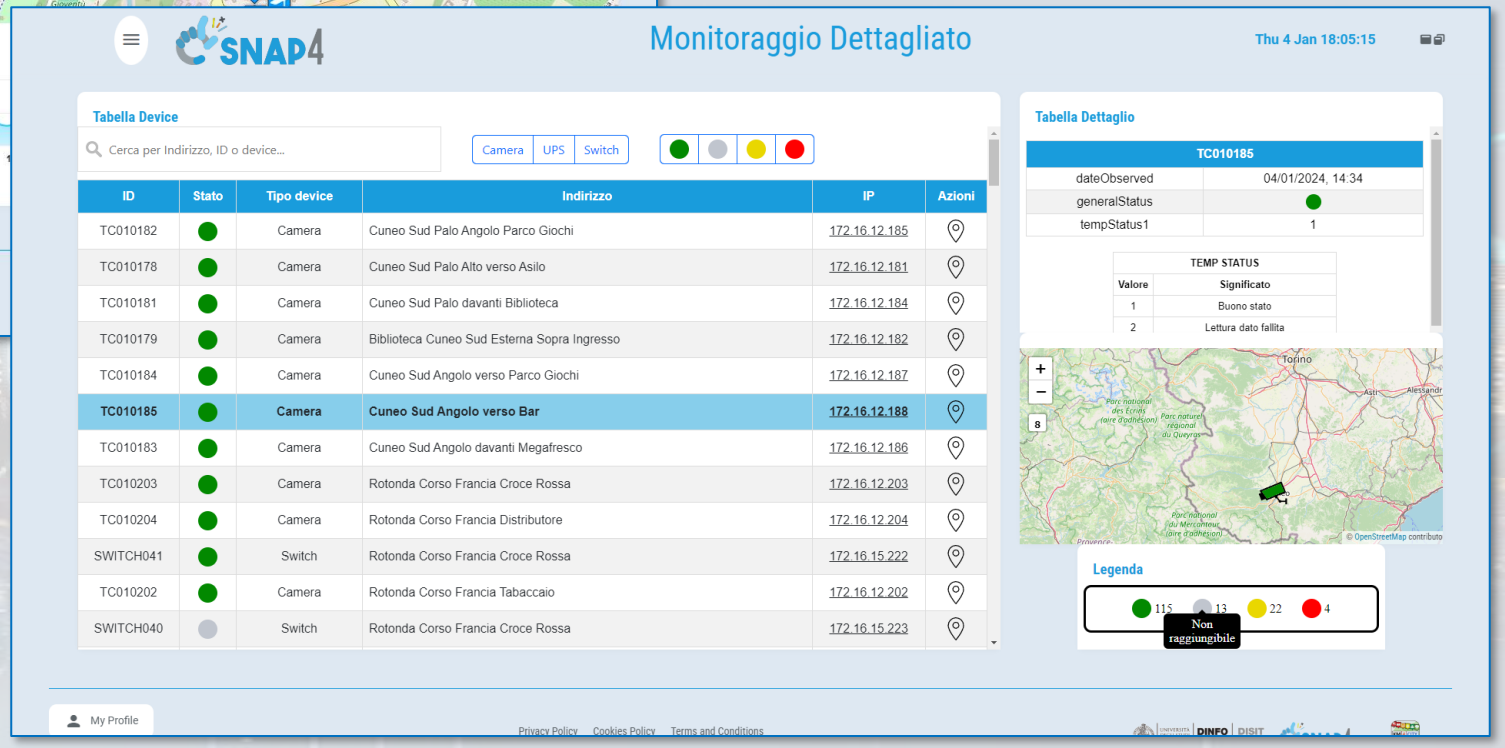


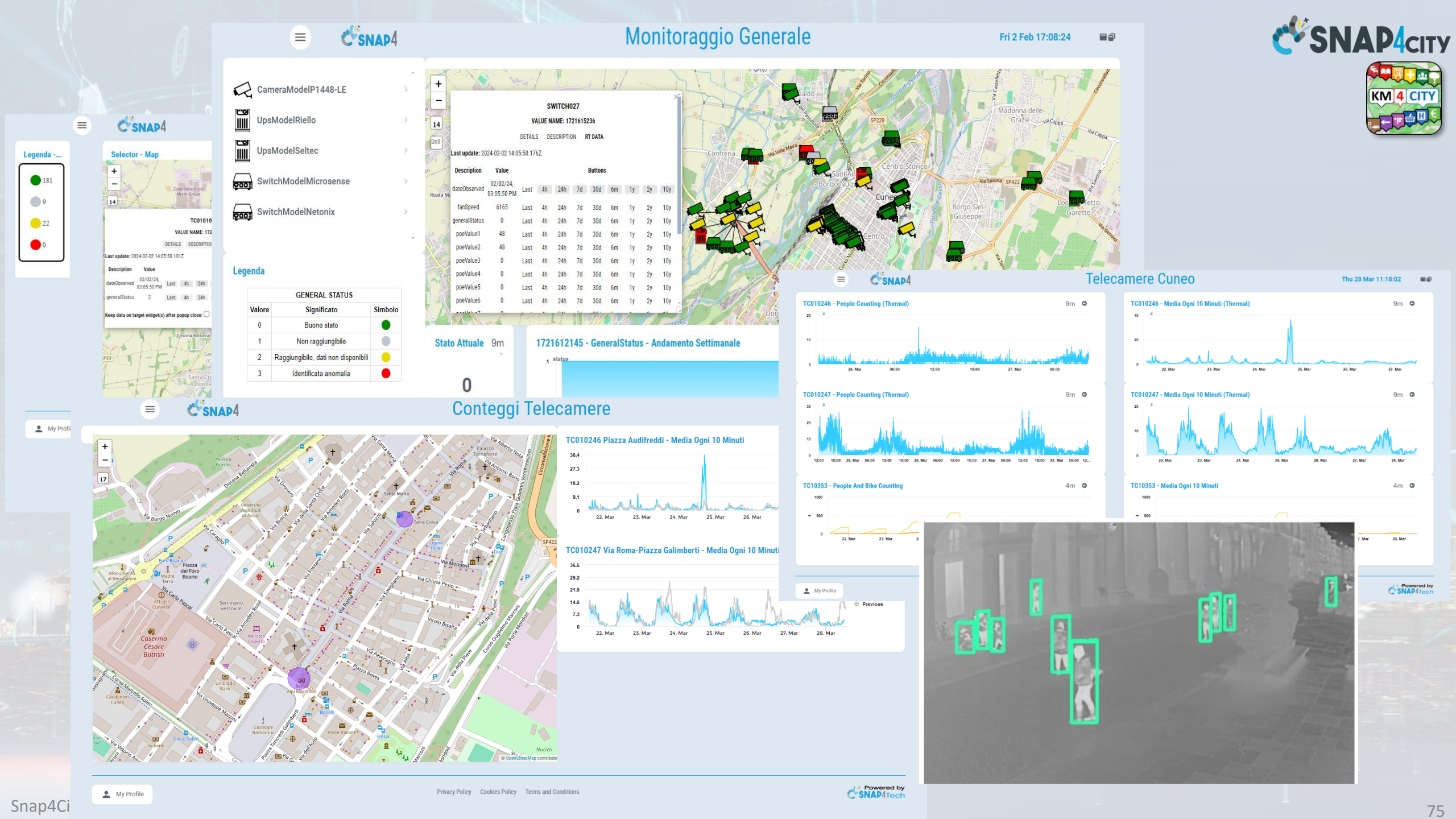




Cuneo Assets' Monitoring, Safety





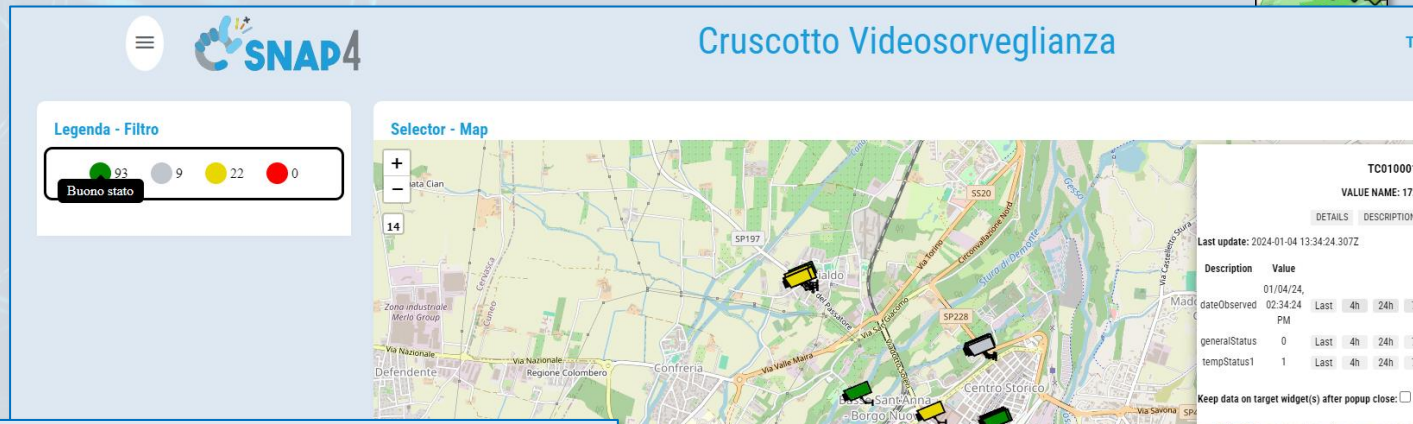


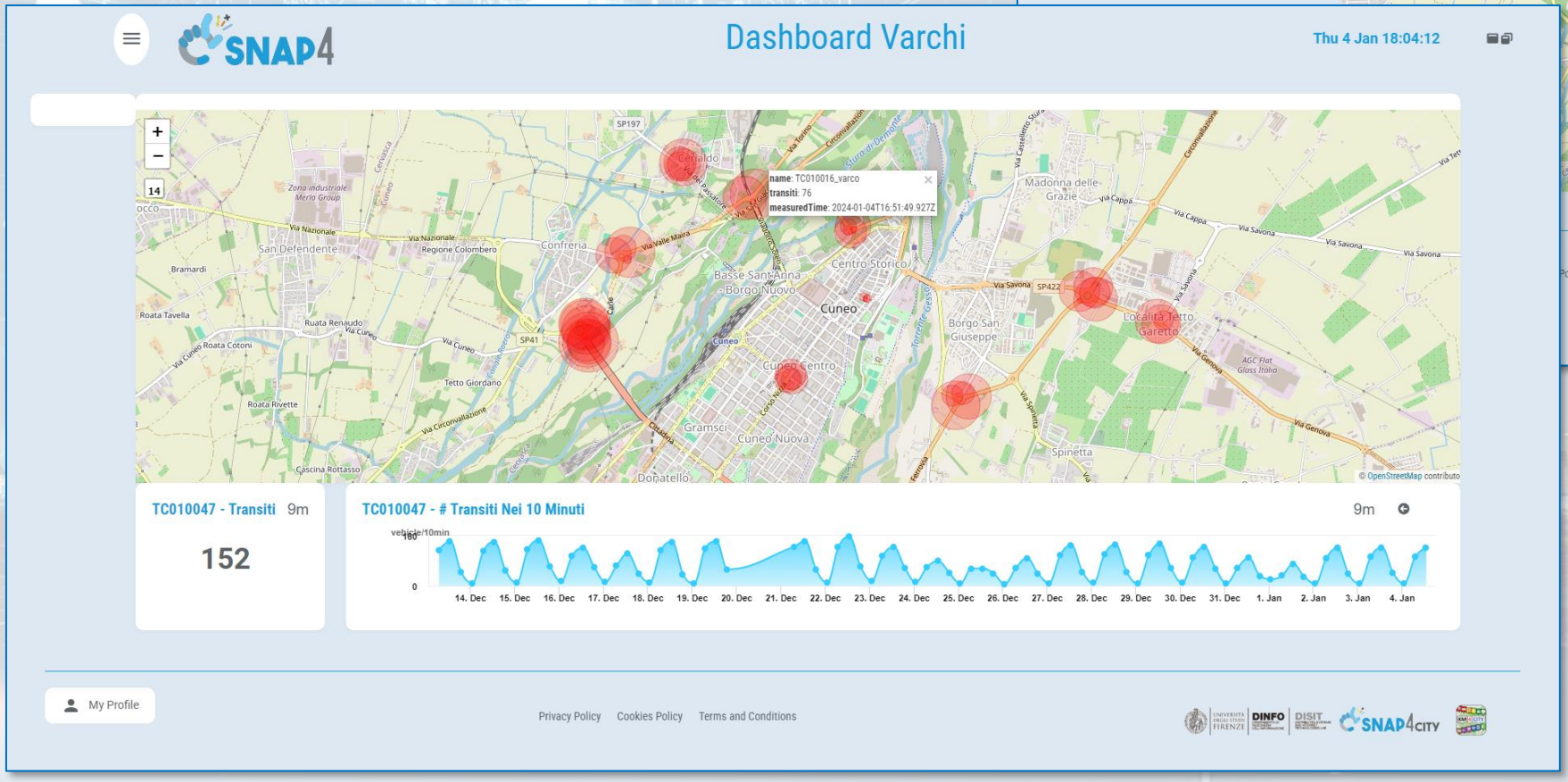
Monitoraggio Generale
Fri 2 Feb 17:08:24
CameraModelP1448-LE
UpsModelRiello
UpsModelSeltec
SwitchModelMicrosense
SwitchModelNetonix
Legenda
GENERAL STATUS
Valore | Significato | Simbolo
0 | Buono stato
1 | Non raggiungibile
2 | Raggiungibile, dati non disponibili
3 | Identificata anomalia
SWITCH027
VALUE NAME: 1721615236
DETAILS DESCRIPTION RT DATA
Last update: 2024-02-02 14:05:50.176Z
Description Value Buttons
dateObserved 02/02/24, 03:05:50 PM Last 4h 24h 7d 30d 6m 1y 2y 10y
fanSpeed 6165 Last 4h 24h 7d 30d 6m 1y 2y 10y
generalStatus 0 Last 4h 24h 7d 30d 6m 1y 2y 10y
poeValue1 48 Last 4h 24h 7d 30d 6m 1y 2y 10y
poeValue2 48 Last 4h 24h 7d 30d 6m 1y 2y 10y
poeValue3 0 Last 4h 24h 7d 30d 6m 1y 2y 10y
poeValue4 0 Last 4h 24h 7d 30d 6m 1y 2y 10y
poeValue5 0 Last 4h 24h 7d 30d 6m 1y 2y 10y
poeValue6 0 Last 4h 24h 7d 30d 6m 1y 2y 10y
Stato Attuale 9m
0
1721612145 - GeneralStatus - Andamento Settimanale
Legenda -...
181
9
22
0
Selector - Map
Telecamere Cuneo
Thu 28 Mar 11:18:02
TC010246 - People Counting (Thermal) 9m
TC010246 - Media Ogni 10 Minuti (Thermal) 9m
TC010247 - People Counting (Thermal) 9m
TC010247 - Media Ogni 10 Minuti (Thermal) 9m
TC10353 - People And Bike Counting 4m
TC10353 - Media Ogni 10 Minuti 4m
Conteggi Telecamere
TC010246 Piazza Audifreddi - Media Ogni 10 Minuti
TC010247 Via Roma-Piazza Galimberti - Media Ogni 10 Minuti
Previous
My Profile
Privacy Policy
Cookies Policy
Terms and Conditions
Powered by SNAP4Tech

TOP

Assets Management & Control

Cuneo Assets' Monitoring, Safety





TOP

Social Media Analysis

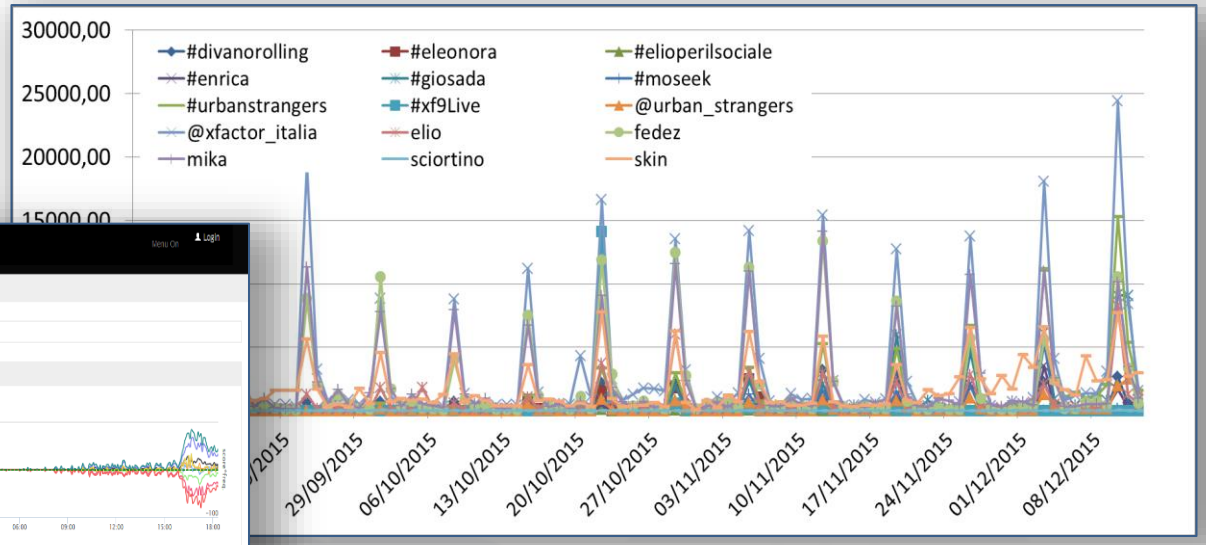
100% OPEN SOURCE

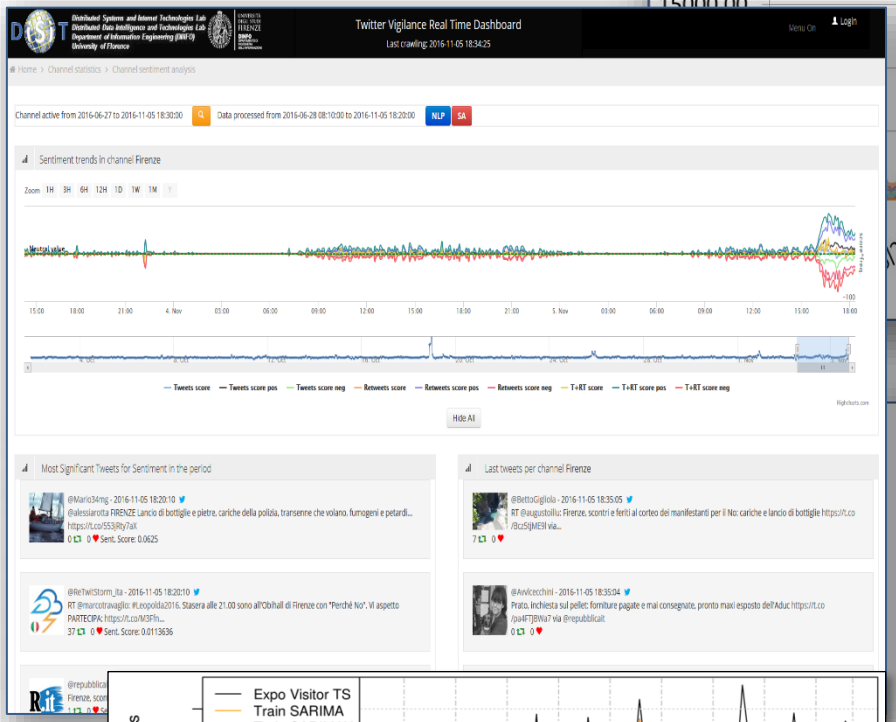
SNAP4 Appliances and Dockers **Installations**

Social Media

Twitter Vigilance

- **Prediction** of Audience on TV programme
- **Prediction** of retweet proneness: RF, GBM, ..
- **Project**
  - TwitterVigilance
  - +NLP, SA





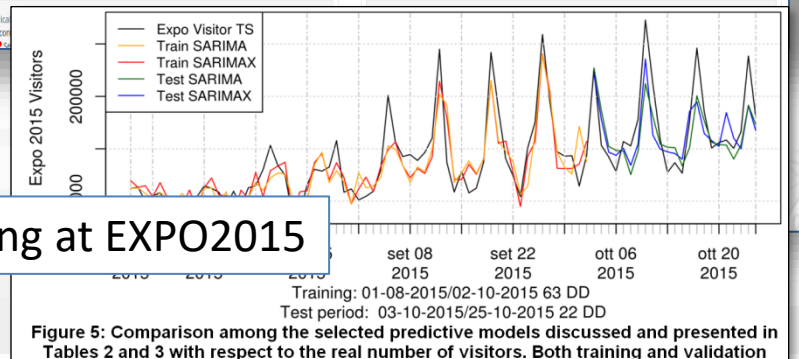
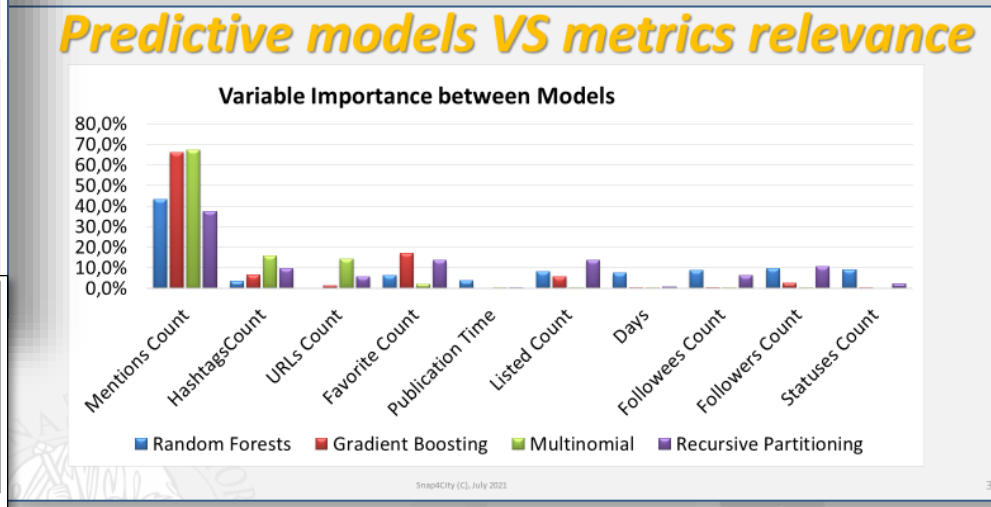


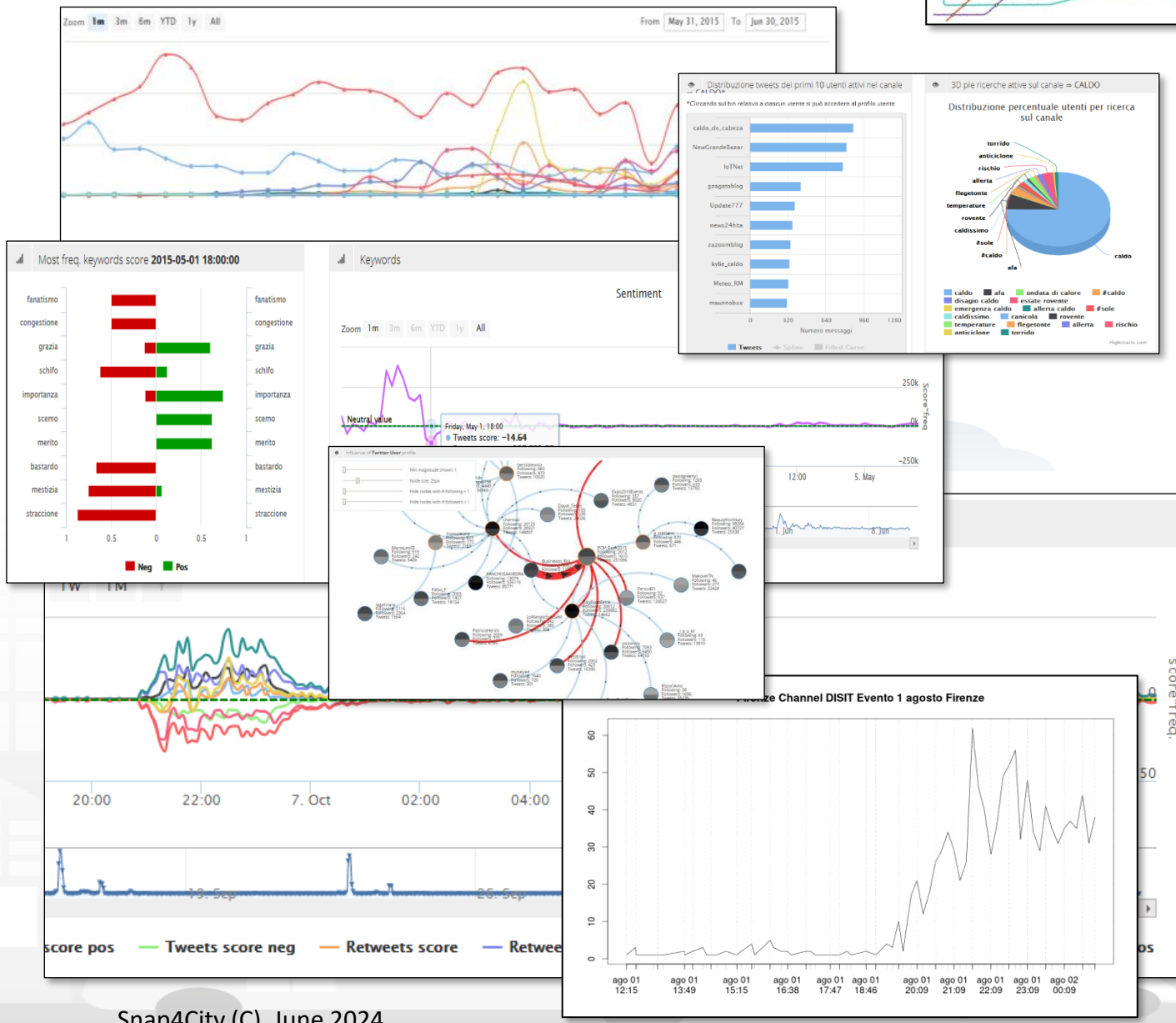
Figure 5: Comparison among the selected predictive models discussed and presented in Tables 2 and 3 with respect to the real number of visitors. Both training and validation

Predicting at EXPO2015



Twitter Vigilance

- http://www.disit.org/tv
- http://www.disit.org/rttv
- Citizens as sensors to
  - Assess sentiment on services, events, …
  - Response of consumers wrt, …
  - Early detection of critical conditions
  - Information channel
  - Opinion leaders
  - Communities
  - Formation
  - Predicting volume of visitors for tuning the services



Twitter Vigilance

Several Channels

Twitter Vigilance Dashboard

Last crawling: 2015-12-11 01:20:20

Login

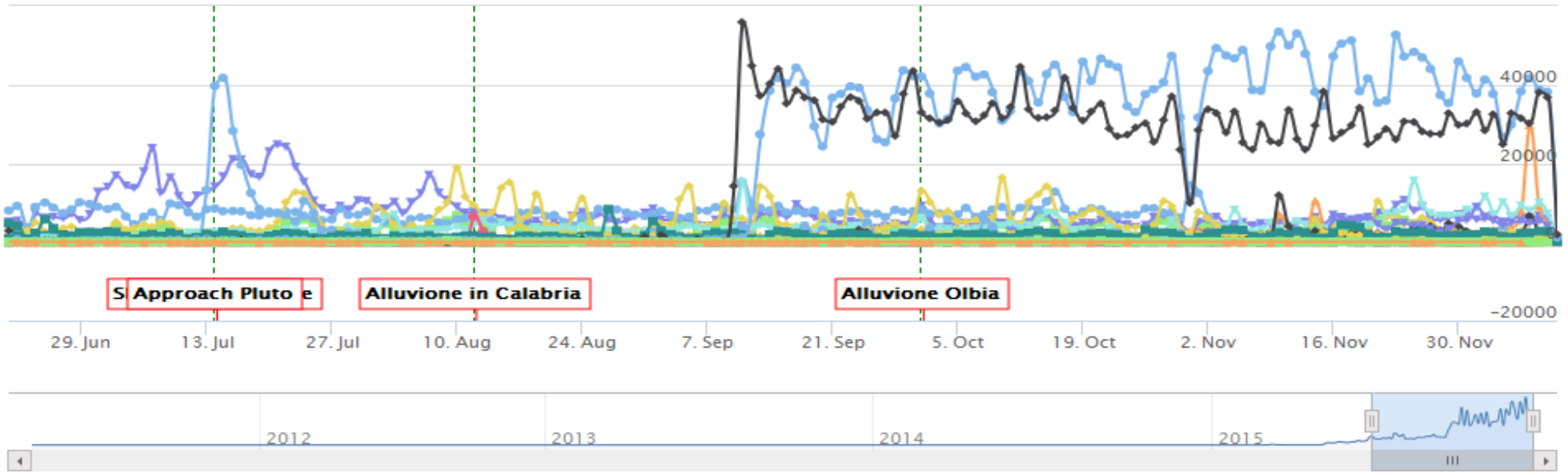
- Search parameters
- Data analysis 4
- Channel statistics
- Search statistics
- Retweet statistics
- Twitter Users statistics
- INFO

Home > Channel statistics

Global view of user channels

Zoom 1m 3m 6m YTD 1y All

From Jun 20, 2015 To Dec 11, 2015



ads aeroporto firenze Allertameteo TOSCANA apretoscana CALDO cambiamenti climatici
Codified Hashtags Allerta ConsumoSuolo Emergenza_acqua Europeana EXPO2015 Firenze
FirenzeICT Giubileo iononrischio LaMMA Maltempo maturità 2015 MeteoUSER mymeteo
NASA New Horizons papafrancesco PA_social_PA protezione civile toscana resilienza rossano
siena smartcity smartcitybigdata2015 SOLO allertameteoTOSCANA tech uber Univ-Firenze
zanzara Events

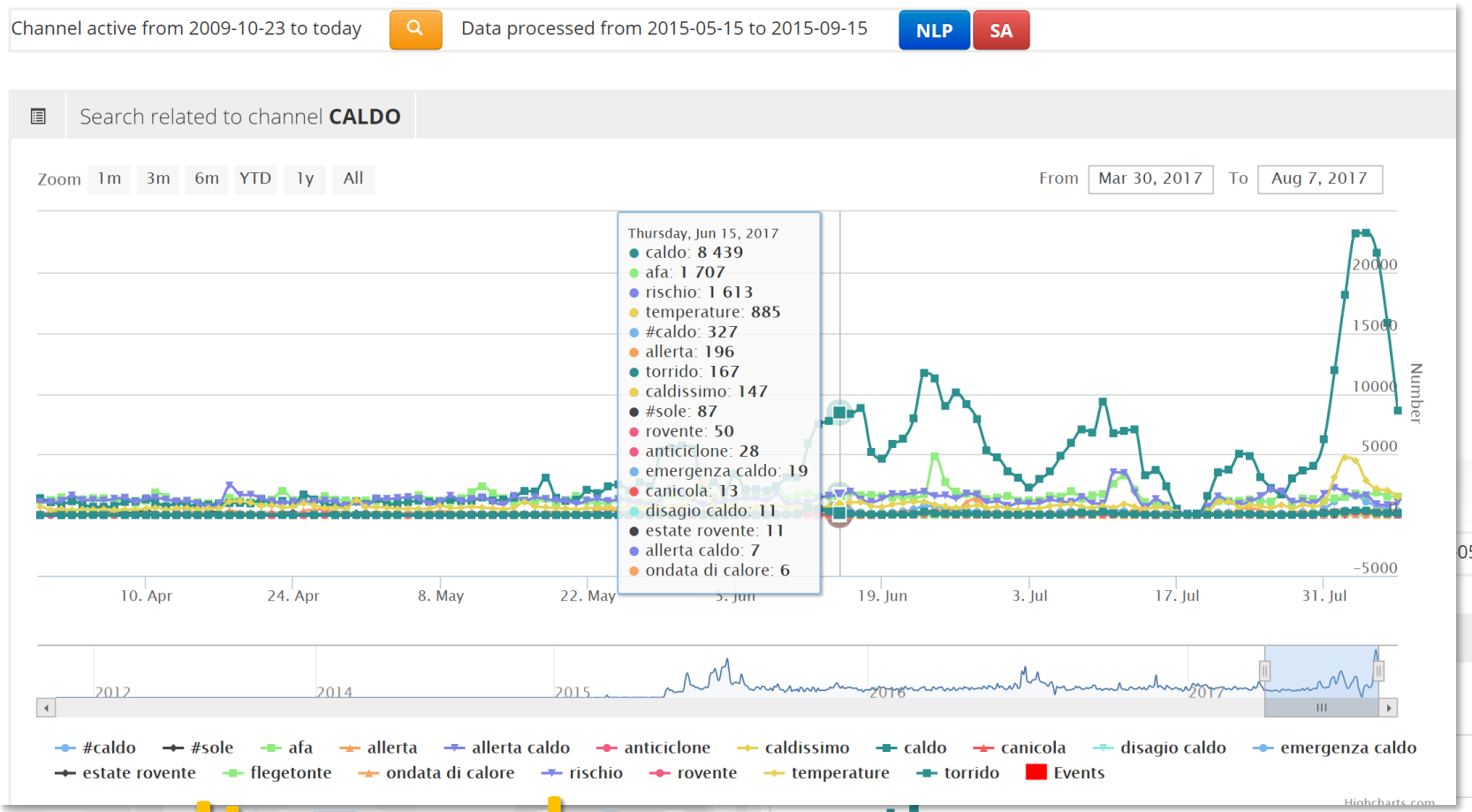
Twitter Vigilance

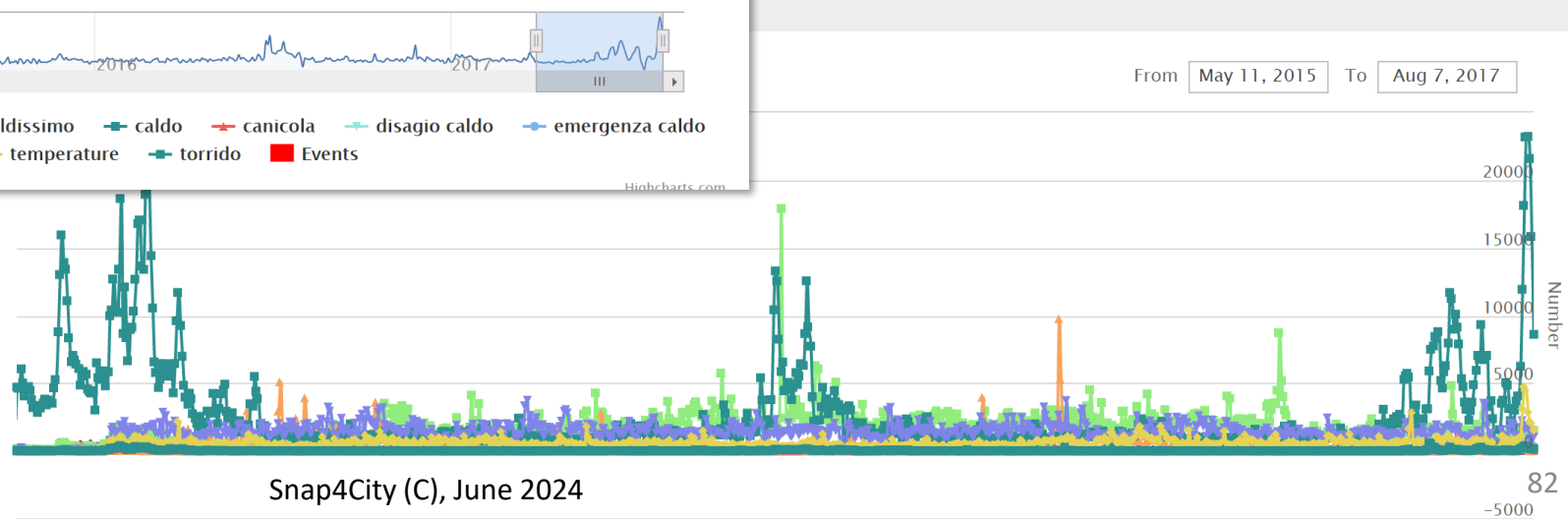
UNIVERSITÀ DEGLI STUDI FIRENZE | DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE | DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB
http://www.disit.org

A Channel

Sii-Mobility

Its searches

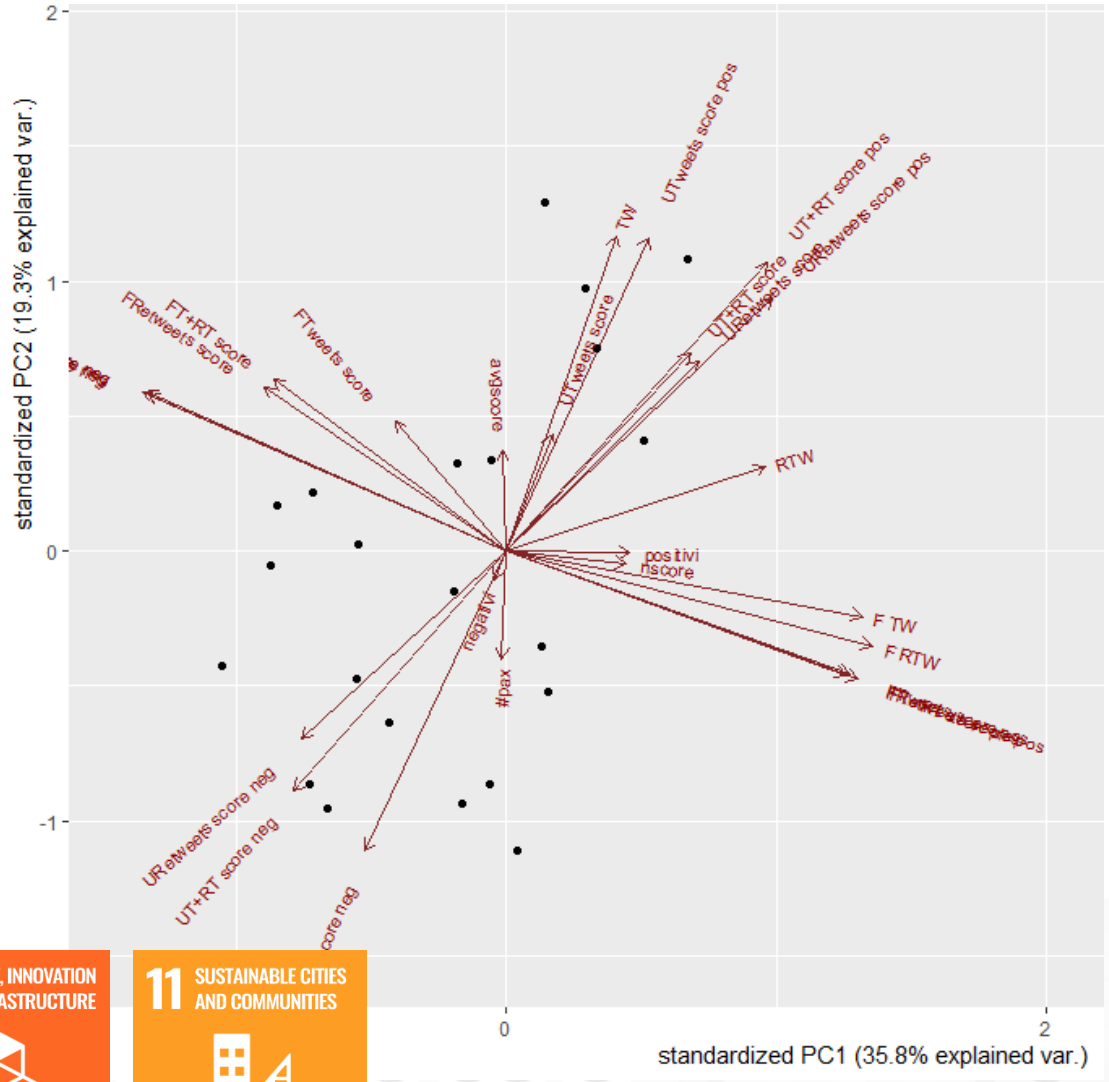




Twitter Vigilance

Reputation

- Prediction/estimation of **Average Score of Trip Advisor** as a function of *Twitter Vigilance Metrics + other information*
- Prediction/estimation of **Negative Scores on specific Museum** or service as a function *of Twitter Vigilance Metrics + other information*

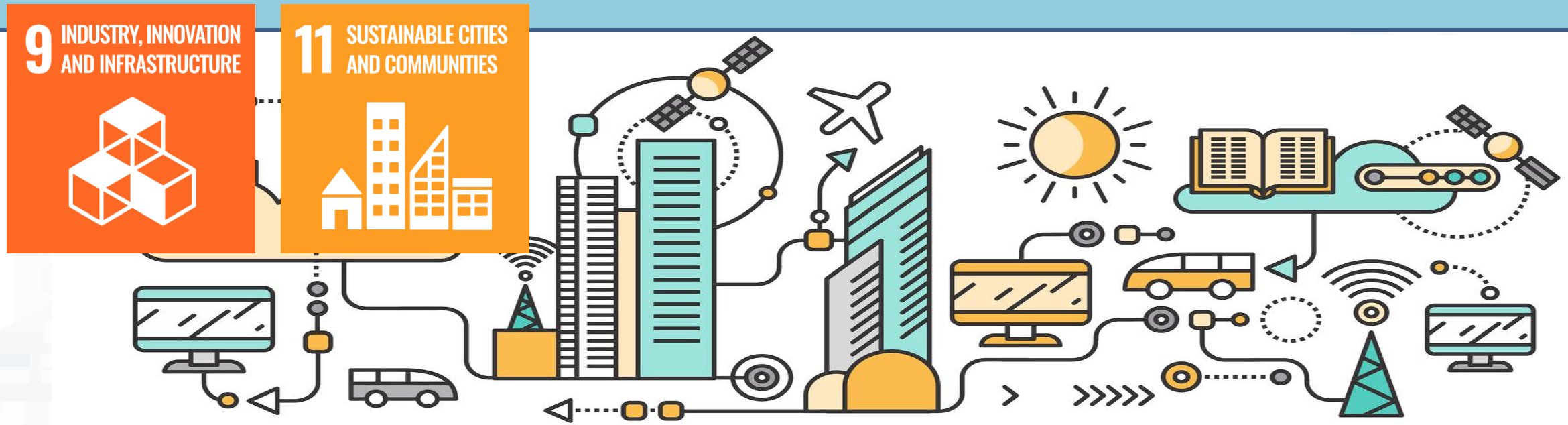


9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

11 SUSTAINABLE CITIES AND COMMUNITIES

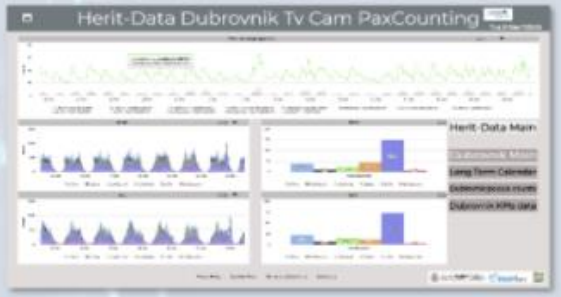
Twitter Vigilance

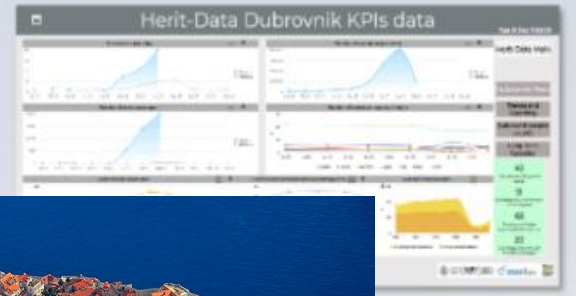
Predicting Service's Load via NLP on Social Media

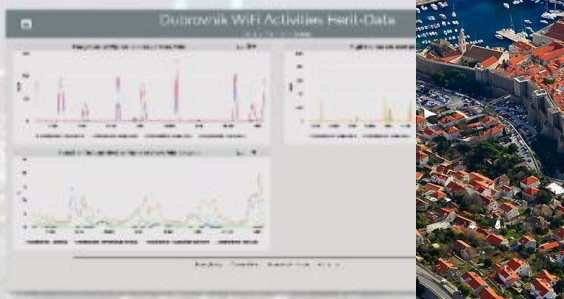


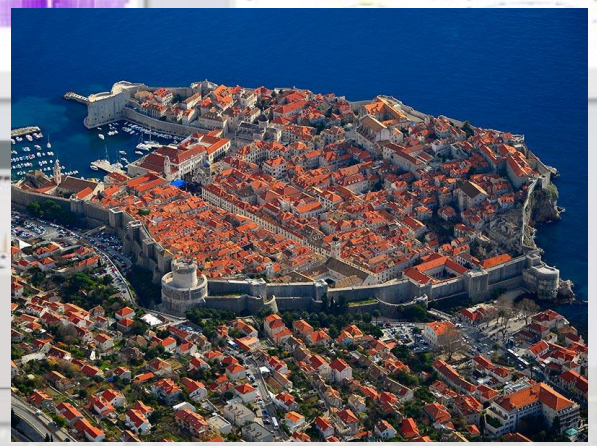
Dubrovnik

- **Tourism Domain**
  - Counting People
  - TV Cameras and WiFi
  - Social Media
- **Dashboards**
  - Monitoring and real time control
  - People flow
  - Twitter Vigilance
- **Historical and Real Time data**
- **Services Exploited on:**
  - Dashboard
- **Since 2020**





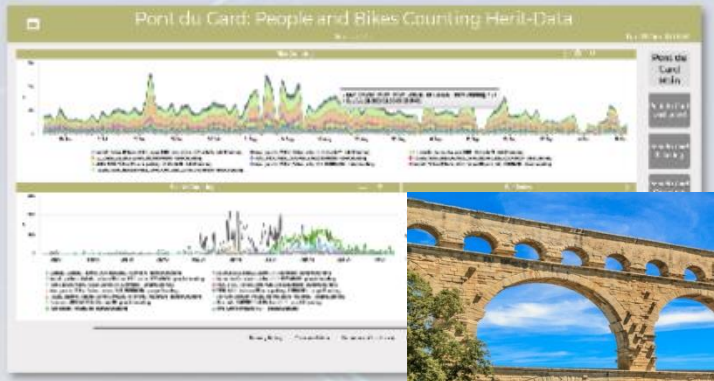


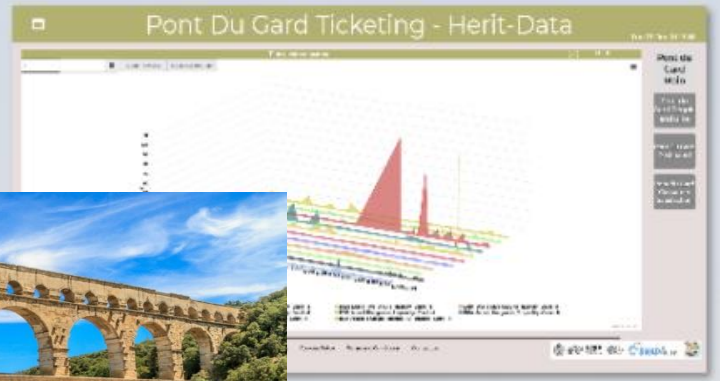


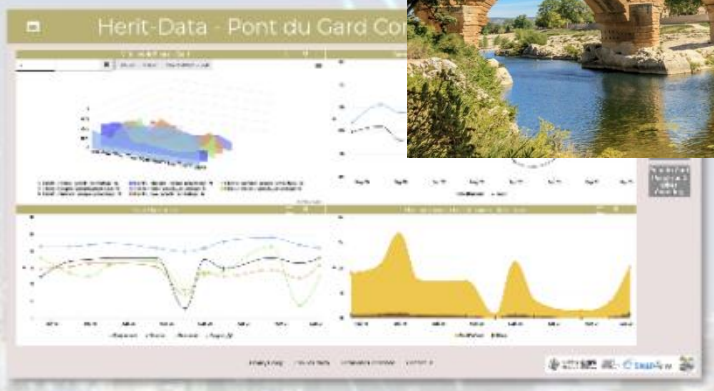
https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzE0Ng==

Pont du Gard

- **Tourism Domain**
  - KPIs
  - Social Media
  - People Flows
  - Bike Flows
- **Dashboards**
  - Monitoring KPI
  - People and bikes flows
  - Twitter Vigilance
- **Historical and updated data**
- **Services Exploited on:**
  - Dashboard
- **Since 2020**







9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

11 SUSTAINABLE CITIES AND COMMUNITIES

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MzE1Mw==

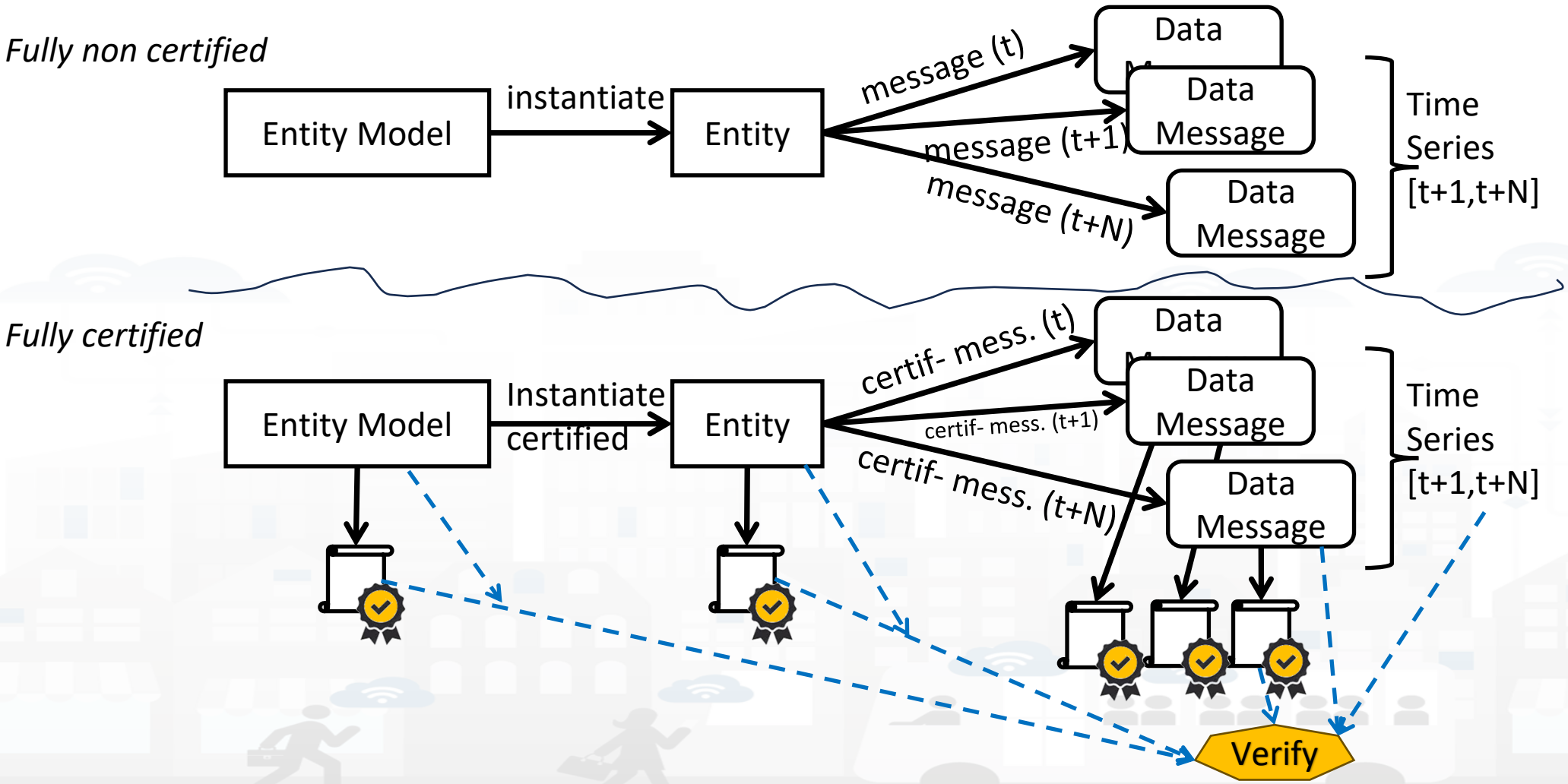
TOP

Blockchain for Certification, Contracts, NFT, etc.

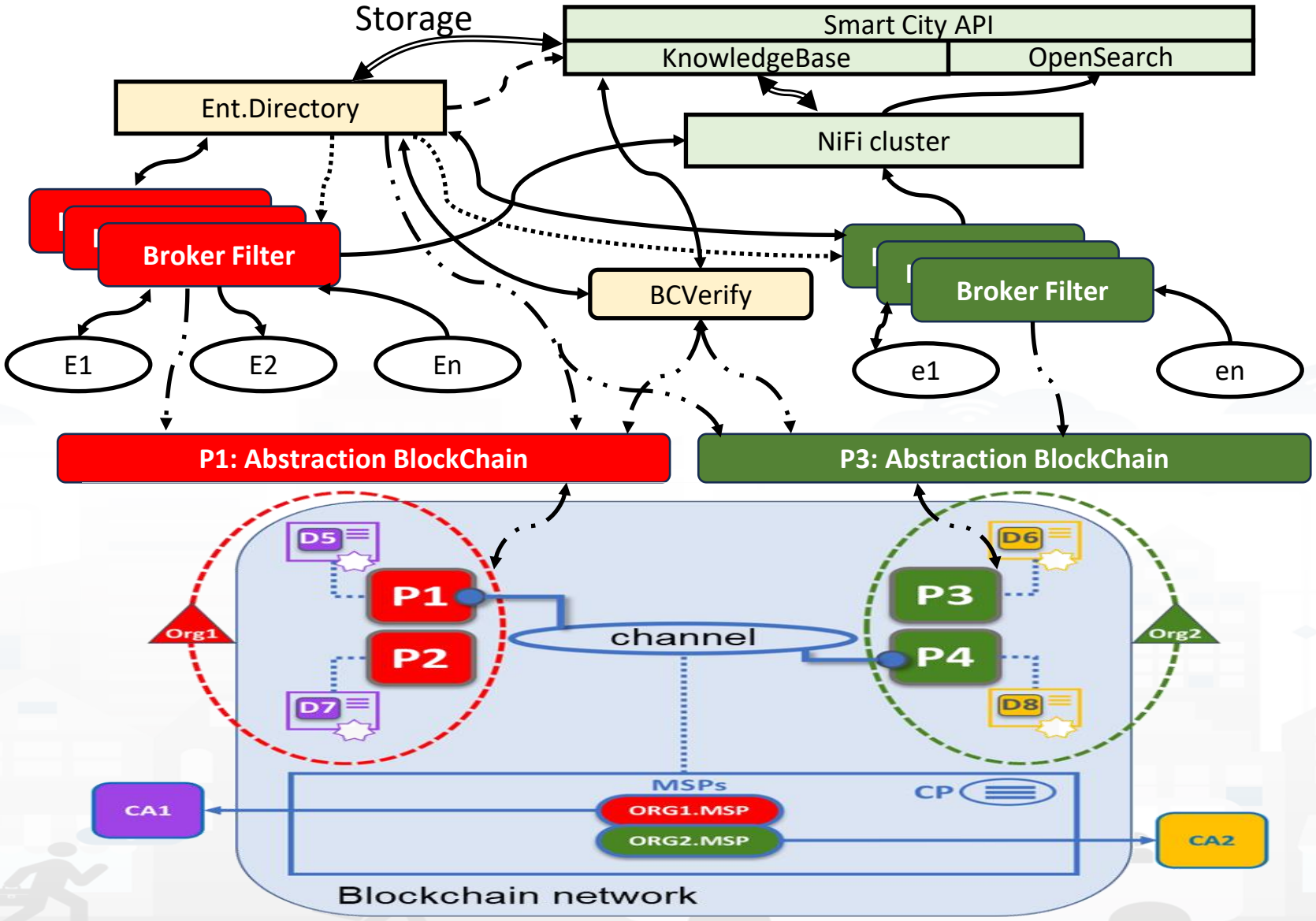
BlockChain vs Snap4City

- A feature optionally installed and optimally used to certify locally or in federation with other installations.
- Blockchain technology on Snap4City can be used for:
  - Certification of Data Messages →
    - Time Series, NFT with history of transactions, cold chains, transactions chains
    - MaaS, Waste collection Pay as you Throw (PAYT), etc.
  - Certification of Devices/Entities →
    - Contracts, transaction, micro-transactions
  - Certification of IoT Devices/Entities Models
    - Usage of Standard models and templates

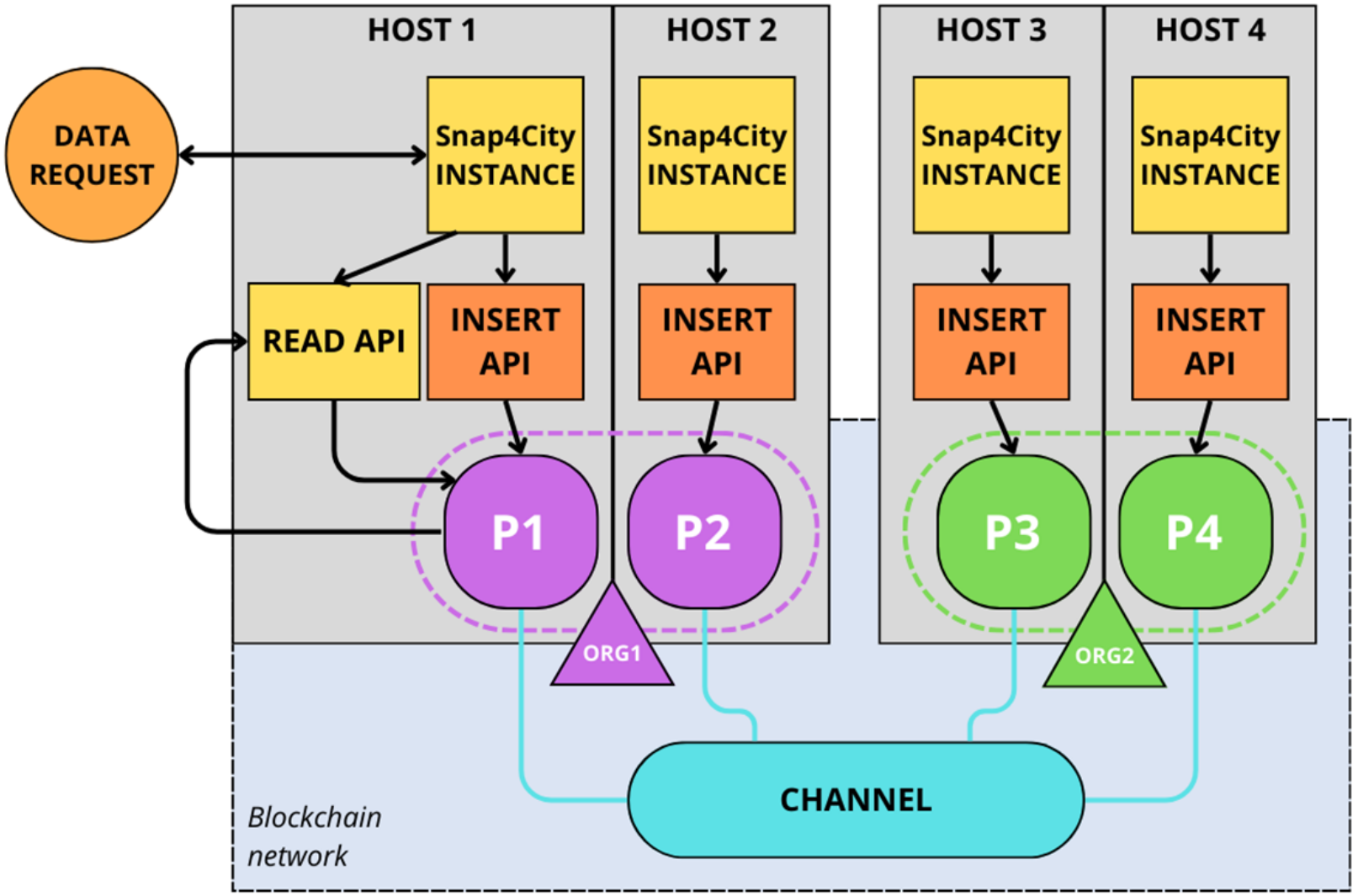
Blockchain Cerified and non certified entities

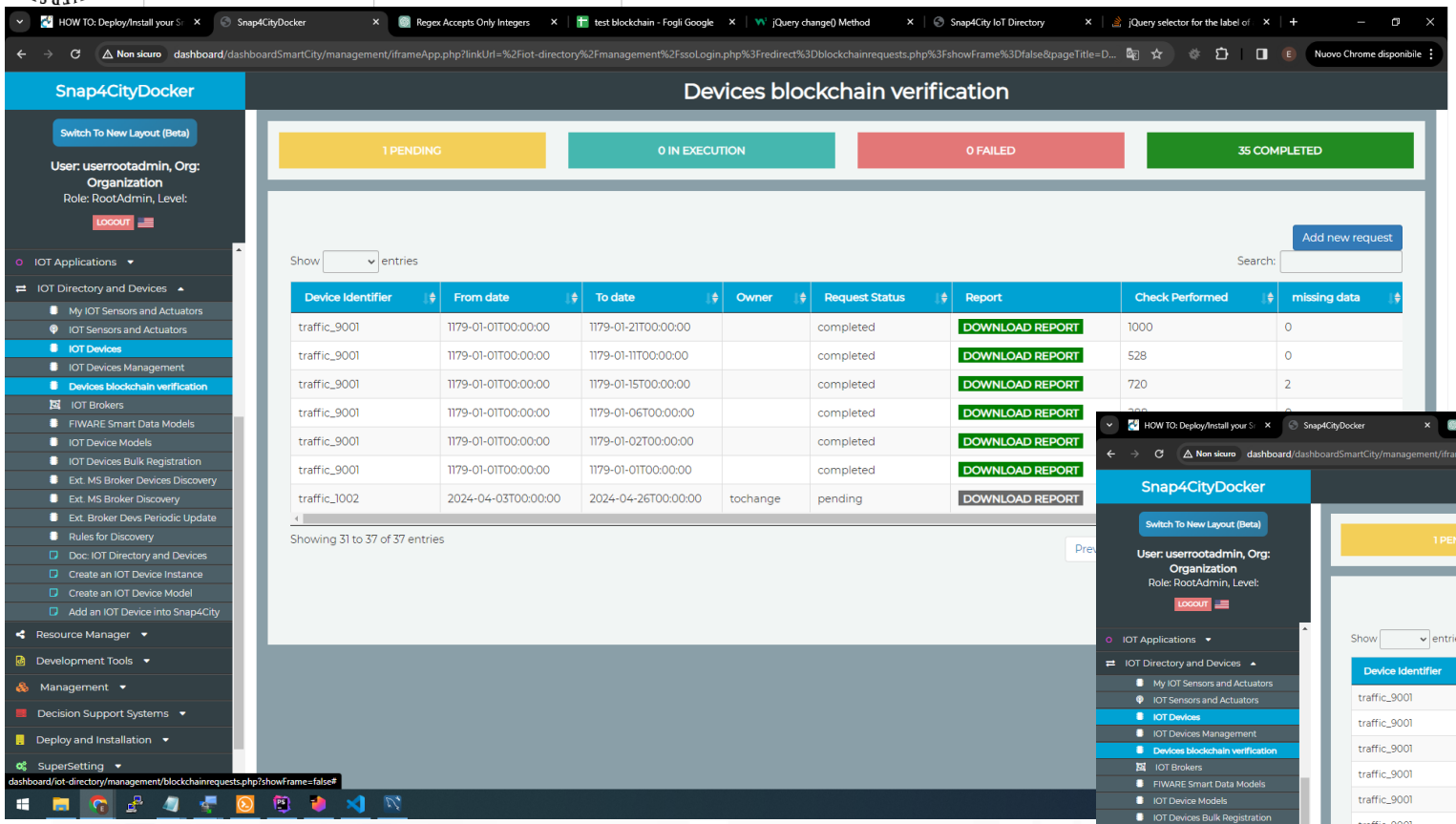


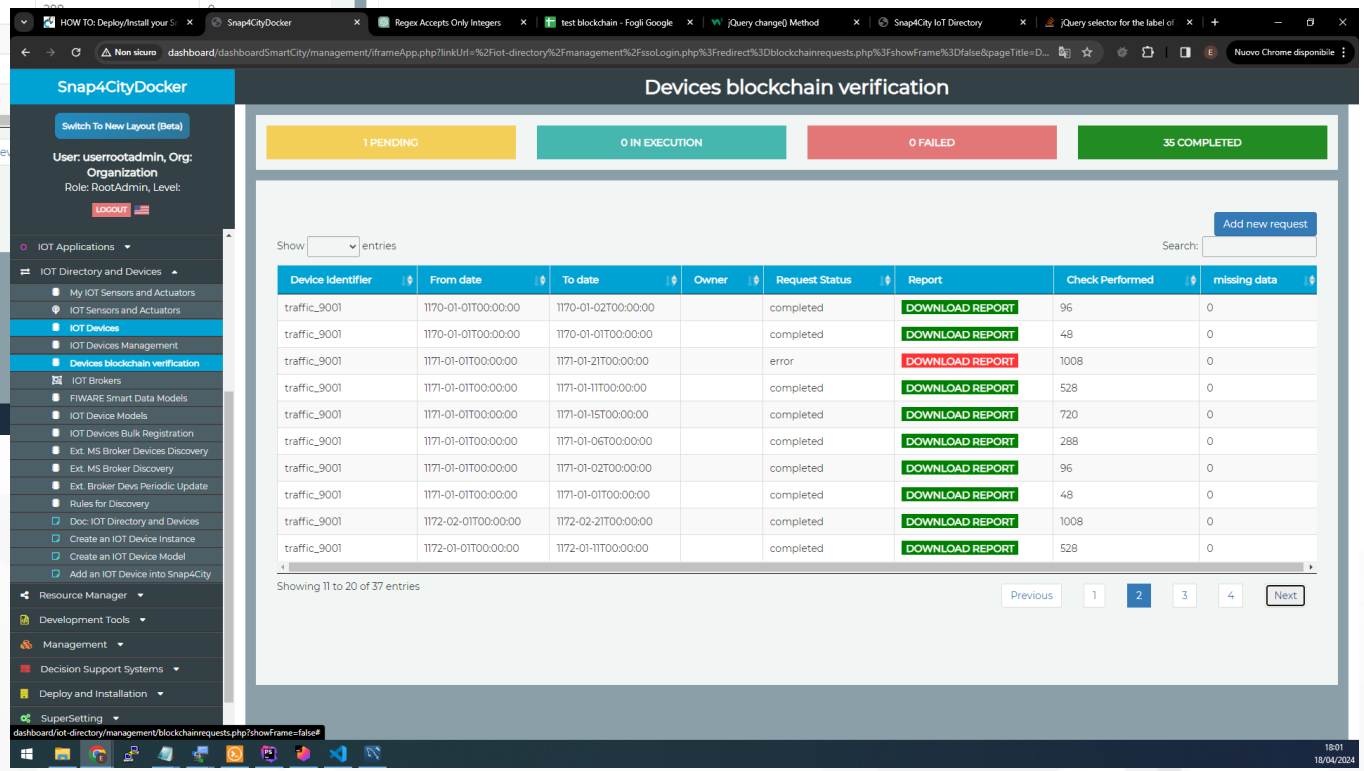
Architecture



Snap4City with Blockchain




Snap4CityDocker
Devices blockchain verification
Switch To New Layout (Beta)
User: userrootadmin, Org: Organization
Role: RootAdmin, Level:
LOGOUT
1 PENDING
0 IN EXECUTION
0 FAILED
35 COMPLETED
Add new request
Show entries
Search:
Device Identifier | From date | To date | Owner | Request Status | Report | Check Performed | missing data
traffic_9001 | 1179-01-01T00:00:00 | 1179-01-21T00:00:00 | | completed | DOWNLOAD REPORT | 1000 | 0
traffic_9001 | 1179-01-01T00:00:00 | 1179-01-11T00:00:00 | | completed | DOWNLOAD REPORT | 528 | 0
traffic_9001 | 1179-01-01T00:00:00 | 1179-01-15T00:00:00 | | completed | DOWNLOAD REPORT | 720 | 2
traffic_9001 | 1179-01-01T00:00:00 | 1179-01-06T00:00:00 | | completed | DOWNLOAD REPORT
traffic_9001 | 1179-01-01T00:00:00 | 1179-01-02T00:00:00 | | completed | DOWNLOAD REPORT
traffic_9001 | 1179-01-01T00:00:00 | 1179-01-01T00:00:00 | | completed | DOWNLOAD REPORT
traffic_1002 | 2024-04-03T00:00:00 | 2024-04-26T00:00:00 | tochange | pending | DOWNLOAD REPORT
Showing 31 to 37 of 37 entries
IOT Applications
IOT Directory and Devices
My IOT Sensors and Actuators
IOT Sensors and Actuators
IOT Devices
IOT Devices Management
Devices blockchain verification
IOT Brokers
FIWARE Smart Data Models
IOT Device Models
IOT Devices Bulk Registration
Ext. MS Broker Devices Discovery
Ext. MS Broker Discovery
Ext. Broker Devs Periodic Update
Rules for Discovery
Doc: IOT Directory and Devices
Create an IOT Device Instance
Create an IOT Device Model
Add an IOT Device into Snap4City
Resource Manager
Development Tools
Management
Decision Support Systems
Deploy and Installation
SuperSetting


Snap4CityDocker
Devices blockchain verification
Switch To New Layout (Beta)
User: userrootadmin, Org: Organization
Role: RootAdmin, Level:
LOGOUT
1 PENDING
0 IN EXECUTION
0 FAILED
35 COMPLETED
Add new request
Show entries
Search:
Device Identifier | From date | To date | Owner | Request Status | Report | Check Performed | missing data
traffic_9001 | 1170-01-01T00:00:00 | 1170-01-02T00:00:00 | | completed | DOWNLOAD REPORT | 96 | 0
traffic_9001 | 1170-01-01T00:00:00 | 1170-01-01T00:00:00 | | completed | DOWNLOAD REPORT | 48 | 0
traffic_9001 | 1171-01-01T00:00:00 | 1171-01-21T00:00:00 | | error | DOWNLOAD REPORT | 1008 | 0
traffic_9001 | 1171-01-01T00:00:00 | 1171-01-11T00:00:00 | | completed | DOWNLOAD REPORT | 528 | 0
traffic_9001 | 1171-01-01T00:00:00 | 1171-01-15T00:00:00 | | completed | DOWNLOAD REPORT | 720 | 0
traffic_9001 | 1171-01-01T00:00:00 | 1171-01-06T00:00:00 | | completed | DOWNLOAD REPORT | 288 | 0
traffic_9001 | 1171-01-01T00:00:00 | 1171-01-02T00:00:00 | | completed | DOWNLOAD REPORT | 96 | 0
traffic_9001 | 1171-01-01T00:00:00 | 1171-01-01T00:00:00 | | completed | DOWNLOAD REPORT | 48 | 0
traffic_9001 | 1172-02-01T00:00:00 | 1172-02-21T00:00:00 | | completed | DOWNLOAD REPORT | 1008 | 0
traffic_9001 | 1172-01-01T00:00:00 | 1172-01-11T00:00:00 | | completed | DOWNLOAD REPORT | 528 | 0
Showing 11 to 20 of 37 entries
Previous 1 2 3 4 Next

TOP

References

FROM CITY DASHBOARD TO APPLICATIONS

DATA GATHERING AND CITY DATA KNOWLEDGE MANAGEMENT

FORGING & MANAGING OPEN AND FLEXIBLE WEB AND MOBILE APPS

IOT/IOE DEVICES AND NETWORKS

IOT APPLICATIONS VS IOT EDGE DEVICES

IOT APPLICATIONS, THE LOGIC AND THE SMARTNESS

ADVANCED SMART CITY API, MICROSERVICES, SNAP4CITY API

SNAP4CITY LIVING LAB FOR COLLABORATIVE WORK

SNAP4CITY FOR BEGINNERS

DATA ANALYTICS, BUSINESS INTELLIGENCE, WHAT-IF AND SIMULATION

SNAP4CITY ARCHITECTURE AND ECOSYSTEM. OPENED TO DEVELOPERS AND STAKEHOLDERS

TWITTER VIGILANCE: SOCIAL MEDIA ANALYSIS

DECISION SUPPORT SYSTEM AND CITY RESILIENCE

HOW TO ADOPT SNAP4CITY, AND OUR ROADMAP

SNAP4CITY AND KM4CITY PROJECTS

SNAP4CITY THE VIEW OF THE ADMINISTRATORS

100% OPEN SOURCE

SNAP4 Appliances and Dockers **Installations**

2023 booklets

- Smart City

https://www.snap4city.org/download/video/DPL_SNAP4CITY.pdf

- Industry

https://www.snap4city.org/download/video/DPL_SNAP4INDUSTRY.pdf

- Artificial Intelligence

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

DISIT lab roadmap vs model and tools' usage

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
Km4City 1.5

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

ckan, resolute, H2020 (2015-18)

2016
(2016-21) H2020 REPLICATE

Km4City 1.6.4

- Smart Energy
- Sustainable Mobility
- Control Room
- Dashboard

Km4City 1.6.2

Sii-Mobility (2016-21) MIUR

SII-MOBILITY SCN

- Infomobility
- Mobile App
- Routing
- Multimodality

FIWARE

Km4City 1.5

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

2017
Sii-Mobility

- Origin-Destination and trajectories
- Traffic Reconstruction
- Offer Analysis
- OBU, smart devices

E0l5 digital ecosystem (Powered by EXPO MILANO 2015)

(2016-19) MIUR GHOST SIR

- Sardinia Region Smart City Strategies and plan

GREEN IMPACT C.A.P.A.C.I.T.Y.

GREEN IMPACT
POR FESR 2014-2020

- Industry 4.0
- Critical Plant
- Monitoring

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

life weee (2017-20)

- Smart Waste

2018
MOSAiC Mobility 4.0 for SmArt (i) City (2018-20)

- Mobility Demand / Offer Analytics and Strategy

5G (2018-21)

- 5G tech
- Energy
- Industry 4.0
- Synoptics

Sii-Mobility

- User engagement
- Bike Sharing
- Data Analytics ++
- Social Predictions
- OBD2

IOT/IOE

Km4City 1.6.6

Node-RED

SNAP4CITY SELECT for Cities H2020 (2017-19)

SIRIUS

TRAFAIR CEF (2018-21)

- Traffic and Mobility Impact on Pollution
- NOX predictions

2019
EUROPEAN OPEN SCIENCE CLOUD

LAID Smart Bed

- Smart Health

GREEN FIELD PEAS Soda4.0 Optimization and Automated Decision System 4.0

- Industry 4.0

bee smart city

- Smart Lonato

Reverberi Enetec Gruppo MPES

Winner of Select4Cities PCP

SNAP4CITY roadmap

Km4City 1.6.7

2020

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

- Smart Mobility
- PISA, PUMS
- Living lab

2021

Smart Ambulance (2021-22)

Enterprise (2021-22) Industry 4.0

Sii-Mobility

enel x Contract

JRC EUROPEAN COMMISSION Contract

PC4City (2020-21) Monitoring Terrain

Winner of Open Data Challenge of enel x

CAPELON

- Smart Light
- Sweden

2022

Almafluida Industry 4.0 (2021-22)

AMPERE (2021-22) Industry 4.0

SYN-RG-AI SmartCity

GRUPPO PRETTO Industry 4.0

uni.systems SmartCity, 2021-23

AXIS COMMUNICATIONS AXIS collab SmartCity

ASYMMETRICA URBAN TECHNOLOGY Asymmetrica Smart City, 2022-23

2023

JRC EUROPEAN COMMISSION Contract, 2022-23

ART-ER ATTRATTIVITÀ RICERCA TERRITORIO Contract, 2022-23

Filippi 2022-2023

enel x Contract, 15min

IMPETUS Security and Risk

Smartea

ITALFERR GRUPPO FERROVIE DELLO STATO ITALIANE Italferr, Smart City

2024

JRC EUROPEAN COMMISSION Contract, 2024-25

MOST CENTRO NAZIONALE PER LA MOBILITÀ SOSTENIBILE CN MOST, 2022-26

Italiadomani

EI THE, 2022-26

Italiadomani

G. Agile, 2021-23

TUSCANY X.0 EDIH 2023-26

Finanziato dall'Unione europea NextGenerationEU

Merano, smart light

OceanRace, Genova, AWS

Cuneo, smart city

TOURISMO

ELLIE IA 2024-2027

SASUAM

MOST

Italiadomani

CAI4DSA

FAIR Future Artificial Intelligence Research

Italiadomani

Rhodes, smart city

eShare UNIFI TUSS

AMMIRARE

Interreg MARITTIMO-IT FR-MARITIME

Interreg Euro-MED Co-funded by the European Union

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KM4CITY

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SNAP4 Appliances and Dockers **Installations**

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