



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB



Open Urban Platform: Technical View 2018

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

www.Km4City.org

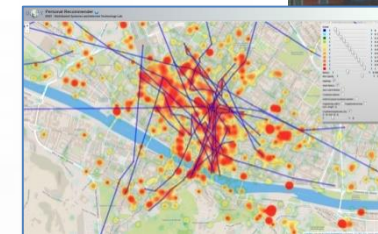
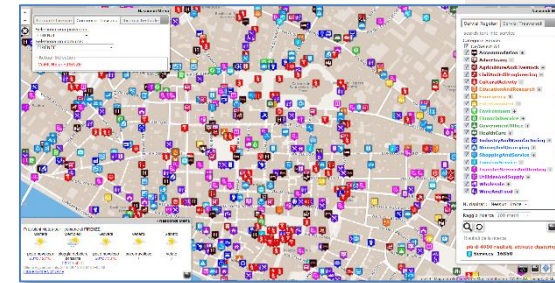
Paolo Nesi, paolo.nesi@unifi.it





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



**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

/

/

<http://servicemap.km4city.org>

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

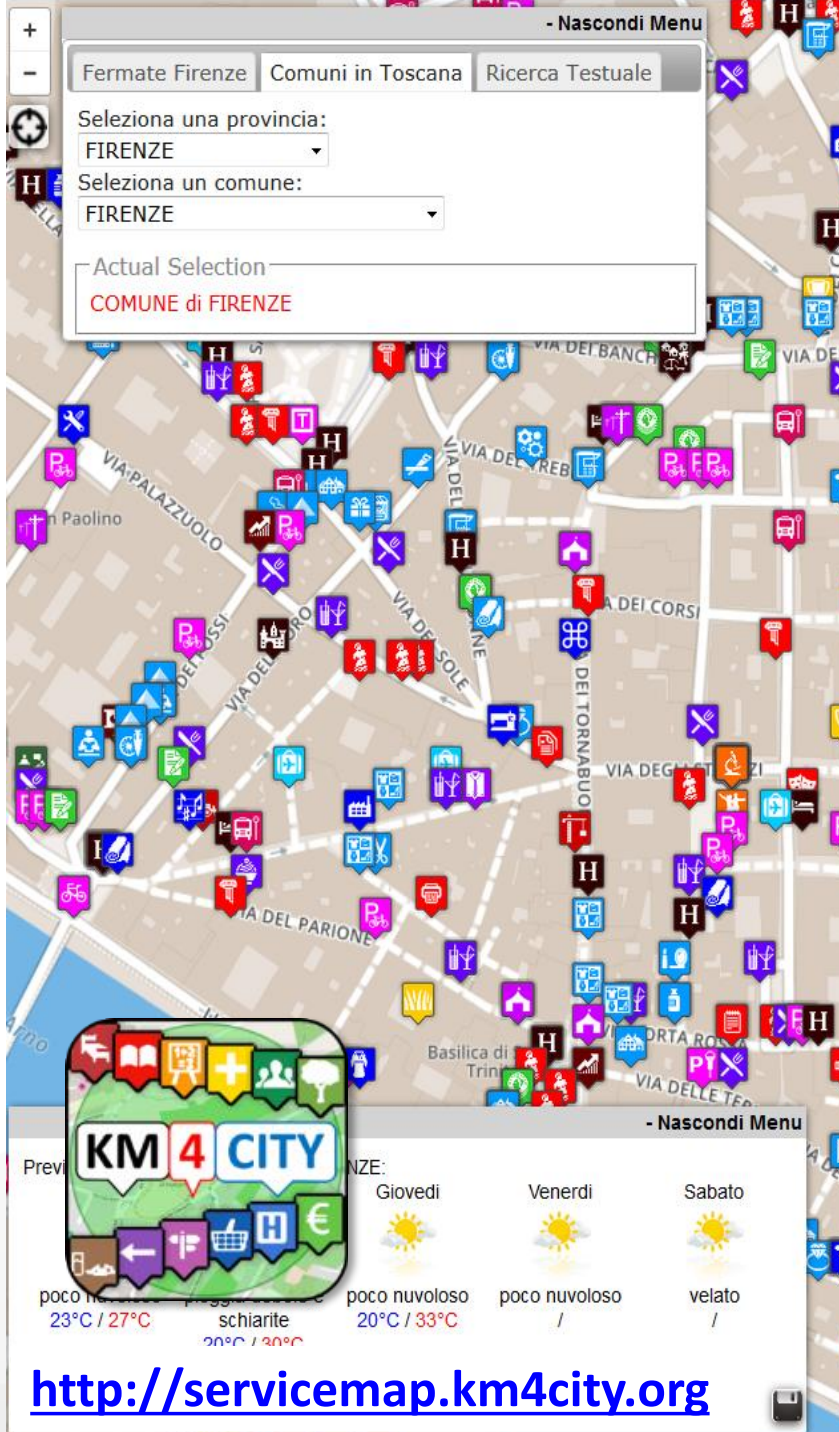


Risultati della ricerca

più di 4000 risultati, attivato clustering

Services 16858



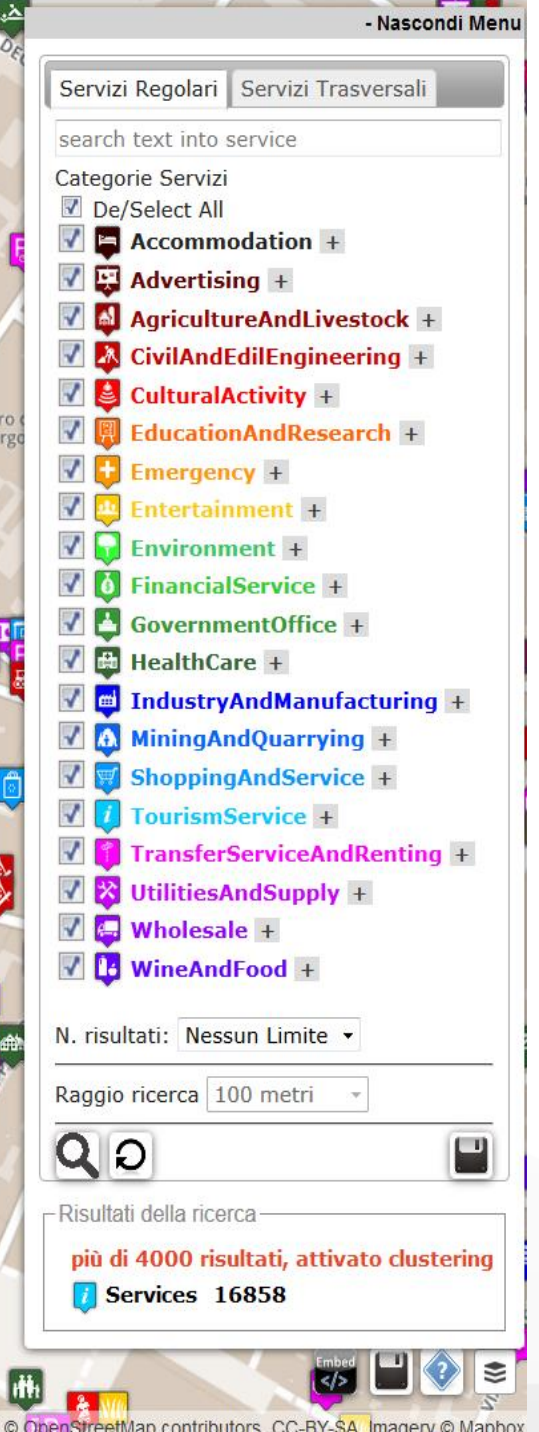


What is enabling and providing smart services

- 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!





Services



- **Dashboard and Notifications for Decision Makers**
 - Control Room Dashboard, Notifications, personalized
 - Widgets in third party web pages
- **Development Tools for Applications**
 - Development of Web and Mobile App, HTML5, Open
 - Development of IOT Application for all
 - **Smart City API to access and exploit the city knowledge Km4City**
 - **Easy upload of Data Set and Data Analytics/Processing Processes**
 - **Development Environment for Data Analytics**
 - Sand Box, VM for developers: ETL, Python, C/C++, Java, etc.

Transport systems
Mobility, parking



Public Services
Govern, events, ...



Sensors, IOT
Cameras, ..



Environment,
Water, energy



Shops, services,
operators



Social Media
WiFi, network

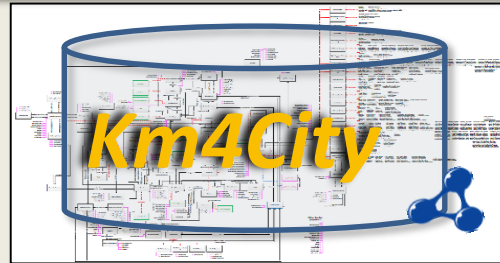


Static, Slow and Real Time data flows

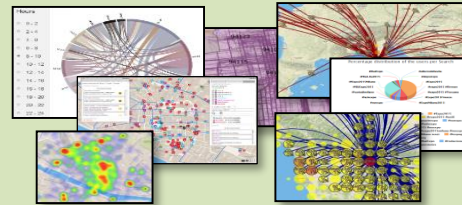
DISCES -- Distributed and parallel architecture on Cloud



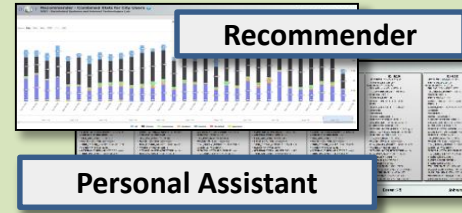
Km4City Smart City Engine



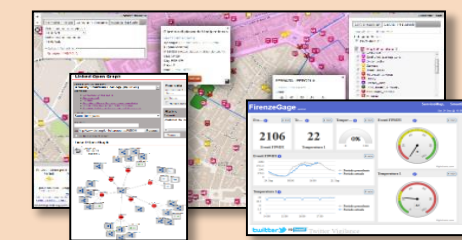
Big Data Analytics



Smartening Tools



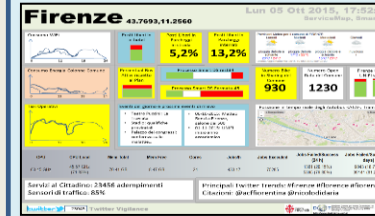
Development Tools



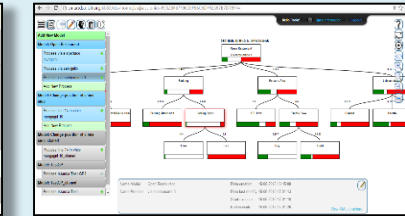
Km4City Smart City API

City Operators and Decision Makers

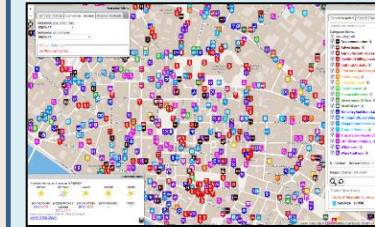
Dashboards



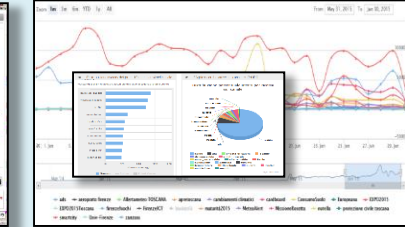
Smart Decision Support



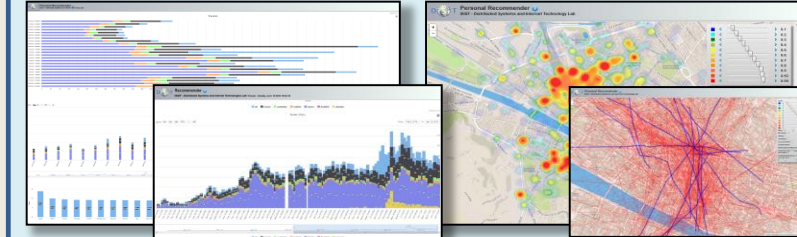
ServiceMap browser



Twitter Vigilance

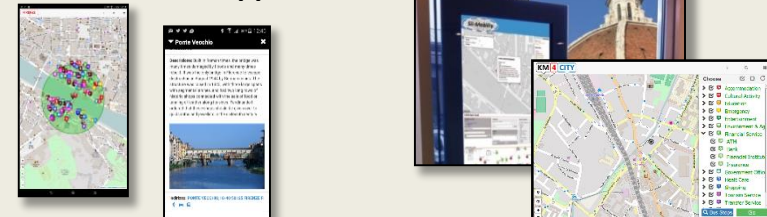


Analyzers of City User Behavior



Tools for Final Users

Mobile e Web Apps





Cycling Paths



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

Services Categories

- De/Select All
- Area +
- DigitalLocation +
- HappeningNow +
- Path -
- Cycle_paths
- Tourist_trail
- Tramline
- Fresh Place
- Public Transport Line
- Road Sensors
- Bus Stops

Filter:
 search text into service
 N. results for each: No Limit
 Search Range: visible areas

Search Results
 Services 228 of 228 available

Mobile App Screenshot 1 (Left):
 FIRENZE
 Servizi: 85 su 85 disponibili
 Percorsi Ciclabili.309
 Tipo: Ciclopercorsi
 Distanza 172 m
 Distanza 1329 m
 Percorsi Ciclabili.305
 Tipo: Ciclopercorsi
 Distanza 191 m
 Distanza 956 m

Mobile App Screenshot 2 (Right):
 FIRENZE Navigazione
 Servizi: 100 su 1516 disponibili
 Arena Esterno Notte Poggetto
 Tipo: Cinema
 Distanza 351 m
 Auditorium Flog
 Tipo: Teatro
 Distanza 351 m



ServiceMap



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
 Path
 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
 Bus Lines: 72 Bus Lines Found.

Search for Geo Located Services

Get Events in the city

Regular Services | Transversal Services
 search text into service
 Services Categories
 De/Select All
 Area
 DigitalLocation
 HappeningNow
 Path
 Fresh Place
 Public Transport Line
 Road Sensors
 Bus Stops
 N. results for each: 500
 Search Range: 500 mt
 Search Results:
 Services: 418 of 418 available
 Bus Stops: 23 of 23 available
 Road Sensors: 2 of 2 available
 Bus Lines: 33 Bus Lines Found.

Search in an area

Regular Services | Transversal Services
 search text into service
 Services Categories
 De/Select All
 Accommodation
 Advertising
 AgricultureAndLivestock
 CivilAndITEngineering
 CulturalActivity
 EducationAndResearch
 Emergency
 Entertainment
 Environment
 FinancialService
 GovernmentOffice
 HealthCare
 IndustryAndManufacturing
 MiningAndQuarrying
 ShippingAndService
 Transportation
 TransferServiceAndRenting
 UtilitiesAndSupply
 Wholesale
 WineAndFood
 N. results: No Limit
 Search Range: visible areas
 Search Results:
 Services: 2231 of 2231 available
 Query results organized by category
 Total number of results: 2231

Category	Number of Results
Accommodation	14
Advertising	21
AgricultureAndLivestock	31
CivilAndITEngineering	21
CulturalActivity	4
EducationAndResearch	24
Emergency	15
Entertainment	24
Environment	15
FinancialService	104
GovernmentOffice	241
HealthCare	264
IndustryAndManufacturing	49
MiningAndQuarrying	54
ShippingAndService	154
Transportation	154
TransferServiceAndRenting	154
UtilitiesAndSupply	154
Wholesale	154
WineAndFood	154

Get weather forecast

Get Real Time data (public busses, car parks, sensors, traffic flows)

Regular Services | Transversal Services
 search text into service
 Services Categories
 De/Select All
 Area
 DigitalLocation
 HappeningNow
 Path
 Fresh Place
 Public Transport Line
 Road Sensors
 Bus Stops
 N. results for each: 200
 Search Range: 500 mt
 Search Results:
 Bus Stops: 25 of 25 available
 Road Sensors: 3 of 3 available
 Actual Selection
 Service: F1055ZTL01601
 F1055ZTL01601
 Linked Open Graph
 Topology: TransferServiceAndRenting - SensorSite
 Address: VIA GUELFIA
 Data from sensor: F1055ZTL01601
 Last Update: 2016-08-15 13:30:42:00

Avg Distance(m)	Avg Time (sec)	Occupancy (%)	Concentration (car/km)
N.A.	N.A.	N.A.	0.0
Vehicle Flow (car/h)	Avg Speed (km/h)	Threshold Perc (%)	Speed Perc (%)
66.0	0.0	N.A.	N.A.



Km4City in Firenze



- Nascondi Menu

Fermate Firenze | Comuni in Toscana | Ricerca Testuale

Seleziona una provincia:
FIRENZE

Seleziona un comune:
FIRENZE

Actual Selection
Servizio: PERGOLA

Giardino di piazza dell'Indipendenza

LINKED OPEN GRAPH
Tipologia: Entertainment - Green_areas
Digital Location
Indirizzo: PIAZZA DELLA INDIPENDENZA, 15
Cap: 50129
City: FIRENZE
Prov.: FI
Note: areeverdi238

Rimuovi dalla Mappa

FERMATATA : T1 ALAMANNI

LINKED OPEN GRAPH
Linee:
2 28 52 54
Dati Real Time al momento non disponibili

FERMATATA : PERGOLA

LINKED OPEN GRAPH
Linee:
14 19 23 31 6

Route:

Linea	Percorso
6 A	NOVELLI → OSPEDALE TORRE GALLI
6 B	NOVELLI → OSPEDALE TORRE GALLI
6 A	OSPEDALE TORRE GALLI → NOVELLI
6 B	OSPEDALE TORRE GALLI → NOVELLI

Dati Real Time al momento non disponibili

Servizi Regolari | Servizi Trasversali

search text into service

Categorie Servizi
 De/Select All

Digital Location

- Consulate
- Controlled_parking_zone
- Cycle_paths
- Gardens
- Green_areas
- Historical_buildings
- Library
- Literary_cafe
- Local_health_authority
- Monument_location
- Museum

Fresh Place

Road Sensors

Bus Stops

N. risultati for each: Nessun Limite

Raggio ricerca: area visibile

Risultati della ricerca:

Bus Stops: 21 - Linea Bus: 25

Direction: LA PIRA → PIAN DI SAN BARTOLO

Previsioni Meteo per il comune di FIRENZE:

Martedì	Mercoledì	Giovedì	Venerdì	Sabato
poco nuvoloso 23°C / 27°C	pioggia debole e schiarite 20°C / 30°C	poco nuvoloso 20°C / 33°C	poco nuvoloso /	velato /

Ultimo Aggiornamento: 2015-09-15T09:07:00+02:00
LINKED OPEN GRAPH

servicemap.disit.org/WebAppGrafo/mapa.jsp#close

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

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

Dashboard vs Data Types

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



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TECHNOLOGIES LAB

DISIT lab, 15 August 2017



Filtering data to reach selection

- **High Level Types:** sensors, special, KPI, POI, etc.
- **Nature:** accommodation, mobility, financial, wine, health, etc.
 - Dashboard \leftrightarrow IOT APP, IOT Device to system
- **SubNature:** a subclassification of the nature
- **ValueType:** temperature, humidity, memory, pressure, glucose, etc...
- **ValueName:** name of variable of the: IOT sensor, data, etc.
- **DataType:** integer, text, Boolean, float, webpage
- **LastDate:** last date and time of data acquisition
- **LastValue:** the last value, an example; in some case a parameter
- **Healthiness:** green or red according to the data quality criteria defined
- **LastCheck:** date and time of the last valid data
- **Ownership:** Public or Private; it may be: private, private (Delegated), private (MyOwn)



Data Kinds vs Widgets: Complex events

High Level Types

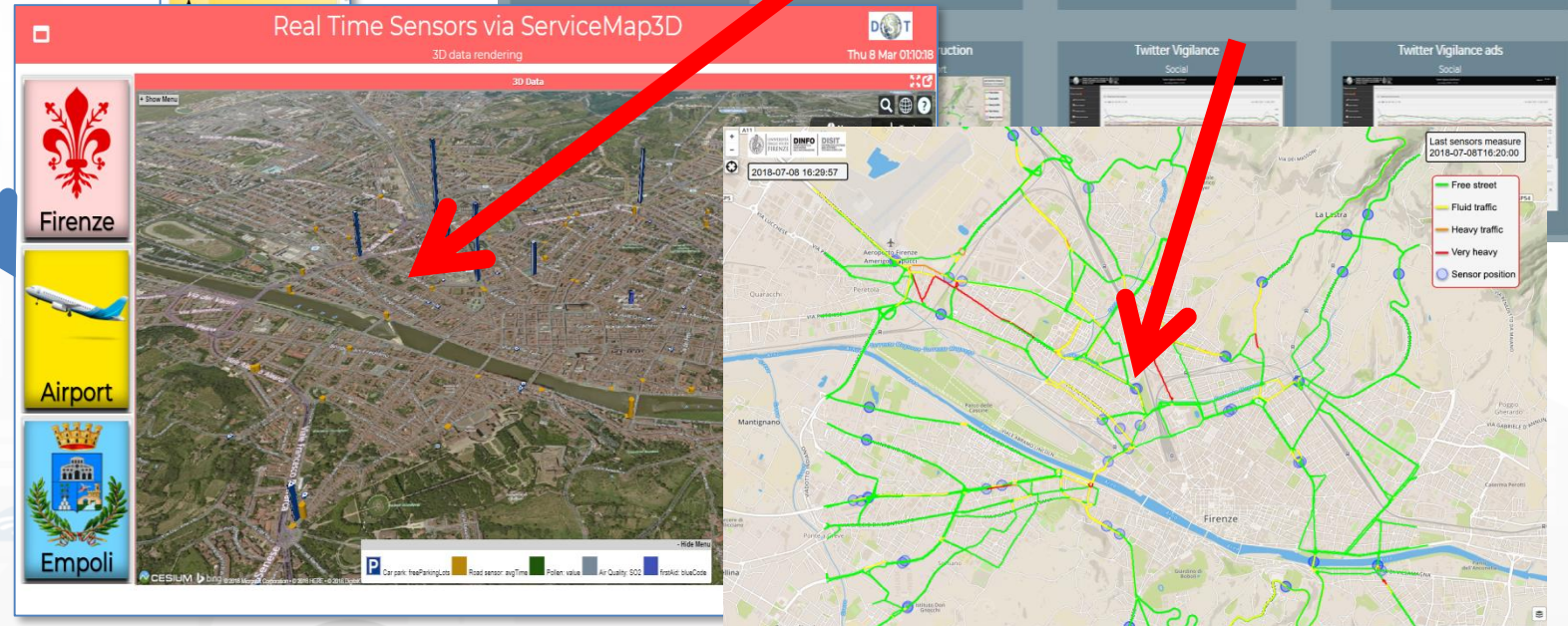
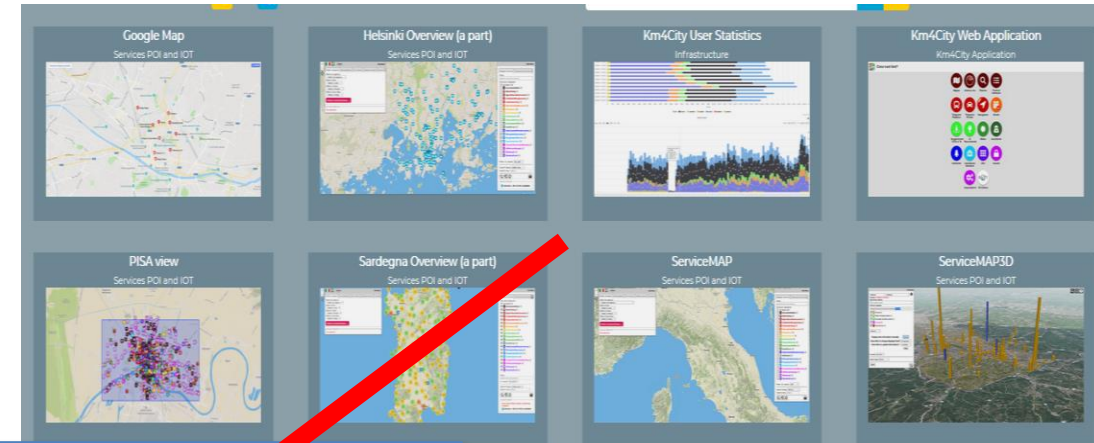
- Complex Event
- External Service
- MicroApplication
- Special Widget
- POI, Point of Interest
- KPI, Key Performance Indicator
- Sensor
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App



Data Kinds vs Widgets: external services

High Level Types

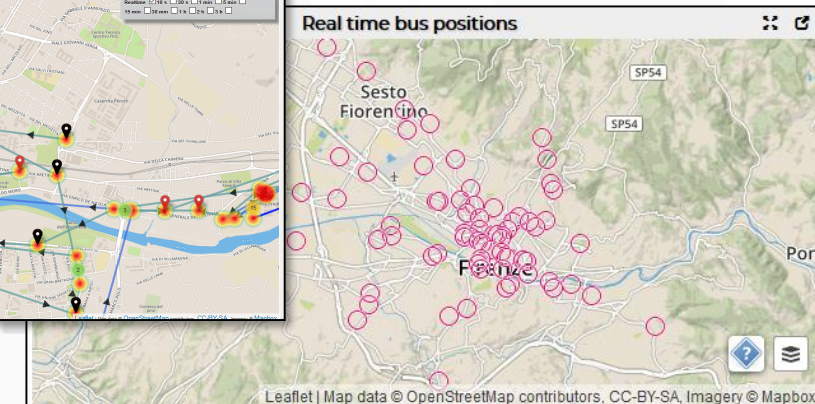
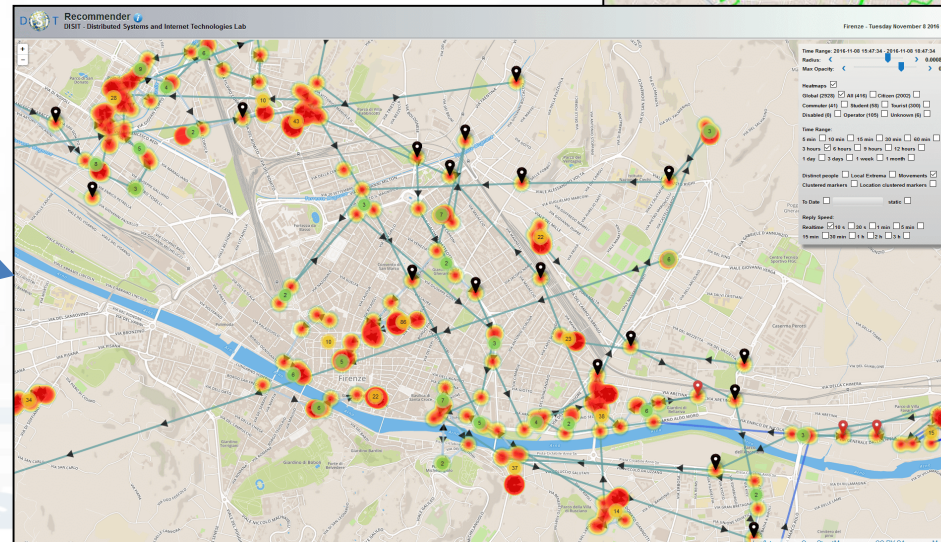
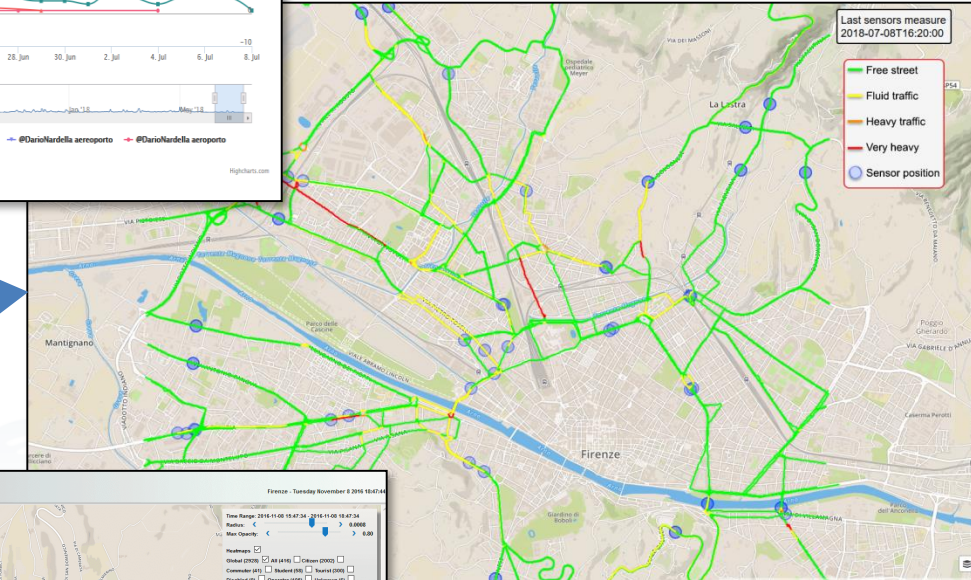
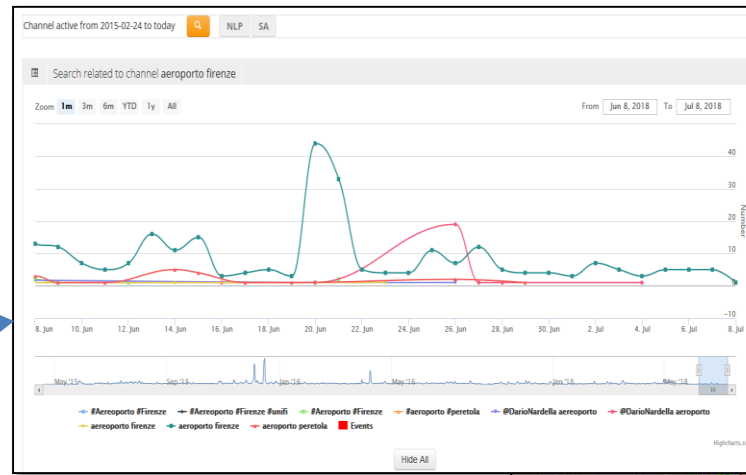
- Complex Event
- **External Service**
- MicroApplication
- Special Widget
- POI, Point of Interest
- KPI, Key Performance Indicator
- Sensor
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App





External Services

- Twitter Vigilance:
 - daily and real time
 - Volume and sentiment analysis
- Traffic Flow
- Services on Maps
- Tracking vehicles
- Real time sensors on 3D
- Web HTML5 Applications
- User behaviour monitoring

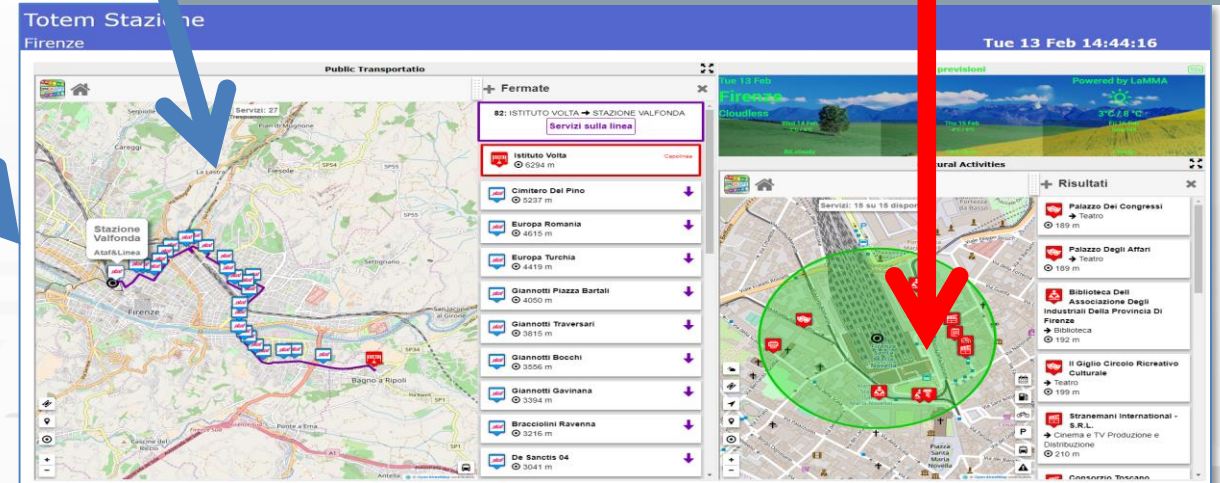
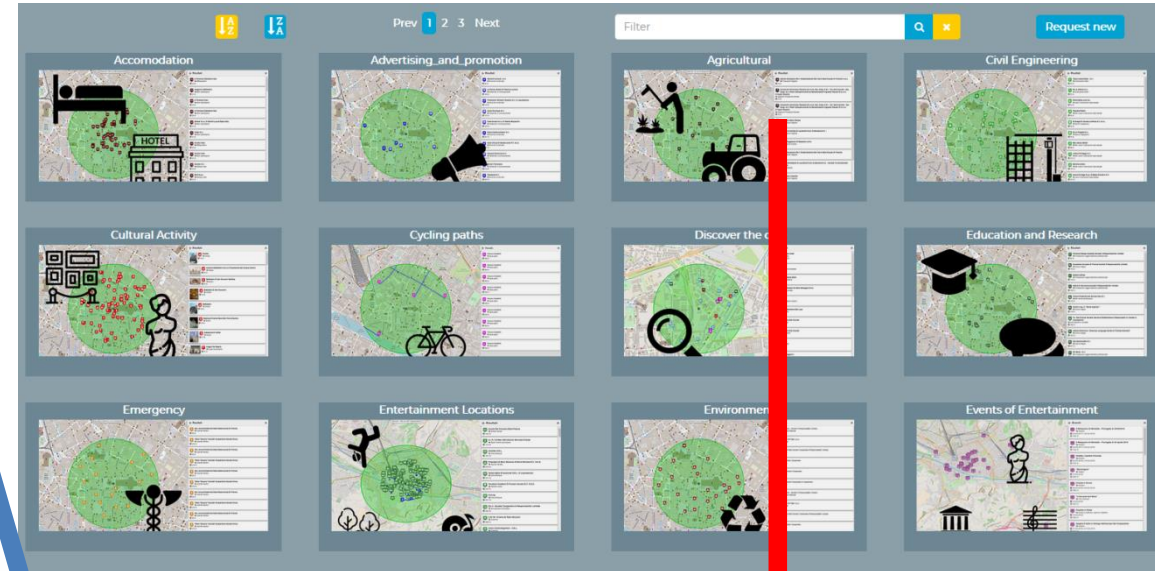


Data Kinds vs Widgets: MicroApplications

High Level Types

- Complex Event
- External Service
- **MicroApplication**
- Special Widget
- POI, Point of Interest
- KPI, Key Performance Indicator
- Sensor
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App

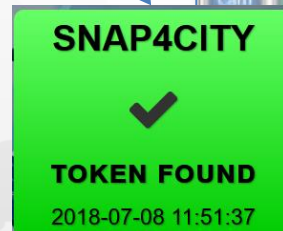
Selector	
	Traffic Sensors
	First Aid
	Smart waste
	Meteo sensor in via Bolognese
	Air quality
	Pollination
	Parking Status
	Smart bench
	Bike sharing (Pisa)



Data Kinds vs Widgets: Special Widgets

High Level Types

- Complex Event
- External Service
- MicroApplication
- **Special Widget**
- POI, Point of Interest
- KPI, Key Performance Indicator
- Sensor
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App

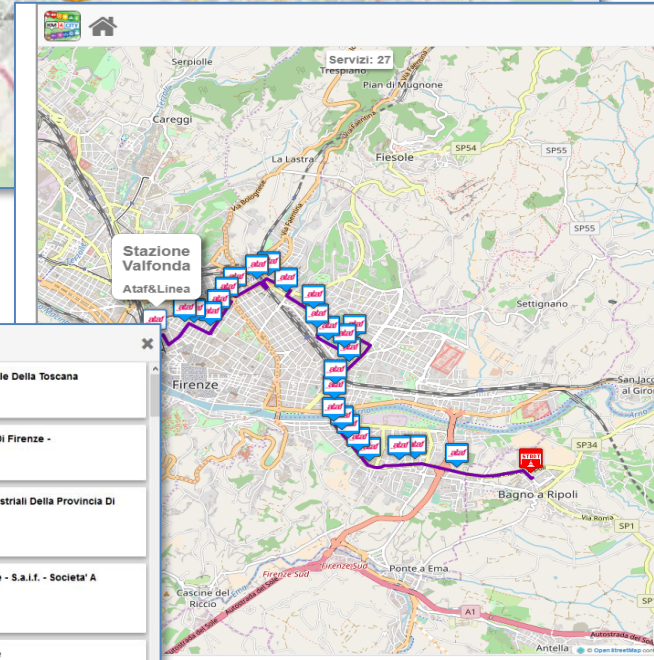
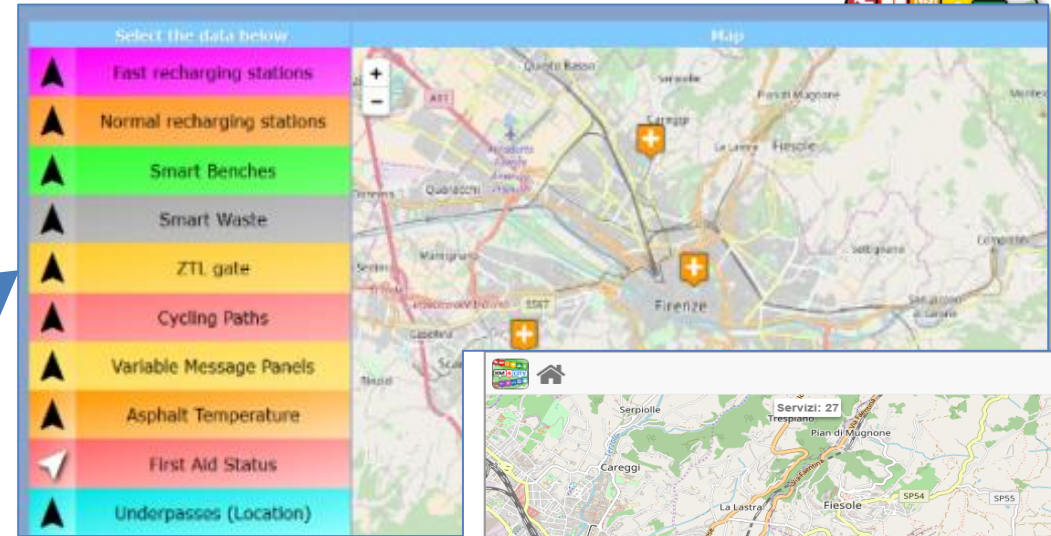


Florence main first aids status					
Priority/ Hospitals	Red code	Yellow code	Green code	Blue code	White code
PSAO CAREGGI	7	9	43	25	0
PS SAN GIOVANNI DI DIO TORREGALLI	1	6	20	6	0
PS SANTA MARIA ANNUNZIATA	0	8	10	8	1
PS SANTA MARIA NUOVA	1	6	17	5	0

Data Kinds vs Widgets: POI

High Level Types

- Complex Event
- External Service
- MicroApplication
- Special Widget
- **POI, Point of Interest**
- KPI, Key Performance Indicator
- Sensor
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App

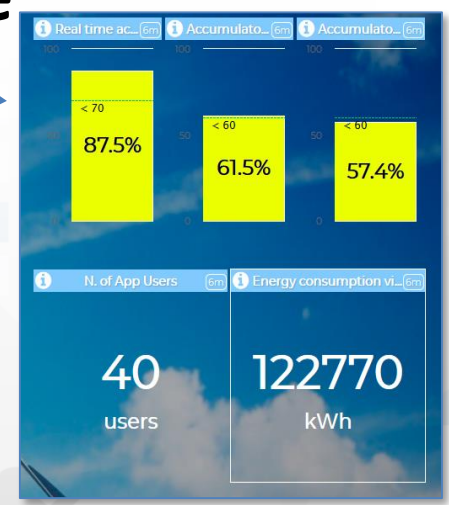
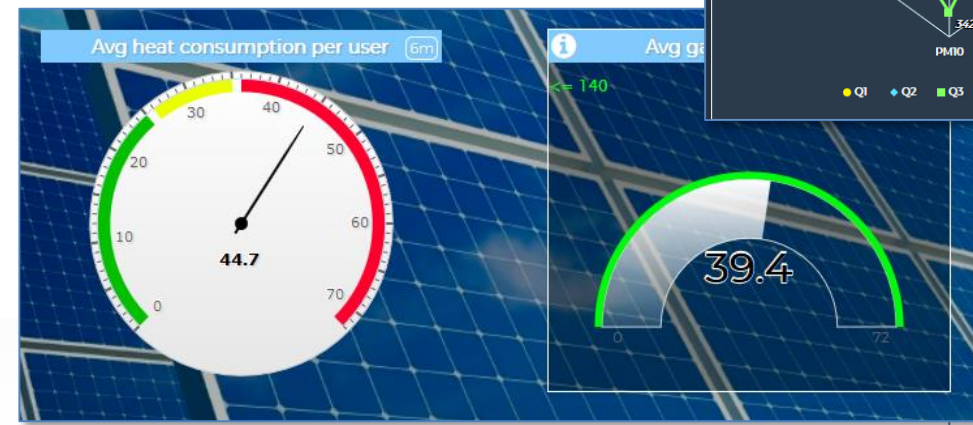




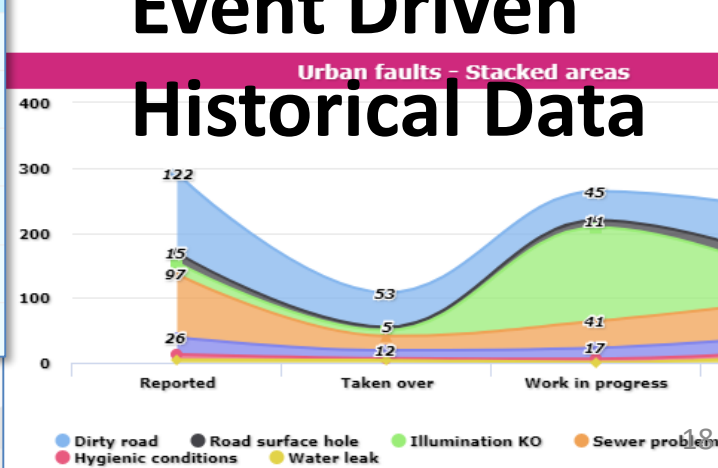
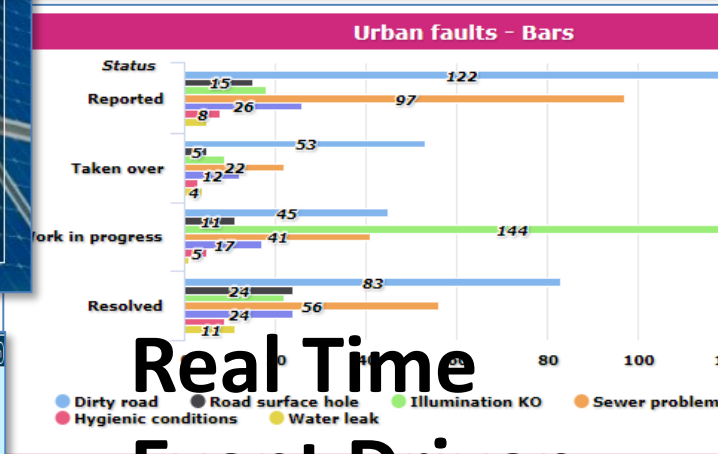
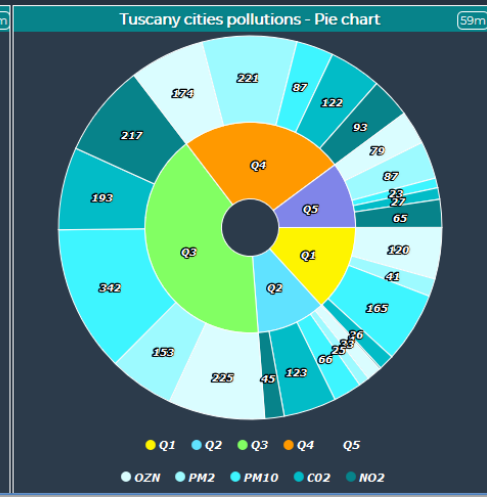
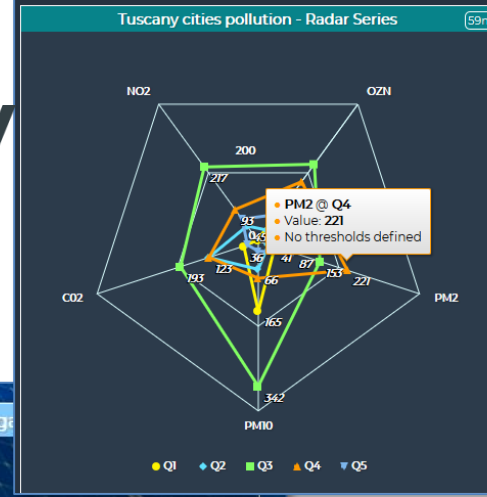
Data Kinds vs Widgets: KPI

- Complex Event
- External Service
- MicroApplication
- Special Widget
- POI, Point of Interest
- **KPI, Key Performance Indicator**
- Sensor
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App

High Level Types



Data / Station	Wind speed (km/h)	Direction	Temperature (°C)	Humidity (%)	Rain today (mm)	Pressure (mbar)
Sesto Fiorentino	50	N	7	32	0	922
Livorno	65	NE	5.5	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
Ciglio	97	O	3	19	0	957

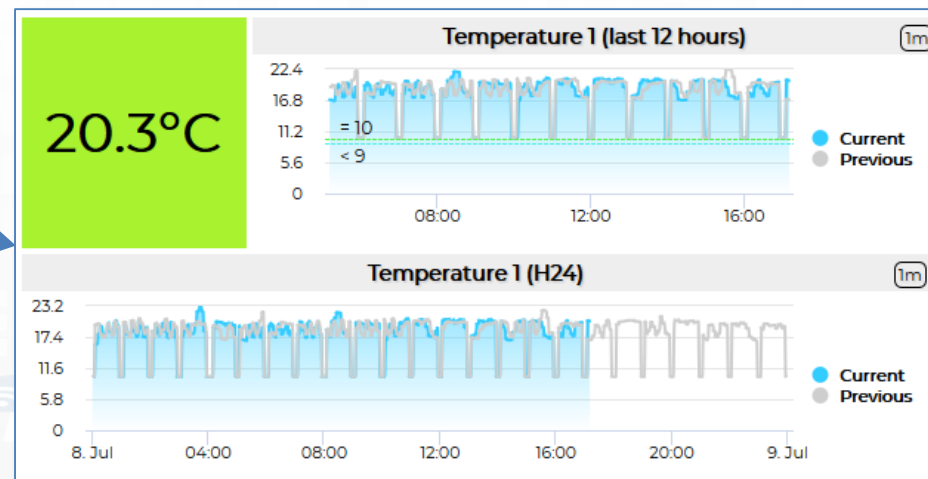
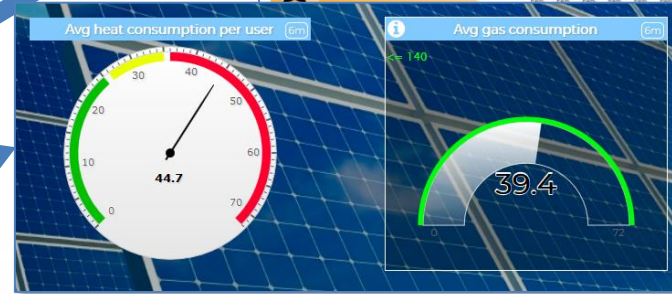
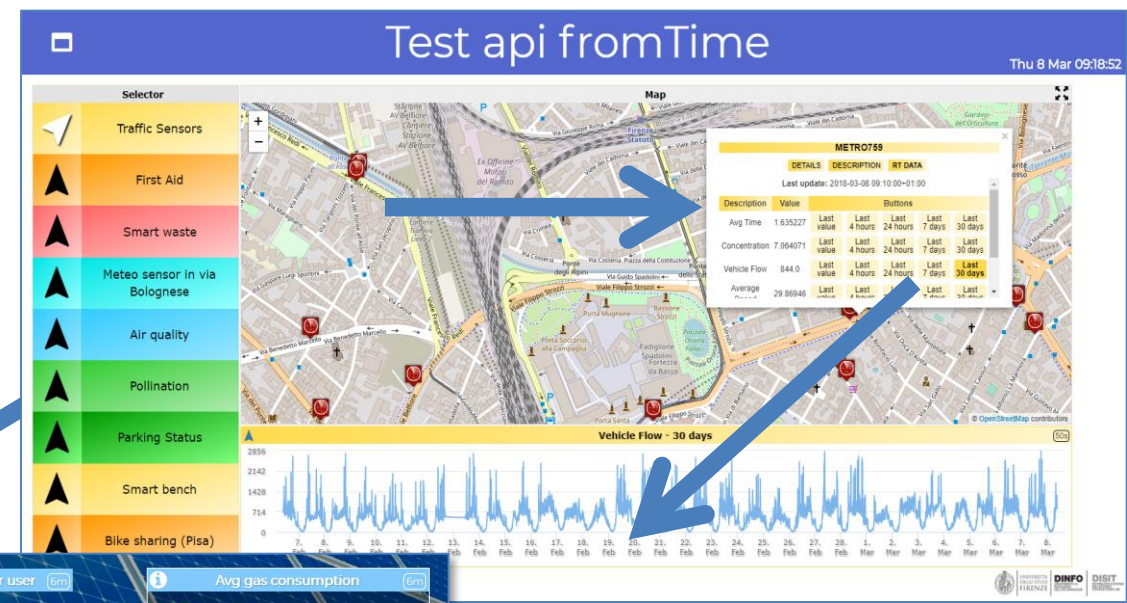


Data Kinds vs Widgets:

Sensors

High Level Types

- Complex Event
- External Service
- MicroApplication
- Special Widget
- POI, Point of Interest
- KPI, Key Performance Indicator
- **Sensor**
- Sensor-Actuator
- My Personal Data
- Dashboard-IOT App



Real Time Event Driven Historical Data





Data Kinds vs Widgets: KPI

High Level Types

- Complex Event
- External Service
- MicroApplication
- Special Widget
- POI, Point of Interest
- KPI, Key Performance Indicator
- Sensor
- **Sensor-Actuator**
- My Personal Data
- Dashboard-IOT App



Antwerp	Helsinki	Florence	Current	Blue
PeopleNumber <small>New</small> <small>Last confirmed</small> <small>None</small>				Green
7	8	9		
4	5	6		Yellow
1	2	3		
0	.	Canc		Red
Confirm				



Dashboard intelligence

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



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TECHNOLOGIES LAB

DISIT lab, 15 August 2017

dashboard with intelligence App

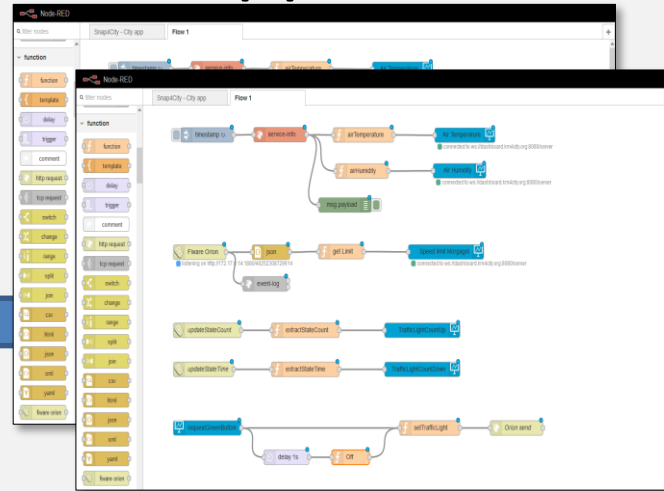
- Dashboards with IOT Applications for enforcing smart and intelligence into them.

IOT and City data World



My IOT Devices

IOT Applications



Dashboards

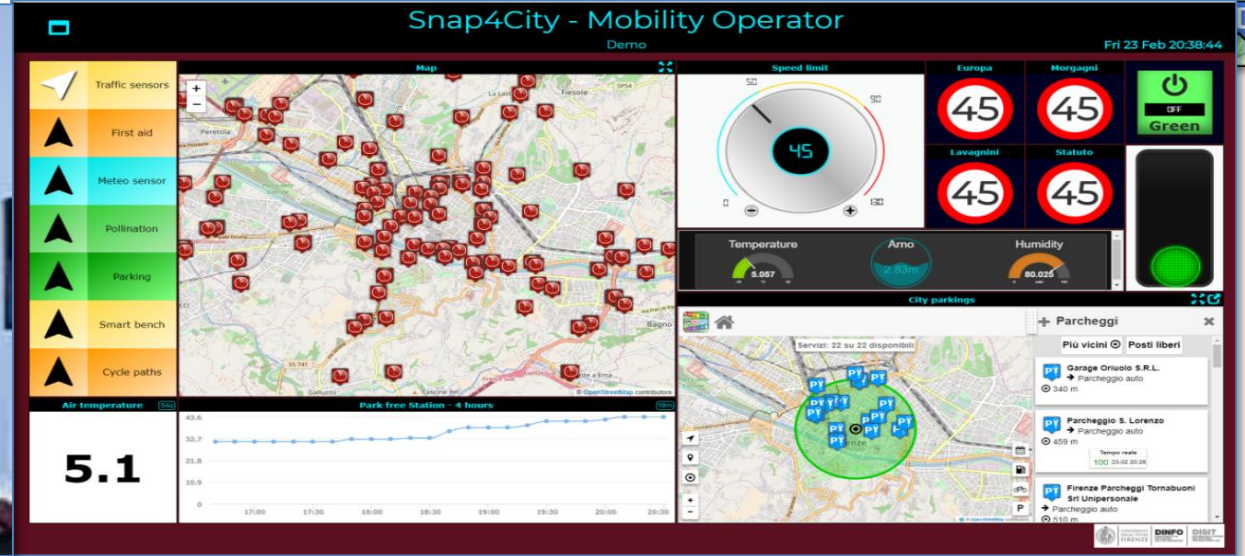


Applications

Control Room Operator

Would like to:

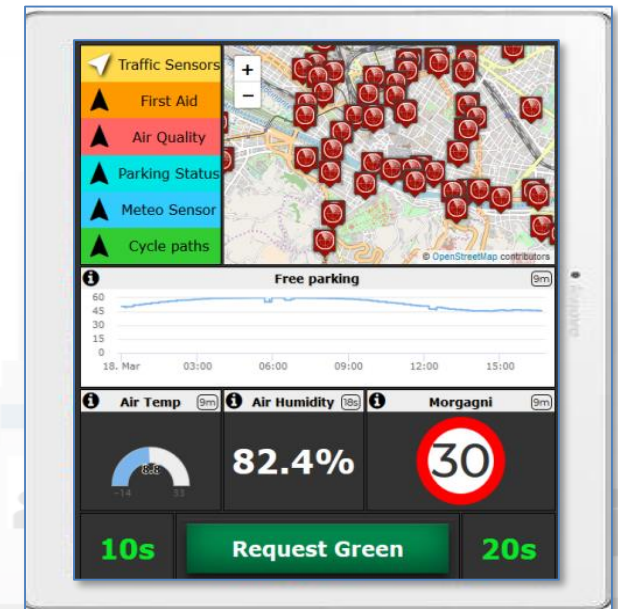
- **Monitor** traffic flow, Environment, Car parking, Cycling, First aid, temp., ..
- **Act and** monitor Dynamic Plates
- **Act and** monitor red lights



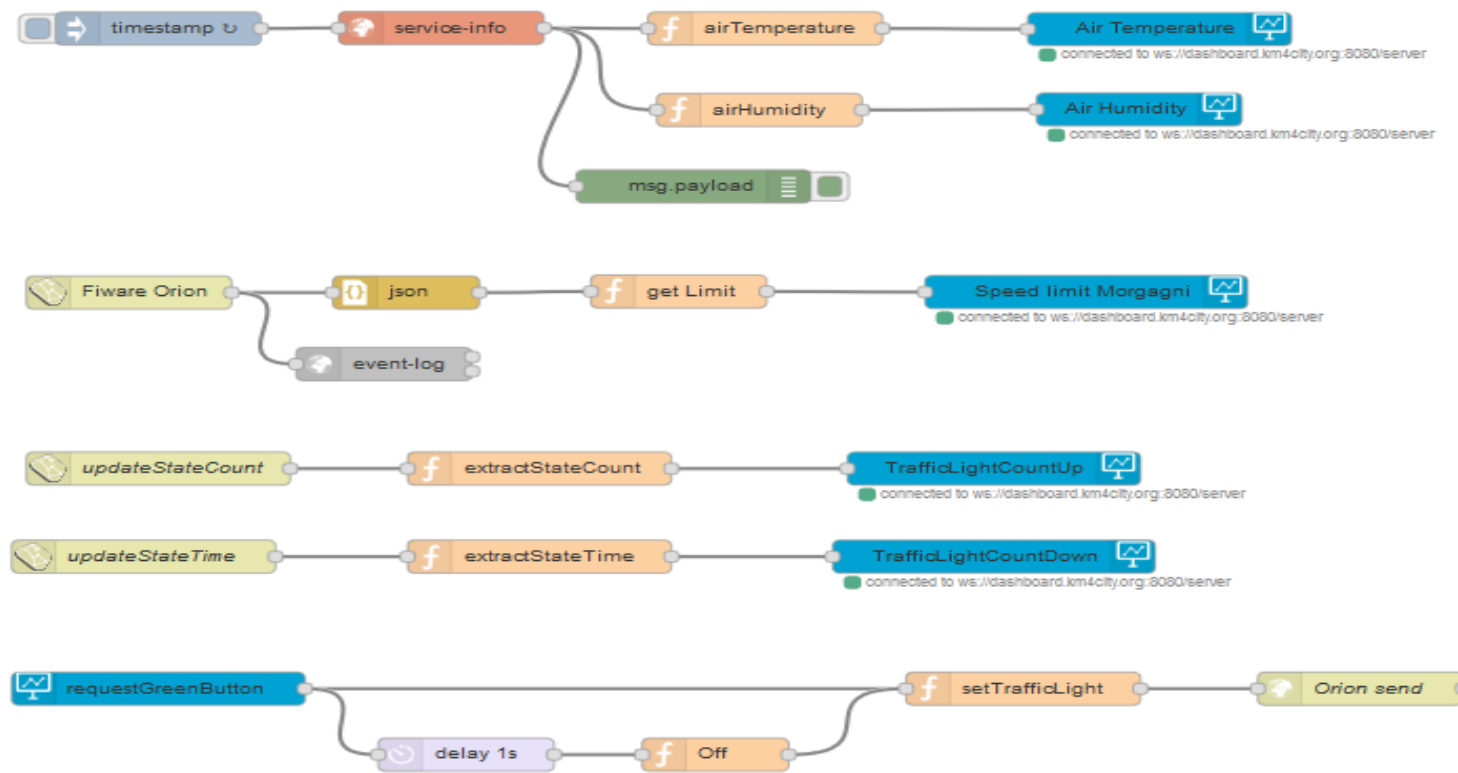
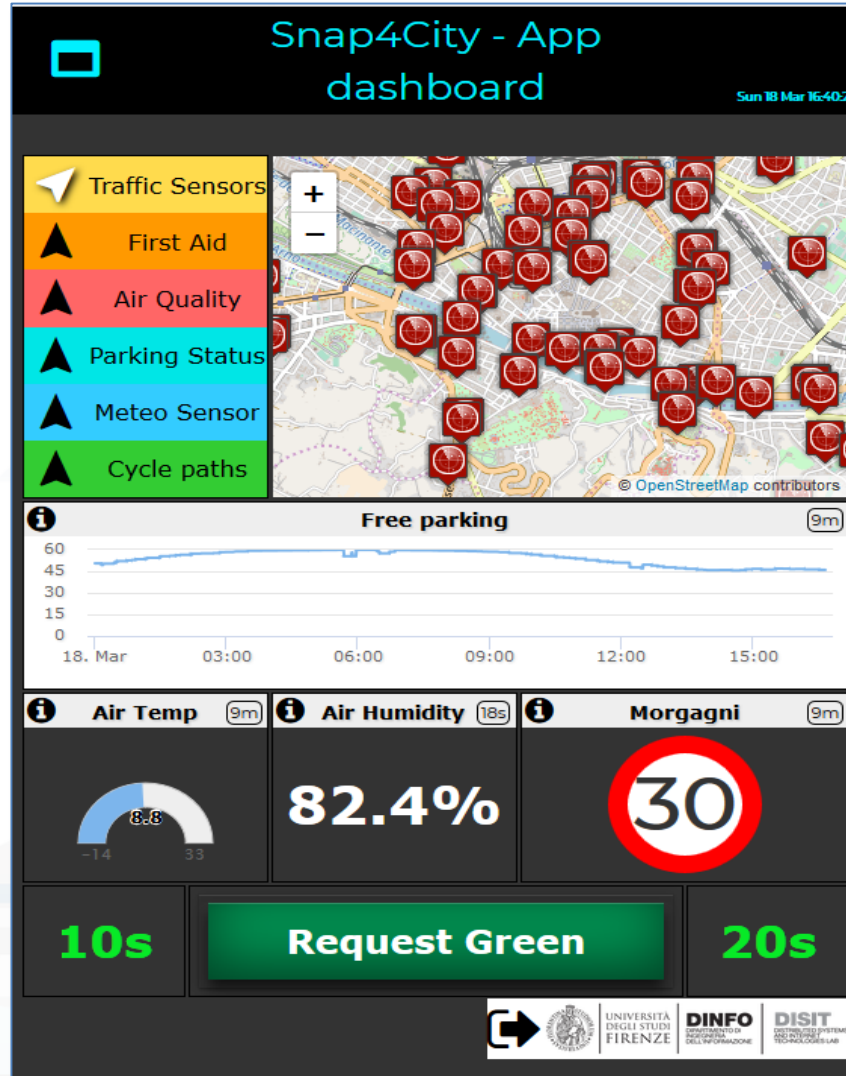
Driver, Policeman

Would like to:

- Monitor traffic, Parking, env., speed limit, ...
- **Act and** monitor red lights



IOT Application with City Dashboard simpler development



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>



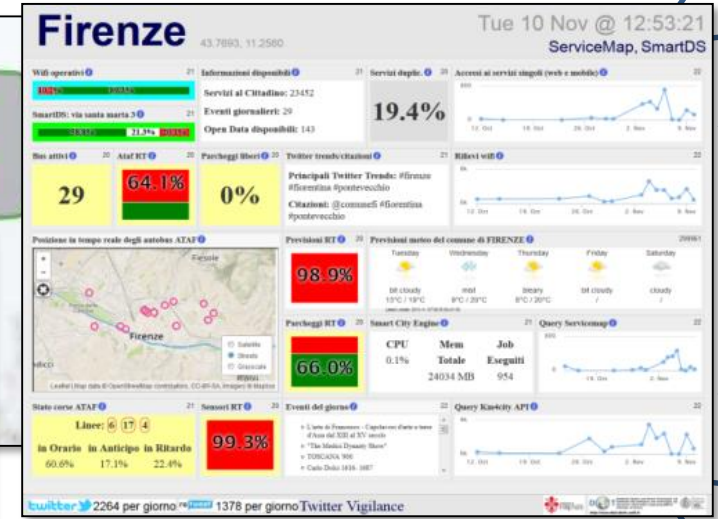
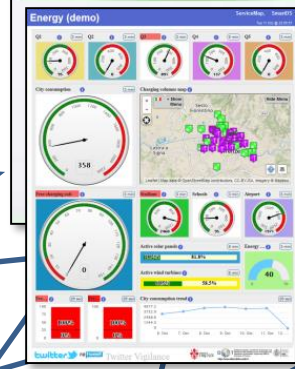
Horizon 2020
European Union Funding
for Research & Innovation



Transport
systems,
Mobility, Parking



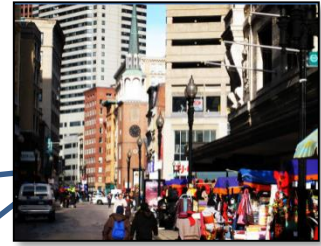
Sensors, IOT
Cameras, ..



Public services,
Govern, Events



Environment,
Water, energy



Shops,
services,
operators



Social Media,
WiFi, Network

Dashboards

Energy Dash

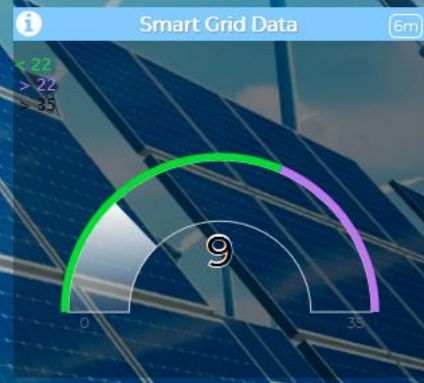
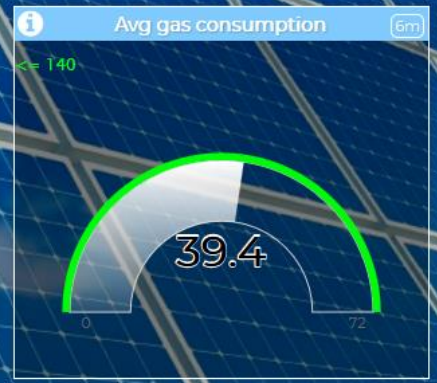
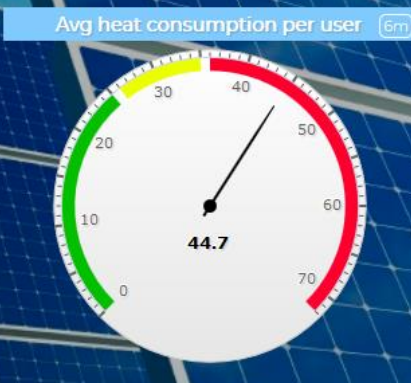
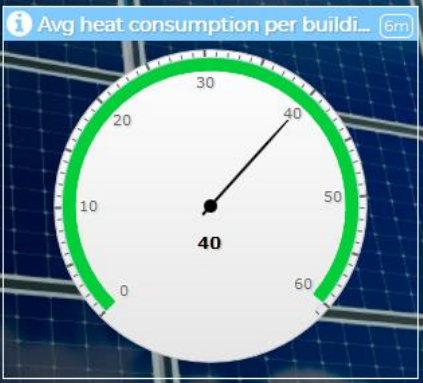
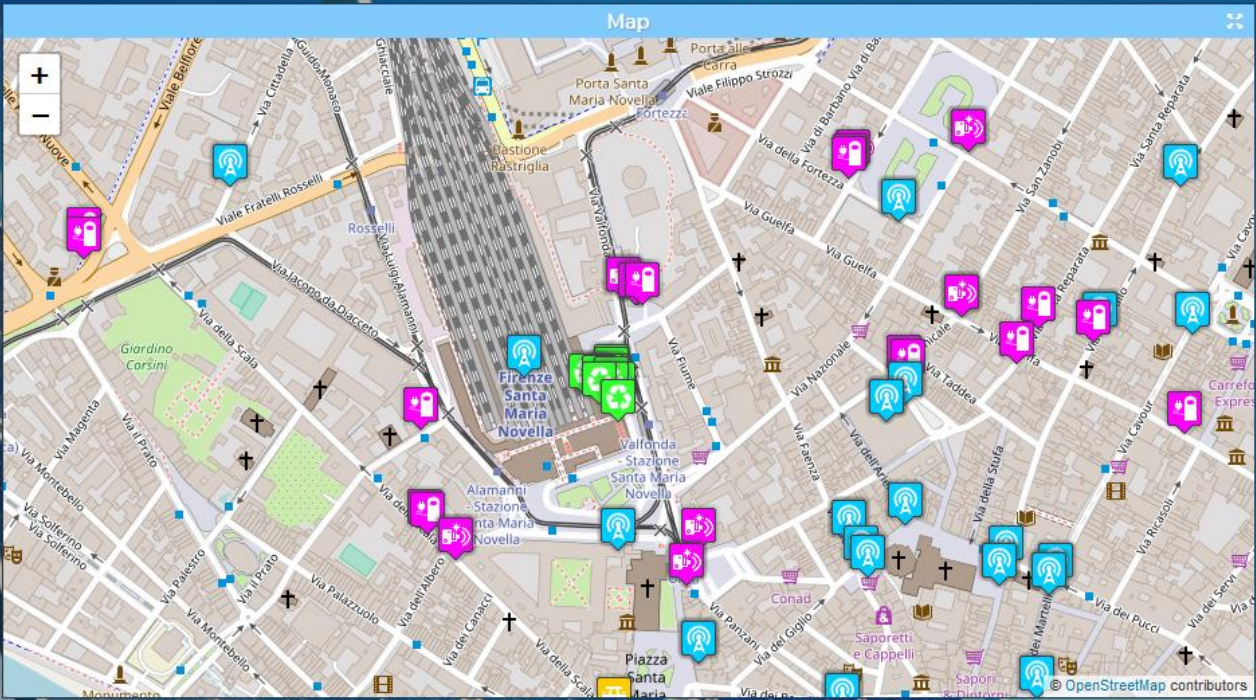
Pilot dashboard



Sun 8 Jul 11:59:06

Selector - Click the icon

- Fast recharging stations
- Florence WiFi POI
- Normal recharging stations
- Smart Benches
- Smart waste
- ZTL gate



Web site status 6m

SNAP4CITY

TOKEN FOUND

2018-07-08 11:51:37



<https://dashboard.km4city.org/view/index.php?iddashboard=MjY1>

<https://www.disit.org/dashboardSmartCity/view/index.php?iddashboard=MjI5>

Municipality Operator Dashboard

Fri 9 Mar 15:52:08

Air Temp
15.5 °C

Recharging
22.8

Web users
27310 N. of users

Traffic Flow reconstruction
2018-03-09 15:52:08

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

Traffic events
INCIDENTI SOLO DANNO ACCIDENTI

RISCHIO
NULO BASSO MEDIO ALTO
RISCHIO IDRAULICO
RISCHIO TEMPORALI
RISCHIO IDROGEOLOGICO
RISCHIO NEVE
RISCHIO GHIACCIO
RISCHIO VENTO
RISCHIO MAREGGIATE

Test api fromTime

Thu 8 Mar 09:18:52

Selector

- Traffic Sensors
- First Aid
- Smart waste
- Meteo sensor in via Bolognese
- Air quality
- Pollination
- Parking Status
- Smart bench
- Bike sharing (Pisa)

Map
METRO759
Last update: 2018-03-08 09:10:00+01:00

Description	Value	Last value	Last 4 hours	Last 24 hours	Last 7 days	Last 30 days
Avg Time	1.635227	Last	Last	Last	Last	Last
Concentration	7.064071	Last	Last	Last	Last	Last
Vehicle Flow	844.0	Last	Last	Last	Last	Last
Average	29.8946	Last	Last	Last	Last	Last

Vehicle Flow - 30 days

<https://www.disit.org/dashboardSmartCity/view/index.php?iddashboard=MjQ2>

<https://www.disit.org/dashboardSmartCity/view/index.php?iddashboard=MjUw>

Monitoring Station for Parking

Sat 10 Feb 19:38:28

Car Park Stazione Binario 16

Car Park Stazione Firenze S.M.N.

Qui Intorno
Tempo reale
Andamento Giornaliero

Parcheggio auto
Abbonamenti: Tesserà a scalare dal valore di 7.120.00 Euro al costo di 7.100.00 "salvo disponibilità, tariffa attivabile esclusivamente con pagamento anticipato. Validità: mese solare, ovvero dal primo all'ultimo giorno del mese solare di riferimento indipendentemente dalla data di acquisto dell'acquisto

Totem Stazione Firenze

Tue 13 Feb 14:44:16

Public Transportation
Fermate

- ISTITUTO VOLTA - STAZIONE VALFONDA
- ISTITUTO VOLTA
- Cimitero Del Pino
- Europa Romania
- Europa Turchia
- Giannotti Piazza Bartoli
- Giannotti Traversari
- Giannotti Bocchi
- Giannotti Gaviana
- Bracciolini Ravenna
- De Sanctis 04

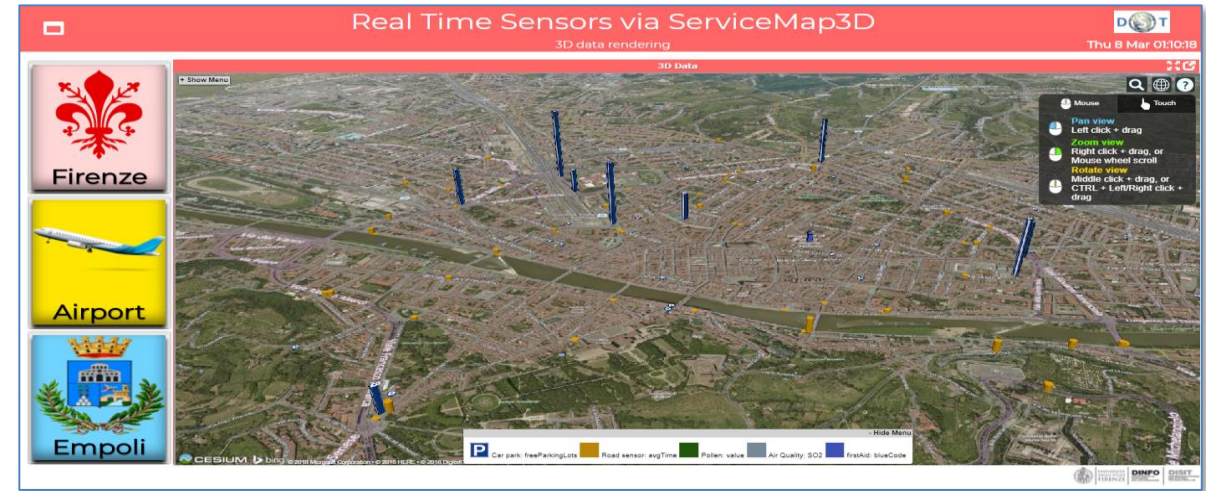
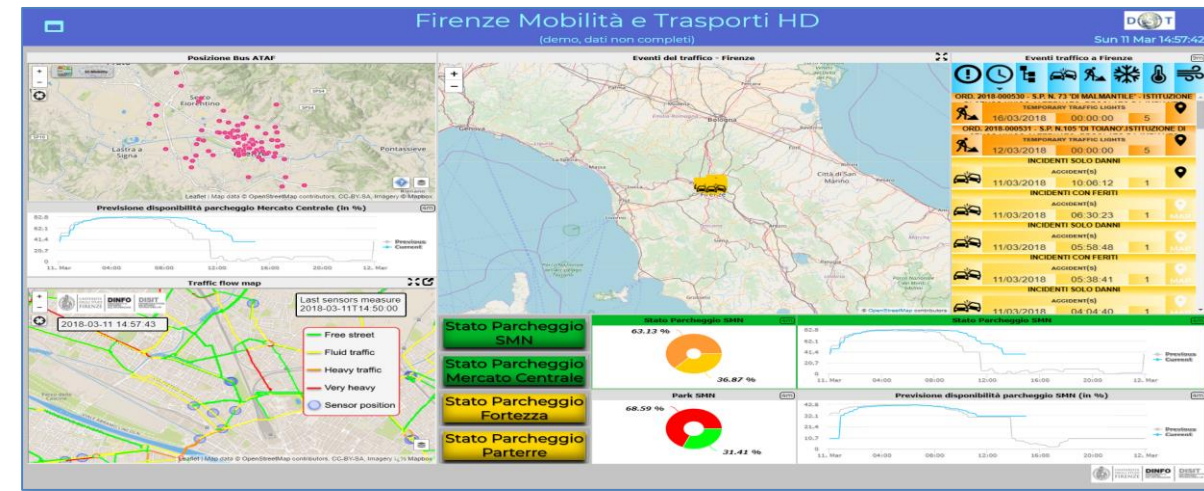
Cultural Activities
Risultati

- Palazzo Dei Congressi
- Palazzo Degli Affari
- Biblioteca Davi
- Il Giglio Circolo Ricreativo Culturale
- Stranemani Internazionali S.R.L.



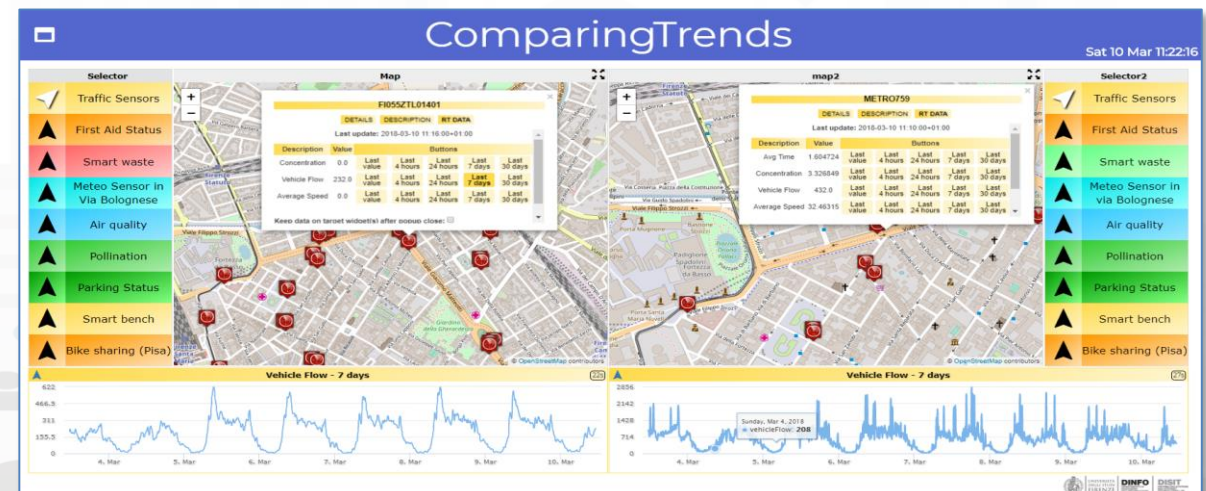
<https://dashboard.km4city.org/dashboardSmartCity/view/index.php?iddashboard=MTE5>

<https://dashboard.km4city.org/view/index.php?iddashboard=MTY2>



<https://dashboard.km4city.org/view/index.php?iddashboard=MjY3>

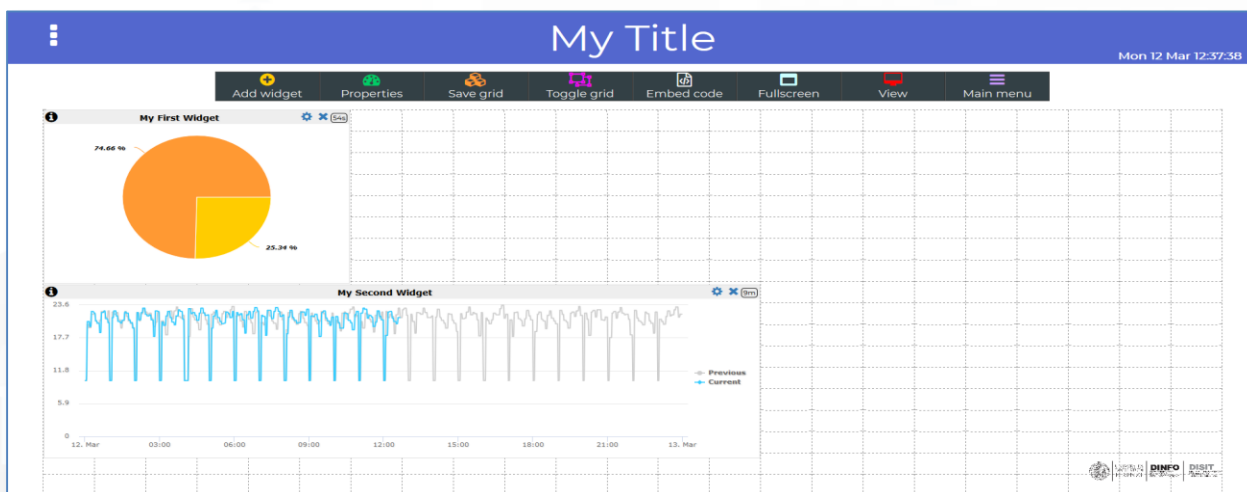
<https://dashboard.km4city.org/view/index.php?iddashboard=MjQ3>



<https://dashboard.km4city.org/view/index.php?iddashboard=MTU1>



<https://dashboard.snap4city.org/dashboardSmartCity/view/index.php?iddashboard=MjY2>



- Grid on the frame to simplify the sizing of dash and widgets
- Spaces among widgets to simplify the reading
- Full set of colour, which can be used more moderately than us 😊

ESB

Alarms

- TEST - ALLUVIONE MUGNONE MAJOR
- ALLUVIONE ARNO COVERCIANO CRITICAL
- ALLUVIONE ARNO VIA PETRIOLO MAJOR
- TEST - SCONTRI ALLO STADIO CRITICAL

Traffic events

- SEVERE ACCIDENT SERIOUS ACCIDENT(S)
- ROAD WORKS ROADWORKS
- ORD 2017-001302 - SP NA*17 A??ALTO VALDARNOA??1ST
- RESTRICTIONS
- INTERVENTO URGENTE PUBBLICACQUA CLOSED AHEAD

Evacuation plans

- PLAN N.1497263867 IN_PROGRESS
- PLAN N.2000000000 PROPOSED
- PLAN N.1497604404 PROPOSED

Tram position

- TRAM1
- TRAM2

Network Analysis

- FM0495 (NORMALIZED) NODE BETWEENNESS: 1.0000
- FM0496 (NORMALIZED) NODE BETWEENNESS: 0.7825
- FM0701 (NORMALIZED) NODE BETWEENNESS: 0.7825

Environment

PROTEZIONE CIVILE

GENERAL METEO

NULLO BASSO MEDIO ALTO

RISCHIO IDRAULICO

RISCHIO TEMPORALI

RISCHIO IDROGEOLOGICO

RISCHIO NEVE

RISCHIO GHIACCIO

RISCHIO VENTO

RISCHIO MAREGGIATE

Pluv. Flore...
24 mm

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

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

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

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%

SMN
65.7%

Fortezza Fi...
37.2%

Mercato Ce...
65.4%

Resources

Planned events

- 1966 - 2016 - LA BELLEZZA SALVATA - PROROGATA FINO AL 2
- ESPLORATE LE BIBLIOTECHE DELL'UNIVERSITA' DI FIRENZE IN
- BIBLIOTECHE DELL'UNIVERSITA' DI FIRENZE IN MOSTRA - PROR

Ambulance...
20 num.

Voluntiers
33 num.

Florence main first aids status

Priority	Red code	Yellow code	Green code	Blue code	White code
PS SANTA MARIA NUOVA	1	7	14	1	0
PS SAN GIOVANNI DE' DEI TORREGGIALLI	2	10	24	2	
PS AD CARREGGI	10	27			
PS SANTA MARIA ANNUNZIATA	2				

TRENDS QUOTES

#FIRENZE

- #NEWS #FIRENZE
- #FIRENZE #FIFIUTI
- #UFFIZI
- #PONTEVEGGHIO
- #BARGELLO
- #AEROPORTO #FIRENZE
- #DUOMO #FIRENZE
- #VIAGGI #FIRENZE
- #CRONACA #FIRENZE

TRENDS QUOTES

- @MUSEOFIRENZE
- @COMUNEFI
- @NAZIONE_FIRENZE
- @PROTCIVCOMUNEFI
- @UNI_FIRENZE
- @HUBFIRENZE
- @NOVEDAFIRENZE
- @ILSITO

TV-RT Firenze

Twitter Vigilance Real Time Dashboard

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

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

Channel sentiment analysis

Sentiment trends in channel Firenze

Most Significant Tweets for Sentiment

Last tweets per channel Firenze

Firenze Wi-Fi - Access Points Clusters Coverage Map

Firenze - Wednesday June 21 2017 12:49:12

Firenze Wi-Fi - APs Streaming Realtime

Firenze - Wednesday June 21 2017 12:49:12

<http://dashboard.km4city.org/dashboard?idashboard=MT15>

Smart City Dashboard



Horizon 2020
European Union Funding
for Research & Innovation

Firenze

43 1903, 11/2000

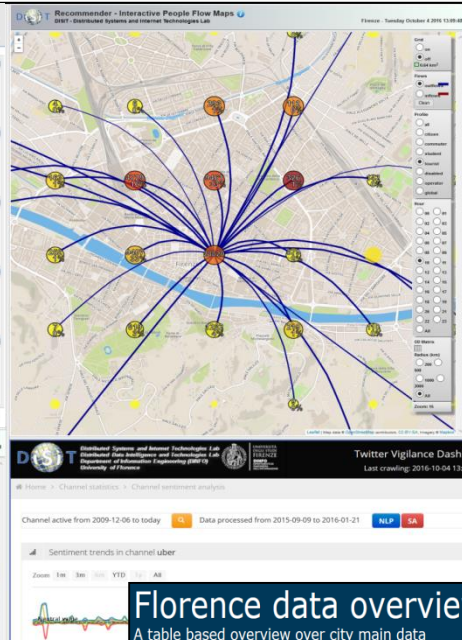
Smart City Engine: 42.4% (CPU: 58.7, RAM: 4863, DAILY JOBS: 55.4%)

Real-time position ATAP bus: 24 (55.4%)

Smart City Engine: 26%

Twitter Vigilance

Recommender - Heatmap and Trajectories Clusters (User Profile: All)



FirenzeWifi

1948 Usati FWIFI

2822 Eventi FWIFI

222 Usati FWIFI (weekby)

Usati FWIFI (mensile)



Energy (demo)

ServiceMap, SmartDS

Q1: 2078 GW, Q2: 446 GW, Q3: 138 GW, Q4: 2078 GW

Active wind turbines: 57.6%

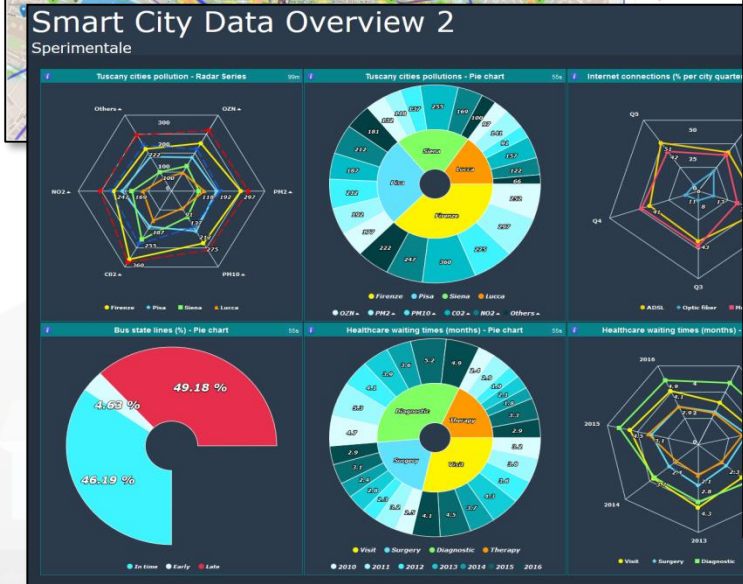
Charging columns map

City consumption: 0 GW

Free charging rods: 17 cols

City consumption trend

Free bike c...: 26%, Free car ch...: 100%, Energy fro...: 81.6%



Florence data overview

A table based overview over city main data

Wed 18 Jan @ 19:10:10

Air Quality Index					Weather stations				Citizens satisfaction index								
Substances	OZ ₃	PM _{2.5}	PM ₁₀	CO ₂	NO ₂	Stato	Wind speed (km/h)	Direction	Temperature (°C)	Humidity (%)	Rain today (mm)	Pressure (mbar)	Water	Quality (%)	Cost (%)	Availability time (%)	Emergency handling (%)
Q1	120	41	105	36	4	Sesto Fiorentino	50	N	12	0	0	922	92	67	95	42	
Q2	33	25	66	123	45	Livorno	65	NE	17	0	0	876	36	29	27	31	
Q3	225	153	342	193	217	Grosseto	78	E	4	22	0	1022	77	64	58	62	
Q4	174	221	87	122	93	Vado	42	S	6	0	34	895	28	42	27	25	
Q5	79	87	23	27	65	Follonica	102	N	7.2	23	0	913	72	61	23	56	
						Cigliolo	97	O	3	19	0	957	43	54	38	36	

Categories	Total arrivals	Overights	Day triggers	Free	Paid	Winter	Spring	Summer	Autumn
Allypne	56	36	20	7	23	6	10	4	10
Train	122	81	41	4	16	3	7	6	4
Car	215	133	82	60	140	15	100	50	35
Bus	157	110	47	0	0	0	0	0	0
Crabe	0	0	0	7	7	2	6	2	4
Boat	0	0	0	35	15	10	22	9	9
Total	550	360	190	30	42	8	25	30	9

Cross widget interaction 1

Artistical events, traffic events, city cams



Tu 18:50:21

Artistical and recreative events

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

Unexplored treasures.
Florence University Libraries on display
LINKED OPEN GRAPH
Tipology: Event

Artistical and recreative events - Others

Cam Duomo	Cam Piazzale	Cam Signoria	Cam Trinita
-----------	--------------	--------------	-------------

City webcams - 1

Traffic events

ALL ON MAP | SHOW ON MAP

- 14:21:55
INCIDENTE IN FIRENZE, VIALE EUROPA
06/06/2017
- 13:43:23
INCIDENTE
06/06/2017
- 13:38:00
MATERIALE OLE
06/06/2017
- 13:20:00
INCIDENTE IN FIRENZE, VIA...
06/06/2017

Traffic events

Traffic events - Slippery roads & others

Cam P.Vecchio	Cam S.Croce	Cam Repubbli.	Cam Fortezza
---------------	-------------	---------------	--------------

City webcams - 2

<http://dashboard.km4city.org/dashboardSmartCity/view/index.php?pidashboard=MT10>

First aids overview - Tuscany

Service status of main first aids

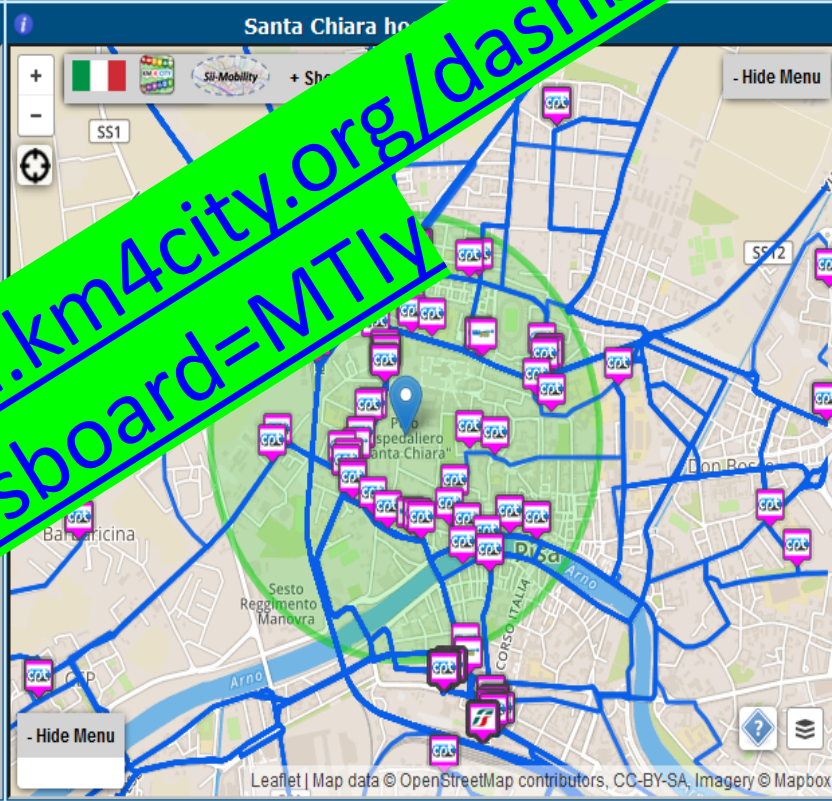
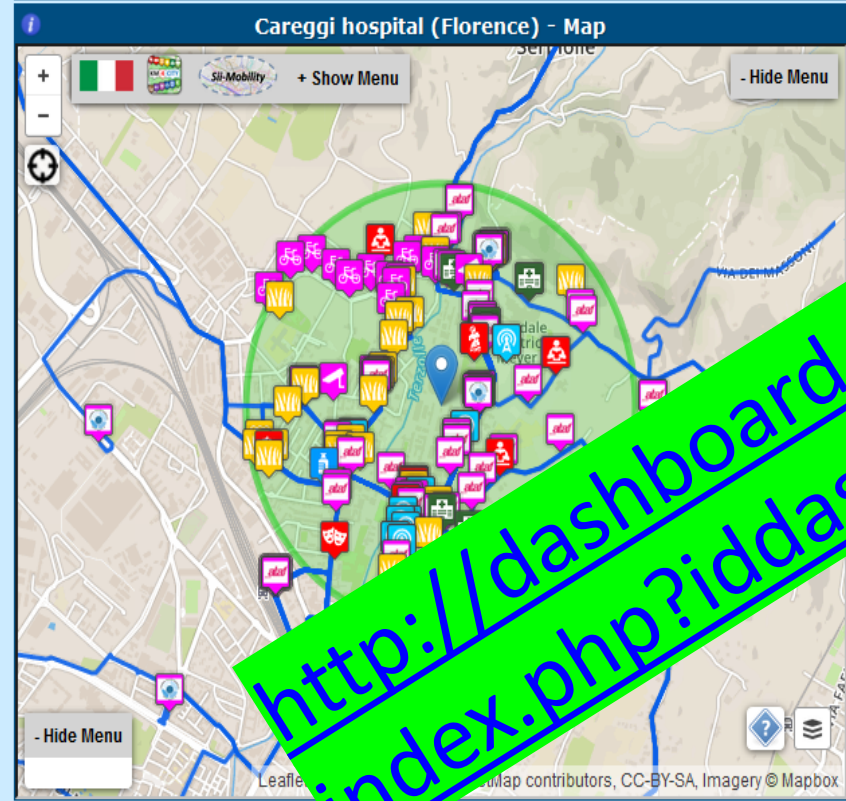


ay @ 11:00:34

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
Totals	6	34	32	5	0

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

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
Totals	2	26	14	5	0

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



Firenze

43.7693, 11.2560

Wed 9 Nov @ 23:36:04



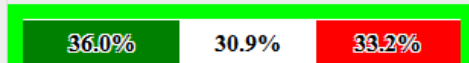
Wifi operativi

9 min



SmartDS: via Santa Marta 3

9 min



Informazioni disponibili

9 min

Servizi attivi su Firenze 23452

Eventi del giorno a Firenze 2173

Open Data disponibili 138

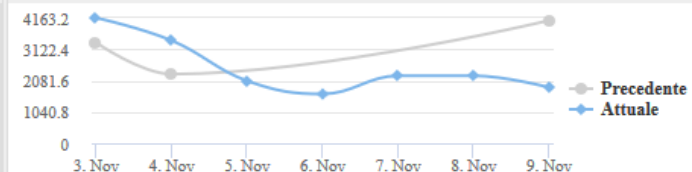
42.4%

Servizi du...

9 min

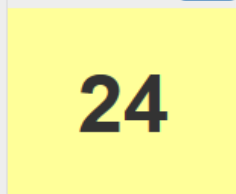
Accessi ai servizi singoli (web e mobile)

31 sec



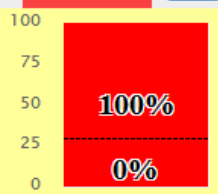
Bus Attivi

29 sec



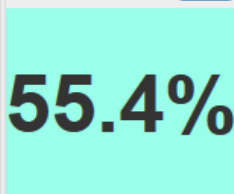
Ataf RT

30 sec



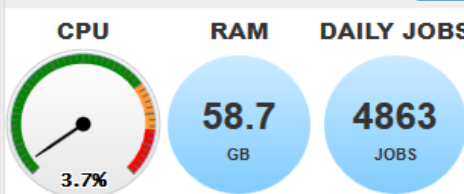
Parcheggi...

29 sec



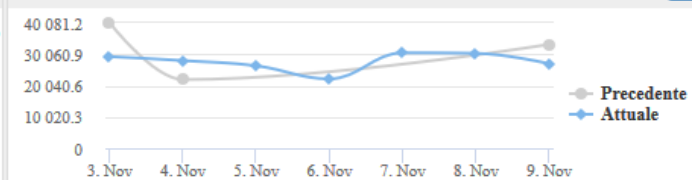
Smart City Engine

30 sec

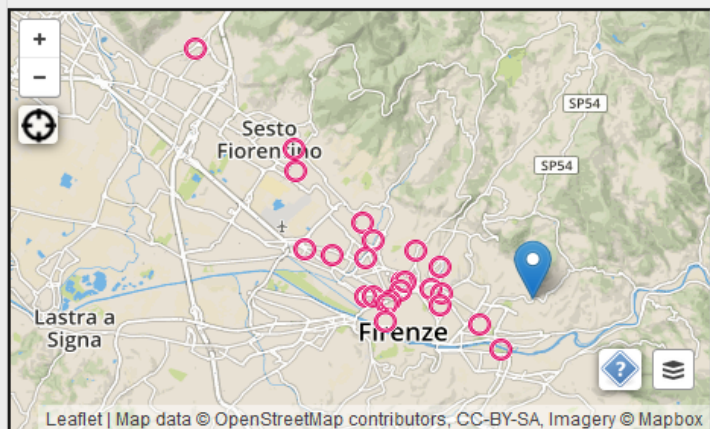


Rilievi wifi

9 min

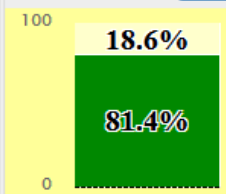


Real time position ATAF bus



Sensori RT

29 sec



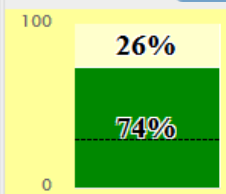
Previsioni meteo: FIRENZE

359 min



Parcheggi...

30 sec



Twitter Trends/citazioni

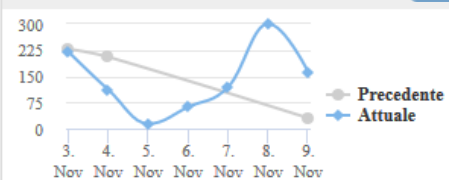
30 sec

PRINCIPALI TREND TWITTER:
 #FIRENZE
 #FIORENTINA
 #UFFIZI

CITAZIONI:

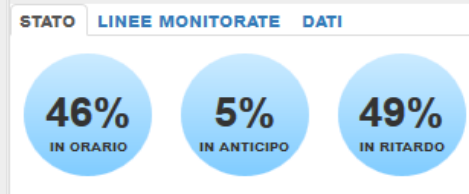
Query Servicemap

31 sec



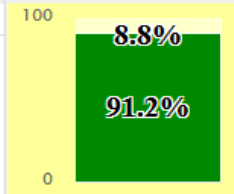
Stato linee ATAF

29 sec



Previsioni...

30 sec



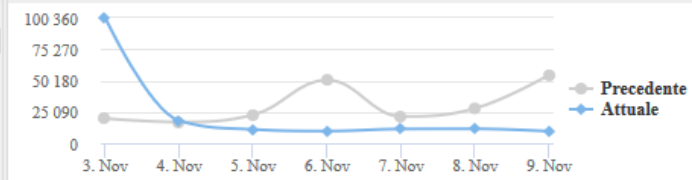
Elenco eventi del giorno

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



Servizi agli Utenti

Firenze (sperimentale)

Tue 17 Jan @ 19:52:49



Recenti #hashtag più utilizzati

TRENDS QUOTES

- #FIRENZE
- #NEWS #FIRENZE
- #UFFIZI

Citazioni di Firenze frequenti...

TRENDS QUOTES

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

Eventi a Firenze oggi

- 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 PROSPERITÀ 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

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

STATO LINEE MONITORATE DATI

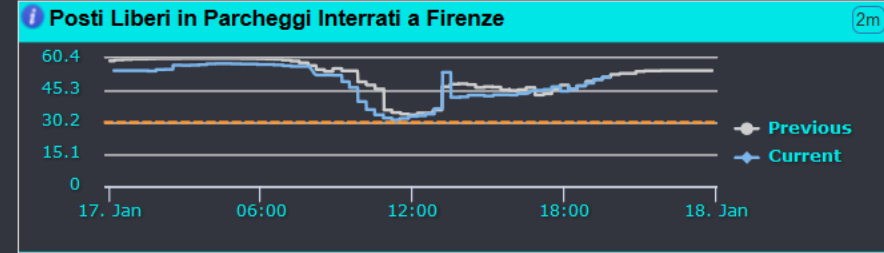
- 46% IN ORARIO
- 5% IN ANTICIPO
- 49% IN RITARDO

Previsioni del tempo a Firenze

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

Posti Liberi

51.5%



Firenze

43.7693, 11.2560

42.4%

24

55.4%

3.7%

18.6%

26%

99%

6.8%

21.2%

200

100

0

0

100

200

300

400

500

600

700

800

900

1000

1100

1200

1300

1400

1500

1600

1700

1800

1900

2000

2100

2200

2300

2400

2500

2600

2700

2800

2900

3000

3100

3200

3300

3400

3500

3600

3700

3800

3900

4000

4100

4200

4300

4400

4500

4600

4700

4800

4900

5000

5100

5200

5300

5400

5500

5600

5700

5800

5900

6000

6100

6200

6300

6400

6500

6600

6700

6800

6900

7000

7100

7200

7300

7400

7500

7600

7700

7800

7900

8000

8100

8200

8300

8400

8500

8600

8700

8800

8900

9000

9100

9200

9300

9400

9500

9600

9700

9800

9900

10000

SmartCity Processes

Fri 4 Nov @ 18:51:20

- ATAP: RUNNING, SUCCESS
- PARK: FAILED, SUCCESS
- METEO: SUCCESS
- SENSORI: SUCCESS
- TWITTER: SUCCESS
- FI WIFI: SUCCESS

Florence data overview

A table based overview over city main data

Wed 18 Jan @ 19:19:10

Air Quality Index 39s						Weather stations 39s						Citizens satisfaction index 39s					
Substances / Quarters	OZN	PM2	PM10	CO2	NO2	Data / Station	Wind speed (km/h)	Direction	Temperature (°C)	Humidity (%)	Rain today (mm)	Pressure (mbar)	Criteria / Services	Quality (%)	Cost (%)	Availability time (%)	Emergency handling (%)
Q1	120	41	165	36	4	Sesto Fiorentino	50	N	32	32	0	922	Water	92	67	95	42
Q2	33	25	66	123	45	Livorno	65	NE	37	37	0	876	Public transportation	36	29	27	31
Q3	225	153	342	193	217	Grosseto	78	E	4	22	0	1022	Public safety	77	64	58	62
Q4	174	221	87	122	93	Vada	42	S	6	0	34	895	Roads management	28	42	27	25
Q5	79	87	23	27	65	Follonica	102	N	7.2	23	0	913	Healthcare	72	64	23	56
						Giglio	97	O	3	19	0	957	Welfare	43	51	38	36
													Public administration	58	16	18	22

Tourists flow 39s				Florence events 2017 overview 39s						
Categories / Vehicle	Total arrivals	Overnights	Day trippers	Fields / Categories	Free	Paid	Winter	Spring	Summer	Autumn
Airplane	56	36	20	Classical music, opera, ballet	7	23	6	10	4	10
Train	122	81	41	Exhibitions	4	16	3	7	6	4
Car	215	133	82	Guided tours	60	140	15	100	50	35
Bus	157	110	47	Film festival	0	0	0	0	0	0
Cruise	0	0	0	Markets, fairs	7	7	2	6	2	4
Boat	0	0	0	Readings, conferences	35	15	10	22	9	9
Total	550	360	190	Contemporary music	30	42	8	25	30	9
				Sport	20	192	55	104	27	26

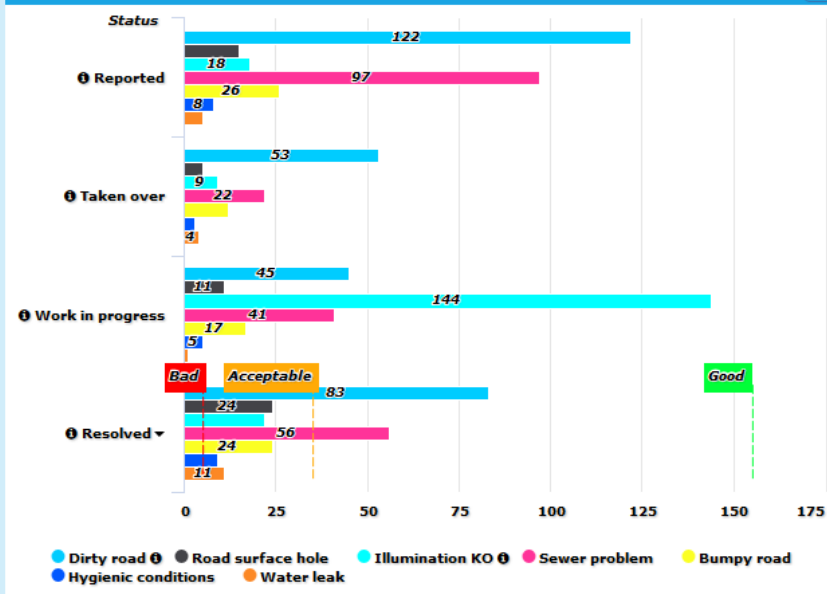
Smart City Data Overview



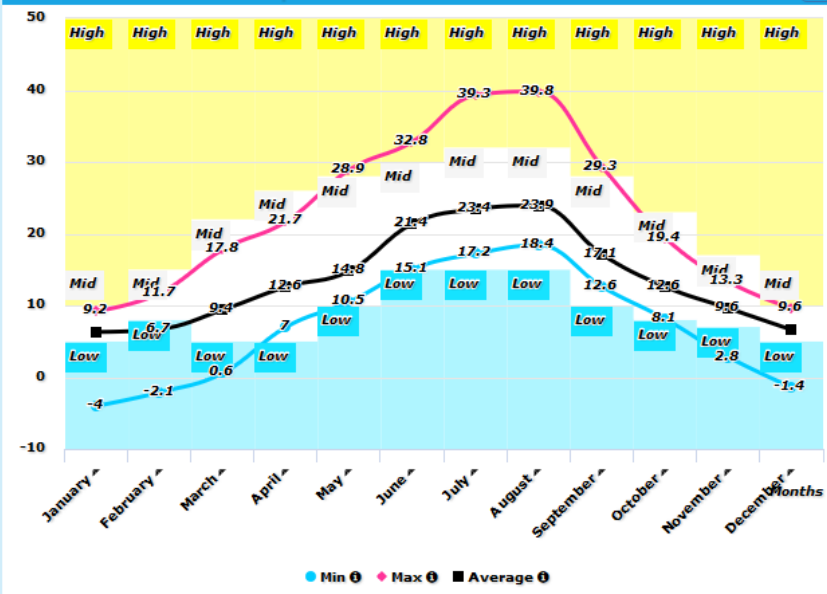
Thu 16 Mar @ 02:23:38

Sperimentale

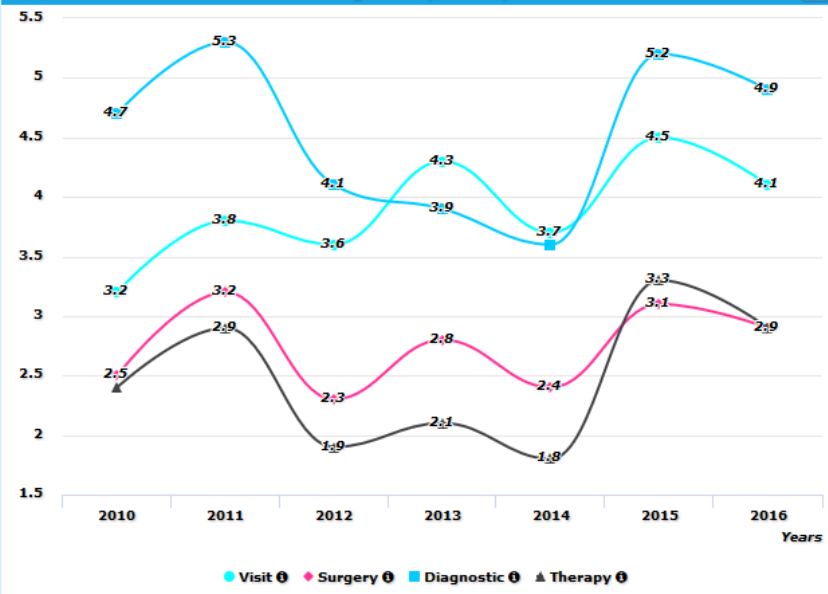
Urban faults - Horizontal bar series



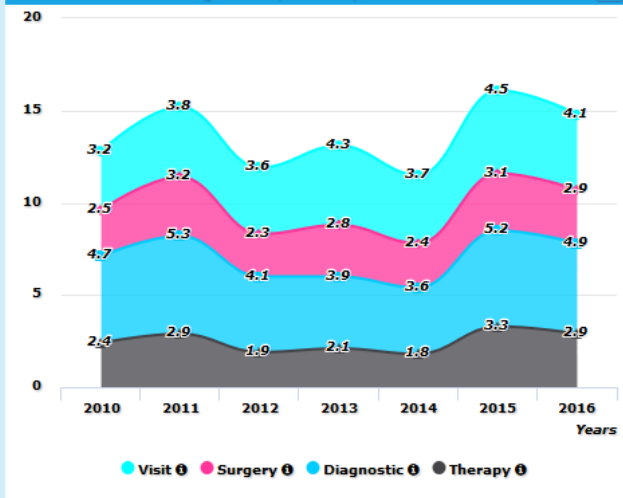
2016 Temperature statistics - Curved line series



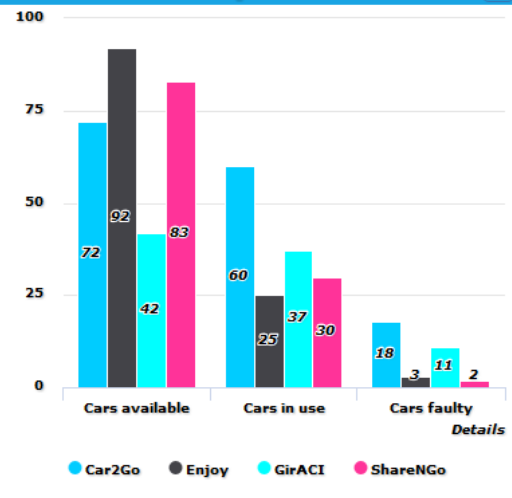
Healthcare waiting times (months) - Curved lines



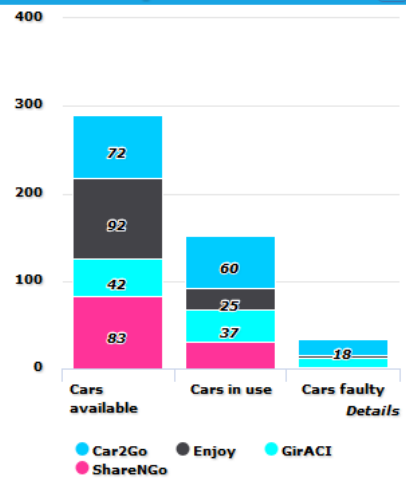
Healthcare waiting times (months) - Stacked curved area



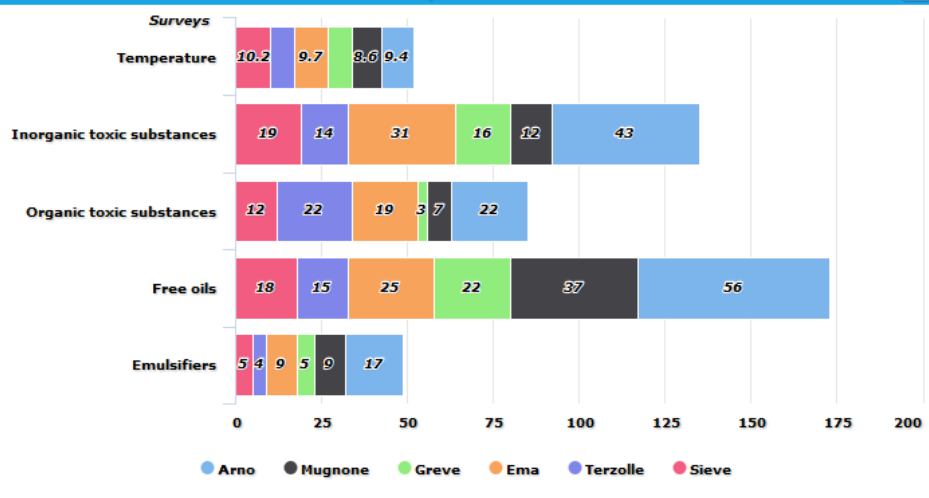
Car sharing - Vertical bars



Car sharing - Vertical stacked bars



Rivers water analysis - Horizontal stacked bars

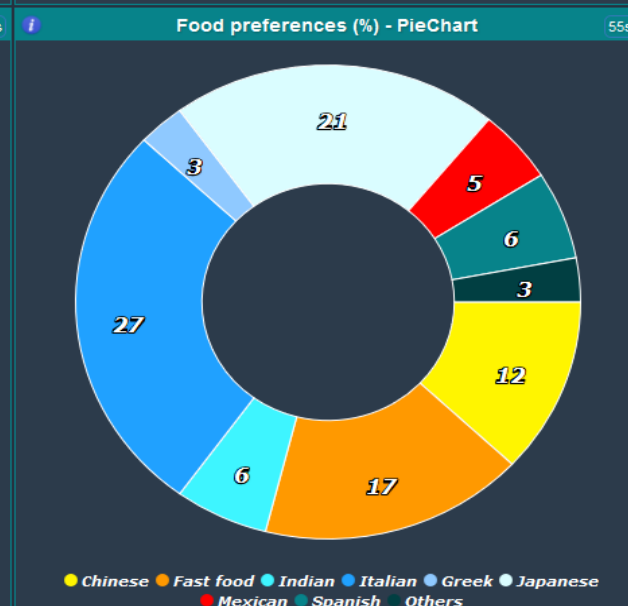
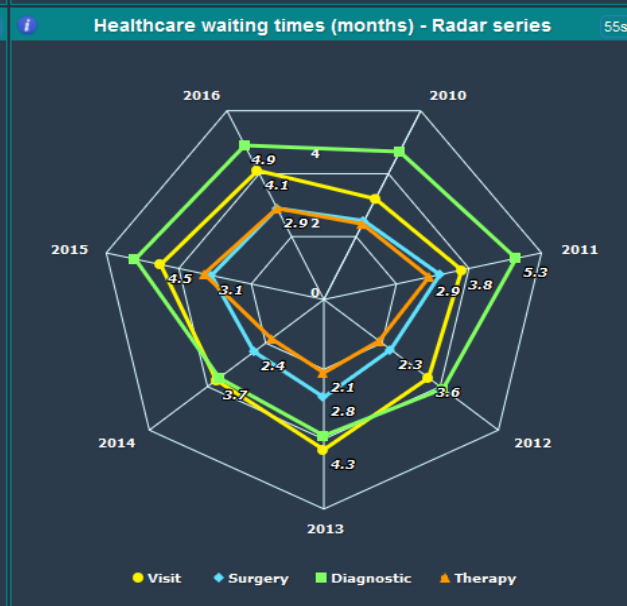
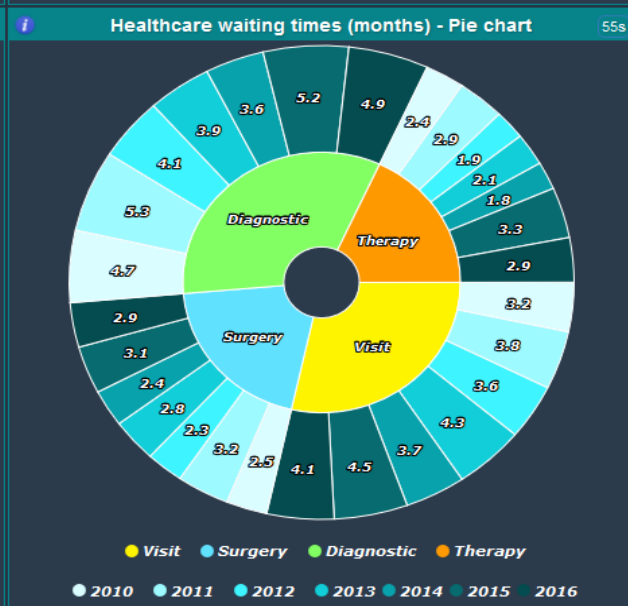
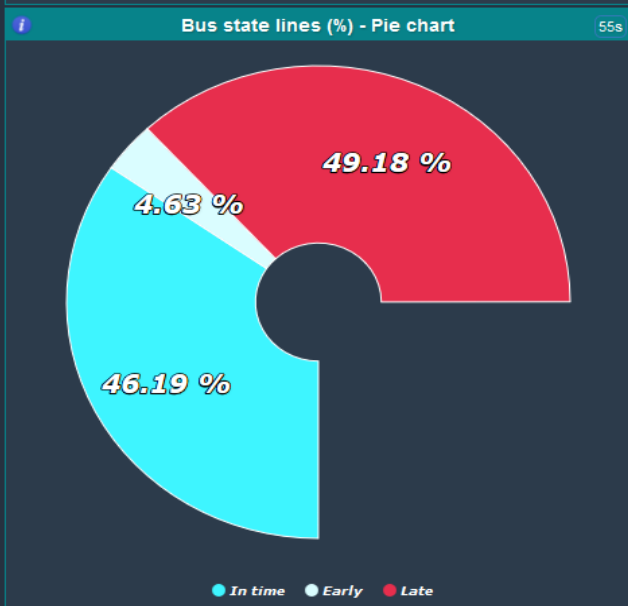
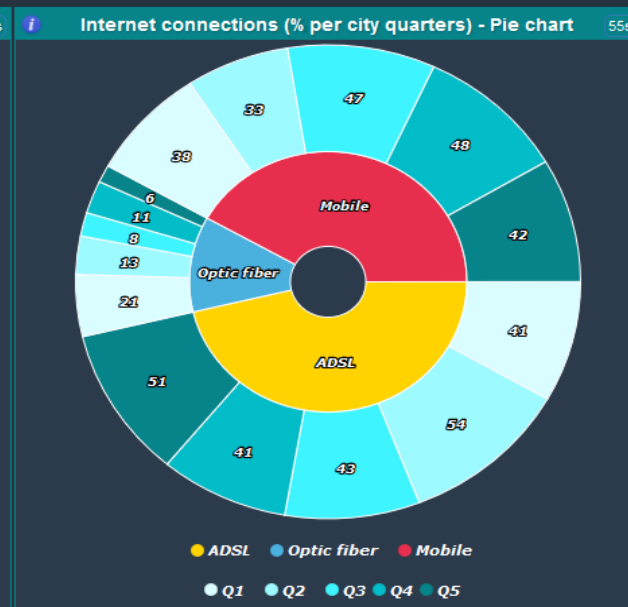
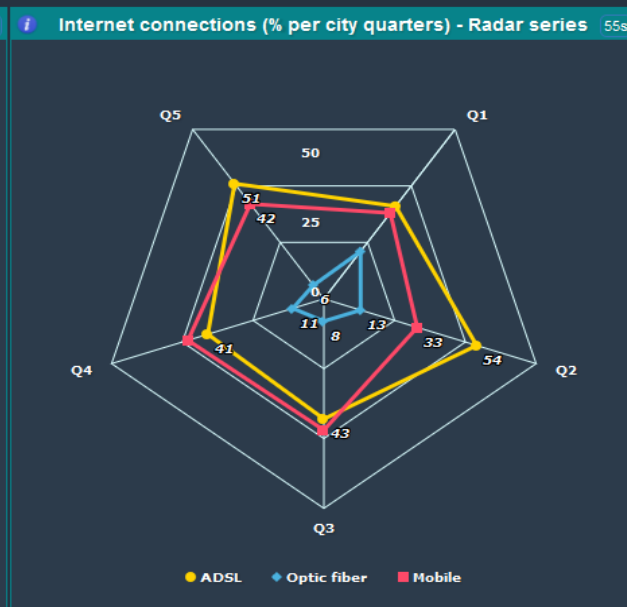
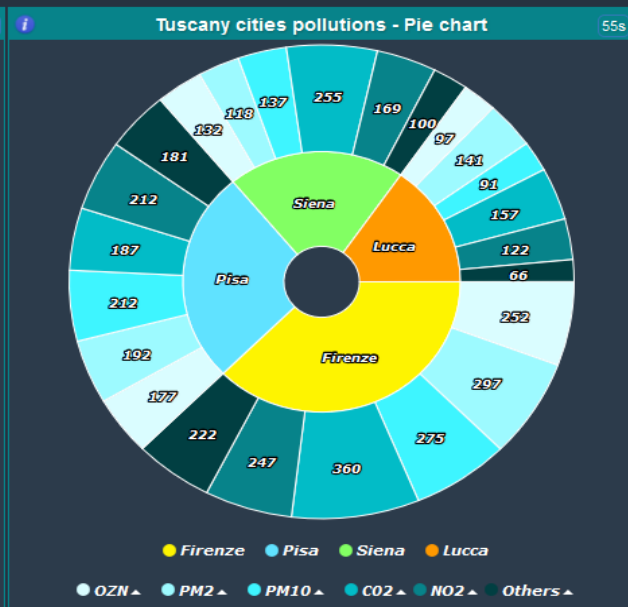
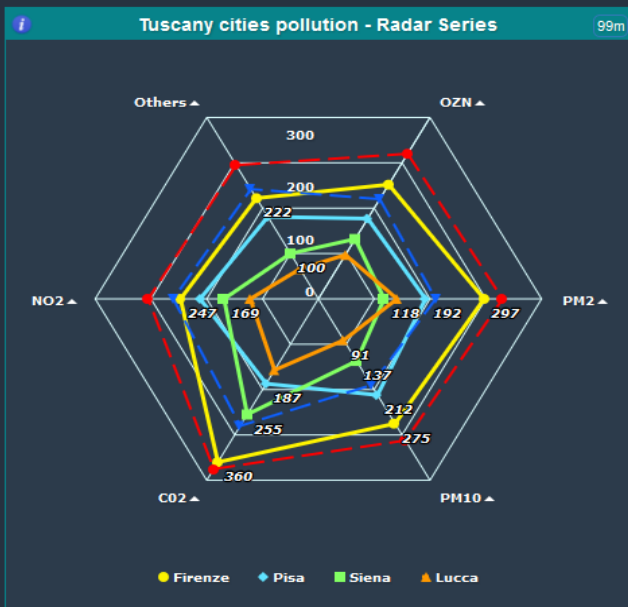


Smart City Data Overview 2



Sperimentale

Thu 16 Mar @ 02:24:52



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>

Real Time Sensors via ServiceMap3D



Fri 26 Jan 00:23:19

3D data rendering



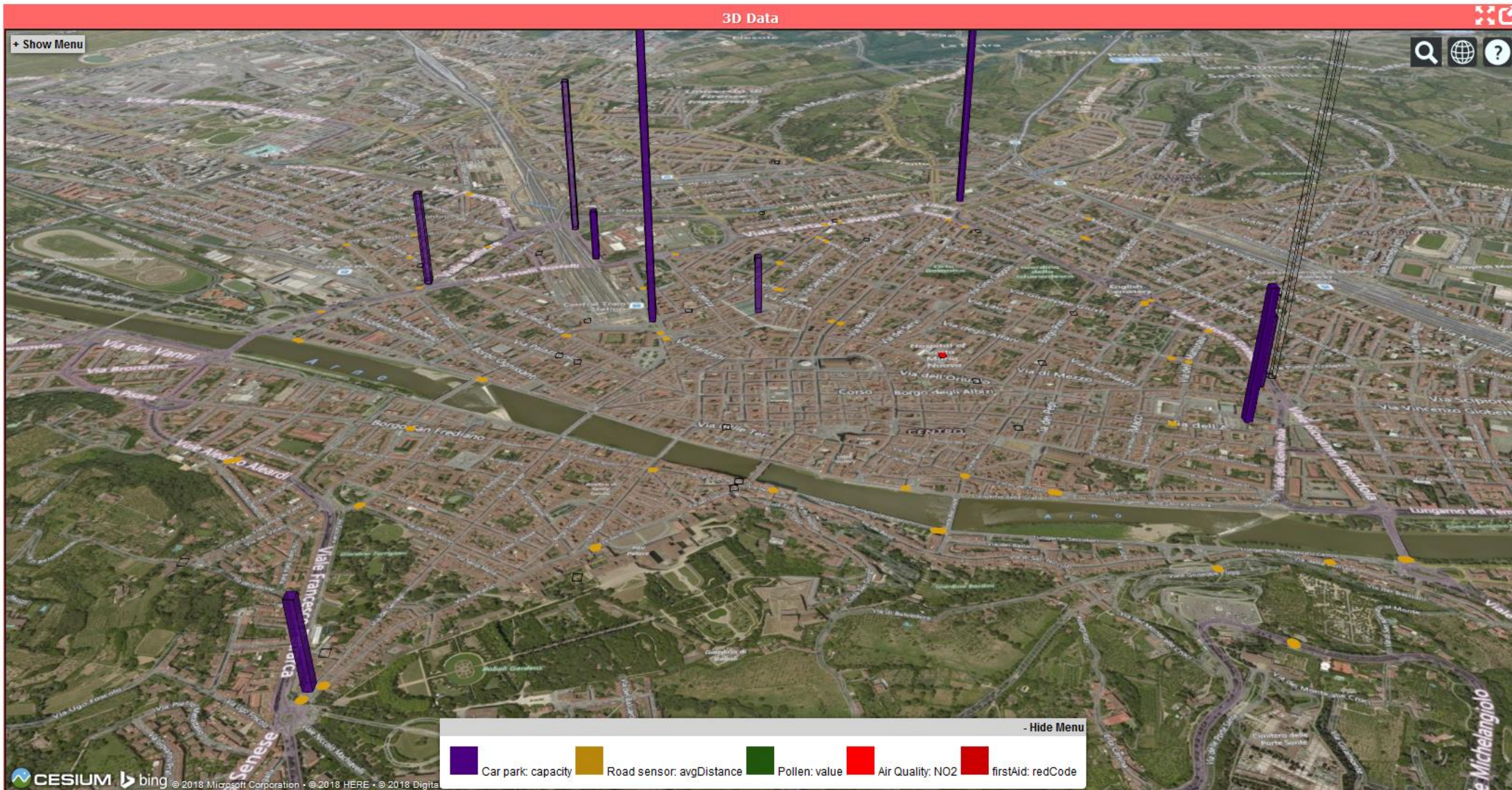
Firenze



Airport



Empoli



- Click POI of interest below
- Fast recharging stations
- Normal recharging stations
- Cycle paths
- Public transport paths (F)
- Restricted traffic areas
- Parking status
- Variable Message Signs

Traffic events

05/02/2018 07:44:07 1 MAP

ORD. 2018-000257 - S.P. N. 56 'DEL BROLLO E POGGIO ALLA ...' ISTITUZIONE DI UN SENSO UNICO ALTERNATO

TEMPORARY TRAFFIC LIGHTS

05/02/2018 00:00:00 5

ORD. 2018-000222 - S.P. 503 'DEL PASSO DEL GIOGO'.ISTITUZIONE DI SENSO UNICO ALTERNATO, REGOLATO DA LUMINARI

TEMPORARY TRAFFIC LIGHTS

04/02/2018 00:00:00 5

ORD. 2018-000252 - S.P. 10 'VAL D'EL SA'.CHIUSURA TOTALE AL TRAFFICO VEICOLI ADIUTANTI SENSO UNICO ALTERNATO

BLOCKED AHEAD

POI Map

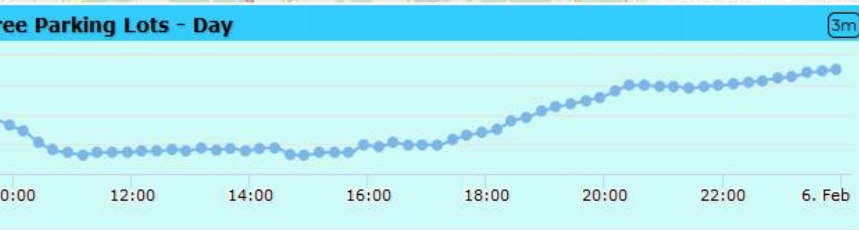
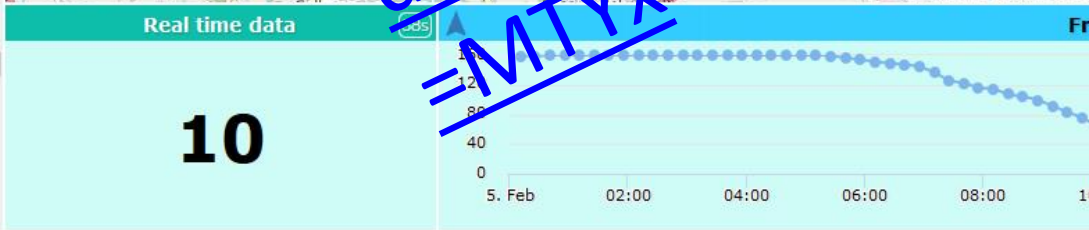
PARCHEGGIO STAZIONE BINARIO 16

DETAILS DESCRIPTION RT DATA

Last update: 2018-02-05 23:56:03+01:00

Description	Value	Buttons		
Capacity	165	Last	4 Hours	Day
Free Parking Lots	141	Last	4 Hours	Day
Occupied Parking Lots	24	Last	4 Hours	Day

Traffic events - Map



<http://dashboard.km4city.org/dashboard>
dsmartCity/view/index.php?iddashboard=MTYx



Map Rivers | Map minor reticulum | Map Meteo stations

Rivers sensors (F) | Minor reticulum sensors (F) | Meteo stations (F)

Map

COOPERATIVA SOCIALE SERVIZI AUTO POSTEGGI CUSTODITI FIRENZE

DETAILS | DESCRIPTION | RT DATA

Last update: 2017-01-18 14:25:00+01:00

Description	Value	Buttons
Capacity	80	Last 4 Hours Day
Free Parking Lots	32	Last 4 Hours Day
Occupied Parking Lots	48	Last 4 Hours Day
Occupancy	60	Last 4 Hours Day

Weather forecast - Florence

Powered by LaMMA

Tue 6 Feb
Firenze
Overcast

5°C / 12°C

Wed 7 Feb 4°C / 10°C Light rain	Thu 8 Feb 5°C / 10°C Light rain	Fri 9 Feb Temp N/A cloudy	Sat 10 Feb Temp N/A Bit cloudy
---------------------------------------	---------------------------------------	---------------------------------	--------------------------------------

N. of App users

42
N. of users

River sensor value

42 m.s.z.l.

River sensor values trend



Public building sensors

10 / 43

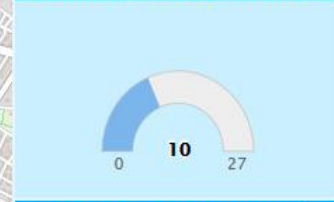
Occupied Parking Lots - 4 Hours



Annual Energy consu...

10 / 27

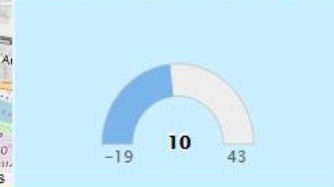
Annual Energy consumption trend - Florence



Public Photovoltaic p...

10 / 43

Public Photovoltaic plants trend



<http://dashboard.km4city.org/dashboard?rdSmartCity/view/index.php?id=MTU3>

Points of interest - 1	Points of interest - 2	Points of interest - 3
▲ Rivers sensors (D)	▲ Minor reticulum sensors (F)	▲ Asphalt temperature
▲ Underpasses	▲ Variable Message Signs	▲ Public transport paths (F)

Meteo forecast - Florence

Powered by LaMMA

Tue 6 Feb
Overcast

5°C / 12 °C

Wed 7 Feb 4°C / 10°C Light rain	Thu 8 Feb 5°C / 10°C Light rain	Fri 9 Feb Temp N/A Cloudy	Sat 10 Feb Temp N/A Bit cloudy
---------------------------------------	---------------------------------------	---------------------------------	--------------------------------------

Map

SENSORE BOLOGNESE - METEO E STRADA

DETAILS DESCRIPTION RT DATA

Last update: 2018-02-05 13:59:00+01:00

Description	Value	Buttons
Air Temperature	12.02	Last 4 Hours Day
Air Humidity	54.897	Last 4 Hours Day
Pressure	1006.589	Last 4 Hours Day
Wind Speed	0.341	Last 4 Hours Day

Traffic events in Florence

Icon	Date	Time	Count
Accident	05/02/2018	11:22:44	1
Accident with injuries	05/02/2018	13:22:10	1
Accident with injuries	05/02/2018	13:27:27	1
Accident with injuries	05/02/2018	10:04:34	1

PROTEZIONE CIVILE

GENERAL METEO

NULLO	BASSO	MEDIO	ALTO

Air Temperature

12

Air Temperature - Day

First aids - Florence

Priority\ Hospitals	Red code	Yellow code	Green code	Blue code	White code
PS AO CAREGGI	5	36	37	6	0
PS SANTA MARIA NUOVA	0	6	17	2	0
PS SANTA MARIA ANNUNZIATA	0	6	15	8	0

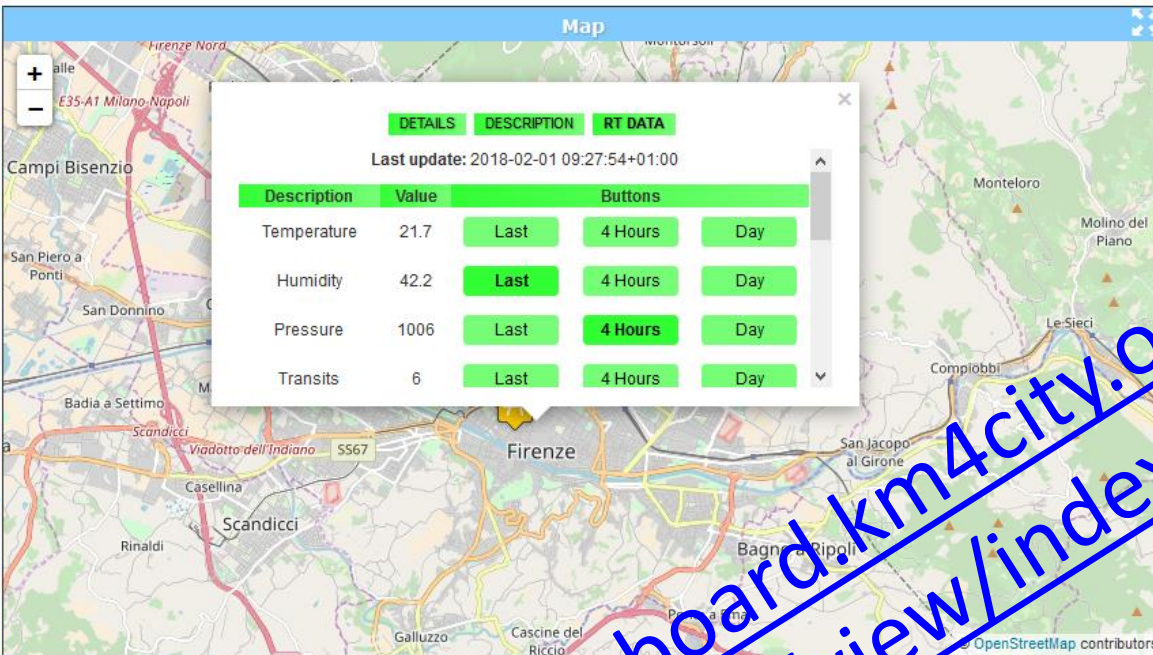
Chat

http://dashboard.km4city.org/dashboardSmartCity/view/index.php?id_dashboard=MTYz



Select the data below

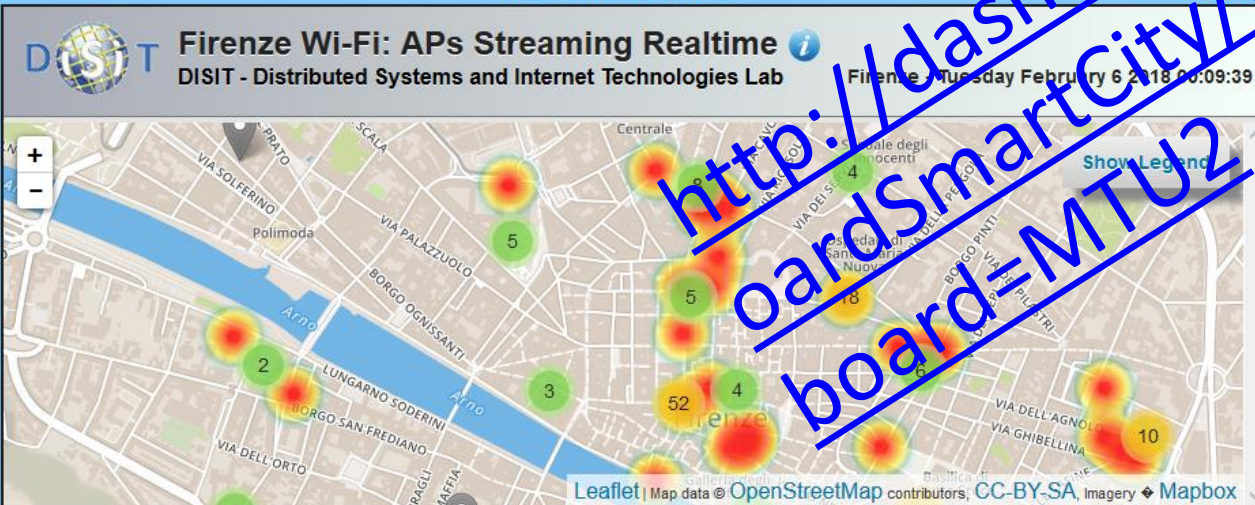
- Fast recharging stations
- Normal recharging stations
- Smart Benches**
- Smart Lights (F)
- Smart Irrigation (F)
- ZTL gate
- Smart waste
- Florence WiFi POI



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



Firenze Wi-Fi RealTime



<http://dashboard.km4city.org/dashb>
boardsmartcity/view/index.php?id=as
board-MTU2

Trasporti a Firenze

Servizi: 9 su 9 disponibili

Piazza Di San Marco

Servizi: 1 su 1 disponibili

Orario	Linea	Direzione
00:31:00	11	Salviatino
2018-02-06		
00:31:00	6	Novelli
00:32:00	4	Cappuccini
2018-02-06		
00:36:00	17	Verga Tozzi
2018-02-06		
00:43:00	14	Il Girone
2018-02-06		
01:04:00	25	La Pira
2018-02-06		
01:11:00	6	Novelli
2018-02-06		
01:17:00	14	Il Girone
2018-02-06		
01:18:00	7	Verga Tozzi
2018-02-06		
05:28:00	23	Sorgane
2018-02-06		

previsioni

Powered by LaMMA

Firenze
Overcast

Wed 7 Feb
4°C / 10°C
Light rain

Thu 8 Feb
6°C / 10°C
Light rain

Fri 9 Feb
Temp N/A
Cloudy

Sat 10 Feb
Temp N/A
Bit cloudy

5°C / 12°C

Cycling

Risultati

Percorsi Ciclabili.148
Ciclopercorsi
167 m

MicroApplications

<http://www.disit.org/dashboardM-artCity/view/index.php?iddashboard=MjE0>



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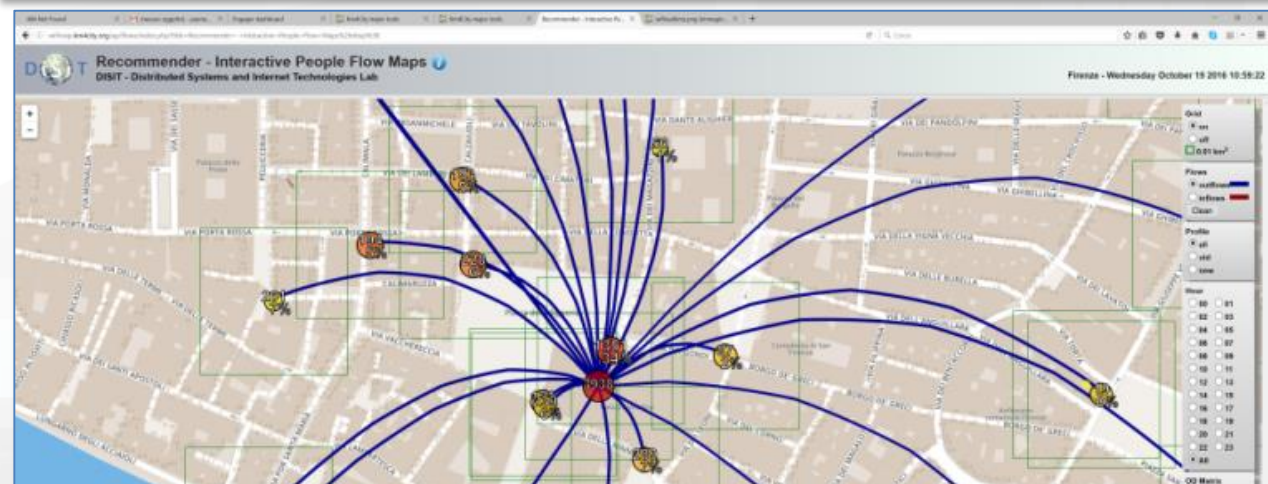
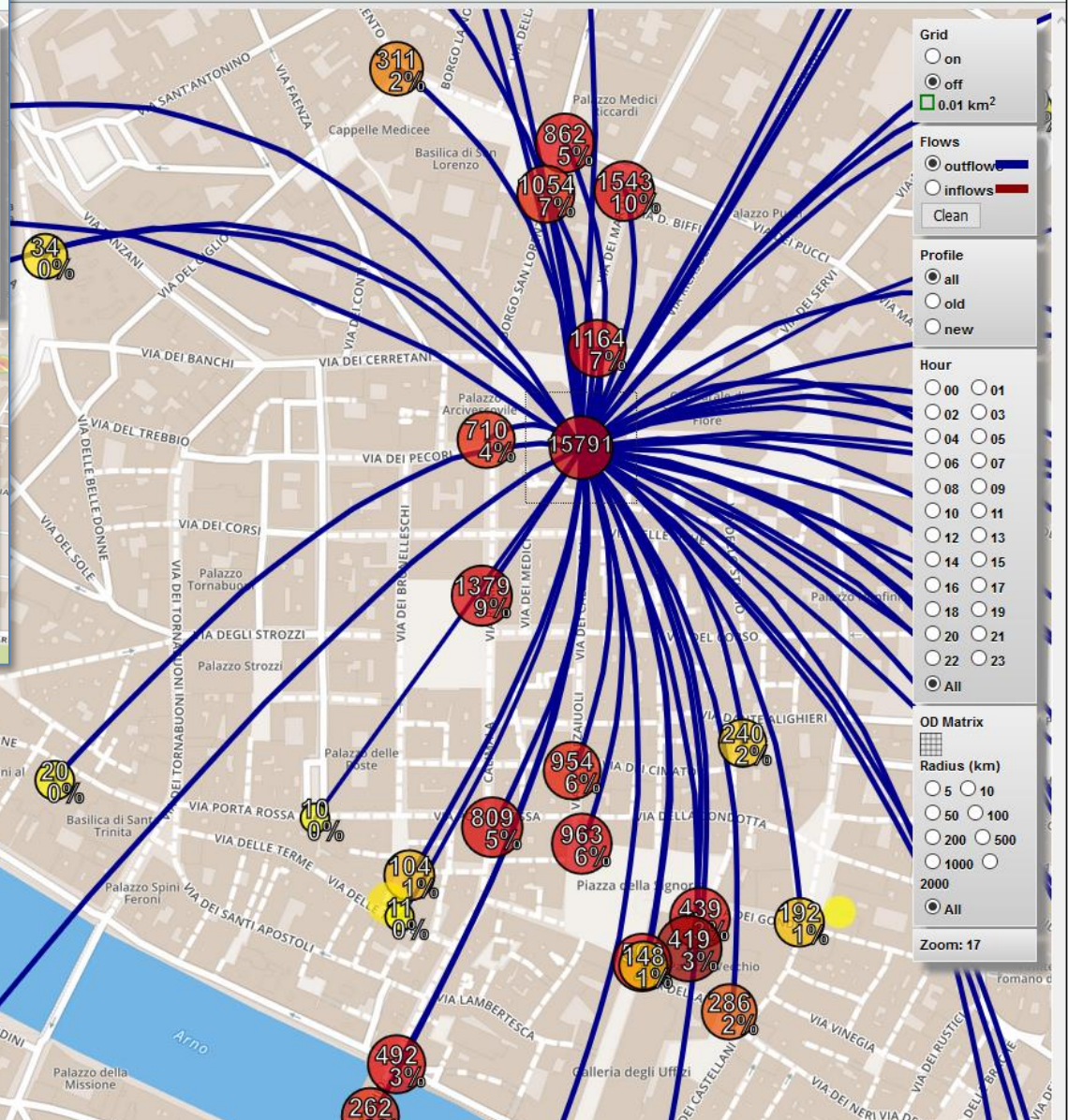
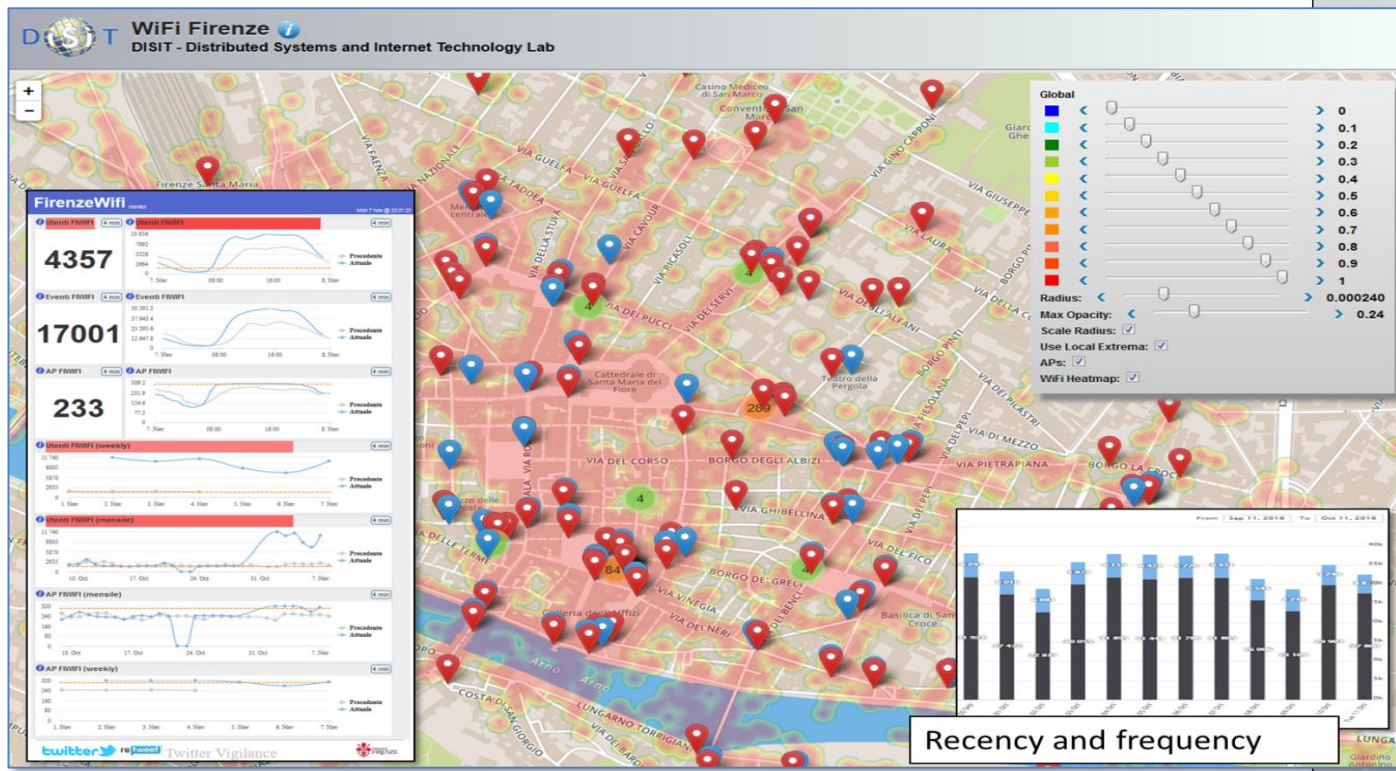
DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

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

Wi-Fi OD estimation.



Firenze - Saturday November 12 2016 20:11:59





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

Embedded Widgets



DESTINATION FLORENCE Destination Official Partner del Comune di Firenze

Visitare Vivere Dormire Mangiare Tour Eventi Servizi Blog

COME MUOVERSI

Fermate bus Piste ciclabili Parcheggi Distributori

Powered by www.km4city.org

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



UNIVERSITÀ DEGLI STUDI FIRENZE **DINFO** Dipartimento di Ingegneria dell'Informazione

Informazioni sui mezzi di trasporto pubblico disponibili, per una mobilità sostenibile nell'ateneo fiorentino

Scegli il raggio di ricerca - Choose the search distance

0500 m 1 km 2 km

Vista iniziale - First view Km4city WebApp Indicazioni stradali - Directions

Scegli altri servizi da visualizzare

Choose other services to show

- Rastrelliere bici - Bike racks
- Piste ciclabili - Cycle paths
- Strutture UNIFI - UNIFI Depts
- Linee Tpl - Bus routes

Clicca sul nome della fermata qui sotto per avere il dettaglio delle linee

Click the stop name for more details on the routes

- Massaia 4
- Massaia 02 4
- Cappuccini 4
- Mercati 4
- Incontri 40

DISIT Lab, Gennaio 2010

FILTRI DI RICERCA

CONTENUTI

- In primo piano
- Most Viewed (last 500)
- Most Viewed All (last 500)
- Ultimi caricati
- Più votati
- Risultati della Ricerca

CLASSIFICAZIONE

Lista dei termini

- application fields (3425)
- content kind (962)
- models and systems (3014)
- project kind (809)
- research topics (7453)
- standard (501)

Ven 26 Gen Powered by LaMMA

Firenze

Nuvoloso 5°C / 10°C

Sab 27 Gen 1°C / 14°C Seren	Dom 28 Gen 1°C / 15°C Seren	Lun 29 Gen Temp N/A Nuvoloso	Mar 30 Gen Temp N/A Coperto
-----------------------------------	-----------------------------------	------------------------------------	-----------------------------------

Powered by www.km4city.org

Smart City Monitoring: Notificator

Events log

EVENTS GENERATORS
MESSAGE BOOK
ADDRESS BOOK
REST BOOK
EVENTS LOG
CLIENT APPLICATIONS

Text filter:

Start date: 2017-07-31 00:00:00

End date: 2017-08-11 09:22:00

Application: All

[Filter](#) [Restore](#)

Generator container	Generator name	Generator type	User	Event time	Event type	Application	Link
ToolAdmin - Public	Ataf RT	Ataf_Rt	marazzini	2017-08-09 17:38:03	Value <= 50 - Bad	Dashboard Manager	Link
ToolAdmin - Public	Park Free - Speedo	Park_Free	marazzini	2017-08-09 17:37:32	27 < Value <= 54 - Ok	Dashboard Manager	Link
ToolAdmin - Public	Ataf RT	Ataf_Rt	marazzini	2017-08-09 17:37:02	Value <= 50 - Bad	Dashboard Manager	Link
ToolAdmin - Public	Park Free - Speedo	Park_Free	marazzini	2017-08-09 17:36:28	27 < Value <= 54 - Ok	Dashboard Manager	Link
ToolAdmin - Public	Ataf RT	Ataf_Rt	marazzini	2017-08-09 17:36:02	Value <= 50 - Bad	Dashboard Manager	Link
New events occurred							
Generator	Event	Time	Generator	User	Event time	Event type	Application
Ataf RT	Value <= 50 - Bad	2017-08-11 09:23:41	Temp	marazzini	2017-08-09 17:35:42	6 < Value <= 30 - Ok	Dashboard Manager
	ee - Speedo		Park_Free	marazzini	2017-08-09 17:35:25	27 < Value <= 54 - Ok	Dashboard Manager

Logout
marazzini
Dashboard Manager
ToolAdmin
On
RT events

Smart City API

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



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INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

DISIT lab, 15 August 2017

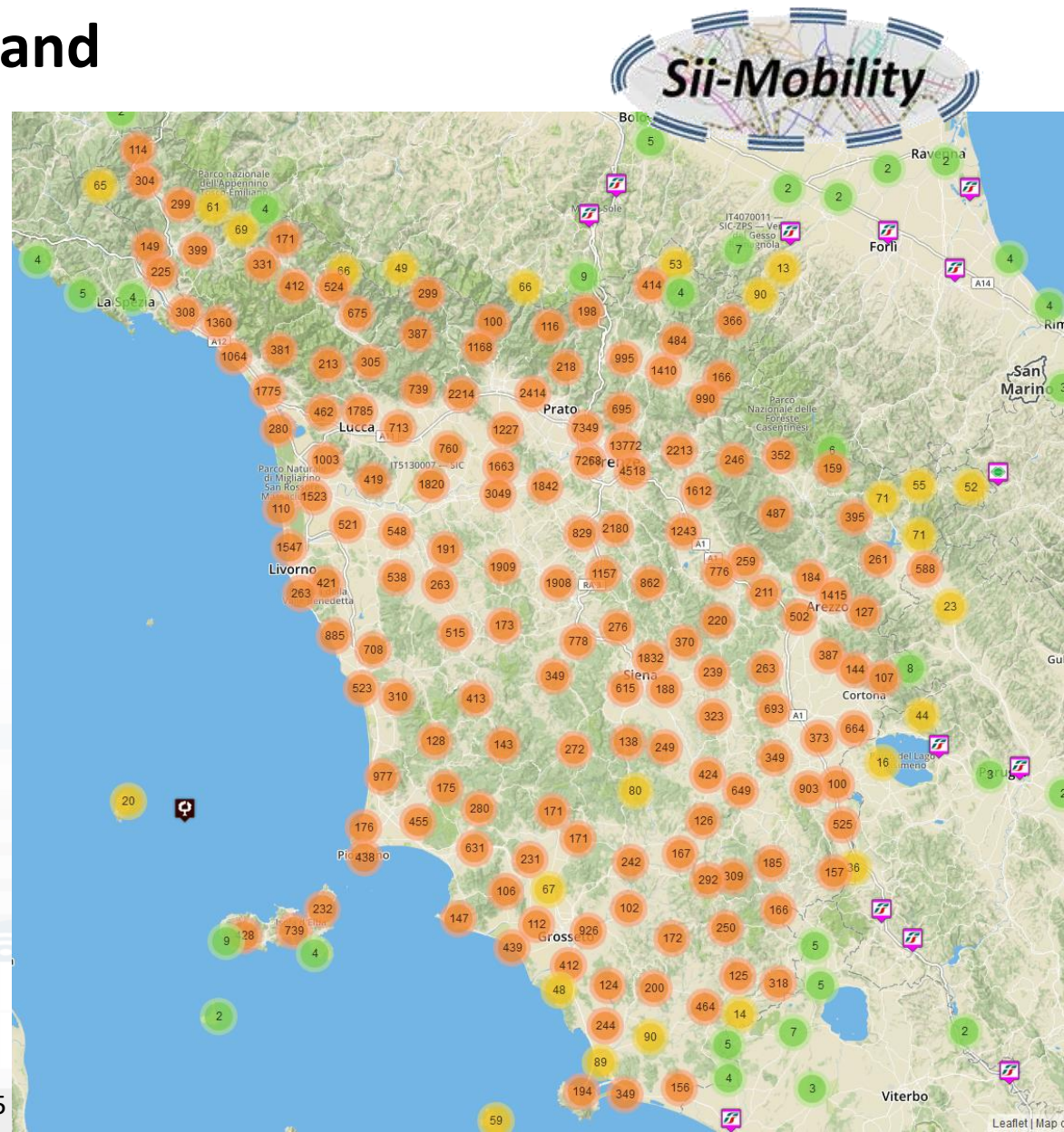


Scenariious vs SmartCity API

- 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 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

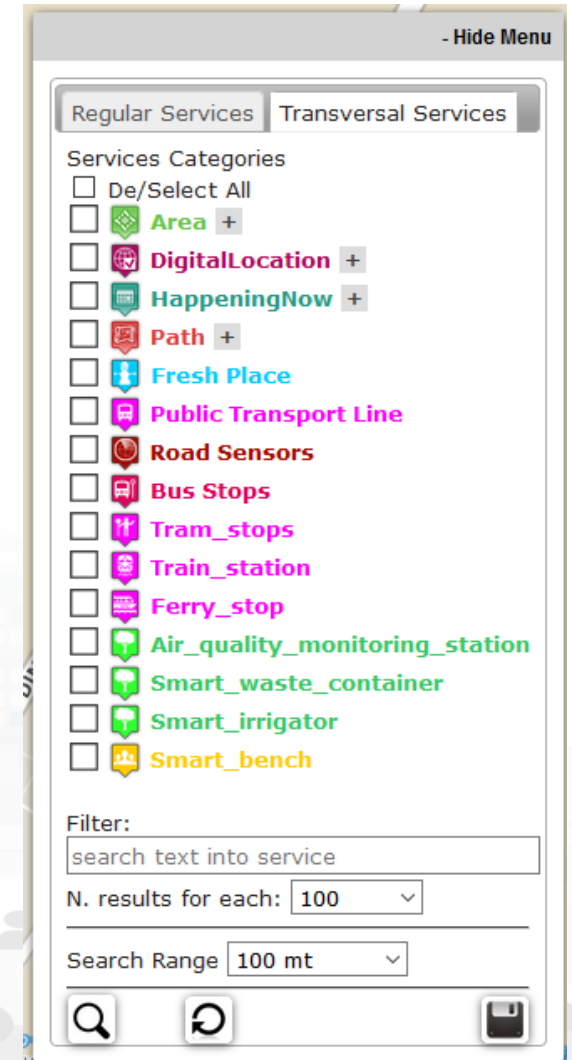
Service Class

Accommodation -

- Agriturismo
- 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 services

AURORA

LINKED OPEN GRAPH

Typology: Accommodation - Hotel

Email: info@hotelaurora.info

Website: 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:

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

ZCS_1_D

LINKED OPEN GRAPH

Typology: TransferServiceAndRenting - Controlled_parking_zone

Digital Location

Address: VIA GUSCIANA

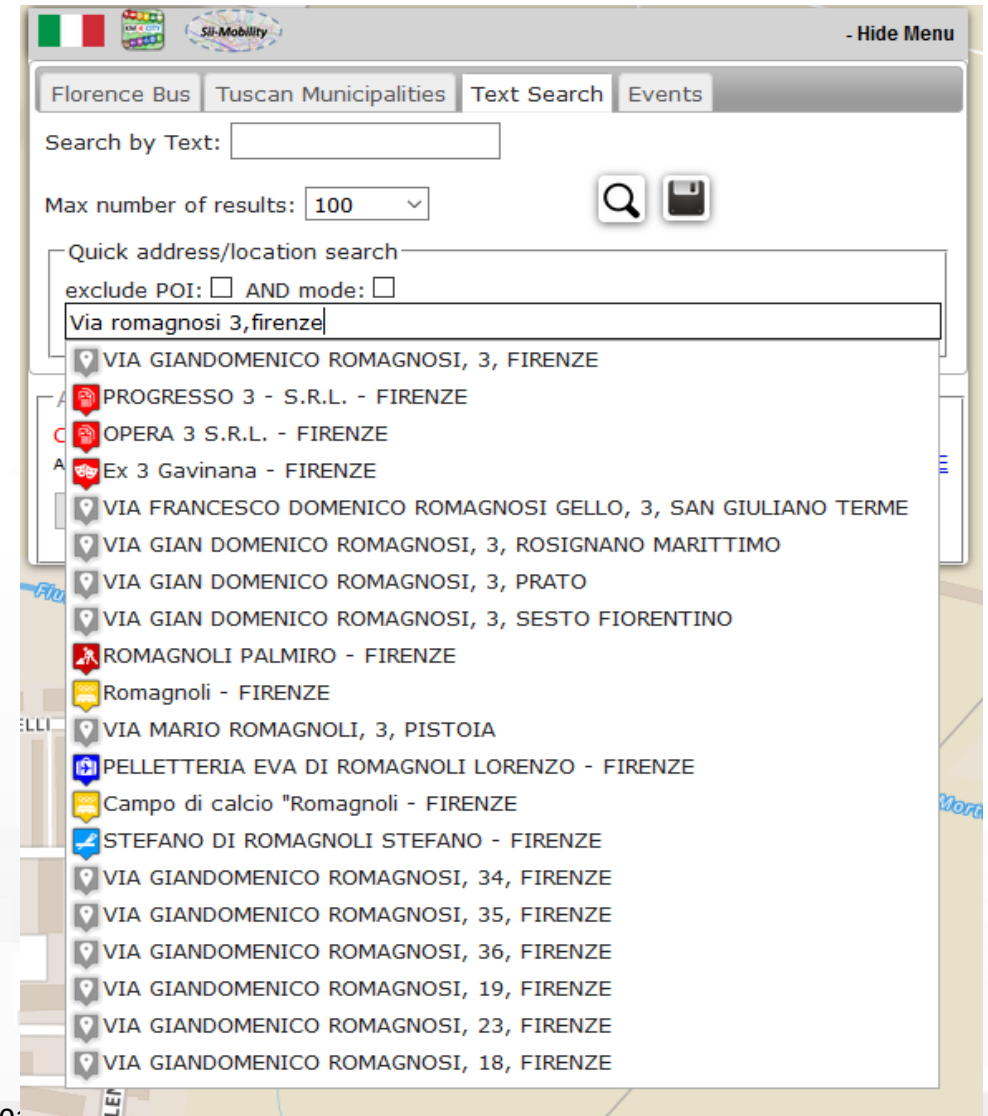
Cap: 50124

City: FIRENZE

Prov.: FI

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



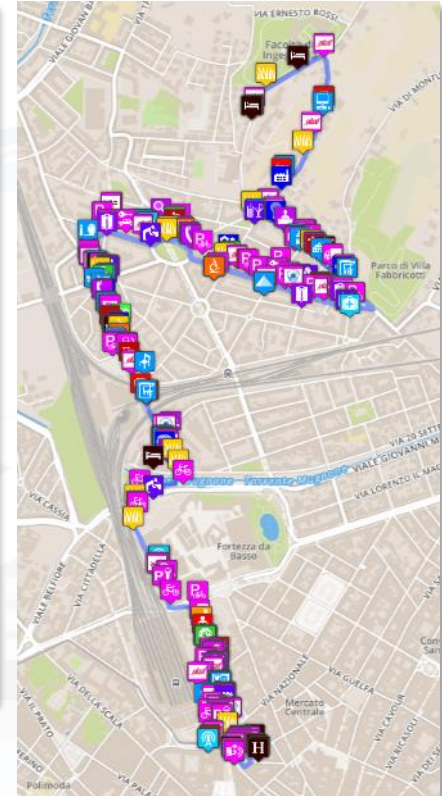
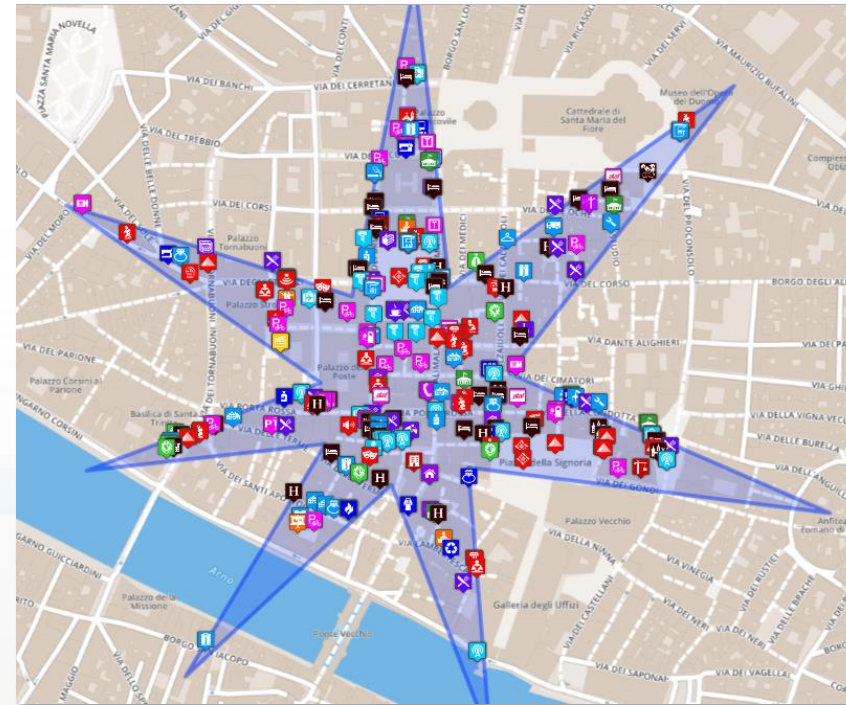
Around a point or POI

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

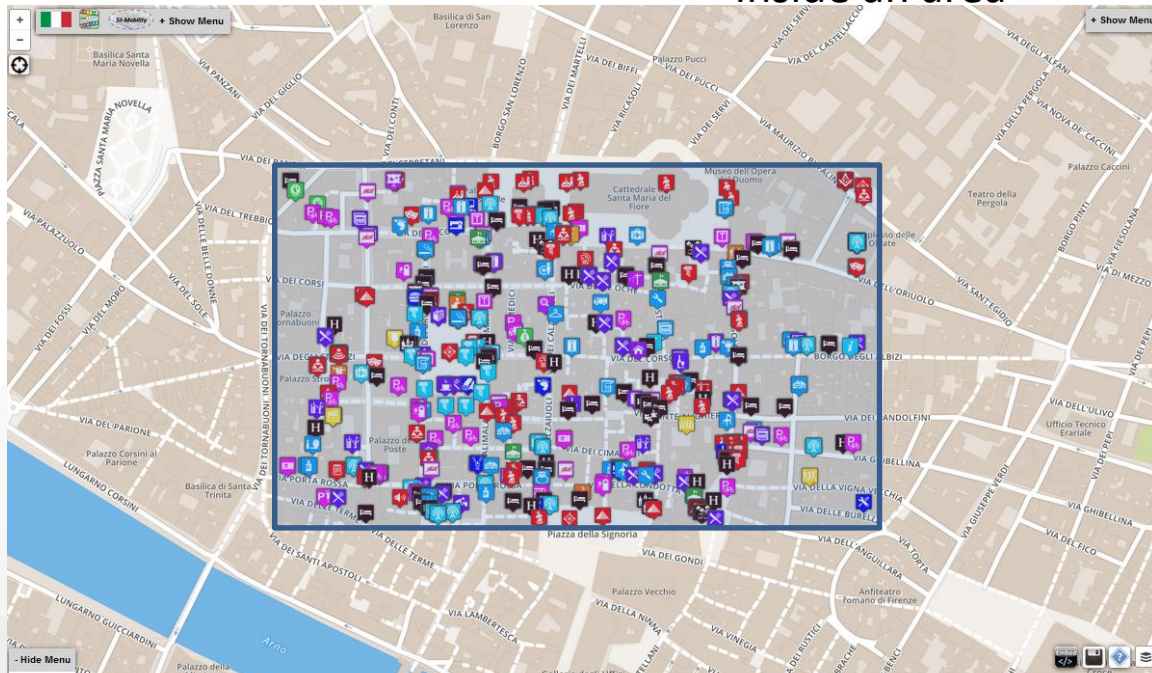


Inside a closed polyline

Along a polyline



Inside an area

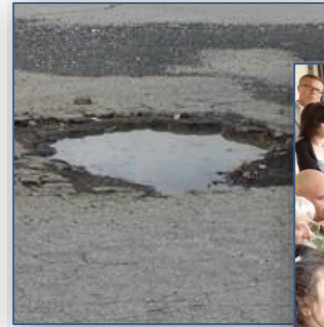


Main ServiceMap features

- **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;

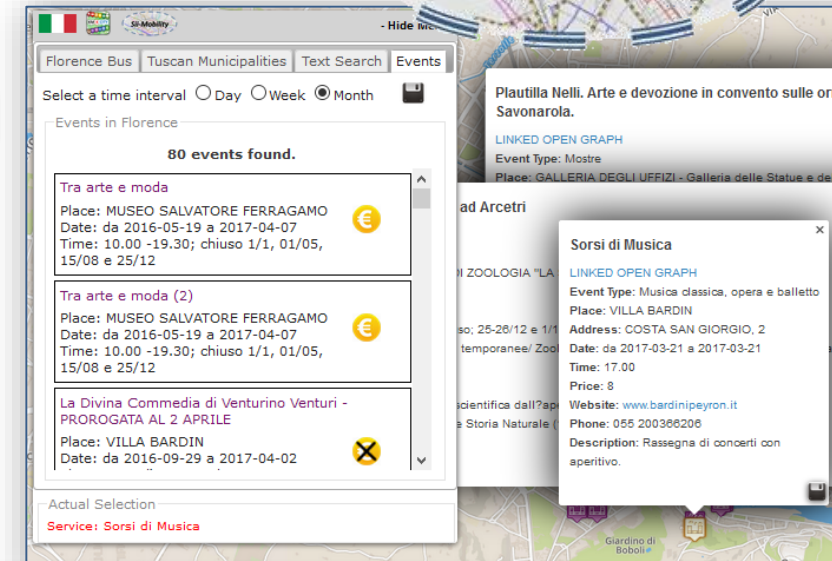
Empowering City Users

- 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

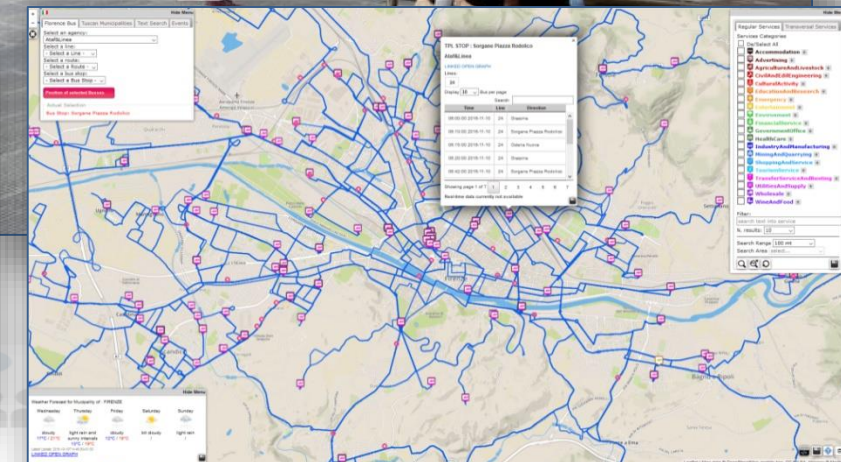
- Getting Traffic Events
- Getting Critical Events
- Getting Events in the city
 - Theater, museum, show, sport, etc.
 - Getting Event details
 - Event kind, and thus ordering
 - in the day, week, and month
 - Location, and thus ordering, or selecting events per area, per residence
 - General information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



Supporting City Users in using Public Mobility

- **Public Transport, PT**

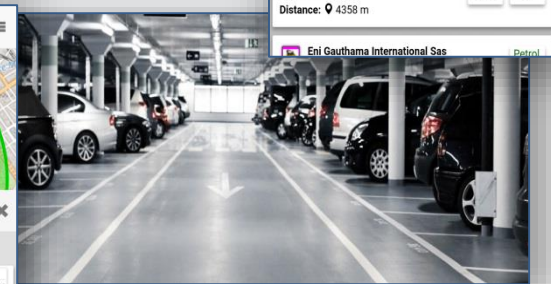
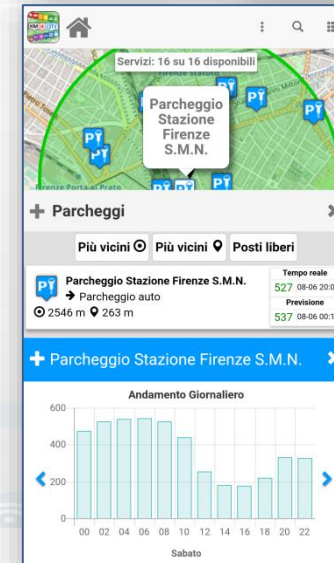
- Getting tickets
- Getting bus stops, lines, and timelines for bus, train and tramline (GTFS, ETL, ..)
- Searching Services along a Pub. Transport line or closer to a stop
- Searching the closest bus stops
- searching for BUS stops via name
- real time delays of busses
- modal routing for Pub. Transport



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

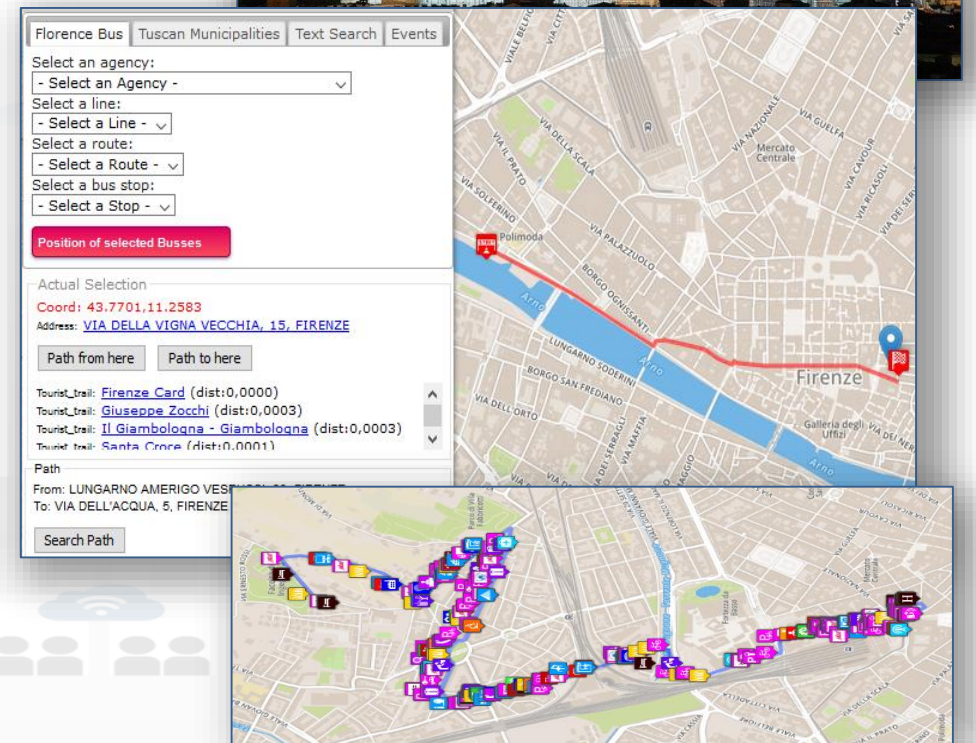


Private Mobility: routing and navigation paths

- 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)



Servi: 2 su 2 disponibili

corso
enda
daliera
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
Totali	5	23	22	3	0

20-03-2017 00:37

I CODICI DEL PRONTO SOCCORSO

CODICE ROSSO EMERGENZA accesso immediato	Casi con pericolo di vita Il trattamento di questi pazienti avviene immediatamente in via prioritaria
CODICE GIALLO URGENZA accesso rapido	Casi con lesioni gravi ed eventuale alterazione di una o più funzioni vitali L'assistenza viene assicurata nel minor tempo possibile
CODICE VERDE URGENZA differibile	Casi in condizioni critiche, ma non in pericolo di vita L'assistenza viene assicurata dopo i casi più urgenti
CODICE AZZURRO NON URGENZA	Casi in condizioni non gravi La prestazione sanitaria è differibile
CODICE BIANCO	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
Arezzo	14	
Firenze	12	
Grosseto	13	
Livorno	ND	

Qualità Aria

Fi-Mosse
Stazione di monitoraggio della qualità dell'aria
1759 m 2135 m

	NO2	PM10	Max Orario
NO2	77.0 µg/m³		Max Orario
SO2	2.3 µg/m³		Max Orario
Benzene	1.4 µg/m³		Media Giornaliera
PM2_5	10.0 µg/m³		Media Giornaliera
PM10	15.0 µg/m³		Media Giornaliera
Superamenti	3 Giorni		Superamenti Annuali

Pollen Firenze

Stazione monitoraggio polline

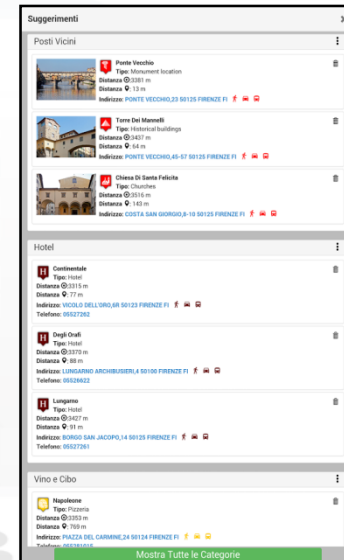
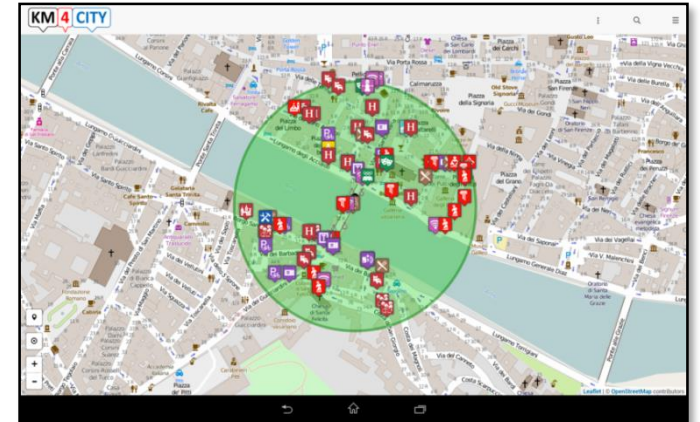
Alternaria	39.0	↑
Amarantacee	1.0	
Castagno	26.0	
Cupressacee/Taxacee	0.7	
Fagacee	30.0	
Frassino	1.0	✓
Graminacee	9.0	✓
Oleacee	4.0	✓
Olivo	3.0	✓
Pinacee	3.0	
Plantaginacee	3.0	
Poligonacee	0.3	
Quercia	3.0	
Urticacee	6.0	✓

2016-12-18T08:52:00+01:00

	Domenica	Lunedì	Martedì	Mercoledì	Giovedì
Temp.	10°C	11°C	12°C	-1°C	-1°C
Humidity	8%	8%	7%	-	-

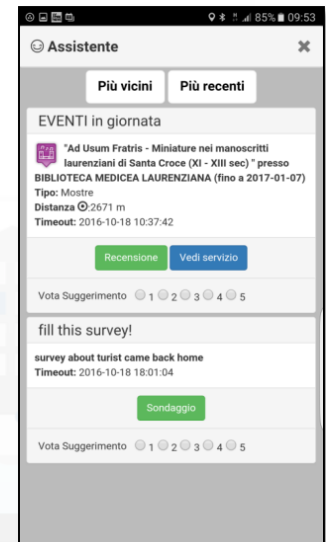
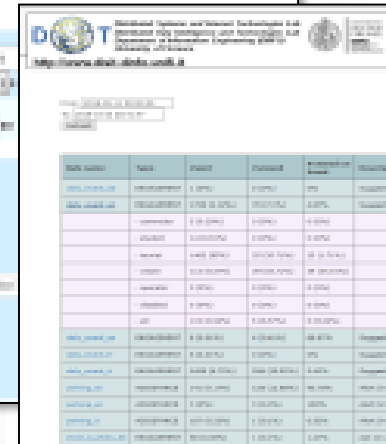
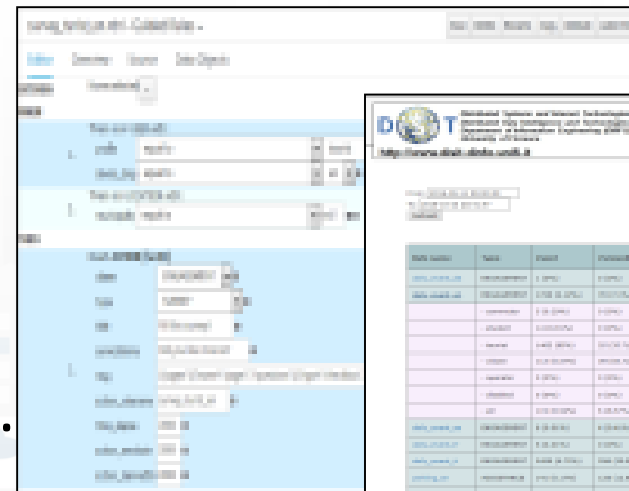
Profiled Suggestions to City Users

- 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,



Monitoring Traffic Flow and Parking

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



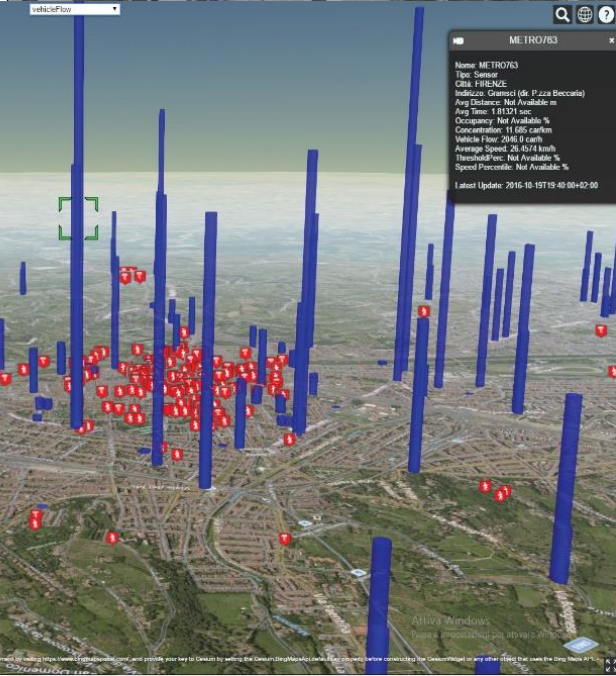


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AND INTERNET
TECHNOLOGIES LAB
<http://www.disit.org>

Traffic Flows



Hide Menu

FIRENZE

Selezione: COMUNE DI FIRENZE

Indirizzo approssimativo

Ulteriori risultati per questo indirizzo

Services Categories

Regular Services/Transversal Services

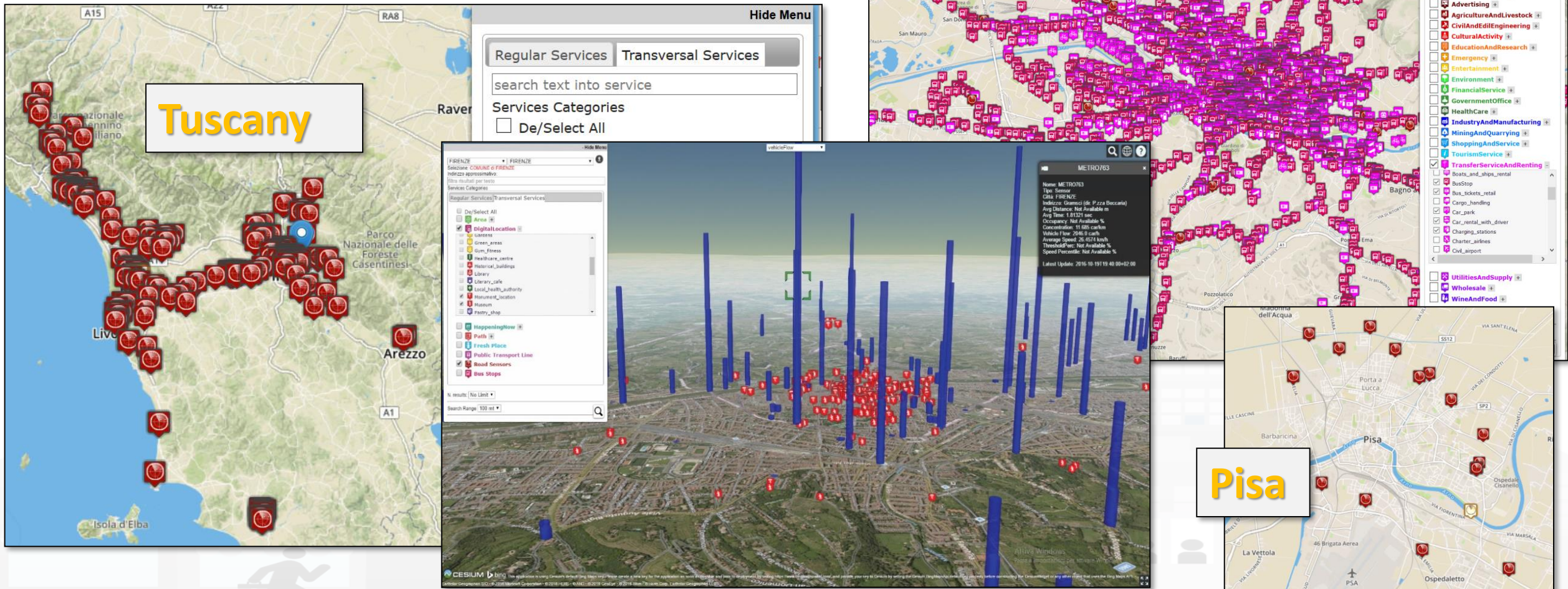
- Do/Relact All
- Arena
- DigitalLocation
- Gardens
- Green_areas
- Gym_Sites
- Healthcare_centre
- Historical_buildings
- Library
- Library_cafe
- Local_health_authority
- Monument_location
- Museum
- Pawn_shop
- HappeningNow
- Path
- Fresh_Place
- Public_Transport_Line
- Road_Sensors
- Bus_Stops

N. results: NO LIMIT

Search Range: 100 m

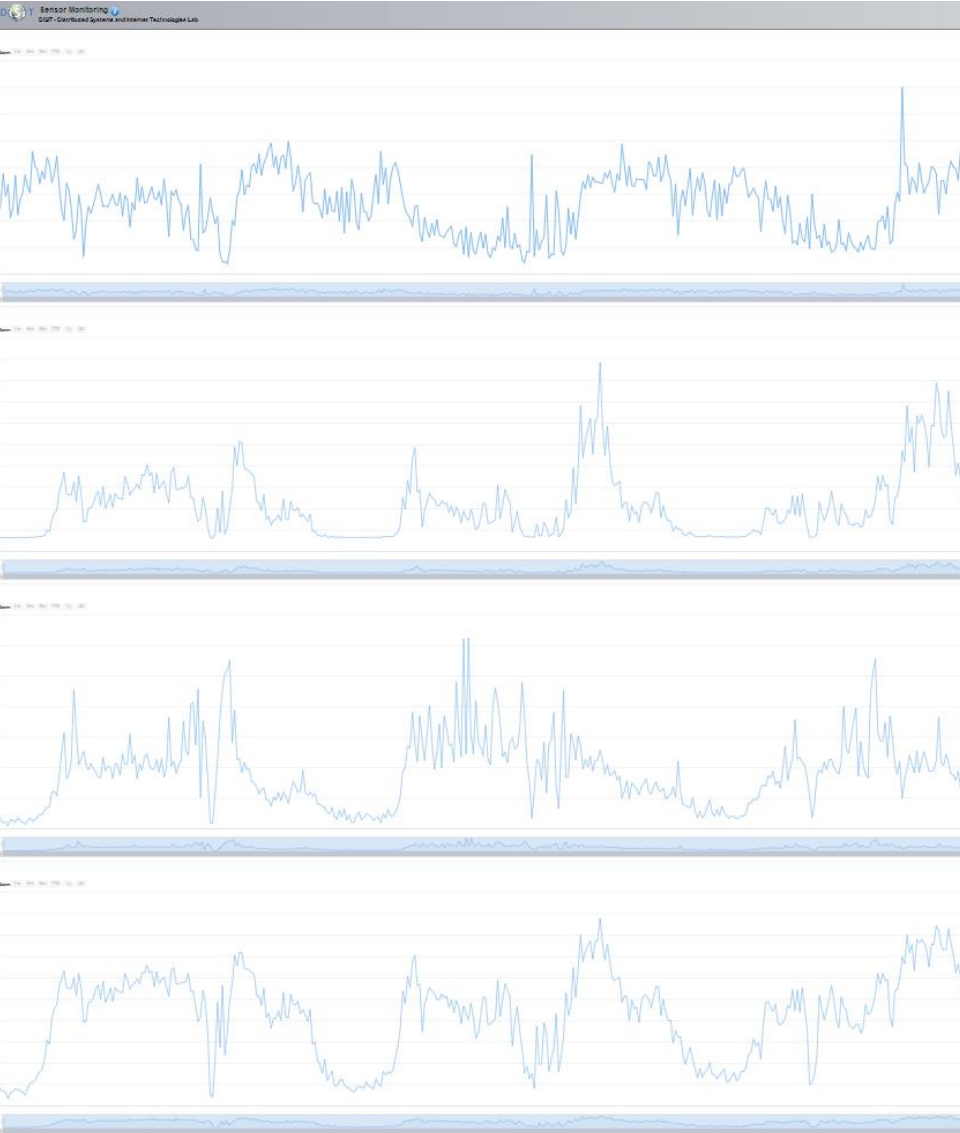
Traffic Flow Tools

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





Traffic Flow data



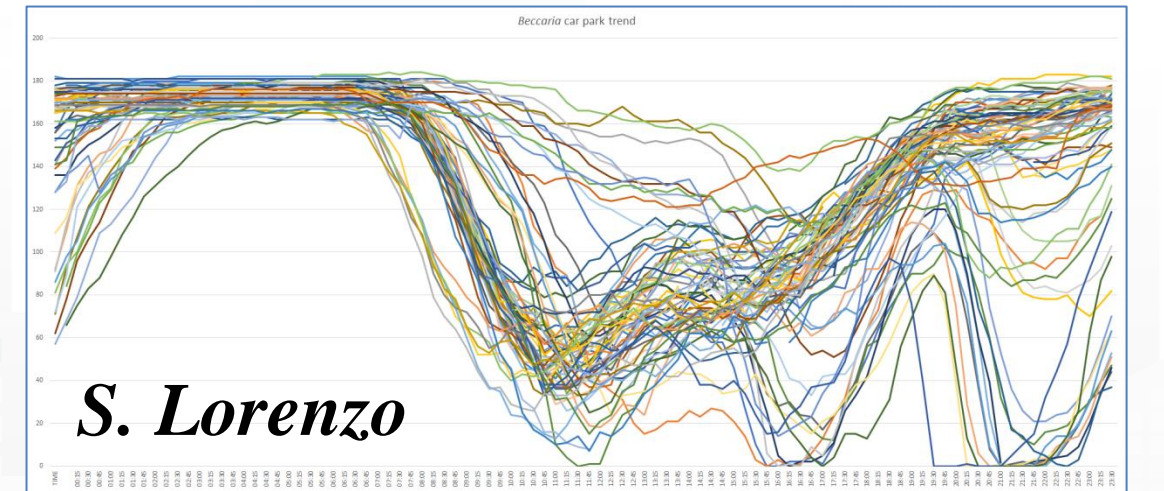
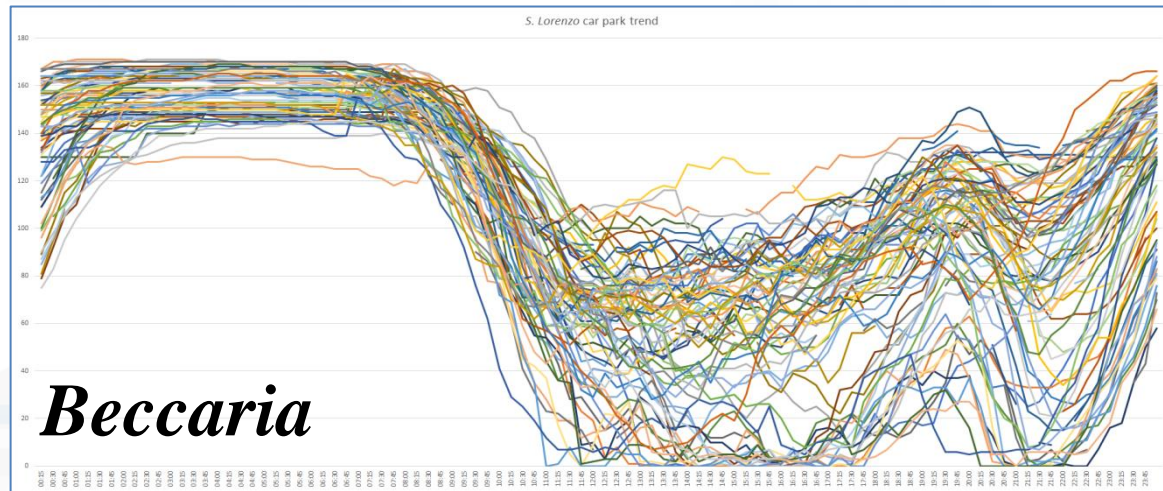
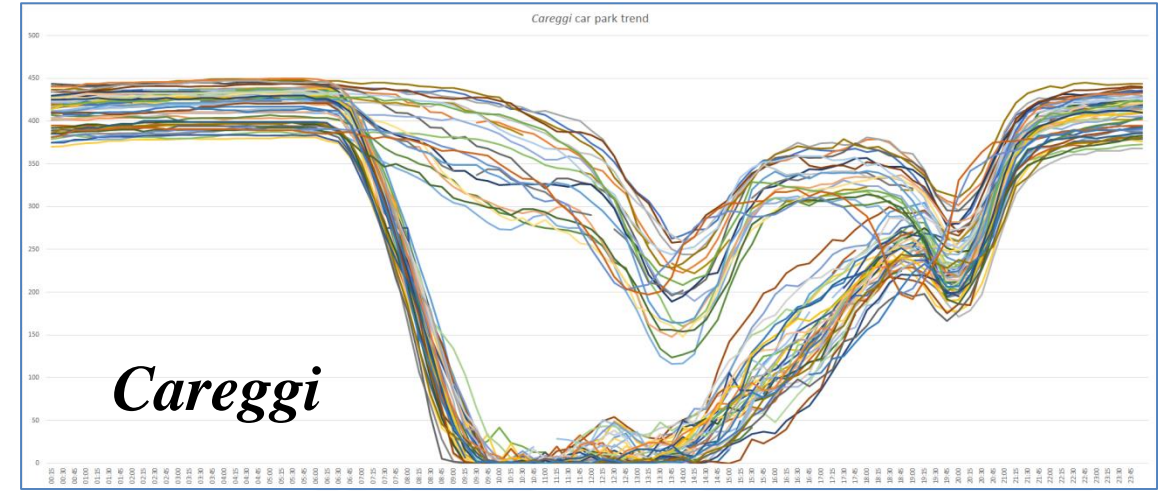
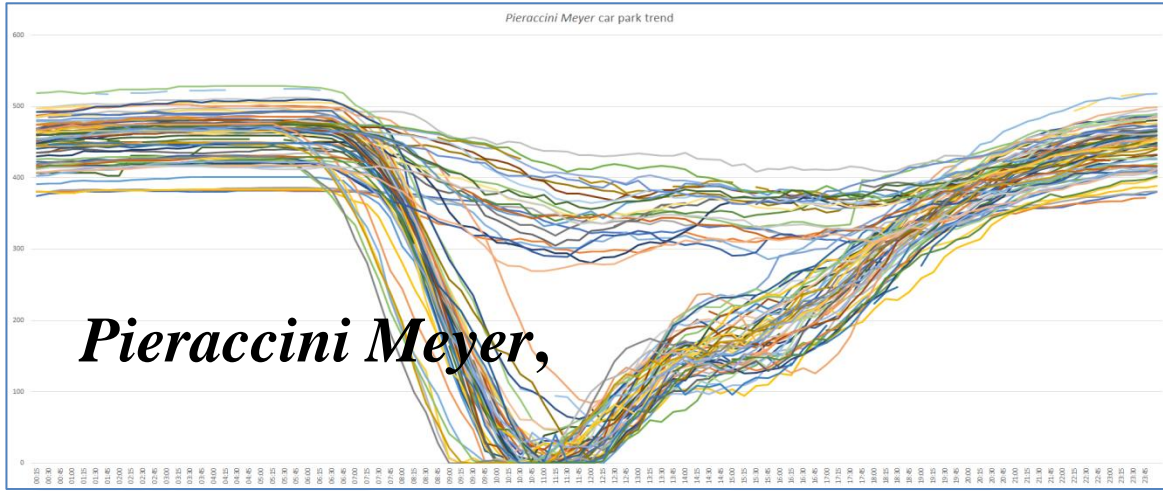


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<http://www.disit.org>

Free Parking space trends



12 parking areas in Florence

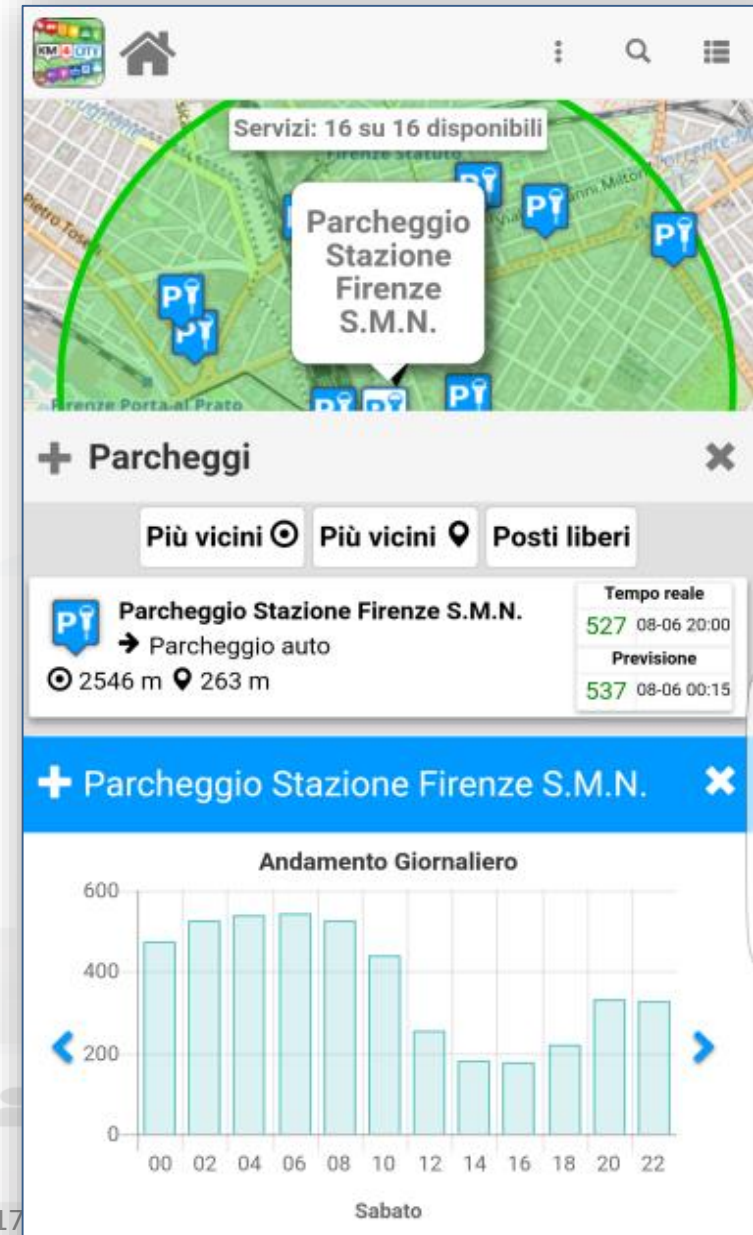
DISIT lab, 15 August 2017

Free Parking PREDICTIONS



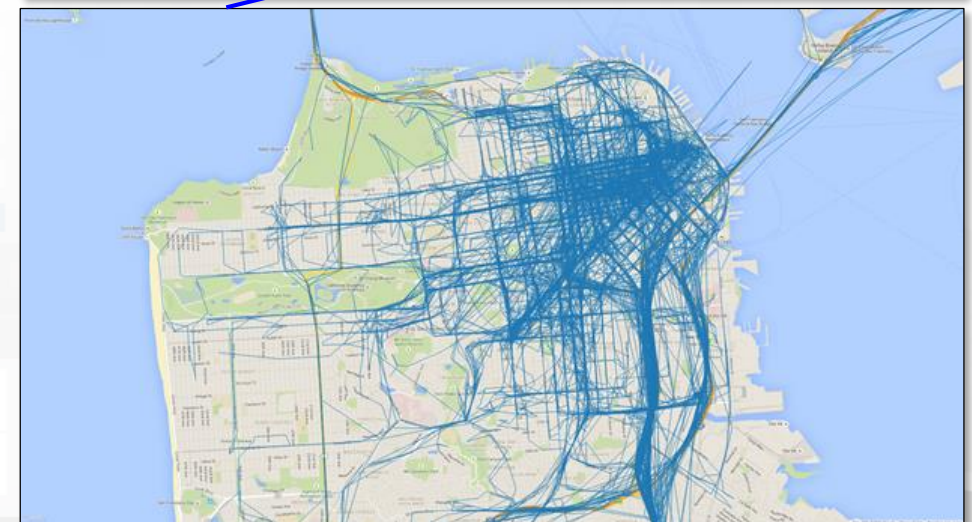
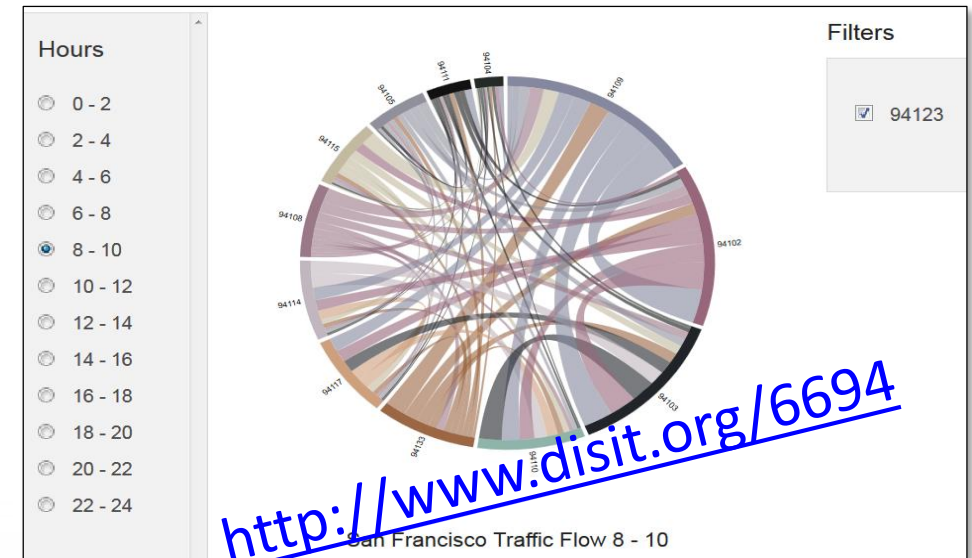
Careggi car park			
Model features	BRNN model results		
	R-squared	RMSE	MASE
Baseline	0.974	24	1.87
Baseline + Weather	0.975	24	1.75
Baseline + Traffic sensors	0.975	24	2.04
Baseline + Weather + Traffic sensors	0.975	24	1.87

- 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



Monitoring City users Via Wi-Fi

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

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

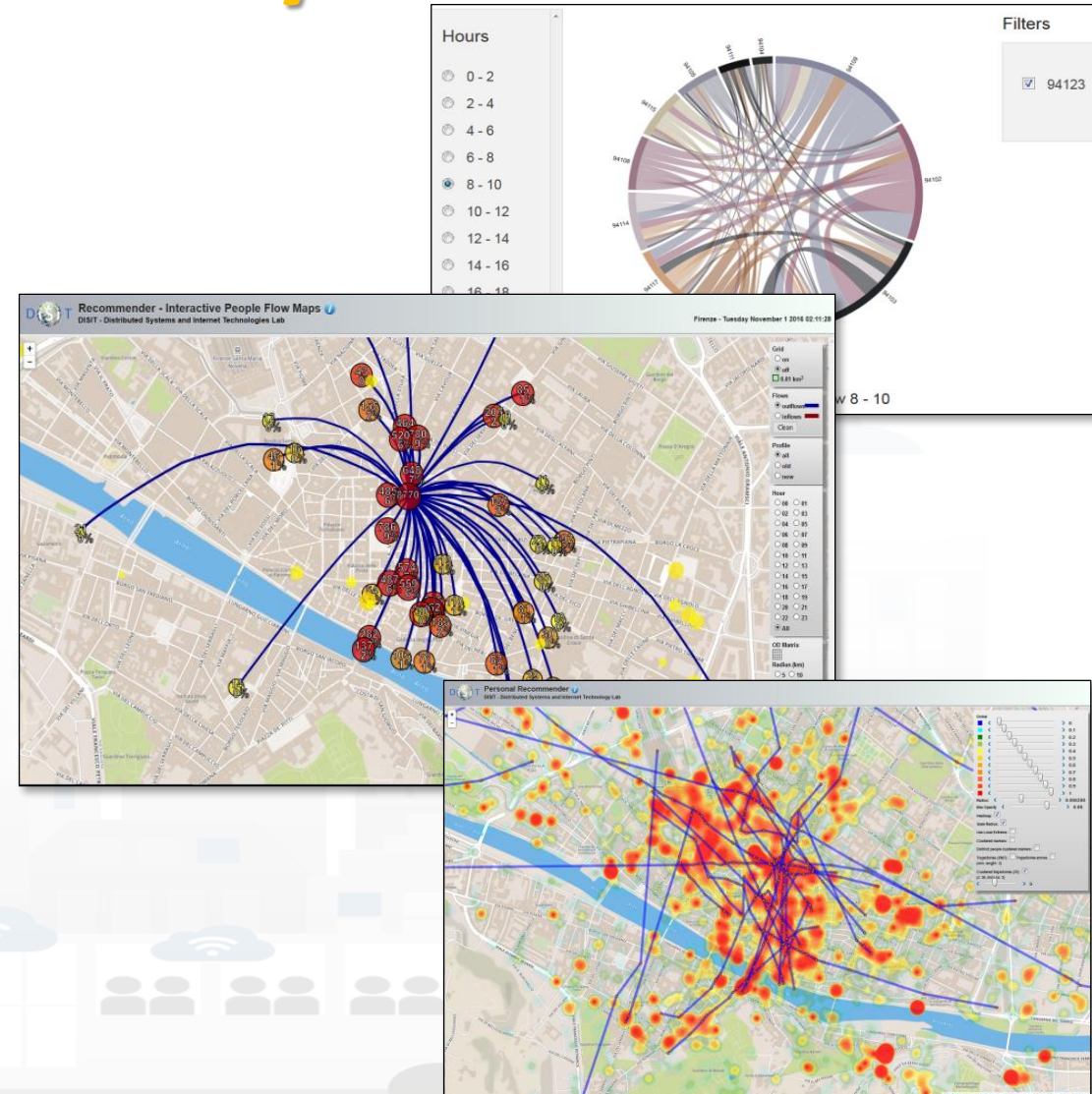
<http://www.km4city.org/?infoDocs>

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



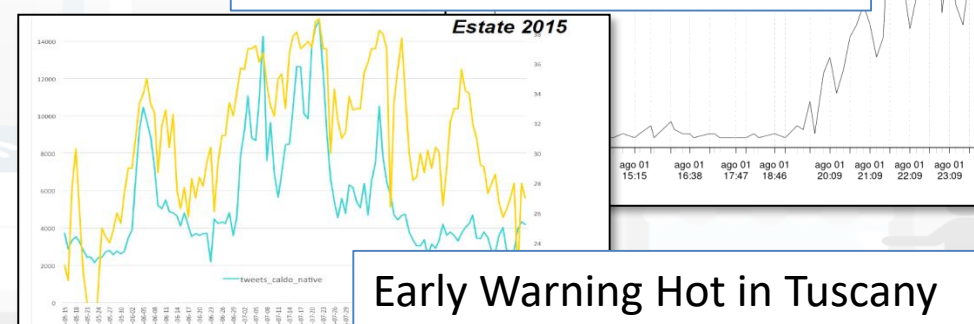
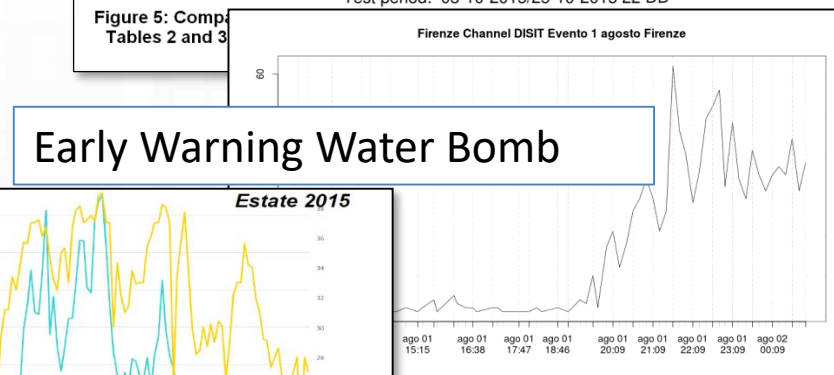
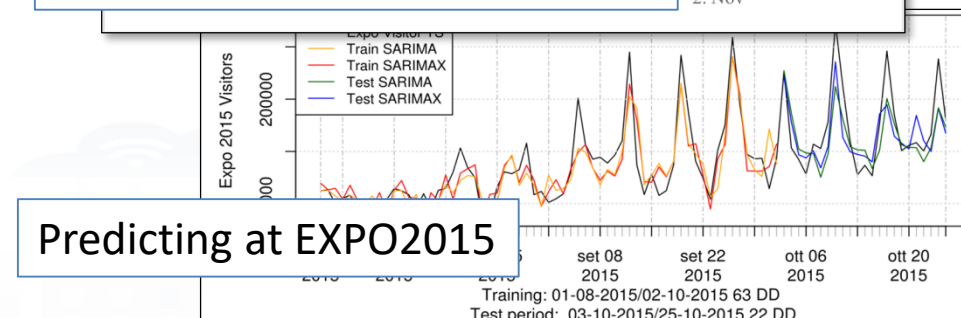
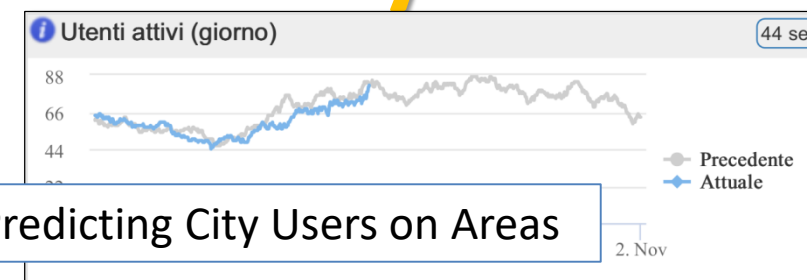
User Behaviour Analysis

- **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**



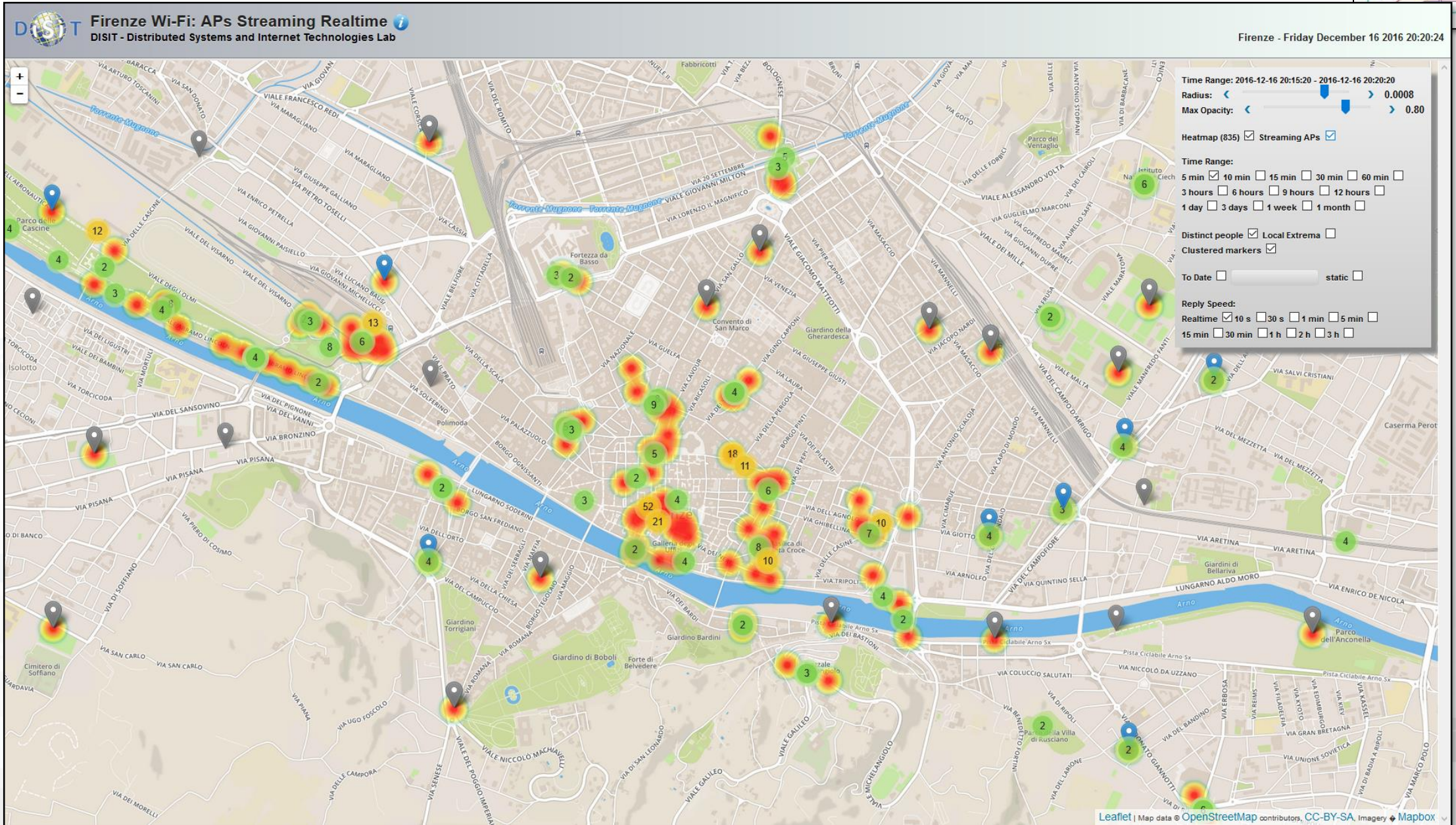
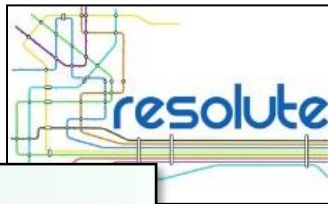
Predicting Models for Admin. & City Users

- **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



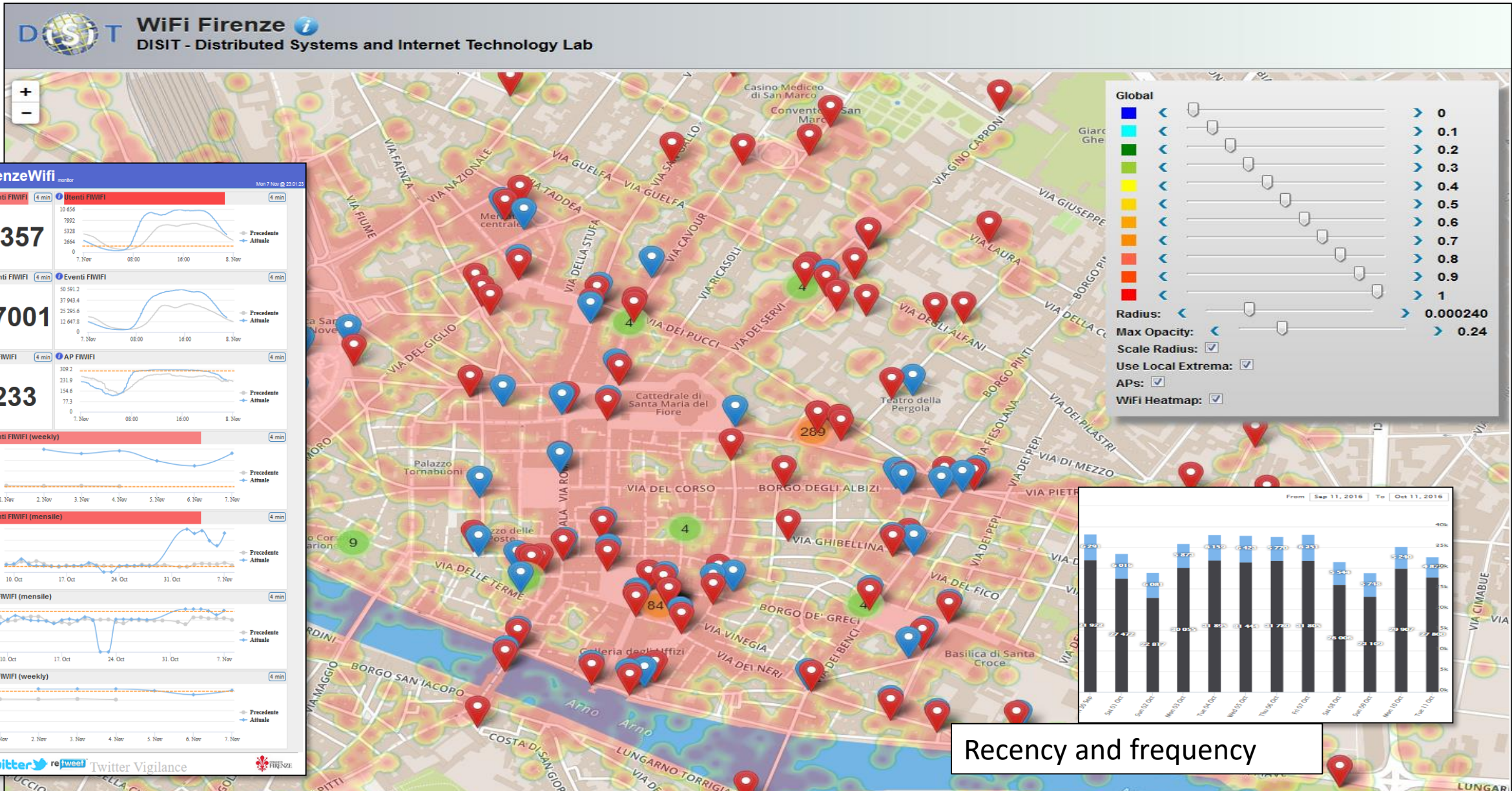
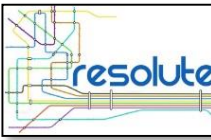


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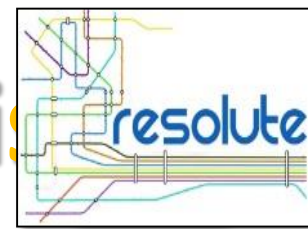
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AND INTERNET
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<http://www.disit.org>

WiFi Monitor tool



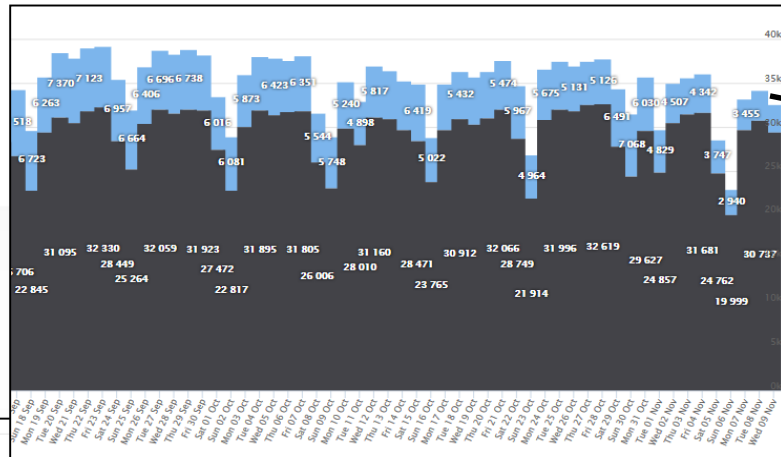
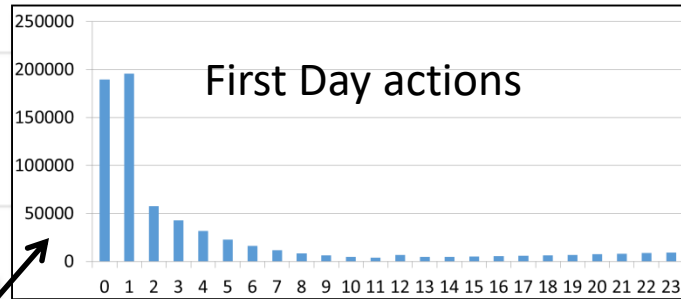


User Behavior Analysis

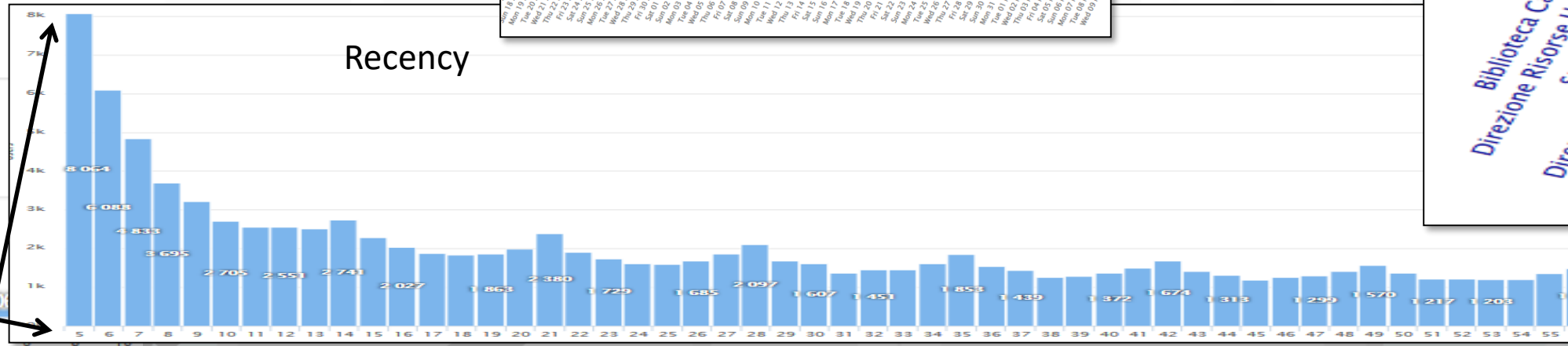


Distinct APs: 343
Distinct APs (last 24 hours): 311
Distinct Users (last 180 days): 1102098
Distinct Excursionists (last 180 days, < 24 h): 687025

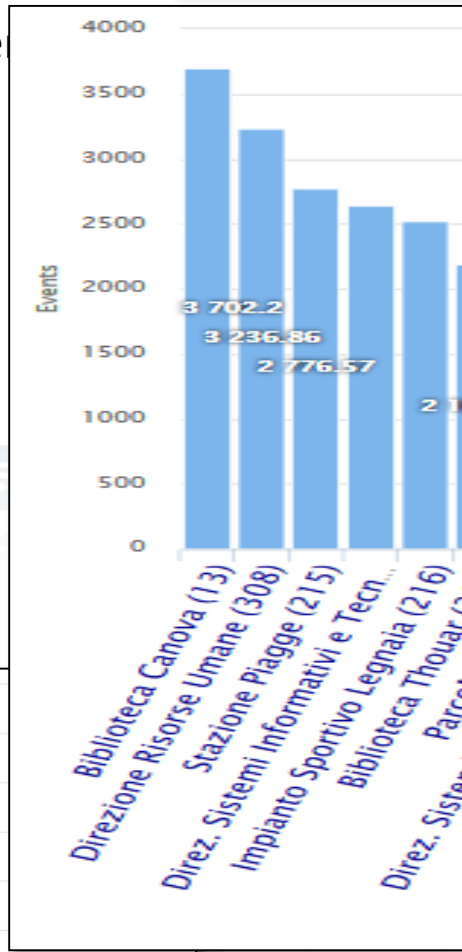
Excursionists
Users



New City Users
VS
Returning



Whe





Characterizing City Areas

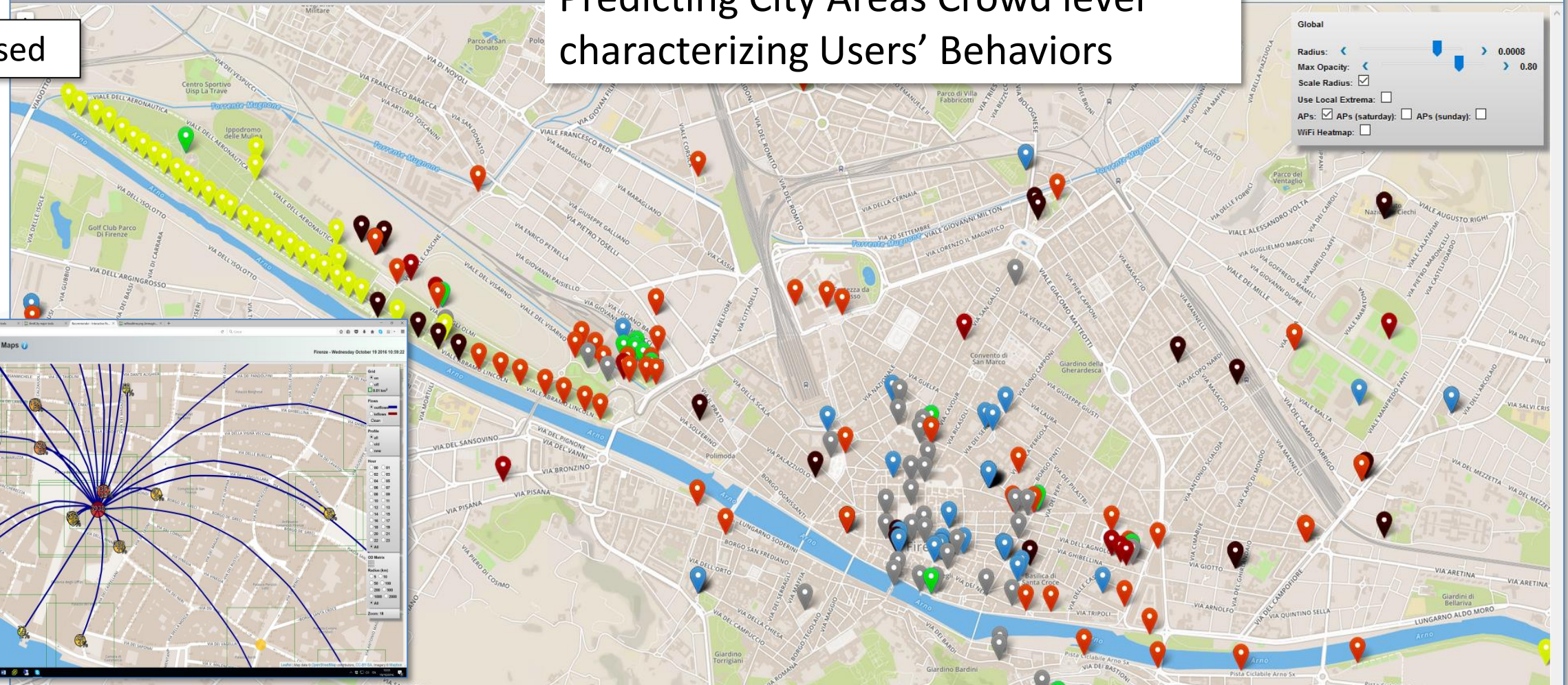


DISIT Firenze Wi-Fi: Access Points Clusters Coverage Map
DISIT - Distributed Systems and Internet Technologies Lab

Predicting City Areas Crowd level characterizing Users' Behaviors

Firenze - Saturday November 12 2016 19:16:33

Wi-Fi based



Global

Radius: 0.0008

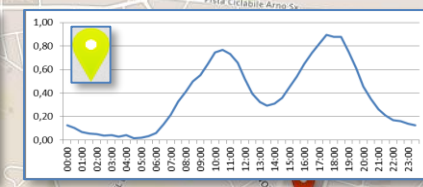
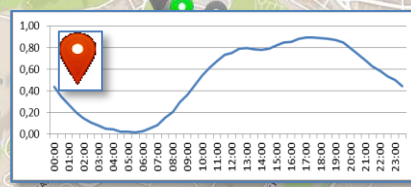
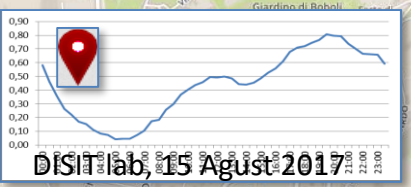
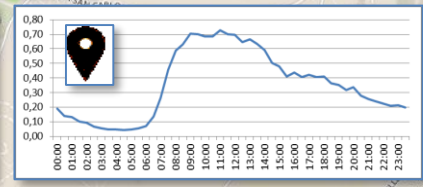
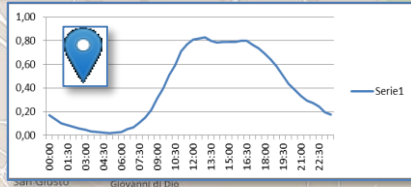
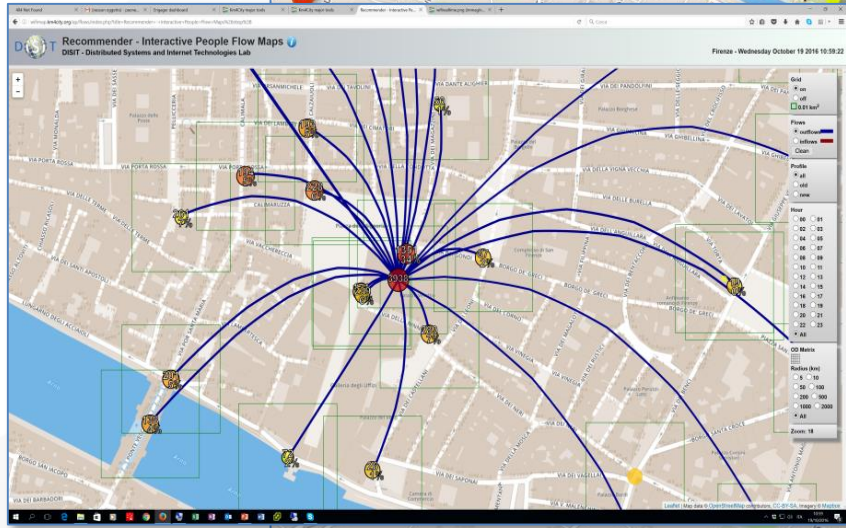
Max Opacity: 0.80

Scale Radius:

Use Local Extrema:

APs: APs (saturday) APs (sunday)

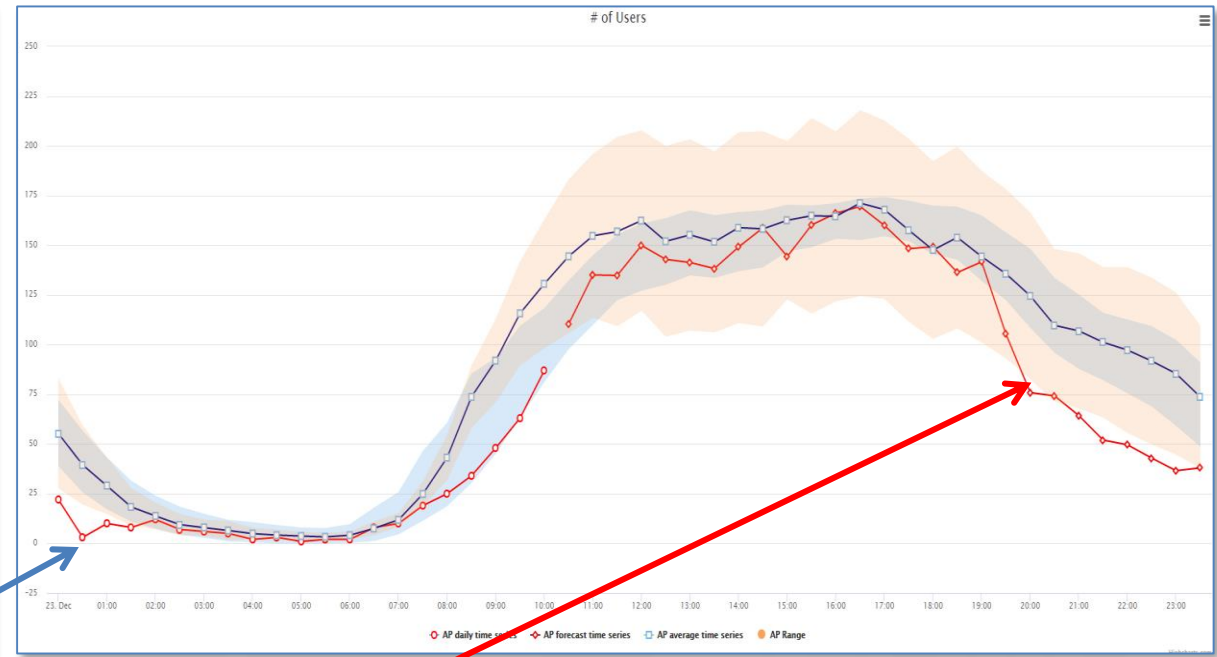
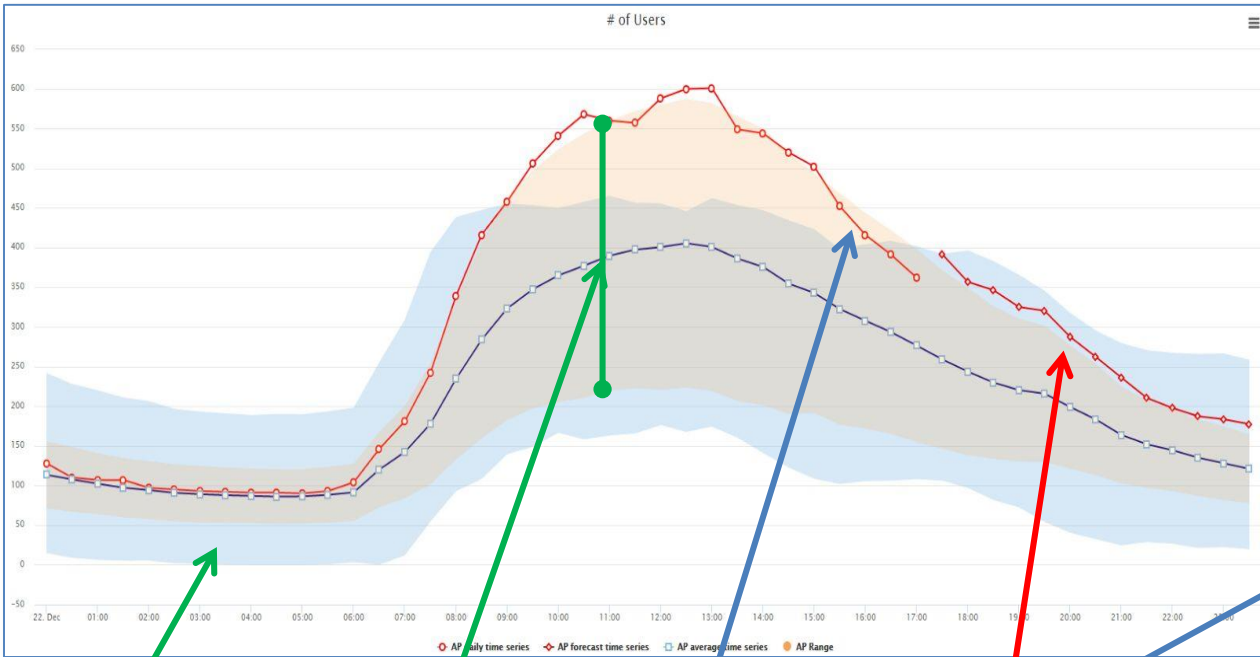
WiFi Heatmap:



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

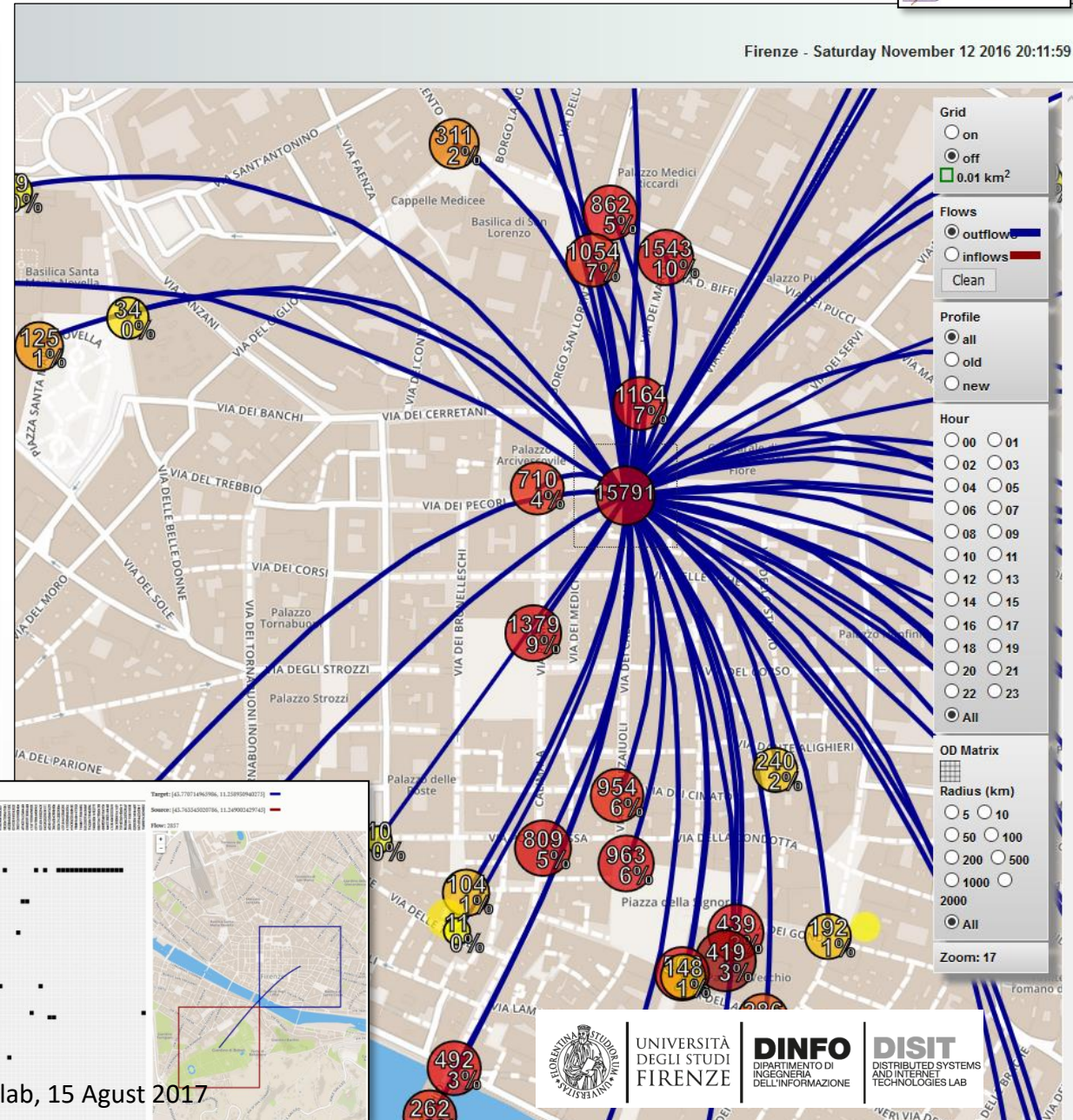
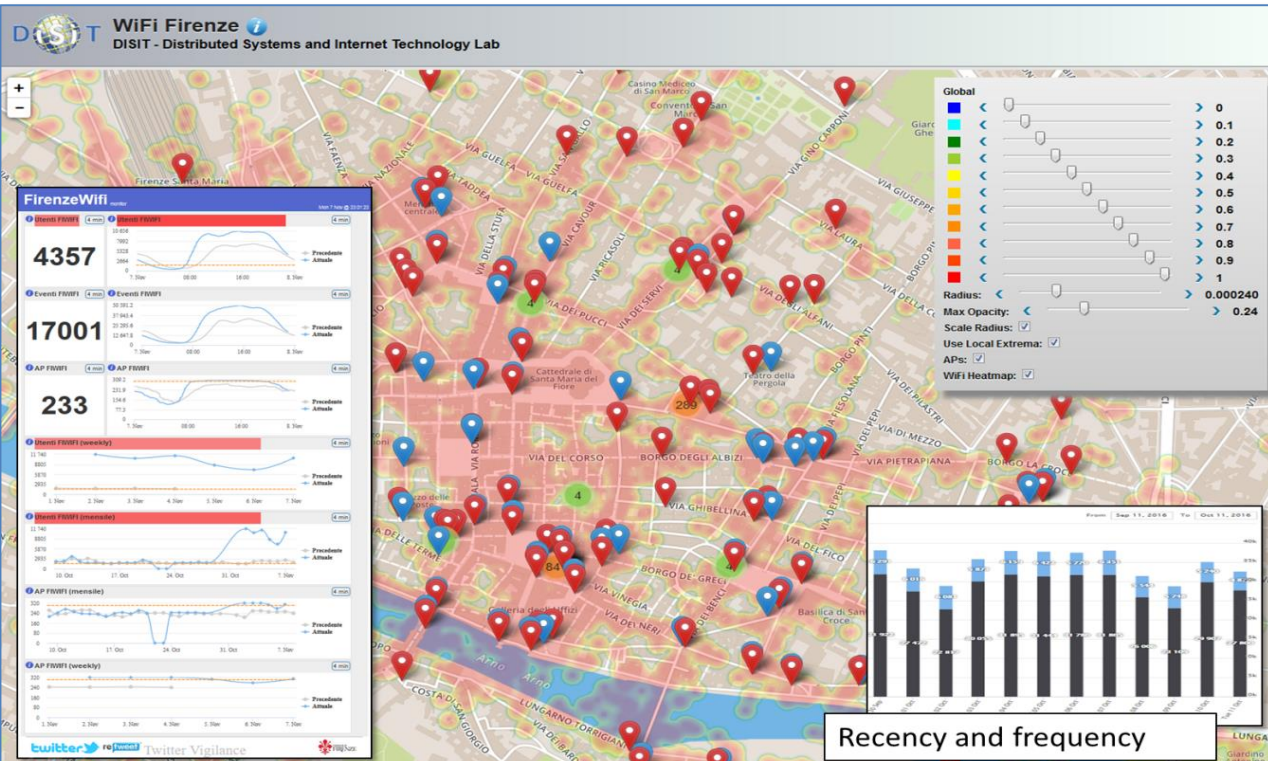
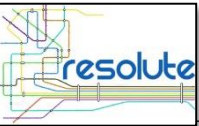


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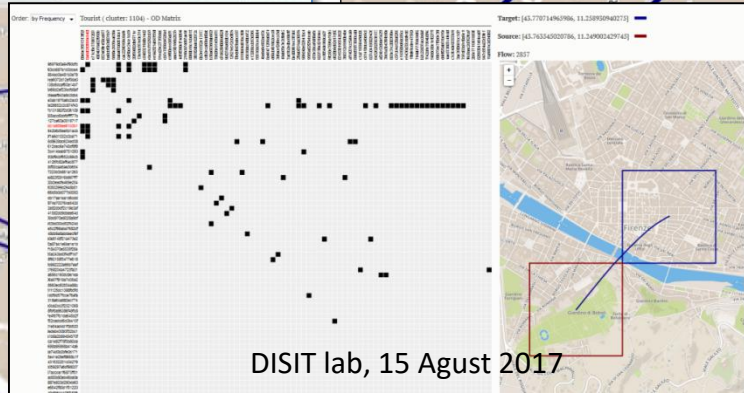
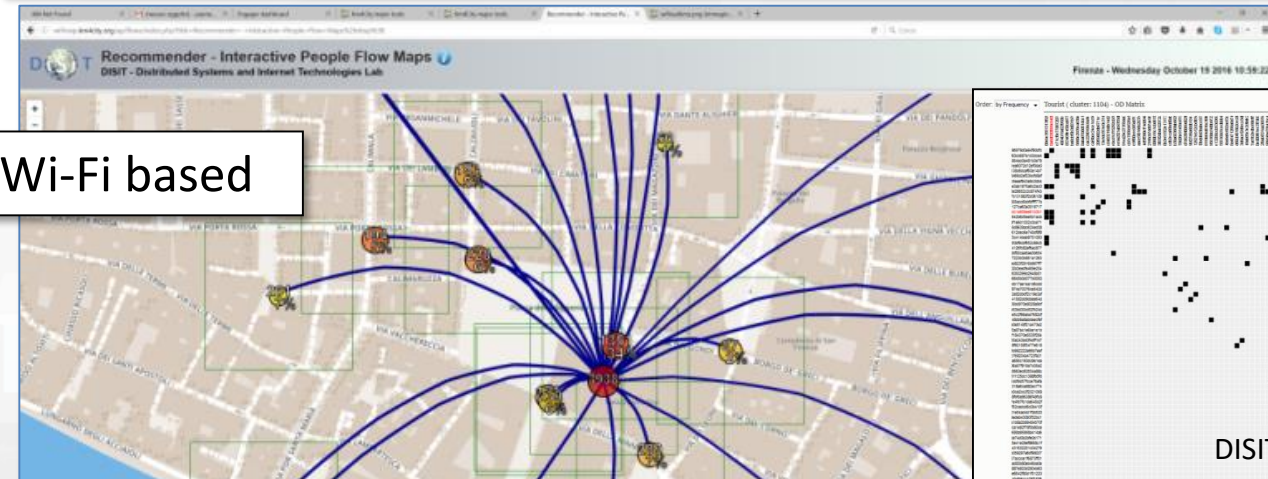
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Origin Destination Matrix Estimation



Wi-Fi based



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>





- **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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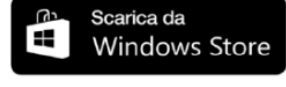
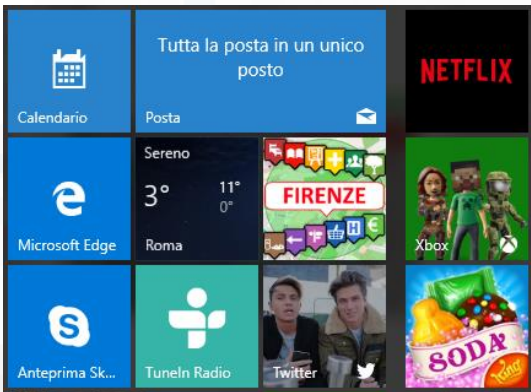
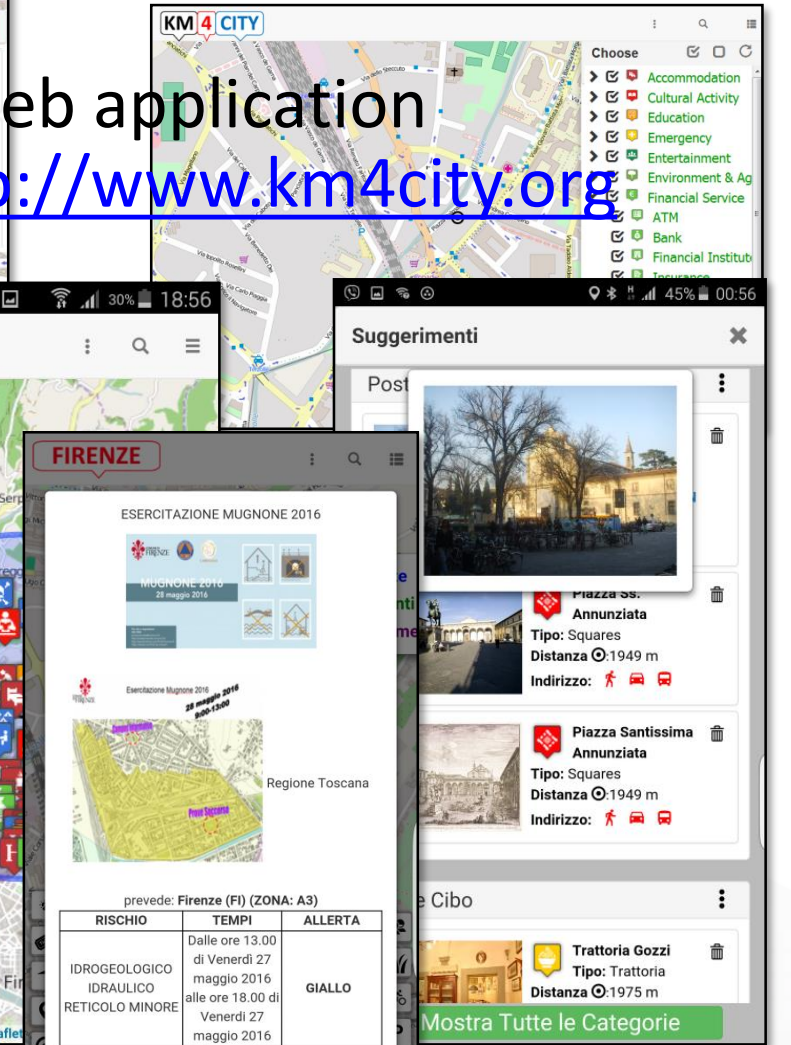
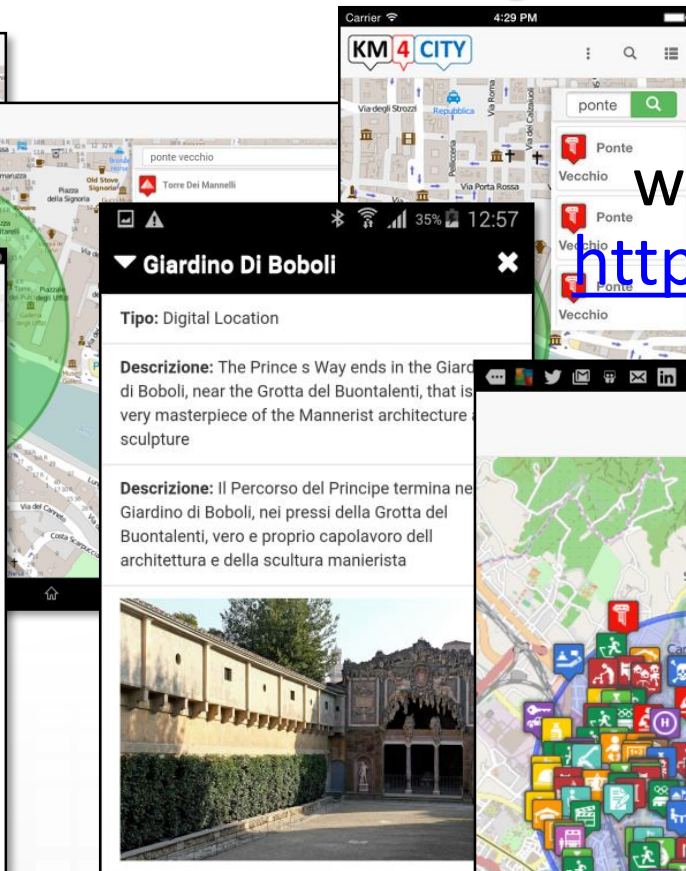
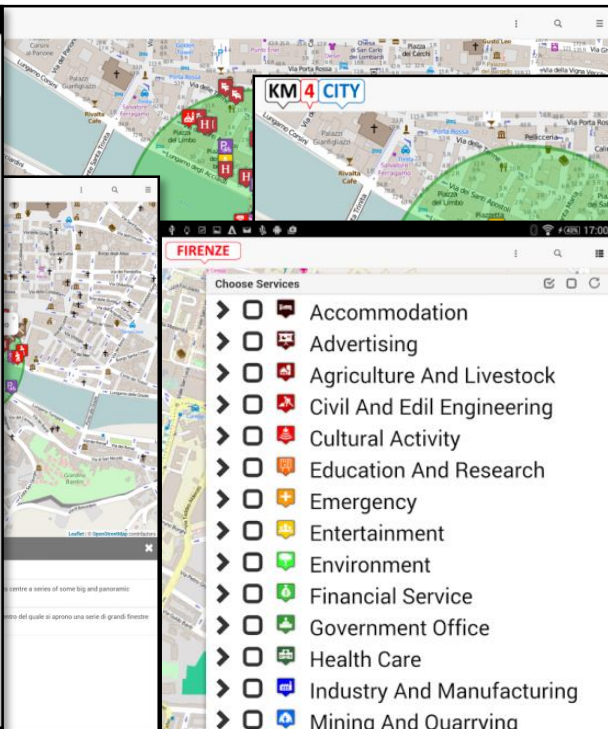
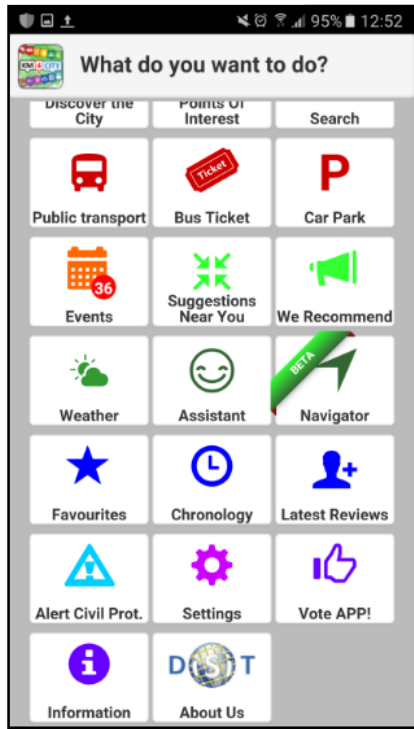
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<http://www.disit.org>

Km4CityMobile App



web application

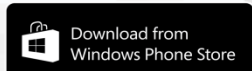
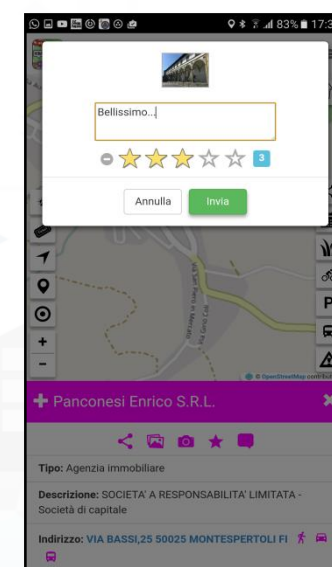
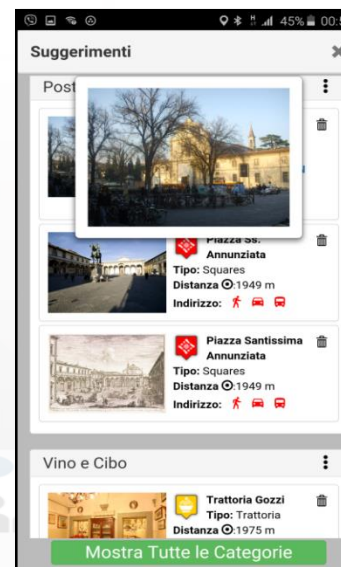
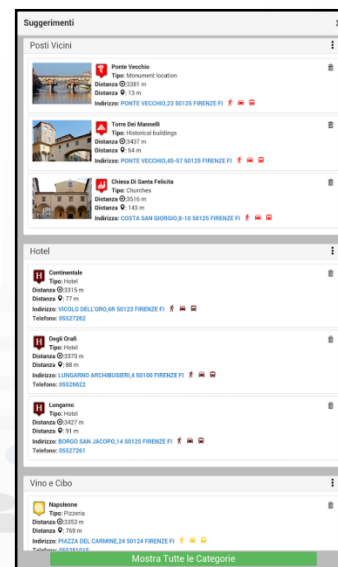
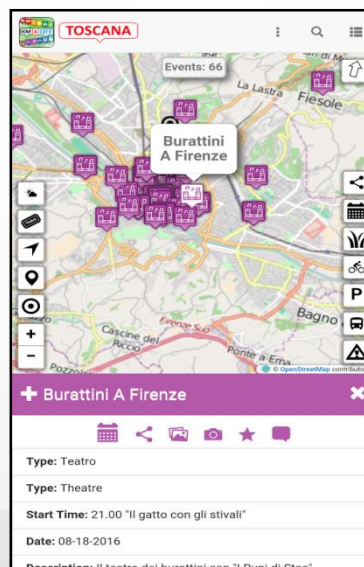
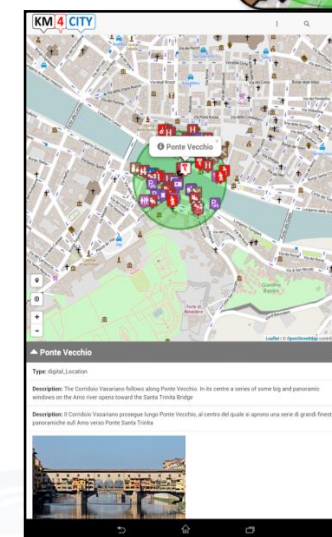
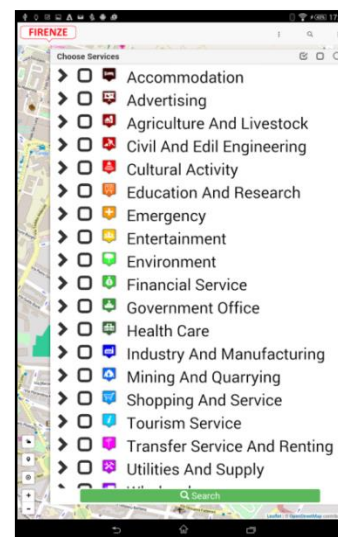
<http://www.km4city.org>



Km4City APP, features 1/3



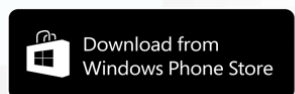
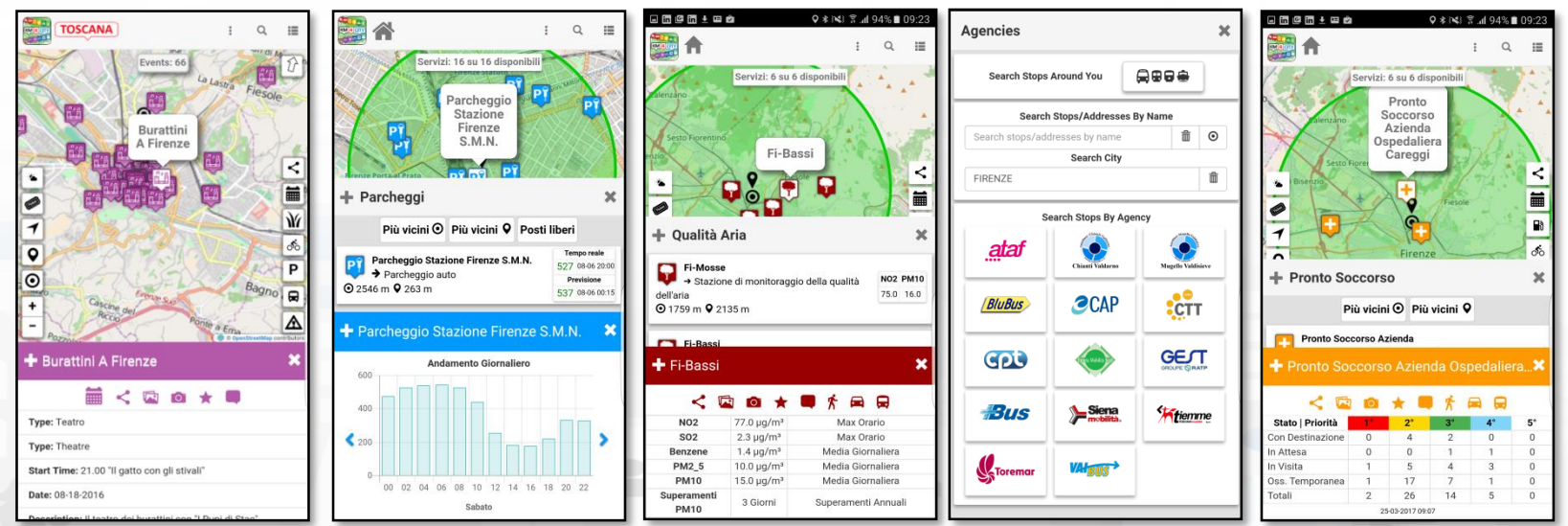
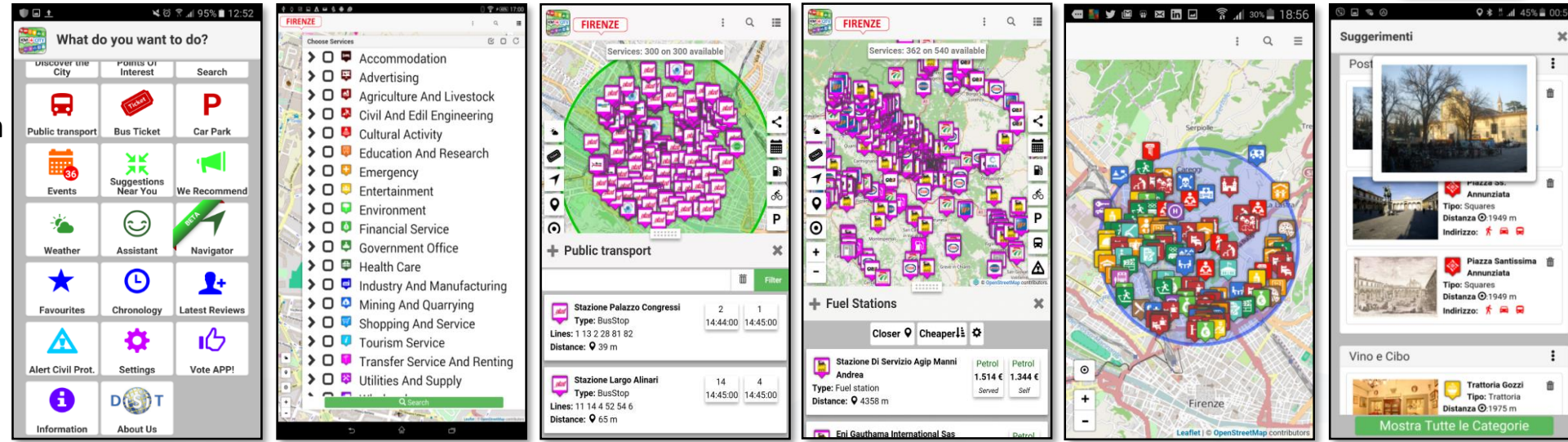
- **5 languages:** IT, EN, SP, DE, FR
- **Profiles** city users: Citizens, commuter, student, tourist, operator, etc..
- **Profiled Menu** per POI
 - adaptive
- **Main Menu: dynamic, and personalized**
- **Search Text**
- Search per POI
 - Near to you, near to a point, line...
- Other search
 - Close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



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



Km4City APP



- Mobility**

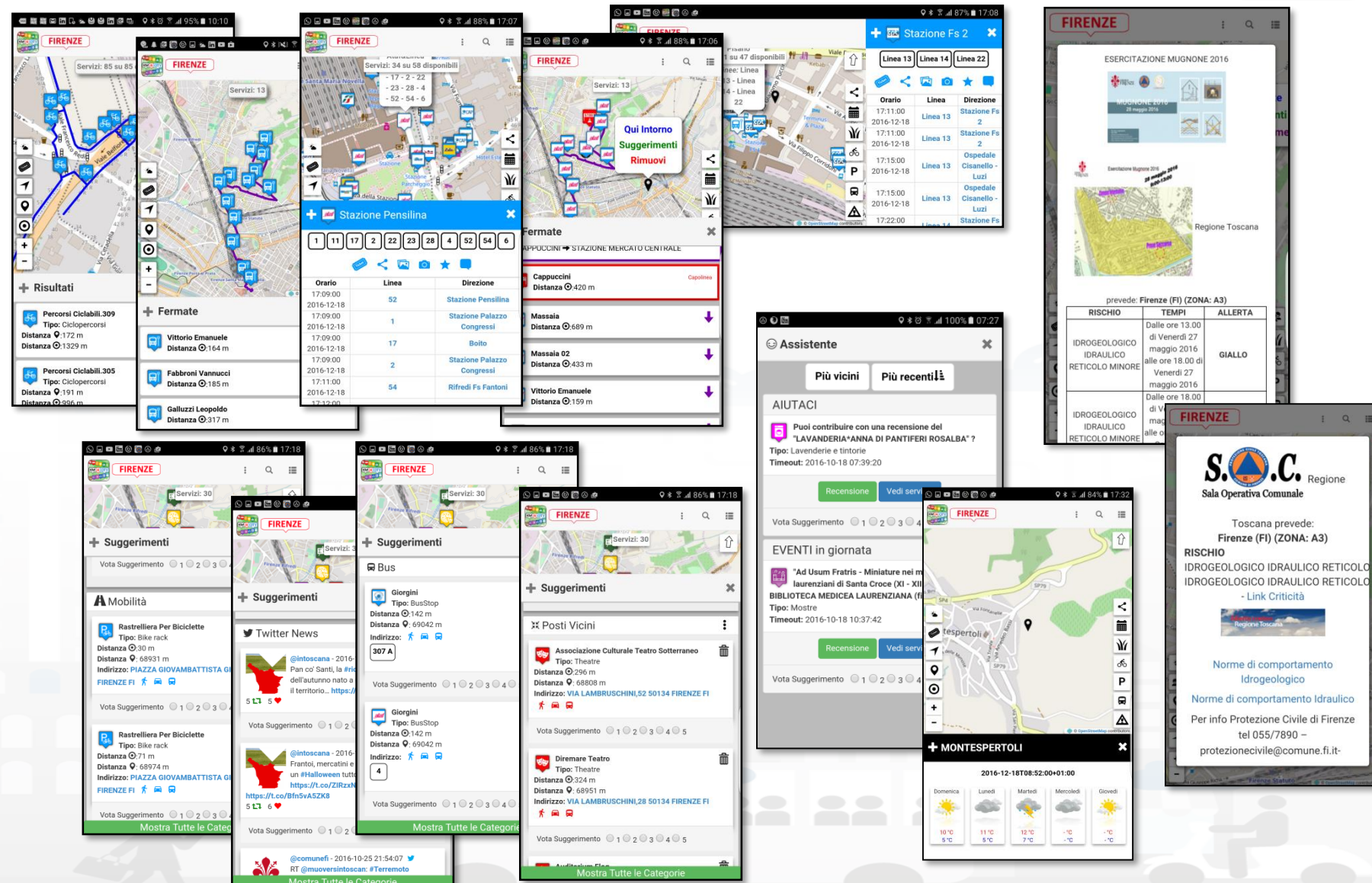
- Paths and stops, time
- Parking + prediction
- Ticketing
- Flow + prediction
- Navigation
- Connection with devices
- XXX Sharing

- Personal Assistant**

- Info, Engagement
- Help, Civil protection

- Suggestions:**

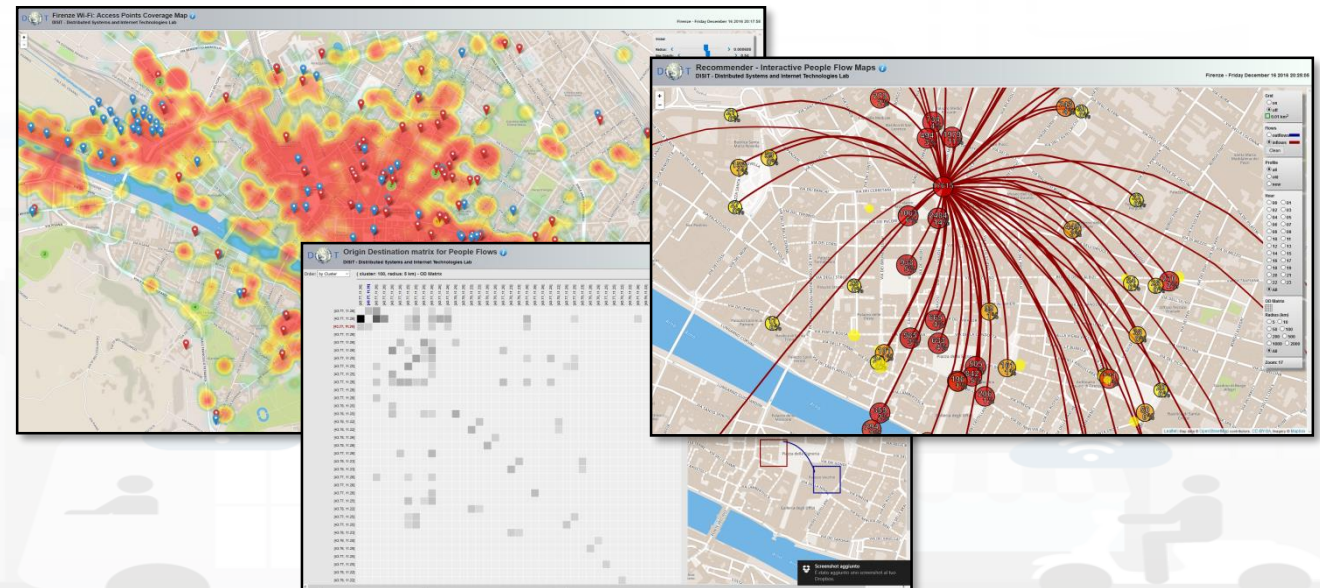
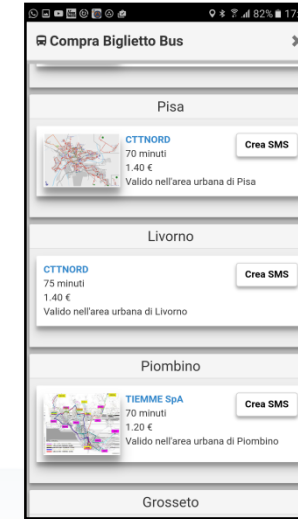
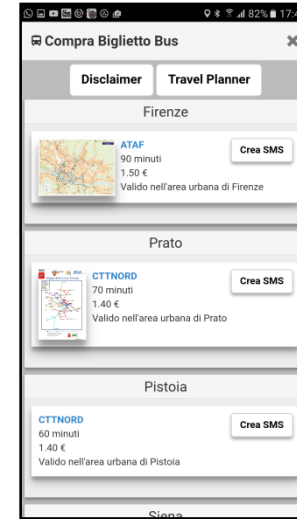
- Personalized and adaptive: banned e typed per city user.
- POI, Twitter, Events,
- Weather forecast,
- Civil Protection



Km4City APP, features 3/3

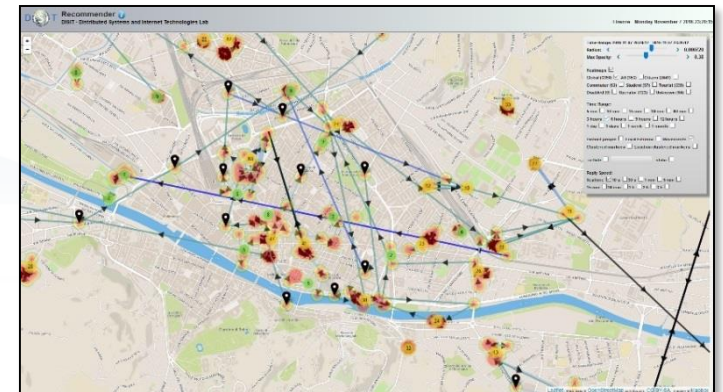
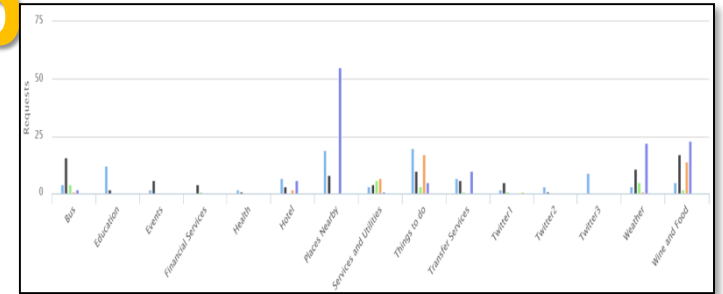


- Navigation 3D (BETA)
- Ticketing for busses
- App used are tool for city assessment
 - Wifi status
 - iBeacon status
 - User behavior analysis
 - GPS movements kinds
 - OD matrix
 - International flows



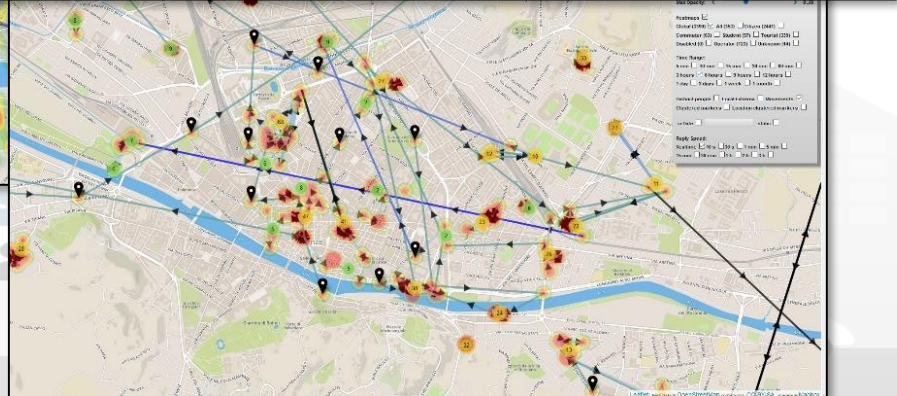
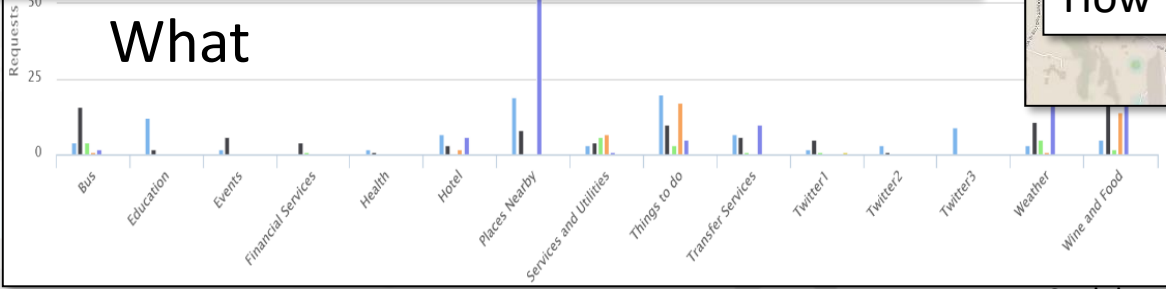
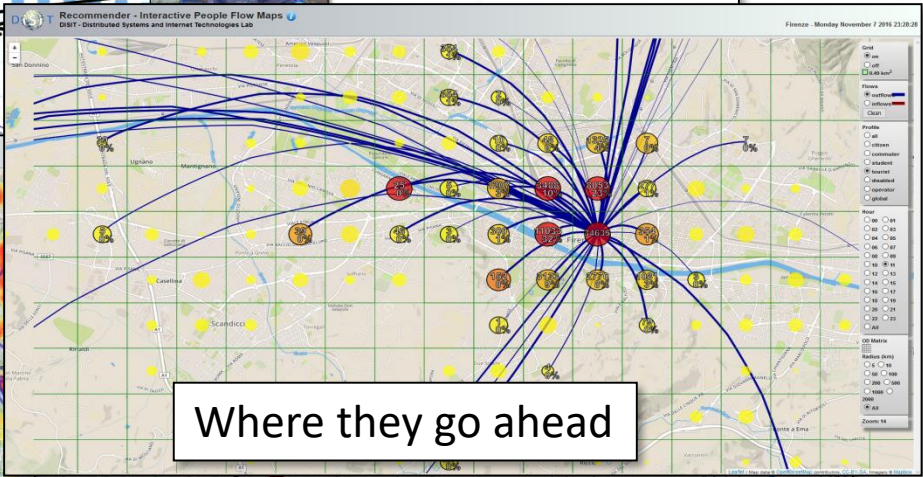
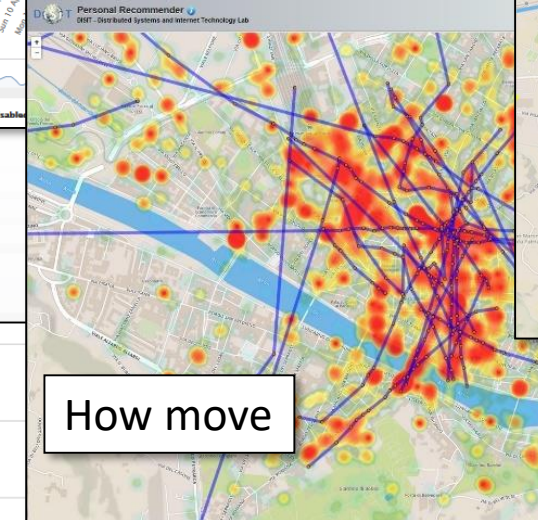
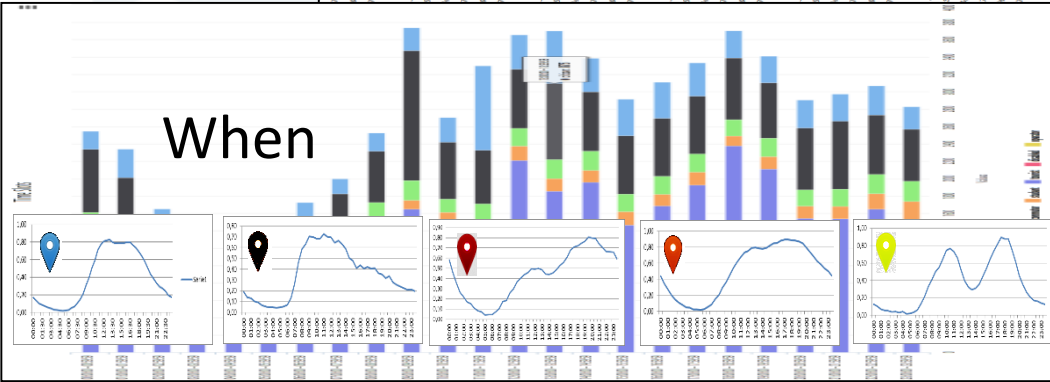
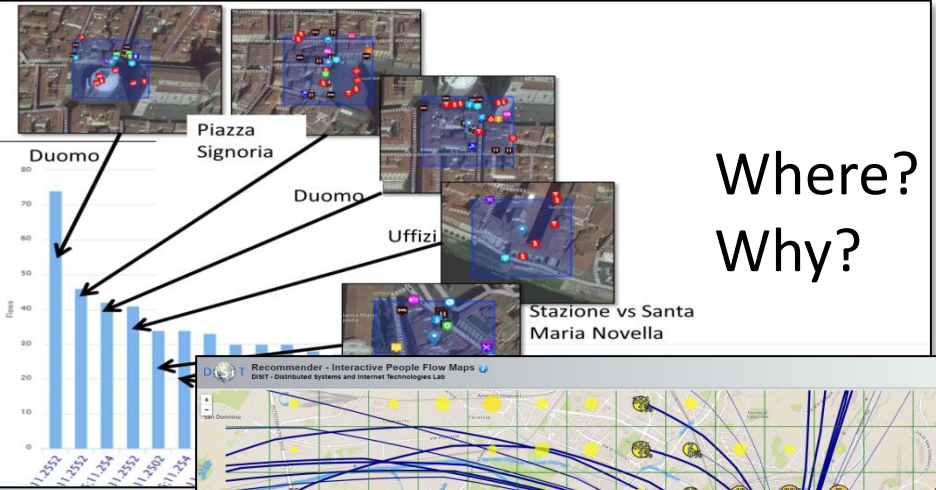
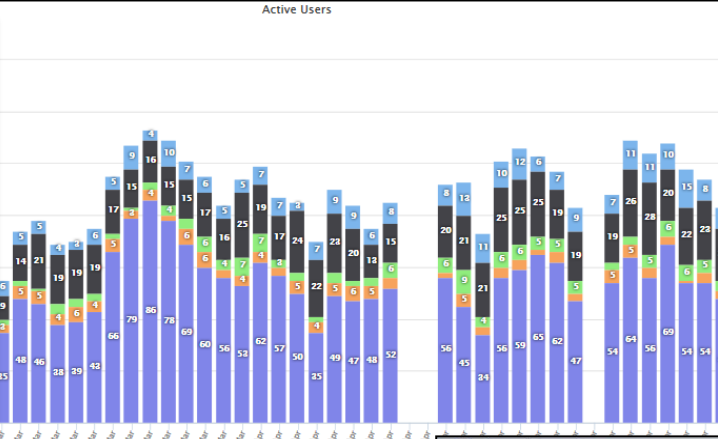
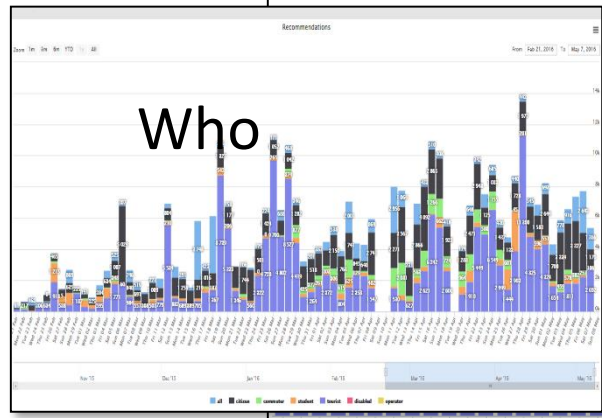
Reasoning on App Data and for App

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



Rule name	Type	#sent	#viewed	#viewed on #sent	Description
daily_event_de	ENGAGEMENT	1 (0%)	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

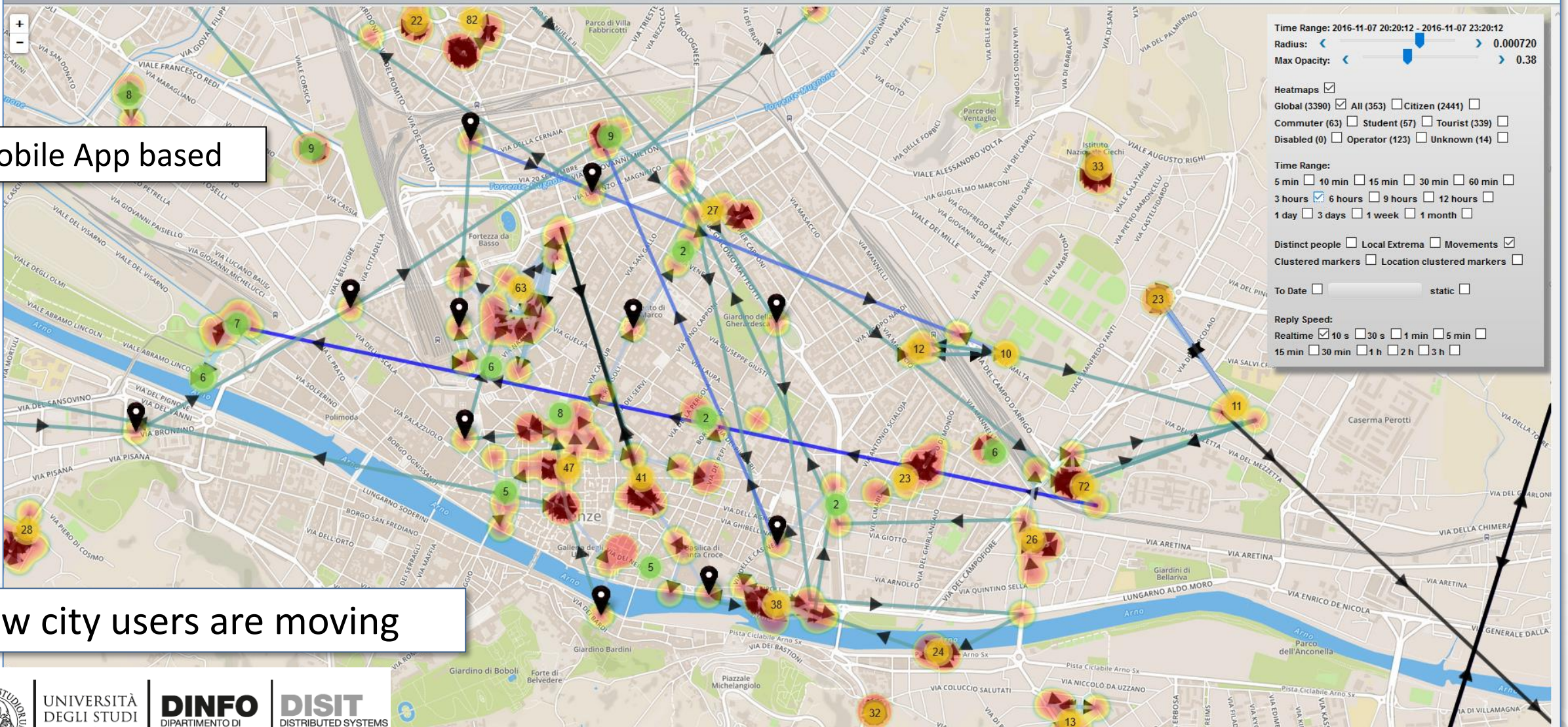


Anonymous User Behavior Analysis



DISIT Recommender
DISIT - Distributed Systems and Internet Technologies Lab

Firenze - Monday November 7 2016 23:20:15



Mobile App based

How city users are moving



Problems of Trajectories from Apps

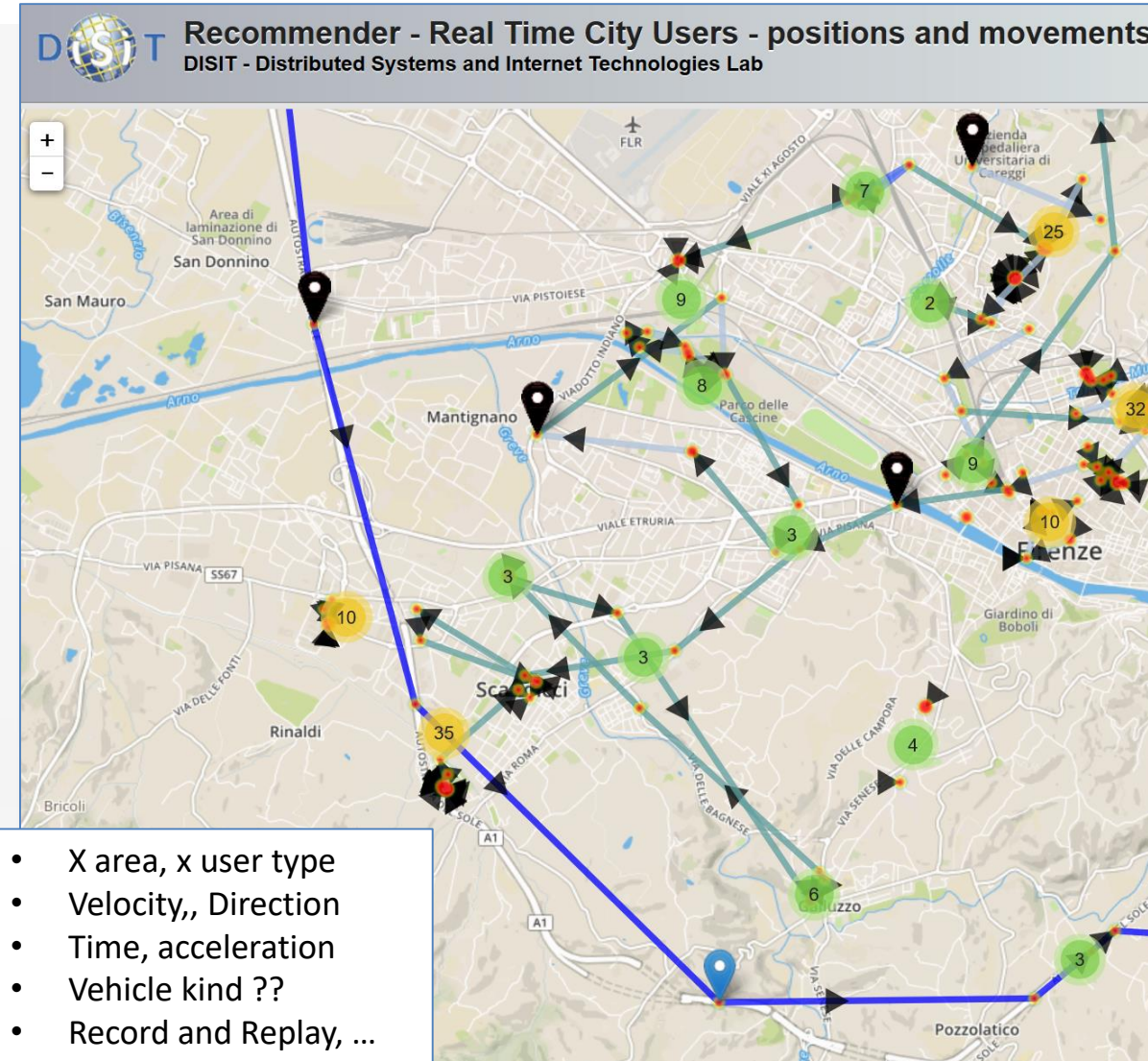
- **From mobile app:**

- 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.

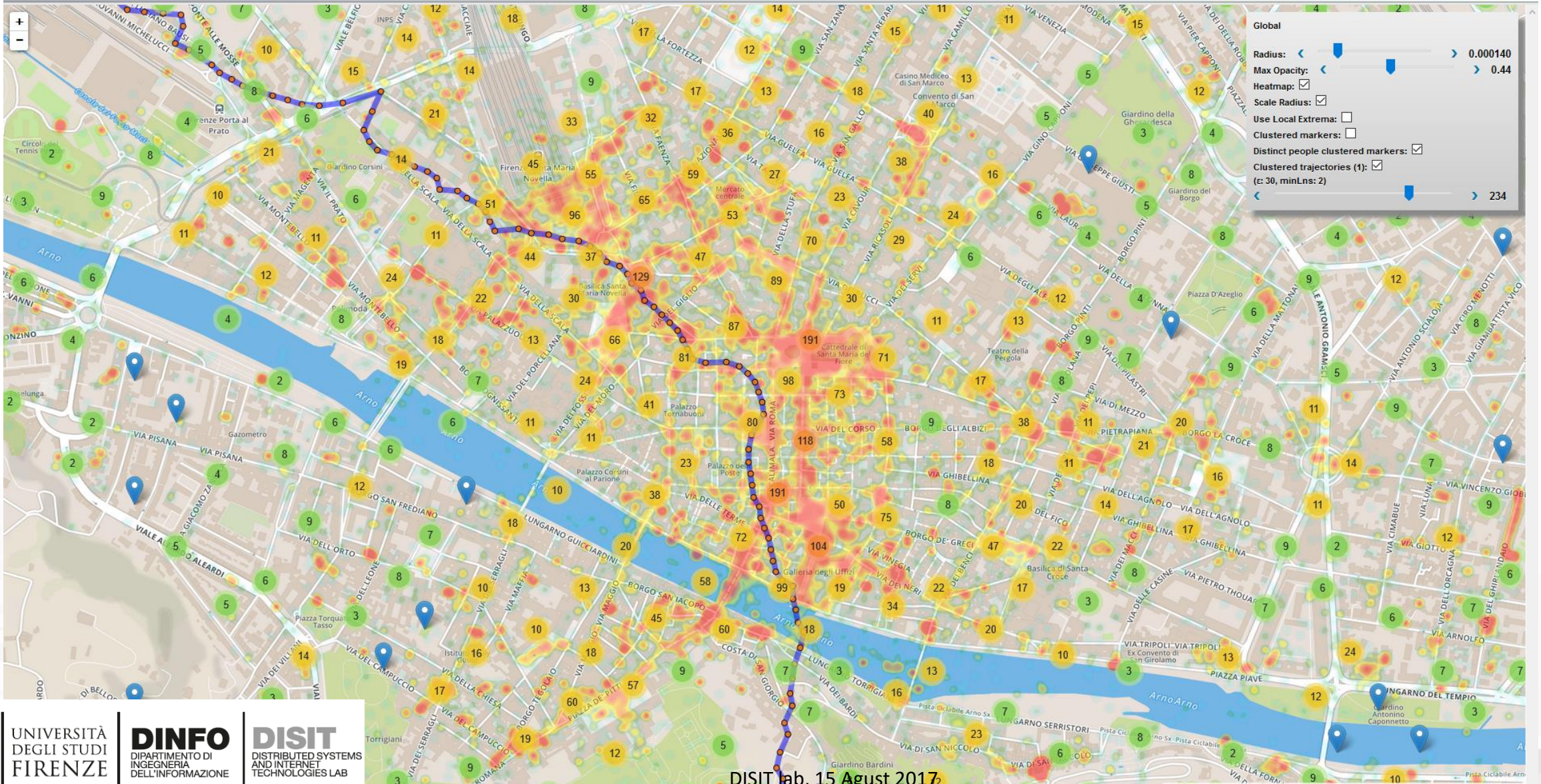


Heat Map from Mobile: users as sensors



DISIT Recommender - Heatmap and Trajectories Clusters of City Users Together
DISIT - Distributed Systems and Internet Technologies Lab

Firenze - Sunday January 8 2017 13:57:00



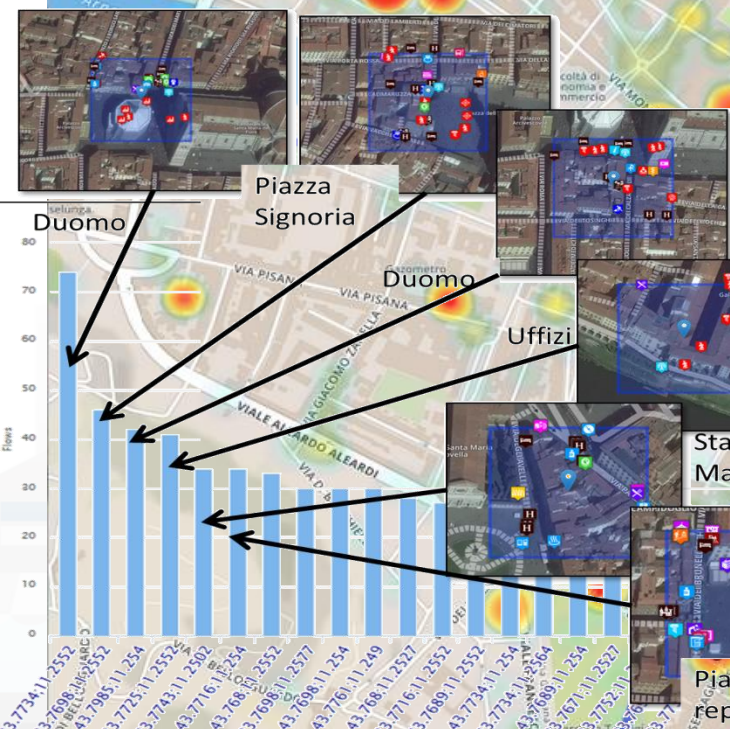
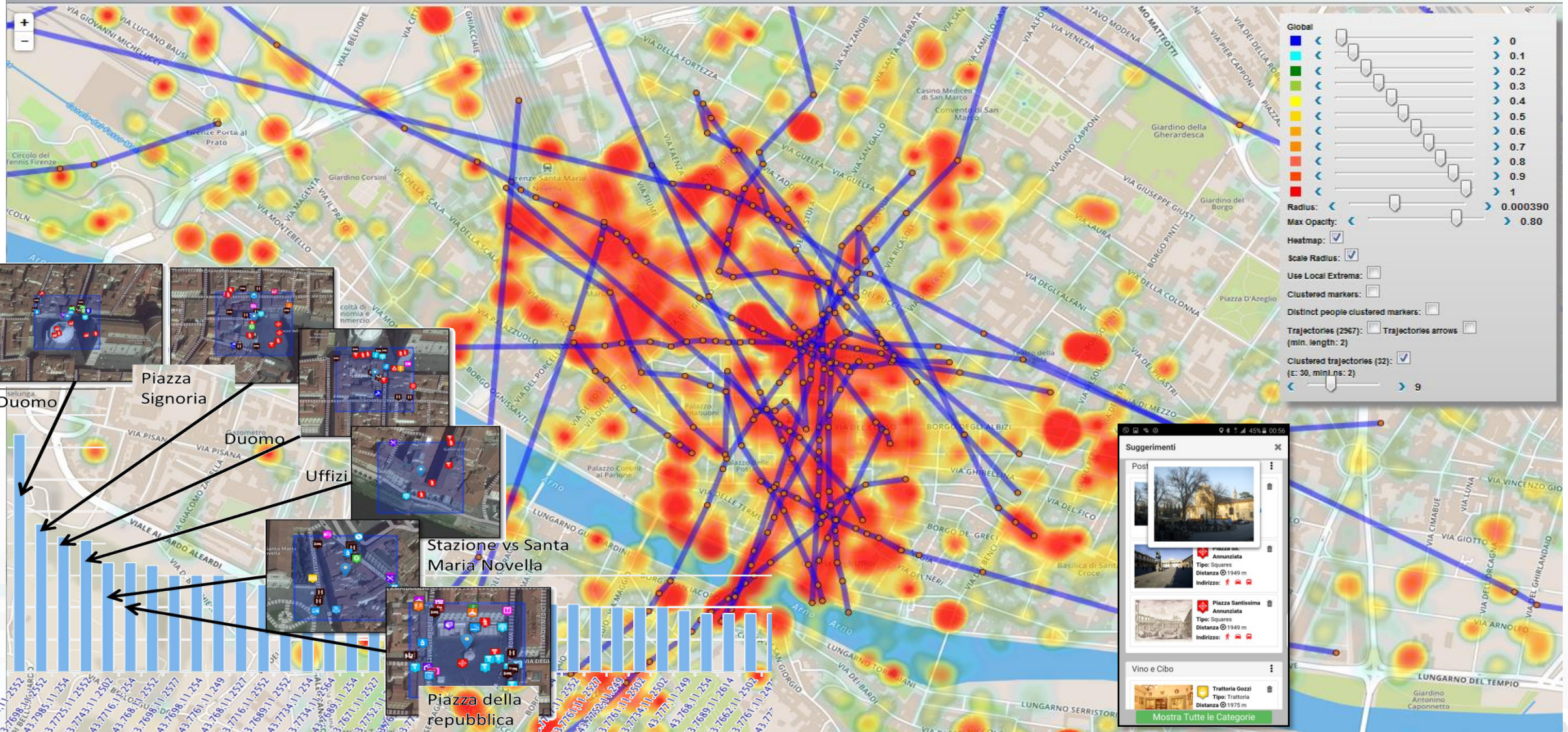
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User Behavior Analyzer

DISIT Personal Recommender
DISIT - Distributed Systems and Internet Technology Lab

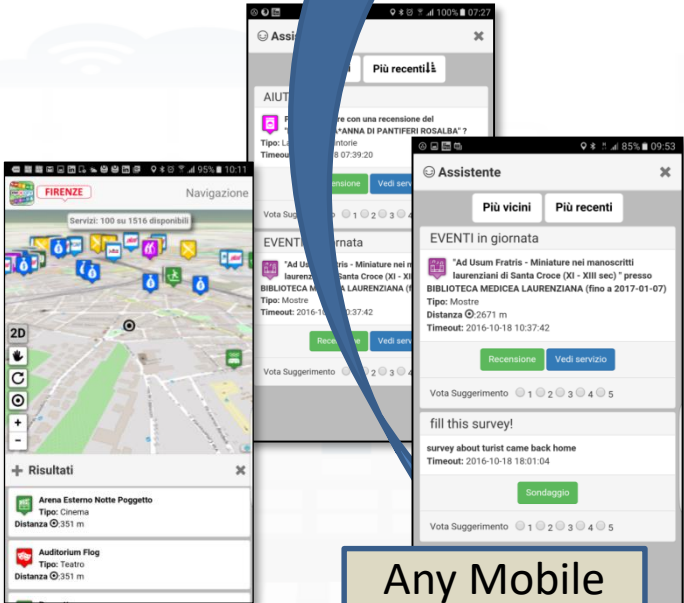
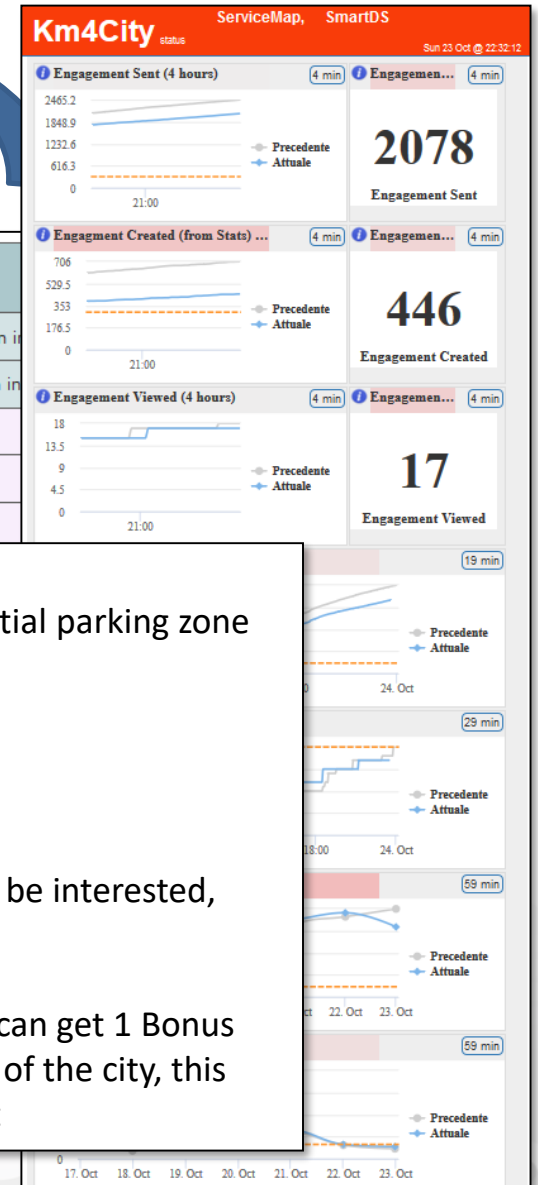


User influencing, engaging, monitoring & Follow Up

City & City Operators Strategy Editor



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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

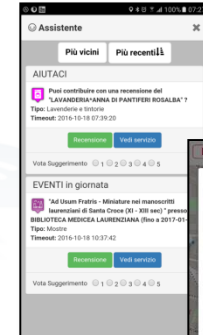
Engage
 Provide a comment, a score, etc..

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

Engagement & Assistant 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





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voucher per:

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Scari
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Scarica, viaggia, vinci!

Dal 15 aprile al 15 luglio scegliere il trasporto pubblico ti premia! Scarica l'app "Toscana dove, cosa", guadagna punti viaggiando in autobus e vinci tanti fantastici premi! Per maggiori informazioni visita il sito info.sii-mobility.org



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REWARDING'S RULES

• ASSISTANCE

- If public transport is detected after bus line suggestion on trajectory usually made on private transport → 10points
 - Why don't you take the bus line 4 in Piazza Marconi to reach your workplace? You save money, you respect the environment and you will be stress free for not worry about parking!
- Once a day, if public transport is detected after suggestion on an alternative bus line availability → 3points
 - Why don't you take the bus line 4 that stop just 50 meters far from you? You save money, you respect the environment and you will be stress free for the traffic jam!
- If public transport is detected for at least 30(?) minutes a day → 1point
- ?parking

• ENGAGEMENT

- Survey on commuter and their preferred way of mobility → 1point
 - How many minutes you usually commute to go to work? How do you rate the service?
- Feedback on public transport → 1point
 - Which current public transport are you using? Are the service in line with your expectation?
- Comments/Photo/Rate or survey on POI (public transport) → 1point
- Survey on use of the App after N days or for tourist coming home → 1point
- Feedback on PPOI or mobility → 1point
- ?events



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www.disit.org

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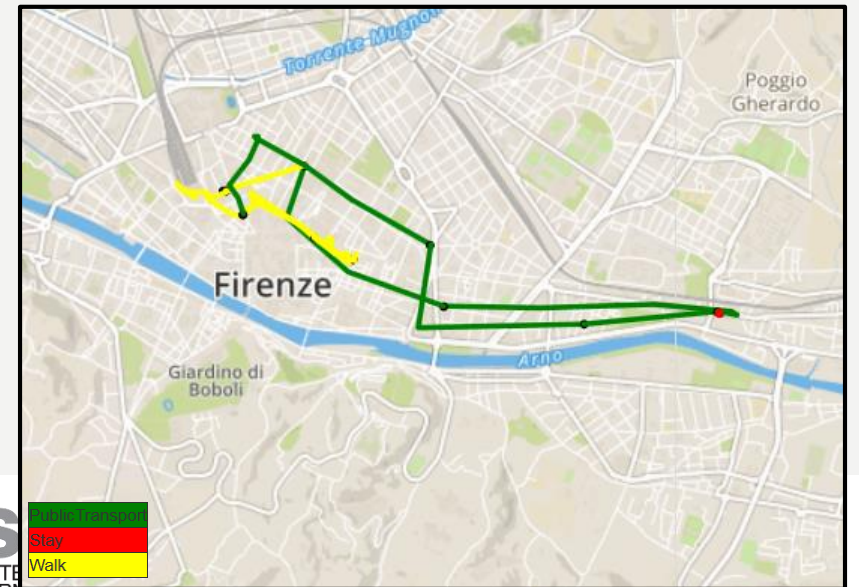
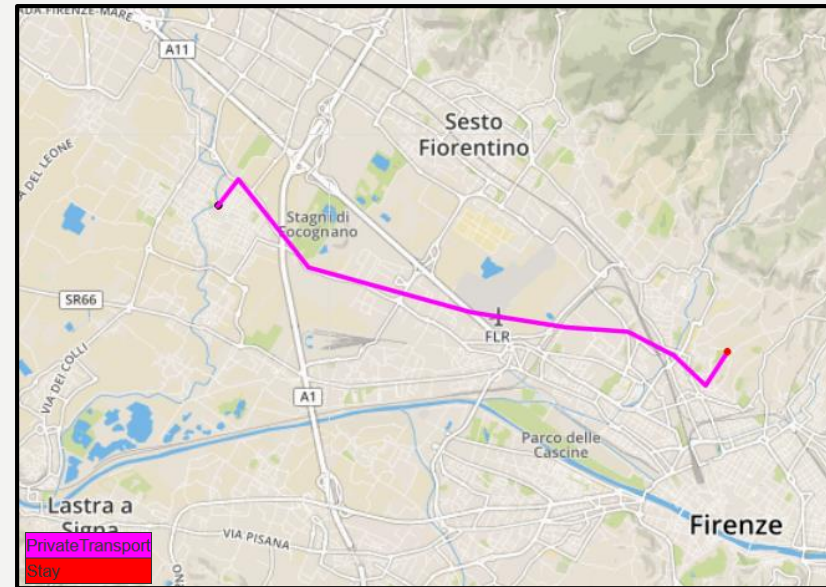
www.sii-mobility.org



www.km4city.org

WALLET / PROFILE

- On homepage
 - How many points have been distributed?
 - How many rewards has been already delivered?
 - How many rewards are still available?
 - How many CO2 has been saved?
 - How many km our users made this week?



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DISTRIBUZIONE
E INFORMATICA
E TECNOLOGIE
DELL'INFORMAZIONE

www.disit.org

www.sii-mobility.org

www.km4city.org

Monitoring City users

Via Social Media

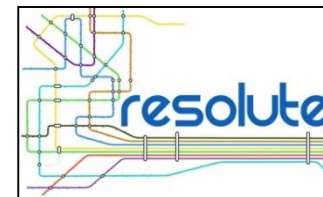
<http://www.km4city.org/?controlRoom>

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

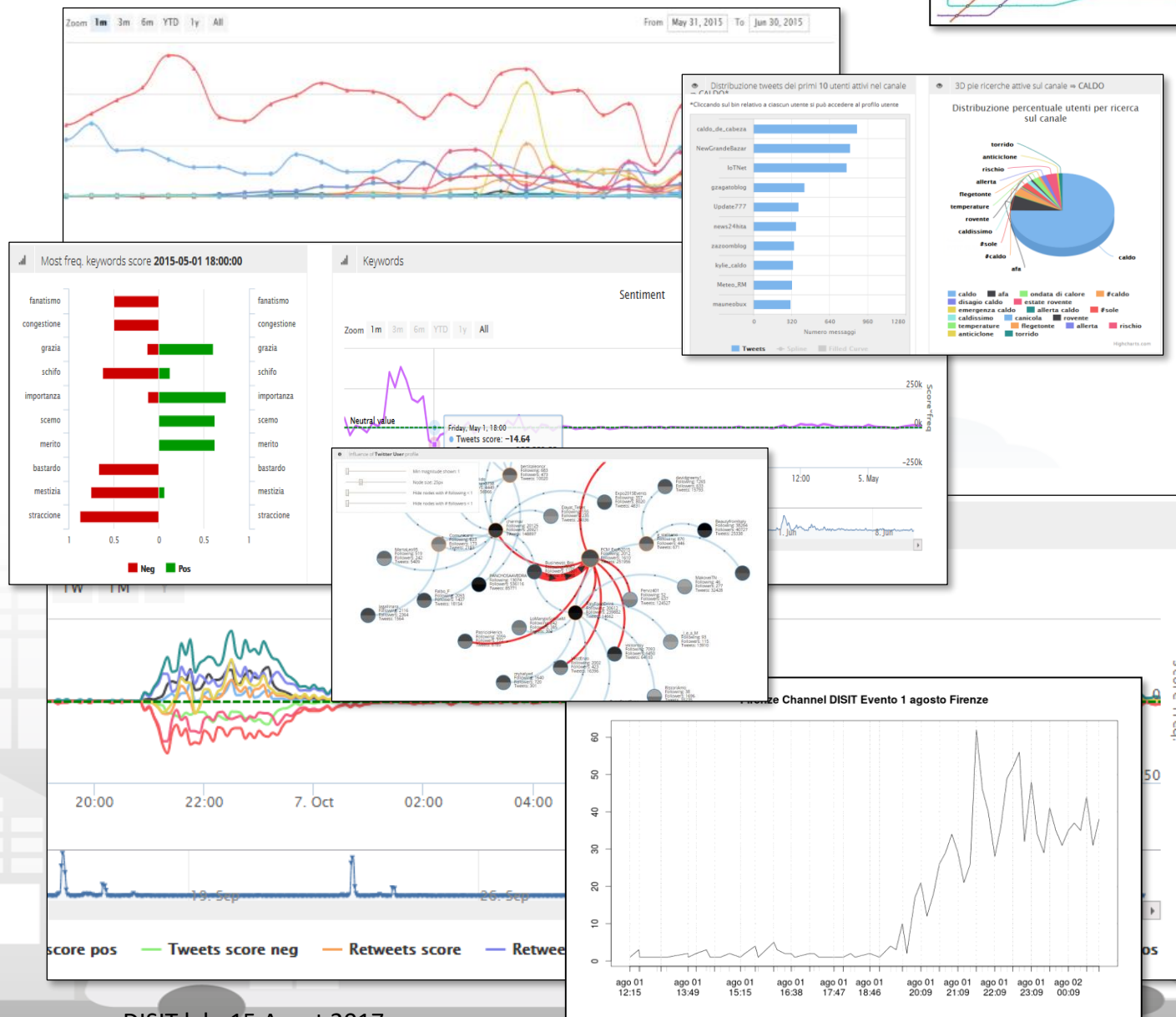
<http://www.km4city.org/?infoDocs>

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

Twitter Vigilance



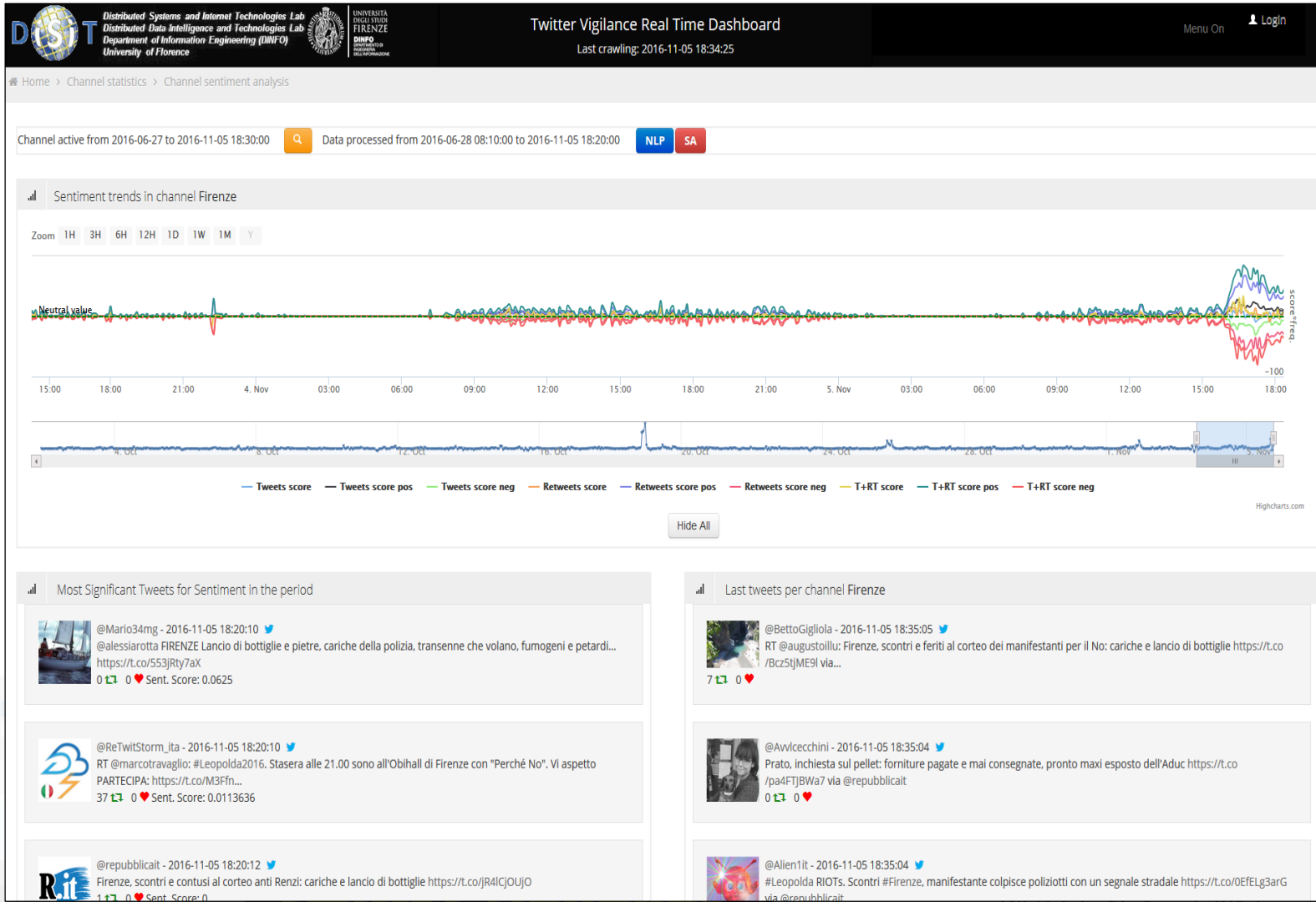
- <http://www.disit.org/tv>
- <http://www.disit.org/rttv>
- Citizens as sensors to
 - Assess sentiment on services, events, ...
 - Response of consumers wrt...
 - Early detection of critical conditions
 - Information channel
 - Opinion leaders
 - Communities
 - Formation
 - Predicting volume of visitors for tuning the services



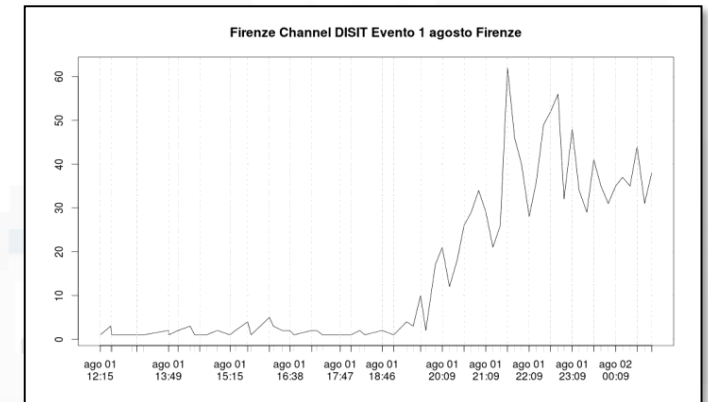
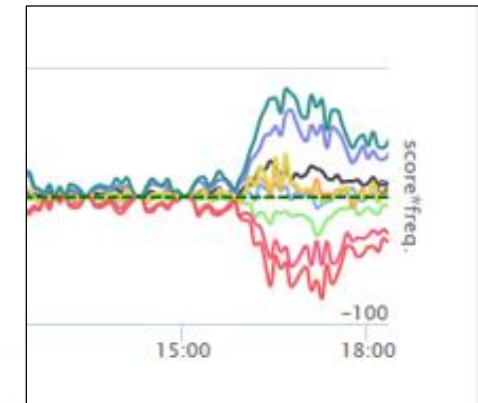


Twitter Vigilance

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

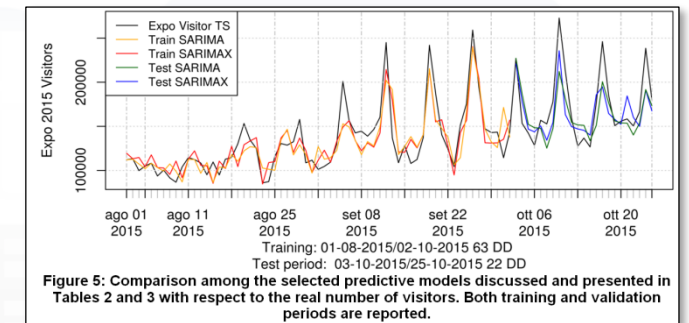
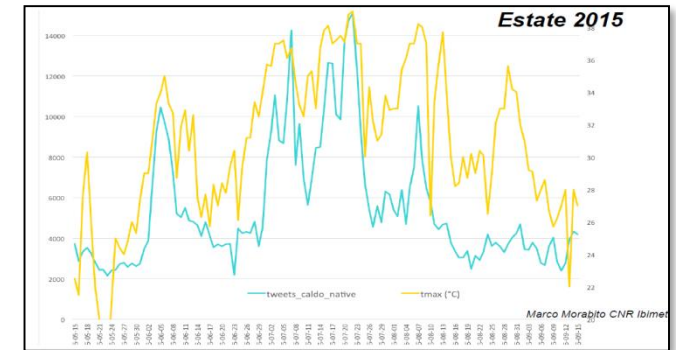
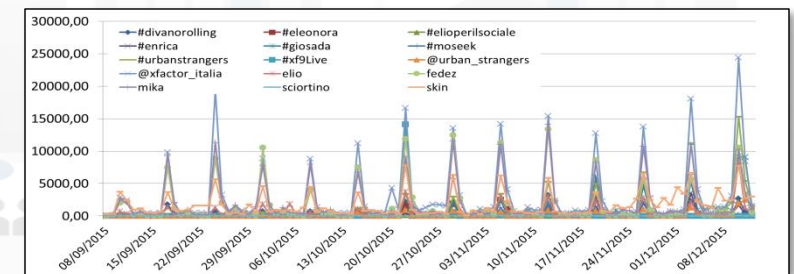


Figure 5: Comparison among the selected predictive models discussed and presented in Tables 2 and 3 with respect to the real number of visitors. Both training and validation periods are reported.



Twitter Vigilance su Firenze (sperimentale)

Twitter: Volume di Tweet tramite Twitter Vigilance

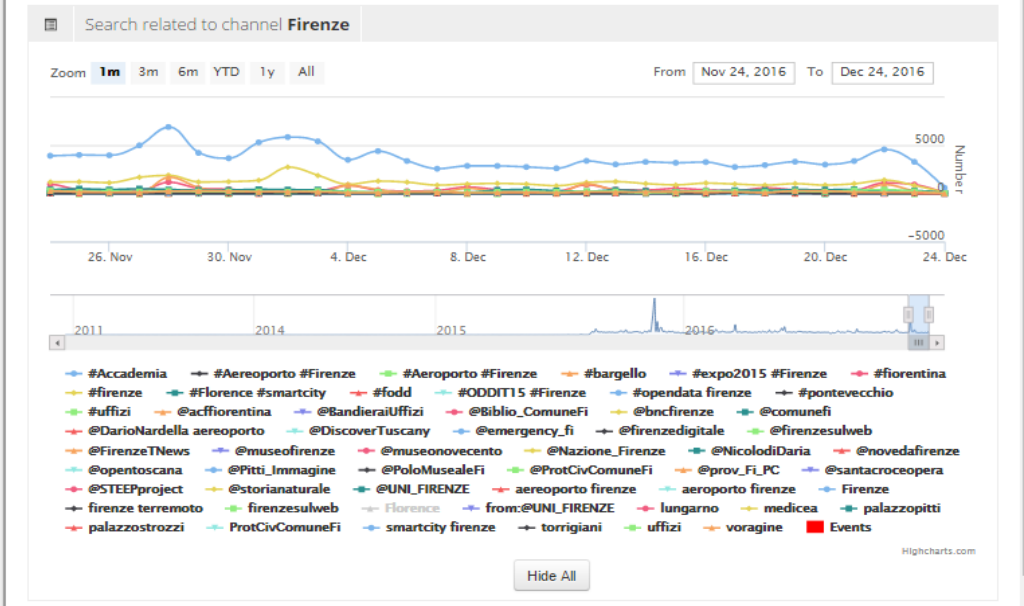
Twitter Vigilance Dashboard
Last crawling: 2016-12-24 12:34:51

Menu On Login

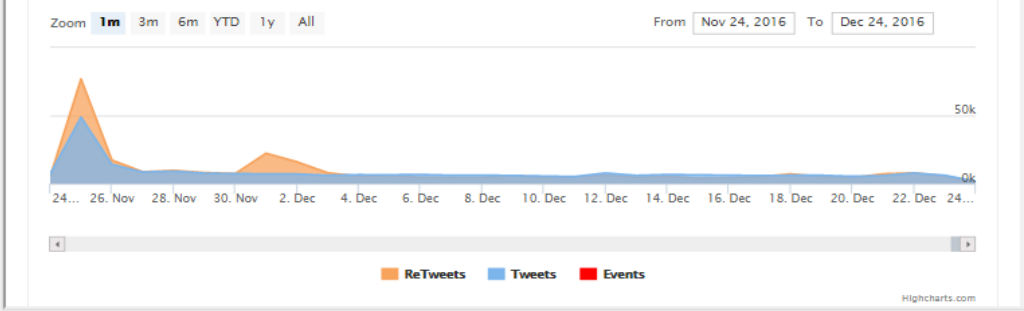
Home > Channel statistics > Statistics on single Channel

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

NLP SA



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



Sentiment Analysis in Tempo Reale su Firenze

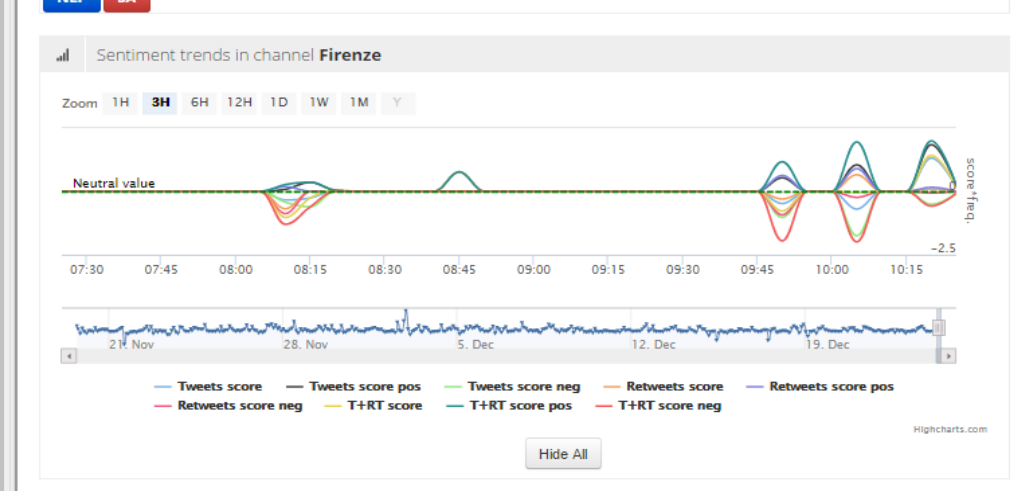
Twitter Vigilance Real Time Dashboard
Last crawling: 2016-12-24 10:32:33

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



Most Significant Tweets for Sentiment in the period

Last tweets per channel **Firenze**

@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

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

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

@infoiterno - 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>

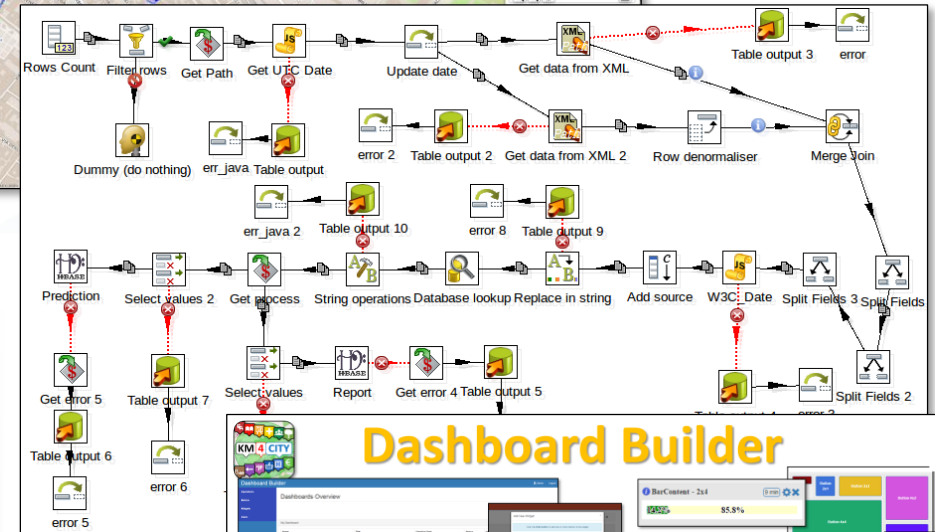
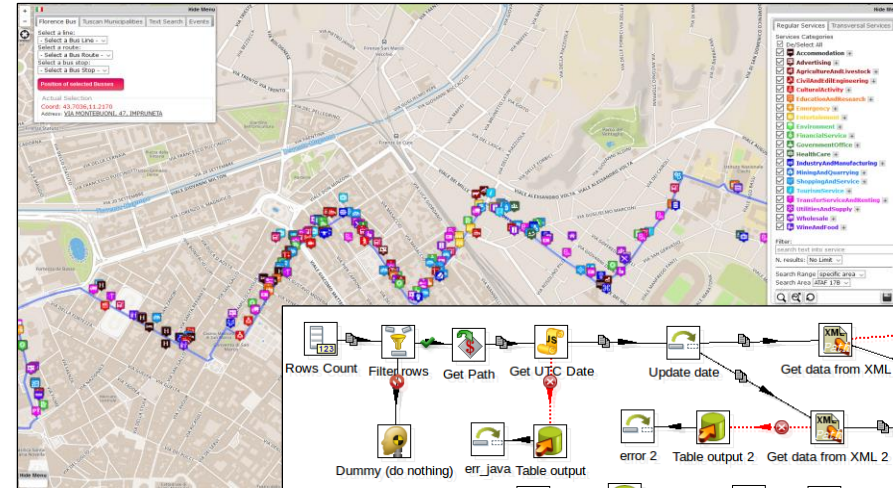
<http://www.km4city.org/?app>



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



Energy (demo)

ServiceMap SmartDS

Q1 Q2 Q3 Q4 Q5

Active wind turbines: 57.6%

Charging column map

City consumption: GW 0

Free charging slots: cols 17

Active solar panels: 81.6%

City consumption trend

Free bike...

Energy...

Firenze

43.7693, 11.2560

ServiceMap, SmartDS

Tue 4 Oct @ 12:18:04

WiFi operativi: 100%

Numero di processi lanciati: 2676

CPU in uso: 24.2%

Memoria in uso

SmartCity Engine

Bus attivi: 0

Parcheggi liberi: 100%

Real time position ATAF bus

Previsioni meteo: FIRENZE

Twitter Trends/citazioni

Principali Twitter Trends: #fiorentina #uffizzi

Citazioni: @NicolodiDaria @acffiorentina @communi

Stato linee ATAF

Linee: 6 17 4

in Orario: 46.2%

in Anticipo: 4.6%

in Ritardo: 49.2%

23.4%

71.6%

Twitter Vigilance

Firenze Wi-Fi: APs Streaming Realtime

DISIT - Distributed Systems and Internet Technologies Lab

Firenze - Tuesday October 4 2016 13:18:05

Time Range: 2016-10-04 13:03:00 - 2016-10-04 12:18:00

Radius: 0.0008

Max Capacity: 0.80

Heatmap (2865) Streaming APs

Time Range: 5 min 10 min 15 min 30 min 60 min 3 hours 6 hours 9 hours 12 hours 1 day 3 days 1 week 1 month

Distinct people Local Extrema Clustered markers

To Date static

Reply Speed: Realtime 10 s 30 s 1 min 5 min 15 min 30 min 1 h 2 h 3 h

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

Mugnone 2016

Uteati attivi (12 ore)

Turisti attivi (12 ore)

Rilievi wifi al giorno

Accessi ai servizi singoli (web e mobile)

Query Km4city API

Recommender - Heatmap and Trajectories Clusters (User Profile: All)

DISIT - Distributed Systems and Internet Technologies Lab

Firenze - Tuesday October 4 2016 13:18:05

Radius: 0.000510

Max Capacity: 0.46

Scale Radius

Use Local Extrema

Clustered markers

Distinct people clustered markers

Clustered trajectories (15) (0.36, 0.00, 0.2)

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

Twitter Vigilance Dashboard

DISIT - Distributed Systems and Internet Technologies Lab

Department of Information Engineering (DICE) University of Florence

Twitter Vigilance Dashboard

Last crawling: 2016-10-04 13:16:53

Home > Channel statistics > Channel sentiment analysis

Channel active from 2009-12-06 to today

Data processed from 2015-09-09 to 2016-01-21

NLP SA

Sentiment trends in channel uber

Zoom 1m 3m 6m YTD 1y All

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

Hide All

SmartCity Processes

Fri 4 Nov @ 18:51:20

ATAF ATAF ATAF ATAF CHECK RT EVENTI FI

amr_lineaT1_1 RUNNING RUNNING SUCCESS SUCCESS SUCCESS SUCCESS

PARK PARK PARK PARK PARK PARK

parcagg1_1 FAILED SUCCESS SUCCESS SUCCESS SUCCESS SUCCESS

METEO METEO METEO METEO METEO METEO METEO

previ_meteo_Abbone_xmi_1 previ_meteo_Arezzo_xmi_1 previ_meteo_Fiesole_xmi_1 previ_meteo_Firenze_xmi_1 previ_meteo_Impuneta_xmi_1 previ_meteo_Lucca_xmi_1

sensori sensori sensori sensori sensori sensori sensori

sensoriandicometro sensori_AREZZO_1 sensori_EMPOLI_1 sensori_PISA_1 sensori_FIRENZE_1 sensori_PRATO_1

TWITTER TWITTER FI WIFI FI WIFI FI WIFI FI WIFI FI WIFI

tweetTweetsRecommender TwitterVigilanceDashboard calculateAPTimeSeries calculateNewUsers calculateUsersStatus GraphJSGenerator

SUCCESS RUNNING RUNNING SUCCESS SUCCESS FAILED

Twitter Vigilance



Dashboard Builder

<http://www.disit.org/6935>



Dashboard Builder

Admin Logout

Operations
Metrics
Widgets
Users

Dashboards Overview

My Dashboard

Name	Title	Creation Date	Status
12	Dashboard Galia	2016-07-27 11:35:15	

A - 01

Copia 59

Copia Duplicazione Dashboard

CopiaAdminDash

CopiaDashAttuale

dashboard creata

DASHBOARD DUPLICATA 41

DashobarAdmin

Menu_dash

nuova Copia

nuova Copia01

Nuova Dashboard

NUOVA DASHBOARD 40

Sources Management

DataSources Overview

ID	URI
Km4CityApp	jdbc:mysql://fedislog:3306
Km4Cityquartz	jdbc:mysql://192.168.0.20:3306
Km4CityRDF	http://192.168.0.208:8080/WebApp/Grafico?spanl
Km4CityRecommender	jdbc:mysql://192.168.0.55:3306
Km4CityServiceMap	jdbc:mysql://192.168.0.72:3306
Km4CitySillmobility	jdbc:mysql://192.168.0.72:3306
prova	jdbc:mysql://fedislog:3306
SmartDS	jdbc:mysql://192.168.0.25:3306
TwitterTv	jdbc:mysql://192.168.0.50:3306

Add new Widget

Click the Add button to add one or more metrics to the widget

Metric: Sensors_RT

Metric Description: Description: Percentage of Edge Sensors Active
Metric: CPUUsage: Percentuale+424
Data Area: Mobilita
Data Source: Osservatorio Regionale per la Mobilita ed i Trasporti
Refresh rate: 60 sec
Status: Active

Context: [Dropdown]

Type Widget: widgetPieChart (max 1 metrics)

Selected Metrics: Sensors_RT

Link: www.km4city.wtf_operative.it

Information: Percentage of road sensors (underground only) working or not compared to those declared in the day. The portion of the graph in red refers to the percentage of non-functioning, the green part refers to the active ones.

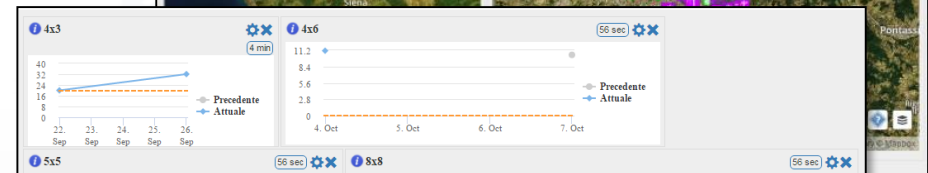
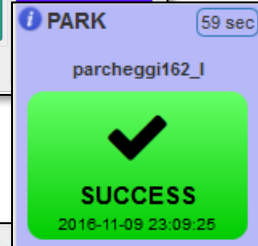
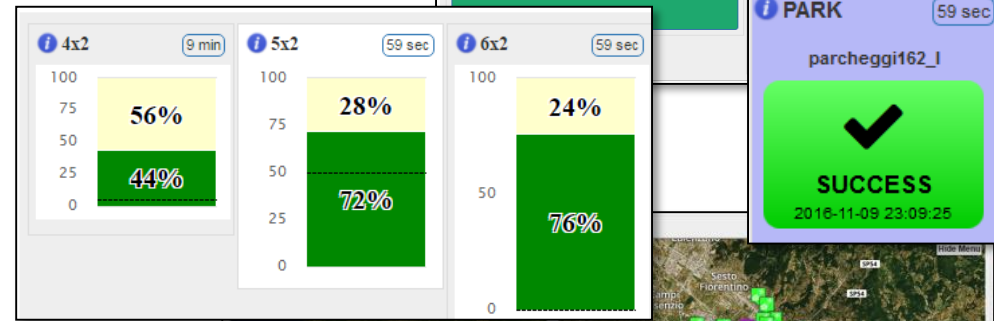
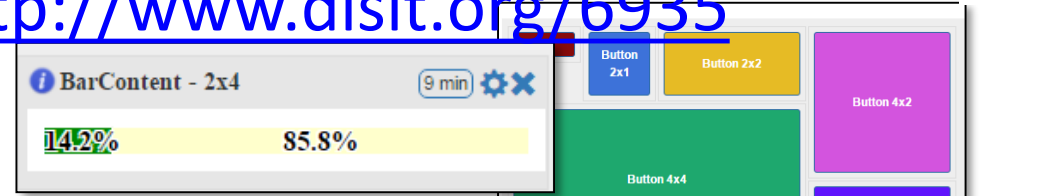
Widget Parameters

Title: Sensors RT Background color: amrr

Time Interval: No Refresh rate (sec): 60

Rows number: 2 Columns number: 3

Buttons: Reset, Close, Create



Modifica Widget

Id Widget: widgetBarContent

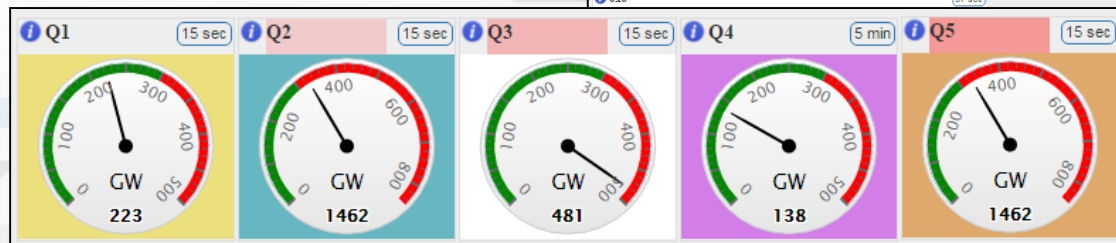
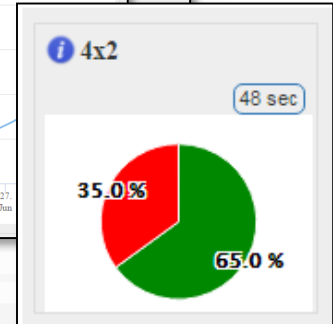
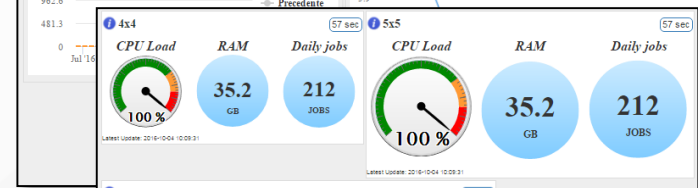
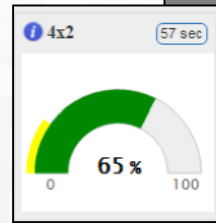
Type: Percentuale

Min. Columns number: 1, Max. Columns number: 2

Min. Rows number: 2, Max. Rows number: 3

n. metrics: 1, Color: 1

Buttons: Close, Modify





Service Map Development 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 Path 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

Bus Lines: 72 Bus Lines Found.

Bus Line: 23
Direzione: NAVE A ROVIZZANO → NUOVO PIGNONE

Bus Line: 23
Direzione: SORGANE → NUOVO PIGNONE

Bus Line: 35
Direzione: MAGENTA → STAZIONE VIA ALAMANNI

Weather Forecast for Municipality of FIRENZE

Day	Forecast
Sunday	light rain and sunny intervals 18°C / 24°C
Monday	cloudy 17°C / 24°C
Tuesday	cloudy 13°C / 20°C
Wednesday	light rain
Thursday	rainstorm

Search for Geo Located Services

Get Events in the city

Regular Services | Transversal Services

search text into service
Services Categories
De/Select All

Area DigitalLocation HappeningNow Path Fresh Place Public Transport Line Road Sensors Bus Stops

N. results for each: 500
Search Range: 500 mt

Search Results

- Services: 418 of 418 available
- Bus Stops: 23 of 23 available
- Road Sensors: 2 of 2 available

Bus Lines: 33 Bus Lines Found.

Bus Line: 23
Direzione: PIAZZA BECCARIA → ...

Bus Line: 23
Direzione: PIAZZA BECCARIA → ...

Bus Line: 12
Direzione: STAZIONE BARRIGONE MESSINI AMPII → ...

Weather Forecast for Municipality of FIRENZE

Day	Forecast
Sunday	light rain and sunny intervals 18°C / 24°C
Monday	cloudy 17°C / 24°C
Tuesday	cloudy 13°C / 20°C
Wednesday	light rain
Thursday	rainstorm

Search in an area

Regular Services | Transversal Services

search text into service
Services Categories
De/Select All

Accommodation Advertising ApplicationAndDevelopment CivilAndITEngineering CulturalActivity Education Environment FinancialService GovernmentOffice HealthCare IndustryAndManufacturing MiningAndQuarrying ShoppingAndService Wholesale WineAndFood

N. results: No Limit
Search Range: visible areas

Search Results

- Services: 2231 of 2231 available

Query results organized by category

Total number of results: 2231

Category	Number of results
Accommodation	458
Advertising	14
ApplicationAndDevelopment	21
CivilAndITEngineering	81
CulturalActivity	16
Education	31
Environment	38
FinancialService	24
GovernmentOffice	104
HealthCare	241
IndustryAndManufacturing	264
MiningAndQuarrying	154
ShoppingAndService	154
Wholesale	154
WineAndFood	154

Weather Forecast for Municipality of FIRENZE

Day	Forecast
Sunday	light rain and sunny intervals 18°C / 24°C
Monday	cloudy 17°C / 24°C
Tuesday	cloudy 13°C / 20°C
Wednesday	light rain
Thursday	rainstorm

Get weather forecast

Get Real Time data (public busses, car park sensors, traffic flows)

Regular Services | Transversal Services

search text into service
Services Categories
De/Select All

Area DigitalLocation HappeningNow Path Fresh Place Public Transport Line Road Sensors Bus Stops

N. results for each: 2
Search Range: 500 mt

Search Results

- Services: 25 of 25 available
- Bus Stops: 25 of 25 available
- Road Sensors: 2 of 2 available

Actual Selection

Service: F1055ZTL01001

Actual Selection

Service: F1055ZTL01001

Parameter	Value
Avg Distance (m)	N.A.
Avg Time (sec)	N.A.
Occupancy (%)	0.0
Concentration (car/km)	0.0
Vehicle Flow (car/h)	40.0
Avg Speed (km/h)	0.0
Threshold Perc (%)	N.A.
Speed Perc (%)	N.A.

Weather Forecast for Municipality of FIRENZE

Day	Forecast
Sunday	light rain and sunny intervals 18°C / 24°C
Monday	cloudy 17°C / 24°C
Tuesday	cloudy 13°C / 20°C
Wednesday	light rain
Thursday	rainstorm

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
- Post
- 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

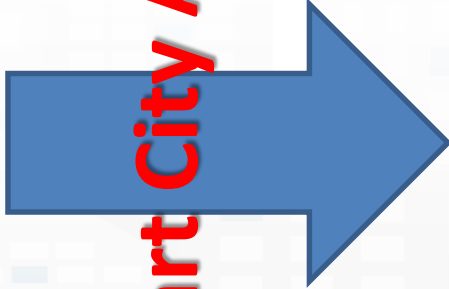
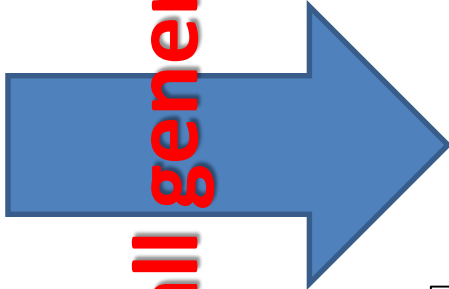
Category	Number of Results
Accommodation	14
Cultural	21
Education	33
Emergen	16
Entertain	31
Environn	38
Financial	24
HealthCare	104
IndustryAndManufacturing	292
MiningAndQuarrying	245
ShoppingAndService	264
TourismService	49
TransferServiceAndRenting	18
UtilitiesAndSupply	154
Wholesale	
WineAndFood	

N. results: No Limit

Search Range: visible areas

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

Embed into Web pages

Indirizzo: VIALE DE FIRENZE FI

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

HOME ABOUT RESEARCH INNOVATION EDUCATION AND COURSES HOWTO

KM4CITY SERVICE MAP EMBEDDED



Using and Contributing to Km4City



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

DISIT lab, 15 August 2017



UNIV
DEGLI
FIR



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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DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

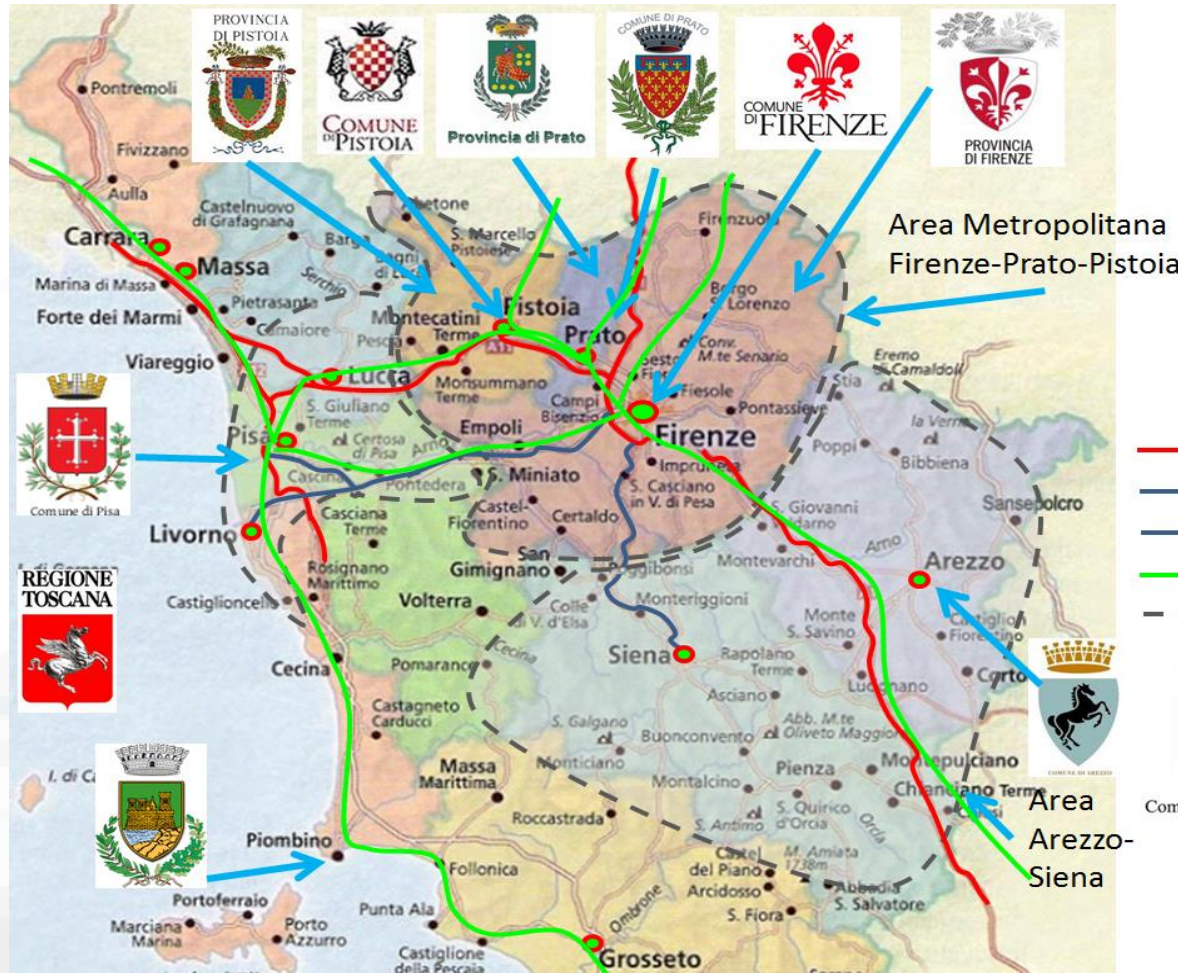
DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB
<http://www.disit.org>

Sii-Mobility

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



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



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

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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MINISTERO DELL'ISTRUZIONE DELL'UNIVERSITÀ E DELLA RICERCA



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

Commenti dei cittadini,
Social Media



AVM trasporto
Pubblico



Sensori,
sistema monitoraggio

Merci



Sensori su
trasporto Privato

Sensori
Parcheggi



Monitoraggio
traffico, autostrade



Rete
Ferroviaria

Parametri
ambientali

Servizi ed
enti



Ordinanze: eventi,
lavori pubblici, ..



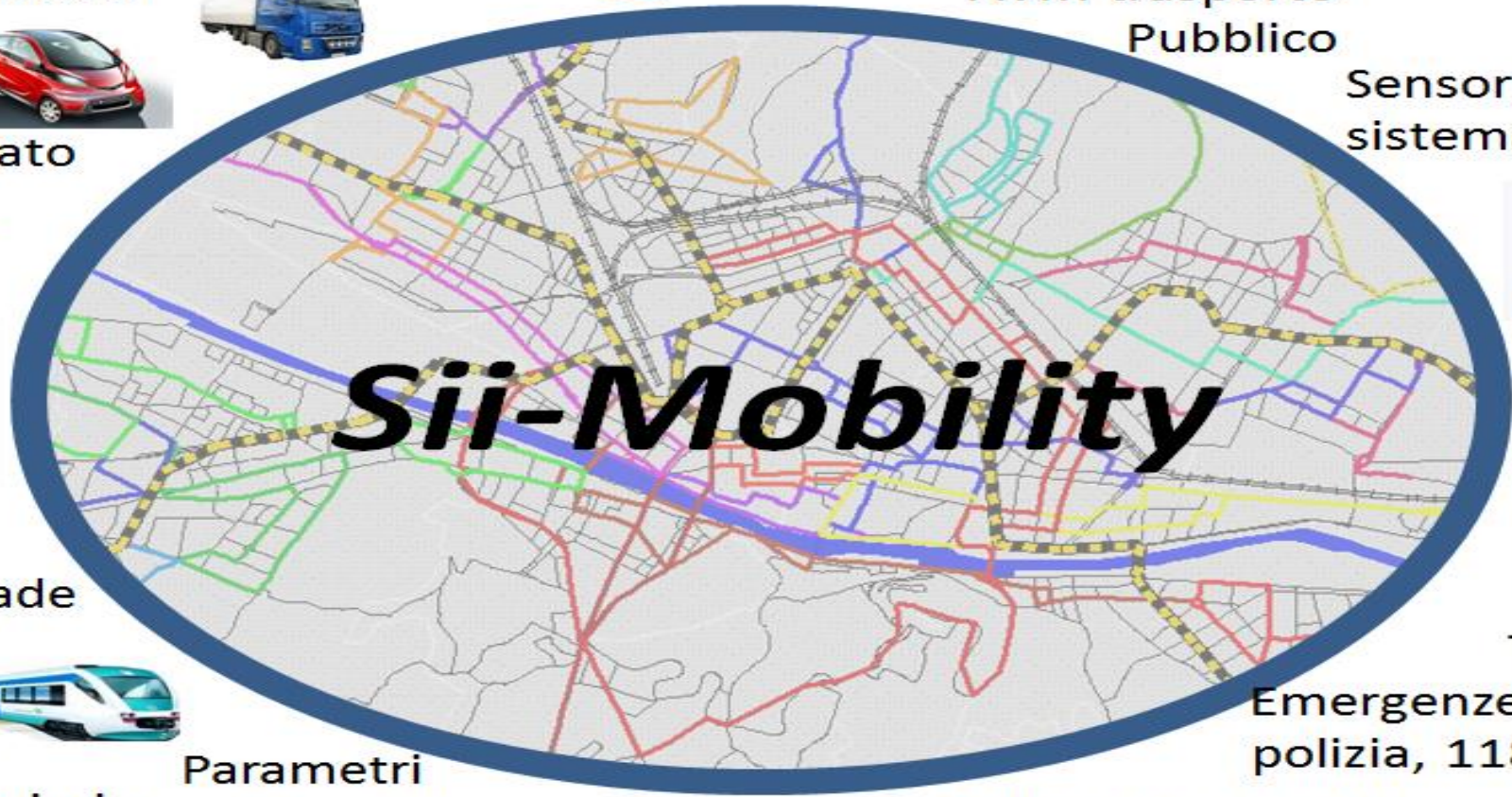
Emergenze,
polizia, 118



Infomobility



Varchi
Telematici, ZTL





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.
- **Testing on municipalities and provinces of Tuscany**
- **Contribute to the improvement of national and international standards**
- **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

Principali Delibere su Sii-Mobility

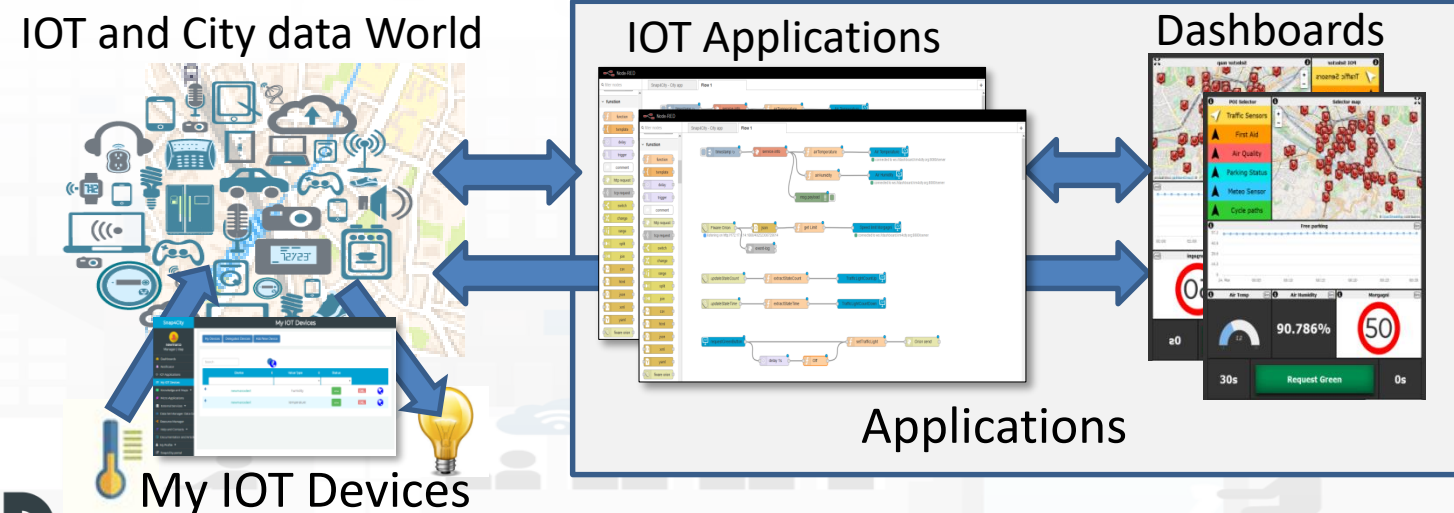


PA	Tipo di atto
Provincia di Prato	Delibera di Giunta n.267 del 30.10.2012
Comune di Prato	Delibera di Giunta n.474 del 30.10.2012
Provincia di Firenze	Delibera di Giunta n.147 del 06.11.2012
Comune di Firenze	Delibera di Giunta n.403 del 06.11.2012
Provincia di Pistoia	Delibera di Giunta n.156 del 08.11.2012
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>

- Snap4City is an open, standardized, data-driven, service-oriented, user-centric platform enabling large-scale co-creation IOT/IOE applications.
- Snap4City is a fully open source, robust, scalable, easy to use solution, provides tools for
 - co-creation of mixt data driven, stream and batch processing, extending the powerful semantic reasoner of Km4City <https://www.km4city.org>, with IOT/IOE, GDPR, and city dashboards.
- validated in multiple devices (PC, Android, Raspberry, ..), and domains: mobility and transport, tourism, health, welfare, social
- The innovation on semantic reasoning, IOT interoperability, microservices, automated dashboard production, .. thus

• *smart city solutions in a*





Horizon 2020
European Union Funding
for Research & Innovation

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

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

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



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SNAP4CITY



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>

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

2014

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 SCN
2016-2018 - Started
Km4City 1.6.2

2016

REPLICATE H2020
2016-2021- Started



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



12/2017
WEEE
2017-2020

6/2017

ALTAIR

- 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



SELECT
for Cities

Snap4City

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

5G

- Smart City vs IOT, Industria 4.0

MOSAIC

6/2018

Trafair CEF

SMARTCITY
EXPO WORLD CONGRESS

11/2018

ICT2018
IMAGINE DIGITAL
CONNECT EUROPE

12/2018

2021

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).
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- Thanks to the European Commission for founding. All slides reporting logo of **Snap4City** <https://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 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.

