



UNIVERSITÀ  
DEGLI STUDI  
FIRENZE

**DINFO**  
DIPARTIMENTO DI  
INGEGNERIA  
DELL'INFORMAZIONE

**DISIT**  
DISTRIBUTED SYSTEMS  
AND INTERNET  
TECHNOLOGIES LAB

# Smart City



## Piattaforma Km4City PISA

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

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[www.Km4City.org](http://www.Km4City.org)

<http://www.disit.org/7141>





# KM4CITY

## Open Urban Platform for a Sentient Smart City

Km4City platform is a Smart City tools for implementing the city vision, monitoring the city evolution, diffusely providing new services for improving quality of life of city users, for the city economic grow; stimulating city users; since an attractive city is a `city that produces` in which users are happy and proud.

[www.Km4City.org](http://www.Km4City.org)



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# Km4City Roadmap



**SELECT**  
for Cities  
*Snap4City*

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



Smart City vs IOT, Industria 4.0

6/2018

**SMARTCITY**  
EXPO WORLD CONGRESS

11/2018

2021

2013

## Km4City 1.1

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

- <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 recharge pillar
- Wi-Fi
- Events in the city

2015

## Km4City 1.4

- Embed
- More API
- iBeacon

## Km4City 1.5

- SmartDS
- Km4City App

**RESOLUTE**  
RESilience management guidelines and Operationalization appLied to Urban Transport Environment

**RESOLUTE H2020**  
2015-2018 - Started

**Sii-Mobility**  
<http://www.sii-mobility.org>

**Sii-Mobility SCN**  
2016-2018 - Started  
**Km4City 1.6.2**

2016

**REPLICATE H2020**  
2016-2021- Started

**REPLICATE**  
Renaissance of Places with Innovative Citizenship And Technology

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



**12/2017**  
**WEEE**  
2017-2020

**6/2017**

- waste
- Territorial areas and paths
- Health, Bike sharing
- Statistics, Energy, ICT, ...
- E-vehicles
- Risk analysis
- Environmental, water
- Data Licensing models
- Energy Meters
- Fi-Ware compliant

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

**GHOST SIR**  
2016-2019 - Started

**GHOST**  
Questioning the smart city: a governance-centred approach to Smart Urbanism

Transport systems  
Mobility, parking



Public Services  
Govern, events, ...



Sensors, IOT  
Cameras, ..



Environment,  
Water, energy



Shops, services,  
operators



Social Media  
WiFi, network

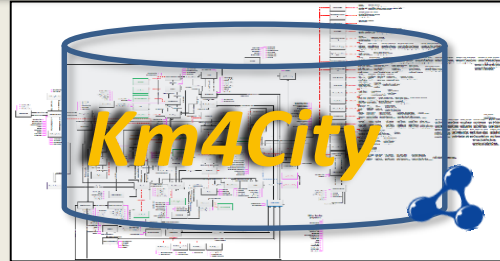


Static, Slow and Real Time data flows

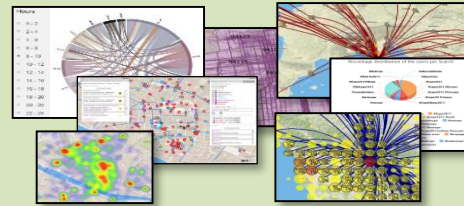
DISCES -- Distributed and parallel architecture on Cloud



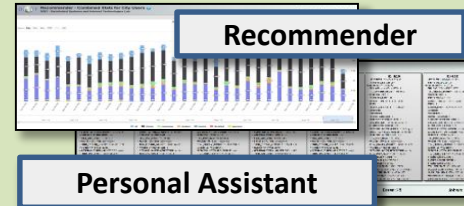
## Km4City Smart City Engine



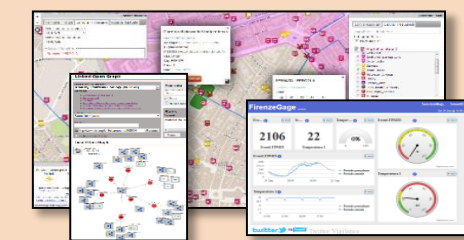
## Big Data Analytics



## Smartening Tools



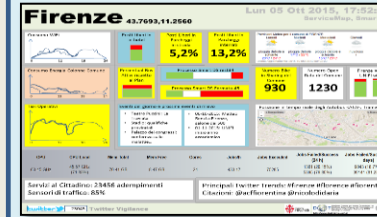
## Development Tools



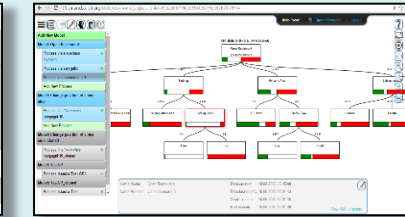
Km4City Smart City API

## City Operators and Decision Makers

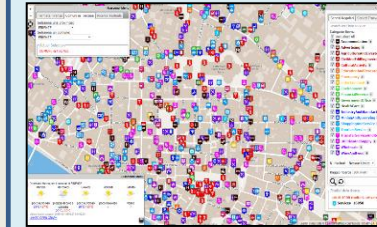
### Dashboards



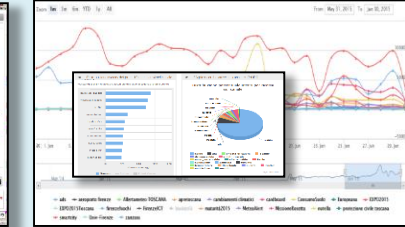
### Smart Decision Support



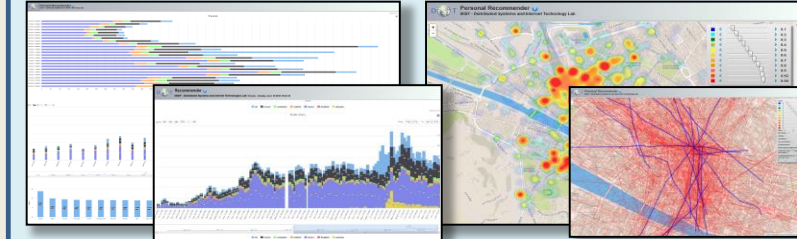
### ServiceMap browser



### Twitter Vigilance

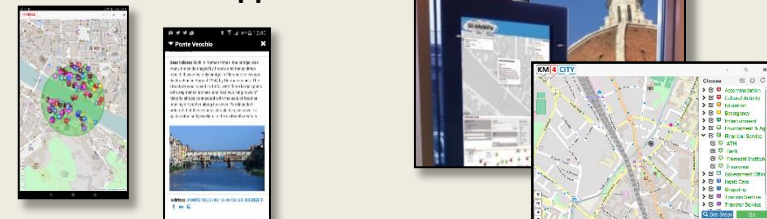


### Analyzers of City User Behavior



## Tools for Final Users

### Mobile e Web Apps





# Km4City: Open Urban Platform for Smart Sentient Cities

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



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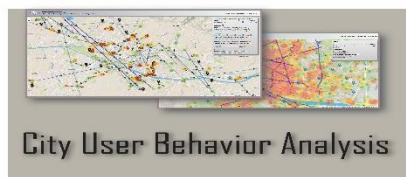


Smart City Control Room



Mobile, Web and Instant Apps

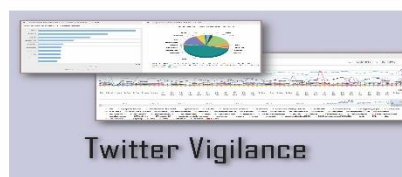
## Smart City API



City User Behavior Analysis



Multidomain Real Time Monitoring



Twitter Vigilance

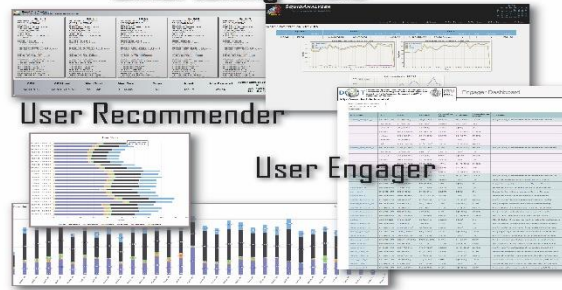


Resilience, Risk and Smart Decision Support

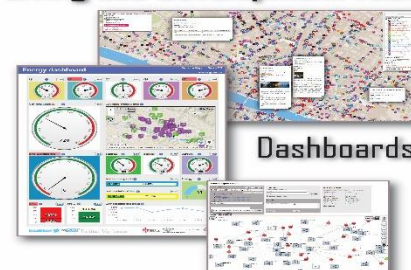
## Big Data Analytics



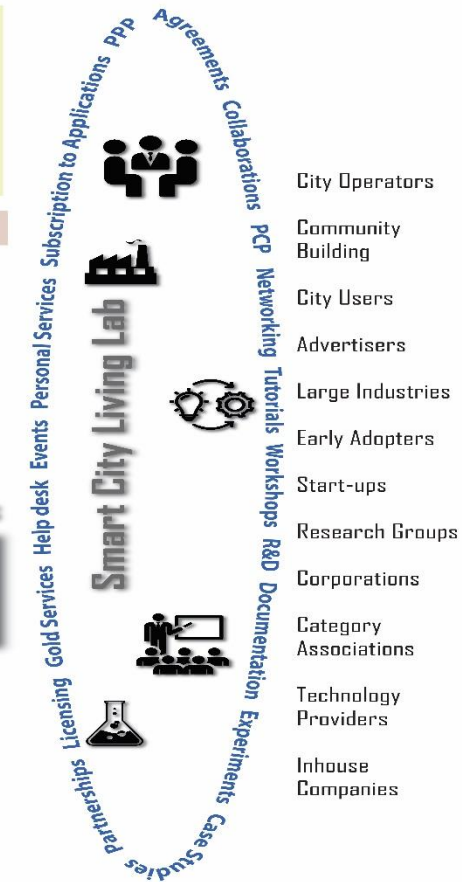
## Smartening Tools



## Living Lab Development Tools



## Smart City Data Aggregator and Service Provider



**Present data on  
Tuscany Region  
January 2018**

## Road Graph (Tuscany region)

132,923 Roads , 389,711 Road Elements

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

Info on: points, paths, areas, etc.

Services (20 cat, 512 cat.)

16 Public Transport Operators

21.280 Bus stops & 1081 bus lines

## Dynamic/real-time in Tuscany Region

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

Fermate Firenze Comuni in Toscana Ricerca Testuale

Seleziona una provincia:

FIRENZE

Seleziona un comune:

FIRENZE

Actual Selection

COMUNE di FIRENZE

KM4 CITY

Giovedì

Venerdì

Sabato

poco nuvoloso

poco nuvoloso

velato

23°C / 27°C

schiarite

20°C / 33°C



Servizi Regolari Servizi Trasversali

search text into service

Categorie Servizi

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

N. risultati: Nessun Limite

Raggio ricerca 100 metri

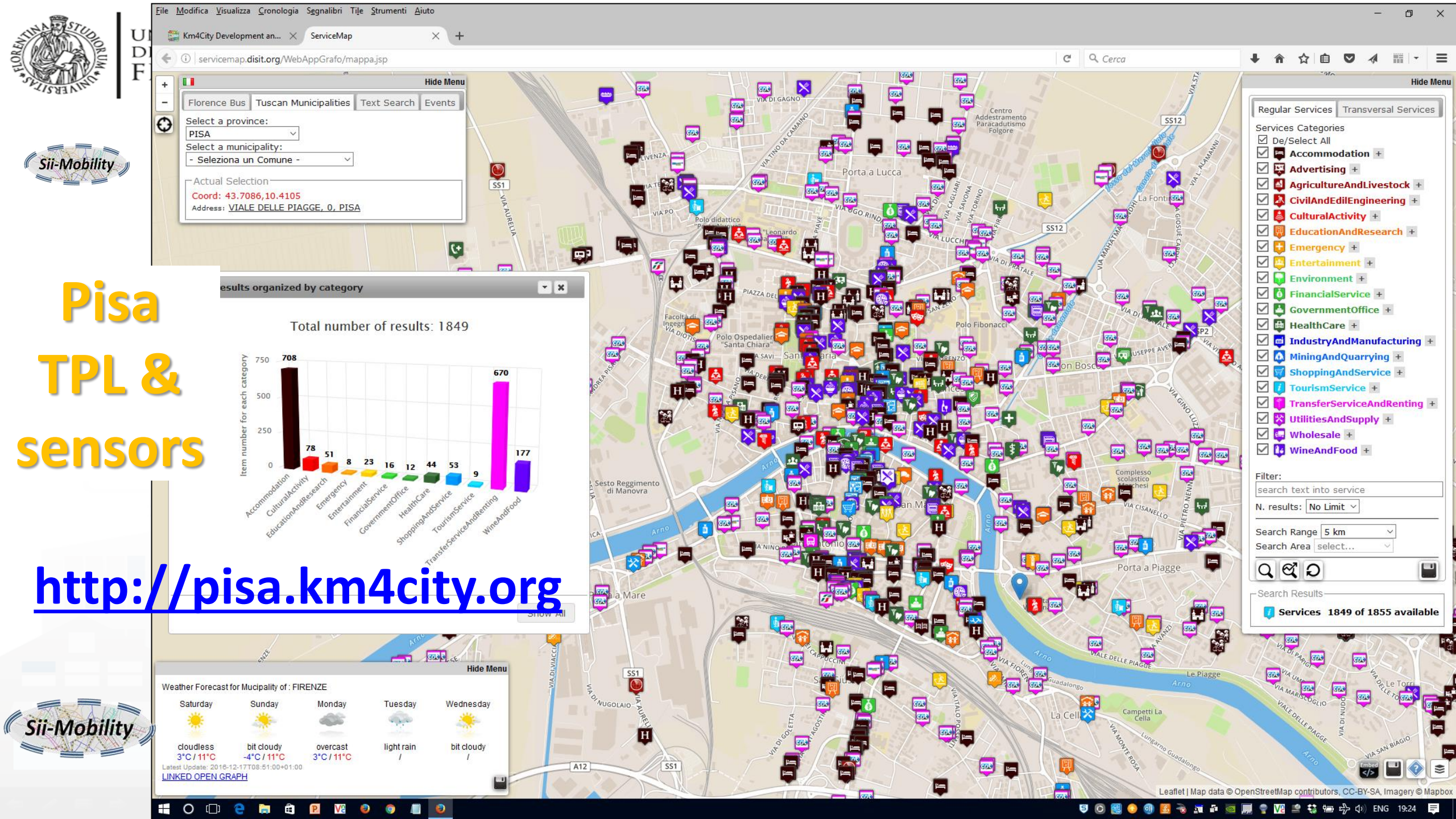


Risultati della ricerca

più di 4000 risultati, attivato clustering

Services 16858

<http://servicemap.km4city.org>



# Pisa TPL & sensors

<http://pisa.km4city.org>



File Modifica Cronologia Segnalibri Strumenti Aiuto

Km4City Development an... ServiceMap

servicemap.disit.org/WebAppGrafo/mappa.jsp

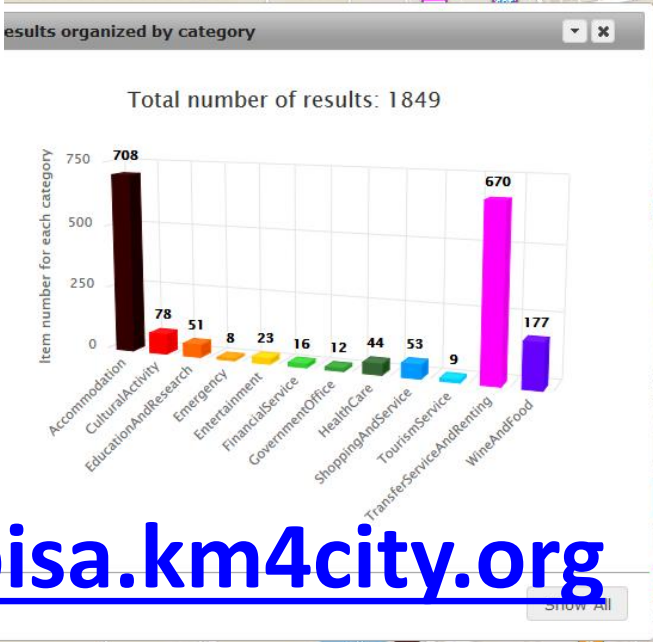
Hide Menu

Florence Bus Tuscan Municipalities Text Search Events

Select a province:  
PISA

Select a municipality:  
- Seleziona un Comune -

Actual Selection  
Coord: 43.7086,10.4105  
Address: VIALE DELLE PIAGGE, 0, PISA



Hide Menu

Weather Forecast for Municipality of: FIRENZE

Saturday	Sunday	Monday	Tuesday	Wednesday
cloudless 3°C / 11°C	bit cloudy -4°C / 11°C	overcast 3°C / 11°C	light rain /	bit cloudy /

Latest Update: 2016-12-17T08:51:00+01:00  
[LINKED OPEN GRAPH](#)

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

**Services 1849 of 1855 available**



**Public transport** Municipalities Text Search Address Search Events

Select an agency:  
- Select an Agency -

Select a line:  
- Select a Line -

Select a route:  
- Select a Route -

Select a bus stop:  
- Select a Stop -

**Position of selected Busses**

Actual Selection  
Coord: **43.7166,10.4023**  
Address: **PIAZZA GIUSEPPE GARIBALDI, 5, PISA**

Path from here Path to here

Route: **010 - Consorzio Pisano Trasporti** (dist:0.0004)  
Route: **LAM verde - Consorzio Pisano Trasporti** (dist:0.0004)  
Route: **LAM verde - Consorzio Pisano Trasporti** (dist:0.0004)  
Route: **Linea 2 - Consorzio Pisano Trasporti** (dist:0.0004)

**Regular Services** Transversal Services

Filter:  
search text into service

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: N. results: **No Limit**

Search Range **2 km**

Search Area **select...**

Search Results

**Services 1110 of 1110 available**





Public transport Municipalities Text Search Address Search Events

Select an agency:  
 - Select an Agency -

Select a line:  
 - Select a Line -

Select a route:  
 - Select a Route -

Select a bus stop:  
 - Select a Bus Stop -

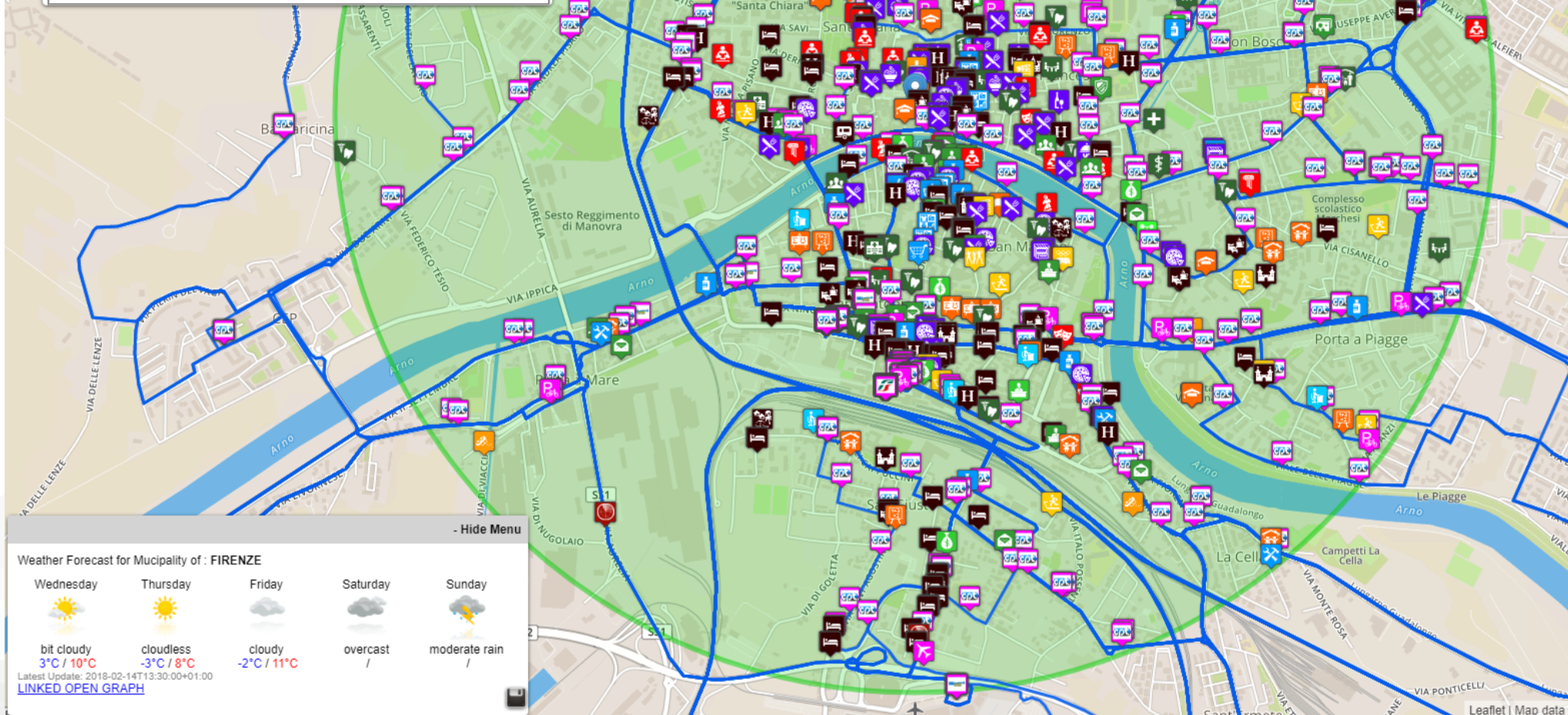
**Position of selected Buses**

---

Actual Selection

Coord: **43.7171,10.3996**  
 Address: [PIAZZA DELLA SAPIENZA, 3, PISA](#)

Path from here Path to here



Weather Forecast for Municipality of : FIRENZE

Wednesday	Thursday	Friday	Saturday	Sunday
bit cloudy 3°C / 10°C	cloudless -3°C / 8°C	cloudy -2°C / 11°C	overcast /	moderate rain /

Latest Update: 2019-02-14T13:30:00+01:00  
[LINKED OPEN GRAPH](#)

Regular Services Transversal Services

Services Categories

- De/Select All
- Area +
- DigitalLocation +
- HappeningNow +
- Path +
- Fresh Place
- Public Transport Line
- Road Sensors
- Bus Stops
- Tram\_stops
- Train\_station
- Ferry\_stop
- Car\_park
- Bike\_sharing\_rack
- RTZgate
- Fuel\_station
- Air\_quality\_monitoring\_station
- Pollen\_monitoring\_station
- Smart\_waste\_container
- Smart\_irrigator
- Smart\_bench
- First\_aid

Filter:  
 search text into service

N. results for each: No Limit

Search Range 2 km

Search Results

- Services 810 of 810 available**
- Bus Stops: 308 of 308 available**
- Road Sensors: 10 of 10 available**

Bus Lines

**313 Public Transport Lines Found.**

TPL Line:  
 Direction: Agnano → Pisa V.Battisti

TPL Line:  
 Direction: Agnano → Pisa V.Battisti

TPL Line:

**Public Transportation**

Servizi: 29 su 29 disponibili

**Pisa V.Le Gramsci**  
Consorzio Pisano Trasporti

**875**

Orario	Linea	Direzione
12:15:00	875	Pisa V.Le Gramsci
13:14:00	875	Pisa V.Le Gramsci
13:30:00	875	Pisa V.Le Gramsci
14:29:00	875	Pisa V.Le Gramsci
14:30:00	875	Pisa V.Le Gramsci
15:29:00	875	Pisa V.Le Gramsci
18:30:00	875	Pisa V.Le Gramsci
19:29:00	875	Pisa V.Le Gramsci
19:30:00	875	Pisa V.Le Gramsci
20:29:00	875	Pisa V.Le Gramsci

Aggiorna Vedi Tutti

Cosa ne pensi del servizio?

Vota

☆☆☆☆☆ 0

Commenta

**previsioni** 47%

Thu 15 Feb  
**Pisa**  
Bit cloudy

Powered by LAMMA

5°C / 11°C

Day	Temp	Weather
Fri 16 Feb	1°C / 13°C	Cloudy
Sat 17 Feb	6°C / 13°C	Overcast
Sun 18 Feb	Temp 10°C	Moderate or strong rain
Mon 19 Feb	Temp 10°C	Cloudy

**Cultural Activities**

Servizi: 9 su 9 disponibili

**Risultati**

- Biblioteca Centrale**  
→ Biblioteca  
⊙ 34 m
- Chiesa Di Santa Maria Della Spina**  
→ Luogo monumento  
⊙ 80 m
- Biblioteca Di Scienze Politiche Dell'università Di Pisa**  
→ Biblioteca  
⊙ 254 m
- Biblioteca Giuridica Dell'università Di Pisa**  
→ Biblioteca  
⊙ 261 m
- Biblioteca Universitaria**  
→ Biblioteca  
⊙ 261 m
- Biblioteca Universitaria**  
→ Biblioteca  
⊙ 261 m

<http://www.disit.org/dashboardSmartCity/view/index.php?iddashboard=MjUy>



# Cycling Paths



Hide Menu

Florence Bus Tuscan Municipalities Text Search Events

Select a line:  
- Select a Bus Line -  
Select a route:  
- Select a Bus Route -  
Select a bus stop:  
- Select a Bus Stop -

**Position of selected Busses**

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

Hide Menu

Regular Services Transversal Services

Services Categories

- De/Select All
- Area +
- DigitalLocation +
- HappeningNow +
- Path -
- Cycle\_paths
- Tourist\_trail
- Tramline
- Fresh Place
- Public Transport Line
- Road Sensors
- Bus Stops

Filter:  
  
 N. results for each: No Limit  
 Search Range: visible areas

Search Results  
**Services 228 of 228 available**

FIRENZE

Servizi: 85 su 85 disponibili

**Result 1:**  
 Percorsi Ciclabili.309  
 Tipo: Ciclopercorsi  
 Distanza 172 m  
 Distanza 1329 m

**Result 2:**  
 Percorsi Ciclabili.305  
 Tipo: Ciclopercorsi  
 Distanza 191 m  
 Distanza 956 m

FIRENZE Navigazione

Servizi: 100 su 1516 disponibili

**Result 1:**  
 Arena Esterno Notte Poggetto  
 Tipo: Cinema  
 Distanza 351 m

**Result 2:**  
 Auditorium Flog  
 Tipo: Teatro  
 Distanza 351 m



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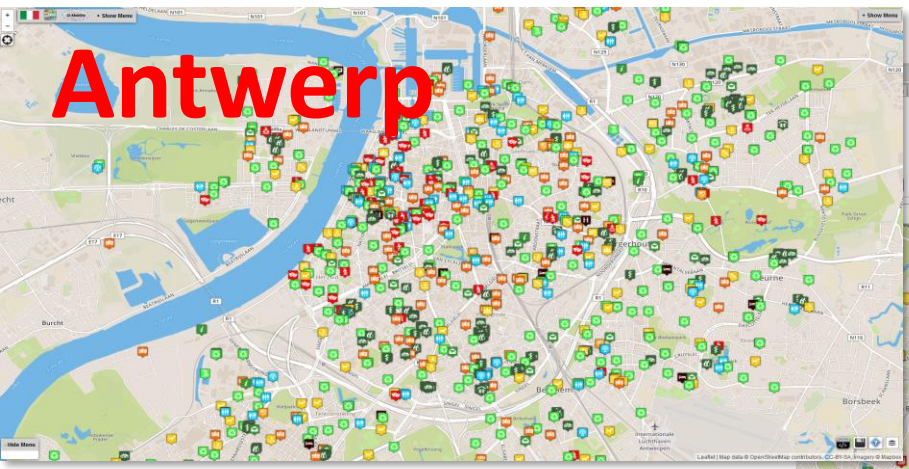
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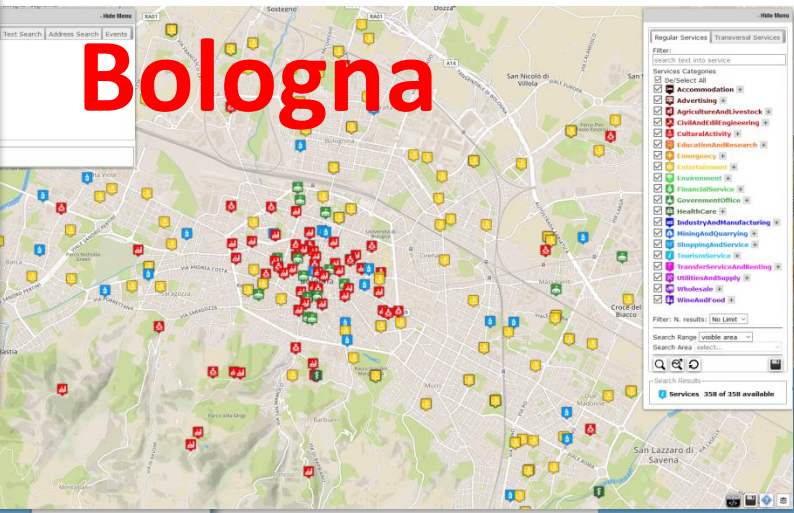
# Km4City in ...



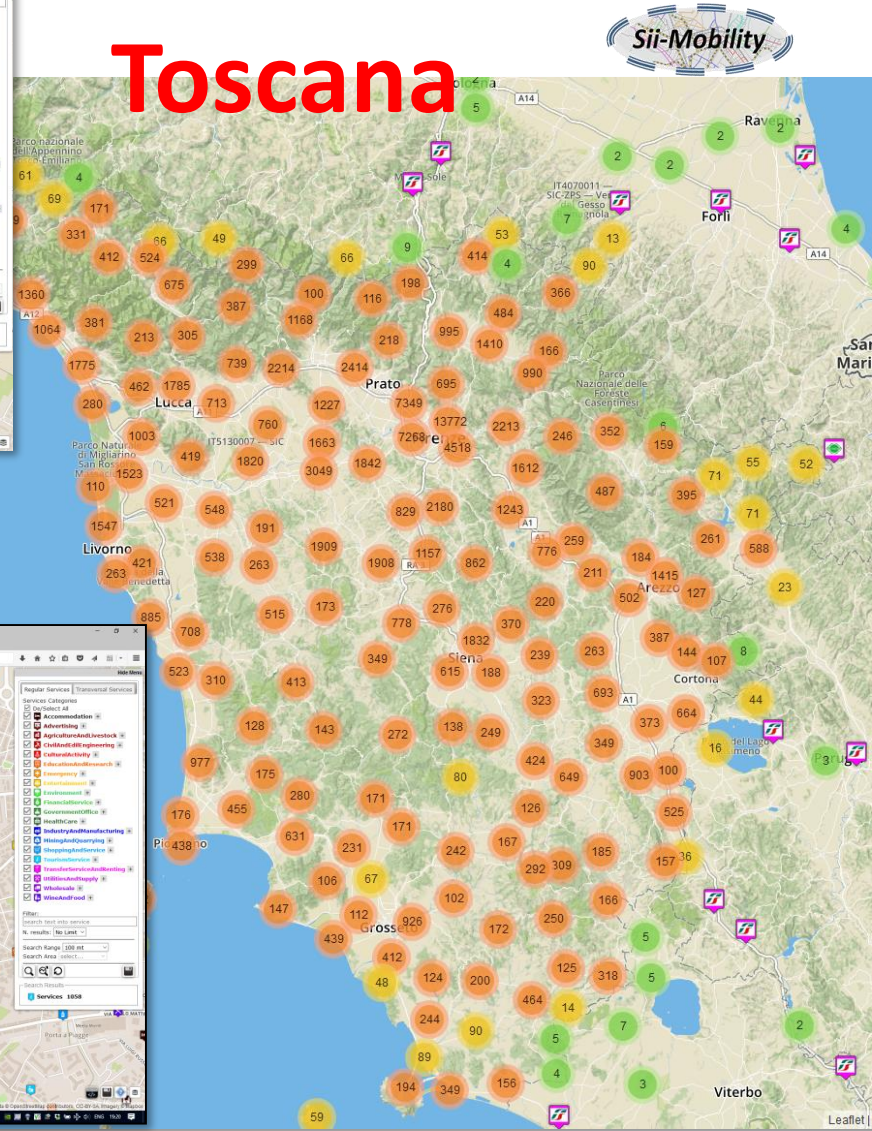
## Antwerp



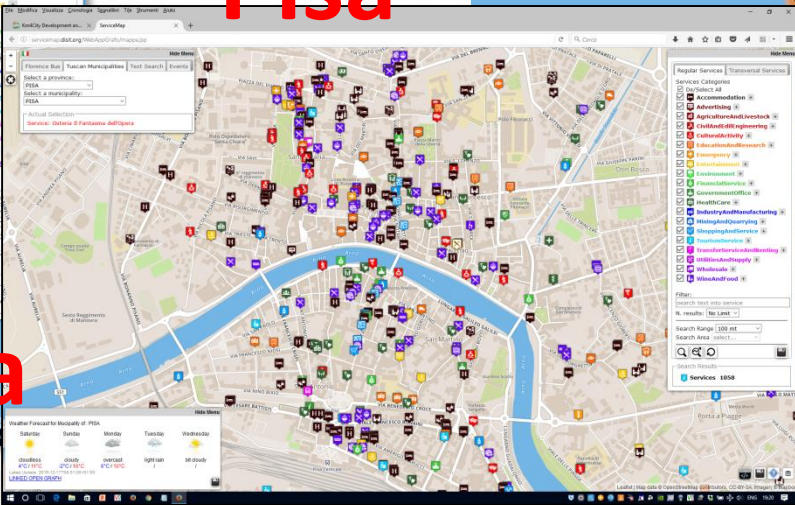
## Bologna



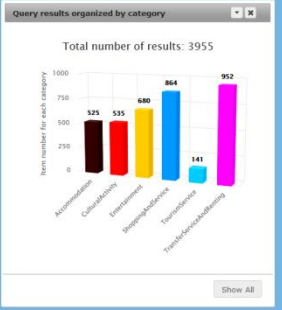
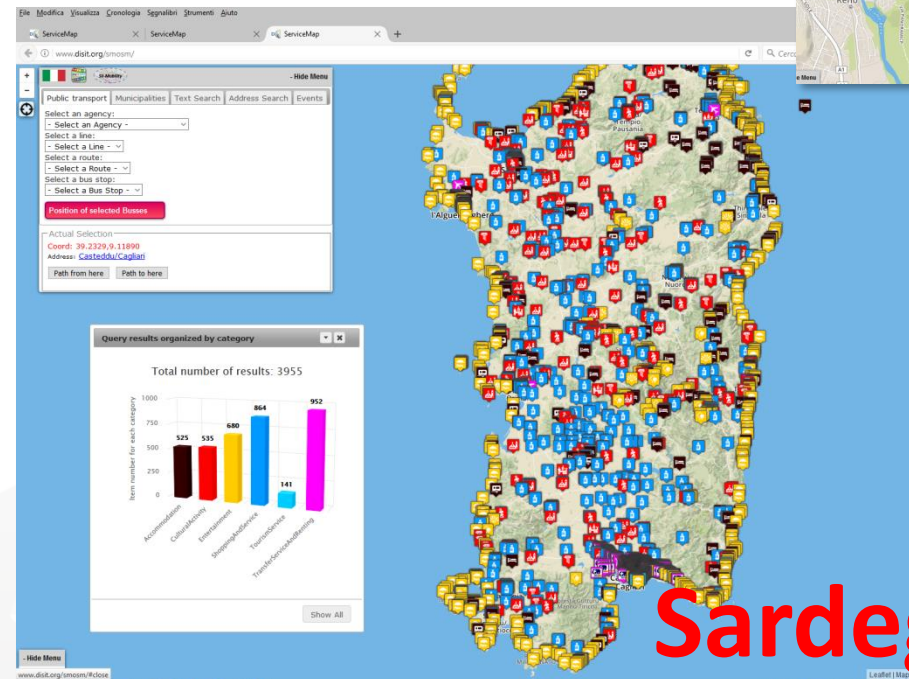
## Toscana



## Pisa



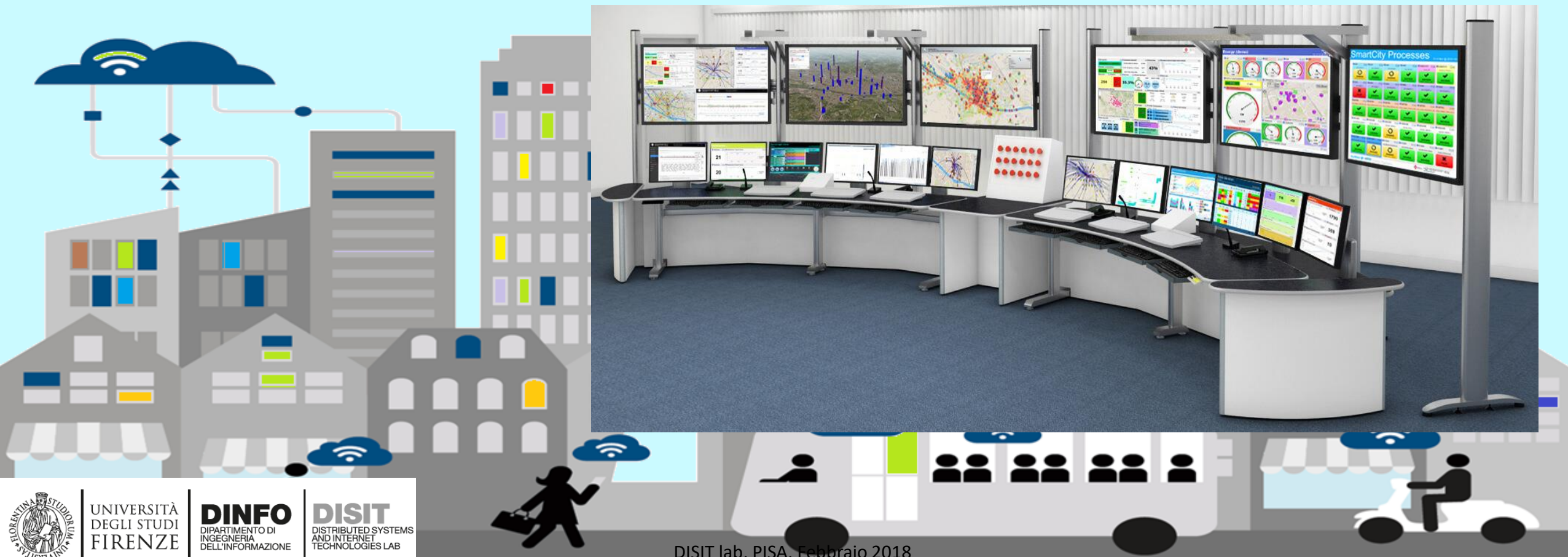
## Sardegna



• Search all services in the area

# Dashboard for all

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



### POI

- Bike Sharing
- Fermate Bus
- Pronto Soccorso
- Air quality
- Traffic Sensors

### Meteo Pisa


Gio 15 Feb **Pisa** Poco nuvoloso 5°C / 11 °C

Day	Temp	Condition
Ven 16 Feb	1°C / 13°C	Nuvoloso
Sab 17 Feb	6°C / 13°C	Coperto
Dom 18 Feb	Temp N/A	Temp N/A
Lun 19 Feb	Temp N/A	Temp N/A

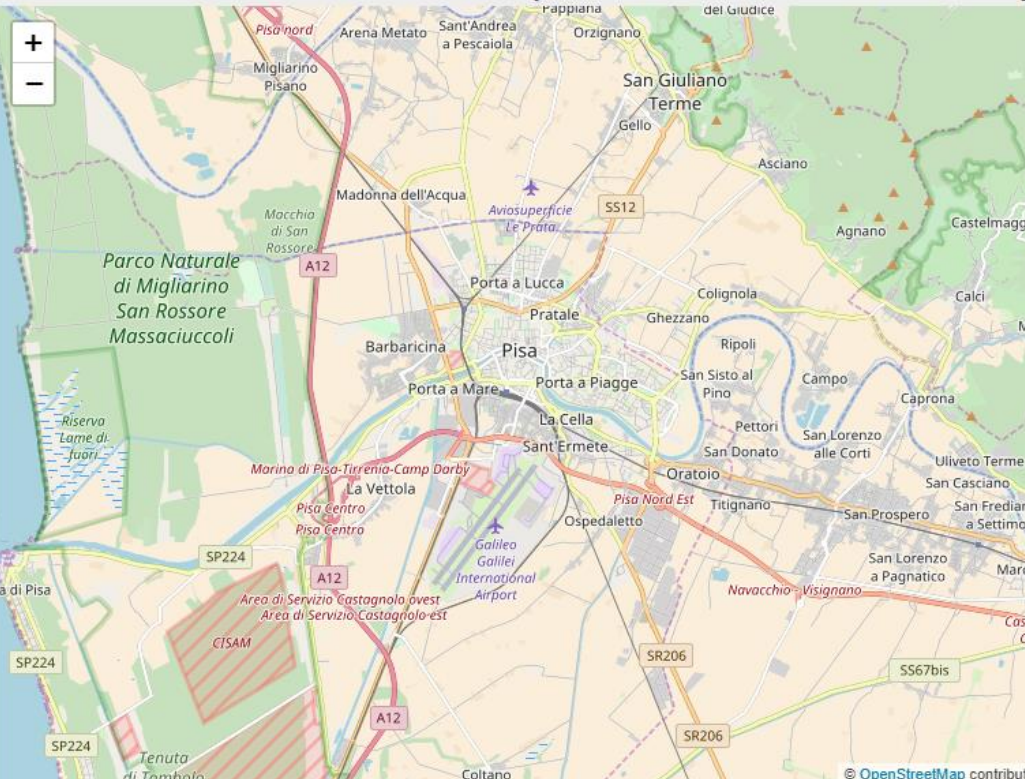
### Temperatura RT

16.2

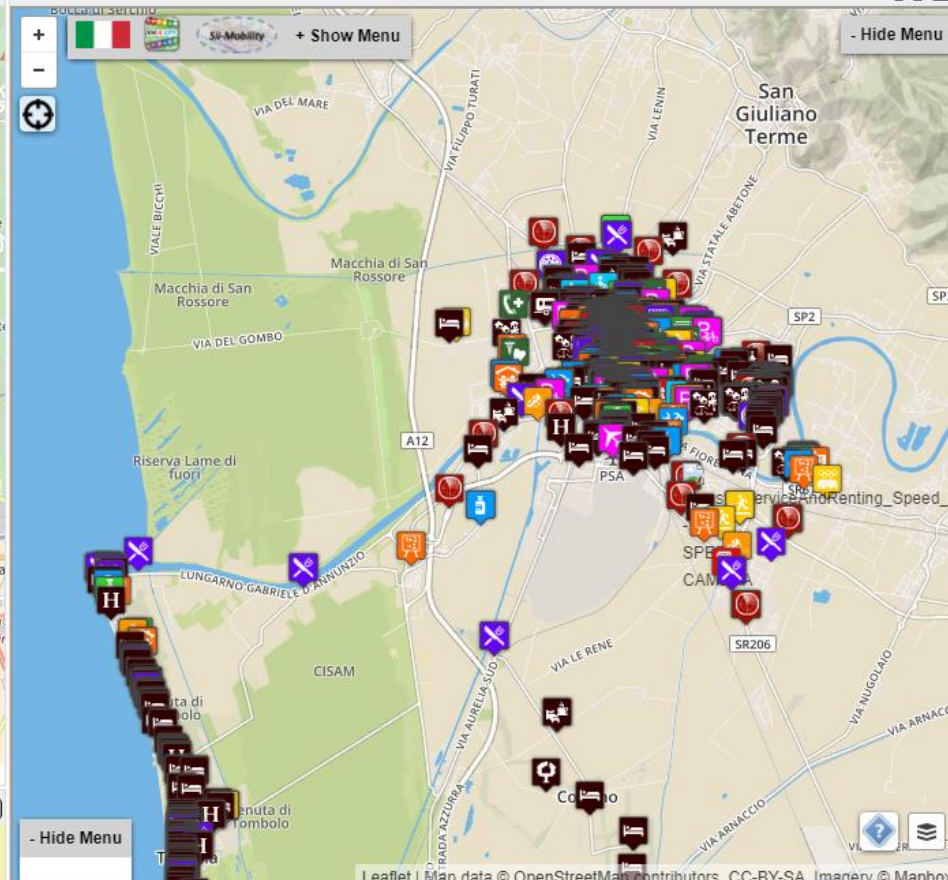
### Andamento giornaliero



### Map




### Servizi a Pisa



Traffico a Firenze (external link)

Console (external link)

Km4City website (external link)



<http://www.disit.org/dashboardSmartCity/view/index.php?iddashboard=MjMx>

# First aids overview - Tuscany

Service status of main first aids

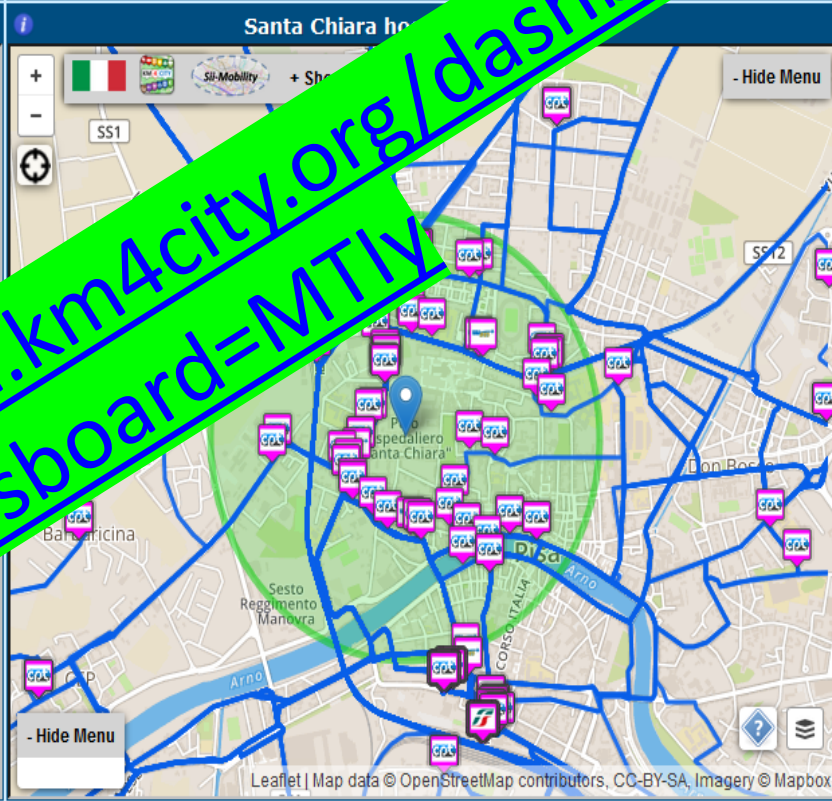
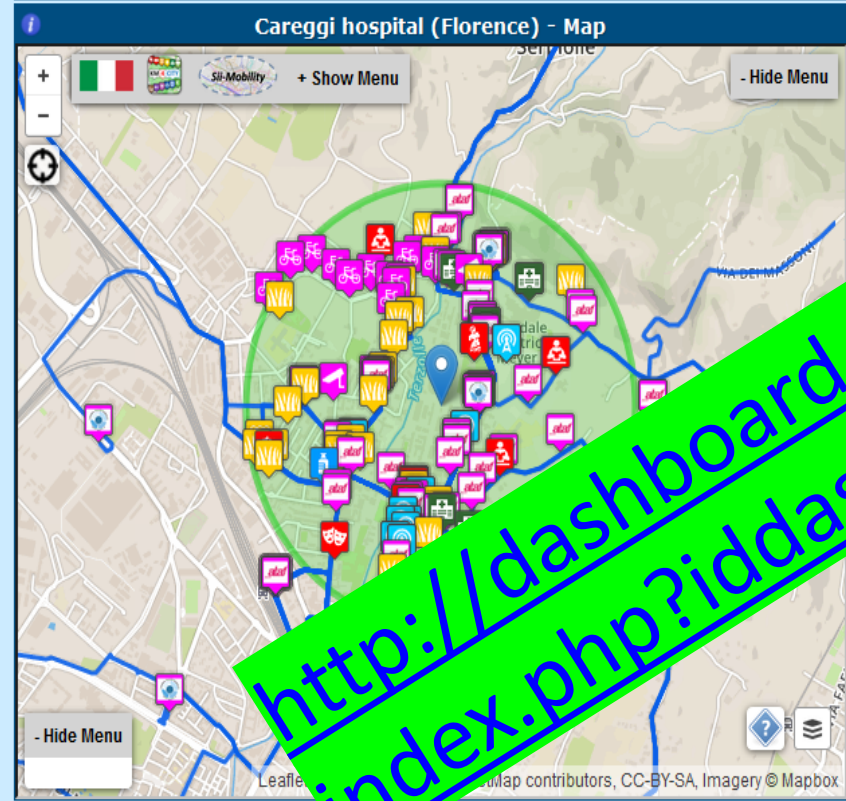


ay @ 11:00:34

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
<b>Totals</b>	<b>6</b>	<b>34</b>	<b>32</b>	<b>5</b>	<b>0</b>

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

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



Mobile app interface showing service status and location. The screen displays a map with a highlighted service area and a list of services available. A pop-up window shows details for 'Pronto Soccorso Azienda Ospedaliera Careggi'.

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

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



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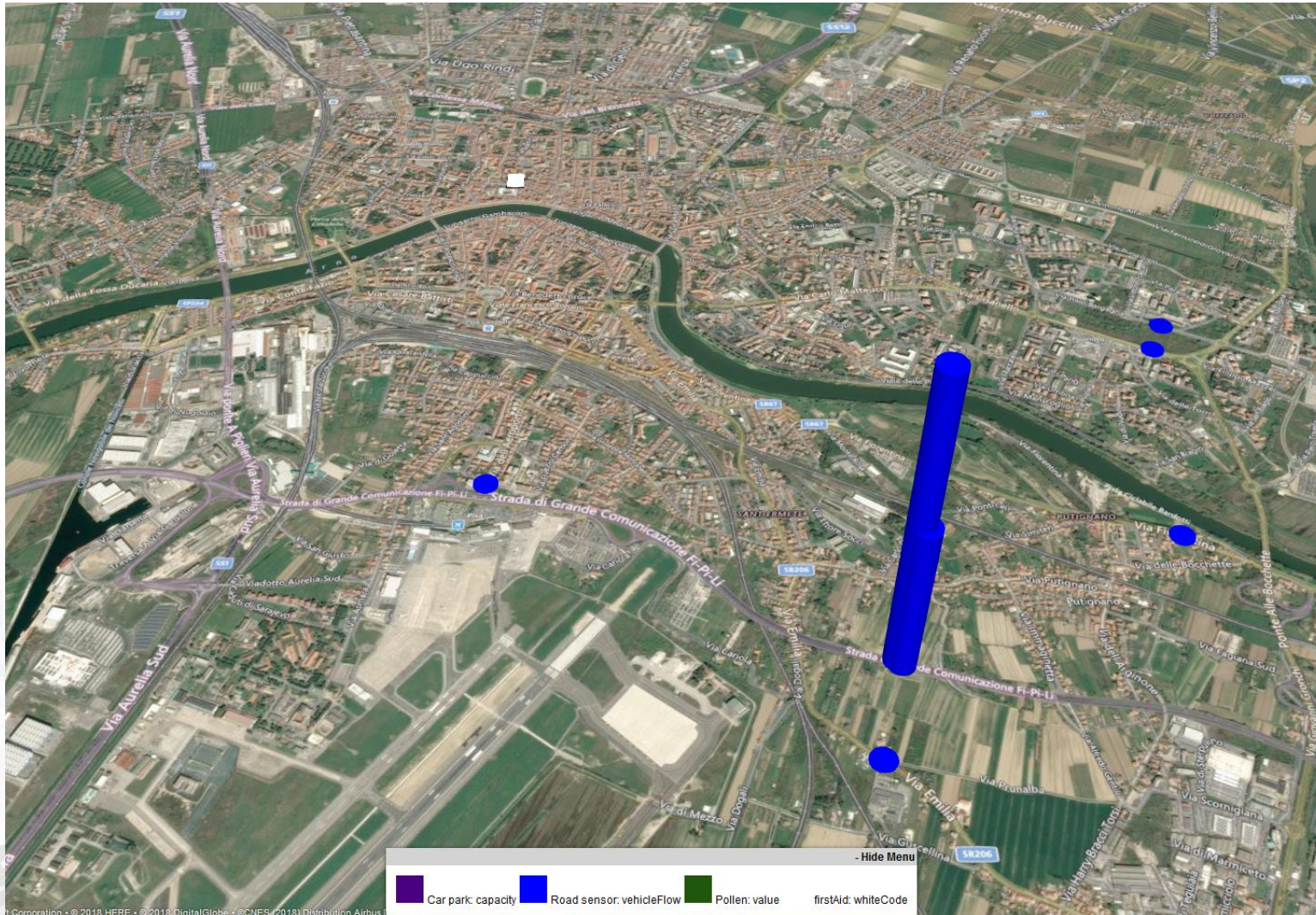
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INGEGNERIA  
DELL'INFORMAZIONE

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

# Pisa



## <http://www.disit.org/servicemap3d/?c=pisa>





# Traffico Real time



**FIPILIM000902**

LINKED OPEN GRAPH

Tipology: TransferServiceAndRenting - SensorSite

Address: SENZA FIRENZE PISA LIVORNO (S.G.C. FI-PI-LI)

Data from sensor: FIPILIM000902

Latest Update: 2016-05-27T12:02:00+02:00

Avg Distance(m)	Avg Time (sec)	Occupancy (%)	Concentration (car/km)
N.A.	N.A.	N.A.	61.0
Vehicle Flow (car/h)	Avg Speed (Krn/h)	Threshold Perc (%)	Speed Perc (%)
2411.0	39.7499	N.A.	N.A.

**METRO563**

LINKED OPEN GRAPH

Tipology: TransferServiceAndRenting - SensorSite

Address: SGC FI-PI-LI (km 26 100) verso Firenze

Data from sensor: METRO563

Latest Update: 2018-02-05T10:50:00+01:00

Avg Distance(m)	Avg Time (sec)	Occupancy (%)	Concentration (car/km)
N.A.	181.5702	N.A.	1.260315
Vehicle Flow (car/h)	Avg Speed (Krn/h)	Threshold Perc (%)	Speed Perc (%)
336.0	133.3	N.A.	N.A.

Regular Services | Transversal Services

Filter: search text into service

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: N. results: No Limit






Search Range: specific area

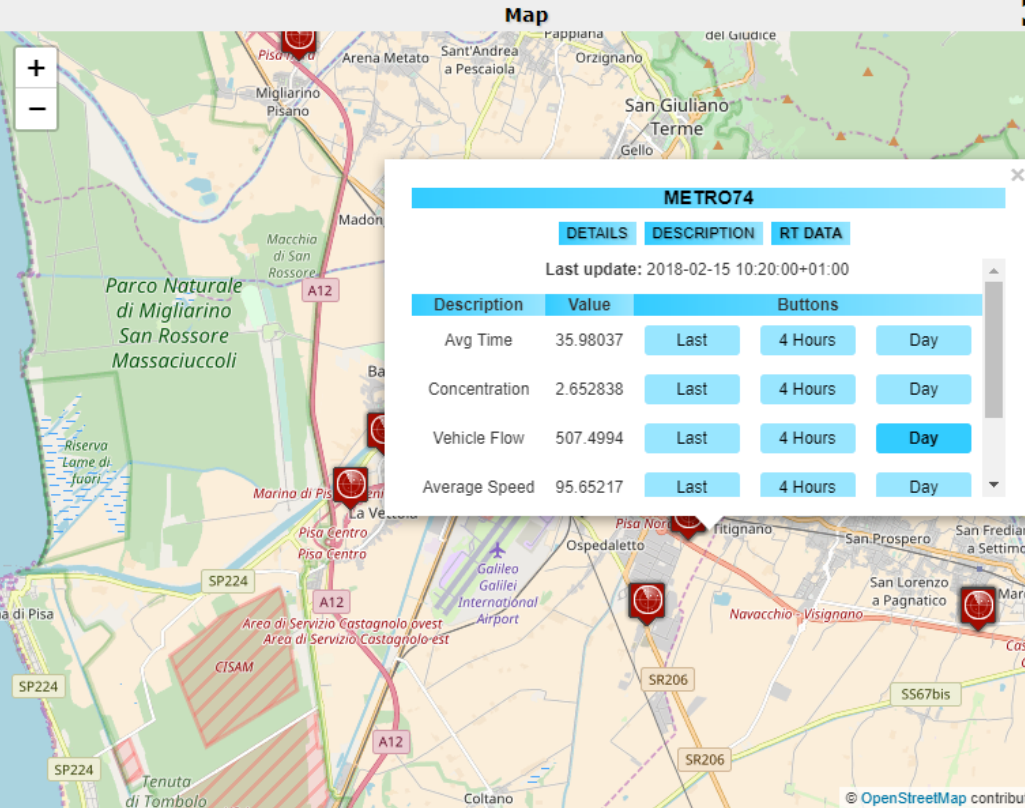
Search Area: fi-pi-li2

Search Results

**Services 62 of 62 available**

**POI**

-  Bike Sharing
-  Fermate Bus
-  Pronto Soccorso
-  Air quality
-  Traffic Sensors



**METRO74**

[DETAILS](#)
[DESCRIPTION](#)
[RT DATA](#)

Last update: 2018-02-15 10:20:00+01:00

Description	Value	Buttons		
Avg Time	35.98037	Last	4 Hours	Day
Concentration	2.652838	Last	4 Hours	Day
Vehicle Flow	507.4994	Last	4 Hours	Day
Average Speed	95.65217	Last	4 Hours	Day

**Meteo Pisa**

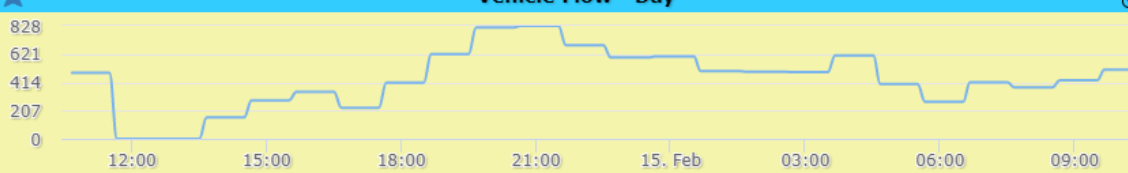
Gio 15 Feb  
**Pisa**  
Poco nuvoloso  
5°C / 11°C

Ven 16 Feb 1°C / 13°C Nuvoloso	Sab 17 Feb 6°C / 13°C Coperto	Dom 18 Feb Temp N/A Pioggia moderata o	Lun 19 Feb Temp N/A Nuvoloso
--------------------------------------	-------------------------------------	--	------------------------------------

**Temperatura RT** (1m)

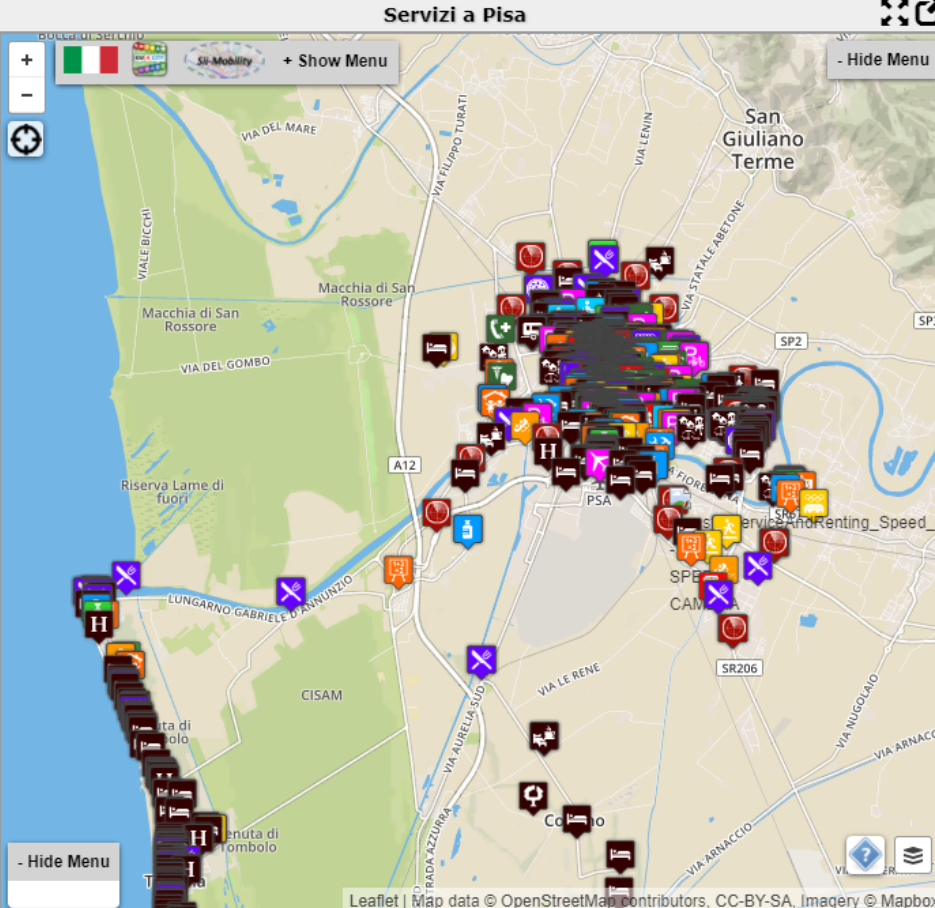
## 16.2

**Vehicle Flow - Day** (9m)



**Servizi a Pisa**

+ Show Menu



- Hide Menu

**Traffico a Firenze**  
(external link)

**Console (external link)**

**Km4City website**  
(external link)



# Pronto Soccorso



**PRONTO SOCCORSO AZIENDA OSPEDALIERA PISANA**

LINKED OPEN GRAPH

Typology: Emergency - First\_aid  
Phone: 050992300  
Fax: 050992300  
Address: VIA BONANNO PISANO  
DBpedia: "Nino\_Pisano"  
DBpedia: "Giovanni\_Pisano"  
DBpedia: "Giovanni\_Pisano\_(calciatore)"  
DBpedia: "Andrea\_Pisano"  
DBpedia: "Andrea\_Pisano\_(pallanuotista)"  
DBpedia: "Nicola\_Pisano"  
DBpedia: "Pisanello"  
Cap: 56100  
City: PISA  
Prov.: PI  
Note: general information: SNC

state	redCode	yellowCode	greenCode	blueCode	whiteCode
In Attesa	0	0	8	3	7
In Visita	1	5	9	1	4
Totale	1	5	17	4	11

Latest Update: 2018-02-05T10:45:03Z

Regular Services | Transversal Services

Services Categories

- De/Select All
- Area +
- DigitalLocation +
- HappeningNow +
- Path +
- Fresh Place
- Public Transport Line
- Road Sensors
- Bus Stops
- Tram\_stops
- Train\_station
- Ferry\_stop
- Car\_park
- Bike\_sharing\_rack
- RTZgate
- Fuel\_station
- Air\_quality\_monitoring\_station
- Pollen\_monitoring\_station
- Smart\_waste\_container
- Smart\_irrigator
- Smart\_bench
- First\_aid

Filter:  
search text into service

N. results for each: 100

Search Range: visible areas

Search Results  
**Services 4 of 4 available**



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# Qualità dell'aria



**PI-BORGHETTO**  
LINKED OPEN GRAPH  
Tipology: Environment - Air\_quality\_monitoring\_station  
. 7  
City: PISA  
Prov.: PISA

Property	Value
NO2	
SO2	
H2S	
CO	
Benzene	
PM2_5	
PM10	9.0
annualPM10ExceedCount	1

Latest Update: 2018-02-03T00:00:00+01:00

Regular Services | Transversal Services

Services Categories

- De/Select All
- Area +
- DigitalLocation +
- HappeningNow +
- Path +
- Fresh Place
- Public Transport Line
- Road Sensors
- Bus Stops
- Tram\_stops
- Train\_station
- Ferry\_stop
- Car\_park
- Bike\_sharing\_rack
- RTZgate
- Fuel\_station
- Air\_quality\_monitoring\_station
- Pollen\_monitoring\_station
- Smart\_waste\_container
- Smart\_irrigator
- Smart\_bench
- First\_aid

Filter:  
search text into service

N. results for each: 100

Search Range: visible areas

Search Results:  
**Services 2 of 2 available**



# Pronto Soccorso su webApp



**Pronto Soccorso Azienda Ospedaliera Pisana**

Qui Intorno

Stato   Priorità	1°	2°	3°	4°	5°
In Attesa	0	2	8	1	3
In Visita	1	8	1	0	4
<b>Totali</b>	<b>1</b>	<b>10</b>	<b>9</b>	<b>1</b>	<b>7</b>

Pronto Soccorso

VIA BONANNO PISANO , 56100 PISA PI

050992300

050992300

general information: SNC

DBPedia: Nino Pisano - Giovanni Pisano - Giovanni Pisano (calciatore) - Andrea Pisano - Andrea Pisano (pallanuotista) - Nicola Pisano - Pisanello -

Cosa ne pensi del servizio?

Vota

☆☆☆☆☆ 0

Commenta

Invia

<https://www.km4city.org/webapp-new/?coordinates=43.720953,10.395&operation=health/firstaid#b>

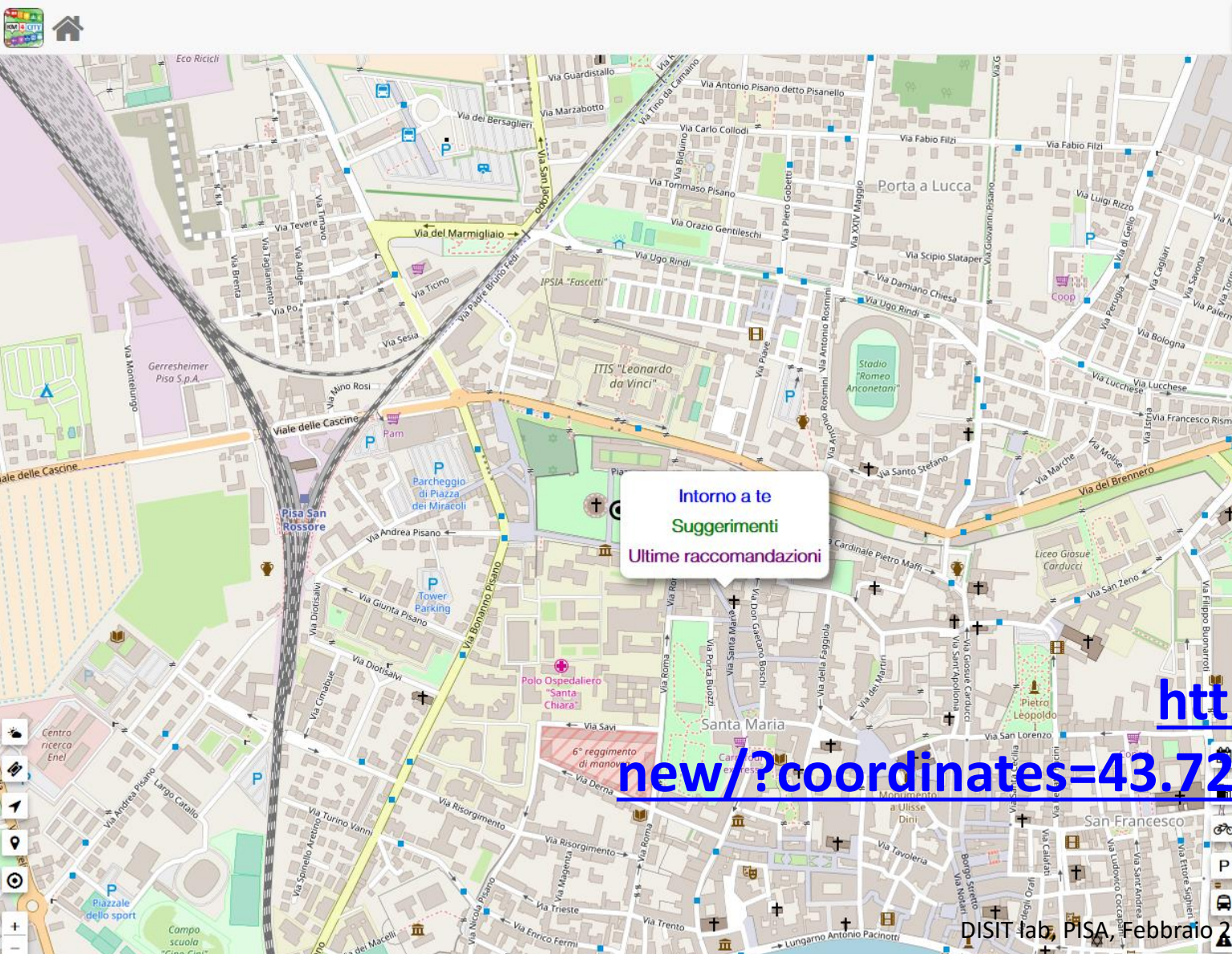


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# Meteo su WebApp



+ PISA X

05-02-2018 08:54

Lunedì	Martedì	Mercoledì	Giovedì	Venerdì
12 °C 8 °C	10 °C 5 °C	10 °C 6 °C	- °C - °C	- °C - °C

<https://www.km4city.org/webapp-new/?coordinates=43.7232;10.3947&operation=weather>

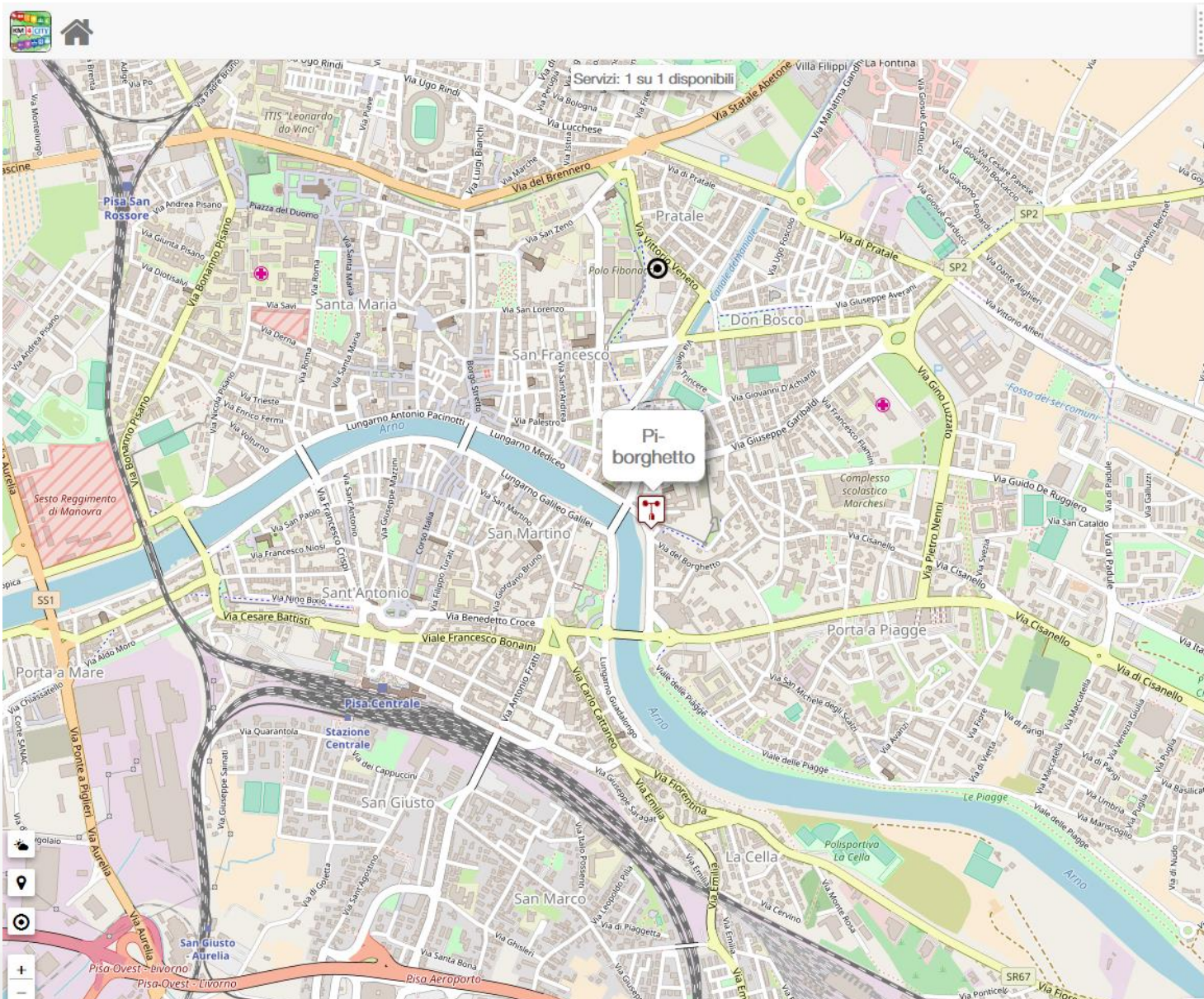


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# Dati su WebApp



+ Qualità + Pi-borghetto ✕

Pi-bor  
→ Staz  
883 m

**Qui Intorno**

PM10	9.0 µg/m³	Media Giornaliera
Superamenti PM10	1 Giorni	Superamenti Annuali

→ Stazione di monitoraggio della qualità dell'aria

Cosa ne pensi del servizio?

Vota

☆☆☆☆☆ 0

Commenta

pp-  
her

# Smart City Control Room Console

Entry point for REPLICATE dashboards



Tue 21 Nov 19:30:36

**Energy**

**Environment**

**Mobility and Transport**

**Social**

**4 in one UHD**

**Energy Pilot**

**Environment and Weather**

**Mobility and Transport**

**Web and Social**

**4 in one UHD (2)**

**Data Aggregation and Data Analytics**  
DISIT Lab

**RealTime Sensors via ServiceMap3D**

**Resilience Management**

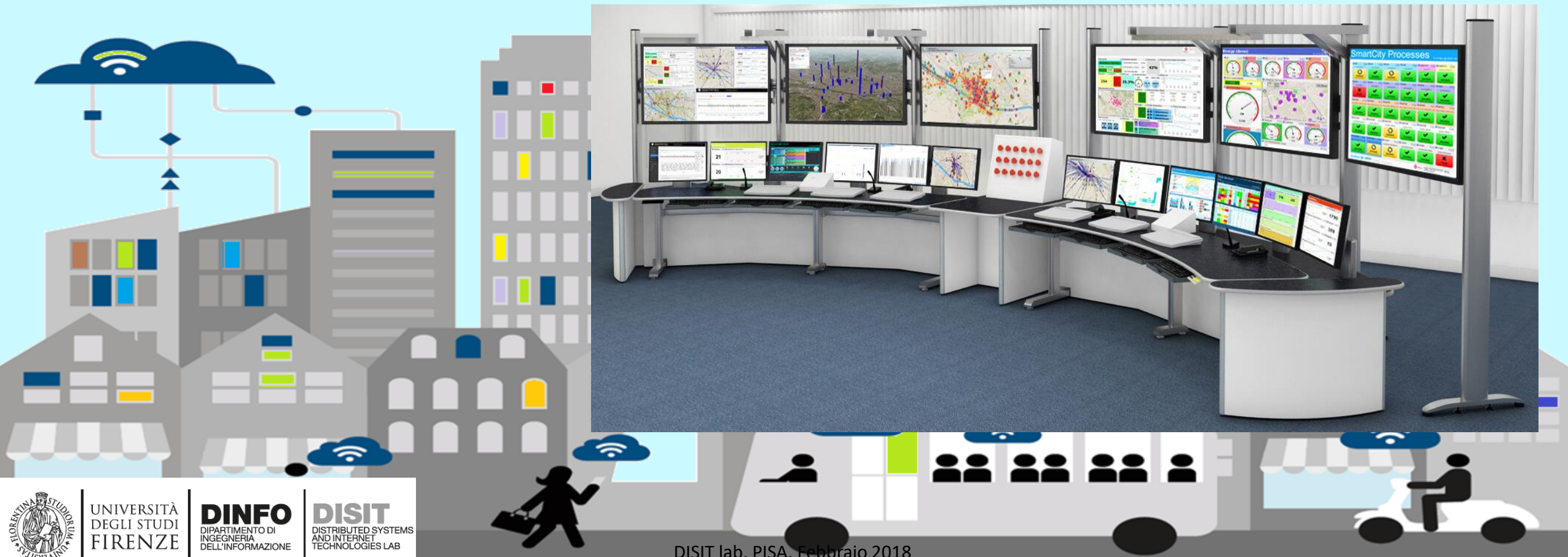
**Resilience Dashboard by RESOLUTE**

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

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



# Big Data Analytics



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AND INTERNET  
TECHNOLOGIES LAB

DISIT lab, PISA, Febbraio 2018





# Le sperimentazioni Big Data ...

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



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<http://www.disit.org>

# Km4CityMobile App

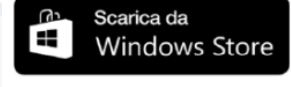


web application

<http://www.km4city.org>

The collage displays several screenshots of the Km4CityMobile App interface:

- Home Dashboard:** A grid of service icons including Public transport, Bus Ticket, Car Park, Events, Suggestions Near You, We Recommend, Weather, Assistant, Navigator, Favourites, Chronology, Latest Reviews, Alert Civil Prot., Settings, Vote APP!, Information, and About Us.
- Service Selection:** A list of categories such as Accommodation, Advertising, Agriculture And Livestock, Civil And Edil Engineering, Cultural Activity, Education And Research, Emergency, Entertainment, Environment, Financial Service, Government Office, Health Care, Industry And Manufacturing, Mining And Quarrying, Shopping And Service, Tourism Service, and Transfer Service And Renting.
- Location Details:** A screen for 'Giardino Di Boboli' showing a 'Digital Location' type and two descriptions in Italian, one mentioning the Prince's Way and the other the Prince's Path.
- Map View:** A map of Florence with various service icons overlaid on different areas of the city.
- Suggestions:** A list of suggested locations like 'Piazza SS. Annunziata' and 'Piazza Santissima Annunziata' with details on type, distance, and address.
- Weather and News:** A screenshot showing weather for Rome (3°C) and a news snippet about 'ESERCITAZIONE MUGNONE 2016'.



# Km4City APP



- **Mobility**

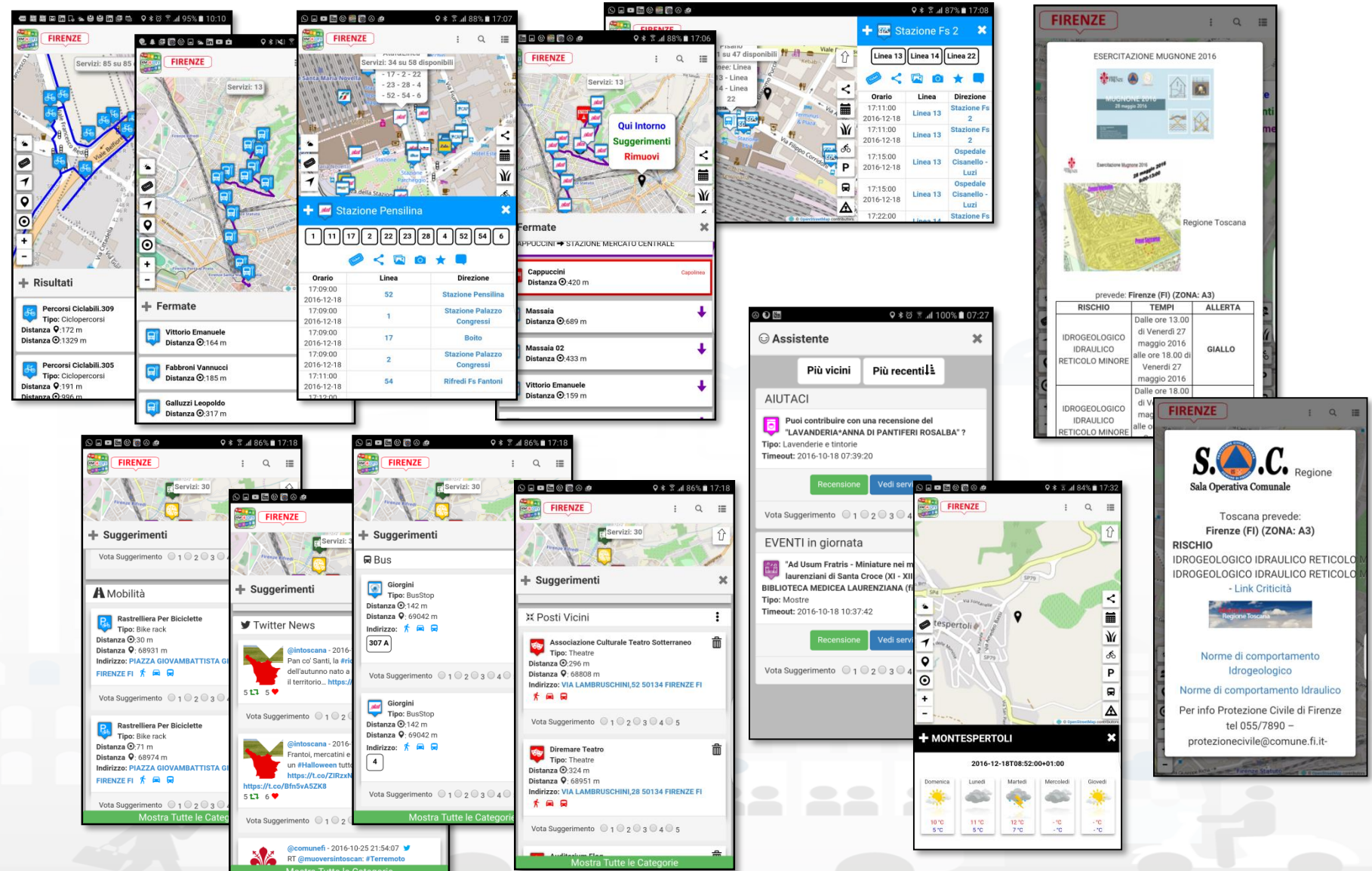
- Paths and stops, time
- Parking + prediction
- Ticketing
- Flow + prediction
- Navigation
- Connection with devices
- XXX Sharing

- **Personal Assistant**

- Info, Engagement
- Help, Civil protection

- **Suggestions:**

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

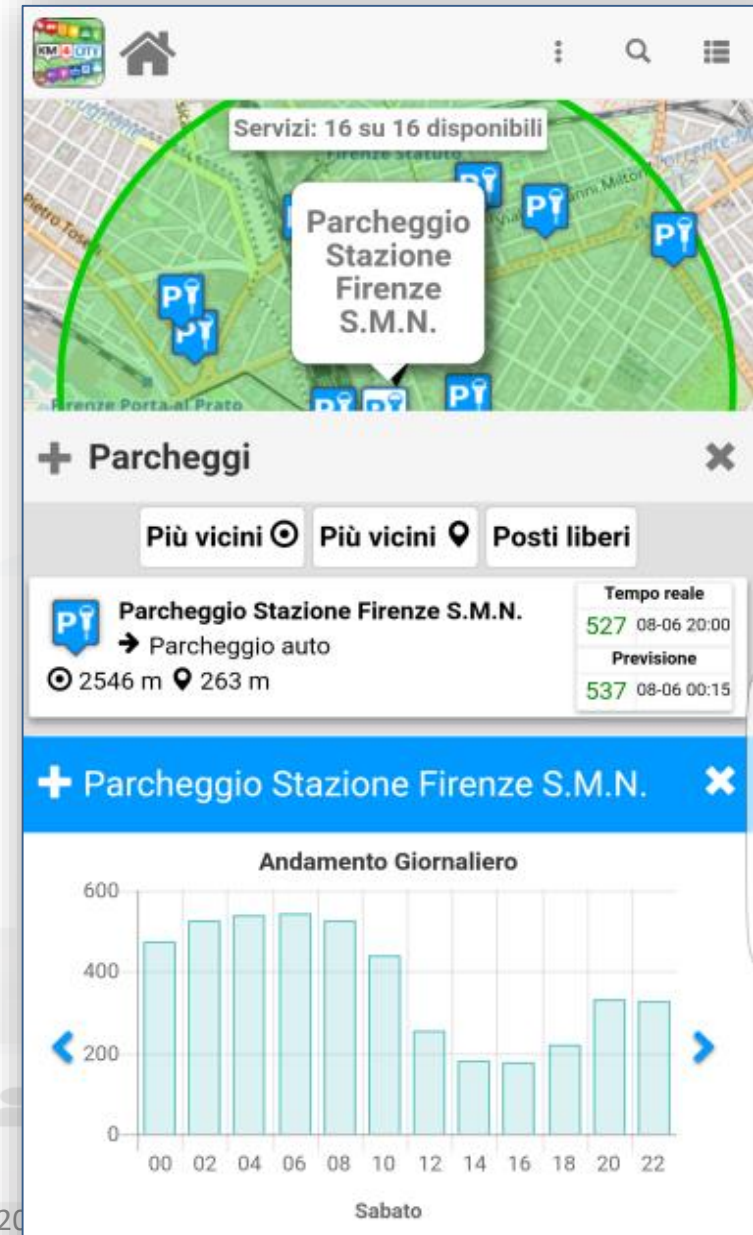


# Free Parking PREDICTIONS



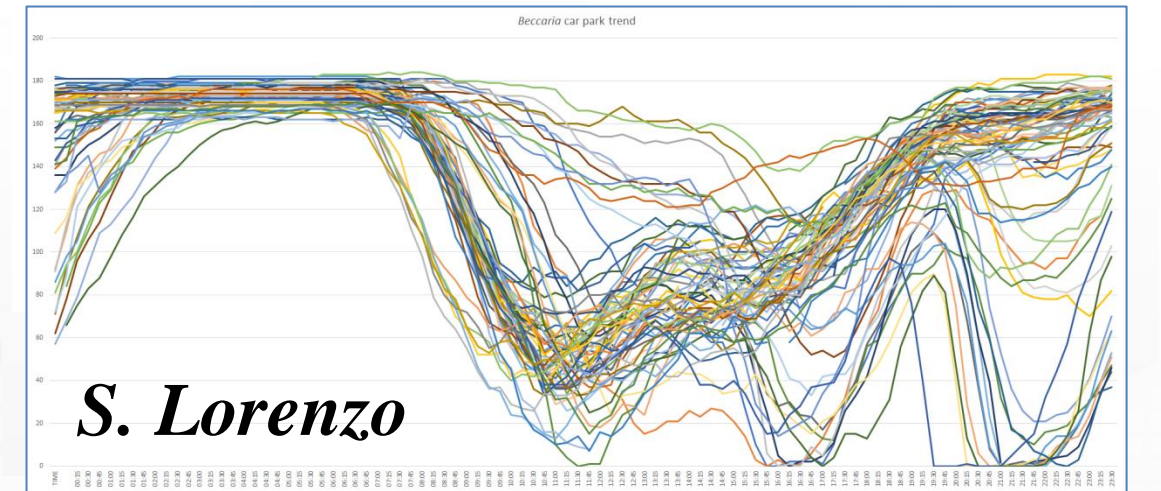
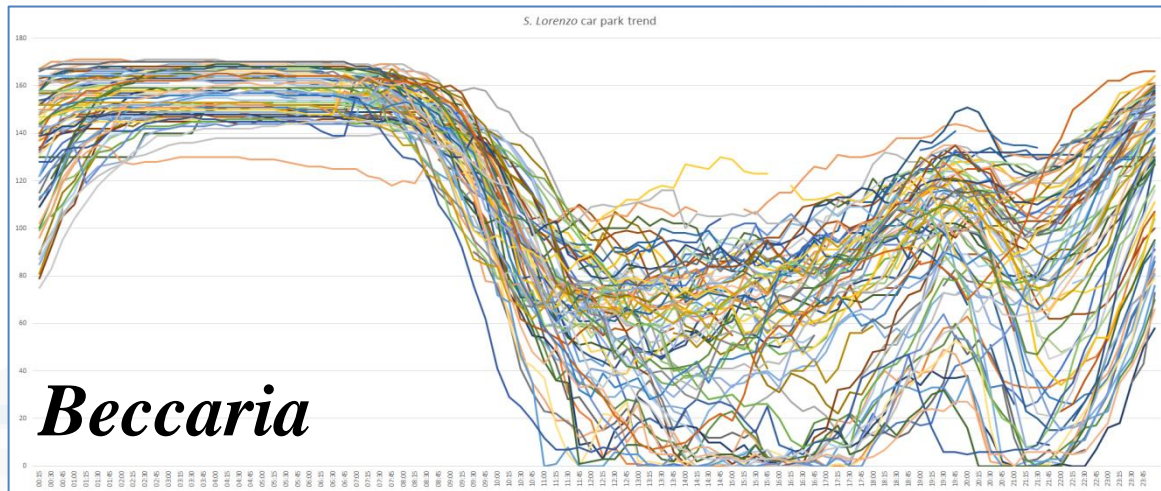
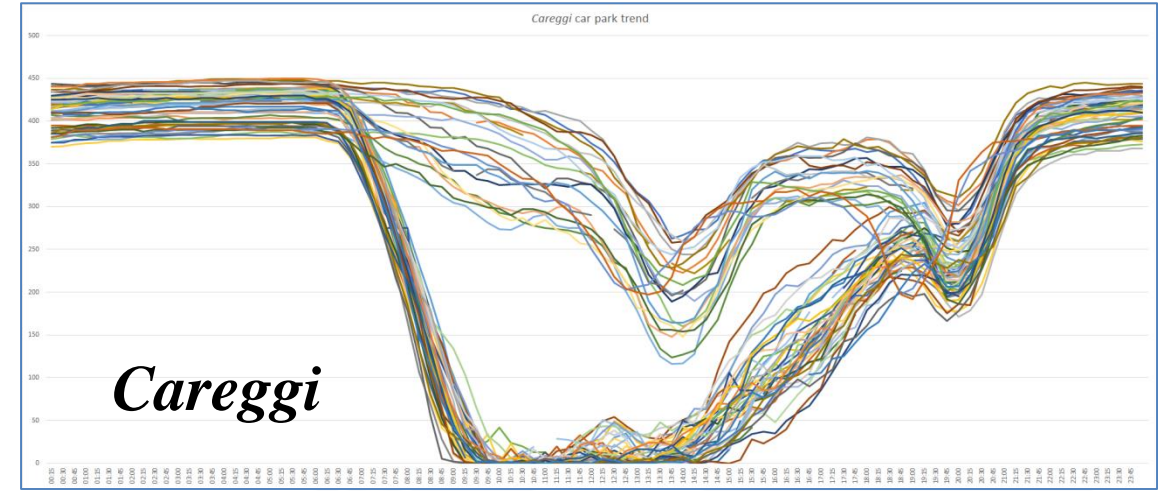
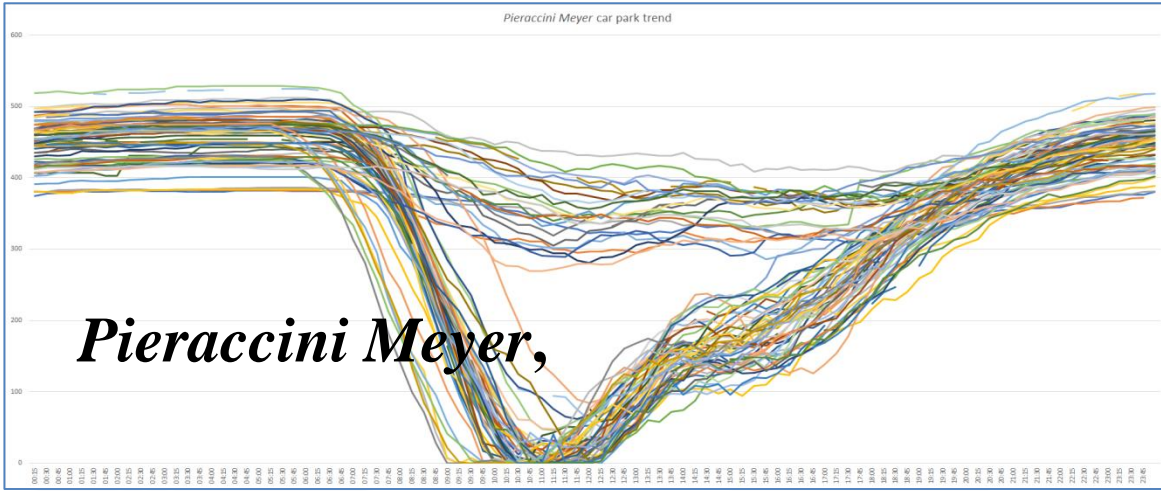
Careggi car park			
Model features	BRNN model results		
	R-squared	RMSE	MASE
Baseline	0.974	24	1.87
Baseline + Weather	0.975	24	1.75
Baseline + Traffic sensors	0.975	24	2.04
Baseline + Weather + Traffic sensors	0.975	24	1.87

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





# Free Parking space trends

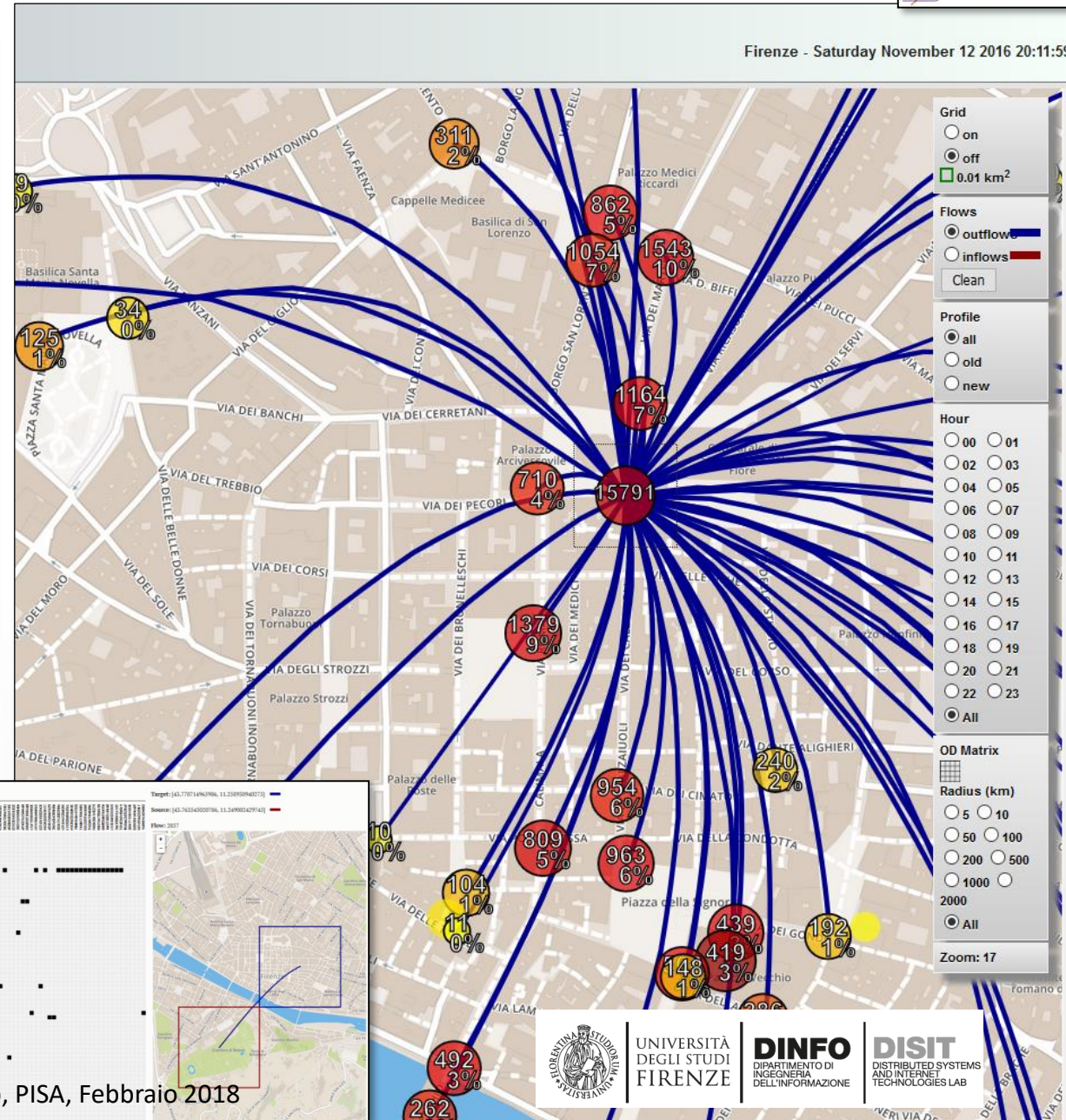
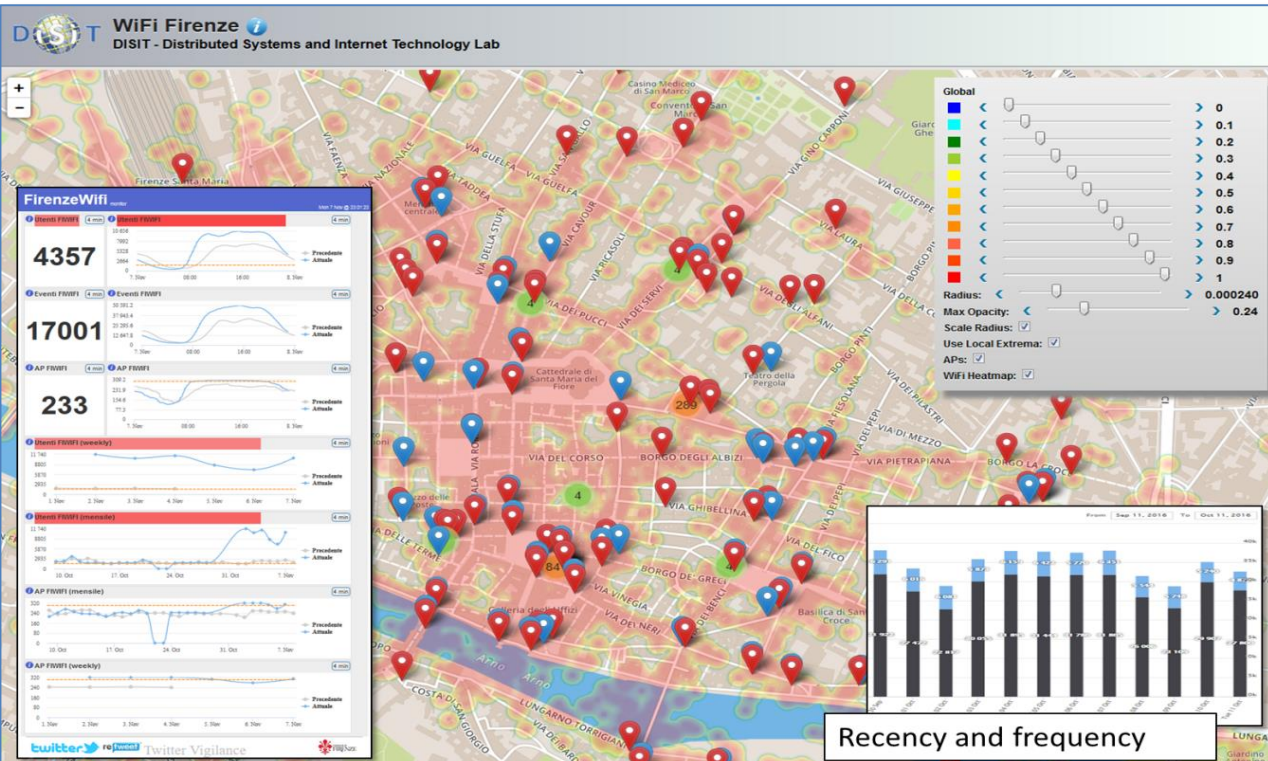
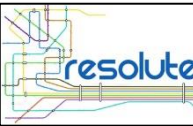


12 parking areas in Florence

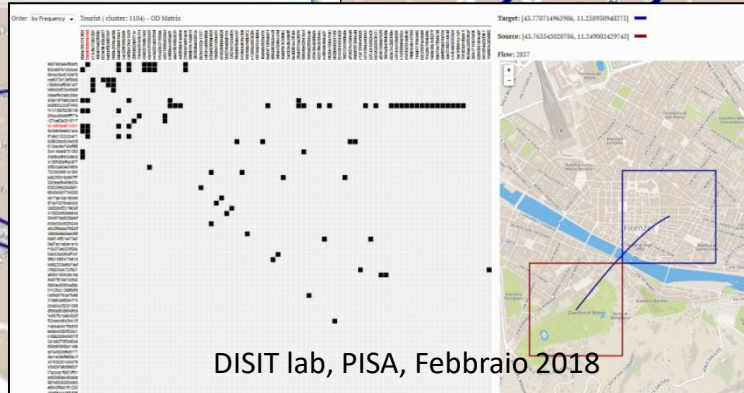




# Origin Destination Matrix Estimation

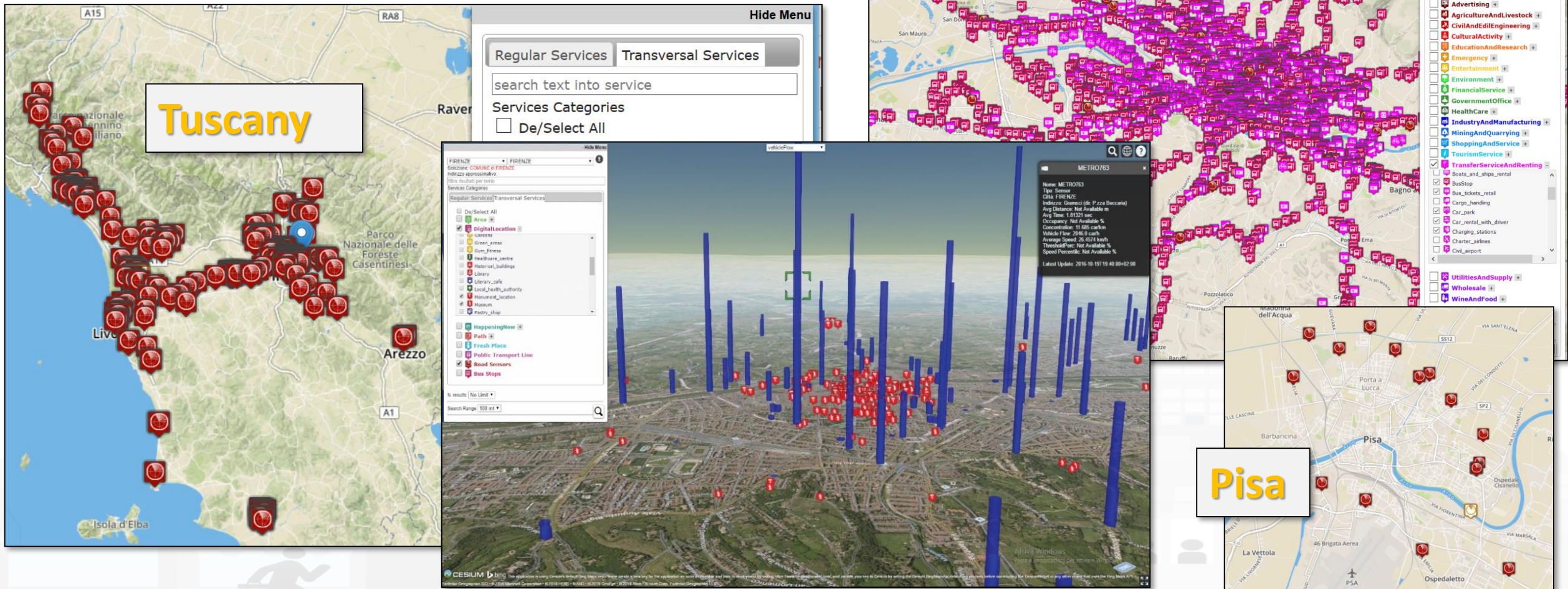


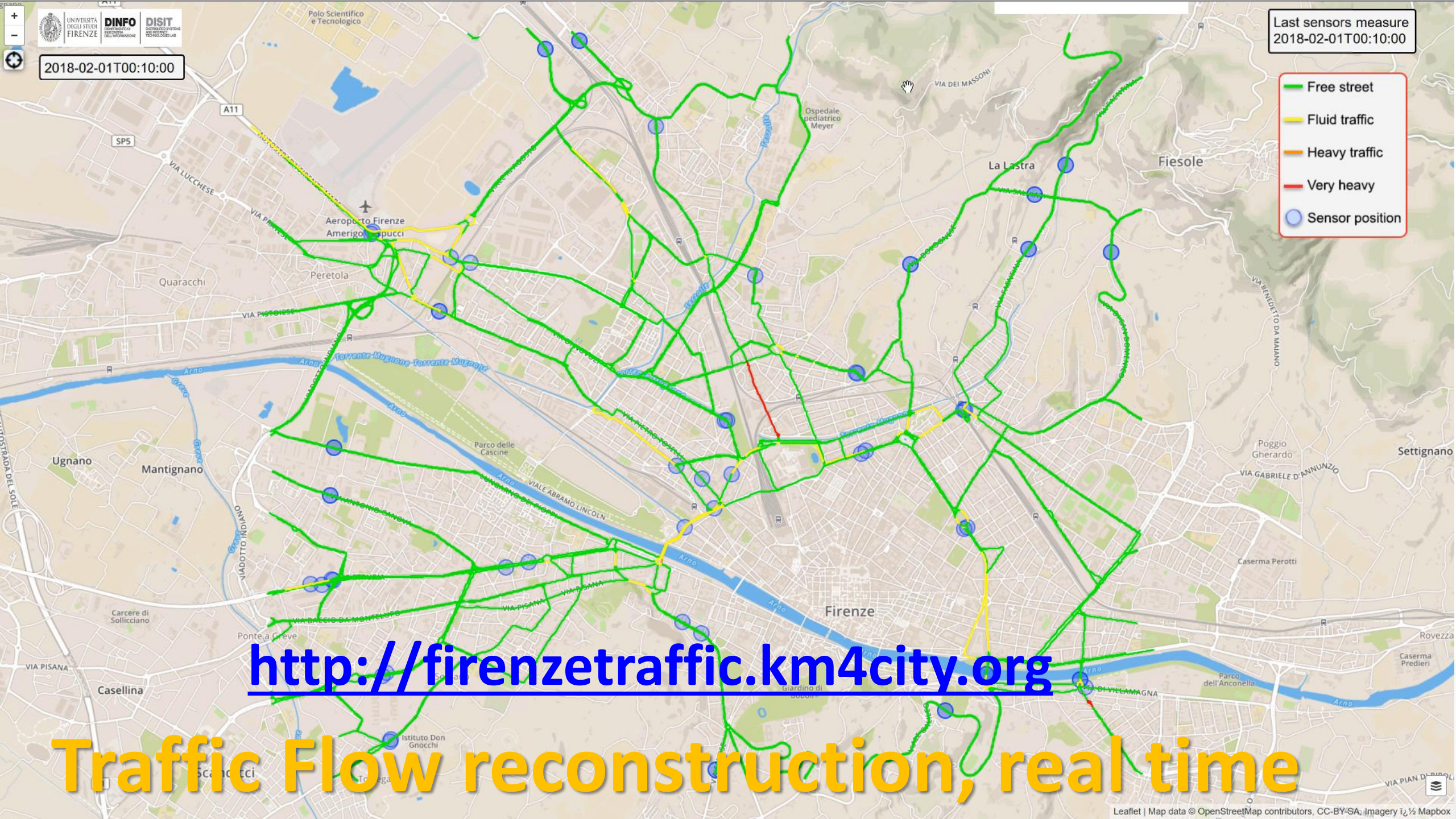
Wi-Fi based



# Traffic Flow Tools

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





2018-02-01T00:10:00

Last sensors measure  
2018-02-01T00:10:00

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

<http://firenzetraffic.km4city.org>

Traffic Flow reconstruction, real time



# Characterizing City Areas

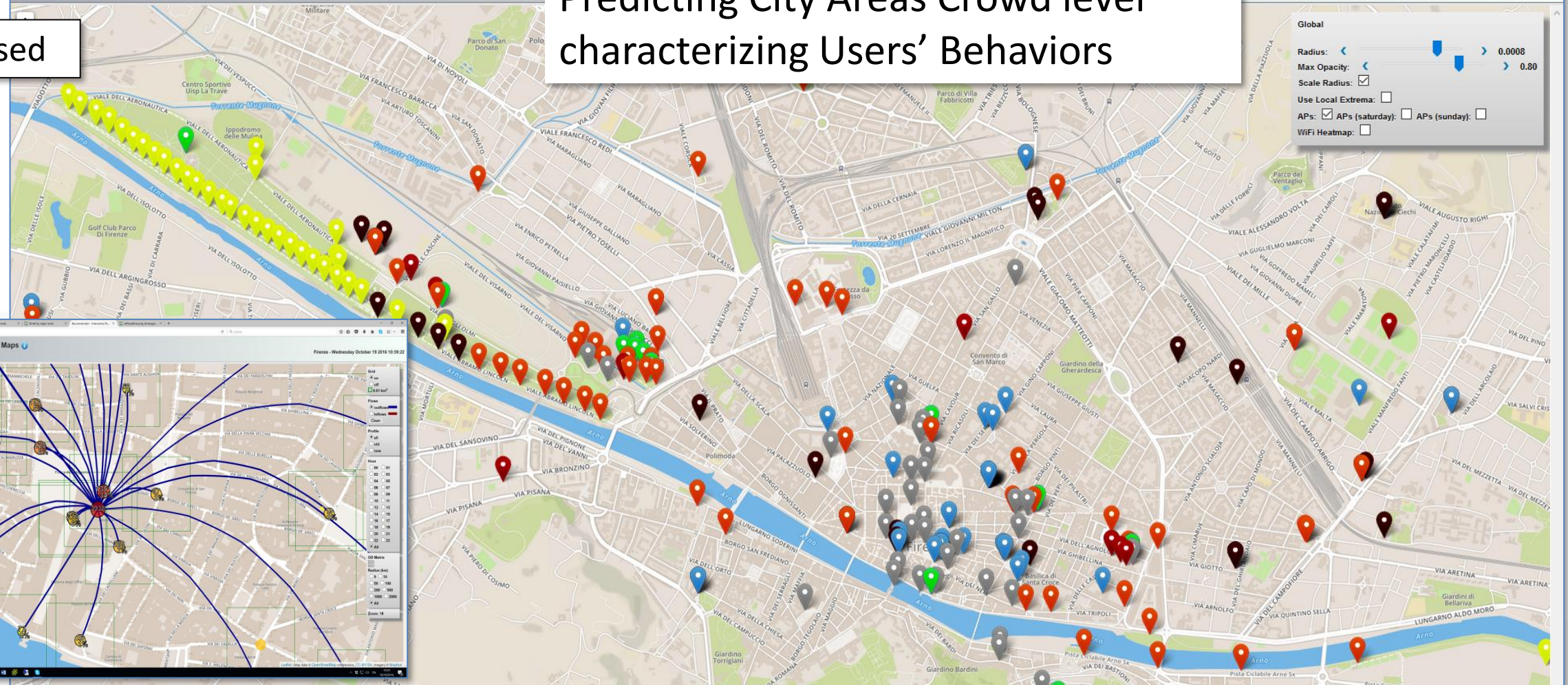


DISIT Firenze Wi-Fi: Access Points Clusters Coverage Map  
DISIT - Distributed Systems and Internet Technologies Lab

## Predicting City Areas Crowd level characterizing Users' Behaviors

Firenze - Saturday November 12 2016 19:16:33

Wi-Fi based



Global

Radius: 0.0008

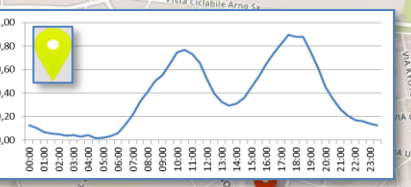
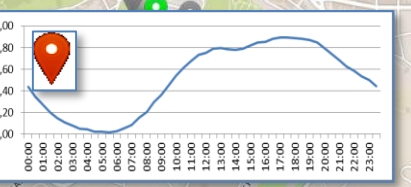
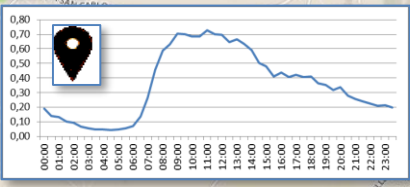
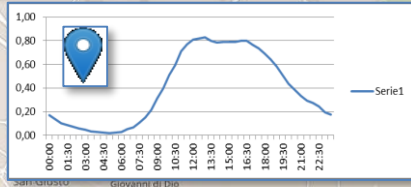
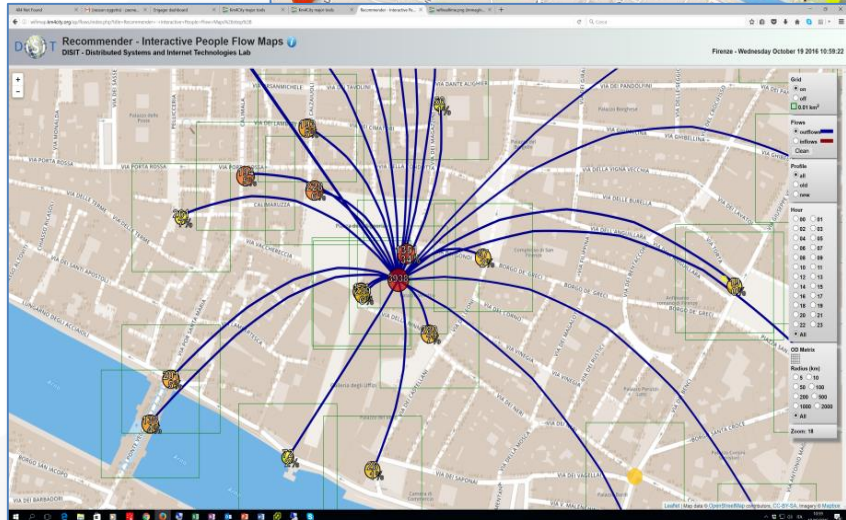
Max Opacity: 0.80

Scale Radius:

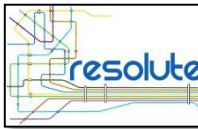
Use Local Extrema:

APs:  APs (saturday)  APs (sunday)

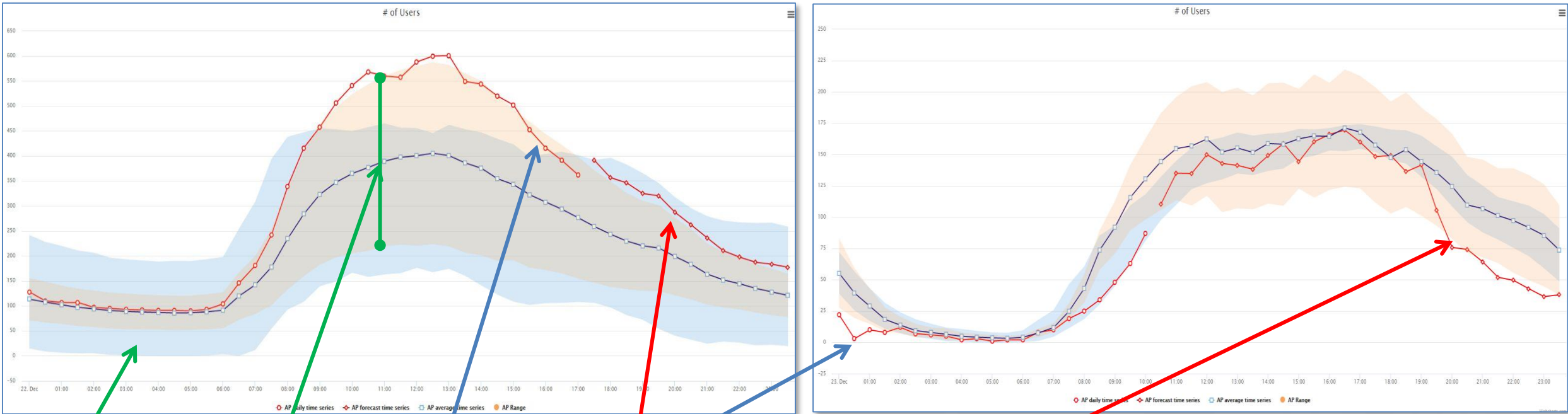
WiFi Heatmap:



# Prediction and identification of anomalies



## Guessing number of users of Wi-Fi Access Points



Cluster confidence

AP average and confidence

Actual AP trend for today

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



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# Routing Multimodale

**Public transport** | Municipalities | Text Search | Address Search | Events

Select an agency:  
- Select an Agency -

Select a line:  
- Select a Line -

Select a route:  
- Select a Route -

Select a bus stop:  
- Select a Stop -

**Position of selected Buses**

Actual Selection  
Coord: 43.7560,11.1914  
Address: [VIA BRUNO BUOZZI, 1/A, SCANDICCI](#)

Path from here | Path to here

Path  
From: PIAZZA DELLE CURE, 22, FIRENZE  
To: VIA BRUNO BUOZZI, 1/A, SCANDICCI  
Route via: public\_transport

Start date&time: 2018-02-10 | 04:20

Search Path

Found 2 paths (in 1.797s)

**Length: 11198m arrival time:06:52:46 (02:31:55)**

1. Piazza delle Cure 27m (04:20:00)
2. Viale dei Mille 249m (04:20:21)
3. Via Dogali 12m (04:23:38)
4. nd 134m (04:23:47)
5. 17 : Mille Pacinotti - Stazione Scalette 3115m (05:39:00)
6. 6 : Stazione Scalette - Pier Della Francesca Pisana 4166m (06:14:00)
7. Piazza Pier della Francesca 31m (06:27:00)
8. Via Antonio del Pollaiolo 12m (06:27:25)
9. nd 35m (06:27:34)
10. Via Giuseppe Ferruzzi 12m (06:27:50)

Regular Services | Transversal Services

Filter:  
search text into service

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: N. results: 100

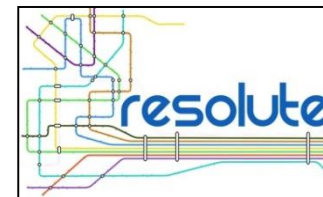
Search Range 100 mt

Search Area select...

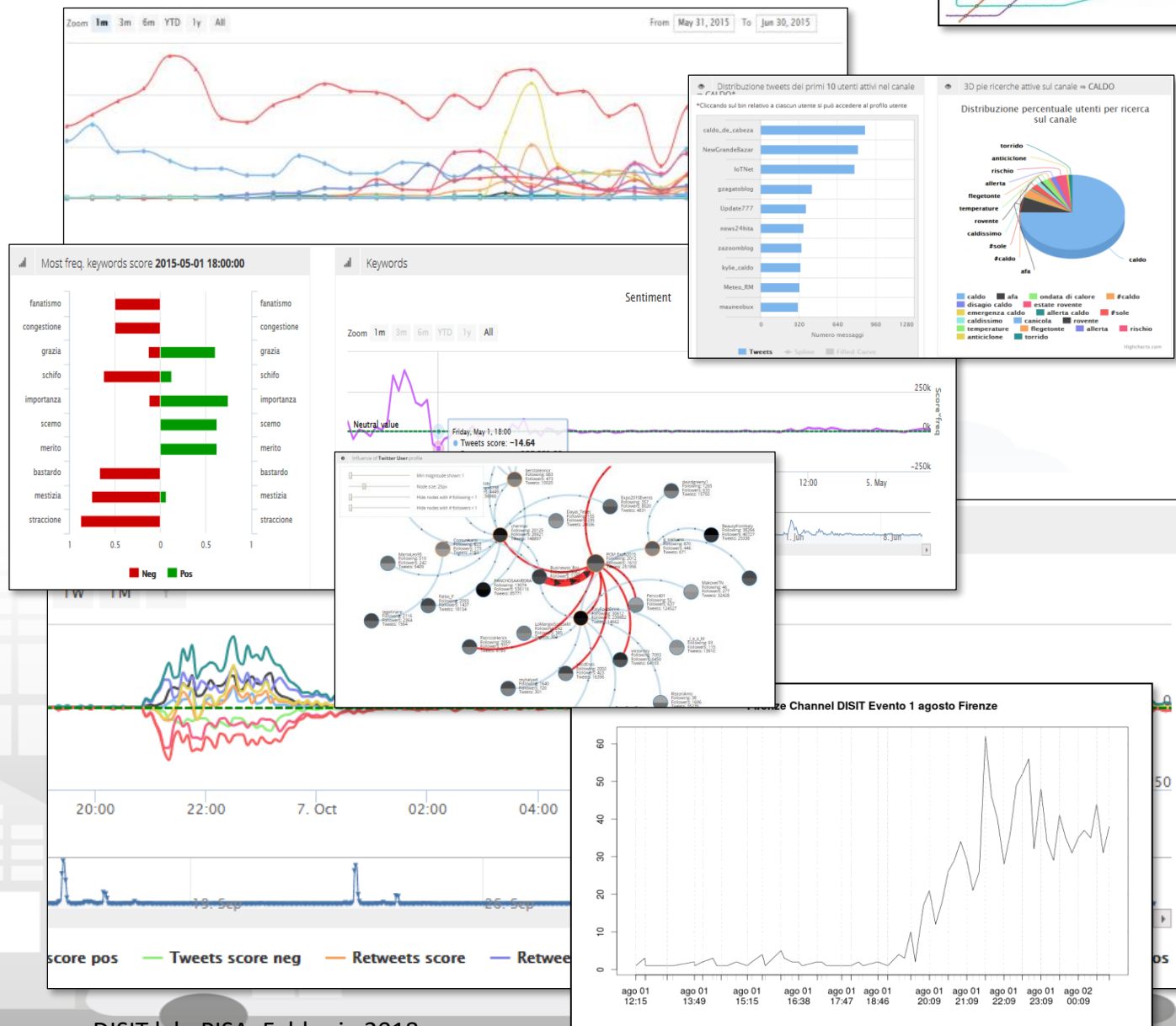
Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

<http://servicemap.km4city.org>

# 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



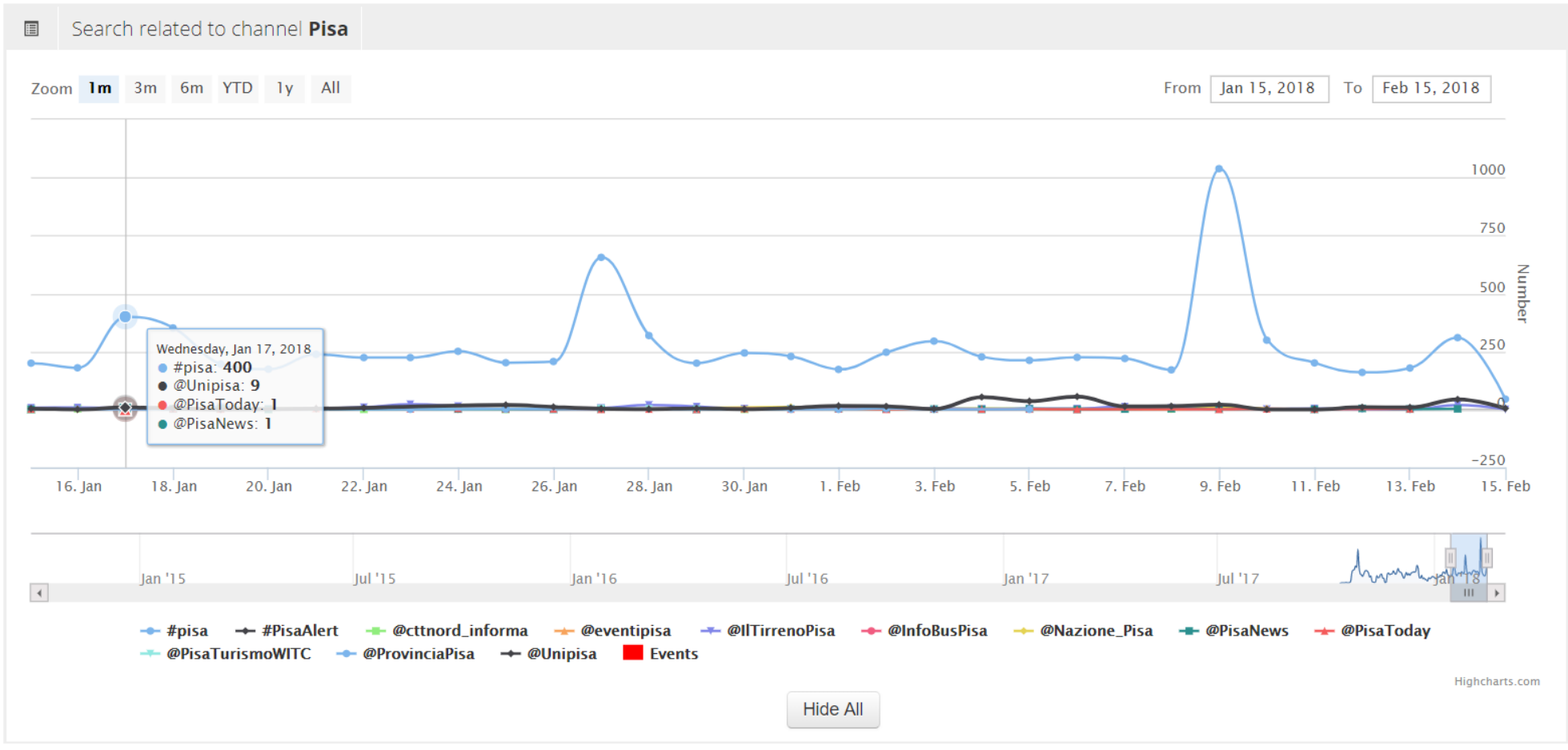


# TV: pisa



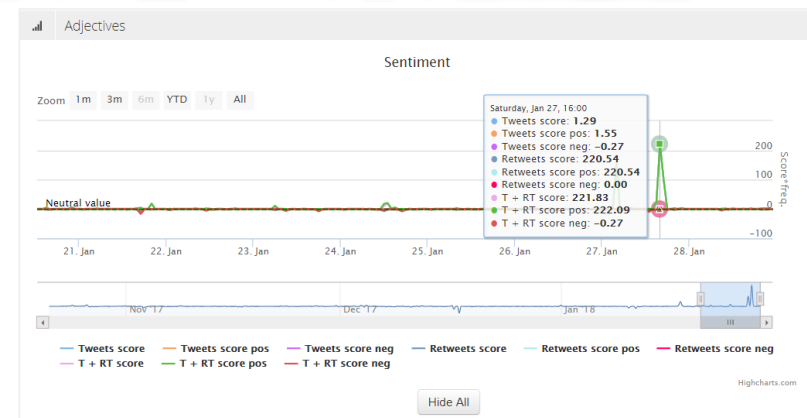
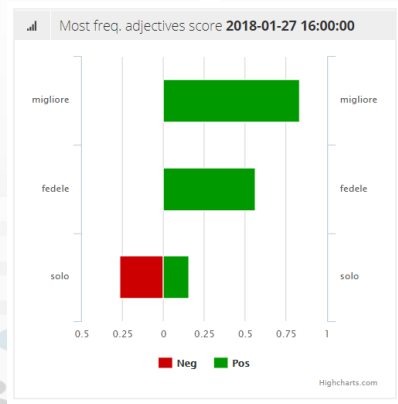
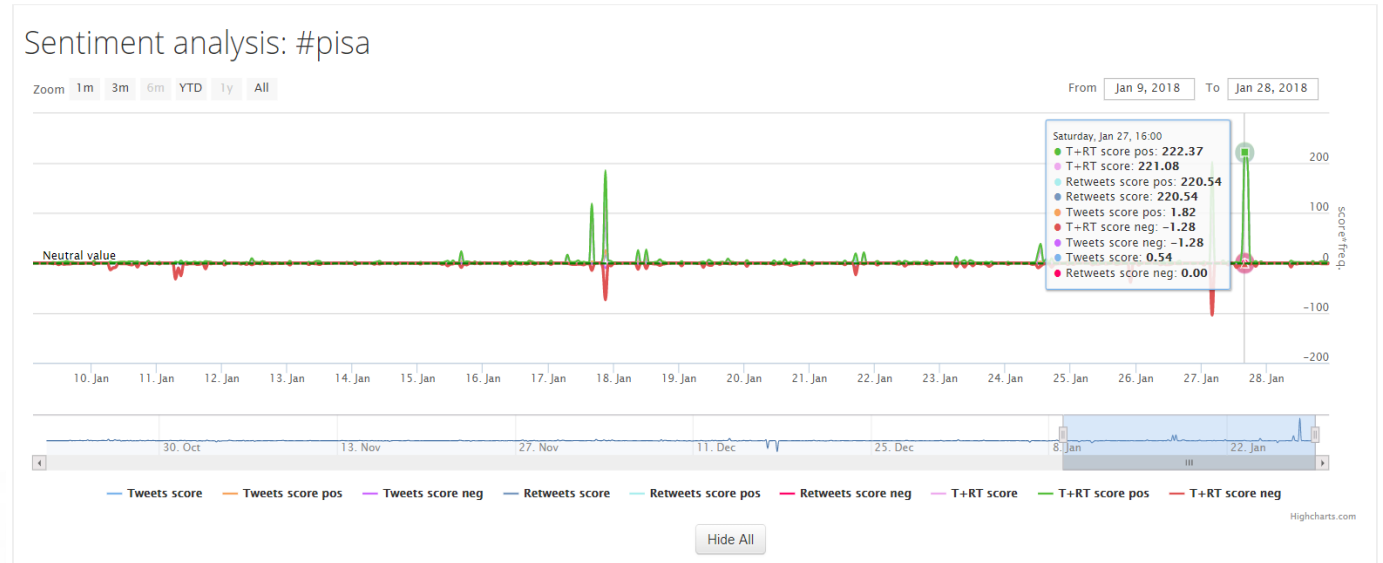
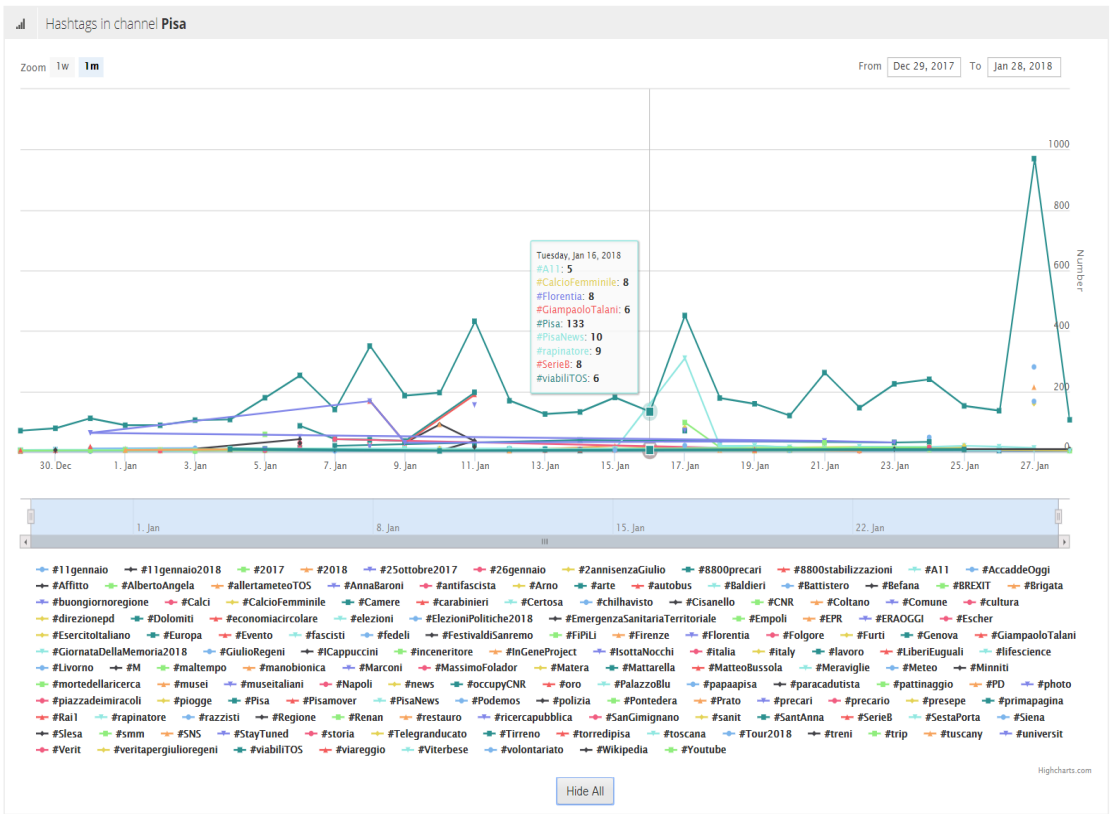
[http://www.disit.org/tv/index.php?p=chart\\_singlechannel&dashboard=&canale=Pisa](http://www.disit.org/tv/index.php?p=chart_singlechannel&dashboard=&canale=Pisa)

Channel active from 2018-02-02 to today  Data processed from 2017-10-21 to 2018-01-28





# NLP and Sentiment Analysis

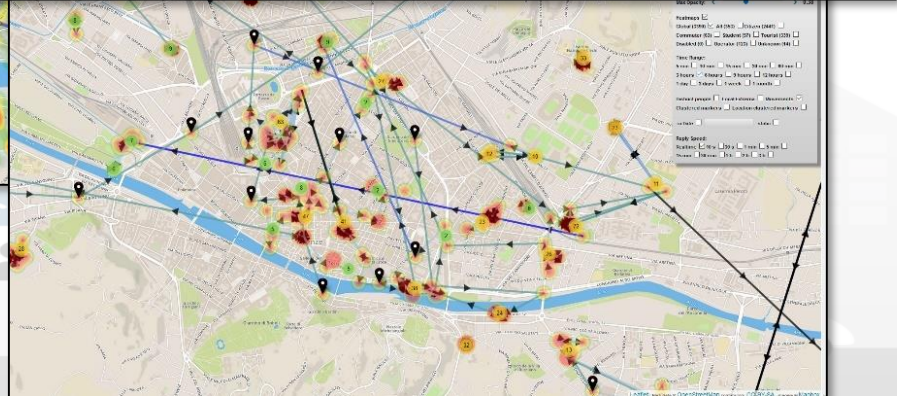
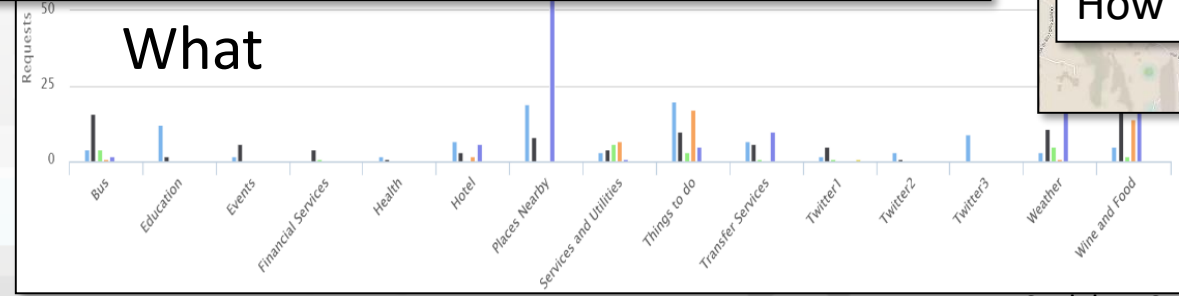
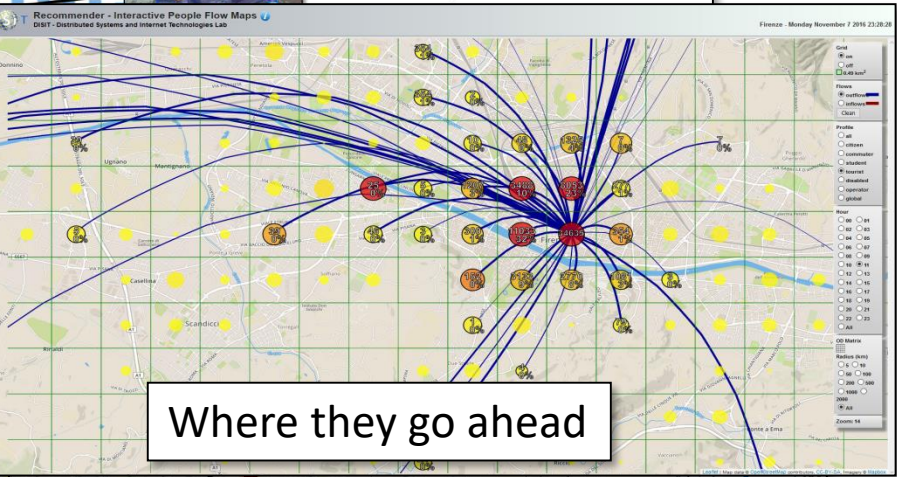
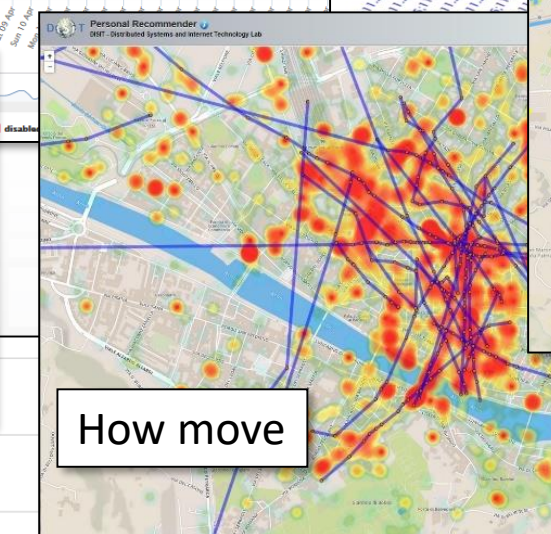
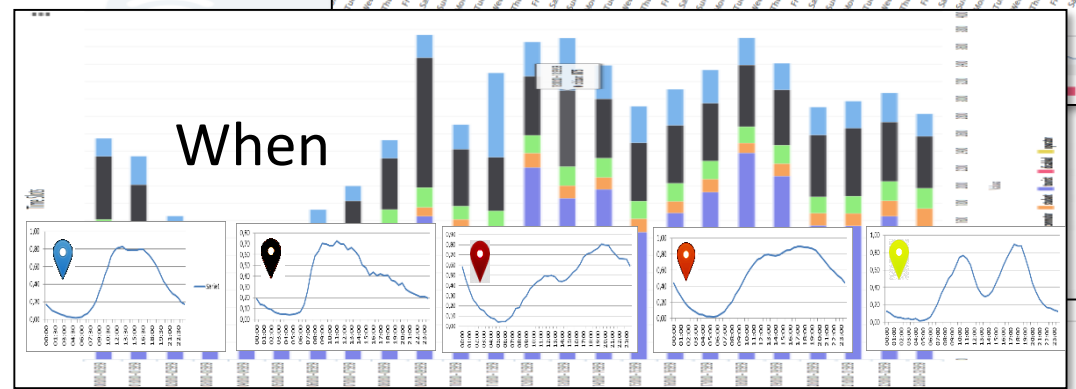
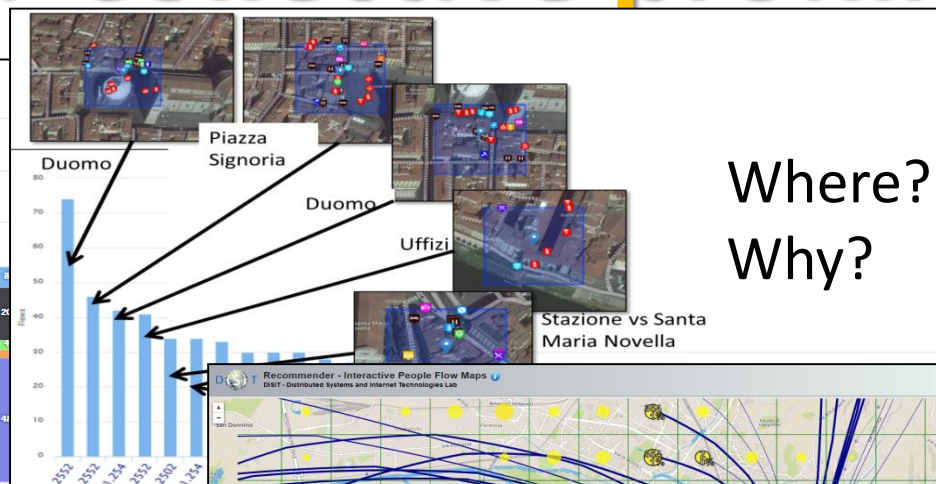
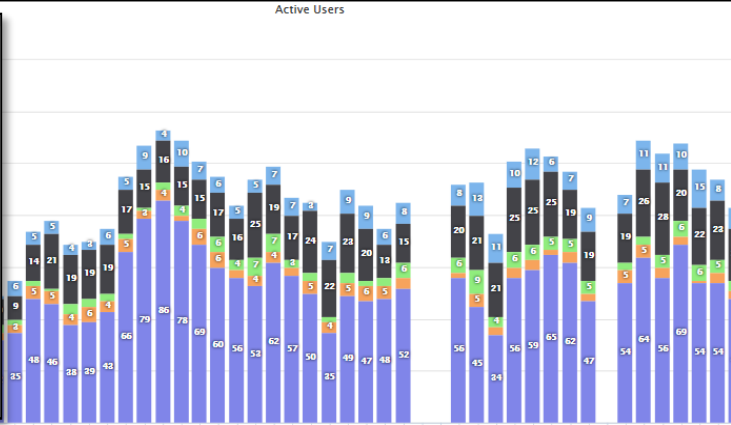
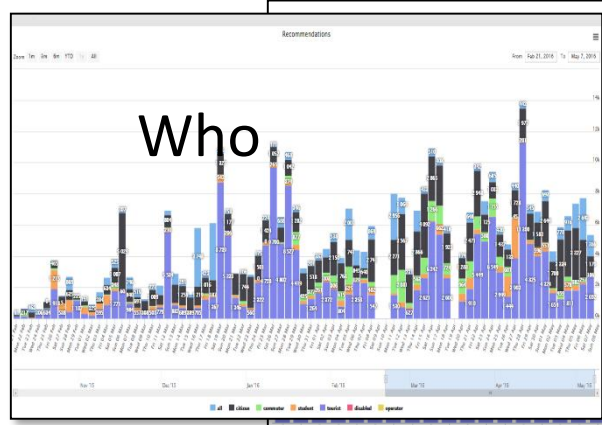


Channel active from 2018-02-02 to today

Data processed from 2017-10-21 to 2018-01-28

NLP SA

# User Behavior Analyzer for Collective profiling



# User influencing, engaging, monitoring & Follow Up

## City & City Operators Strategy Editor



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



Any Mobile and Web App

**Inform**  
 You have parked out of your residential parking zone  
 The Road cleaning is this night  
 The waste in S.Andreas Road is full

**Engage**  
 Provide a comment, a score, etc..

**Stimulate / recommend**  
 Events in the city, services your may be interested, etc..

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

# Development

<http://www.disit.org/7044>



UNIVERSITÀ  
DEGLI STUDI  
FIRENZE

**DINFO**  
DIPARTIMENTO DI  
INGEGNERIA  
DELL'INFORMAZIONE

**DISIT**  
DISTRIBUTED SYSTEMS  
AND INTERNET  
TECHNOLOGIES LAB

DISIT lab, PISA, Febbraio 2018

# ServiceMap Dev Tool

**Search around a GPS point**

**Search along a line**

Regular Services | Transversal Services

search text into service

Services Categories

- De/Select All
- Area
- DigitalLocation
- HappeningNow
- Park
- Fresh Place
- Public Transport Line
- Road Sensors
- Bus Stops

N. results for each: 200

Search Range: 500 mt

Search Results:

- Services: 35 of 35 available
- Bus Stops: 13 of 13 available
- Road Sensors: 2 of 2 available

72 Bus Lines Found.

Bus Lines:

- Bus Line: 23  
Direction: NAVE A ROVEZZANO → NUOVO PIGNONE
- Bus Line: 23  
Direction: SORGANE → NUOVO PIGNONE
- Bus Line: 35  
Direction: MAGENTA → STAZIONE VIA ALABARNI

**Query results organized by category**

Total number of results: 2231

Category	Count
Accommodation	14
Cultural	21
Education	33
Emergency	16
Environment	1
Financial	38
Government	24
HealthCare	25
IndustryAndManufacturing	104
MiningAndQuarrying	292
ShoppingAndService	245
TourismService	264
UtilitiesAndSupply	49
Wholesale	18
WineAndFood	154

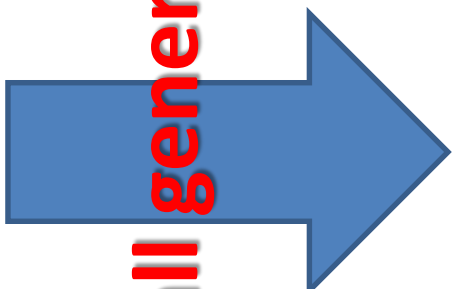
N. results: No Limit

Search Range: visible areas

Search Results:

- Services: 2231 of 2231 available

Smart City API call generation



Web App HTML5

**Giardino Di Boboli**

Tipo: Digital Location

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

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

Mobile Apps

Indirizzo: VIALE DE FIRENZE FI

DISIT Distributed Systems and Internet Technologies Lab  
Distributed Data Intelligence and Technologies Lab  
Department of Information Engineering (DINFO)  
University of Florence

<http://www.disit.dinfo.unifi.it>

HOME ABOUT RESEARCH INNOVATION EDUCATION AND COURSES HOWTO

**KMACITY SERVICE MAP EMBEDDED**

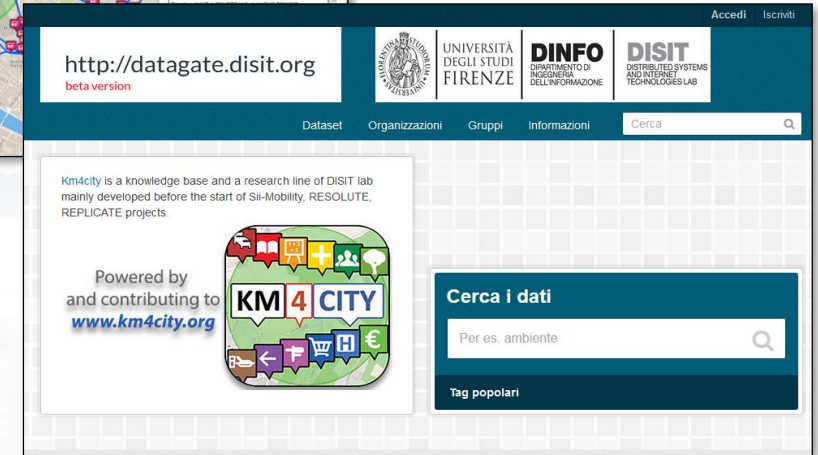
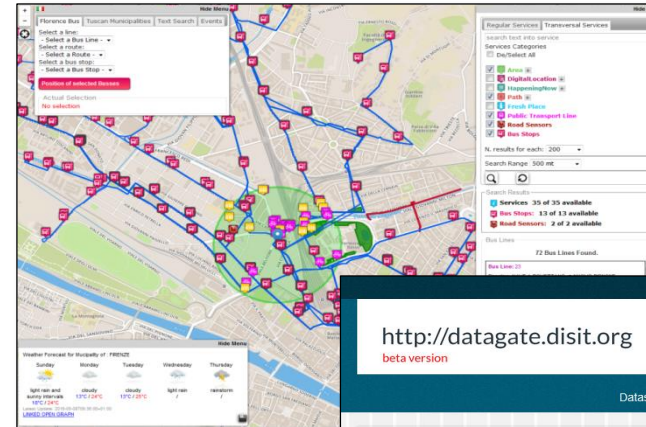
Embed into Web pages





# Providing Development tools

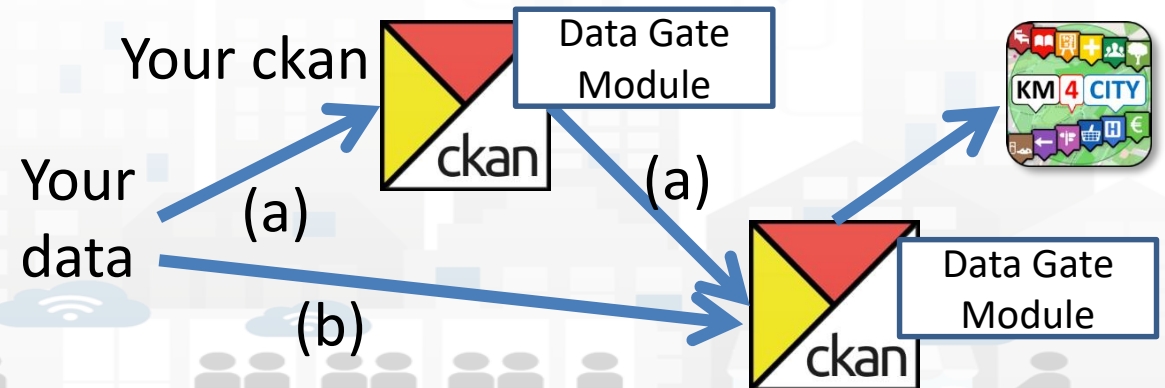
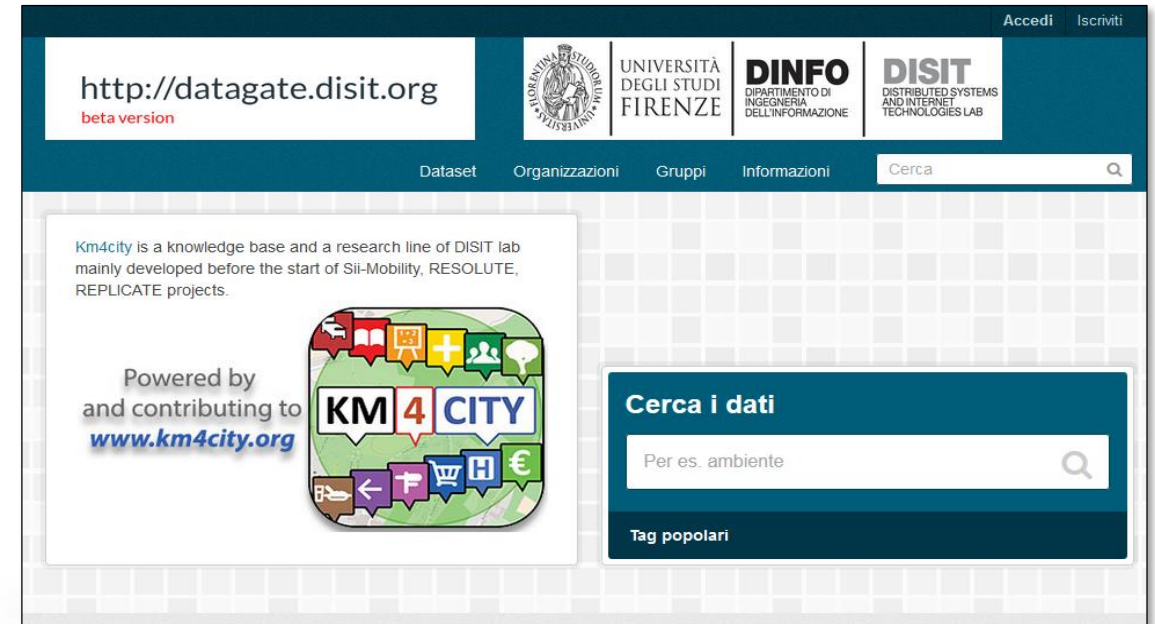
- Generating API Call: ServiceMap
  - Navigating on maps
  - Navigating on the semantic model worldwide
- Loading Data via DataGate tool
- Creating Widgets: dashboard builders, ServiceMap3D, MicroApplications





## 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





# Loading Shapes and Paths for search

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

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

Fork me on GitHub

### Wicket

Mappa

Wicket is a lightweight Javascript library that reads and writes Well-Known Text (WKT) strings. It can also be extended to parse and to create geometric objects from various mapping frameworks, such as Leaflet, the ESRI ArcGIS JavaScript API, and the Google Maps API.

```
MULTIPOLYGON (((40 40, 20 45, 45 30, 40 40)), ((20 35, 10 30, 10 10, 30 5, 45 20, 20 35), (30 20, 20 15, 20 25, 30 20)))
```

Format for URLs Map It! Clear Map

Home Contact Me "Fork me on GitHub!" Design © 2012-2013 K. Arthur Endsley Wicket is released under the GPL v3

## Upload a SHP file or paste a WKT

You can add SHP files to the system to convert them in WKT or paste a valid WKT.

### SHP File

Label

Nessun file selezionato.

### Paste a WKT

Label

WKT





Linked Open Graph

log.disit.org/service/?graph=df5b4f67f01b7d96071475d62068e0fe

**SiiMobility (by DISIT)**

Examples:

- VIA GIACOMO MATTEOTTI
- Bagno a ripoli
- Florence

Choose a class:

Search for keyword

keyword:

uri: http://... Request

**Your data**

sparql endpoint: (optional)

http://...

uri: http://... Request

**Status**

Requests:

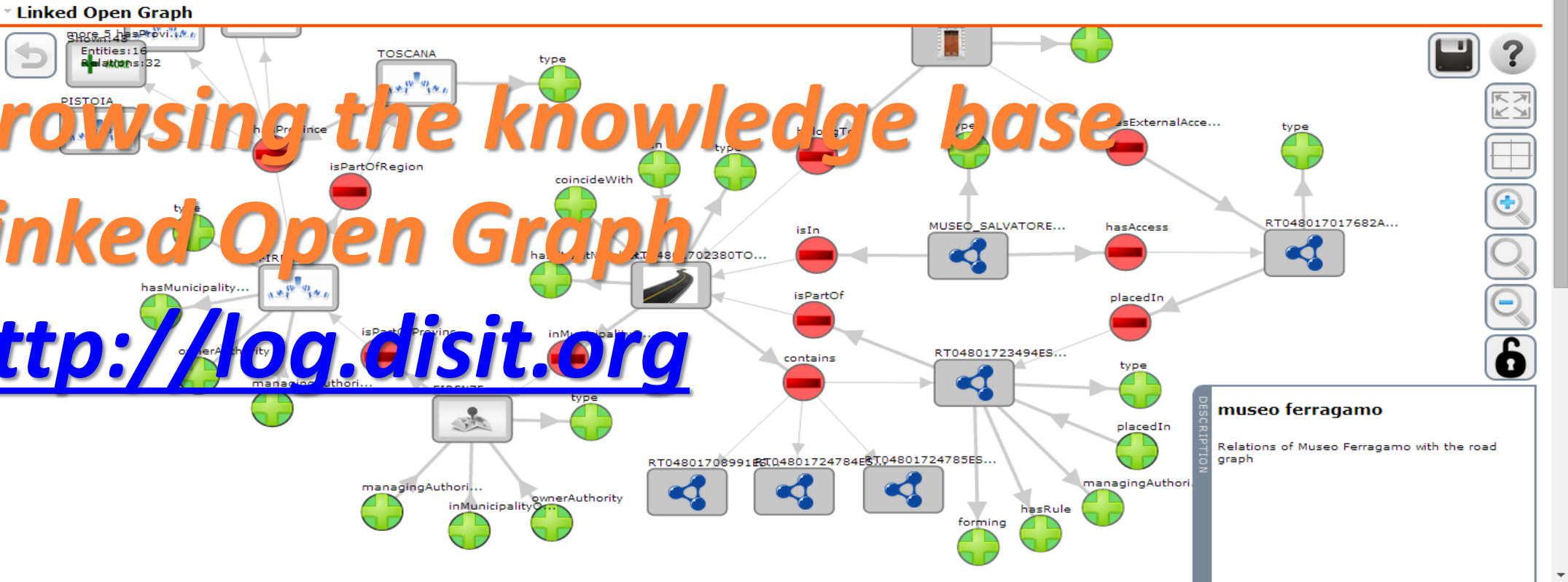
http://www.disit.dinfo.unifi.it/SiiMobility/MUSE

Remove Clear

**Type of relations**

Select all Deselect all Invert Hide all inverse

- belongTo
- contains
- ends
- has
- hasExternalAccess
- hasProvince
- hasStreetNumber
- isIn
- isPartOfProvince
- managingAuthority
- placedIn
- seeAlso
- coincideWith
- depiction
- forming
- hasAccess
- hasMunicipality
- hasRule
- inMunicipalityOf
- isPartOf
- isPartOfRegion
- ownerAuthority
- sameAs
- starts



Browsing the knowledge base  
Linked Open Graph  
<http://log.disit.org>



# <http://log.disit.org/spqlquery/>

Flint SPARQL Editor 1.0.3

New Edit View Help

Dataset **KM4CITY** Mode **SPARQL 1.1 Query** Output **SPARQL-XML**

Query 1

```

1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3
4 SELECT * WHERE {
5   ?s ?p ?o
6 }
7 LIMIT 10

```

**All municipalities**

Select all municipalities names.

```

PREFIX km4cr: <http://www.disit.org/km4city/schema#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
SELECT * WHERE {
  ?s a km4cr:Municipality;
  rdfs:label ?l.
} ORDER BY ?l

```

**Bus stops near the Florence SMN train station**

The bus stops within 100m of the Firenze SMN

```

PREFIX km4cr: <http://www.disit.org/km4city/schema#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

```

Line 1: Position: 1; Copy: Copy; Query Results: Query Results; Visual: Visual; Code: Code

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

## Querying the knowledge base in SPARQL

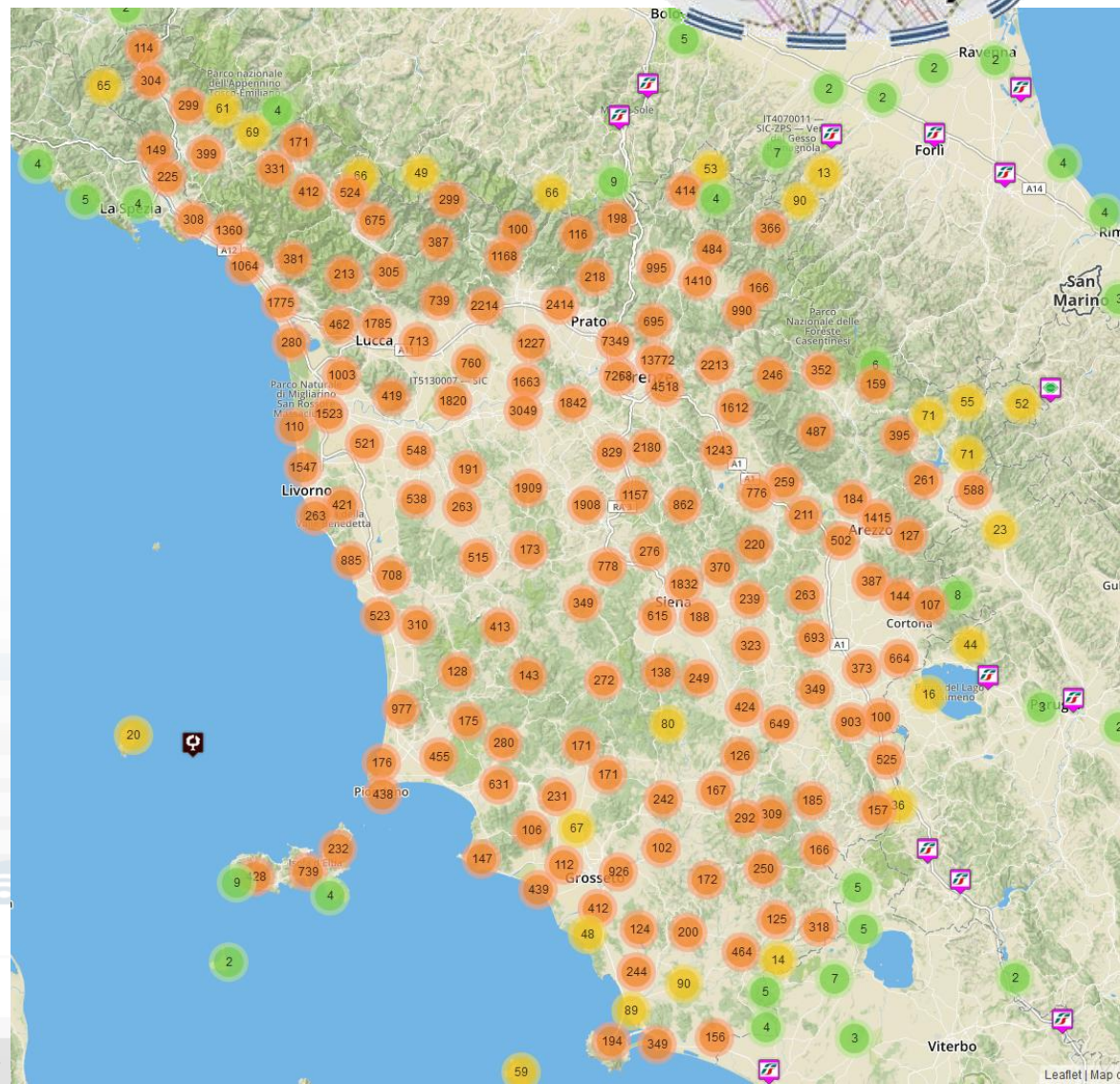


# Scenariosi vs SmartCity API

- 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



- **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 subcategory

Regular Services | Transversal Services

Services Categories

- De/Select All
- Accommodation** +
- Advertising** +
- AgricultureAndLivestock** +
- CivilAndEdilEngineering** -
- Architectural\_consulting
- Building\_construction
- Cartographers
- Civil\_engineering
- Engineering\_consulting
- Other\_specialized\_construction
- Specialized\_construction
- Surveyor
- Technical\_consultants
- CulturalActivity** +
- EducationAndResearch** +
- Emergency** +
- Entertainment** +
- Environment** +
- FinancialService** +
- GovernmentOffice** +
- HealthCare** +
- IndustryAndManufacturing** +
- MiningAndQuarrying** +
- ShoppingAndService** +
- TourismService** +
- TransferServiceAndRenting** +
- UtilitiesAndSupply** +
- Wholesale** +
- WineAndFood** +

20 Service Macro Classes

Service Class

- Accommodation** -
- Agritourism
- Beach\_resort
- Bed\_and\_breakfast
- Boarding\_house
- Camping
- Day\_care\_centre
- Farm\_house
- Historic\_residence

# 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

**AURORA**

LINKED OPEN GRAPH

Typology: Accommodation - Hotel

Email: [info@hotelaurora.info](mailto:info@hotelaurora.info)

Website: [www.hotelaurora.info](http://www.hotelaurora.info)

Phone: 055210283

Address: VIA L. ALAMANNI, 5

Cap: 50100

City: FIRENZE

Prov.: FI

**TPL STOP : Piazza Stazione (Fr. Cc)**

Vaubus

LINKED OPEN GRAPH

Lines:

**FI-LU** **FI-VG**

No available routes

Display  Bus per page

Search:

Time	Line	Direction
08:48:00	2017-03-20	FI-LU Piazzale Verdi
08:16:00	2017-03-20	FI-LU Piazzale Verdi
10:09:00	2017-03-20	FI-LU Piazzale Verdi
	2017-03-20	FI-LU Piazzale Verdi
	2017-03-20	FI-LU Piazzale Verdi
	2017-03-20	FI-LU Piazzale Verdi

Page 1 of 1

Data currently not available

**Loggia San Paolo**

LINKED OPEN GRAPH

Typology: CulturalActivity - Monument\_location

**Digital Location**

Address: VIA DELLA SCALA, 3

Cap: 50123

City: FIRENZE

Prov.: FI

Photos:

Description: The rounded arches, the stone skeleton and the glazed terracotta medallions recall the model of the Loggiato degli Innocenti. The medallions in glazed terracotta by Andrea della Robbia and his sons Marco and Luca contain seven polychrome figures of Santi Francescani and two works of mercy Cristo conforta un Giovane and Cristo conforta un Anziano. Beneath the portico can be admired the expressive embrace between San Domenico Guzman and San Francesco d Assisi by Andrea della Robbia

**Giardino di piazza dell Indipendenza**

LINKED OPEN GRAPH

Typology: Entertainment - Green\_areas

**Digital Location**

Address: PIAZZA DELLA INDIPENDENZA, 15

Cap: 50129

City: FIRENZE

Prov.: FI

Note: areeverdi238

**Remove from map**

**ZCS\_1\_D**

LINKED OPEN GRAPH

Typology: TransferServiceAndRenting - Controlled\_parking\_zone

**Digital Location**

Address: VIA GUSCIANA

Cap: 50124

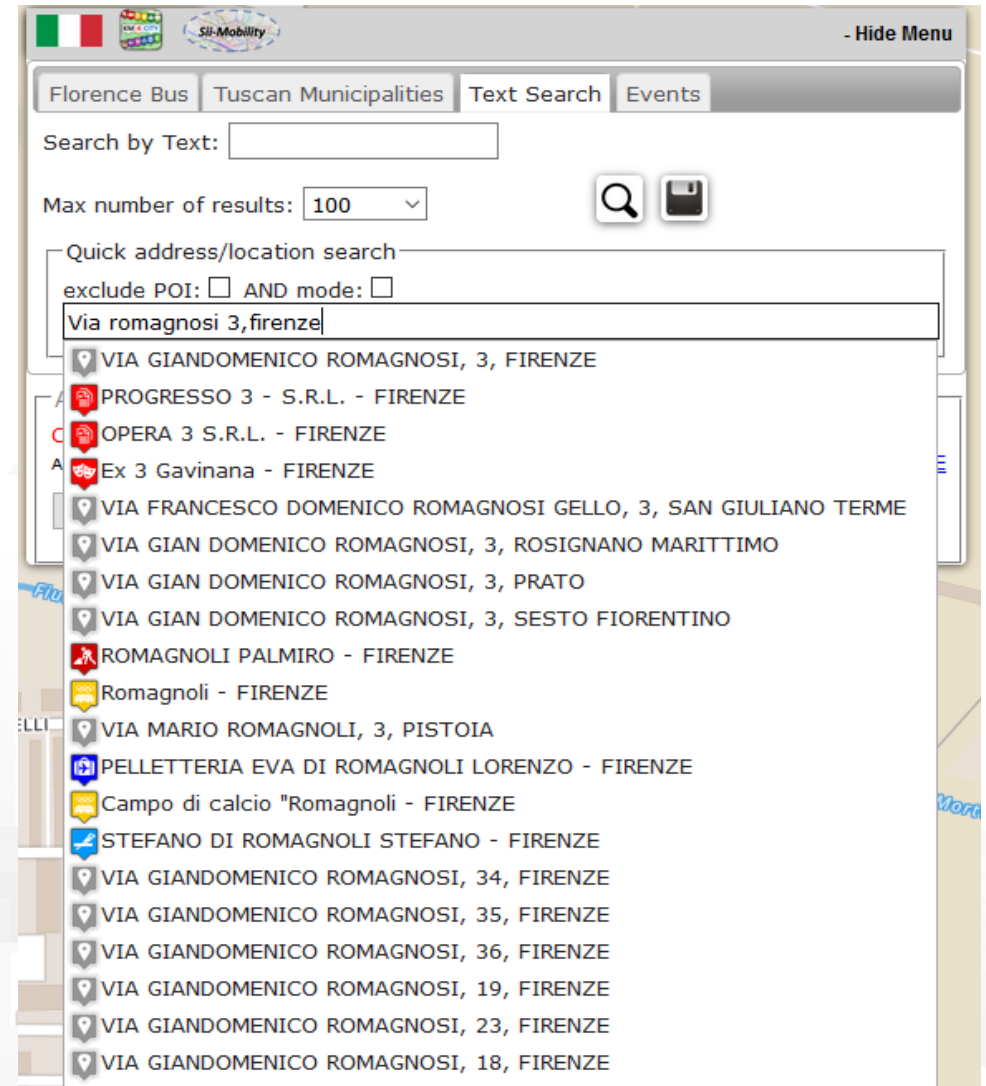
City: FIRENZE

Prov.: FI

**Remove from map**

# 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





# Search by Shape and Distance



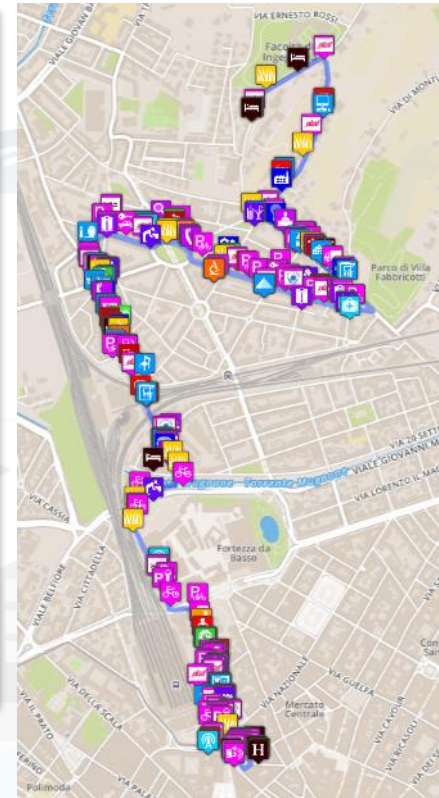
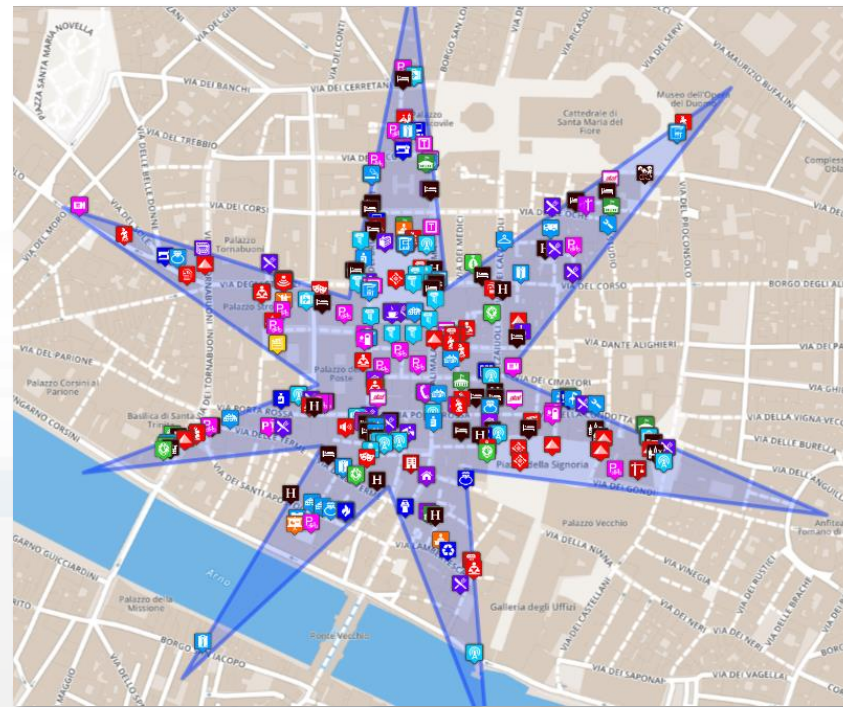
Around a point or POI

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

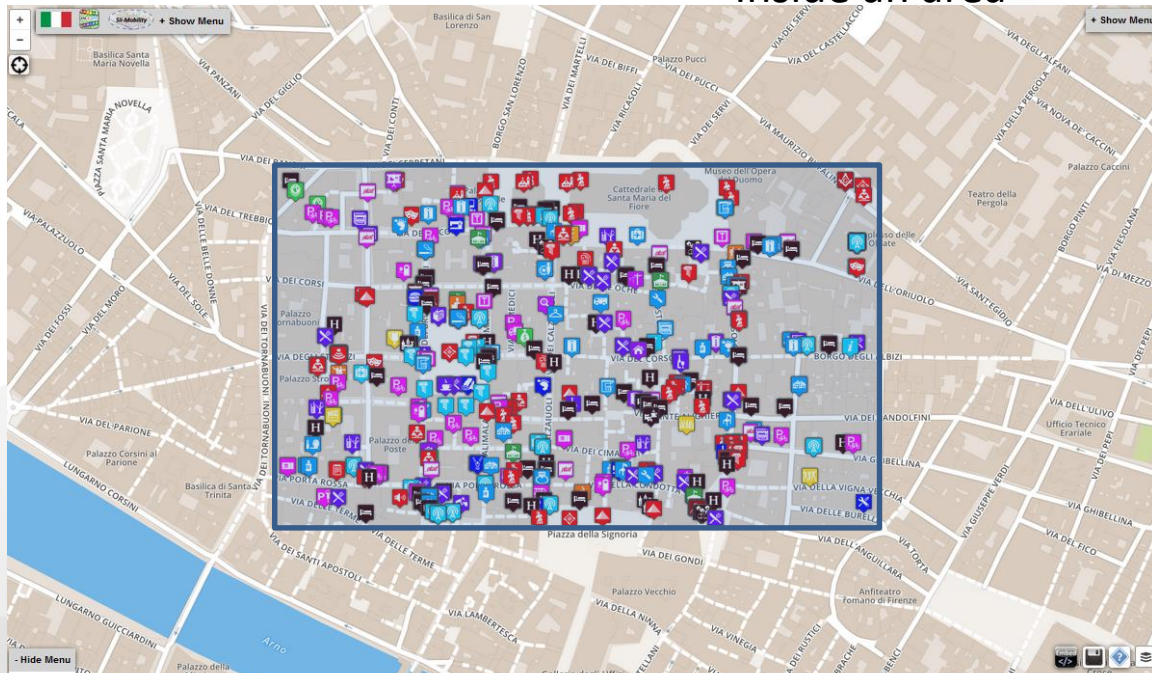


Inside a closed polyline

Along a polyline



Inside an area





# 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;

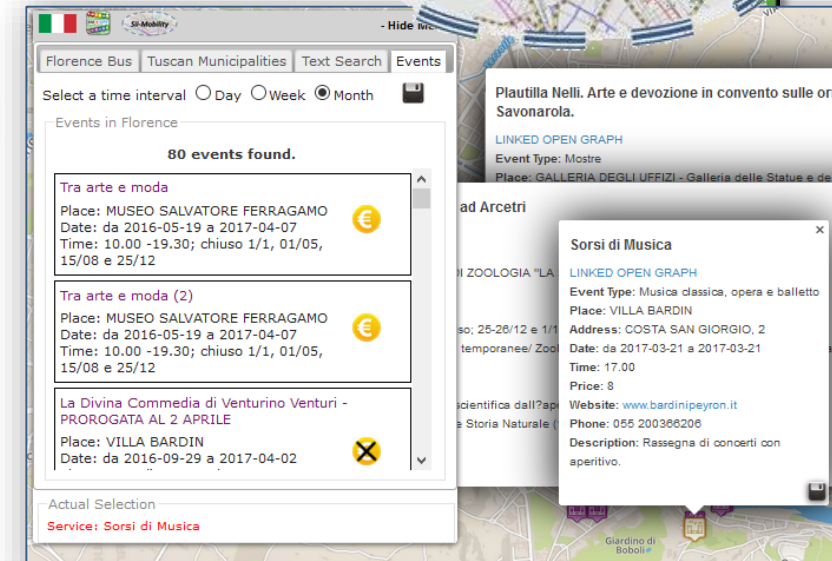
# Empowering City Users

- 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



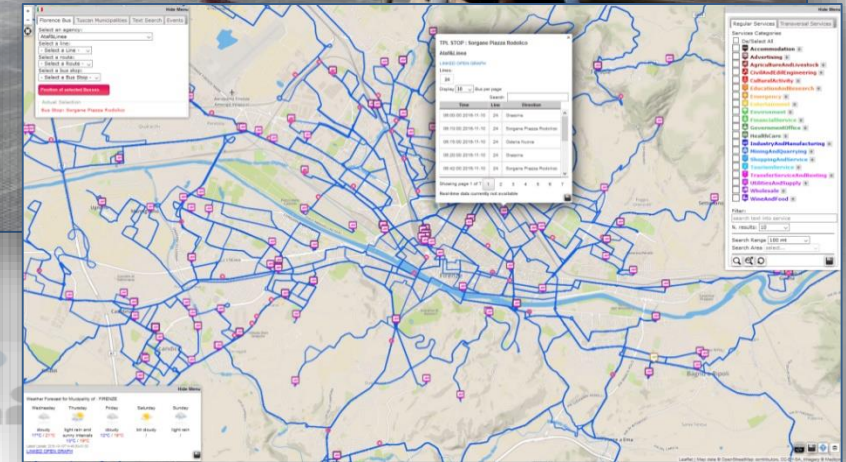
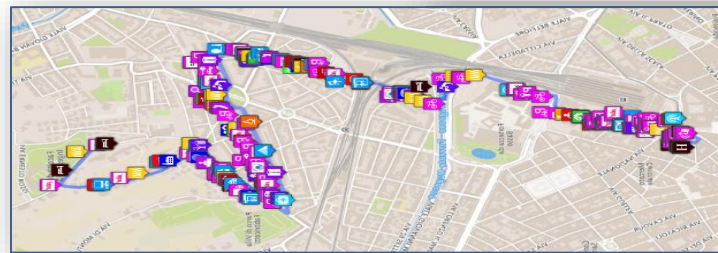
# Access to Event information

- 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.



## Mobility

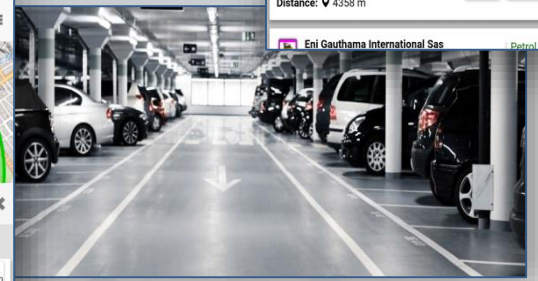
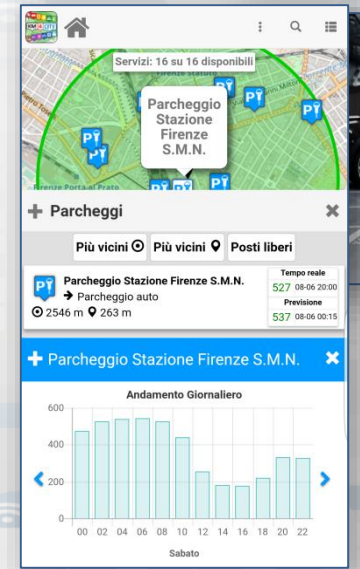
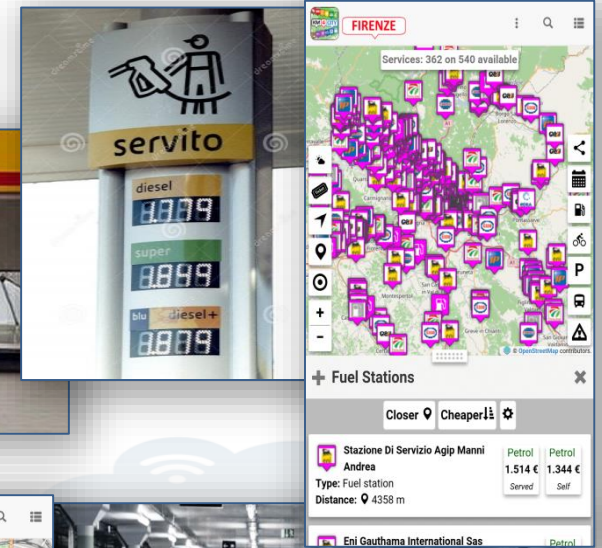
- **Public Transport, PT**
  - Getting tickets
  - Getting bus stops, lines, and timelines for bus, train and tramline (GTFS, ETL, ..)
  - Searching Services along a Pub. Transport line or closer to a stop
  - Searching the closest bus stops
  - searching for BUS stops via name
  - real time delays of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

The screenshot displays the Sii-Mobility web application interface. At the top, there are navigation tabs for 'Florence Bus', 'Tuscan Municipalities', 'Text Search', and 'Events'. Below these are several dropdown menus for selecting an agency, line, route, and bus stop. A red button labeled 'Position of selected Busses' is visible. The main area features a 'Quick address/location search' field with an 'exclude POI' checkbox. Below this, the 'Actual Selection' section shows the coordinates '43.7681, 11.2537' and the address 'LUNGARNO DEGLI ARCHIBUSIERI, 18, FIRENZE'. There are buttons for 'Path from here' and 'Path to here'. The 'Path' section shows the route from 'PIAZZA DELLA STAZIONE, 42, FIRENZE' to 'LUNGARNO DEGLI ARCHIBUSIERI, 18, FIRENZE' via 'foot\_shortest'. A 'Search Path' button is also present. The 'Found 1 paths' section shows a single path with a length of 1262m and an arrival time of 12:58:12 (00:14:24). The path details are listed as follows:

Order	Distance	Time
1. nd	305m	(12:43:33)
1.	foot 13m	(12:43:42)
2.	foot 15m	(12:43:53)
3.	foot 29m	(12:44:14)
4.	foot 35m	(12:44:39)
5.	foot 16m	(12:44:50)
6.	foot 7m	(12:44:55)

The map on the right shows a red path starting from Piazza della Stazione and ending at Lungarno degli Archibusieri. An inset map at the bottom shows a detailed view of the path with various colored icons representing different points of interest or bus stops along the route.

# New Experience to access at Cultural and Tourism

## 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)



Servi: 2 su 2 disponibili

corso  
enda  
daliere  
reggi

Soccorso

Più vicini

Soccorso Azienda Ospedaliera Careggi

on to soccorso

Distanza: 1268 m

Triage

5	23	22	3	0
---	----	----	---	---

+ Pronto Soccorso Azienda Ospedaliera...

Stato   Priorità	1°	2°	3°	4°	5°
Con Destinazione	0	1	0	0	0
In Attesa	0	1	1	0	0
In Visita	3	10	11	2	0
Oss. Temporanea	2	11	10	1	0
<b>Totali</b>	<b>5</b>	<b>23</b>	<b>22</b>	<b>3</b>	<b>0</b>

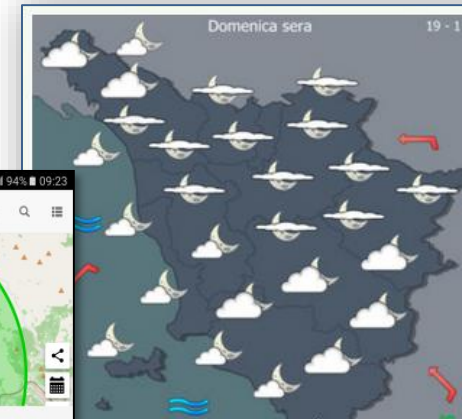
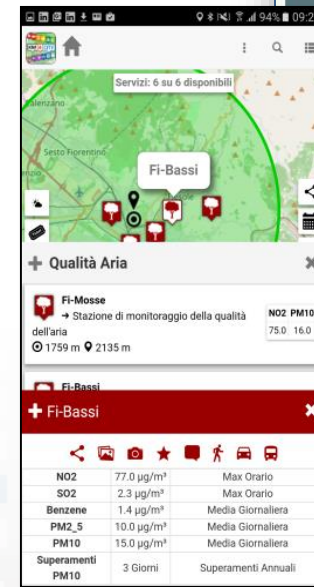
20-03-2017 00:37

I CODICI DEL PRONTO SOCCORSO

<b>CODICE ROSSO</b> EMERGENZA accesso immediato	Casi con pericolo di vita Il trattamento di questi pazienti avviene immediatamente in via prioritaria
<b>CODICE GIALLO</b> URGENZA accesso rapido	Casi con lesioni gravi ed eventuale alterazione di una o più funzioni vitali L'assistenza viene assicurata nel minor tempo possibile
<b>CODICE VERDE</b> URGENZA differibile	Casi in condizioni critiche, ma non in pericolo di vita L'assistenza viene assicurata dopo i casi più urgenti
<b>CODICE AZZURRO</b> NON URGENZA	Casi in condizioni non gravi La prestazione sanitaria è differibile
<b>CODICE BIANCO</b>	Casi con problematiche risolvibili dal medico curante, dalla guardia medica o da ambulatori specialistici Tempi di attesa molto lunghi

# Access at Environmental information

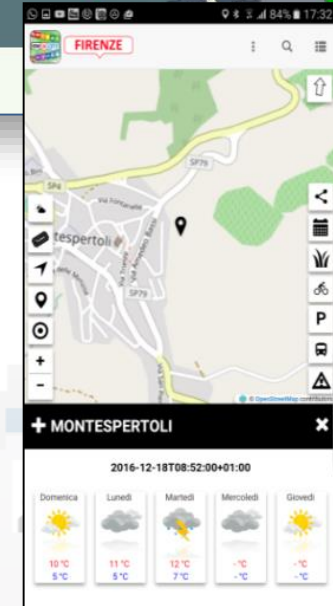
- Getting weather forecast for the next hours and days
- Getting alert information from Civil protection
- Getting air quality status
- Getting pollination status
- getting actual weather status: temperature, humidity, pressure, rain level, etc.



**Codice Allerta Meteo**

Situazione attuale

Città	Temp.	Pioggia
<a href="#">Arezzo</a>	14	
<a href="#">Firenze</a>	12	
<a href="#">Grosseto</a>	13	
<a href="#">Livorno</a>	ND	



Pollen Firenze

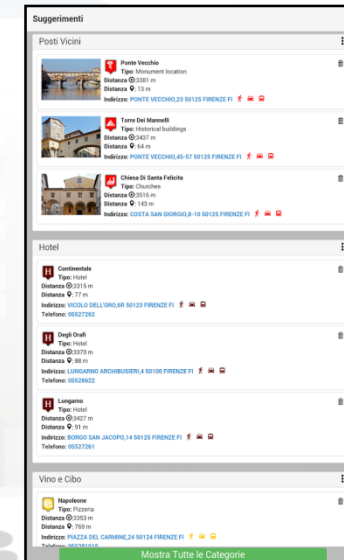
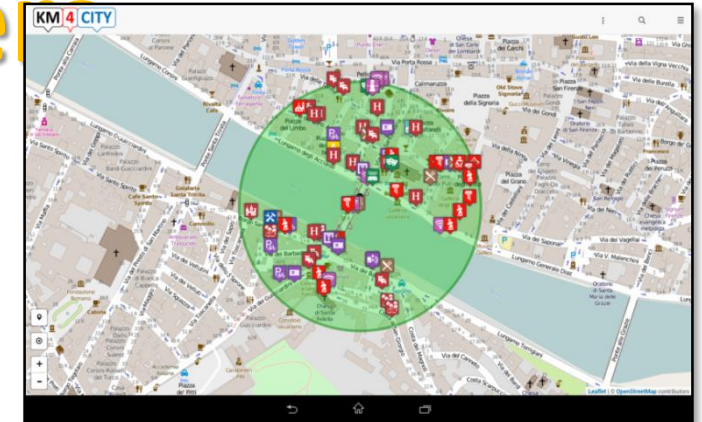
Quantità Polline

Alternaria	39.0	↑
Amarantacee	1.0	
Castagno	26.0	
Cupressacee/Taxacee	0.7	
Fagacee	30.0	
Frassino	1.0	
Graminacee	9.0	
Oleacee	4.0	
Olivo	3.0	
Pinacee	3.0	
Plantaginacee	3.0	
Polygonacee	0.3	
Quercia	3.0	
Urticacee	6.0	



# 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

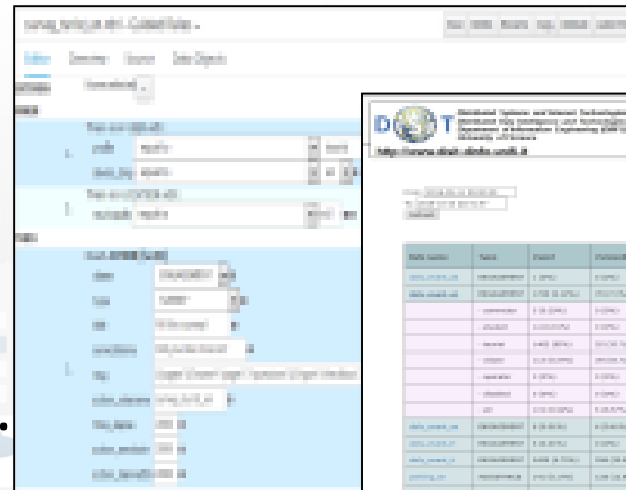


# Personal Assistant Profiled Engagements to City

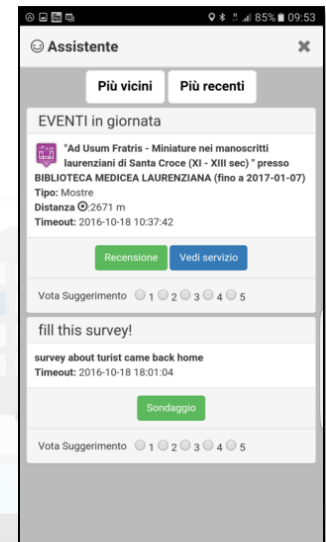


## Users

- 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, ....



Nome servizio	Descrizione	Indirizzo	Orario	Prezzo	Recensioni
DISIT	DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE	UNIVERSITÀ DEGLI STUDI DI FIRENZE			
...	...	...	...	...	...



**Public Transportation**

Servizi: 29 su 29 disponibili

**Pisa V.Le Gramsci**  
Consorzio Pisano Trasporti

**875**

Orario	Linea	Direzione
12:15:00	875	Pisa V.Le Gramsci
13:14:00	875	Pisa V.Le Gramsci
13:30:00	875	Pisa V.Le Gramsci
14:29:00	875	Pisa V.Le Gramsci
14:30:00	875	Pisa V.Le Gramsci
15:29:00	875	Pisa V.Le Gramsci
18:30:00	875	Pisa V.Le Gramsci
19:29:00	875	Pisa V.Le Gramsci
19:30:00	875	Pisa V.Le Gramsci
20:29:00	875	Pisa V.Le Gramsci

Aggiorna Vedi Tutti

Cosa ne pensi del servizio?

Vota

☆☆☆☆☆ 0

Commenta

**previsioni** 47%

Thu 15 Feb  
**Pisa**  
Bit cloudy

Powered by LAMMA

5°C / 11°C

Fri 16 Feb 1°C / 13°C Cloudy  
Sat 17 Feb 6°C / 13°C Overcast  
Sun 18 Feb Temp 10°C Moderate to strong rain  
Mon 19 Feb Temp 10°C Cloudy

**Cultural Activities**

Servizi: 9 su 9 disponibili

**Risultati**

- Biblioteca Centrale**  
→ Biblioteca  
⊙ 34 m
- Chiesa Di Santa Maria Della Spina**  
→ Luogo monumento  
⊙ 80 m
- Biblioteca Di Scienze Politiche Dell'università Di Pisa**  
→ Biblioteca  
⊙ 254 m
- Biblioteca Giuridica Dell'università Di Pisa**  
→ Biblioteca  
⊙ 261 m
- Biblioteca Universitaria**  
→ Biblioteca  
⊙ 261 m
- Biblioteca Universitaria**  
→ Biblioteca  
⊙ 261 m

<http://www.disit.org/dashboardSmartCity/view/index.php?iddashboard=MjUy>



# Smart City API e documentazione

- Dashboard Builder: <https://dashboard.km4city.org/> - User Manual to download: <https://www.disit.org/7074>
- ServiceMap: <https://servicemap.km4city.org>
- ServiceMap3D: <https://www.disit.org/servicemap3d/>
- Km4City WebApp: <https://www.km4city.org/webapp/>
- App Development Kit Tutorial: <http://www.disit.org/6977>
- Advanced Smart City API: <http://www.disit.org/6991>
- Km4City Ontology download: <http://www.disit.org/6506>
- Km4City ontology SVG: <http://www.km4city.org/img/Km4City-v1-6-4.svg>
- Tutorial for App developers: <http://www.disit.org/7044>
- Linked Open Graph and FLINT, SPARQL: LOG: <http://log.disit.org/service/>
- Guida e strumenti: Programmazione ETL per Data Warehouse: <http://www.disit.org/6690>
- GitHub: <https://github.com/disit>
- Twitter Vigilance su Pisa:  
[http://www.disit.org/tv/index.php?p=chart\\_singlechannel&dashboard=&canale=Pisa](http://www.disit.org/tv/index.php?p=chart_singlechannel&dashboard=&canale=Pisa)



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

<http://www.disit.org/7109>



# Magari siete interessati a lavorare al DISIT

**BANDO: 2 POSTI ASSEGNISTA, STUDIO E SVILUPPO DI SOLUZIONI PER L'INTERNET DELLE COSE, IOT/IOE, PER VARI AMBITI APPLICATIVI**

**TITOLO:** Studio e sviluppo di soluzioni per l'internet delle cose, IOT/IOE, per vari ambiti applicativi (*in inglese*) Study and development of solutions for Internet of Thing/Everything for different applications scenarios

**Il Bando e le istruzioni possono essere scaricate da**

<https://titulus.unifi.it/albo/viewer?view=files%2F002633971-UNFICLE-9ea2d448-2dd3-41e8-a41b-912a8ccfb3-000.pdf>

**Campo principale della ricerca ICT**

**Sottocampo della ricerca Sistemi distribuiti, IOT, Big data**

**Area CUN 09**

**Settore Scientifico Disciplinare ing/inf05**

**Descrizione sintetica in italiano**

L'assegnato di ricerca ha come obiettivo lo studio e lo sviluppo di soluzioni distribuite basate su microservizi l'elaborazione dati in ambito internet of thing/everything, IOT/IOE. Lo studio sarà orientato allo sviluppo di soluzioni su architetture distribuite (hadoop, spark, GPU, cloud, nodeRED) per la gestione di processi e la raccolta dati su architetture parallele, con modelli di scaling su VM/cloud e container, processi big data di data mining (modelli predittivi e di identificazione di anomalie), soluzioni di machine learning. Il lavoro si svolge nel contesto dei progetti Snap4City/Select4Cities H2020 (<http://www.disit.org/7113>) (Su Helsinki e Antwerp), Coll@bora del MIUR, Sii-Mobility <http://www.sii-mobility.org> MIUR (su tutta la regione Toscana), <http://www.km4city.org> (su Venezia) e WEEE LIFE della EC (<http://www.disit.org/7114>) su Firenze, REPLICATE H2020 e RESOLUTE H2020 su Firenze. Molti di questi progetti sono in collaborazione con importanti partner nazionali ed internazionali come: Leonardo, Thales, ECM, SWARCO, TIM, ENEL, etc., e moltissimi centri di ricerca (ENEA, CNR, UNIMI, UNICA, ) e pubbliche amministrazioni: Firenze, Helsinki, Compenaghen, Antwerp, Pisa, Venezia, Cagliari, etc.

L'assegnista si troverà ad avere compiti specifici che potrà sviluppare in modo autonomo e al contempo ad

# 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 program (grant agreement n° 653460).
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- Thanks to the European Commission for founding. All slides reporting logo of **Snap4City** <http://www.snap4city.org> of **Select4Cities H2020** are representing tools and research founded by European Commission for the **Select4Cities** project. **Select4Cities** has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation program (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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# Smart City



## Piattaforma Km4City PISA

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[www.Km4City.org](http://www.Km4City.org)

<http://www.disit.org/7141>

