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KM 4 CITY

Open Urban Platform: Technical View 2018

http://www.disit.org/km4city

www.Km4City.org

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Km4City Roadmap

2013

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

2014

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

2015

Km4City 1.4
- Embed
- More API
- iBeacon

Km4City 1.5
- SmartDS
- Km4City App

RESILIENCE management guidelines and Operationalization appLied to Urban Transport Environment

RESOLUTE H2020
2015–2018 - Started

Sii-Mobility
http://www.sii-mobility.org

2016

REPLICATE H2020
2016–2021 - Started

REPLICATE
REnaissance of PLaces with Innovative Citizenship And TEchnology

Today

Sii-Mobility SCN
2016-2018 – Started

Km4City 1.6.2
- Suggestions on demand
- User Behaviour Analysis
- Trajectories and OD

WEEE
2017-2020

6/2017

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

FIWARE

GHOST SIR
2016–2019 - Started

GHOST Governing the smart city: a gOvernance-centred approach to SmarT urbanism

2021

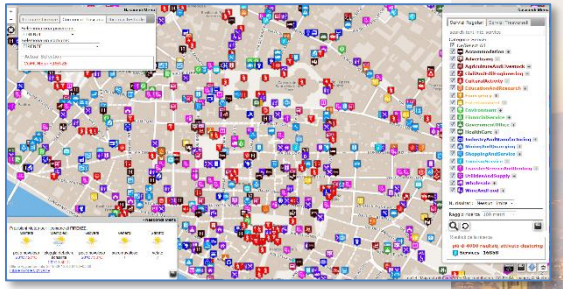
SELECT for Cities

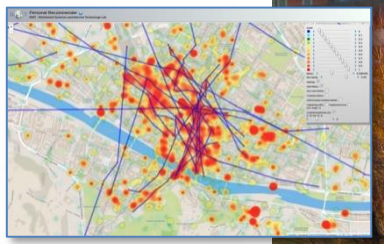
Snap4City
- waste
- Territorial areas and paths
- Health, Bike sharing
- Statistics, Energy, ICT, ...
- E-vehicles

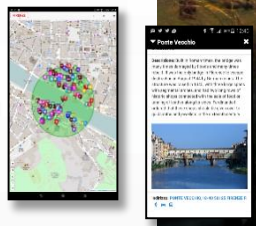
Km4City 2.0
- More Sensors, IOE, IOT
- Dashboard Builder
- Territorial areas and paths
- User Engagement
- Mobility and transport
- Resilience Decision Support

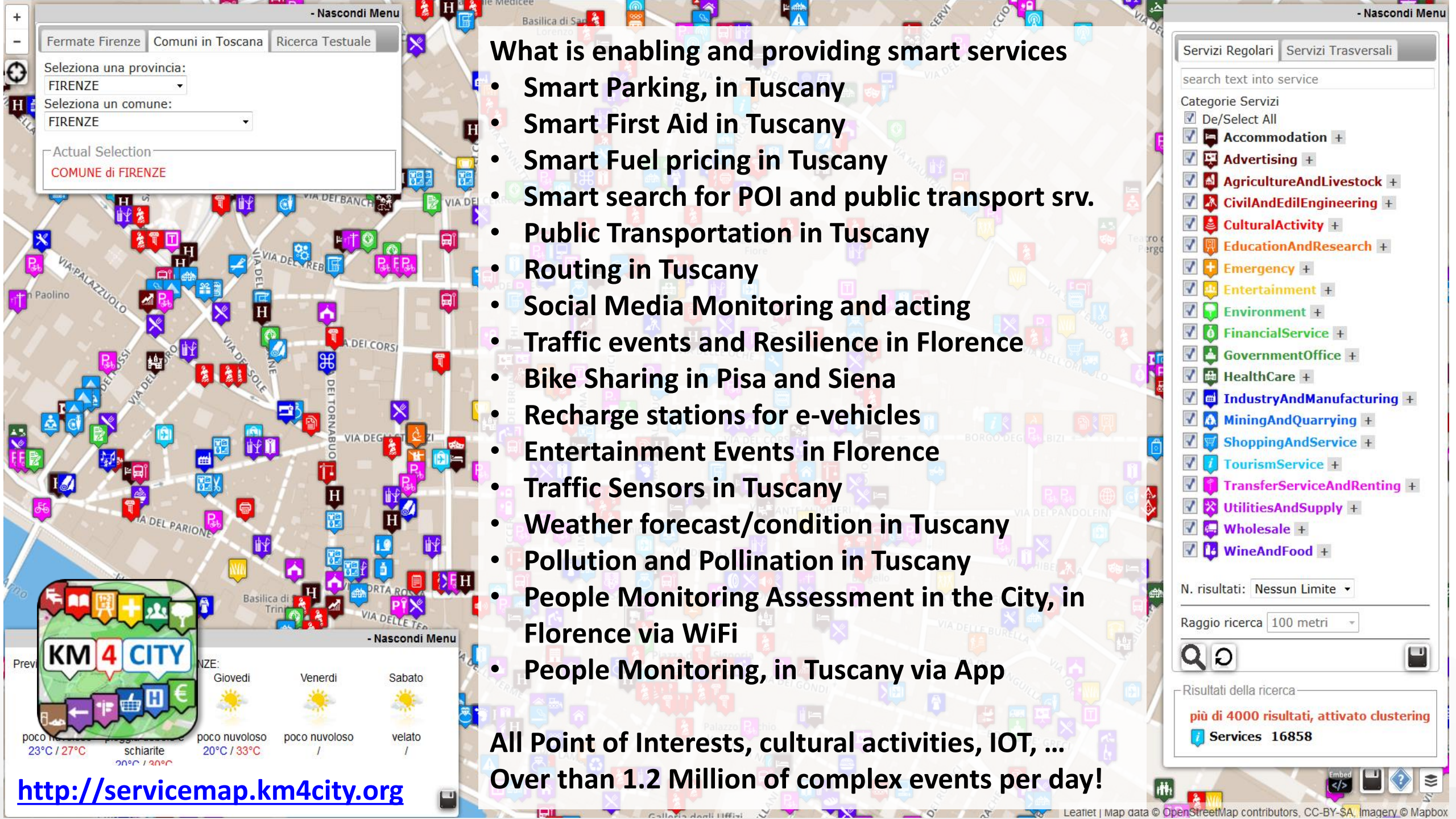
Km4City: Integrated Urban Platform

- **Aggregate & integrate data**
  - Multiple protocols from urban operators, ...
  - open data, IOT, sensors, internet of everything, cloud, mobile devices, Wi-Fi, social media, ...
- **Data Exploitation performing**
  - predictions, reasoning, business intelligence, ..
  - users behavior analysis, decision support system, ..
  - Control Room, Real Time Monitoring tools, ...
- **Produce value from data enabling** to
  - Stimulate virtuous behavior, influence City Users!
  - Put in action CITY Strategies









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 WiFi
- People Monitoring, in Tuscany via App

All Point of Interests, cultural activities, IOT, …

Over than 1.2 Million of complex events per day!

Smart Interoperability and how to start with Km4City

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Transport systems
Mobility, parking

Public Services
Govern, events, …

Sensors, IOT
Cameras, ..

Environment,
Water, energy

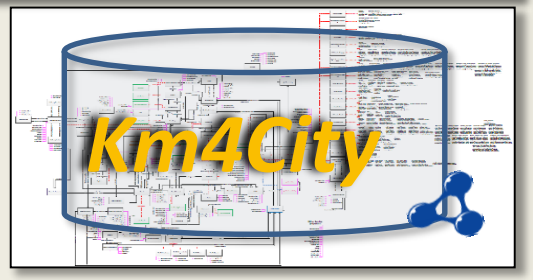
Shops, services,
operators

Social Media
WiFi, network

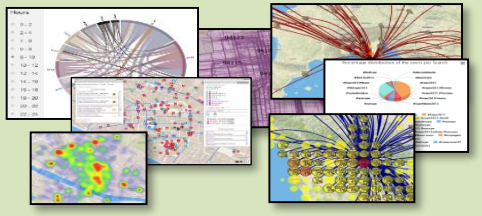
Static, Slow and Real Time data flows

DISCES -- Distributed and parallel architecture on Cloud

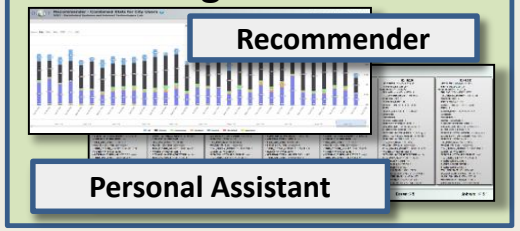
Km4City Smart City Engine



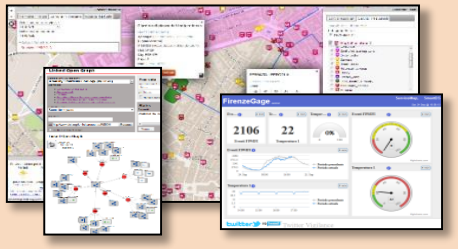
Big Data Analytics



Smartening Tools



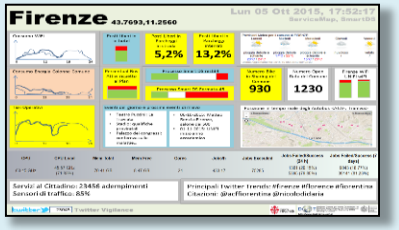
Development Tools



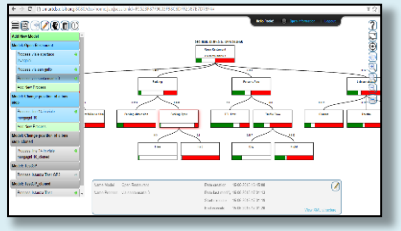
Km4City Smart City API

City Operators and Decision Makers

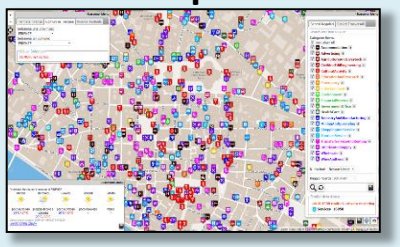
Dashboards



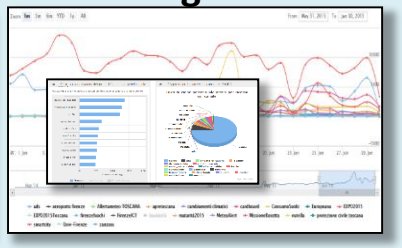
Smart Decision Support



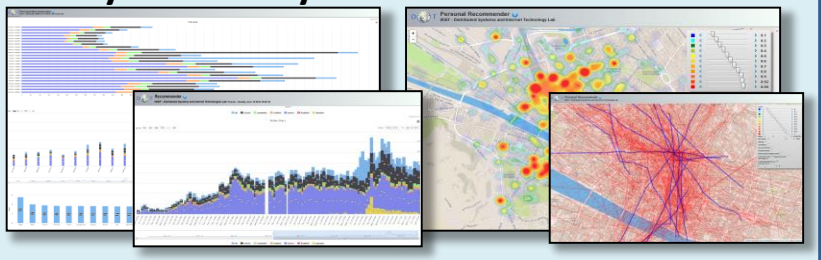
ServiceMap browser



Twitter Vigilance

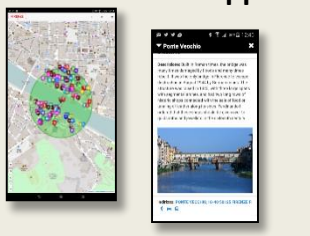


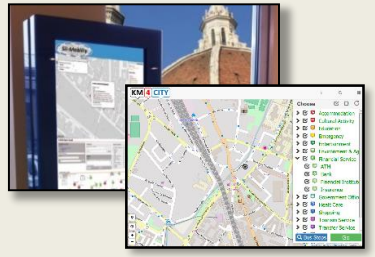
Analyzers of City User Behavior



Tools for Final Users

Mobile e Web Apps





KM4CITY

Sii-Mobility

Http://www.km4city.org

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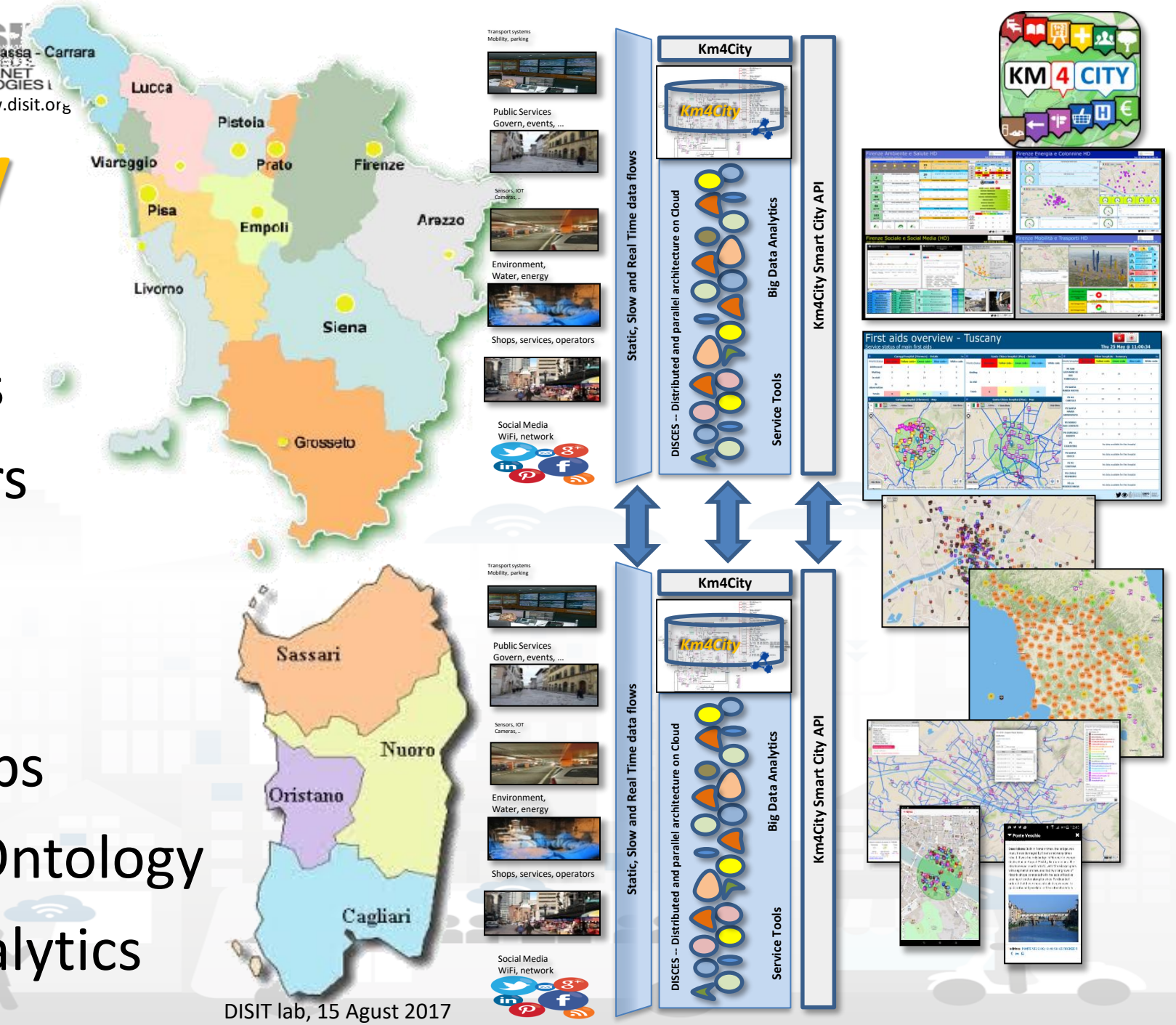
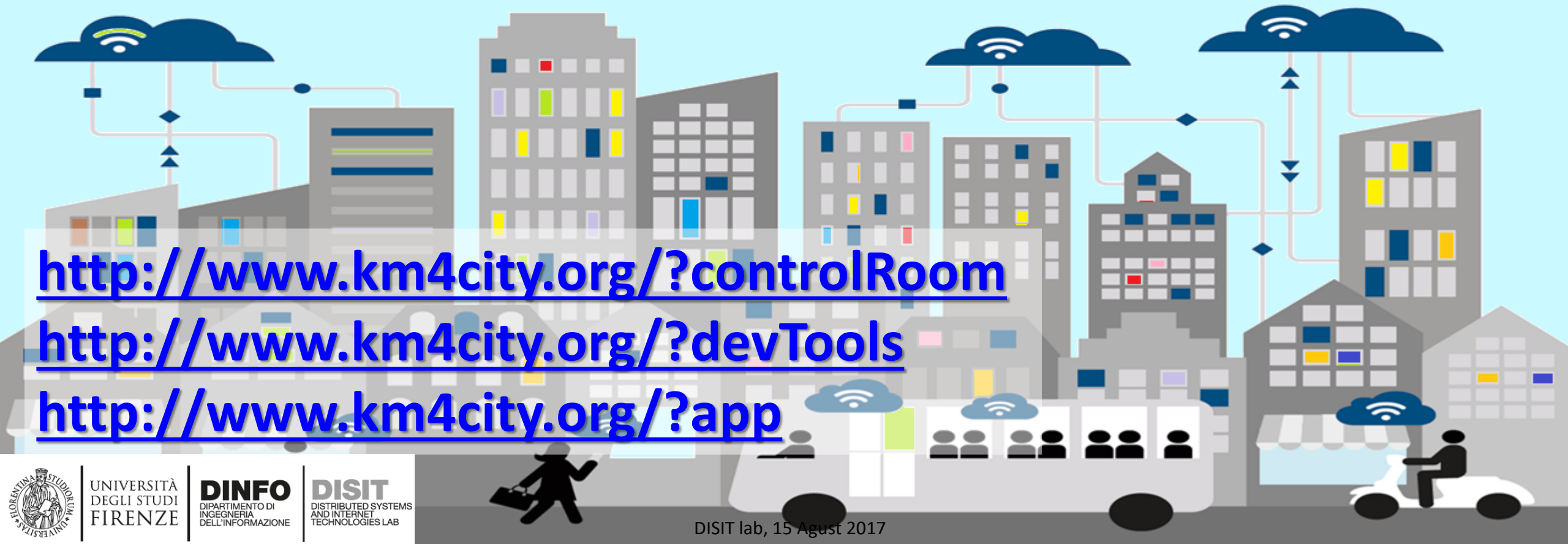
Interoperability

- **At different levels:**
  - Among cities/regions
  - Among data providers
  - Among Operators
- **By Means of:**
  - Smart City API → Apps
  - Km4City Smart City Ontology
  - Dashboards/data analytics



Data & Model

http://www.km4city.org/?infoDocs



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

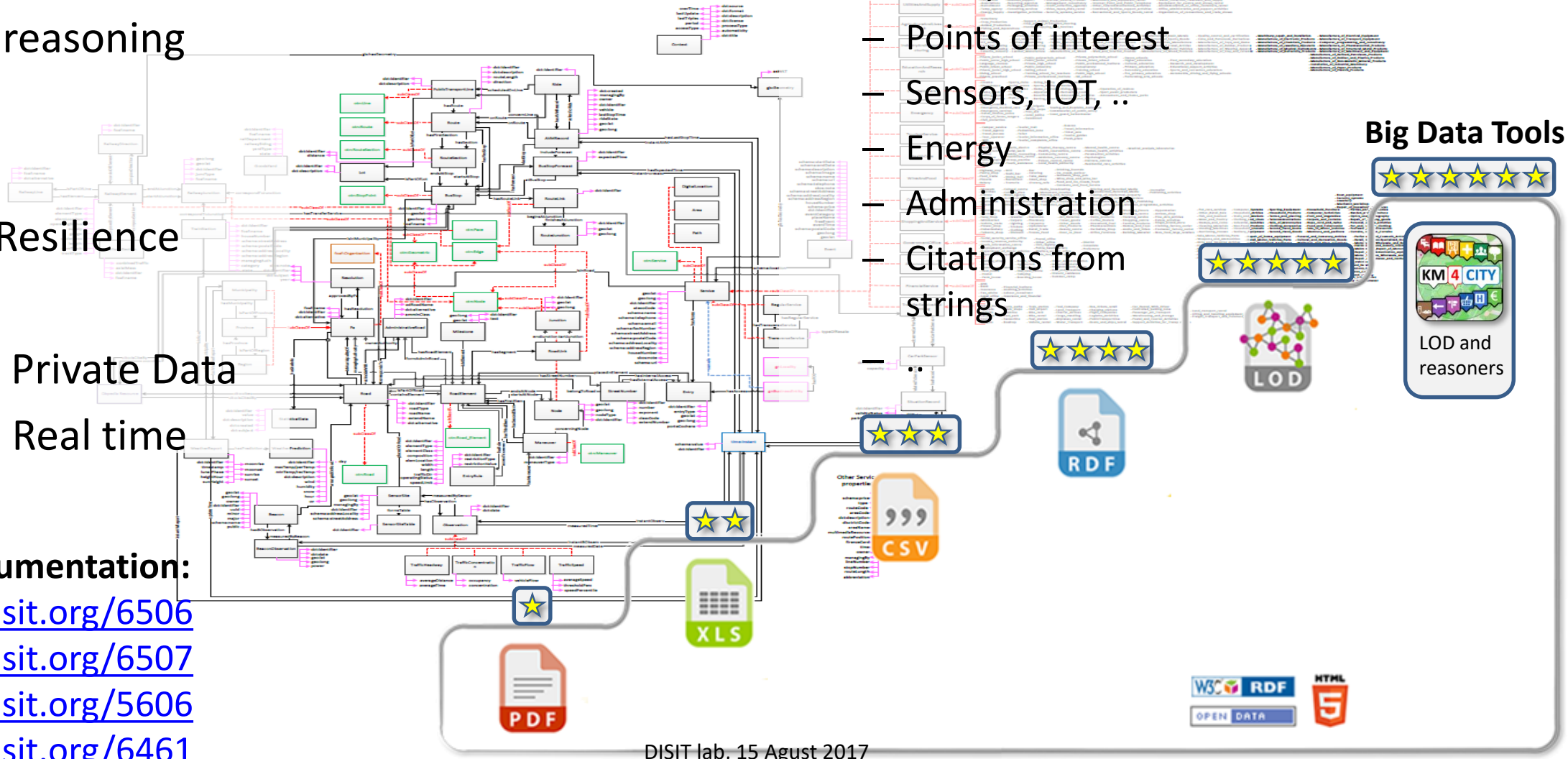
http://www.km4city.org/?devTools

http://www.km4city.org/?app

Km4City: Knowledge Base

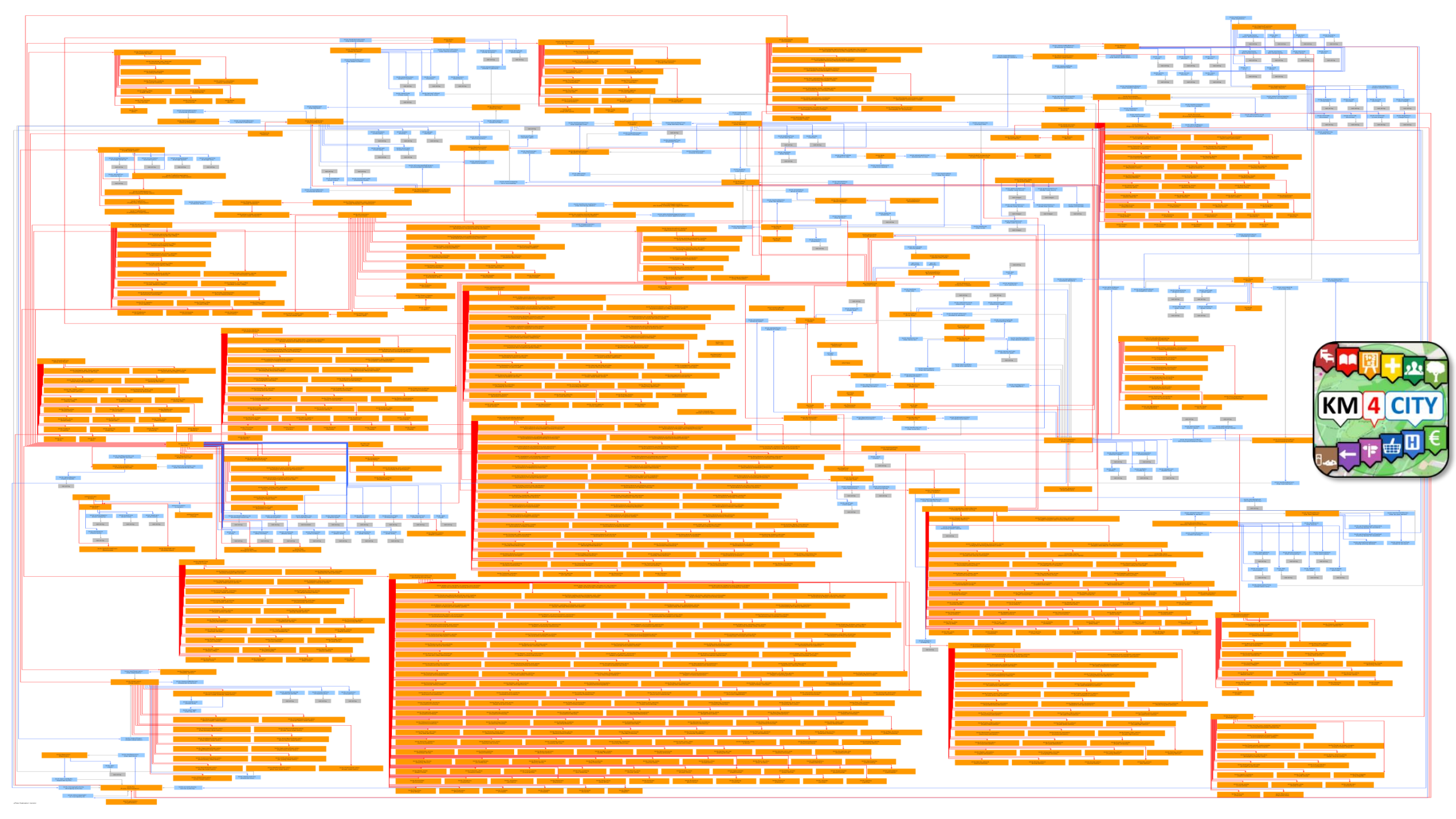
- **Multiple DOMAINS**
- Geospatial reasoning
- Temporal reasoning
- Metadata
- Statistics
- Risk and Resilience
- Licensing
- Open and Private Data
- Static and Real time

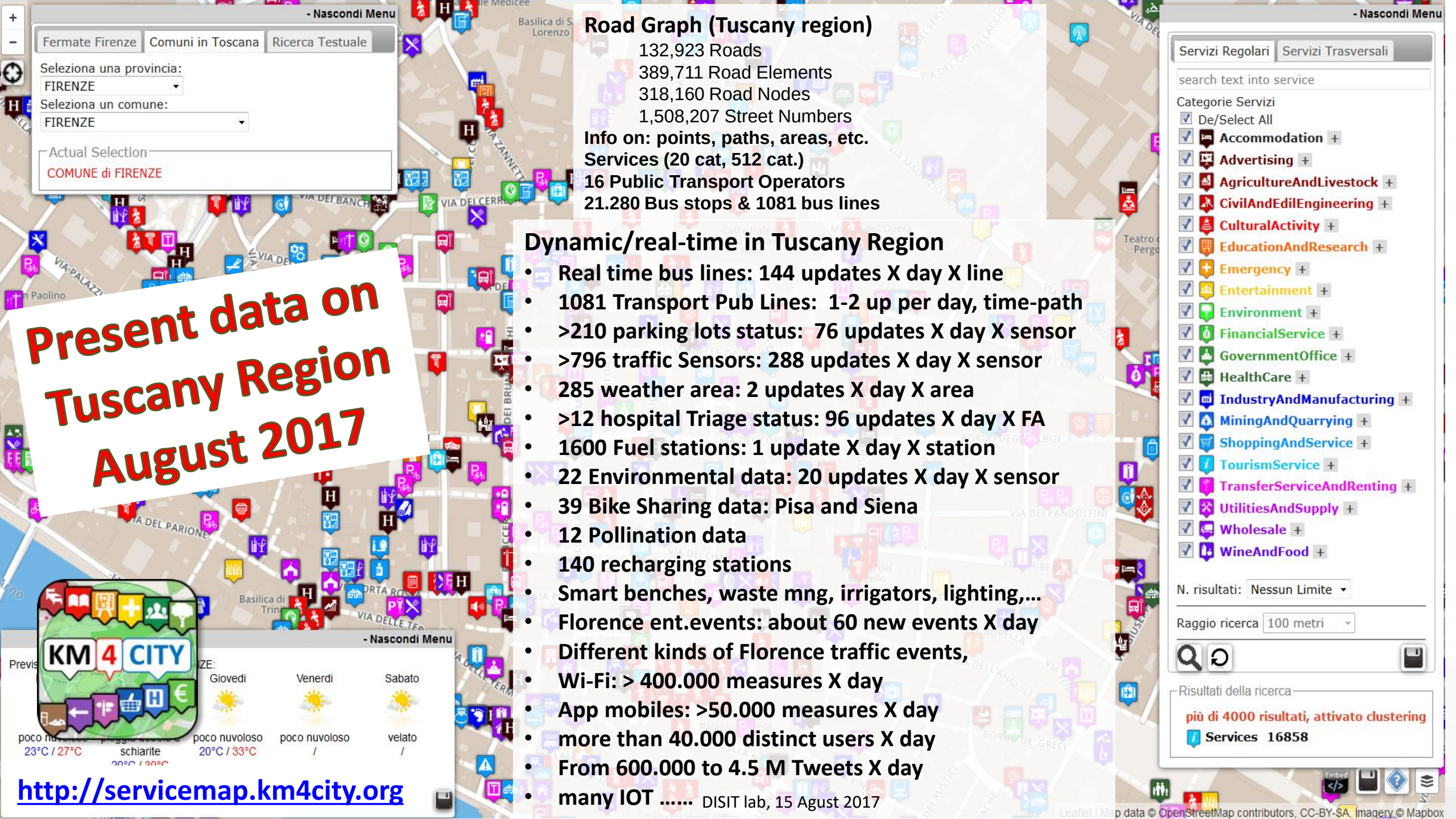
- Street-Guide
- Mobility and transport
- Points of interest
- Sensors, IOT, ..
- Energy
- Administration
- Citations from strings
- ..

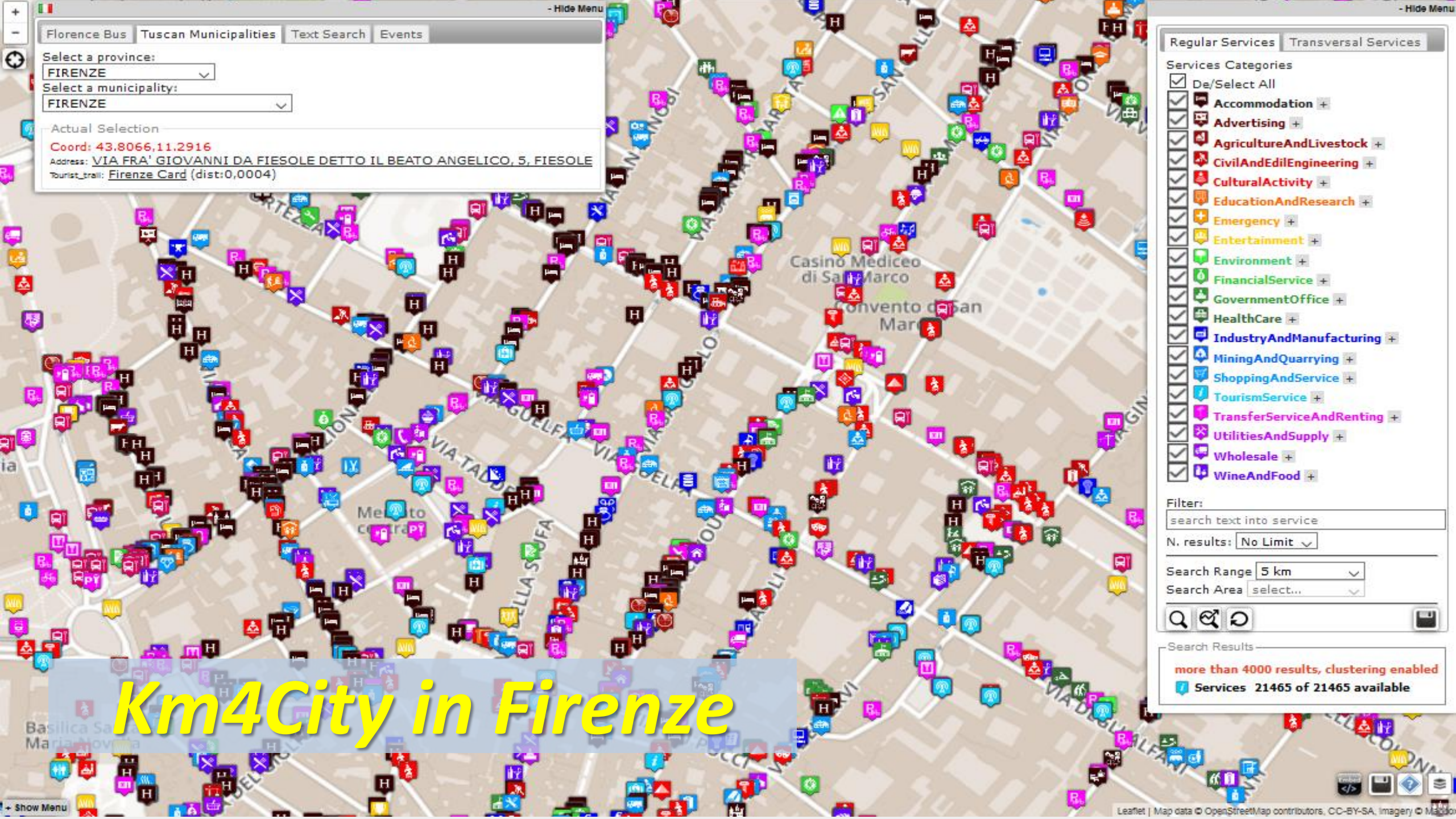


Ontology Documentation:

http://www.disit.org/6506
http://www.disit.org/6507
http://www.disit.org/5606
http://www.disit.org/6461


KM 4 CITY


- Nascondi Menu
Fermate Firenze
Comuni in Toscana
Ricerca Testuale
Seleziona una provincia:
FIRENZE
Seleziona un comune:
FIRENZE
Actual Selection
COMUNE di FIRENZE
Present data on Tuscany Region August 2017
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
• 1600 Fuel stations: 1 update X day X station
• 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,
• 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 …… DISIT lab, 15 Agust 2017
- 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
KM 4 CITY
- Nascondi Menu
Giovedi
Venerdi
Sabato
poco nuvoloso
20°C / 33°C
poco nuvoloso
/
velato
/
23°C / 27°C
schiarite
http://servicemap.km4city.org
Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox


- Hide Menu
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)
- 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: 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
+ Show Menu
Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

Other Sensors and Actuators, IOT

- Restricted Traffic Zone Gates
  - Passages, payment, alerts,
  - Wi-Fi control, RFI control, etc.
- Road Direction manager: panel, red-light, etc.
  - Status and action
- Environmental Sensors:
  - Air quality, pollution, rain, allergens, temperature,
  - humidity,…
- Public Light Pillar
  - Traffic flows, environment,
  - Wi-Fi, Tv-Camera, BT servers, on/off, percentage of light, ..
- Waste Manager
  - Level, kind, status, on/off
- Recharge station, column
  - Free slots, consumption, next time slot, …

- **Environmental Sensors**:
  - Air, temperature, humidity,
  - water level in rivers
  - Status of underpass and bridges
- **Risk assessment**
  - Value of the buildings,
  - hydrogeological risk map,
  - earthquake risk map, …
  - people distribution and location
  - Position of recover places,
- **Traffic Zone Gates**
  - Passages, alerts,
  - etc.

Service Map Tool

- The Km4City model consists of an ontology and documentation to populate and reasoning on a GraphDB.
- **ServiceMap tool**
  - with Km4City are substantially a Smart City Expert System, SCES
  - includes the Smart City API
  - is a for developers to: search and browse on Smart City Knowledge, also to generate examples of the Smart City API call to be used in the development of Web and Mobile Apps
- Final users tools exploiting Km4City are:
  - Web and Mobile Applications and Dashboards

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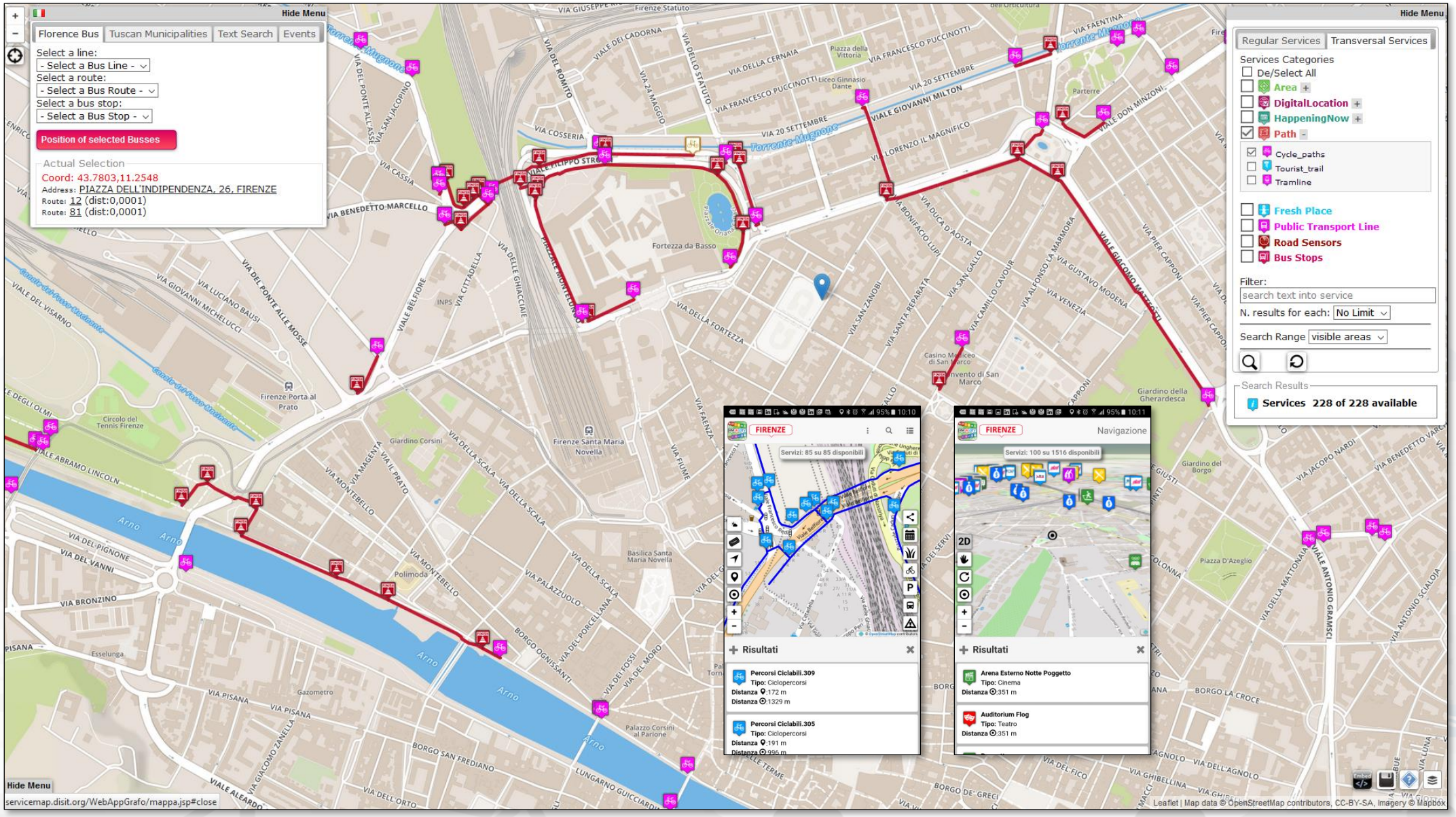
Cycling Paths



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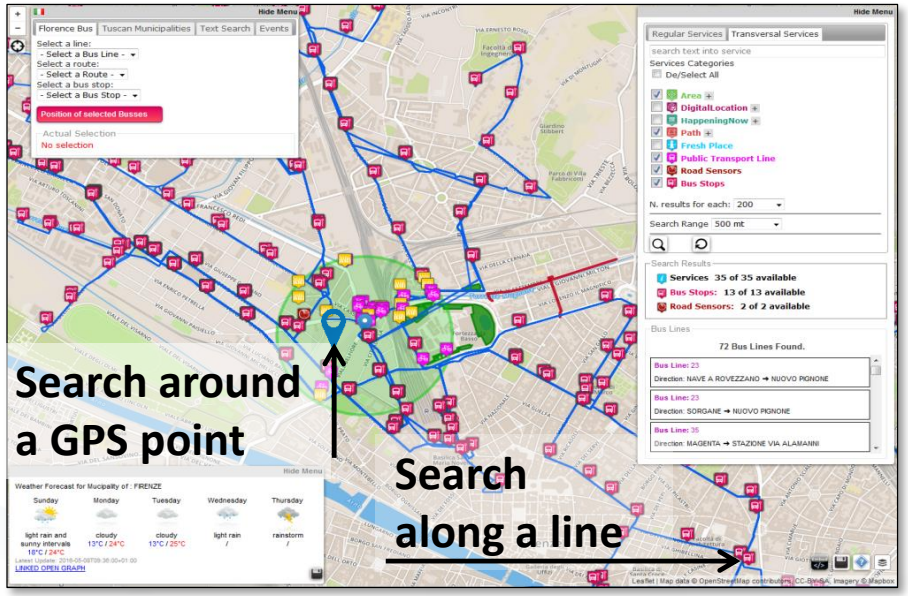
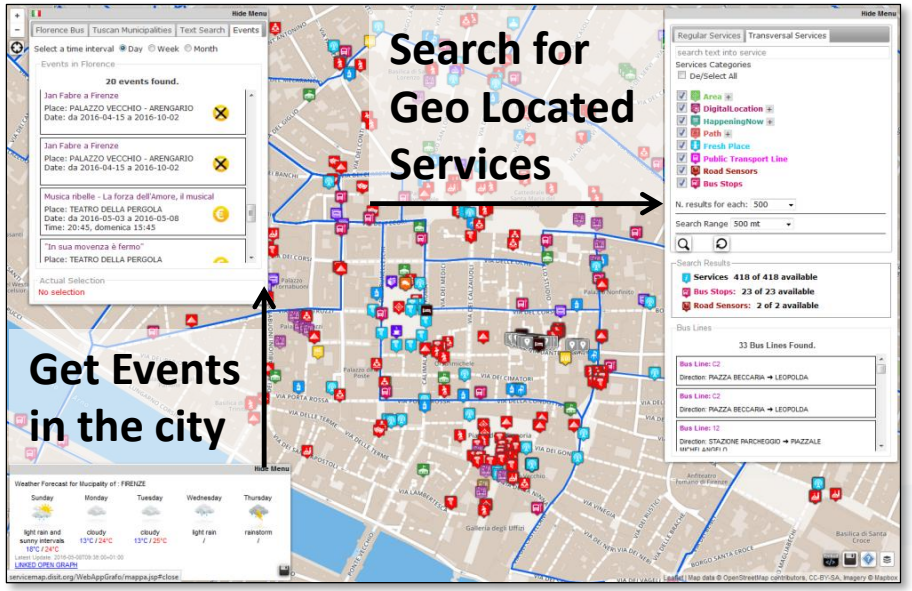
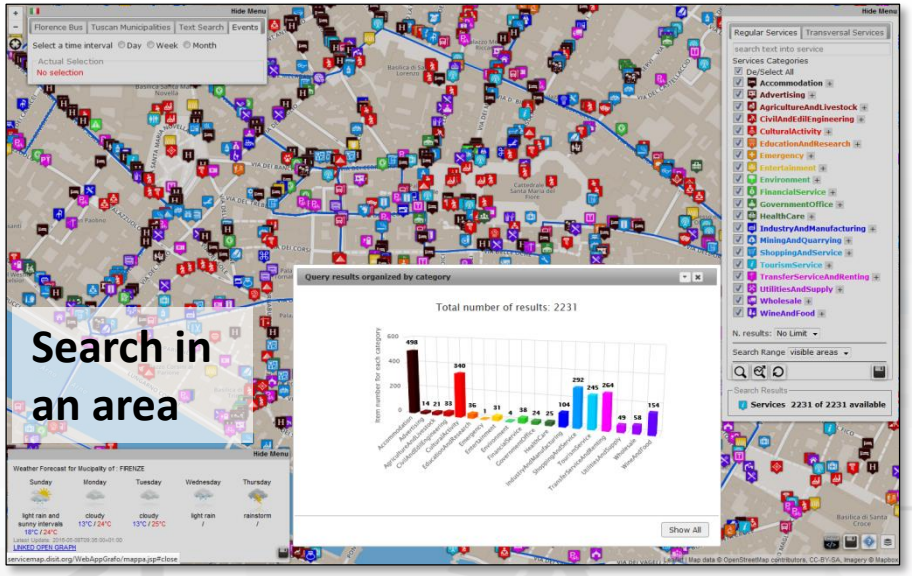
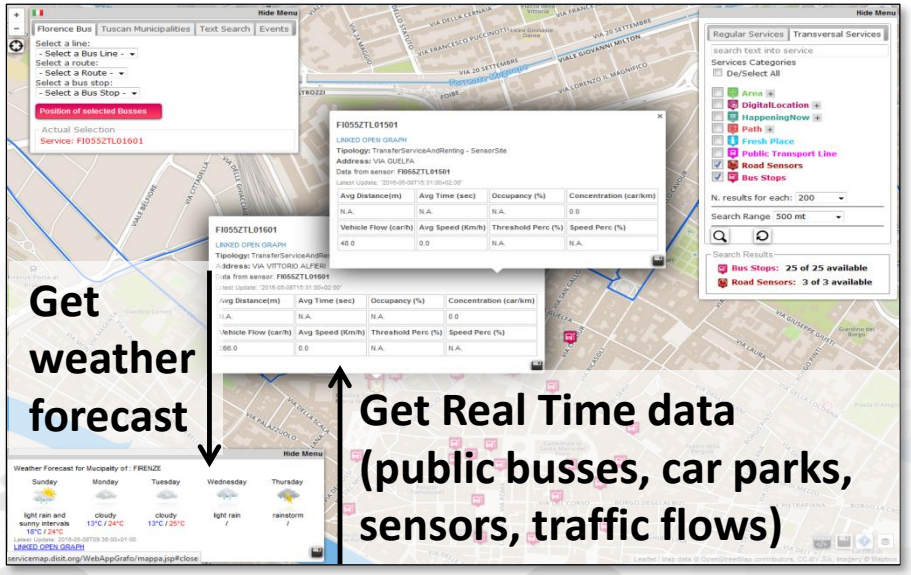
ServiceMap









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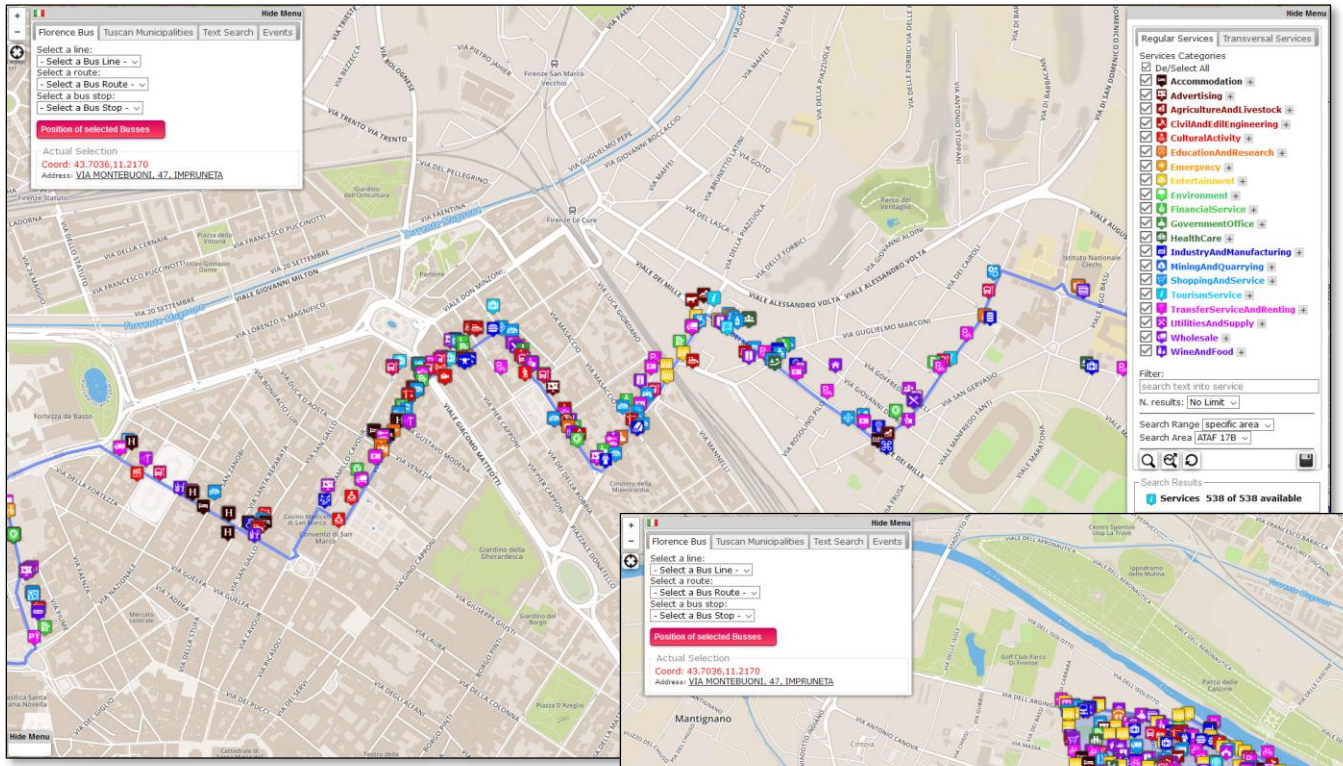
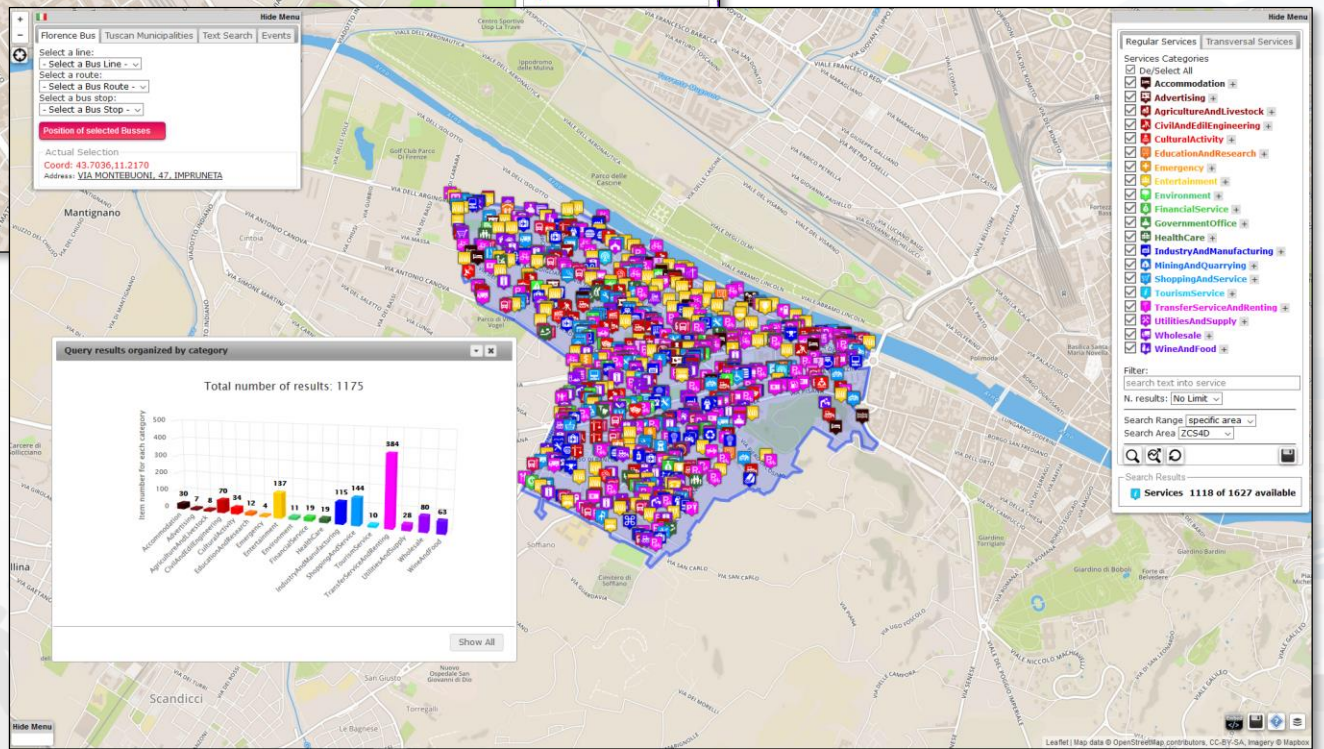
Along a Line





Into an Area

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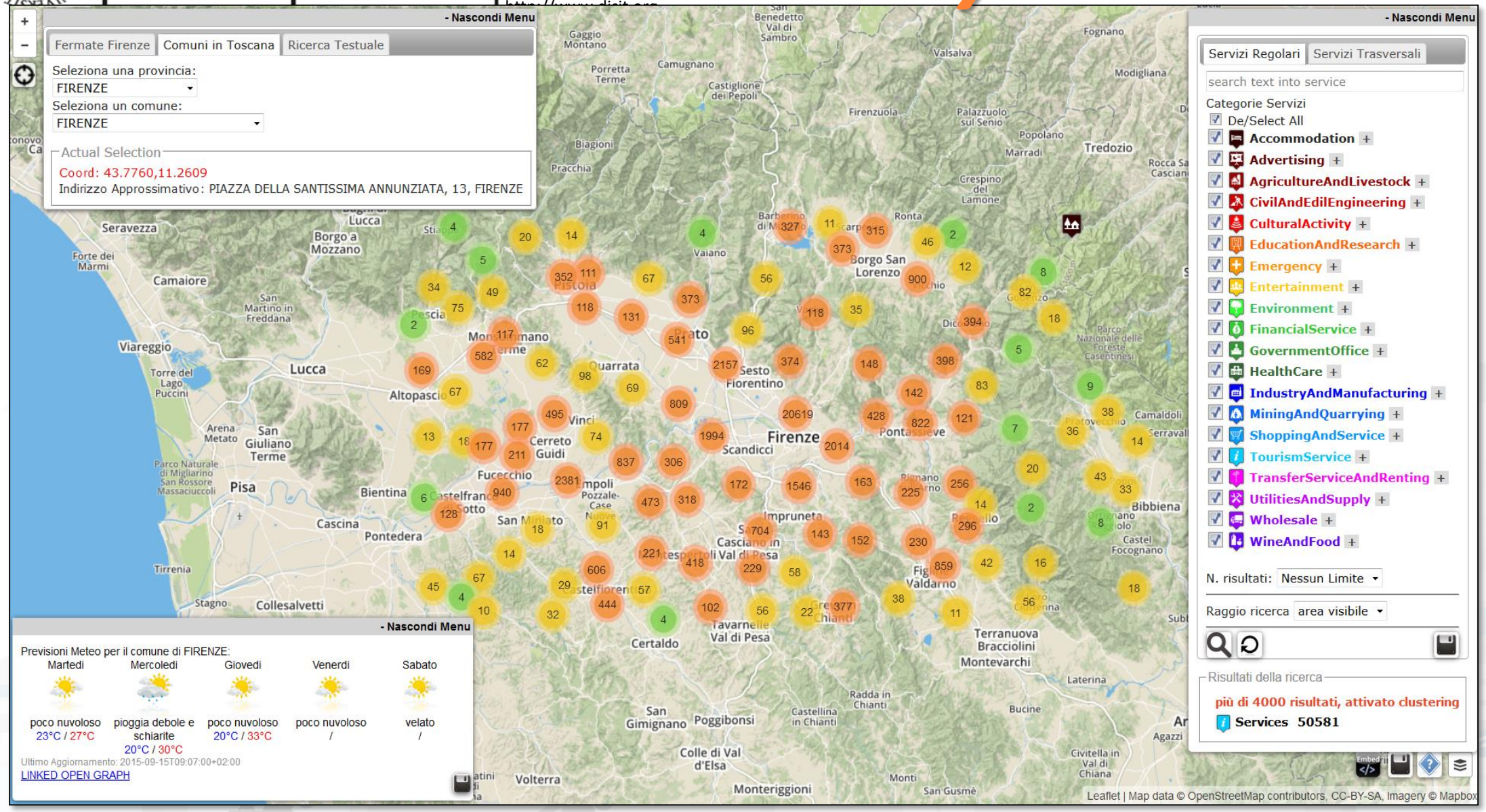
Km4City in Toscana



- **Search all services in the area**

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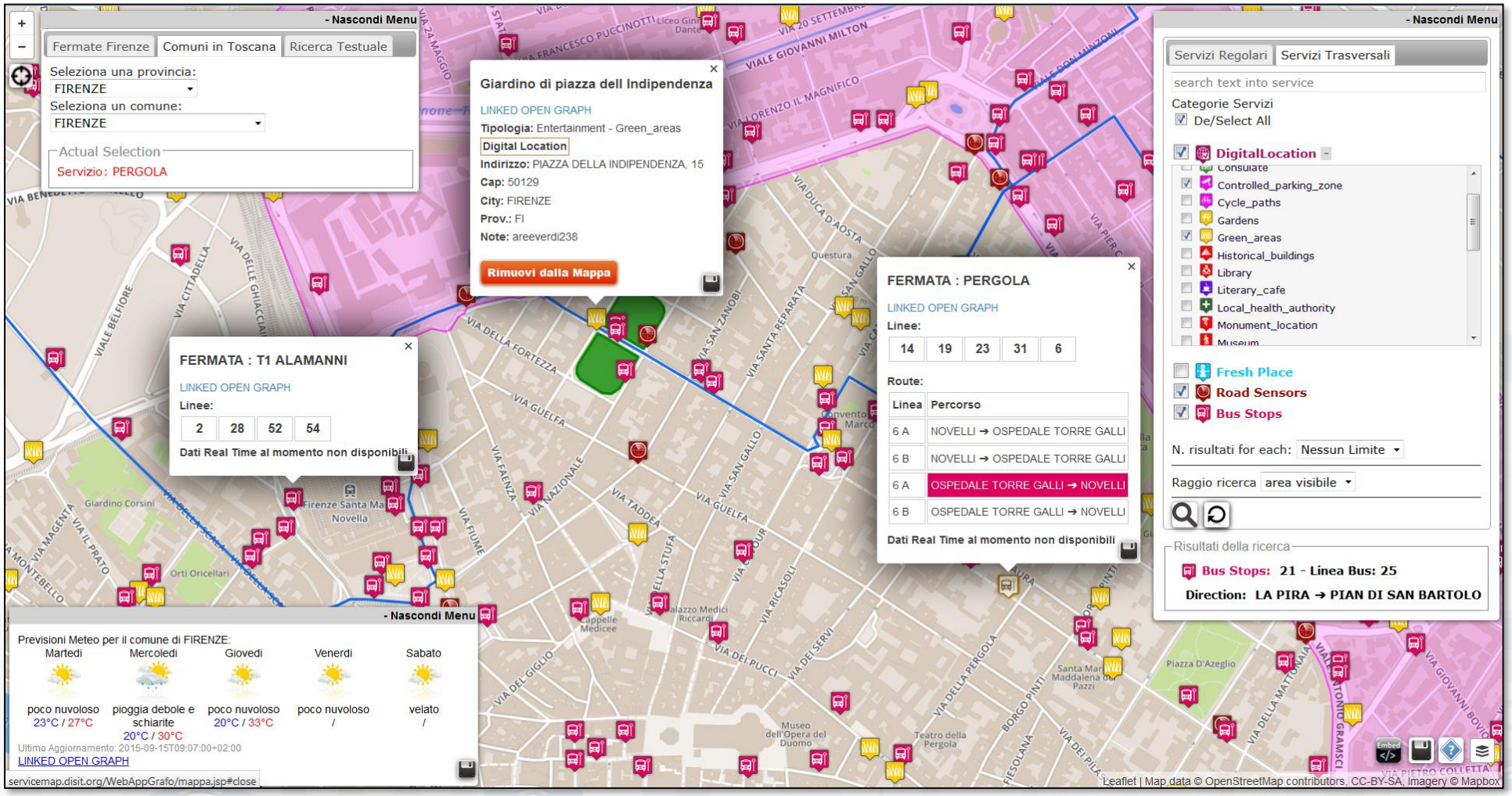
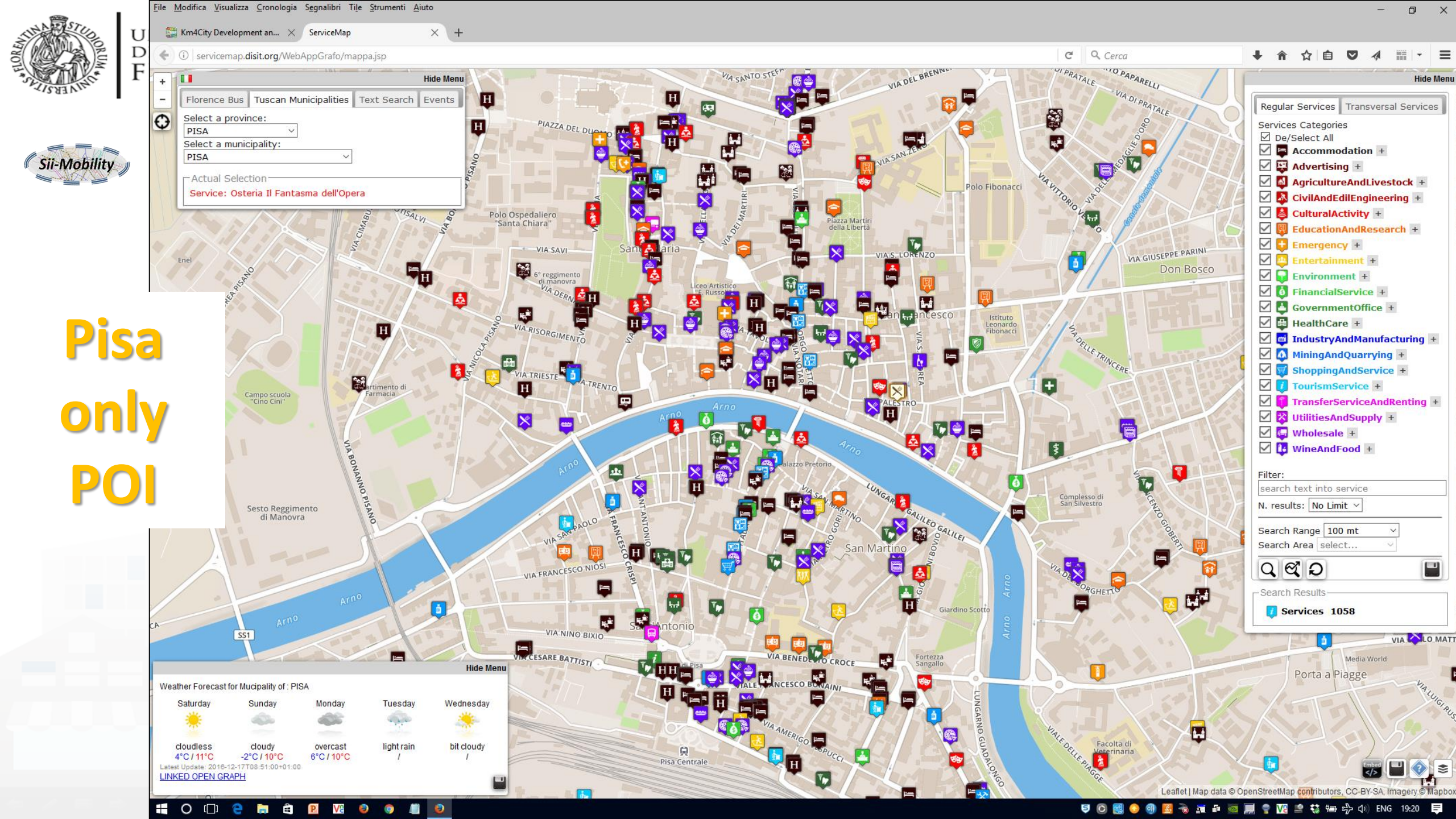
Km4City in Firenze



- **Areas, Bus lines, bike lanes, tram, RTZ, etc.**



Pisa only POI

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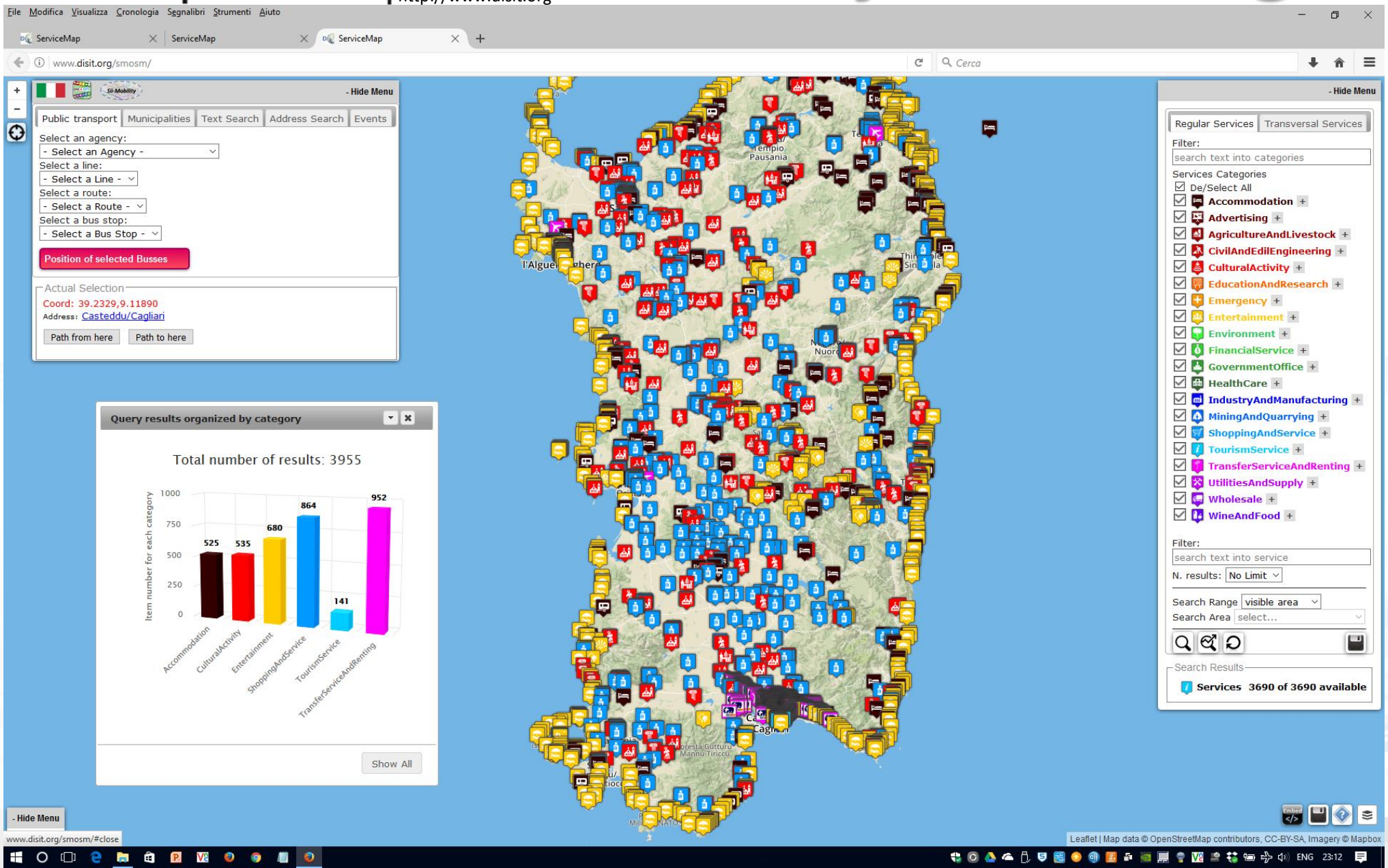
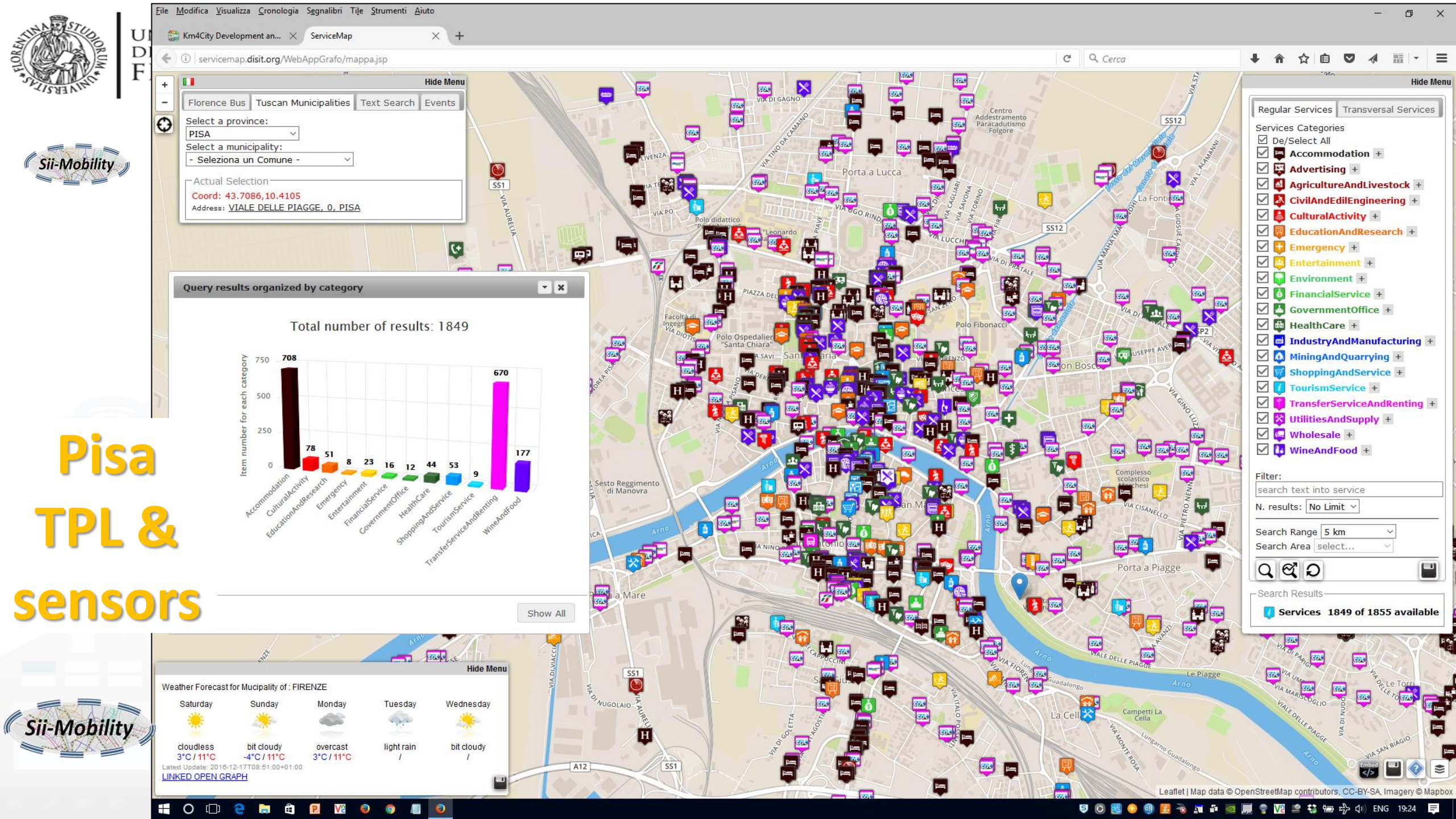
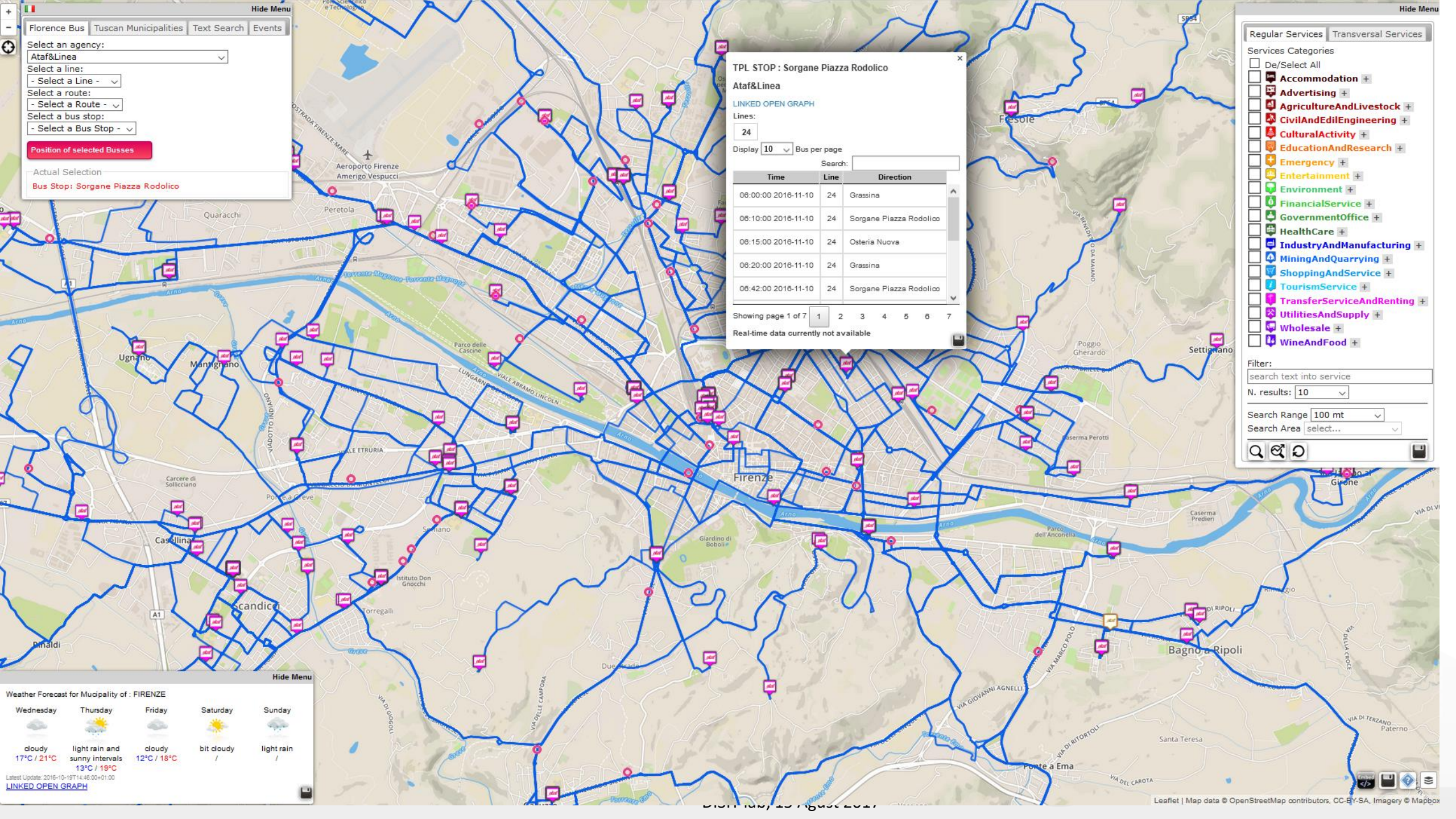
Km4City in Sardegna



Sii-Mobility



Pisa TPL & sensors


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
1 2 3 4 5 6 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 Mucipality of : FIRENZE
Wednesday
cloudy
17°C / 21°C
Thursday
light rain and sunny intervals
13°C / 19°C
Friday
cloudy
12°C / 18°C
Saturday
bit cloudy
/
Sunday
light rain
/
Latest Update: 2016-10-19T14:46:00+01:00
LINKED OPEN GRAPH
Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

Smart City Control Room

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

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

Sentient City Control Room

UNIVERSITÀ DEGLI STUDI FIRENZE

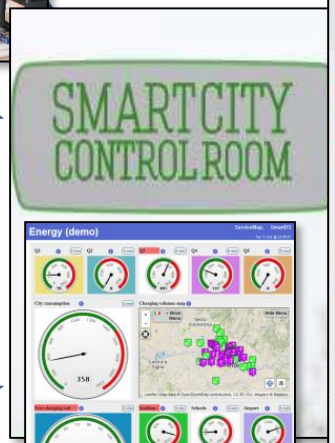
DINFO DIPARTIMENTO DI INGEGNERIA

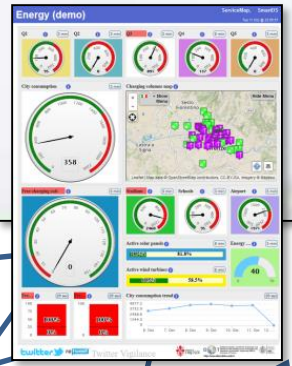
DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB
http://www.disit.org

REPLICATE

Horizon 2020
European Union Funding
for Research & Innovation

Transport systems, Mobility, Parking





Shops, services, operators

Sensors, IOT Cameras, ..

Social Media, WiFi, Network

Dashboards

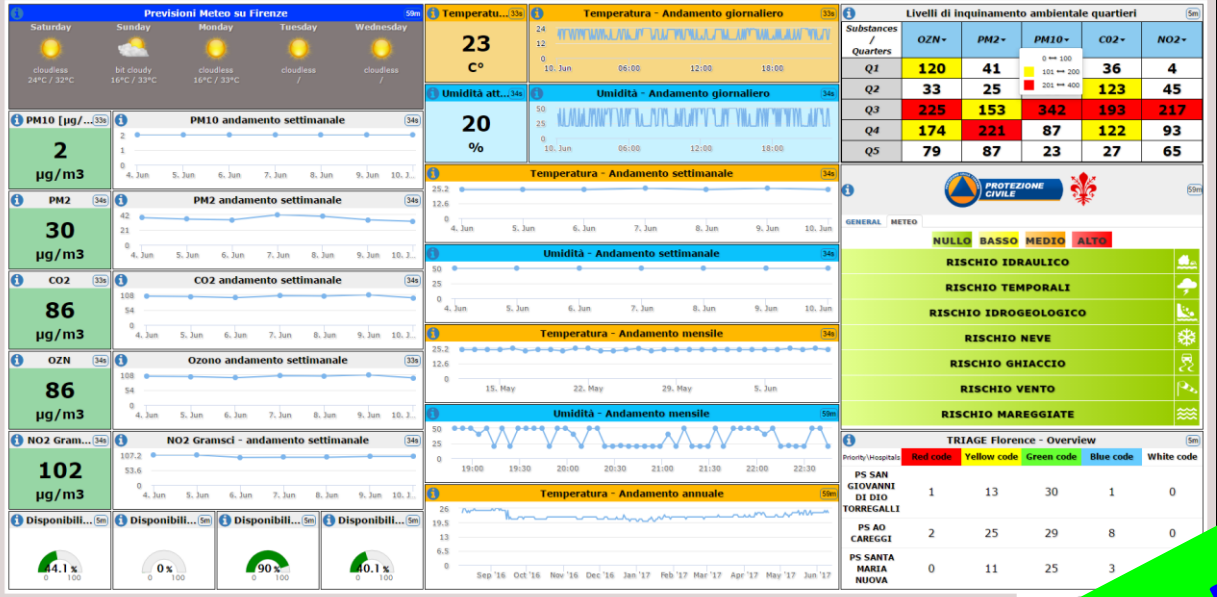
Public services, Govern, Events

Environment, Water, energy

Firenze Ambiente e Salute HD

Dati ambientali su Firenze (demo)

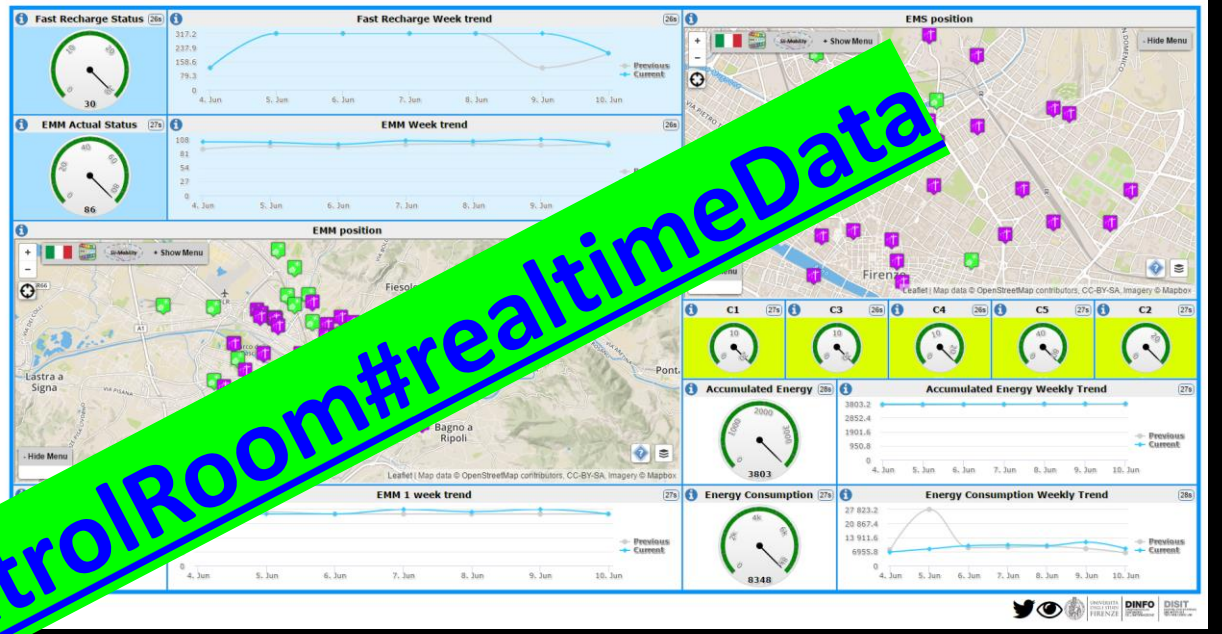
Sat 10 Jun @ 22:49:06



Firenze Energia e Colonnine HD

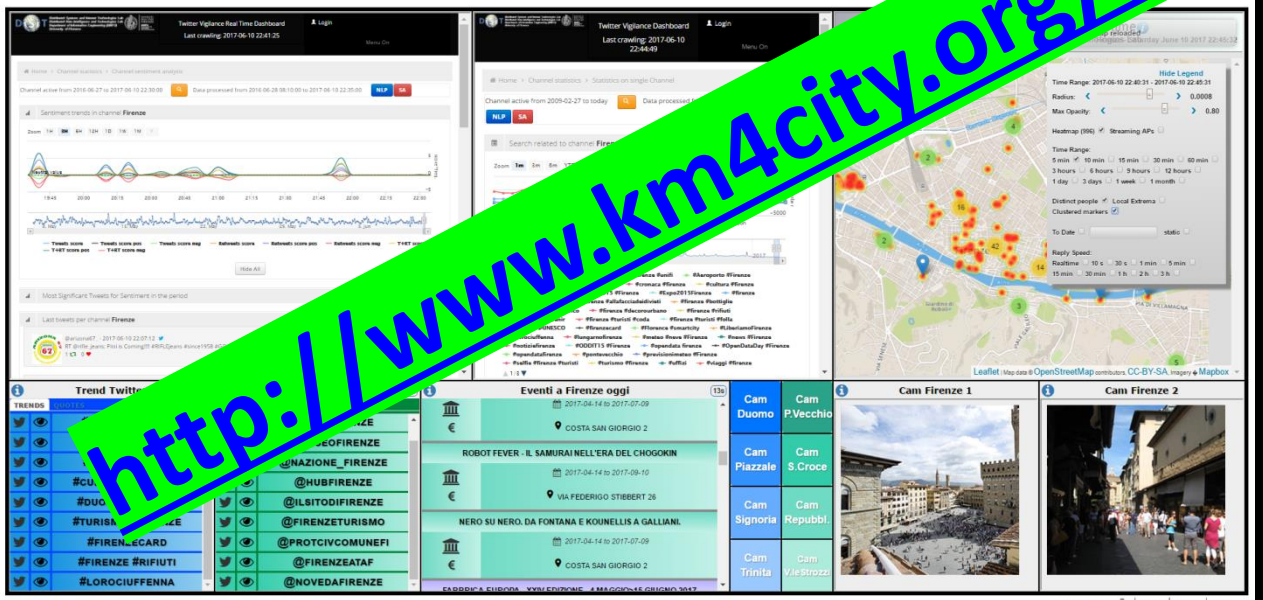
(demo, dati simulati)

Sat 10 Jun @ 22:48:16



Firenze Sociale e Social Media (HD)

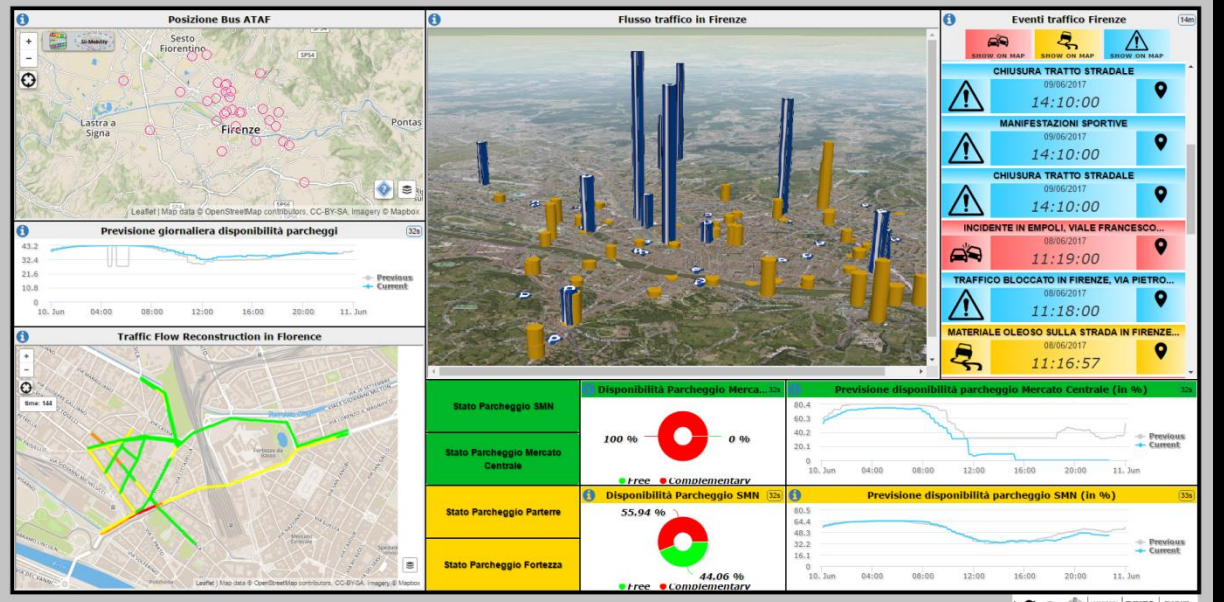
(dati non completi)



Firenze Mobilità e Trasporti HD

(demo, dati non completi)

Sat 10 Jun @ 22:46:34



Dashboard Main Features

- Dashboards can render data coming from multiple data sources: SQL, noSQL, RDF Stores, etc.
  - Each Dashboard is based on a number of Widgets that can be fully configured for color, size, style, etc. and connected to data sources
  - Each Widget can show in different manner multiple metrics, taken from multiple sources
  - Widget can be created and changed at source level in PhP and JavaScript
- At each metric of a Widget, a number of Notifications can be set up with multiple firing conditions
- You can access to the Dashboard Manual via Km4City docs web pages

RESOLUTE Dashboard 4XHD v5

Wed 21 ... 14

ESB

Alarms

TEST - ALLUVIONE MUGNONE
MAJOR
07/06/2017 12:45:54

ALLUVIONE ARNO COVERCIANO
CRITICAL
15/06/2017 15:47:31

ALLUVIONE ARNO VIA PETRIOLO
MAJOR
07/06/2017 16:48:11

TEST - SCONTRI ALLO STADIO
CRITICAL
15/06/2017 09:50:04

Traffic events

SEVERE ACCIDENT
SERIOUS ACCIDENT(S)
21/06/2017 11:24:01 5

ROAD WORKS
ROADWORKS
21/06/2017 11:24:10 8

ORD 2017-001302 - SP NÃ°17 Ã??ALTO VALDARNOÃ??IST...
RESTRICTIONS
13/06/2017 00:00:00 5

INTERVENTO URGENTE PUBLIACQUA
CLOSED AHEAD
20/06/2017 10:00:00 10

Evacuation plans

PLAN N.1497263867
IN_PROGRESS
12/06/2017 - 11:37:47 PATHS: 3

PLAN N.2000000000
PROPOSED
16/06/2017 - 09:42:06 PATHS: 2

PLAN N.1497604404
PROPOSED
16/06/2017 - 11:06:47 PATHS: 1

Tram position

TRAM/1
21/06/2017 11:32:27

TRAM/2
21/06/2017 11:32:31

Network Analysis

FM0495
(NORMALIZED) NODE BETWEENNESS
1.0000

FM0701
(NORMALIZED) NODE
0.7825

Environment

PROTEZIONE CIVILE

NULLO BASSO MEDIO ALTO

RISCHIO IDRAULICO
RISCHIO TEMPORALI
RISCHIO IDROGEOLOGICO
RISCHIO NEVE
RISCHIO GHIACCIO
RISCHIO VENTO
RISCHIO MAREGGIATE

Anemomet...
221

Ground Te...
22 C°

Temperatu...
24 C°

Umidity
20 %

Pluv. Flore...
24 mm

Pluviometer Florence City - last 24h

Hydromete...
20 m.s.z.l.

Hydrometer Arno Nave di Rosano - Last 24h

Hidromete...
24 m.s.z.l.

Hydrometer Arno Florence Uffizi - Last 24h

Hydromete...
24 m.s.z.l.

Hydrometer Mugnone Ponte alle Mosse - Last 24h

Mobility

Bus Lines Status

ULTIMO AGGIORNAMENTO: 2016-08-04 23:59:03

Underpass Viale Mariti Aperto

Underpass Viale Talenti closed

Underpass Fortezza Aperto

Parterre Pa...
76.2%
23.8%

SMN
65.7%
34.3%

Fortezza Fi...
37.2%
62.8%

Mercato Ce...
65.4%
34.6%

Resources

Planned events

E 1966 - 2016 - LA BELLEZZA SALVATA - PROROGATA FINO AL 2
2016-12-01 to 2017-07-02
VIA CAMILLO CAVOUR 3

NE SPLORATI.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 2017-09-29
PIAZZA DI SAN LORENZO 9

Ambulance...
20 num.

Ambulance...
33

Voluntiers
33 num.

Florence main first aids status

Priority\ Hospitals	Red code	Yellow code	Green code	Blue code	White code
PS SANTA MARIA NUOVA	1	7	14	1	0
PS SAN GIOVANNI DI DIO TORREGALLI	2	10	24	2	
PS AO CAREGGI	10	27			
PS SANTA MARIA ANNUNZIATA	2				

28:2

TRENDS QUOTES

#FIRENZE
#NEWS #FIRENZE
#FIRENZE #RIFIUTI
#UFFIZI
#PONTEVECCHIO
#BARGELLO
#AEROPORTO #FIRENZE
#DUOMO #FIRENZE
#VIAGGI #FIRENZE
#CRONACA #FIRENZE

@MUSEOFIRENZE
@COMUNEFI
@NAZIONE_FIRENZE
@PROTCIVCOMUNEFI
@UNI_FIRENZE
@HUBFIRENZE
@NOVEDAFIRE
@ILSITO

TV-RT Firenze

Twitter Vigilance Real Time Dashboard
Last crawling: 2017-06-21 12:44:30

Menu On Login

Channel active from 2016-06-27 to 2017-06-21 12:35:00
08:10:00 to 2017-06-21 12:35:00
Data processed from
NLP SA

Sentiment trends in channel Firenze

Most Significant Tweets for Sentiment in the period

Last tweets per channel Firenze

@GiorgiaLodi - 2017-06-21 12:13:45
RT @emanuelegeri: Primo giorno d'#Estate: pubblicato aggiornamento luoghi freschi https://t.co/isKeZoeGhw su #opendatafirenze @comunefi

Hide All

Menu On Login

Data processed from 2015-05-22 to 2017-02-24

Search related to channel Firenze

#Aeroporto #Firenza #Aeroporto #Firenza #unifi #Aeroporto #Firenza
#americani #firenza #bargello #cronaca #firenza #cultura #Firenze
#duomo #firenza #expo2015 #Firenza #Expo2015Firenze #firenze
#firenze #abusivi #firenza #allafacciadaidiviati #firenza #bottiglia
#Firenze #centrostorico #firenze #decorurbano #firenza #rifiuti
#firenze #souvenir #firenza #turisti #coda #firenza #turisti #folla
#firenze @UNESCO #firenzecard #Florence #smartcity #LiberiamoFirenza
#lorociuffonna #lungarnofirenza #meteo #neve #Firenze #news #Firenze
#notiziafirenza #ODDITI5 #Firenza #opendata firenze #OpenDataDay #Firenze
#opandatafirenza #pontevecchio #previsionimeteo #Firenze

Hide All

Daily number of tweets/retweets for channel: Firenze

ESB events

Show Menu

Firenze Wi-Fi - Access Points Clusters Coverage Map

Fi: Access Points Clusters Coverage Map
d Systems and Internet Technologies Lab
Firenze - Wednesday June 21 2017 12:49:12

Show Legend

Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

Firenze Wi-Fi - APs Streaming Realtime

Firenze Wi-Fi: APs Streaming Realtime
DISIT - Distributed Systems and Internet Technologies Lab
Firenze - Wednesday June 21 2017 12:49:12

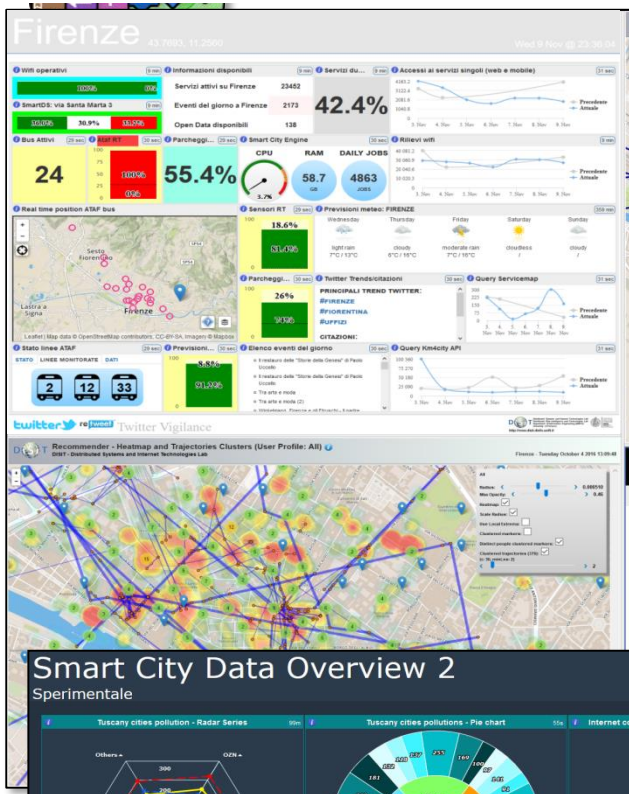
Show Legend

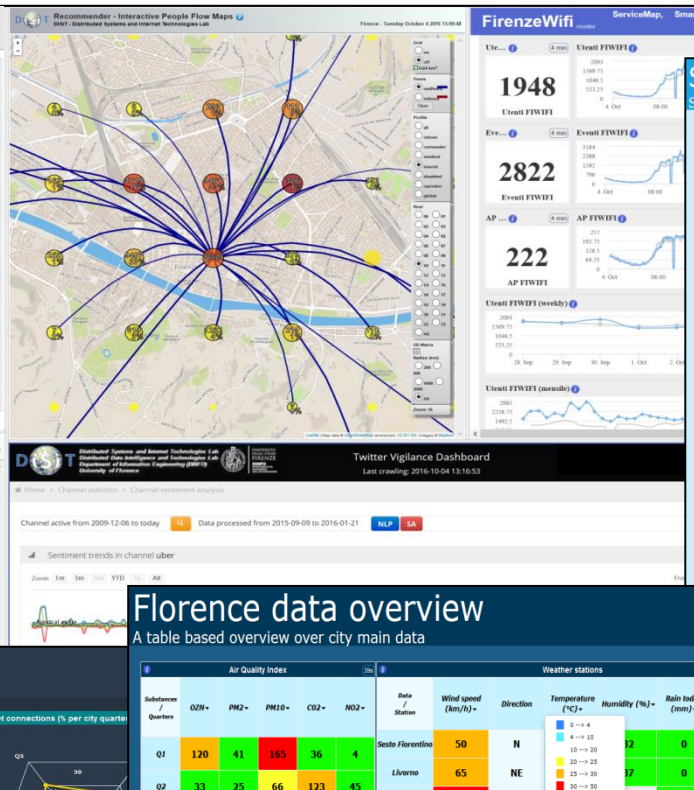
Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

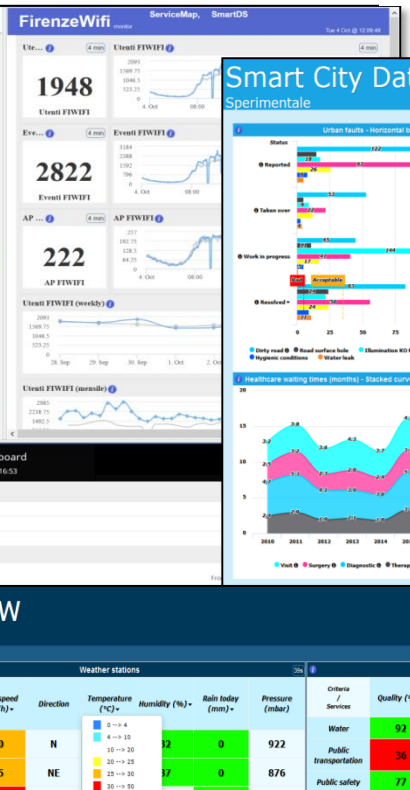
Smart City Dashboard

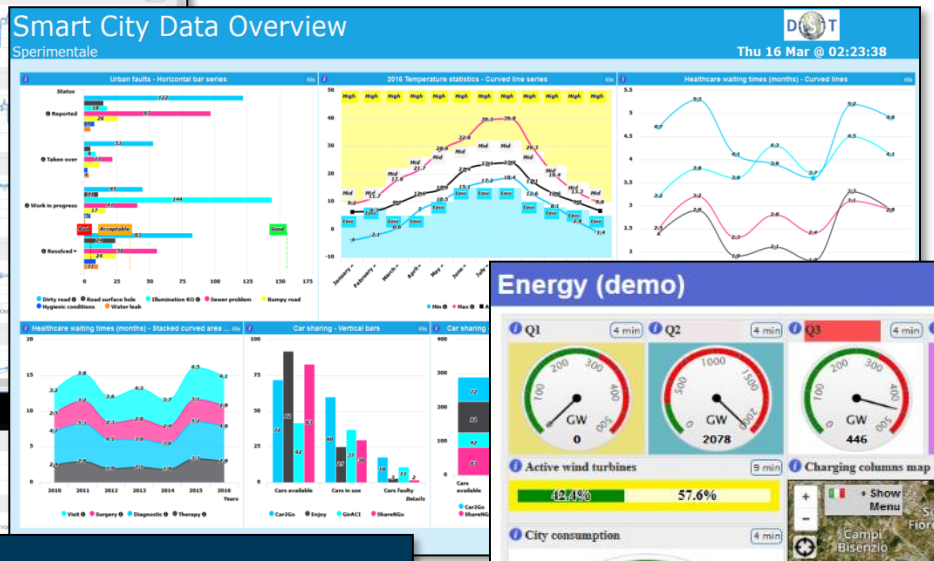
REPLICATE

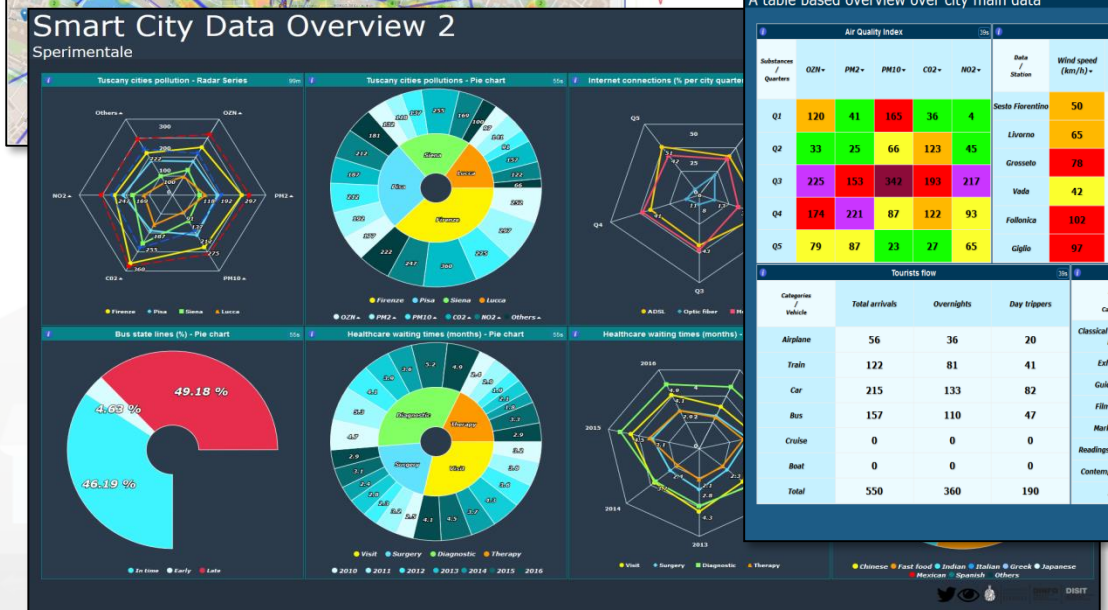
Horizon 2020
European Union Funding
for Research & Innovation

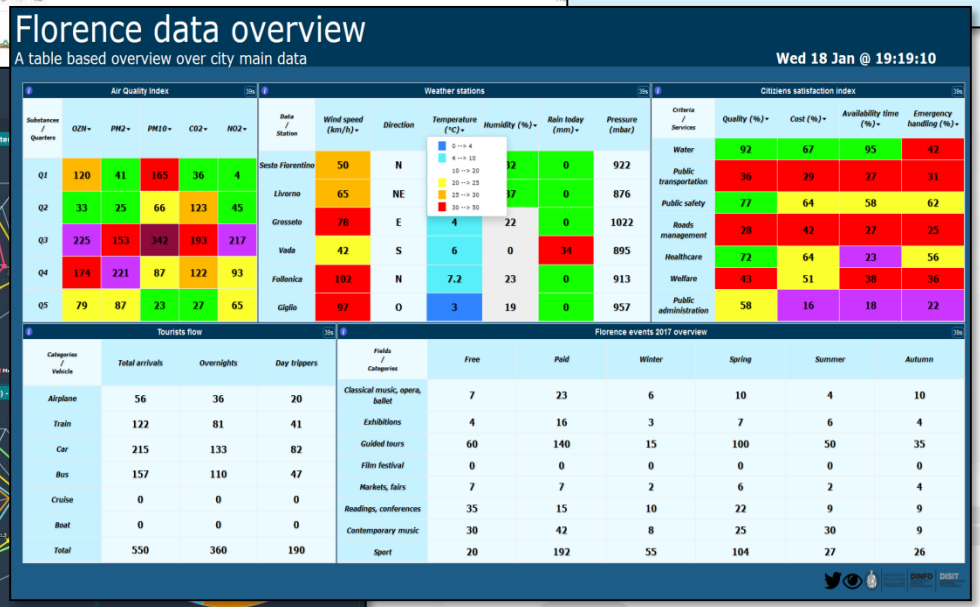


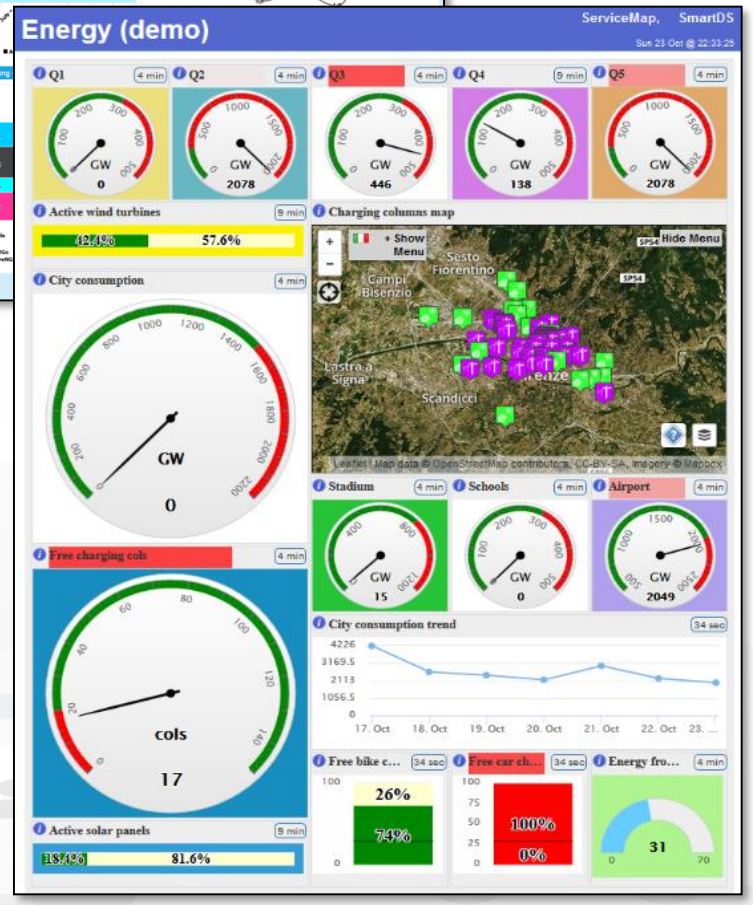












DISIT lab, 15 Agust 2017

Cross widget interaction 1

Artistical events, traffic events, city cams

Tu 18:50:21

Artistical and recreative events

58m

PIAZZALE DEGLI UFFIZI 2

LA FABBRICA DELLA BELLEZZA. LA MANIFATTURA GINORI E IL SUO POPOLO DI STATUE

2017-05-18 to 2017-10-01

VIA DEL PROCONSOLO 4

"DANTE INFERNO"

2017-05-22 to 2017-06-30

VIA RICASOLI

UN FRAGILE CAPOLAVORO

2017-05-24 to 2017-09-24

VIA DEGLI ALFANI 78

ESTATE FIORENTINA DEL GIARDINO DELL'ARTECULTURA

Artistical and recreative events - Exhibitions

+ Show Menu

Unexplored treasures. Florence University Libraries on display

LINKED OPEN GRAPH

Tipology: Event

Basilica Santa Maria Novella

Spedale degli Innocenti

VIA DEL GIGLIO

VIA DEI PUCCI

VIA DEI SERVI

VIA RICASOLI

VIA FIUME

VIA FAENZA

Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

Artistical and recreative events - Others

+ Show Menu

VIALE DEL VISARNO

VIA DELLA SCALA

VIA DEL VANNI

VIA BRONZINO

Arno

Polimoda

Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

Cam Duomo | Cam Piazzale | Cam Signoria | Cam Trinita

City webcams - 1

Traffic events

3m

ALL ON MAP | ALL ON MAP | SHOW ON MAP

06/06/2017 14:21:55 ON MAP

INCIDENTE IN FIRENZE, VIALE EUROPA

06/06/2017 13:43:23 ON MAP

INCIDENTE

06/06/2017 13:38:

MATERIALE OLE

06/06

13:20

INCIDENTE IN FIRENZE, VI ALA

06/06/2017

Traffic ev

Firenze

© OpenStreetMap contributors

Traffic events - Slippery roads & others

La Lastra

Fiesole

SP54

Via Bolognese

Via Faentina

Via di San Domenico

Firenze

© OpenStreetMap contributors

Cam P.Vecchio | Cam S.Croce | Cam Repubbl. | Cam Fortezza

City webcams - 2

DINFO DISIT

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

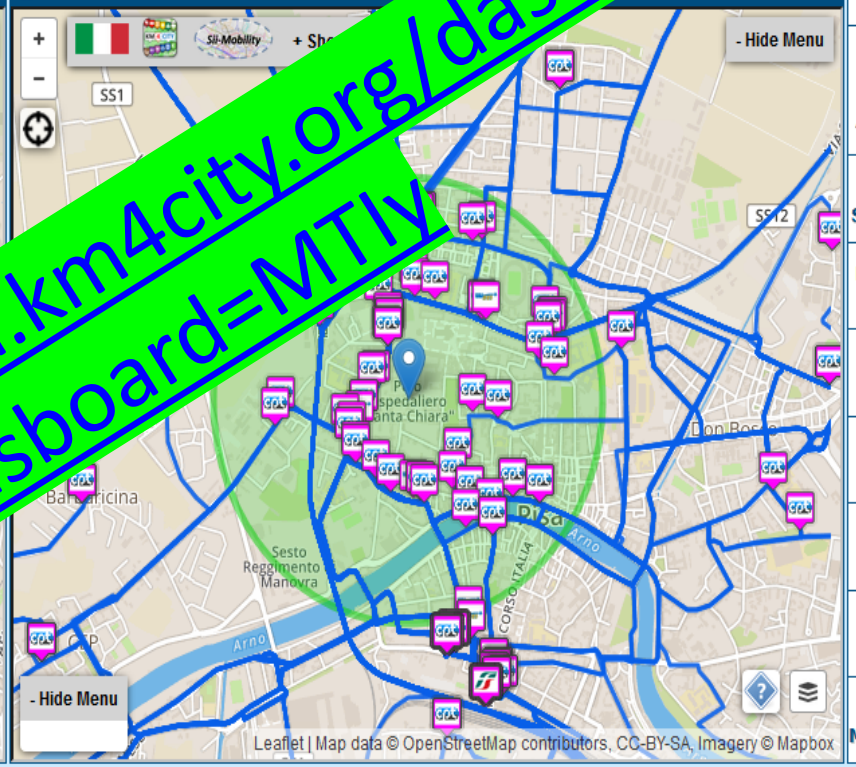
Priority\Status	Red code	Yellow code	Green code	Blue code	White code
Waiting	0	1	7	9	3
In visit	0	7	1	1	
Totals	0	8	8		9

...spitals - Summary

Priority\Ho...	...ellow code	Green code	Blue code	White code
...EGALLI	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
PS OSPEDALI RIUNITI	3				1
PS CASENTINO					
PS SANTA CROCE					
PI PO CORTONA					
PS CIVILE PIOMBINO					
PS LA MISERICORDIA					

Careggi hospital (Florence) - Map

Santa Chiara ho...



http://dashboard.km4city.org/dashboardSmartCity/view/index.php?iddasboard=MTIy

Firenze

43.7693, 11.2560

Wed 9 Nov @ 23:36:04

REPLICATE

Wifi operativi — 9 min

100% | 0%

SmartDS: via Santa Marta 3 — 9 min

36.0% | 30.9% | 33.2%

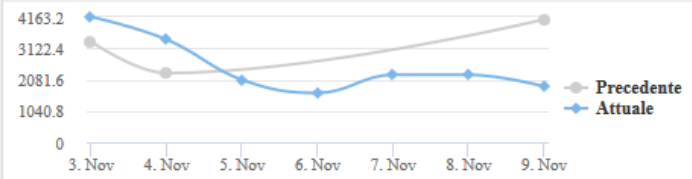
Informazioni disponibili — 9 min

Servizi attivi su Firenze	23452
Eventi del giorno a Firenze	2173
Open Data disponibili	138

Servizi du... — 9 min

42.4%

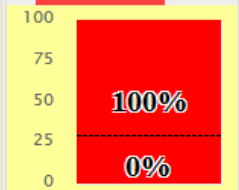
Accessi ai servizi singoli (web e mobile) — 31 sec



Bus Attivi — 29 sec

24

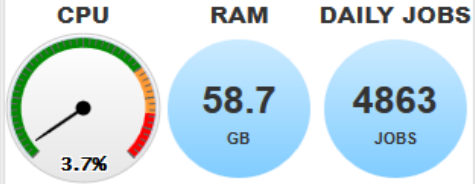
Ataf RT — 30 sec



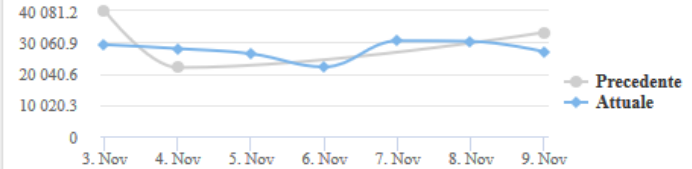
Parcheggi... — 29 sec

55.4%

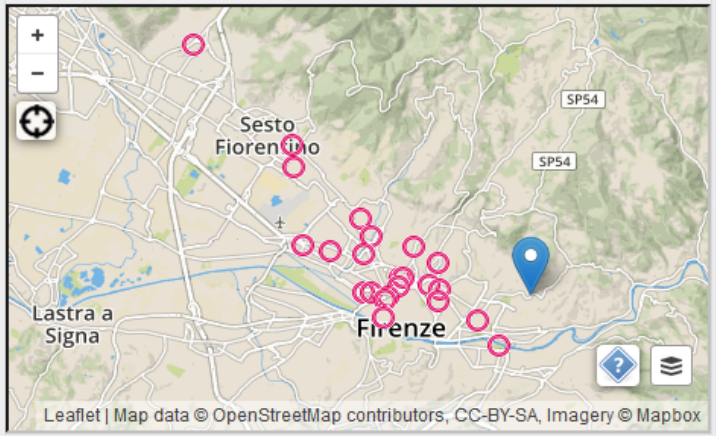
Smart City Engine — 30 sec



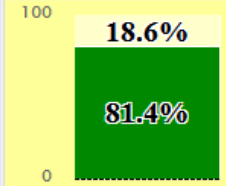
Rilievi wifi — 9 min



Real time position ATAF bus



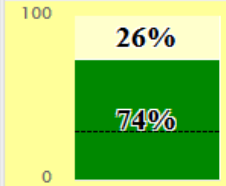
Sensori RT — 29 sec



Previsioni meteo: FIRENZE — 359 min

Wednesday	Thursday	Friday	Saturday	Sunday
light rain	cloudy	moderate rain	cloudless	cloudy
7°C / 13°C	6°C / 16°C	7°C / 16°C	/	/

Parcheggi... — 30 sec



Twitter Trends/citazioni — 30 sec

PRINCIPALI TREND TWITTER:

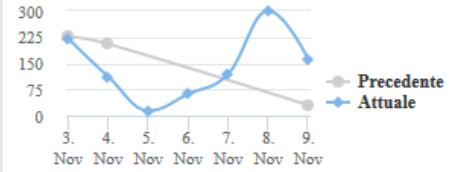
#FIRENZE

#FIORENTINA

#UFFIZI

CITAZIONI:

Query Servicemap — 31 sec

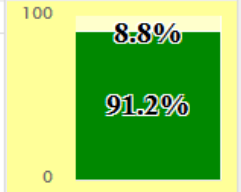


Stato linee ATAF — 29 sec

STATO | LINEE MONITORATE | DATI

46%	5%	49%
IN ORARIO	IN ANTICIPO	IN RITARDO

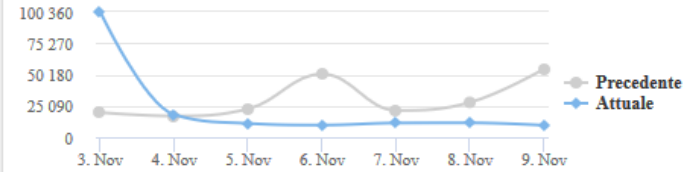
Previsioni... — 30 sec



Elenco eventi del giorno — 30 sec

- Il restauro delle "Storie della Genesi" di Paolo Uccello
- Il restauro delle "Storie della Genesi" di Paolo Uccello
- Tra arte e moda
- Tra arte e moda (2)
- Winkelmann, Firenze e gli Etruschi - Il padre

Query Km4city API — 31 sec



twitter retweet Twitter Vigilance

DISIT Distributed Systems and Internet Technologies Lab — http://www.disit.dinfo.unifi.it

Servizi agli Utenti

Firenze (sperimentale)

Tue 17 Jan @ 19:52:49

Recenti #hashtag più utilizzati — 2m

TRENDS | QUOTES

- #FIRENZE
- #NEWS #FIRENZE
- #UFFIZI

Citazioni di Firenze frequenti... — 2m

TRENDS | QUOTES

- @NAZIONE_FIRENZE
- @UNI_FIRENZE
- @NOVEDAFIRENZE
- @FIRENZEDIGITALE
- @FIRENZETURISMO

Eventi a Firenze oggi — 37s

ERWIN WURM - GURKEN
2016-09-23 to 2017-01-20
PIAZZA DI SANTA MARIA NOVELLA 10

LA DIVINA COMMEDIA DI VENTURINO VENTURI
2016-09-29 to 2017-02-26
COSTA SAN GIORGIO 2

IN COLLEZIONE - UN PERCORSO D'ARTE DAL XIII AL XX SECOLO
2016-10-01 to 2017-02-26
VIA MAURIZIO BUFALINI

ARNO: FONTE DI PROSPERIT€ E FONTE DI DISTRUZIONE.
2016-10-09 to 2017-02-04
VIALE DELLA GIOVINE ITALIA

ARNO: FONTE DI PROSPERITÀ E FONTE DI DISTRUZIONE.

PROTEZIONE CIVILE — 37s

GENERAL | METEO

NULLO	BASSO	MEDIO	ALTO

- RISCHIO IDRAULICO
- RISCHIO TEMPORALI
- RISCHIO IDROGEOLOGICO
- RISCHIO NEVE
- RISCHIO GHIACCIO
- RISCHIO VENTO
- RISCHIO MAREGGIATE

Stato servizio BUS a Firenze — 16m

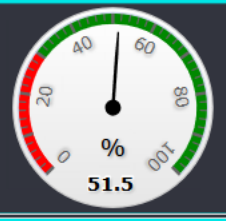
STATO | LINEE MONITORATE | DATI

46%	5%	49%
IN ORARIO	IN ANTICIPO	IN RITARDO

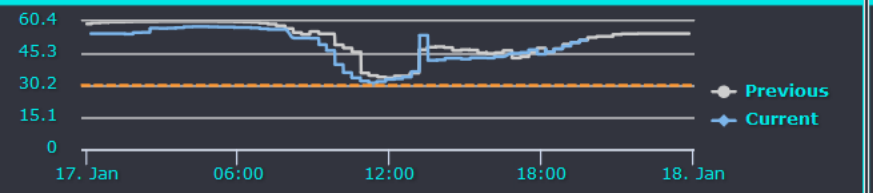
Previsioni del tempo a Firenze — 59m

Tuesday	Wednesday	Thursday	Friday	Saturday
light snow	overcast	cloudy	bit cloudy	cloudy
3°C / 4°C	2°C / 5°C	2°C / 7°C	/	/

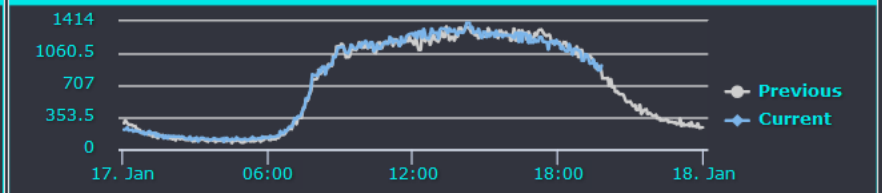
Posti Liberi — 37s



Posti Liberi in Parcheggi Interrati a Firenze — 2m

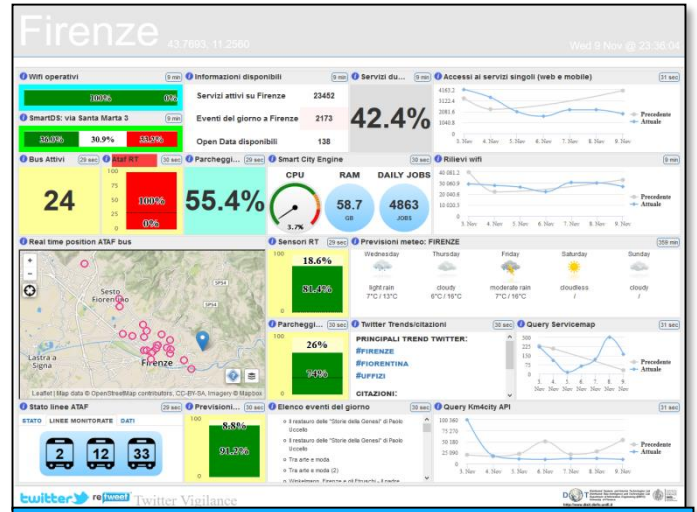


Utenti FirenzeWiFi negli ultimi 5 minuti — 2m



REPLICATE

Horizon 2020
European Union Funding
for Research & Innovation



SmartCity Processes

Fri 4 Nov @ 18:51:20

Florence data overview

A table based overview over city main data

Wed 18 Jan @ 19:19:10

Air Quality Index

Substances / Quarters	OZN	PM2	PM10	C02	NO2
Q1	120	41	165	36	4
Q2	33	25	66	123	45
Q3	225	153	342	193	217
Q4	174	221	87	122	93
Q5	79	87	23	27	65

Weather stations

Data / Station	Wind speed (km/h)	Direction	Temperature (°C)	Humidity (%)	Rain today (mm)	Pressure (mbar)
Sesto Fiorentino	50	N		32	0	922
Livorno	65	NE		37	0	876
Grosseto	78	E	4	22	0	1022
Vada	42	S	6	0	34	895
Follonica	102	N	7.2	23	0	913
Giglio	97	O	3	19	0	957

0 --> 4
4 --> 10
10 --> 20
20 --> 25
25 --> 30
30 --> 50

Citizens satisfaction index

Criteria / Services	Quality (%)	Cost (%)	Availability time (%)	Emergency handling (%)
Water	92	67	95	42
Public transportation	36	29	27	31
Public safety	77	64	58	62
Roads management	28	42	27	25
Healthcare	72	64	23	56
Welfare	43	51	38	36
Public administration	58	16	18	22

Tourists flow

Categories / Vehicle	Total arrivals	Overnights	Day trippers
Airplane	56	36	20
Train	122	81	41
Car	215	133	82
Bus	157	110	47
Cruise	0	0	0
Boat	0	0	0
Total	550	360	190

Florence events 2017 overview

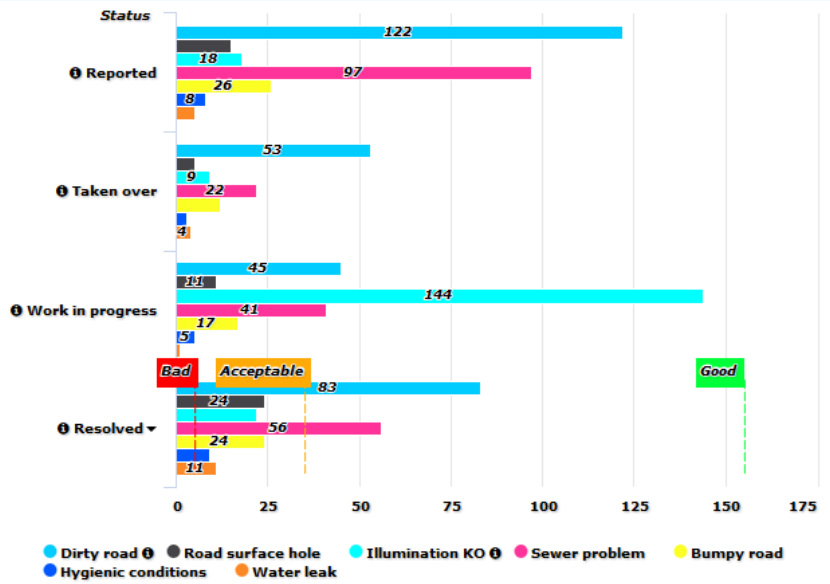
Fields / Categories	Free	Paid	Winter	Spring	Summer	Autumn
Classical music, opera, ballet	7	23	6	10	4	10
Exhibitions	4	16	3	7	6	4
Guided tours	60	140	15	100	50	35
Film festival	0	0	0	0	0	0
Markets, fairs	7	7	2	6	2	4
Readings, conferences	35	15	10	22	9	9
Contemporary music	30	42	8	25	30	9
Sport	20	192	55	104	27	26

Smart City Data Overview

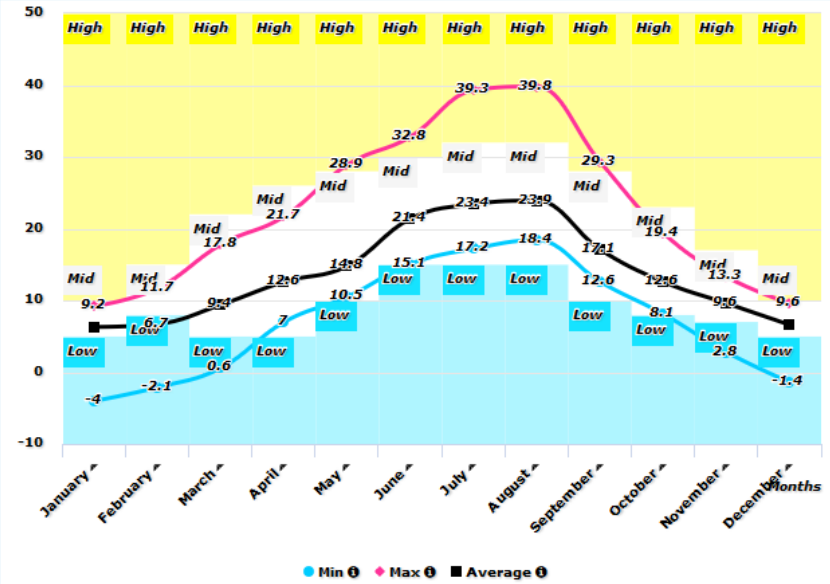
Sperimentale

Thu 16 Mar @ 02:23:38

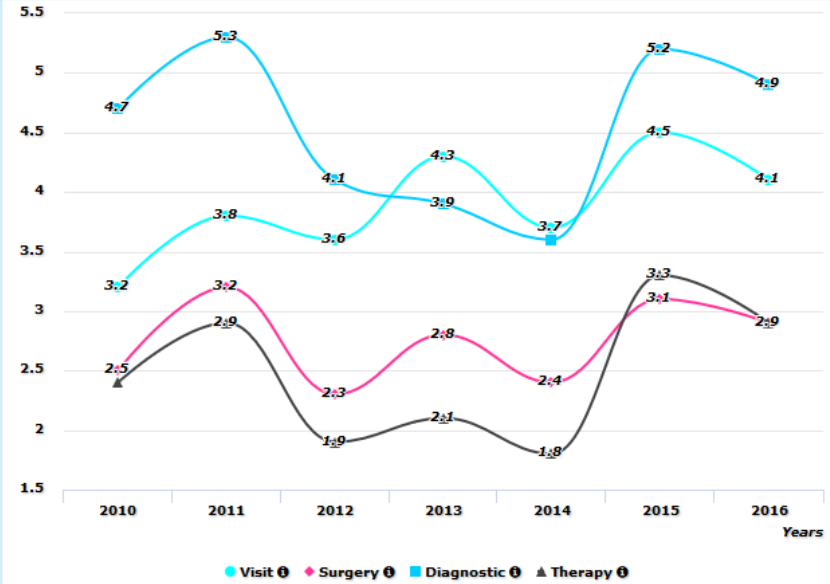
Urban faults - Horizontal bar series



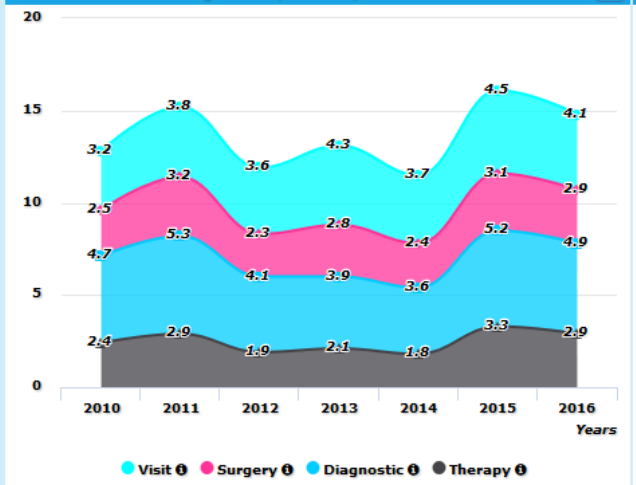
2016 Temperature statistics - Curved line series



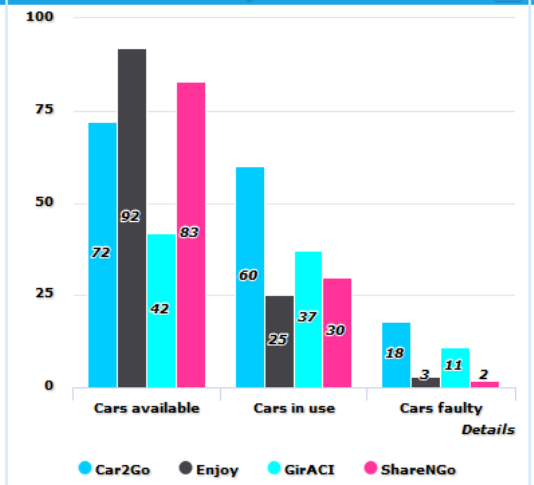
Healthcare waiting times (months) - Curved lines



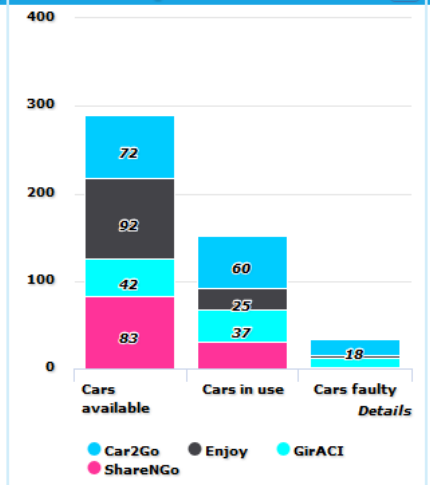
Healthcare waiting times (months) - Stacked curved area ...



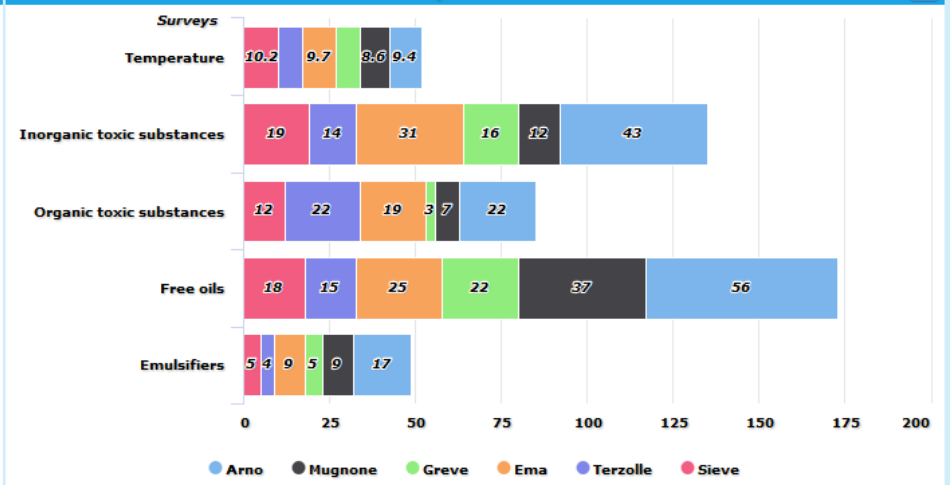
Car sharing - Vertical bars



Car sharing - Vertical stacked bars



Rivers water analisys - Horizontal stacked bars

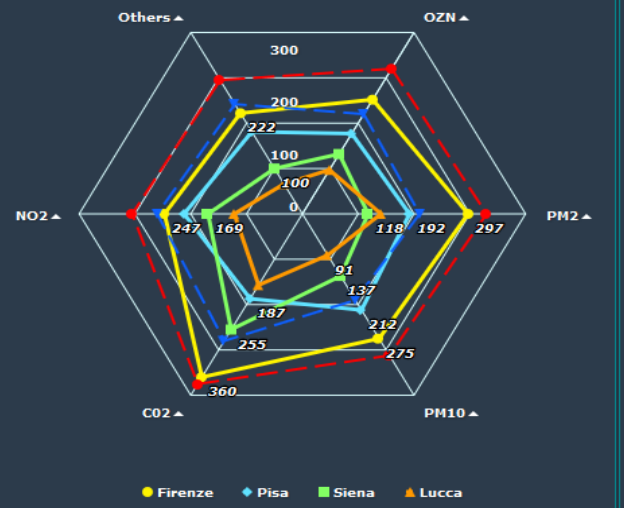


Smart City Data Overview 2

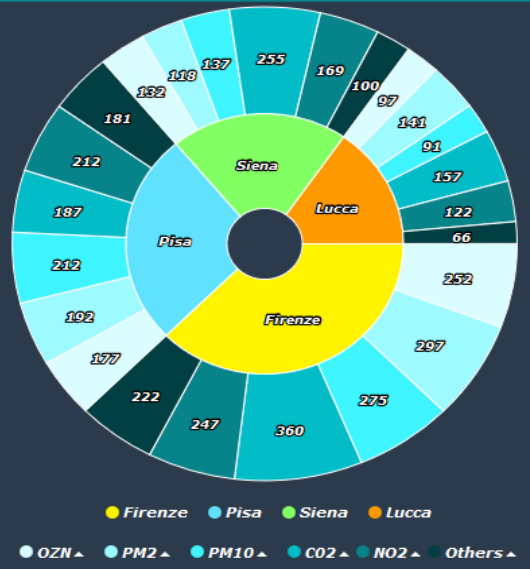
Sperimentale

Thu 16 Mar @ 02:24:52

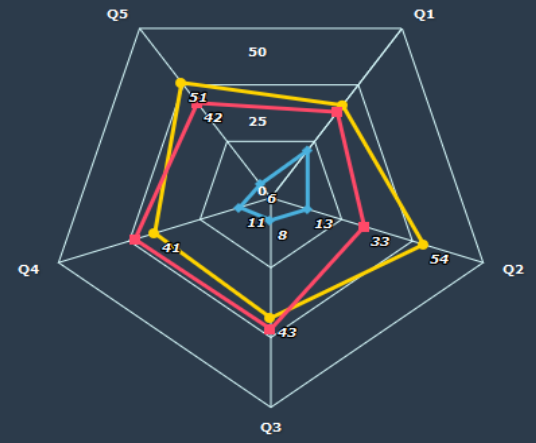
Tuscany cities pollution - Radar Series



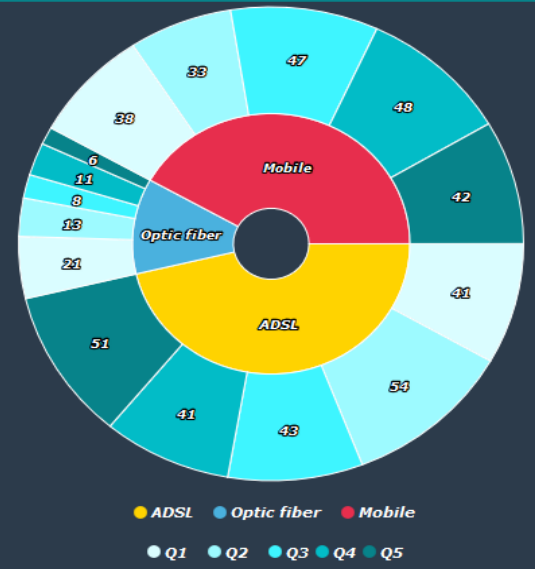
Tuscany cities pollutions - Pie chart



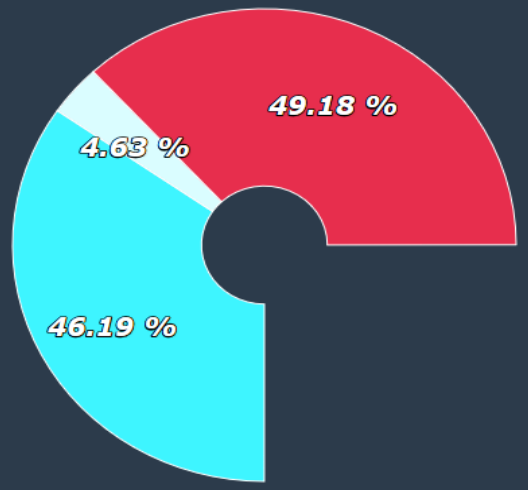
Internet connections (% per city quarters) - Radar series



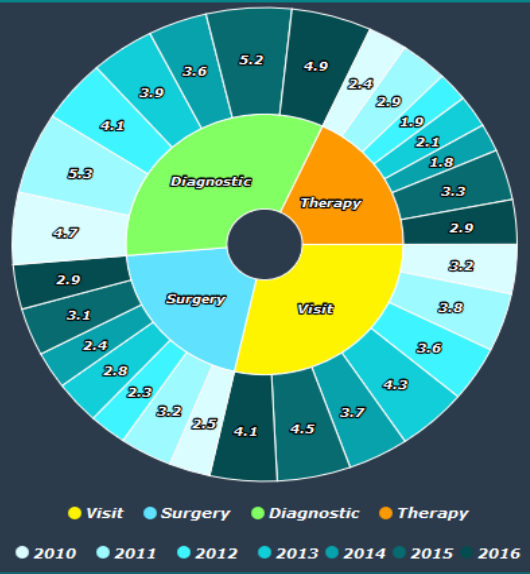
Internet connections (% per city quarters) - Pie chart



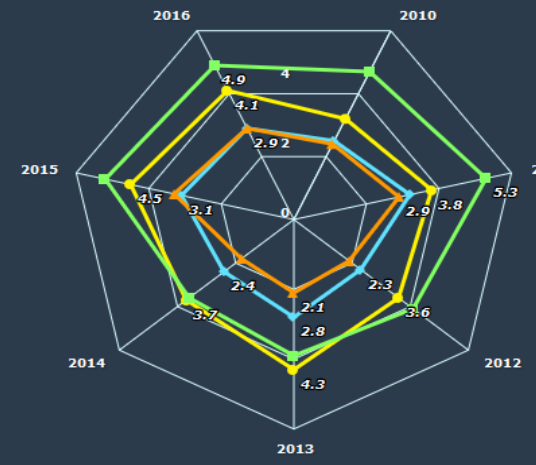
Bus state lines (%) - Pie chart



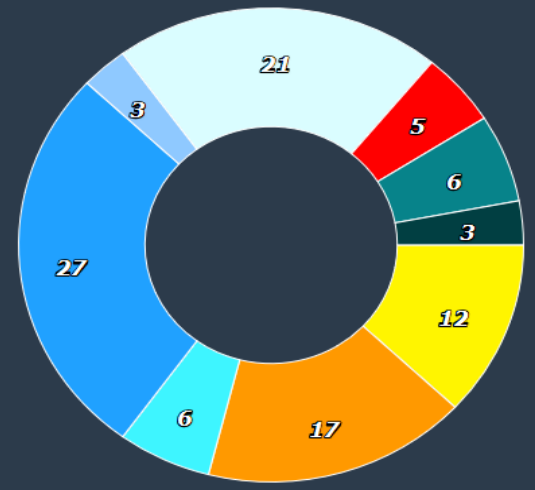
Healthcare waiting times (months) - Pie chart



Healthcare waiting times (months) - Radar series



Food preferences (%) - PieChart



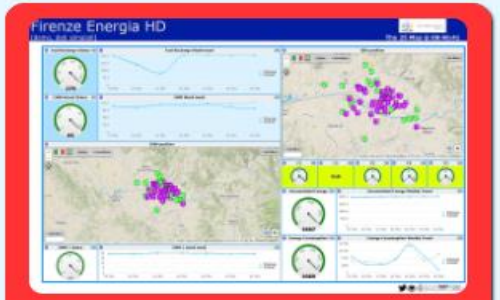
Smart City Control Room Console

Entry point for REPLICATE dashboards

REPLICATE

COMUNE DI FIRENZE

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 & Data Analytics by DISIT Lab

RealTime Sensors via ServiceMap3D

Resilience Management

Resilience Dashboard by RESOLUTE

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Sensori in Tempo Reale in Toscana

Trafico, Parcheggi, Triage, Aria, Pollinazion

Sat 30 Sep @ 21:24:46

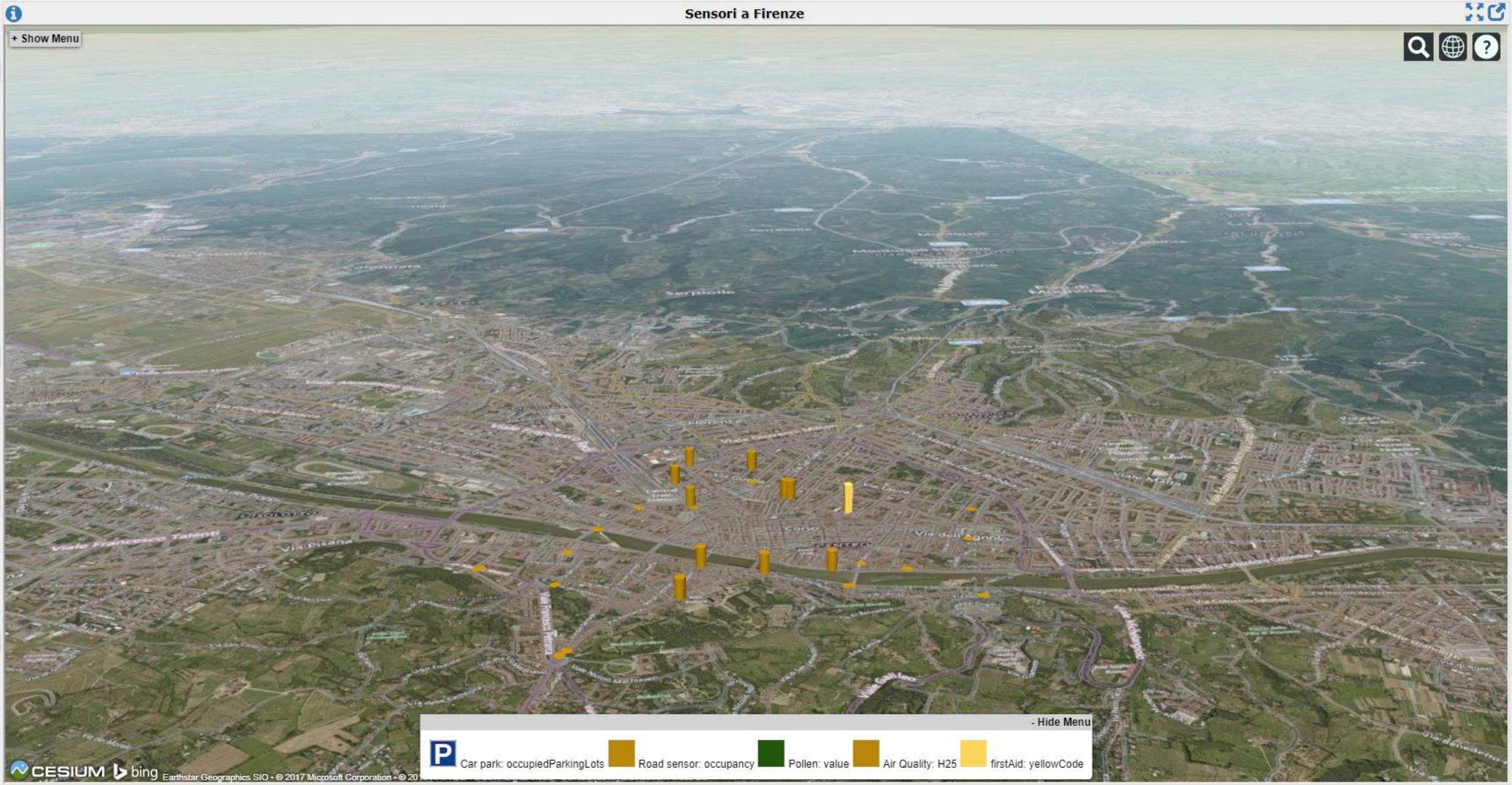
Firenze

Empoli

Pisa

Siena

Arezzo



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REPLICATE

Mobility and Transport

REPLICATE

Mon 23 Oct @ 15:13:21

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)

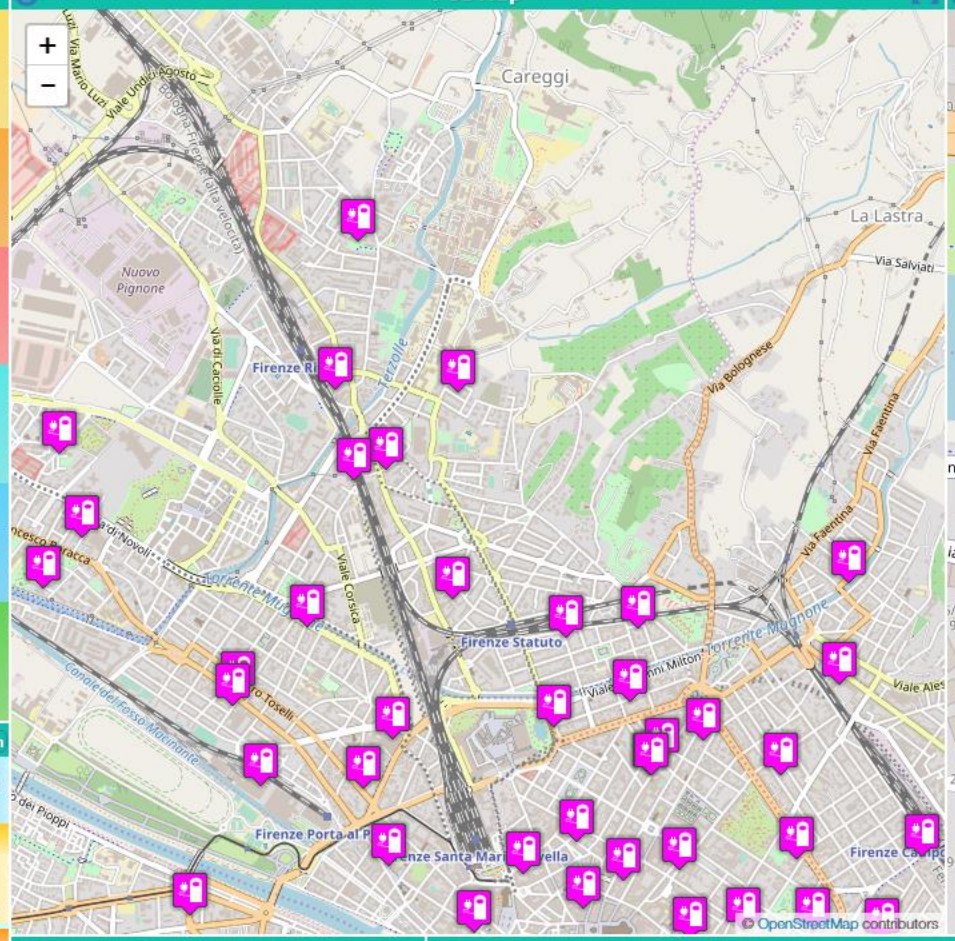
Traffic events

18m

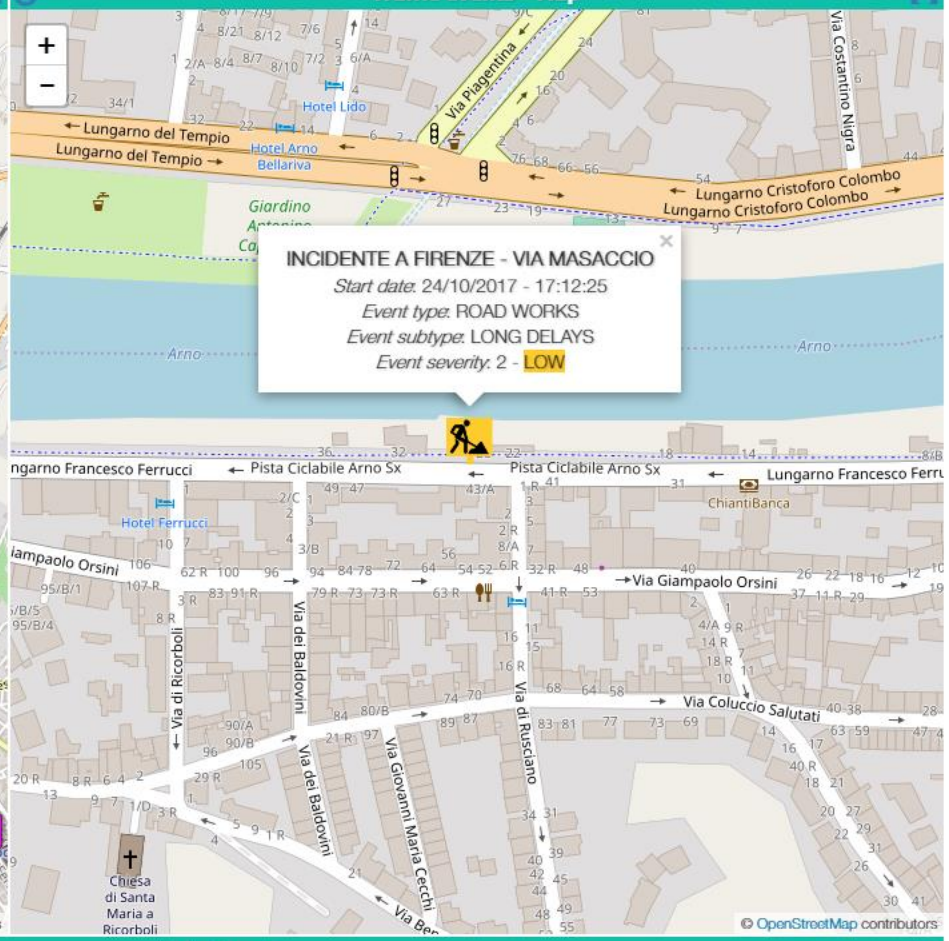
(5)

INCIDENTE A FIRENZE - VIA MASACCIO	LONG DELAYS		ON MAP
	24/10/2017	17:12:25	2
INCIDENTE A FIRENZE - VIA MASACCIO	ACCIDENT(S)		
	24/10/2017	20:44:29	5
INCIDENTE A FIRENZE - VIA GARFAGNANA	ACCIDENT(S)		
	25/10/2017	11:30:29	8

POI Map



Traffic events – Map



Real time data

38s

(3a) **199**

Data trend

4m

(3b)

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REPLICATE

Resilience

REPLICATE

Mon 23 Oct @ 15:40:51

Points of interest - 1

(1) Rivers sensors (D)

Underpasses status (F) (7)

Points of interest - 2

(3) Minor reticulum sensors (F)

Variable Message Signs (D) (10)

Points of interest - 3

(4) Asphalt temperature (F)

Public transport paths (F) (8)

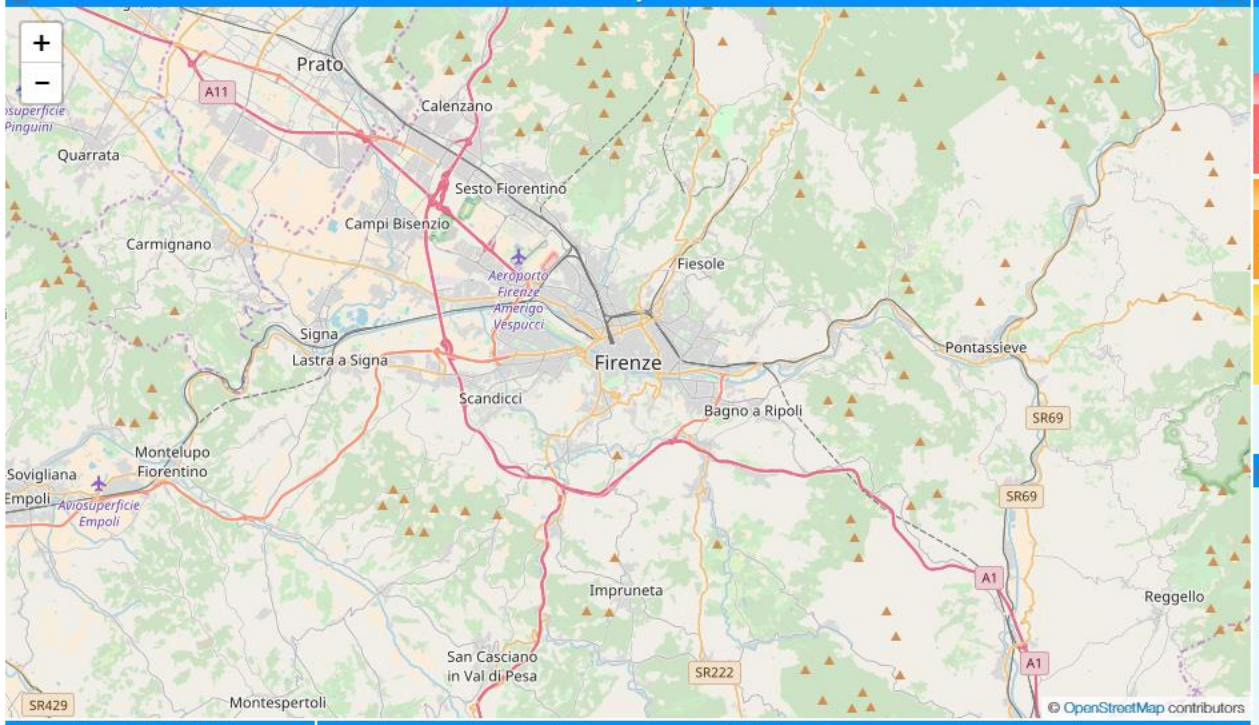
Meteo forecast - Florence

19m

(5)

Wednesday	Thursday	Friday	Saturday	Sunday
cloudless	mist	cloudless	cloudy	moderate rain
14°C / 23°C	6°C / 22°C	7°C / 23°C	/	/

Map



Traffic events in Florence

53s

(9)

INCIDENTE A FIRENZE - VIA GARFAGNANA	ACCIDENT(S)		
	25/10/2017	11:30:29	8
INCIDENTE A FIRENZE - VIA MASACCIO	ACCIDENT(S)		
	24/10/2017	20:44:29	5
INCIDENTE A FIRENZE - VIA MASACCIO	LONG DELAYS		
	24/10/2017	17:12:25	2

PROTEZIONE CIVILE

53s

GENERAL | METEO

NULLO	BASSO	MEDIO	ALTO

(11)

- RISCHIO IDRAULICO
- RISCHIO TEMPORALI
- RISCHIO IDROGEOLOGICO
- RISCHIO NEVE
- RISCHIO GHIACCIO
- RISCHIO VENTO
- RISCHIO MAREGGIATE

First aids - Florence

19m

(6)

Priority\ Hospitals	Red code	Yellow code	Green code	Blue code	White code
PS SANTA MARIA NUOVA	0	12	15	2	1
PS AO CAREGGI	0	36	22	6	0
PS SANTA MARIA ANNUNZIATA	1	10	17	7	1

Real time data

2m

(2a) 20

Data trends

19m

(2b)

(12)

Chat

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REPLICATE

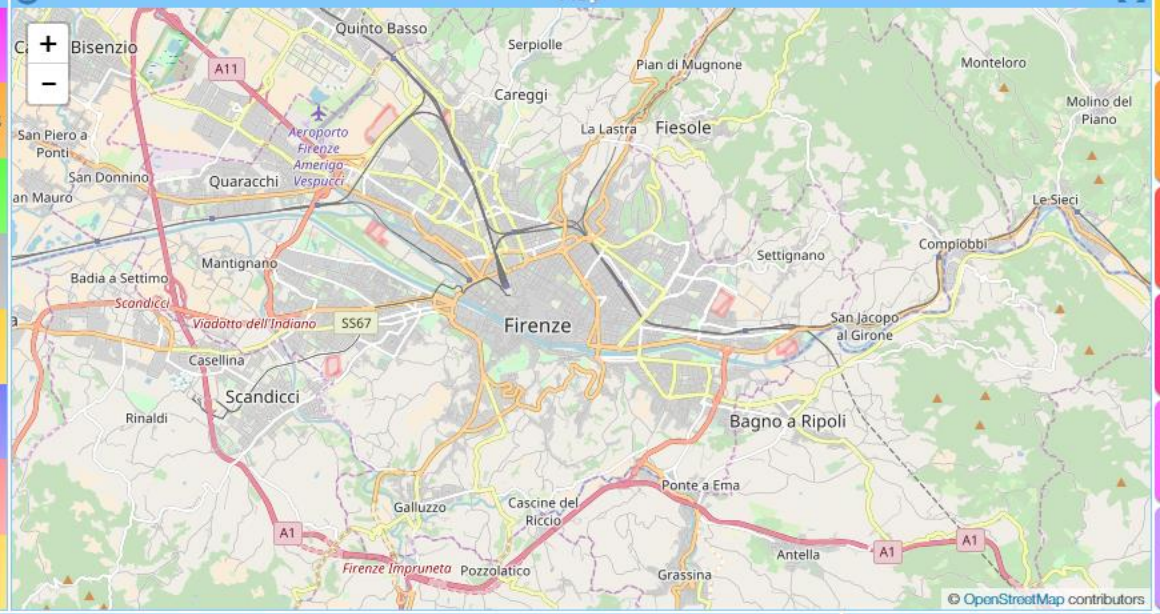
Pilot dashboard

Mon 23 Oct @ 14:55:54

Select the data below

- (1) Fast recharging stations
- (2) Normal recharging stations
- (8) Smart Benches (F)
- (9) Smart Lights (F)
- (11) Smart Irrigation (F)
- (12) ZTL gate
- (10) Smart waste (F)
- (15) Florence WiFi POI

Map

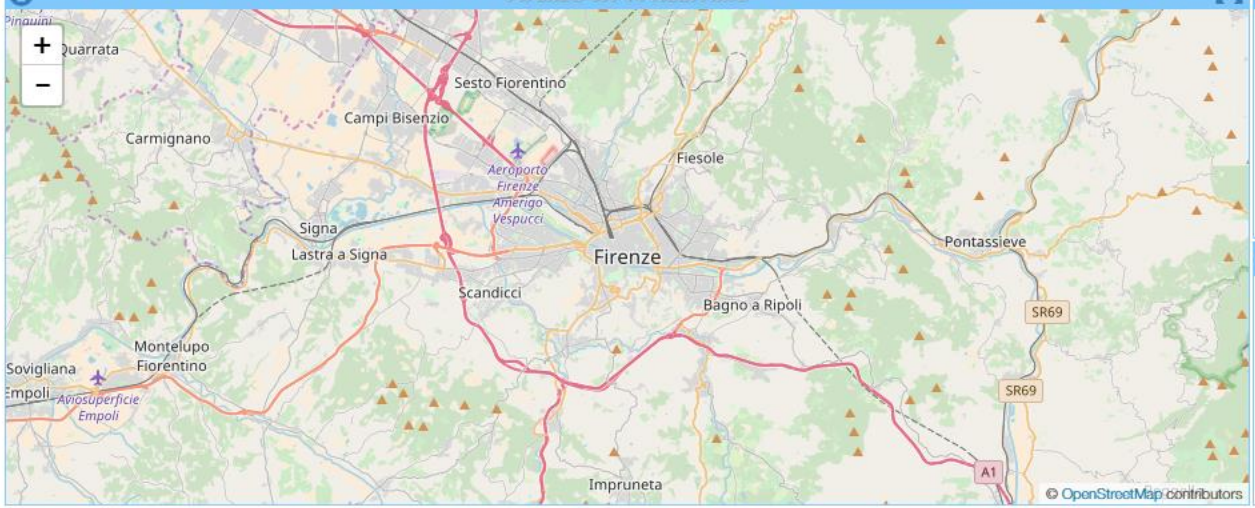


(14)

- Duomo
- P. Michelangelo
- Piazza Repubblica
- Piazza S. Croce
- Ponte Vecchio
- Piazza Signoria

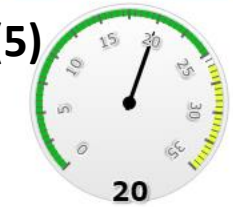
Firenze Cam

Firenze Wi-Fi RealTime



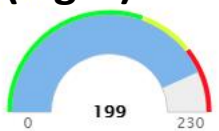
Average heat consu... 9m

(5)



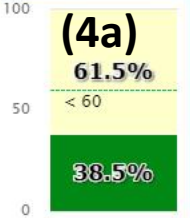
Average gas consum... 9m

(6 gas)



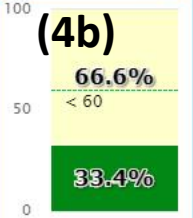
Accumulat... 9m

(4a)



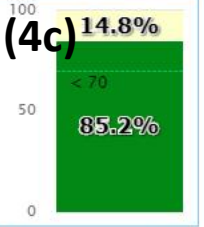
Accumulat... 9m

(4b)



Real time ... 9m

(4c)

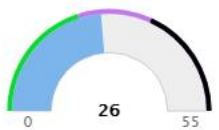


Average heat consu... 9m

(6 calore)

Smart Grid Data 1s

(7)



Web porta... 9m

Ok

(16)

N. of App ... 9m

(3)

100

users

Energy co... 9m

(17)

35150

kWh

REPLICATE

Mobility and Transport

REPLICATE

Mon 23 Oct @ 15:13:21

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)

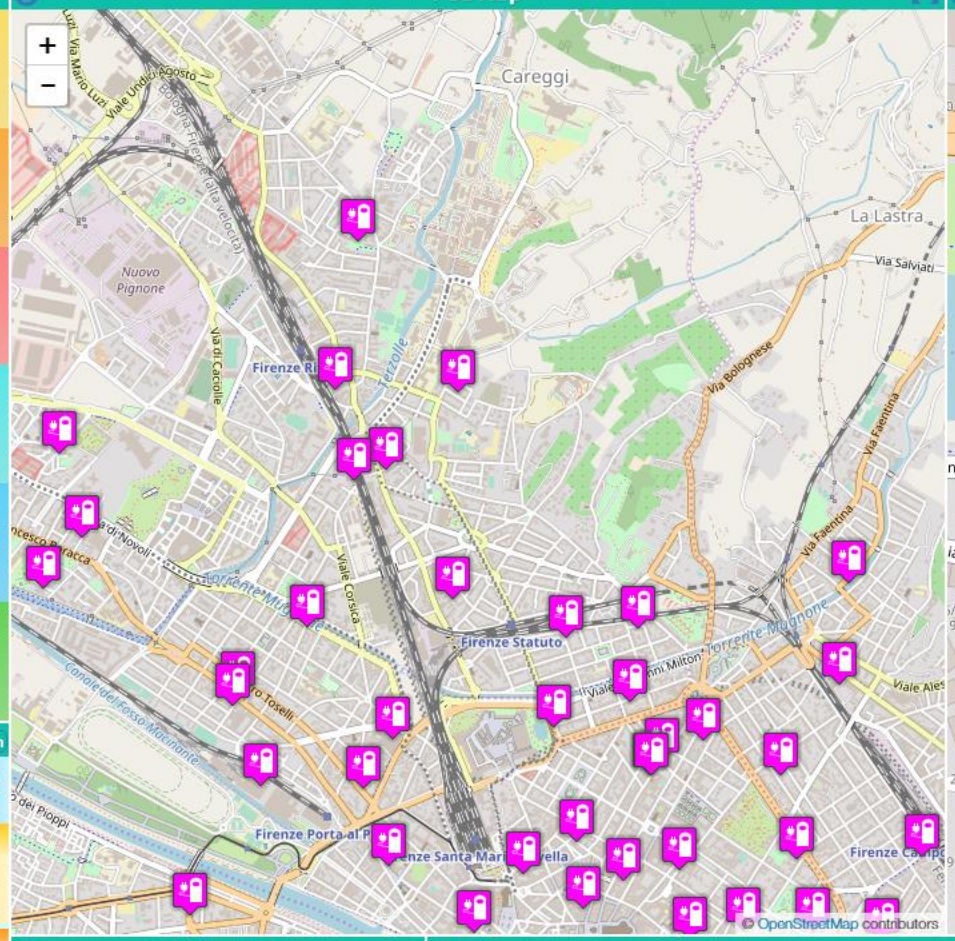
Traffic events

18m

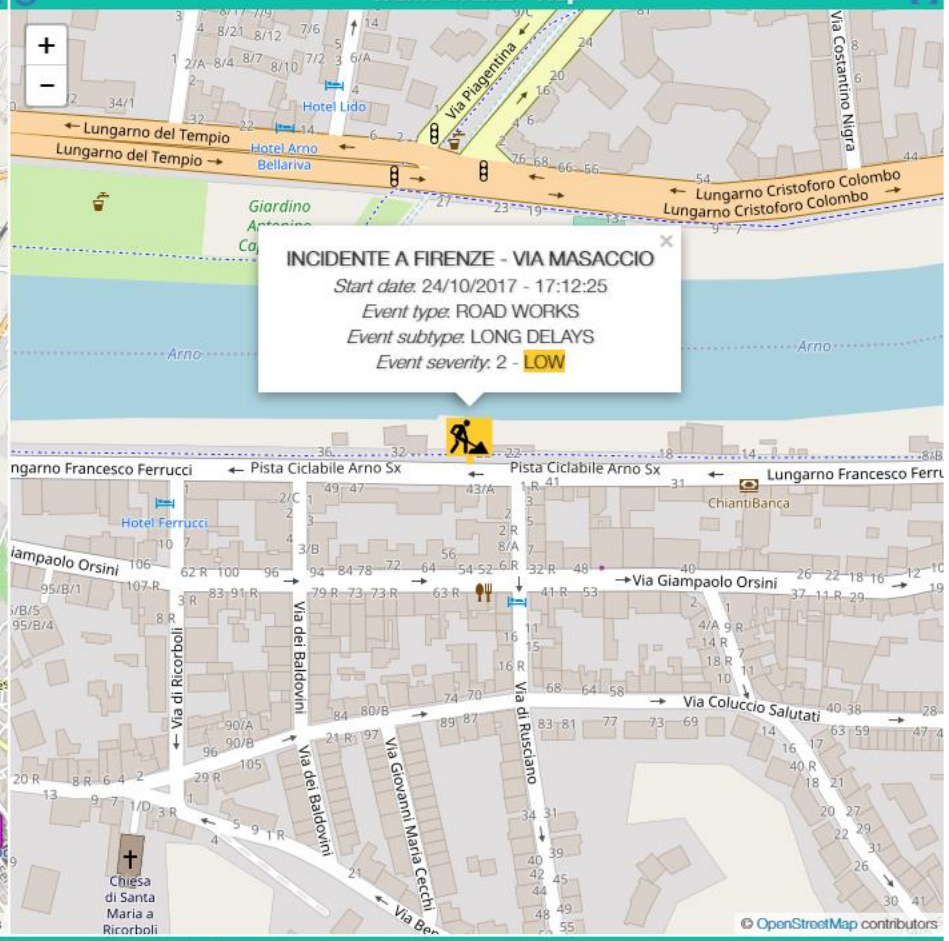
(5)

INCIDENTE A FIRENZE - VIA MASACCIO	LONG DELAYS		ON MAP
	24/10/2017	17:12:25	2
INCIDENTE A FIRENZE - VIA MASACCIO	ACCIDENT(S)		
	24/10/2017	20:44:29	5
INCIDENTE A FIRENZE - VIA GARFAGNANA	ACCIDENT(S)		
	25/10/2017	11:30:29	8

POI Map



Traffic events – Map



Real time data

38s

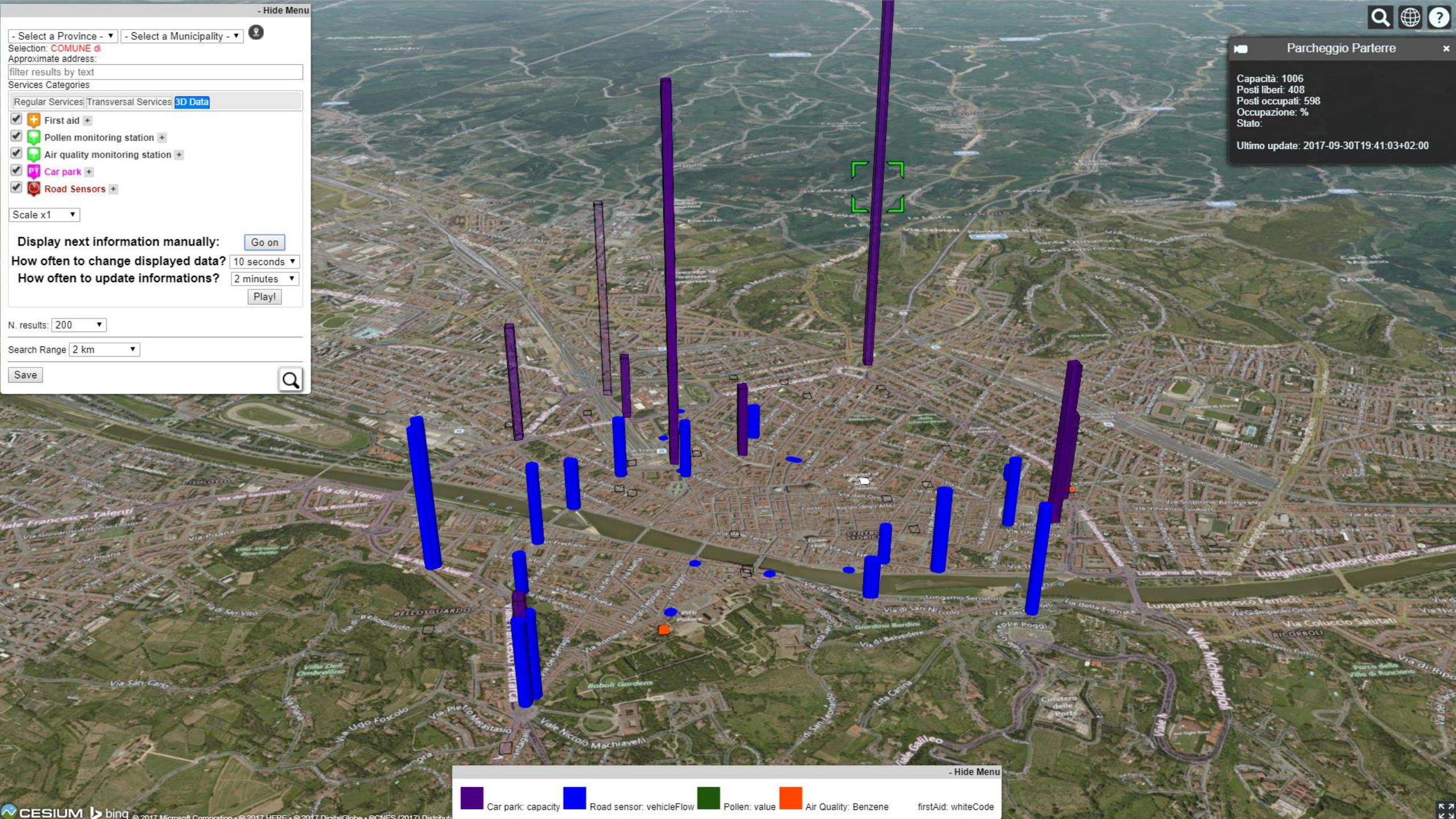
(3a) **199**

Data trend

4m

(3b)

UNIVERSITÀ DEGLI STUDI FIRENZE | DINFO | DISIT


- Hide Menu
- Select a Province -
- Select a Municipality -
Selection: COMUNE di
Approximate address:
filter results by text
Services Categories
Regular Services
Transversal Services
3D Data
First aid
Pollen monitoring station
Air quality monitoring station
Car park
Road Sensors
Scale x1
Display next information manually:
Go on
How often to change displayed data?
10 seconds
How often to update informations?
2 minutes
Play!
N. results:
200
Search Range
2 km
Save
Parcheggio Parterre
Capacità: 1006
Posti liberi: 408
Posti occupati: 598
Occupazione: %
Stato:
Ultimo update: 2017-09-30T19:41:03+02:00
- Hide Menu
Car park: capacity
Road sensor: vehicleFlow
Pollen: value
Air Quality: Benzene
firstAid: whiteCode
CESIUM
bing

UNIVERSITÀ DEGLI STUDI FIRENZE

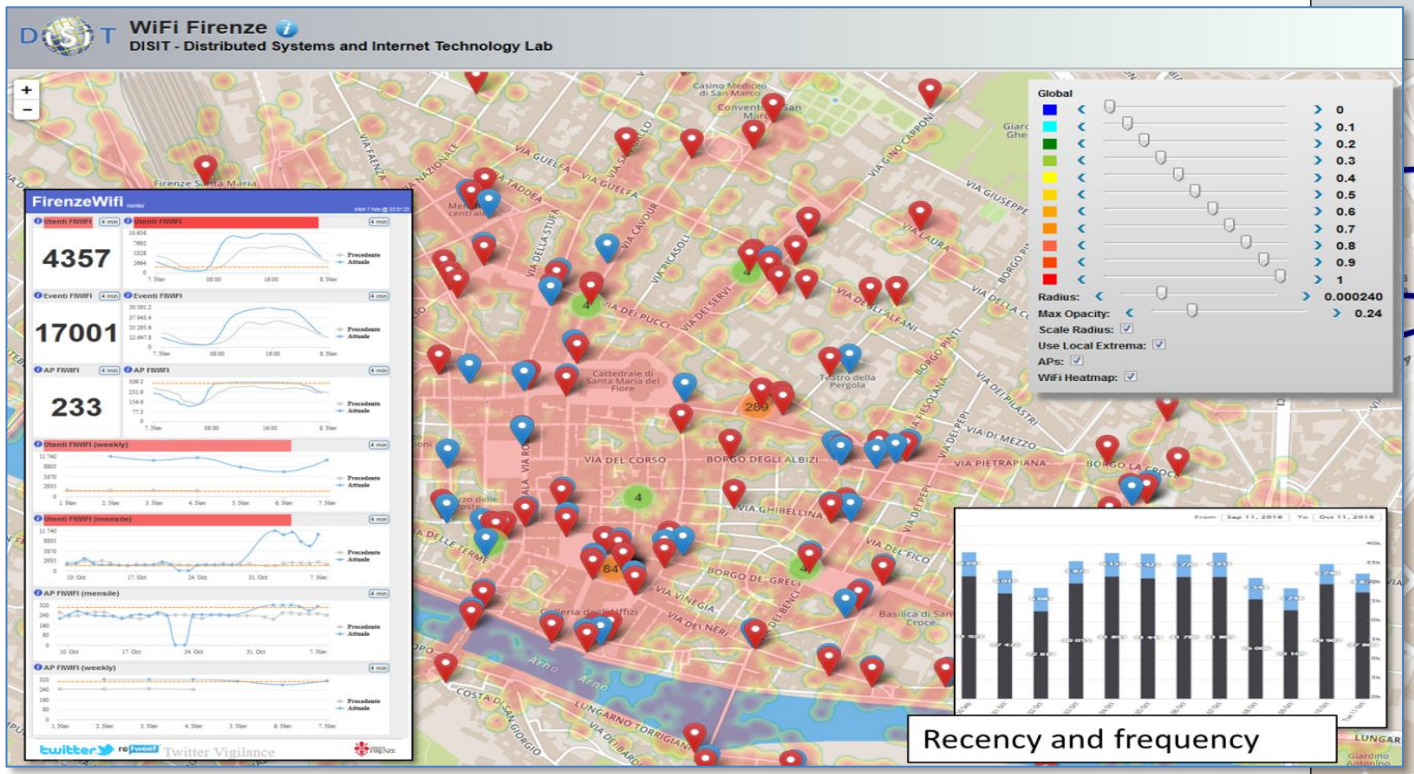
DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE

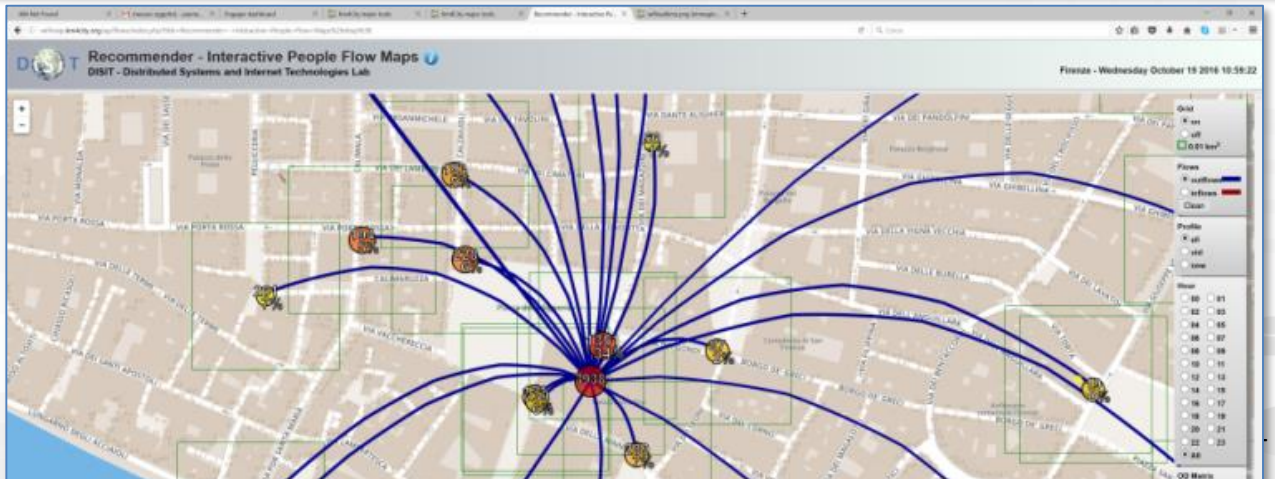
DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB

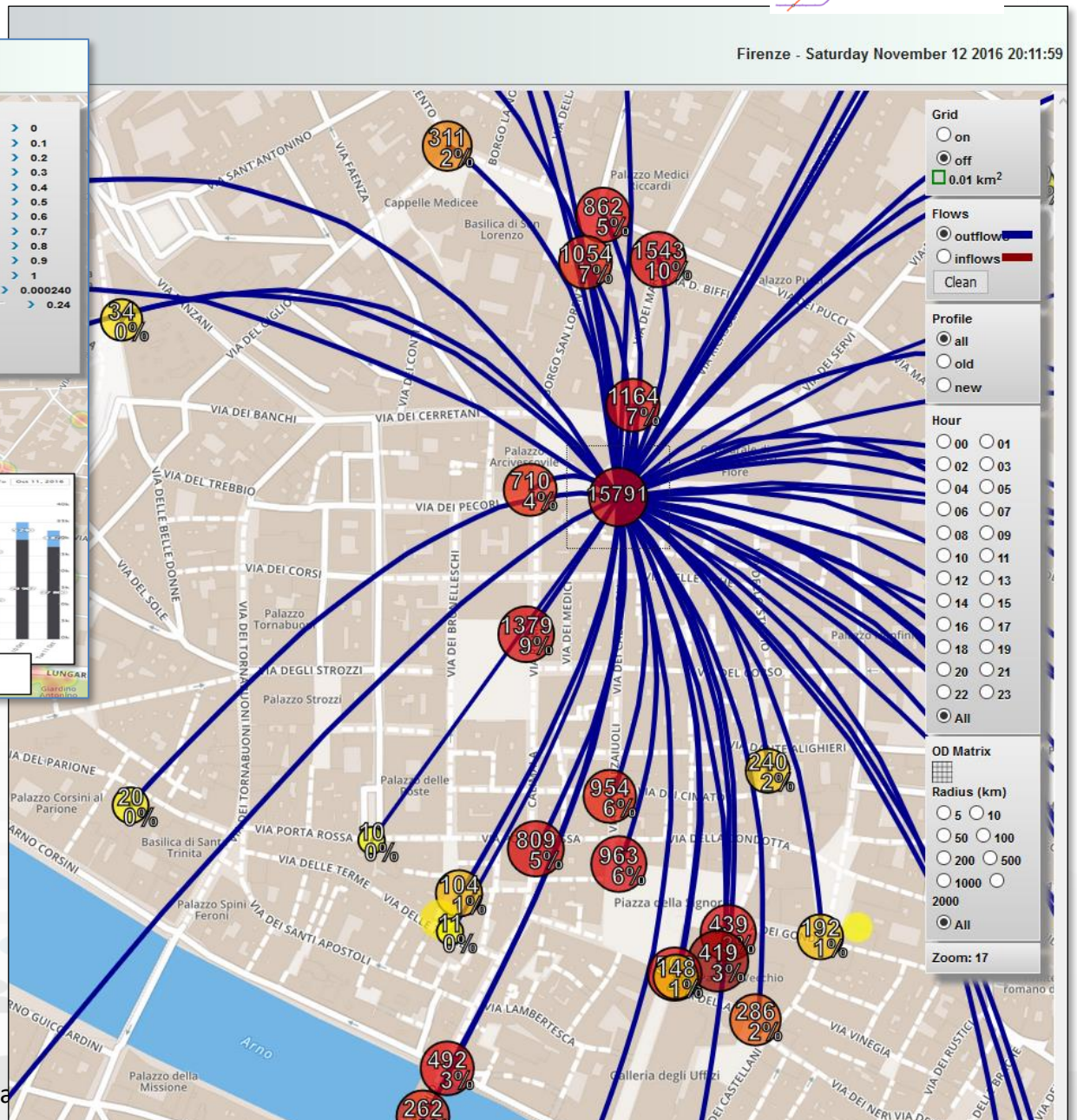
http://www.disit.org

Wi-Fi OD estimation.

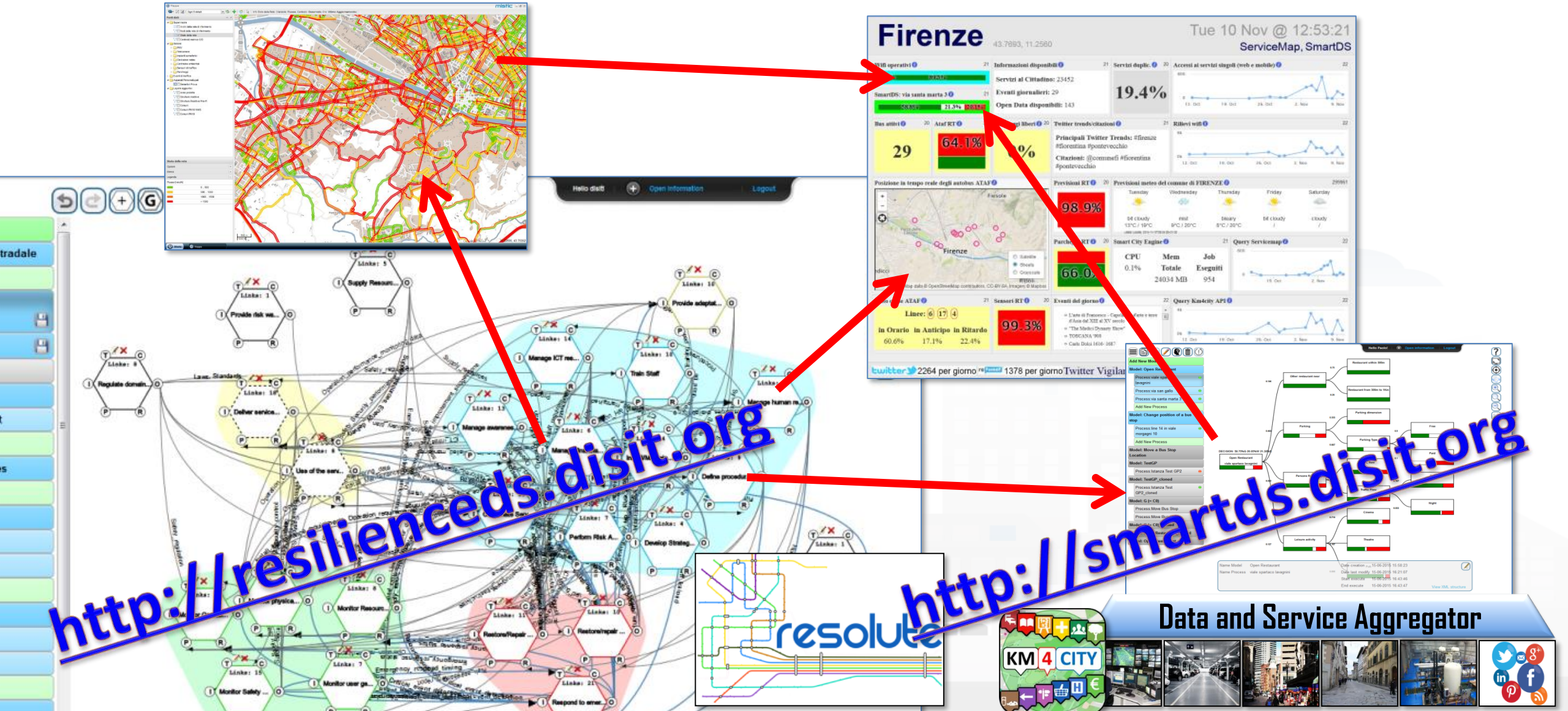
resolute





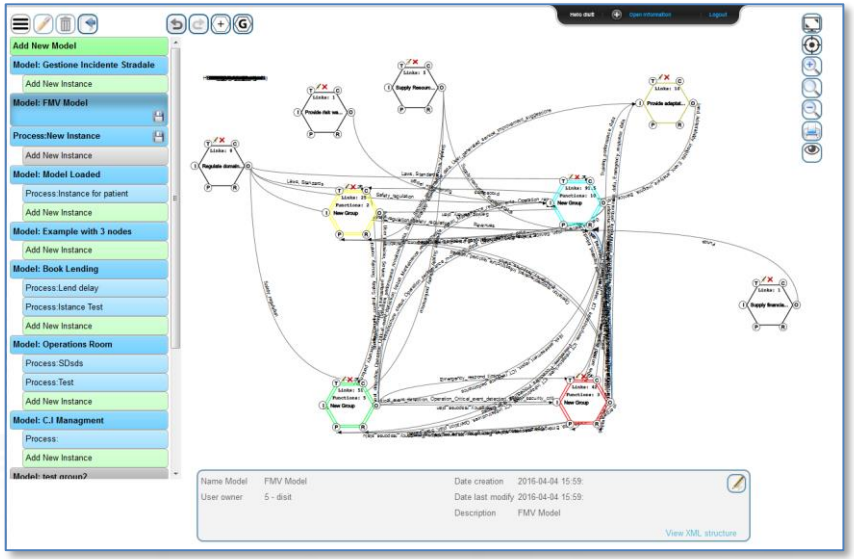


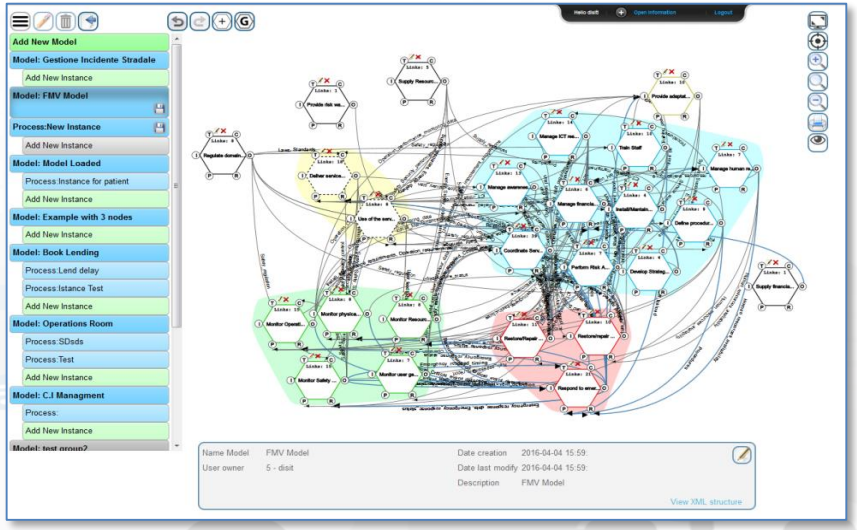
Assessing / Controlling city resilience



ResilienceDS tool

- **FRAM Model**
  - Macro FRAM processes
  - Metrics for Process complexity assessment
  - Operational Semantic for executing FRAM model
  - Connection with SmartDS
  - Connection with BigData open to multiple sources of data and workgroup results, Km4City
- **Collaborative work**
- **Open for all**
- **Validated on ERMG**
- **Web Tool**

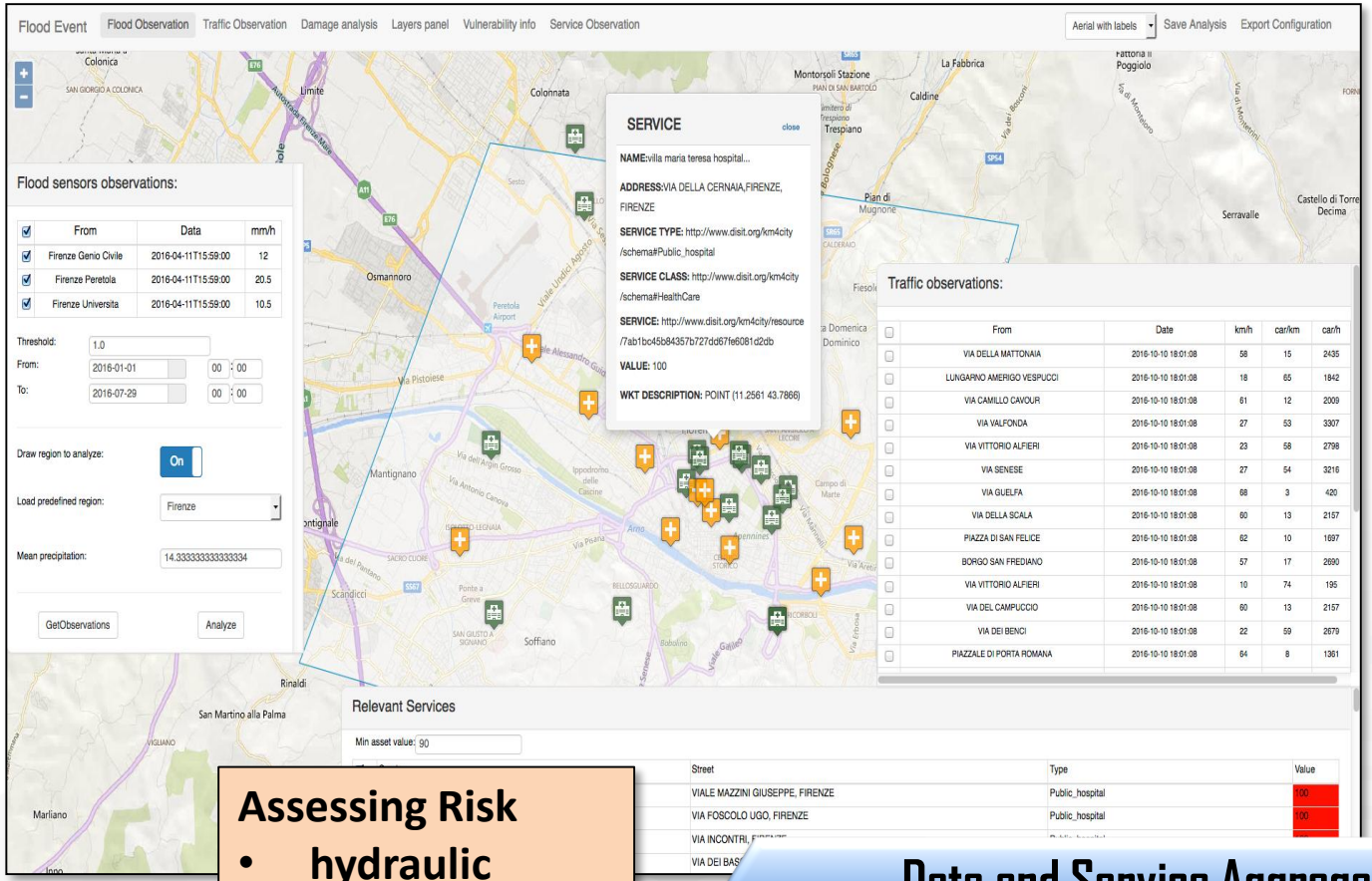


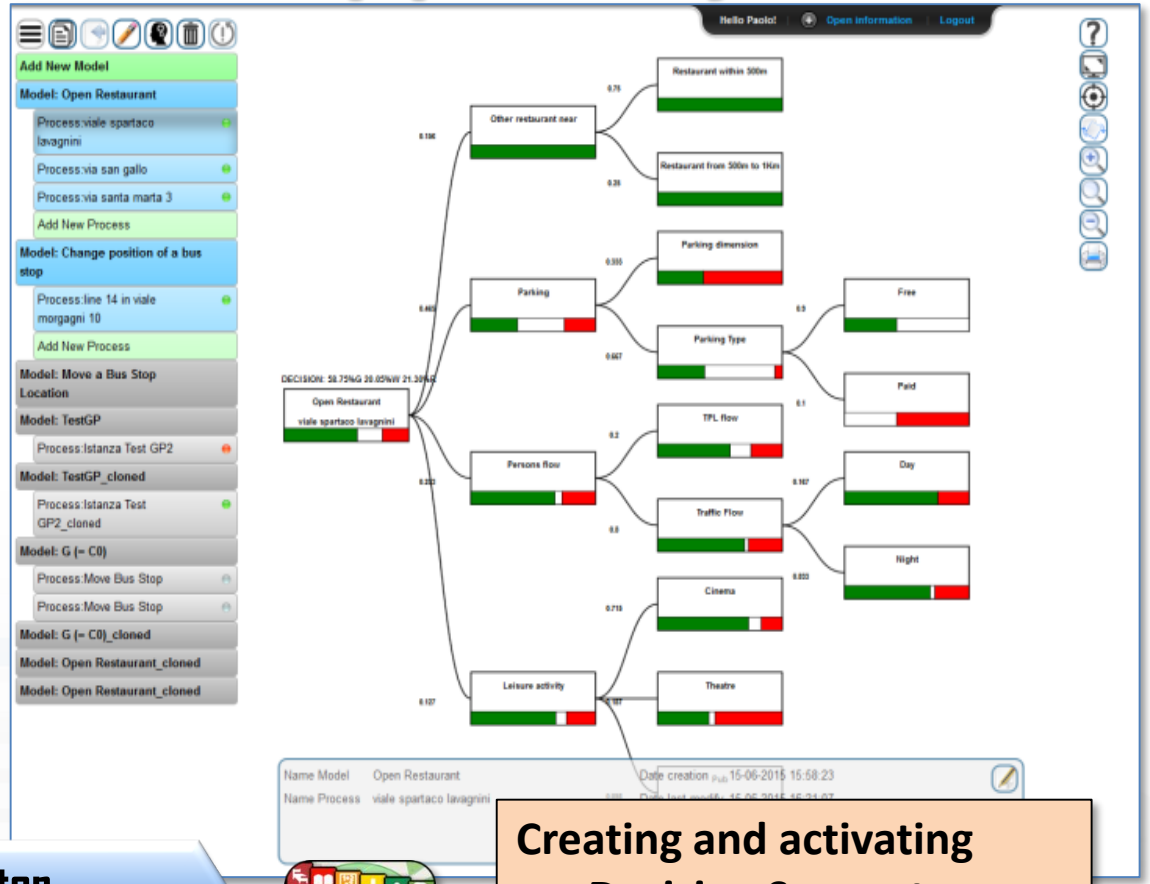


http://resilienceds.disit.org

Risk Assessment

Decision Support Systems





Assessing Risk

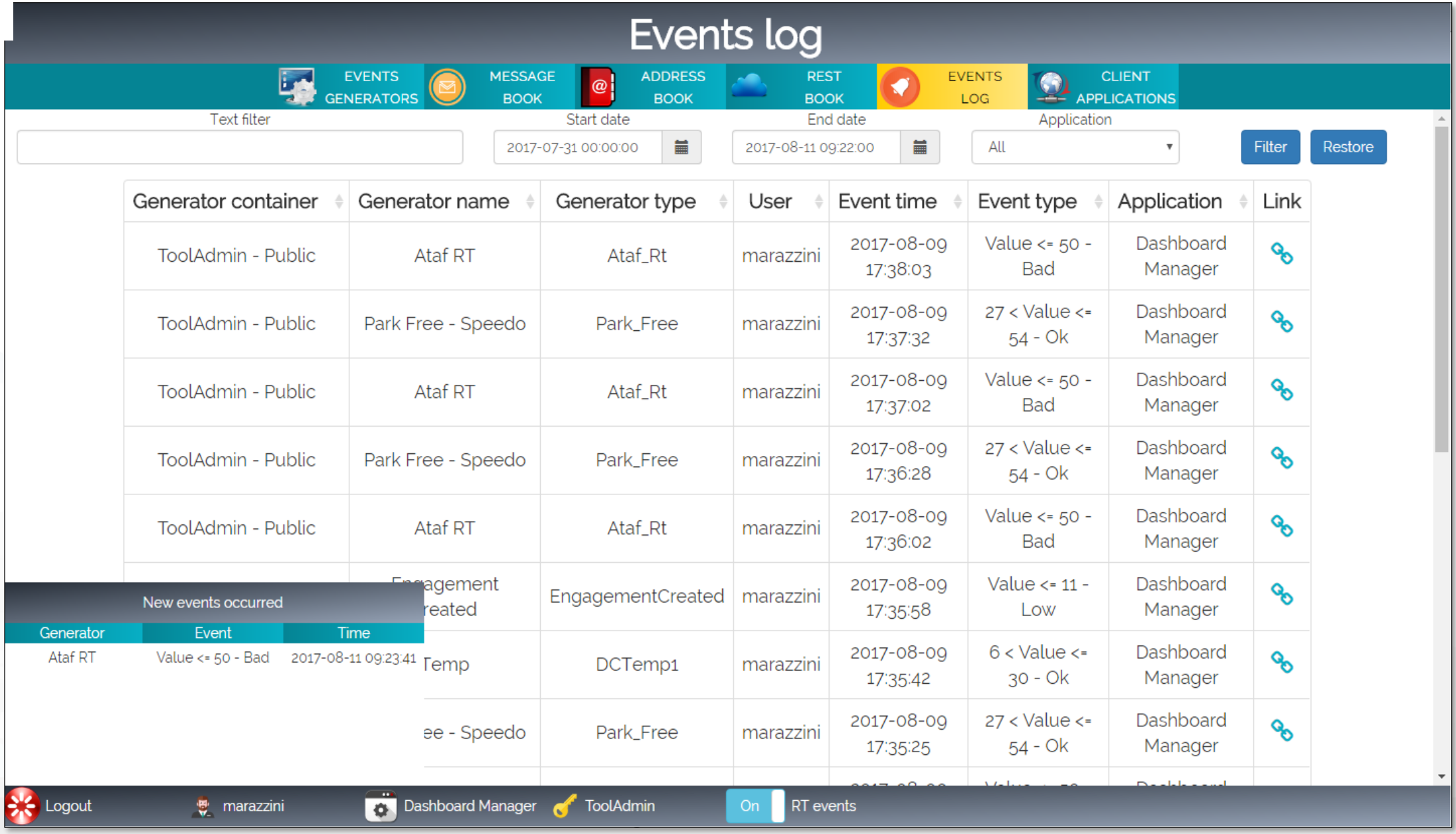
- hydraulic
- Seismic

Creating and activating

- Decision Support models

Data and Service Aggregator

Smart City Monitoring: Notificator



Notificator monitoring

Data about events received by Notificator

Sat 30 Sep @ 18:17:50

Notificator - Client applications list

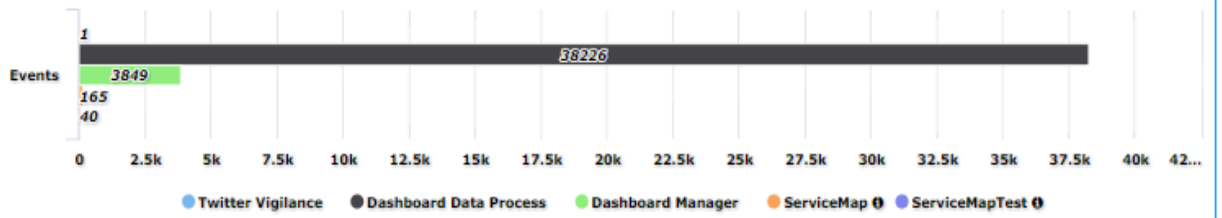
	Has local users	Has ldap users	Container alias	Generator alias	Generator type alias
Dashboard Manager	yes	yes	Dashboard title	Widget title	Metric type
Twitter Vigilance	no	yes	Metric page	Metric name	Metric type
Dashboard Data Process	no	yes	Generator context	Generator name	Generator type
ServiceMap	no	yes	ServiceMap	Generator name	Generator Type
ServiceMapTest	no	yes	ServiceMapTest	Generator name	Generator Type

Notificator - Total events of to...

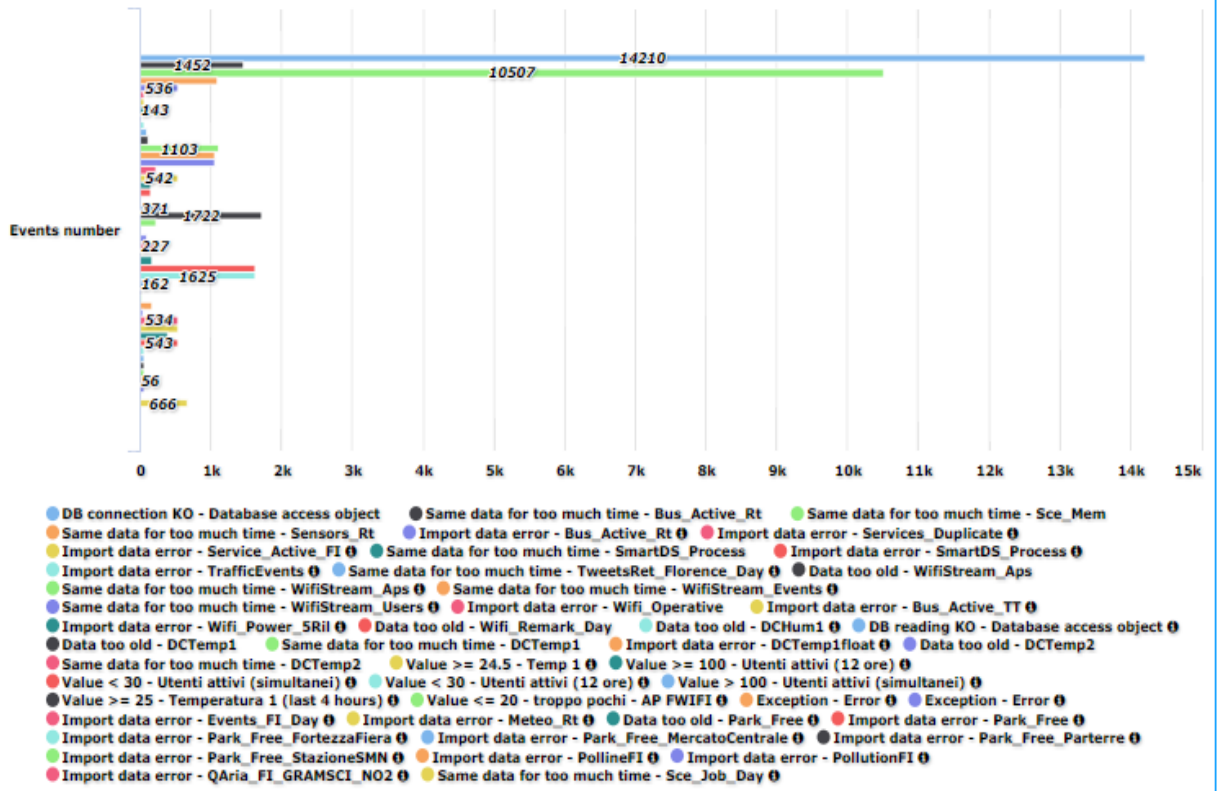
30

events

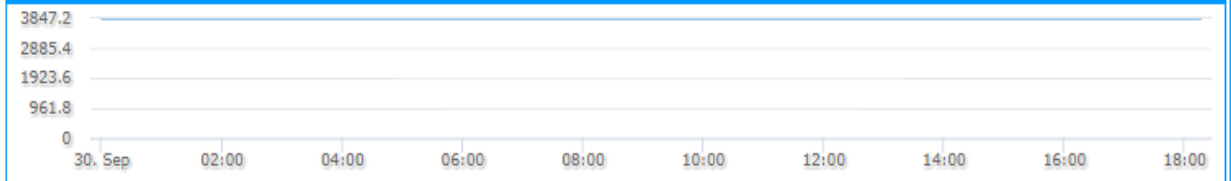
Notificator - Total events number per application



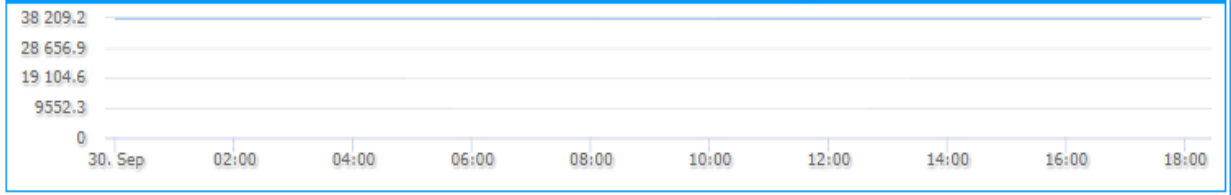
Notificator - Total events number per event type



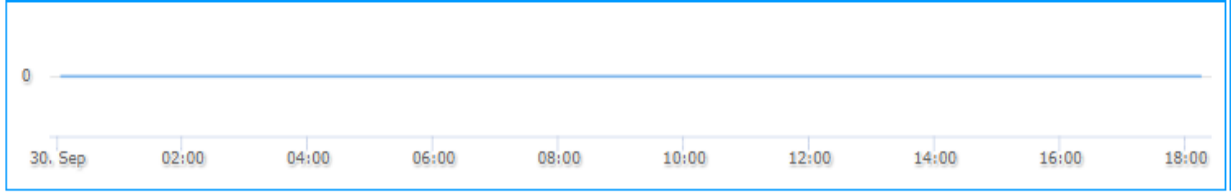
Dashboard Builder - Total events - Day



Dashboard Process - Total events - Day



Twitter Vigilance - Total events - Day



Smart City API

http://www.disit.org/7044

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Providing Services to City Users

- Cities aims at **providing new Smart Services** to city users:
  - operators, final users, etc.
- In most cases via **Web and Mobile Apps** which **exploit data**:
  - Structural data, open data, real time data, etc., private data from companies
  - **to be aggregated and transformed** in services (providing: prediction, information, early warning, relations)
  - **at reasonable cost** for: developers, operators, and SME to realize new Apps and services.
- *If cost is not affordable*, *Services and Apps are not developed*, in most cases the Apps are also provided for free, so that high costs are not sustainable → Public Private Partnership

City Services

- **Case A)** Data may be accessible as single non-Aggregated Data Sets
  - → very expensive for App builders or
- **Case B)** Services and microservices may become accessible via Smart City API, providing a view on Aggregated Data and Services.
  - → Affordable for App builders

Case B) Smart City API on aggregated data is as solution

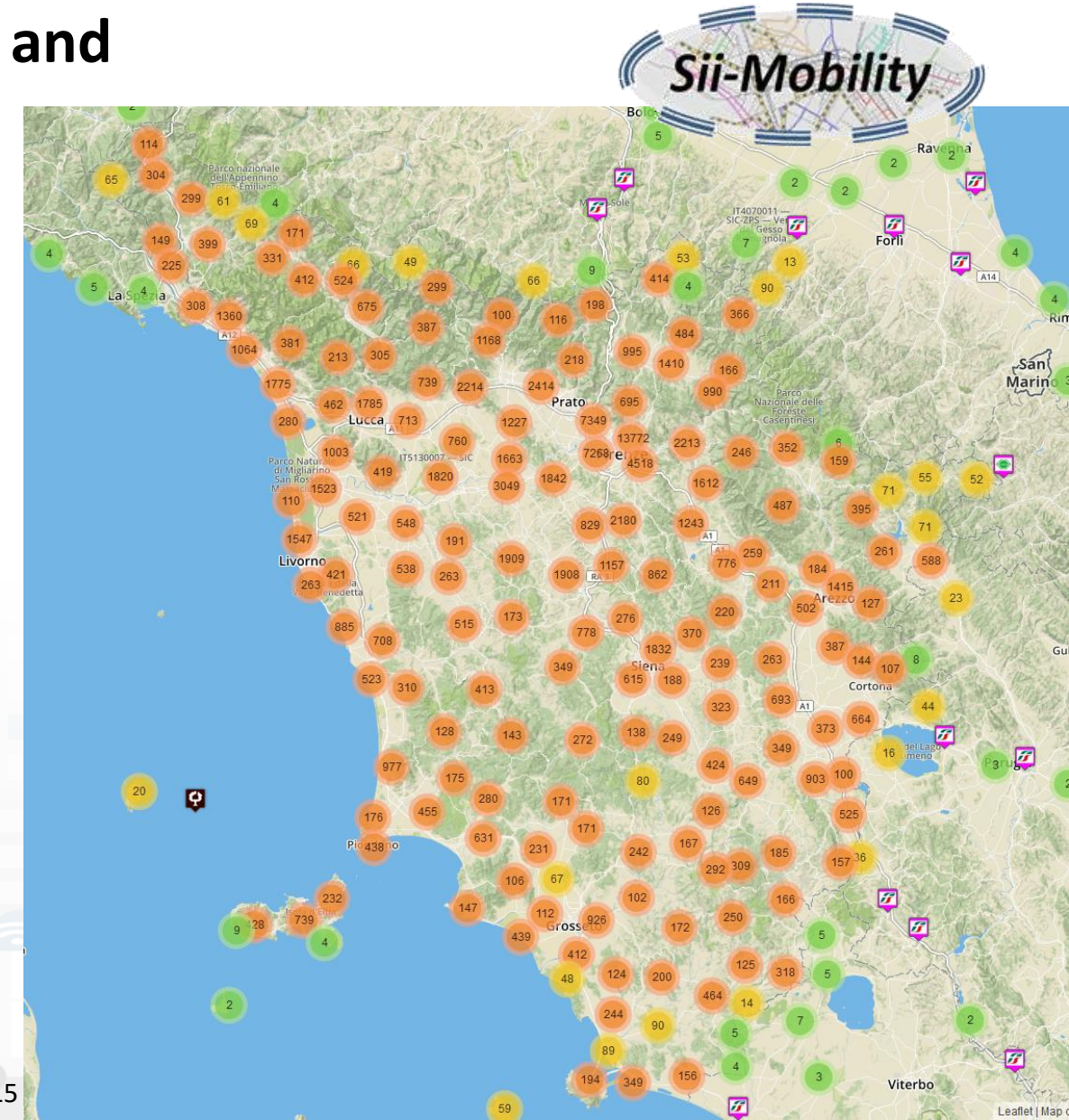
- PROS: May abstract from the underlined data model, but can exploit it to provide insight, inference, reasoning about the aggregated data and services
- CONS: may be complex and difficult to use without training and without knowing the context.
- CONS: they have not been standardized yet.

Scenarious vs SmartCity API

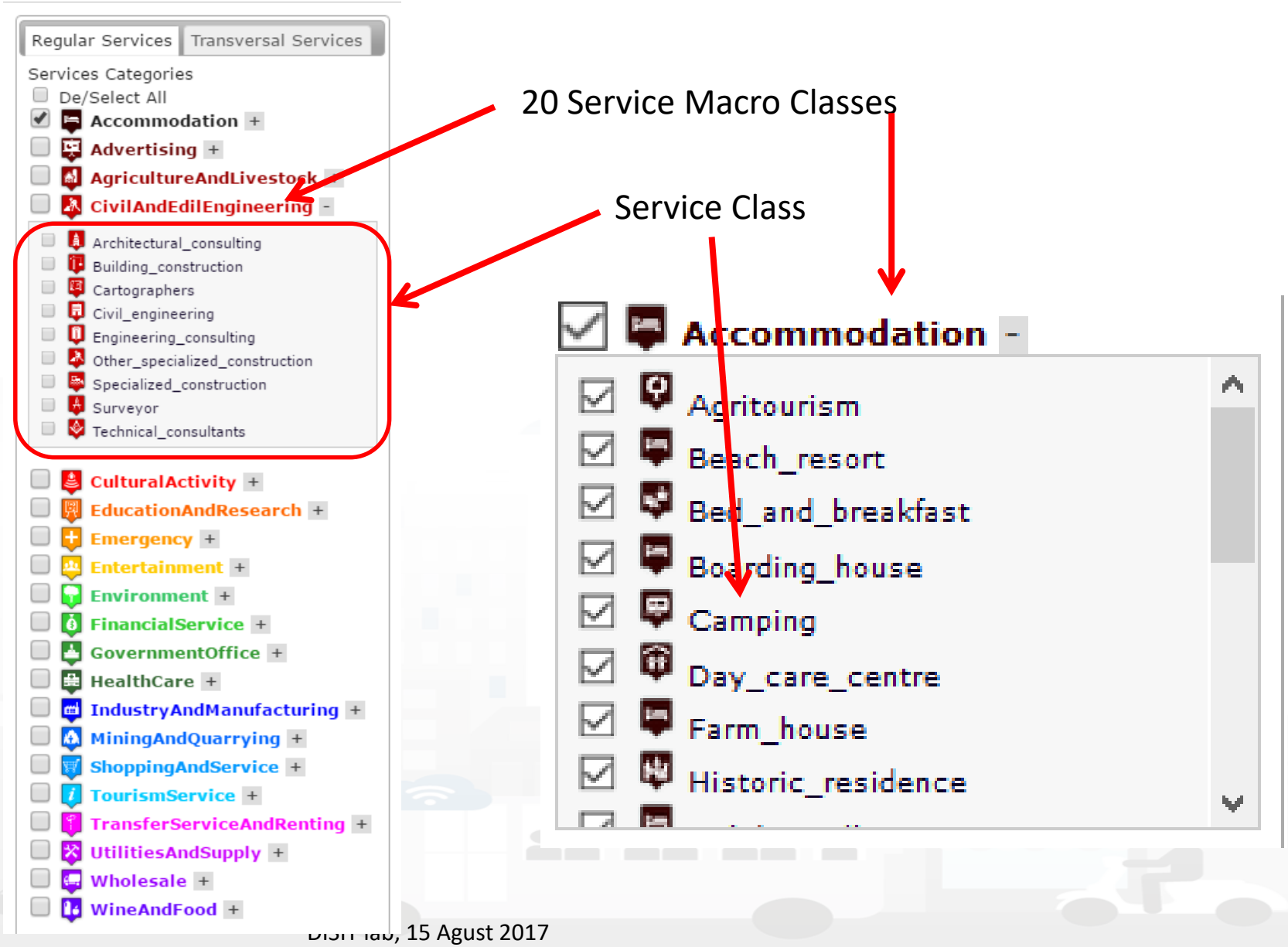
- Search data: by text, near, along, etc...
  - Resolving text to GPS and formal city nodes model
- Empowering the city users
- Access to event information
- Supporting City Users in using Public Mobility
- Supporting City Users in using Private Mobility
- New Experience to access at Cultural and Touristic info
- New way to access at health services
- Access at Environmental information
- Profiled Suggestions to City Users
- Personal Assistant
- Sharing knowledge among cities

Thematic Data Domain Tuscany

- **Street and geoinformation of the territory and details for routing, navigation, …**
- **Mobility and Transport**: public and private, public transport, parking status, fuel stations prices, traffic sensors, etc.
- **Culture and Tourism**: POI, churches, museum, schools, university, theatres, events in Florence
- **Environmental**: pollution real time, weather forecast, etc.
- **Social Media**: twitter data
- **Health**: hospital, pharmacies, status of the first aid triage in major hospitals, …
- **Alarms**: civil protection alerts, hot areas, …

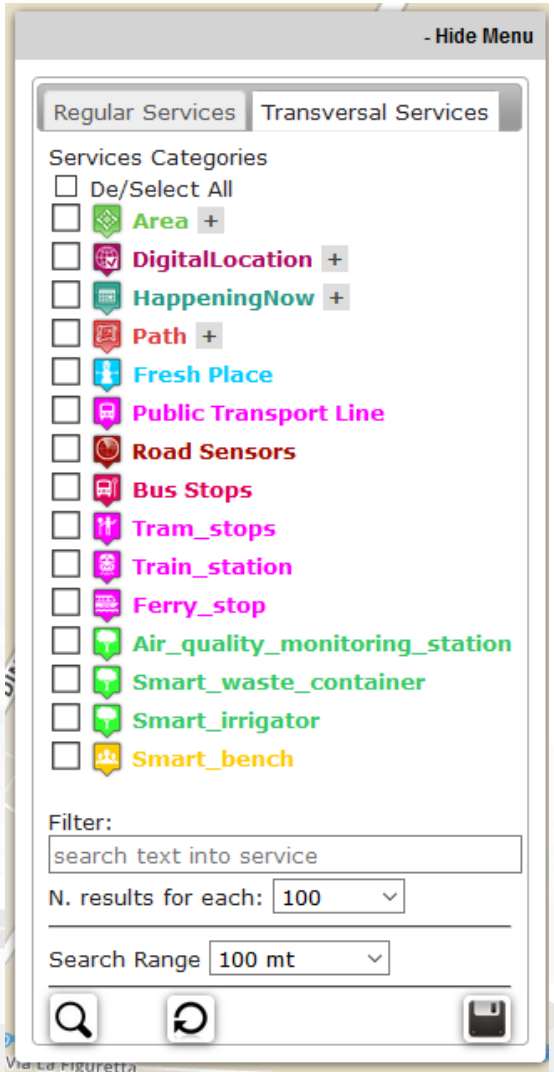


Concepts of Services: Macro and subcathegory

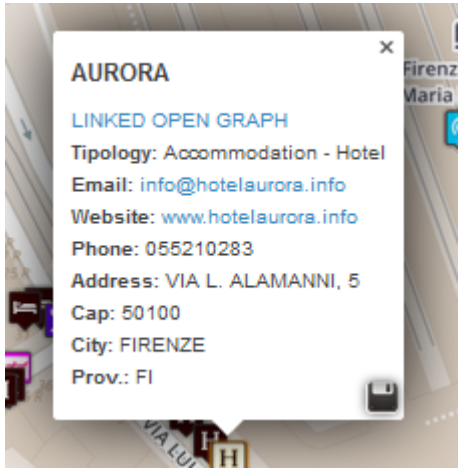


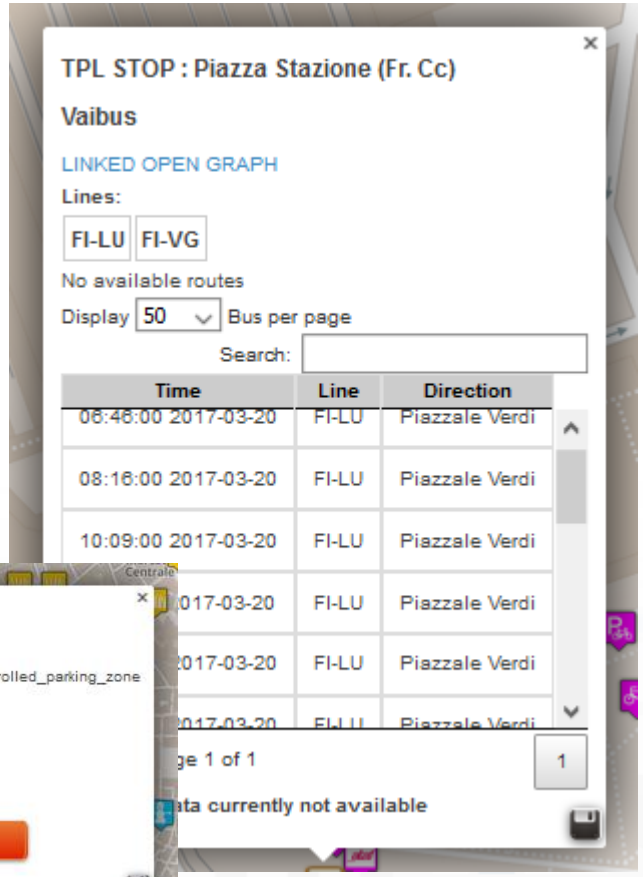
Access to Point of Interest information, POI

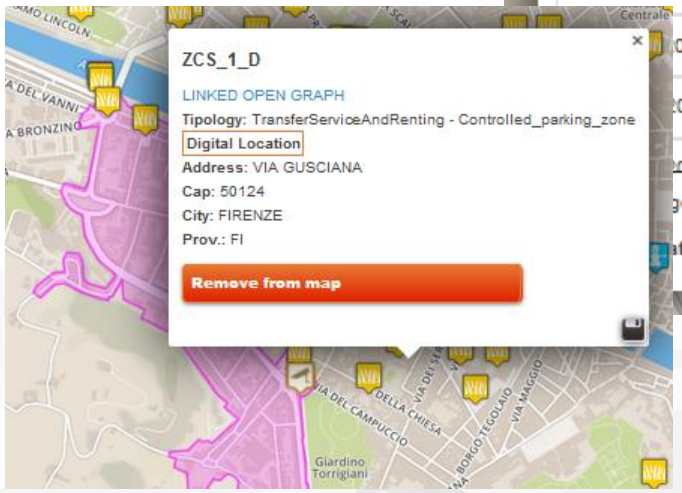
- **POI**: point of interest
- **type**: macro and subcategories
- **Position**: GPS, address, telephone, fax, email, URL, ..
- **Description**: textual, multilingual, with images, …
- **Link** to dbPedia, Linked Open Data
- **Links to other services**
- **Real time data if any:** sensors data, timeline, events, prices, opening time, rules of access, status of services, status of queue, etc..
- *See transversal services on ServiceMap*
  - *Regular and in test platform*

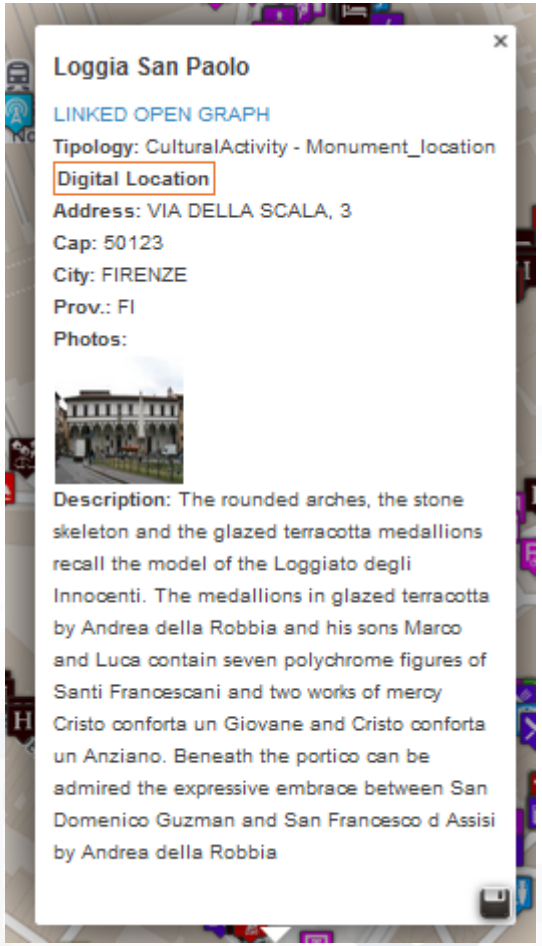


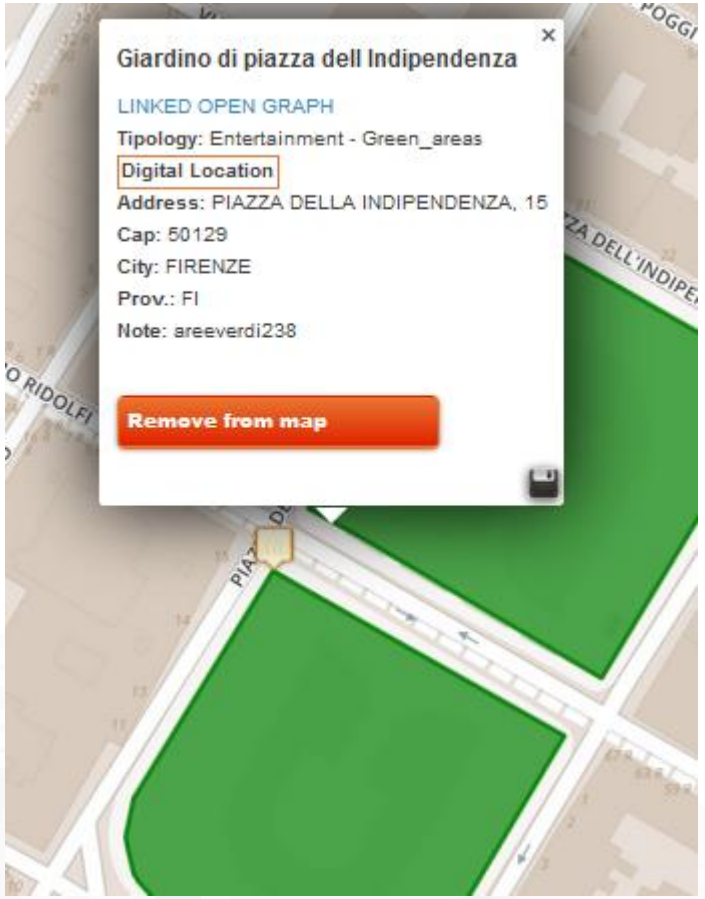
Service Information: different kind of services





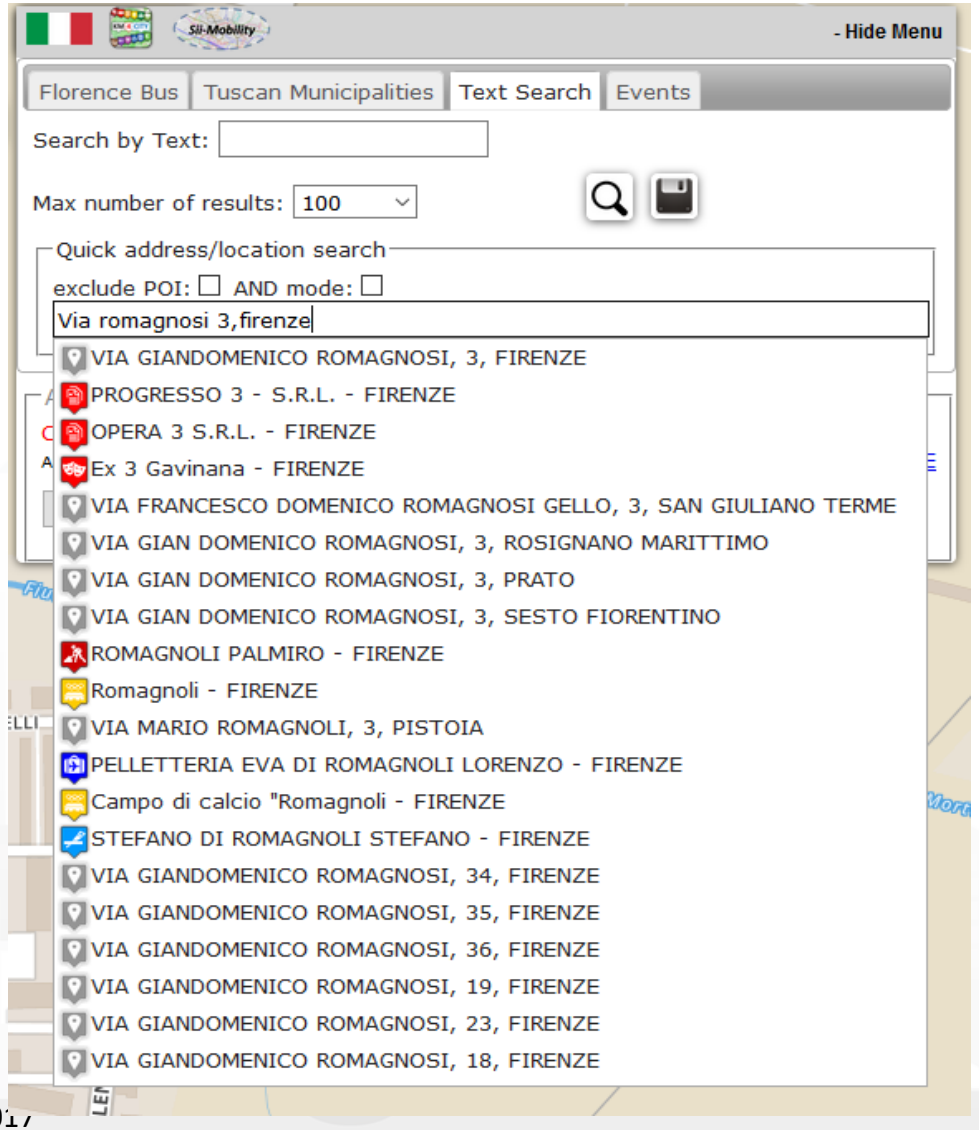






General Text Search Features

- **Search by text for POIs via**
  - Full text: description, title, macro and category name
  - Filtering by macro-cat and subcategory
  - Filtering on distance and geometric shape
- **Search by text with assisted suggestion to get:**
  - Streets and civic numbers, or POI, locations



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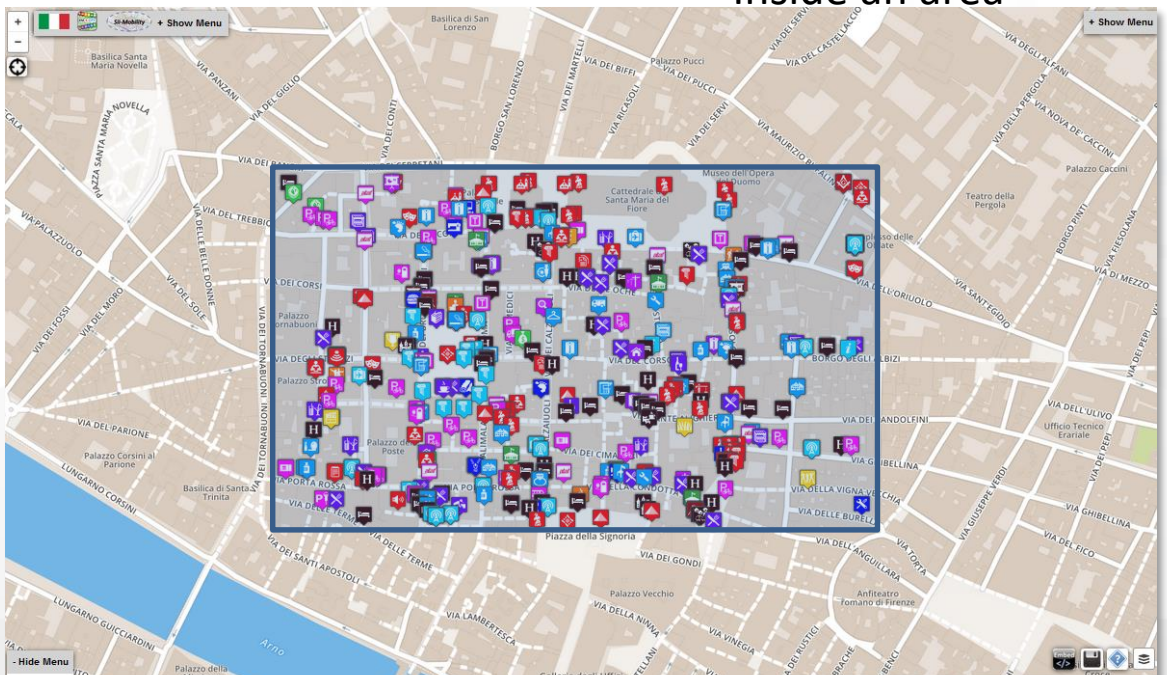
Search by Shape and Distance

Sii-Mobility

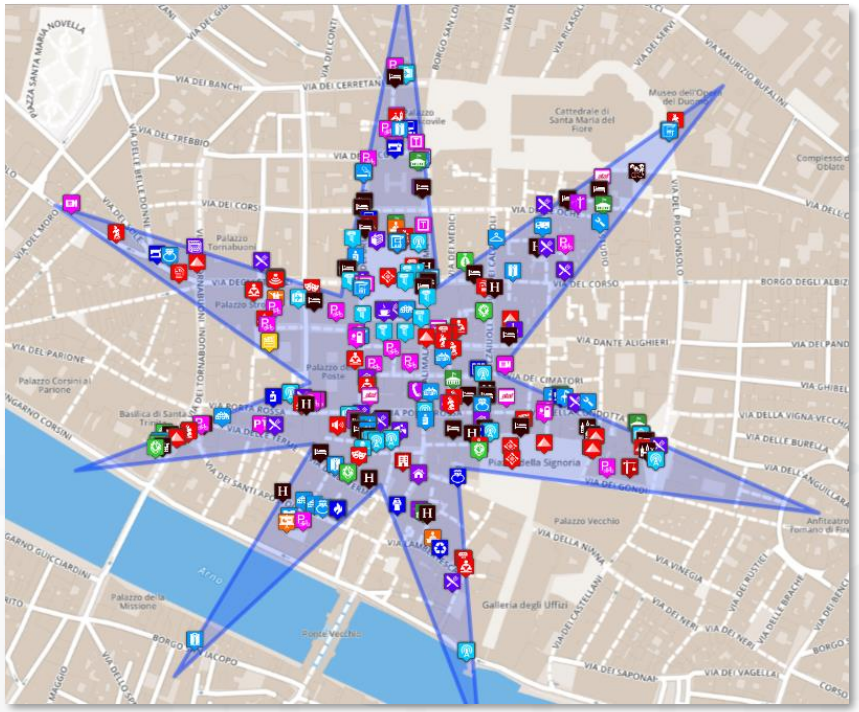
Each request or search in the Km4City model can be referred to a point and a ray, to an area, to a polyline

Around a point or POI

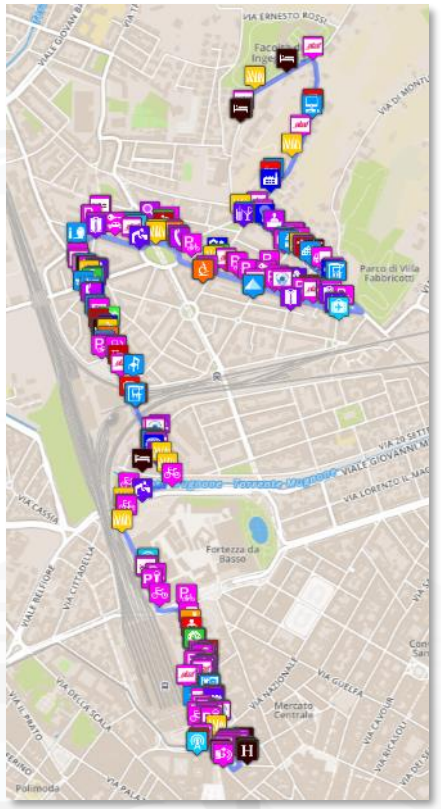
Inside an area



Inside a closed polyline



Along a polyline



DISIT lab, 15 Agust 2017

Main ServiceMap features

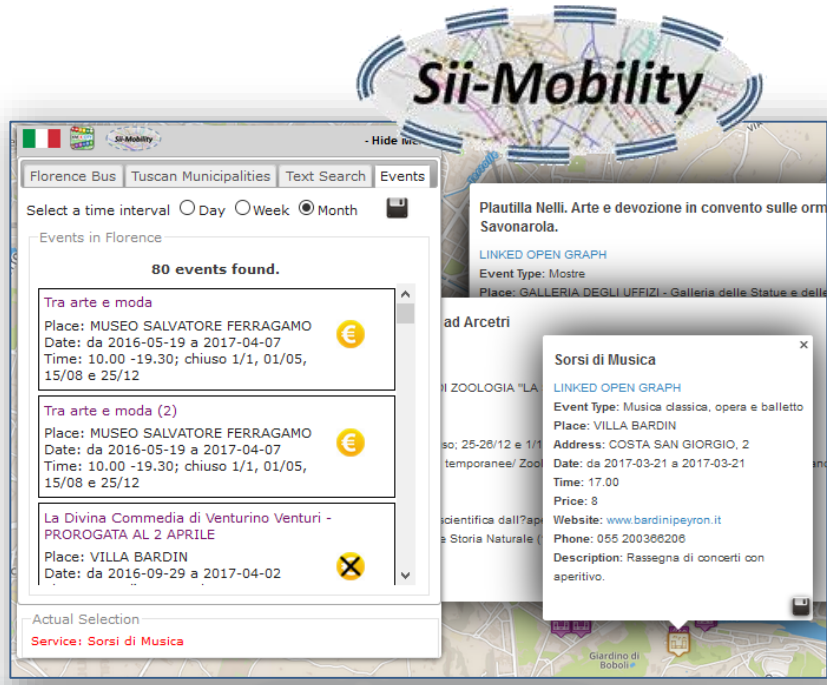
- **Search**: provides a set of different searches on MAP and LOG
- **Save & Get API Call**: saves the performed visual query to send via e-mail the Rest call to the developer
- **Save & Get QueryID API Call**: saves the performed visual queries and send via e-mail a Rest call with a simplified syntax referring to a QueryID and not reporting the complexity of the query.
- **Save & Get Embed Code**: saves the visual query of the user in visually recall smart city elements on the map, and gives the HTML Iframe code for embedding the view on a third party web page;

Empowering City Users

- Allow city users to
  - provide comments, images and scores associated with a certain Service (or place, via GPS)
  - Get list of last contributions of the same kind provided by other users
- They can be:
  - used as feedbacks
  - moderated by a back office personnel
  - ..
- In the future (→) connection with a more powerful server based on 311 standard would be possible

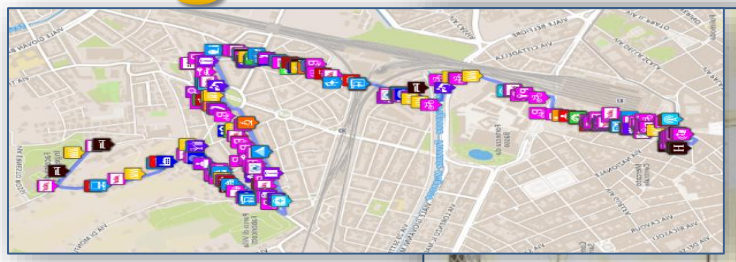
Access to Event information

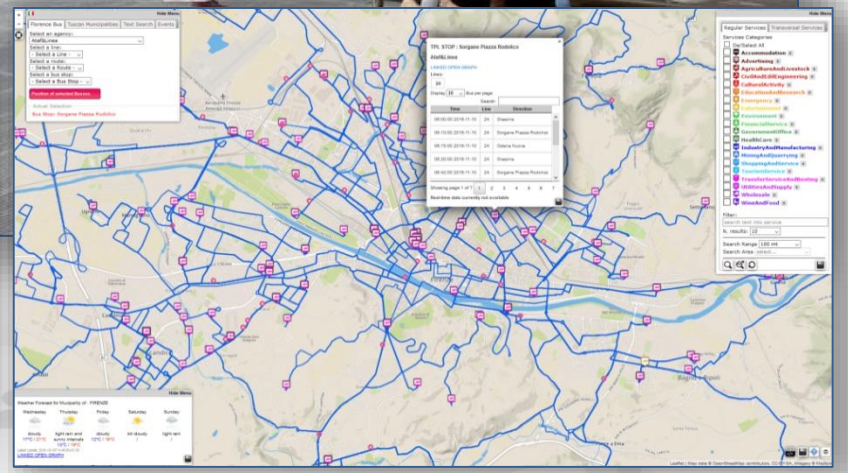
- **Getting Traffic Events**
- **Getting Critical Events**
- **Getting Events** in the city
  - Theater, museum, show, sport, etc.
  - **Getting Event details**
    - Event kind, and thus ordering
    - in the day, week, and month
    - Location, and thus ordering, or selecting events per area, per residence
    - General information
    - Opening and cost (if any)
    - Etc.



Supporting City Users in using Public Mobility

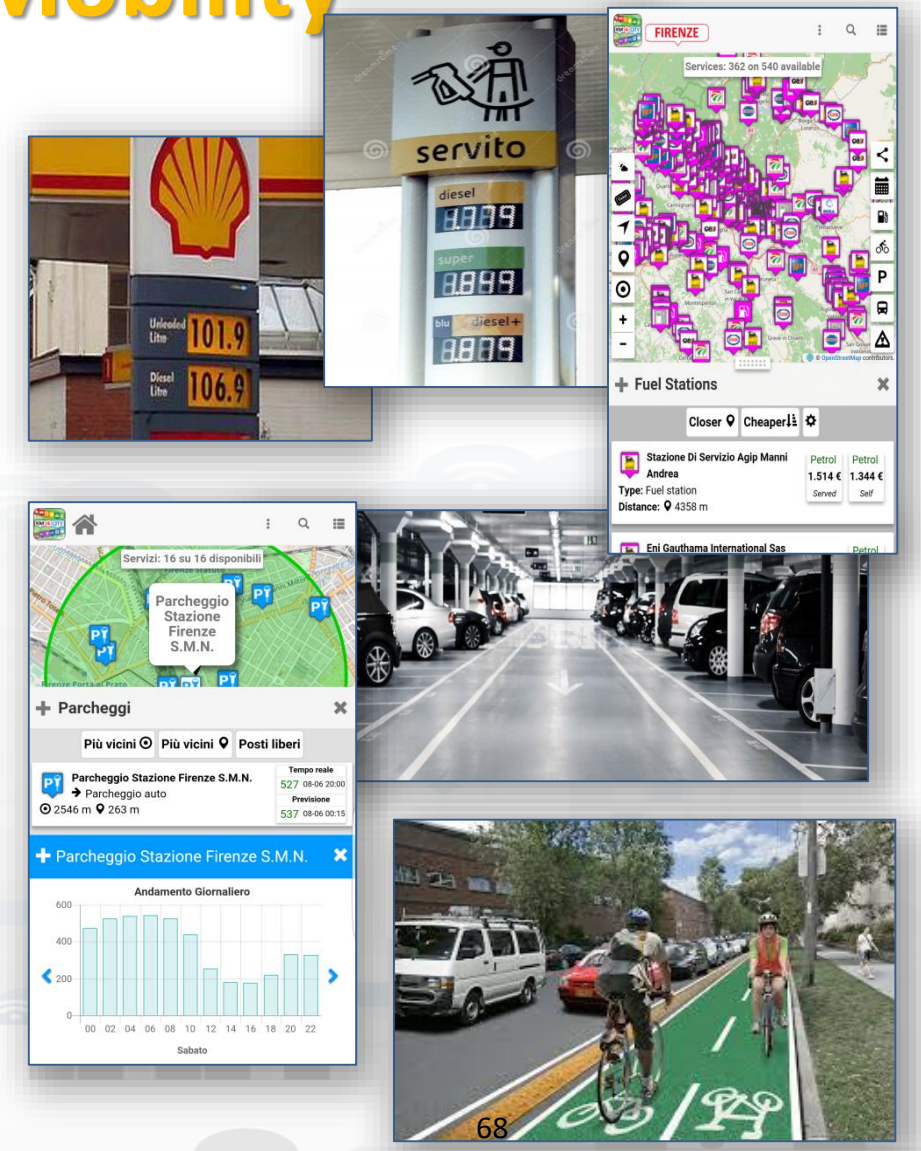
- **Public Transport, PT**
  - Getting tickets
  - Getting bus stops, lines, and timelines for bus, train and tramline (GTFS, ETL, ..)
  - Searching Services along a Pub. Transport line or closer to a stop
  - Searching the closest bus stops
  - searching for BUS stops via name
  - real time delays of busses
  - modal routing for Pub. Transport





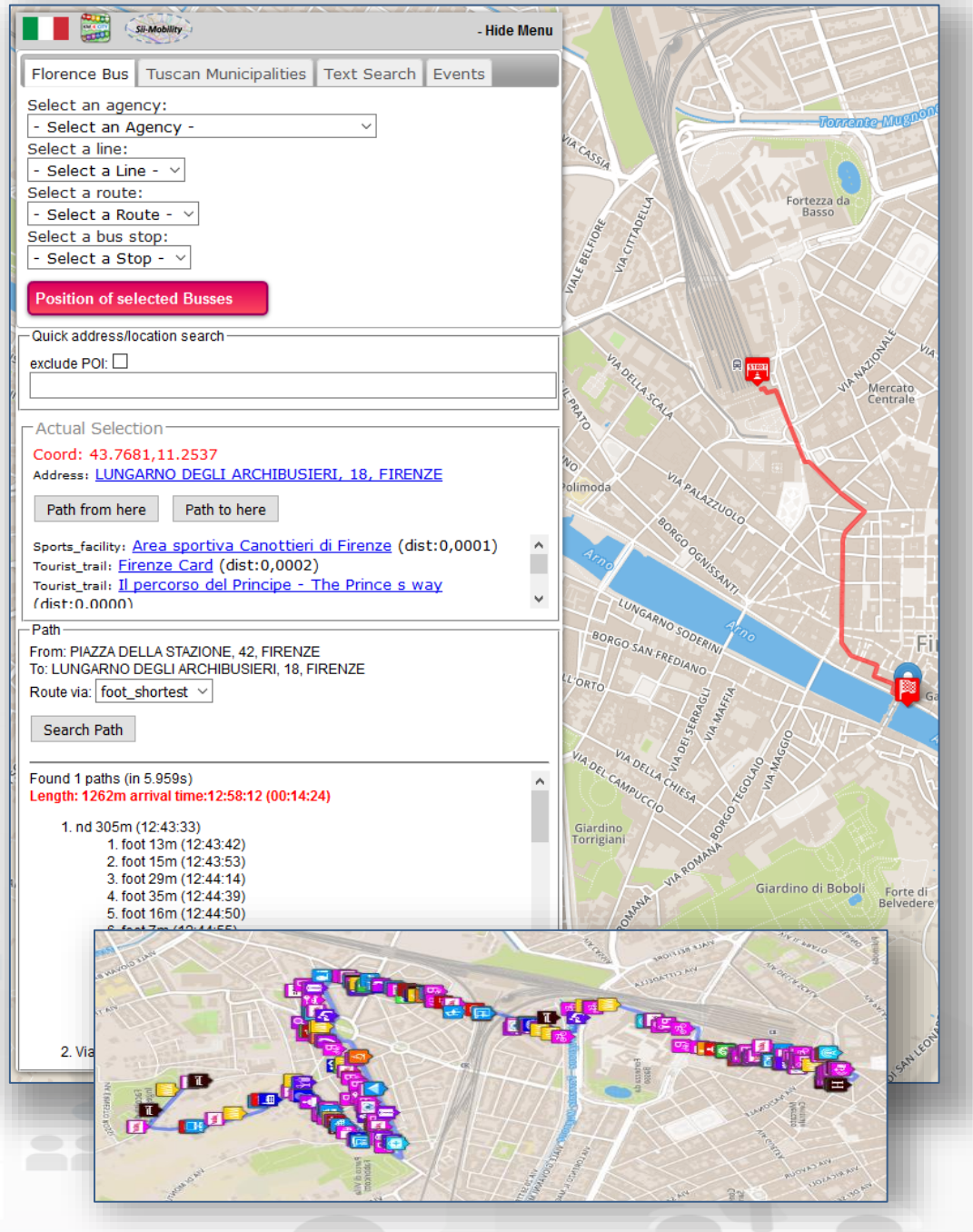
Supporting City Users using Private Mobility

- **Private Transport**
  - Getting **closer parking**
  - **Getting parking forecast**
  - Getting **closer free space on parking**
  - Getting **fuel stations** location and fuel product prices
  - Getting bike sharing rack status
  - Searching Services along a **path** or closer to a point or Service as Hotel, Restaurants, square, etc.
  - Getting closer **cycling paths**
  - Recharging stations: location and status
  - Getting traffic information



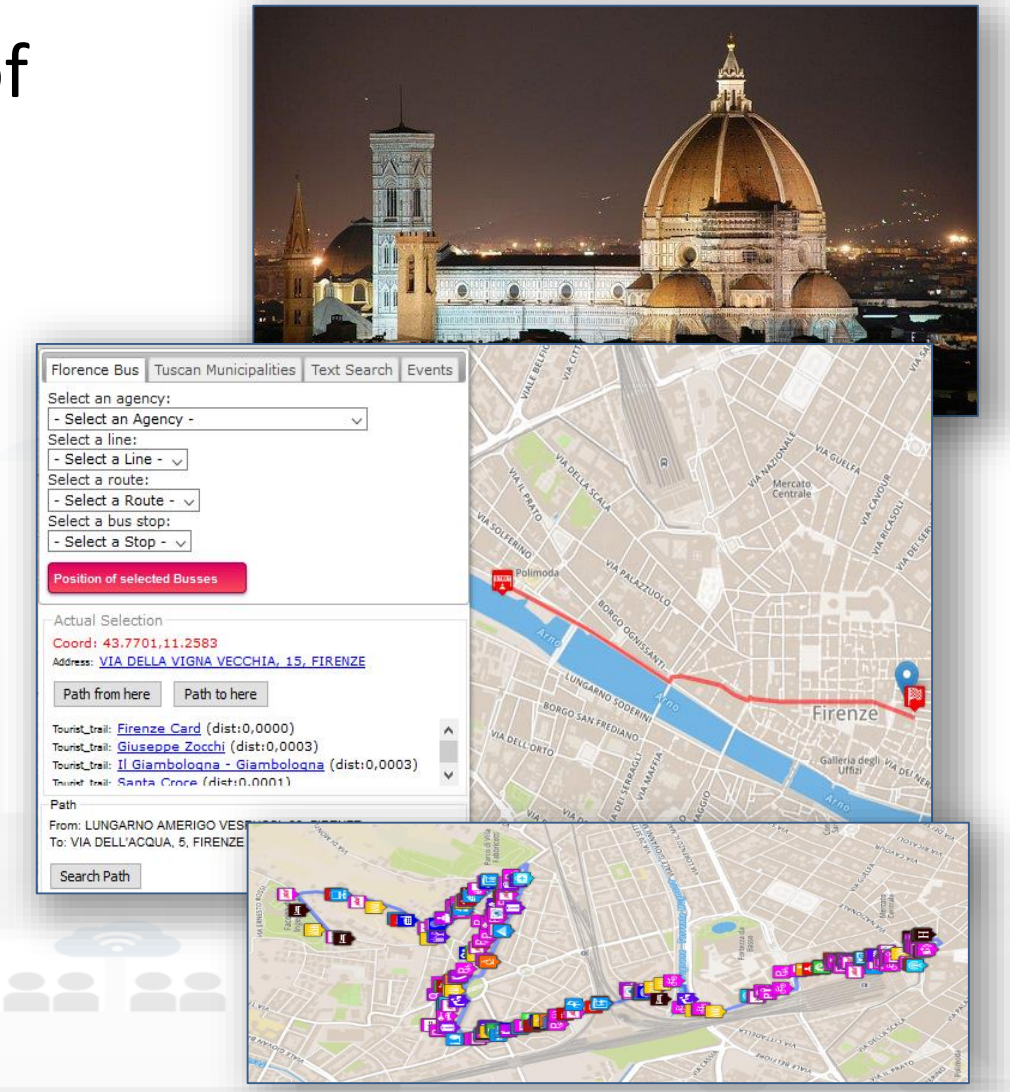
Private Mobility: routing and navigation paths

- To get the path from two points/POIs:
  - Shortest for pedestrian
  - Quietest for pedestrian
  - Shortest for private vehicles
- Search for POIs along the identified Path!
- http://www.disit.org/ServiceMap



New Experience to access at Cultural and Touristic info

- Getting location and description of Point of Interests, POIs: culture and tourism first
  - Location, images, phone, URL, etc.
  - Get image, video, audio, …
- Search for POIs in areas and closer
- Get routing to reach location or POI by walking downtown
  - searching Services along the path
- Search for location, full text assisted
- Leave a score, take a picture, etc..

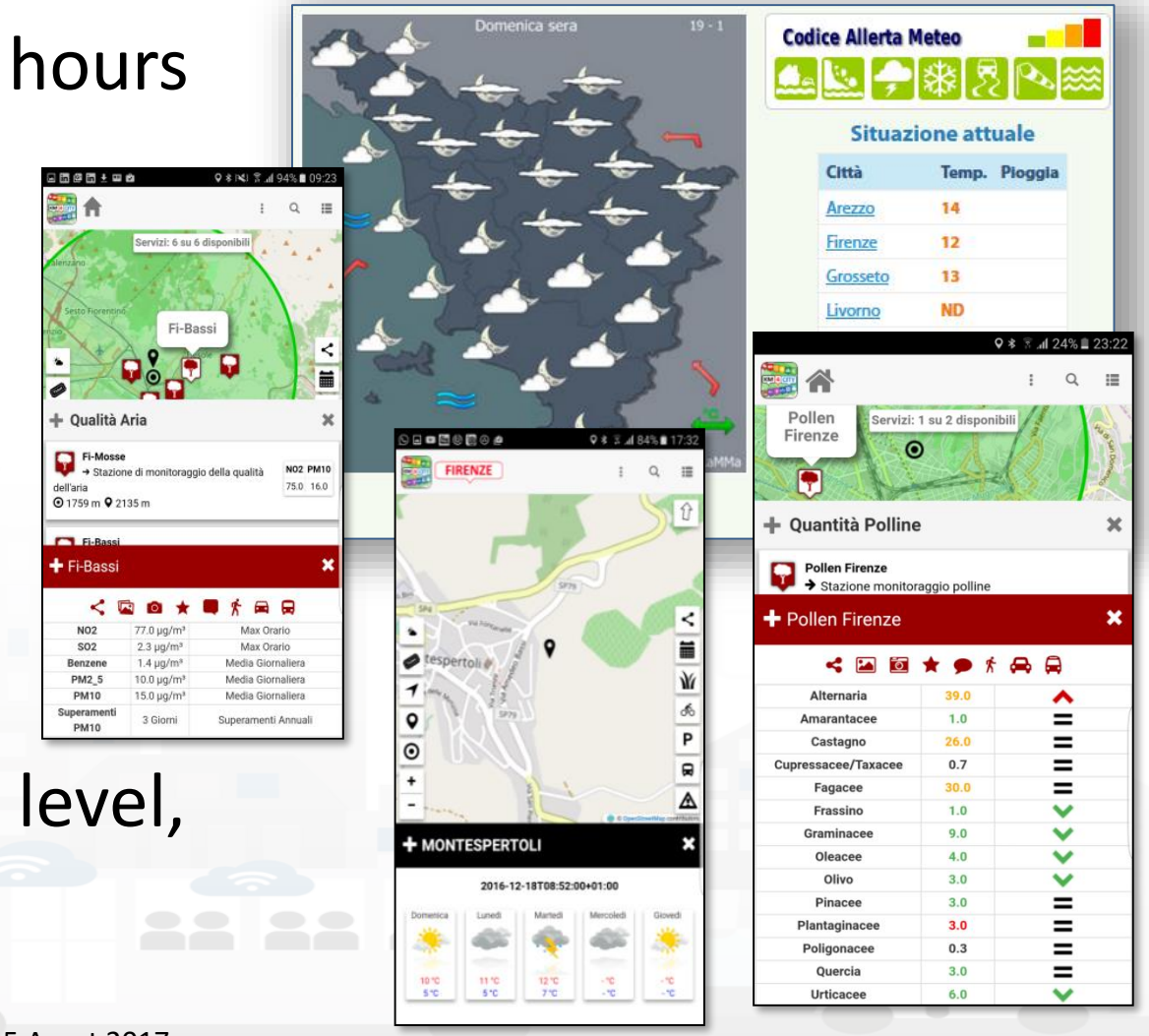


New way to access at health services

- Searching for pharmacies and hospitals
- Getting the closest hospital first aid locations and status
- Getting real time updated information about the first aid status of major hospitals (triage)

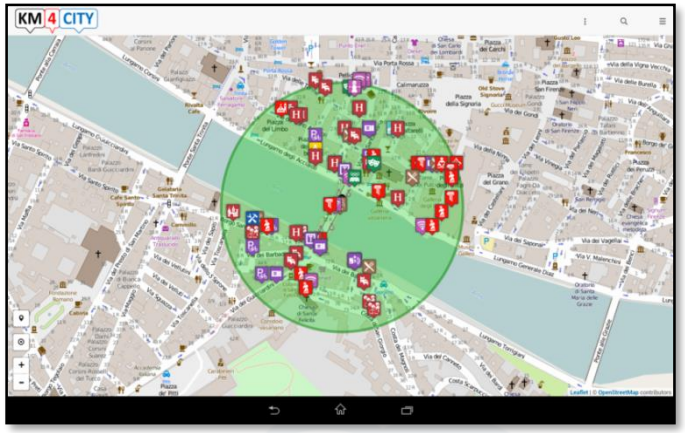
Access at Environmental information

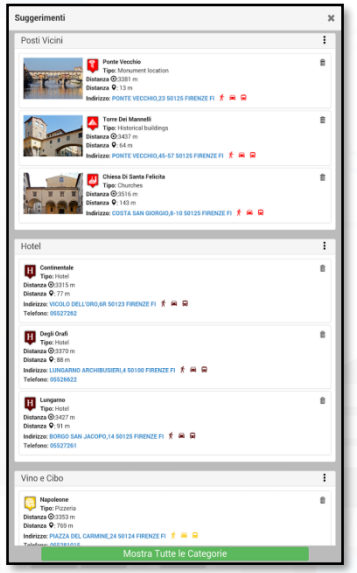
- Getting weather forecast for the next hours and days
- Getting alert information from Civil protection
- Getting air quality status
- Getting pollination status
- getting actual weather status: temperature, humidity, pressure, rain level,
- etc.



Profiled Suggestions to City Users

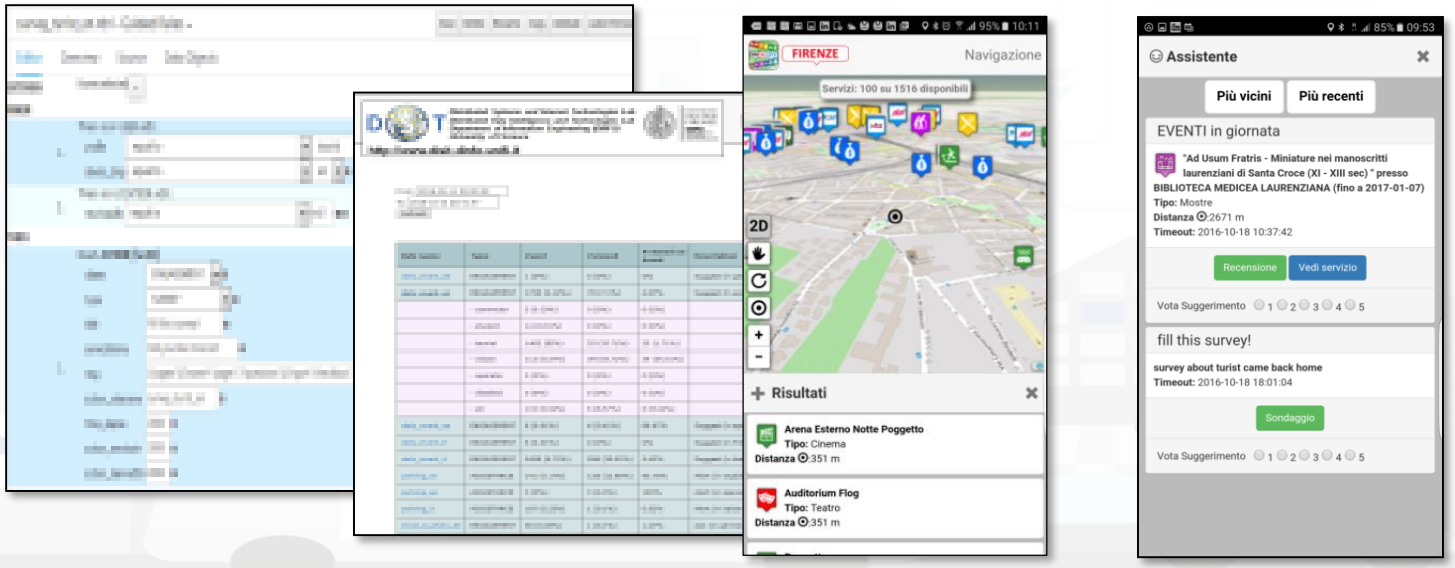
- Personalized suggestions
  - The server provide suggestions in the user context (location and time) arranged in a number of categories
    - Culture, mobility, food and drink, etc.
    - Alerts: civil protection, city council, twitter data, etc.
  - The city user may reject some of them, thus the suggestion engine learns about preferred topics and category





Profiled Engagements to City Users

- The user are profiled to learn habits:
  - Personal POI and paths
  - Mobility habits
- Information and engagements sent to the city users are programmed according to the user evolution to:
  - Stimulate virtuous habits
  - More sustainable habits
  - More healthy habits, etc.
  - Get feedbacks
  - Provide bonus and prices, ….
  - Send alerts, ….



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To appear, the Virtual Assistant PAVAL

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DISIT - Km4City Semantic Service Search

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A quale servizio sei interessato...?
Cosa vuoi fare? Dove?

Select Language: ITA

Specificare Coordinate Utente (opzionale): Latitudine: Longitudine:

Submit

Il servizio permette la ricerca tramite query in linguaggio naturale di servizi di interesse per l'utente nella provincia di Firenze, restituendo le aziende legate al tipo di servizio cercato attraverso interrogazione del repository semantico di Km4City, piattaforma Smart City ideata, progettata e realizzata da DISIT Lab dell'Universita' di Firenze. Se l'utente accetta di inviare le coordinate relative alla sua posizione attuale, il sistema restituisce i risultati dei servizi considerati attinenti alla ricerca effettuata ordinati in base alla vicinanza con la posizione dell'utente stesso. In alternativa, e' possibile per l'utente specificare una coppia di coordinate negli appositi box; in questo caso, le coordinate inserite verranno prese come riferimento di posizione al posto delle coordinate di posizione rilevate. Se inoltre l'utente inserisce nella query di ricerca il riferimento geografico ad un luogo di interesse (via, comune, quartiere), i risultati restituiti saranno ordinati per vicinanza con tale destinazione e non piu' in base al riferimento posizionale dell'utente.

Esempi di domande:

Esempio 1: "Vorrei vedere un museo in centro" Submit

Esempio 2: "Sono in Via di Novoli e voglio fare la manicure" Submit

Esempio 3: "Mi fanno male i denti" Submit

Esempio 4: "Voglio tagliarmi i capelli a Firenze" Submit

http://paval.disit.org/Paval/

Sharing with other Cities

- Collaboration can be performed in terms of data, tools, Application, Apps, Dashboard, process, etc.
- **Machine to Machine connections** via
  - Sharing and gathering data via DataGate API, CKAN API
  - Reusing IOT from other cities via DataMapper
  - Sharing Dashboard models
  - Sharing Notifications, alerts…
  - **Exchanging knowledge with KB interconnection Smart InterCity API with Public/Private datasets/graphs**
    - **See Tuscany ←→Sardegna**

Monitoring Traffic Flow and Parking

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

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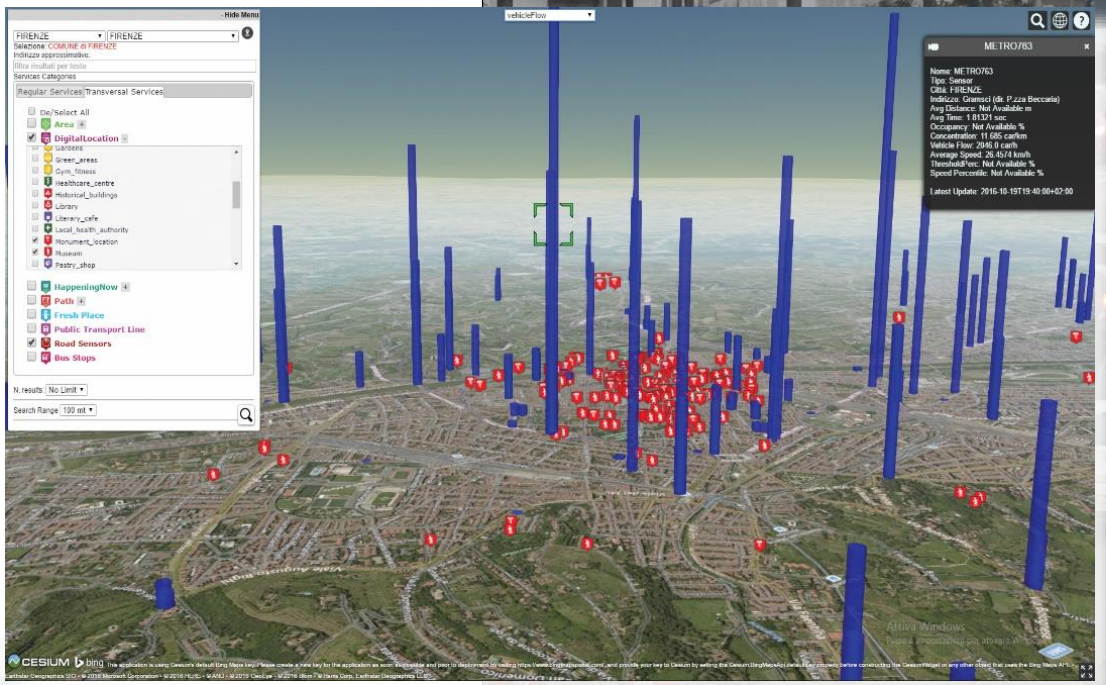
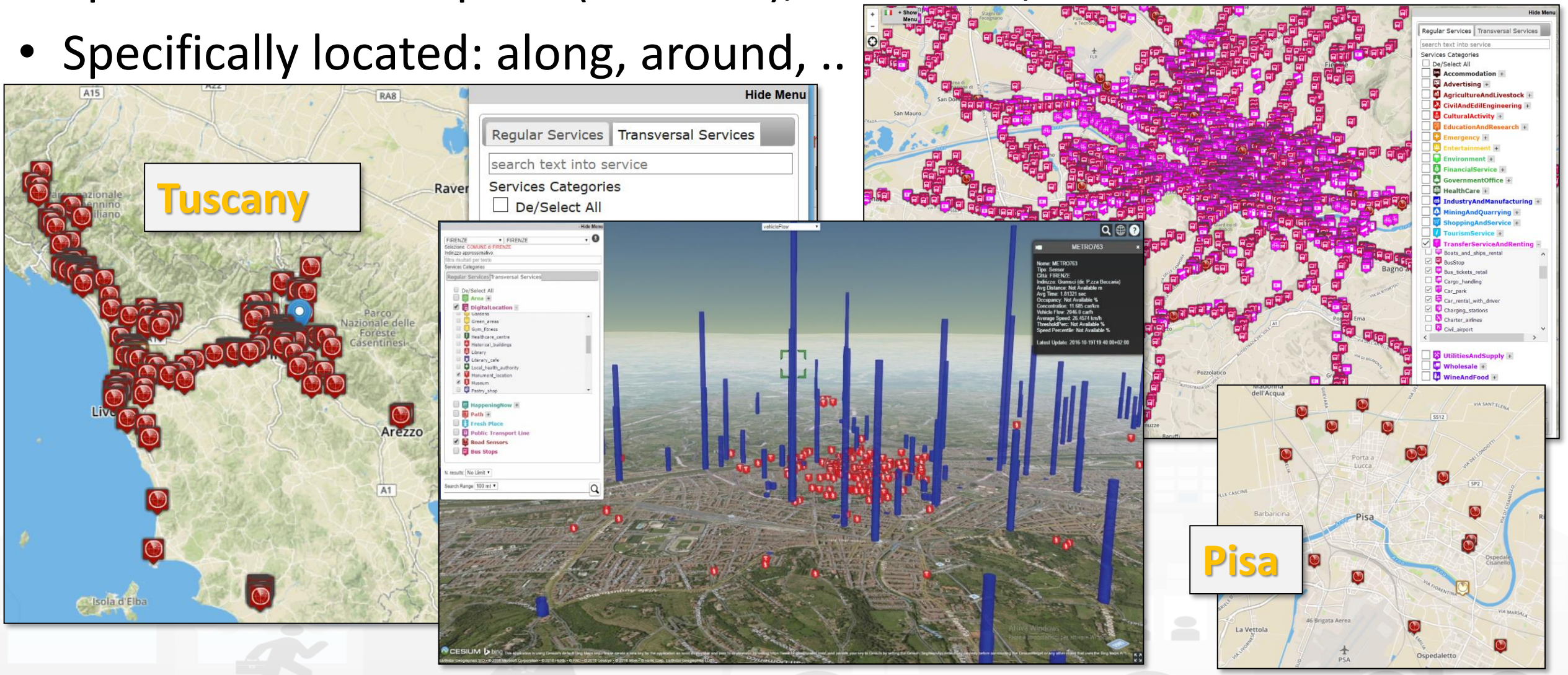
Traffic Flows

Sii-Mobility



Traffic Flow Tools

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



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Traffic Flow data

Sii-Mobility

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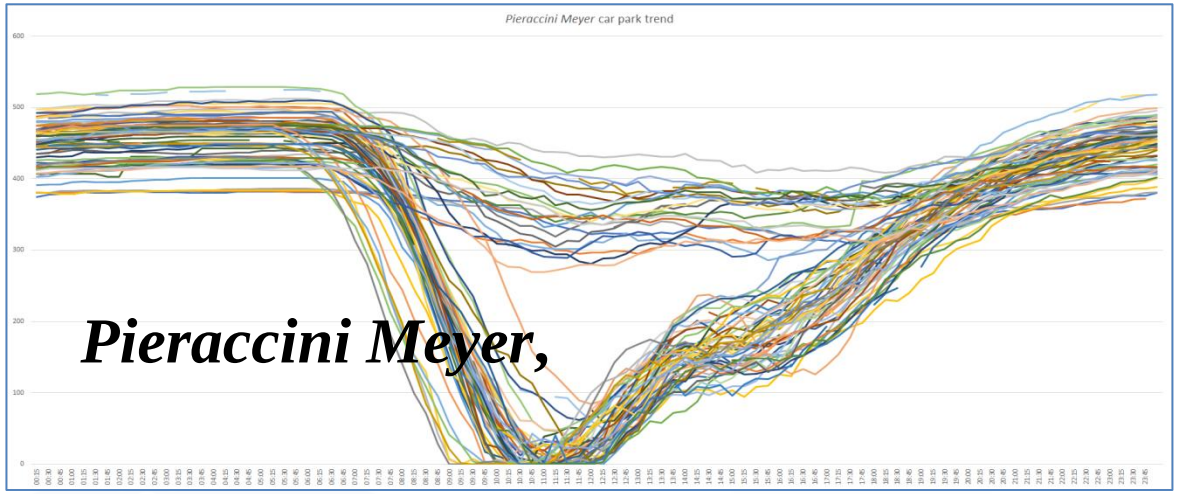
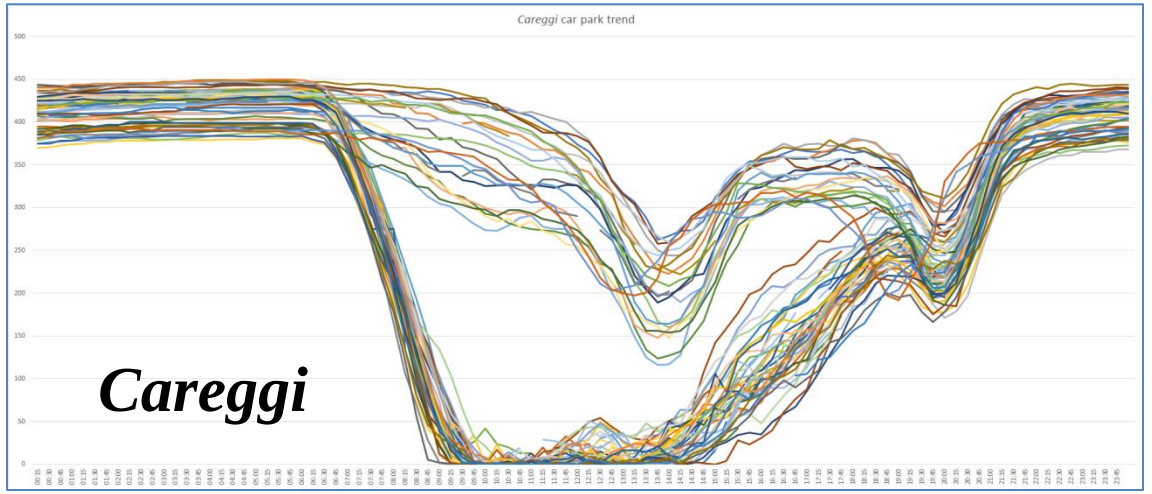
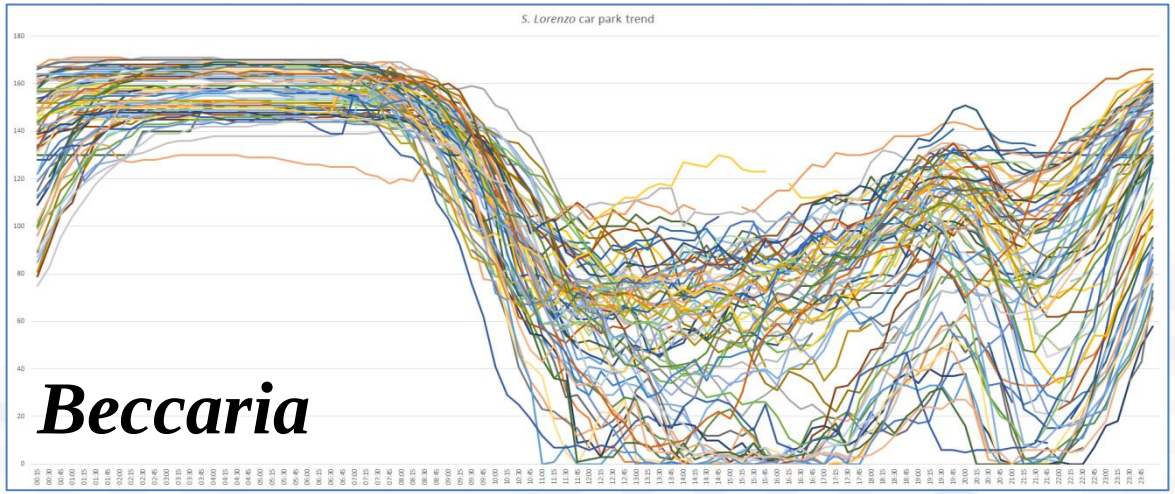
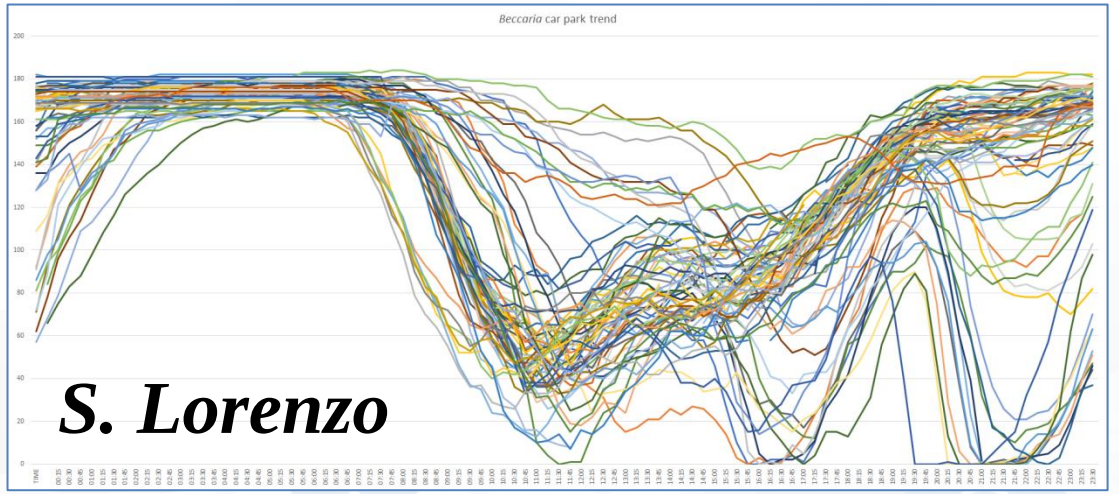
Free Parking space trends









12 parking areas in Florence

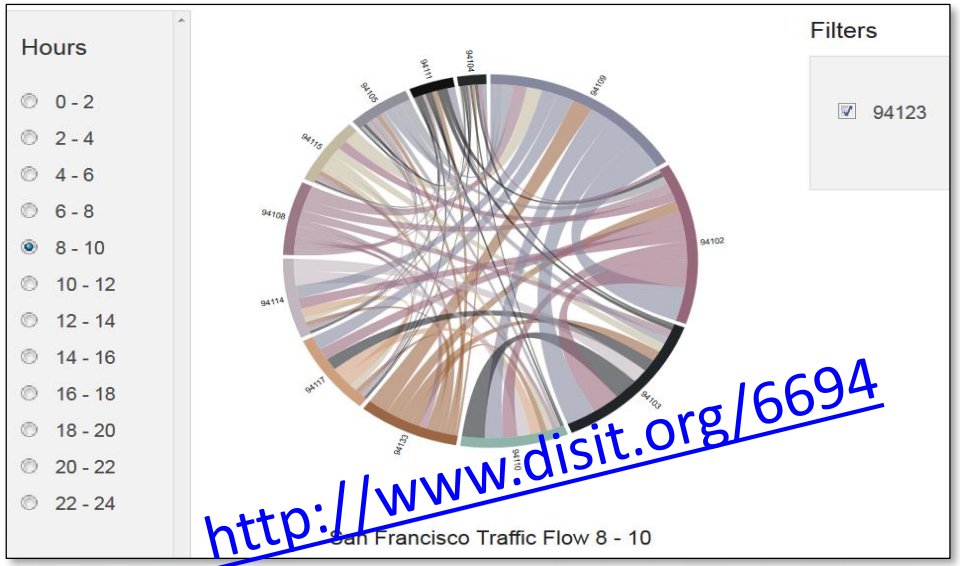
Free Parking PREDICTIONS

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

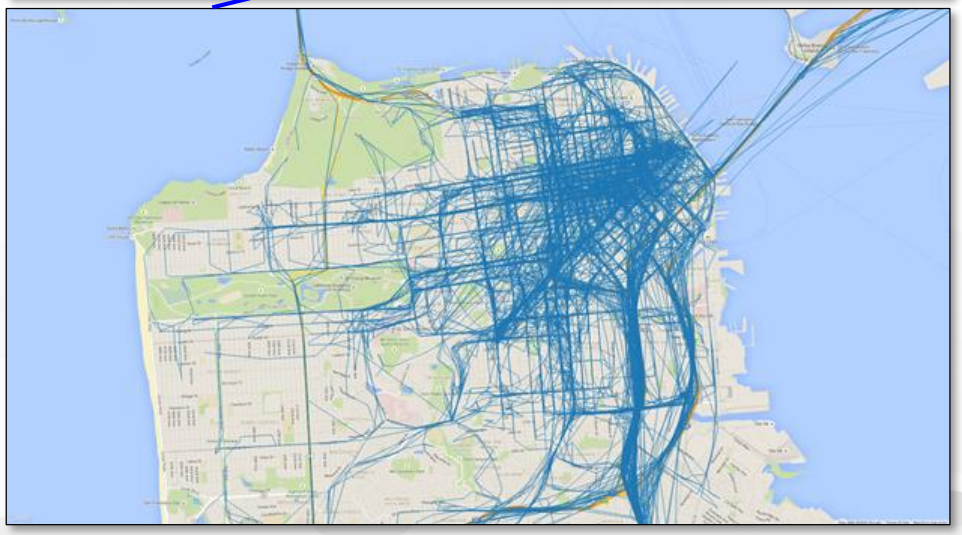
- Active on Apps
  - «Firenze dove cosa»
  - «Toscana dove cosa»

Traffic and People Flow Assessment

- **Origin Destination Matrix**
  - Specific Sensors, vehicle Kits, mobile App, Wi-Fi Access Points, etc.
- **Assess people and traffic flows to**
  - improve services
  - predict critical conditions on Crit. Infra.
  - take real time decisions and sending messages in push to population
  - Increase city resilience
  - optimize traffic flow
  - take decision of routing



http://www.disit.org/6694



Monitoring City users Via Wi-Fi

http://www.km4city.org/?controlRoom
http://www.km4city.org/?devTools
http://www.km4city.org/?infoDocs
http://www.km4city.org/?app

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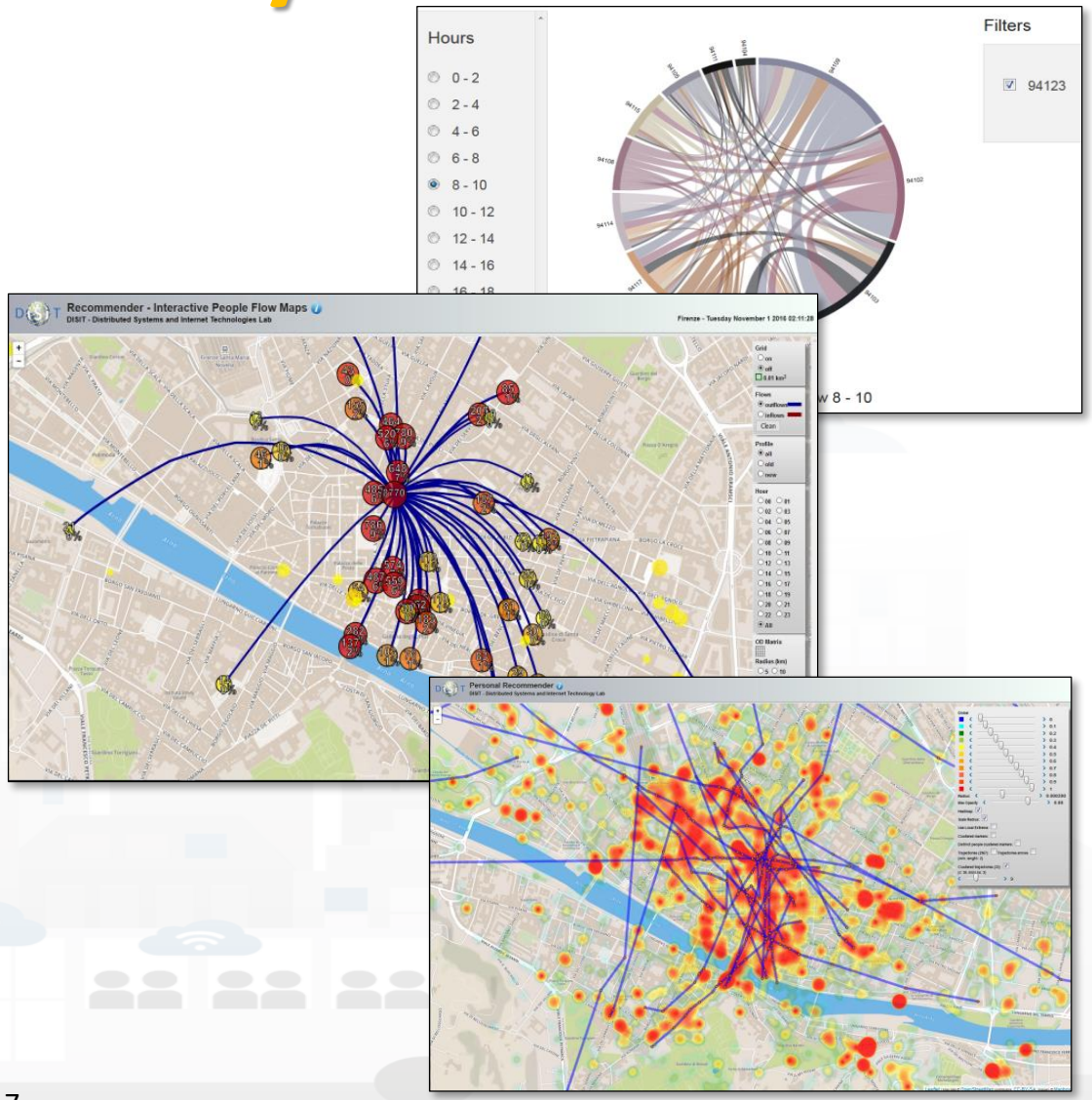
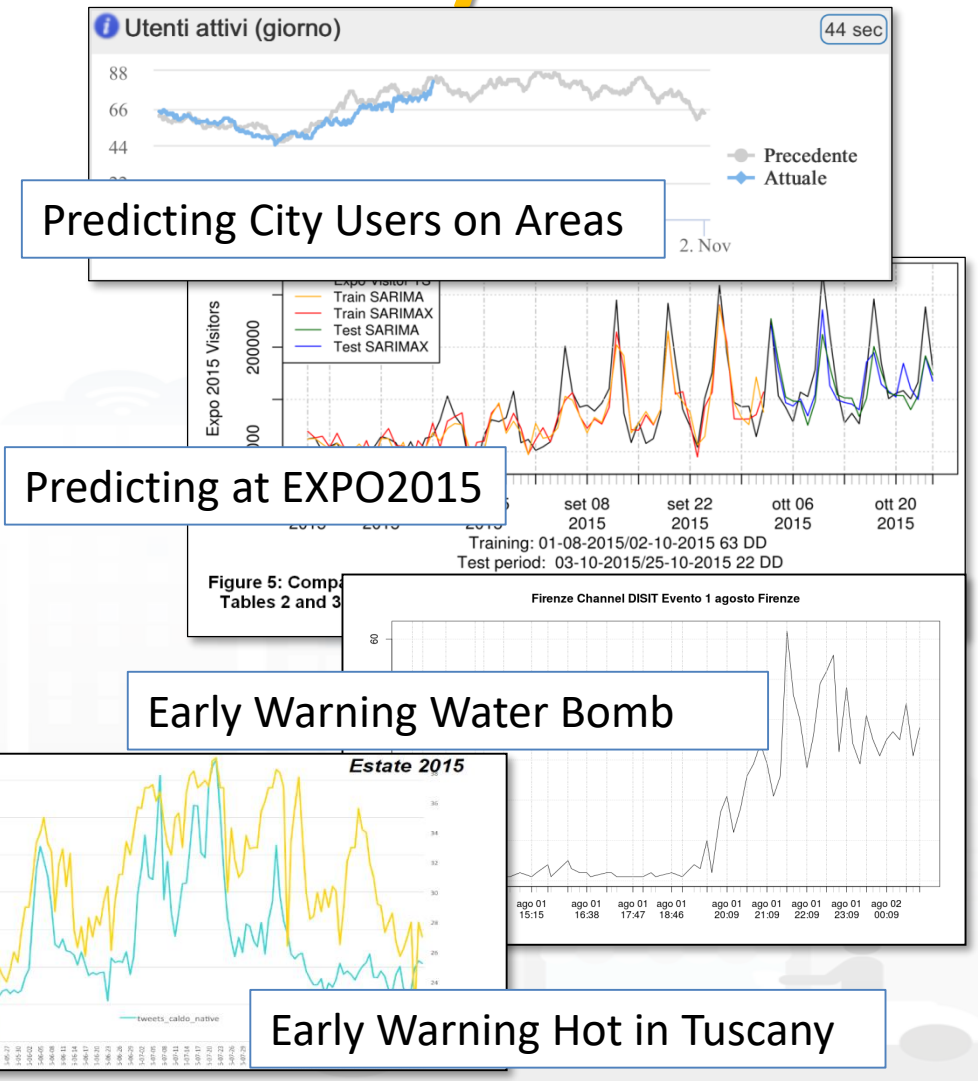
User Behaviour Analysis

- **Monitoring movements by traffic flow sensors**
  - Spires and virtual spires
- **Monitoring movements from Mobile Cells**
  - Unsuitable for precise tracking and OD production
- **Monitoring movements from Wi-Fi**
- **Monitoring movements** and much more from mobile Apps

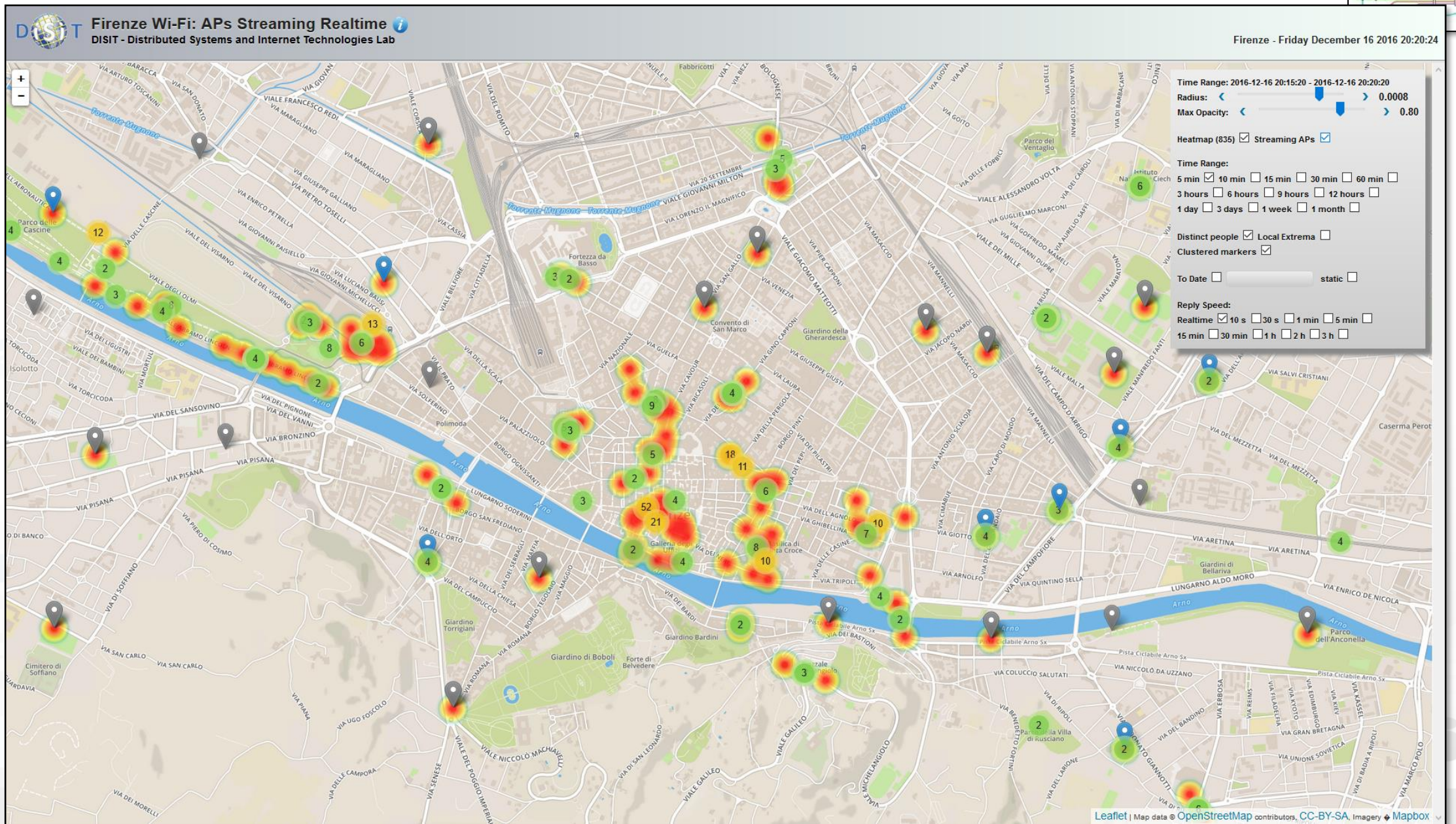


Predicting Models for Admin. & City Users

- **Aiming at improving**
  - quality of service, distributing workload
  - early warning
- **Predictions**: **Short** (15 min, 30 Min) and mid Term (1 week)
- **Data Analytics**: ML, NLP/SA, Clust…
  - Traffic Flows → multiflow reconstruction
  - Parking Status → free slots
  - People Flows (WiFi, Twitter) → crowd , #number of people



Real Time Monitoring of Wi-Fi network



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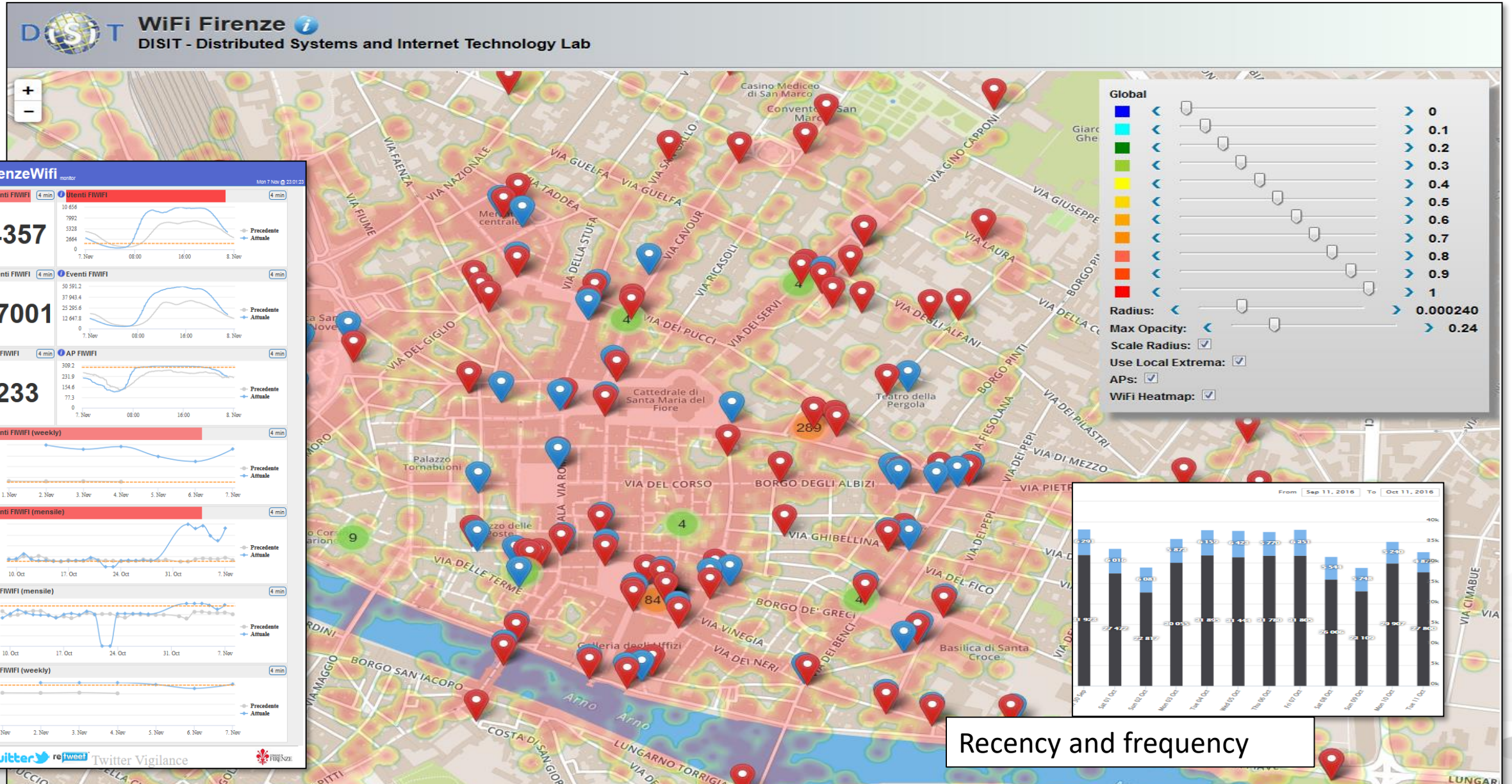
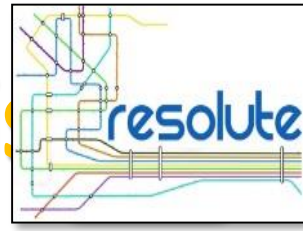
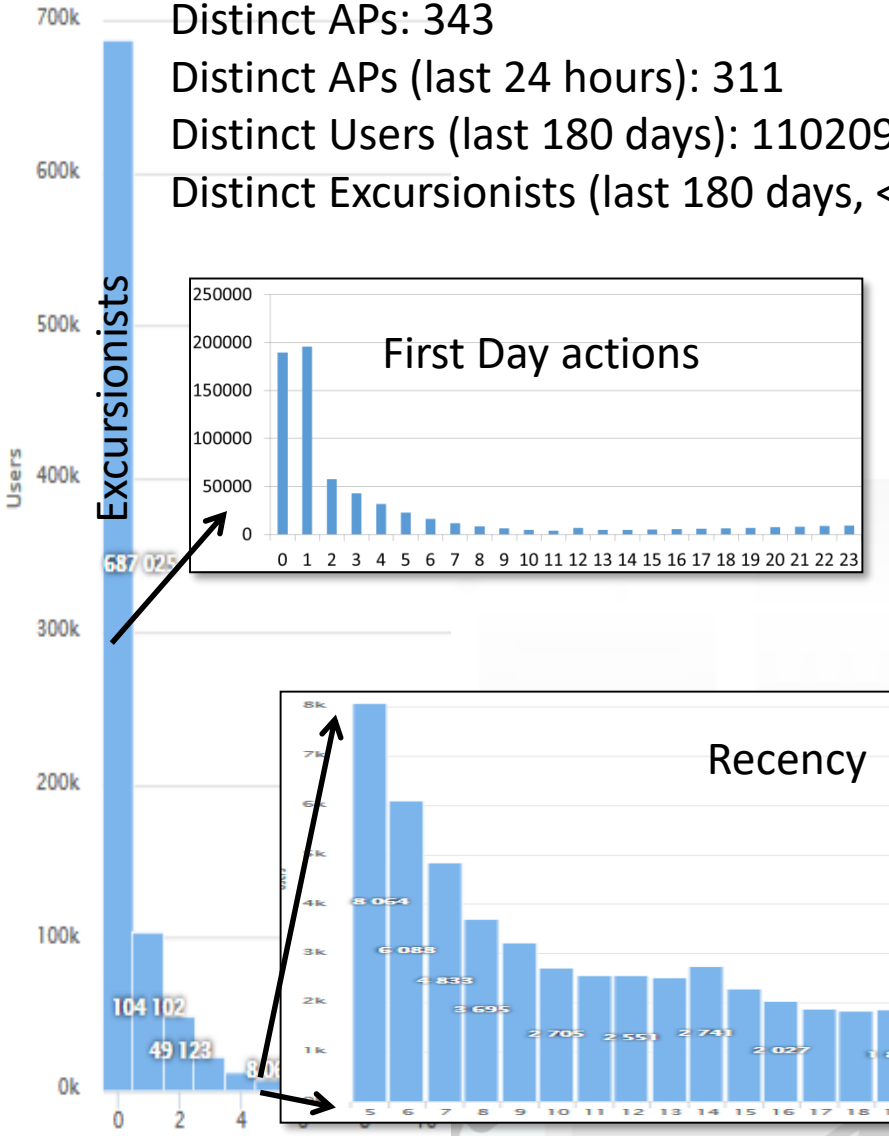
WiFi Monitor tool

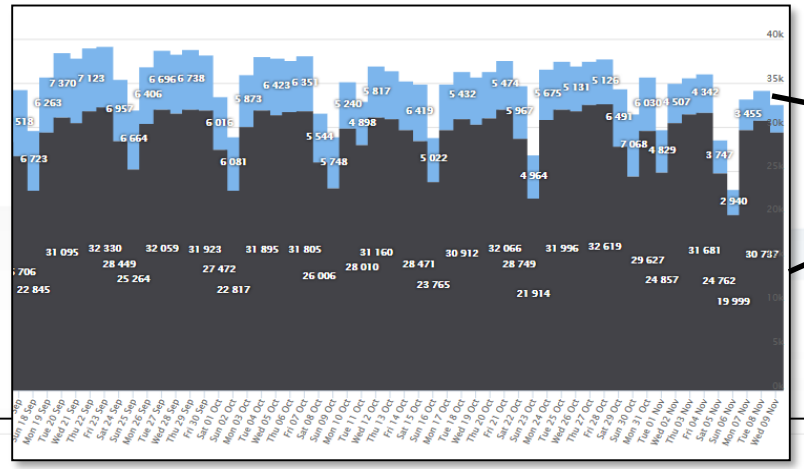


User Behavior Analysis

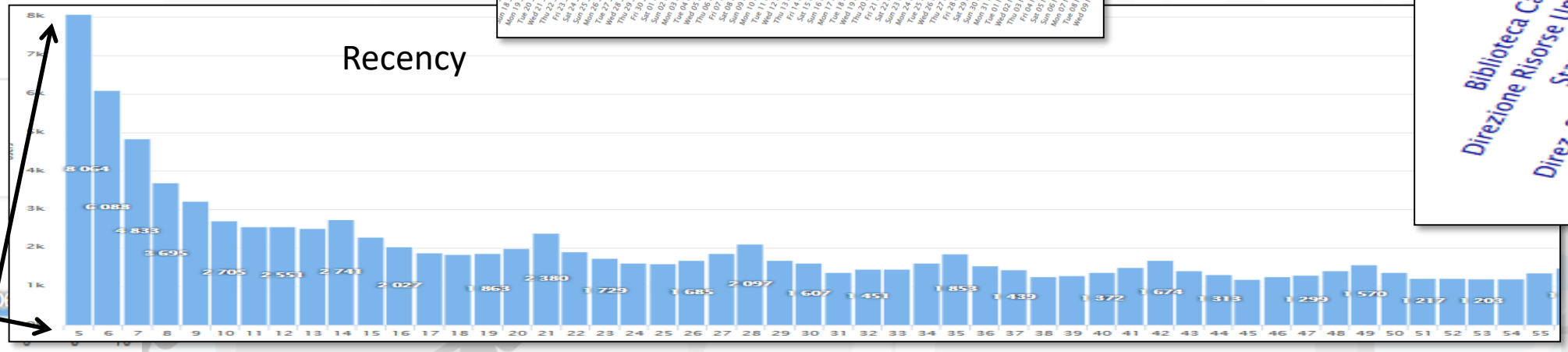


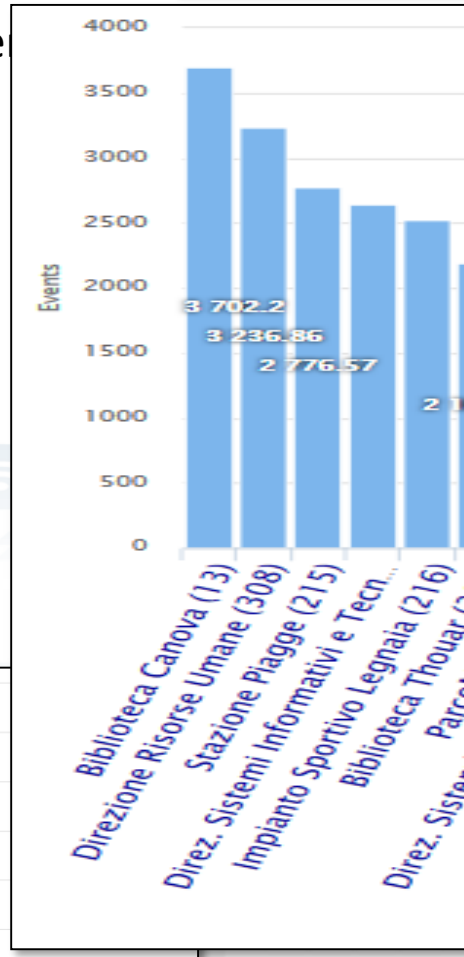
Distinct APs: 343
Distinct APs (last 24 hours): 311
Distinct Users (last 180 days): 1102098
Distinct Excursionists (last 180 days, < 24 h): 687025





New City Users
VS
Returning





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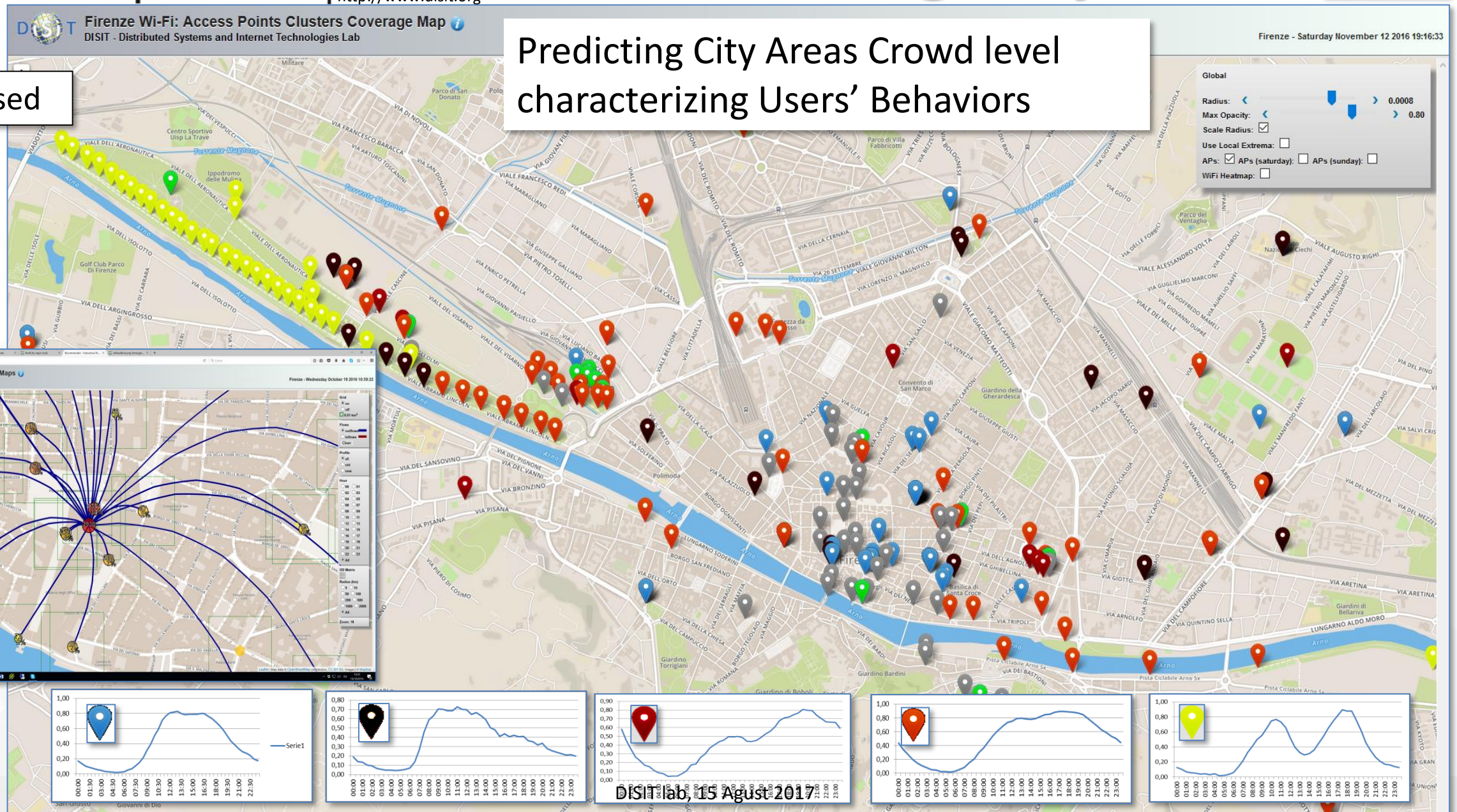
Characterizing City Areas

resolute

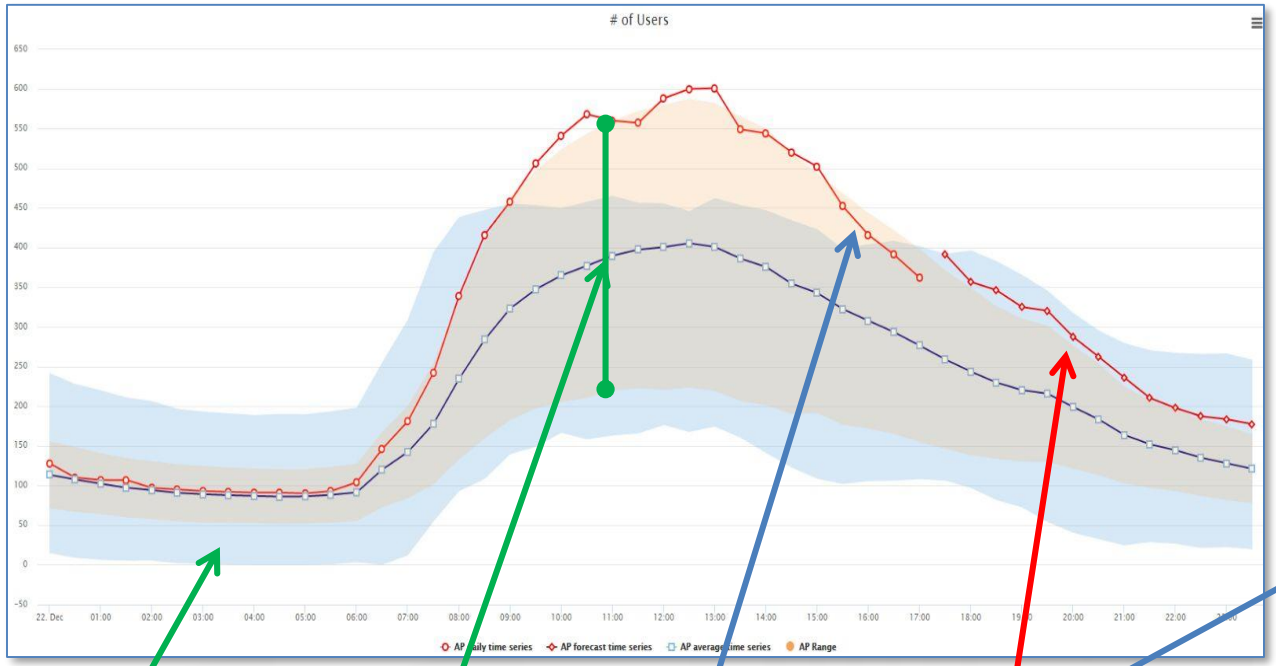
Wi-Fi based

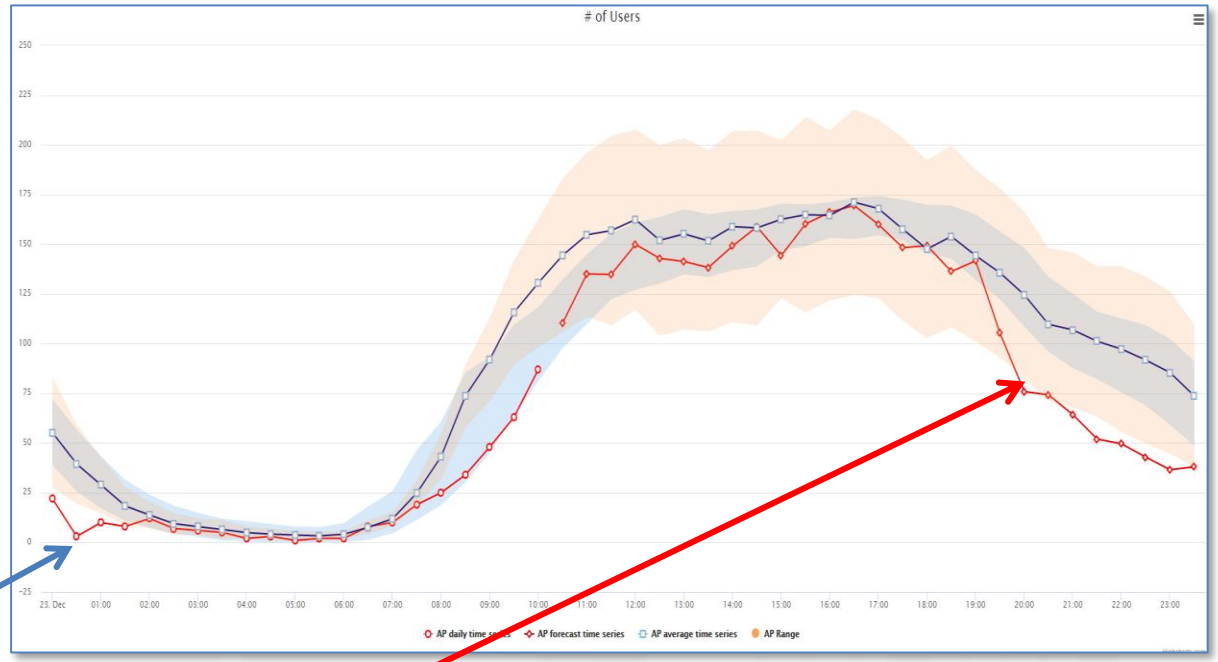
Predicting City Areas Crowd level characterizing Users' Behaviors



Prediction and identification of anomalies

Guessing number of users of Wi-Fi Access Points





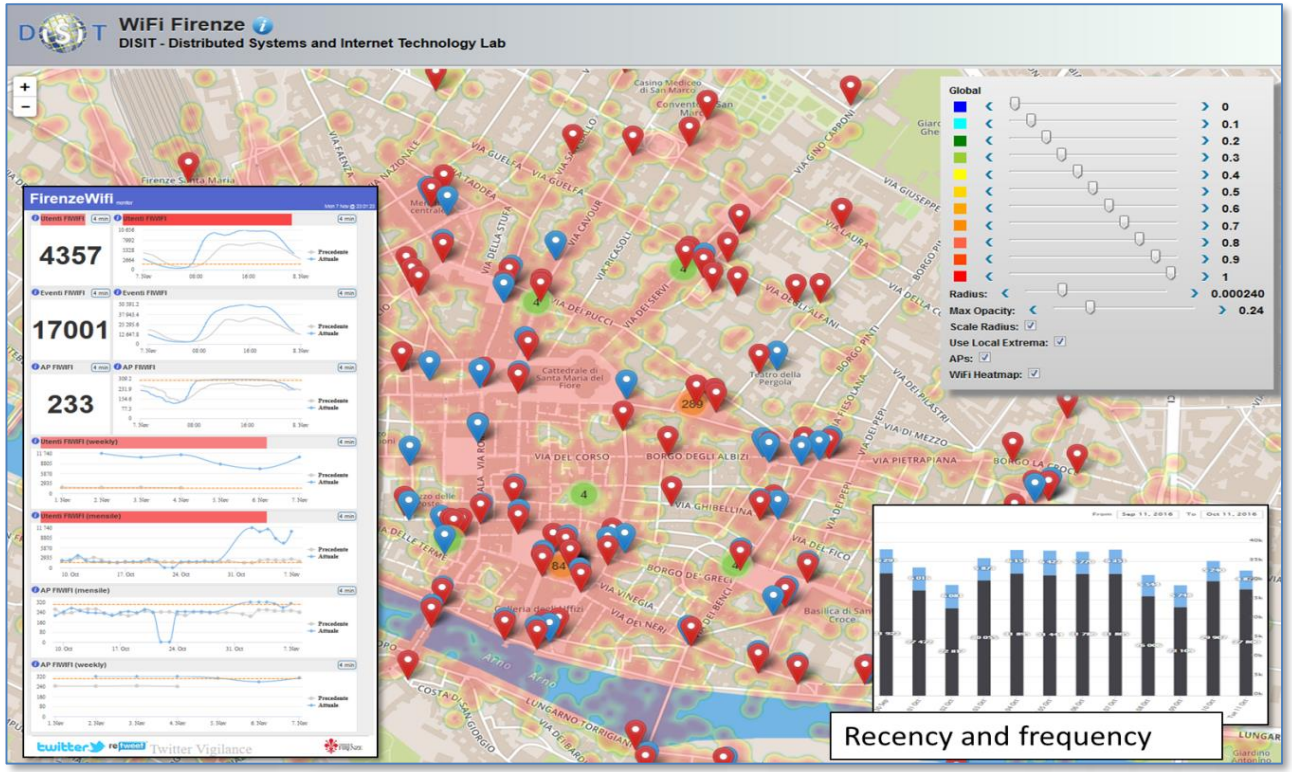
Cluster confidence

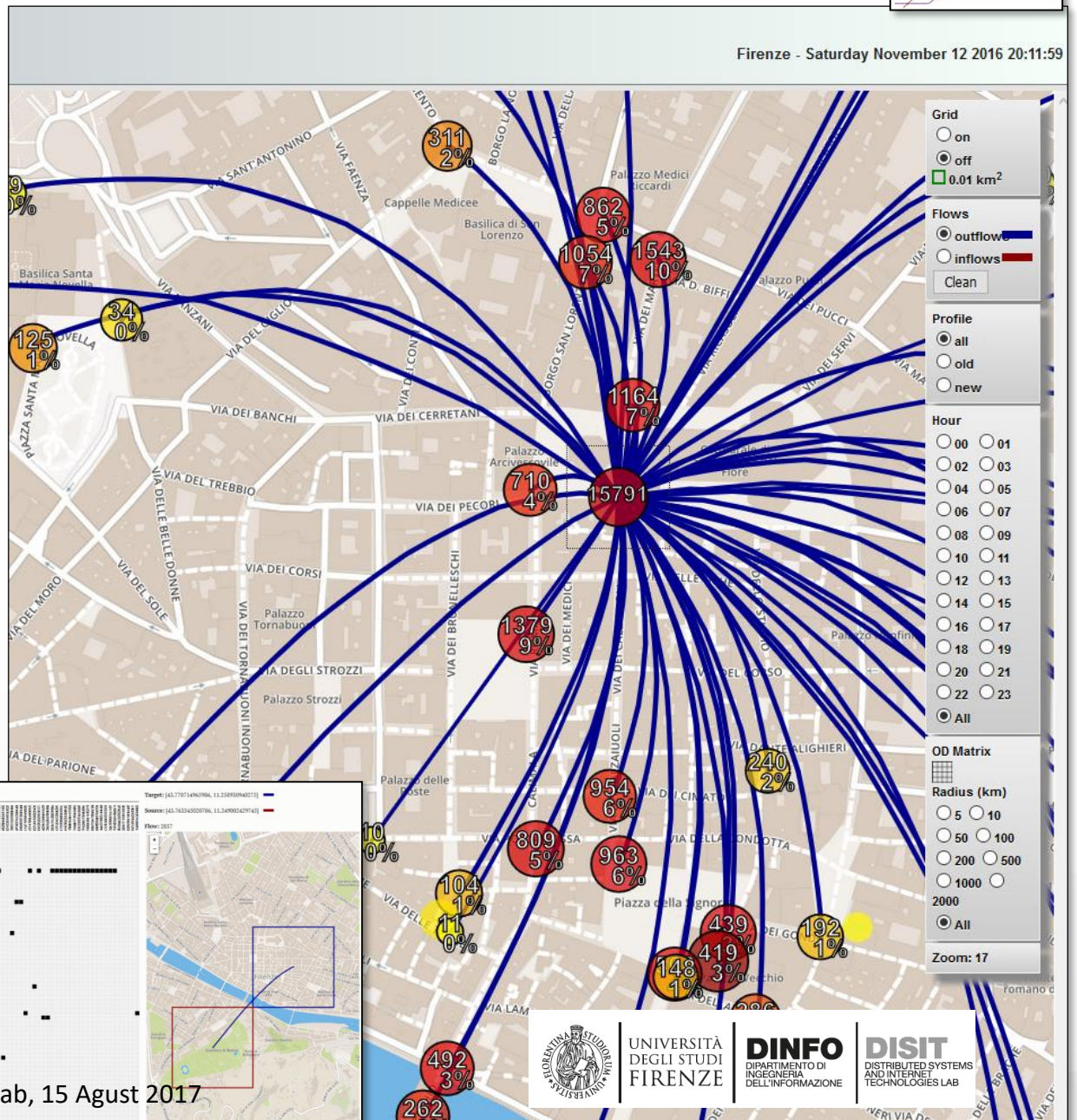
AP average and confidence

Actual AP trend for today

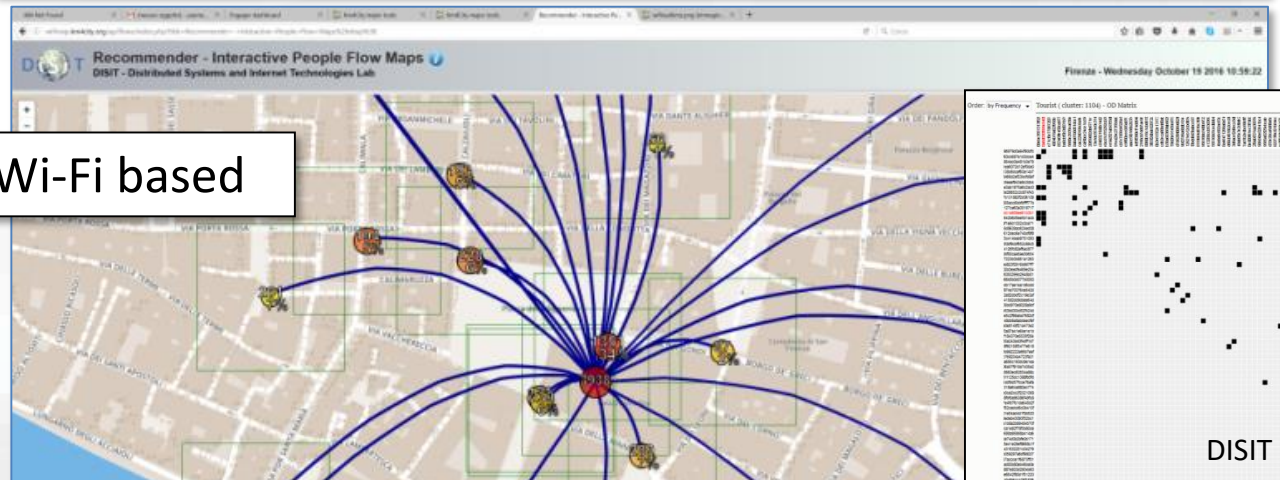
AP prediction for the next time slot in the day on the basis of past weeks

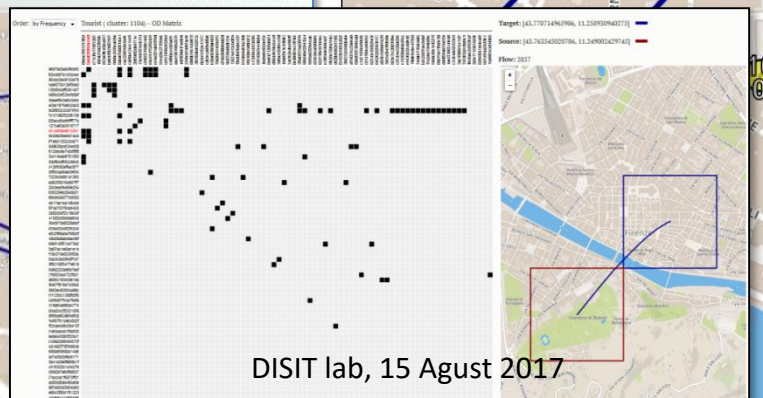
Origin Destination Matrix Estimation





Wi-Fi based





DISIT lab, 15 Agust 2017

Engaging Users via Mobile App

http://www.km4city.org/?controlRoom
http://www.km4city.org/?devTools
http://www.km4city.org/?infoDocs
http://www.km4city.org/?app

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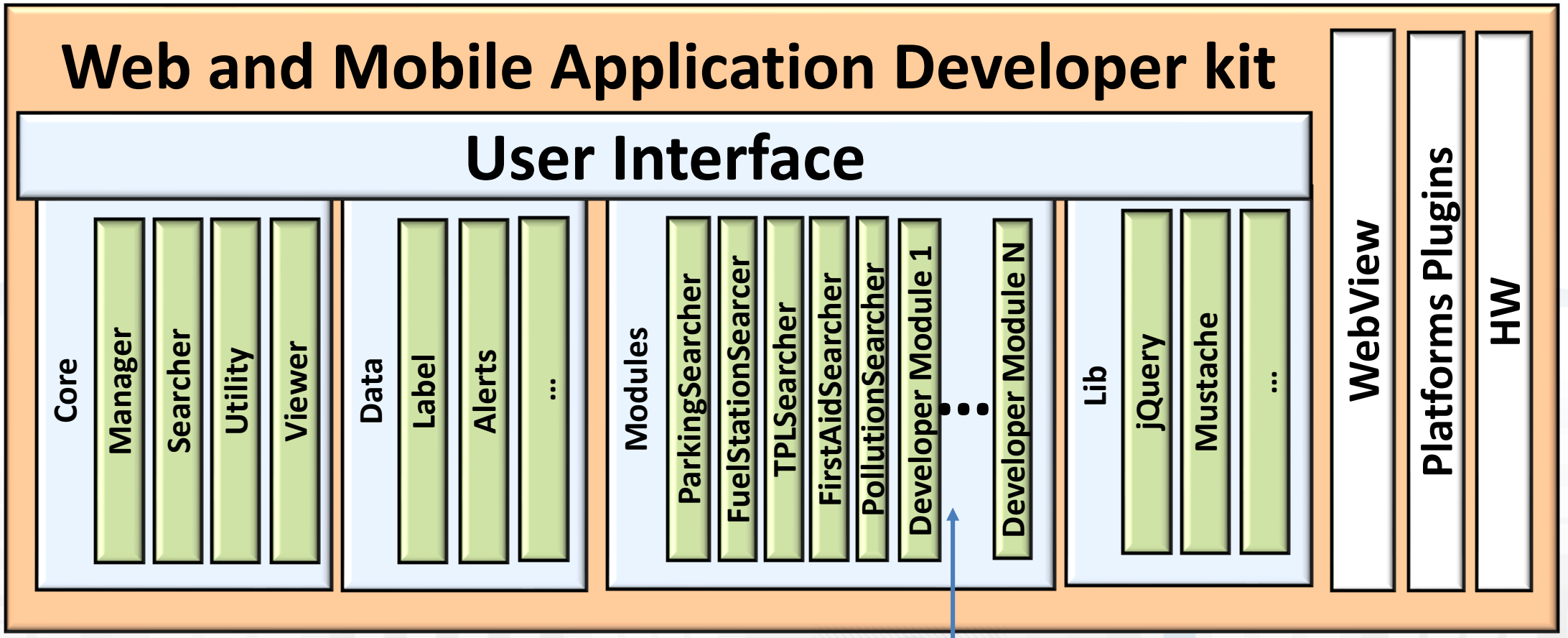
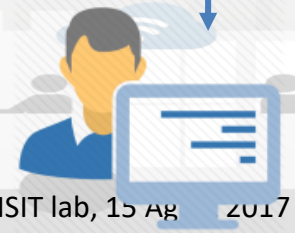
Web and Mobile App. Development Kit





Developers

ADK features

- **Exploiting Km4City Smart City API**
  - Open Source
  - Multiplatform: exploiting Apache Cordova Framework
  - Active since 2015
  - Adopted by a community of several Projects, Cities and SME.

- **Respecting user privacy:**
  - Anonymous usage vs Authenticated usage (OAuth, email, ..)
- **Modular & Dynamic:**
  - loading new modules from the WEB, and/or creating App by modular approach
- **Personalization and Profiling:**
  - personalized menu, proposed POI for search,
- **Reaching City Users:**
  - alerting and notifications by location, by user behaviour

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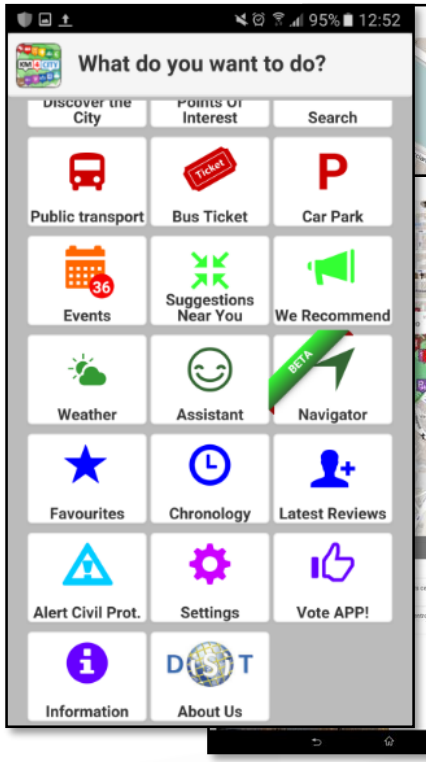
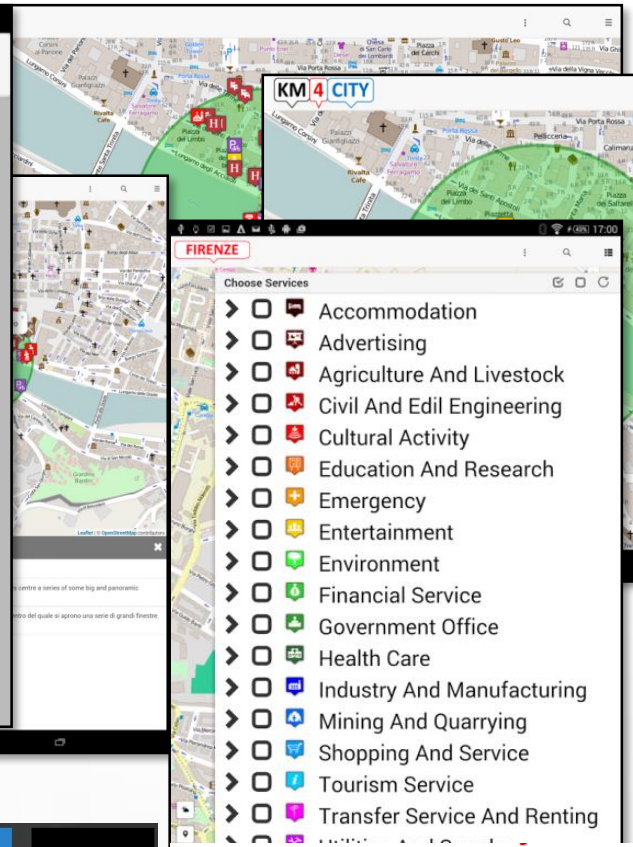
Km4CityMobile App

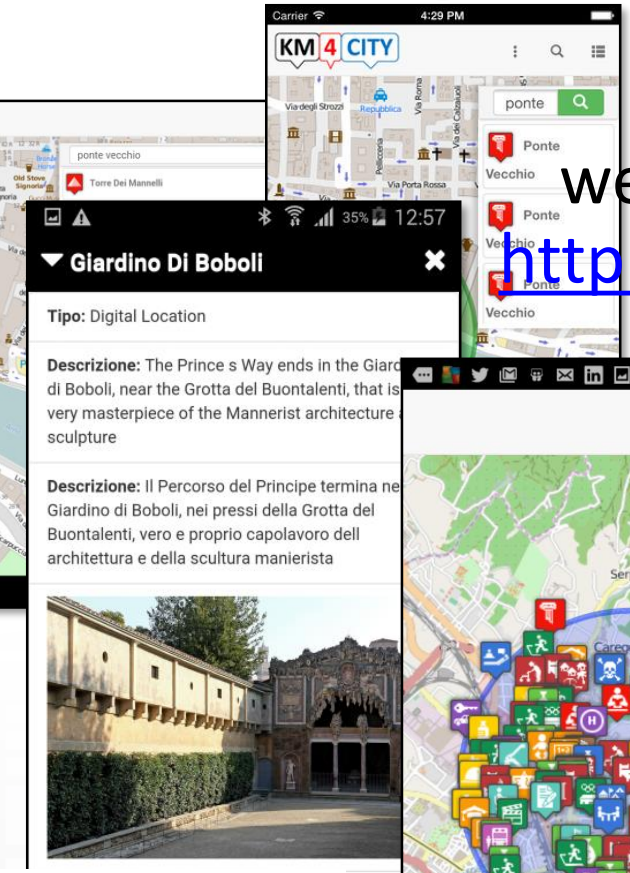
Sii-Mobility

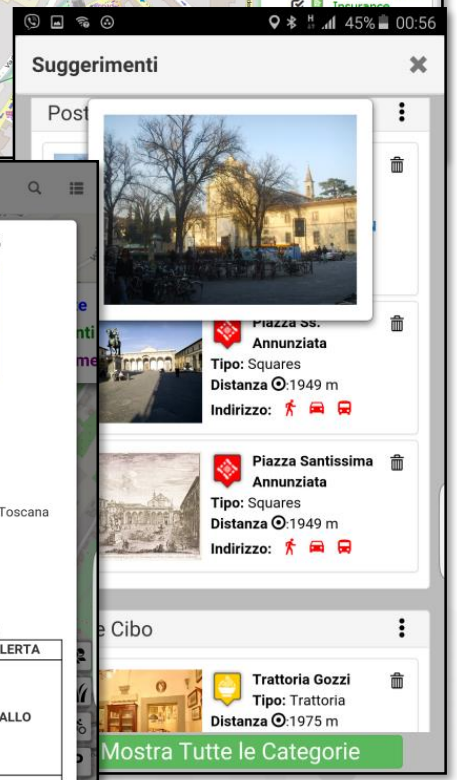
web application

http://www.km4city.org









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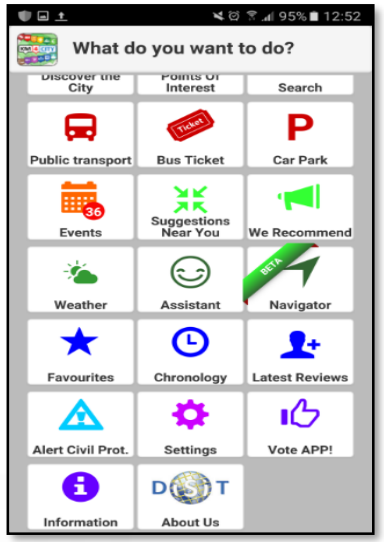
Scarica da App Store

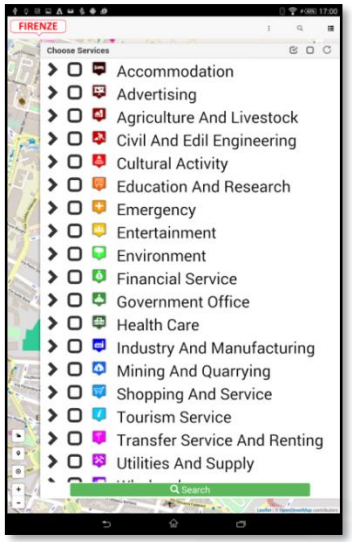
Scarica da Windows Store

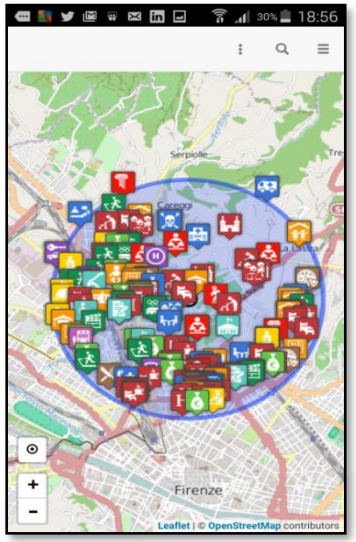
FIRENZE

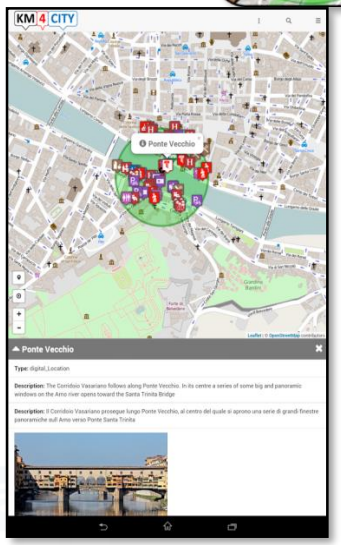
Km4City APP, features 1/3

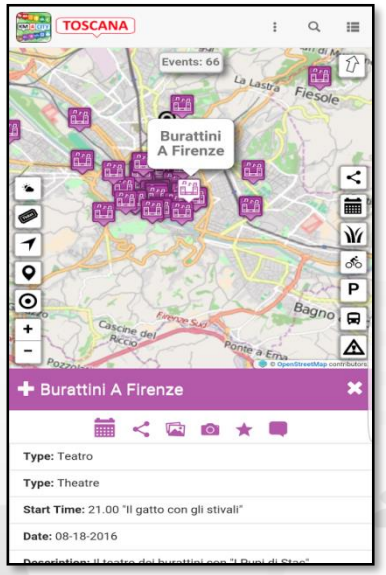
- **5 languages:** IT, EN, SP, DE, FR
- **Profiles** city users: Citizens, commuter, student, tourist, operator, etc..
- **Profiled Menu** per POI
  - adaptive
- **Main Menu: dynamic, and personalized**
- **Search Text**
- Search per POI
  - Near to you, near to a point, line...
- Other search
  - Close to you, events green areas, public transport, tickets , Cycling, parking, ….
  - Etc.
- POI
  - Preferred, Social icon
  - Ranking, Comments, images

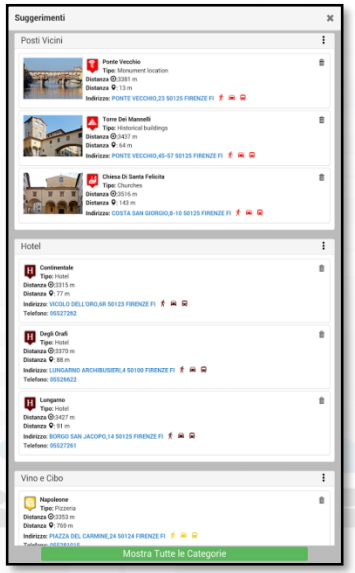


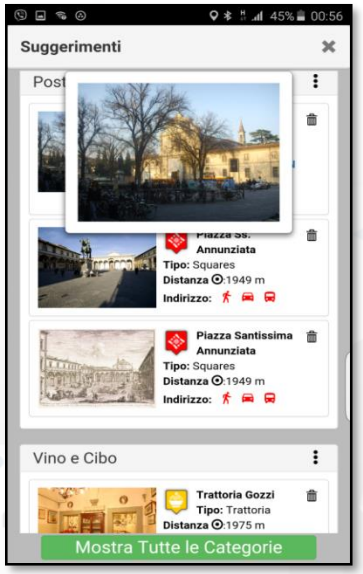


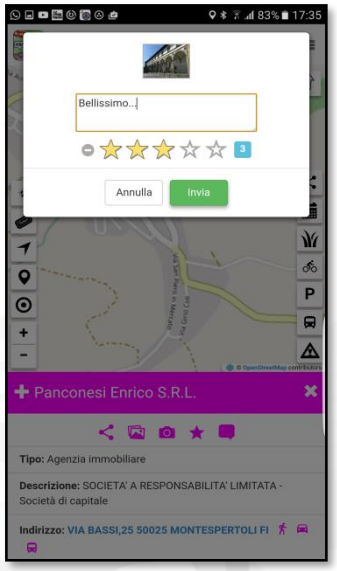












Available on the App Store

ANDROID APP ON Google play

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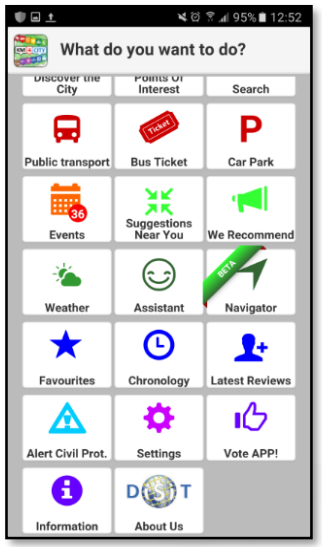
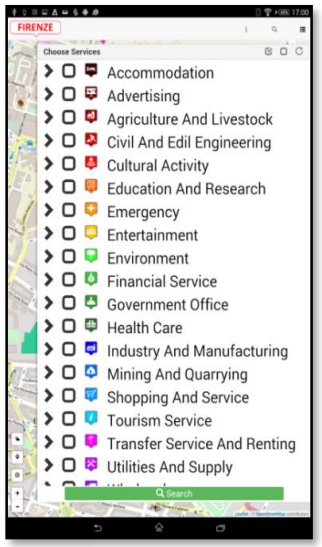
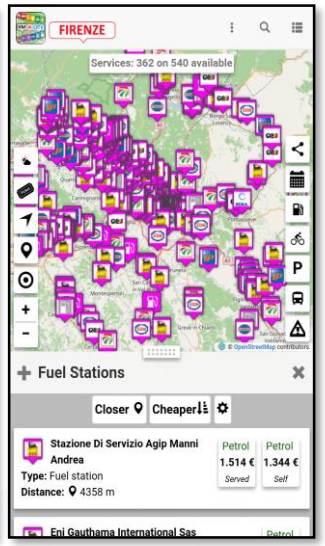
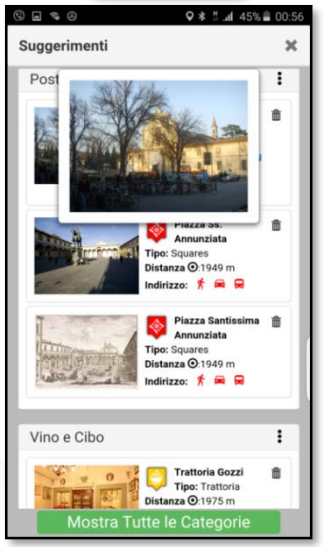
Km4City APP

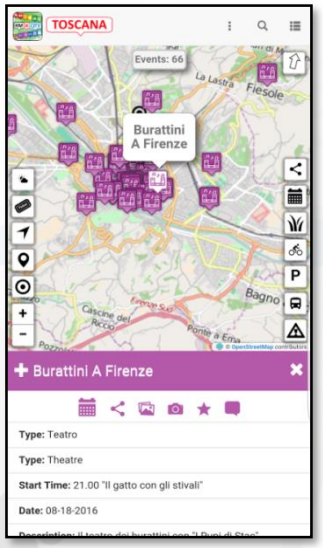
- Smart Parking, in Tuscany
- Smart First Aid in Tuscany
- Smart Public Transportation in Tuscany
- Smart Fuel pricing in Tuscany
- Bike Sharing in Pisa
- Weather condition in Tuscany
- Pollution and Pollination in Tuscany
- Traffic Sensors in Tuscany
- Smart Routing in Tuscany
- Smart Transportation in Florence
  - Events, traffic, …
- Entertainment Events in Florence

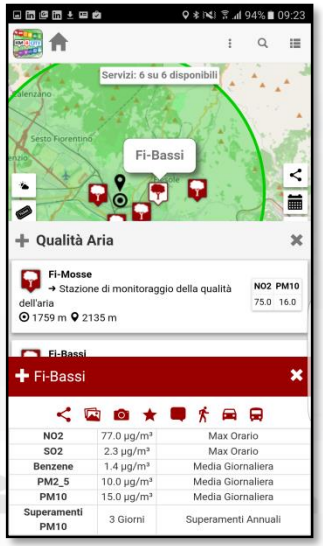


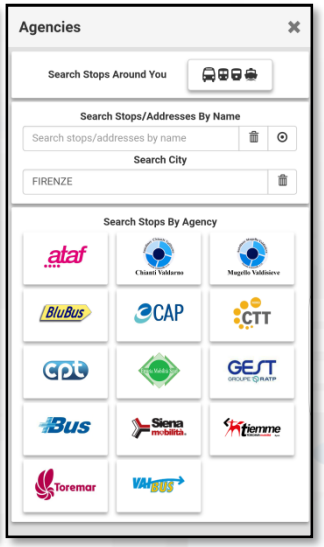












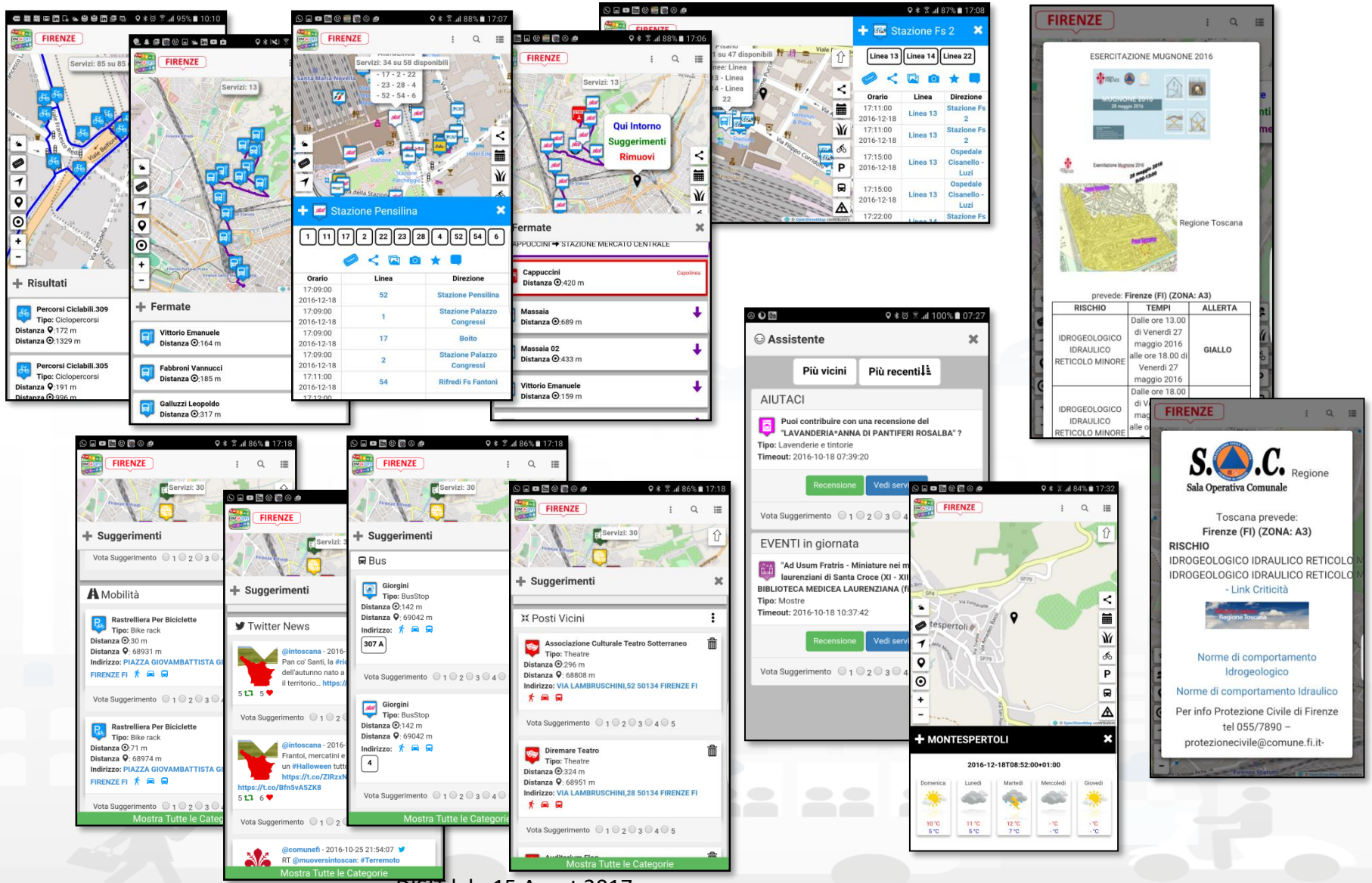
Available on the App Store

ANDROID APP ON Google play

Download from Windows Phone Store

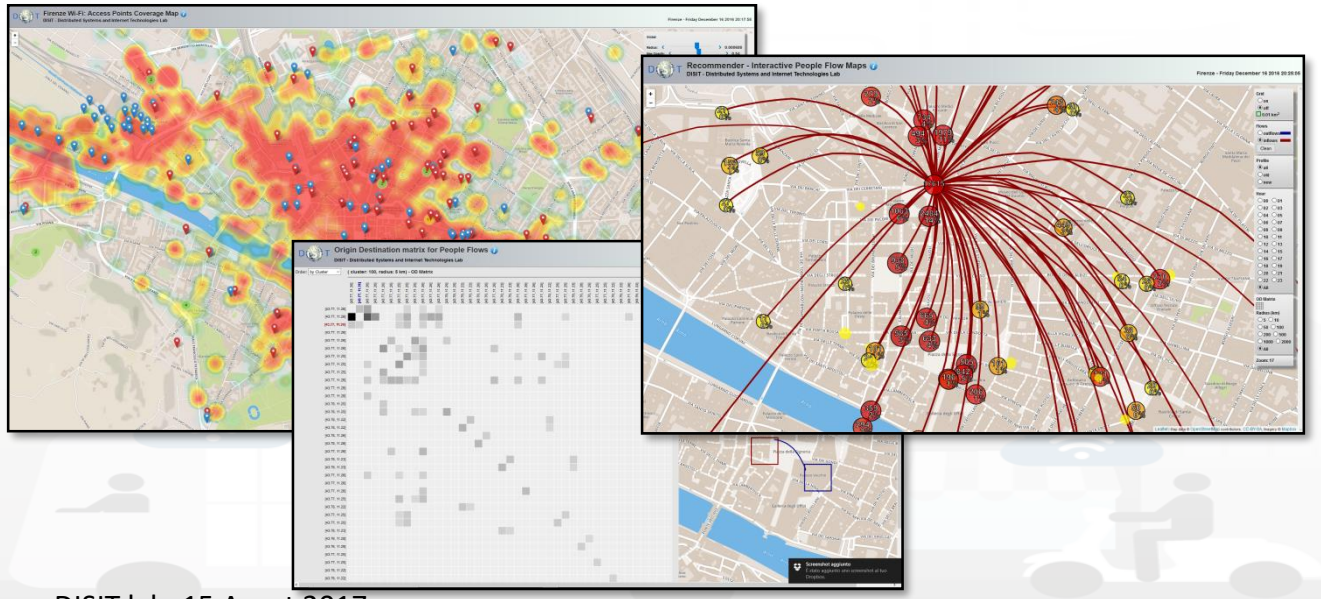
Km4City APP

- **Mobility**
  - Paths and stops, time
  - Parching + 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



Km4City APP, features 3/3

- **Navigation 3D (BETA)**
- **Ticketing for busses**
- **App used are tool for city assessment**
  - Wifi status
  - iBeacon status
  - User behavior analysis
    - GPS movements kinds
    - OD matrix
    - International flows



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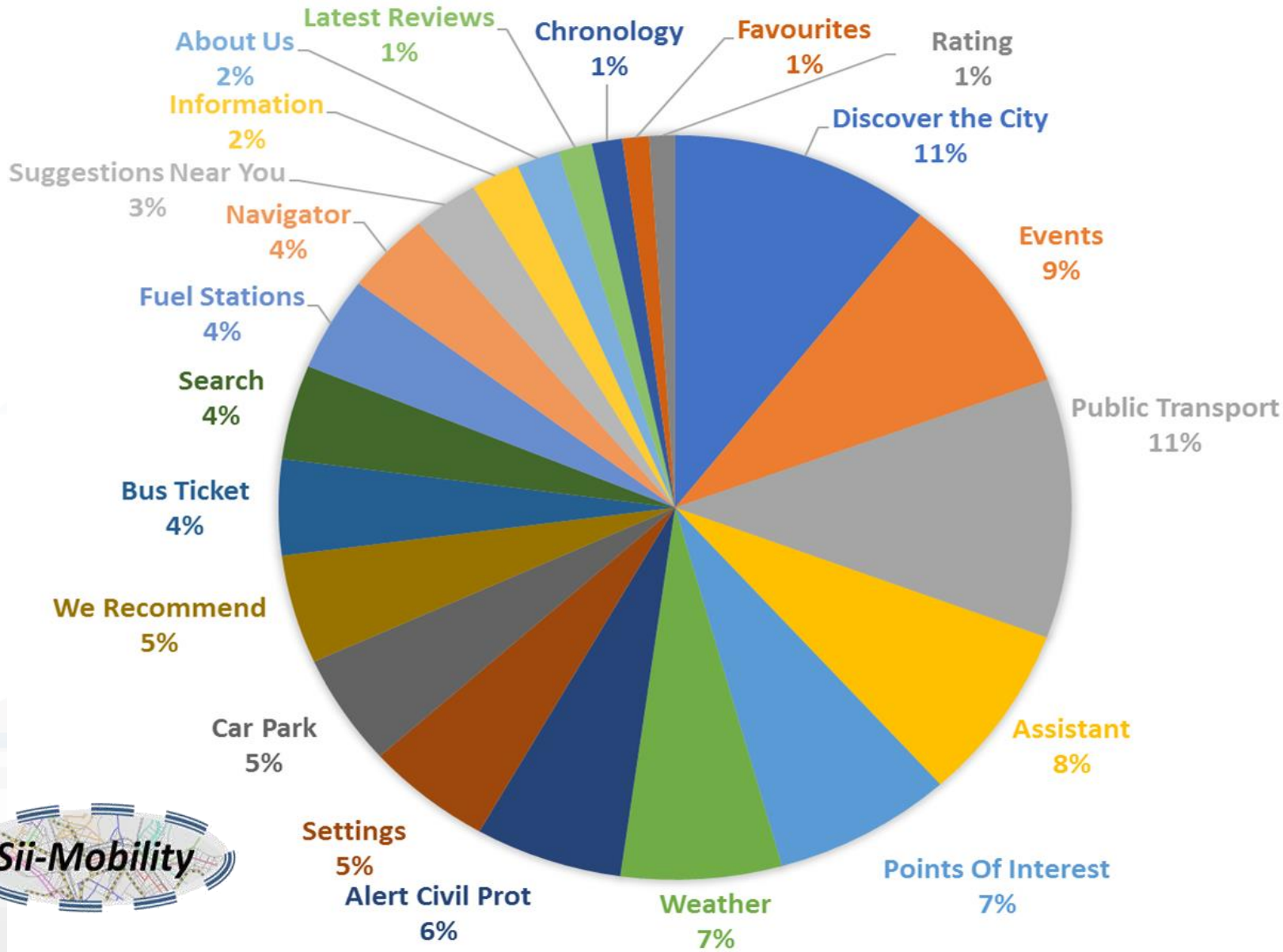
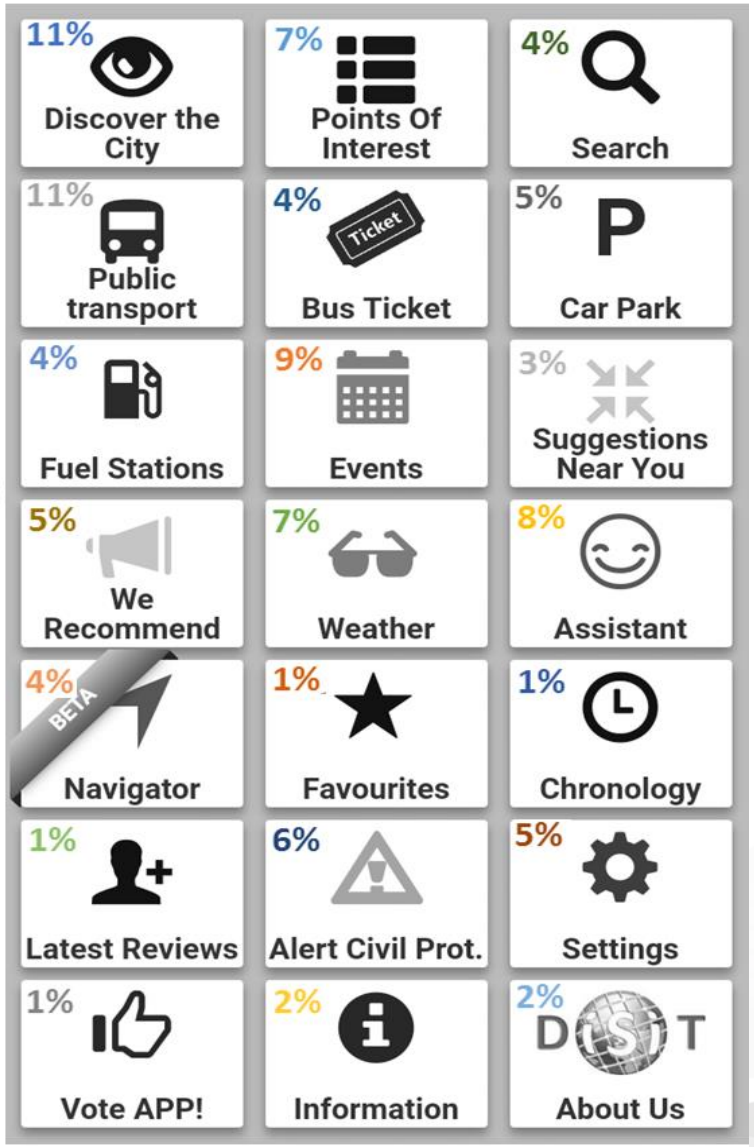
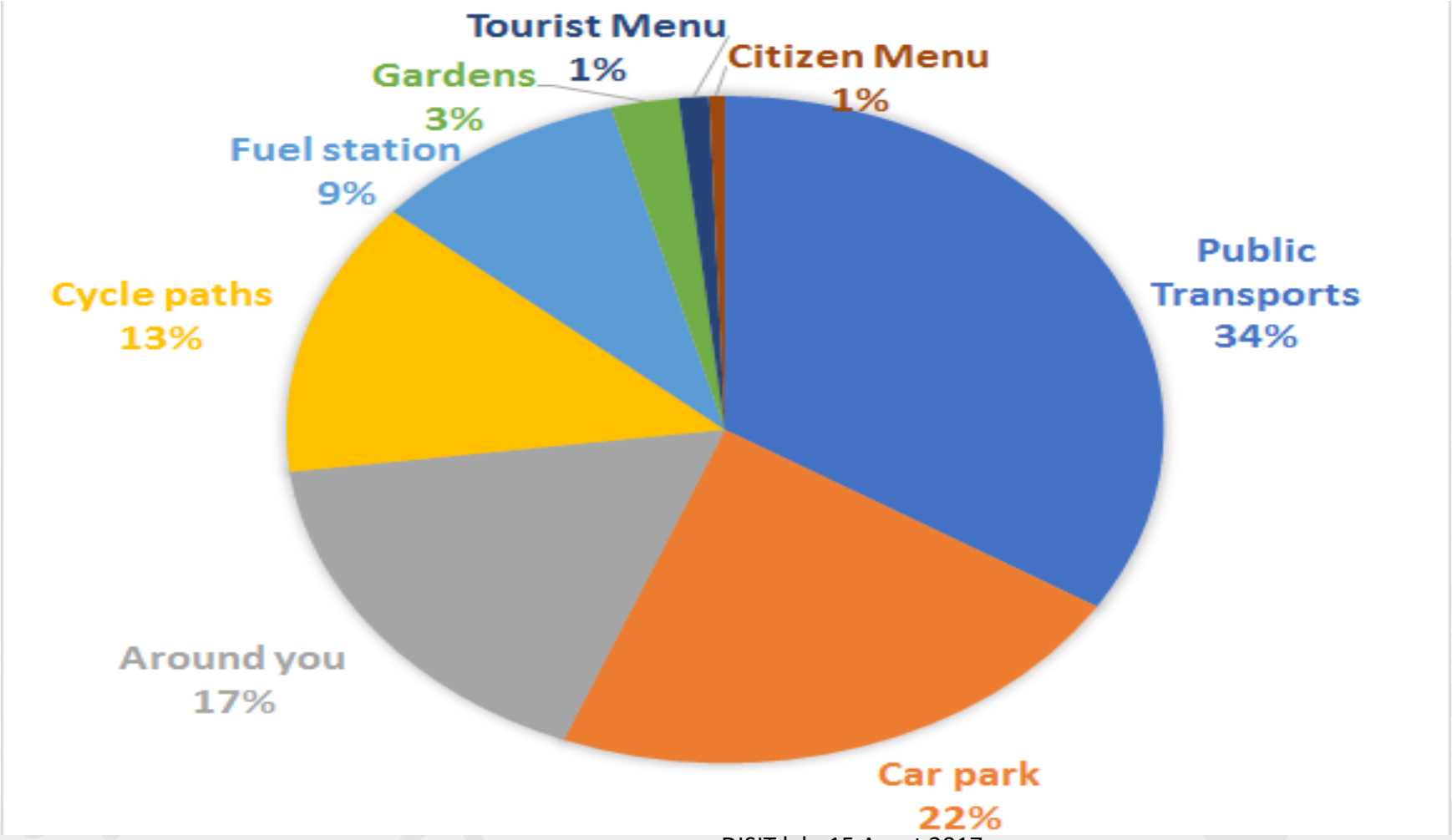
Usage of the main Menu



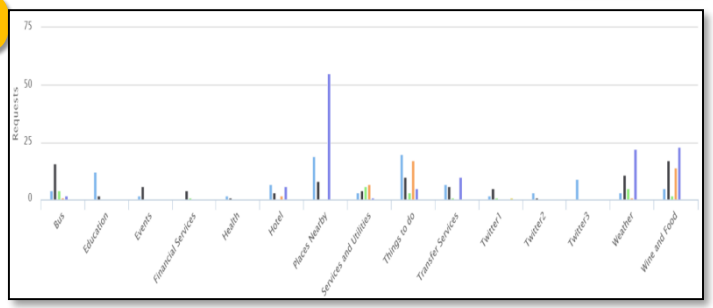


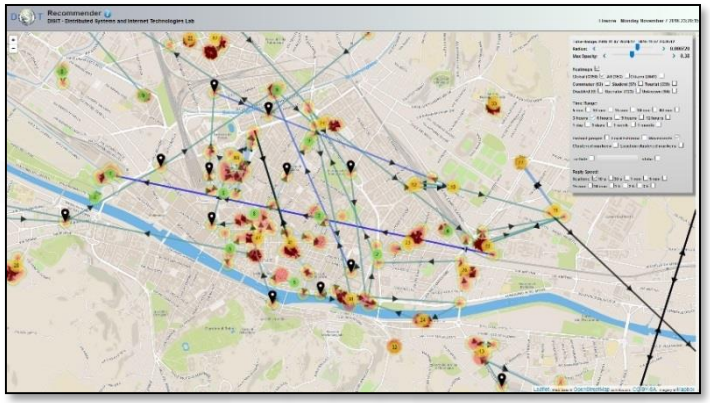
The most searches cathegories



Reasoning on App Data and for App

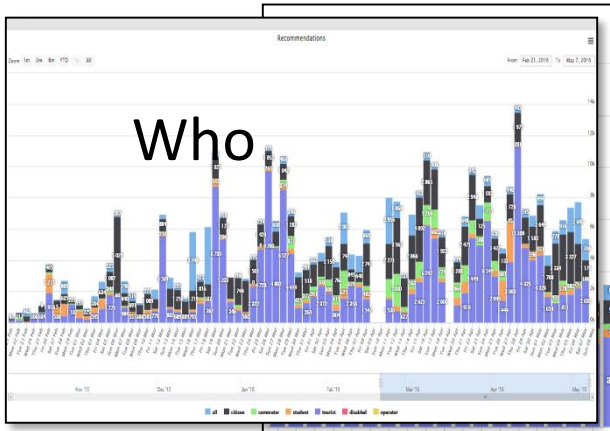
- **Suggestions….**
  - **ML, clustering..**
- **Engagements….**
  - **Rules systems, ML, city strategies**
- **User behavior analysis**
  - *Reconstruction of user behavior on t he move*
    and in the city in general
  - *Pedestrian, TPL, Bike, private, etc.*

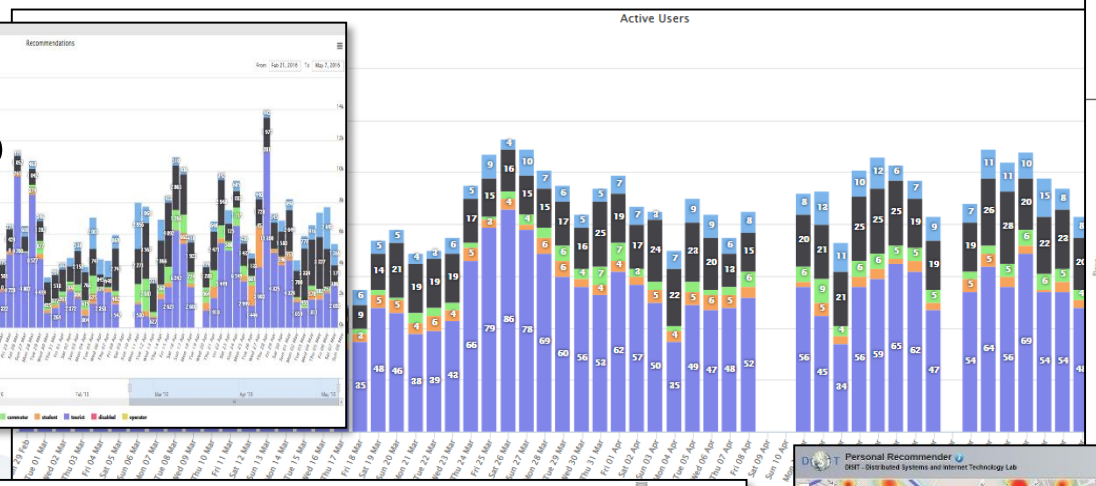


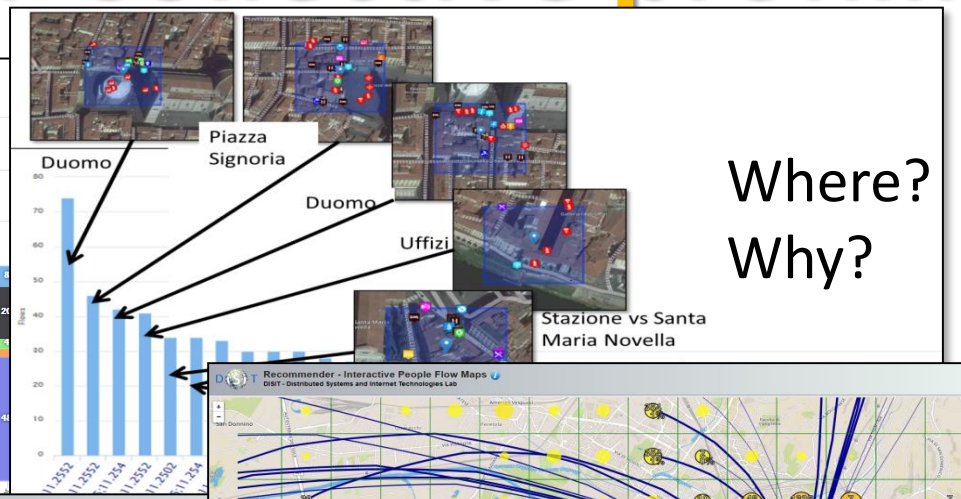


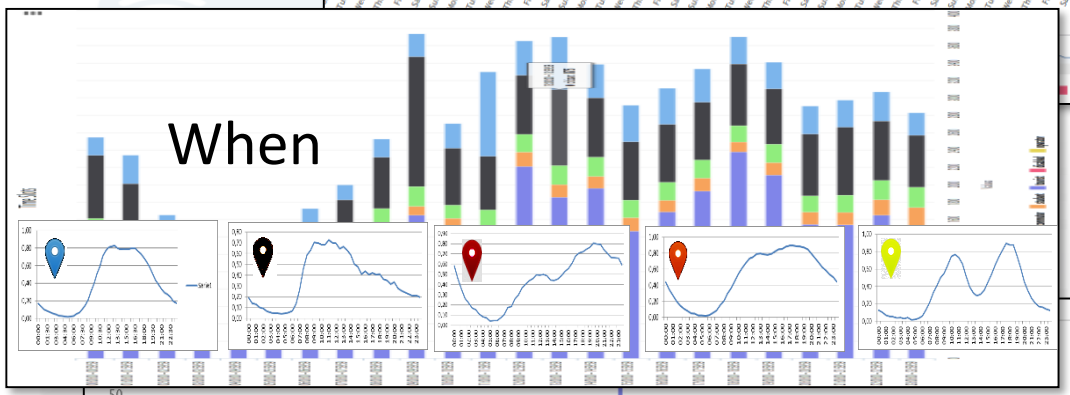
Rule name	Type	#sent	#viewed	#viewed on #sent	Description
daily_event_de	ENGAGEMENT	1 (0%)	0 (0%)	0%	Suggest (in german) an event currently on in Florence
daily_event_en	ENGAGEMENT	1720 (2.12%)	70 (7.1%)	4.07%	Suggest (in english) an event currently on in Florence
	- commuter	5 (0.29%)	0 (0%)	0 (0%)	
	- 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 (8.57%)	6 (5.04%)	
daily_event_es	ENGAGEMENT	6 (0.01%)	4 (0.41%)	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	5459 (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
shoot_a_photo_de	ENGAGEMENT	68 (0.08%)	1 (0.1%)	1.47%	Ask (in german) a contribution for a nearby point-of-interest

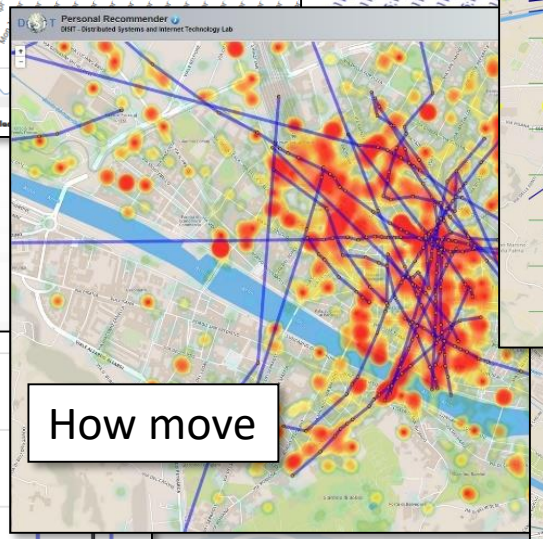
User Behavior Analyzer for Collective profiling

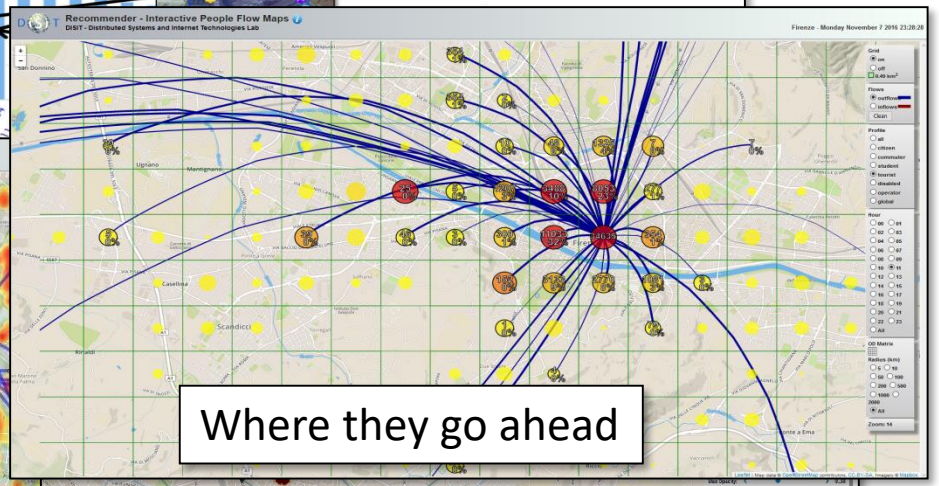


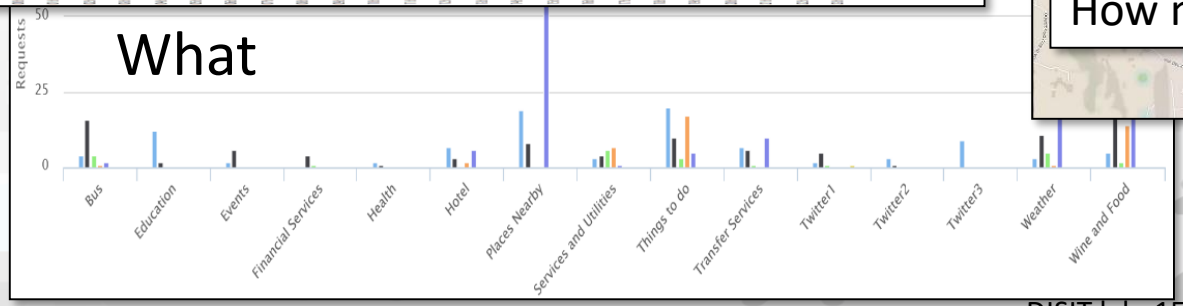


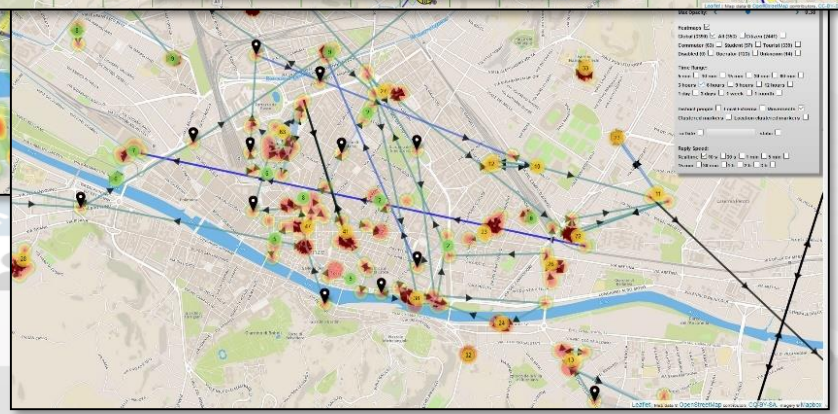












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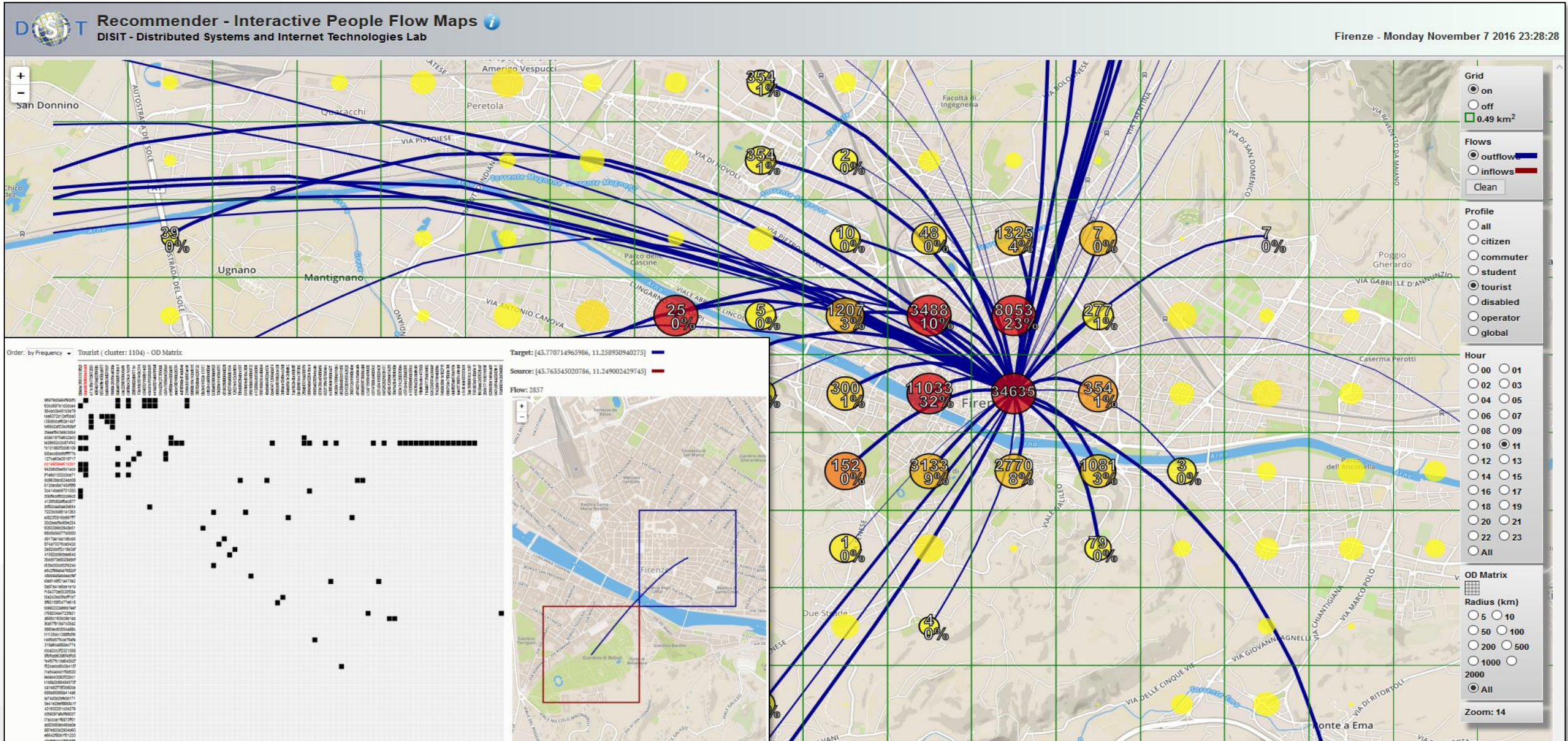
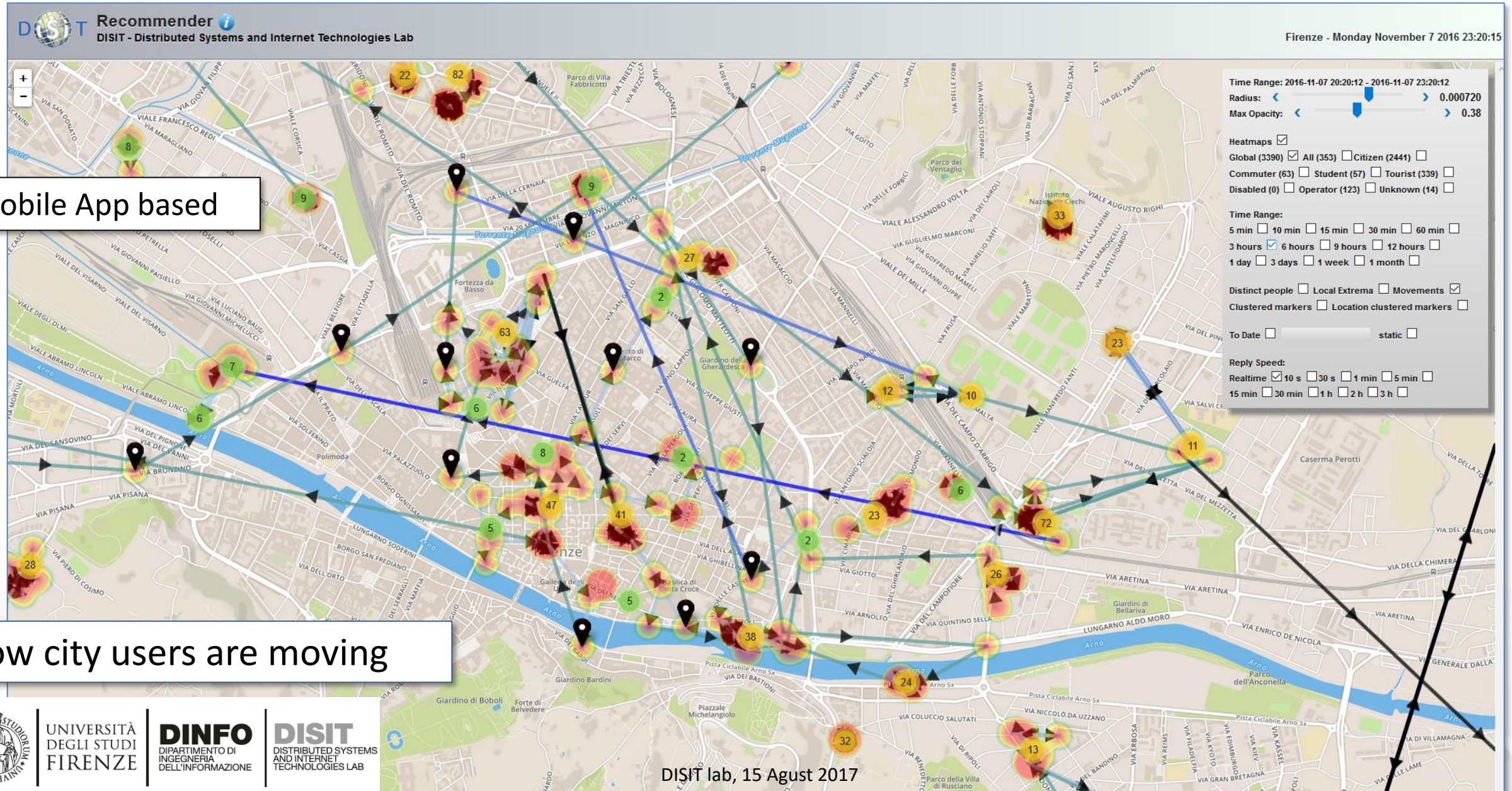
OD Matrix scalabile

Sii-Mobility



Anonymous User Behavior Analysis

Sii-Mobility

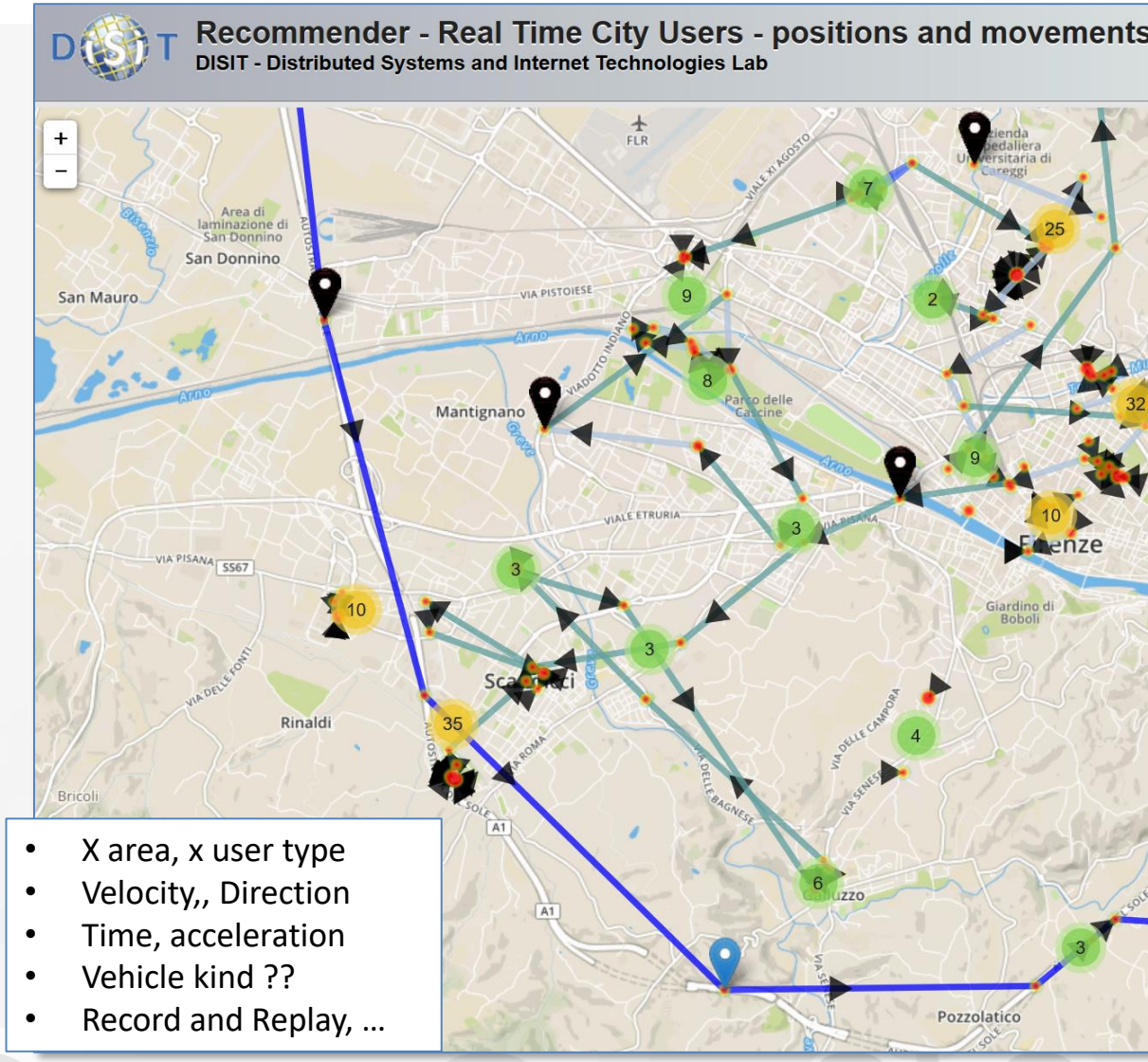


Mobile App based

How city users are moving

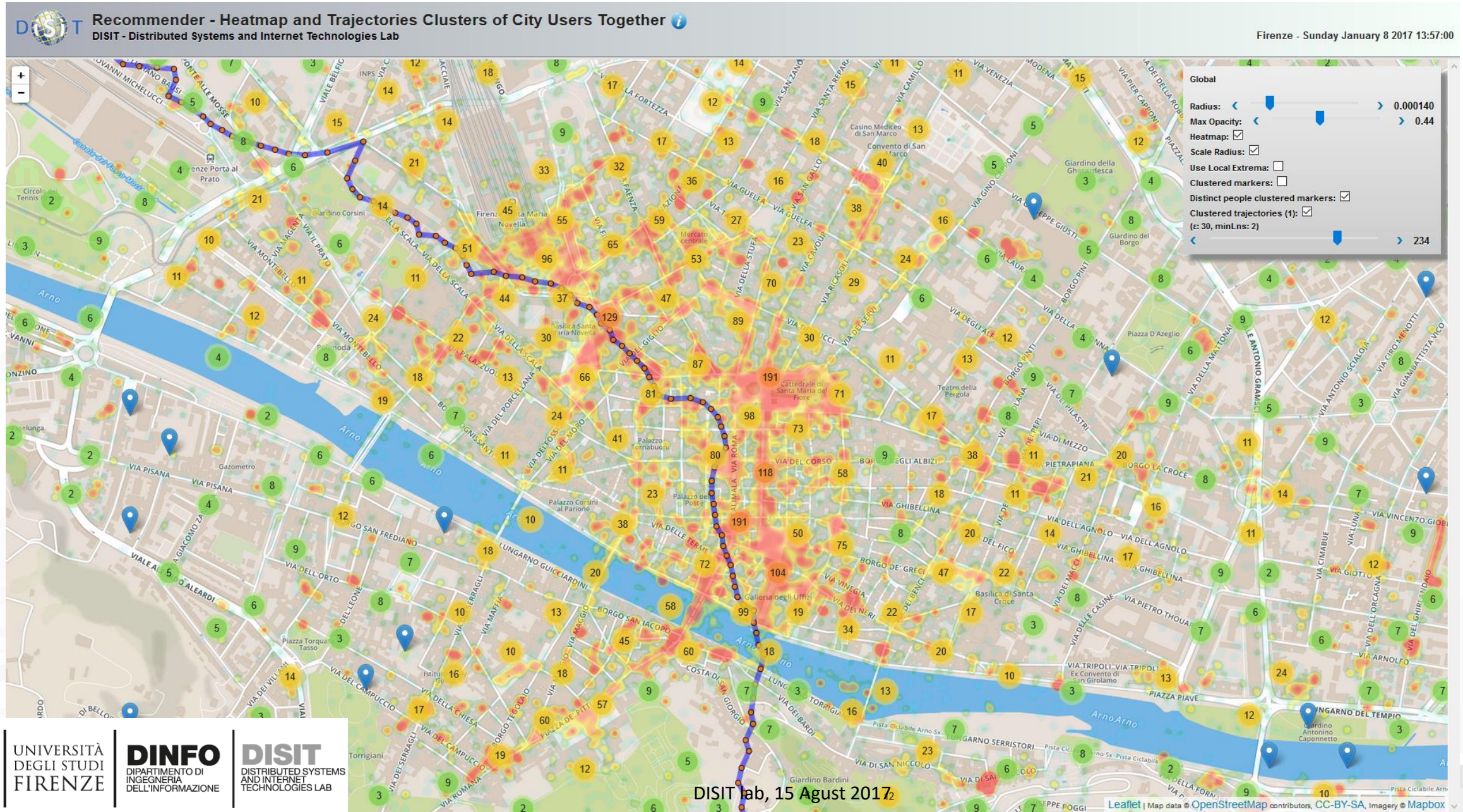
Problems of Trajectories from Apps

- **From mobile app:**
  - Resolving GPS location: GPS, cells, wifi-network, ..mixt
  - Noisy, different kind of devices, ..
  - Smart algorithm on devices for location acquisition
  - Anonymized data, terms of use on mobile
- **Issues and Filtering**
  - Gps Accuracy, kind of measure (GPS, mixt)
  - Jump in time, space, velocity
  - General noise (diff. devices)
  - Knowledge of precision map
- **Clustering**: time, space, user kind, etc.



- X area, x user type
- Velocity,, Direction
- Time, acceleration
- Vehicle kind ??
- Record and Replay, …

Heat Map from Mobile: users as sensors



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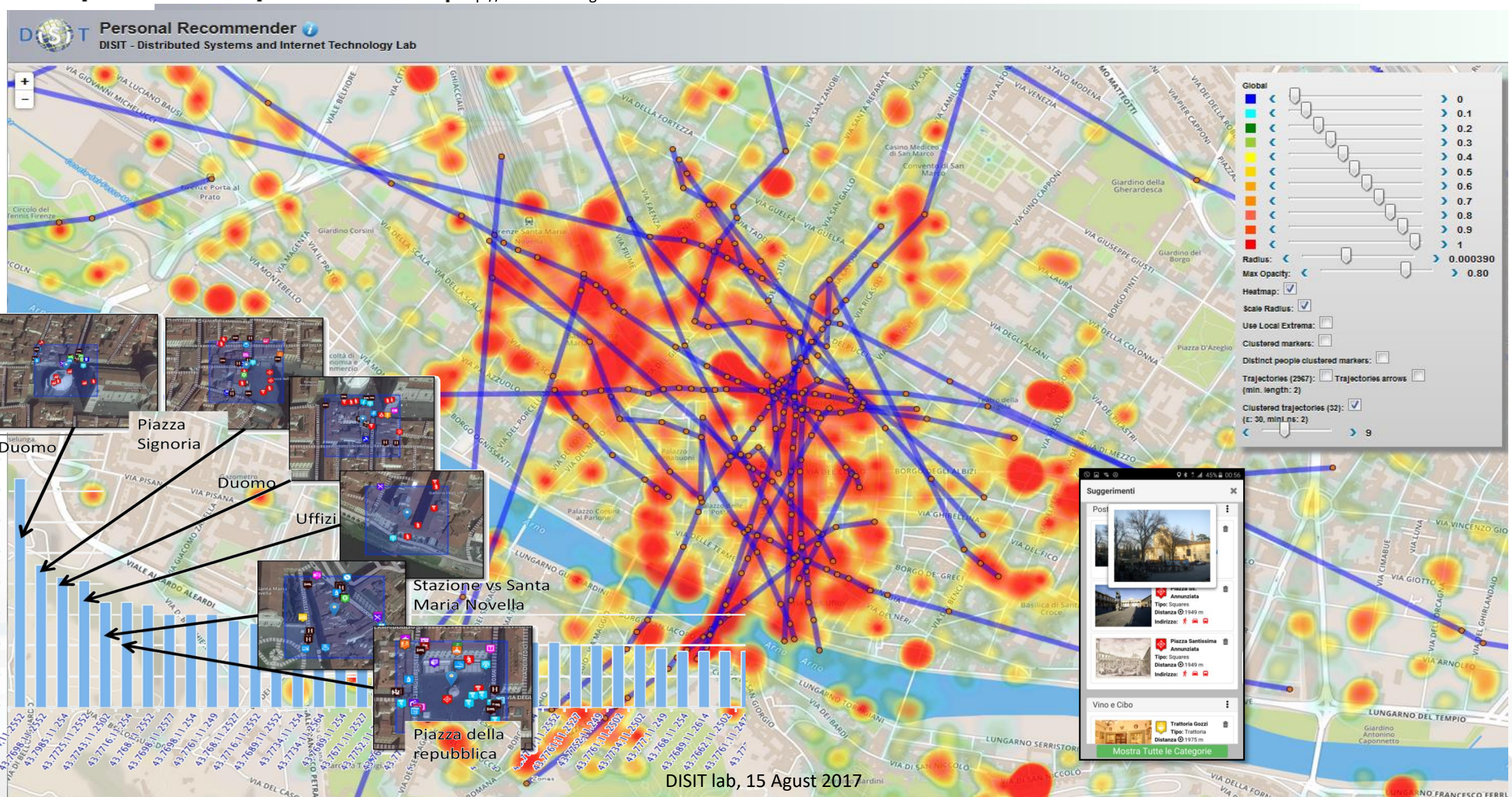
User Behavior Analyzer

Sii-Mobility



DISIT lab, 15 Agust 2017

Strategies Implementation via Engagement

- **Produce value from data enabling** to
  - ***Stimulate virtuous behavior,***
  - ***influence engage City Users!***
  - Increase efficiency in energy consumption
  - Reduce pollution and traffic congestion
  - Improve quality of service, quality of life
- **Create an ecosystem for innovation** and put in action any smart city solutions and services.

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 i
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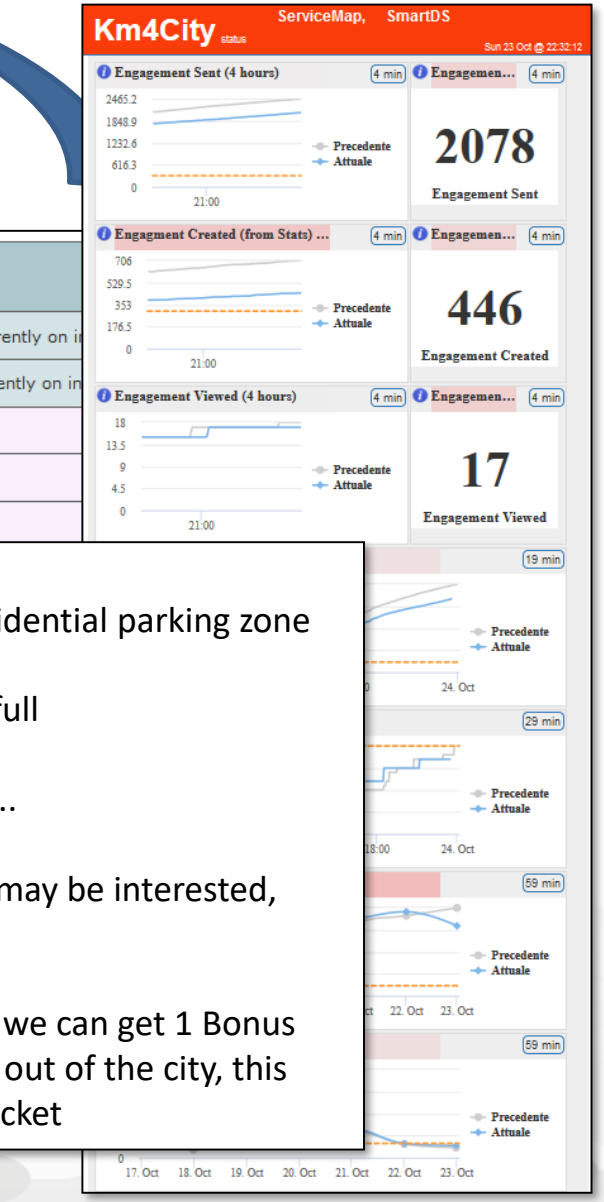
	- student	14 (0.81%)	0 (0%)	0 (0%)	
	- tourist	1462 (85%)	25 (35.71%)	25 (1.71%)	
	- citizen	113 (6.57%)			
	- operator	0 (0%)			
	- disabled	0 (0%)			
	- all	119 (6.92%)			
daily_event_es	ENGAGEMENT	6 (0.01%)			
daily_event_fr	ENGAGEMENT	6 (0.01%)			
daily_event_it	ENGAGEMENT	5459 (6.73%)			
parking_en	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

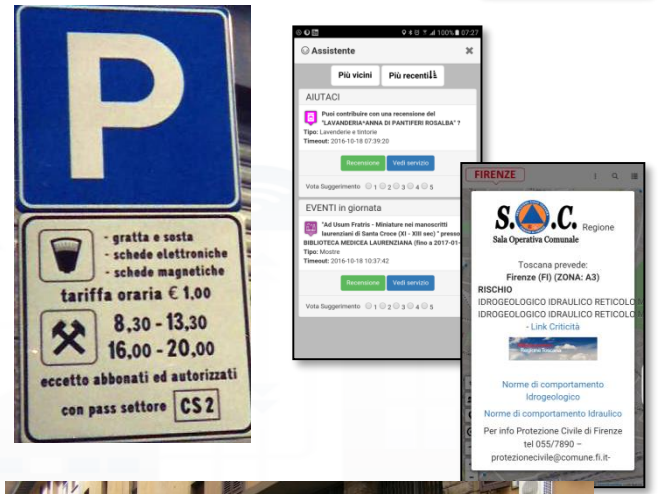
Events in the city, services your may be interested, etc..

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

Engagement & Assisstant Rules

- **Detecting** city users' habits about mobility
  - Private cars → **stimulating Bus Usage & Bikes**
  - Private cars parking → usage of **peripheral parking-lot + bus**
  - Leave the car and take the bus twice → by using **bonus, tickets**..
  - ….. → different solutions for moving…
- **Assisting by notifying** when one is
  - parking out of the residential parking zone
  - parking in a zone subjected to cleaning in the next two days
  - entering in the restricted traffic zone
- **Suggesting** you about
  - Events, **Civil Protection Alerts**, …..
  - **Closer free parking** …
- **Administering** questionnaires
  - Getting assessment about services, city experience
  - ….
- **Requesting** ranking, photo and/or comments



Monitoring City users Via Social Media

http://www.km4city.org/?controlRoom
http://www.km4city.org/?devTools
http://www.km4city.org/?infoDocs
http://www.km4city.org/?app

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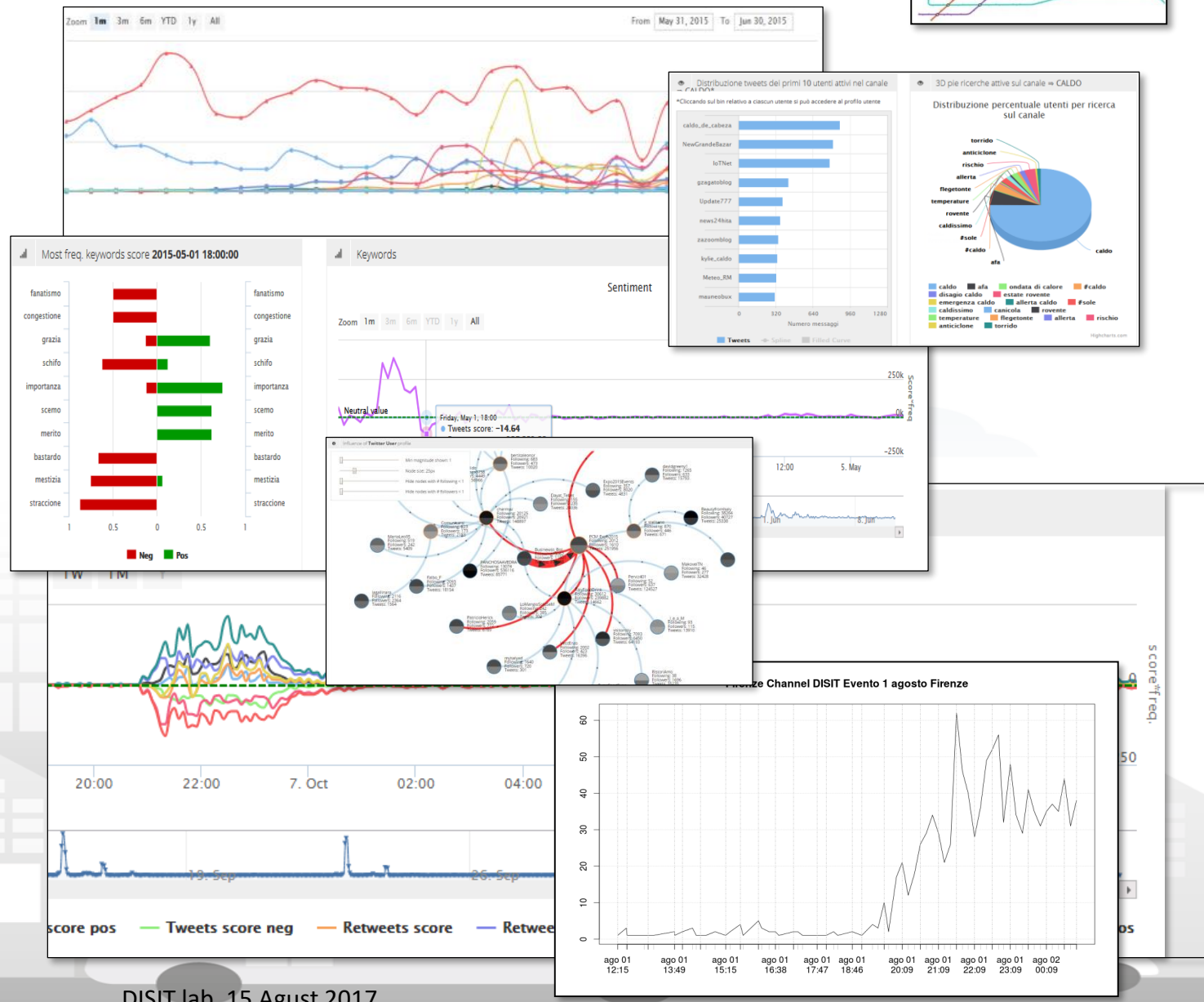
Twitter Vigilance

- 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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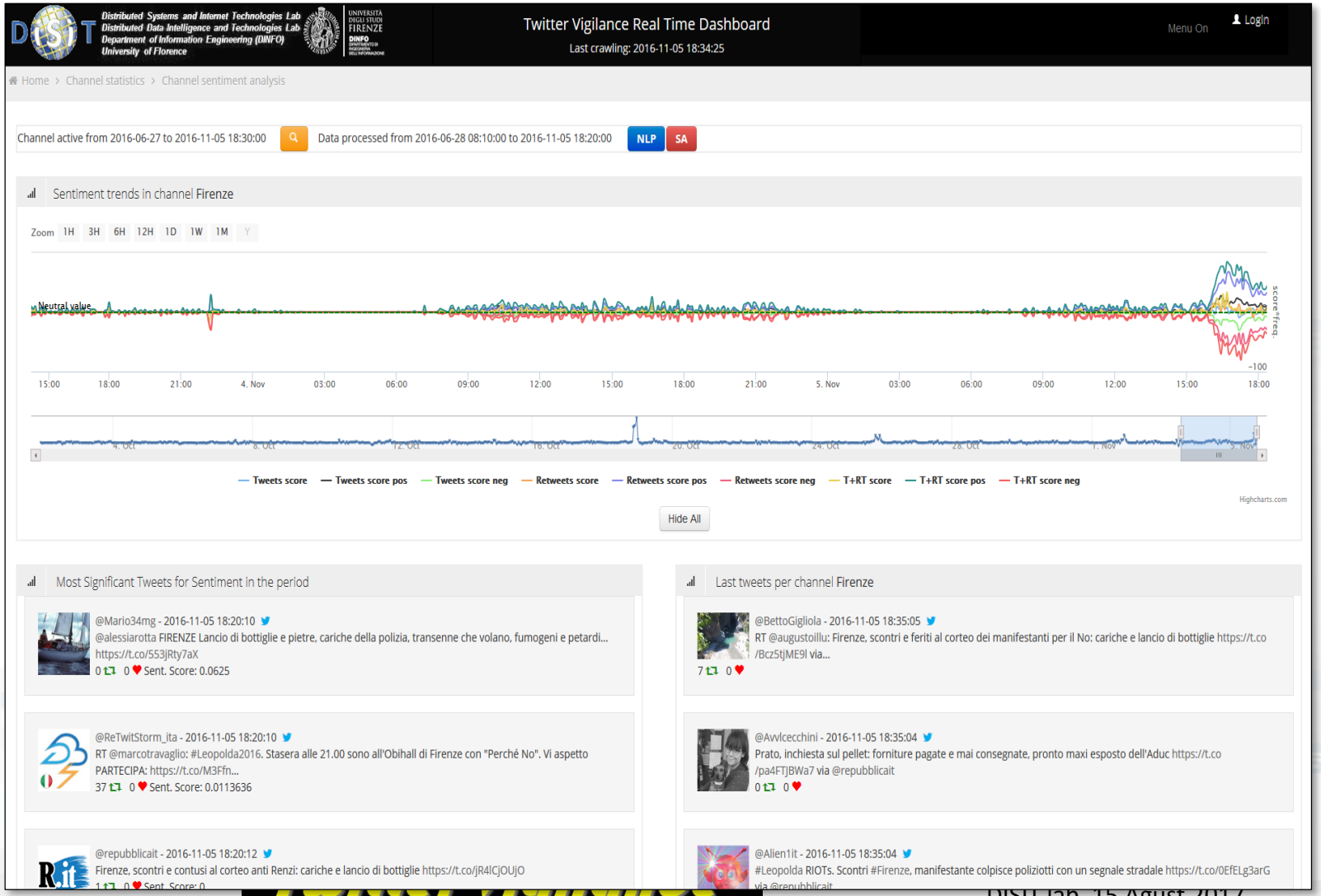
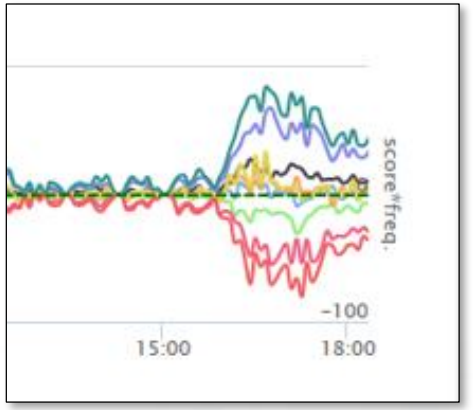
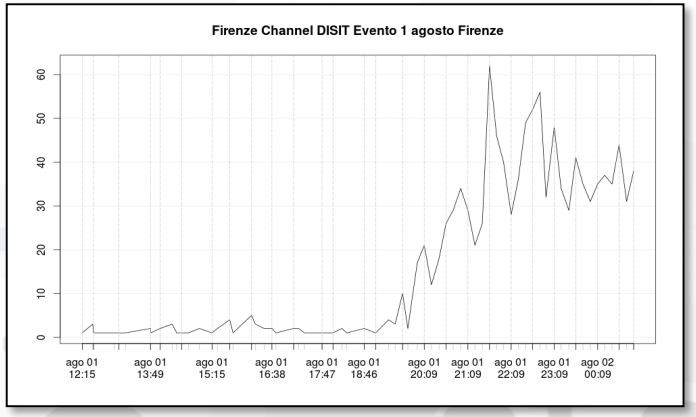
Twitter Vigilance

Real Time Twitter Vigilance, Early Warning



Sentiment Analysis

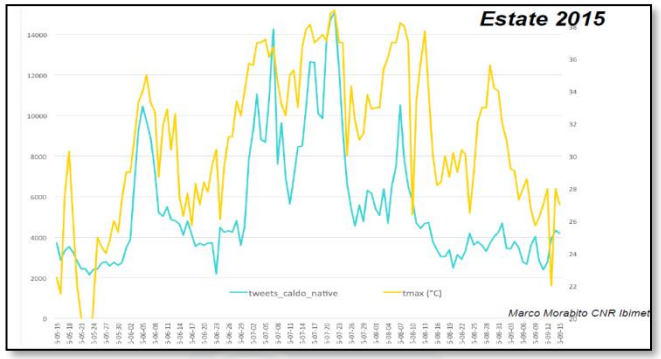




Twitter Vigilance

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



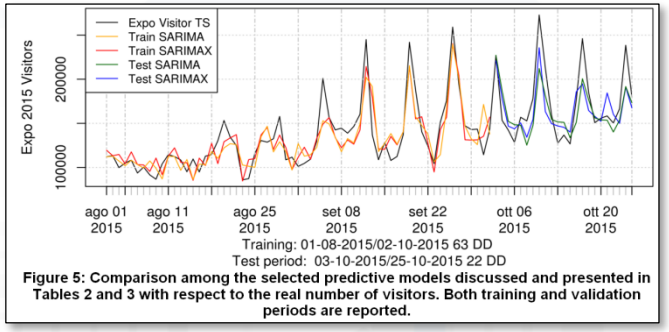
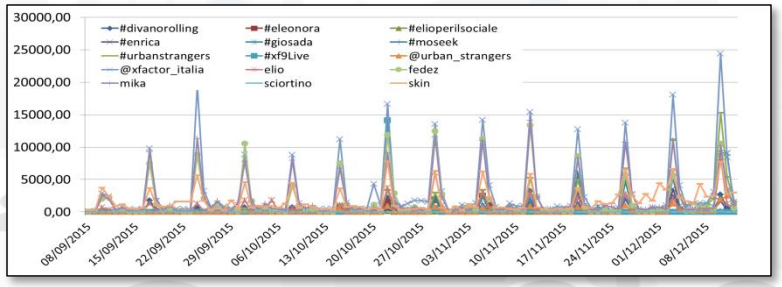
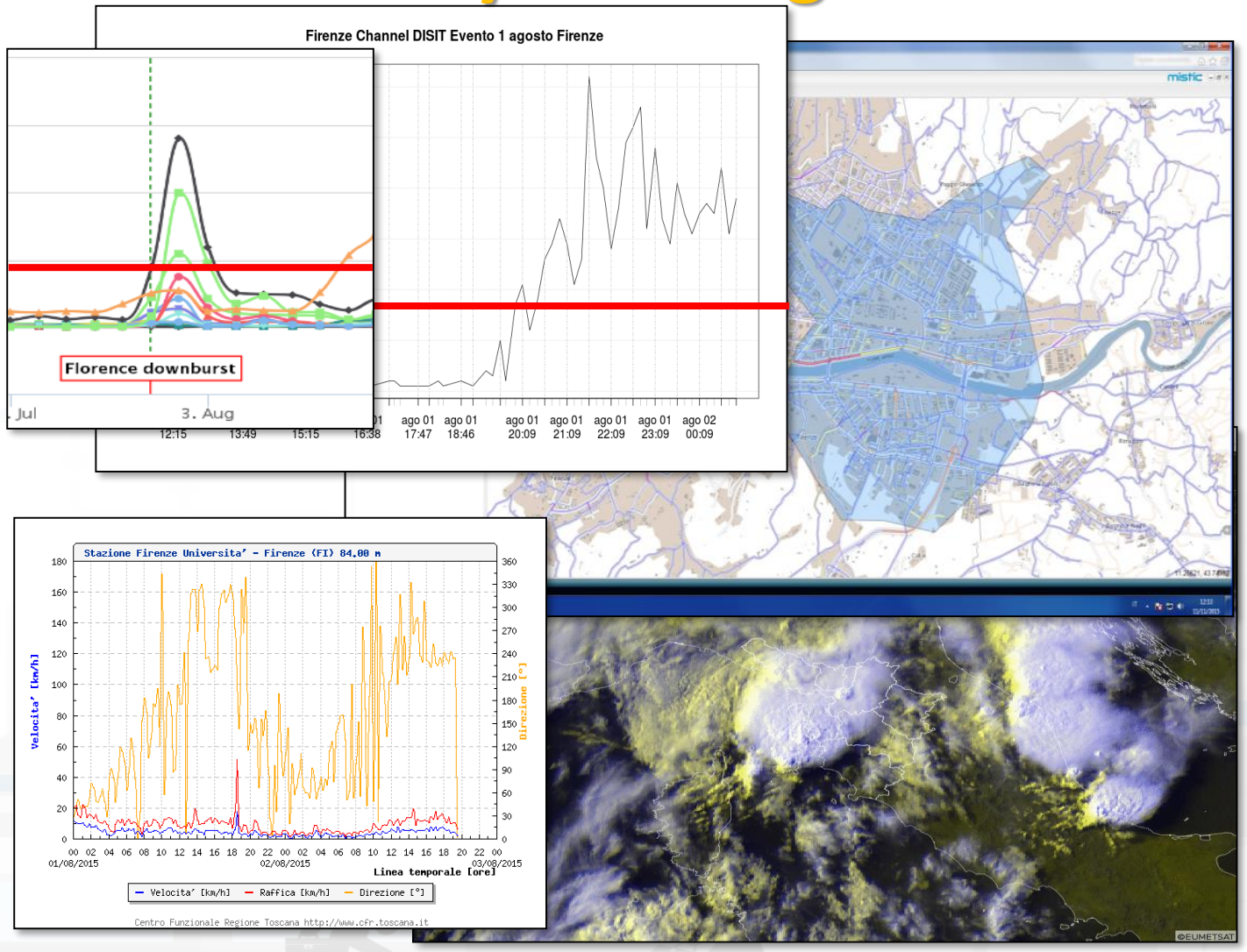


Figure 5: Comparison among the selected predictive models discussed and presented in Tables 2 and 3 with respect to the real number of visitors. Both training and validation periods are reported.

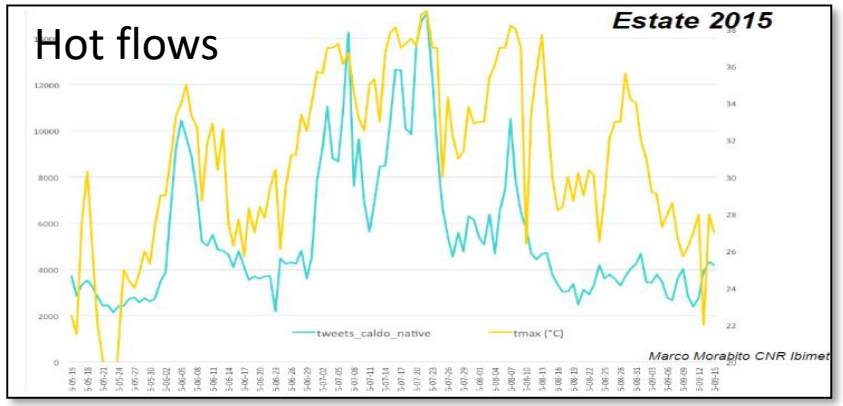


Twitter Vigilance

Early Warning



Predictive models



Attendance at long lasting events: EXPO2015

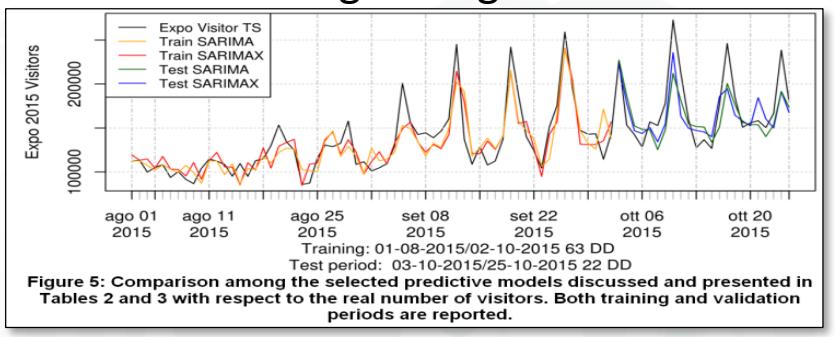
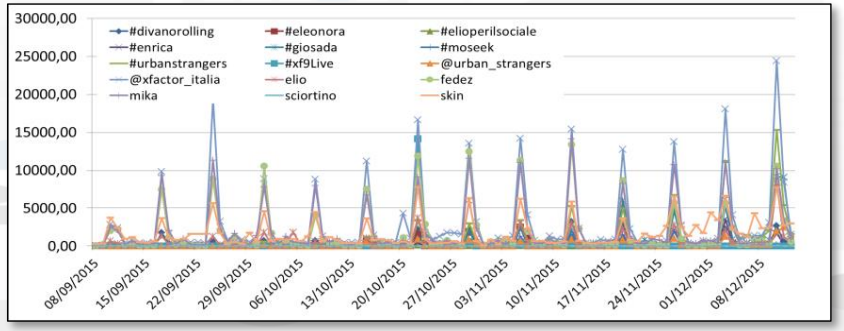


Figure 5: Comparison among the selected predictive models discussed and presented in Tables 2 and 3 with respect to the real number of visitors. Both training and validation periods are reported.

Attendance at recurrent events: TV, footbal



Twitter Vigilance su Firenze
(sperimentale)

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Sat 24 Dec @ 10:37:57

Twitter: Volume di Tweet tramite Twitter Vigilance

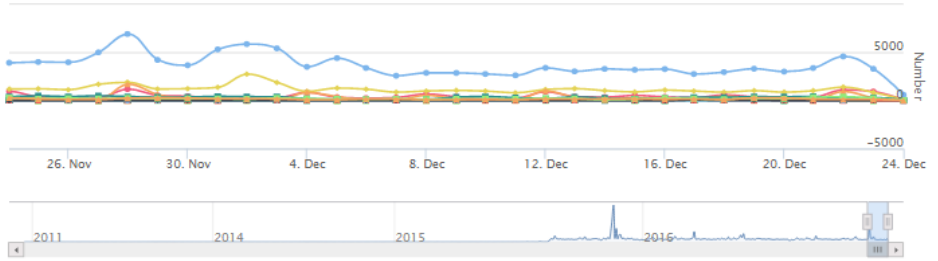
Twitter Vigilance Dashboard
Last crawling: 2016-12-24 12:34:51
Menu On | Login

Home > Channel statistics > Statistics on single Channel

Channel active from 2009-02-27 to today | Data processed from 2015-05-22 to 2016-12-02 | NLP | SA

Search related to channel **Firenze**

Zoom 1m 3m 6m YTD 1y All | From Nov 24, 2016 To Dec 24, 2016



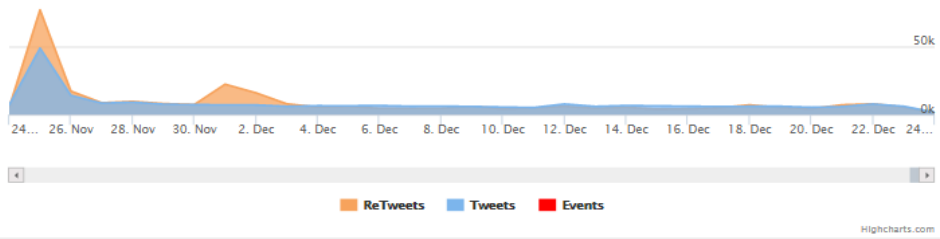
#Accademia #Aereoporto #Firenze #Aeroporto #Firenze #bargello #expo2015 #Firenze #fiorentina
#firenze #Florence #smartcity #fodd #ODDIT15 #Firenze #opendata firenze #pontevecchio
#uffizi @acffiorentina @BandieraiUffizi @Biblio_ComuneFi @bncfirenze @comunefi
@DarioNardella aereoporto @DiscoverTuscany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

Highcharts.com

Hide All

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

Zoom 1m 3m 6m YTD 1y All | From Nov 24, 2016 To Dec 24, 2016



Highcharts.com

Sentiment Analysis in Tempo Reale su Firenze

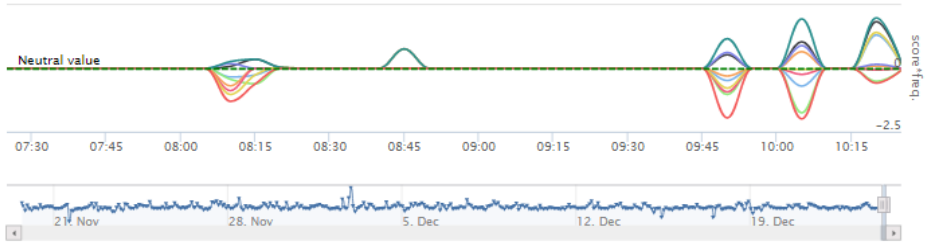
Twitter Vigilance Real Time Dashboard
Last crawling: 2016-12-24 10:32:33
Menu On | Login

Home > Channel statistics > Channel sentiment analysis

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
NLP | SA

Sentiment trends in channel **Firenze**

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



Tweets score | Tweets score pos | Tweets score neg | Retweets score | Retweets score pos
Retweets score neg | T+RT score | T+RT score pos | T+RT score neg

Highcharts.com

Hide All

Most Significant Tweets for Sentiment in the period

@forealziesdayle - 2016-12-24 10:25:39
@Ahno_its_arno meh, I've only had average curry there
0 0 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 0 Sent. Score: 0

@infoitinterno - 2016-12-24 10:30:05
Firenze, un piano per un Natale sicuro (055firenze) https://t.co/vpqDAsEspi https://t.co/2Bn5k3zoyv

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 0

@MORINEMMANUELL2 - 2016-12-24 10:30:14
RT @Navymat: Francesco #Salviati Carità,1543 #Manierisme Galleria degli Uffizi, Firenze @ChevernyM @mariaireneali @pieroBENEDETTO @Giusepp...
6 0

@infoitinterno - 2016-12-24 10:30:12

Twitter Citazioni

TRENDS | QUOTES

@NICOLODIDARIA
@COMUNEFI
@ACFFIORENTINA
@NAZIONE_FIRENZE
@SANTACROCEOPERA
@MUSEONOVECENTO
@FIRENZEDIGITALE

Twitter Hashtag trend

TRENDS | QUOTES

#FIRENZE
#FIORENTINA
#UFFIZI
#PONTEVECCHIO

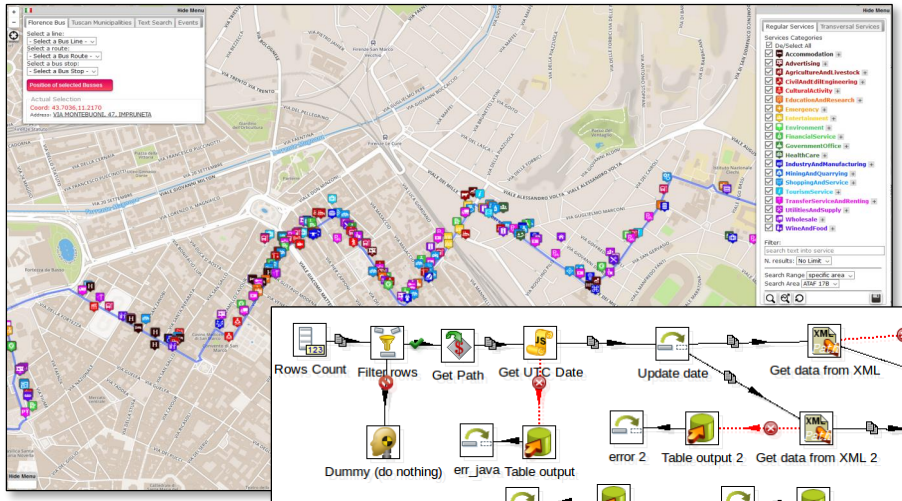
We suggest to use Chrome browser for better experience

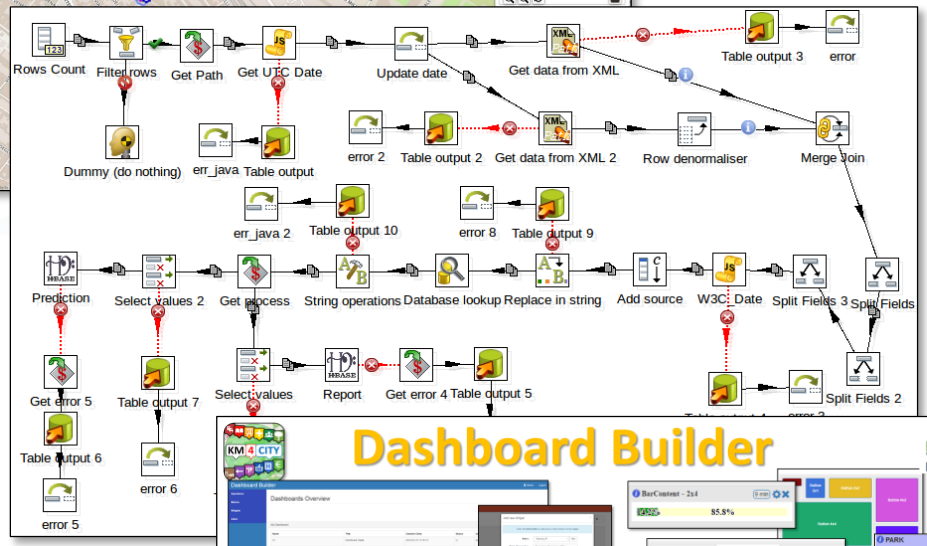
Development Tools

http://www.km4city.org/?controlRoom
http://www.km4city.org/?devTools
http://www.km4city.org/?infoDocs
http://www.km4city.org/?app

Development Tools

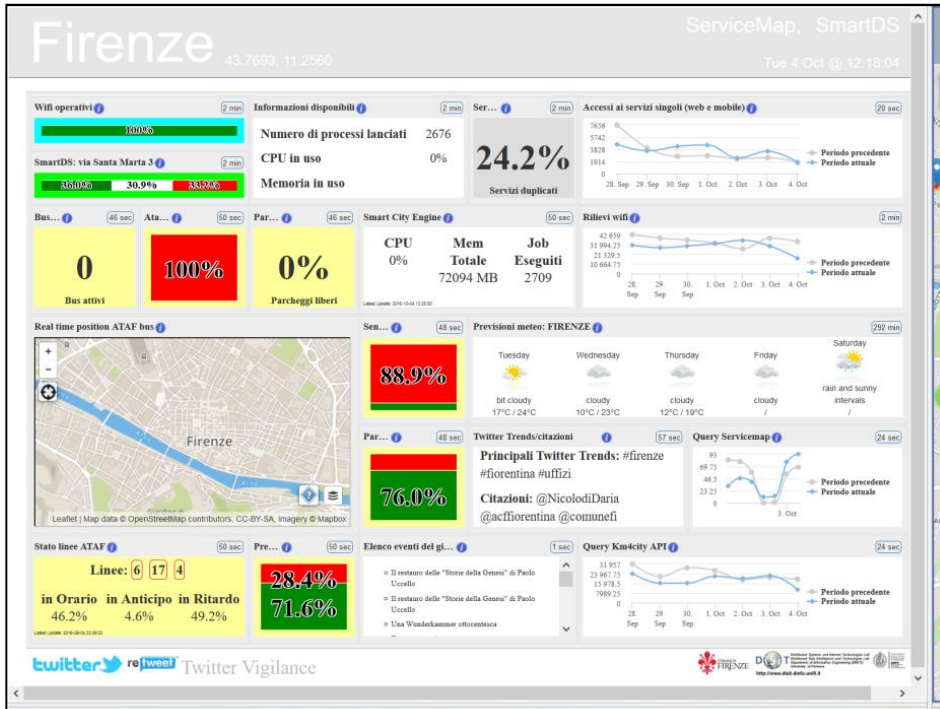
- **Smart City API:**
  - Several kind of APIs
- **Generator "ServiceMap", http://servicemap.km4city.org**
  - Call per web and mobile App
  - Embedding in web pages
  - ***Collaborative work***
- **Load new data: manual and automatic**
  - POI, IOT, etc.
  - Load of Shape & Paths
  - ***Collaborative work***
- **Dashboard builder**
  - Production of dashboard per control room
  - Embedding view of any other analytics of Km4City or of third party: wifi, 3D, flow, recommend, engager, etc.
  - ***Collaborative work***

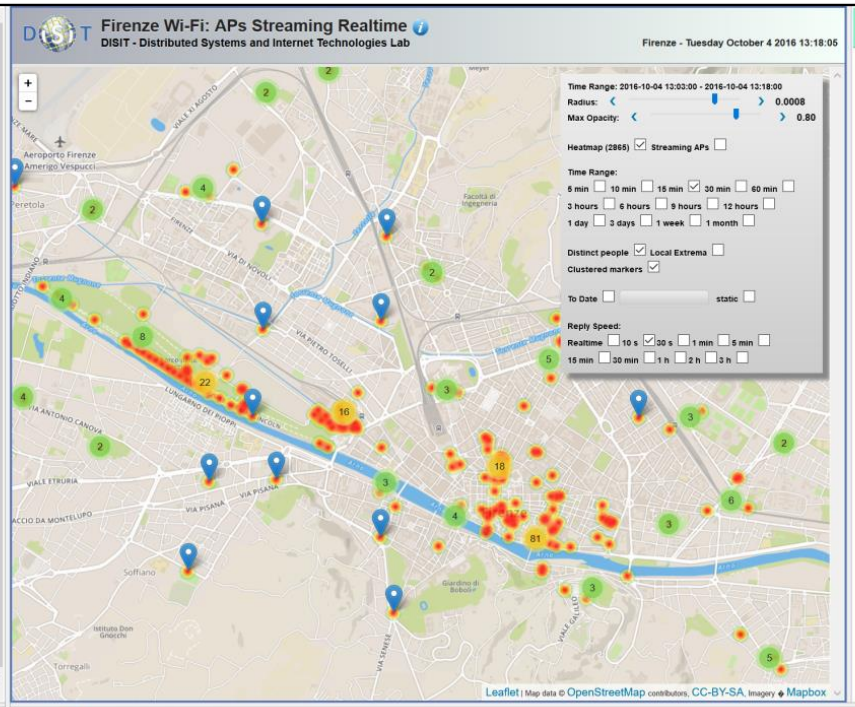


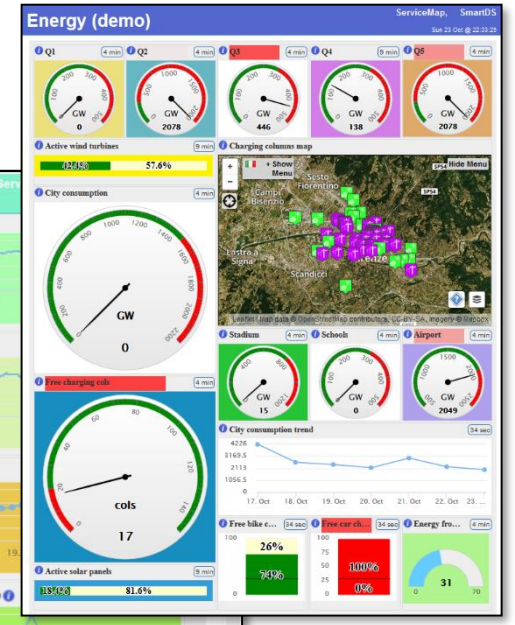


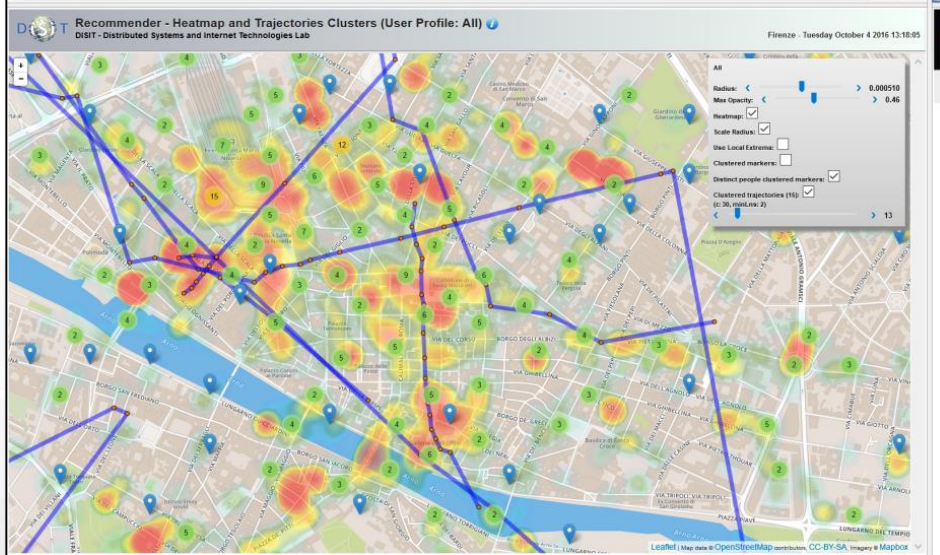
Higher level Dashboard

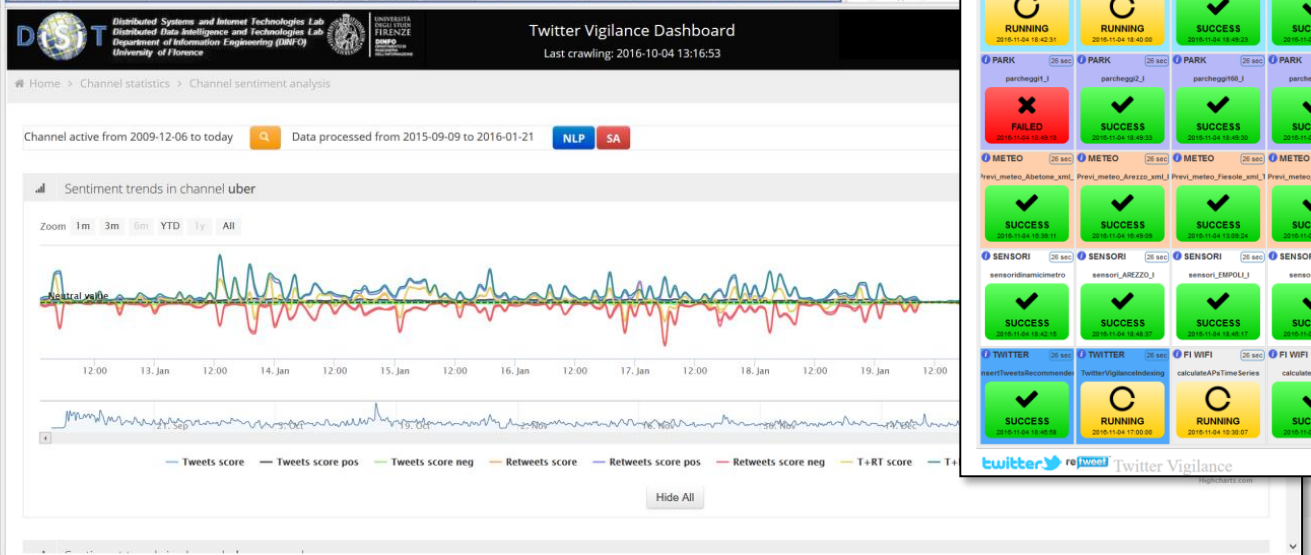
REPLICATE











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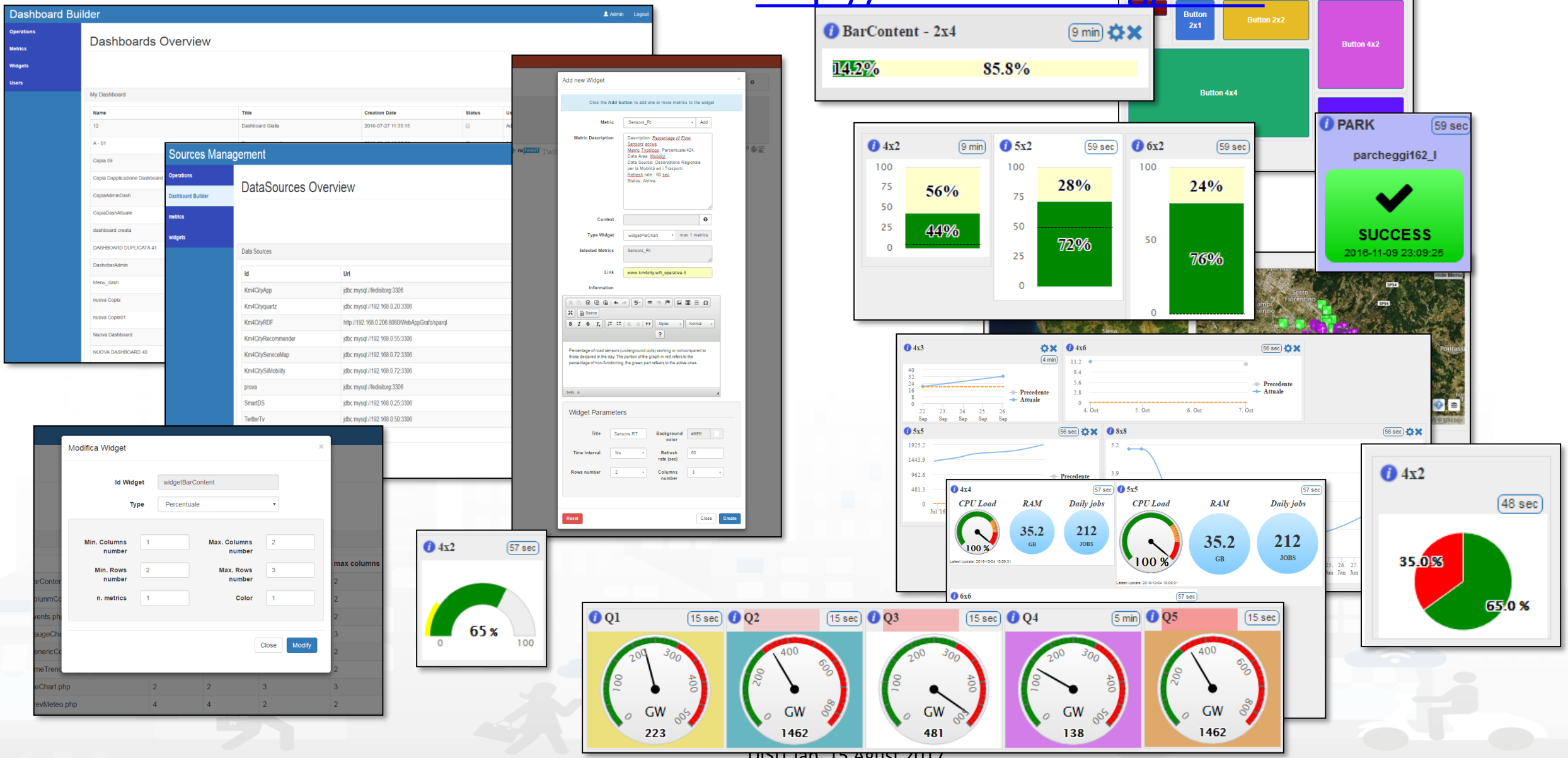
DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB
http://www.disit.org

REPLICATE

Dashboard Builder

http://www.disit.org/6935



Transport systems
Mobility, parking

Public Services
Govern, events, …

Sensors, IOT
Cameras, ..

Environment,
Water, energy

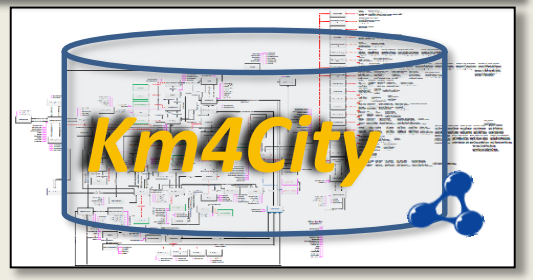
Shops, services,
operators

Social Media
WiFi, network

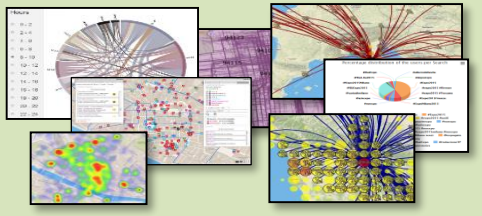
Static, Slow and Real Time data flows

DISCES -- Distributed and parallel architecture on Cloud

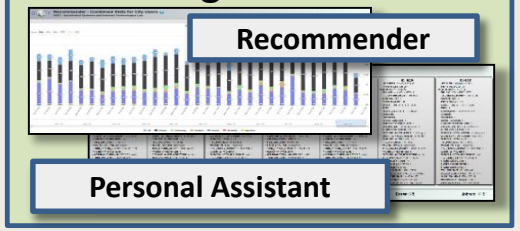
Km4City Smart City Engine



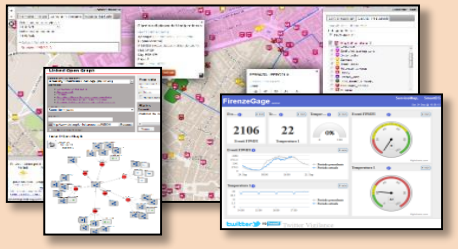
Big Data Analytics



Smartening Tools



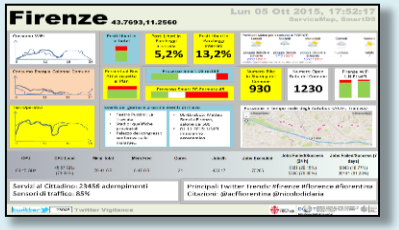
Development Tools



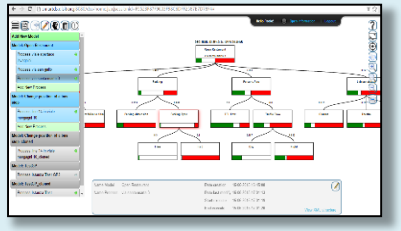
Km4City Smart City API

City Operators and Decision Makers

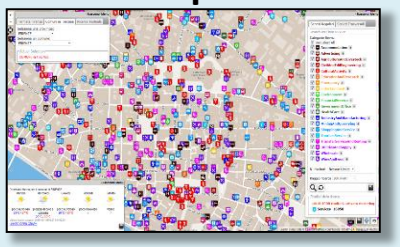
Dashboards



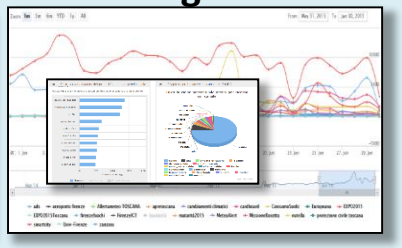
Smart Decision Support



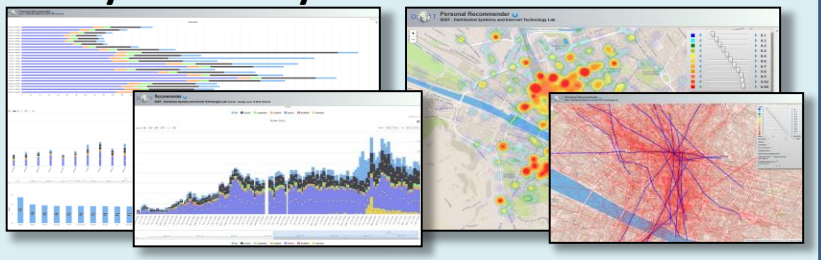
ServiceMap browser



Twitter Vigilance

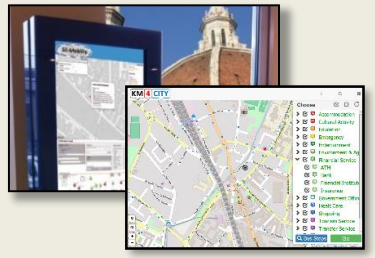


Analyzers of City User Behavior



Tools for Final Users

Mobile e Web Apps



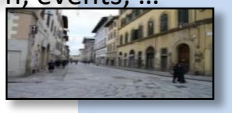
KM4CITY

Sii-Mobility

Http://www.km4city.org

Transport systems
Mobility, parking

Public Services,
Govern, events, …



Sensors, IOT Cameras,
Wi-Fi ..

Environment, Water,
energy

Shops, services,
operators

Social Media

Social Media Crawler and Manager

ETL
Static Data harvesting

ETL
Quality Improvement

ETL
Data Mapping To triple

Hbase Store

R2RML Models

Data Mapping To triple

ETL

Sensors and streams: AVM, Parking, environment, weather, IOT, Etc…

Real Time Data Ingestion (ETL)

Real Time Data Stream (wifi+)

IOT Brokers….

Real Time Data

DISCES: Distributed SCE Scheduler

Phoenix

Hbase noSQL

User profiling Storage

Km4City Ontology

Other SPARQL End points

New triple

RDF Store SPARQL End point

RDF Store SPARQL End point

RDF Store SPARQL End point

Smart City Developer Environment: ETL, Java, Big data

Linked Open Graph

SPARQL RDF Store Interface

Sii-Mobility

Web and mobile Applications

Smart City API + Conditional Access

Service Map

Smart City Network API

Participation Platform

Analytics: suggestions, user behaviour, clustering, prediction, early detection, Routing, ….

Big Data Analytics

DISCES: Distributed SCE Scheduler

Sensor Server and Manager

Suggestions on Demand

User Engagements on Demand

User Crowd Sourcing Manager

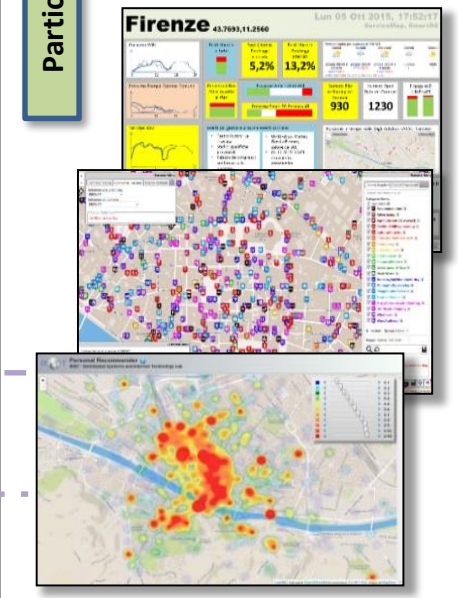
Ticketing and Booking

User Profiler

Dashboard Engine and Dashboard Builder

Smart Decision Support

Dashboards x Control Room



Algorithm Loader

Monitoring Services Interface

Notificator

Authentication Support Tool (LDAP)

Big Data Warehouse
Knowledge Management
Big Data Analytics
User Management
NoSQL Storage
Decision Support
System Support

DISIT lab, 15 Agust 2017

Dashboard Management System

databases

SQL
noSQL

Pull

Ext. serv

Rest Call

Ext. serv

Push

Streams

stream

Data Mart

Selection process

Dashboard Builder

Data Sources

DM. Settings

LDAP

Metric Definition

Dashboard Builder

Widget Models

Data Collect or as Metric Engines

Metric historical values

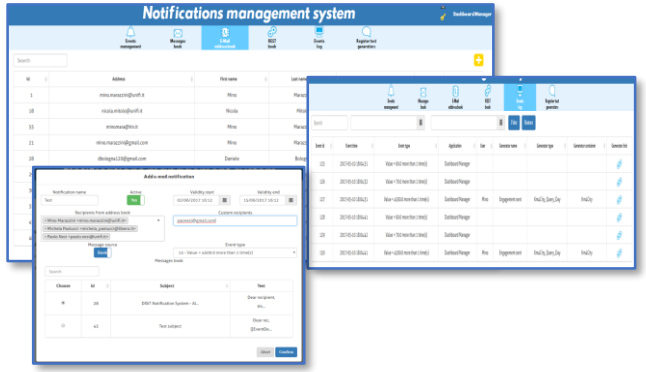
Firing Assessment

Dashboard Engine

Dashboard & Widget Instances

Direct in/out streams

External Tools as Web pag: maps, analytics



Send mailer

Send SMS

Send mail

External Services

Ticketing Service

REST call

Notificator

Logger

N. Settings

Notifier

LDAP

Any Third party Tool

REST call for Subscription and Notification

REPLICATE

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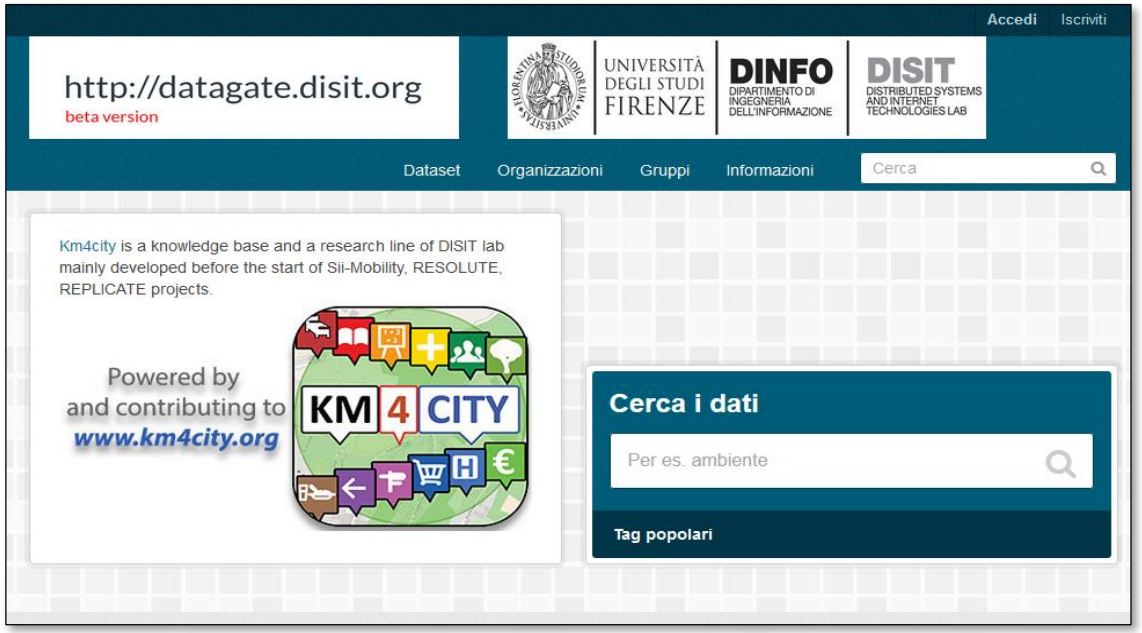
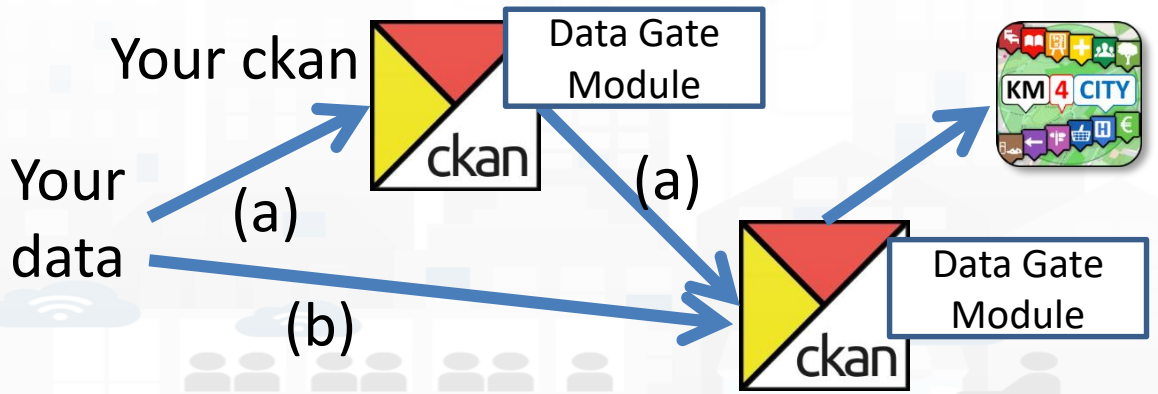
http://DataGate.disit.org

DISIT DataGate

- To load new data into Km4City model in short time ..
  - Upload your CSV, XLS, XLSX directly on our CKAN DataGate.
- DataGate allows you
  - fastening the data ingestion, from your CKAN to our model
  - formatting and improving your data, assisting you in the process





http://DataGate.disit.org

Sii-Mobility

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http://www.disit.org

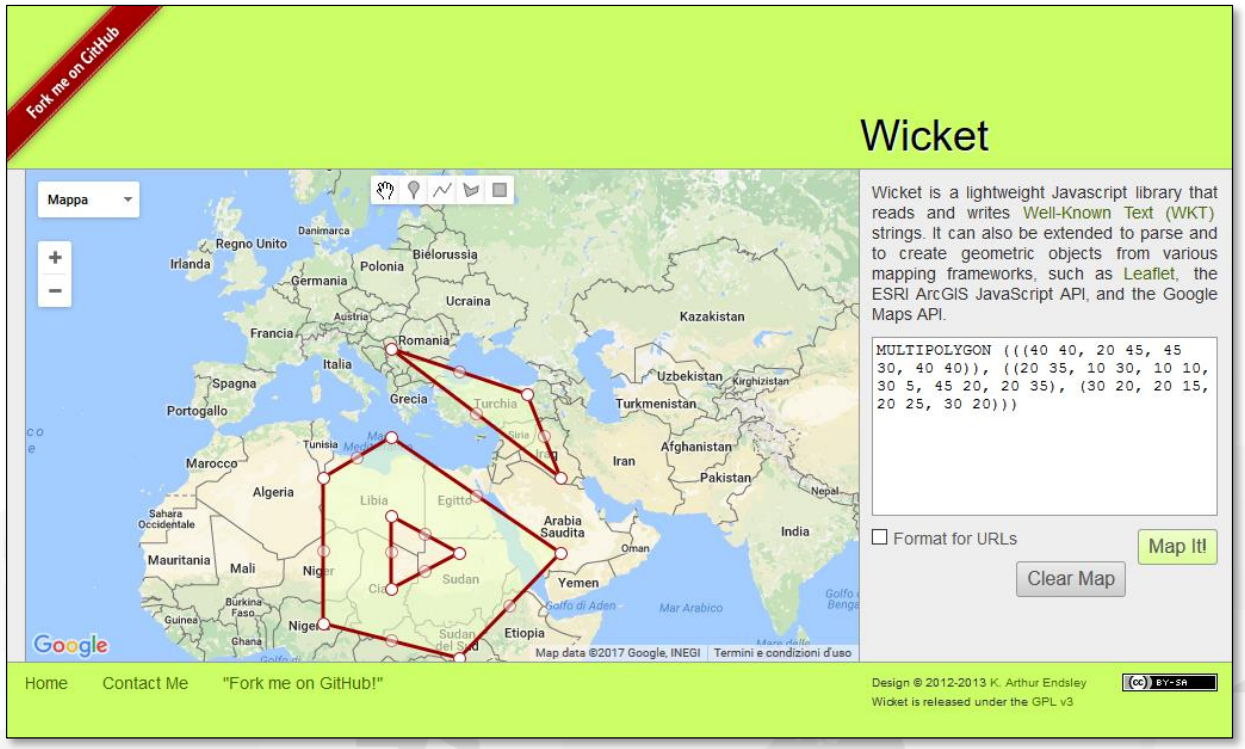
Sii-Mobility

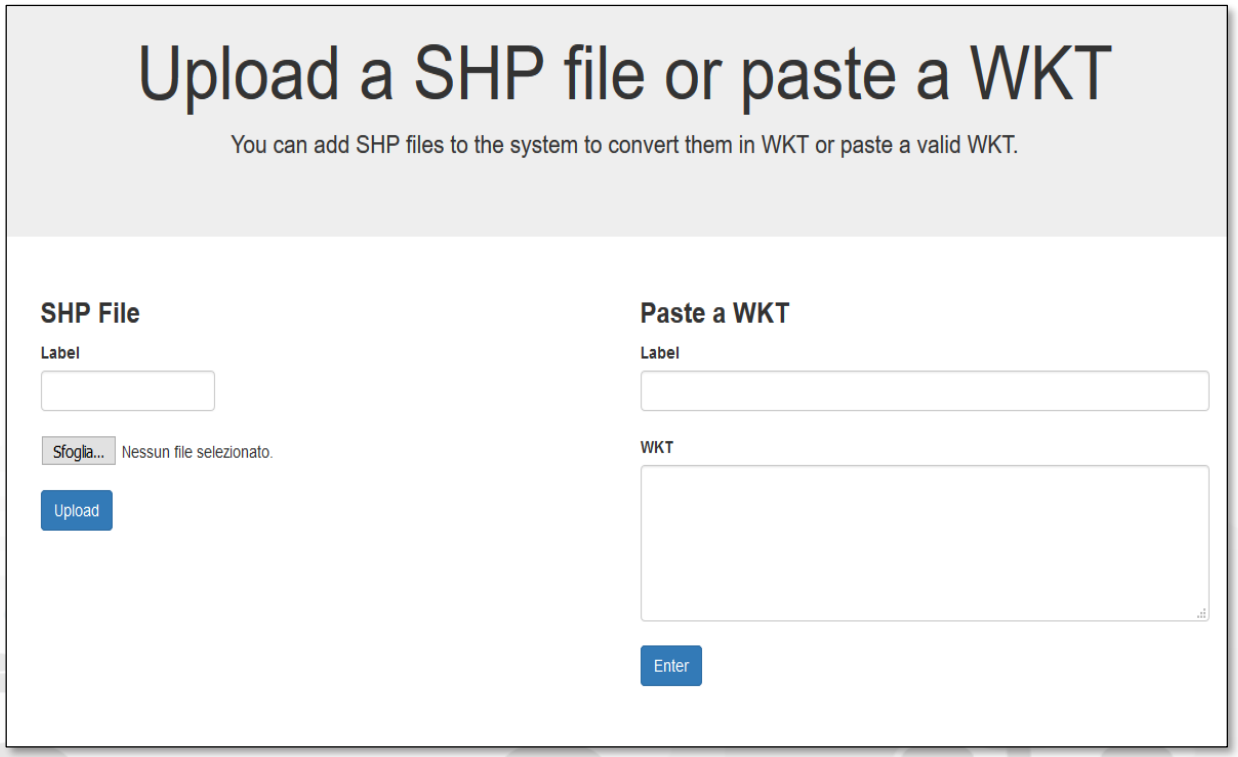
KM 4 CITY

Loading Shapes and Paths for search

https://arthur-e.github.io/Wicket/sandbox-gmaps3.html

http://www.km4city.org/wkt/



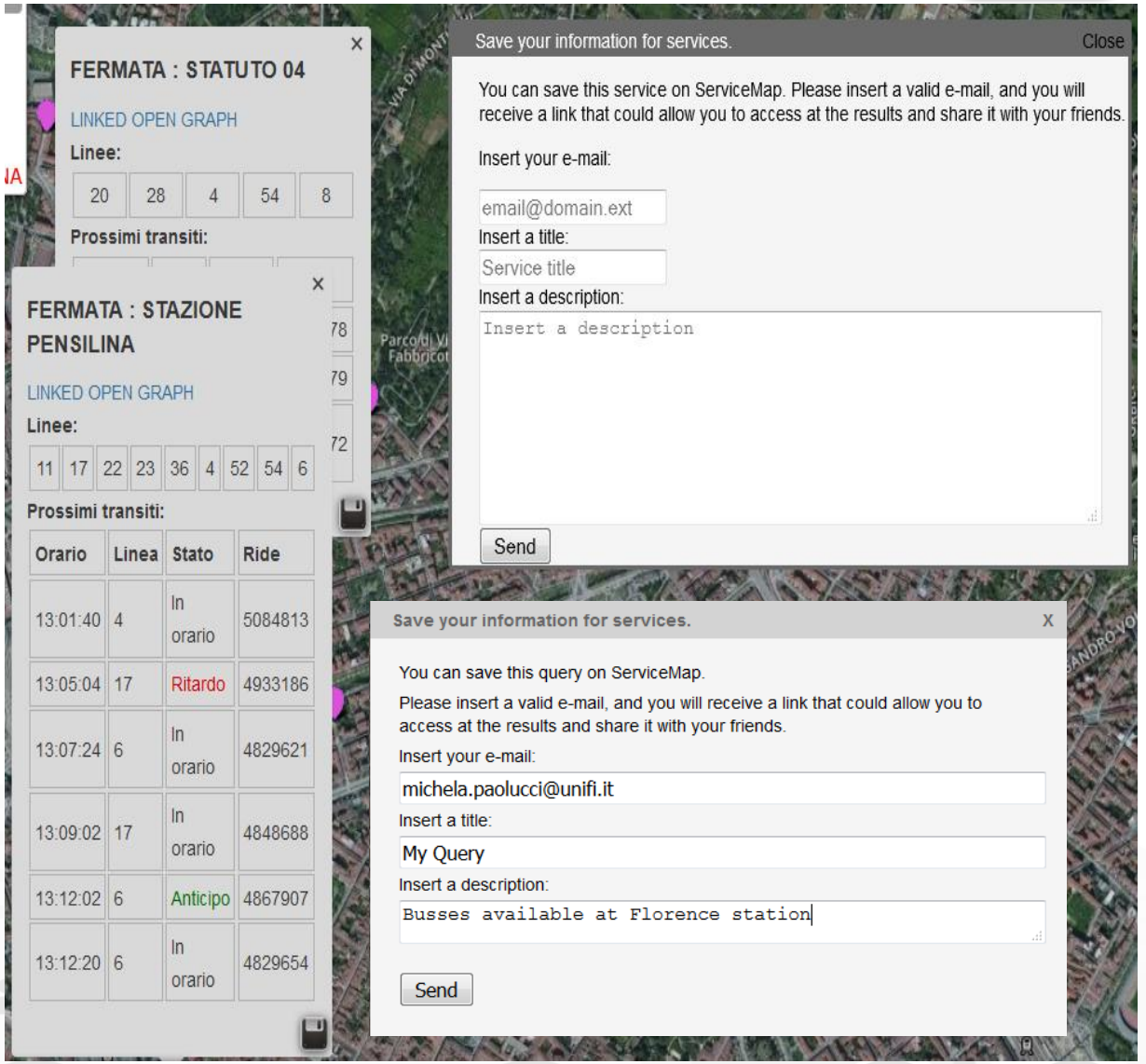


ServiceMap Tool

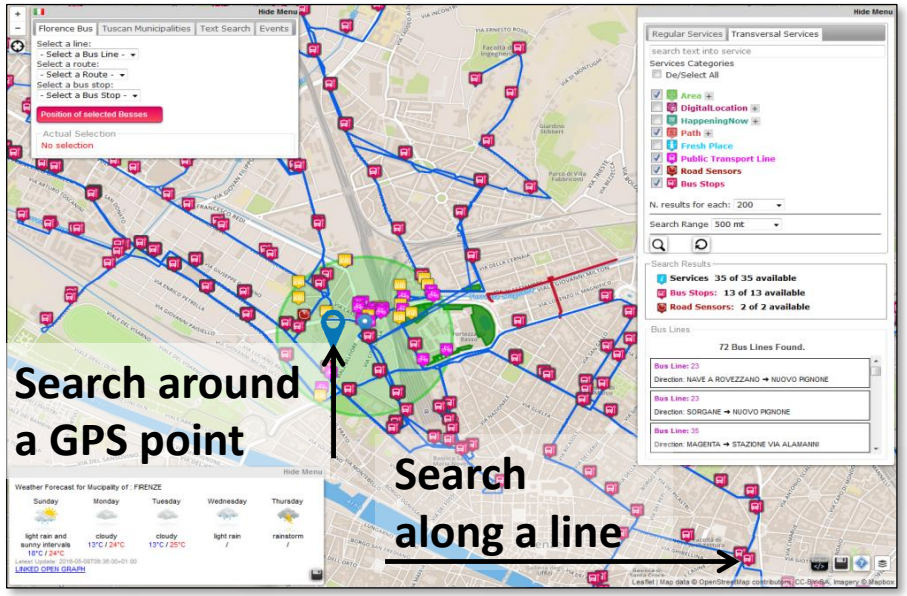
- **ServiceMap tool**
  - with Km4City are substantially a Smart City Expert System, SCES
  - includes the Smart City API
  - is a for developers to: search and browse on Smart City Knowledge, also to generate examples of the Smart City API call to be used in the development of Web and Mobile Apps

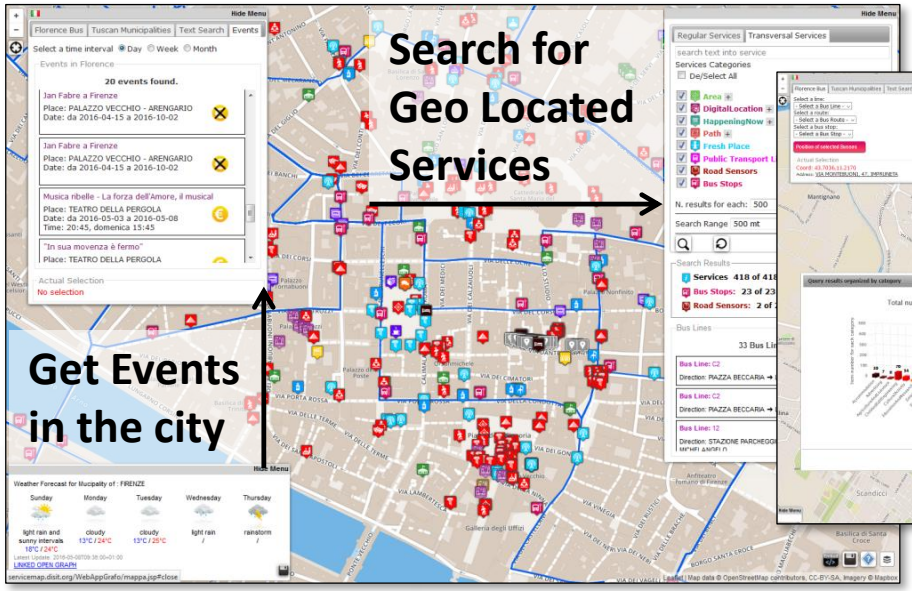
Smart City API

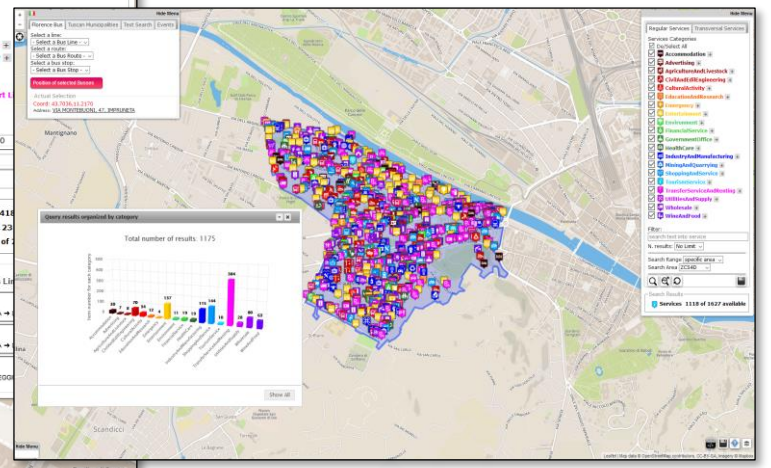
- http://www.disit.org/6597
  - REST API: serviceURI or Selection or GPS
  - REST API: Query ID
  - Receive an email
  - Get a JSON, HTML, …
  - Call SPARQL
- EMBED facility in third party web pages
- Developers may use the ServiceMap tool to:
  - compose geographical and textual queries
  - THEN request an e-mail containing the calls (same results in JSON and/or in HTML)

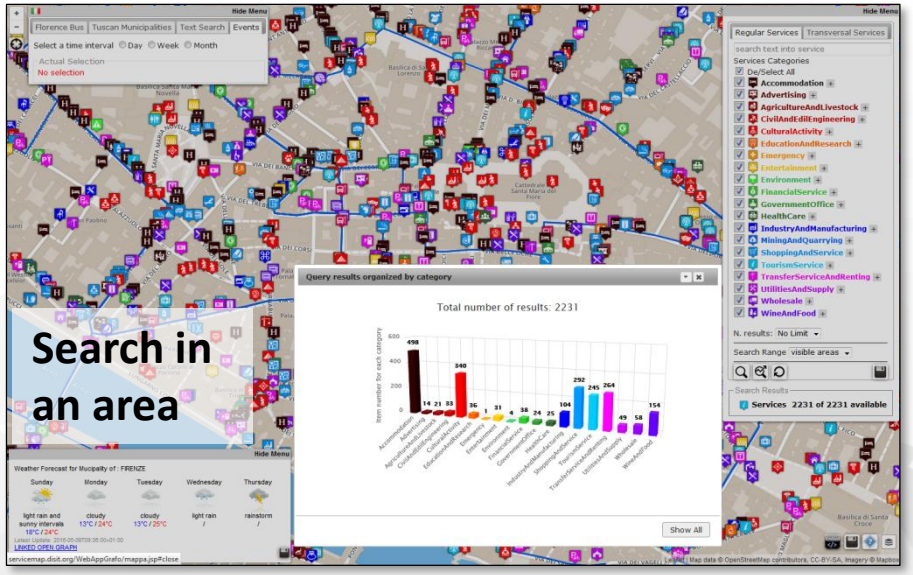


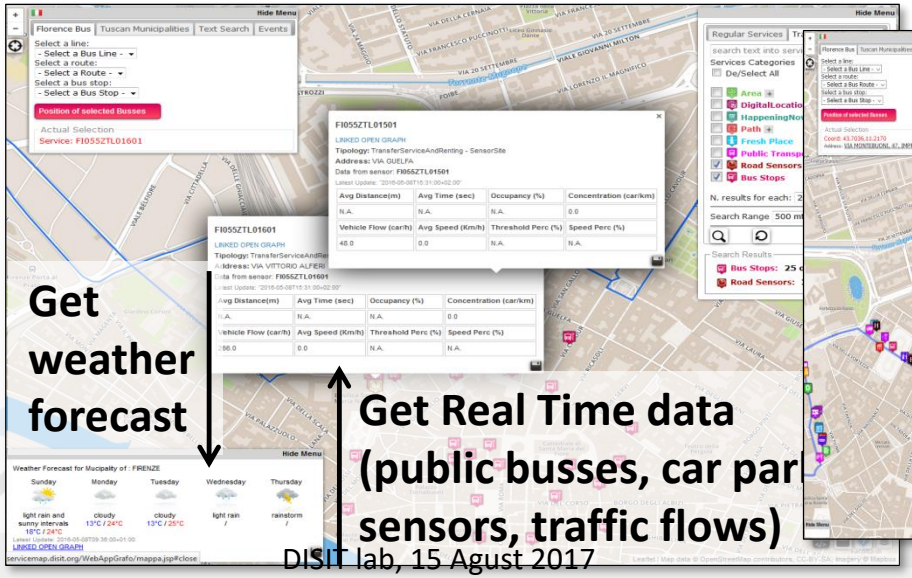
ServiceMap Development Tool

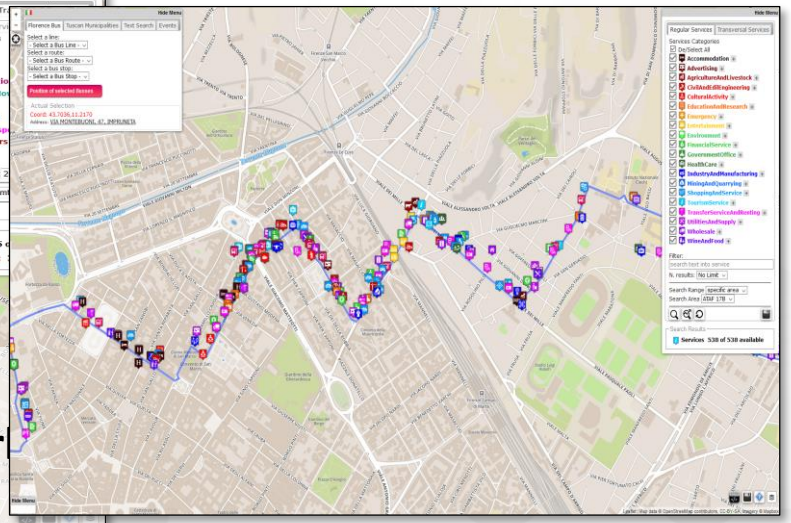












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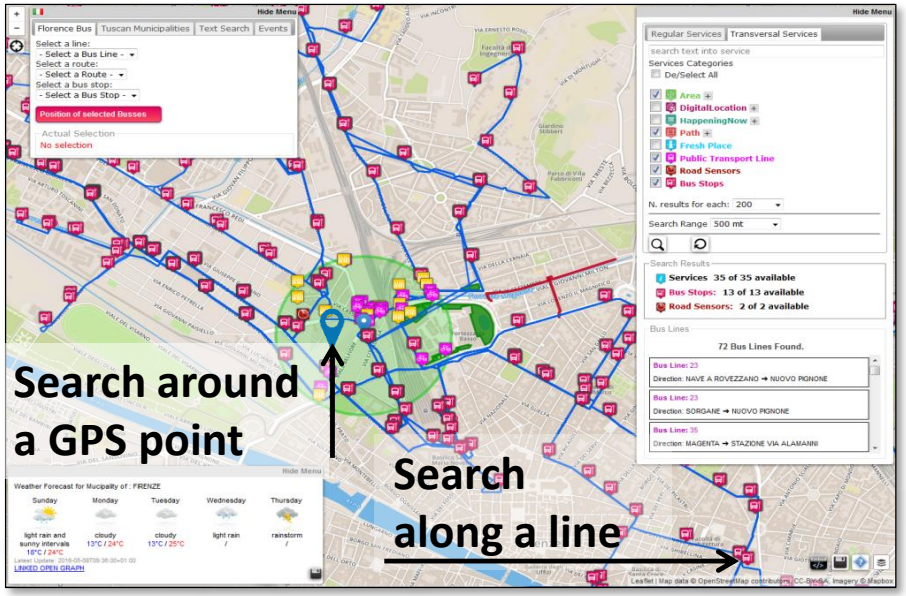
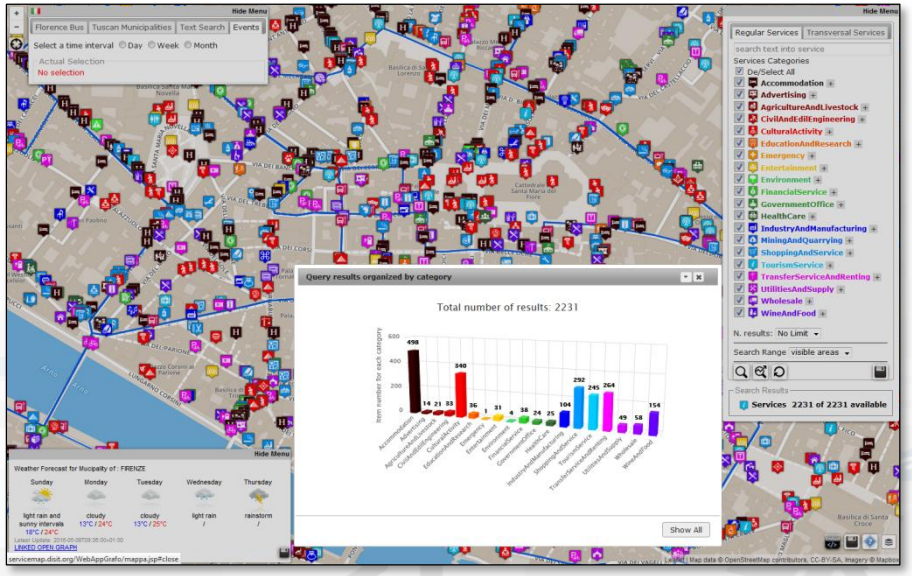
http://www.disit.org

Sii-Mobility

ServiceMap Dev Tool

Smart City API call generation

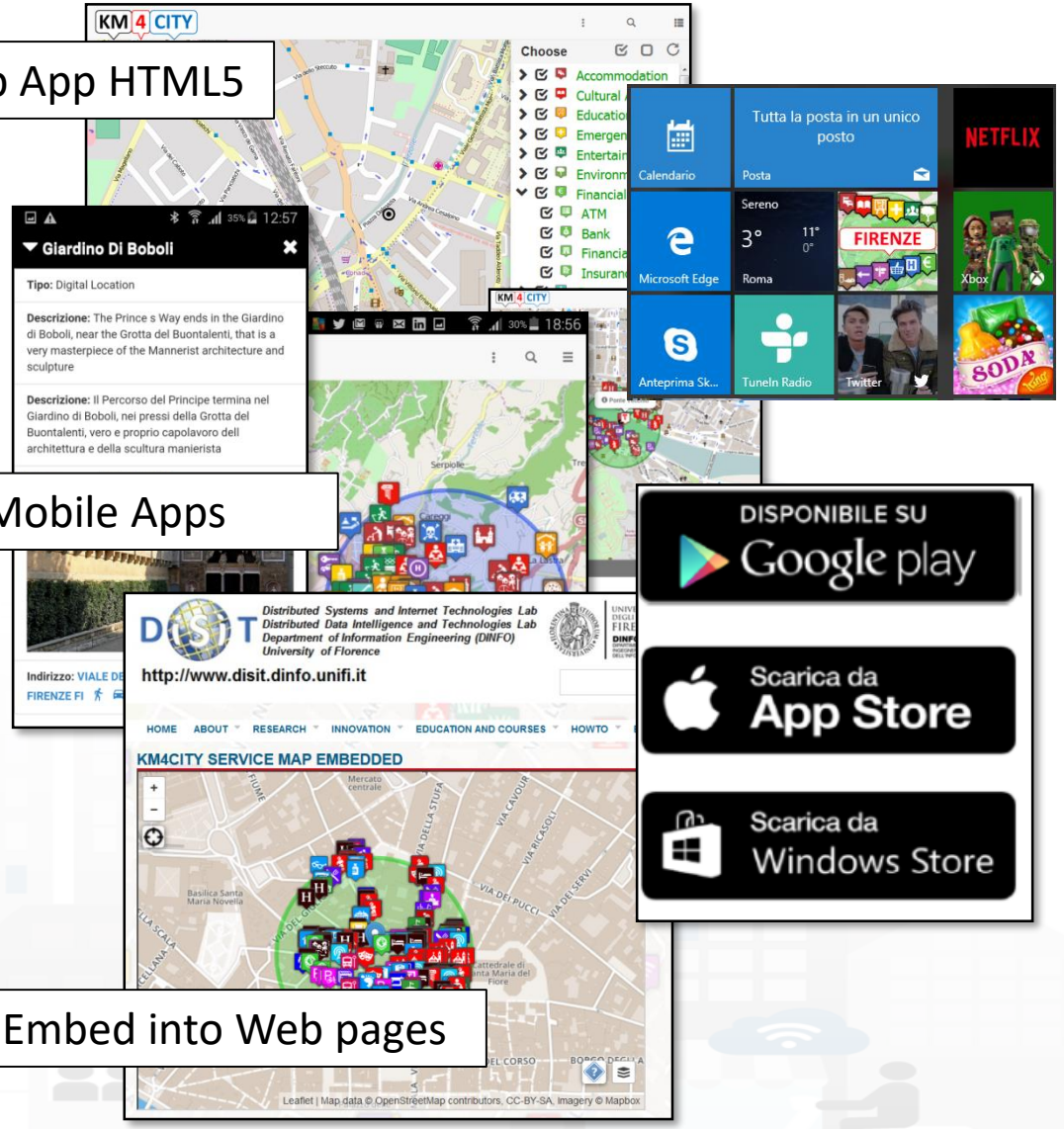




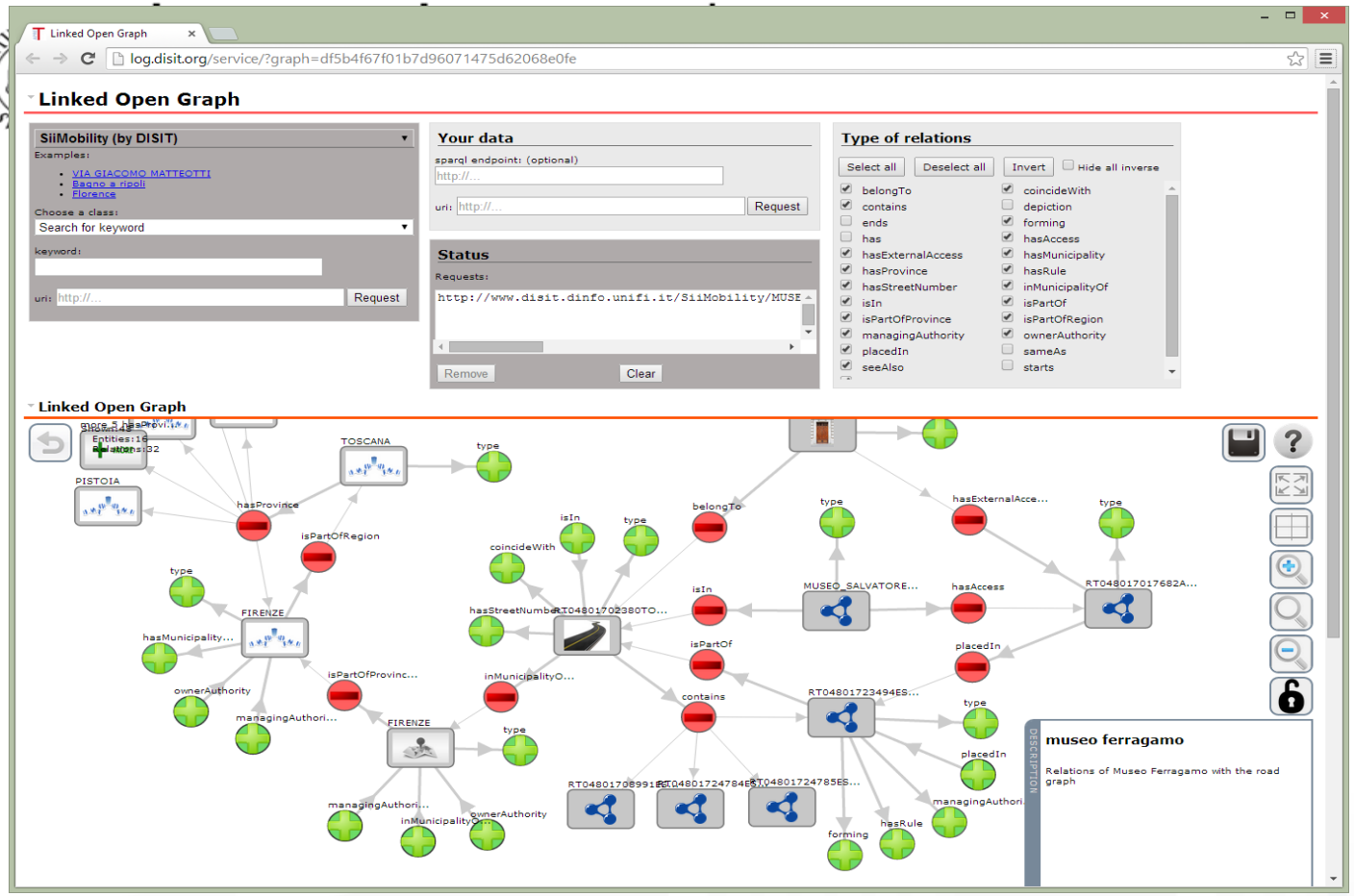
Web App HTML5

Mobile Apps

Embed into Web pages



http://www.disit.org/6873

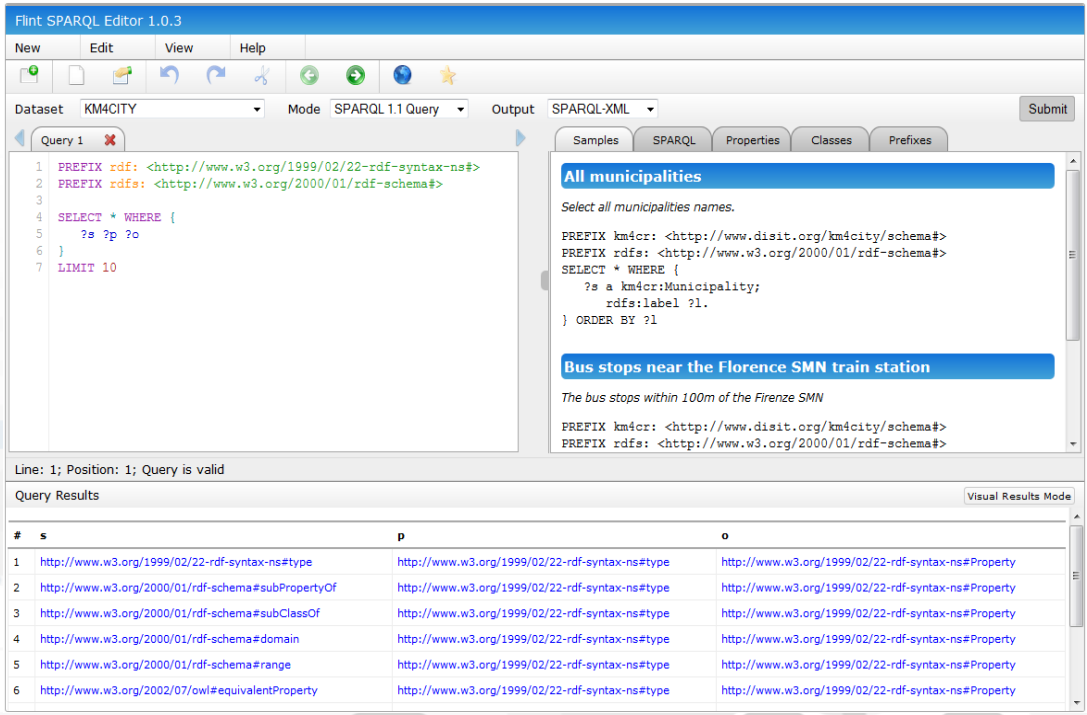


Browsing the knowledge base Linked Open Graph

http://log.disit.org

Querying the knowledge base in SPARQL

http://log.disit.org/spqlquery/



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http://www.disit.org

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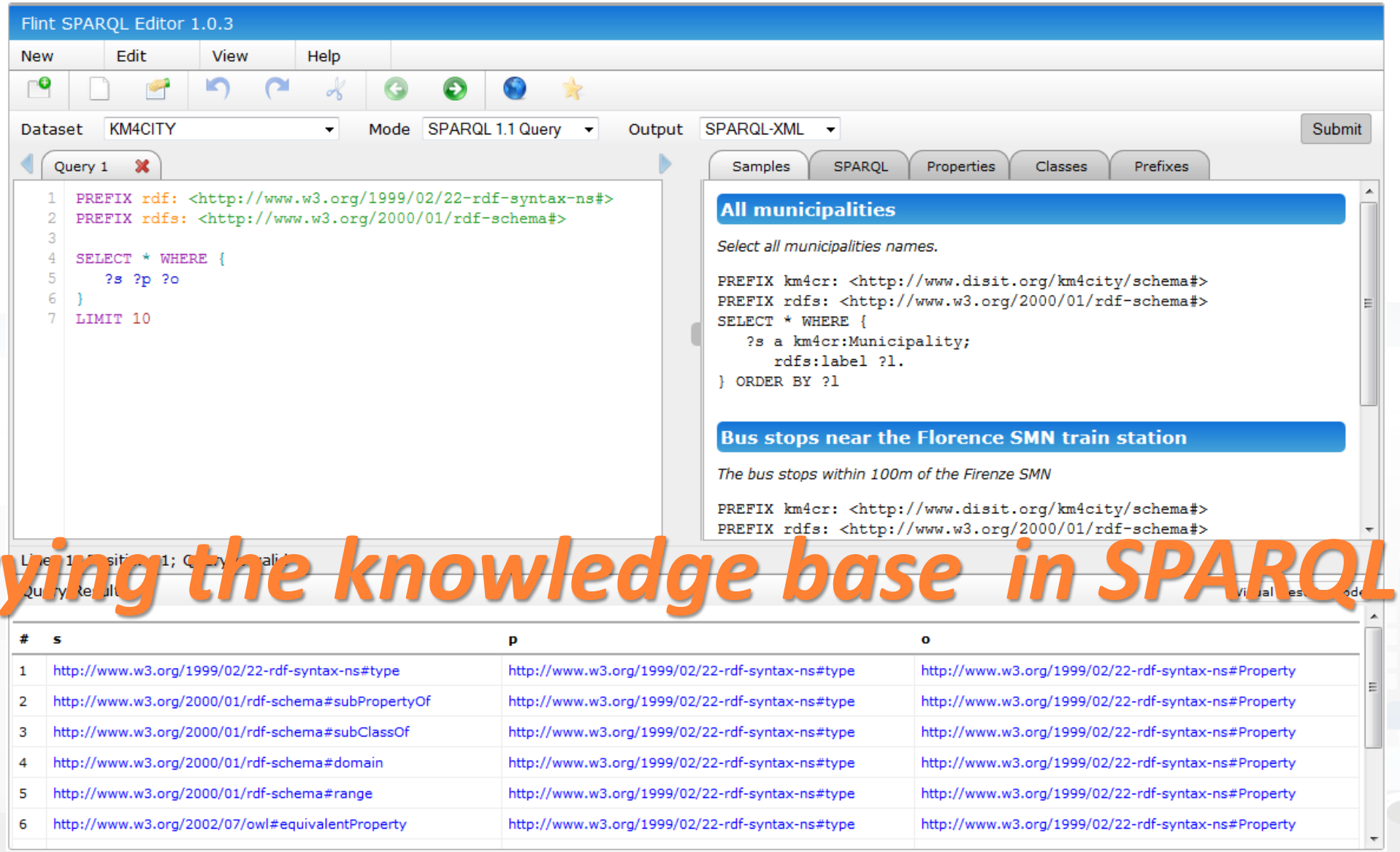
KM4CITY

http://log.disit.org/spqlquery/



Querying the knowledge base in SPARQL

#	s	p	o
1	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://www.w3.org/1999/02/22-rdf-syntax-ns#Property
2	http://www.w3.org/2000/01/rdf-schema#subPropertyOf	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://www.w3.org/1999/02/22-rdf-syntax-ns#Property
3	http://www.w3.org/2000/01/rdf-schema#subClassOf	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://www.w3.org/1999/02/22-rdf-syntax-ns#Property
4	http://www.w3.org/2000/01/rdf-schema#domain	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://www.w3.org/1999/02/22-rdf-syntax-ns#Property
5	http://www.w3.org/2000/01/rdf-schema#range	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://www.w3.org/1999/02/22-rdf-syntax-ns#Property
6	http://www.w3.org/2002/07/owl#equivalentProperty	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://www.w3.org/1999/02/22-rdf-syntax-ns#Property

Using and Contributing to Km4City

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Km4City Roadmap

2013

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

2014

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

2015

Km4City 1.4
- Embed
- More API
- iBeacon

Km4City 1.5
- SmartDS
- Km4City App

RESILIENCE management guidelines and Operationalization appLied to Urban Transport Environment

RESOLUTE H2020
2015–2018 - Started

Sii-Mobility
http://www.sii-mobility.org

2016

REPLICATE H2020
2016–2021 - Started

REPLICATE
REnaissance of PLaces with Innovative Citizenship And TEchnology

Today

Sii-Mobility SCN
2016-2018 – Started

Km4City 1.6.2
- Suggestions on demand
- User Behaviour Analysis
- Trajectories and OD

WEEE
2017-2020

6/2017

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

FIWARE

GHOST SIR
2016–2019 - Started

GHOST Governing the smart city: a gOvernance-centred approach to SmarT urbanism

2021

SELECT for Cities

Snap4City
- waste
- Territorial areas and paths
- Health, Bike sharing
- Statistics, Energy, ICT, ...
- E-vehicles

Km4City 2.0
- More Sensors, IOE, IOT
- Dashboard Builder
- Territorial areas and paths
- User Engagement
- Mobility and transport
- Resilience Decision Support

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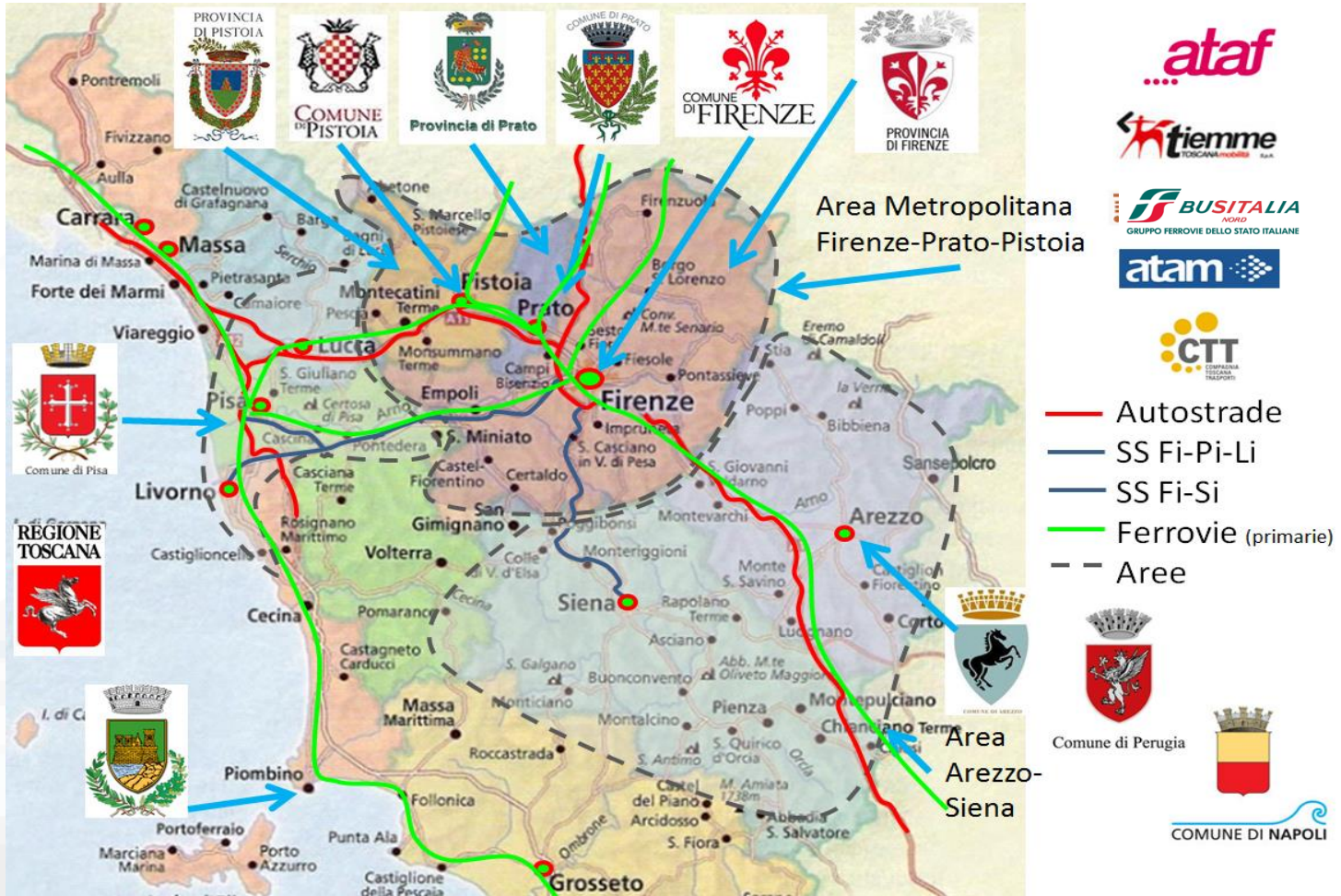
http://www.disit.org

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

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Sii-Mobility

http://www.Sii-Mobility.org

MIUR MINISTERO DELL'ISTRUZIONE DELL'UNIVERSITÀ E DELLA RICERCA

KM 4 CITY

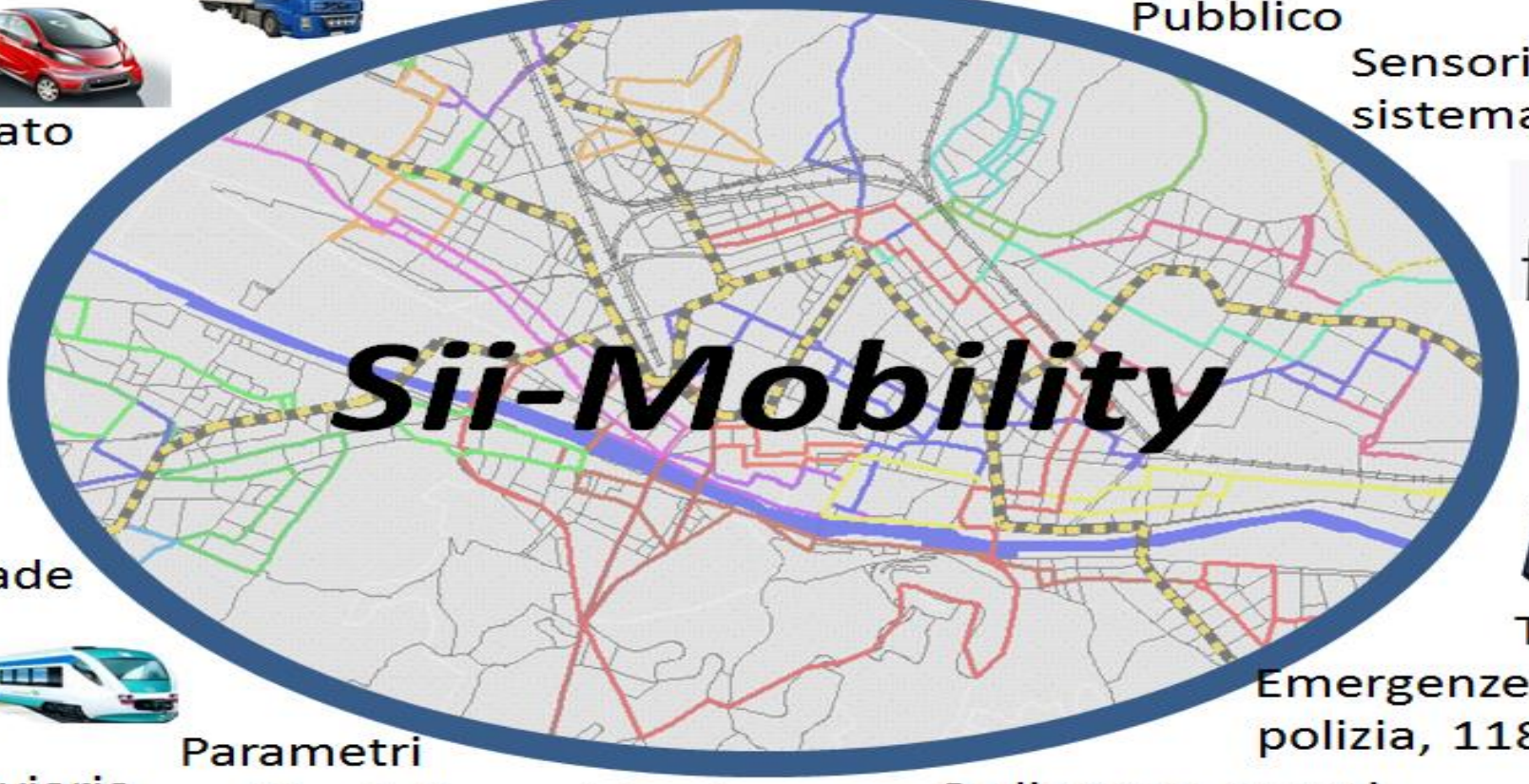
Commenti dei cittadini, Social Media

AVM trasporto Pubblico

Merci

Sensori su trasporto Privato

Sensori, sistema monitoraggio



Sensori Parcheggi

UTC

Infomobility

Varchi Telematici, ZTL

Monitoraggio traffico, autostrade

Rete Ferroviaria

Parametri ambientali

Servizi ed enti

Ordinanze: eventi, lavori pubblici, ..

Emergenze, polizia, 118

General Objectives

http://www.Sii-Mobility.org

- Reduce the social costs of mobility
  - minor inconvenience,
  - greater efficiency,
  - greater sensitivity to the needs of the citizen,
  - lower emissions,
  - better environmental conditions;
  - info-training programs to help city user in getting virtuous habits;
  - reduce transportation costs and travel times for users, for operators and administrations,
  - optimization solutions.
- **simplify the use of mobility systems**
  - innovative sensors for AVM and private transport on the territory
  - integrated systems for payment and identification
  - driving / offline routing solutions
  - connect the drive, smart drive or walk
  - Integration of data from operators and different type sources
  - advanced management of resources measurement of flows realization of sensors, actuators
- **Testing on municipalities and provinces of Tuscany**
- **Contribute to the improvement of national and international standards**

Principali Delibere su Sii-Mobility

PA	Tipo di atto
Provincia di Prato	Delibera di Giunta n.267 del 30.10.2012
Comune di Prato	Delibera di Giunta n.474 del 30.10.2012
Provincia di Firenze	Delibera di Giunta n.147 del 06.11.2012
Comune di Firenze	Delibera di Giunta n.403 del 06.11.2012
Provincia di Pistoia	Delibera di Giunta n.156 del 08.11.2012
Comune di Pistoia	Delibera di Giunta n.321 del 08.11.2012
Comune di Pisa	Delibera di Giunta n.203 del 06.11.2012
Comune di Arezzo	Delibera di Giunta n.498 del 07.11.2012
Regione Toscana	Delibera di Giunta n.249 del 15.04.2013

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

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

RESOLUTE Architecture

RESOLUTE RESILIENCE Dashboard

Presentation& Visualization

User guidance

RESOLUTE Mobile APPs

FRAM → ResilienceDS

CRAMSS

FRAM operalization

ITS DSS

Smart DS

Evacuation DSS

Application framework

Algorithms and models

Decision support system

Data Integration APIs

User Profiler APIs

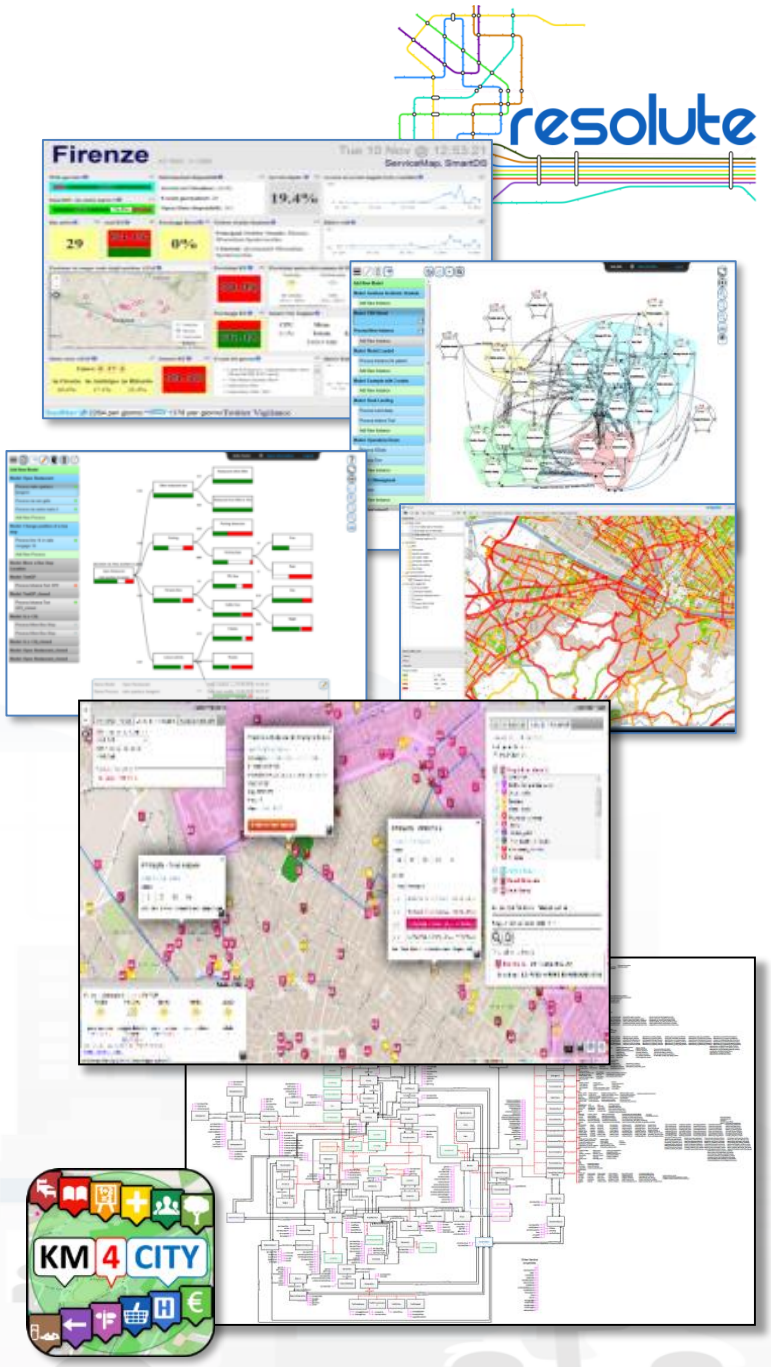
User profiler

Integration framework

Data and Service Aggregator





UNIV DEGI FIR

REPLICATE

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 DIEF
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

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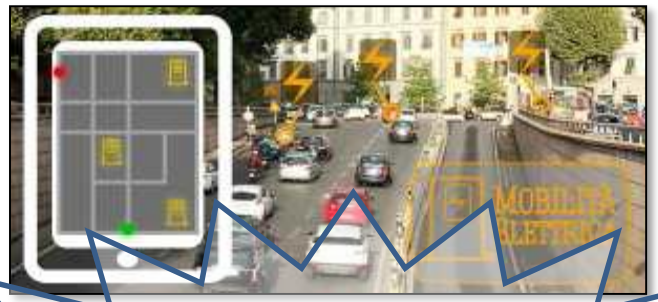
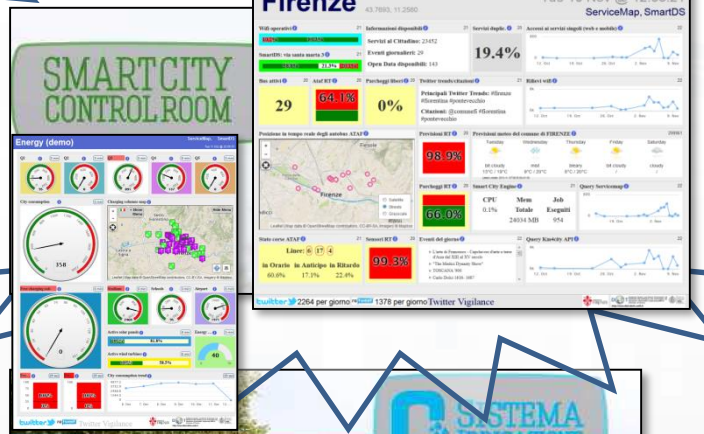
REPLICATE

Horizon 2020
European Union Funding
for Research & Innovation

REPLICATE in Firenze: Energy, ICT & Mobility





http://replicate-project.eu/

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Horizon 2020 European Union Funding for Research & Innovation

REPLICATE

DISIT Lab actions for REPLICATE

- **Integrated infrastructure: aggregation model and urban platform**
  - Adoption of Km4City solutions and tools as starting point
  - Improvements of Km4City ontology, by adding:
    - energy, sustainable mobility, dashboarding, urban services, IOT of several kind
  - Improving Smart City API, providing support for:
    - Above mentioned domains in addition to those of Km4City for developing energy based APPs REPLICATE
- Developing and putting in place a **dashboard** system and development tool

http://replicate-project.eu/

Http://www.km4city.org

Km4City Smart City Engine

COMUNE DI FIRENZE

Transport systems
Mobility, parking

Public Services
Govern, events,

COMUNE DI FIRENZE

TIM

Sensors, IOT
Cameras, ..

e-distribuzione

Environment,
Water, energy

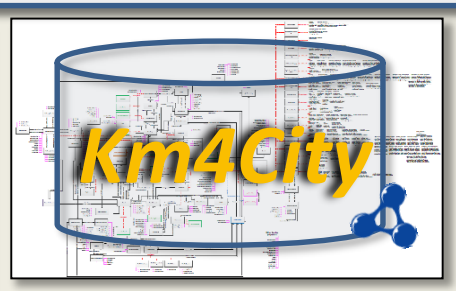
Shops, services,
operators

Social Media
WiFi, network

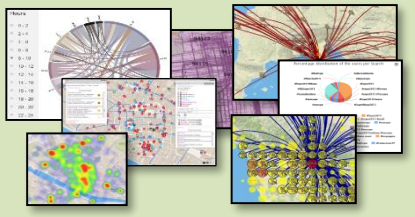
Twitter Vigilance

Static, Slow and Real Time data flows

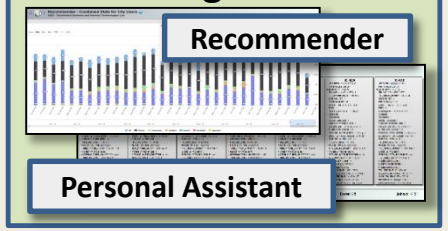
DISCES -- Distributed and parallel architecture on Cloud



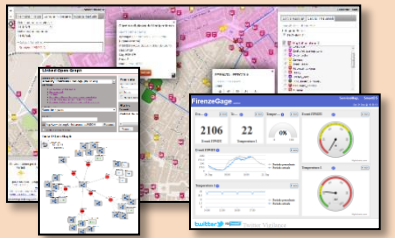
Big Data Analytics



Smartening Tools



Development Tools



Km4City Smart City API

KM4CITY

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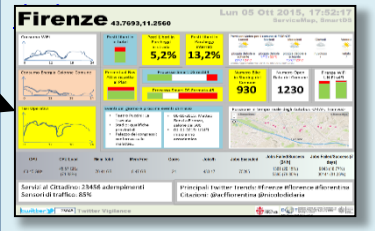
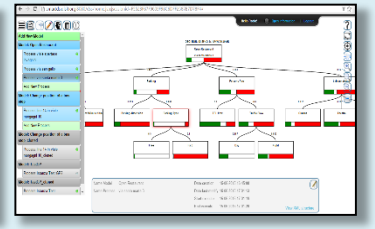
Tools for City Operators and Decision Makers

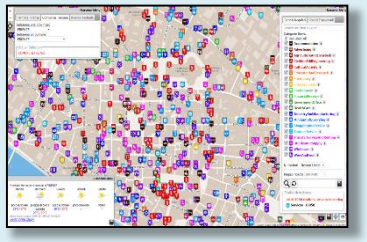
Smart City Dashboard
Http://dashboard.km4city.org/



Smart Decision Support
Http://Smartds.km4city.org

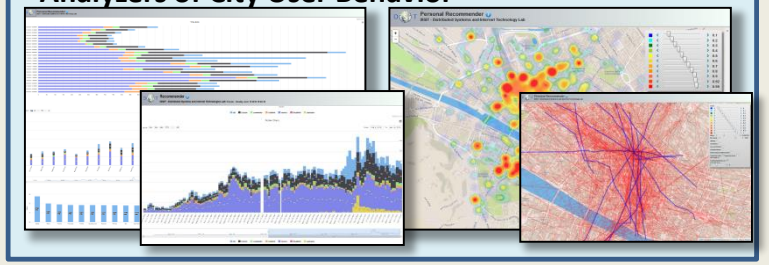


ServiceMap browser
Http://servicemap.km4city.org



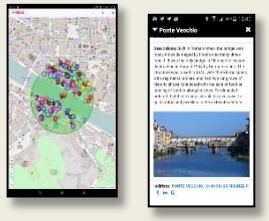
Twitter Vigilance
Http://www.disit.org/tv

Analyzers of City User Behavior



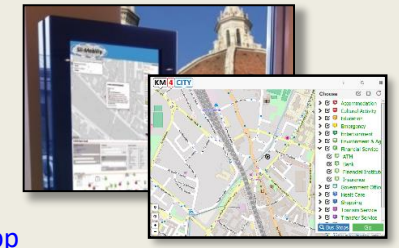
Tools for Final Users

Mobile e Web Apps



Http://www.km4city.org/app

Http://www.km4city.org/webapp



REPLICATE

http://replicate-project.eu/

Governing tHe smart city: a gOvernance-centred approach to SmarT urbanism – GHOST

General Objectives

- Offer a comprehensive framework for measuring and reassessing urban smart development and related rankings
- Critical assessment of Smart City ranking index existence
- Definition of an enabling technology supporting the action plans for strengthening multi-level place-based governance, applied in the tourism context
- Definition of strategies for good smart governance, with the purpose of providing recommendations to start or implement an institutional and development process leading towards smart city governance.

Partners:

University of Cagliari (Coordinator) DICAAR and DMI

University of Florence SAGAS and DISIT

University of Turin ESOMAS

University of Sassari DADU

Under the patronage of the Municipality of Cagliari

COMUNE DI CAGLIARI

Duration: 23/09/2015 - 23/09/2018

http://sites.unica.it/ghost

City Resilience and, DSS, Decision Support Systems

http://www.km4city.org/?controlRoom
http://www.km4city.org/?devTools
http://www.km4city.org/?infoDocs
http://www.km4city.org/?app

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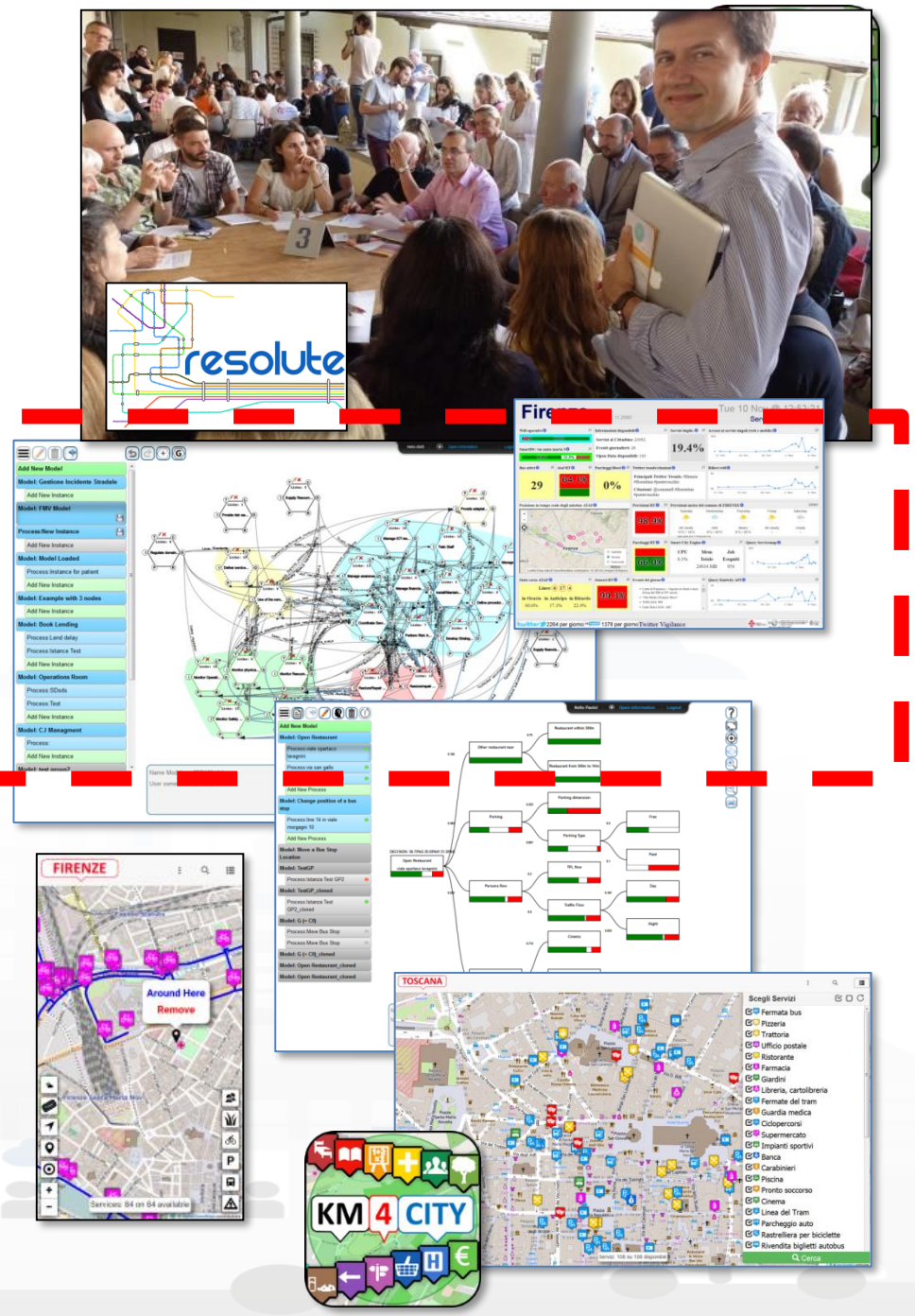
Improve city resilience, reducing risks and decision support

- **assessing** city **resilience** level
- **improving** city **resilience**, providing objective hints
- **improving** city users **awareness** with personal city assistants and participatory tools



Problems and issues

- Cities include critical infrastructures strongly related / depended each other:
  - Transport, energy, communication, cyber, health...
- Risks for these Critical Infrastructure (safety and security) may be due to natural and/or human made events.
- UTS, Urban Transport System, is one of the most challenging since UTS is the via by which many problems may propagate but also the path used by solutions and the recovery actions.

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

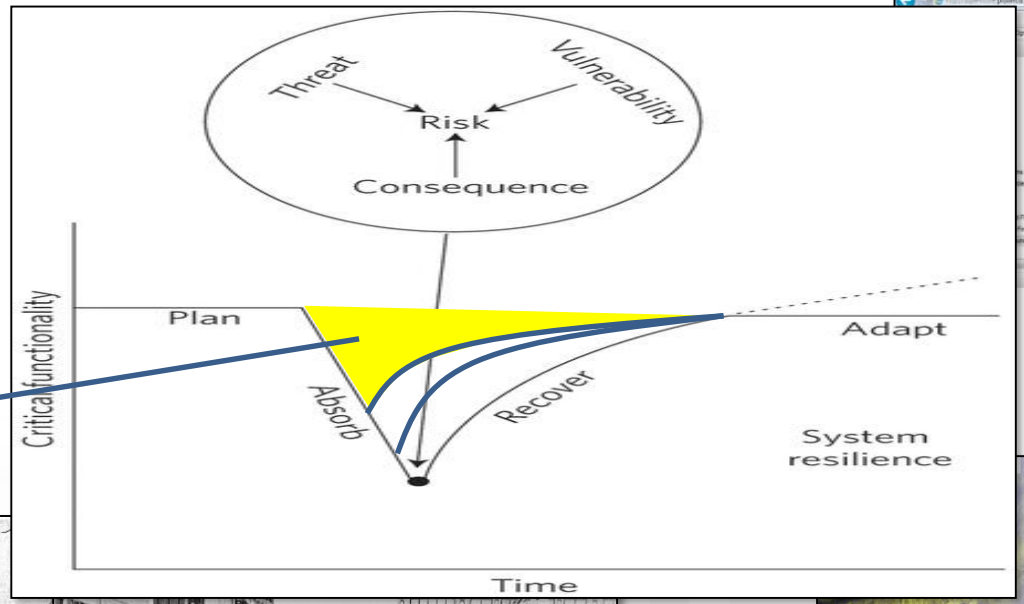
City Resilience

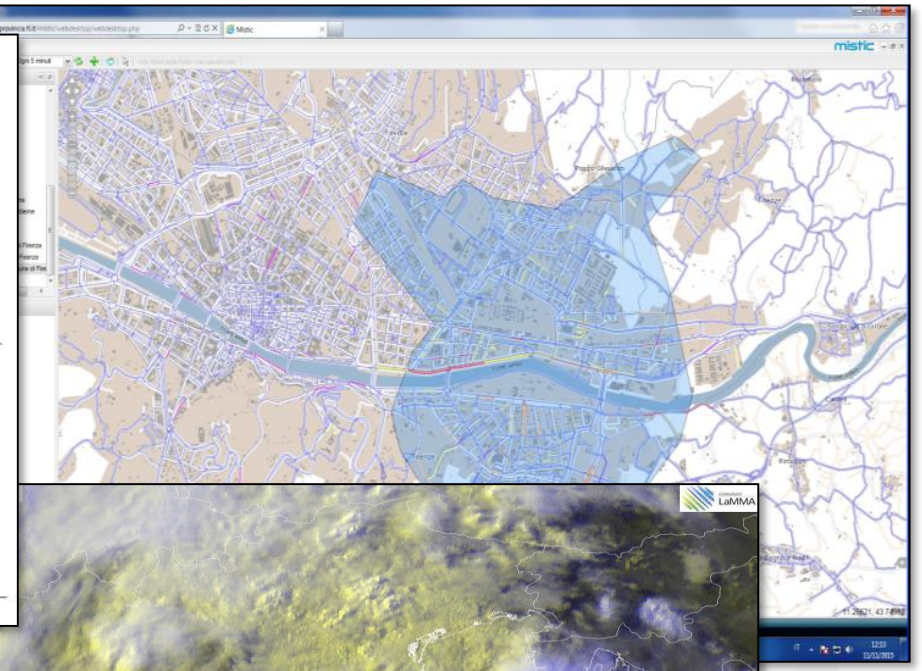
Early warning, detection

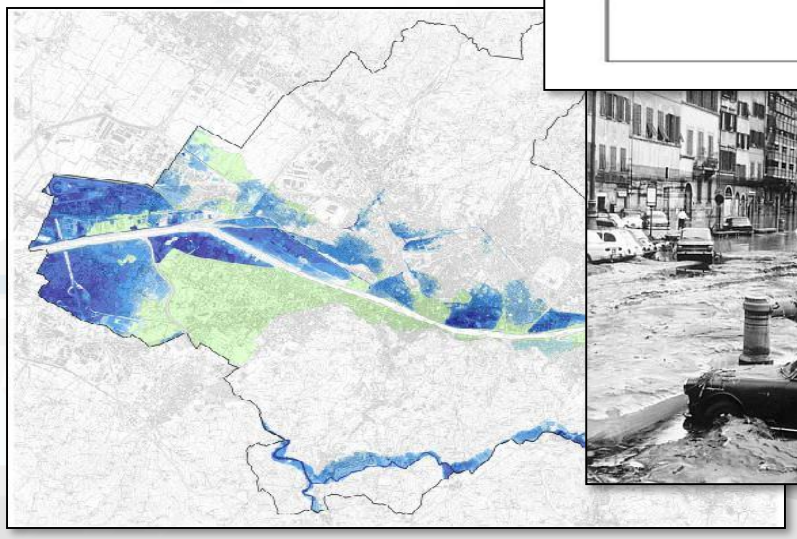
resolute

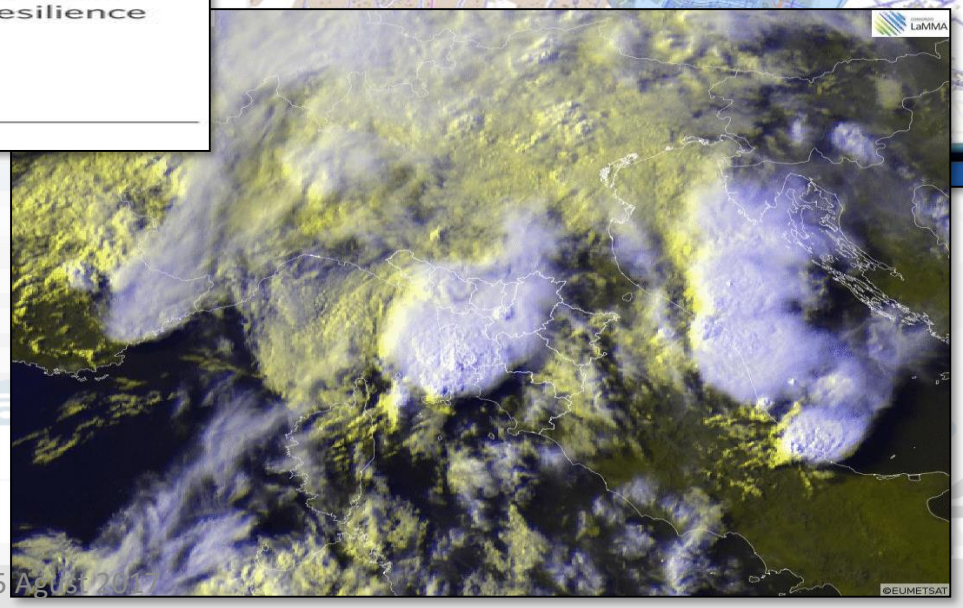
Prepare
Absorb
Recover
Adapt

damage









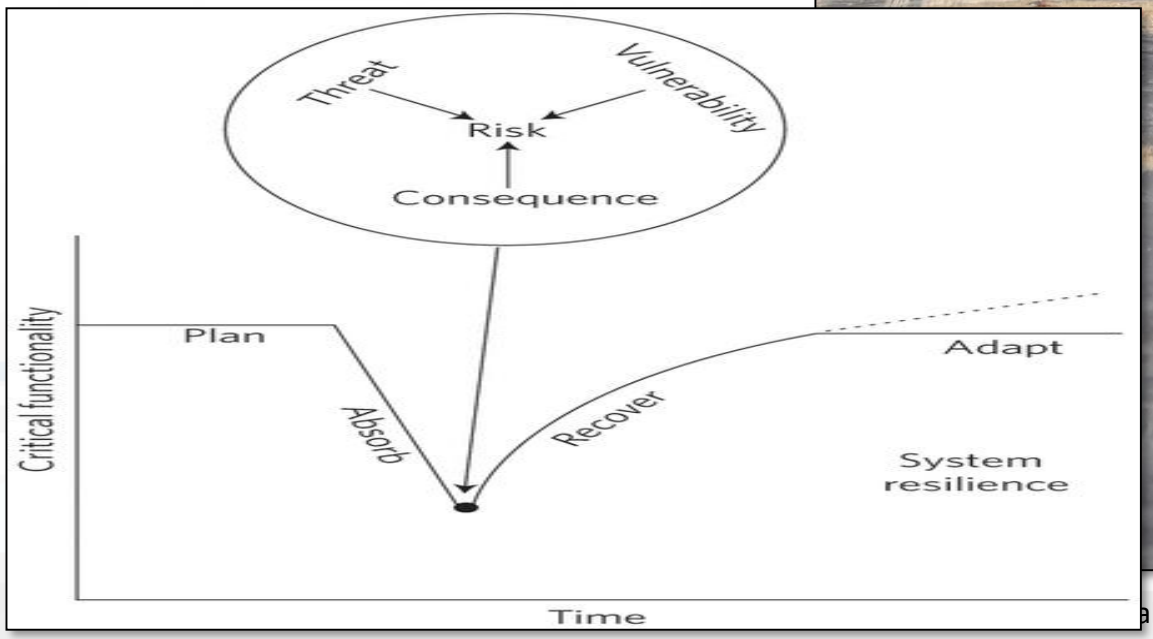
City Resilience

Prepare

Absorb

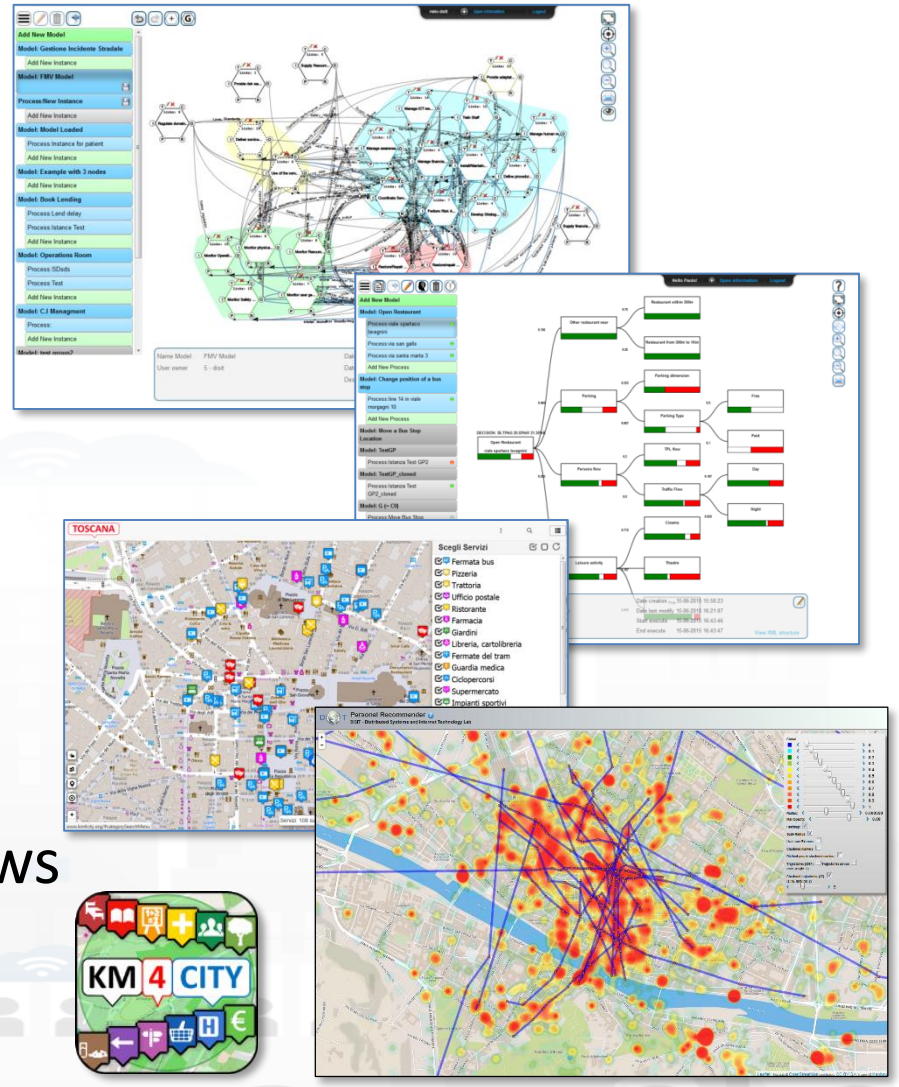
Recover

Adapt



Main Approach

- Three main layers
- Complex System modeling: function, processes, resources, time, events, etc..
  - Functional Resonance Analysis Method, FRAM
  - Resilience Analysis Grid, RAG
- Decision Support System, DSS
  - System Thinking, Goal Models
  - Risk analysis
  - UTS/ITS decision supports
- Data, big data access and exploitation
  - Data Analytics, Internet of Things, sensors, flows
  - People flow and behavior
  - Social Media



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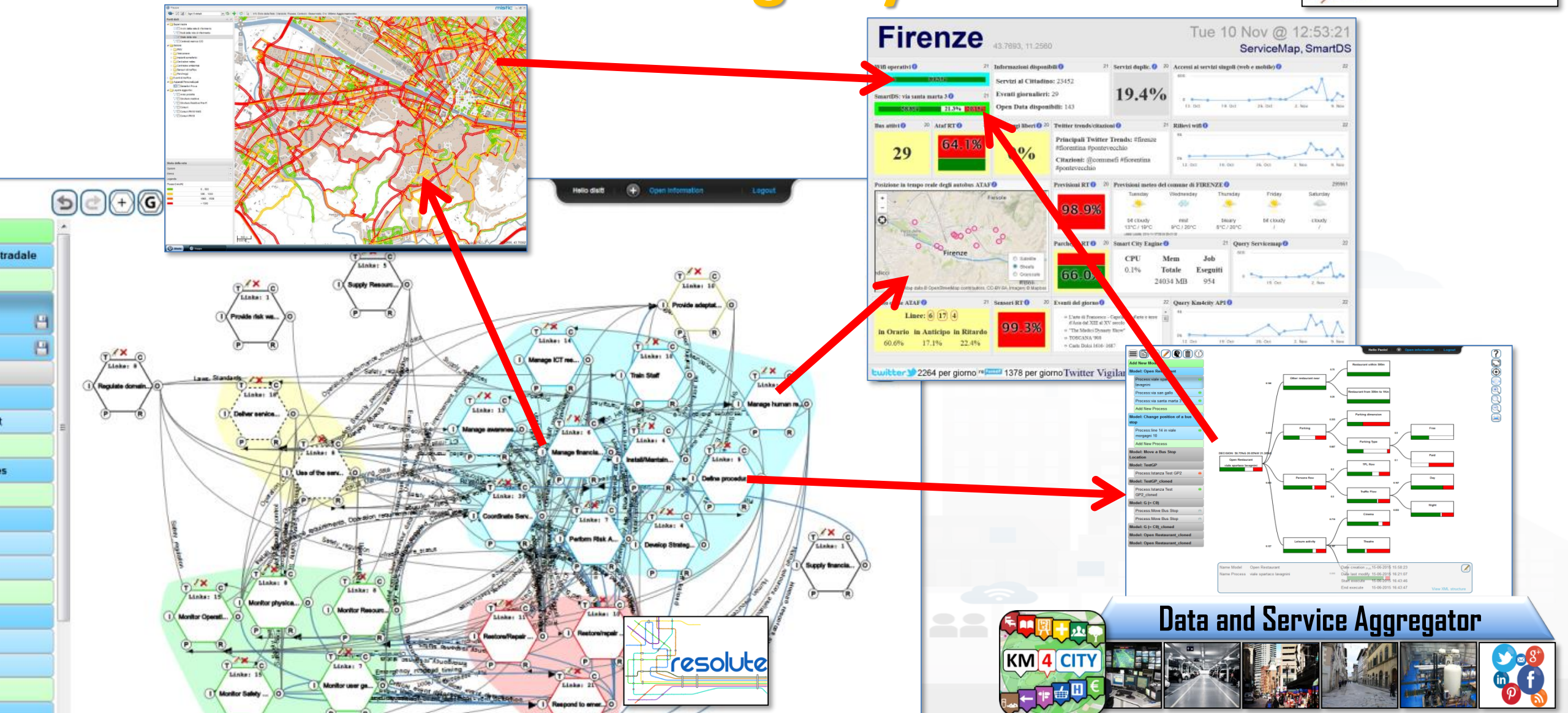
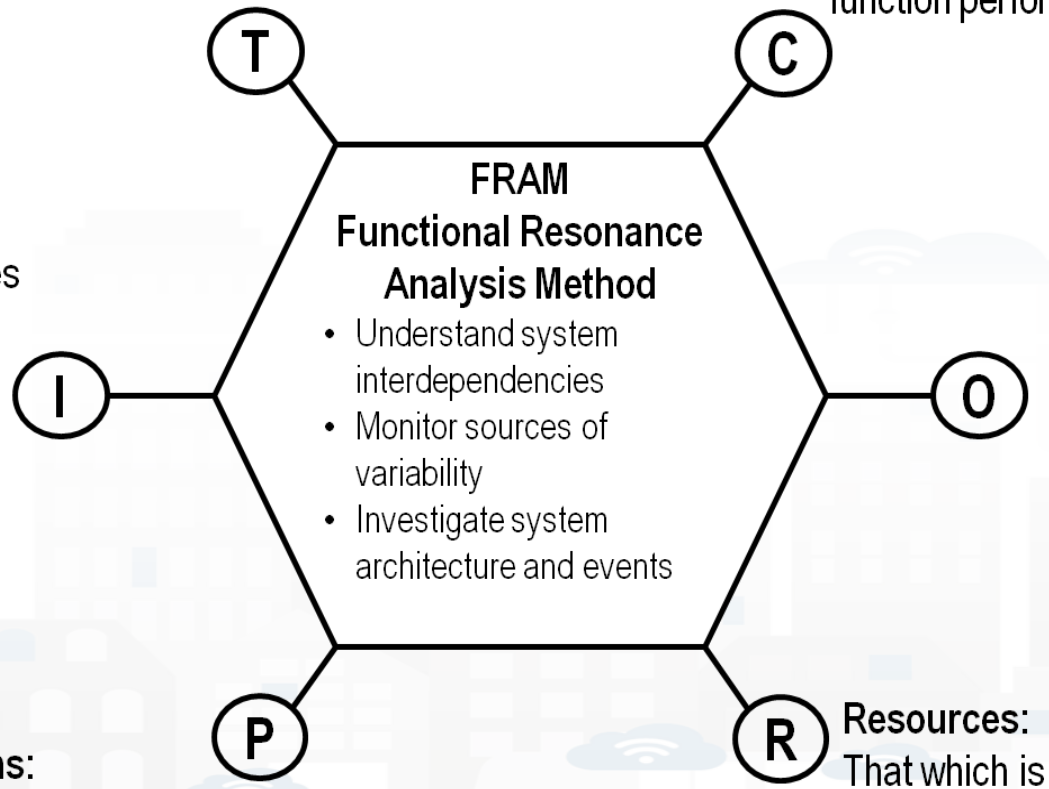
DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB

http://www.disit.org

Dashboarding city resilience



Functional Resonance Analysis Method



Time:
This is simultaneously a resource and a constraint

Controls:
That which supervises or adjust function performance

Input:
That which engages function operation and is used to produce the function output

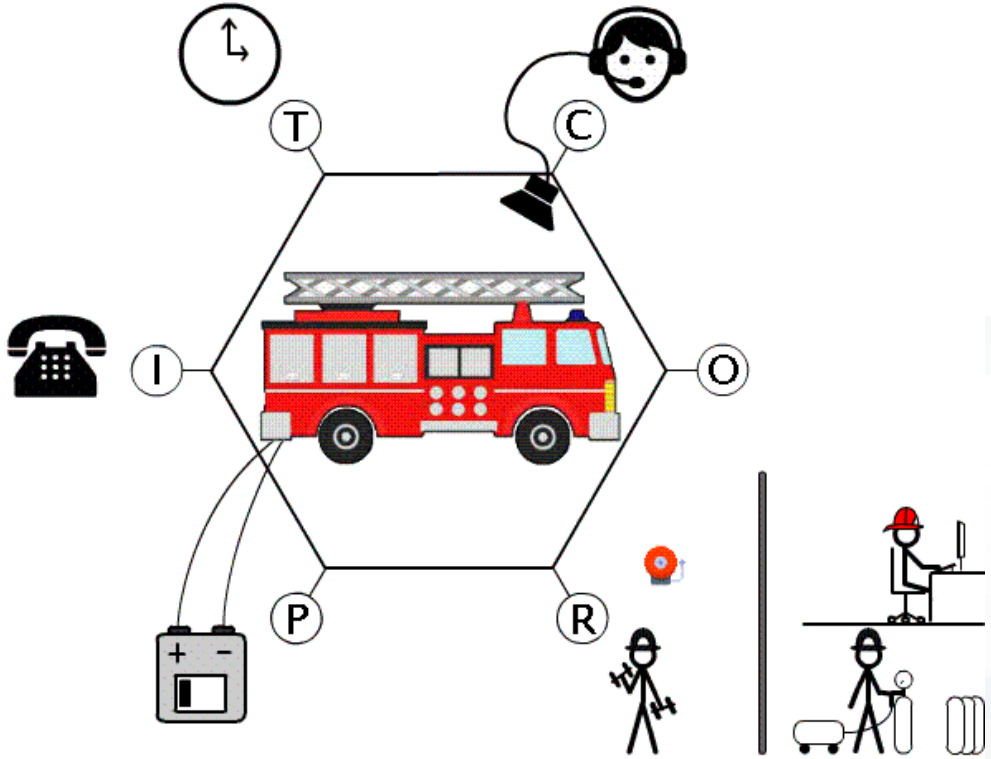
Output:
That which is produced by the function and becomes the input for other functions

Preconditions:
System conditions that must be met before function can be carried out

Resources:
That which is needed and/or consumed by the function to process the input

Functional Resonance Analysis Method

- Success and failure are equivalent in the sense that they both emerge from performance variability.
- Variability, intended as a way for people to adjust tools and procedures to match operating conditions.
- Emergence of either success or failure is due to unexpected combination of variability from multiple functions.
- The unexpected "amplified" effects of interactions between different sources of variability are at the origin of the phenomenon described by functional resonance.



resolute

Functional Resonance Analysis Method

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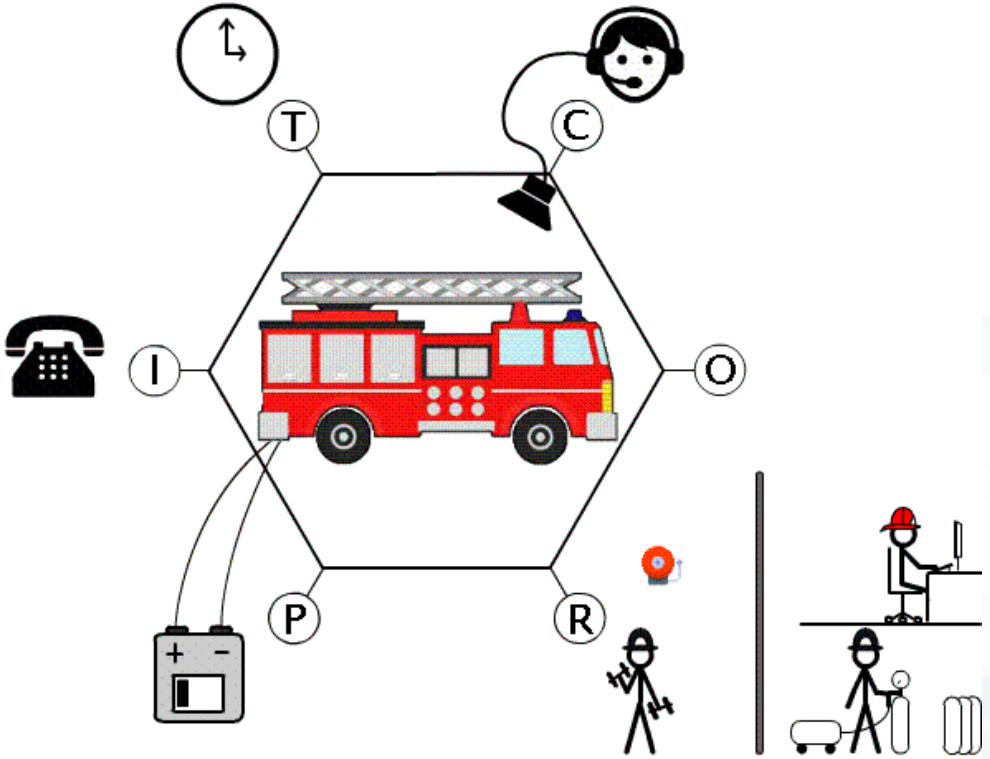
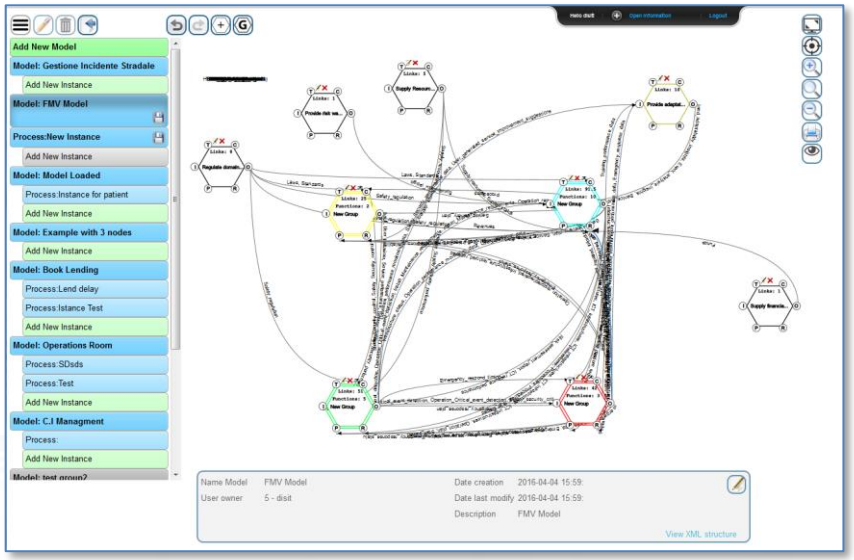
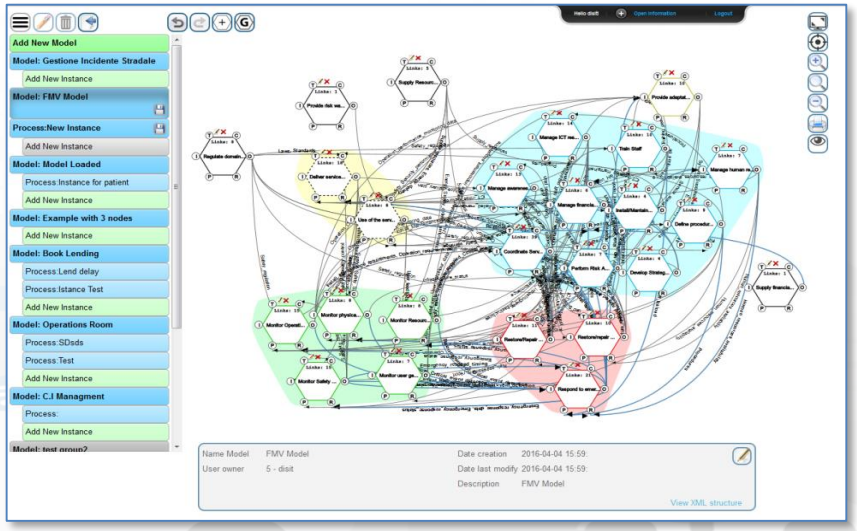


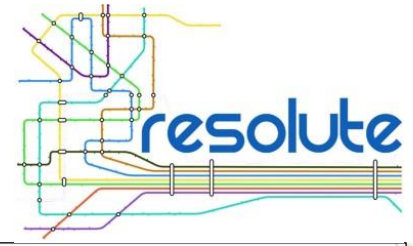
ResilienceDS tool

- FRAM Model
  - Macro FRAM processes
  - Metrics for Process complexity assessment
  - Operational Semantic for executing FRAM model
  - Connection with SmartDS
  - Connection with BigData open to multiple sources of data and workgroup results, Km4City
- Collaborative work
- Open for all
- Validated on ERMG
- Web Tool

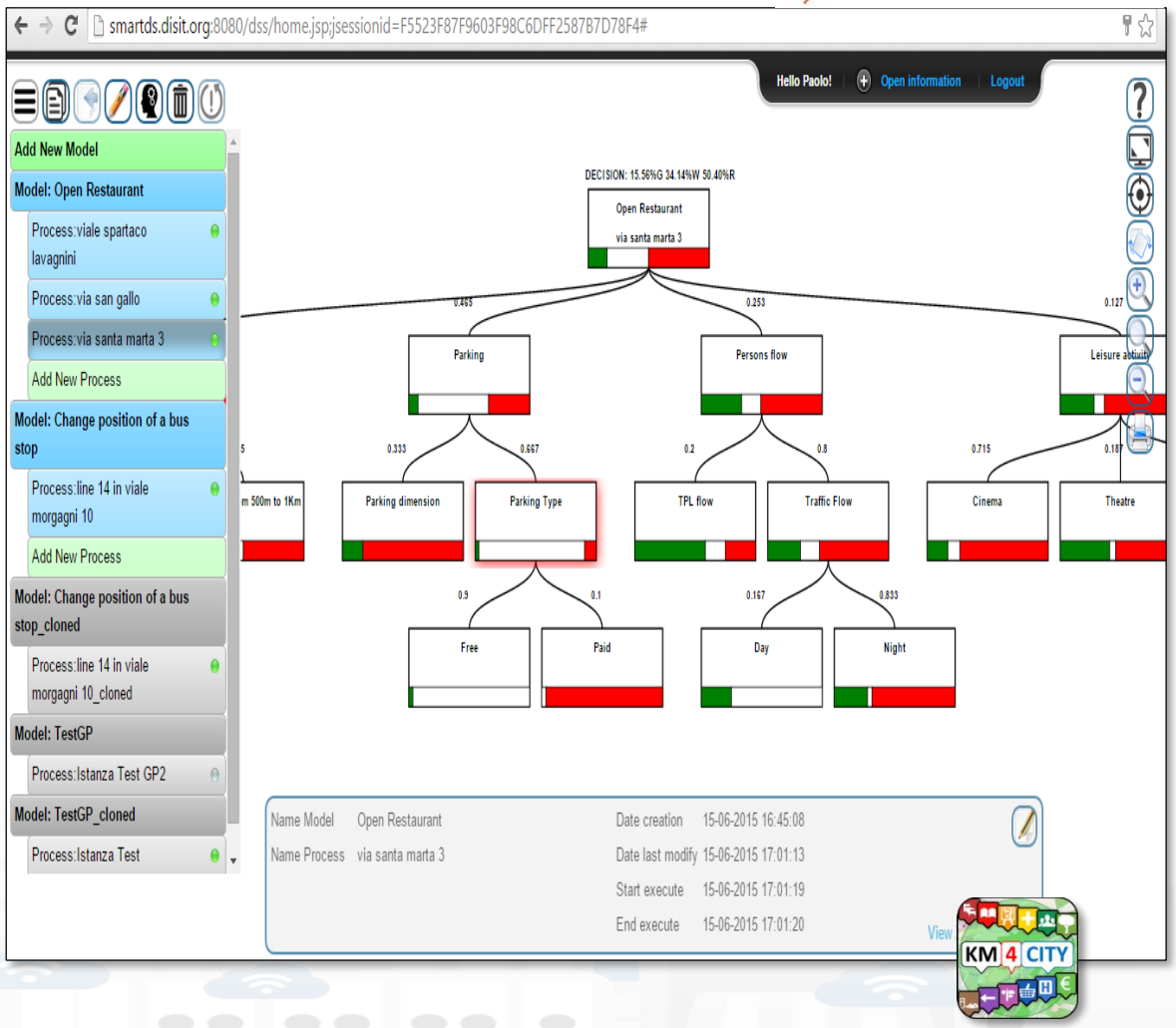




Smart Decision Support



- Smart Decision Support System based on System Thinking plus
- Actions to city reaction, resilience, smartness..
- Enforcing
- Mathematical model for propagation of decision confidence..
- Collaborative work…,
- Processes connected to city data: DB, RDF Store, Twitter, etc.
- Production of alerts/alarms
- Data analytics process
- Twitter Processes
- reuse, copy past, …



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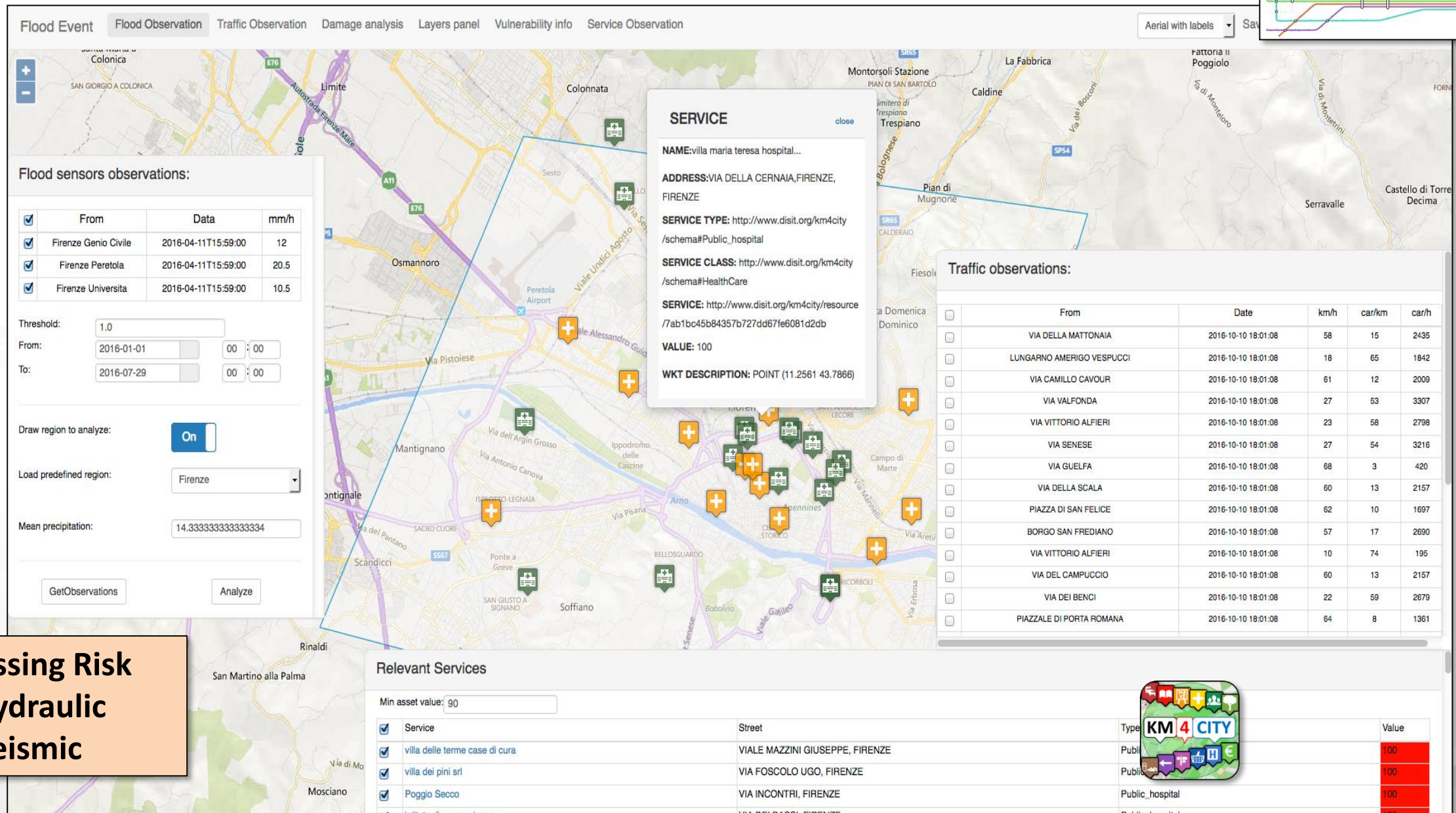
Risk Assessment

resolute

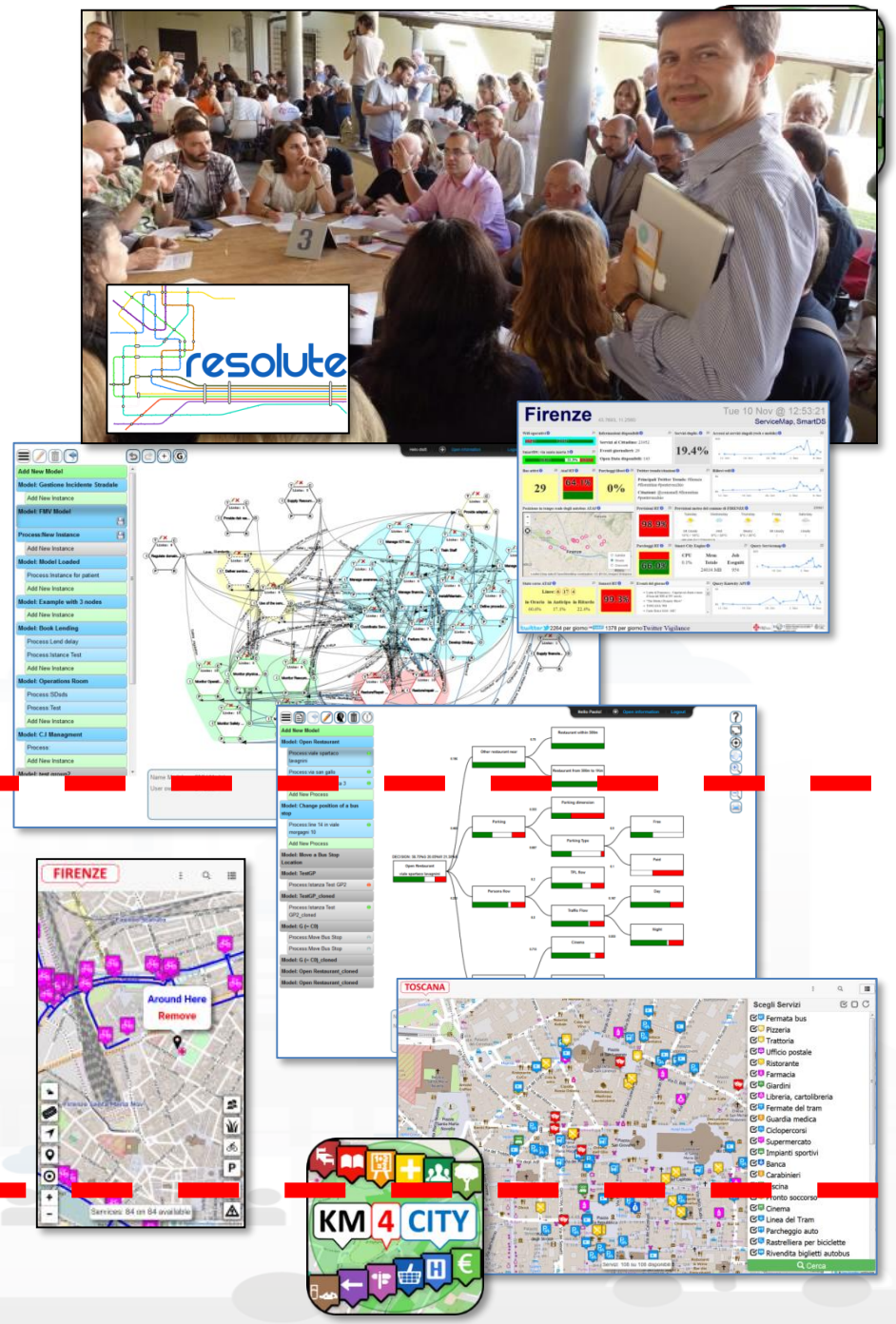


Assessing Risk

- **hydraulic**
- **Seismic**

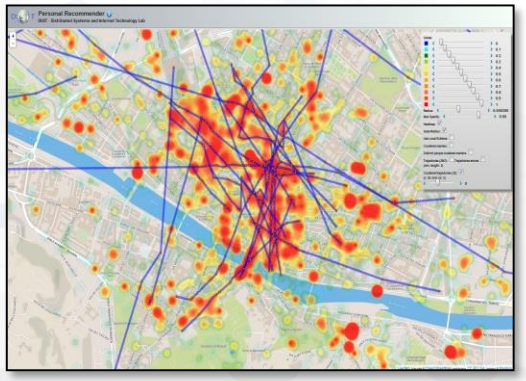
Improve city resilience, reducing risks and decision support

- **assessing** city **resilience** level
- **improving** city **resilience**, providing objective hints
- **improving** city users **awareness** with personal city assistants and participatory tools



Mobile Emergency

- Personalized menu for Operators
- Providing information and suggestions to citizens
  - Civil Protection Page
  - Twitter Info
  - Geolocalized Info
- Tracking people and operators flows
- Collecting information from citizens
  - Comments
  - Images



Info and Documents

http://www.km4city.org/?infoDocs

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Open Source

- **Km4City, Sii-Mobility, RESOLUTE, REPLICATE: smart city big data open source tools. Km4City is a knowledge base and a research line of DISIT lab mainly developed before the start of Sii-Mobility, RESOLUTE, REPLICATE projects. While it has been mainly improved by them. Those projects are complementar each other and almost all of them use and contribute the Km4City research line.ServiceMap smart city knowledge base tool**: smart city service tool (mainly developed for Sii-Mobility project) for accessing to km4city knowledge base, for service browsing and query, for **Smart City API** for mobile and for mobile development tool, http://www.disit.org/km4city
- **Km4City ontology model and files** are accessible from http://www.disit.org/km4city improved with the support of projects as Sii-mobility, REPLICATE and RESOLUTE
- **SCE, Smart City/Cloud Engine front end interface,** SCE is part of DISCES a Distributed SCE Scheduler Tools (SCE: Smart City/Cloud Engine), a DISIT tool for smart environments. It is currently in use in Km4City tools, and in ICARO Cloud project and service, see CLOUD page. Developed for ICARO, and then improved for Sii-Mobility, and used in many other projects
- **SCE, Smart City/Cloud Engine backend,** SCE is part of DISCES a Distributed SCE Scheduler Tools (SCE: Smart City/Cloud Engine), a DISIT tool for smart environments. It is currently in use in Km4City tools, and in ICARO Cloud project and service, see CLOUD page. Developed for ICARO, and then improved for Sii-Mobility, and used in many other projects
- **DIM-RIM**: Data Ingestion Manager and RDF Indexing Manager, WEB page on DISIT lab with user manuals, DIM and RIM area used in Km4City and tools, Sii-Mobility smart city national SCN project, RESOLUTE H2020
- **Dashboard Builder and executo**r: a tool for creating dashboard for smart city. See Km4City example of dashboard as reported in http://www.km4city.org/controlroomtools.html for the documentation see http://www.disit.org/6935 which is manual with examples regarding widgets. Developed for REPLICATE Project, and used in others as Sii-Mobility, RESOLUTE.
- **Sii-Mobility Dev Kit Mobile AppKm4city**: Open Source version of the Sii-Mobility mobile and web app, open modular (the full version is operative and accessible on all stores as "Firenze dove cosa", or " Toscana dove cosa", you can install from http://www.km4city.org/app). Developed for Sii-Mobility, adopted for the training and development meeting of the 24 janaury 2017, and as a basis for the Hackathon of 7-8 April 2017 in Florence.

Acknowledgement

- Thanks to the European Commission for founding. All slides reporting logo of **RESOLUTE H2020** are representing tools and research founded by European Commission for the RESOLUTE project. **RESOLUTE** has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement n° 653460).
- Thanks to the European Commission for founding. All slides reporting logo of **REPLICATE H2020** are representing tools and research founded by European Commission for the REPLICATE project. **REPLICATE** has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement n° 691735).
- Thanks to the MIUR for co-fouding and to the University of Florence and companies involved. All slides reporting logo of **Sii-Mobility** are representing tools and research founded by MIUR for the Sii-Mobility SCN MIUR project.
- Thanks to the European Commission for founding. All slides reporting logo of **Snap4City of Select4City H2020** are representing tools and research founded by European Commission for the **Select4City** project. **Select4City** has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement n° 688196)
- **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.

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KM4CITY

Open Urban Platform: Technical View 2018

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