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DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB



Smart City dalle idee ai Fatti (2018)

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

www.Km4City.org

Paolo Nesi, paolo.nesi@unifi.it



**SMART
FI CITY
REN
ZE 2018**

Energy e Utility:
sfide e opportunità
per le imprese innovative



CONFINDUSTRIA FIRENZE



ENERGIAMEDIA

What is enabling and providing smart services

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

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

<http://servicemap.km4city.org>



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Km4City Roadmap



12/2017
WEEE
2017-2020

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

6/2017

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



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



- Smart City vs IOT, Industria 4.0

6/2018

SMARTCITY
EXPO WORLD CONGRESS

11/2018

2021

2013

Km4City 1.1

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

2015

Km4City 1.4

- Embed
- More API
- iBeacon

RESilience management guidelines and Operationalization applied to Urban Transport Environment

Km4City 1.5

- SmartDS
- Km4City App

RESOLUTE H2020
2015-2018 - Started

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

Sii-Mobility SCN
2016-2018 - Started
Km4City 1.6.2

2016

REPLICATE H2020
2016-2021- Started

REPLICATE
Renaissance of Places with Innovative Citizenship And Technology

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

GHOST SIR
2016-2019 - Started

GHOST
Enriching the smart city with innovative services and applications

2014

- <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



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Sentient Urban Platform for Smart City

- Set up an ICT based Urban Platform integrated and unified data management among services, city operators and city users:
 - **Control Room, Real Time Monitoring**
 - decision support, assessing and monitoring risk and resilience
 - **Data analytics and business intelligence**
 - predictions, reasoning, city users behavior analysis,
 - **Reading the city: data, users behavior and needs, ...**
 - IOT, Open data sensors, private data, static and real time data.
 - **City Strategies: stimulate virtuous behavior of City Users**
 - participation, totem, twitter, Apps, etc.
 - **Transform Data into value**
 - Put in action smart city innovative solutions and services, development tools



Transport systems
Mobility, parking



Public Services
Govern, events, ...



Sensors, IOT
Cameras, ...



Environment,
Water, energy



Shops, services,
operators



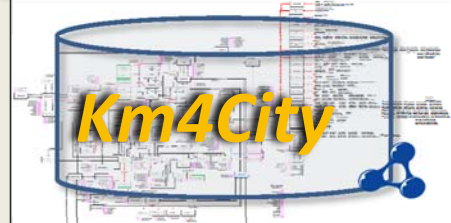
Social Media
WiFi, network



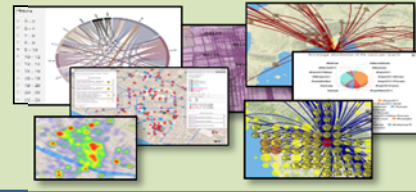
Static, Slow and Real Time data flows

Km4City Smart City Engine

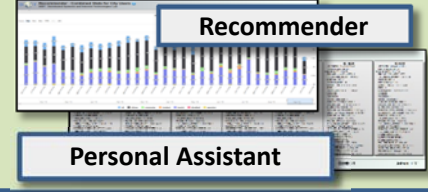
DISCES -- Distributed and parallel architecture on Cloud



Big Data Analytics



Smartening Tools



Development Tools



Km4City Smart City API

City Operators and Decision Makers

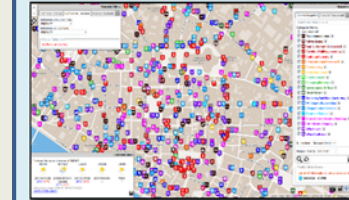
Dashboards



Smart Decision Support



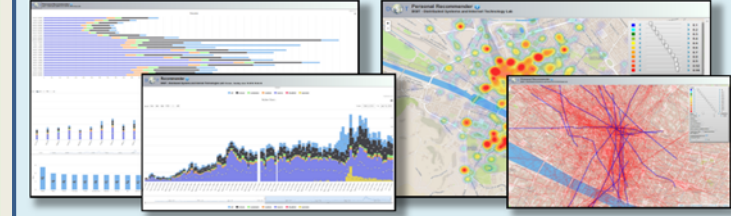
ServiceMap browser



Twitter Vigilance



Analyzers of City User Behavior



Tools for Final Users

Mobile e Web Apps



Km4City: Knowledge Base



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

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

Big Data Tools



LOD and reasoners



Other tools



Ontology Documentation:

<http://www.disit.org/6506>

<http://www.disit.org/6507>

<http://www.disit.org/5606>

<http://www.disit.org/6461>

**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 are coming
- Smart benches, waste mng, irrigators, lighting,...
- Florence ent.events: about 60 new events X day
- Different kinds of Florence traffic events,
- Wi-Fi: > 400.000 measures X day
- App mobiles: >50.000 measures X day
- more than 40.000 distinct users X day
- From 600.000 to 4.5 M Tweets X day
- many IOT



- Nascondi Menu

Previs

| Previs | Giovedì | Venerdì | Sabato |
|-------------|---------------|---------------|--------|
| poco nu... | poco nuvoloso | poco nuvoloso | velato |
| 23°C / 27°C | 20°C / 33°C | | |
| schiarite | | | |
| 20°C / 20°C | | | |

- Nascondi Menu

Servizi Regolari | Servizi Trasversali

search text into service

Categorie Servizi

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

N. risultati: Nessun Limite

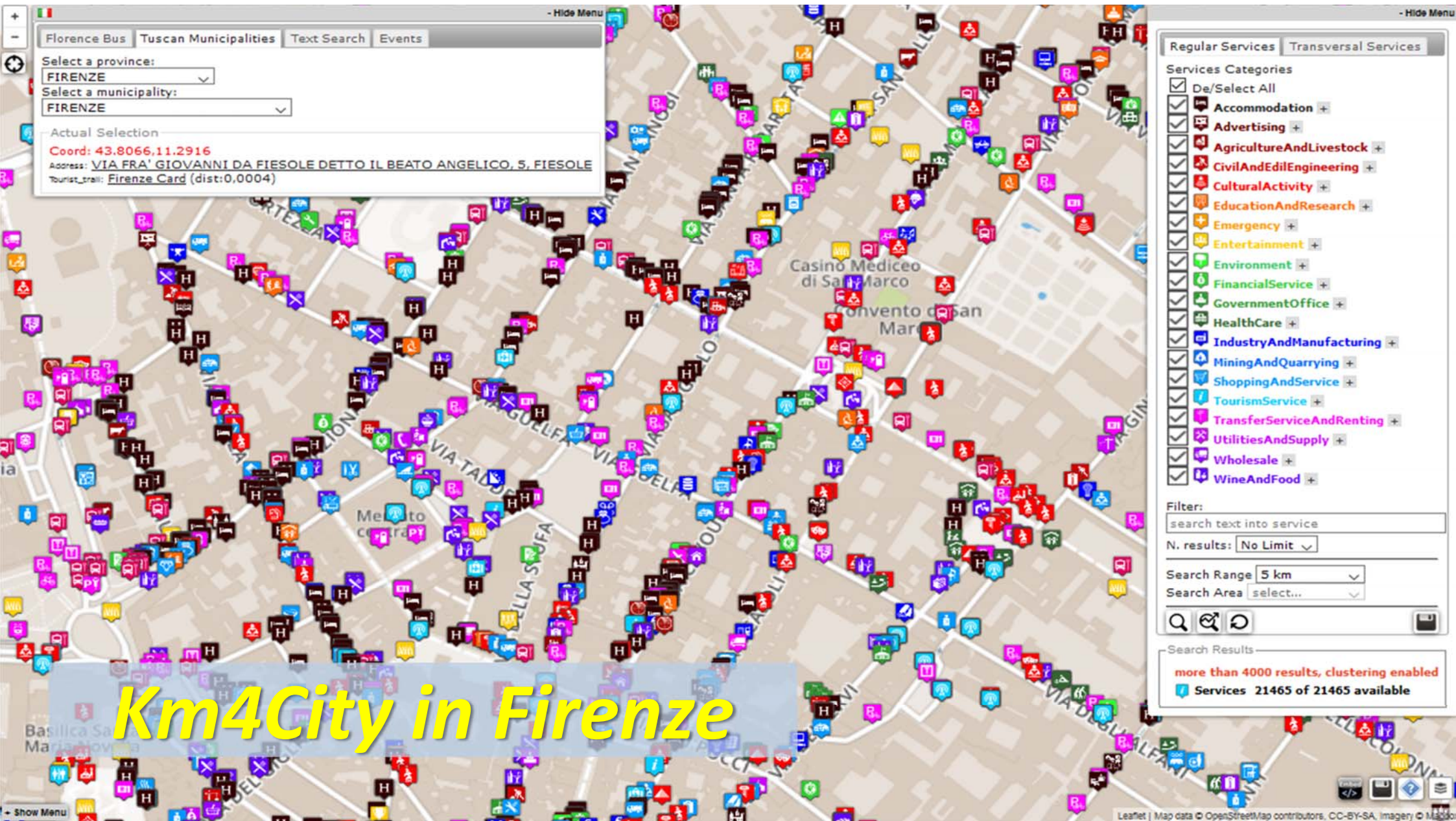
Raggio ricerca 100 metri

Risultati della ricerca

più di 4000 risultati, attivato clustering

Services 16858

<http://servicemap.km4city.org>



Florence Bus Tuscan Municipalities Text Search Events

Select a province:
FIRENZE

Select a municipality:
FIRENZE

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

Regular Services Transversal Services

Services Categories

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

Filter:
search text into service

N. results: No Limit

Search Range 5 km

Search Area select...

Search Results

more than 4000 results, clustering enabled

Services 21465 of 21465 available

Km4City in Firenze



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Km4City in Firenze



The screenshot displays the Km4City web application interface. The main map shows a street view of Florence with various service icons overlaid. Several pop-up windows provide detailed information:

- 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
 - Button: Rimuovi dalla Mappa
- FERMATA : T1 ALAMANNI:**
 - LINKED OPEN GRAPH
 - Linee: 2, 28, 52, 54
 - Dati Real Time al momento non disponibili
- FERMATA : 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

On the right side, there is a search and filter panel:

- Search text into service
- Categorie Servizi: De/Select All
- Services: DigitalLocation, Consuete, Controlled_parking_zone, Cycle_paths, Gardens, Green_areas, Historical_buildings, Library, Literary_cafe, Local_health_authority, Monument_location, Museum.
- Additional services: 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

At the bottom left, there is a weather forecast panel for Firenze:

| Previsioni Meteo per il comune di FIRENZE: | Martedì | Mercoledì | Giovedì | Venerdì | Sabato |
|--|------------------------------|--|------------------------------|---------------|--------|
| | | | | | |
| | poco nuvoloso 23°C / 27°C | pioggia debole e schiarite 20°C / 33°C | poco nuvoloso 20°C / 33°C | poco nuvoloso | velato |

Footer: servicemap.disit.org/WebAppGrafo/mappa.jsp#dose

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

DISIT lab, 15 August 2017



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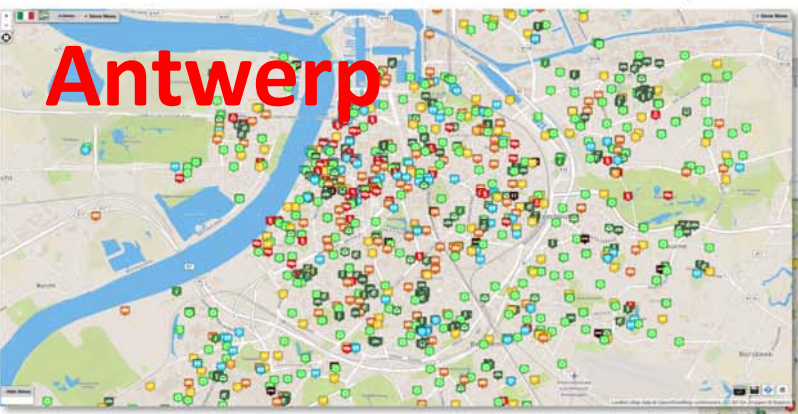
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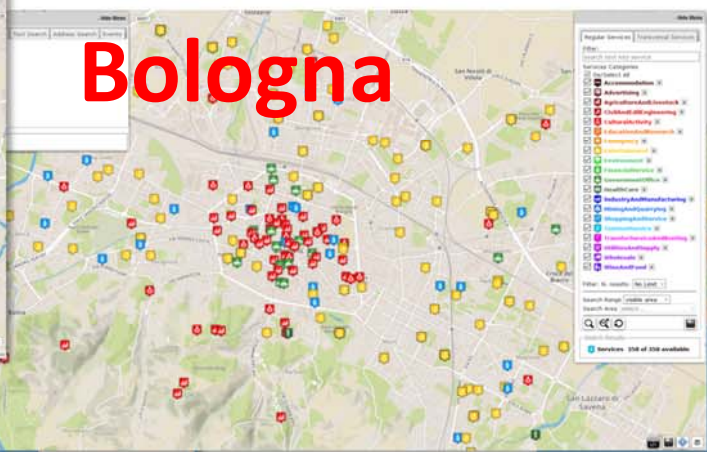
Km4City in ...



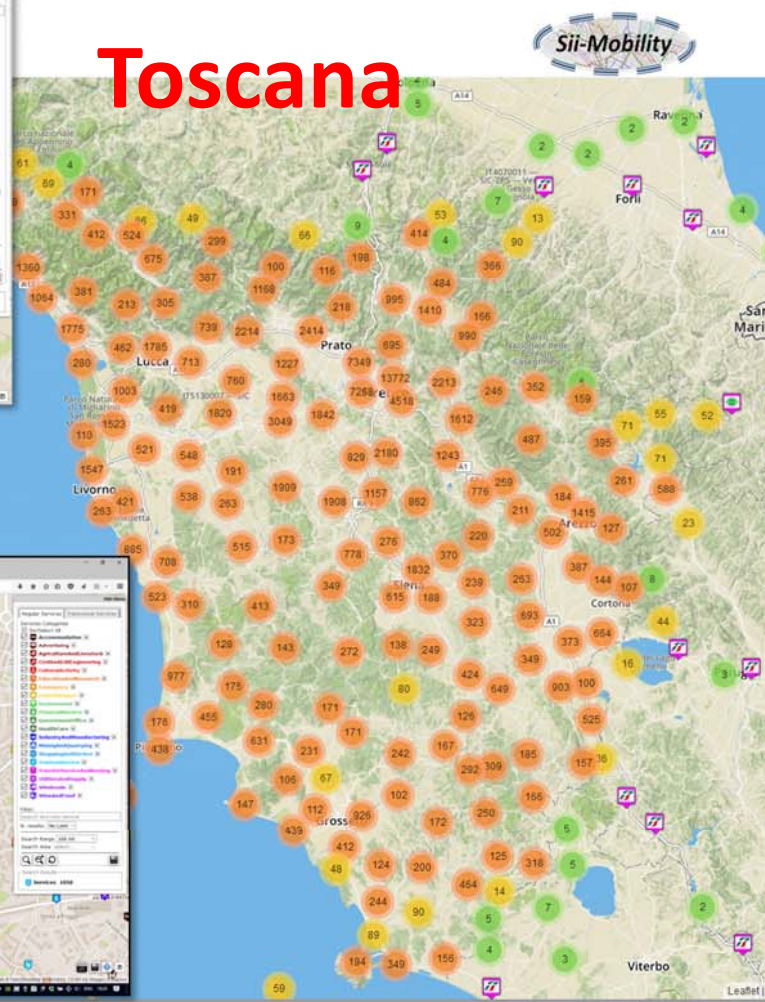
Antwerp



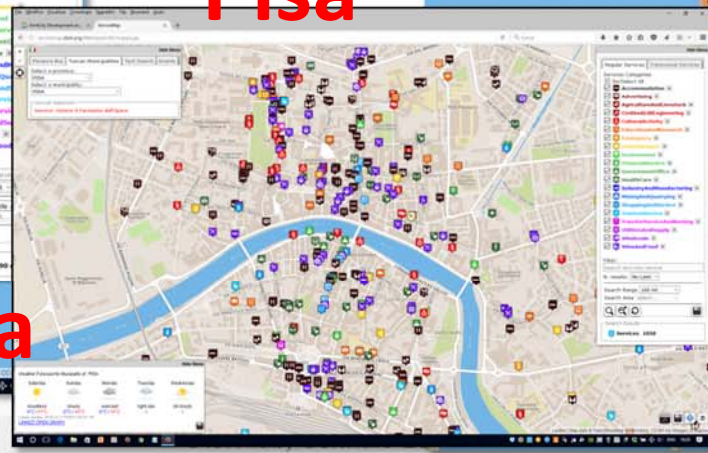
Bologna



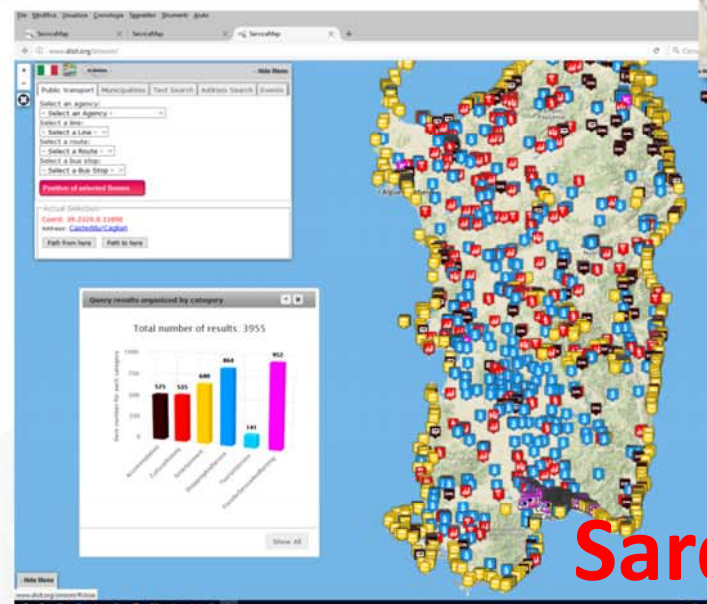
Toscana



Pisa



Sardegna



• **Search all services in the area**





Servizi

- **Smart City API per accedere e sfruttare la base di conoscenza Km4City**
 - Sviluppo di Web e mobile App
 - IOT Application
- **Dashboard e Notifiche**
 - Control Room, notifiche, controllo
 - Widget in Pagine WEB
- **Development Tools for Applications**
 - Web e Mobile App
- **Development Environment for Data Analytics**
 - Sand Box, VM for developers: ETL, Python, C/C++, Java, etc.

Applicazioni



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DISIT lab, Gennaio 2018



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Scenariosi vs SmartCity API

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



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Km4CityMobile App



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

What do you want to do?

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

KM4CITY

Choose Services

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

Giardino Di Boboli

Tipo: Digital Location

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

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

KM4CITY

Map view showing various service icons overlaid on a city map.

KM4CITY

Suggerimenti

ESERCITAZIONE MUGNONE 2016

MODALITÀ 2016 18 maggio 2016

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

Regione Toscana

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

Piazza Santissima Annunziata

Tipo: Squares
Distanza: 1949 m
Indirizzo: 🚶 🚗 🚚

Trattoria Gozzi

Tipo: Trattoria
Distanza: 1975 m

Mostra Tutte le Categorie

Windows Phone interface showing various apps like Calendar, Posta, Netflix, Microsoft Edge, Roma, Xbox, Anteprima Sk..., Tuneln Radio, and Twitter.

DISPONIBILE SU Google play

Scarica da App Store

Scarica da Windows Store



Km4City APP



- **Mobility**

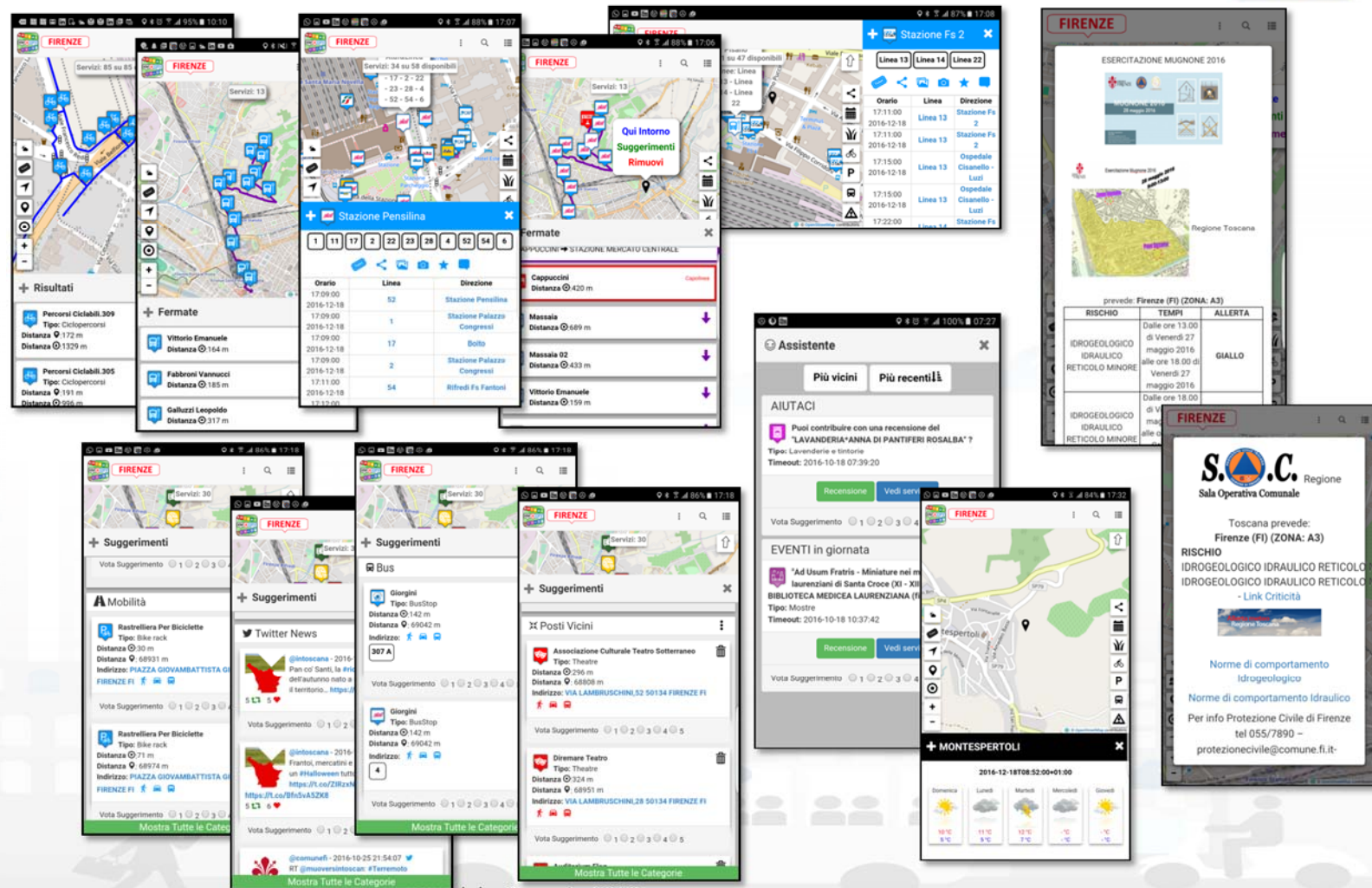
- Paths and stops, time
- Parking + prediction
- Ticketing
- Flow + prediction
- Navigation
- Connection with devices
- XXX Sharing

- **Personal Assistant**

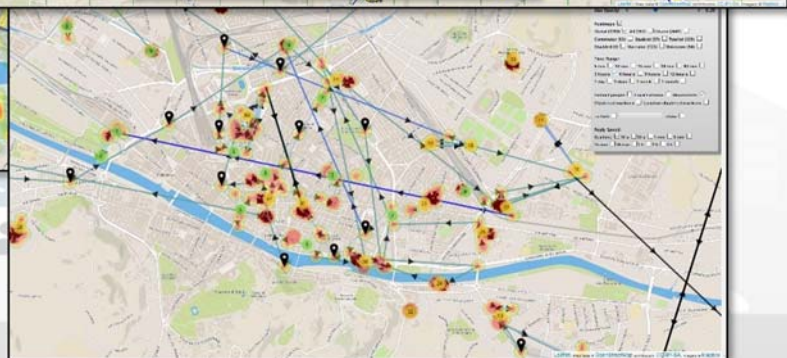
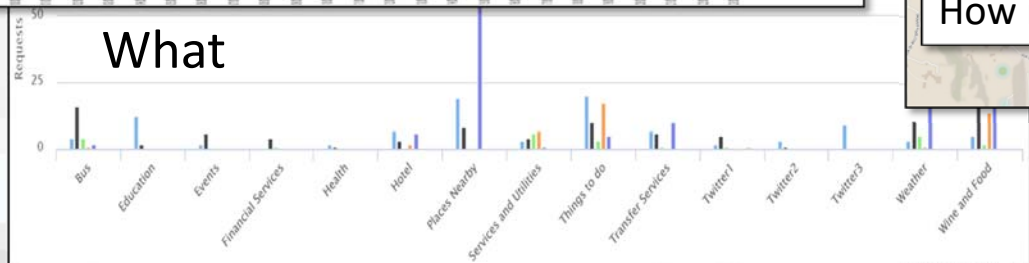
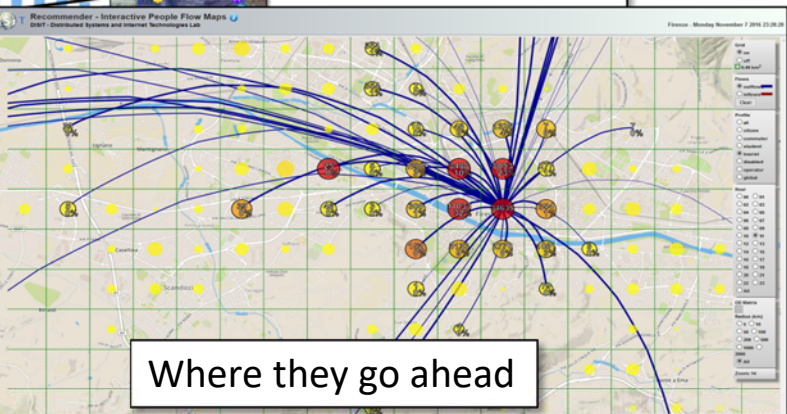
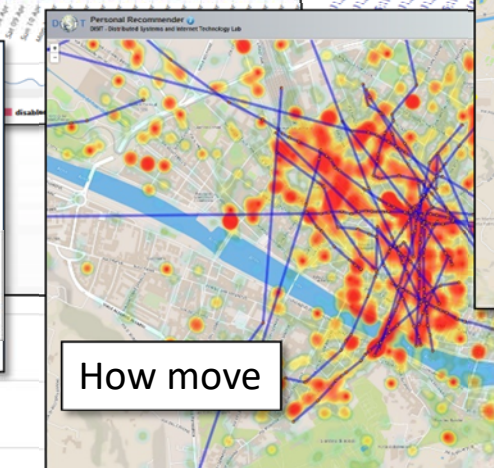
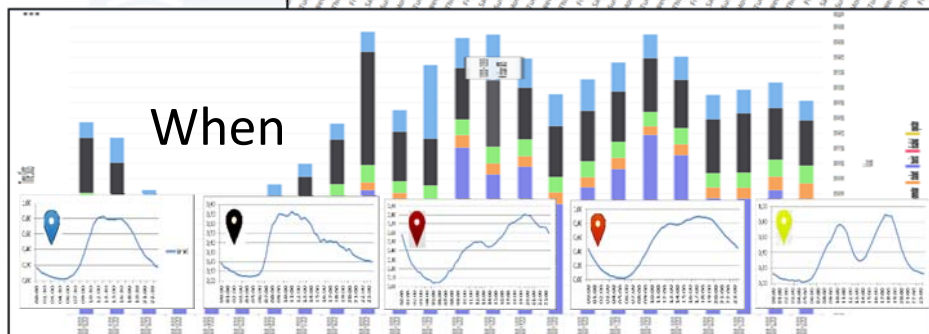
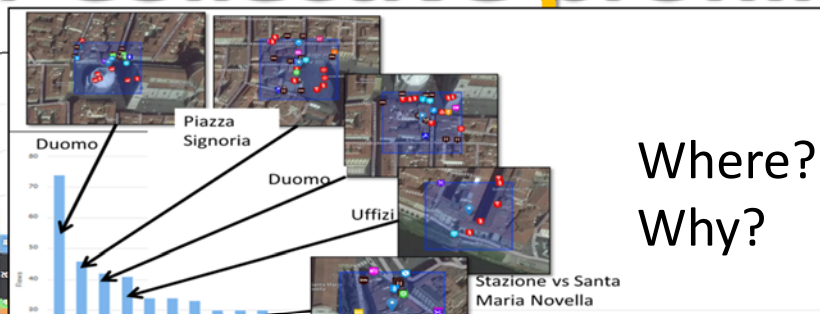
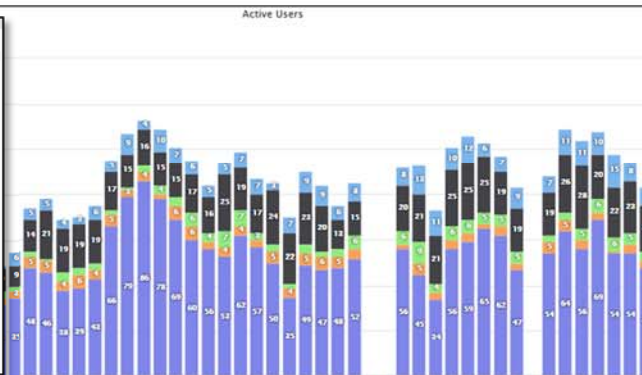
- Info, Engagement
- Help, Civil protection

- **Suggestions:**

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



User Behavior Analyzer for Collective profiling

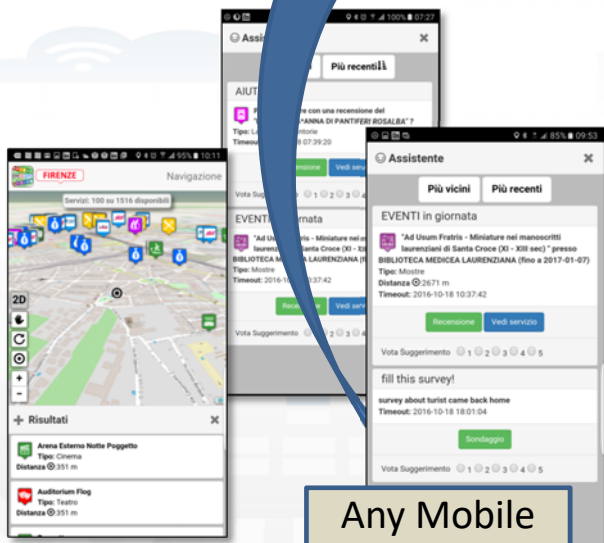
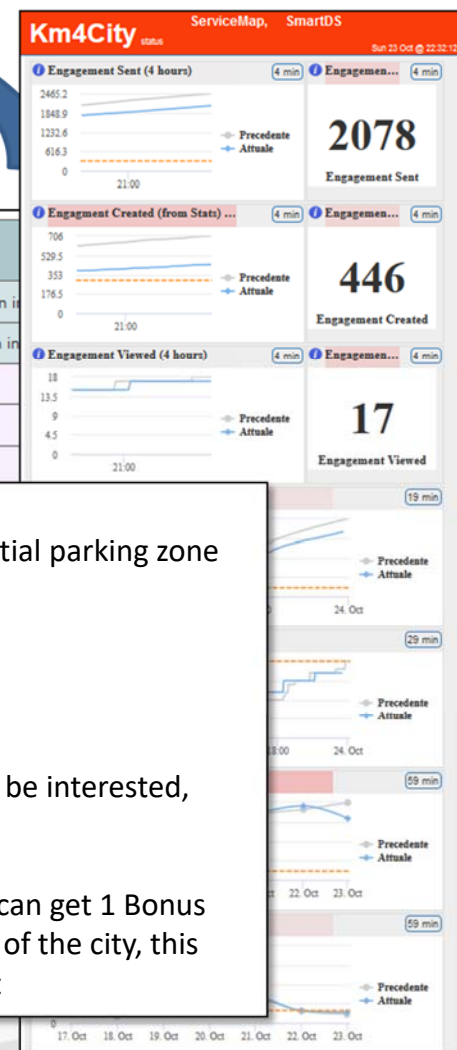


User influencing, engaging, monitoring & Follow Up

City & City Operators Strategy Editor



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



Any Mobile and Web App

- Inform**
You have parked out of your residential parking zone
The Road cleaning is this night
The waste in S.Andreas Road is full
- Engage**
Provide a comment, a score, etc..
- Stimulate / recommend**
Events in the city, services your may be interested, etc..
- Provide Bonus**
Since you have parked here you we can get 1 Bonus
We suggest you to leave the car out of the city, this bonus can be used to by a bus ticket

Dashboard for all

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



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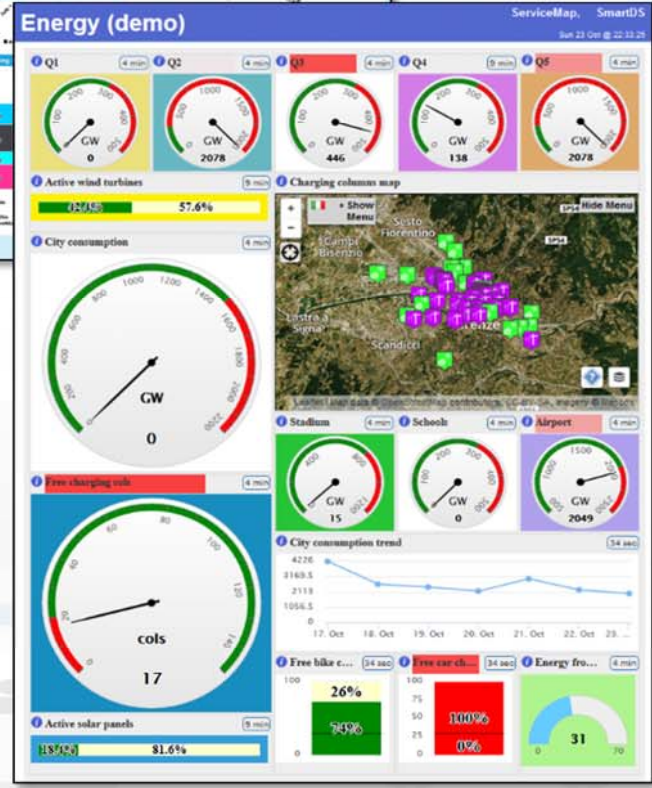
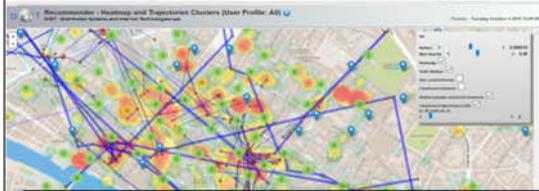
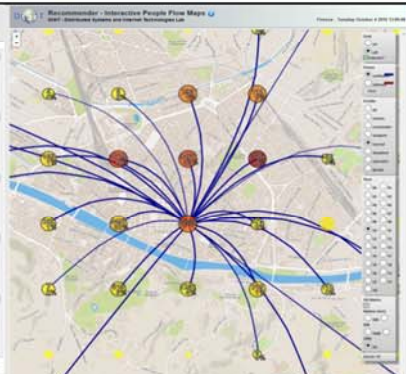
Sentient City Control Room



Smart City Dashboard



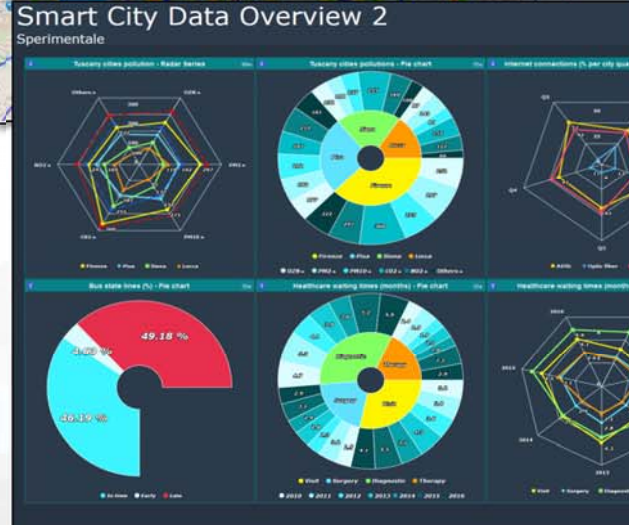
Horizon 2020
European Union Funding
for Research & Innovation



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

| Subsector | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 |
|-----------|-----|-----|-----|-----|-----|----|
| Q1 | 128 | 41 | 181 | 36 | 4 | |
| Q2 | 33 | 75 | 66 | 123 | 63 | |
| Q3 | 225 | 231 | 164 | 185 | 211 | |
| Q4 | 124 | 221 | 87 | 122 | 93 | |
| Q5 | 79 | 87 | 73 | 27 | 65 | |

| Category | Total arrivals | Overnights | Day visitors | Free | Full | Winter | Spring | Summer | Autumn |
|----------|----------------|------------|--------------|------|------|--------|--------|--------|--------|
| Albania | 56 | 36 | 20 | 7 | 23 | 6 | 10 | 4 | 10 |
| Iran | 122 | 81 | 41 | 4 | 16 | 3 | 7 | 6 | 4 |
| Car | 215 | 133 | 82 | 6 | 18 | 15 | 100 | 50 | 35 |
| Bus | 157 | 110 | 47 | 0 | 0 | 0 | 0 | 0 | 0 |
| Crails | 0 | 0 | 0 | 7 | 7 | 2 | 6 | 2 | 4 |
| Real | 0 | 0 | 0 | 35 | 15 | 10 | 22 | 9 | 9 |
| Real | 0 | 0 | 0 | 30 | 42 | 8 | 25 | 30 | 9 |
| Total | 550 | 360 | 190 | 20 | 192 | 55 | 104 | 77 | 26 |



DISIT lab, Gennaio 2018

Servizi agli Utenti

Firenze (sperimentale)

Tue 17 Jan @ 19:52:49

Recenti #hashtag più utilizzati

TRENDS QUOTES

- #FIRENZE
- #NEWS #FIRENZE
- #UFFIZI

Eventi a Firenze oggi

PIAZZA DEGLI STROZZI

- 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.**

Stato servizio BUS a Firenze

STATO LINEE MONITORATE DATI

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

Previsioni del tempo a Firenze

| Day | Weather | Temp |
|-----------|------------|-----------|
| 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

Posti Liberi in Parcheggi Interrati a Firenze

Line graph showing current and previous data from 17 Jan to 18 Jan.

Utenti FirenzeWiFi negli ultimi 5 minuti

Line graph showing current and previous data from 17 Jan to 18 Jan.

PROTEZIONE CIVILE

GENERAL METEO

NULLO BASSO MEDIO ALTO

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



Firenze

43 Feb 11 2018

42.4%

24 55.4%

58.7 4863

15.5%

26%

5.5%

2

12

33

SmartCity Processes

Twitter Vigilance

| | | | | | |
|--------------------------|-------------------------|------------------------|-------------------------|---------------------------|-----------------------|
| ATAF | ATAF | ATAF | ATAF | CHECK RT | EVENTI FI |
| avm_linea7_J | avm_linea7_J | avm_linea7_J | avm_linea7_J | check_RT | Eventi_Firenze_J |
| RUNNING | RUNNING | SUCCESS | SUCCESS | SUCCESS | SUCCESS |
| PARK | PARK | PARK | PARK | PARK | PARK |
| parcagg1_J | parcagg2_J | parcagg16_J | parcagg11_J | parcagg12_J | parcagg13_J |
| FAILED | SUCCESS | SUCCESS | SUCCESS | SUCCESS | SUCCESS |
| METEO | METEO | METEO | METEO | METEO | METEO |
| previ_meteo_Abbatone_xm1 | previ_meteo_Arezzo_xm1 | previ_meteo_Fasole_xm1 | previ_meteo_Firenze_xm1 | previ_meteo_Imprometa_xm1 | previ_meteo_Lucca_xm1 |
| SUCCESS | SUCCESS | SUCCESS | SUCCESS | SUCCESS | SUCCESS |
| SENSORI | SENSORI | SENSORI | SENSORI | SENSORI | SENSORI |
| sensoridiametro | sensori_AREZZO_J | sensori_EMPOLI_J | sensori_PISA_J | sensori_FIRENZE_J | sensori_PRATO_J |
| SUCCESS | SUCCESS | SUCCESS | SUCCESS | SUCCESS | SUCCESS |
| TWITTER | TWITTER | FI WIFI | FI WIFI | FI WIFI | FI WIFI |
| tweetstoccommedie | TwitterVigilanceBotting | calcolateAPITimeSeries | calcolateflowUsers | calcolateUsersStatus | GraphsJGenerator |
| SUCCESS | RUNNING | RUNNING | SUCCESS | SUCCESS | FAILED |

Smart City Control Room Console

Entry point for REPLICATE dashboards



Tue 21 Nov 19:30:36

Energy

Environment

Mobility and Transport

Social

4 in one UHD

Energy Pilot

Environment and Weather

Mobility and Transport

Web and Social

4 in one UHD (2)

Data Aggregation and Data Analytics
SIT Lab

RealTime Sensors via ServiceMap3D

Resilience Management

Resilience Dashboard by RESOLUTE

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

Real Time Sensors via ServiceMap3D

3D data rendering



Fri 26 Jan 00:23:19



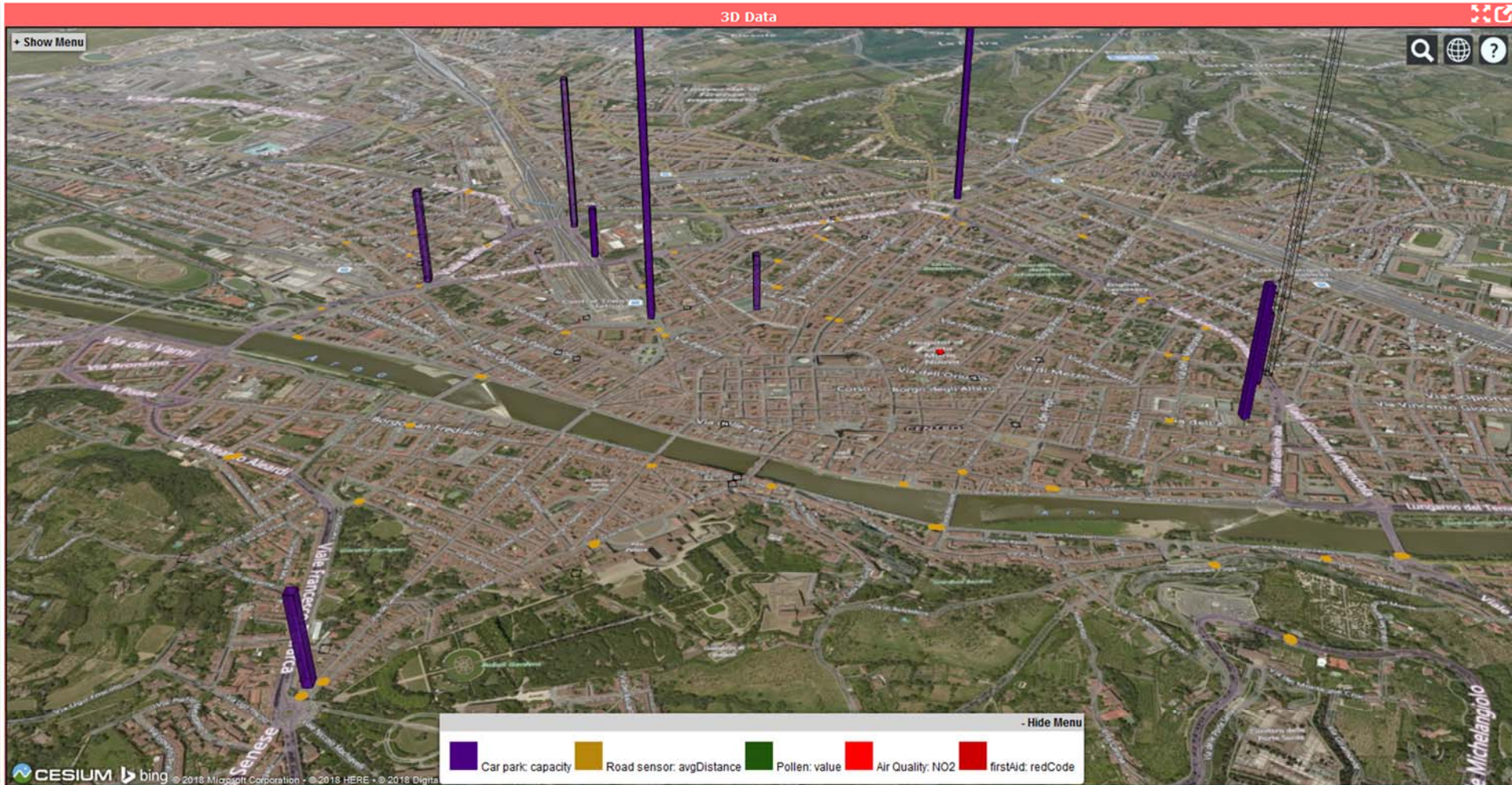
Firenze



Airport



Empoli



Click POI of interest below

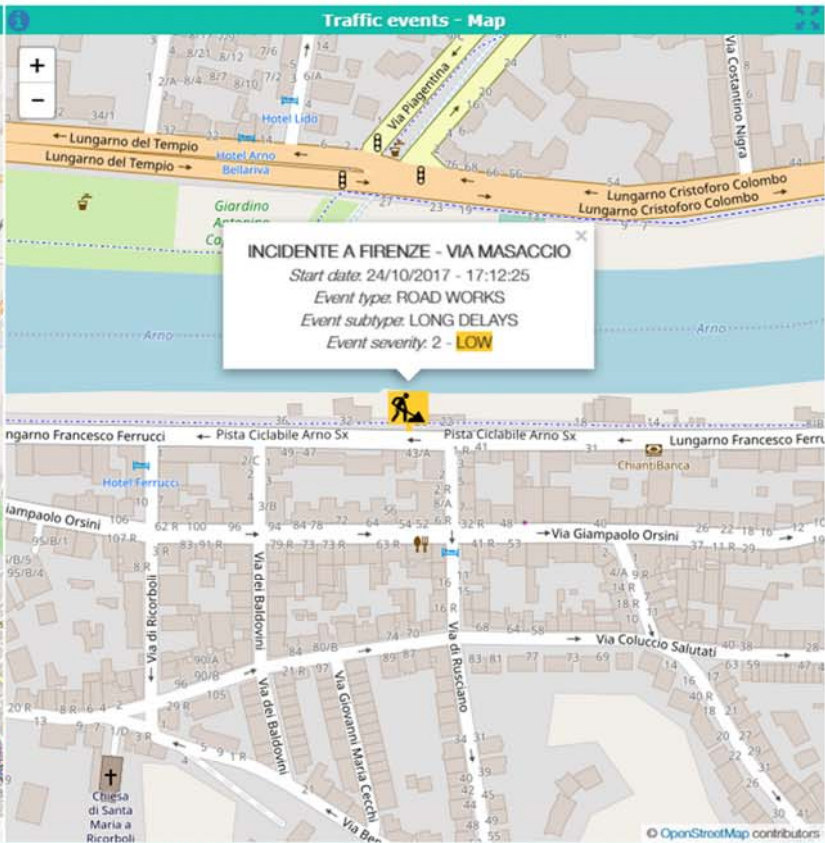
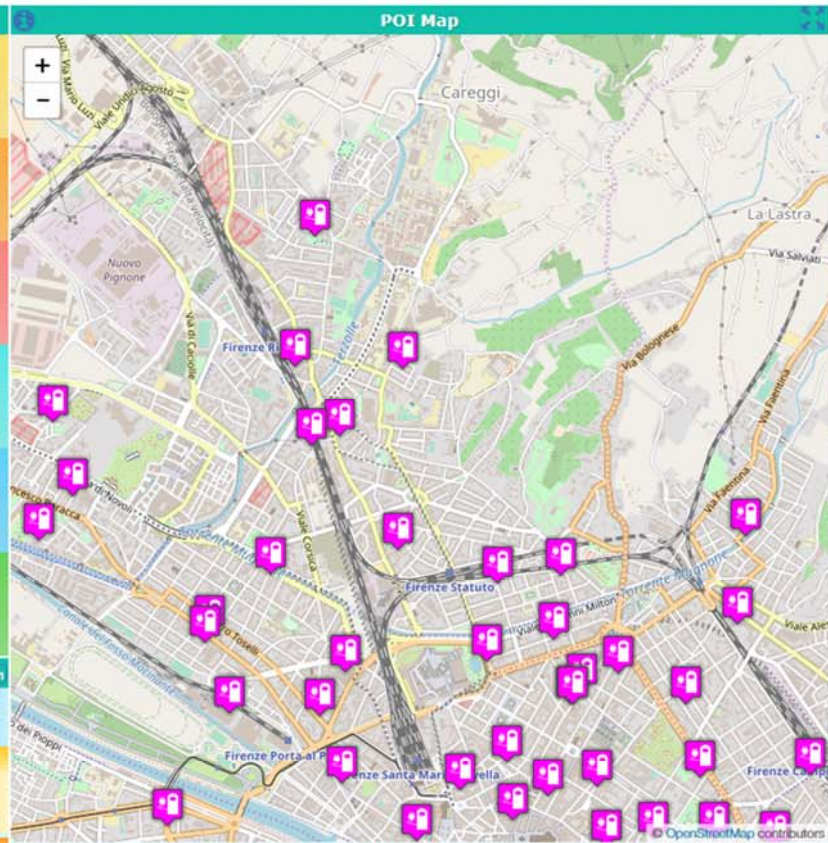
- (1)** Fast recharging stations
- (2)** Cicle paths
- (4)** Public transport paths (F)
- (6)** Restricted traffic areas
- (8)** Parking status
- (7)** Variable Message Signs (F)

Traffic events 18m

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

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

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



REPLICATE

Resilience



Mon 23 Oct @ 15:40:51

Points of interest - 1

(1) Rivers sensors (D)

(7) Underpasses status (F)

Points of interest - 2

(3) Minor reticulum sensors (F)

(10) Variable Message Signs (D)

Points of interest - 3

(4) Asphalt temperature (F)

(8) Public transport paths (F)

Meteo forecast - Florence

| Wednesday | Thursday | Friday | Saturday | Sunday |
|--|------------------------|-----------------------------|-----------------|------------------------|
| (5) cloudless 14°C / 23°C | mist 6°C / 22°C | cloudless 7°C / 23°C | cloudy / | moderate rain / |

Map

Traffic events in Florence

(9) INCIDENTE A FIRENZE - VIA GARFAGNANA
ACCIDENT(S) 25/10/2017 11:30:29 8

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

INCIDENTE A FIRENZE - VIA MASACCIO
LONG DELAYS 24/10/2017 17:12:25 2

PROTEZIONE CIVILE

GENERAL METEO

| NULLO | BASSO | MEDIO | ALTO |
|-------|-------|-------|------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

(11)

First aids - Florence

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

Real time data

(2a) 20

Data trends

(2b)

(12)

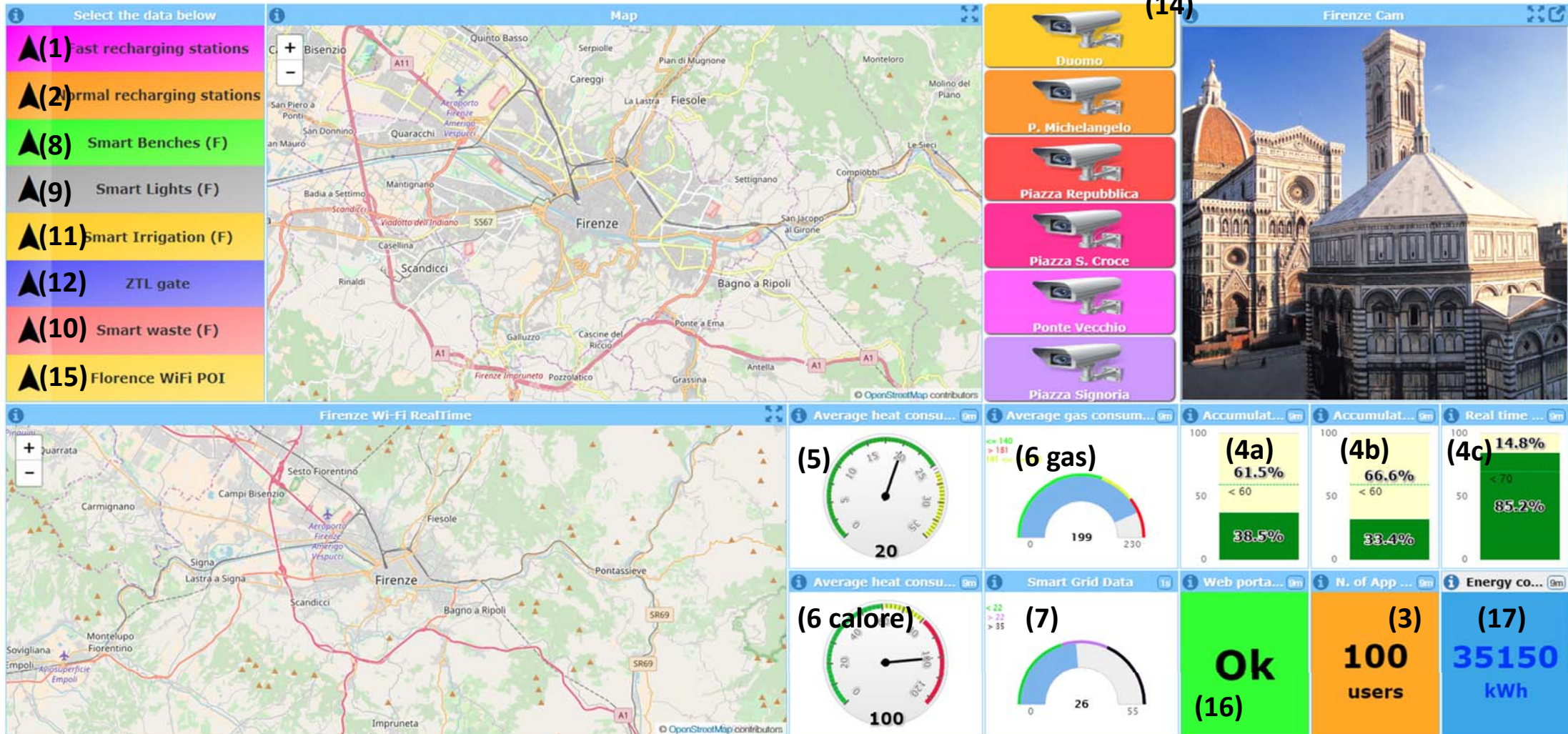
Chat

REPLICATE

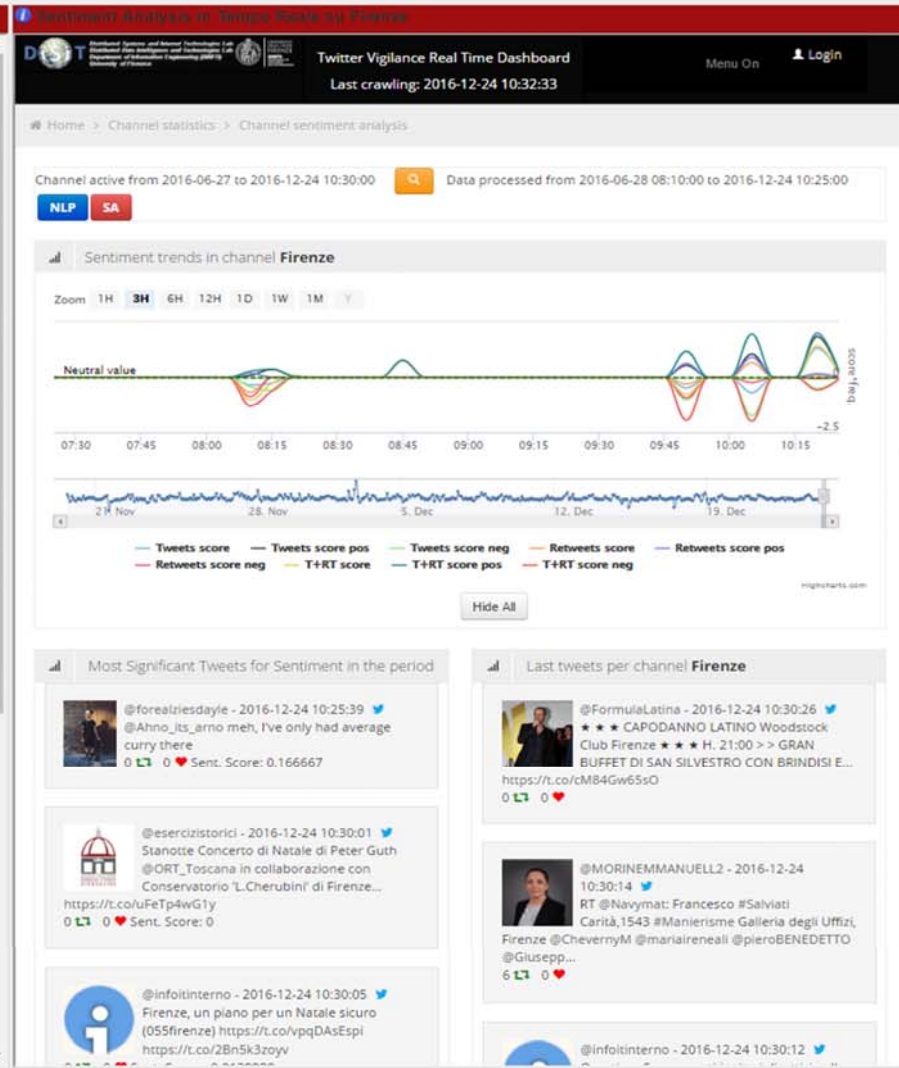
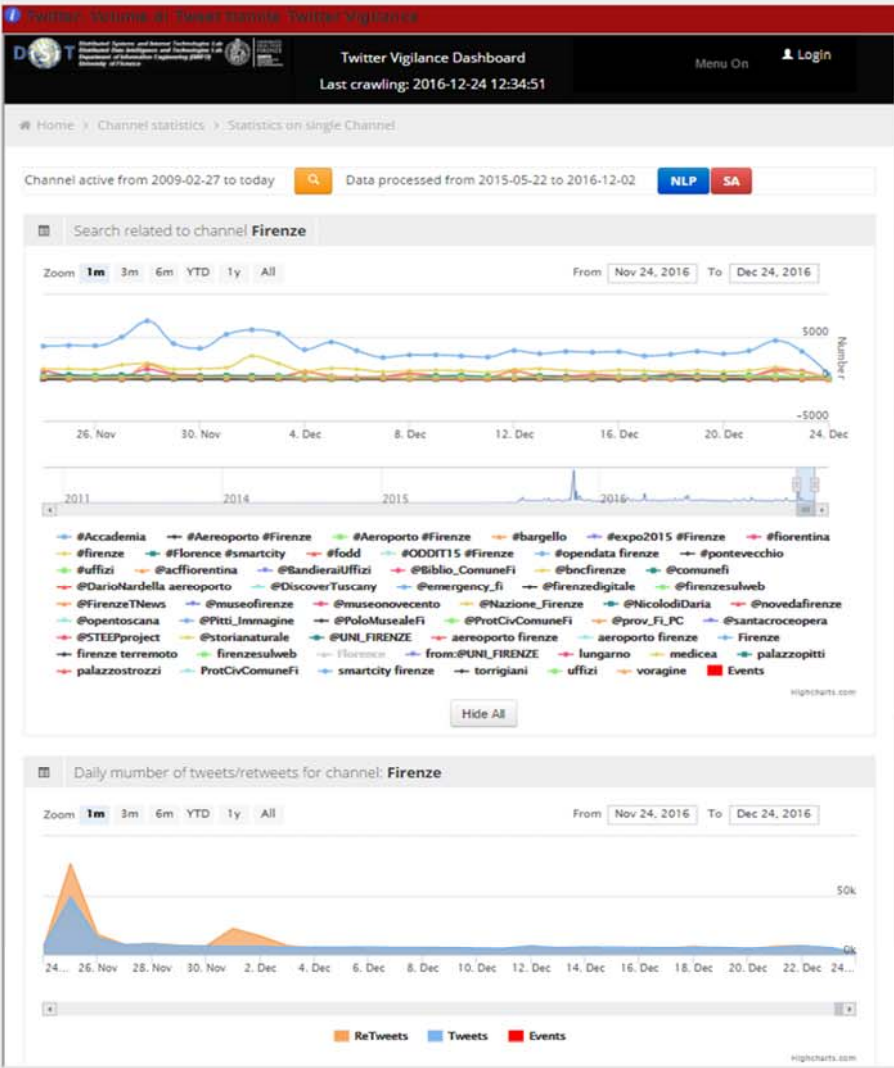
Pilot dashboard



Mon 23 Oct @ 14:55:54



Twitter Vigilance su Firenze (sperimentale)



Twitter Vigilance

TRENDS QUOTES

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

Twitter Vigilance

TRENDS QUOTES

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

We suggest to use Chrome browser for better experience



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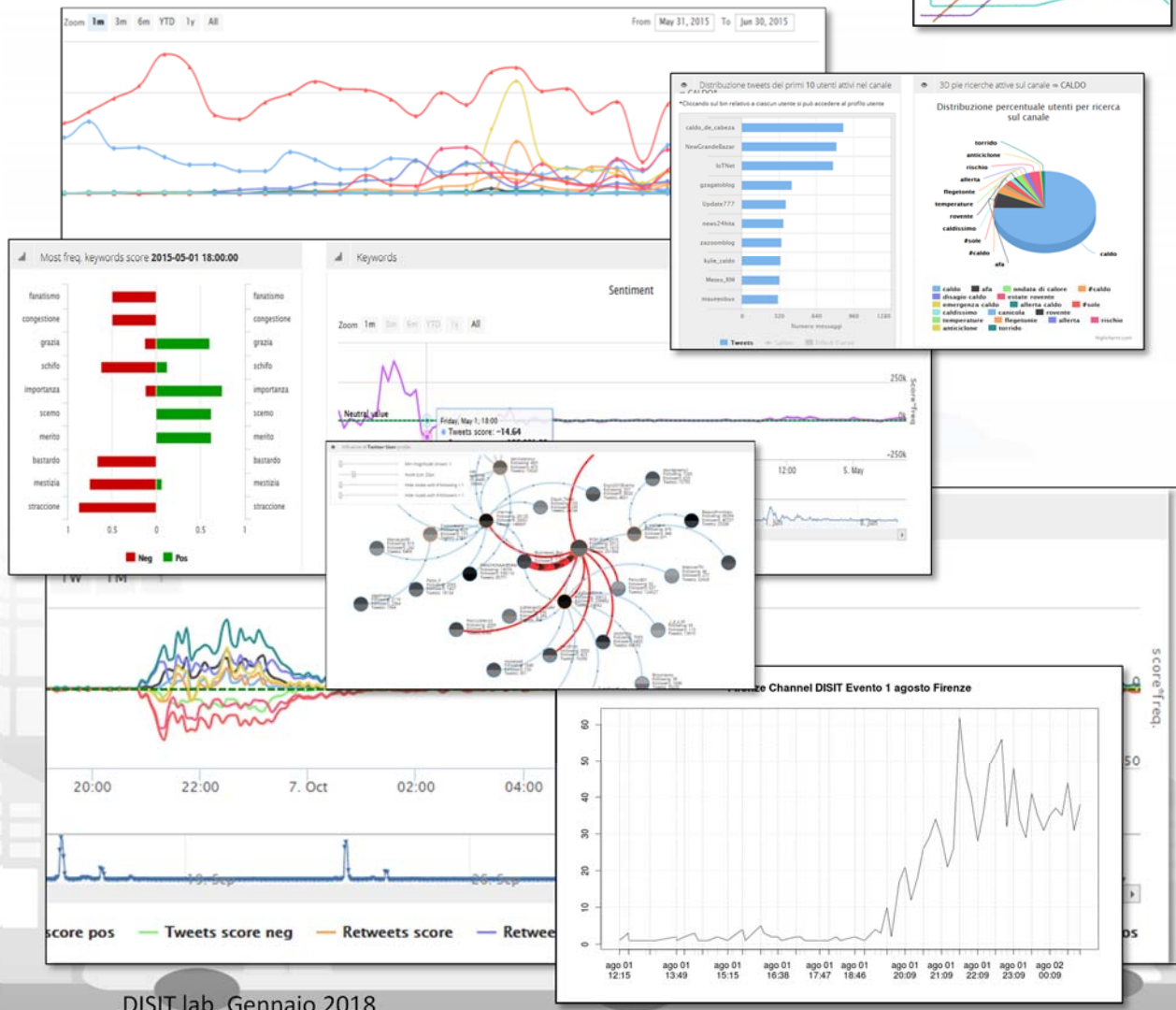
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AND INTERNET
TECHNOLOGIES LAB
<http://www.disit.org>

Twitter Vigilance



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

Twitter Vigilance



DISIT lab, Gennaio 2018

Prediction/Assessment

- Football game results as related to the volume of Tweets
- Number of votes on political elections, via sentiment analysis, SA
- Size and inception of contagious diseases
- marketability of consumer goods
- public health seasonal flu
- box-office revenues for movies
- places to be visited, most visited
- number of people in locations like airports
- audience of TV programmes, political TV shows
- weather forecast information
- Appreciation of services

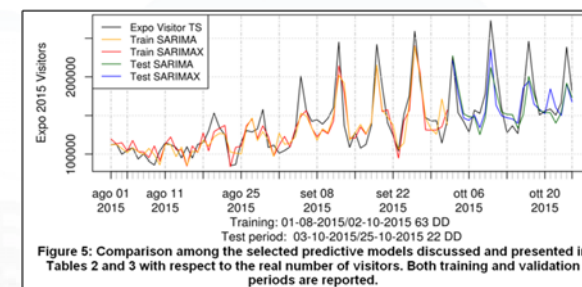
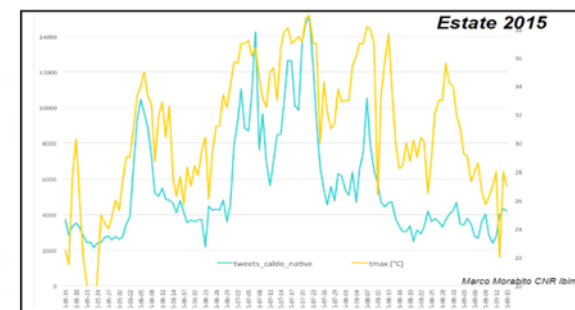
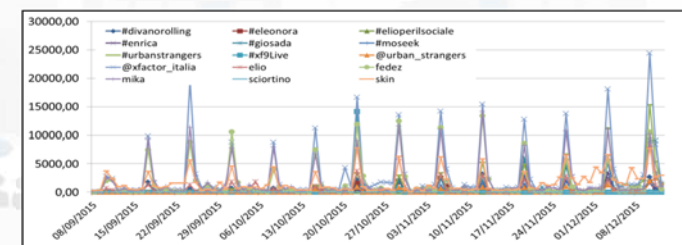


Figure 5: Comparison among the selected predictive models discussed and presented in Tables 2 and 3 with respect to the real number of visitors. Both training and validation periods are reported.



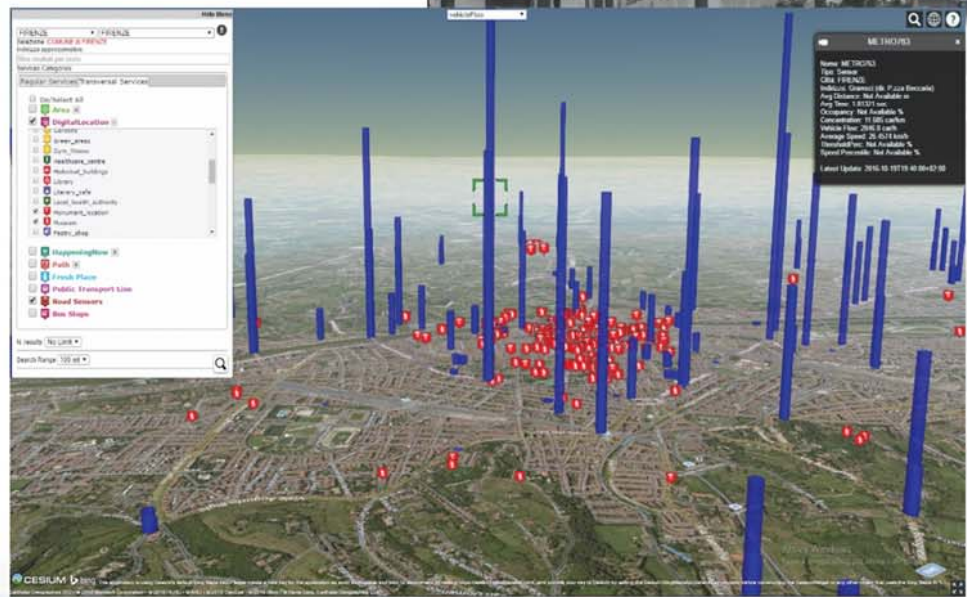


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<http://www.disit.org>

Traffic Flows



Traffic Flow Tools

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

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

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 |

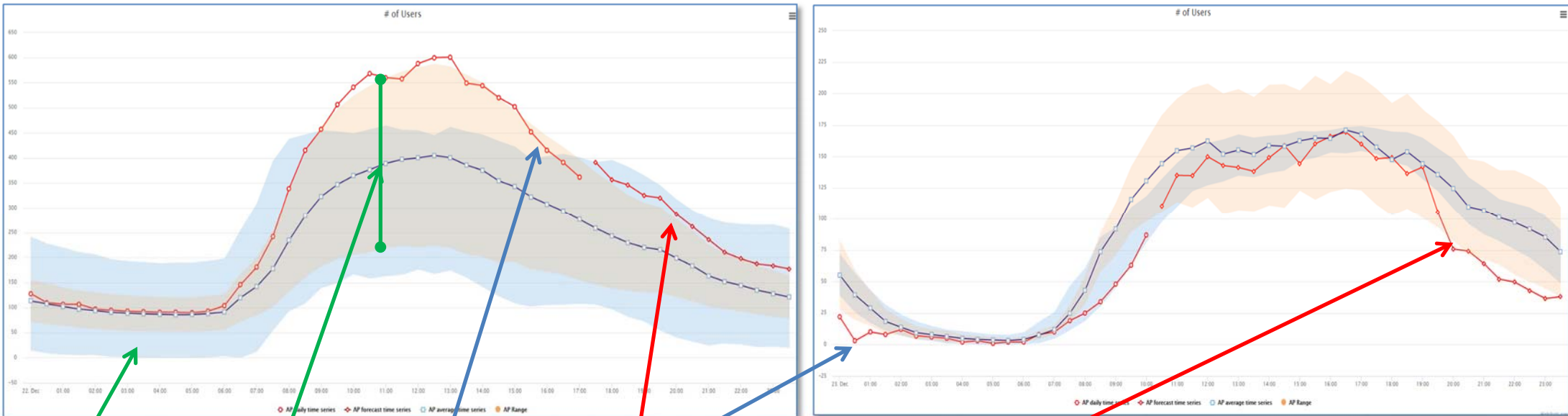
- Active on Apps
 - «Firenze dove cosa»
 - «Toscana dove cosa»



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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http://www.disit.org

Embedded Widgets



DESTINATION FLORENCE

COME MUOVERSI

Fermate bus Piste ciclabili Parcheggi Distributori

Powered by www.km4city.org

DISIT Distributed Systems and Internet Technologies Lab

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

vis| qualsiasi tipo deep search

HOME ABOUT RESEARCH INNOVATION EDUCATION AND COURSES HOWTO EVENTS

RISULTATI DELLA RICERCA (1-10 of 857 in 2723 ms)

DISIT in difficoltà per la neve nel 2010!

DSI DISIT nel 2010, problemi di neve!

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

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

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

Massaia
Massaia 02
Cappuccini
Mercati
Incontri

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 Firenze

Nuvoloso 5°C / 10 °C

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

Powered by www.km4city.org



DISIT Lab, Gennaio 2010

Development Tools

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

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

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

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



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DISIT lab, Gennaio 2018



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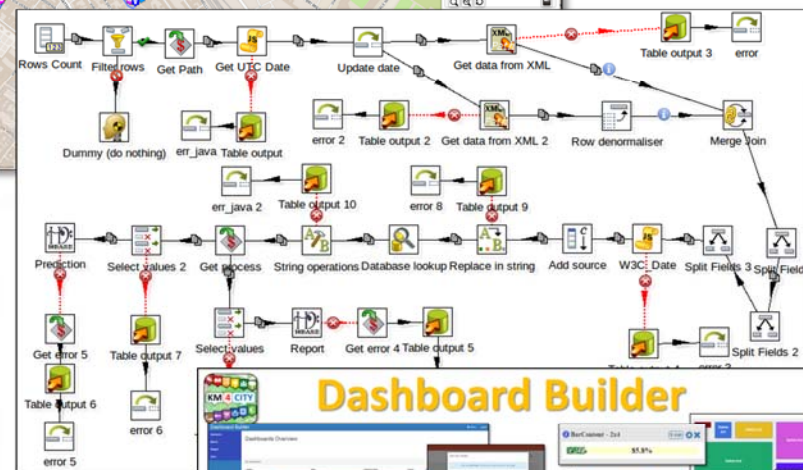
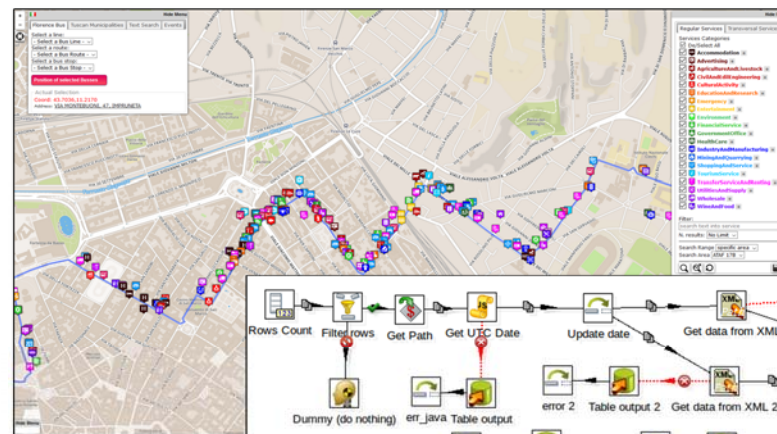
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Development Tools



- **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**





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<http://www.disit.org>

Dashboard Builder

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



Dashboards Overview

| Name | Title | Creation Date | Status |
|------|-------------------|---------------------|--------|
| 12 | Dashboard (title) | 2016-07-27 11:30:15 | OK |

Sources Management

| ID | ID |
|-------------------|---|
| Km4CityApp | jbc.mysp@redborg.3300 |
| Km4CityAlert | jbc.mysp@192.168.0.20.3300 |
| Km4CityLDF | http://192.168.0.206:8080/WebApp/Gratopaper |
| Km4CityRecommend | jbc.mysp@192.168.0.55.3300 |
| Km4CityServiceMap | jbc.mysp@192.168.0.72.3300 |
| Km4CitySikability | jbc.mysp@192.168.0.72.3300 |
| giva | jbc.mysp@redborg.3300 |
| SmartDS | jbc.mysp@192.168.0.25.3300 |
| TwitterTv | jbc.mysp@192.168.0.50.3300 |

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

DISIT lab, Gennaio 2016

Using and Contributing to Km4City



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DISIT lab, Gennaio 2018



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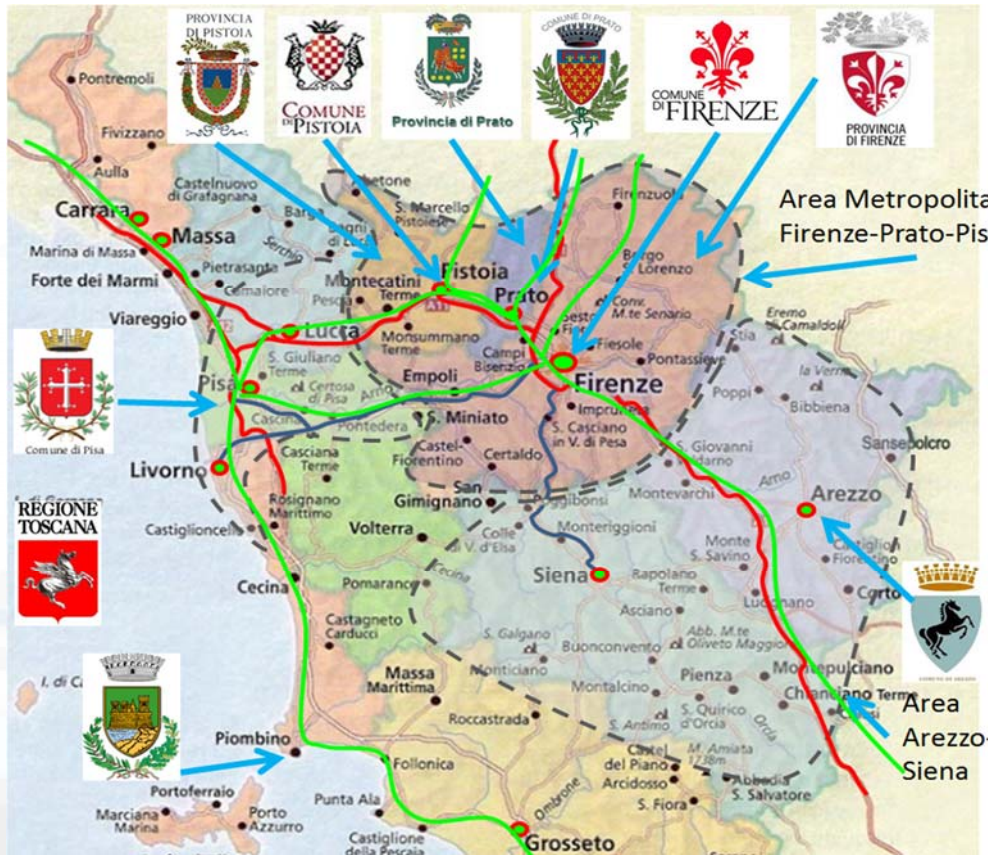
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<http://www.disit.org>

Sii-Mobility

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



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



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

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



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Sii-Mobility



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

Commenti dei cittadini,
Social Media



AVM trasporto
Pubblico



Sensori,
sistema monitoraggio

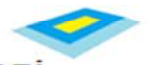
Merci



Sensori su
trasporto Privato



Sensori
Parcheggi

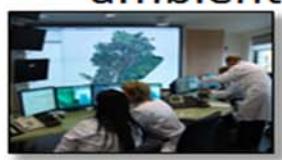


Monitoraggio
traffico, autostrade



Rete
Ferroviaria

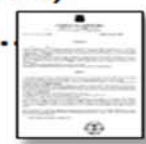
Parametri
ambientali



Servizi ed
enti



Ordinanze: eventi,
lavori pubblici, .



Emergenze,
polizia, 118



Infomobility



Varchi
Telematici, ZTL



Horizon 2020
European Union Funding
for Research & Innovation

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

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

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



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Horizon 2020
European Union Funding
for Research & Innovation

REnaissance of PLaces
with Innovative Citizenship
And TEchnology

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

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

- 1 (coordinator) FOMENTO DE SAN SEBASTIAN FSS SPAIN
- 2 AYUNTAMIENTO DE SAN SEBASTIAN SAN SEBASTIAN SPAIN
- 3 COMUNE DI FLORENCE FLORENCE ITALY
- 4 BRISTOL COUNCIL BRISTOL UNITED KINGDOM
- 5 STADT ESSEN ESSEN GERMANY
- 6 NILUFER BELEDIYESI NILUFER TURKEY
- 7 VILLE DE LAUSANNE LAUSANNE SWITZERLAND
- 8 IKUSI ANGEL IGLESIAS, S.A. IKUSI SPAIN
- 9 ENDESA ENERGÍA, S.A. ENDESA SPAIN
- 10 EUROHELP CONSULTING, S.L. EUROHELP SPAIN
- 11 ILUMINACION INTELIGENTE LUIX, S.L. LUIX SPAIN
- 12 FUNDACION TECNALIA RESEARCH & INNOVATION TECNALIA SPAIN
- 13 EUSKALTEL, S.A. EUSKALTEL SPAIN
- 14 COMPAÑÍA DEL TRANVÍA DE SAN SEBASTIÁN DBUS SPAIN
- 15 CONSIGLIO NAZIONALE DELLE RICERCHE CNR ITALY
- 16 ENEL DISTRIBUZIONE, SPA ENEL ITALY
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- 26 BRISTOL IS OPEN, LTD BIO UNITED KINGDOM
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- 30 ROUTE MONKEY, LTD ROUTE MONKEY UNITED KINGDOM
- 31 ESOTERIX SYSTEMS, LTD ESOTERIX UNITED KINGDOM
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Governing the smart city: a governance-centred approach to Smart urbanism – GHOST



General Objectives

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

Partners:

University of Cagliari (Coordinator) DICAAR and DMI

University of Florence SAGAS and DISIT

University of Turin ESOMAS

University of Sassari DADU

Under the patronage of the Municipality of Cagliari



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

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Open Source



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

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- Thanks to the European Commission for founding. All slides reporting logo of **Snap4City** <http://www.snap4city.org> of **Select4Cities H2020** are representing tools and research funded 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.

