



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

Smart Cities.



Un nuovo modo di concepire la mobilita' Urbana

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

Paolo Nesi, paolo.nesi@unifi.it

www.Km4City.org



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

Convegno

ASSICURAZIONE E NUOVE TECNOLOGIE

Firenze, Palazzo Incontri, Via dei Pucci 1

Venerdì 2 febbraio 2018
ore 9.00 - 17.00



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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<http://www.disit.org>

Km4City Roadmap



12/2017
WEEE
2017-2020

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

6/2017

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



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



- Smart City vs IOT, Industria 4.0

6/2018

SMARTCITY
EXPO WORLD CONGRESS

11/2018

2021

2013

Km4City 1.1

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

2015

Km4City 1.4

- Embed
- More API
- iBeacon

RESilience management guidelines and Operationalization applied to Urban Transport Environment

Km4City 1.5

- SmartDS
- Km4City App

RESOLUTE H2020
2015-2018 - Started

<http://www.sii-mobility.org>

Sii-Mobility SCN
2016-2018 - Started
Km4City 1.6.2

2016

REPLICATE H2020
2016-2021- Started

REPLICATE
Renaissance of Places with Innovative Citizenship And Technology

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

GHOST SIR
2016-2019 - Started

GHOST
Enriching the smart city with innovative digital services in Smart Urbanisation

2014

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

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

Transport systems
Mobility, parking



Public Services
Govern, events, ...



Sensors, IOT
Cameras, ...



Environment,
Water, energy



Shops, services,
operators



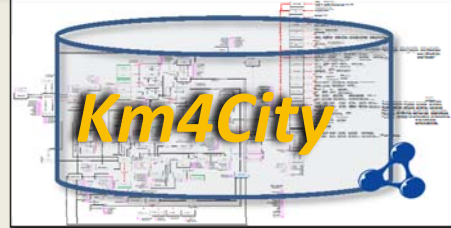
Social Media
WiFi, network



Static, Slow and Real Time data flows

Km4City Smart City Engine

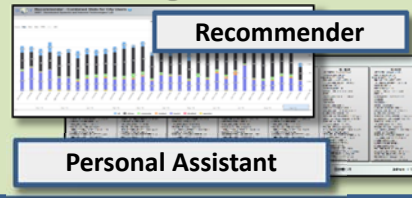
DISCES -- Distributed and parallel architecture on Cloud



Big Data Analytics



Smartening Tools



Development Tools



Km4City Smart City API

City Operators and Decision Makers

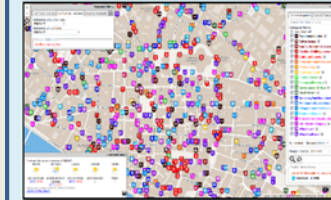
Dashboards



Smart Decision Support



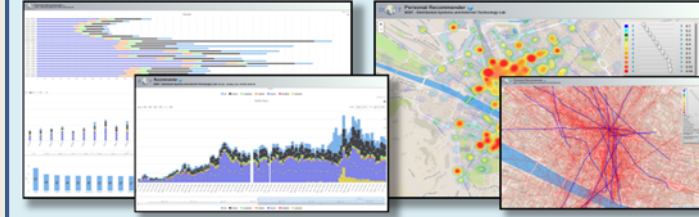
ServiceMap browser



Twitter Vigilance



Analyzers of City User Behavior



Tools for Final Users

Mobile e Web Apps



**Present data on
Tuscany Region
January 2018**

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



- Nascondi Menu

Previs

Giorno	Previsione	Temperatura
Giovedì	poco nuvoloso	23°C / 27°C
Venerdì	poco nuvoloso	20°C / 33°C
Sabato	velato	/

- Nascondi Menu

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

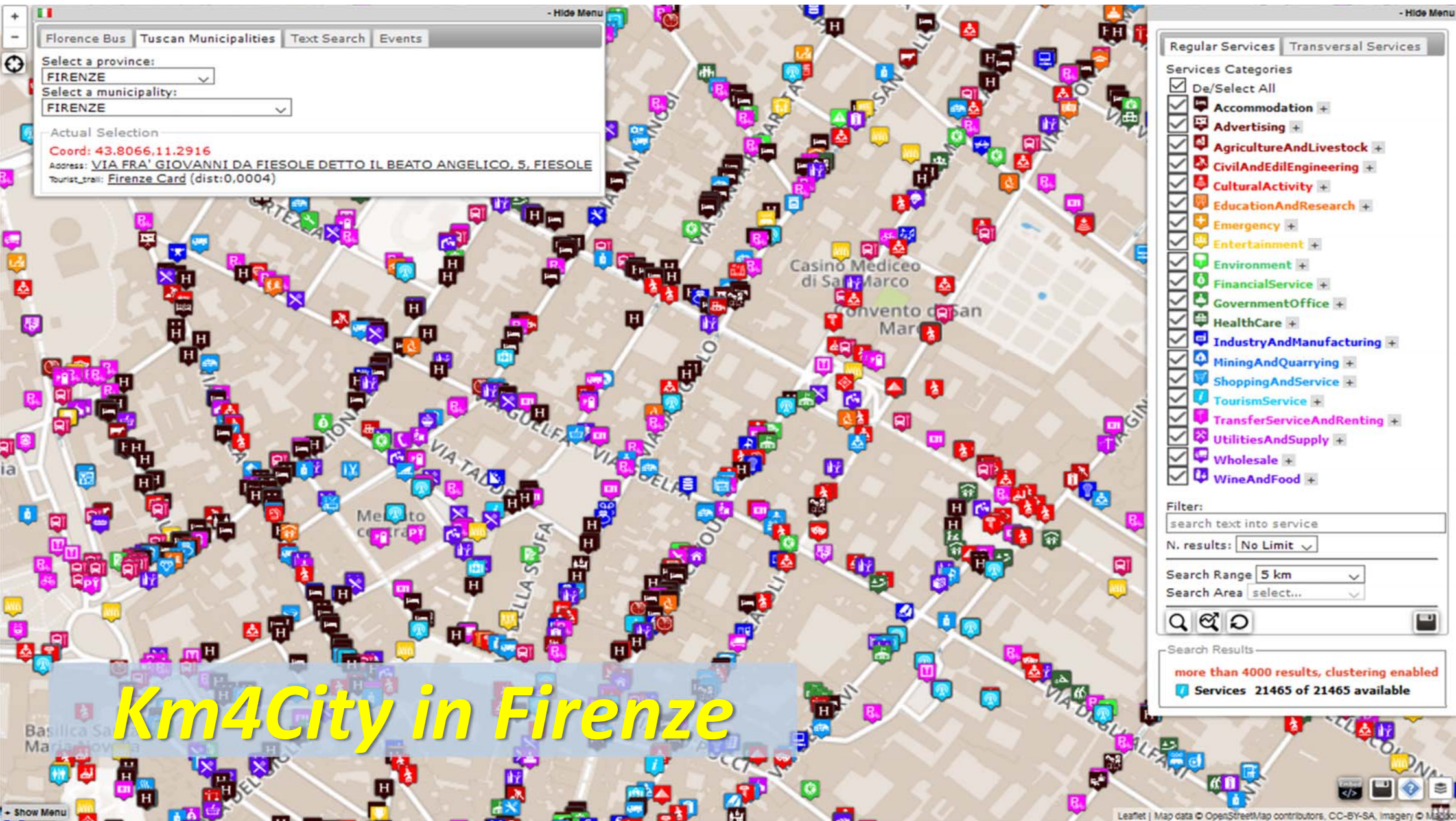
Raggio ricerca 100 metri

Risultati della ricerca

più di 4000 risultati, attivato clustering

Services 16858

<http://servicemap.km4city.org>



Florence Bus Tuscan Municipalities Text Search Events

Select a province:
FIRENZE

Select a municipality:
FIRENZE

Actual Selection
Coord: 43.8066,11.2916
Address: VIA FRA' GIOVANNI DA FIESOLE DETTO IL BEATO ANGELICO, 5, FIESOLE
Tourist_trail: Firenze Card (dist:0,0004)

Regular Services Transversal Services

Services Categories

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

Filter:
search text into service

N. results: No Limit

Search Range 5 km

Search Area select...

Search Results

more than 4000 results, clustering enabled

Services 21465 of 21465 available

Km4City in Firenze

Hide Menu

Florence Bus Tuscan Municipalities Text Search Events

Select an agency:
Ataf&Linea

Select a line:
- Select a Line -

Select a route:
- Select a Route -

Select a bus stop:
- Select a Bus Stop -

Position of selected Busses

Actual Selection
Bus Stop: Sorgane Piazza Rodolico

TPL STOP: Sorgane Piazza Rodolico

Ataf&Linea

LINKED OPEN GRAPH

Lines:
24

Display 10 Bus per page

Search:

Time	Line	Direction
06:00:00 2016-11-10	24	Grassina
06:10:00 2016-11-10	24	Sorgane Piazza Rodolico
06:15:00 2016-11-10	24	Osteria Nuova
06:20:00 2016-11-10	24	Grassina
06:42:00 2016-11-10	24	Sorgane Piazza Rodolico

Showing page 1 of 7

Real-time data currently not available

Hide Menu

Regular Services Transversal Services

Services Categories

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

Filter:
search text into service

N. results: 10

Search Range 100 mt

Search Area select...

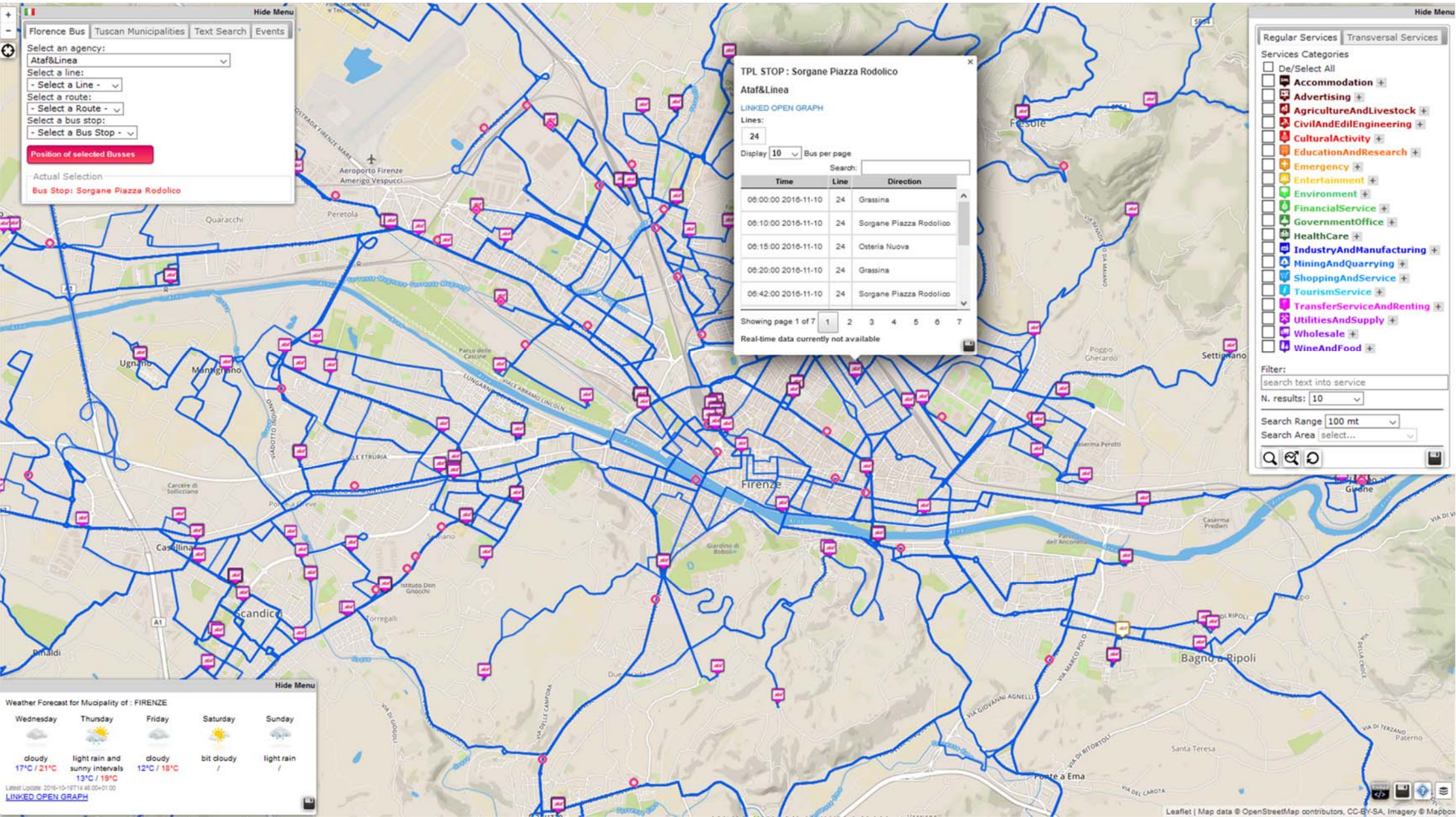
Hide Menu

Weather Forecast for Municipality of : FIRENZE

Wednesday	Thursday	Friday	Saturday	Sunday
cloudy 17°C / 21°C	light rain and sunny intervals 13°C / 18°C	cloudy 12°C / 18°C	bit cloudy	light rain

Latest Update: 2016-10-19T14:46:00+01:00

[LINKED OPEN GRAPH](#)





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Cycling Paths



Actual Selection
Coord: 43.7803,11.2548
Address: PIAZZA DELL'INDIPENDENZA, 26, FIRENZE
Route: 12 (dist:0,0001)
Route: 81 (dist:0,0001)

Regular Services | Transversal Services

Services Categories

- De/Select All
- Area
- DigitalLocation
- HappeningNow
- Path
- Cycle_paths
- Tourist_trail
- Tramline

Filter:

search text into service

N. results for each: No Limit

Search Range: visible areas

Search Results: Services 228 of 228 available

Risultati

Percorsi Ciclabili_309	Tipo: Ciclopercorsi	Distanza: 172 m
Percorsi Ciclabili_305	Tipo: Ciclopercorsi	Distanza: 181 m

serviceapp.disit.org/WebAppGrafo/mappa.jsp#close

DISIT lab, Gennaio 2018



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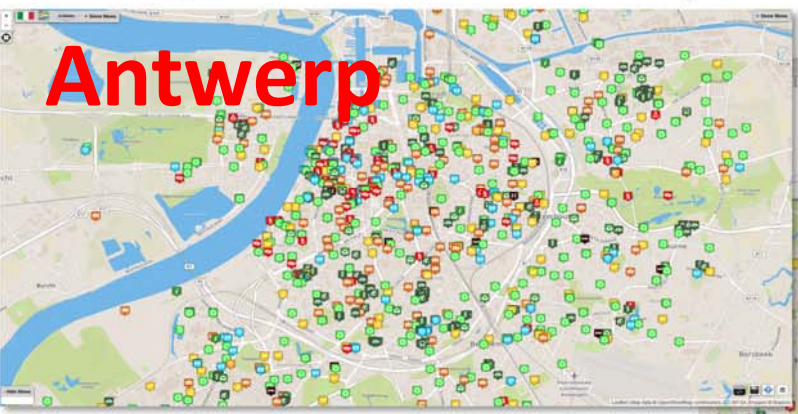
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<http://www.disit.org>

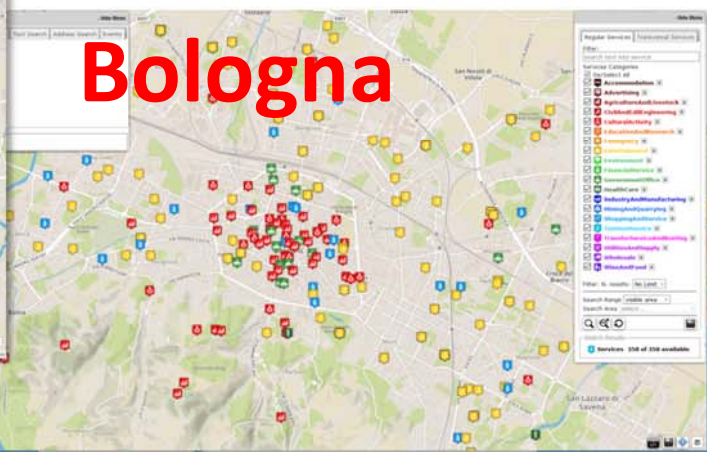
Km4City in ...



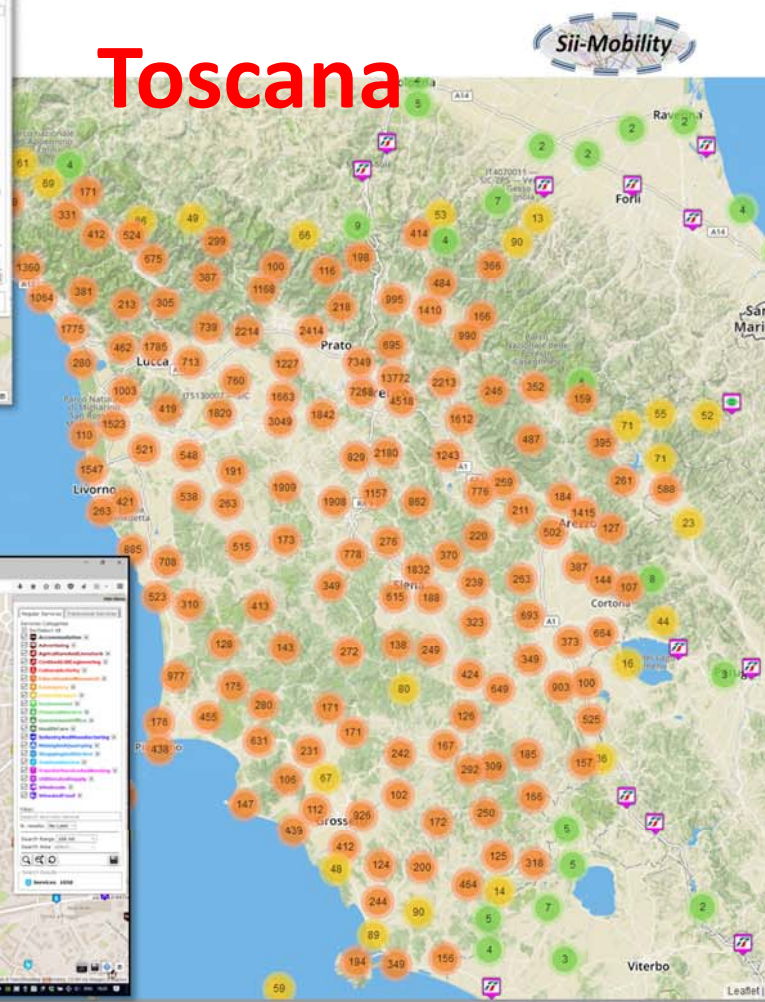
Antwerp



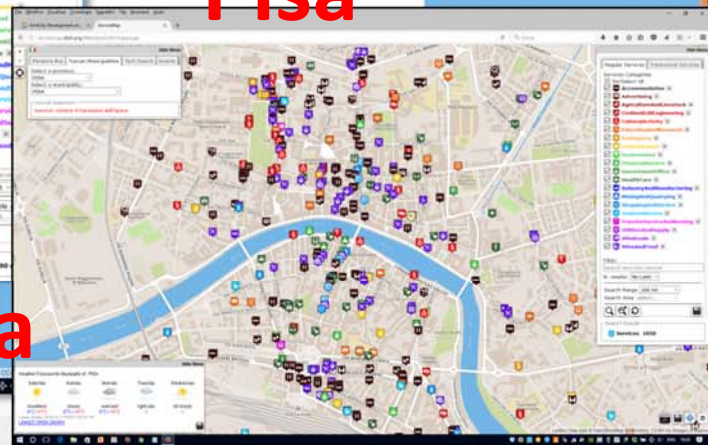
Bologna



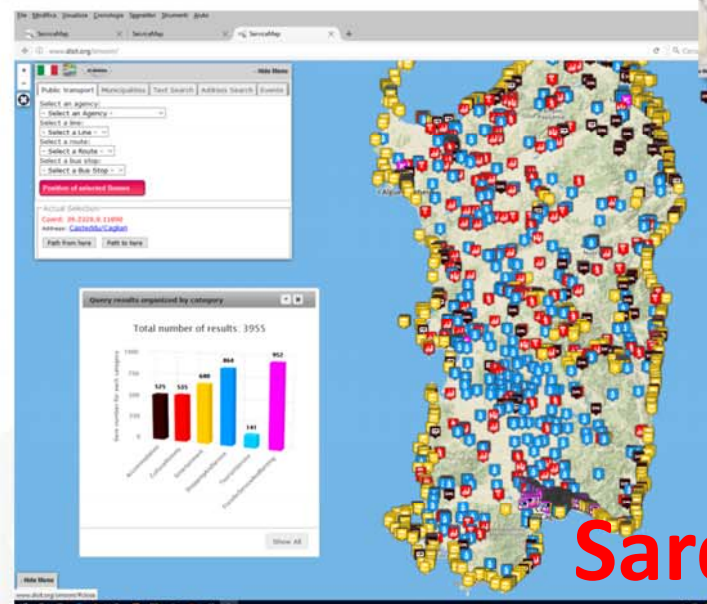
Toscana



Pisa



Sardegna



• Search all services in the area

Dashboard for all

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



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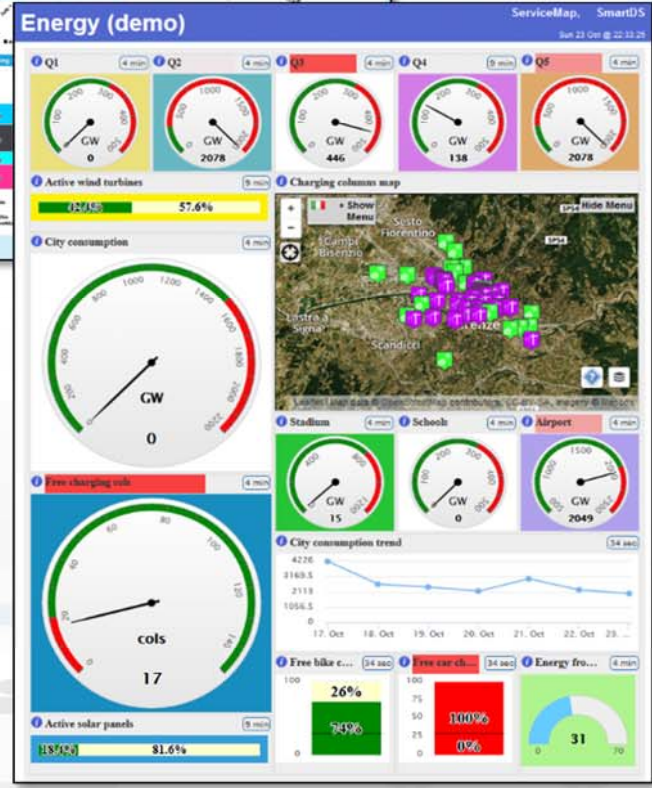
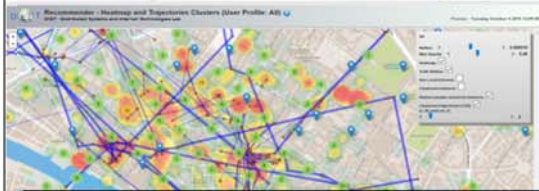
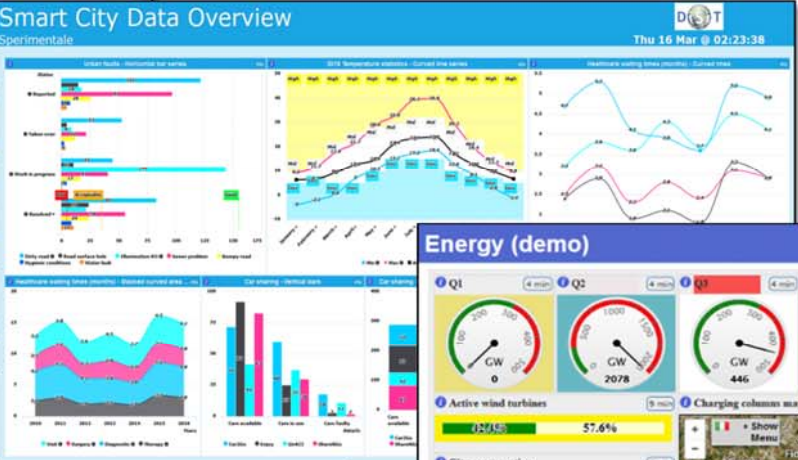
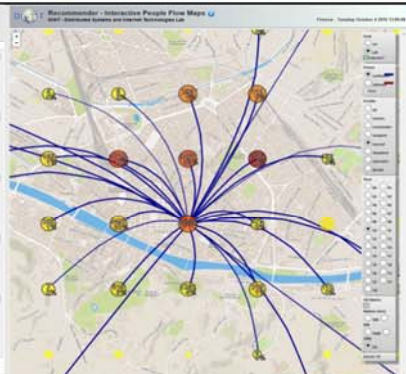
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DISIT lab, Gennaio 2018

Smart City Dashboard

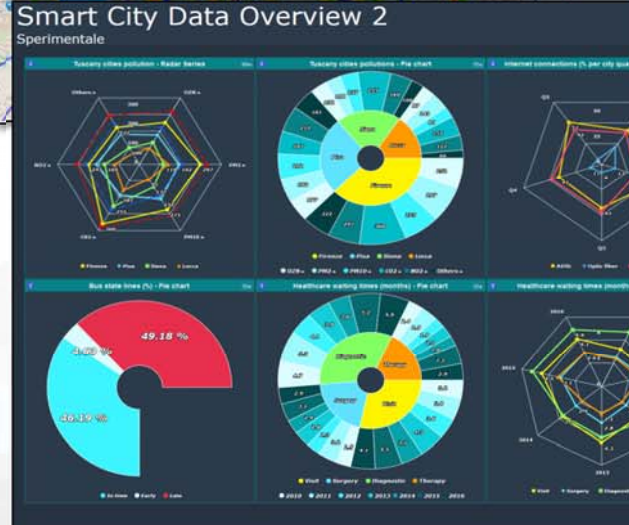


Horizon 2020
European Union Funding
for Research & Innovation



Florence data overview
 A table based overview over city main data
 Wed 18 Jan @ 19:19:10

Substation	Q1+	PM2.5	PM10+	CO2+	NO2+	PM10	Wind speed (Day)(m/s)	Direction	Temperature (°C)	Humidity (%)	Rain today (mm)	Pressure (index)	Fire	Quality (%)	Cost (%)	Availability time (%)	Emergency handling (%)
Q1	128	41	141	36	4	50	N	13	9	922	0	922	92	87	95	82	
Q2	33	75	66	123	63	85	NE	17	0	876	0	876	77	64	58	62	
Q3	225	151	164	185	211	78	E	4	22	1022	0	1022	48	43	31	15	
Q4	174	231	87	122	93	42	S	6	0	913	0	913	73	44	23	56	
Q5	79	87	73	27	65	181	N	7.2	23	0	0	957	55	51	39	36	
Q5	79	87	73	27	65	93	O	3	19	0	0	957	58	16	18	23	



DISIT lab, Gennaio 2018

Click POI of interest below

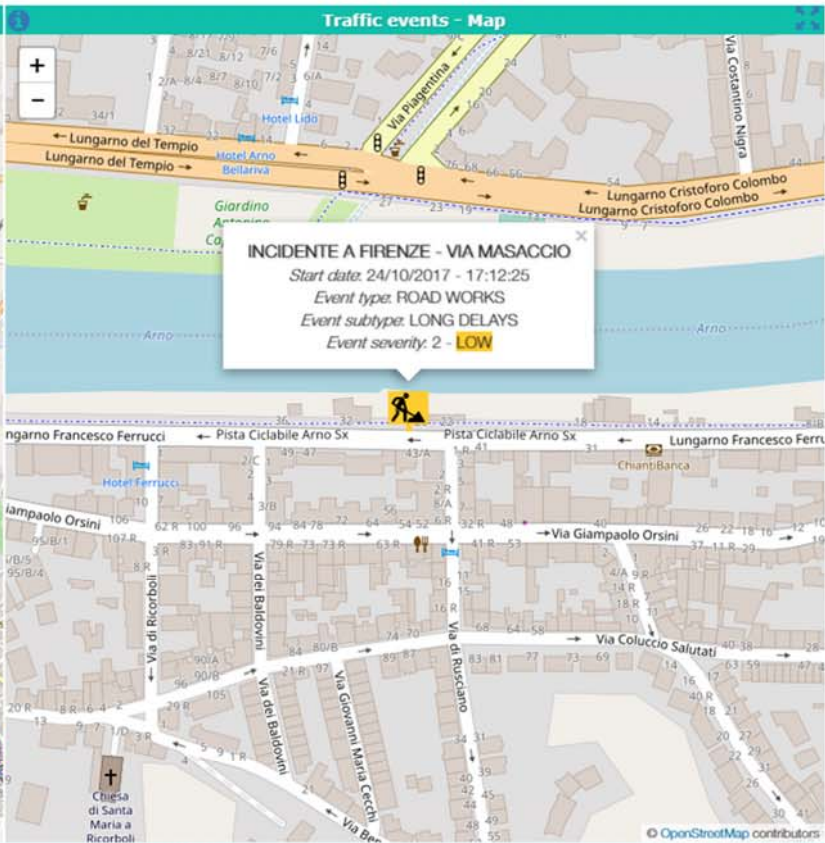
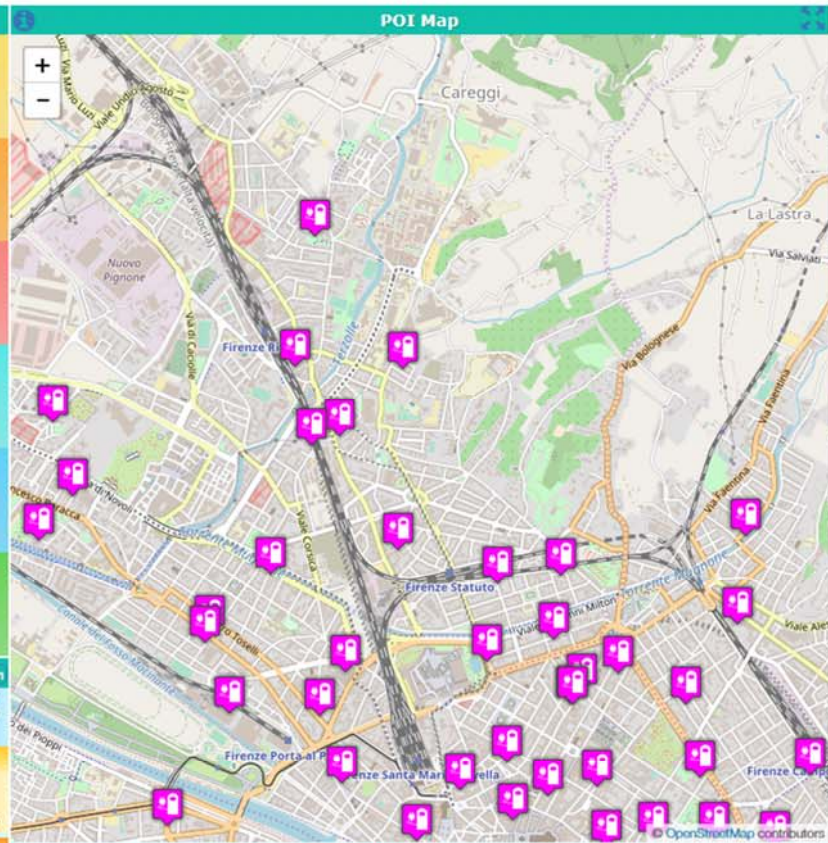
- (1)** Fast recharging stations
- (2)** Cicle paths
- (4)** Public transport paths (F)
- (6)** Restricted traffic areas
- (8)** Parking status
- (7)** Variable Message Signs (F)

Traffic events 18m

(5) INCIDENTE A FIRENZE - VIA MASACCIO
LONG DELAYS
24/10/2017 17:12:25 2 ON MAP

INCIDENTE A FIRENZE - VIA MASACCIO
ACCIDENTI (s)
24/10/2017 20:44:29 5

INCIDENTE A FIRENZE - VIA GARFAGNANA
ACCIDENTI (s)
25/10/2017 11:50:29 8



First aids overview - Tuscany

Service status of main first aids

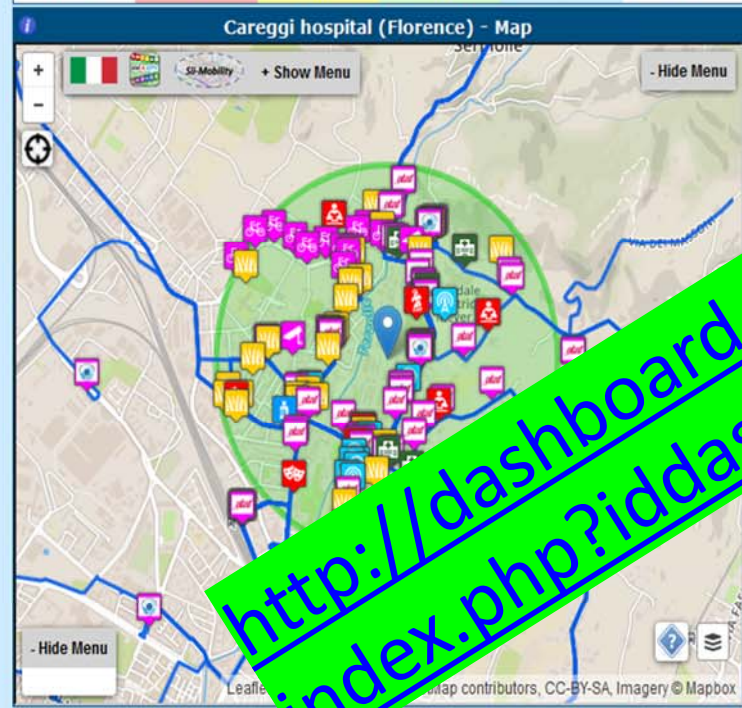


Day @ 11:00:34

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
REGALLI	1	16	20	1	0
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



Stato Priorità	1	2	3	4	5
Con Destinazione	0	4	2	0	0
In Attesa	0	0	1	1	0
In Visita	1	5	4	3	0
Oss. Temporanea	1	17	7	1	0
Totals	2	26	14	5	0

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

ESB

Alarms

- TEST - ALLUVIONE MUGNONE MAJOR
- ALLUVIONE ARNO COVERCIANO CRITICAL
- ALLUVIONE ARNO VIA PIETROLO MAJOR
- TEST - SCORTRI ALLO STADIO CRITICAL

Traffic events

- SEVERE ACCIDENT(S) SERIOUS ACCIDENT(S)
- ROAD WORKS ROADWORKS
- ORD 2017-001302 - SP NA47 APTALTO VALDARNOA7PST
- RESTRICTIONS
- INTERVENTO URGENTE PUBBLICOGUA CLOSED AHEAD

Evacuation plans

- PLAN N. 1497263867 IN PROGRESS
- PLAN N. 2000000000 PROPOSED
- PLAN N. 1497604404 PROPOSED

Tram position

- TRAM1
- TRAM2

Network Analysis

- FMS495
- INDORAL2801
- INDORAL2802
- INDORAL2803
- INDORAL2804
- INDORAL2805
- INDORAL2806
- INDORAL2807
- INDORAL2808
- INDORAL2809
- INDORAL2810
- INDORAL2811
- INDORAL2812
- INDORAL2813
- INDORAL2814
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- INDORAL2897
- INDORAL2898
- INDORAL2899
- INDORAL2900

Environment

PROFEZIONE CIVILE

GENERAL METEO

22 C°

221

24 C°

20 %

RISCHIO IDRAULICO

RISCHIO TEMPORALI

RISCHIO IDROGEOLOGICO

RISCHIO NEVE

RISCHIO GRANDINE

RISCHIO VENTO

RISCHIO MAREGGIATE

Pluv. Firen...

Pluviometro Florence City - Last 24h

24 mm

Hydromete...

Hydrometer Arno Nave di Rossano - Last 24h

20 m.s.z.l.

Hydromete...

Hydrometer Arno Florence Uffizi - Last 24h

24 m.s.z.l.

Hydromete...

Hydrometer Mugnone Ponte alle Vesce - Last 24h

24 m.s.z.l.

Mobility

Bus Lines Status

ULTIMO AGGIORNAMENTO: 2017-06-21 12:38:53

Underpass Viale Mariti Aperto

Underpass Viale Talenti closed

Underpass Fortezza Aperto

ESB events

Fortezza Fl...

37.2%

Mercato Ce...

65.4%

Resources

Planned events

1966 - 2016 - LA BELLEZZA SALVATA - PROROGATA FINO AL 2

2016-12-01 to 2017-07-02

VIA CAMILLO CAVOUR 3

ESPLORATE LE BIBLIOTECHE DELL'UNIVERSITÀ DI FIRENZE IN

2017-02-15 to 2017-06-23

PIAZZA DI SAN LORENZO 9

BIBLIOTECHE DELL'UNIVERSITÀ DI FIRENZE IN MOSTRA - PROR

2017-02-15 to 2017-09-28

Ambulance...

Ambulance...

Voluntiers

20 num.

33 num.

Florence main first aids status

Red code	Yellow code	Green code	Blue code	White code
1	7	14	1	0
PS SANTA MARIA NUOVA				
PS SAN GIOVANNI DE' BOND TORNABUONI	2	10	24	2
PS SANTA MARIA ANNUNZIATA	10	27		

TRENDS QUOTES

#FIRENZE

#NEWS #FIRENZE

#FIRENZE #RIFIUTI

#UFFIZI

#PONTEVEGGIO

#BARGELLO

#AEROPORTO #FIRENZE

#DUOMO #FIRENZE

#VIAGGI #FIRENZE

#GRONACA #FIRENZE

#MUSEOFIRENZE

@COMUNEFI

#INAZIONE #FIRENZE

@PROTIVCOMUNEFI

@UN #FIRENZE

@HUBFIRENZE

@NOVEDAFIRENZE

@SILVIOFIRENZE

TV-RT Firenze

Twitter Vigilance Real Time Dashboard

Last crawling: 2017-06-21 12:44:30

Channel active from 2016-06-27 to 2017-06-21 12:35:00

08:10:00 to 2017-06-21 12:35:00

Sentiments trends in channel: Firenze

Zoom: 1H 3H 6H 12H 1D 1W 1M 1Y

Most Significant Tweets for Sentiment

Last tweets per channel: Firenze

Firenze Wi-Fi - Access Points Clusters Coverage Map

Firenze - Wednesday June 21 2017 12:43:12

Firenze Wi-Fi - APs Streaming Realtime

Firenze - Wednesday June 21 2017 12:43:12

Firenze Wi-Fi: APs Streaming Realtime

DISIT - Distributed Systems and Internet Technologies Lab

<http://dashboard.km4city.org/dashboardSmartCity/view/index.php?iddashboard=MT15>

Real Time Sensors via ServiceMap3D

3D data rendering



Fri 26 Jan 00:23:19



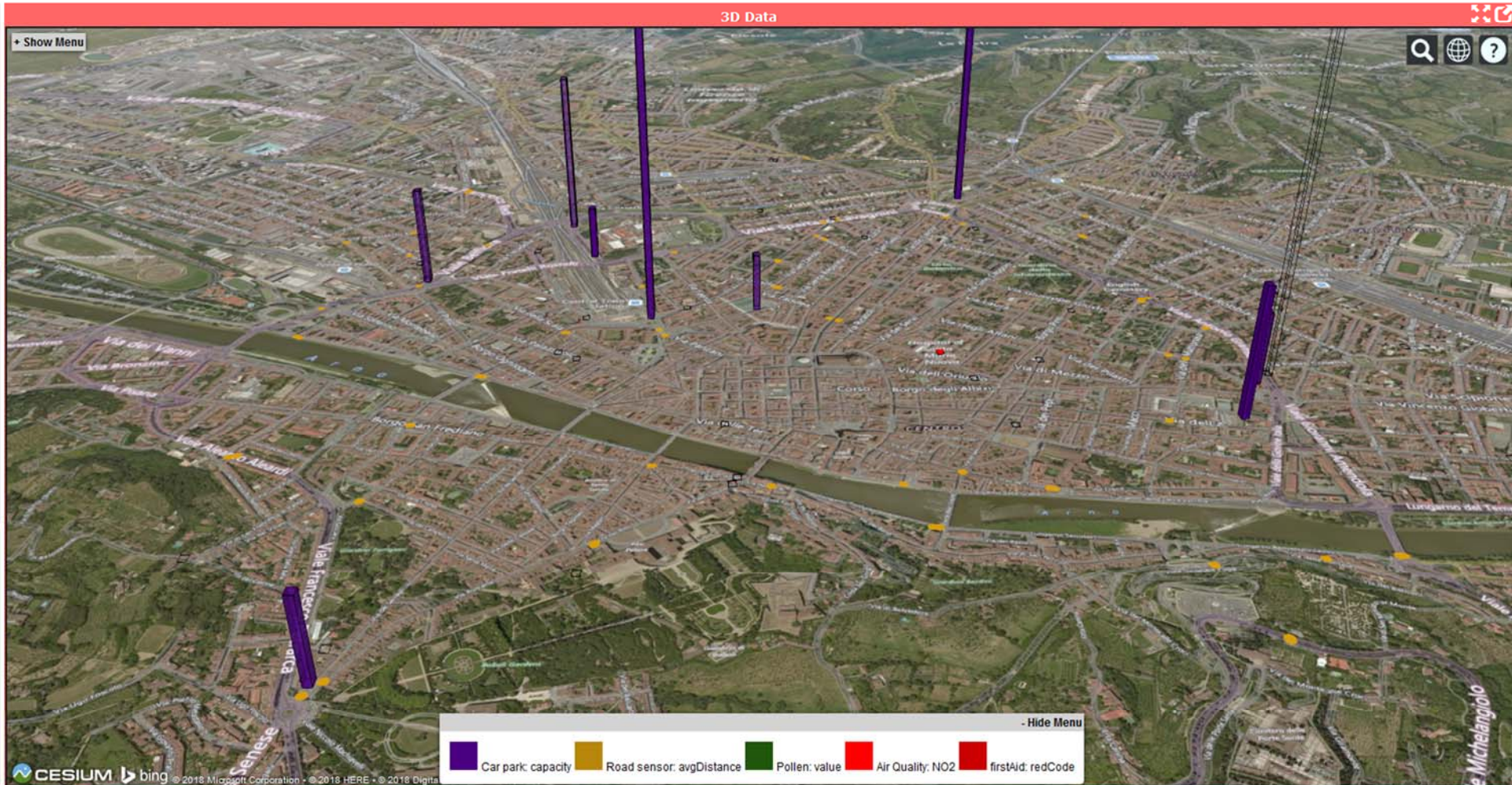
Firenze



Airport



Empoli



Smart City Control Room Console

Entry point for REPLICATE dashboards



Tue 21 Nov 19:30:36

Energy

Environment

Mobility and Transport

Social

4 in one UHD

Energy Pilot

Environment and Weather

Mobility and Transport

Web and Social

4 in one UHD (2)

Data Aggregation and Data Analytics
SIT Lab

RealTime Sensors via ServiceMap3D

Resilience Management

Resilience Dashboard by RESOLUTE

<http://www.disit.org/dashboardSmartCity/view/index.php?idashboard=MTY1>

Sperimentazioni



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DISIT lab, Gennaio 2018

Seleziona una provincia:
FIRENZE

Seleziona un comune:
FIRENZE

Actual Selection
COMUNE di FIRENZE

KM 4 CITY

Previsione: Giovedì Venerdì Sabato

poco nuvoloso 23°C / 27°C schiarite 20°C / 33°C poco nuvoloso velato

Services 16858

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!

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>



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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Km4CityMobile App



What do you want to do?

- Discover the City
- Points Of Interest
- Search
- Public transport
- Bus Ticket
- Car Park
- Events
- Suggestions Near You
- We Recommend
- Weather
- Assistant
- Navigator
- Favourites
- Chronology
- Latest Reviews
- Alert Civil Prot.
- Settings
- Vote APP!
- Information
- About Us

Choose Services

- Accommodation
- Advertising
- Agriculture And Livestock
- Civil And Edil Engineering
- Cultural Activity
- Education And Research
- Emergency
- Entertainment
- Environment
- Financial Service
- Government Office
- Health Care
- Industry And Manufacturing
- Mining And Quarrying
- Shopping And Service
- Tourism Service
- Transfer Service And Renting

Giardino Di Boboli

Tipo: Digital Location

Descrizione: The Prince s Way ends in the Giardino di Boboli, near the Grotta del Buontalenti, that is a very masterpiece of the Mannerist architecture and sculpture

Descrizione: Il Percorso del Principe termina nel Giardino di Boboli, nei pressi della Grotta del Buontalenti, vero e proprio capolavoro dell'architettura e della scultura manierista

Suggerimenti

ESERCITAZIONE MUGNONE 2016

MODALITÀ 2016 18 maggio 2016

Sardegna Mugnone 2016 28 maggio 2016 08:00-12:00

prevede: Firenze (FI) (ZONA: A3)

RISCHIO	TEMPI	ALLERTA
IDROGEOLOGICO IDRAULICO RETICOLO MINORE	Dalle ore 13.00 di Venerdì 27 maggio 2016 alle ore 18.00 di Venerdì 27 maggio 2016	GIALLO
IDROGEOLOGICO IDRAULICO RETICOLO MINORE	Dalle ore 18.00 di Venerdì 27 maggio 2016 alle ore 12.00 di Sabato 28 maggio 2016	ARANCIONE

Trattoria Gozzi
Tipo: Trattoria
Distanza 1975 m

Mostra Tutte le Categorie

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

Tutta la posta in un unico posto

Calendario Posta

Sereno 3° 11° 0°

Microsoft Edge Roma

Anteprima Sk... Tuneln Radio Twitter

NETFLIX

FIRENZE

Xbox

80&A

DISPONIBILE SU Google play

Scarica da App Store

Scarica da Windows Store



Km4City APP



- **Mobility**

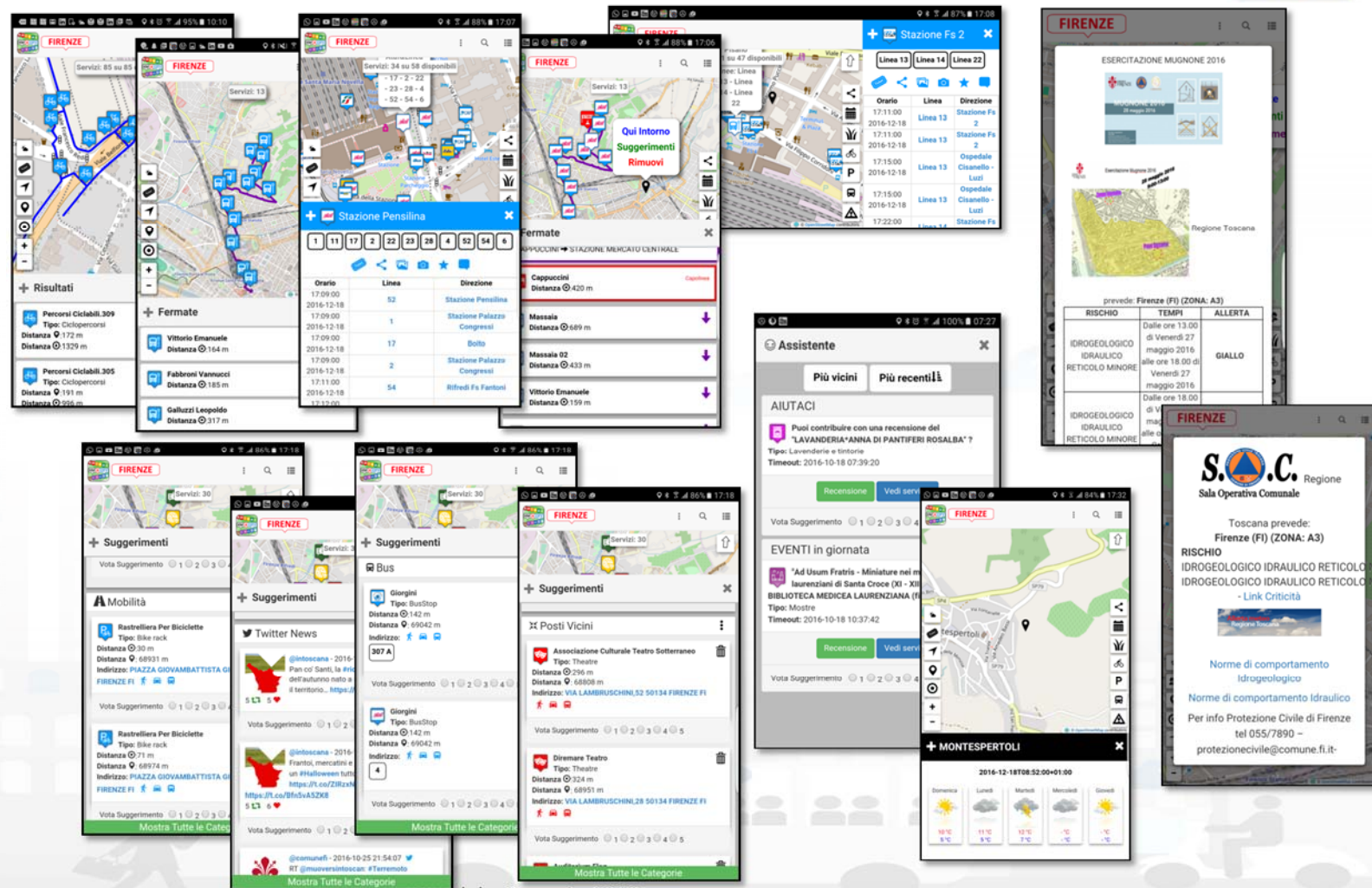
- Paths and stops, time
- Parking + prediction
- Ticketing
- Flow + prediction
- Navigation
- Connection with devices
- XXX Sharing

- **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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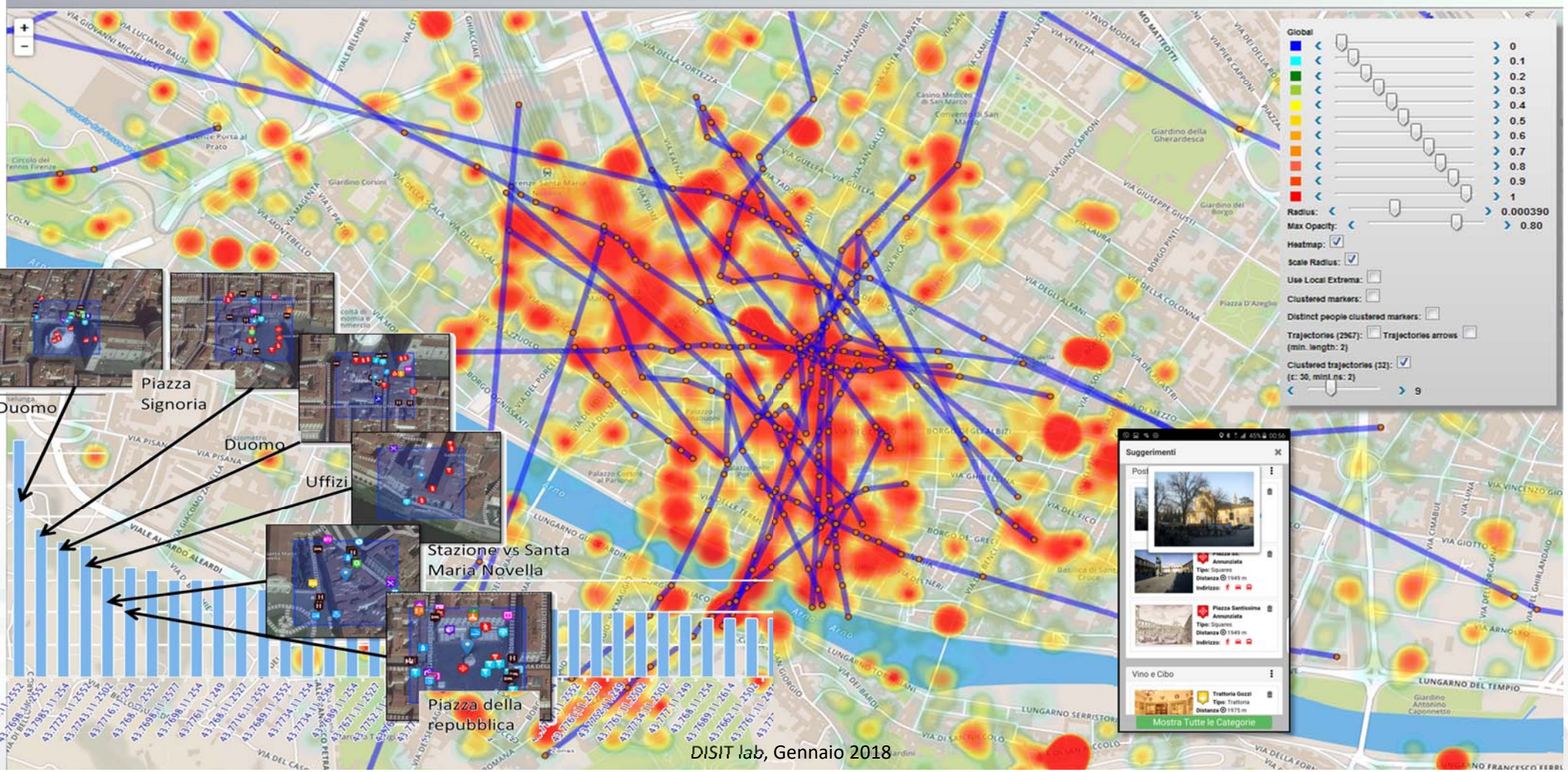
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User Behavior Analyzer



DISIT Personal Recommender
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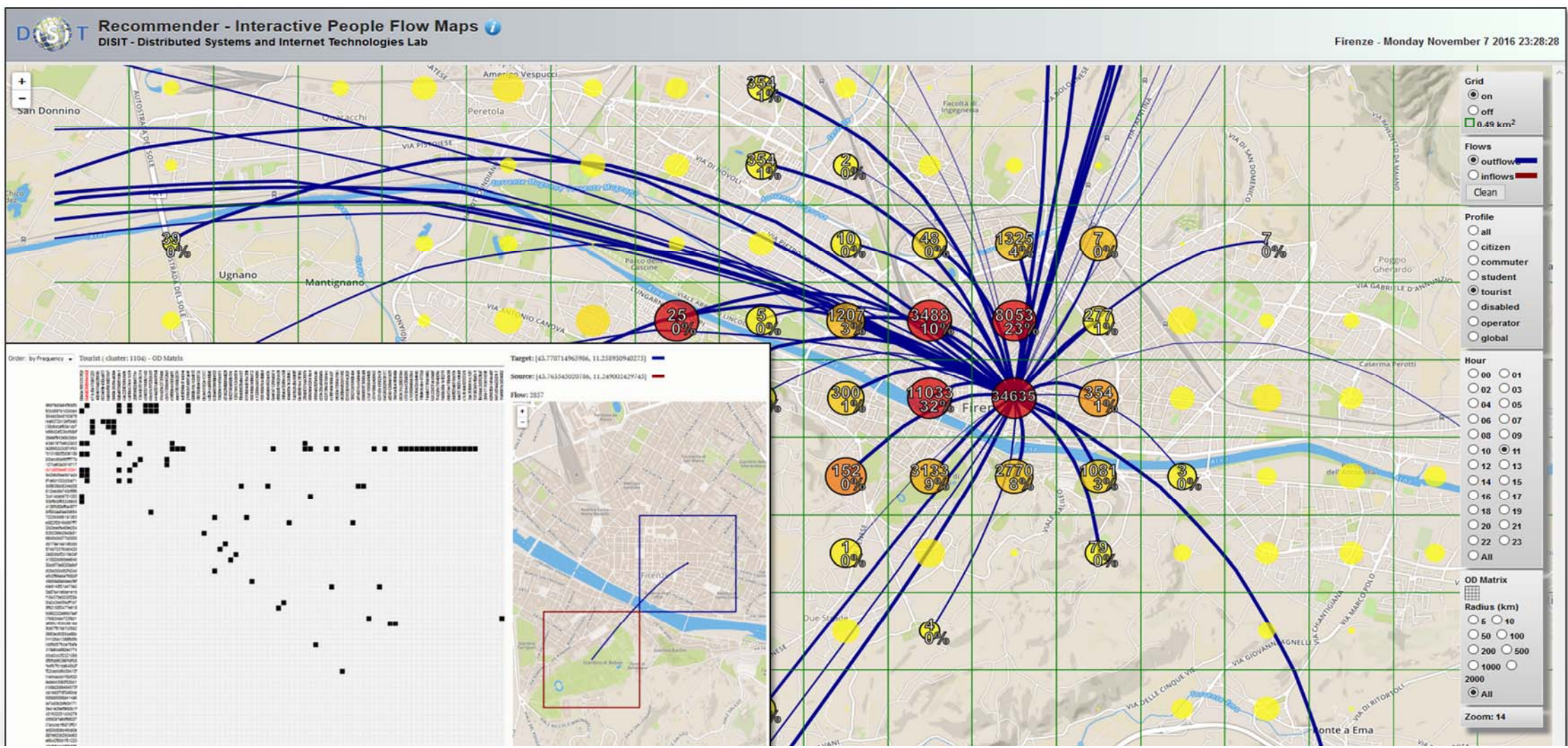
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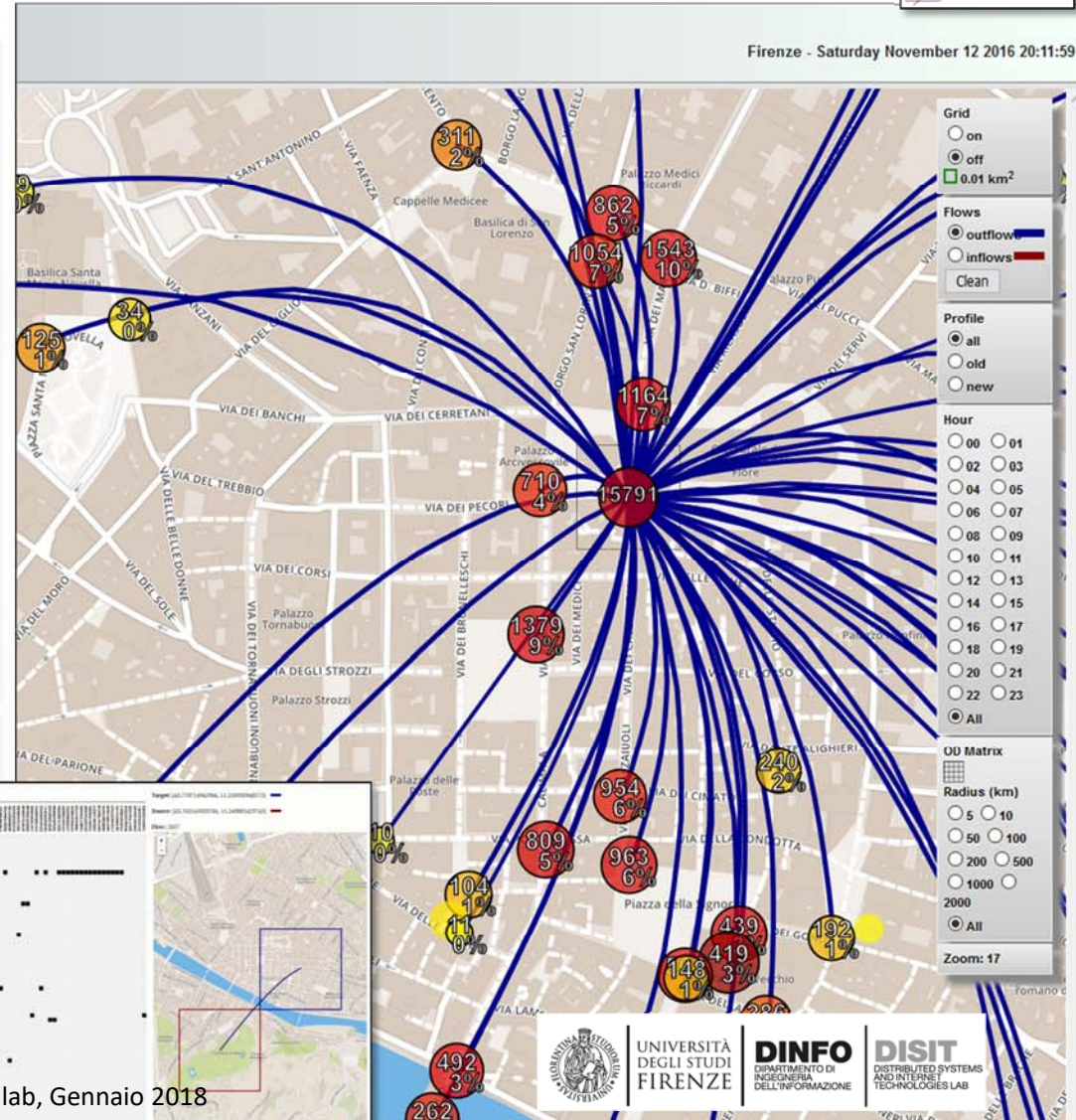
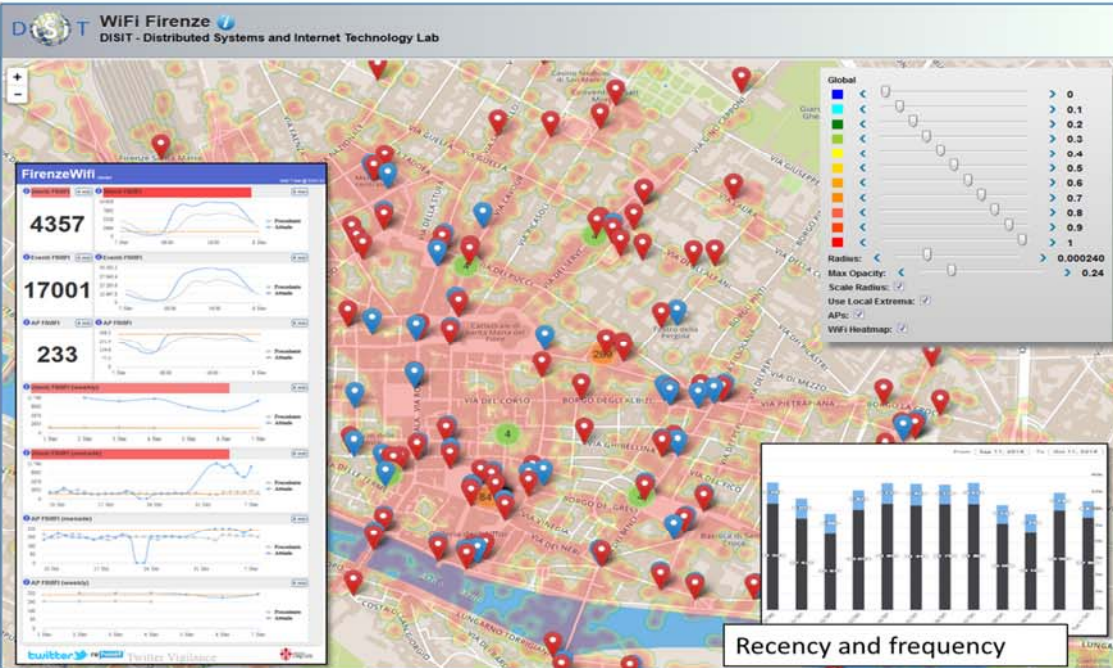
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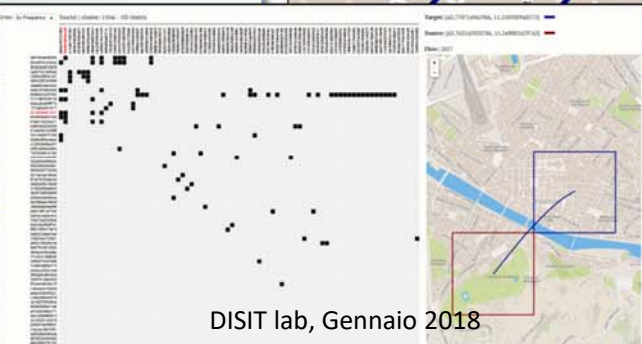
OD Matrix scalabile



Origin Destination Matrix Estimation



Wi-Fi based





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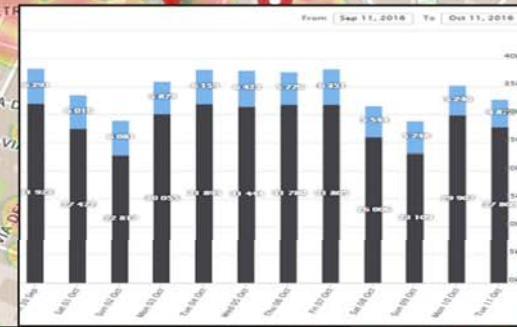
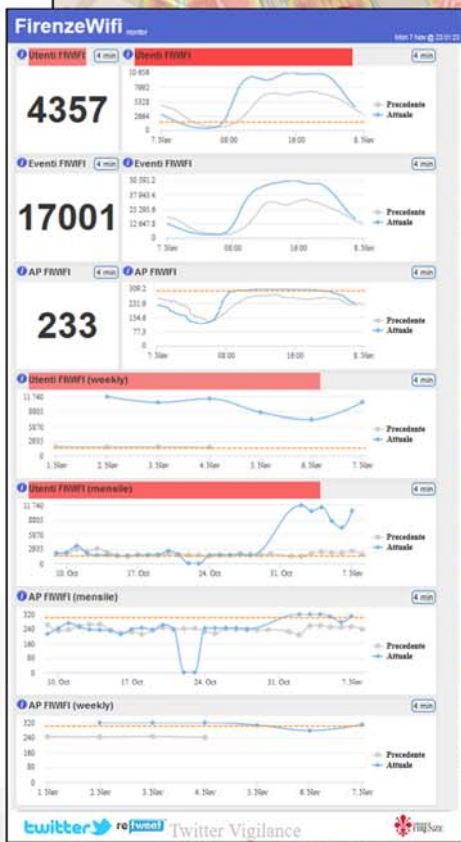
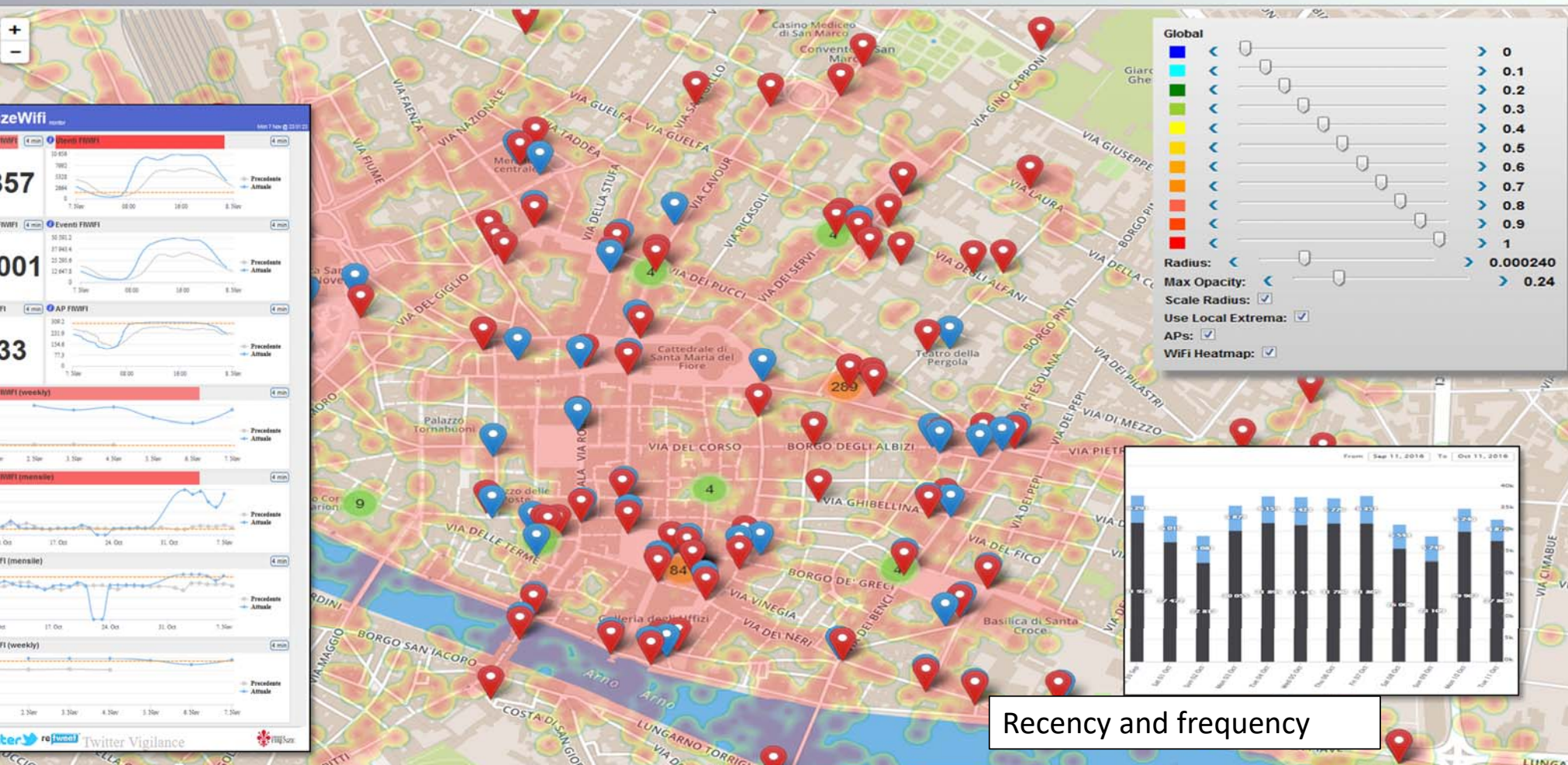
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WiFi Monitor tool



DISIT WiFi Firenze
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Recency and frequency

Traffic Flow Tools

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

The collage illustrates the application of traffic flow tools. It features a map of Tuscany with red circular markers indicating specific locations. A 3D visualization shows a city with blue vertical bars representing traffic flow. A detailed map of Pisa shows red circular markers. A software interface screenshot displays a search bar and a list of service categories, including Regular Services and Transversal Services.

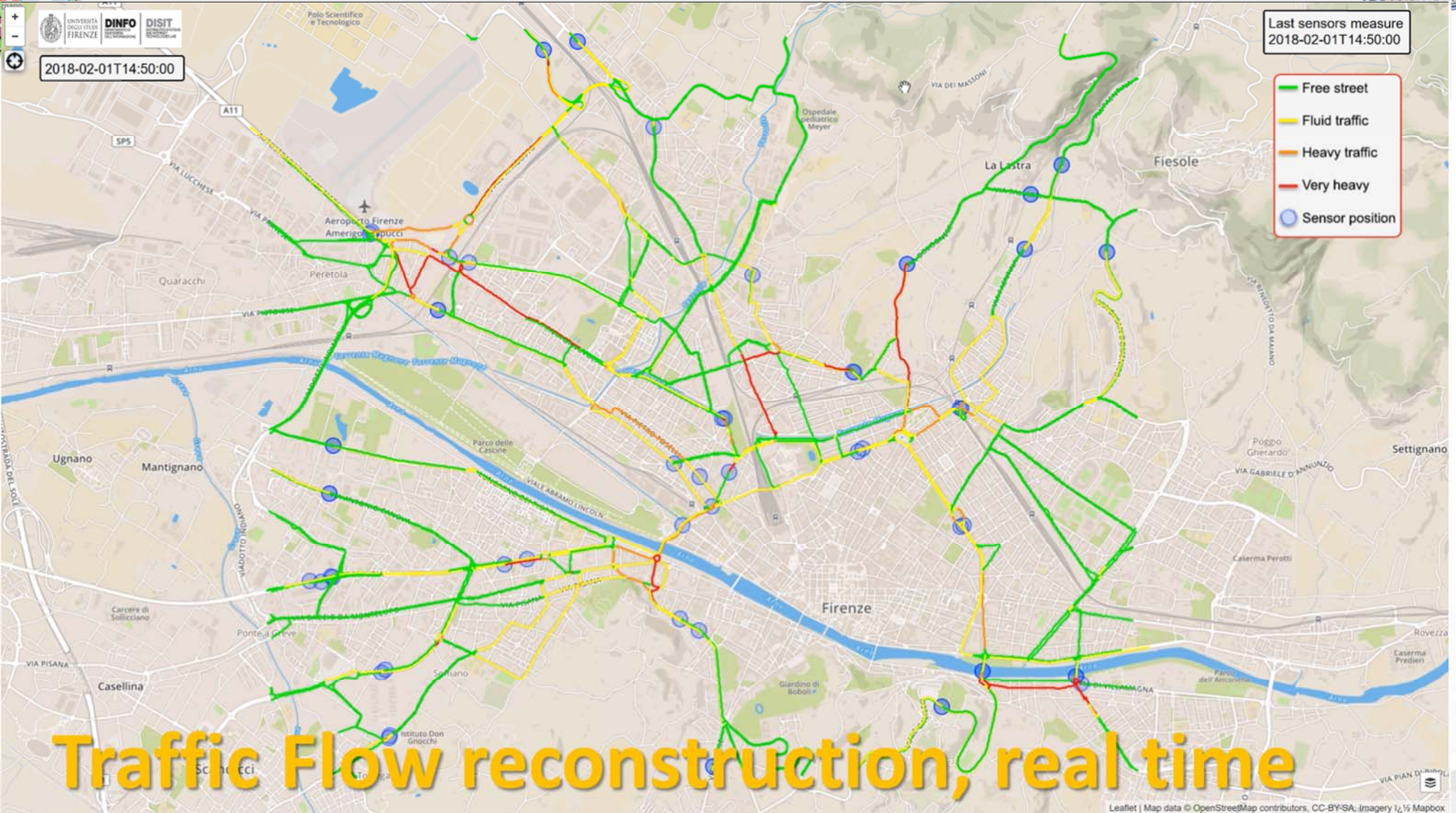
Traffic Flow reconstruction



2018-02-01T14:50:00

Last sensors measure
2018-02-01T14:50:00

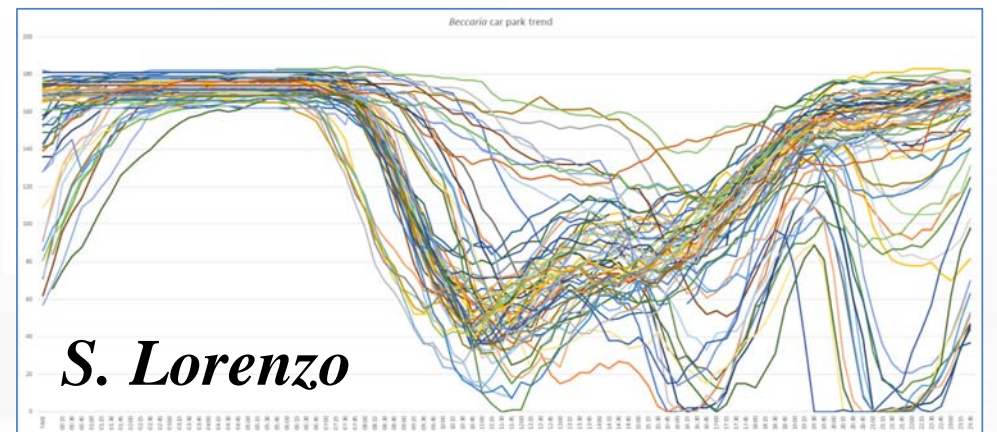
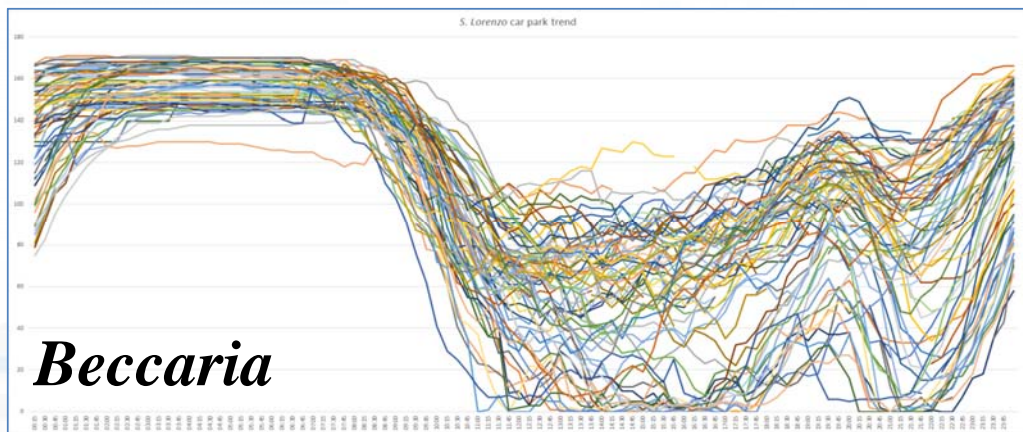
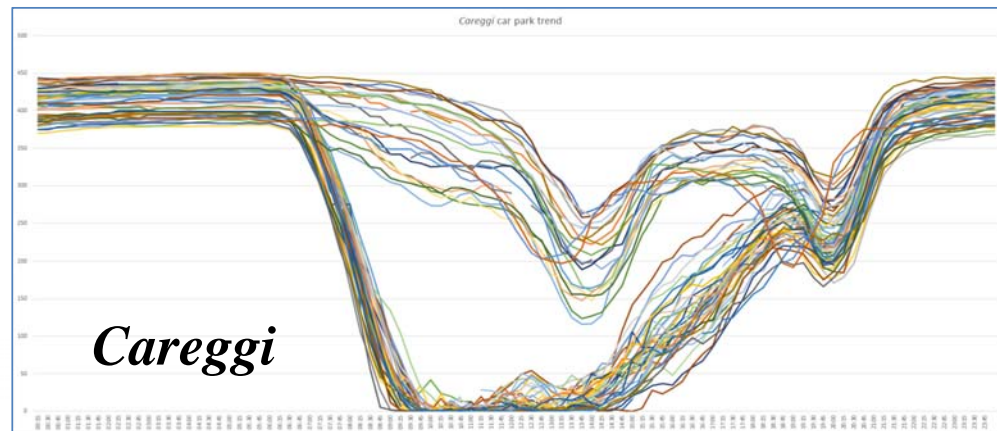
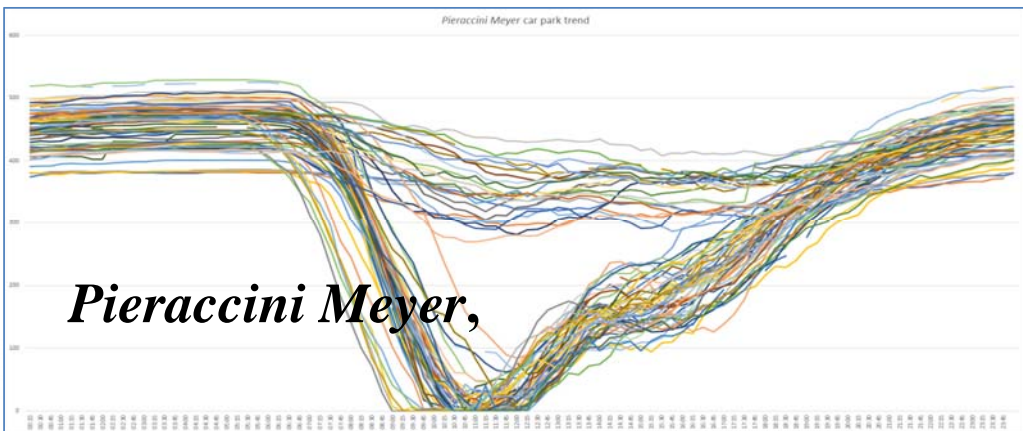
- Free street
- Fluid traffic
- Heavy traffic
- Very heavy
- Sensor position



Traffic Flow reconstruction, real time



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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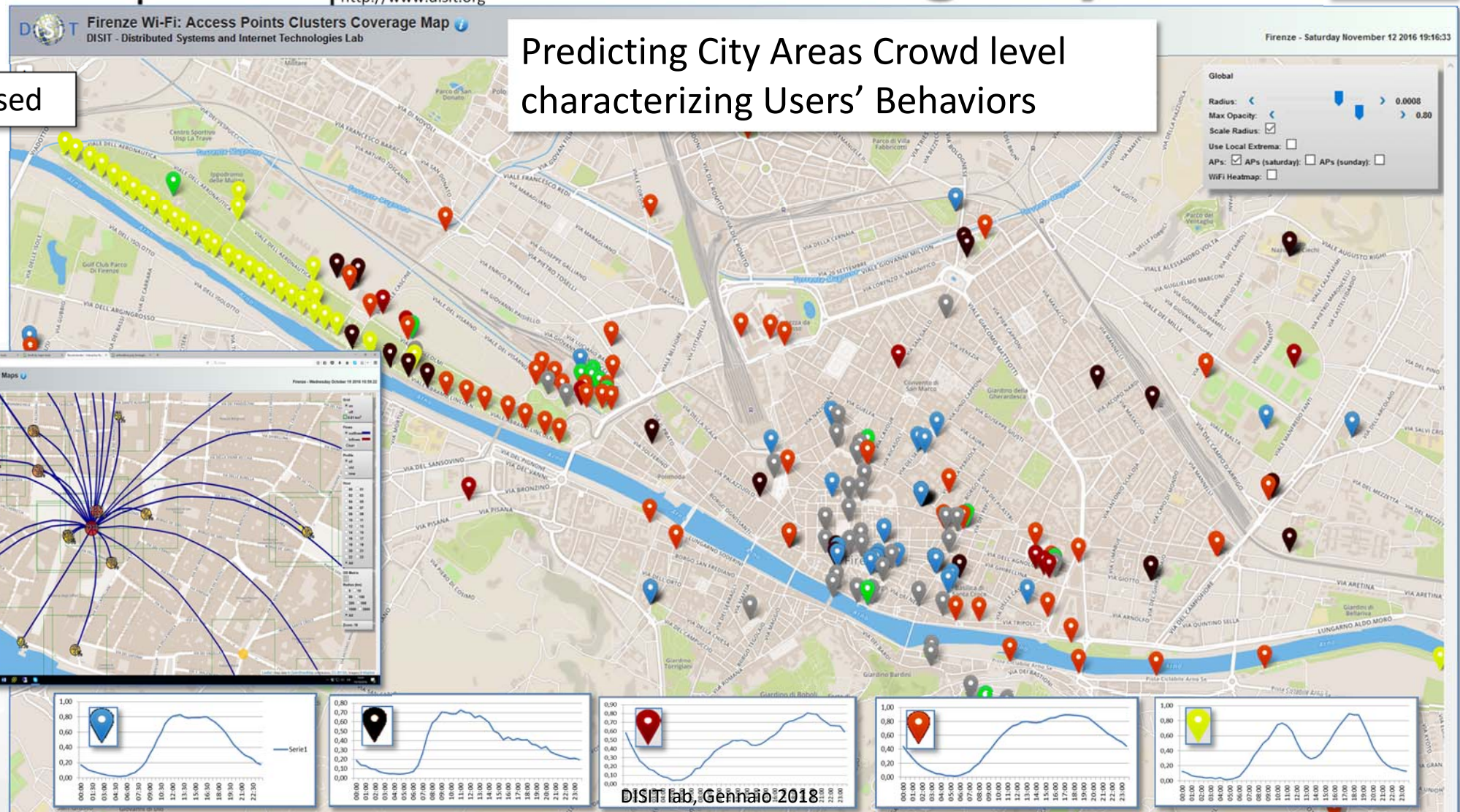
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Characterizing City Areas



Wi-Fi based

Predicting City Areas Crowd level
characterizing Users' Behaviors

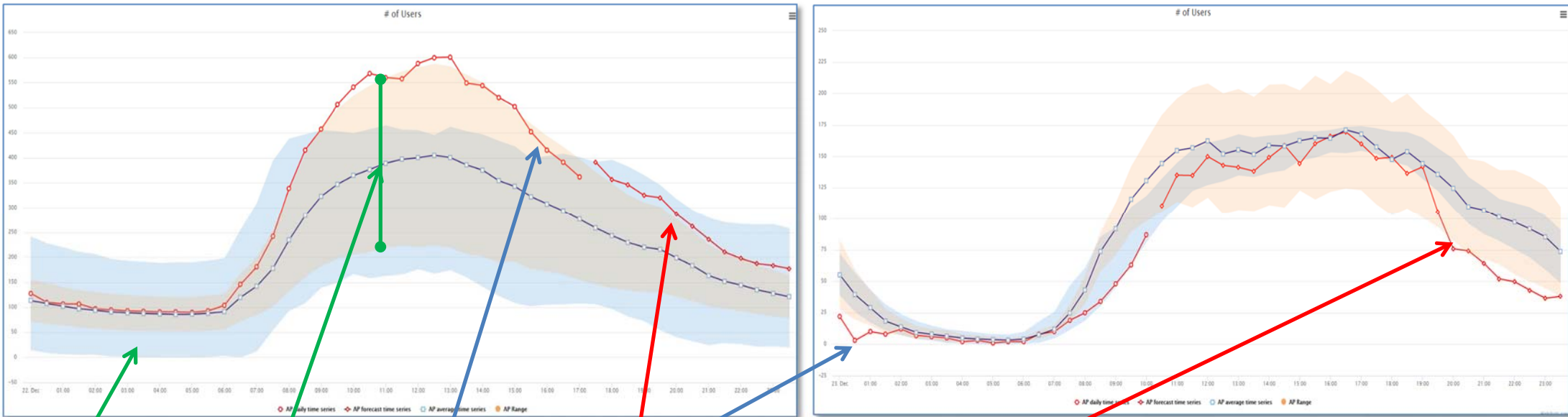


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Prediction and identification of anomalies



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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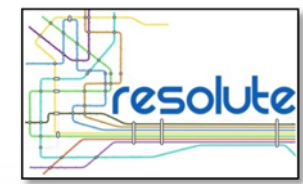


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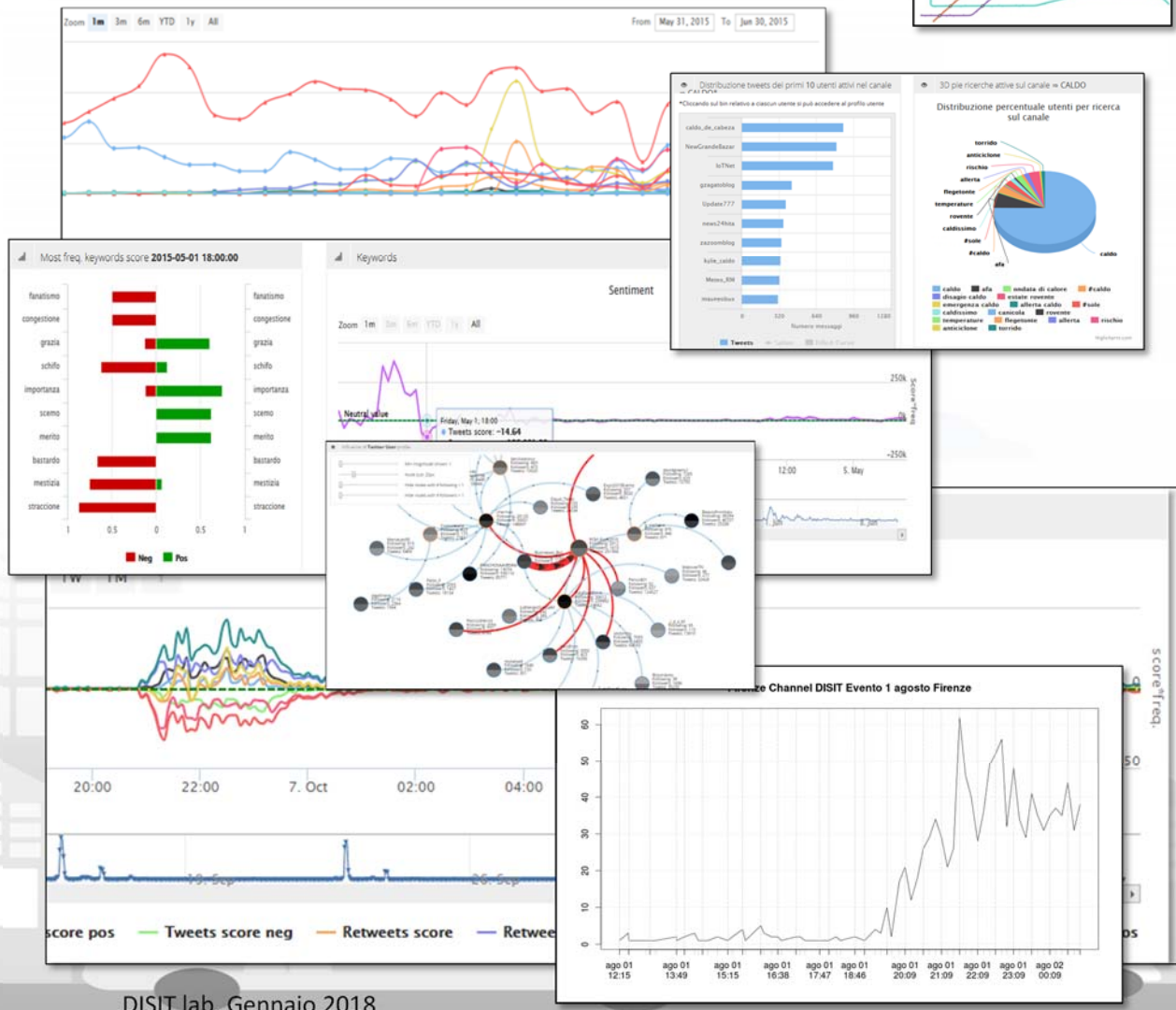
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Twitter Vigilance



- <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

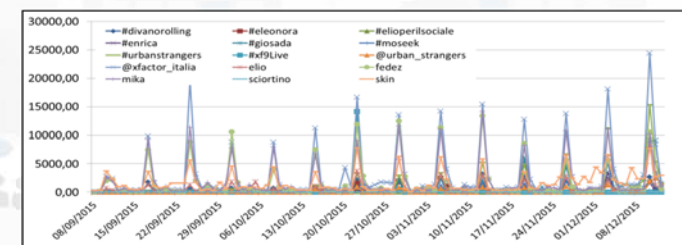
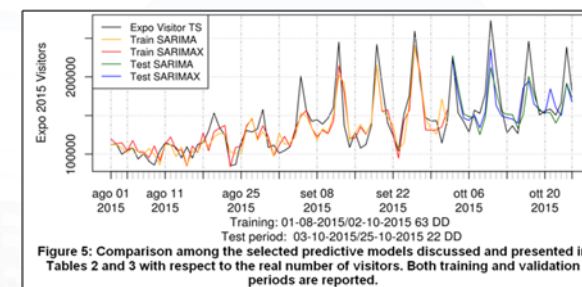
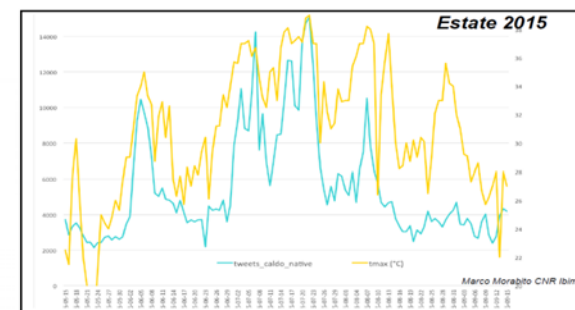
Twitter Vigilance



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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)

Twitter Vigilance Dashboard

Last crawling: 2016-12-24 12:34:51

Channel active from 2009-02-27 to today

Data processed from 2015-05-22 to 2016-12-02

Search related to channel **Firenze**

Zoom 1m 3m 6m YTD 1y All

From Nov 24, 2016 To Dec 24, 2016

- #Accademia
- #Aeroporto #Firenze
- #Aeroporto #Firenze
- #bargello
- #expo2015 #Firenze
- #fiorentina
- #firenze
- #Florence #smartcity
- #fodd
- #ODDIT15 #Firenze
- #opendata firenze
- #pontevecchio
- #uffizi
- @acffiorentina
- @BandieraiUffizi
- @Biblio_ComuneFi
- @bncfirenze
- @comunefi
- @DarioNardella aeroporto
- @DiscoverTuscany
- @emergency_fi
- @firenzedigitale
- @firenzesulweb
- @FirenzeTNews
- @museofirenze
- @museonovecento
- @Nazione_Firenze
- @NicolodiDaria
- @novedafirenze
- @opentoscana
- @Pitti_Immagine
- @PoloMusealeFi
- @ProtCivComuneFi
- @prov_FI_PC
- @santacroceopera
- @STEEPproject
- @storianaturale
- @UNL_FIRENZE
- aeroporto firenze
- aeroporto firenze
- Firenze
- firenze terremoto
- firenzesulweb
- Firenze
- from:PUNL_FIRENZE
- lungarno
- medicea
- palazzopitti
- palazzostruzzi
- ProtCivComuneFi
- smartcity firenze
- torrigiani
- uffizi
- voragine
- Events

Daily number of tweets/retweets for channel: **Firenze**

Zoom 1m 3m 6m YTD 1y All

From Nov 24, 2016 To Dec 24, 2016

Legend: ReTweets, Tweets, Events

Twitter Vigilance Real Time Dashboard

Last crawling: 2016-12-24 10:32:33

Channel active from 2016-06-27 to 2016-12-24 10:30:00

Data processed from 2016-06-28 08:10:00 to 2016-12-24 10:25:00

Sentiment trends in channel **Firenze**

Zoom 1H 3H 6H 12H 1D 1W 1M Y

Most Significant Tweets for Sentiment in the period

- @forealriesdaye - 2016-12-24 10:25:39
@Ahno_its_arno meh, I've only had average curry there
0 Retweets 0 Likes Sent. Score: 0.166667
- @esercizistorici - 2016-12-24 10:30:01
Stanotte Concerto di Natale di Peter Guth @ORT_Toscana in collaborazione con Conservatorio "L.Cherubini" di Firenze...
https://t.co/uFeTp4wG1y
0 Retweets 0 Likes Sent. Score: 0
- @infoiterno - 2016-12-24 10:30:05
Firenze, un piano per un Natale sicuro (055firenze) https://t.co/vpqDASEspI https://t.co/2Bn5k3zoyy

Last tweets per channel **Firenze**

- @FormulaLatina - 2016-12-24 10:30:26
*** CAPODANNO LATINO Woodstock Club Firenze *** H. 21:00 >> GRAN BUFFET DI SAN SILVESTRO CON BRINDISI E...
https://t.co/cM84Gw65sO
0 Retweets 0 Likes
- @MORINEMMANUELL2 - 2016-12-24 10:30:14
RT @NavyMat: Francesco #Salvati Carità,1543 #Manierisme Galleria degli Uffizi, @Giusepp...
6 Retweets 0 Likes
- @infoiterno - 2016-12-24 10:30:12

Twitter Alerts

TRENDS QUOTES

- @NICOLIDIDARIA
- @COMUNEFI
- @ACFFIORENTINA
- @NAZIONE_FIRENZE
- @SANTACROCEOPERA
- @MUSEONOVECENTO
- @FIRENZEDIGITALE

TRENDS QUOTES

- #FIRENZE
- #FIORENTINA
- #UFFIZI
- #PONTEVECCHIO

We suggest to use Chrome browser for better experience

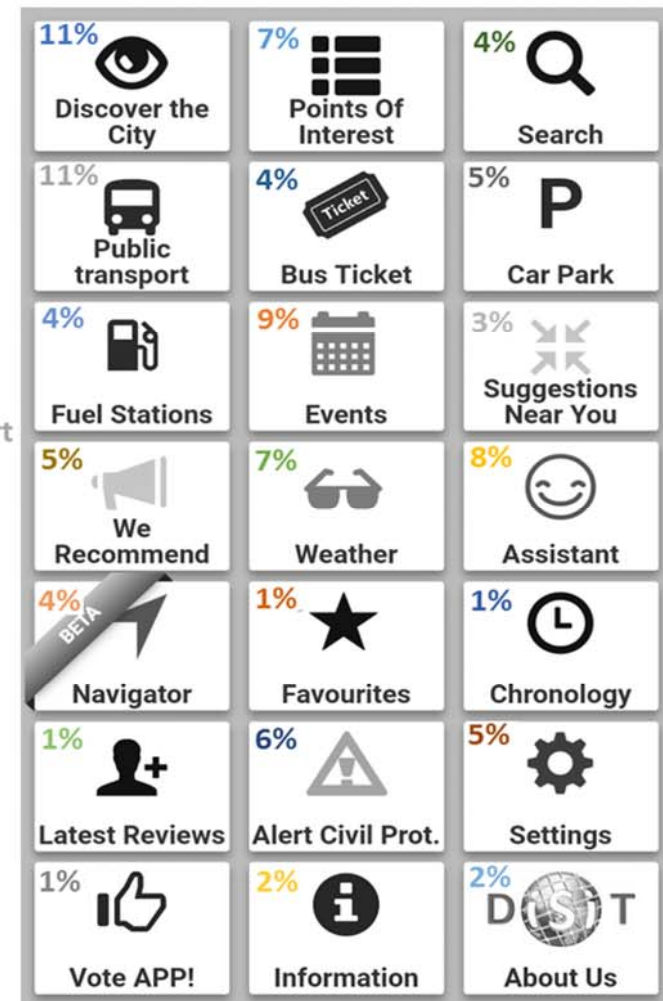
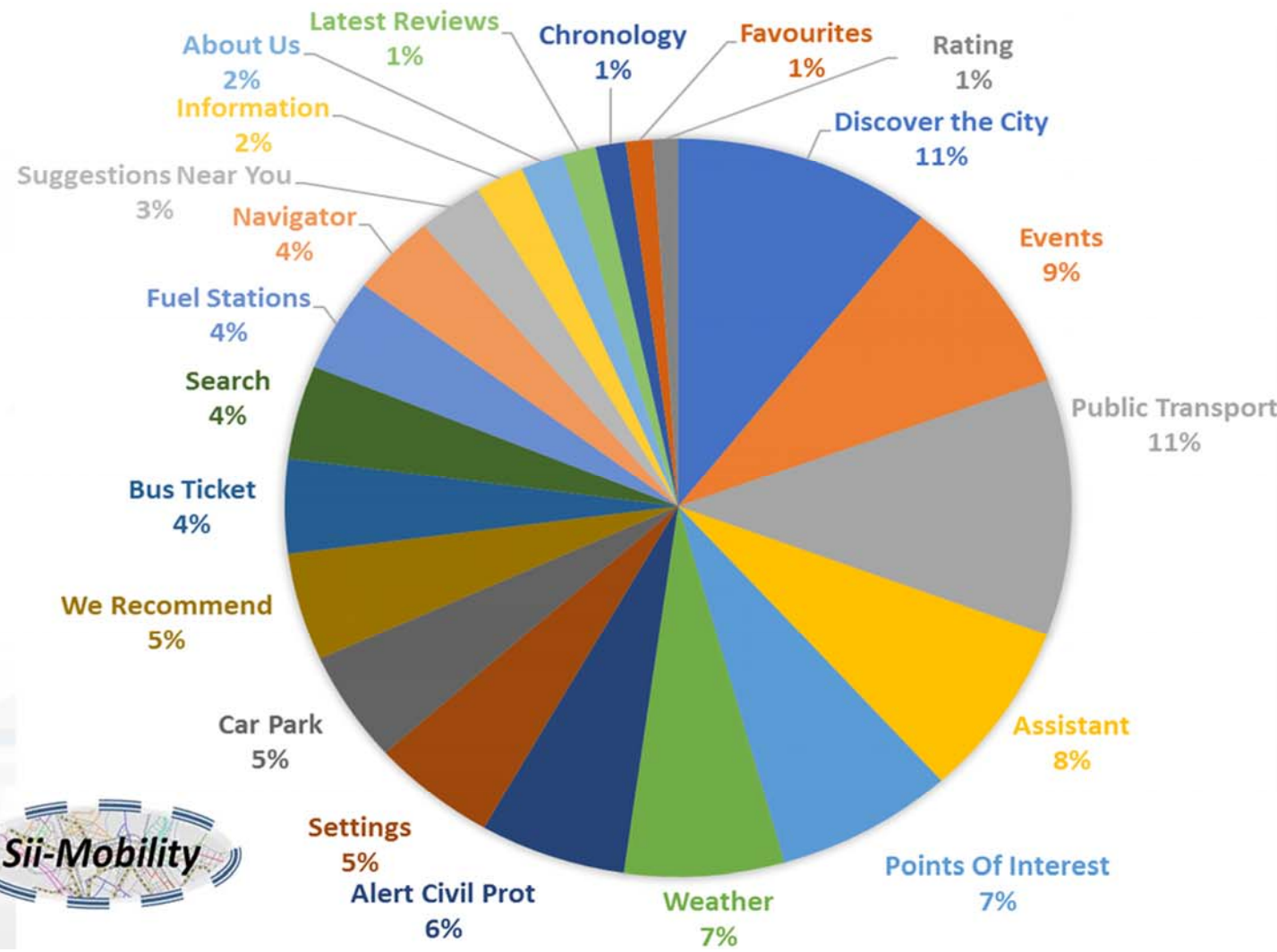


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Usage of the main Menu





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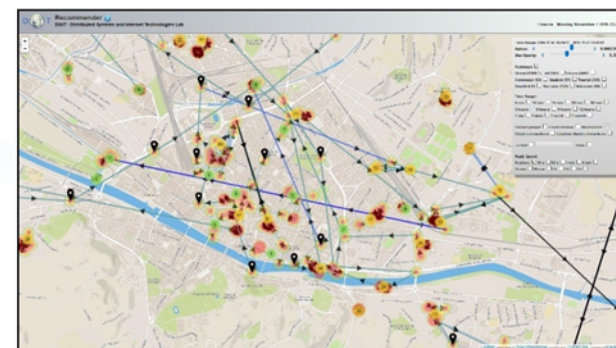
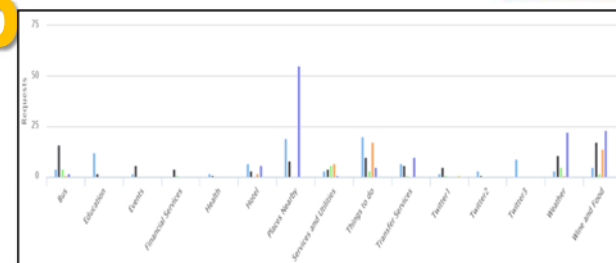
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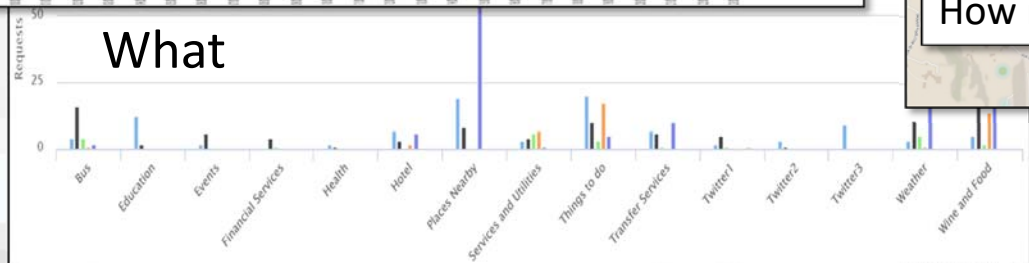
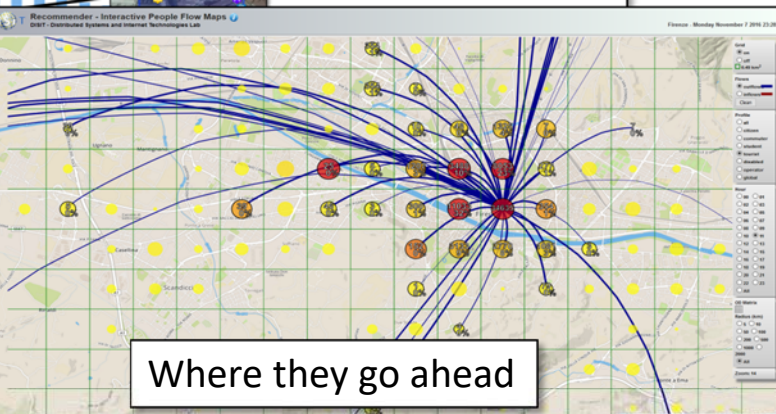
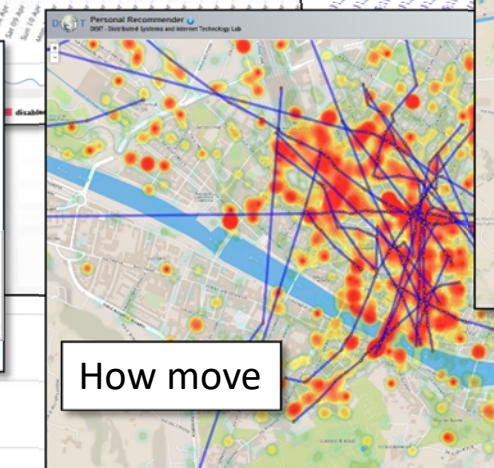
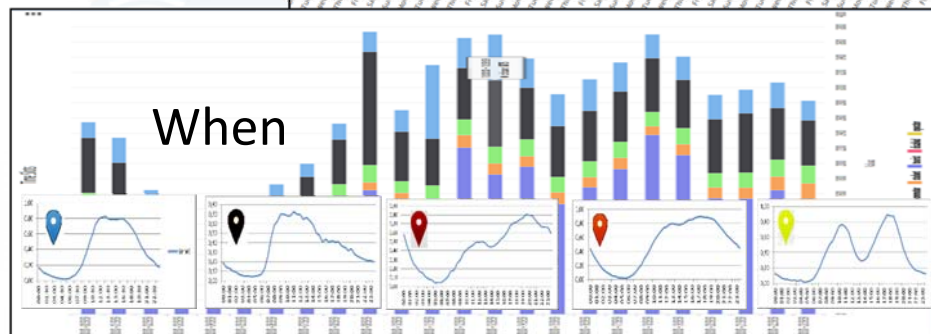
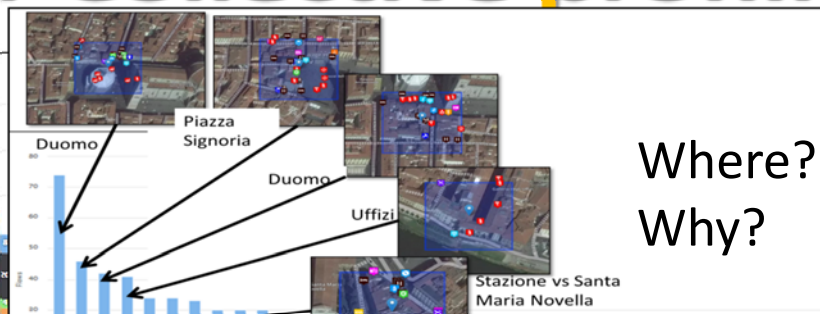
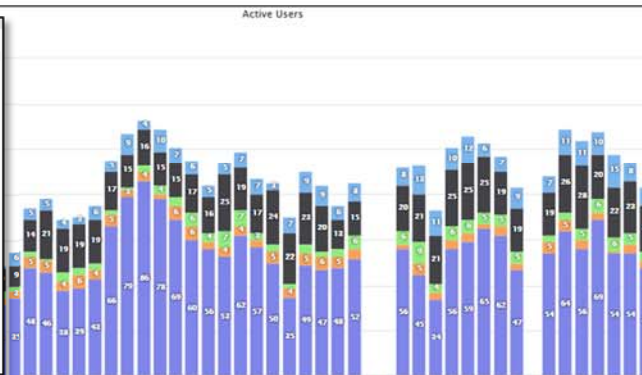
Reasoning on App Data and for App

- **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	#event	#viewed	#viewed on #event	Description
daily_event_de	ENGAGEMENT	1 (0%)	0 (0%)	0%	Suggest (in german) an event currently on in Florence
daily_event_en	ENGAGEMENT	1720 (2.12%)	70 (7.1%)	4.07%	Suggest (in english) an event currently on in Florence
- 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%)	39 (55.71%)	39 (34.51%)	
- operator		0 (0%)	0 (0%)	0 (0%)	
- disabled		0 (0%)	0 (0%)	0 (0%)	
- all		119 (6.92%)	6 (5.07%)	6 (5.04%)	
daily_event_es	ENGAGEMENT	6 (0.01%)	4 (0.43%)	66.67%	Suggest (in spanish) an event currently on in Florence
daily_event_fr	ENGAGEMENT	6 (0.01%)	0 (0%)	0%	Suggest (in french) an event currently on in Florence
daily_event_it	ENGAGEMENT	549 (6.73%)	296 (30.02%)	5.42%	Suggest (in italian) an event currently on in Florence
parking_en	ASSISTANCE	141 (0.17%)	128 (12.98%)	90.78%	Alert (in english) if the user parked in a residential parking zone
parking_es	ASSISTANCE	3 (0%)	3 (0.3%)	100%	Alert (in spanish) if the user parked in a residential parking zone
parking_it	ASSISTANCE	187 (0.23%)	1 (0.1%)	0.53%	Alert (in italian) if the user parked in a residential parking zone
short_a_photo_de	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

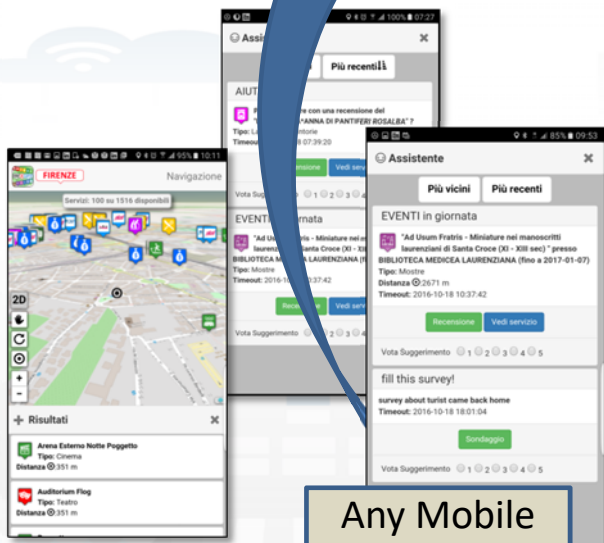
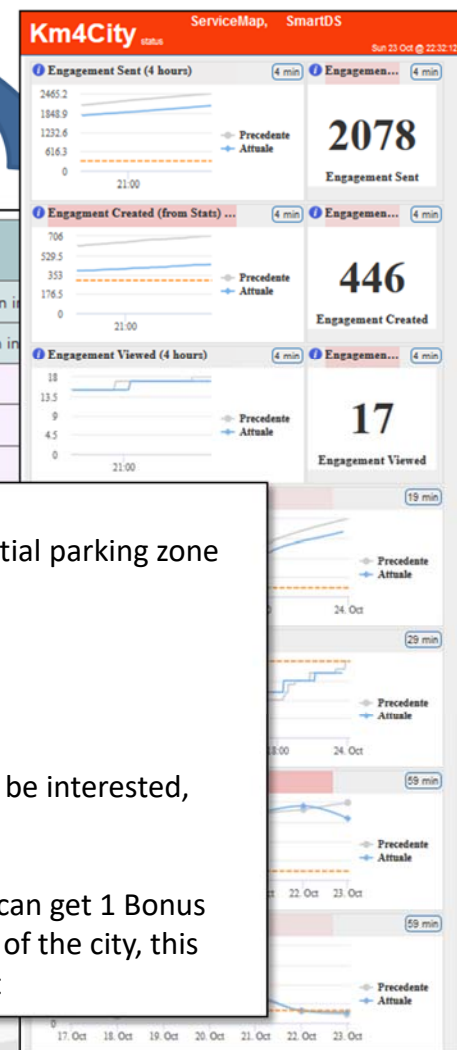


User influencing, engaging, monitoring & Follow Up

City & City Operators Strategy Editor



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%)			



Any Mobile and Web App

- 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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INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

DISIT lab, Gennaio 2018



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DELL'INFORMAZIONE

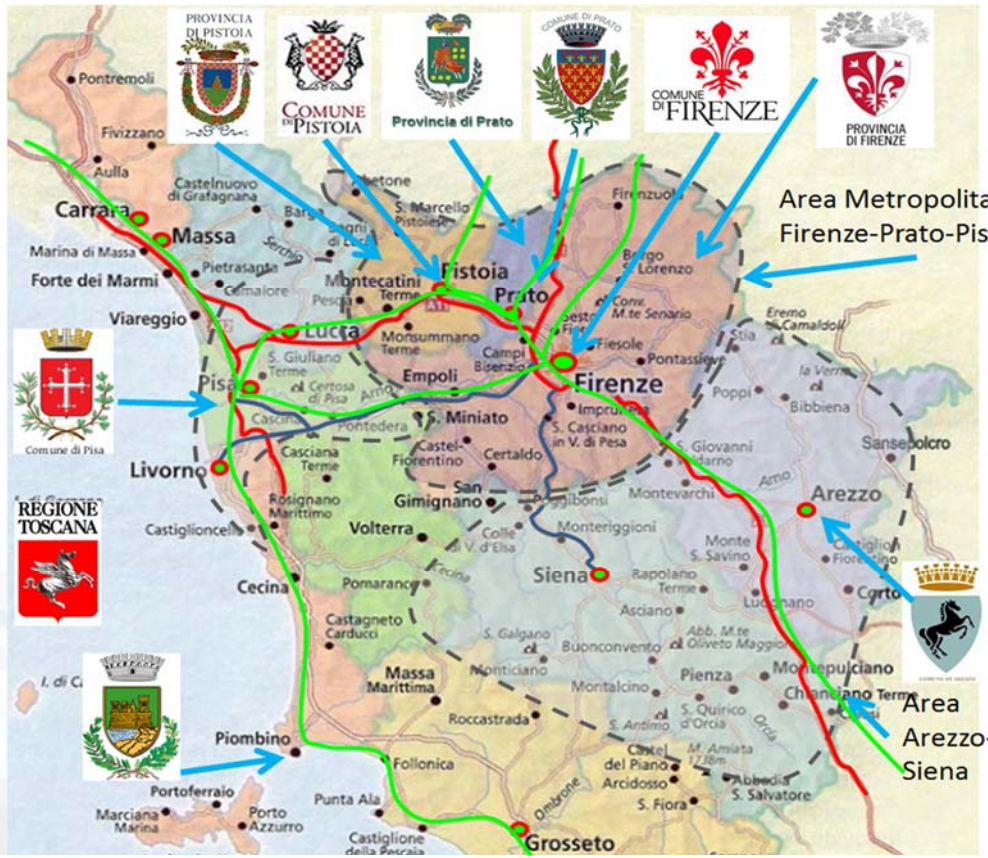
DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB
<http://www.disit.org>

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



- ataf
 - tiemme
 - BUSITALIA
 - atam
 - CTT
 - Comune di Perugia
 - COMUNE DI NAPOLI
- Autostrade
 — SS Fi-Pi-Li
 — SS Fi-Si
 — Ferrovie (primarie)
 - - Aree

ECM; Swarco Mizar;
 Inveni 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
<i>Consorzio Milano Ricerche</i>	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 FLORENCE 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 SYSTEMS, 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

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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.

