

Convegno

ASSICURAZIONE E NUOVE TECNOLOGIE

Firenze, Palazzo Incontri, Via dei Pucci 1

Venerdì 2 febbraio 2018



centro per lo studio delle istituzioni finanziarie
promosso dalla fondazione cassa di risparmio di firenze



ASSOCIAZIONE INTERNAZIONALE DI DIRITTO DELLE ASSICURAZIONI
ASSOCIATION INTERNATIONALE DE DROIT DES ASSURANCES
INTERNATIONAL ASSOCIATION FOR INSURANCE LAW
INTERNATIONALE VEREINIGUNG FÜR VERSICHERUNGSRECHT
ASOCIACION INTERNACIONAL DE DERECHO DE SEGUROS

SEZIONE TOSCANA



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Smart Cities.



Un nuovo modo di concepire la mobilita' Urbana

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

Paolo Nesi, paolo.nesi@unifi.it

www.Km4City.org



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ore 9.00 - 17.00



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Km4City Roadmap



SELECT
for Cities

Snap4City

- IOT/IOE
- Monitoring
- Smart City IOT integration
- Living Lab

5G

Smart City vs
IOT, Industria 4.0

6/2018

SMARTCITY
EXPO WORLD CONGRESS

11/2018

2021



12/2017

WEEE
2017-2020

6/2017

- waste
- Territorial areas and paths
- Health, Bike sharing
- Statistics, Energy, ICT, ...
- E-vehicles

- Risk analysis
- Environmental, water
- Data Licensing models
- Energy Meters
- Fi-Ware compliant



- More Sensors, IOE, IOT
- Dashboard Builder
- Territorial areas and paths
- User Engagement
- Mobility and transport
- Resilience Decision Support

GHOST SIR
2016-2019 - Started



- Suggestions on demand
- User Behaviour Analysis
- Trajectories and OD



Km4City 1.5
- SmartDS
- Km4City App

RESolute H2020
2015-2018 - Started



Sii-Mobility SCN
2016-2018 - Started
Km4City 1.6.2

2015

Km4City 1.4

- Embed
- More API
- iBeacon

API

Twitter Vigilance

2016

REPLICATE H2020
2016-2021 - Started



Km4City 1.1

- Tuscany Map
- Services
- AVM
- Sensors
- Parking
- Cultural Heritage
- Enrichment cities
- Event in the city
- Digital Locations
- Fresh places

- <http://servicemap.km4city.org>
- <http://log.disit.org>
- <http://www.disit.org/fodd>
- <http://www.disit.org/tv>
- <http://smartds.km4city.org>

- Weather
- Cultural Heritage
- Energy recharge pillar
- Wi-Fi
- Events in the city

2014

Transport systems
Mobility, parking



Public Services
Govern, events, ...



Sensors, IOT
Cameras, ..



Environment,
Water, energy



Shops, services,
operators



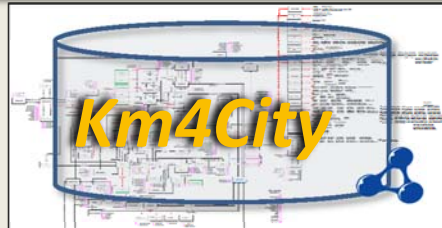
Social Media
WiFi, network



Static, Slow and Real Time data flows

DISCES -- Distributed and parallel architecture on Cloud

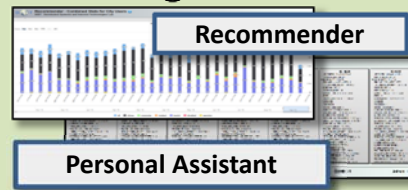
Km4City Smart City Engine



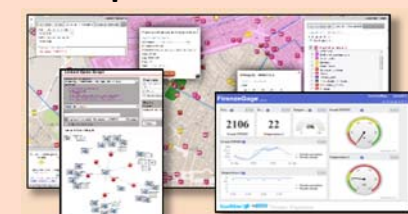
Big Data Analytics



Smartening Tools



Development Tools



Km4City Smart City API

City Operators and Decision Makers

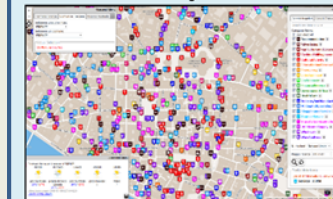
Dashboards



Smart Decision Support



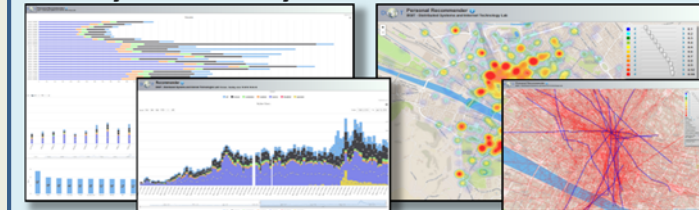
ServiceMap browser



Twitter Vigilance



Analyzers of City User Behavior



Tools for Final Users

Mobile e Web Apps



[Http://www.km4city.org](http://www.km4city.org)

DISIT lab, Gennaio 2018

**Present data on
Tuscany Region
January 2018**



Previs
Giovedì
Venerdì
Sabato
poco nuvoloso
23°C / 27°C
schiarite
20°C / 33°C
poco nuvoloso
velato

Road Graph (Tuscany region)

132,923 Roads , 389,711 Road Elements

318,160 Road Nodes, 1,508,207 Street Numbers

Info on: points, paths, areas, etc.

Services (20 cat, 512 cat.)

16 Public Transport Operators

21.280 Bus stops & 1081 bus lines

Dynamic/real-time in Tuscany Region

- Real time bus lines: 144 updates X day X line
- 1081 Transport Pub Lines: 1-2 up per day, time-path
- >210 parking lots status: 76 updates X day X sensor
- >796 traffic Sensors: 288 updates X day X sensor
- 285 weather area: 2 updates X day X area
- >12 hospital Triage status: 96 updates X day X FA
- 22 Environmental data: 20 updates X day X sensor
- 39 Bike Sharing data: Pisa and Siena
- 12 Pollination data
- 140 recharging stations
- Smart benches, waste mng, irrigators, lighting,...
- Florence ent.events: about 60 new events X day
- Different kinds of Florence traffic events,
- [1600 Fuel stations: 1 update X day X station]
- Wi-Fi: > 400.000 measures X day
- App mobiles: >50.000 measures X day
- more than 40.000 distinct users X day
- From 600.000 to 4.5 M Tweets X day
- many IOT sensors

Servizi Regolari Servizi Trasversali

search text into service

Categorie Servizi

☒ De/Select All

☒ Accommodation +

☒ Advertising +

☒ AgricultureAndLivestock +

☒ CivilAndEdilEngineering +

☒ CulturalActivity +

☒ EducationAndResearch +

☒ Emergency +

☒ Entertainment +

☒ Environment +

☒ FinancialService +

☒ GovernmentOffice +

☒ HealthCare +

☒ IndustryAndManufacturing +

☒ MiningAndQuarrying +

☒ ShoppingAndService +

☒ TourismService +

☒ TransferServiceAndRenting +

☒ UtilitiesAndSupply +

☒ Wholesale +

☒ WineAndFood +

N. risultati: Nessun Limite

Raggio ricerca 100 metri

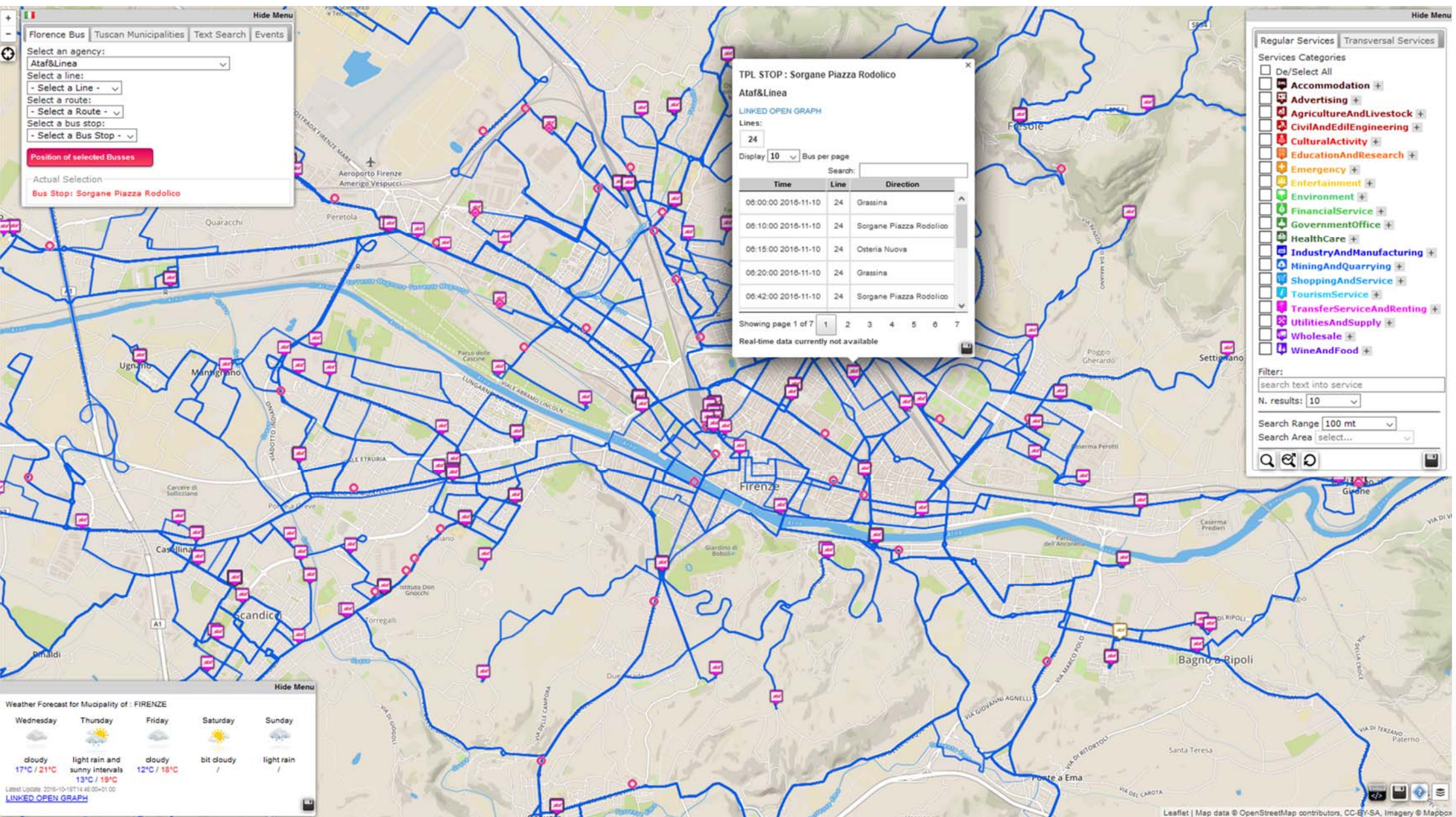


Risultati della ricerca

più di 4000 risultati, attivato clustering

Services 16858

<http://servicemap.km4city.org>





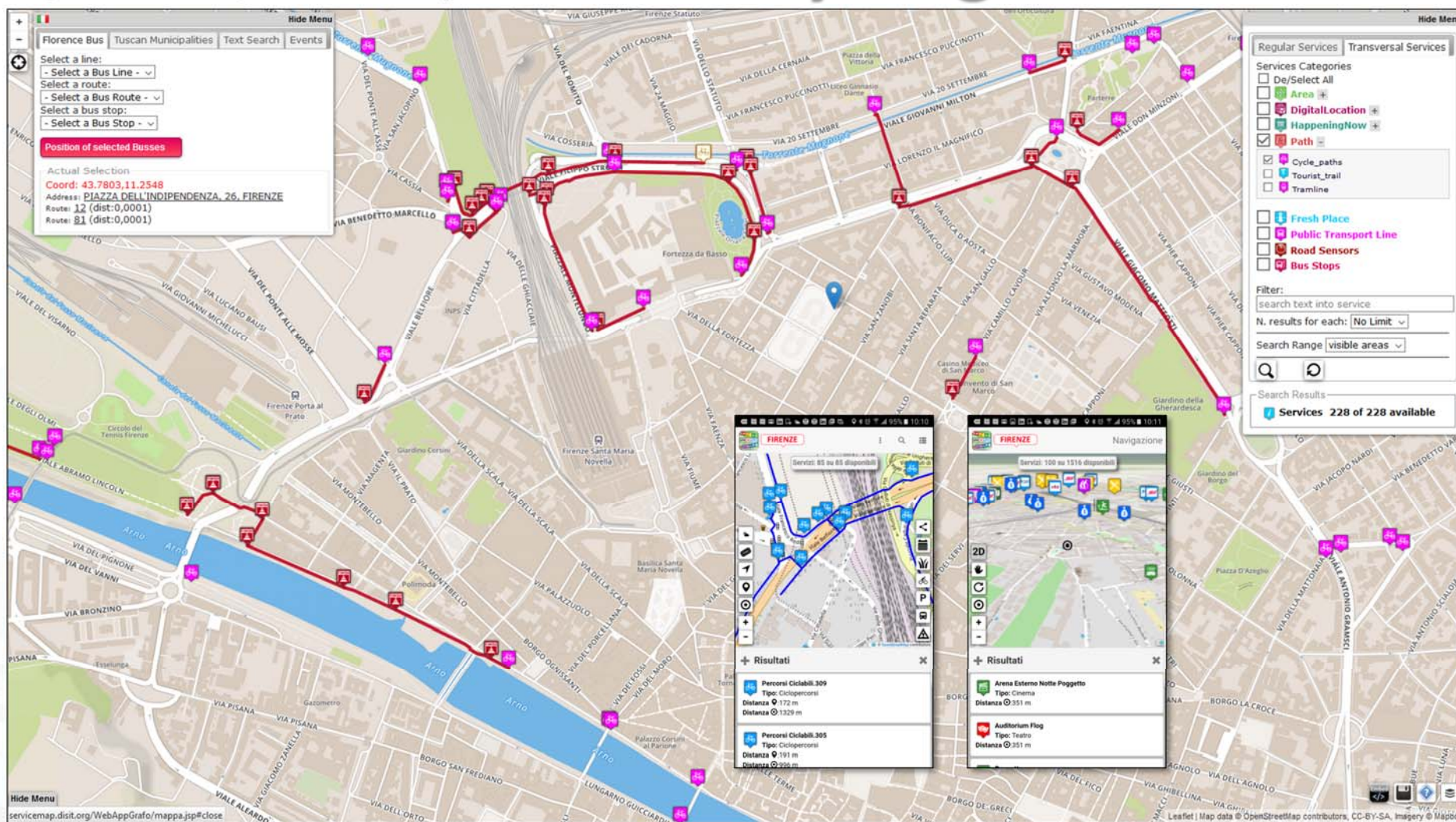
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Cycling Paths



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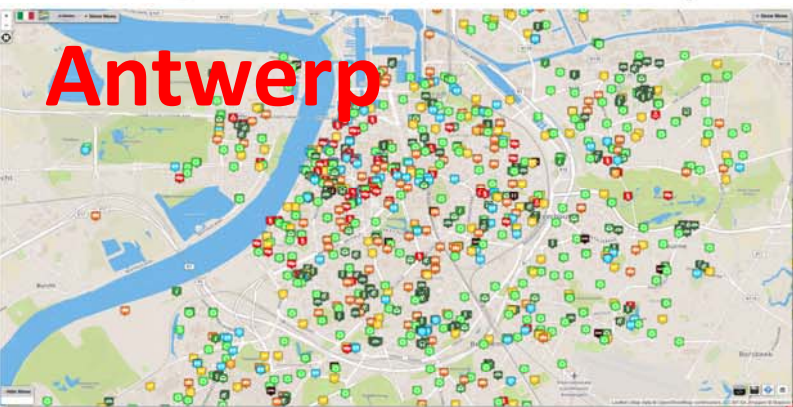
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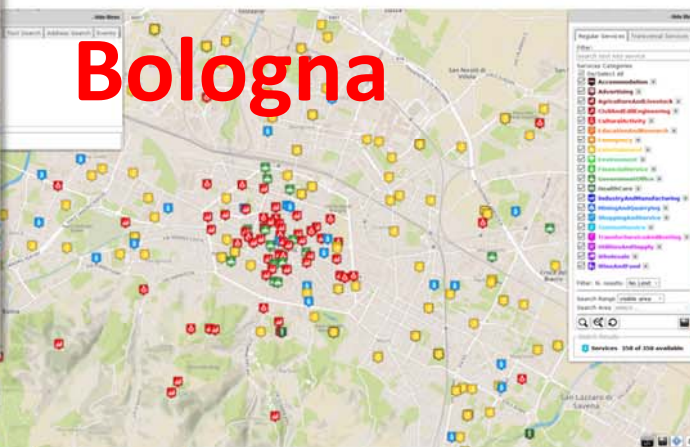
Km4City in ...



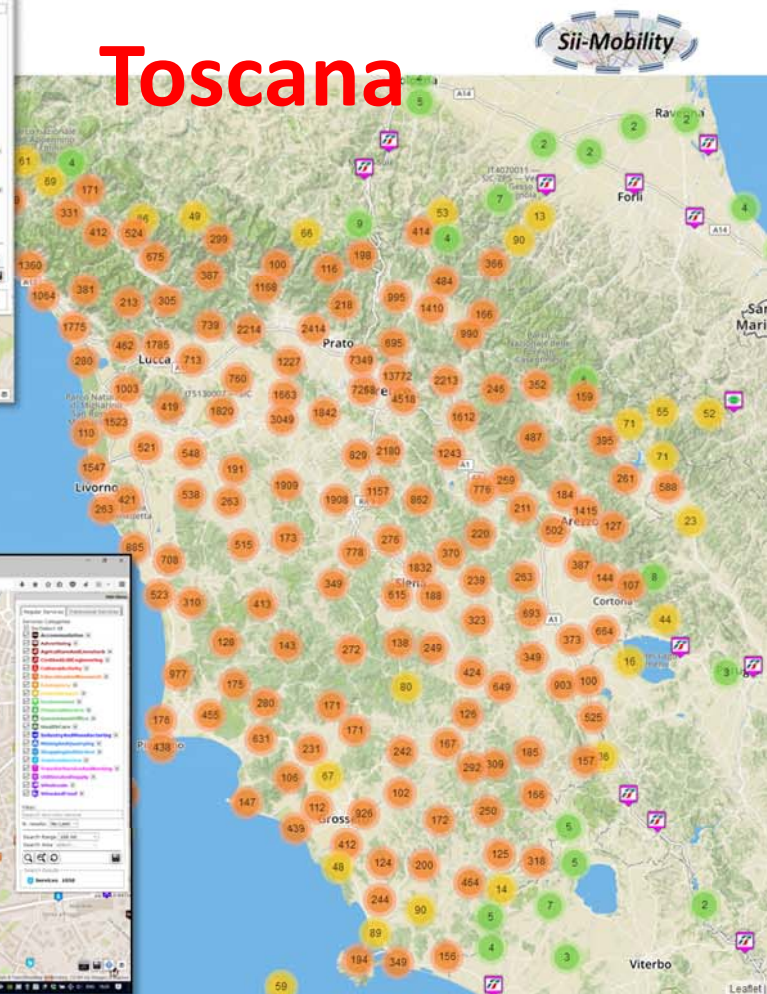
Antwerp



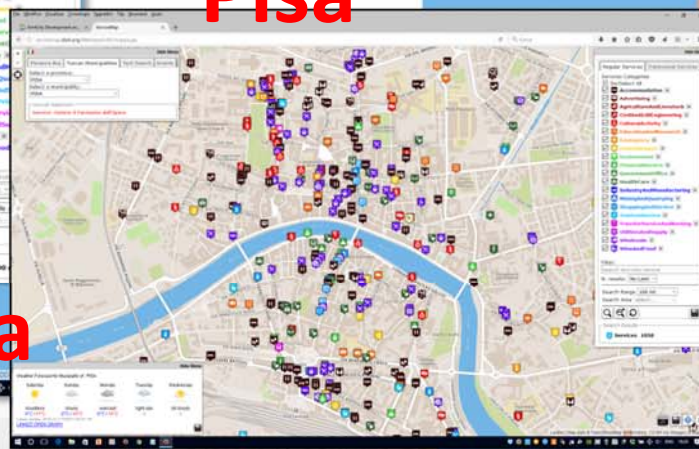
Bologna



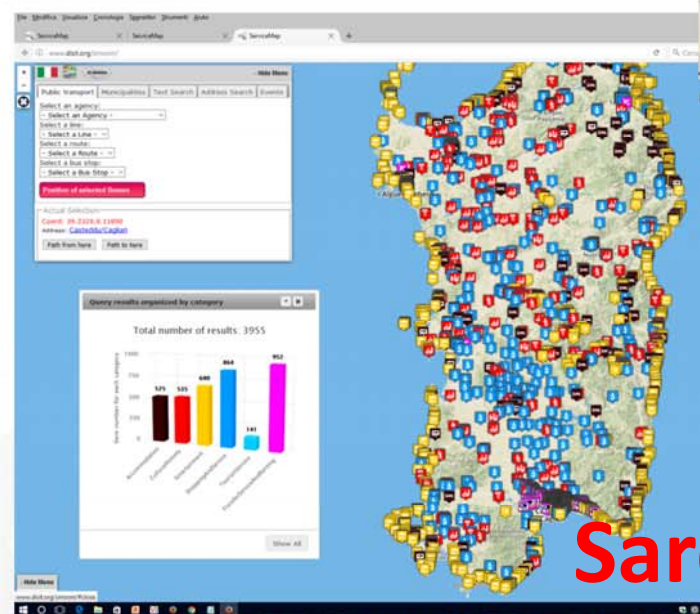
Toscana



Pisa



Sardegna



• **Search all services in the area**

Dashboard for all

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



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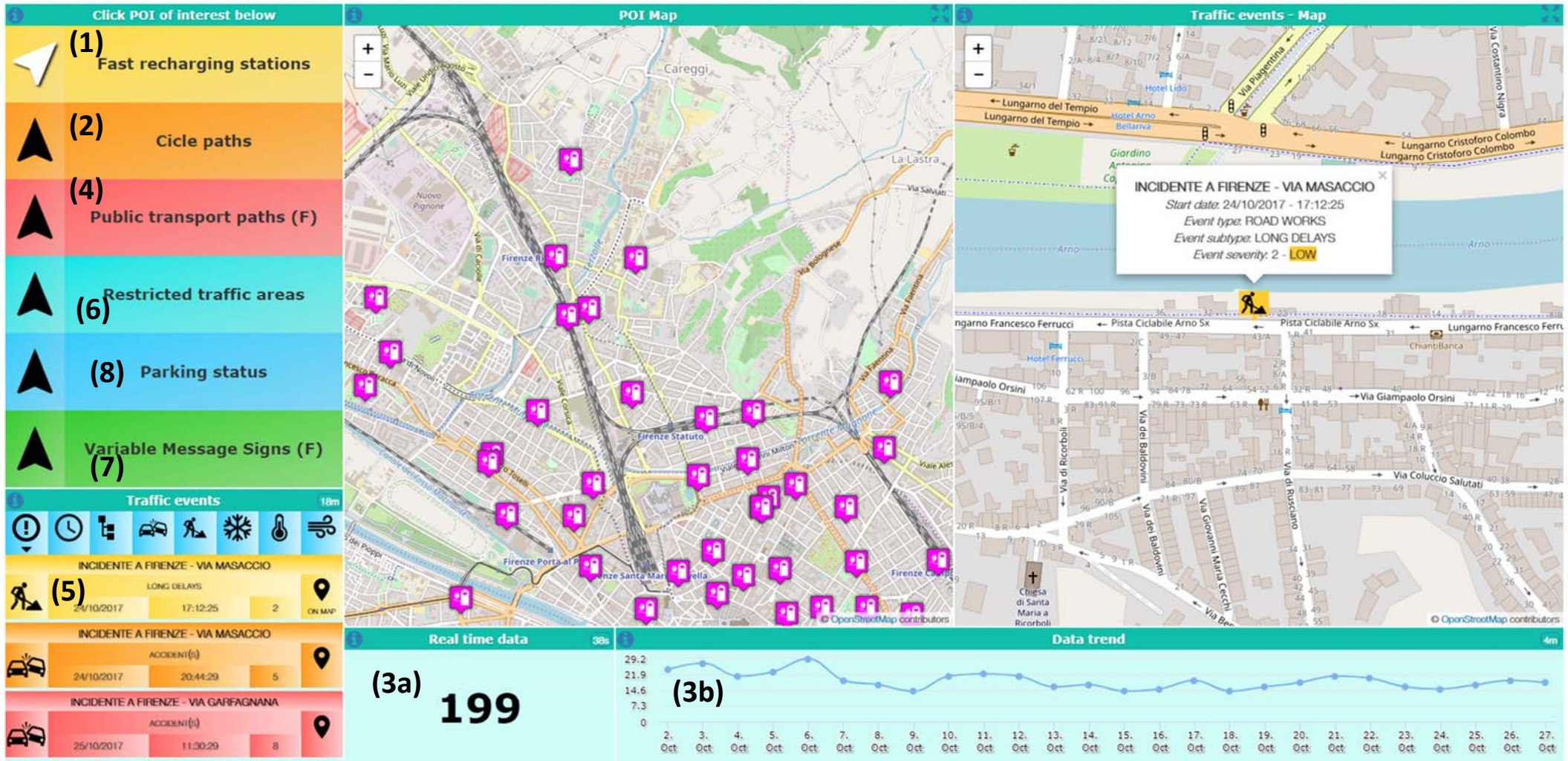
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Smart City Dashboard



Horizon 2020
European Union Funding
for Research & Innovation





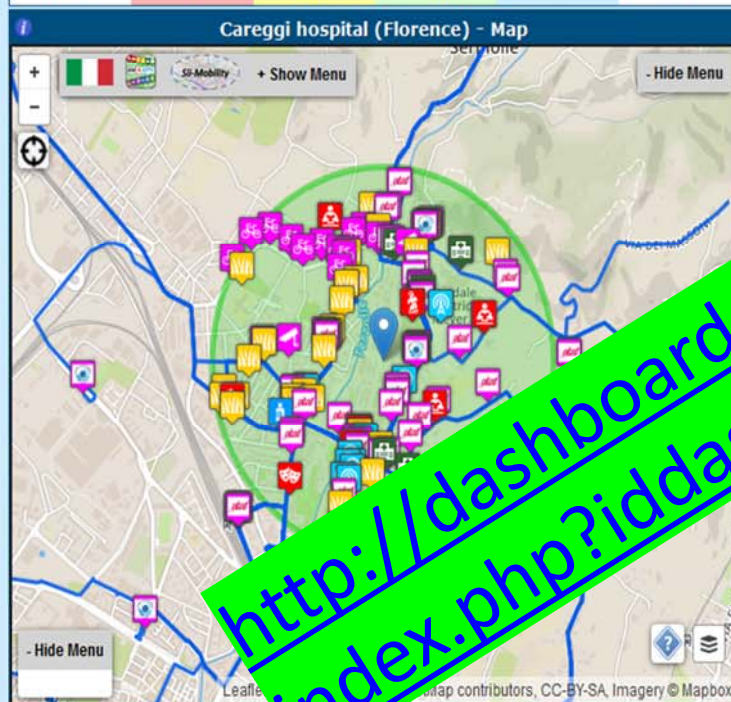
First aids overview - Tuscany

Service status of main first aids

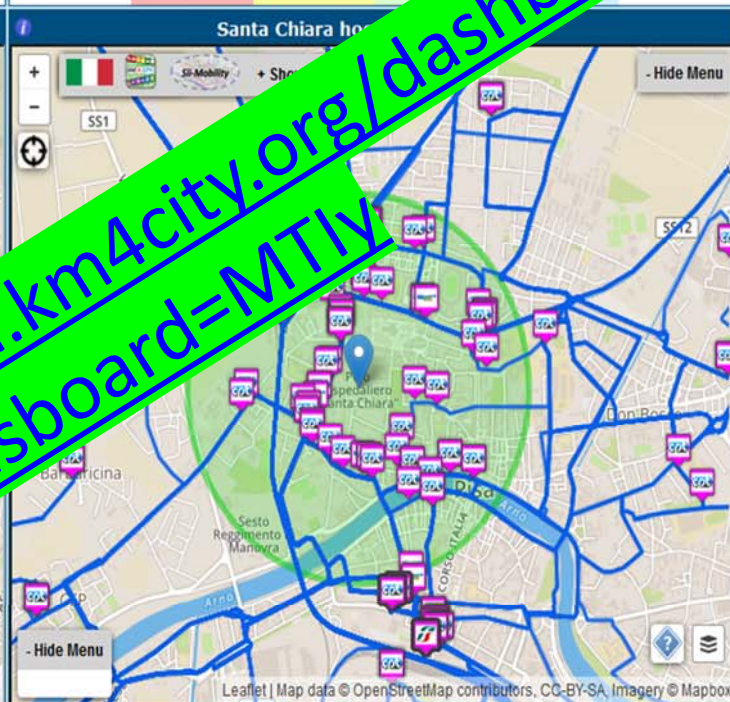


Day @ 11:00:34

Careggi hospital (Florence) - Details					
Priority\Status	Red code	Yellow code	Green code	Blue code	White code
Addressed	1	4	3	0	0
Waiting	0	2	9	2	0
In visit	1	9	18	3	0
In observation	4	19	2	0	0
Totals	6	34	32	5	0



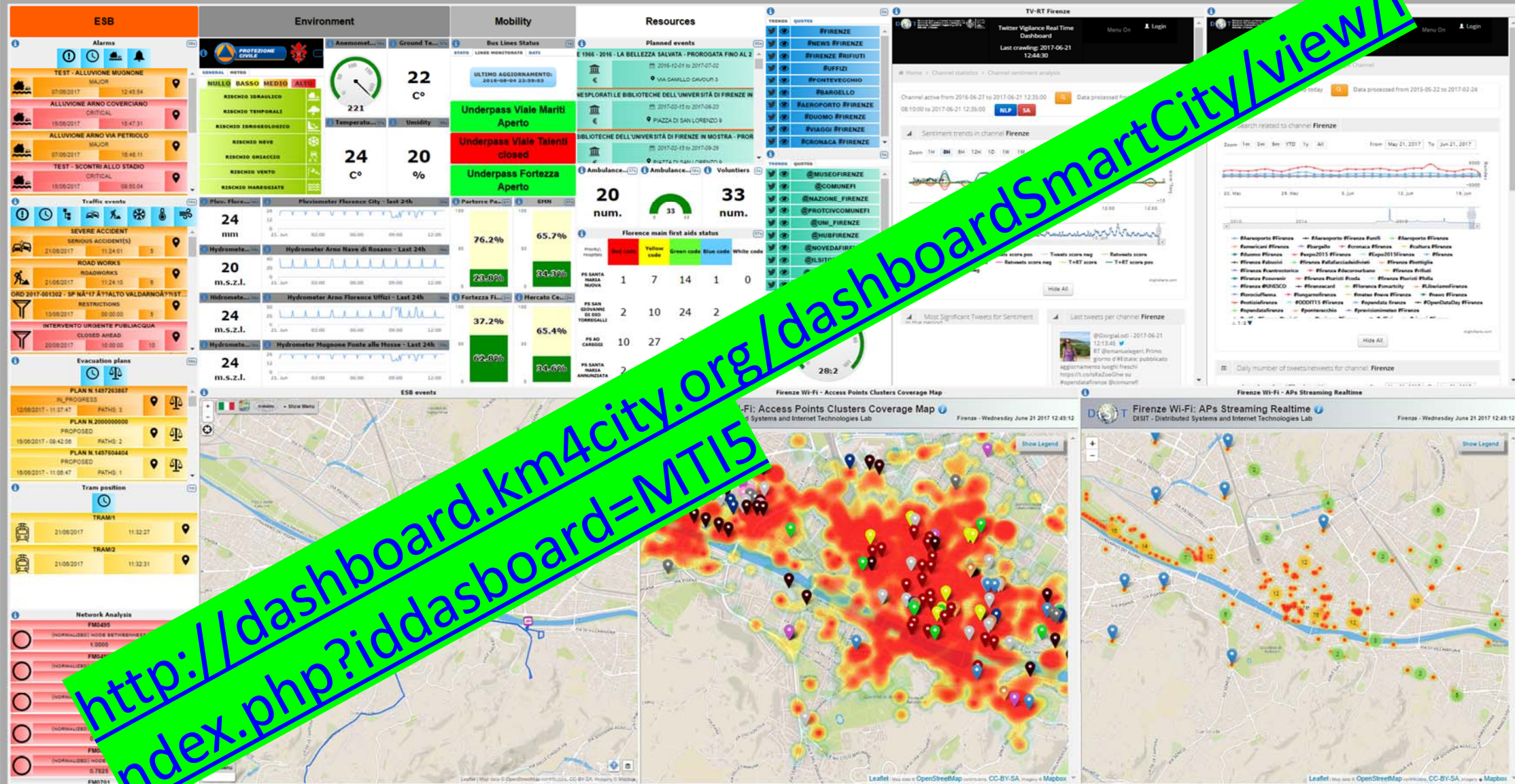
Santa Chiara hospital (Pisa) - Details					
Priority\Status	Red code	Yellow code	Green code	Blue code	White code
Waiting	0	1	7	9	3
In visit	0	7	1	1	0
Totals	0	8	8	9	0



Hospitals - Summary					
Priority\Hospital	Red code	Yellow code	Green code	Blue code	White code
PS SANTA MARIA NUOVA	1	14	12	3	0
PS AO CAREGGI	6	34	32	5	0
PS SANTA MARIA ANNUNZIATA	1	8	11	1	0
PS BORGO SAN LORENZO	0	0	0	0	0
PS OSPEDALI RIUNITI	3	0	0	0	1
PS CASENTINO	0	0	0	0	0
PS SANTA CROCE	0	0	0	0	0
PI PO CORTONA	0	0	0	0	0
PS CIVILE PIOMBINO	0	0	0	0	0
PS LA MISERICORDIA	0	0	0	0	0



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



Real Time Sensors via ServiceMap3D

3D data rendering



Fri 26 Jan 00:23:19



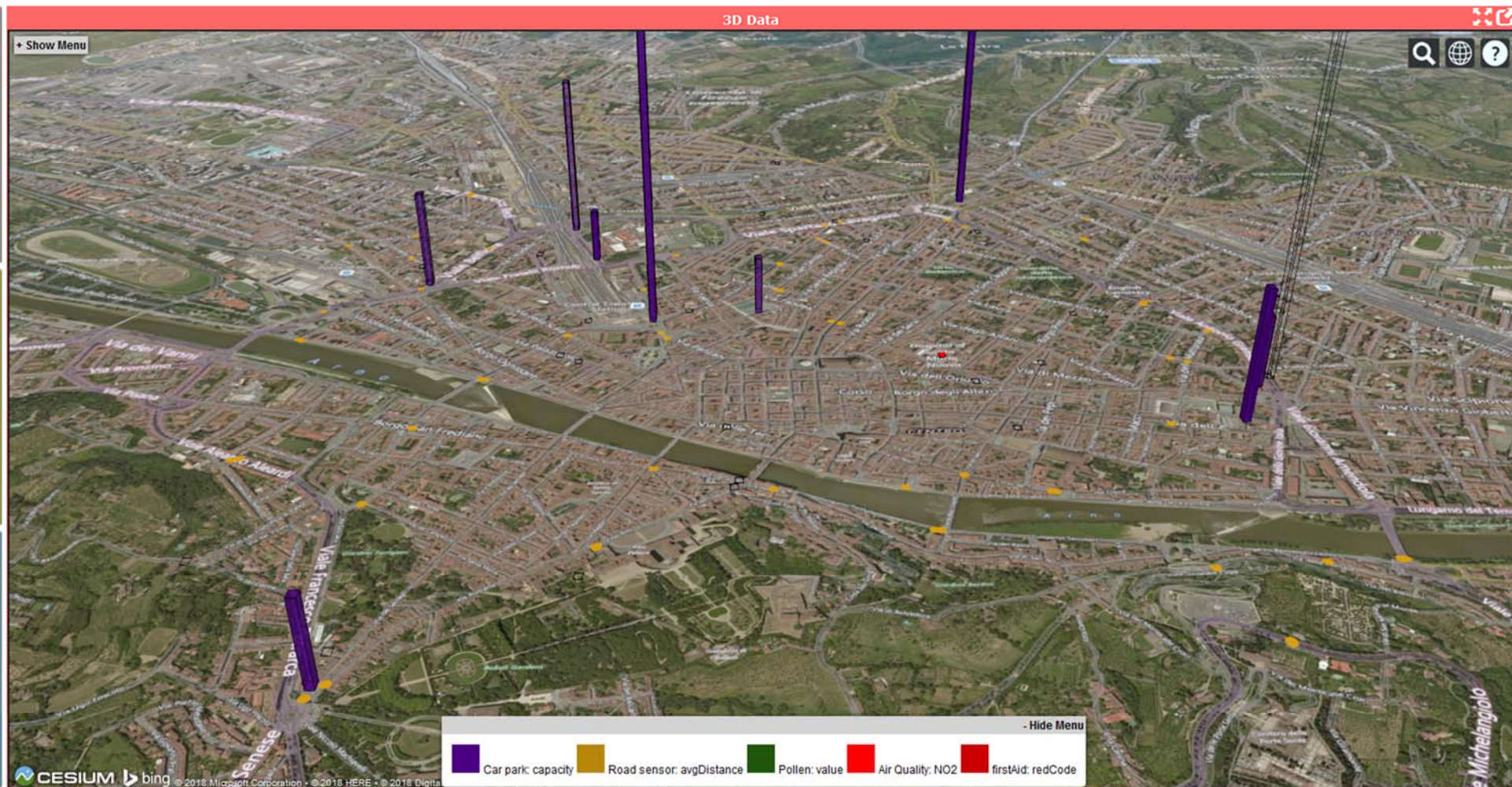
Firenze



Airport



Empoli

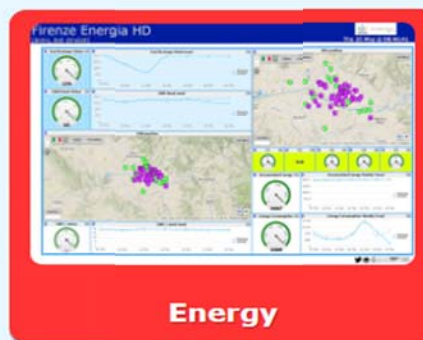


Smart City Control Room Console

Entry point for REPLICATE dashboards



Tue 21 Nov 19:30:36



Sperimentazioni



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What is enabling and providing smart services

- Smart Parking, in Tuscany
- Smart First Aid in Tuscany
- Smart Fuel pricing in Tuscany
- Smart search for POI and public transport srv.
- Public Transportation in Tuscany
- Routing in Tuscany
- Social Media Monitoring and acting
- Traffic events and Resilience in Florence
- Bike Sharing in Pisa and Siena
- Recharge stations for e-vehicles
- Entertainment Events in Florence
- Traffic Sensors in Tuscany
- Weather forecast/condition in Tuscany
- Pollution and Pollination in Tuscany
- People Monitoring Assessment in the City, in Florence via Wi-Fi
- People Monitoring, in Tuscany via App

All Point of Interests, cultural activities, IOT, ...
Over than 1.2 Million of complex events per day!

<http://servicemap.km4city.org>



Le sperimentazioni Big Data ...

- *Info Mobilità è stato l'inizio ora*
- Monitoraggio flussi traffico, sensori traffico
 - Ricostruzione del traffico → predizioni → detection anomalie
- Monitoraggio parcheggi → predizioni → anomalie
- Monitoraggio comportamento utenti in mobilità via: Wi-Fi, APP, IOT app, cellular data
 - Ricostruzione traiettorie degli utenti, punti maggiore interesse, tempi di tenuta
 - Ricostruzione matrici origine destinazione degli utenti, dei mezzi, ...
- Richieste esplicite e implicite degli utenti
 - Ricerche, routing, etc...
 - Erogazione di suggerimenti, incentivi al cambiamento, etc.
- Monitoraggio e Sentiment analisi da Social Media
- User profilig:
 - IOT, APP, web, social media, user behavior,
 - GDPR



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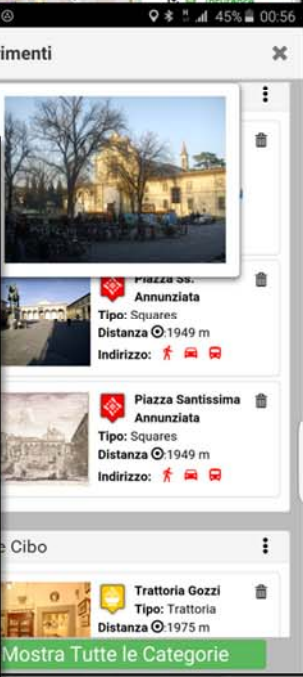
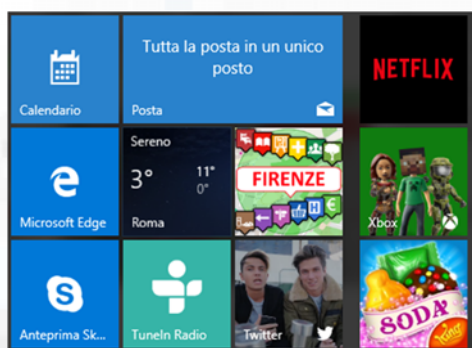
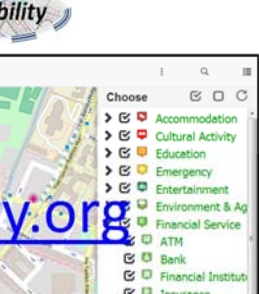
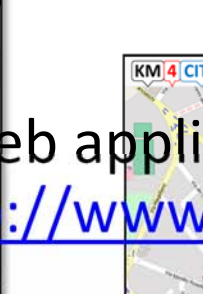
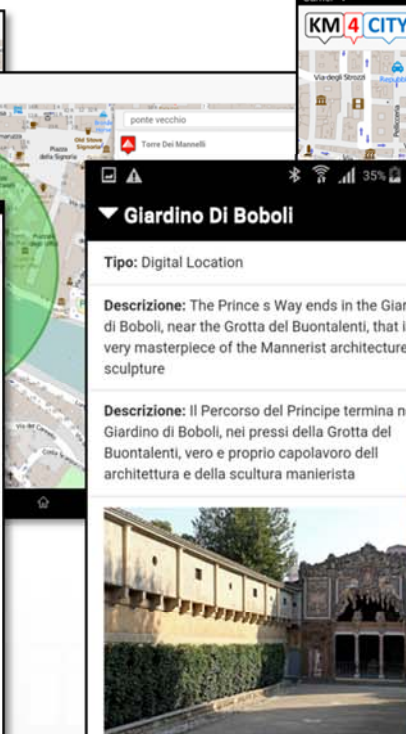
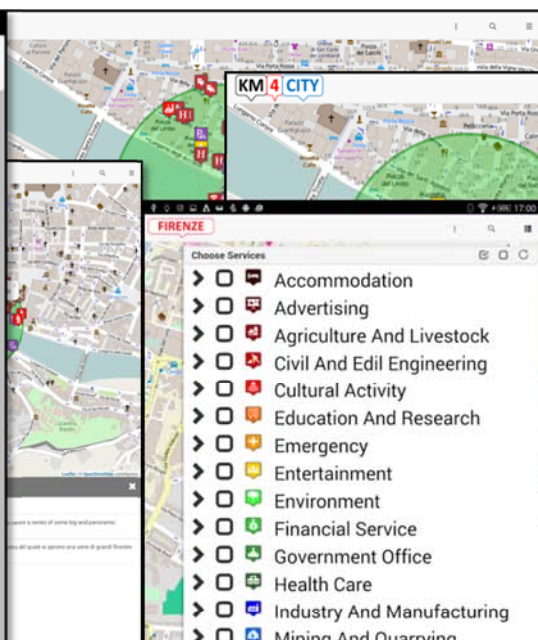
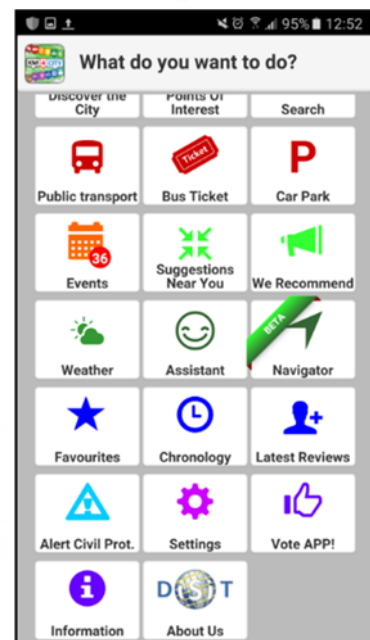
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Km4CityMobile App



web application
<http://www.km4city.org>



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Km4City APP



• Mobility

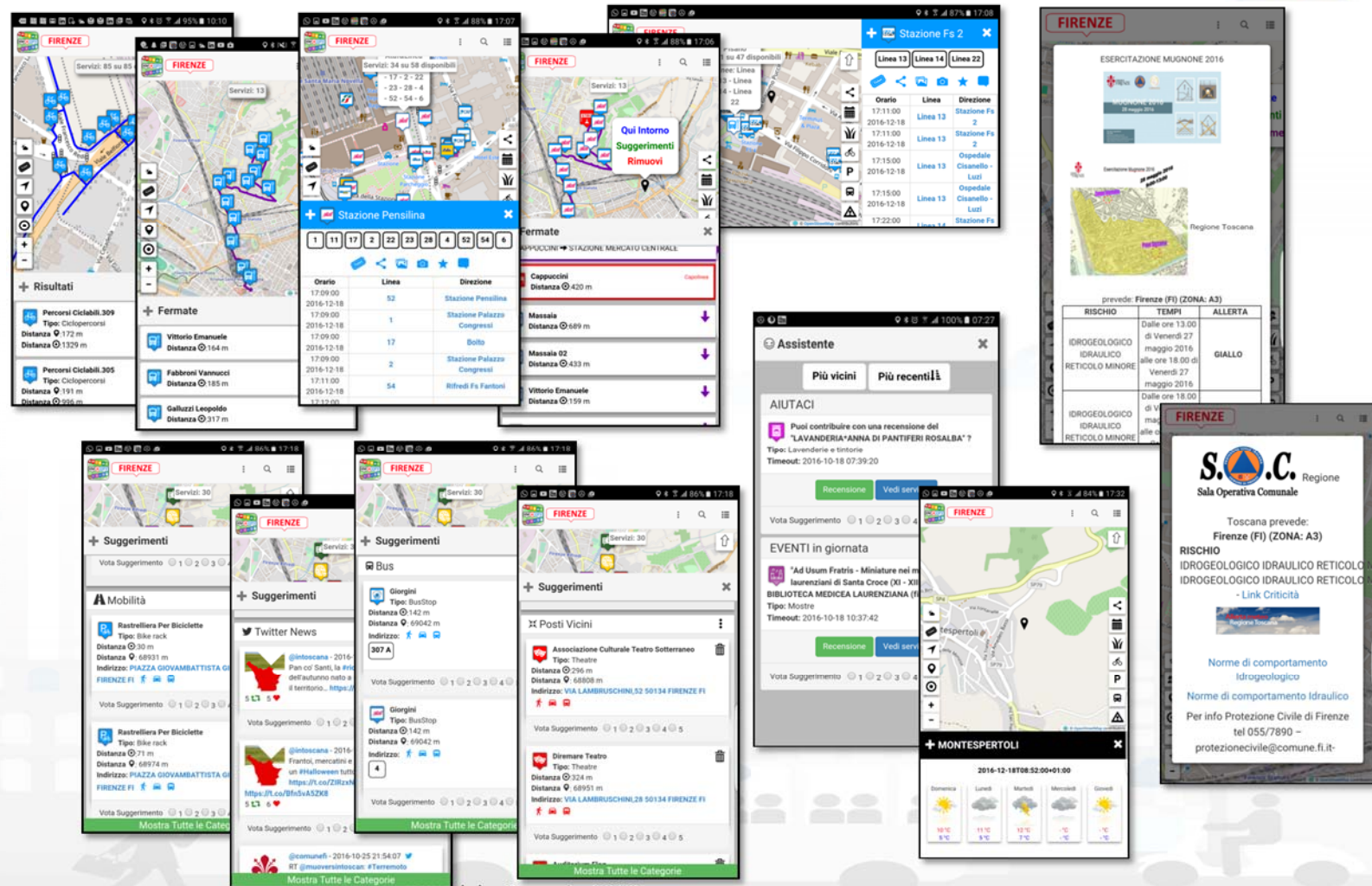
- Paths and stops, time
- Parking + prediction
- Ticketing
- Flow + prediction
- Navigation
- Connection with devices
- XXX Sharing

• Personal Assistant

- Info, Engagement
- Help, Civil protection

• Suggestions:

- Personalized and adaptive: banned e typed per city user.
- POI, Twitter, Events,
- Weather forecast,
- Civil Protection





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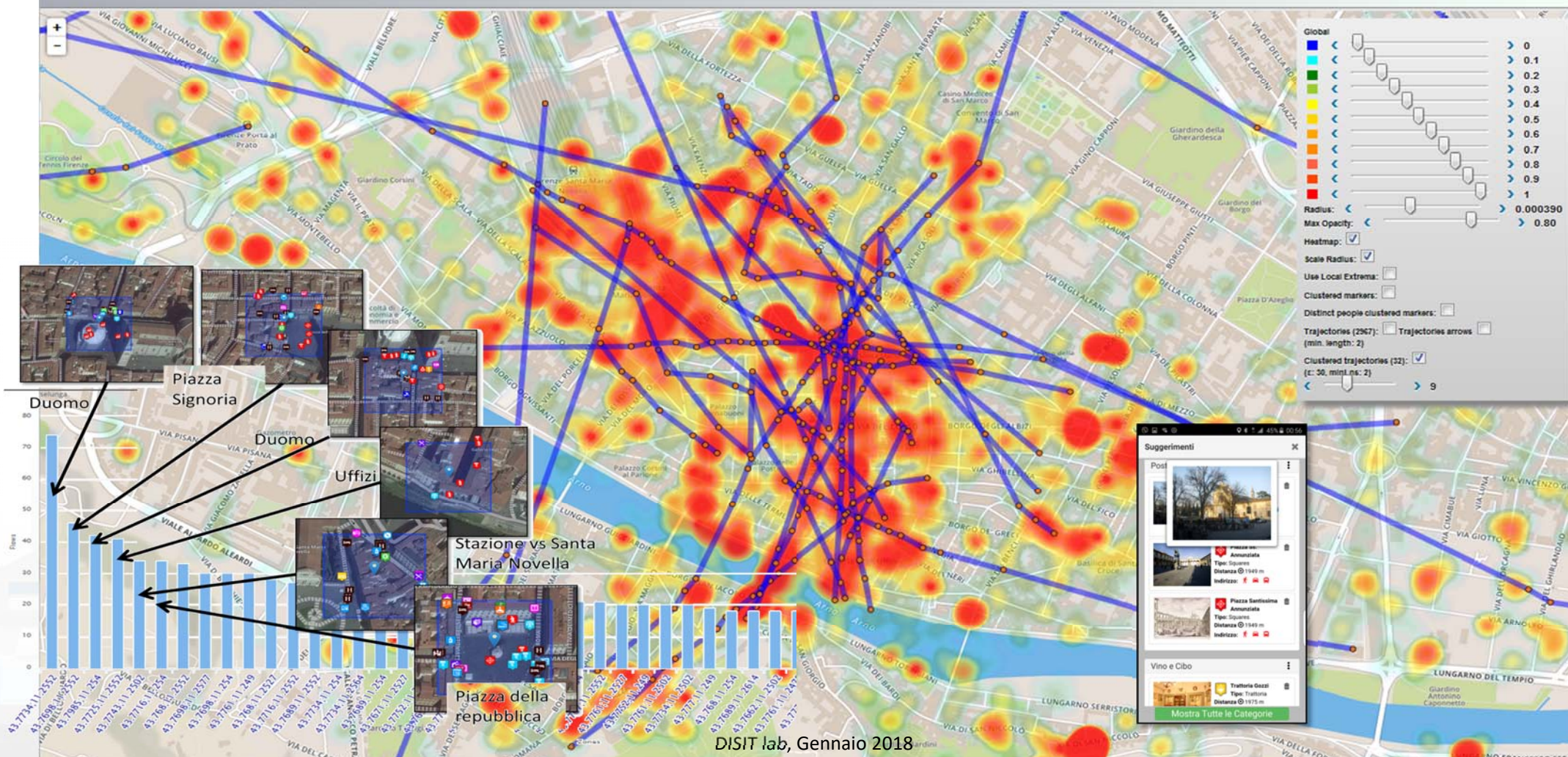
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User Behavior Analyzer



DISIT Personal Recommender
DISIT - Distributed Systems and Internet Technology Lab



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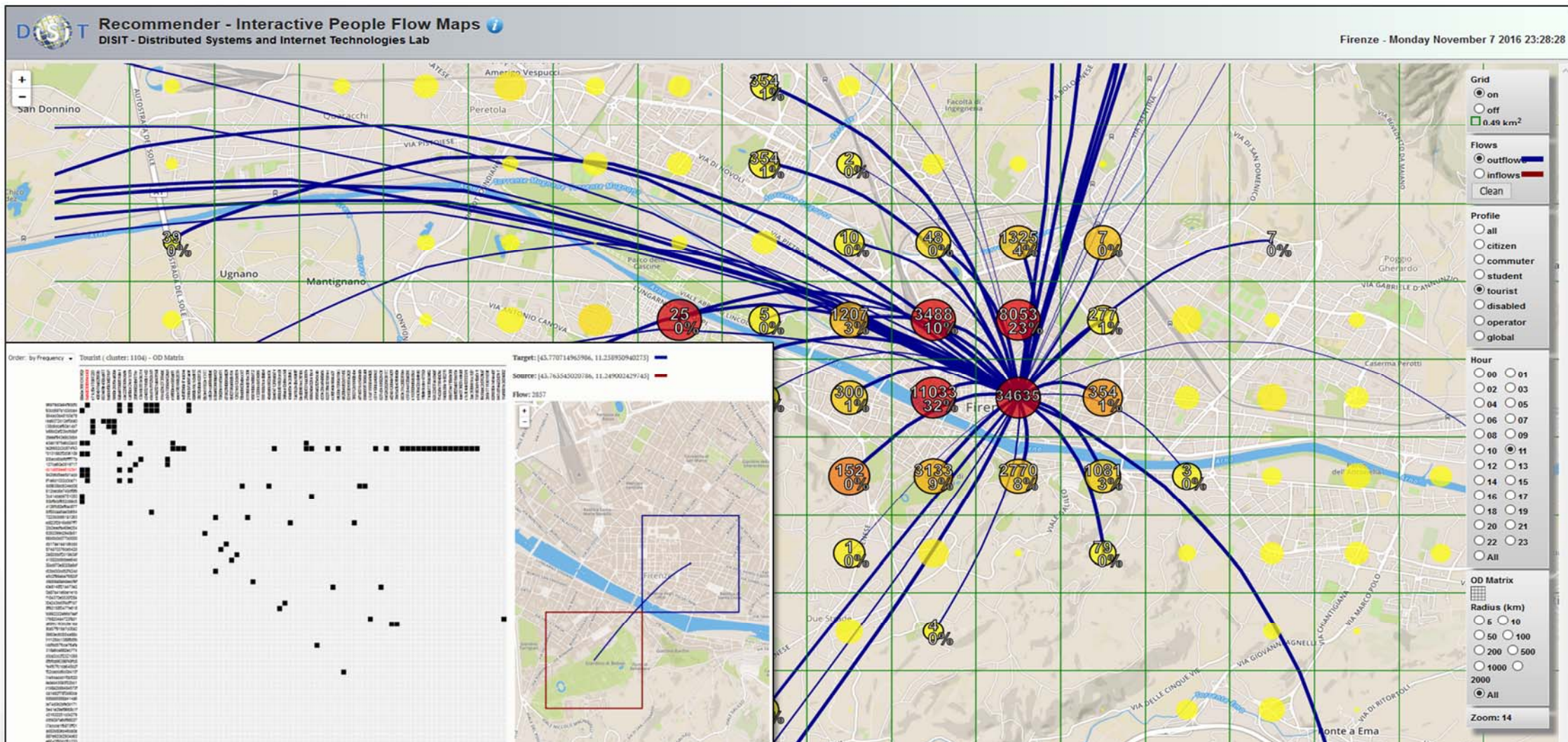
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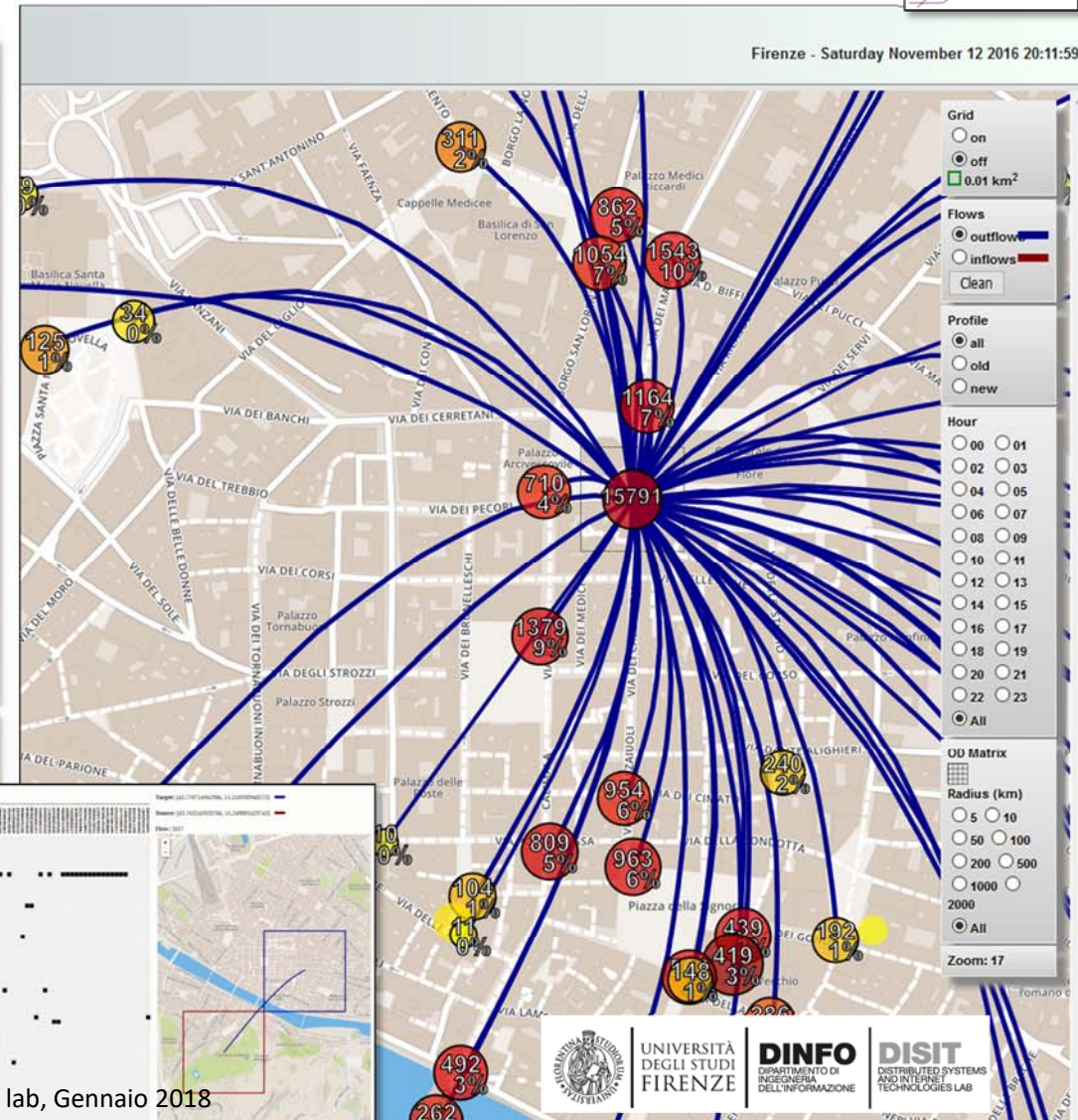
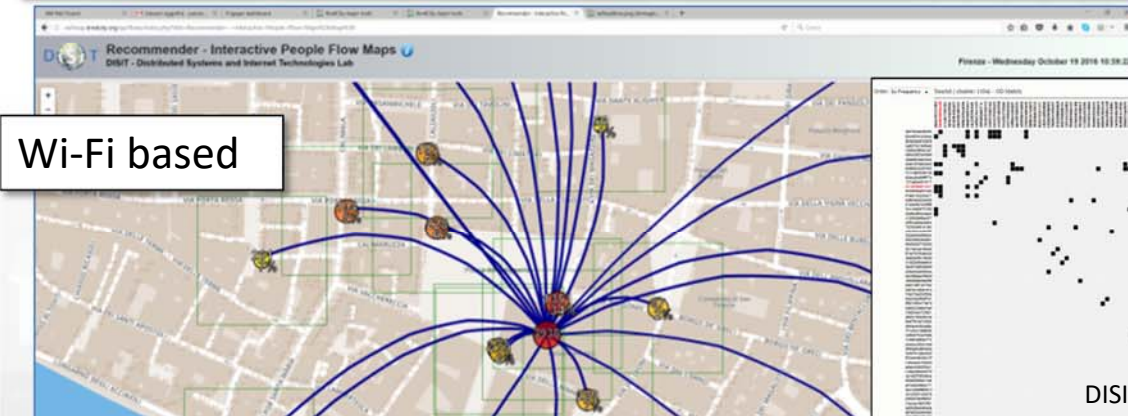
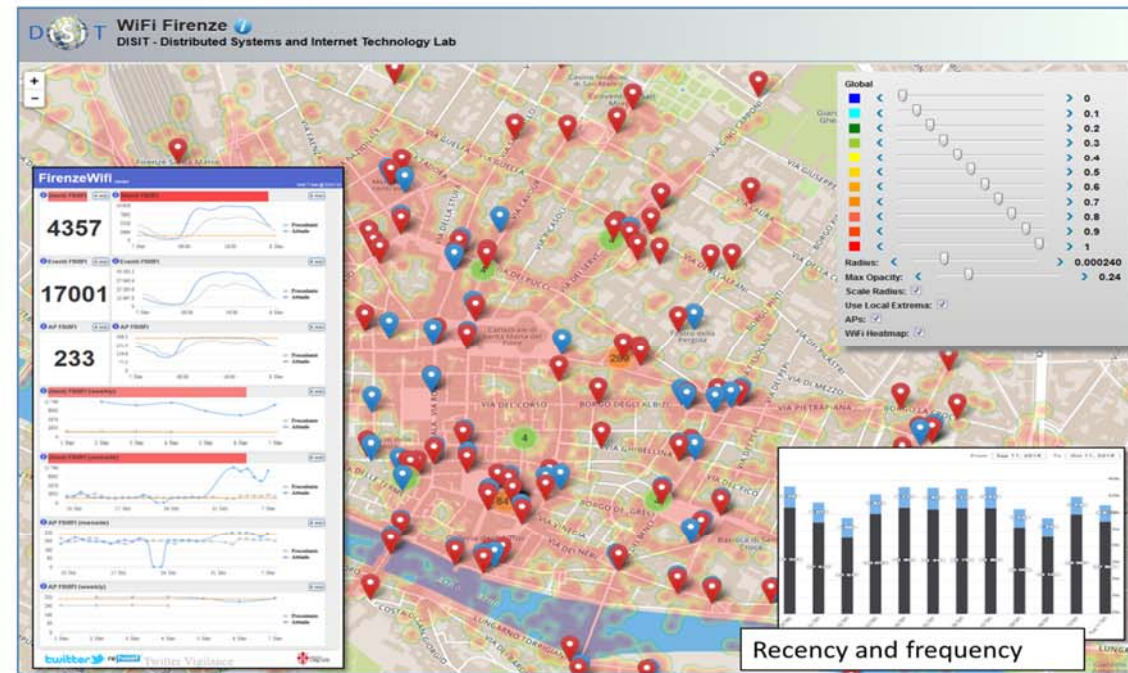
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OD Matrix scalabile



Origin Destination Matrix Estimation



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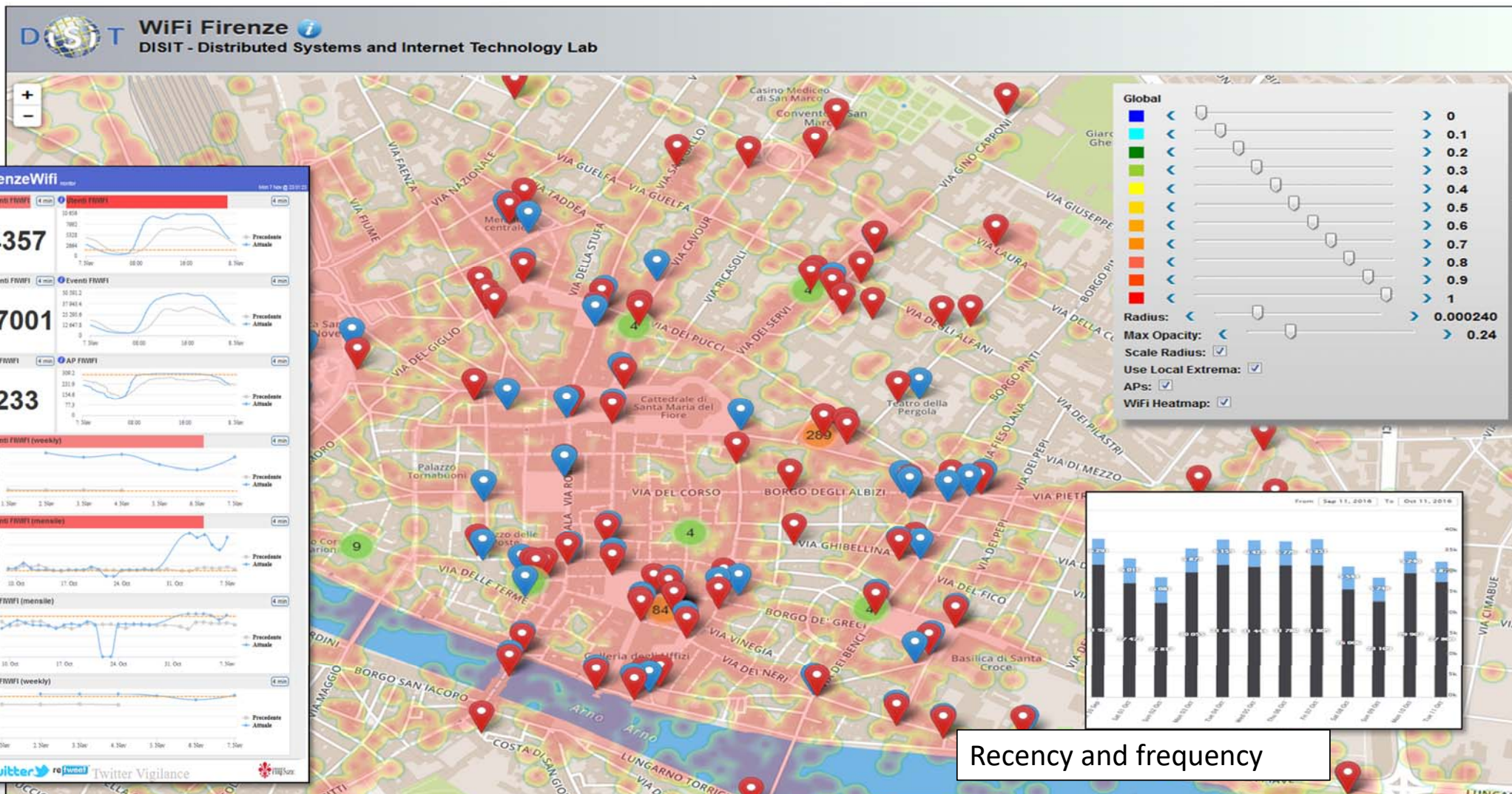
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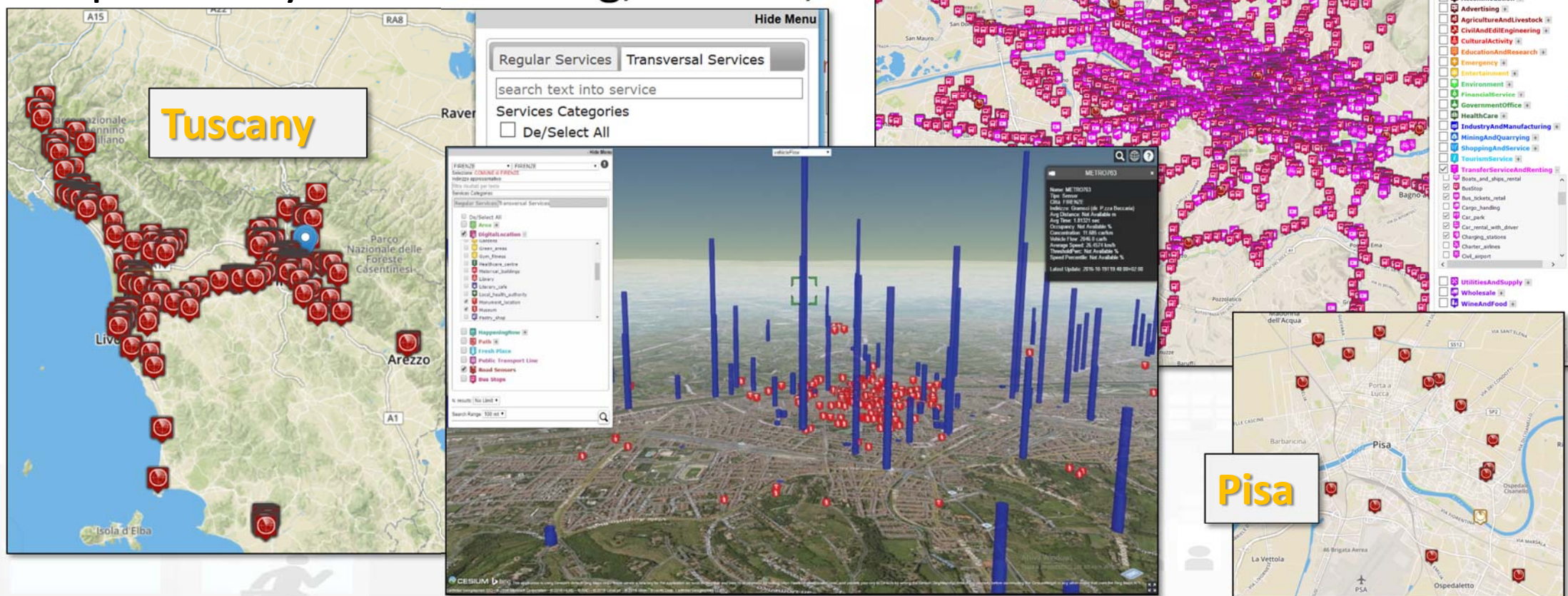
<http://www.disit.org>

WiFi Monitor tool



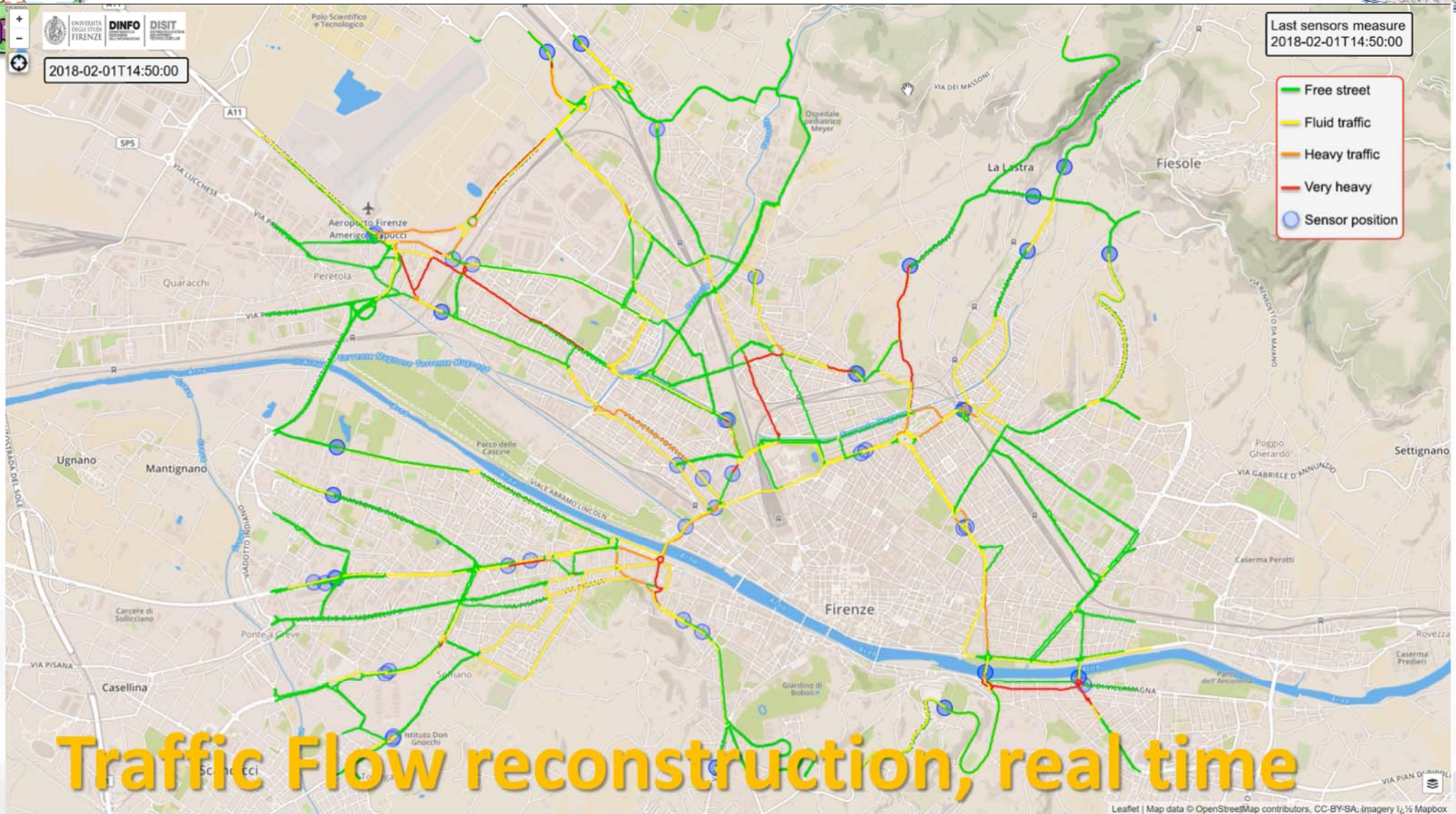
Traffic Flow Tools

- Spire and Virtual Spires (cameras), Bluetooth, ..
- Specifically located: along, around, ..



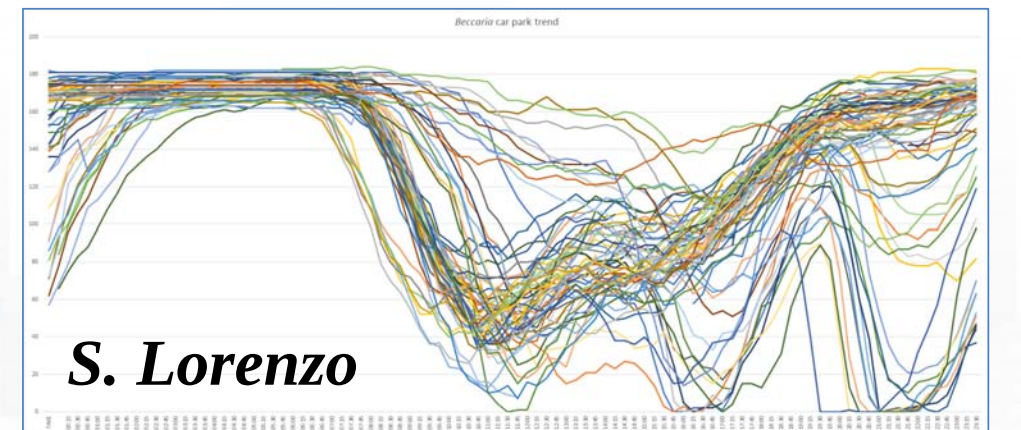
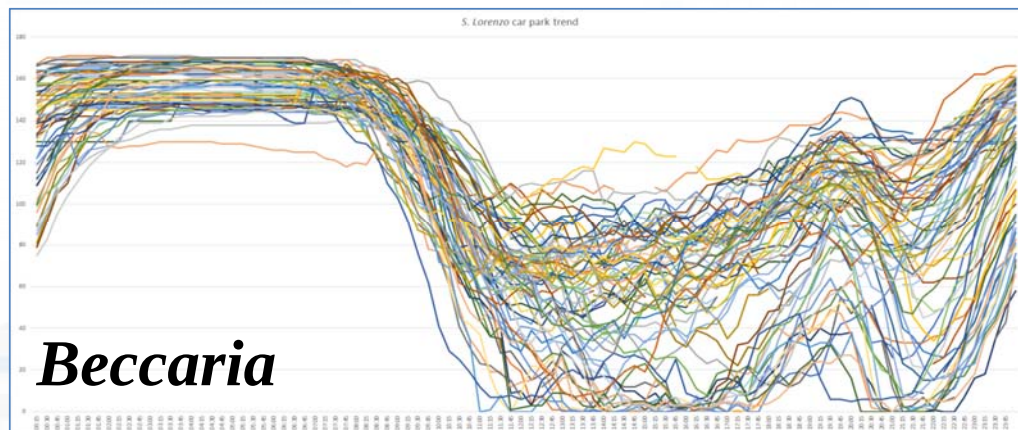
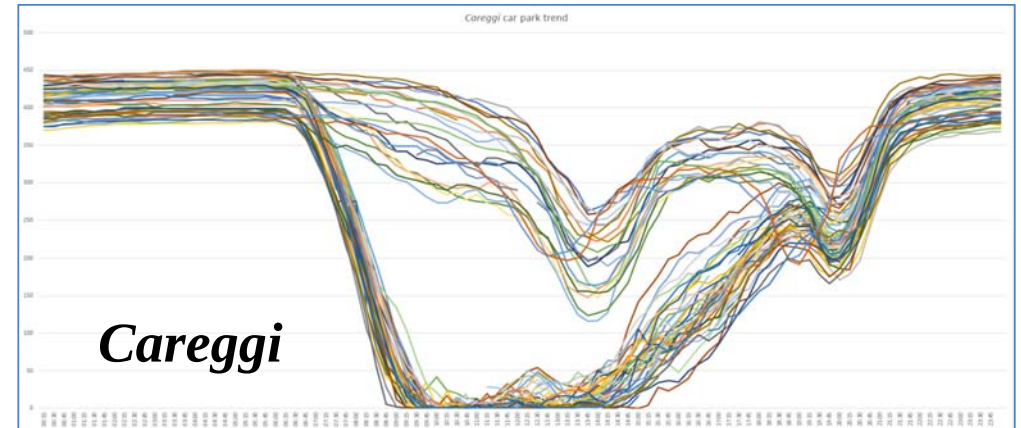
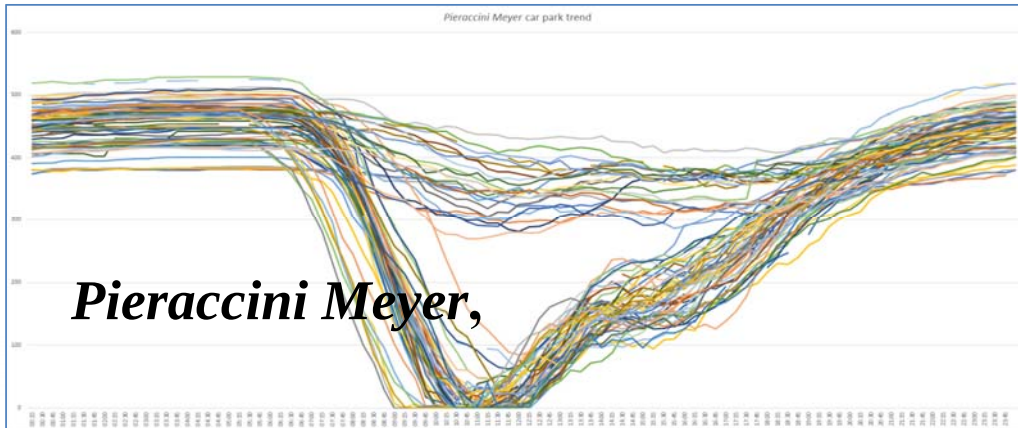


Traffic Flow reconstruction





Free Parking space trends



12 parking areas in Florence

DISIT lab, Gennaio 2018

Free Parking PREDICTIONS



Careggi car park

Model features	BRNN model results		
	R-squared	RMSE	MASE
Baseline	0.974	24	1.87
Baseline + Weather	0.975	24	1.75
Baseline + Traffic sensors	0.975	24	2.04
Baseline + Weather + Traffic sensors	0.975	24	1.87

- Active on Apps
 - «Firenze dove cosa»
 - «Toscana dove cosa»





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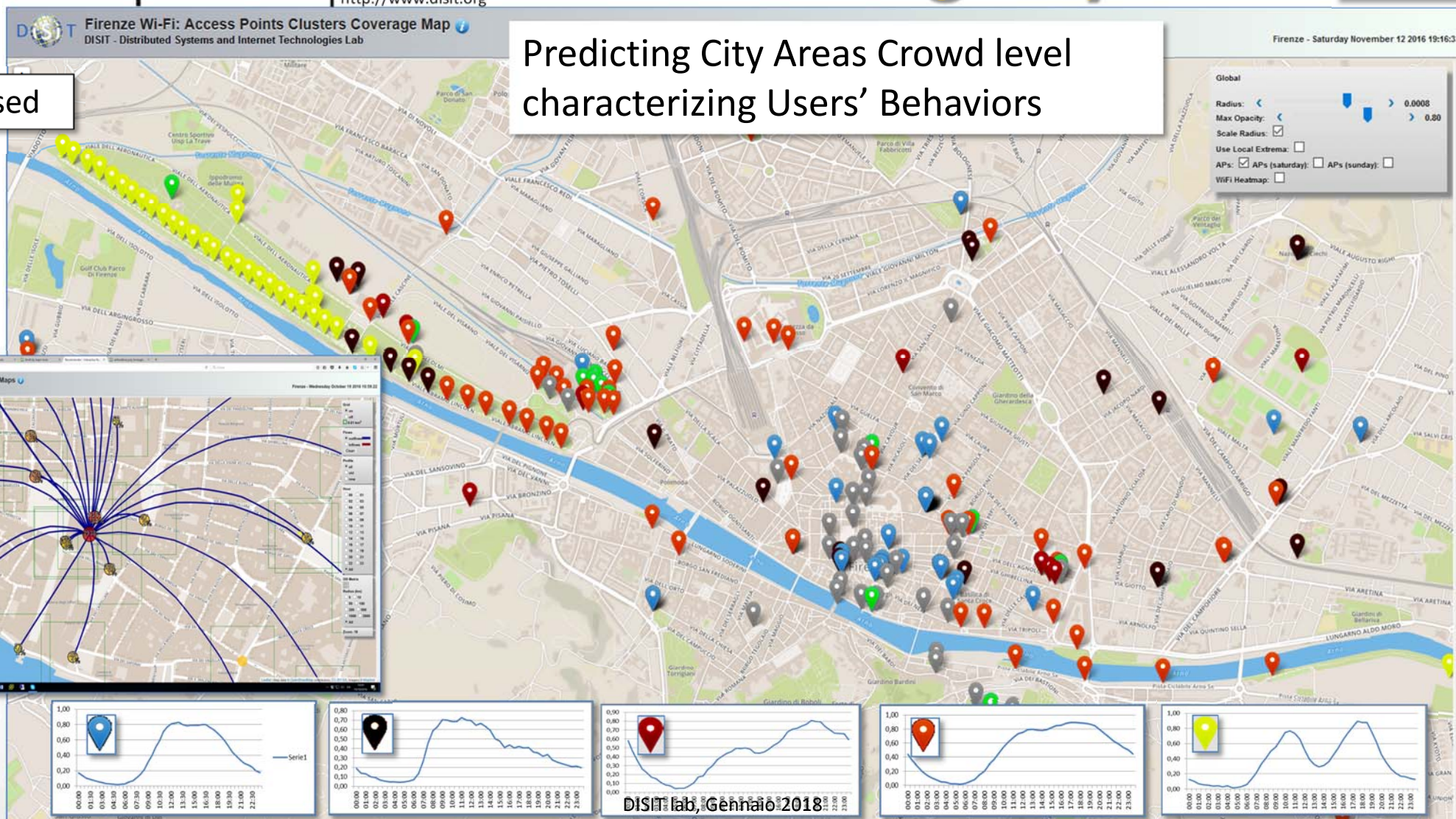
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Characterizing City Areas



Wi-Fi based

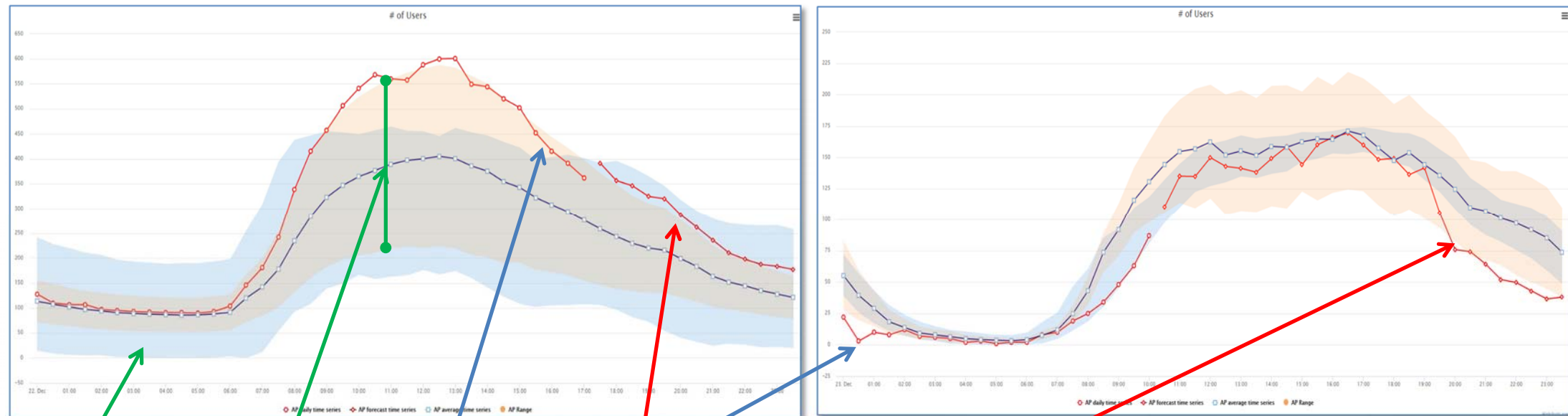
Predicting City Areas Crowd level
characterizing Users' Behaviors



Prediction and identification of anomalies



Guessing number of users of Wi-Fi Access Points



Cluster confidence

AP average and confidence

Actual AP trend for today

AP prediction for the next time slot in the day on the basis of past weeks



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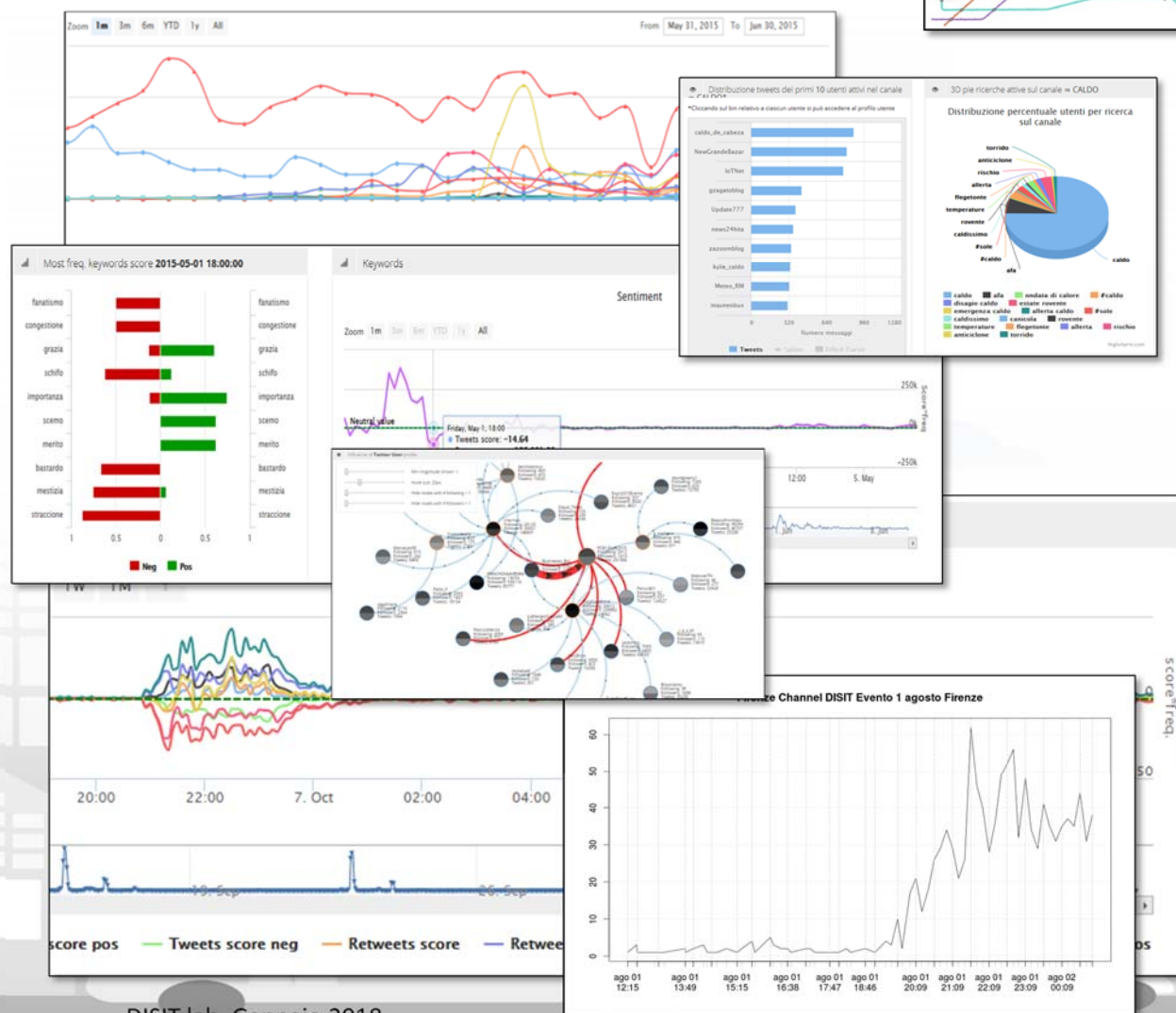
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Twitter Vigilance



- <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

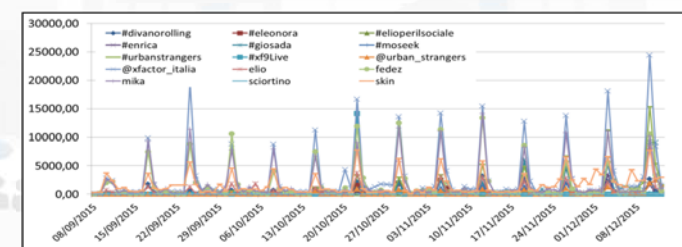
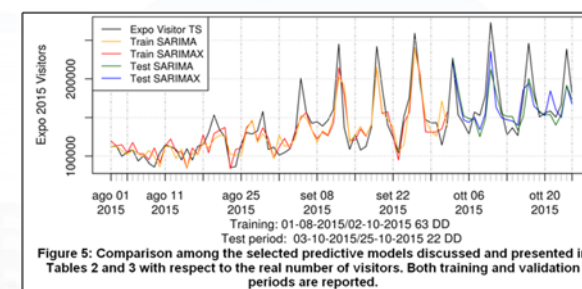
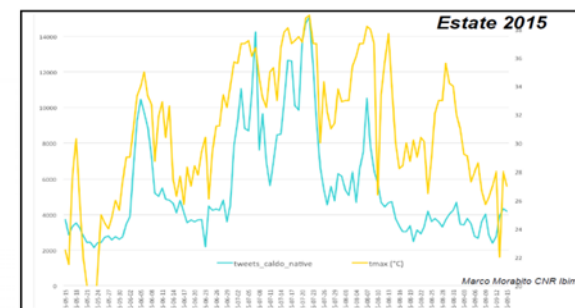
Twitter Vigilance



DISIT lab, Gennaio 2018

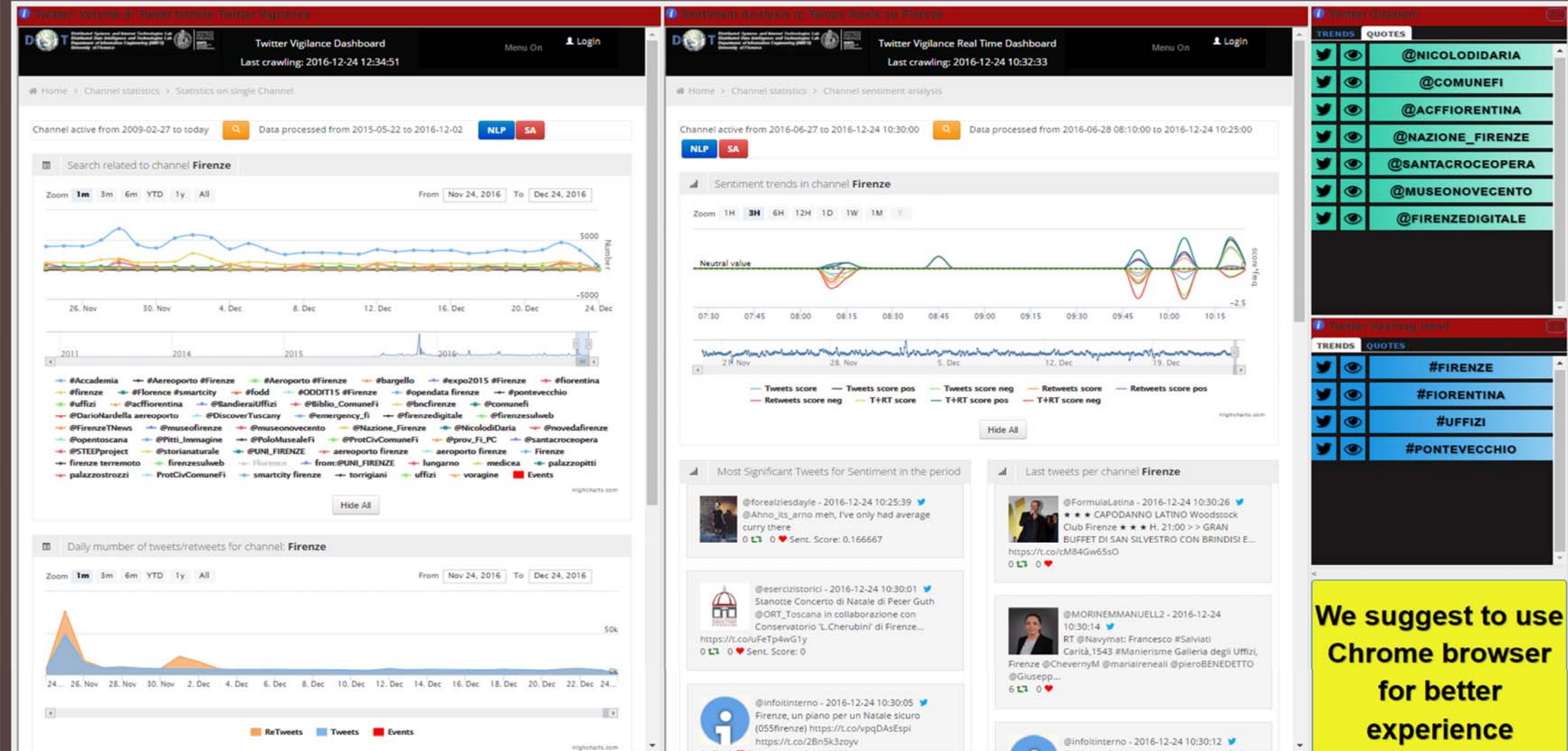
Prediction/Assessment

- 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



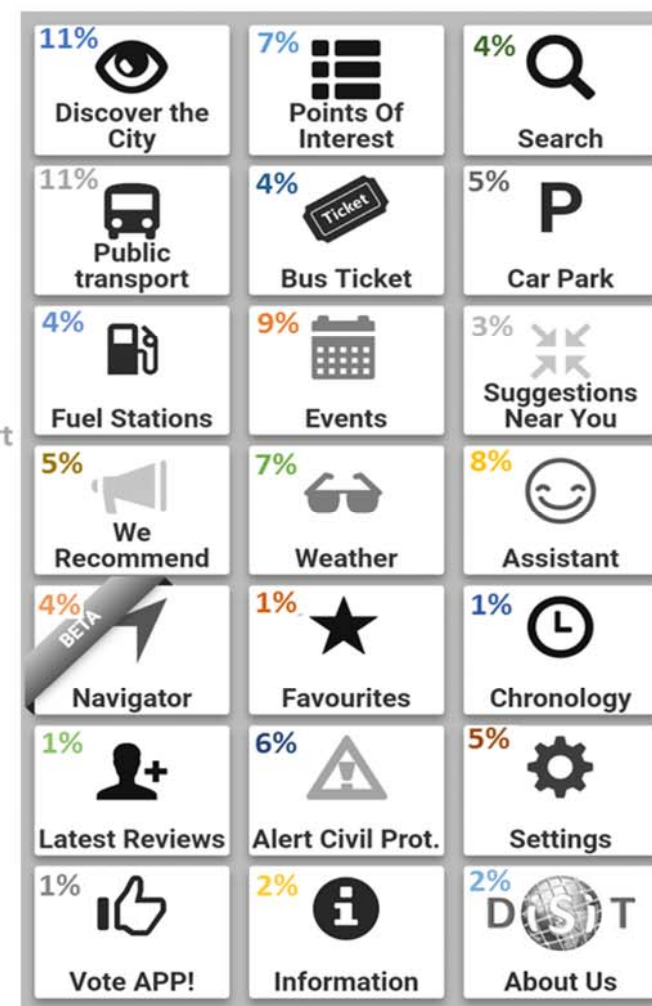
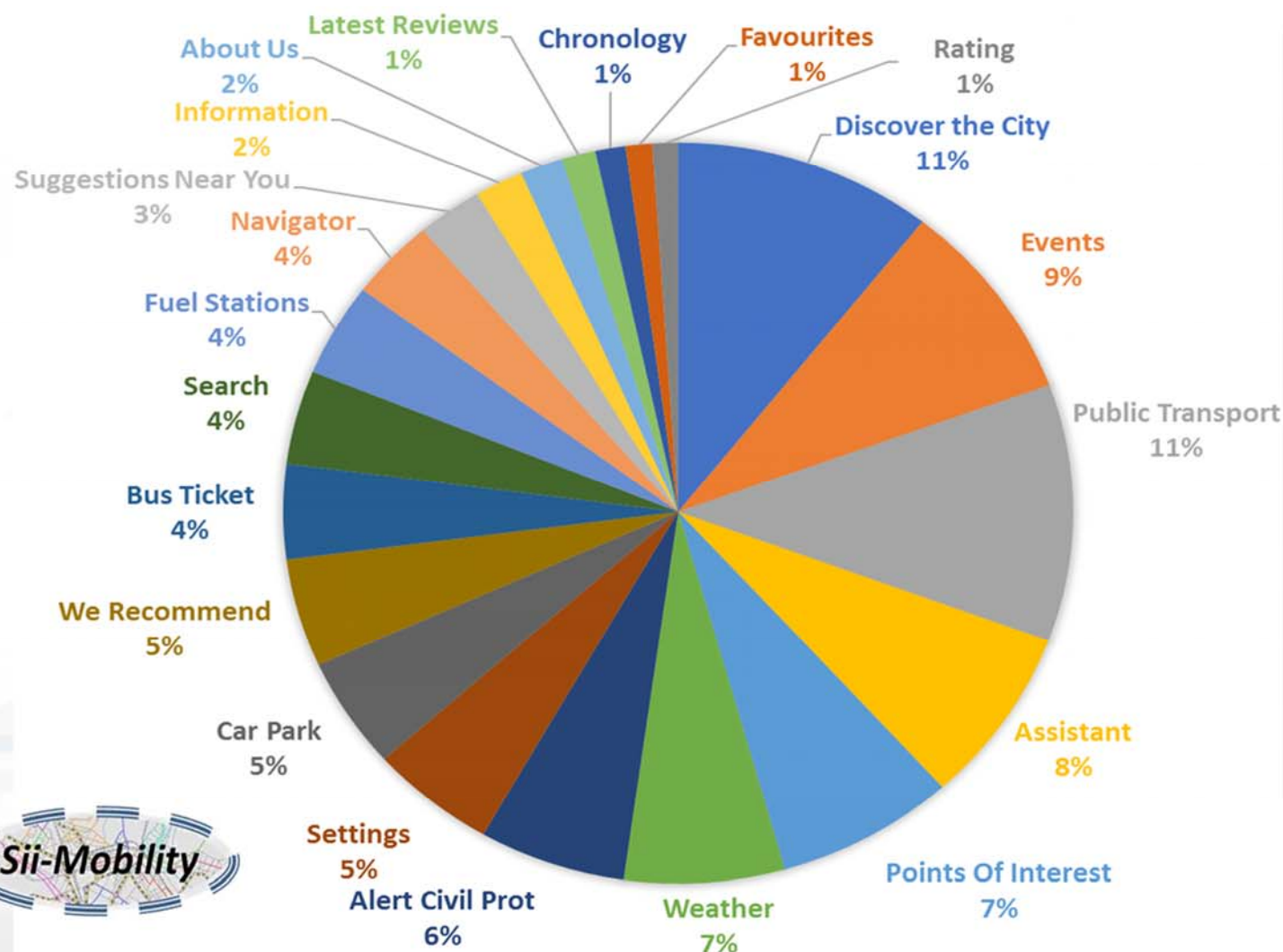
Twitter Vigilance su Firenze (sperimentale)

Sat 24 Dec @ 10:37:57



We suggest to use
Chrome browser
for better
experience

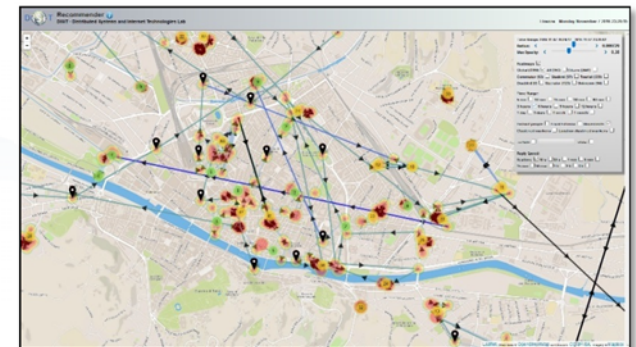
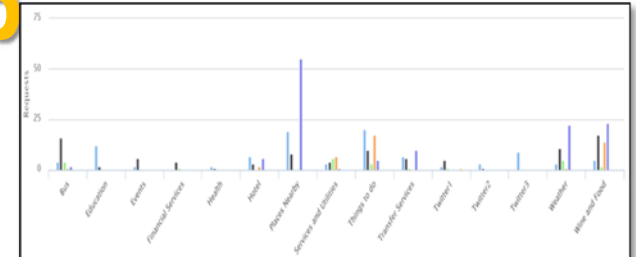
Usage of the main Menu





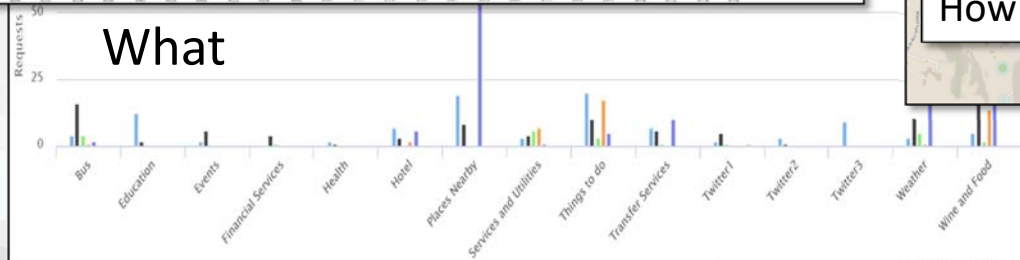
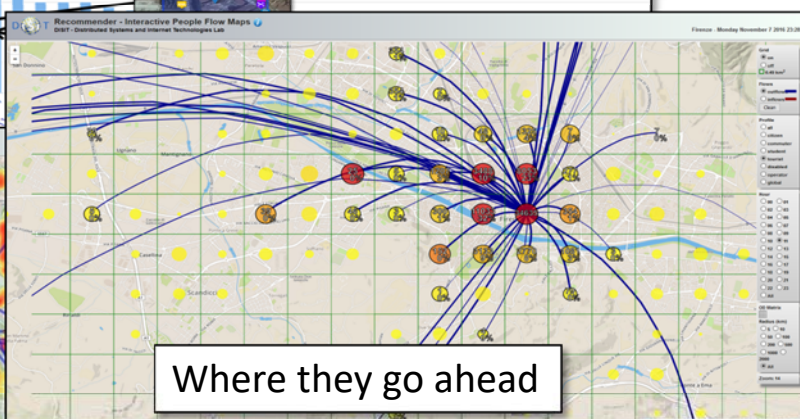
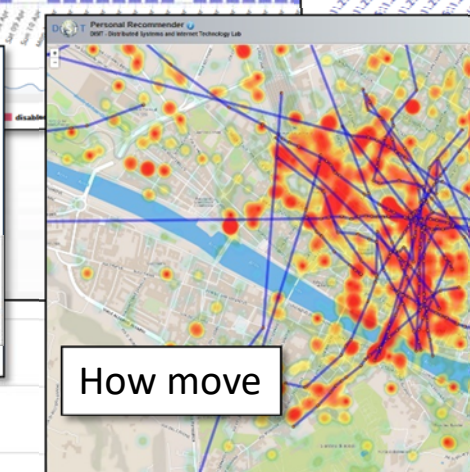
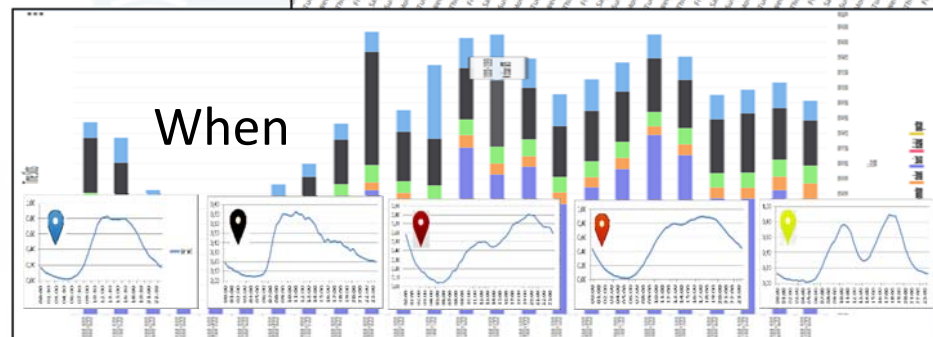
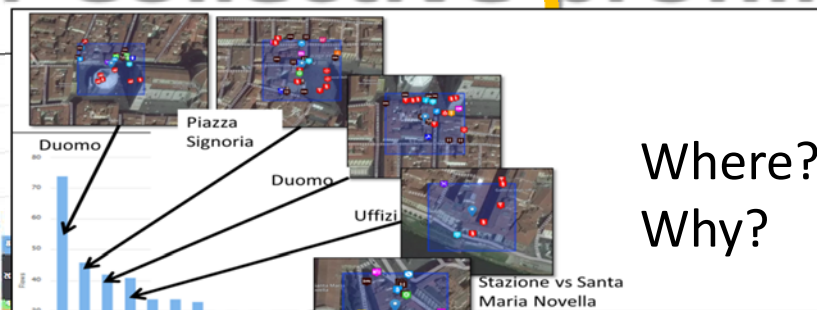
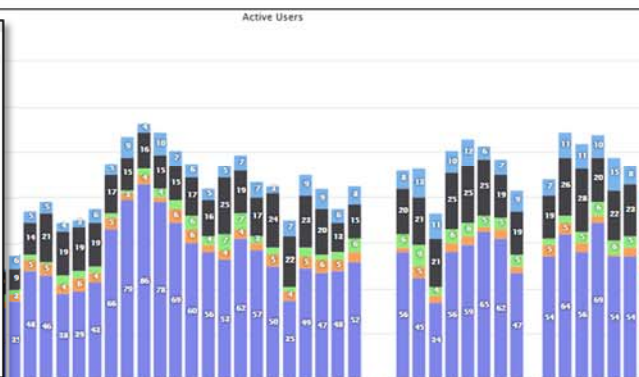
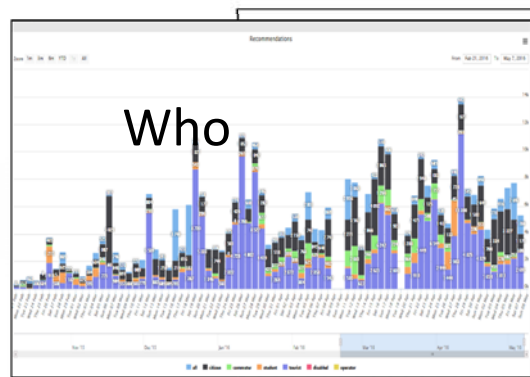
Reasoning on App Data and for App

- **Suggestions....**
 - ML, clustering..
- **Engagements....**
 - Rules systems, ML, city strategies
- **User behavior analysis**
 - *Reconstruction of user behavior on the move*
and in the city in general
 - *Pedestrian, TPL, Bike, private, etc.*



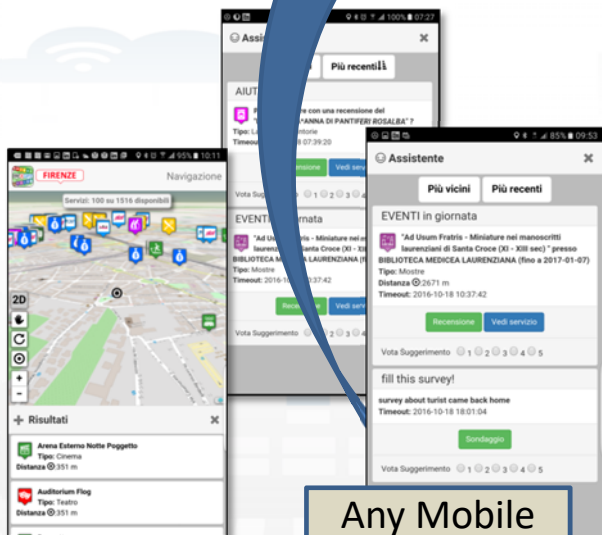
Rule name	Type	#sent	#viewed	#viewed on #sent	Description
<i>daily_event_de</i>	ENGAGEMENT	1 (0%)	0 (0%)	0%	Suggest (in german) an event currently on in Florence
<i>daily_event_en</i>	ENGAGEMENT	1720 (2.12%)	70 (7.1%)	4.07%	Suggest (in english) an event currently on in Florence
	- commuter	3 (0.29%)	0 (0%)	0 (0%)	
	- student	14 (0.81%)	0 (0%)	0 (0%)	
	- tourist	1462 (85%)	25 (35.71%)	25 (1.71%)	
	- citizen	113 (6.57%)	39 (55.71%)	39 (34.51%)	
	- operator	0 (0%)	0 (0%)	0 (0%)	
	- disabled	0 (0%)	0 (0%)	0 (0%)	
	- all	119 (5.92%)	6 (5.07%)	6 (5.04%)	
<i>daily_event_es</i>	ENGAGEMENT	6 (0.01%)	4 (0.41%)	66.67%	Suggest (in spanish) an event currently on in Florence
<i>daily_event_fr</i>	ENGAGEMENT	0 (0.01%)	0 (0%)	0%	Suggest (in french) an event currently on in Florence
<i>daily_event_it</i>	ENGAGEMENT	5439 (9.73%)	296 (20.02%)	5.42%	Suggest (in Italian) an event currently on in Florence
<i>parking_en</i>	ASSISTANCE	141 (0.17%)	128 (12.96%)	90.78%	Alert (in english) if the user parked in a residential parking zone
<i>parking_en</i>	ASSISTANCE	3 (0.03%)	3 (0.3%)	100%	Alert (in spanish) if the user parked in a residential parking zone
<i>parking_it</i>	ASSISTANCE	187 (0.23%)	1 (0.1%)	0.53%	Alert (in Italian) if the user parked in a residential parking zone
<i>shooting_photo_de</i>	ENGAGEMENT	68 (0.08%)	1 (0.1%)	1.47%	Ask (in german) a contribution for a nearby point-of-interest

User Behavior Analyzer for Collective profiling



User influencing, engaging, monitoring & Follow Up

City & City Operators Strategy Editor



Any Mobile
and Web
App

Rule name	Type	#sent	#viewed	#viewed on #sent	Description
daily_event_de	ENGAGEMENT	1 (0%)	0 (0%)	0%	Suggest (in german) an event currently on in
daily_event_en	ENGAGEMENT	1720 (2.12%)	70 (7.1%)	4.07%	Suggest (in english) an event currently on in
- commuter		5 (0.29%)	0 (0%)	0 (0%)	
- student		14 (0.81%)	0 (0%)	0 (0%)	
- tourist		1462 (85%)	25 (35.71%)	25 (1.71%)	
- citizen		113 (6.57%)			
- operator		0 (0%)			
- disabled		0 (0%)			
- all		119 (6.92%)			
daily_event_es	ENGAGEMENT	6 (0.01%)			
daily_event_fr	ENGAGEMENT	6 (0.01%)			
daily_event_it	ENGAGEMENT	5459 (6.73%)			
parking_en	ASSISTANCE	141 (0.17%)			
parking_es	ASSISTANCE	3 (0%)			
parking_it	ASSISTANCE	187 (0.23%)			
shoot_a_photo_de	ENGAGEMENT	68 (0.08%)			

Inform

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 your may be interested, etc..

Provide Bonus

Since you have parked here you we can get 1 Bonus
We suggest you to leave the car out of the city, this bonus can be used to by a bus ticket



Using and Contributing to Km4City



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DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

DISIT lab, Gennaio 2018



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INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

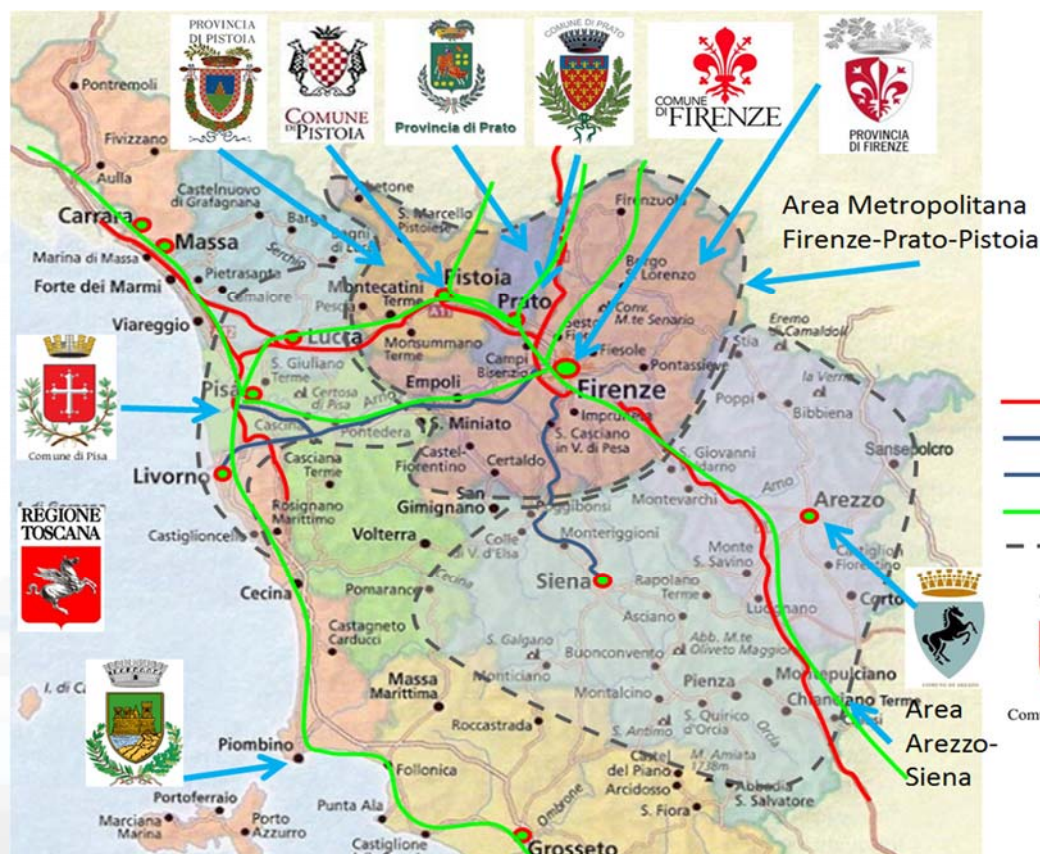
<http://www.disit.org>

Sii-Mobility

<http://www.Sii-Mobility.org>



- Experimentations and validation in Tuscany
- Integration with present central station and subsystems
- DISIT lab, Università di Firenze, is the tech-scientific coordinator



*ECM; Swarco Mizar;
Inventi In20; Geoin;
QuestIT; Softec; T.I.M.E.;
LiberoLogico; MIDRA
(autostrade, motorola);
ATAF; Tiemme; CTT
Nord; BUSITALIA;
A.T.A.M.; Effective
Knowledge; eWings;
Argos Engineering; Elfi;
Calamai & Agresti;
Project; Negentis*



Horizon 2020
European Union Funding
for Research & Innovation

<http://www.resolute-eu.org>

- Develop European Resilience Management Guidelines (ERMG)
 - Develop a conceptual framework for creating/maintaining Urban Transport Systems
- Enhance resilience through improved support of human decision making processes, particularly by training professionals and civil users on the ERMG and the RESOLUTE system
- Operationalize and validate the ERMG by implementing the RESOLUTE Collaborative Resilience Assessment and Management Support Systems (CRAMSS) for Urban Transport Systems addressing Road and Urban Rail Infrastructures
 - Pilots in Florence and Athens
- Adoption of the ERMG at EU and Associated Countries level

University of Florence: DISIT lab DINFO (Proj coordinator), DISIA and DST	UNIFI	IT
THALES	THALES	IT
ATTIKOMetro	ATTIKO	GR
Comune di Firenze	CDF	IT
Centre for Research and Technology Hellas	CERTH	GR
Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.	FHG	DE
HUMANIST	HUMANIST	FR
SWARCO Mizar	SWMIZ	IT
Associação para o Desenvolvimento da Investigação no Instituto Superior de Gestão	ADI-ISG	PT
Consorzio Milano Ricerche	CMR	IT



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Horizon 2020
European Union Funding
for Research & Innovation

REnaissance of PLaces
with Innovative Citizenship
And Technology

<http://replicate-project.eu/>

- demonstrate Smart City technologies in energy, transport and ICT in districts in:
 - San Sebastian, Florence and Bristol,
 - follower cities of Essen, Nilufer and Lausanne
- Cities are the customer: considering local specificities
- Solutions must be replicable, interoperable and scalable.
 - Integrated Infrastructure: deployment of ICT architecture, from internet of things to applications
 - Low energy districts
 - Urban mobility: sustainable and smart urban services

- 1 (coordinator) FOMENTO DE SAN SEBASTIAN FSS SPAIN
- 2 AYUNTAMIENTO DE SAN SEBASTIAN SAN SEBASTIAN SPAIN
- 3 COMUNE DI FLORENCE FLORENCE ITALY
- 4 BRISTOL COUNCIL BRISTOL UNITED KINGDOM
- 5 STADT ESSEN ESSEN GERMANY
- 6 NILUFER BELEDIYESI NILUFER TURKEY
- 7 VILLE DE LAUSANNE LAUSANNE SWITZERLAND
- 8 IKUSI ANGEL IGLESIAS, S.A. IKUSI SPAIN
- 9 ENDESA ENERGÍA, S.A. ENDESA SPAIN
- 10 EUROHELP CONSULTING, S.L. EUROHELP SPAIN
- 11 ILUMINACION INTELIGENTE LUIX, S.L. LUIX SPAIN
- 12 FUNDACION TECNALIA RESEARCH & INNOVATION TECNALIA SPAIN
- 13 EUSKALTEL, S.A. EUSKALTEL SPAIN
- 14 COMPAÑÍA DEL TRANVÍA DE SAN SEBASTIÁN DBUS SPAIN
- 15 CONSIGLIO NAZIONALE DELLE RICERCHE CNR ITALY
- 16 ENEL DISTRIBUZIONE, SPA ENEL ITALY
- 17 MATHEMA, SRL MATHEMA ITALY
- 18 SPES CONSULTING SPES ITALY
- 19 TELECOM ITALIA, SPA TELECOM ITALY
- 20 UNIVERSITA DEGLI STUDI DI FIRENZE UNIFI ITALY:
DINFO.DISIT Lab and DIF
- 21 THALES ITALIA, SPA THALES ITALY
- 22 ZABALA INNOVATION CONSULTING ZABALA SPAIN
- 23 TECHNOMAR TECHNOMAR GERMANY
- 24 UNIVERSITY OF BRISTOL UOB UNITED KINGDOM
- 25 UNIVERSITY OF OXFORD UOXF UNITED KINGDOM
- 26 BRISTOL IS OPEN, LTD BIO UNITED KINGDOM
- 27 ZEETTA NETWORKS ZEETTA UNITED KINGDOM
- 28 KNOWLE WEST MEDIA CENTRE, LGB KWMC UNITED KINGDOM
- 29 TOSHIBA RESEARCH EUROPE, LTD TREL UNITED KINGDOM
- 30 ROUTE MONKEY, LTD ROUTE MONKEY UNITED KINGDOM
- 31 ESOTERIX SYSTMES, LTD ESOTERIX UNITED KINGDOM
- 32 NEC LABORATORIES EUROPE, LTD NEC UNITED KINGDOM
- 33 COMMONWHEELS CAR CLUB CIC CO-WHEELS UNITED KINGDOM
- 34 UNIVERSITY OF THE WEST OF ENGLAND UWE UNITED KINGDOM
- 35 ESADE BUSINESS SCHOOL ESADE SPAIN
- 36 SISTELEC SOLUCIONES DE TELECOMUNICACION, S.L. SISTELEC SPAIN

Acknowledgement

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- **Km4City** is an open technology exploited by those projects and line of research of DISIT Lab. Some of the innovative solutions and research issues developed into the above mentioned projects are also compliant and contributing to the Km4City approach and thus are contributing to the open Km4City model of DISIT lab.

