



Be smart in a SNAP!

HERIT-DATA: Integrazione di dati da sensori in ambito smart city e da social media per il turismo sostenibile: stato delle attività

HERIT-DATA
09-10-2020



<https://www.snap4city.org>

SCALABLE SMART ANALYTIC APPLICATION BUILDER FOR SENTIENT CITIES



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTINCTIVE SYSTEMS
AND INTELLIGENT
TECHNOLOGIES LAB

Overview

- Snap4City
- Snap4city for Herit-Data
- Applications and Scenarios

Overview

- Snap4City



- Snap4city for Herit-Data

- Applications and Scenarios



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

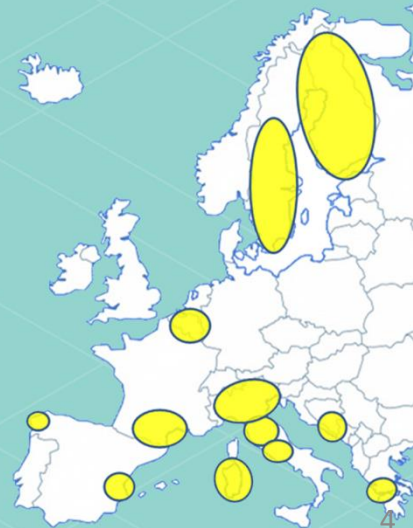


**EXPERT SYSTEM
KNOWLEDGE BASE
STORAGE**

































































**BIG DATA ANALYTICS
ARTIFICIAL INTELLIGENCE
BUSINESS INTELLIGENCE
MACHINE LEARNING**

**DATA FLOWS, WORKFLOWS
MICROSERVICES
MANAGEMENT**

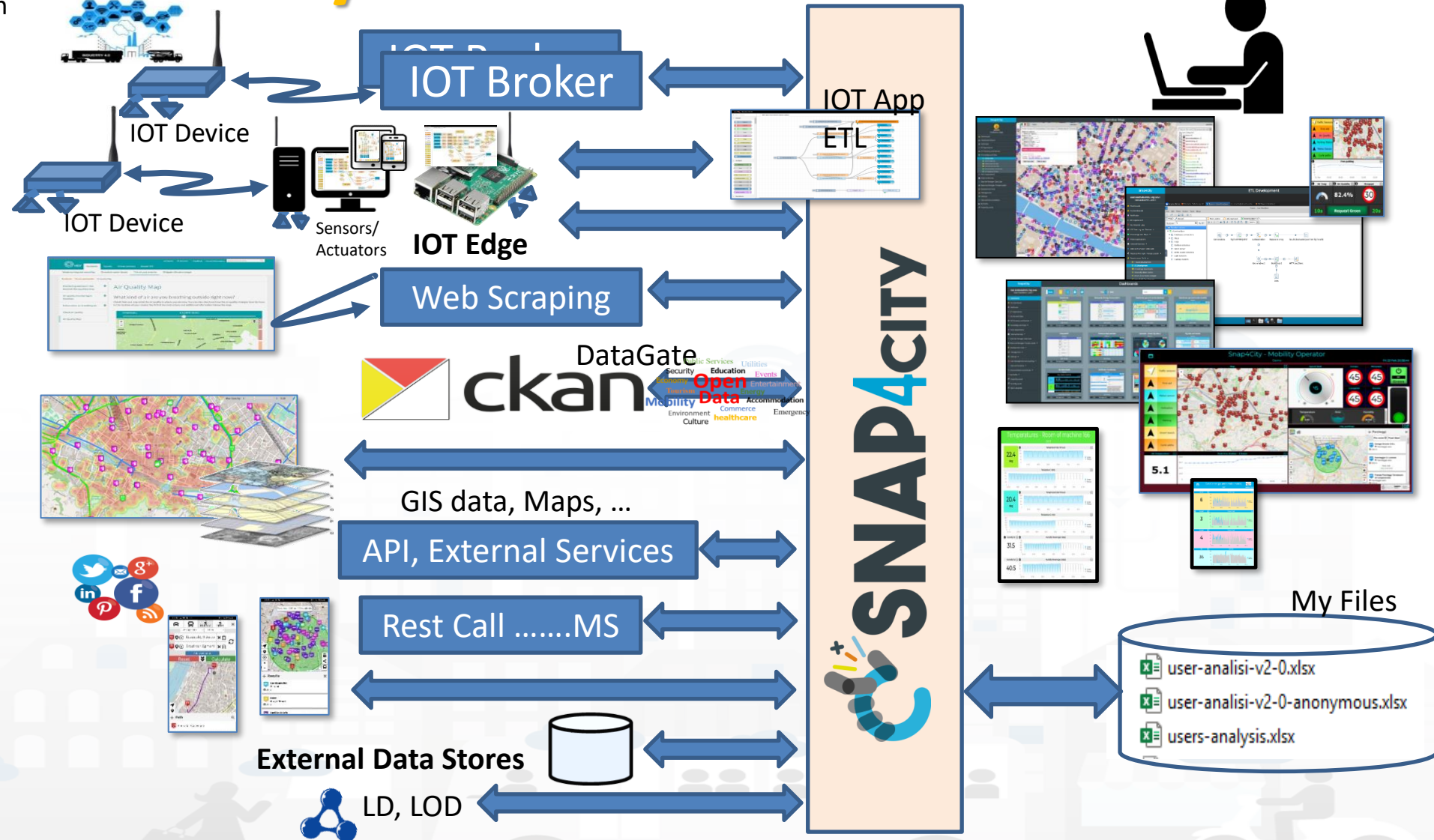
**METHODOLOGIES
COURSES AND COMMUNITY
LIVING LABS
DEVELOPMENT TOOLS**



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							
Inter active							
Video1	 	 	 	 	 	 	 
Video2	 	 	 	 	 	 	 
Video3	 	 	 	 	 	 	 
Video4	 	 	 	none	 	none	none
duration	2:55	3:16	3:41	2:00	2:48	2:35	1:47

Any kind of data and flows



Standards and Interoperability

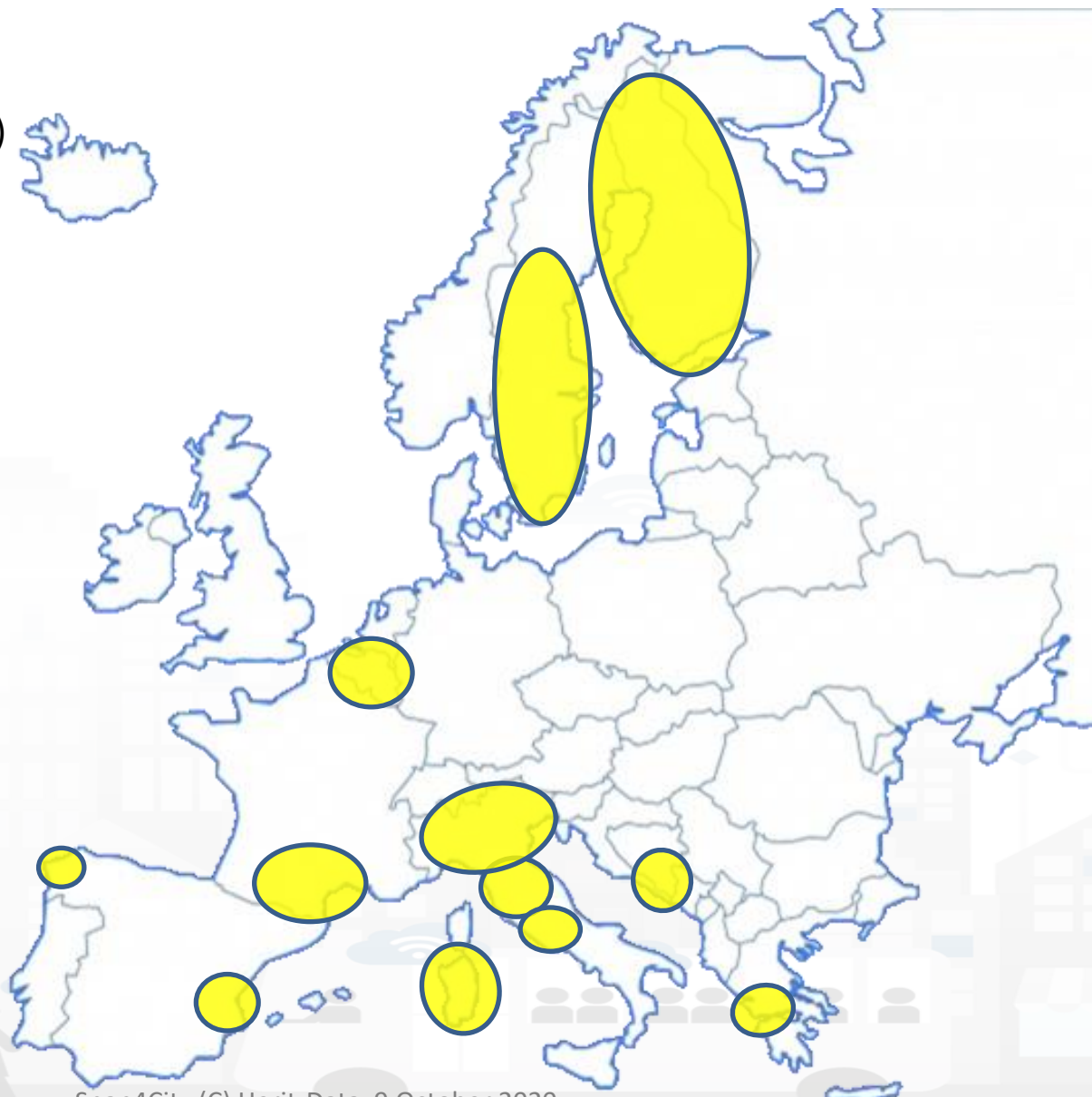
Compliant with: AMQP, COAP, MQTT, OneM2M, HTTP, HTTPS, TLS, Rest Call, SMTP, TCP, UDP, NGSI, LoRa, LoRaWan, TheThingsNetwork, SigFOX, DATEX II, SOAP, WSDL, Twitter, FaceBook, Telegram, SMS, OLAP, MySQL, Mongo, HBASE, SOLR, SPARQL, EMAIL, FTP, FTPS, WebSocket, WebSocket Secure, ModBUS, OPC, GML, RS485, RS232, WFS, WMS, ODBC, JDBC, Elastic Search, Phoenix, XML, JSON, CSV, db, GeoJSON, Enfuser FMI, Android, Raspberry Pi, Local File System, ESP32, Libelium, IBIMET/IBE, OBD2, SVG, XLS, XLSX, TXT, HTML, CSS, KNX, Enocean, Zigbee, DALI, ISEMC, Alexa, Sonoff, HUE Philips, Tplink, etc.

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



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: Builder of Sentient Cities Solutions

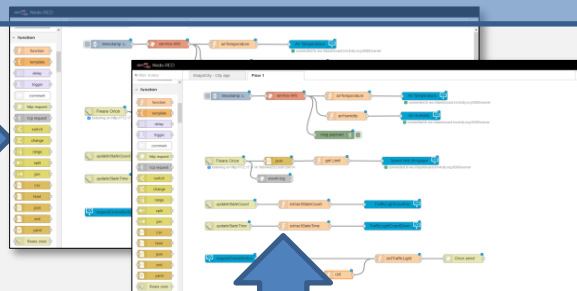
Dashboards with data driven IOT Applications enforcing intelligence

IOT and data World



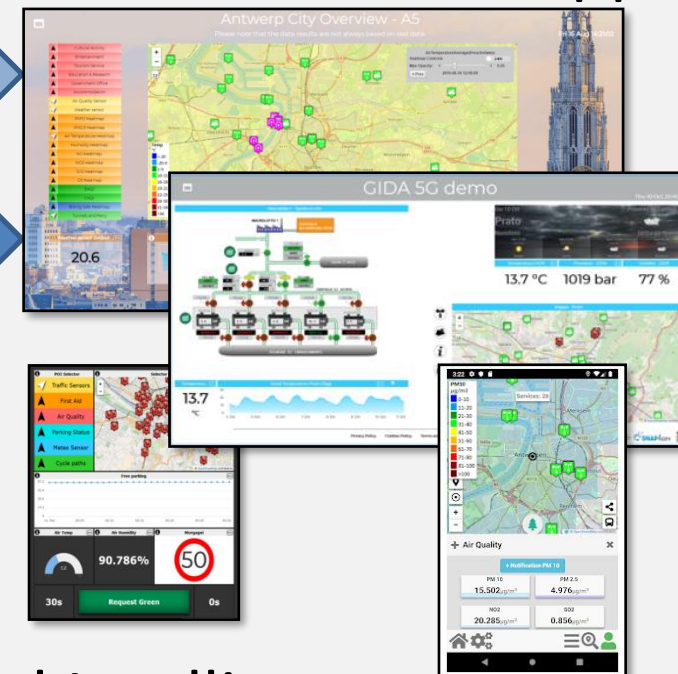
My IOT Devices

IOT Applications



Big Data Analytics, Artificial Intelligence

Dashboards and Apps



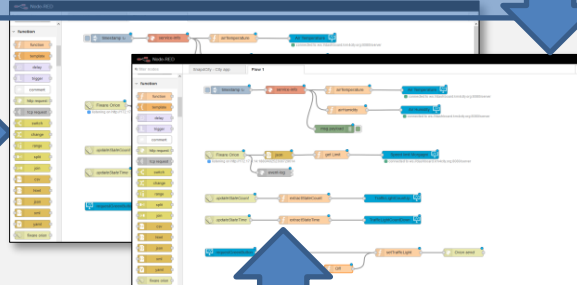
Twitter Vigilance

IOT and data World



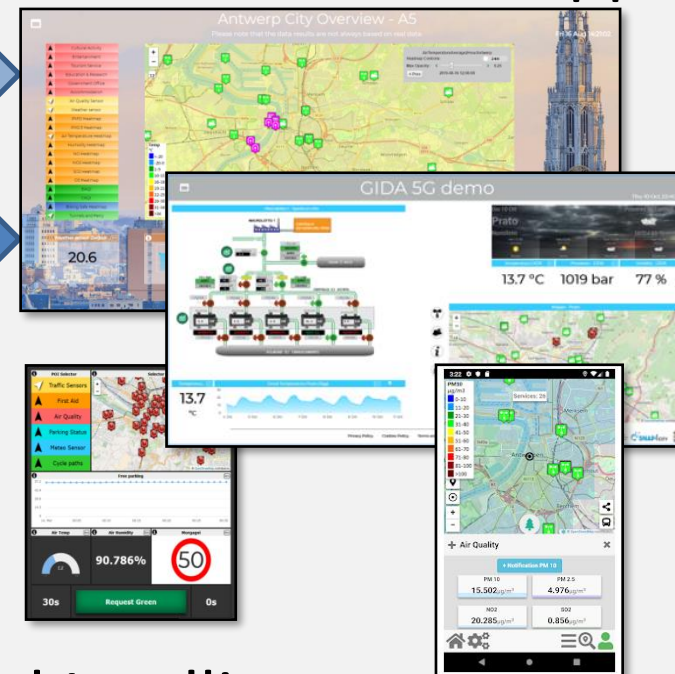
My IOT Devices

IOT Applications




Big Data Analytics, Artificial Intelligence

Dashboards and Apps



Overview

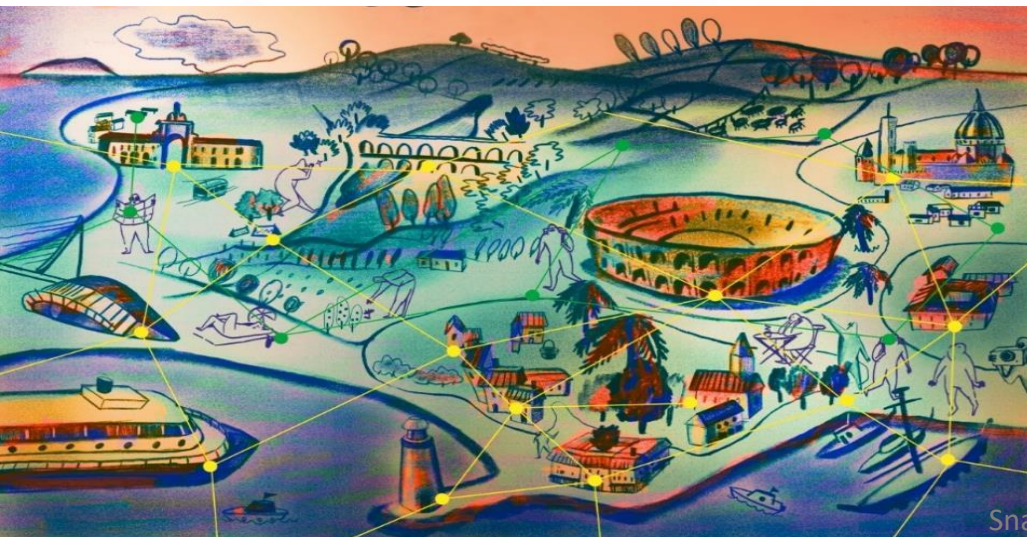
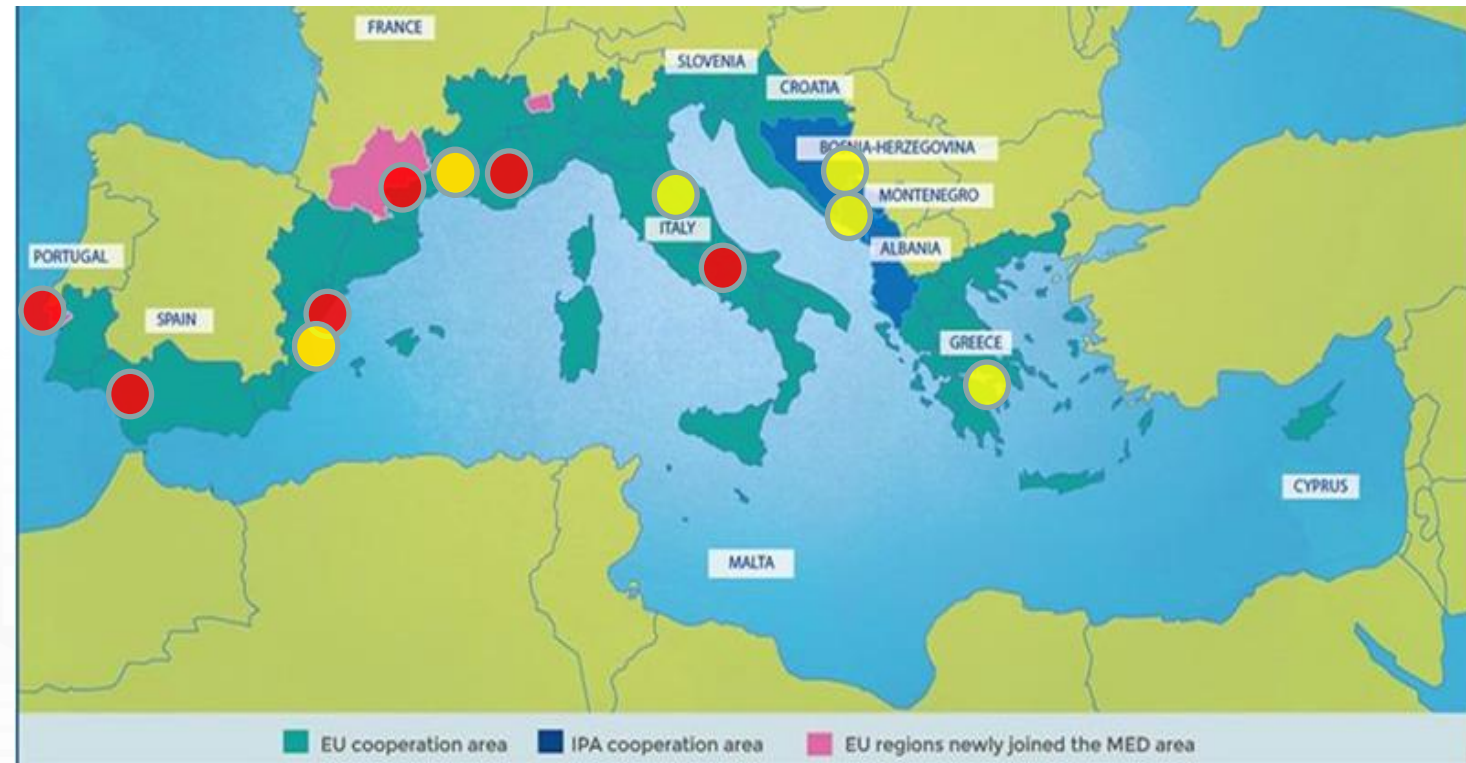
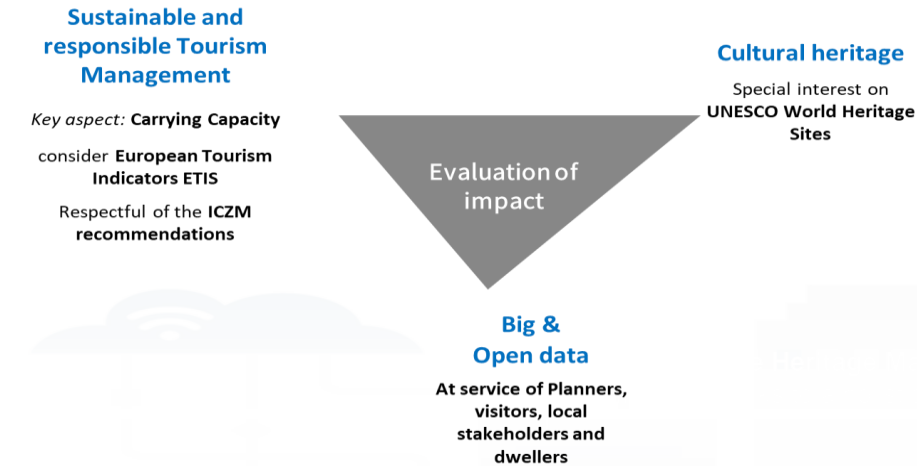
- Snap4City
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Sustainable Heritage Management towards Mass Tourism Impact thanks to a holistic use of **Big and Open Data**

BUDGET: 4.195.515,20 €

- City of Dubrovnik development agency (Croatia)
- Turisme Comunitat Valenciana (Spain)
- AVITEM (France)
- Center for Spatial Research (Bosnia and Herzegovina)
- Conference of peripheral maritime regions of Europe (France)
- Santa Maria Real Foundation for Historical Heritage (Spain)
- Valenciaport Foundation (Spain)
- Foundation for Research and Innovation (Italy)
- Region of Western Greece (Greece)
- Occitanie Region (France)
- Faculty of Sciences and Technology (Portugal)

<https://herit-data.interreg-med.eu/>



Regione Toscana



Fondazione per la ricerca e l'innovazione

Snap4City for Herit-Data



- Which is the goal!
 - Exploiting Big Data and Open Data for understanding and managing Tourism activity
- How
 - Organization on Snap4City portal: <https://www.snap4city.org>
 - Knowledge Base with Maps (ServiceMap)
 - Loading POI, IOT Data real time, and KPI of any kind
 - IOT Applications for data ingestion and transformation
 - IOT Applications for Data Analytics in R studio and/or Python
 - Twitter Monitoring with Twitter Vigilance tool
 - Dashboards and Synoptics

Service Map

The screenshot displays the Snap4City Service Map interface. On the left, a sidebar shows the user's organization (DISIT) and a list of available service maps, including Dubrovnik, Toscana, and various regional maps. The main area is split into two map views. The top map, 'Dubrovnik Service Map', shows a map of Dubrovnik with a pop-up window for 'camera_Dubrovnik_2_Buza' displaying sensor data. The bottom map, 'Service Map (Toscana)', shows a map of Tuscany with a pop-up window for 'FI055ZTL00401' displaying traffic sensor data. Both maps include a sidebar with service categories and a search bar.

Dubrovnik Service Map

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

camera_Dubrovnik_2_Buza

Serviceurl: http://www.disit.org/km4city/resource/tutor/Dubrovnik/camera_Dubrovnik_2_Buza
Name: sensorDubrovnikUNIFI/Dubrovnik/camera_Dubrovnik_2_Buza
Nature: TransferServiceAndRenting
Subnature: Monitoring_camera

Property/Value Type	Value
dataObserved	2020-09-24T12:45:00.000Z
meanPeopleEnter	65.9
meanPeopleExit	65.9

Latest Update: 2020-09-24T14:45:00.000+02:00

Service Map (Toscana)

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

Actual Selection
Service: FI055ZTL00401

FI055ZTL00401

Serviceurl: http://www.disit.org/km4city/resource/FI055ZTL00401
Name: FI055ZTL00401
Nature: TransferServiceAndRenting
Subnature: SensorSite
Address: VIA DEL CAMPUCCIO

Property/Value Type	Value
avgDistance	Not Available
avgTime	Not Available
occupancy	Not Available
concentration	0
vehicleFlow	84
averageSpeed	0.0
thresholdPerc	Not Available
speedPercentile	Not Available
congestionLevel	Not Available
anomalyLevel	Not Available

Latest Update: 2020-10-01T12:31:00+02:00

Services Categories

- ☒ De/Select All
- ☒ Accommodation
- ☒ Advertising
- ☒ AgricultureAndLivestock
- ☒ CivilAndEdiEngineering
- ☒ CulturalActivity
- ☒ EducationAndResearch
- ☒ Emergency
- ☒ Entertainment
- ☒ Environment
- ☒ FinancialService
- ☒ GovernmentOffice
- ☒ HealthCare
- ☒ IndustryAndManufacturing
- ☒ IoTDevice
- ☒ MiningAndQuarrying
- ☒ ShoppingAndService
- ☒ TourismService
- ☒ TransferServiceAndRenting
- ☒ UtilitiesAndSupply
- ☒ Wholesale
- ☒ WineAndFood

Filter:

search text into service

Service providing value type: select value type

N. results: 500

Search Range: visible area

Search Area: select...

Search Results

Services 500 of 24120 available

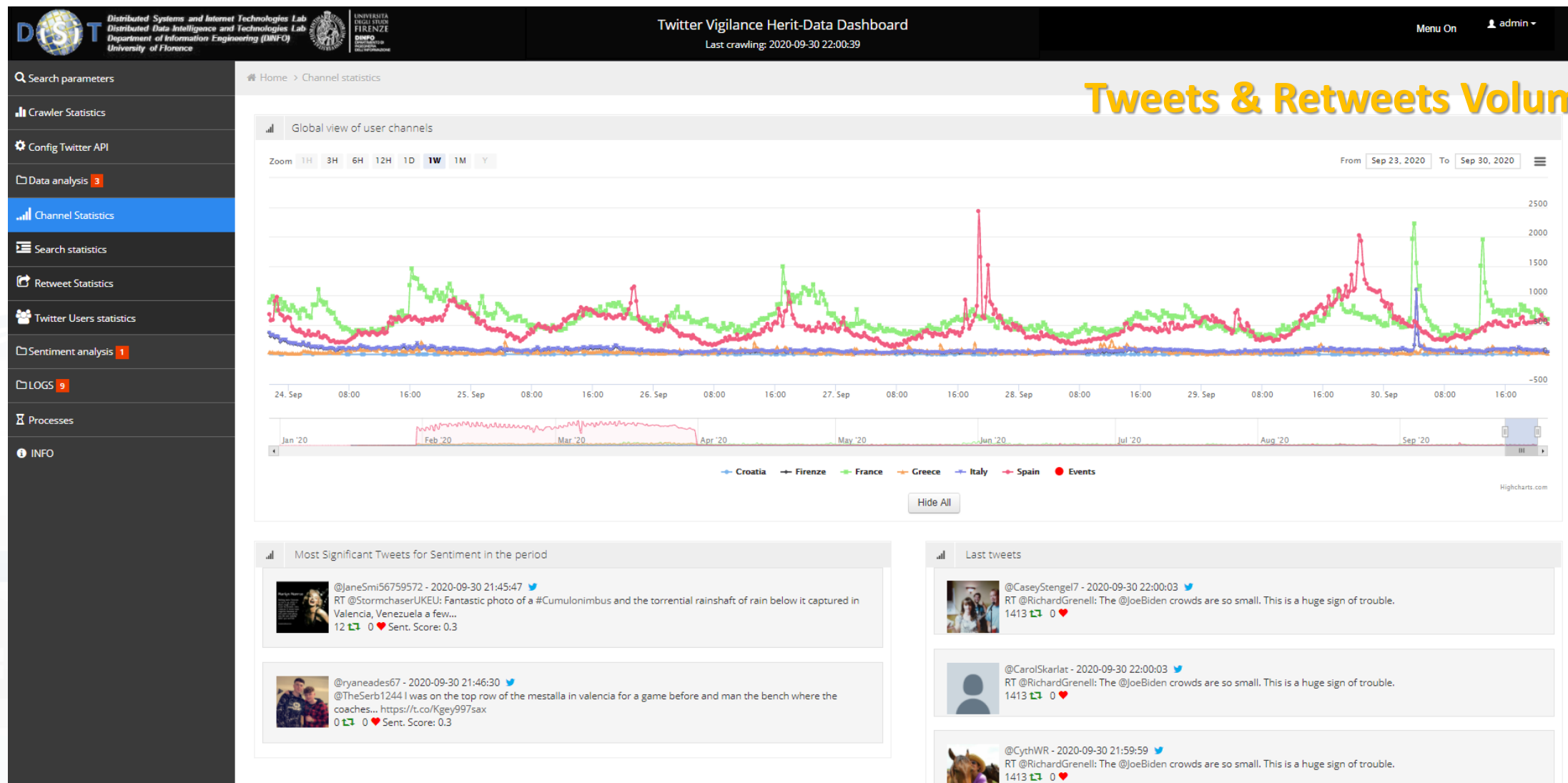
Dubrovnik IoT App

For 6 cameras:

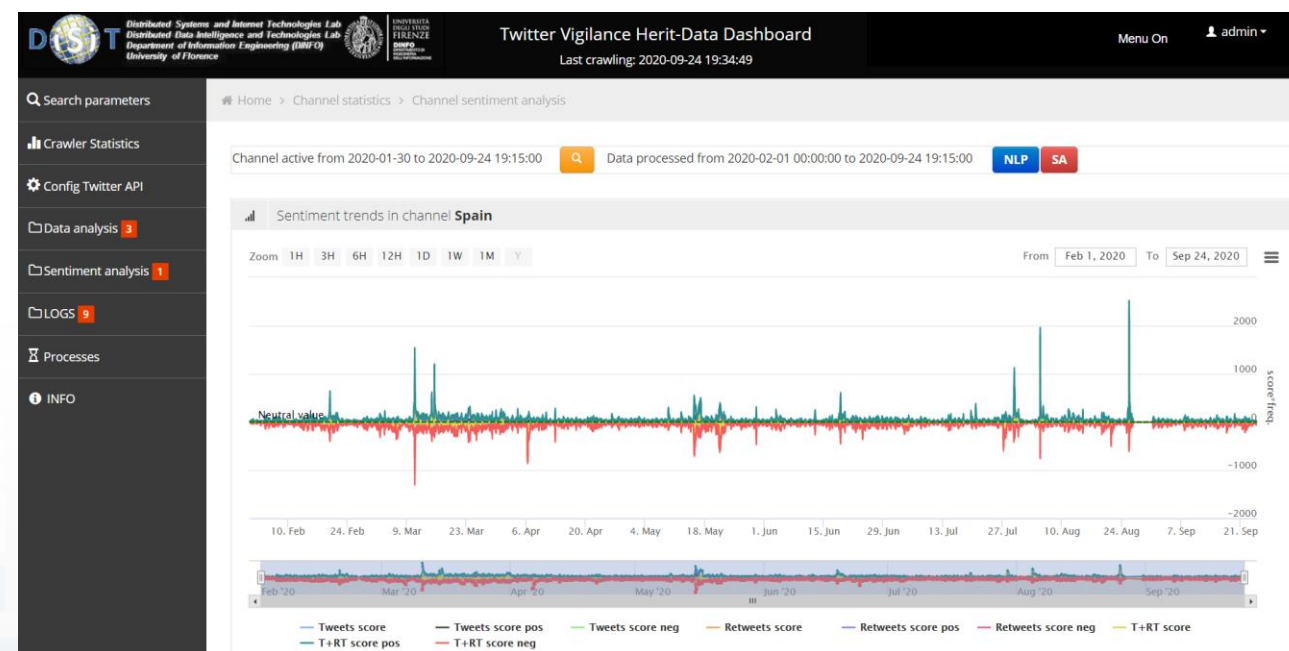
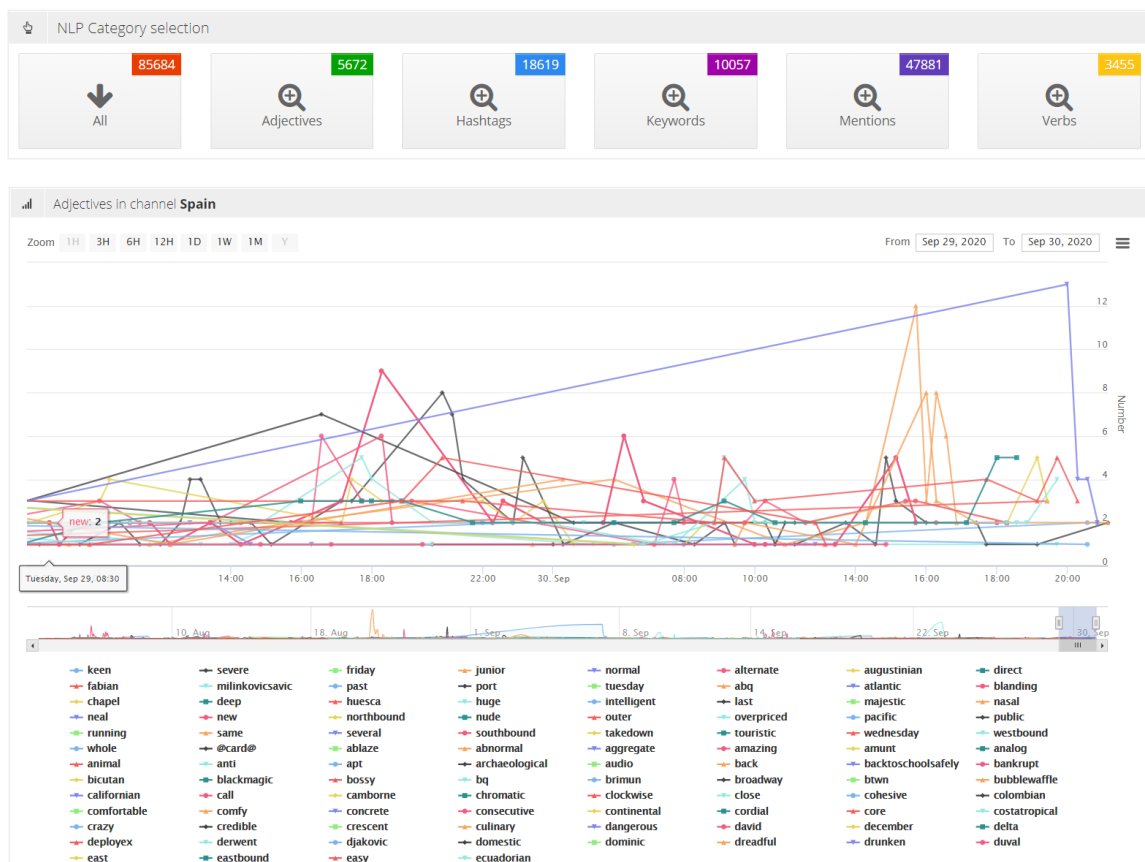
- Dubrovnik_Camera:
 - Static and real time data on 6 cameras (<https://iot-app.snap4city.org/nodered/nrgaxea>)

For downtown:

- camera_Dubrovnik_downto
wn:
 - Historical data (<https://iot-app.snap4city.org/nodered/nrgz66p>)
- camera_Dubrovnik_downto
wn_Realtime:
 - Real time data (<https://iot-app.snap4city.org/nodered/nrq2nd3>)



NLP & Sentiment Analysis



Twitter Vigilance Herit-Data: *Some Numbers*

Channel Name	Total Number of Collected TW+RTW	Number of Collected Tweets	Number of Collected Retweets	Twitter Volume Processing Time Range	NLP & Sentiment Analysis Processing Time Range	NLP & Sentiment Analysis Languages
<i>Spain</i>	94.7 Millions	34.5 Millions	60.2 Millions	From 30-01-2020 to current datetime	From 01-02-2020 to current datetime	English
<i>France</i>	15.8 Millions	3.7 Millions	12.1 Millions	From 30-01-2020 to current datetime	From 01-02-2020 to current datetime	Italian, English
<i>Greece</i>	9.6 Millions	3 Millions	6.6 Millions	From 30-01-2020 to current datetime	From 01-02-2020 to current datetime	English
<i>Italy</i>	762 Thousands	264 Thousands	498 Thousands	From 30-01-2020 to current datetime	From 01-02-2020 to current datetime	Italian, English
<i>Croatia</i>	14 Thousands	5.3 Thousands	8.7 Thousands	From 30-01-2020 to current datetime	From 01-02-2020 to current datetime	English

- For Spain: 87 million of TW taken for too generic keys
- For France: 8.2 Million of TW taken for too generic keys

Dashboards (1)

<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddashboard=MjQ4Nw==>

Dubrovnik Old Town Free WiFi HotSpot Locations

Fri 25 Sep 13:44:22

Selector	
➤	Free WiFi HotSpot Old Town 1
➤	Free WiFi HotSpot Old Town 2
➤	Free WiFi HotSpot Old Town 3
➤	Free WiFi HotSpot Old Town 4
➤	Free WiFi HotSpot Old Town 5
➤	Free WiFi HotSpot Old Town 6
➤	Free WiFi HotSpot Old Town 7
➤	Free WiFi HotSpot Old Town 8

Selector - Map

Privacy Policy

Cookies Policy

Terms and Conditions

Dev. by partner

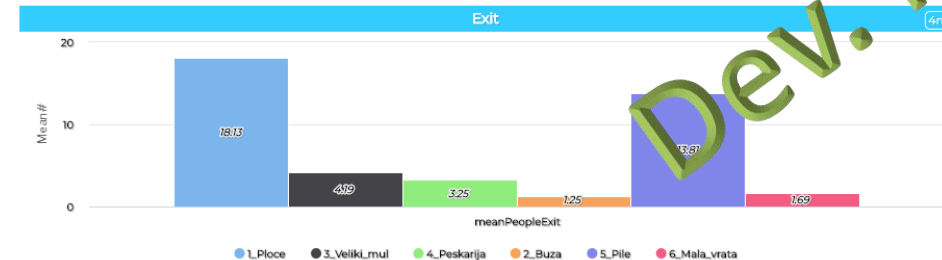
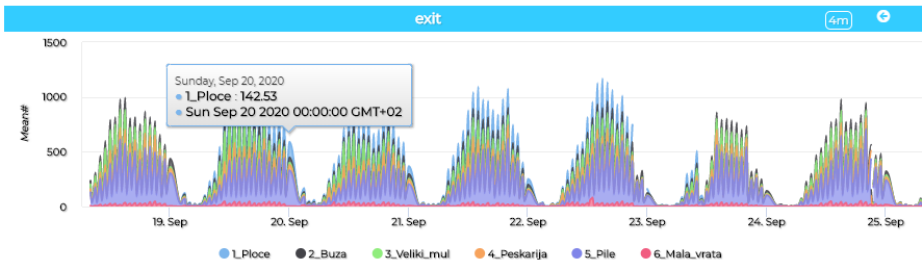
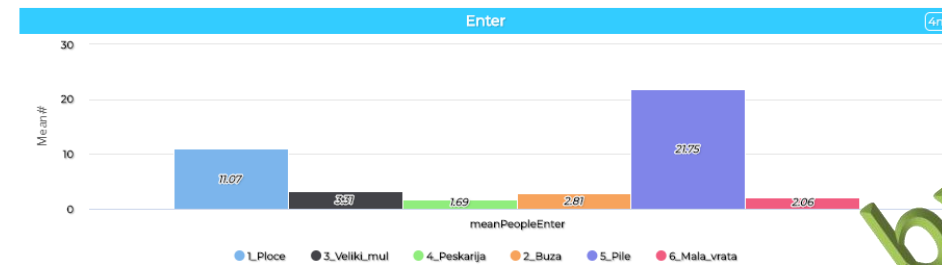
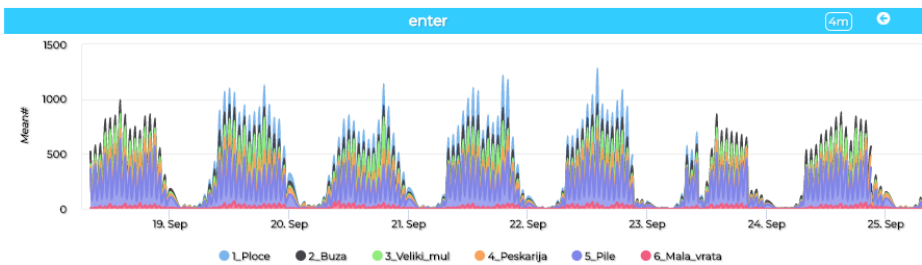
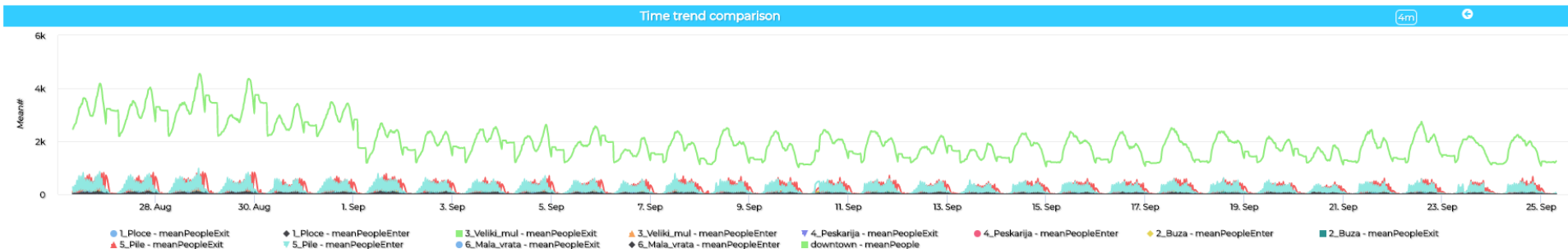
Dashboards (2)

<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddashboard=Mjg5Mw==>



HeritData Dubrovnik Demo

Fri 25 Sep 07:48:37



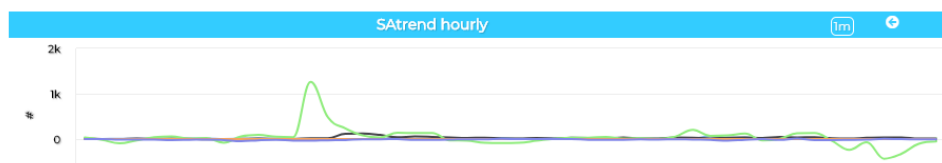
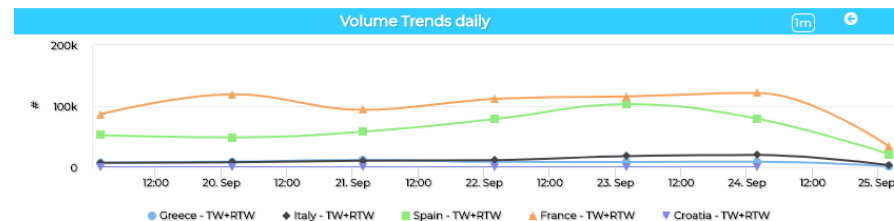
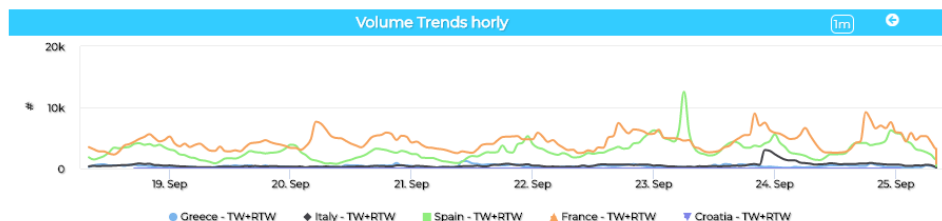
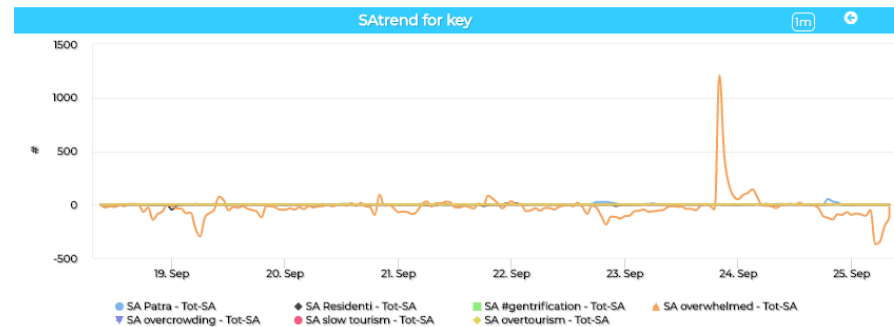
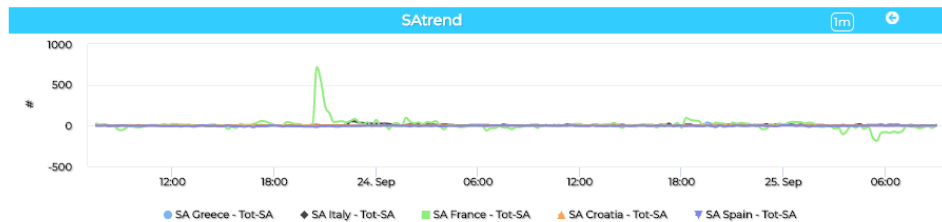
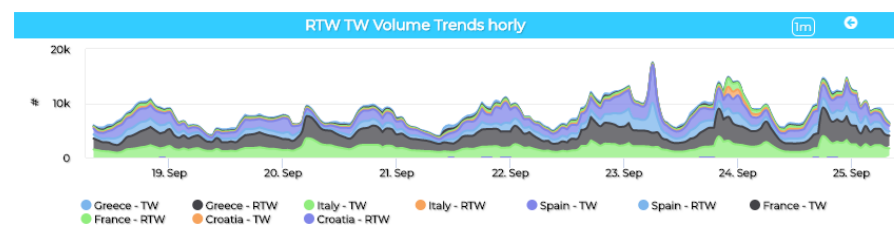
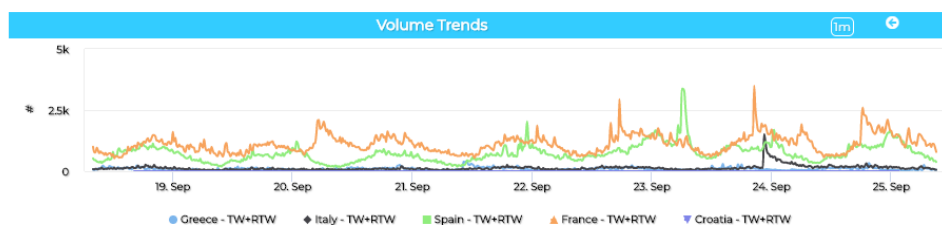
Twitter Vigilance Data on Dashboards through IoT-App

<https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=Mjc3NQ==>

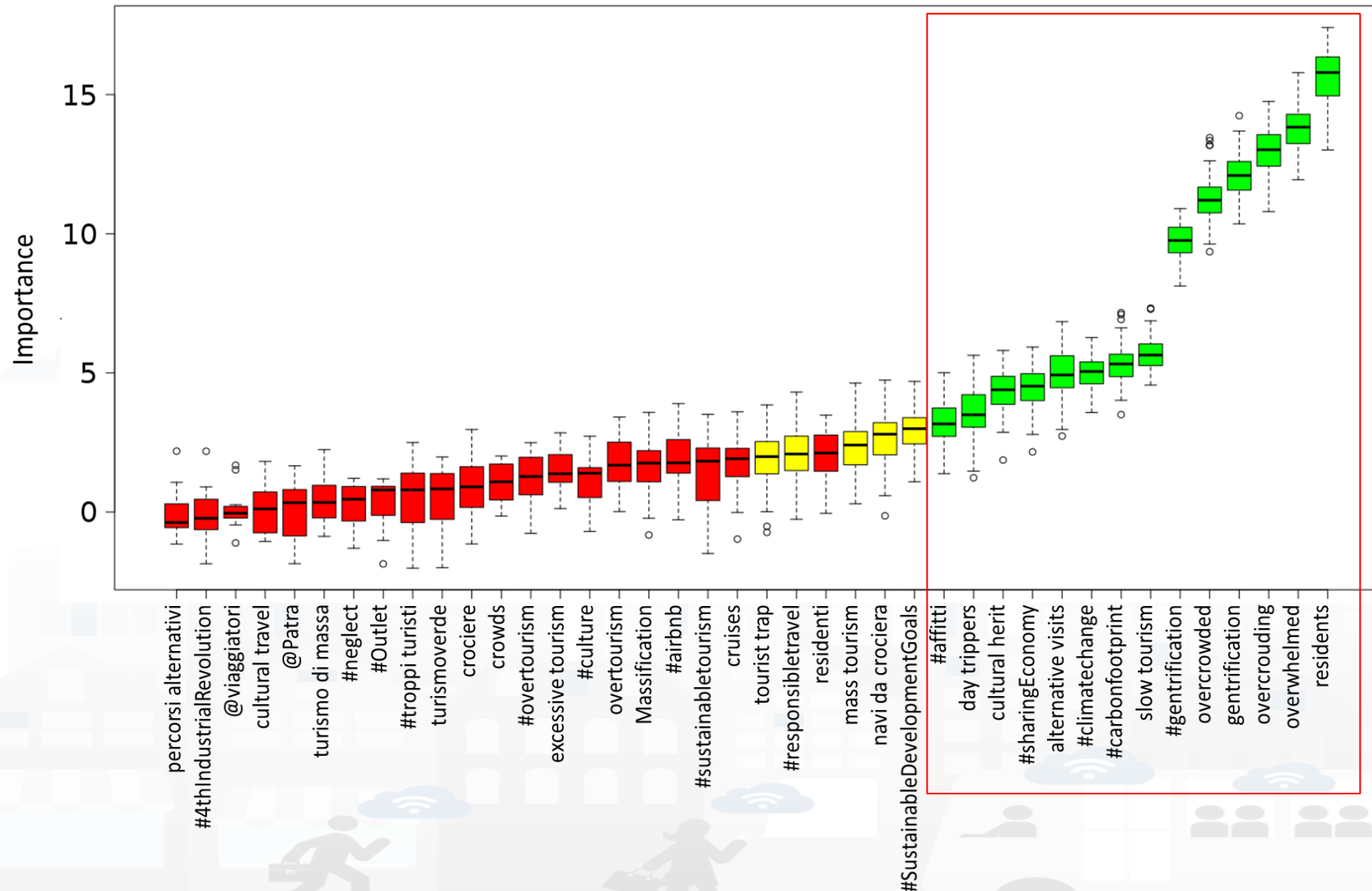


HeritData TW Demo

Fri 25 Sep 07:53:36



Relevant Feature Selection - Italy



Random Forest Model
Results exploiting the
confirmed keys:

- Accuracy = 0.90
- Kappa index = 0.81

Overview

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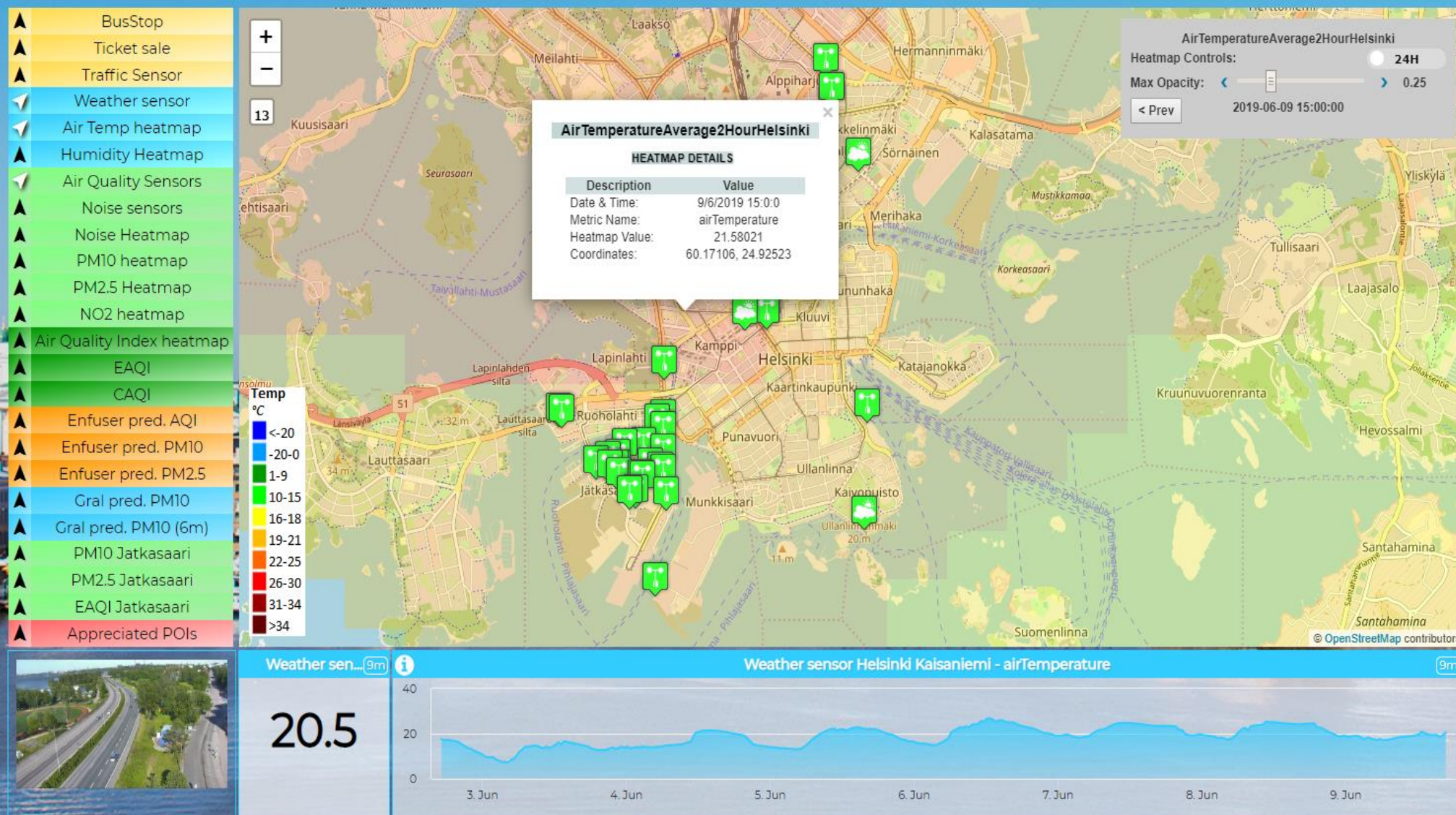




Helsinki City Overview (H5a)

Please note that the data results are not always based on real data.

Sun 9 Jun 17:07:25



The Life of Helsinki

Documentation

Forum
Discussion

Survey

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



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FORUM

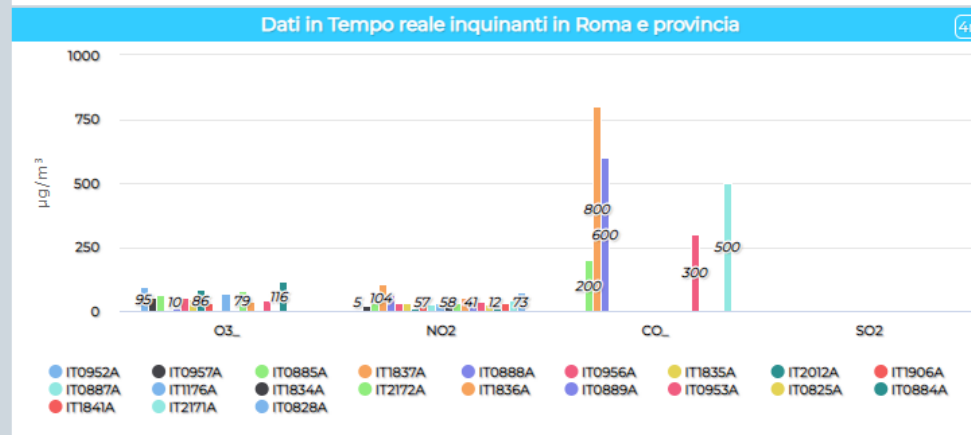
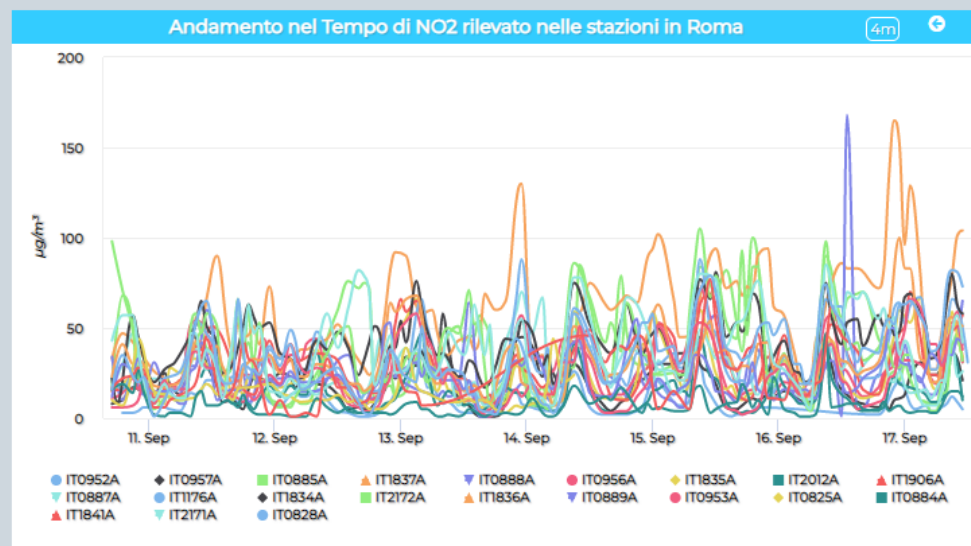
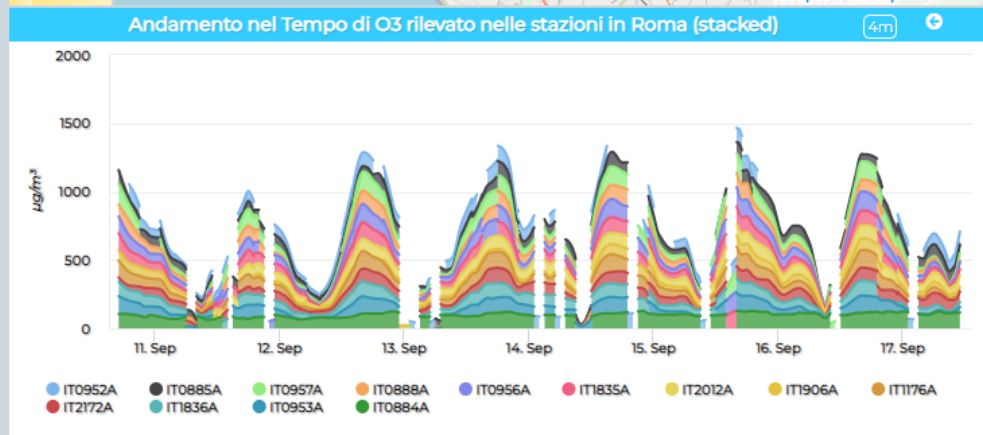
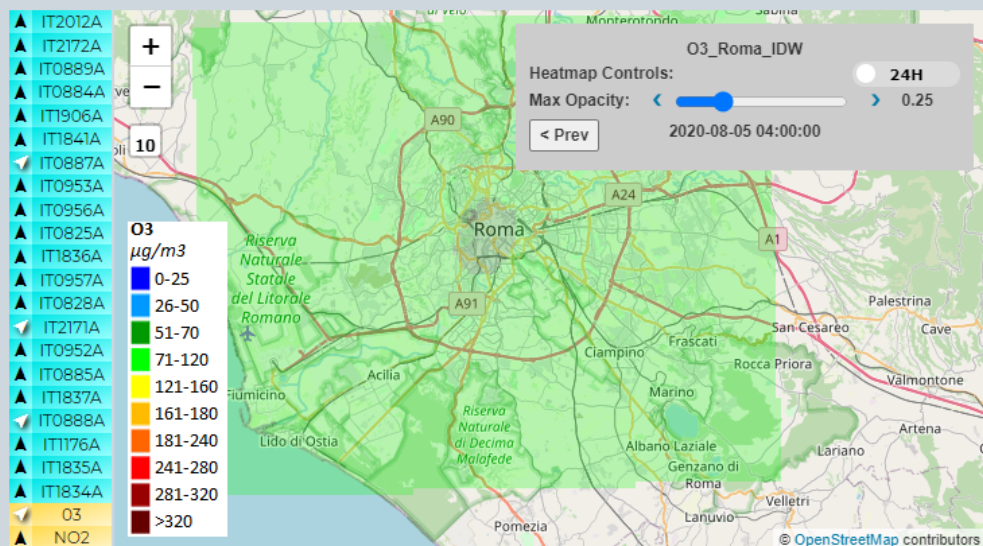
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DIGITAL INFORMATION
SYSTEMS

SNAP4CITY



Roma Demo3 (Qualità dell'Aria)

Thu 17 Sep 16:13:28

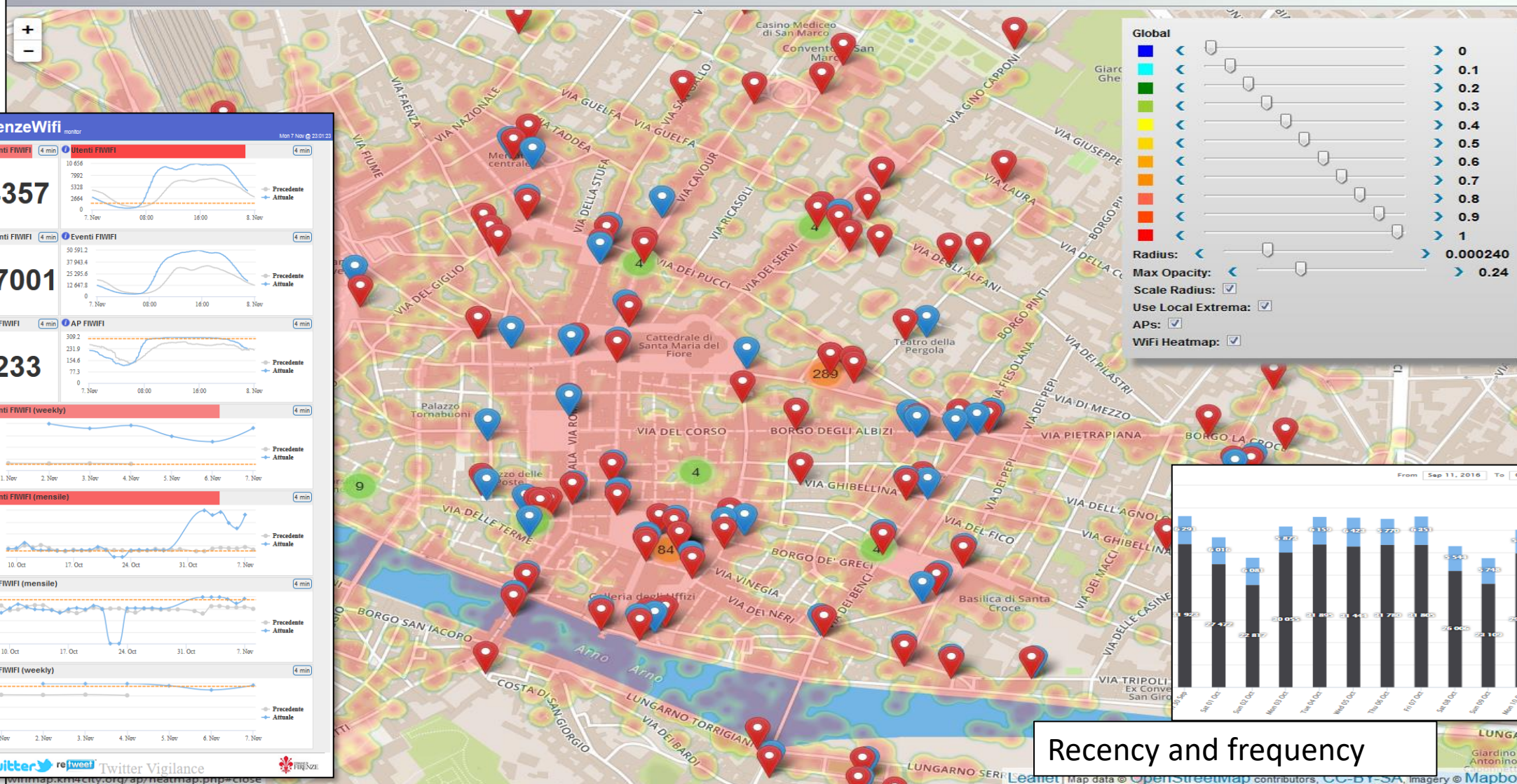


Valori Inquinanti in tempo reale, mappe				
value type / value name	O3_	NO2_	CO_	SO2_
IT0952A	95	5		
IT0957A	54	21		
IT0885A	65	31	200	
IT1837A		104	800	
IT0888A	10	65	600	
IT0956A	51	31		
IT1835A	48	34		
IT2012A	86	10		
IT1906A	30	57		
IT0887A		26		
IT1176A	67	31		
IT1834A		58		
IT2172A	79	32		
IT1836A	36	51		
IT0953A	40	38	300	1.2
IT0889A		41		
IT0825A		24		
IT0884A	116	12		
IT1841A		29		
IT2171A		42	500	
IT0828A		73		

Home

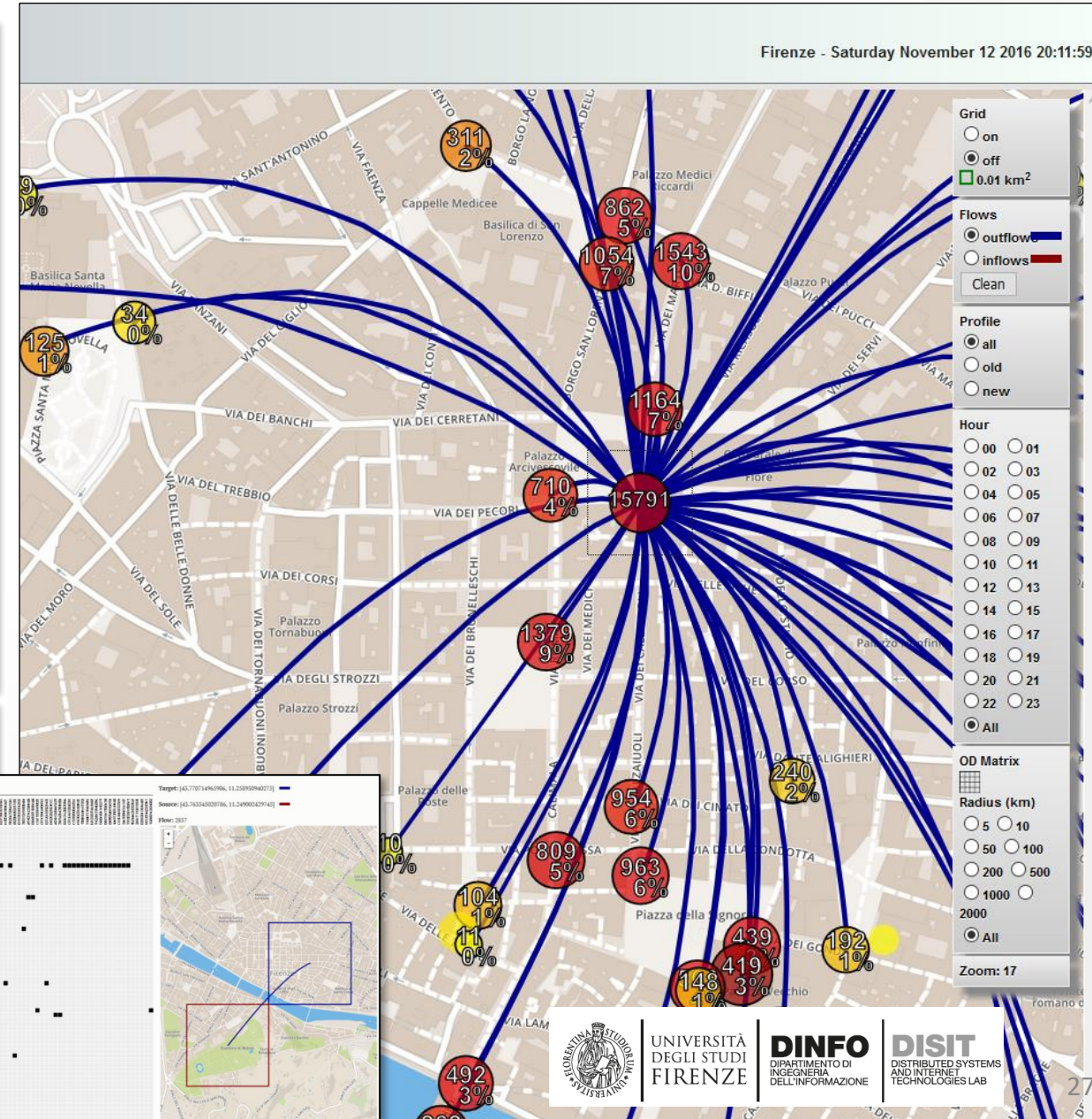
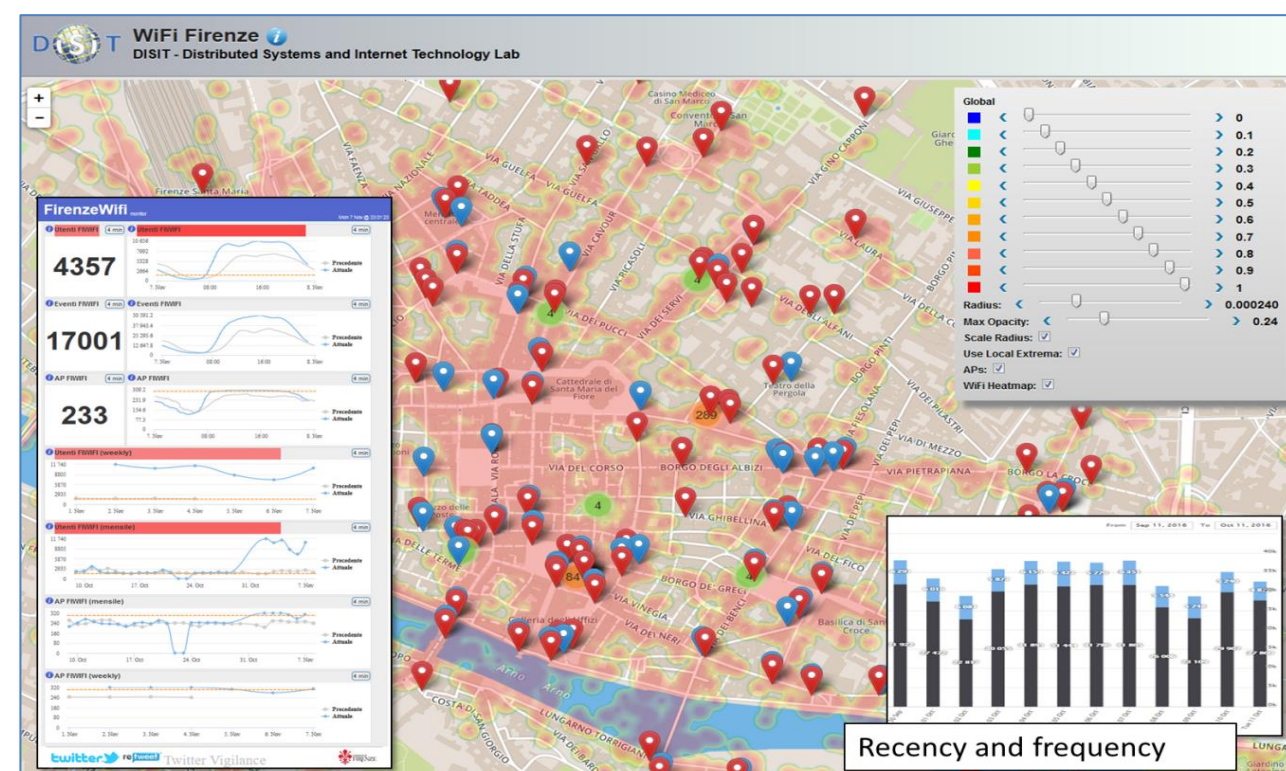
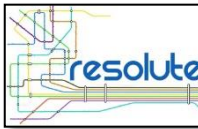
Trasporti

WiFi Firenze
DISIT - Distributed Systems and Internet Technology Lab

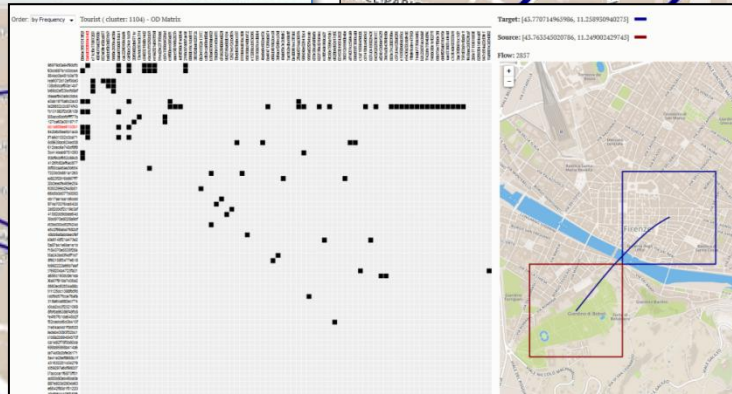


Recency and frequency

Origin Destination Matrix Estimation



Wi-Fi based



Characterizing City Areas by User Behavior

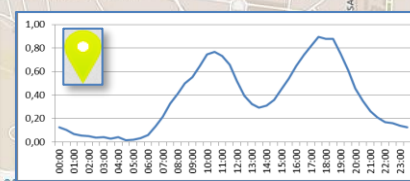
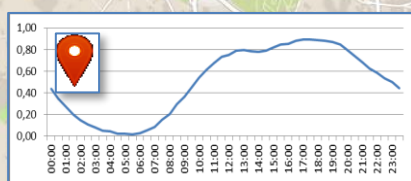
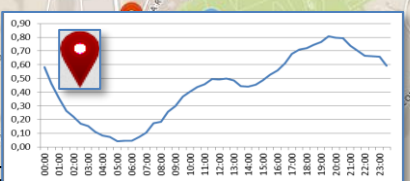
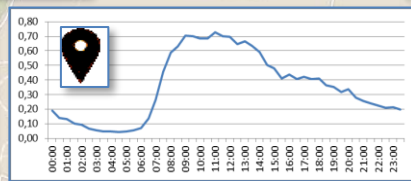
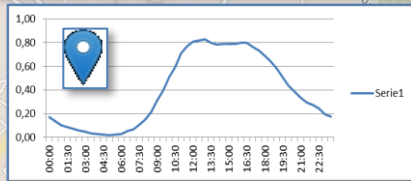
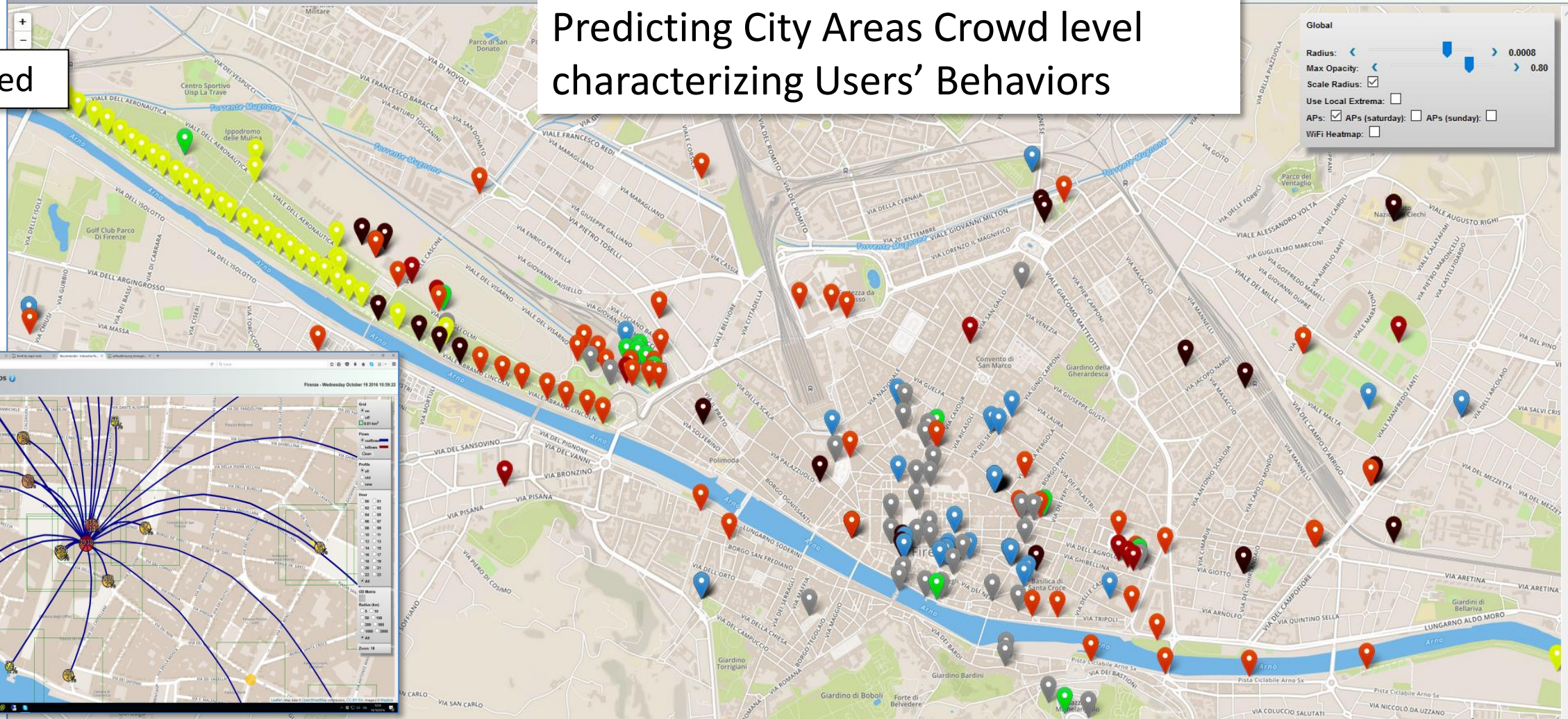


Wi-Fi based

DISIT Firenze Wi-Fi: Access Points Clusters Coverage Map
DISIT - Distributed Systems and Internet Technologies Lab

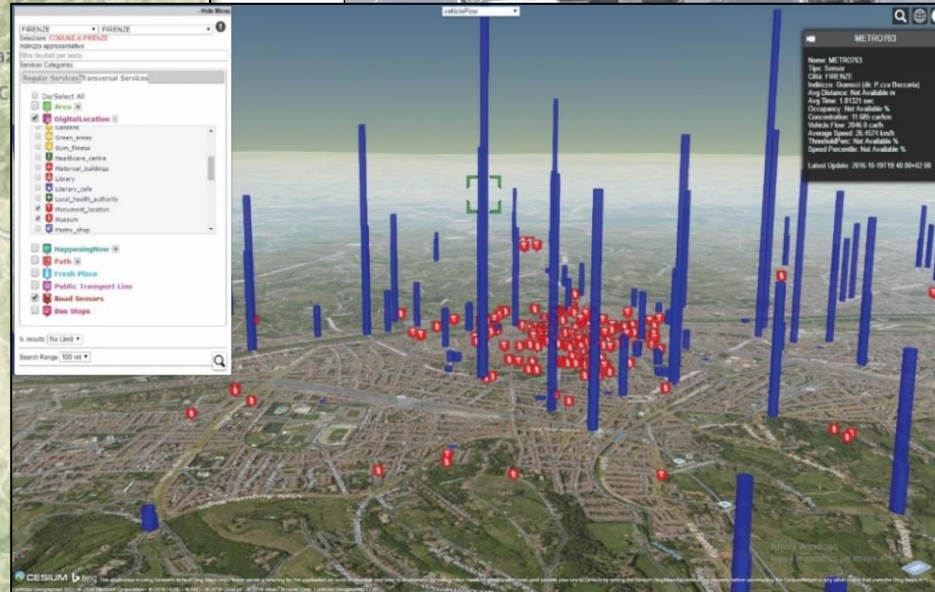
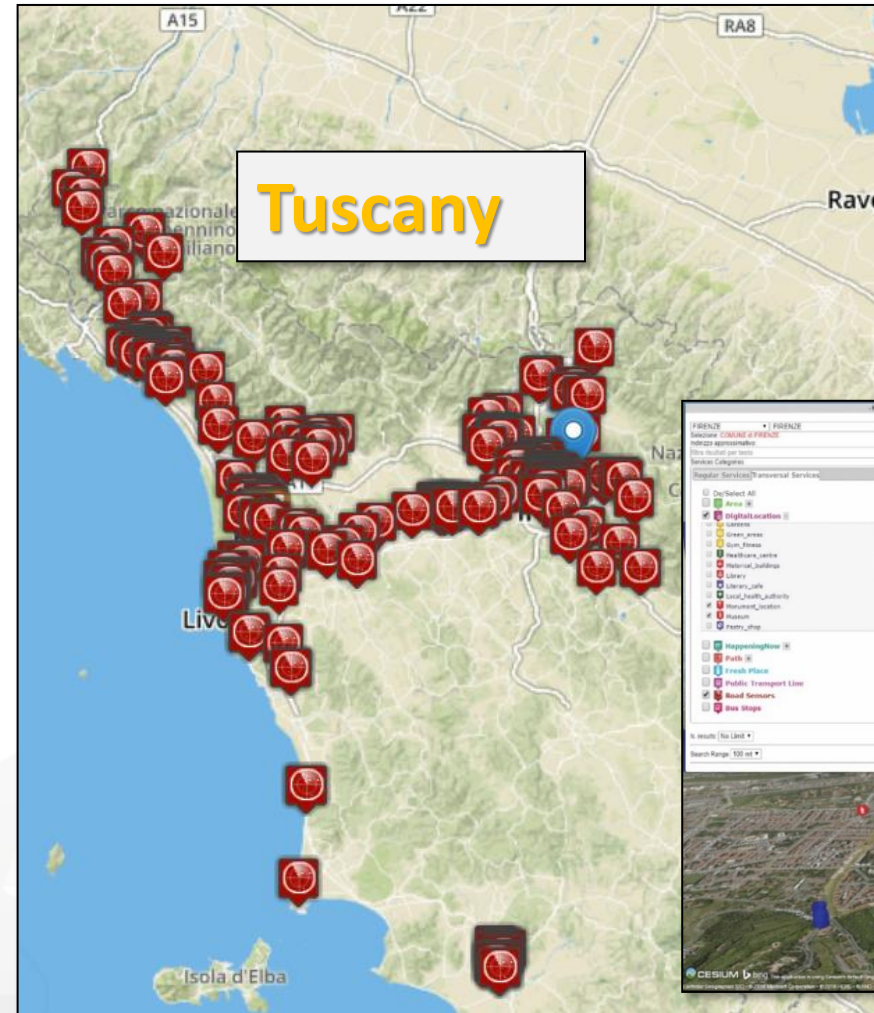
Firenze - Saturday November 12 2016 19:16:33

Predicting City Areas Crowd level
characterizing Users' Behaviors



Traffic Flow Tools

Spire and Virtual Spires (cameras), Bluetooth, ...
Specifically located: along, around, on gates, on x...



Traffic Flow data



Prediction/Assessment

- Football game results as related to the volume of Tweets
- Number of votes on political elections, via sentiment analysis, SA
- Size and inception of contagious diseases
- marketability of consumer goods
- public health seasonal flu
- box-office revenues for movies
- places to be visited, most visited
- number of people in locations like airports
- audience of TV programmes, political TV shows
- weather forecast information
- Appreciation of services

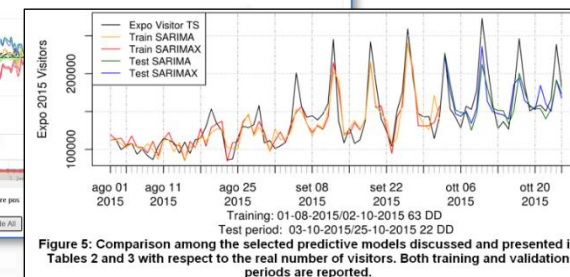
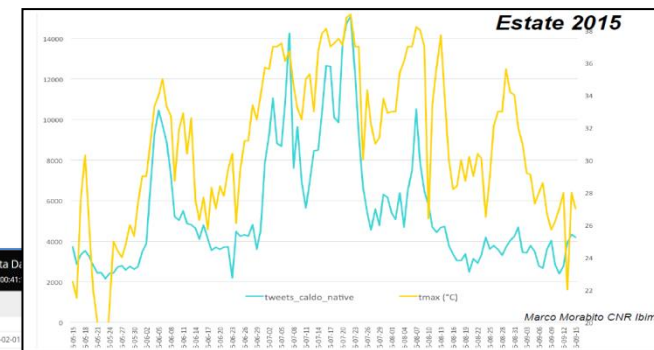
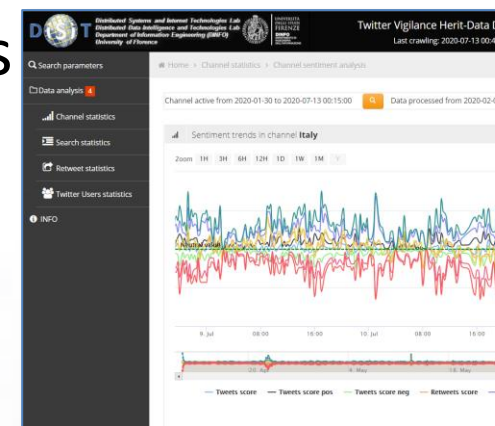
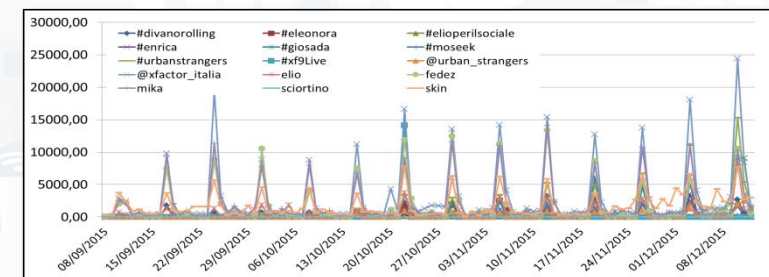


Figure 5: Comparison among the selected predictive models discussed and presented in Tables 2 and 3 with respect to the real number of visitors. Both training and validation periods are reported.



DATA ANALYTICS

- **Resilience**
 - Resilience and risk analysis
 - Early warning computation
 - What-if analysis, dynamic routing, origin destination matrices production from a large range of sources
- **Mobility and transport**
 - Traffic flow reconstruction from sensors and other sources: parking predictions: wi-fi people flow prediction and reconstruction
 - Analysis of the demand vs offer of mobility according to public transportation and multiple data sources
 - Traffic flow predictions, Accidents heatmaps
- **Environment and weather**
 - NOX pollution prediction on the basis of traffic flow, 48 hours see
 - Pollution prediction at 48 hours, every hour
- **User and Social**
 - User engagement for sustainable mobility
 - User's behaviour analysis, data reconstruction and calibration
 - People flow analysis from PAX Counters
 - Social media analysis on specific channel, specific keywords: see Twitter Vigilance, for NLP and Sentiment Analysis, SA
 - ReTweet proneness, retweet-ability of tweets
 - Audience prediction to TV channels and physical events
- **Generic**
 - Data quality assessment, prediction, anomaly detection
 - Maintenance prediction and costs predictions

**Thanks for
your attention !**