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Km4City

Open Urban Platform for a Sentient Smart City

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

www.Km4City.org

Paolo Nesi, paolo.nesi@unifi.it



An aerial night view of a city, likely Florence, Italy, featuring a prominent red-tiled dome (Cattedrale di Santa Maria del Fiore) and a river (Arno) in the foreground. The city lights are illuminated against a dark sky, with mountains visible in the background.

0 – Km4City Open Urban Platform Overview

www.Km4City.org



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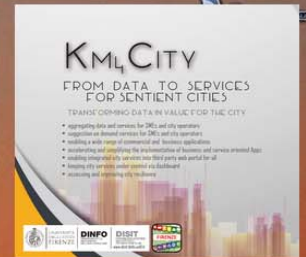
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Home Sentient City Control Room City Users' Tools Back Office and Dev Tools Info and Docs



City Users' Tools for Mobile Devices and Web

Km4City Mobile App Video

Suggestions and recommendations (*)

Engagements

Web and Totem Km4City Apps (*)



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Sentient Urban Platform for Smart City

- **Main Objectives:**
 - **Increase: quality of life, quality of services, ...**
 - reduce pollution, traffic congestion, ...
 - **Keep under control the city costs for services and operators**
 - mobility, energy, health, waste, environment, ...
 - **Reduce the risks and increase resilience**
 - with respect to natural and artificial threats
- **Set up an ICT based Urban Platform *integrated and unified data management among services, city operators and city users:***
 - **Control Room, Real Time Monitoring of KPI, ..**
 - **Data analytics and business intelligence**
 - **Reading the city: data, users behavior and needs, etc.**
 - **Stimulate virtuous behavior of City Users**
 - **Transform Data into value**





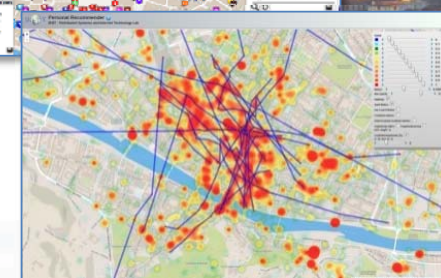
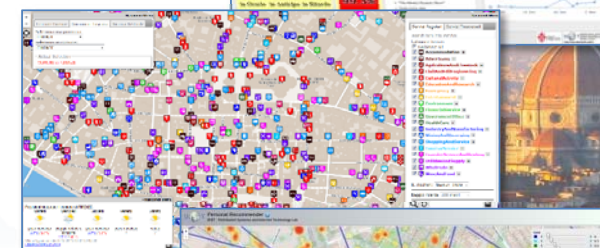
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Sentient Urban Platform for Smart City

- 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





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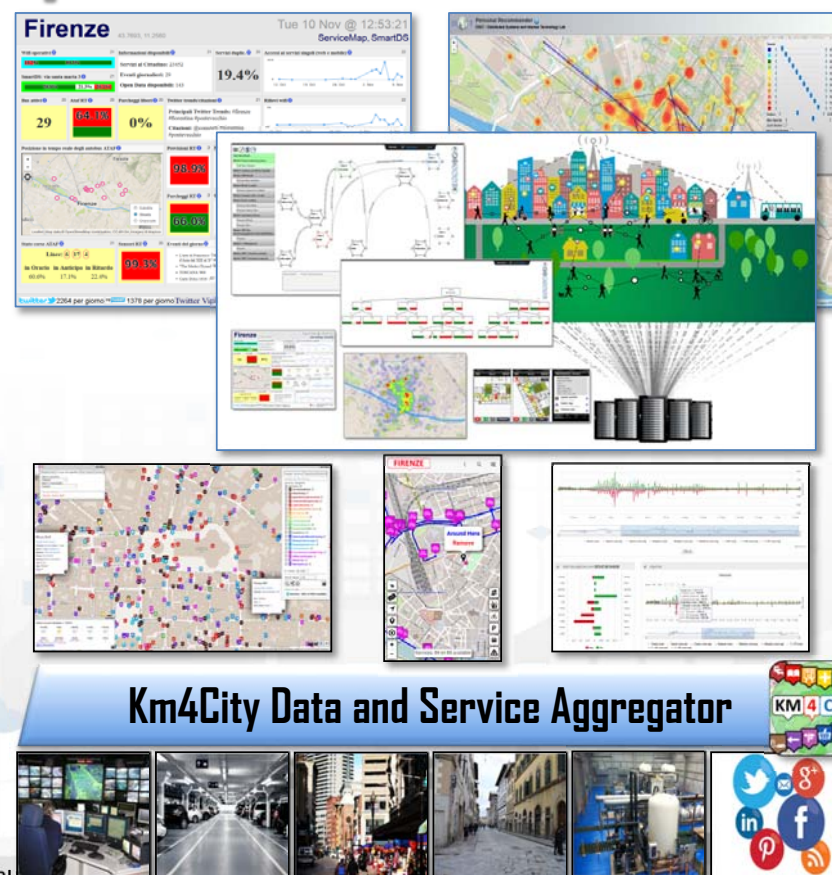
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From Data to Services for the Sentient Cities

Open Source and inter-operable tools to

1. keep city under control via personalized dashboards
2. transform data in value for the city, influence city users
3. Technical details: dashboard development and data aggregation
4. improve city resilience, reducing risks and decision support
5. who is using Km4City





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city under control



- **monitoring services' status**
of city operators

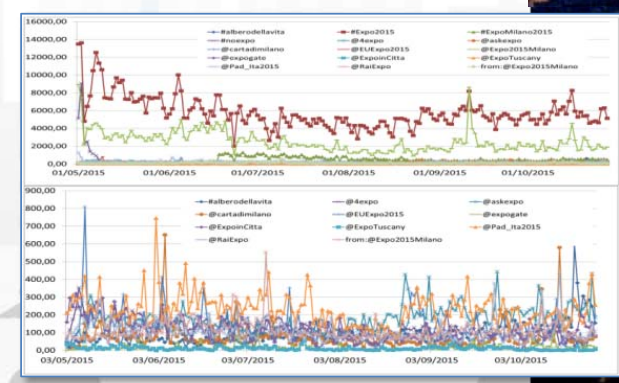
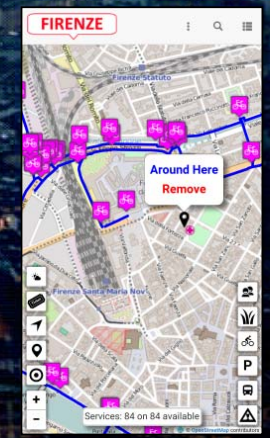
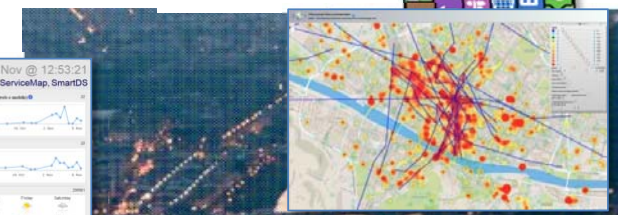
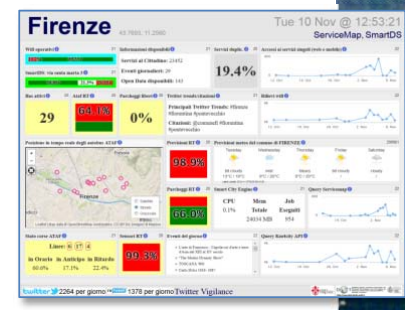
- Smart City Dashboards
- Continuous Business Intelligence

- **City users behaviour monitoring and analysis/influencing/engaging:**

- Sensors, traffic flow, people flows, mobiles, sensors, IOT, IOE
- Wi-Fi, Tv-Cameras

- **City users participation**

- social media for city services and events, **Twitter Vigilance**
- **Collecting contributions:** images, stars, comments



Km4City Smart City Ecosystem, January 2017

Sentient City Control Room

www.Km4City.org



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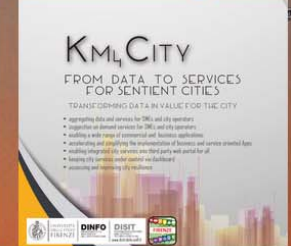
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Real Time Monitoring Tools for Control Room Dashboards

Real Time Control Room Dashboard ⓘ	Monitoring City Users by Wi-Fi (*) ⓘ	Monitoring City Users Behaviour via Mobile App (*) ⓘ	Monitoring Real Time Data on 3D: traffic and parking (*) ⓘ	Monitoring Parking Areas Status in Florence (*) ⓘ	Monitoring Traffic Sensors in Tuscany Region (*) ⓘ	Getting moods and alerts via Twitter Sentiment Analysis (*) ⓘ	Early Warning and Prediction Tools ⓘ	Smart Decision Support System, SmartDS (*) ⓘ
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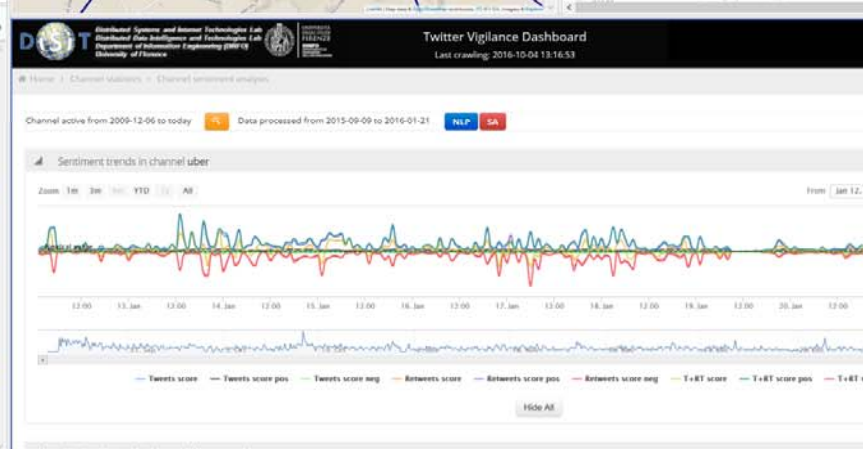
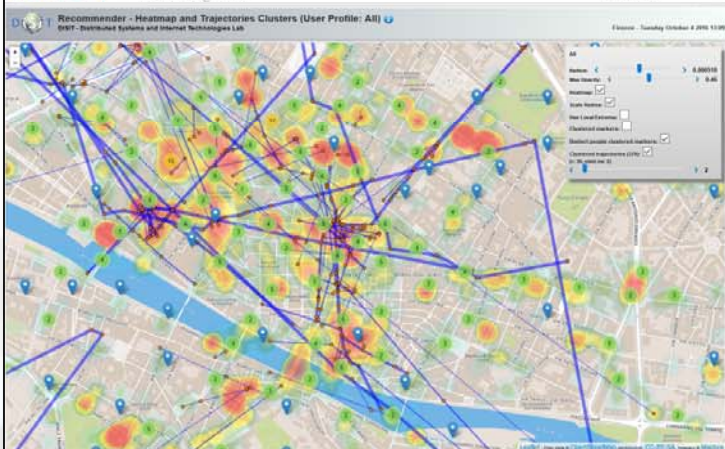
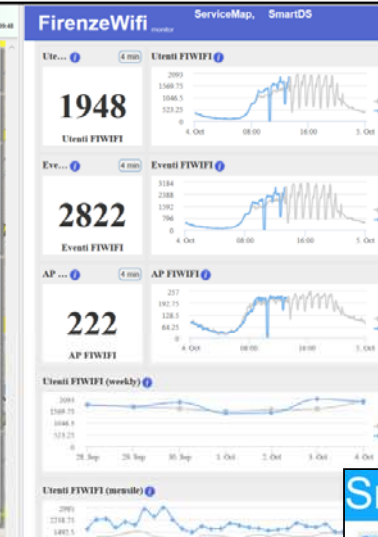
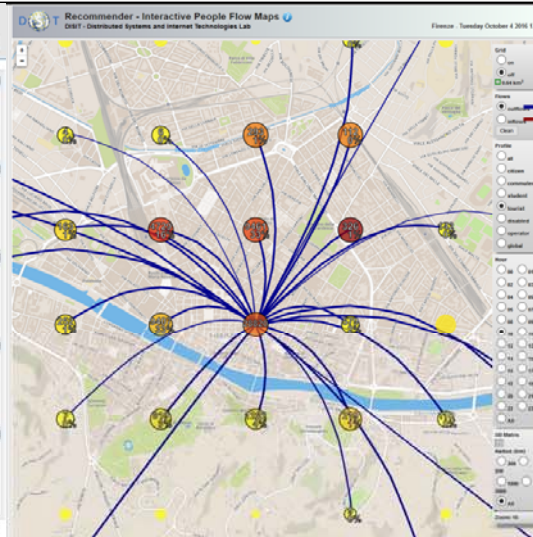
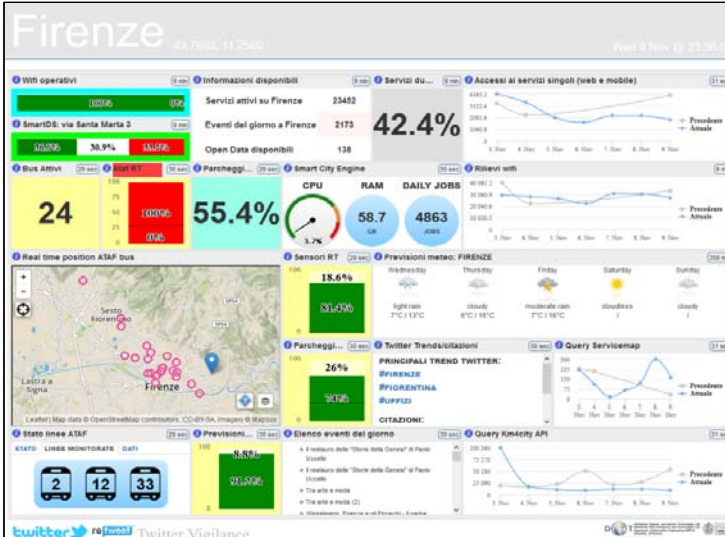
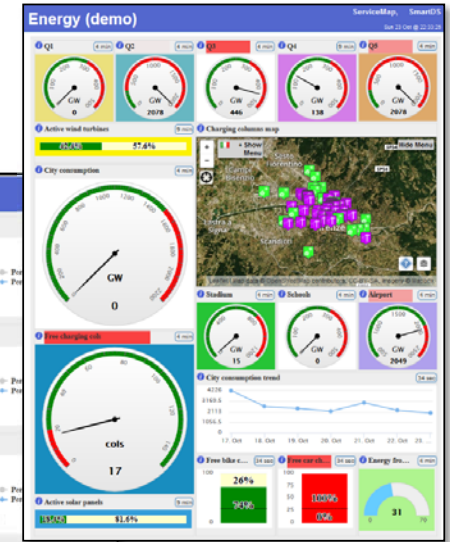
Smart City Control Room, Dashboard, Real Time Data

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Big Data Analytics Tools, Business Intelligence, Decision Support Tools

City Resilience Decision Support System, ResilienceDS (*) ⓘ	City Risk & Vulnerability Analysis Tool ⓘ	Assessing and Analysing Wi-Fi Coverage (*) ⓘ	Origin Destination Matrix by Wi-Fi data (*) ⓘ	City Users Recency and Frequency by Wi-Fi data (*) ⓘ	City Users Origin Destination Matrix via Mobile App (*) ⓘ	Heatmaps and Trajectories of City Users Tourists (*) ⓘ	Analysing City Users' Behavior (*) ⓘ	Social Media Twitter Vigilance (*) ⓘ	Twitter Data Analysis Tool (*) ⓘ
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Smart City Dashboard



Km4City Smart City Ecosystem, January 2017



Firenze

43.7693, 11.2560

Wed 9 Nov @ 23:36:04

Wifi operativi 9 min

100% 0%

SmartDS: via Santa Marta 3 9 min

36.0% 30.9% 33.2%

Informazioni disponibili 9 min

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

Servizi du... 9 min

42.4%

Accessi ai servizi singoli (web e mobile) 31 sec

Bus Attivi 29 sec

24

Ataf RT 30 sec

100% 0%

Parcheggi... 29 sec

55.4%

Smart City Engine 30 sec

CPU **3.7%**
 RAM **58.7 GB**
 DAILY JOBS **4863**

Rilevi wifi 9 min

Real time position ATAF bus

Sensori RT 29 sec

100
18.6%
81.4%

Previsioni meteo: FIRENZE 359 min

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

Parcheggi... 30 sec

100
26%
74%

Twitter Trends/citazioni 30 sec

PRINCIPALI TREND TWITTER:
#FIRENZE
#FIORENTINA
#UFFIZI

CITAZIONI:

Query Servicemap 31 sec

Stato linee ATAF 29 sec

STATO **LINEE MONITORATE** DATI

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

Previsioni... 30 sec

100
8.8%
91.2%

Elenco eventi del giorno 30 sec

- 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

Present data Tuscany Region

Road Graph (Tuscany region)

- 132,923 Roads
- 389,711 Road Elements
- 318,160 Road Nodes
- 1,508,207 Street Numbers

- Services (20 cat, 512 cat.)
- 16 Pub. Transport Operators
- 21.280 Bus stops & 1081 bus lines
- 210 Parking areas
- 796 Traffic Sensors
- Info on: points, paths, areas, etc.

Dynamic/real-time

- bus lines: 144 updates X day X line
- **NEW:** Timeline PT: 1081 lines, 1-2 updates per day
- parking status: 76 updates X day X sensor
- traffic Sensors: 288 updates X day X sensor
- weather: 2 updates X day for 285 areas
- **NEW:** Triage status: 96 updates per day, per hospital
- **NEW:** Fuel stations: 1 update per day, 1600 stations
- events: about 60 new events X day
- Wi-Fi: > 350.000 measures X day
- mobiles: > 50.000 measures X day
- more than 35.000 distinct users X day
- From 600.000 to 4.5 M Tweets X day
-+ many IOT are coming

- Nascondi Menu

Fermate Firenze Comuni in Toscana Ricerca Testuale

Seleziona una provincia:
FIRENZE

Seleziona un comune:
FIRENZE

- Actual Selection
COMUNE di FIRENZE

- 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

KM4 CITY

Previs

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

<http://servicemap.km4city.org>

Other Sensors and Actuators, IOT

- **Restricted Traffic Zone Gates**
 - Passages, payment, alerts, Wi-Fi control, RFI control, etc.
- **Road Direction manager:** panel, red-light, etc.
 - Status and action
- **Environmental Sensors:**
 - Air quality, pollution, rain, allergens, snow, ...
 - humidity, temperature, ...
 - water level in rivers
 - Status of underpass and bridges
 - Seismic sensors
- **Public Light Pillars**
 - Traffic flows, people flow,
 - Wi-Fi, Tv-Camera, BT servers, on/off, percentage of light, ..
- **Waste Manager**
 - Level, kind, status, on/off



- **Recharge station, column**
 - Free slots, consumption, next time slot, ...
- **Risk assessment**
 - Value of the buildings,
 - hydrogeological risk map,
 - earthquake risk map, ...
 - people distribution and location
 - Position of recover places,
- **Traffic Zone Gates**
 - Passages, alerts,
 - Wi-Fi control,
 - RFID control,
 - etc.





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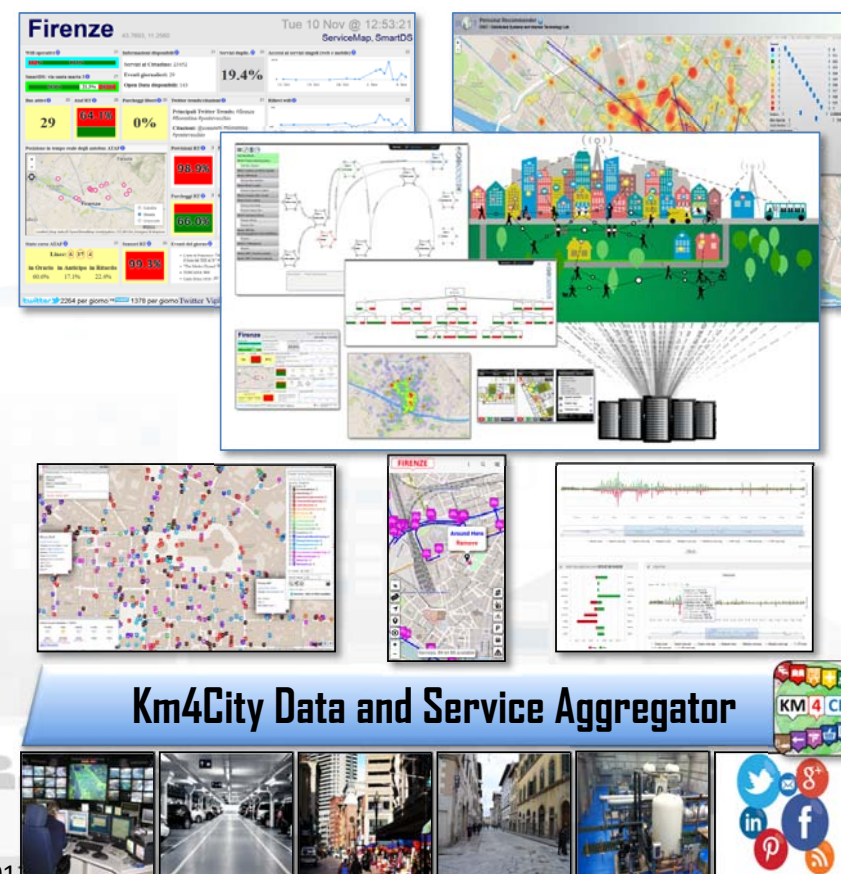
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From Data to Services for the Sentient Cities

Open Source and inter-operable tools to

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5. who is using Km4City



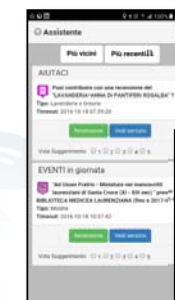
Strategies Implementation via Engagement

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



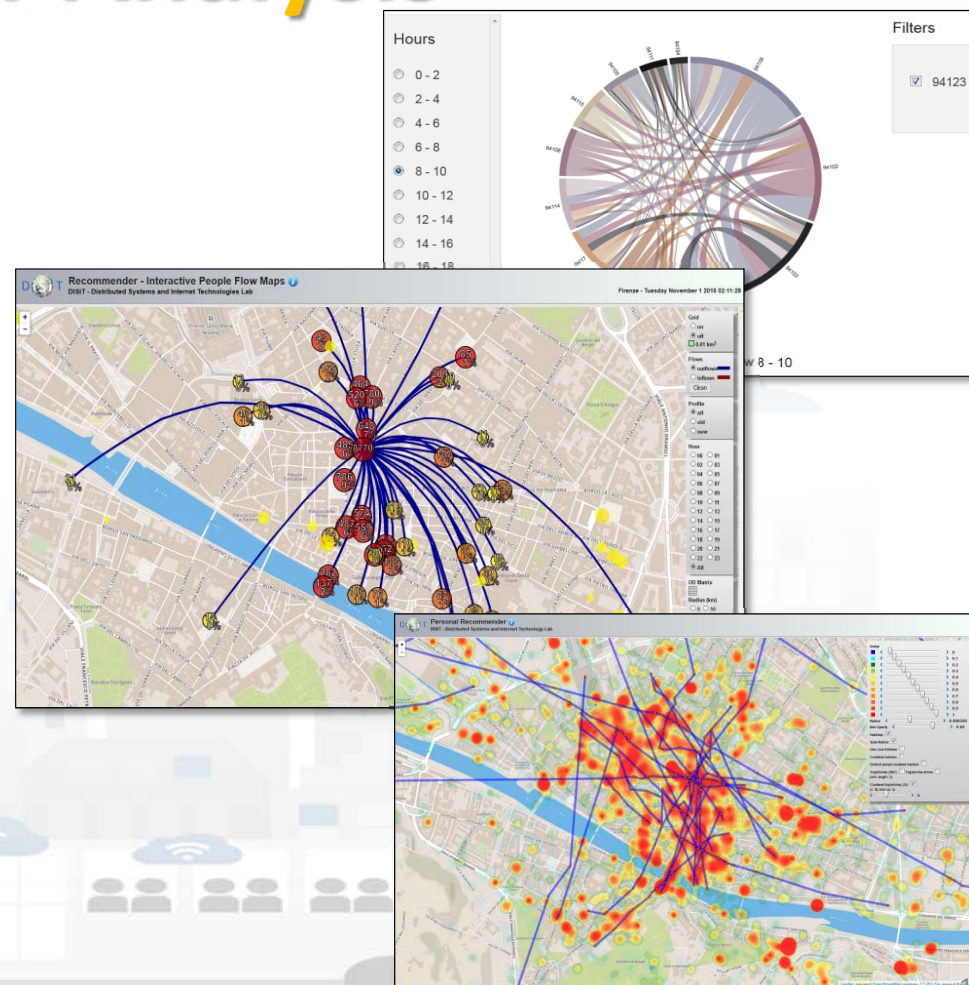
Engagement & Assistant Rules

- **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

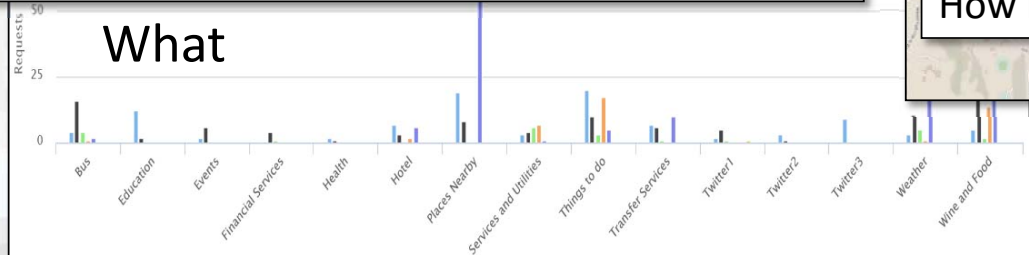
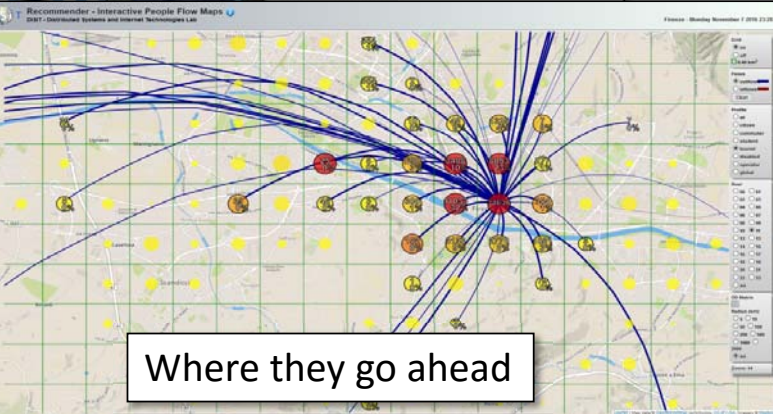
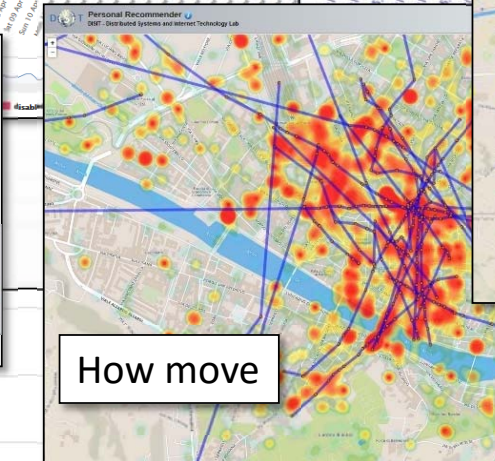
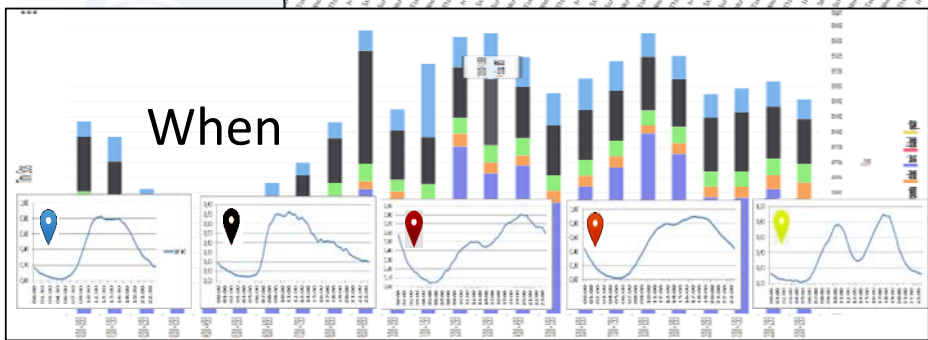
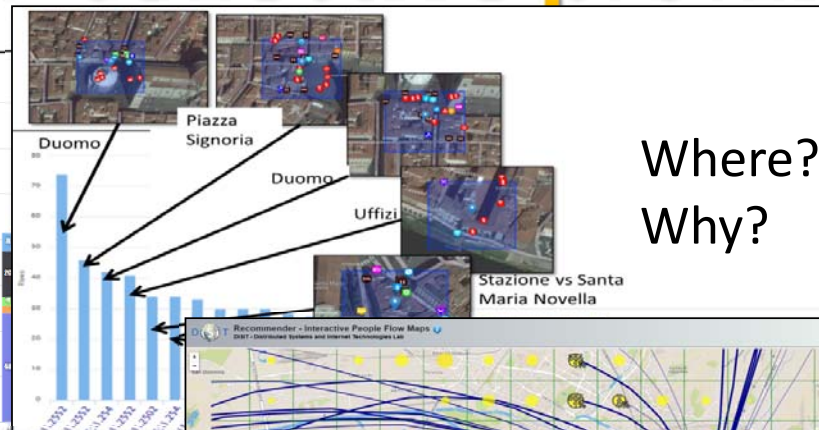
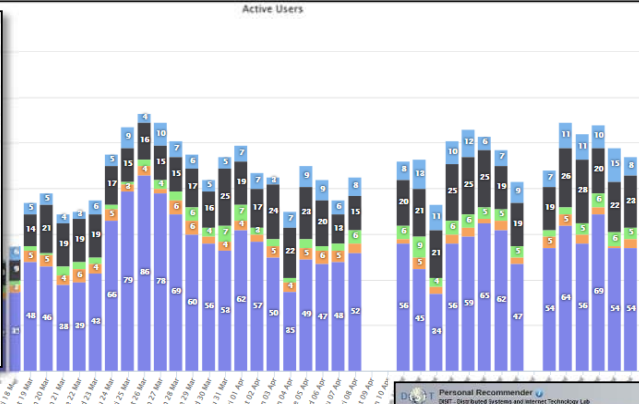
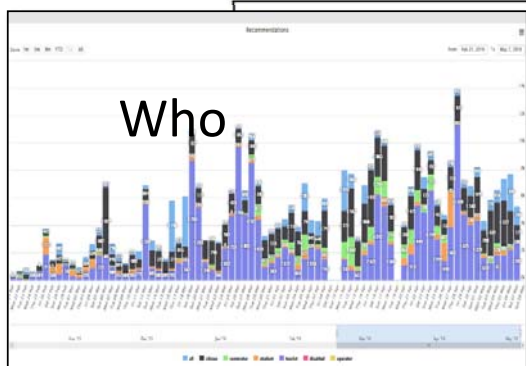


User Behaviour Analysis

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

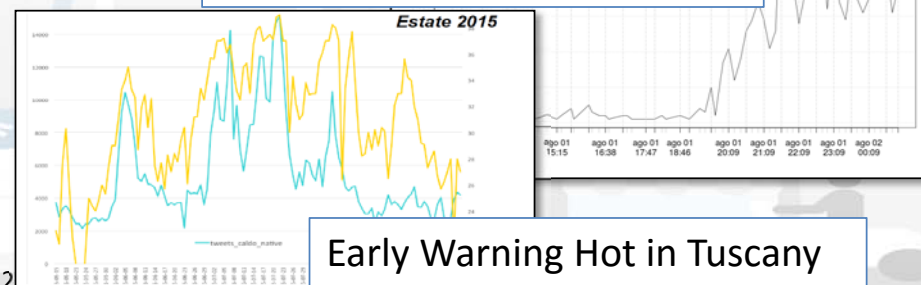
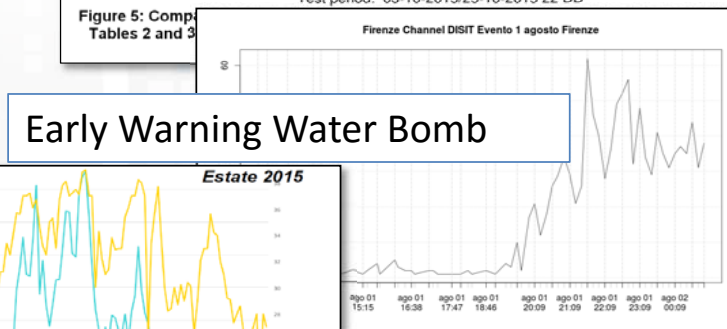
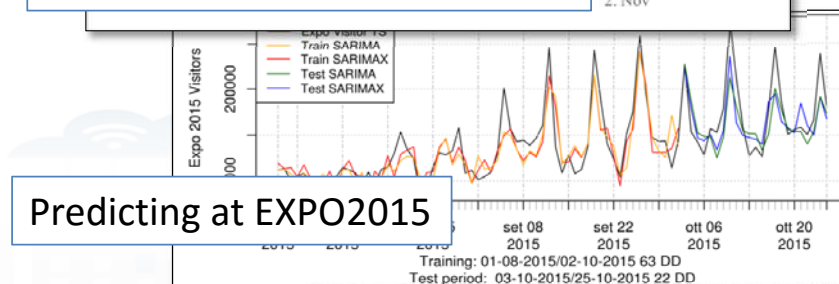
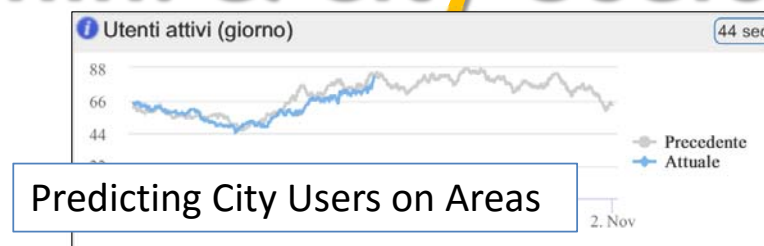


User Behavior Analyzer for Collective profiling



Predicting Models for Admin. & City Users

- Aiming at improving
 - quality of service,
 - distributing workload
 - early warning
- Traffic Flows & People Flows
 - crowd , #number of people
- Parking Status → free slots
- Weather Forecast (LAMMA)





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Km4CityMobile App



What do you want to do?

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

Ponte Vecchio

Tipo: Digital Location

Descrizione: The Condition Vasariano follows along Ponte Vecchio, in its centre a series of some log and panoramic windows on the Arno river opens toward the Santa Trinita Bridge

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

Indirizzo: **VIALE DELLA MERIDIANA, 50125 FIRENZE FI**

Choose Services

- Accommodation
- Advertising
- Agriculture
- Civil Architecture
- Culture
- Education
- Emergency
- Environment
- Finance
- Government
- Health
- Industry
- Mining
- Shopping
- Tourism
- Transfer Service And Renting
- Utilities And Supply

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

Suggerimenti

Post

Piazza SS. Annunziata
Tipo: Squares
Distanza: 1949 m
Indirizzo: [Icons]

Piazza Santissima Annunziata
Tipo: Squares
Distanza: 1949 m
Indirizzo: [Icons]

Trattoria Gozzi
Tipo: Trattoria
Distanza: 1949 m

ESERCITAZIONE MUGNONE 2016

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	ARANCIONE

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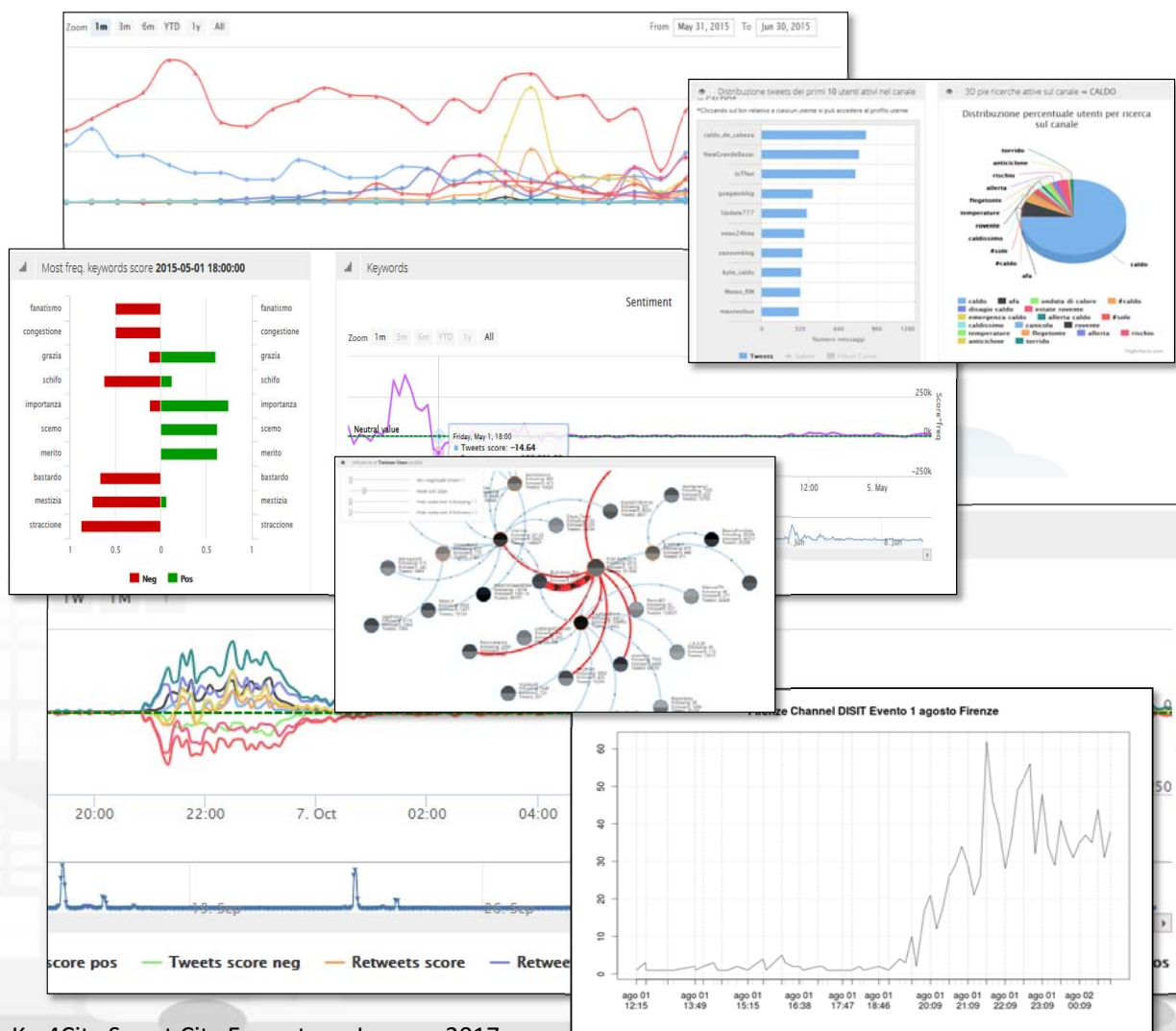
Scarica da
 Windows Store



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





Km4City: Open, Flexible, Scalable City Platform

- **Over the 5 stars data**
 - linked open data, RDF store + big data analytics
- **Open**
 - Open to any kind of customization → Open Source, license free
 - Open to any data source → Km4City DataWarehouse
- **Flexible**
 - multiple domains data and processes → Km4City Ontology and Tools
 - Ingesting data via any protocol and approach → Km4City DataWarehouse
- **Scalable**
 - Sustainable and affordable → Flexible and compoundable tools
 - providing support for decision support performing data analytics in real time → Km4City Scalable Back office for Big Data Analytics



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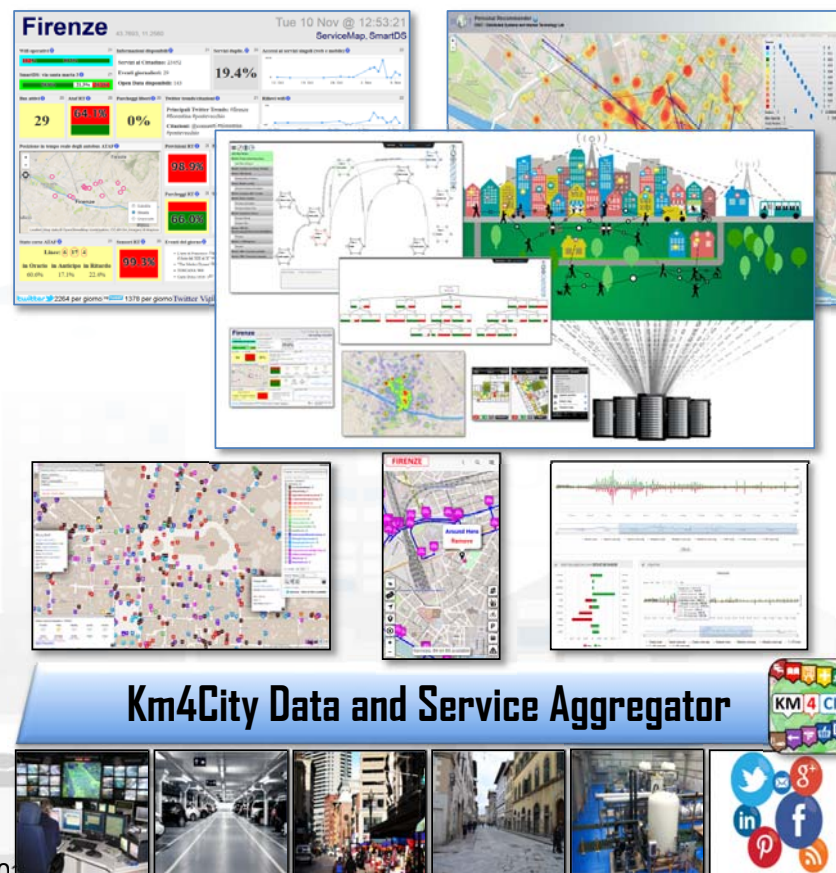
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Back Office and Dev Tools



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KM4CITY
FROM DATA TO SERVICES
FOR SENTIENT CITIES

TRANSFORMING DATA IN VALUE FOR THE CITY

- aggregating data and services for 360° and city operators
- supporting the shared services for 360° and city operators
- enabling a wide range of commercial and business applications
- monitoring and optimizing the implementation of business and services oriented flow
- enabling integrated data services and third party web portals for all
- enabling city operators and services to be developed
- enabling and monitoring city evolution

Home Sentient City Control Room City Users' Tools Back Office and Dev Tools Info and Docs

Development Tools for Mobile App and Web App (the ServiceMap Tool), generating Smart City API calls

Service Map (visual query development tool) (*)	POI density in Florence Downtown (*)	Events in Florence (*)	Services & POI in Tuscany (*)	Services & POI in Florence (*)	Services & POI in Pisa (*)	Bus Lines and timelines in Tuscany	Green Areas in Florence (*)	Cycling Path in Florence (*)	Search on Area analysis (*)	Search along line analysis (*)
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Dashboard development tools

Dashboard Builder for control room (*)

Smart City API, Linked Open Data, RDF Store tools, 5 Stars Data

Web page: Km4City Smart City API documentation	Km4City Ontology, SVG File	ZIP File: Download Km4City Ontology, multiple formats	Linked Open Graph LOD (*)	SPARQL & Data Licenses (*)	Km4City in Tuscany Area
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Data Warehouse and Back Office Data Aggregation Tools

Smart City General Architecture	Programming User Engagements	DIM: Data Ingestion Manager	DIM: Data Ingestion Manager	DIM: Data Ingestion Manager
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www.Km4City.org



Development tools

- **Dashboard builder**
 - Creating personalized dashboards in few clicks
- **aggregating multi-domain data and services** for SMEs and city operators
 - **Data /Service Aggregator**: open, flexible and suitable access
- **development tool** for fast and low cost implementation of business and service oriented Apps
 - access to aggregated data → **Smart City API**
 - ServiceMap → **Smart City API**



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<http://www.disit.org>

Higher level Dashboard



Firenze

43 7893, 11 2560

ServiceMap, SmartDS

Tue 4 Oct @ 12:18:04

WiFi operativi: 100%

SmartDS: via Santa Marta 3: 30.9%

Bus attivi: 0

Ata...: 100%

Par...: 0%

Smart City Engage: 0%

CPU Totale: 0%

Mem Totale: 72094 MB

Job Eseguiti: 2709

Accessi ai servizi singoli (web e mobile): 1936

Rilievi wifi: 42 639

Real time position ATAF bus

Previsioni meteo: FIRENZE

Twitter Trends/citazioni

Principali Twitter Trends: #fiorenza @uffici

Citazioni: @NicolodiDaria @acffiorenza @comunefi

Query Kintcity API

Stato linee ATAF

Linee: 6 | 17 | 4

in Orario in Anticipo in Ritardo

46.2% 4.6% 49.2%

28.4%

71.6%

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 13:00:00 - 2016-10-04 13:18:00

Radius: 0.0000

Max Opacity: 0.80

Heatmap (2885) Streaming APs

Time Range: 5 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

Mugnone 2016

ServiceMap, SmartDS

Tue 4 Oct @ 12:18:04

Utenti attivi (12 ore)

Turisti attivi (12 ore)

Rilievi wifi al giorno

Accessi ai servizi singoli (web e mobile)

Query Kintcity 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 Opacity: 0.46

Heatmap:

Scale Radius:

Show Local Extrema:

Clustered markers:

Distinct people clustered markers:

Clustered trajectories (15) (0:30, min: 10:2)

Twitter Vigilance Dashboard

DISIT - Distributed Systems and Internet Technologies Lab

Department of Informatics Engineering (DICE) University of Florence

Firenze

Menu On | Login

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

From Jan 12, 2016 To Jan 21, 2016

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

Hide All



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Dashboard Builder



Dashboard Builder

Dashboards Overview

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

Sources Management

DataSources Overview

ID	URL
Km4CityApp	jbtc.mysqj (/redstarg.3306)
Km4CityAlert	jbtc.mysqj (/192.168.0.20.3306)
Km4CityRCF	http://192.168.0.206:8080/WebAppGrabsip.asp
Km4CityRecommender	jbtc.mysqj (/192.168.0.55.3306)
Km4CityServiceMap	jbtc.mysqj (/192.168.0.72.3306)
Km4CitySustainability	jbtc.mysqj (/192.168.0.72.3306)
priva	jbtc.mysqj (/redstarg.3306)
SmartOS	jbtc.mysqj (/192.168.0.25.3306)
TwitterTv	jbtc.mysqj (/192.168.0.52.3306)

Add new Widget

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

Metric: Sensors_Fl Add

Metric Description: Developer: Percentage of Error
Details: 8008
Metric: Temperature
Percentage: 100
Data Area: Stability
Data Source: Osservatorio Regionale per la Mobilità del Trasporto Pubblico
Refresh rate: 60 sec
Status: Active

Content: [Empty]

Type Widget: widgetPacChart Max 1 metrics

Selected Metrics: Sensors_Fl

Link: www.km4city.org/operativita/

Information: Percentage of road sensors underground (only working or not compared to those located on the city. The portion of the path in red refers to the percentage of non-functioning, the green part pertains to the active ones.

Widget Parameters: Title: Sensors_RT Background color: #fff Time Interval: No Refresh rate (sec): 60 Rows number: 2 Columns number: 3

Buttons: Add, Close, Create

Modifica Widget

Id Widget: widgetBarContent

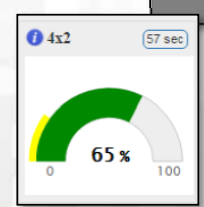
Type: Percentuale

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

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

n. metrics: 1 Color: 1

Buttons: Close, Modify



BarContent - 2x4 9 min

14.2% 85.8%

Buttons: Button 2x1, Button 2x2, Button 4x2, Button 4x4

PARK 59 sec

parccheggio162_I

SUCCESS

2016-11-09 23:09:25

4x2 9 min: 56%, 44%

5x2 59 sec: 28%, 72%

6x2 59 sec: 24%, 76%

4x3 4 min: 11.2, 5.6, 2.8, 1.6

4x6 56 sec: 11.2, 5.6, 2.8, 1.6

5x5 57 sec: CPU Load 100%, RAM 35.2 GB, Daily jobs 212

8x8 56 sec: CPU Load 100%, RAM 35.2 GB, Daily jobs 212

4x2 48 sec: 35.0%, 65.0%



Km4City Smart City Ecosystem, January 2017

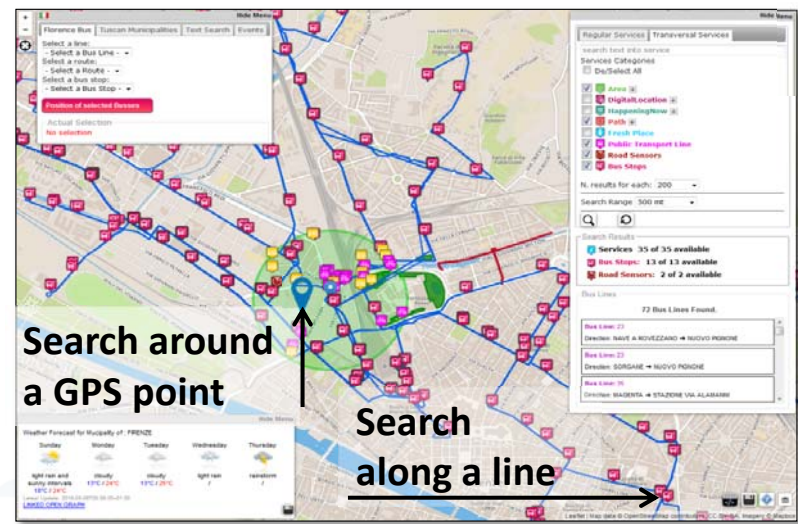


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ServiceMap Dev Tool



Smart City API call generation

Web App HTML5

Mobile Apps

Embed into Web pages

DISPONIBILE SU Google play

Scarica da App Store

Scarica da Windows Store

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Distributed Data Intelligence and Technologies Lab
Department of Information Engineering (DINFO)
University of Florence
<http://www.disit.dinfo.unifi.it>

KM4CITY SERVICE MAP EMBEDDED



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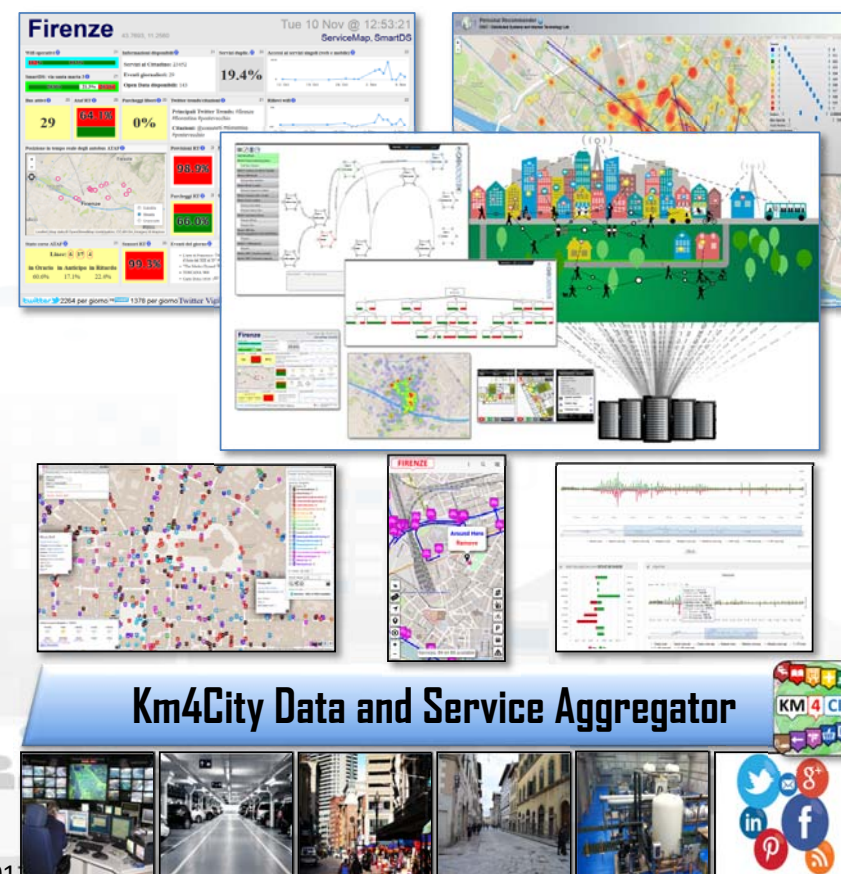
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From Data to Services for the Sentient Cities

Open Source and inter-operable tools to

1. keep city under control via personalized dashboards
2. transform data in value for the city, influence city users
3. Technical details: dashboard development and data aggregation
4. improve city resilience, reducing risks and decision support
5. who is using Km4City



Improve city resilience, reducing risks and decision support

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

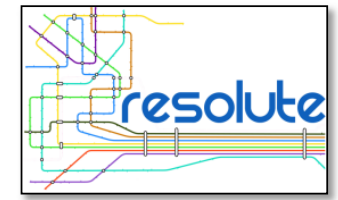




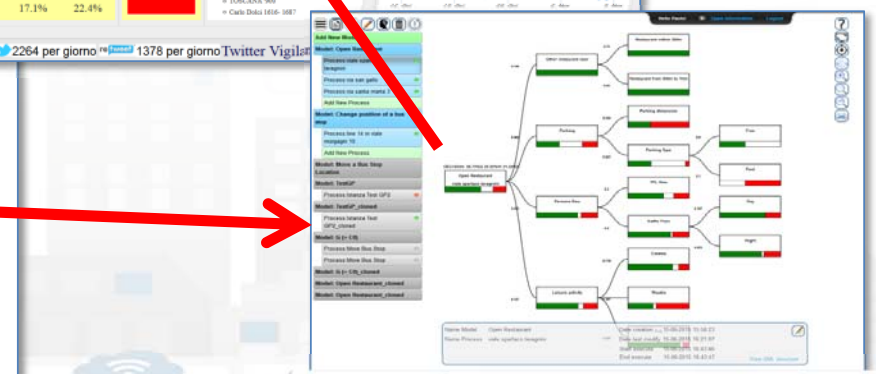
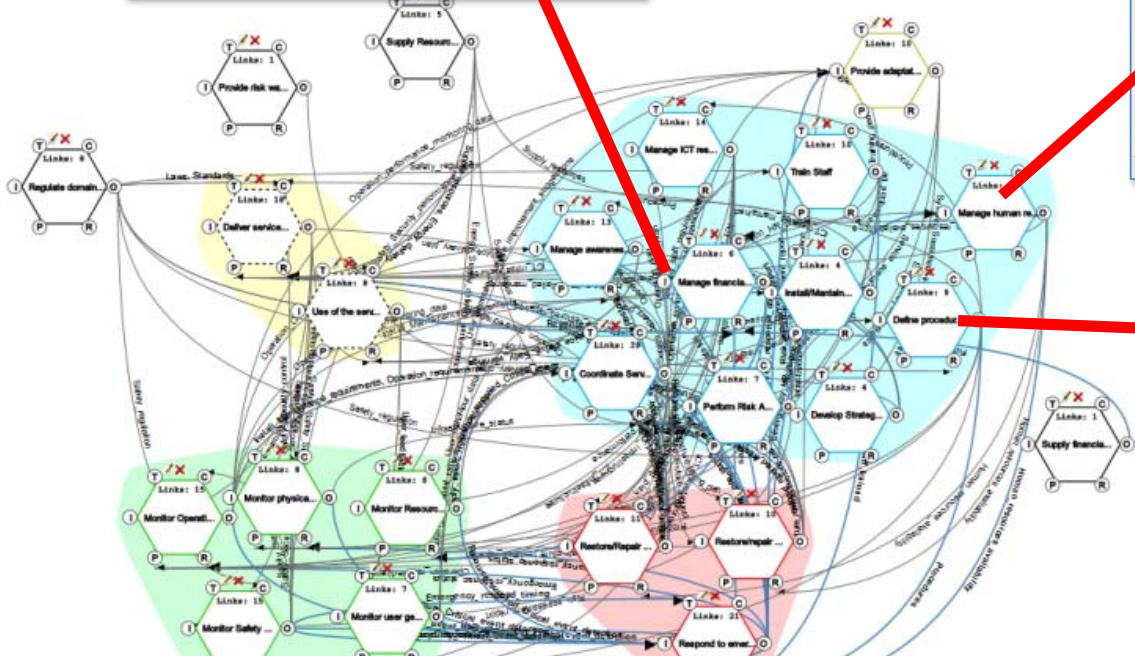
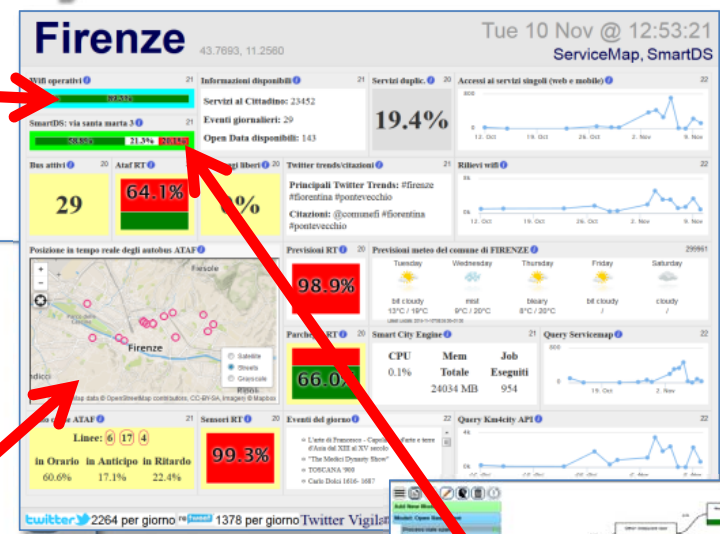
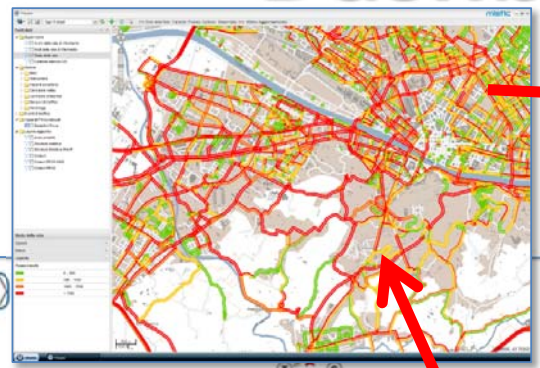
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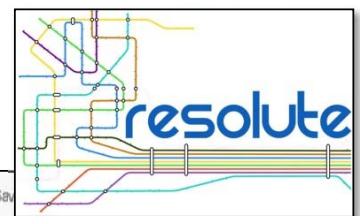
Dashboarding city resilience



Data and Service Aggregator



2017



Flood sensors observations:

<input checked="" type="checkbox"/>	From	Data	mm/h
<input checked="" type="checkbox"/>	Firenze Genio Civile	2016-04-11T15:59:00	12
<input checked="" type="checkbox"/>	Firenze Peretola	2016-04-11T15:59:00	20.5
<input checked="" type="checkbox"/>	Firenze Universita	2016-04-11T15:59:00	10.5

Threshold: 1.0
 From: 2016-01-01 00:00
 To: 2016-07-29 00:00

Draw region to analyze: On
 Load predefined region: Firenze
 Mean precipitation: 14.333333333333334

GetObservations Analyze

SERVICE

NAME: villa maria teresa hospital...

ADDRESS: VIA DELLA CERNAIA, FIRENZE, FIRENZE

SERVICE TYPE: http://www.disit.org/km4city/schema#Public_hospital

SERVICE CLASS: <http://www.disit.org/km4city/schema#HealthCare>

SERVICE: <http://www.disit.org/km4city/resource/77ab1bc45b84357b727dd67fe6081d2db>

VALUE: 100

WKT DESCRIPTION: POINT (11.2561 43.7866)

Traffic observations:

<input type="checkbox"/>	From	Date	km/h	car/km	car/h
<input type="checkbox"/>	VIA DELLA MATTONAIA	2016-10-10 18:01:08	58	15	2435
<input type="checkbox"/>	LUNGARNO AMERIGO VESPUCCI	2016-10-10 18:01:08	18	65	1842
<input type="checkbox"/>	VIA CAMILLO CAVOUR	2016-10-10 18:01:08	61	12	2009
<input type="checkbox"/>	VIA VALFONDA	2016-10-10 18:01:08	27	53	3307
<input type="checkbox"/>	VIA VITTORIO ALFIERI	2016-10-10 18:01:08	23	58	2798
<input type="checkbox"/>	VIA SENESE	2016-10-10 18:01:08	27	54	3216
<input type="checkbox"/>	VIA GUELFA	2016-10-10 18:01:08	68	3	420
<input type="checkbox"/>	VIA DELLA SCALA	2016-10-10 18:01:08	60	13	2167
<input type="checkbox"/>	PIAZZA DI SAN FELICE	2016-10-10 18:01:08	62	10	1687
<input type="checkbox"/>	BORGO SAN FREDIANO	2016-10-10 18:01:08	57	17	2690
<input type="checkbox"/>	VIA VITTORIO ALFIERI	2016-10-10 18:01:08	10	74	195
<input type="checkbox"/>	VIA DEL CAMPUCCIO	2016-10-10 18:01:08	60	13	2157
<input type="checkbox"/>	VIA DEI BENCI	2016-10-10 18:01:08	22	59	2679
<input type="checkbox"/>	PIAZZALE DI PORTA ROMANA	2016-10-10 18:01:08	64	8	1361

Assessing Risk

- hydraulic
- Seismic

Relevant Services

Min asset value: 90

<input checked="" type="checkbox"/>	Service	Street	Type	Value
<input checked="" type="checkbox"/>	villa delle terme case di cura	VIALE MAZZINI GIUSEPPE, FIRENZE	Publ	100
<input checked="" type="checkbox"/>	villa dei pini srl	VIA FOSCOLO UGO, FIRENZE	Publ	100
<input checked="" type="checkbox"/>	Poggio Secco	VIA INCONTRI, FIRENZE	Public_hospital	100

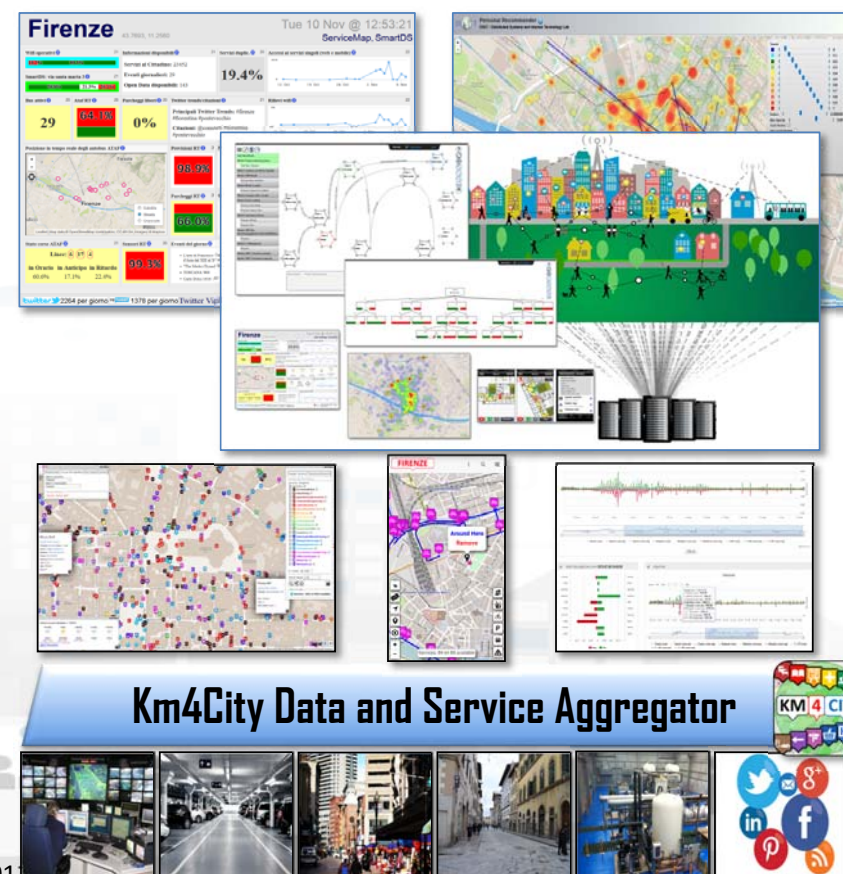




From Data to Services for the Sentient Cities

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Km4City Roadmap




2021

12/2017

- 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 

Today

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

GHOST SIR
2016-2019 - Started



 **RESOLUTE H2020**
2015-2018 - Started

Km4City 1.5
- SmartDS
- Km4City App



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

2015

Km4City 1.4

- Embed
- More API
- iBeacon

API
<http://www.disit.org/fodd>
Twitter Vigilance
<http://smartds.km4city.org>

2014

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>
<http://log.disit.org>
<http://www.disit.org/fodd>
<http://www.disit.org/tv>
<http://smartds.km4city.org>

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

A nighttime photograph of a city, likely Florence, Italy, featuring the Florence Cathedral (Duomo) with its large dome. The city is illuminated by streetlights and building lights, with a river in the foreground reflecting the lights. The sky is a mix of orange and dark blue, suggesting dusk or dawn. The text "1 - Keep City under Control: services and users' behavior" is overlaid in large, bold, yellow letters.

1 - Keep City under Control: services and users' behavior

From Data to Services for the Sentient Cities

Open Source and inter-operable tools to

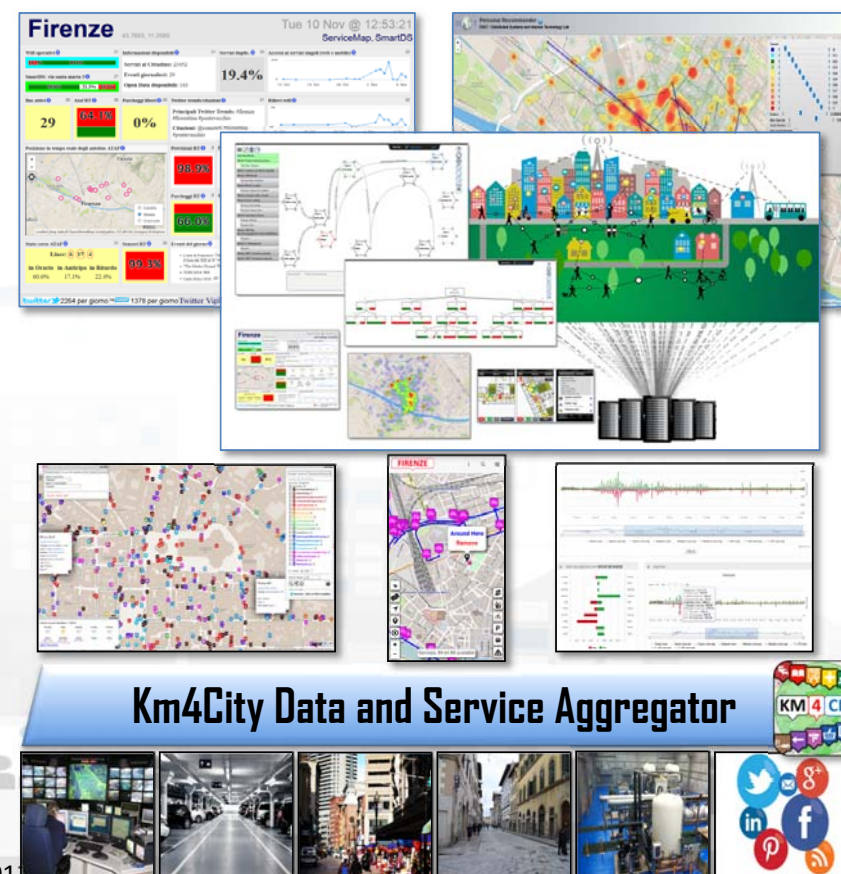
1. keep city under control via personalized dashboards

- transform data in value for the city,
- influence city users

2. Technical details:

- dashboard development
- data aggregation
- Projects contributing

3. improve city resilience, reducing risks and decision support



Sentient City Control Room

www.Km4City.org



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Real Time Monitoring Tools for Control Room Dashboards

 Real Time Control Room Dashboard ⓘ	 Monitoring City Users by Wi-Fi (*) ⓘ	 Monitoring City Users Behaviour via Mobile App (*) ⓘ	 Monitoring Real Time Data on 3D: traffic and parking (*) ⓘ	 Monitoring Parking Areas Status in Florence (*) ⓘ	 Monitoring Traffic Sensors in Tuscany Region (*) ⓘ	 Getting moods and alerts via Twitter Sentiment Analysis (*) ⓘ	 Early Warning and Prediction Tools ⓘ	 Smart Decision Support System, SmartDS (*) ⓘ
--	--	--	--	---	--	---	--	--

Smart City Control Room, Dashboard, Real Time Data

 Firenze	 DataCenter	 Km4City	 FirenzeWiFi	 Energy (demo)	 Mugone 2011	 SmartCity Processes	 Servizi agli Utenti
-------------	----------------	-------------	-----------------	-------------------	-----------------	-------------------------	-------------------------

Big Data Analytics Tools, Business Intelligence, Decision Support Tools

 City Resilience Decision Support System, ResilienceDS (*) ⓘ	 City Risk & Vulnerability Analysis Tool ⓘ	 Assessing and Analysing Wi-Fi Coverage (*) ⓘ	 Origin Destination Matrix by Wi-Fi data (*) ⓘ	 City Users Recency and Frequency by Wi-Fi data (*) ⓘ	 City Users Origin Destination Matrix via Mobile App (*) ⓘ	 Heatmaps and Trajectories of City Users Tourists (*) ⓘ	 Analysing City Users' Behavior (*) ⓘ	 Social Media Twitter Vigilance (*) ⓘ	 Twitter Data Analysis Tool (*) ⓘ
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city under control

- **monitoring services' status**
of city operators

- Smart City Dashboards
- Continuous Business Intelligence

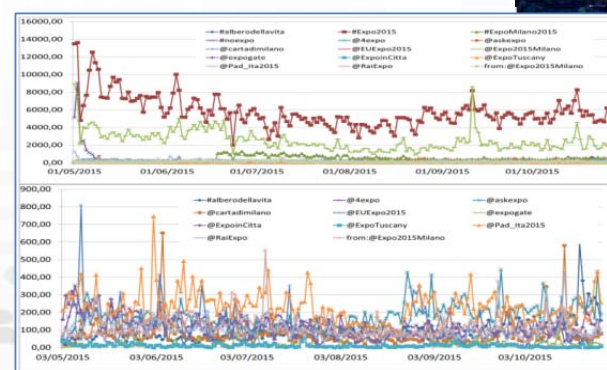


- **City users behaviour monitoring and analysis/influencing/engaging:**

- Sensors, traffic flow, people flows, mobiles, sensors, IOT, IOE
- Wi-Fi, Tv-Cameras

- **City users participation**

- social media for city services and events, Twitter Vigilance
- Collecting contributions: images, stars, comments





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Horizon 2020
European Union Funding
for Research & Innovation

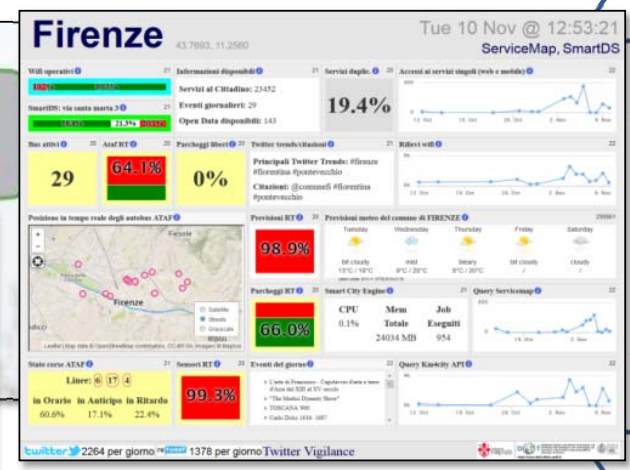


Transport
systems,
Mobility, Parking

Shops,
services,
operators



Sensors, IOT
Cameras, ..



Public services,
Govern, Events



Environment,
Water, energy



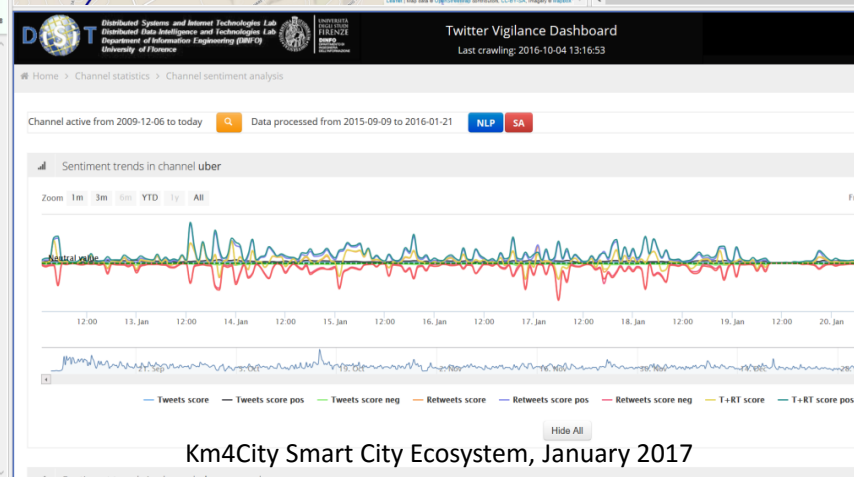
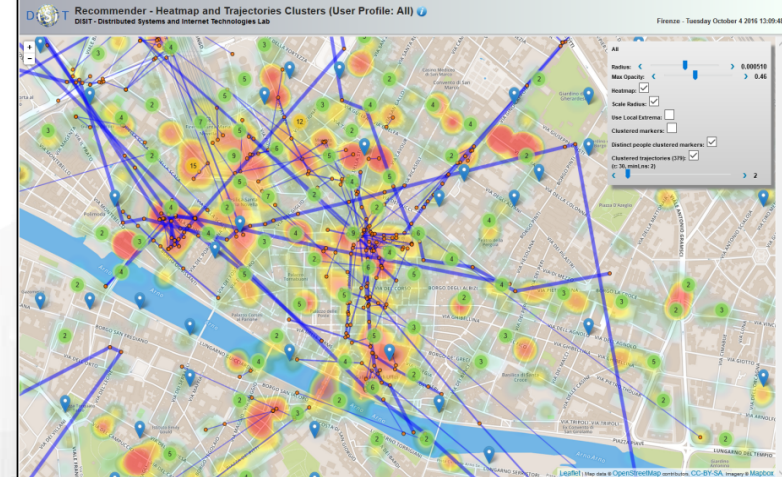
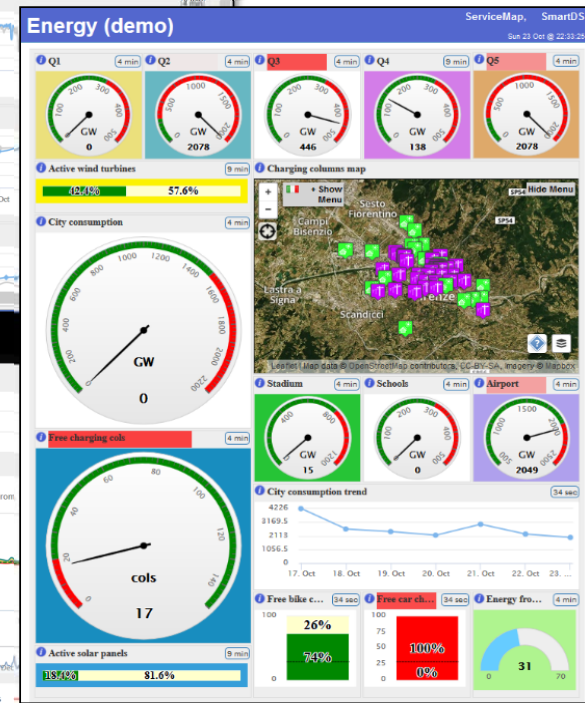
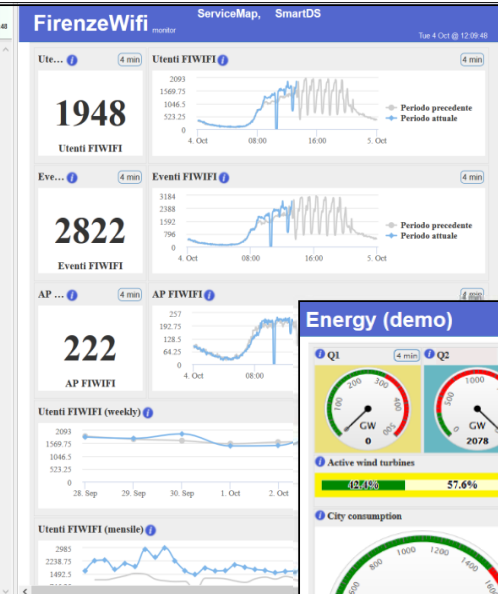
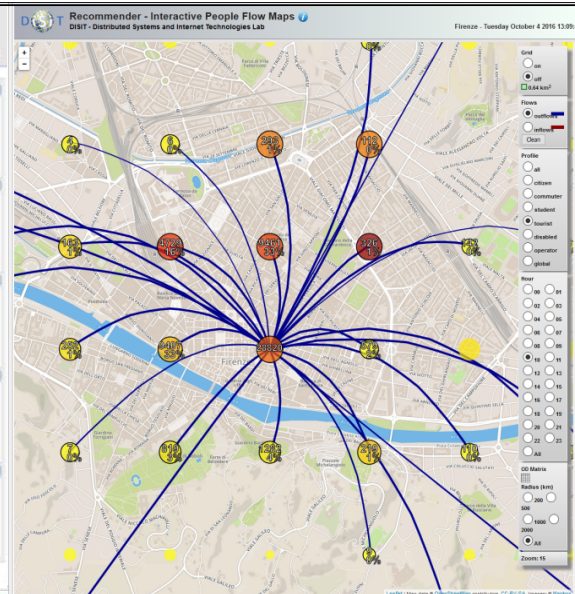
Social Media,
WiFi, Network

Dashboards

Smart City Dashboard



Horizon 2020
European Union Funding
for Research & Innovation



Km4City Smart City Ecosystem, January 2017

Servizi agli Utenti

Firenze

Tue 13 Dec @ 17:01:29

Tweet per Firenze

TRENDS QUOTES

- #FIORENTINA
- #UFFIZI
- #PONTEVECCHIO
- #BARCELLO

Twitter quotes

TRENDS QUOTES

- @ACFFIORENTINA
- @MUSEONOVECENTO
- @UNI_FIRENZE
- @COMUNEFI
- @NAZIONE_FIRENZE
- @FIRENZE311WEB

Eventi a Firenze

WINKELMANN, FIRENZE E GLI ETRUSCHI - IL PADRE DELL'ARCHEOLOGIA IN TOSCANA
2016-05-26 to 2017-01-30
PIAZZA DELLA SANTISSIMA ANNUNZIATA

SPLENDIDA MINIMA. PICCOLE SCULTURE PREZIOSE NELLE COLLEZIONI MEDICEE: ...
2016-06-21 to 2017-01-08
PIAZZA DEI PITTI 1

SCULTURA E CULTO A POGGIO COLLA: UN SANTUARIO ETRUSCO NEL MUGELLO
2016-08-27 to 2016-12-31
VIA CAMILLO CAVOUR

AD USUM FRATRIS - MINIATURE NEI MANOSCRITTI LAURENZIANI DI SANTA CROCE...
2016-09-05 to 2017-01-07
PIAZZA DI SAN LORENZO 9

TEMPO REALE E TEMPO DELLA REALTÀ. GLI OROLOGI DI PALAZZO PITTI DAL XVI...

PROTEZIONE CIVILE

GENERAL METEO

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

Stato servizio BUS

STATO LINEE MONITORATE DATI

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

Meteo Firenze

Tuesday: cloudless 6°C / 15°C

Wednesday: overcast 4°C / 12°C

Thursday: overcast 5°C / 15°C

Friday: bit cloudy /

Saturday: cloudless /

Parcheggi

65%

Parcheggi liberi

Line graph showing free parking spots over time (13 Dec to 14 Dec). Previous (dashed line) and Current (solid line) are shown.

Utenti FirenzeWiFi negli ultimi 5 minuti

Line graph showing WiFi users over time (13 Dec to 14 Dec). Previous (dashed line) and Current (solid line) are shown.



Firenze

41 2003 11 2009

42.4%

24

55.4%

58.7

4883

15.5%

33006

24%

9706

4.55%

33006

2

12

33

SmartCity Processes

Fri 4 Nov @ 18:51:20

ATAP	ATAP	ATAP	ATAP	CHECK RT	EVENTI FI
Running	Running	Success	Success	Success	Success
PARK	PARK	PARK	PARK	PARK	PARK
Failed	Success	Success	Success	Success	Success
METEO	METEO	METEO	METEO	METEO	METEO
Success	Success	Success	Success	Success	Success
SENSORI	SENSORI	SENSORI	SENSORI	SENSORI	SENSORI
Success	Success	Success	Success	Success	Success
TWITTER	TWITTER	FI WIFI	FI WIFI	FI WIFI	FI WIFI
Success	Running	Running	Success	Success	Failed

Twitter Vigilance

Present data Tuscany Region

Road Graph (Tuscany region)

- 132,923 Roads
- 389,711 Road Elements
- 318,160 Road Nodes
- 1,508,207 Street Numbers

- Services (20 cat, 512 cat.)
- 16 Pub. Transport Operators
- 21.280 Bus stops & 1081 bus lines
- 210 Parking areas
- 796 Traffic Sensors
- Info on: points, paths, areas, etc.

Dynamic/real-time

- bus lines: 144 updates X day X line
- **NEW:** Timeline PT: 1081 lines, 1-2 updates per day
- parking status: 76 updates X day X sensor
- traffic Sensors: 288 updates X day X sensor
- weather: 2 updates X day for 285 areas
- **NEW:** Triage status: 96 updates per day, per hospital
- **NEW:** Fuel stations: 1 update per day, 1600 stations
- events: about 60 new events X day
- Wi-Fi: > 350.000 measures X day
- mobiles: > 50.000 measures X day
- more than 35.000 distinct users X day
- From 600.000 to 4.5 M Tweets X day
-+ many IOT are coming

- Nascondi Menu

Fermate Firenze Comuni in Toscana Ricerca Testuale

Seleziona una provincia:
FIRENZE

Seleziona un comune:
FIRENZE

- Actual Selection
COMUNE di FIRENZE

- 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

KM4 CITY

Previs

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

<http://servicemap.km4city.org>

Other Sensors and Actuators, IOT

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



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





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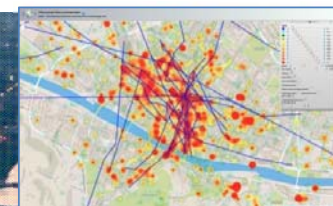
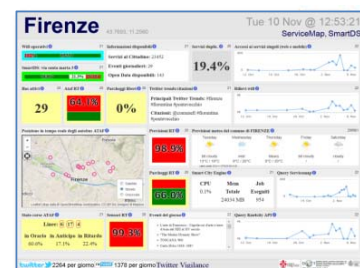
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city under control

- **monitoring services' status**
of city operators

- Smart City Dashboards
- Continuous Business Intelligence



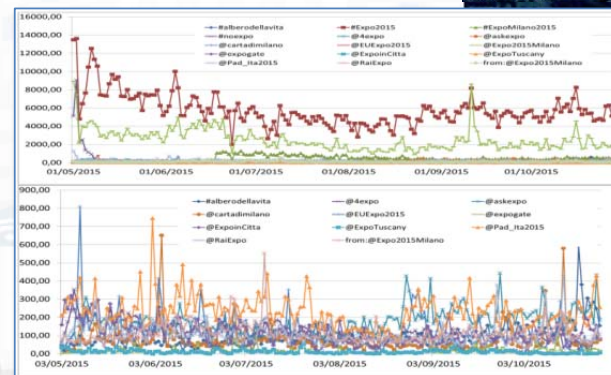
- **City users behaviour monitoring and analysis/influencing/engaging:**

- Sensors, traffic flow, people flows, mobiles, sensors, IOT, IOE
- Wi-Fi, Tv-Cameras



- **City users participation**

- social media for city services and events, **Twitter Vigilance**
- Collecting contributions: images, stars, comments



Km4City Smart City Ecosystem, January 2017



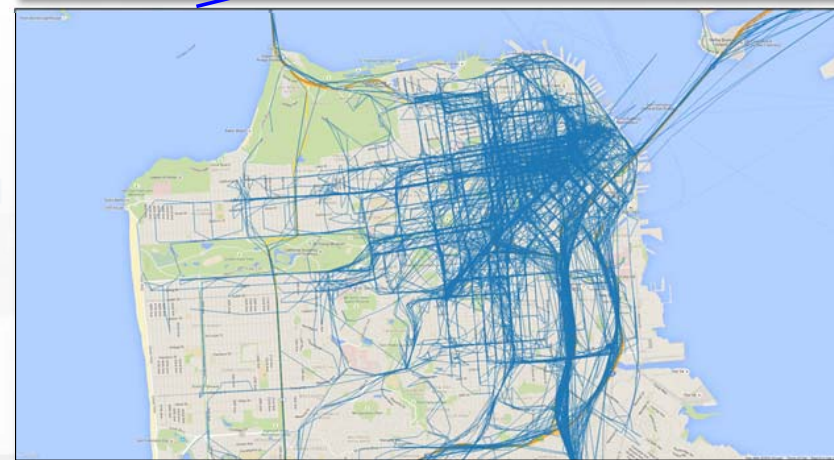
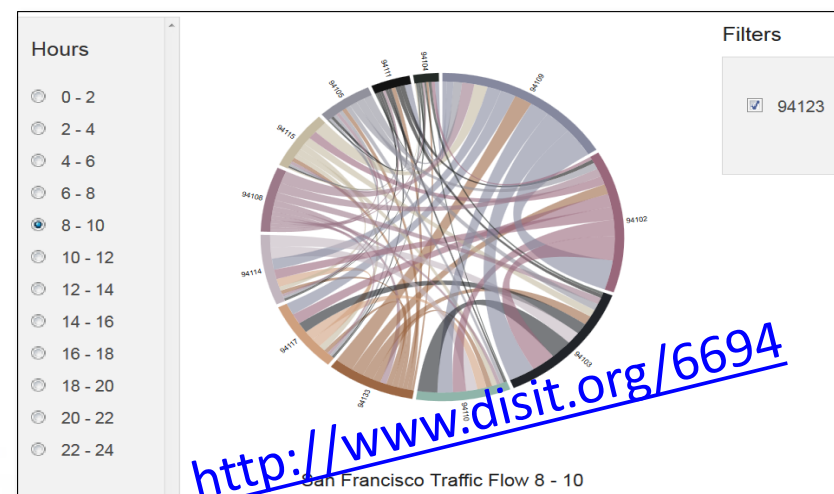
Traffic Flow Tools

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

The image displays a collage of screenshots from the Km4City Smart City Ecosystem. The top left shows a map of Tuscany with red circular markers. The top right shows a map of a city area with numerous purple square markers. The bottom left shows a 3D city model with blue vertical bars representing spires. The bottom right shows a map of Pisa with red circular markers. Overlaid on these are several UI panels: a search bar for 'Regular Services' and 'Transversal Services', a list of service categories, and a detailed data panel for a 'METRO7ES' station showing metrics like 'Avg Distance', 'Avg Time', and 'Occupancy'.

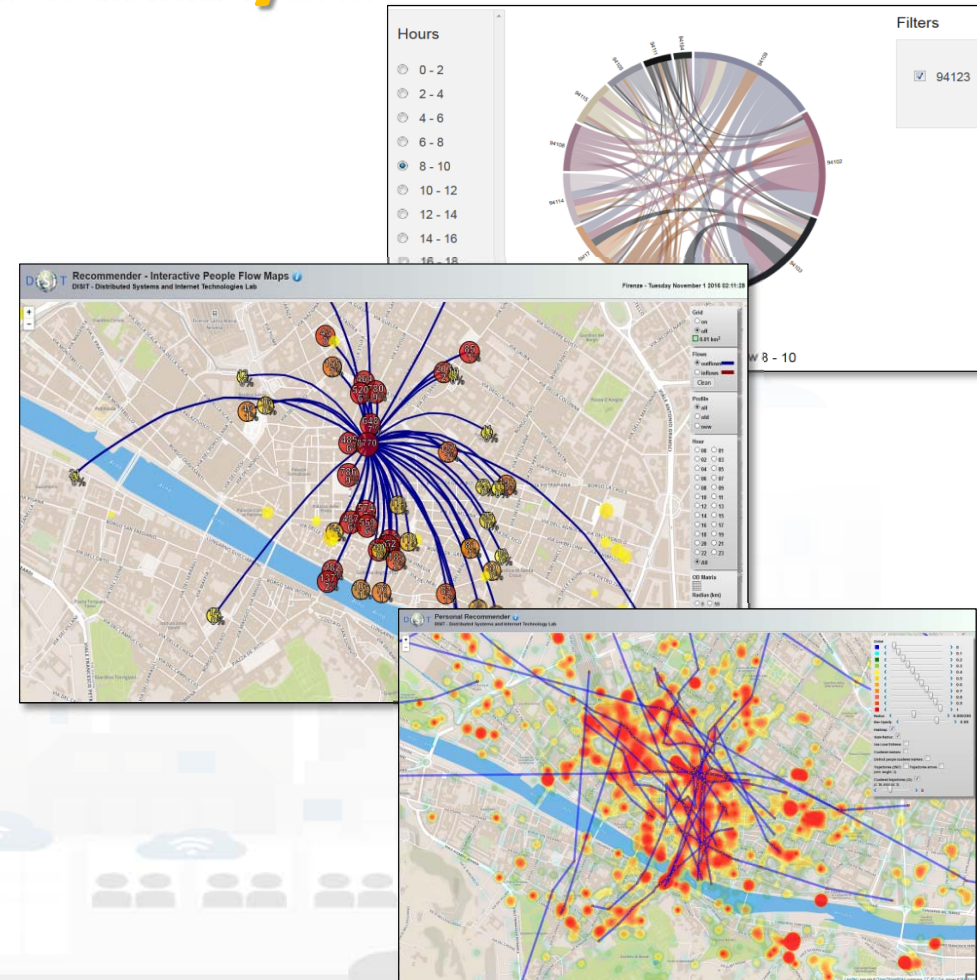
Traffic and People Flow Assessment

- **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



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



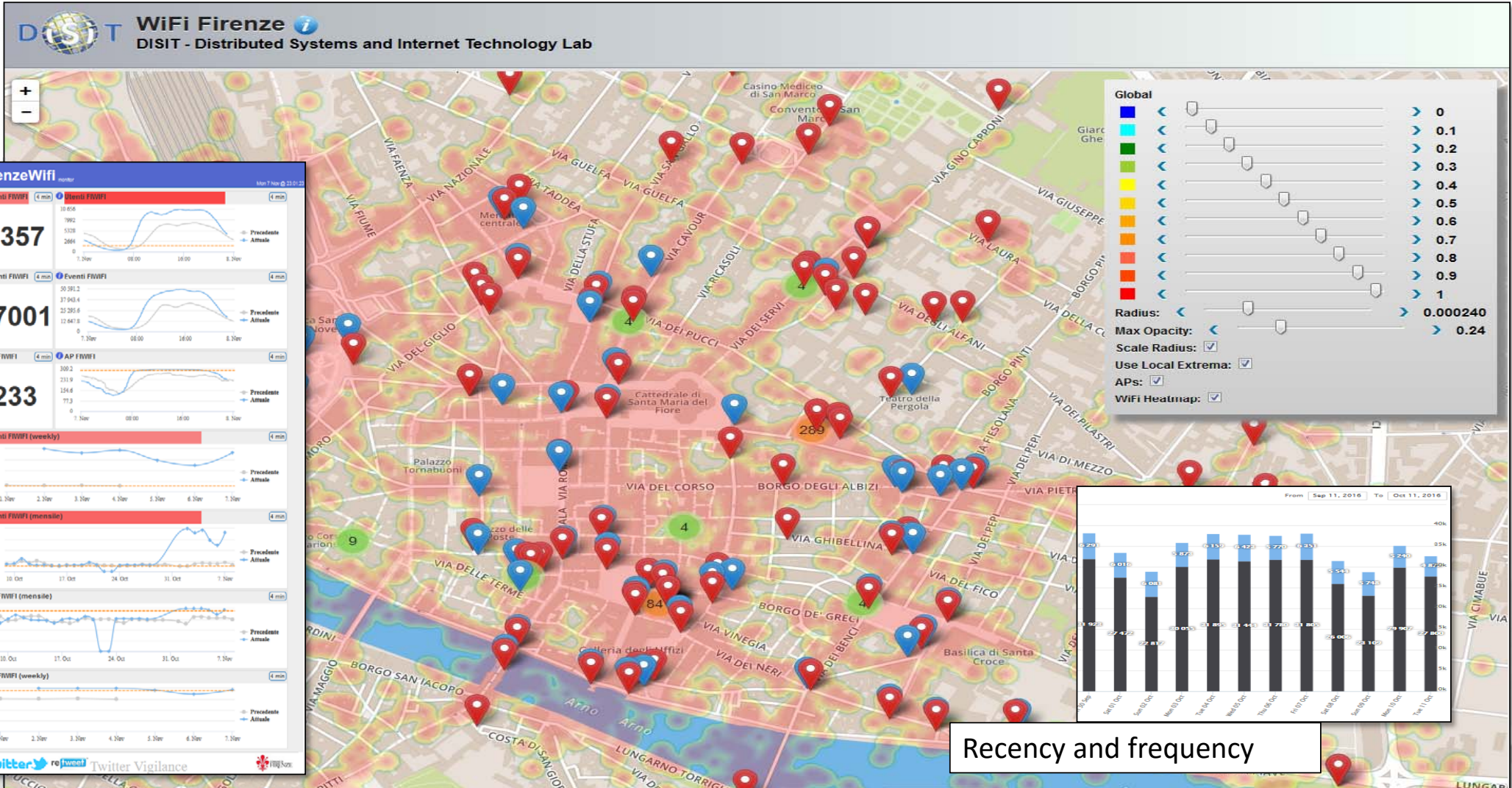


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WiFi Monitor tool



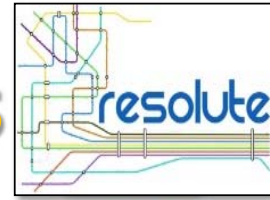


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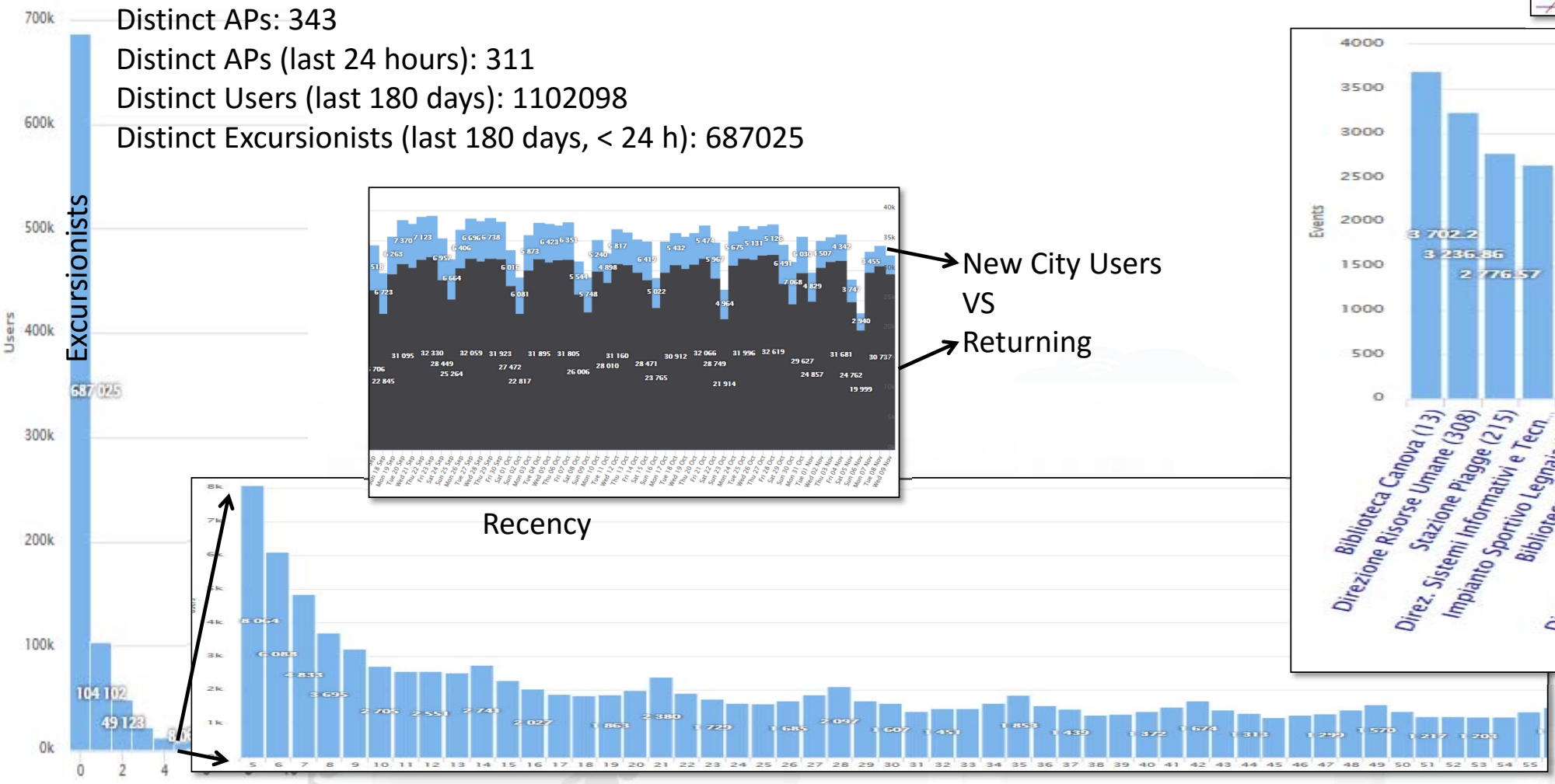
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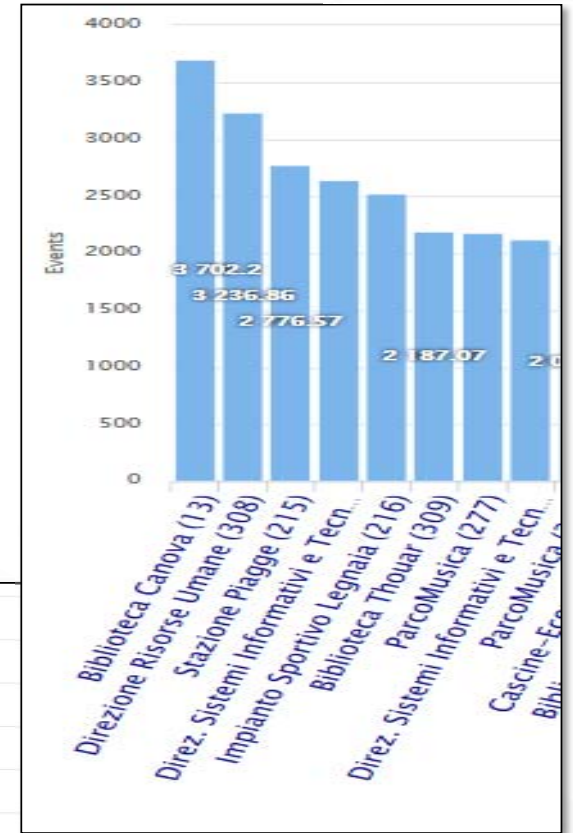
User Behavior Analysis



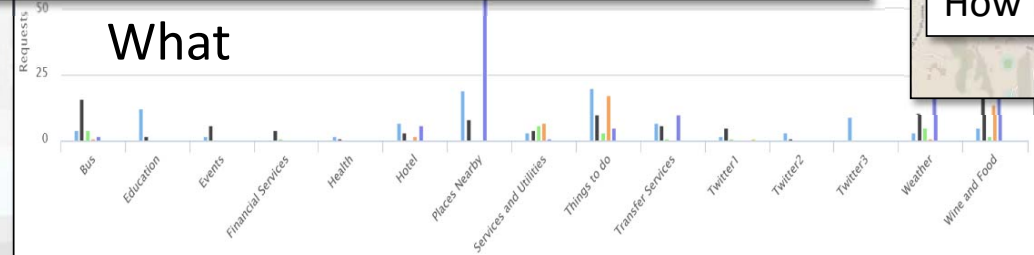
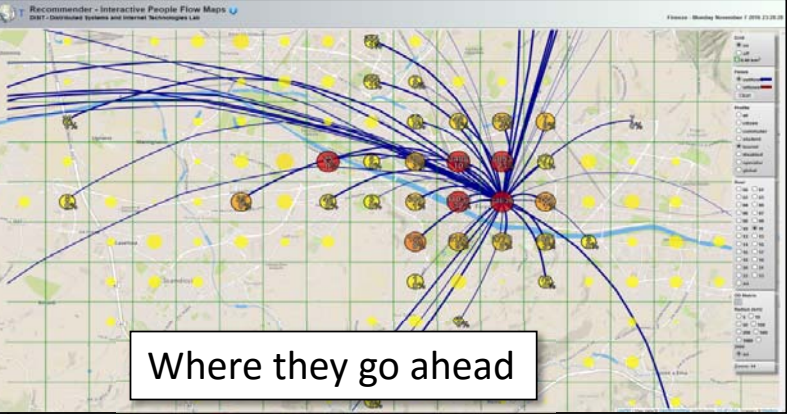
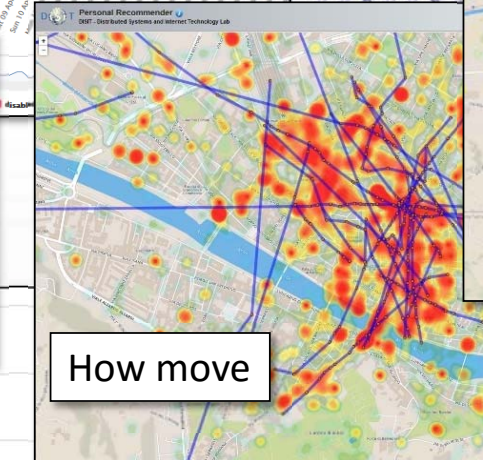
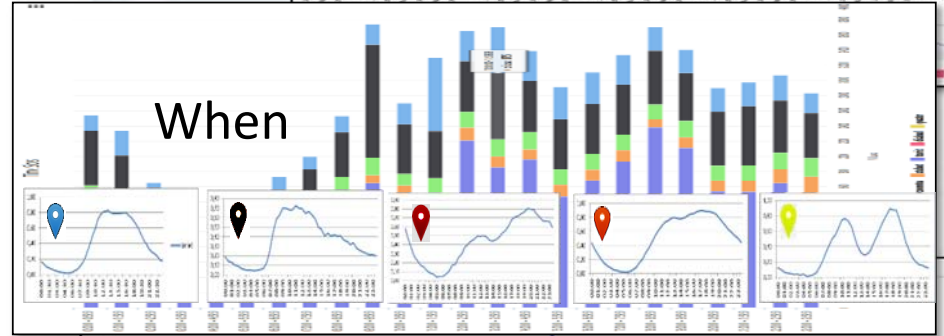
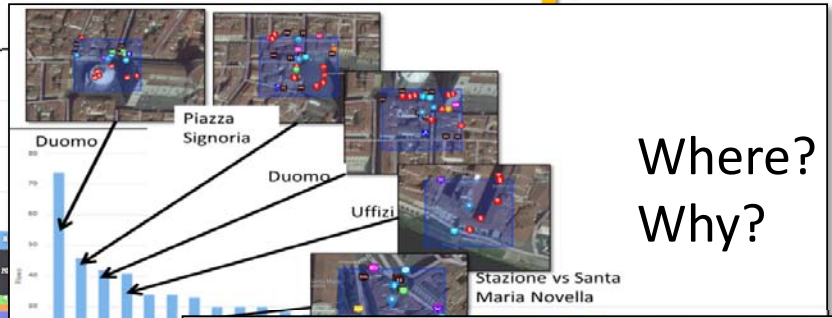
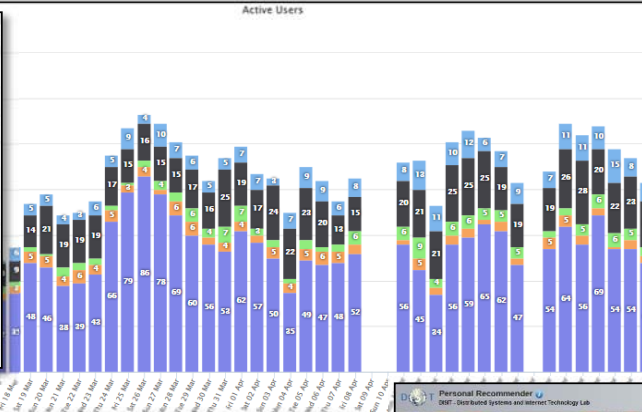
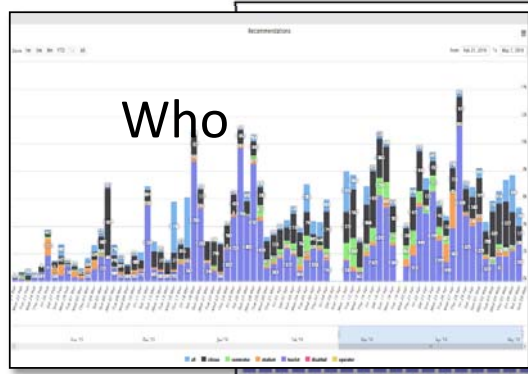
Distinct APs: 343
 Distinct APs (last 24 hours): 311
 Distinct Users (last 180 days): 1102098
 Distinct Excursionists (last 180 days, < 24 h): 687025



→ New City Users
 VS
 → Returning



User Behavior Analyzer for Collective profiling



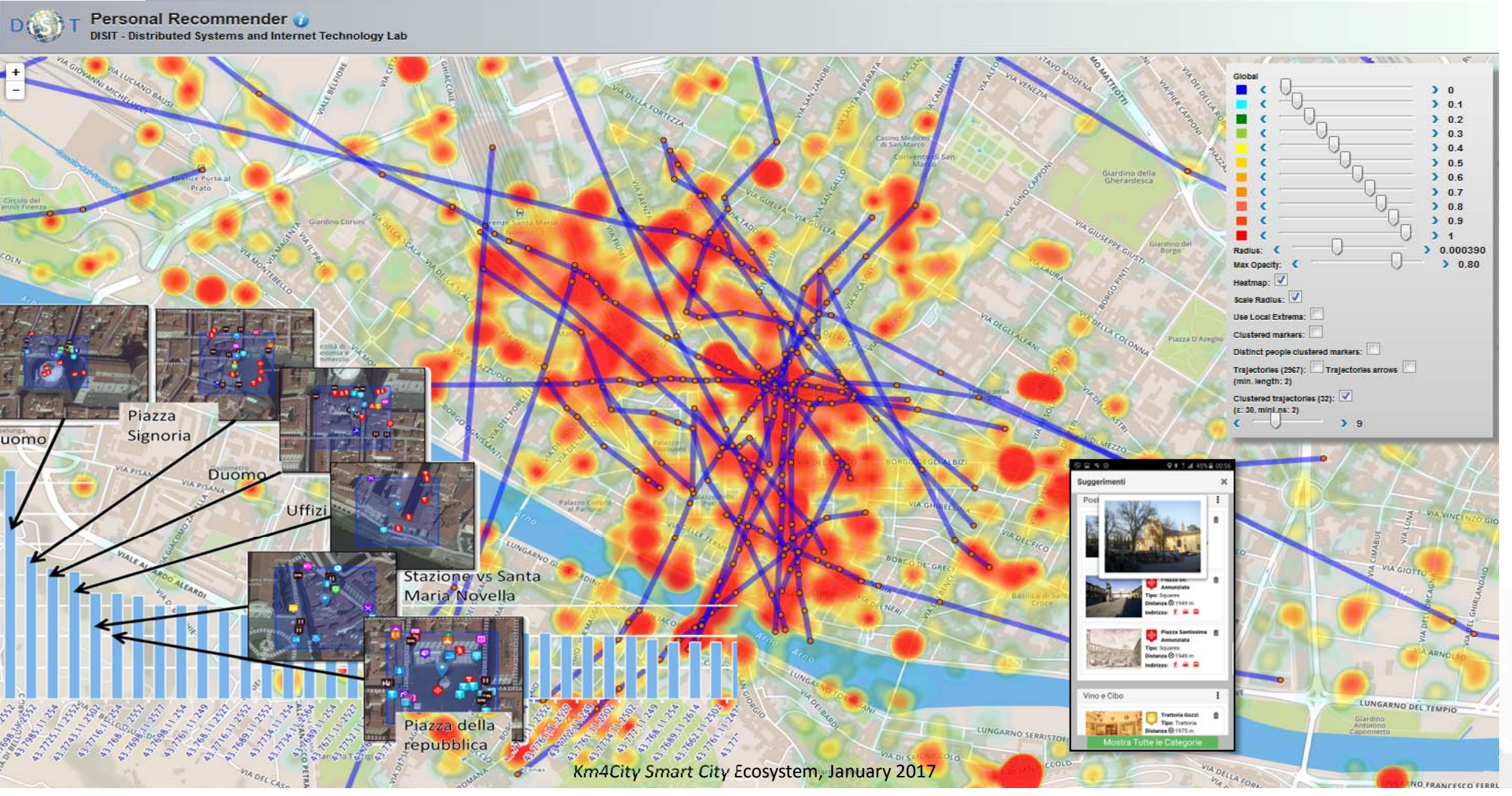


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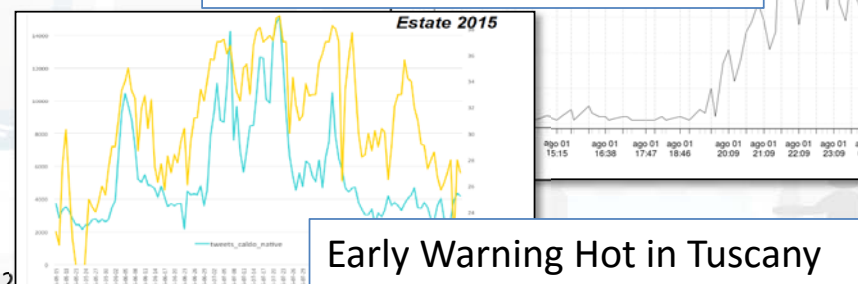
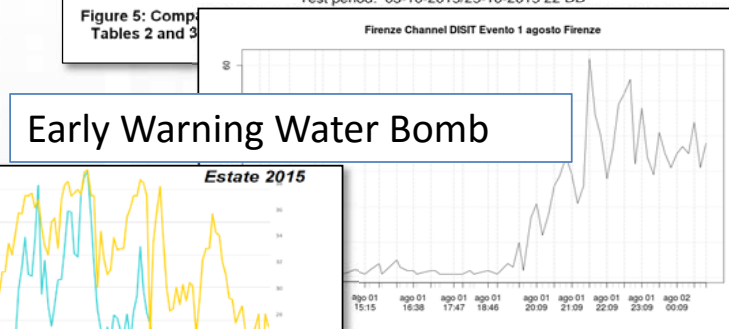
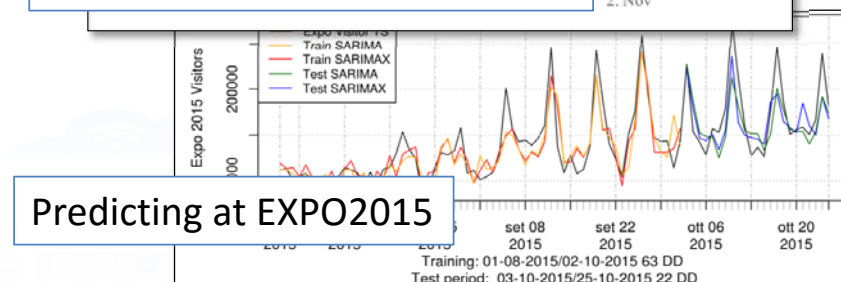
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User Behavior Analyzer



Predicting Models for Admin. & City Users

- Aiming at improving
 - quality of service,
 - distributing workload
 - early warning
- Traffic Flows & People Flows
 - crowd , #number of people
- Parking Status → free slots
- Weather Forecast (LAMMA)



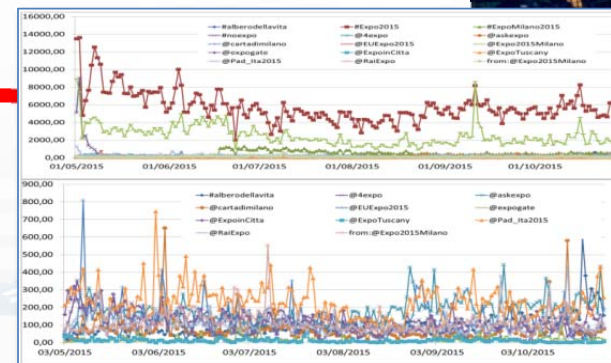
city under control

- **monitoring services' status** of city operators
 - Smart City Dashboards
 - Continuous Business Intelligence
- **City users behaviour monitoring and analysis/influencing/engaging:**
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City users participation

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Km4CityMobile App



What do you want to do?

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

FIRENZE

Choose Services

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

Giardino Di Boboli

Tipo: Digital Location

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

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

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

FIRENZE

ESERCITAZIONE MUGNONE 2016

Dissesto Mugnone 2016

prevede: Firenze (FI) (ZONA: A3)

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

Suggerimenti

Piazza SS. Annunziata
Tipo: Squares
Distanza: 1949 m
Indirizzo: 🚶 🚗 🚚

Piazza Santissima Annunziata
Tipo: Squares
Distanza: 1949 m
Indirizzo: 🚶 🚗 🚚

Trattoria Gozzi
Tipo: Trattoria
Distanza: 1975 m

Mostra Tutte le Categorie

Calendario

Posta

NETFLIX

Sereno

3° 11°

0°

Microsoft Edge

Roma

FIRENZE

Xbox

Anteprima Sk...

Tuneln Radio

Twitter

SODA

DISPONIBILE SU
 Google play

Scarica da
 App Store

Scarica da
 Windows Store

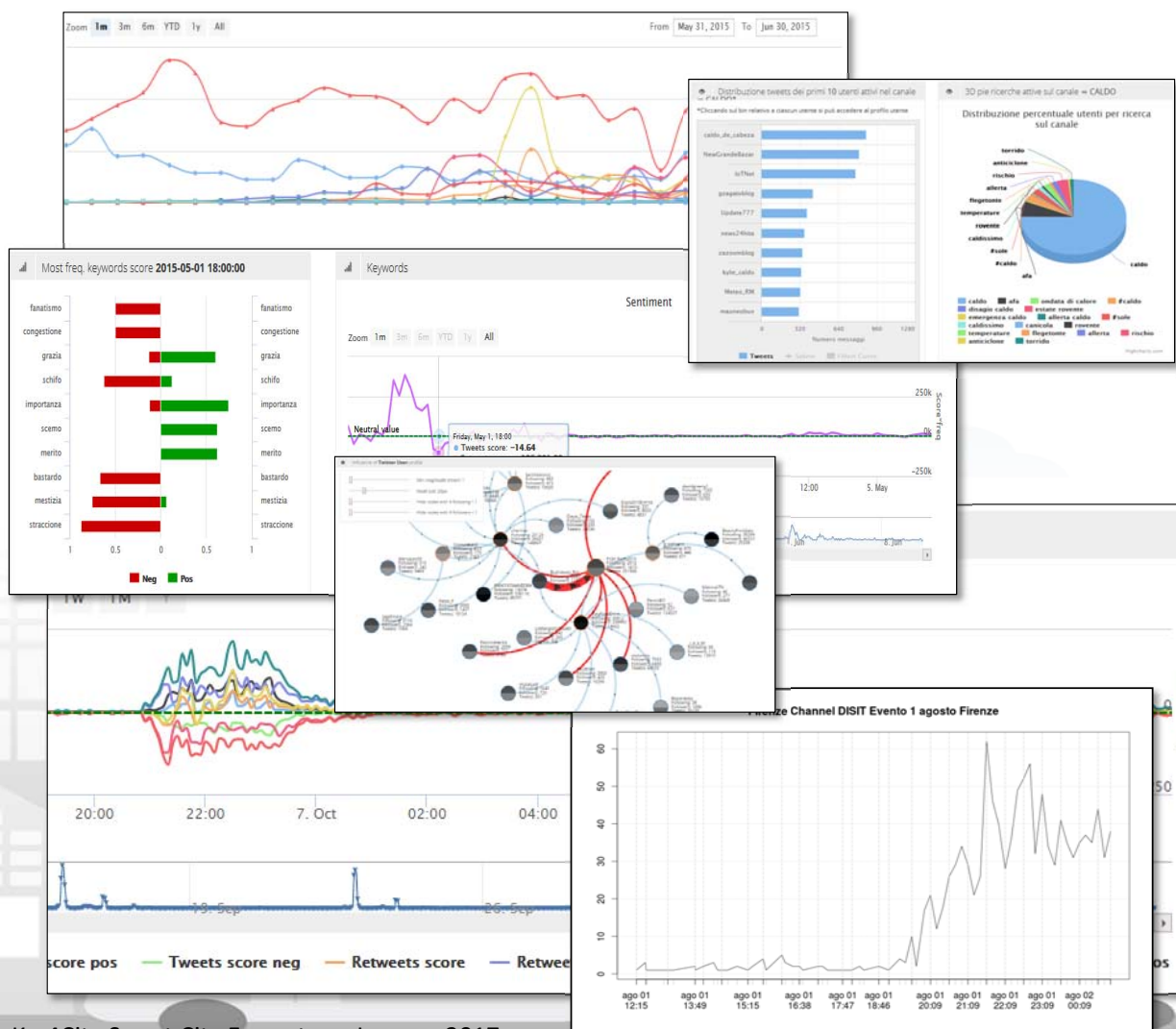


Km4City Smart City Ecosystem, January 2017

Twitter Vigilance

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

Twitter Vigilance





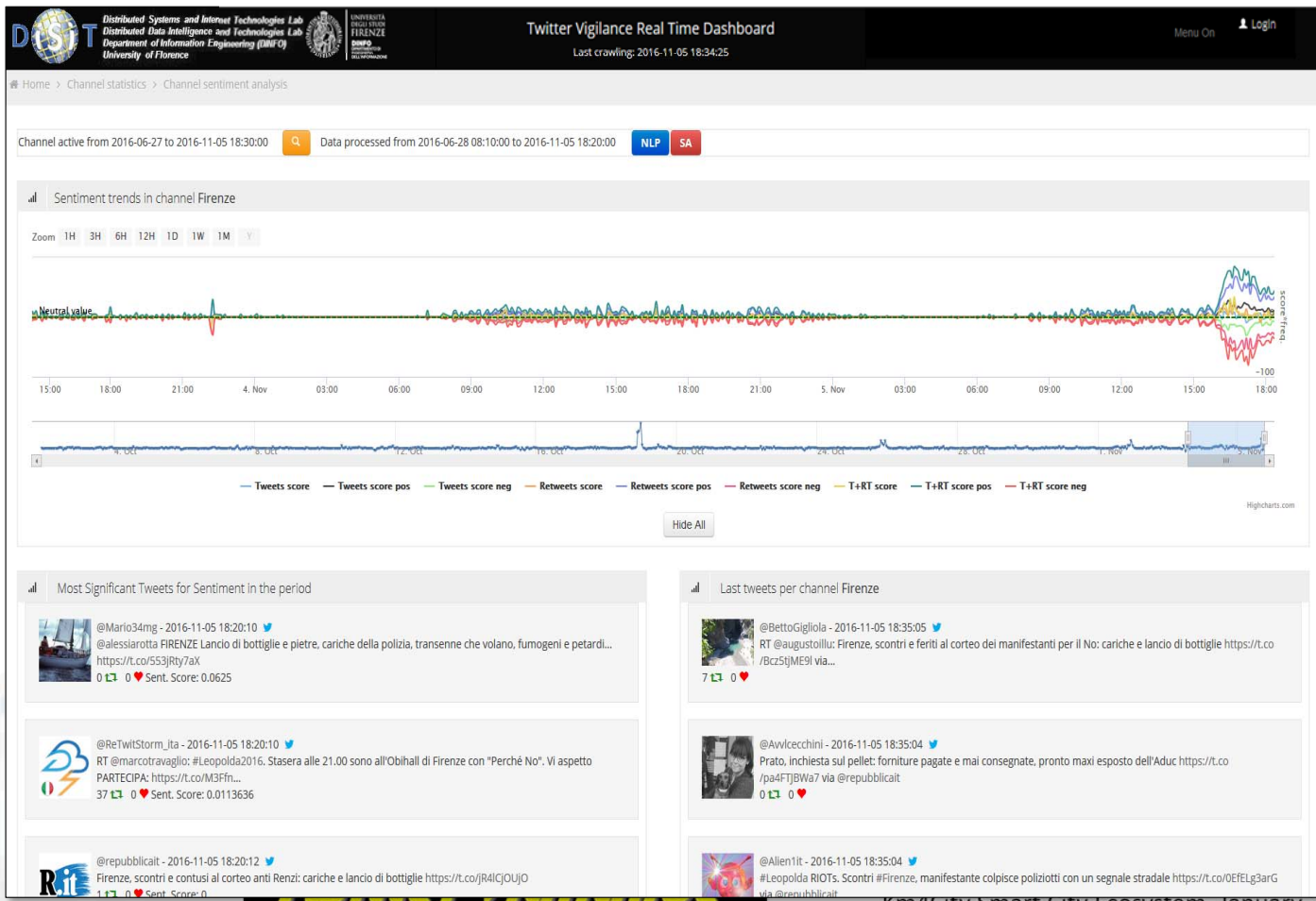
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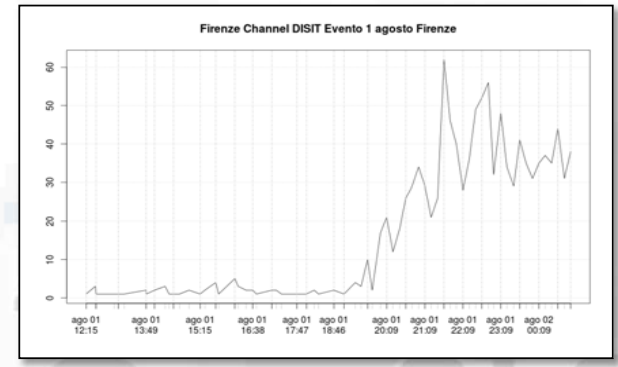
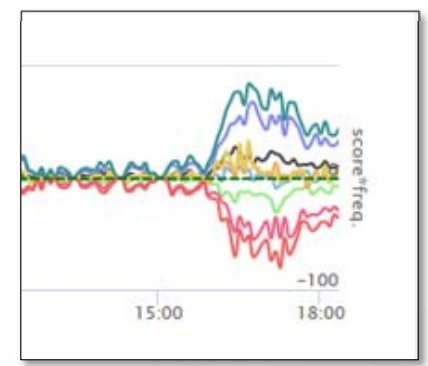
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Twitter Vigilance

Real Time Twitter Vigilance, Early Warning

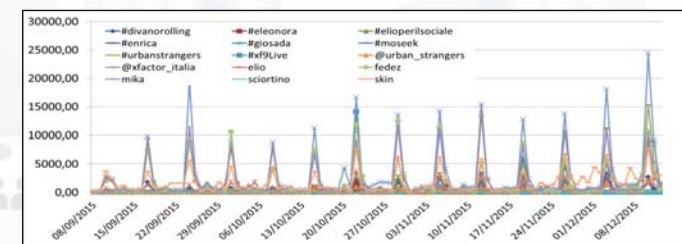
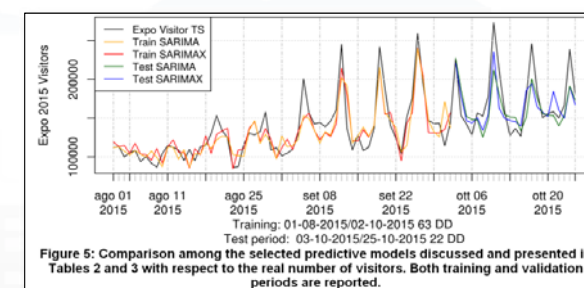
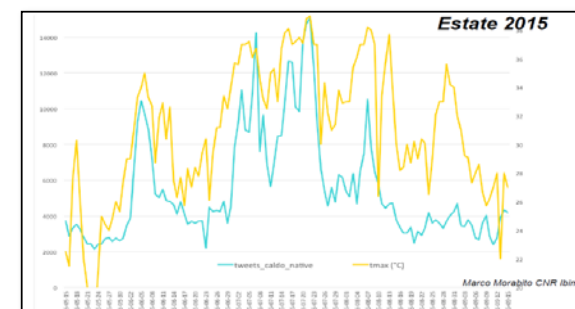


Sentiment Analysis



Prediction/Assessment

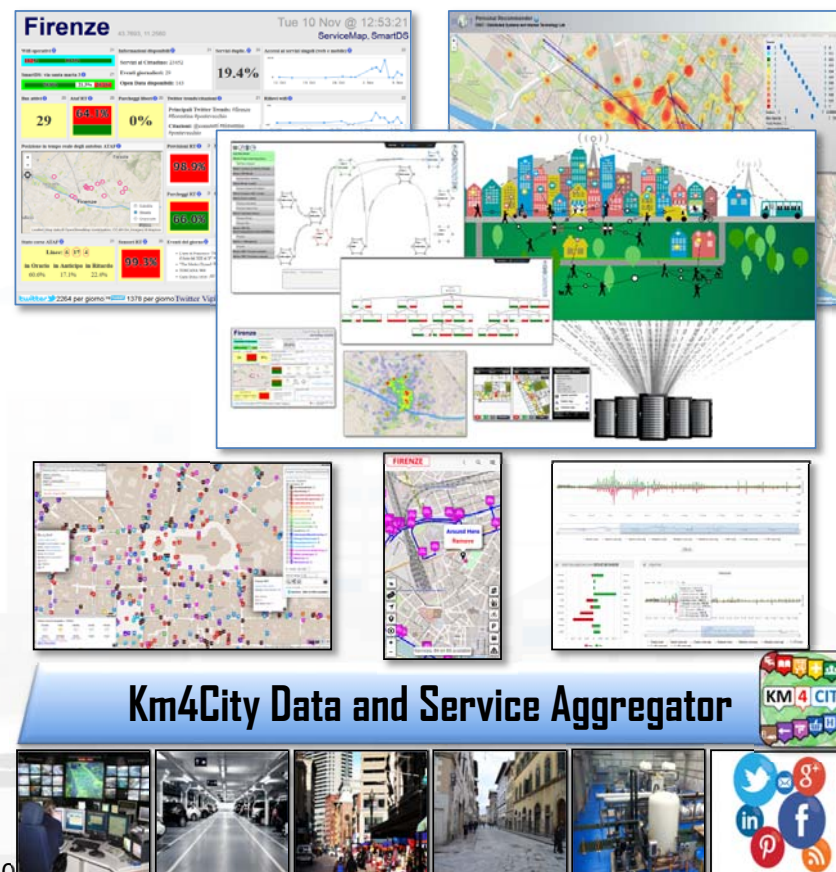
- Football game results as related to the volume of Tweets
- Number of votes on political elections, via sentiment analysis, SA
- Size and inception of contagious diseases
- marketability of consumer goods
- public health seasonal flu
- box-office revenues for movies
- places to be visited, most visited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



From Data to Services for the Sentient Cities

Open Source and inter-operable tools to

1. keep city under control via personalized dashboards
 - transform data in value for the city,
 - influence city users
2. Technical details:
 - dashboard development
 - data aggregation
 - Projects contributing
3. improve city resilience, reducing risks and decision support



Strategies Implementation via Engagement

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



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



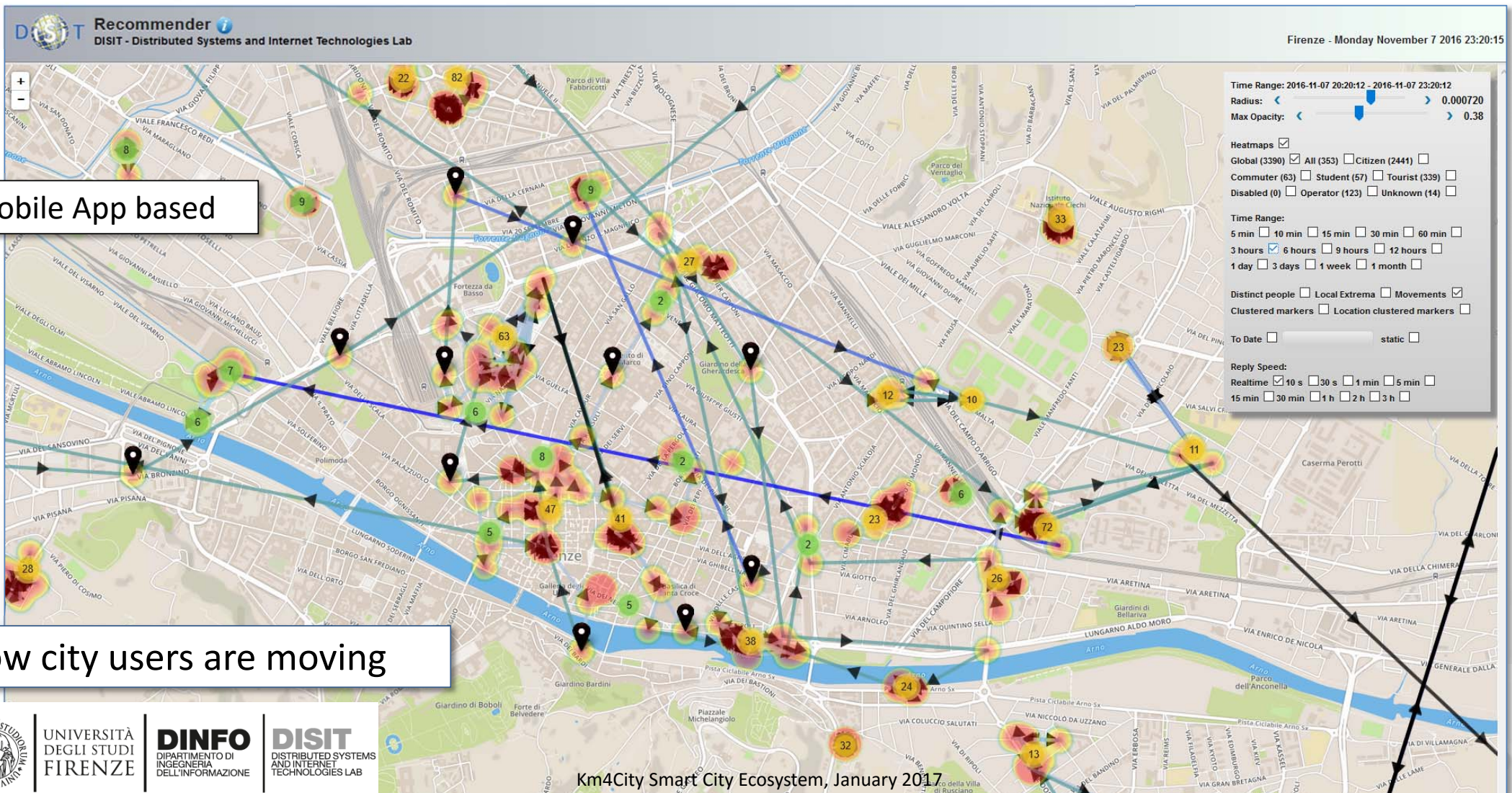
Suggestion on demand service

- Personalized menu on the basis of User Category
- **Automated Suggestions personalized:**
 - taking into account user profile and behavior, dislikes, requests, queries, etc.
- **Engagement**
 - Engine and Rule Editor
- **Advertising**
 - Engine and Rule Editor



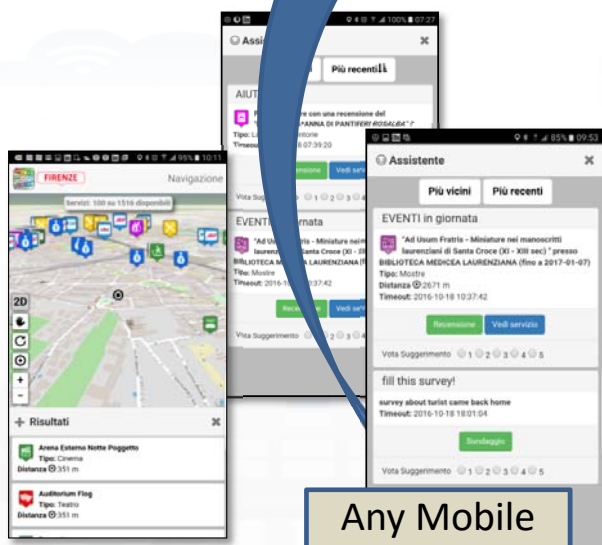
Km4City Smart City Ecosystem, January 2017

Anonymous User Behavior Analysis



User influencing, engaging, monitoring & Follow Up

City & City Operators Strategy Editor



Any Mobile and Web App

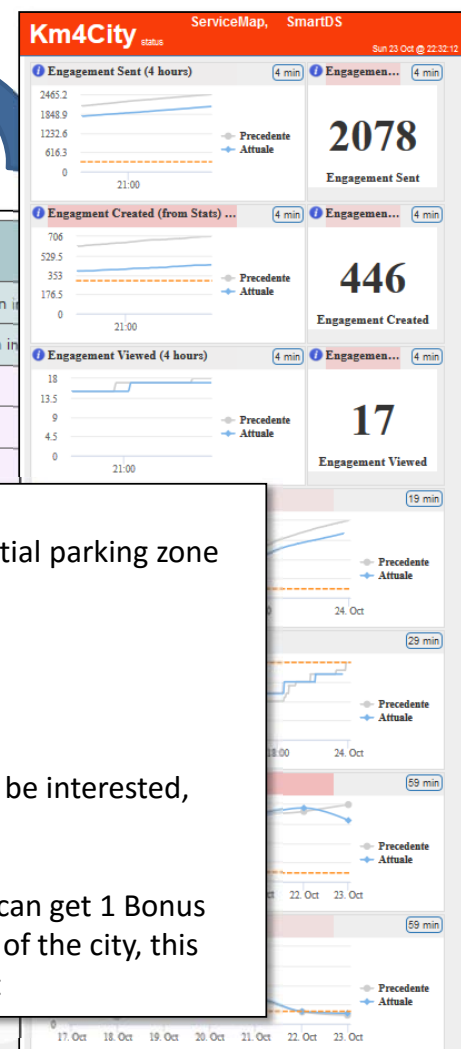
Rule name	Type	#sent	#viewed	#viewed on #sent	Description
daily_event_de	ENGAGEMENT	1 (0%)	0 (0%)	0%	Suggest (in german) an event currently on in
daily_event_en	ENGAGEMENT	1720 (2.12%)	70 (7.1%)	4.07%	Suggest (in english) an event currently on in
- commuter		5 (0.29%)	0 (0%)	0 (0%)	
- student		14 (0.81%)	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%)			

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





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Km4City Roadmap




2021

12/2017

- 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 

Today

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

GHOST SIR
2016-2019 - Started



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

2016

REPLICATE H2020
2016-2021 - Started



Sii-Mobility SCN
2016-2018 - Started
Km4City 1.6.2



Km4City 1.5
- SmartDS
- Km4City App

RESOLUTE H2020
2015-2018 - Started



2015

Km4City 1.4

- Embed
- More API
- iBeacon

API

Twitter Vigilance

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

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

2014

Km4City 1.1

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

2013

An aerial night view of a city, likely Siena, Italy, featuring a prominent cathedral with a large dome and a river in the foreground. The city lights are illuminated against a dark sky, with the river reflecting the lights. The title text is overlaid in a large, bold, yellow font.

The Anatomy of a Smart City



From Data to Services for the Sentient Cities

Open Source and inter-operable tools to

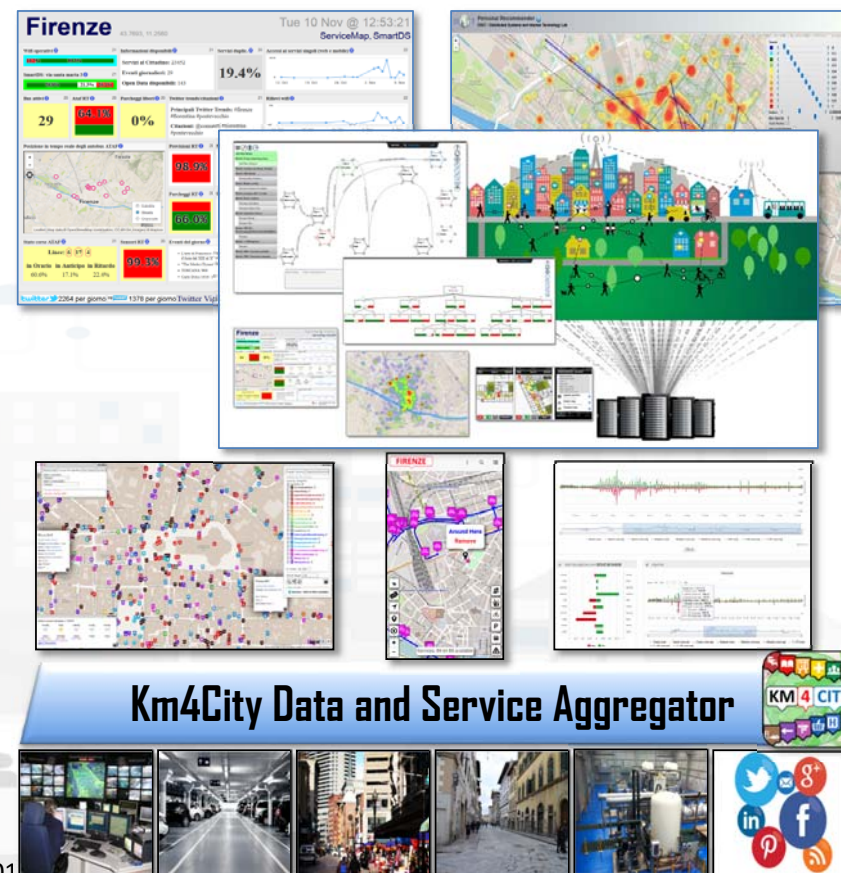
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Back Office and Dev Tools



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App Store

Download from
Windows Phone Store



Home Sentient City Control Room City Users! Tools Back Office and Dev Tools Info and Docs

Development Tools for Mobile App and Web App (the ServiceMap Tool), generating Smart City API calls

Service Map (visual query development tool) (*)	POI density in Florence Downtown (*)	Events in Florence (*)	Services & POI in Tuscany (*)	Services & POI in Florence (*)	Services & POI in Pisa (*)	Bus Lines and timelines in Tuscany	Green Areas in Florence (*)	Cycling Paths in Florence (*)	Search on Area analysis (*)	Search along line analysis (*)
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Dashboard development tools

Dashboard Builder for control room (*)

Smart City API, Linked Open Data, RDF Store tools, 5 Stars Data

Web page: Km4City Smart City API documentation	Km4City Ontology, SVG File	ZIP File: Download Km4City Ontology, multiple formats	Linked Open Graph LOD (*)	SPARQL & Data Licenses (*)	Smart City Main Data, IOT, Sensors in Tuscany
--	----------------------------	---	---------------------------	----------------------------	---

Data Warehouse and Back Office Data Aggregation Tools

Smart City General Architecture	Programming User Engagements	Web Page: Data Ingestion Manager, DIM data broker tool	Web Page: DISCES, Smart City Engine, Big Data Process manager	Web Page: RDF store Indexer, RIM, and versioning manager
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www.Km4City.org



Development tools

- **Dashboard builder**
 - Creating personalized dashboards in few clicks
- **aggregating multi-domain data and services** for SMEs and city operators
 - **Data /Service Aggregator**: open, flexible and suitable access
- **development tool** for fast and low cost implementation of business and service oriented Apps
 - access to aggregated data → **Smart City API**
 - ServiceMap → **Smart City API**

Higher level Dashboard



Firenze

43 7893, 11 2560

ServiceMap, SmartDS

Tue 4 Oct @ 12:15:04

WIFI operativi 100%

SmartDS: via Santa Marta 3

Bus... 0

Real time position ATAF bus

Linee: 6 17 4

in Orario in Anticipo in Ritardo

46.2% 4.6% 49.2%

Informazioni disponibili

Numero di processi lanciati: 2676

CPU in uso: 0%

Memoria in uso: 24.2%

Smart City Engine

CPU: 0%

Mem Totale: 72094 MB

Job Eseguiti: 2709

Previsioni meteo: FIRENZE

Tuesday: 17°C / 24°C

Wednesday: 10°C / 23°C

Thursday: 12°C / 19°C

Friday: cloudy

Saturday: rain and sunny intervals

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 12:05:00 - 2016-10-04 13:18:00

Radius: 0.0000

Max Capacity: 0.80

Heatmap (2865)

Time Range: 5 min 10 min 15 min 30 min 60 min 2 hours 6 hours 9 hours 12 hours 1 day 3 days 1 week 1 month

Distinct people: Local Extrema

Clustered markers

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

Mugnone 2016

Attivi utenti (12 ore): 77

Turisti attivi (12 ore): 34

Rilevati wifi al giorno: 42 659

Accessi ai servizi singoli (web e mobile): 13700

Query Kactcity API: 32 367

Energy (demo)

Active wind turbines: 57.6%

Charging rebuses step: 0

Free charging cable: 17

City consumption: 26%

Free like: 100%

Energy flow: 31

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

DISIT - Distributed Systems and Internet Technologies Lab

Firenze - Tuesday October 4 2016 13:18:05

Radius: 0.00050

Max Capacity: 6.46

Scale Radius: 0.30

Use Local Extrema

Clustered markers

Clustered trajectories (5%): 0.30, max.radius: 2

Twitter Vigilance Dashboard

Distributed Systems and Internet Technologies Lab

Distributed Data Intelligence and Technologies Lab

Department of Information Engineering (DINF) - University of Florence

Twitter Vigilance Dashboard

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

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 ly All

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

SmartCity Processes

Fri 4 Nov @ 18:51:20

ATM	ATM	ATM	ATM	CHECK RT	EVENTI FI
RUNNING	RUNNING	SUCCESS	SUCCESS	SUCCESS	SUCCESS
PARK	PARK	PARK	PARK	PARK	PARK
FAILED	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
METEO	METEO	METEO	METEO	METEO	METEO
SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
SENSORI	SENSORI	SENSORI	SENSORI	SENSORI	SENSORI
SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
TWITTER	TWITTER	FI WIFI	FI WIFI	FI WIFI	FI WIFI
SUCCESS	RUNNING	RUNNING	SUCCESS	SUCCESS	FAILED



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

Dashboard Builder



Dashboards Overview

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

Sources Management

DataSources Overview

ID	URL
Km4CityApp	jdbc:mysql://redborg.3306
Km4CityAlert	jdbc:mysql://192.168.0.20:3306
Km4CityRCF	http://192.168.0.206:8080/WebAppGrabsip.asp
Km4CityRecommender	jdbc:mysql://192.168.0.55:3306
Km4CityServiceMap	jdbc:mysql://192.168.0.72:3306
Km4CitySustainability	jdbc:mysql://192.168.0.72:3306
priva	jdbc:mysql://redborg.3306
SmartDS	jdbc:mysql://192.168.0.25:3306
TwitterTv	jdbc:mysql://192.168.0.52:3306

Add new Widget

Metric: Sensors_P1

Metric Description: Developer: Percentage of Error (Default: 80%)
Metric: Temperature (Percentage: 100%)
Data Area: Stability
Data Source: Osservatorio Regionale per la Mobilità del Transport (Default) min: 05 sec
Status: Active

Type Widget: widgetPacChart (Max 1 metrics)

Selected Metrics: Sensors_P1

Link: www.km4city.org/operative/

Information: Percentage of road sensors underground only working or not compared to those located in the city. The portion of the path in red refers to the percentage of non-functioning, the green part refers to the active ones.

Widget Parameters: Title: Sensors_P1, Background color: #fff, Time Interval: No, Refresh rate (sec): 60, Rows number: 2, Columns number: 3

BarContent - 2x4 (9 min)

14.2% 85.8%

Buttons: Button 2x1, Button 2x2, Button 4x2, Button 4x4

PARK (59 sec)

parccheggio162_I

SUCCESS

2016-11-09 23:09:25

4x2 (9 min): 56%, 44%

5x2 (59 sec): 28%, 72%

6x2 (59 sec): 24%, 76%

Modifica Widget

Id Widget: widgetBarContent

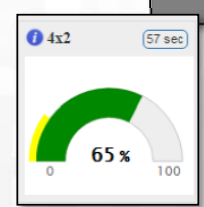
Type: Percentuale

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

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

n. metrics: 1, Color: 1

Buttons: Close, Modify



4x3 (4 min): Line chart with 'Precedente' and 'Attuale' series.

4x6 (56 sec): Line chart with 'Precedente' and 'Attuale' series.

5x5 (57 sec): CPU Load (100%), RAM (35.2 GB), Daily jobs (212)

5x5 (57 sec): CPU Load (100%), RAM (35.2 GB), Daily jobs (212)

4x2 (48 sec): Pie chart showing 35.0% and 65.0%



Km4City Smart City Ecosystem, January 2017



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

Servizi du... 9 min

42.4%

Accessi ai servizi singoli (web e mobile) 31 sec

Bus Attivi 29 sec

24

Ataf RT 30 sec

Parcheggi... 29 sec

55.4%

Smart City Engine 30 sec

CPU	3.7%
RAM	58.7 GB
DAILY JOBS	4863 JOBS

Rilievi wifi 9 min

Real time position ATAF bus

Sensori RT 29 sec

Previsioni meteo: FIRENZE 359 min

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

Parcheggi... 30 sec

Twitter Trends/citazioni 30 sec

PRINCIPALI TREND TWITTER:

- #FIRENZE
- #FIORENTINA
- #UFFIZI

CITAZIONI:

- 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 Servicemap 31 sec

Stato linee ATAF 29 sec

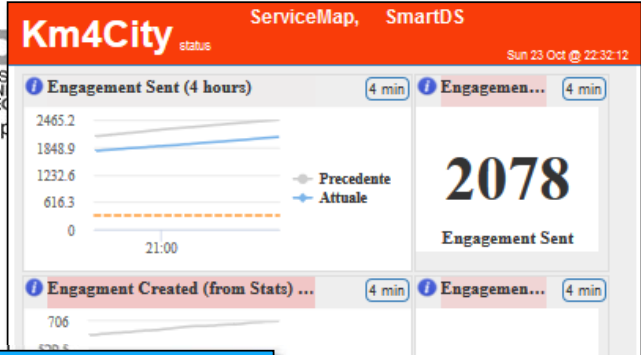
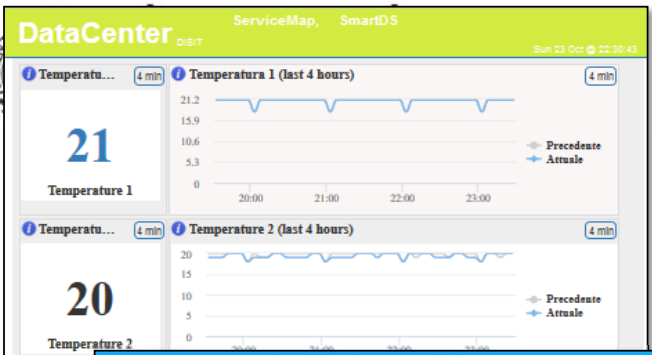
IN ORARIO	46%
IN ANTICIPO	5%
IN RITARDO	49%

Previsioni... 30 sec

Elenco eventi del giorno 30 sec

- 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



SmartCity Processes

Fri 4 Nov @ 18:51:20

Process	Status	Time
ATAF avm_linea17_I	RUNNING	2016-11-04 18:42:31
ATAF avm_linea31_I	RUNNING	2016-11-04 18:40:00
ATAF avm_linea4_I	SUCCESS	2016-11-04 18:49:23
ATAF avm_linea6_I	SUCCESS	2016-11-04 18:43:12
CHECK RT check_RT	SUCCESS	2016-11-04 09:27:48
EVENTI FI Eventi_a_Firenze_I	SUCCESS	2016-11-04 18:05:32
PARK parcheggi1_I	FAILED	2016-11-04 18:49:19
PARK parcheggi2_I	SUCCESS	2016-11-04 18:49:33
PARK parcheggi160_I	SUCCESS	2016-11-04 18:49:30
PARK parcheggi161_I	SUCCESS	2016-11-04 18:49:20
PARK parcheggi162_I	SUCCESS	2016-11-04 18:49:20
PARK parcheggi163_I	SUCCESS	2016-11-04 18:49:21
METEO Previ_meteo_Abetone_xml_I	SUCCESS	2016-11-04 18:39:11
METEO Previ_meteo_Arezzo_xml_I	SUCCESS	2016-11-04 18:49:09
METEO Previ_meteo_Fiesole_xml_I	SUCCESS	2016-11-04 13:09:24
METEO Previ_meteo_Firenze_xml_I	SUCCESS	2016-11-04 13:15:14
METEO rev_i_meteo_impruneta_xml_I	SUCCESS	2016-11-04 14:54:40
METEO Previ_meteo_Lucca_xml_I	SUCCESS	2016-11-04 14:45:24
SENSORI sensoridynamicimetro	SUCCESS	2016-11-04 18:42:15
SENSORI sensori_AREZZO_I	SUCCESS	2016-11-04 18:49:37
SENSORI sensori_EMPOLI_I	SUCCESS	2016-11-04 18:49:17
SENSORI sensori_PISA_I	SUCCESS	2016-11-04 18:45:08
SENSORI sensori_FIRENZE_I	SUCCESS	2016-11-04 18:48:21
SENSORI sensori_PRATO_I	SUCCESS	2016-11-04 18:47:03
TWITTER inseriTweetsRecommend	SS	2016-11-04 17:00:00
TWITTER TwitterVigilanceIndexing	RUNNING	2016-11-04 17:00:00
FI WIFI calculateAPsTimeSeries	RUNNING	2016-11-04 10:30:07
FI WIFI calculateNewUsers	SUCCESS	2016-11-04 09:21:24
FI WIFI calculateUsersStatus	SUCCESS	2016-11-04 18:48:45
FI WIFI GraphsJSGenerator	FAILED	2016-11-04 18:24:49



re:tweet Twitter Vigilance



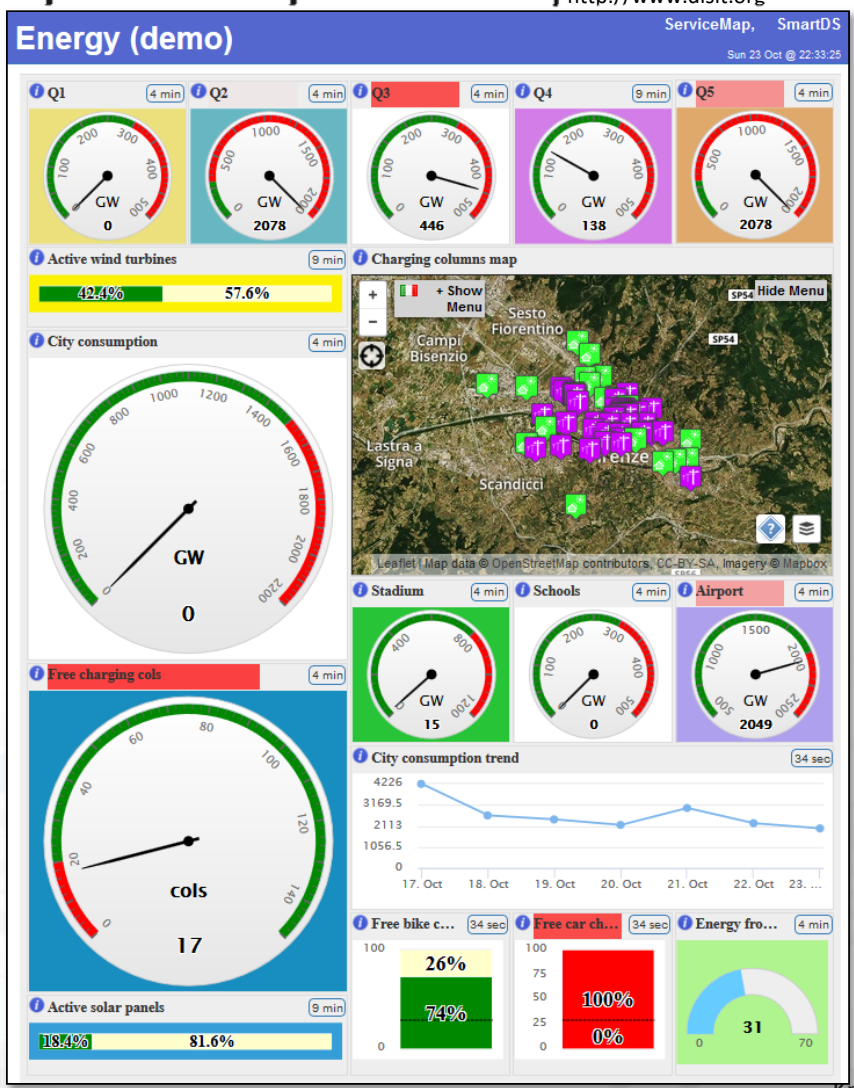
ary 20



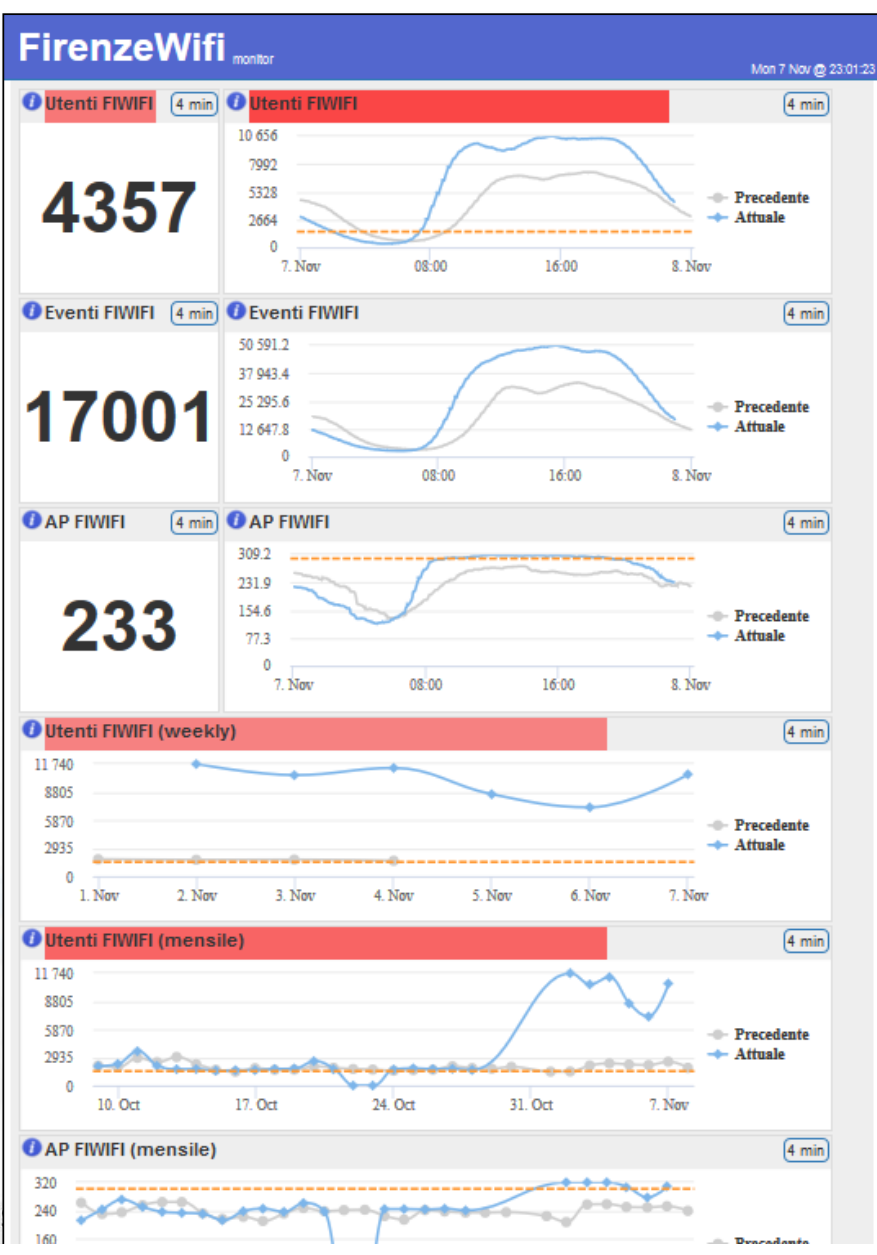
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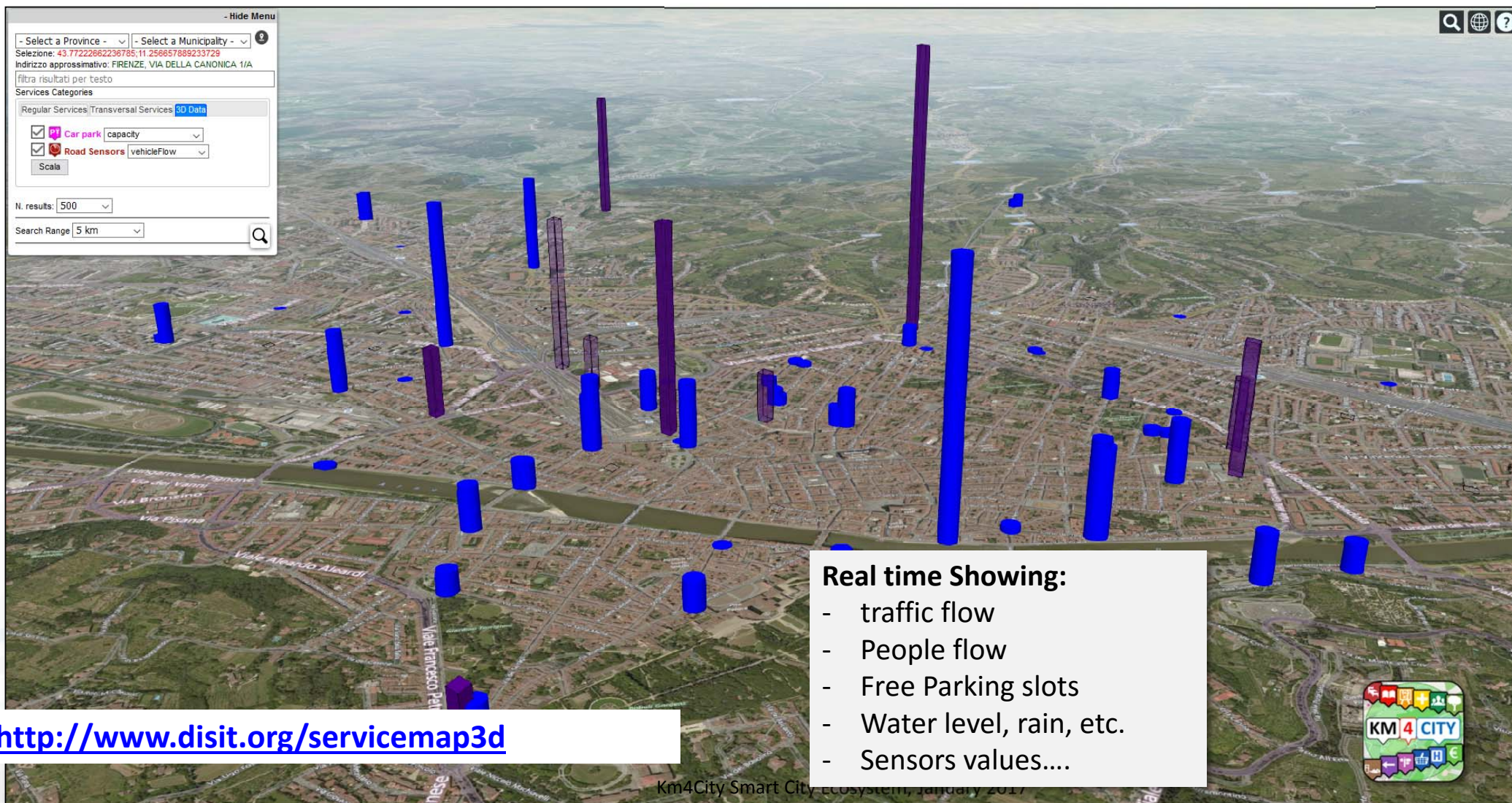
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<http://www.disit.org>



Km4City



RealTime Values 3D





Development tools

- **Dashboard builder**
 - Creating personalized dashboards in few clicks
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 - **Data /Service Aggregator**: open, flexible and suitable access
- **development tool** for fast and low cost implementation of business and service oriented Apps
 - access to aggregated data → **Smart City API**
 - ServiceMap → **Smart City API**

Present data Tuscany Region

Road Graph (Tuscany region)

- 132,923 Roads
- 389,711 Road Elements
- 318,160 Road Nodes
- 1,508,207 Street Numbers

- Services (20 cat, 512 cat.)
- 16 Pub. Transport Operators
- 21.280 Bus stops & 1081 bus lines
- 210 Parking areas
- 796 Traffic Sensors
- Info on: points, paths, areas, etc.

Dynamic/real-time

- bus lines: 144 updates X day X line
- **NEW:** Timeline PT: 1081 lines, 1-2 updates per day
- parking status: 76 updates X day X sensor
- traffic Sensors: 288 updates X day X sensor
- weather: 2 updates X day for 285 areas
- **NEW:** Triage status: 96 updates per day, per hospital
- **NEW:** Fuel stations: 1 update per day, 1600 stations
- events: about 60 new events X day
- Wi-Fi: > 350.000 measures X day
- mobiles: > 50.000 measures X day
- more than 35.000 distinct users X day
- From 600.000 to 4.5 M Tweets X day
-+ many IOT are coming

- Nascondi Menu

Fermate Firenze Comuni in Toscana Ricerca Testuale

Seleziona una provincia:
FIRENZE

Seleziona un comune:
FIRENZE

Actual Selection
COMUNE di FIRENZE

KM4 CITY

Previs

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

- Nascondi Menu

Servizi Regolari Servizi Trasversali

search text into service

Categorie Servizi

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

N. risultati: Nessun Limite

Raggio ricerca 100 metri

Risultati della ricerca

più di 4000 risultati, attivato clustering

Services 16858

<http://servicemap.km4city.org>

Transport systems
Mobility, parking



Public Services
Govern, events, ...



Sensors, IOT
Cameras, ...



Environment,
Water, energy



Shops, services,
operators



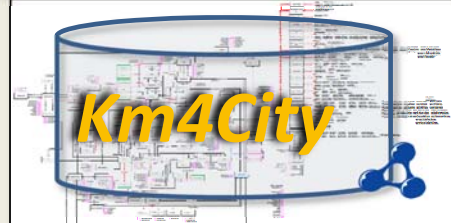
Social Media
WiFi, network



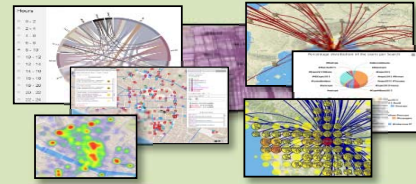
Static, Slow and Real Time data flows

Km4City Smart City Engine

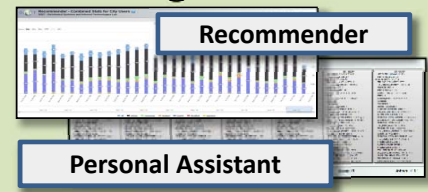
DISCES -- Distributed and parallel architecture on Cloud



Big Data Analytics



Smartening Tools



Development Tools



Km4City Smart City API

City Operators and Decision Makers

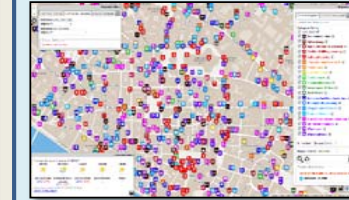
Dashboards



Smart Decision Support



ServiceMap browser



Twitter Vigilance

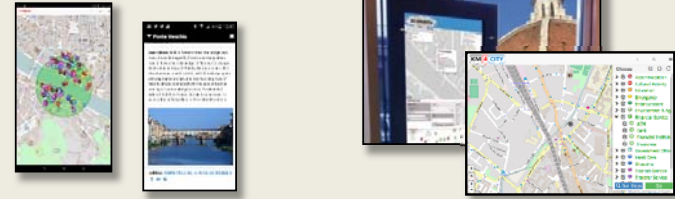


Analyzers of City User Behavior



Tools for Final Users

Mobile e Web Apps



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



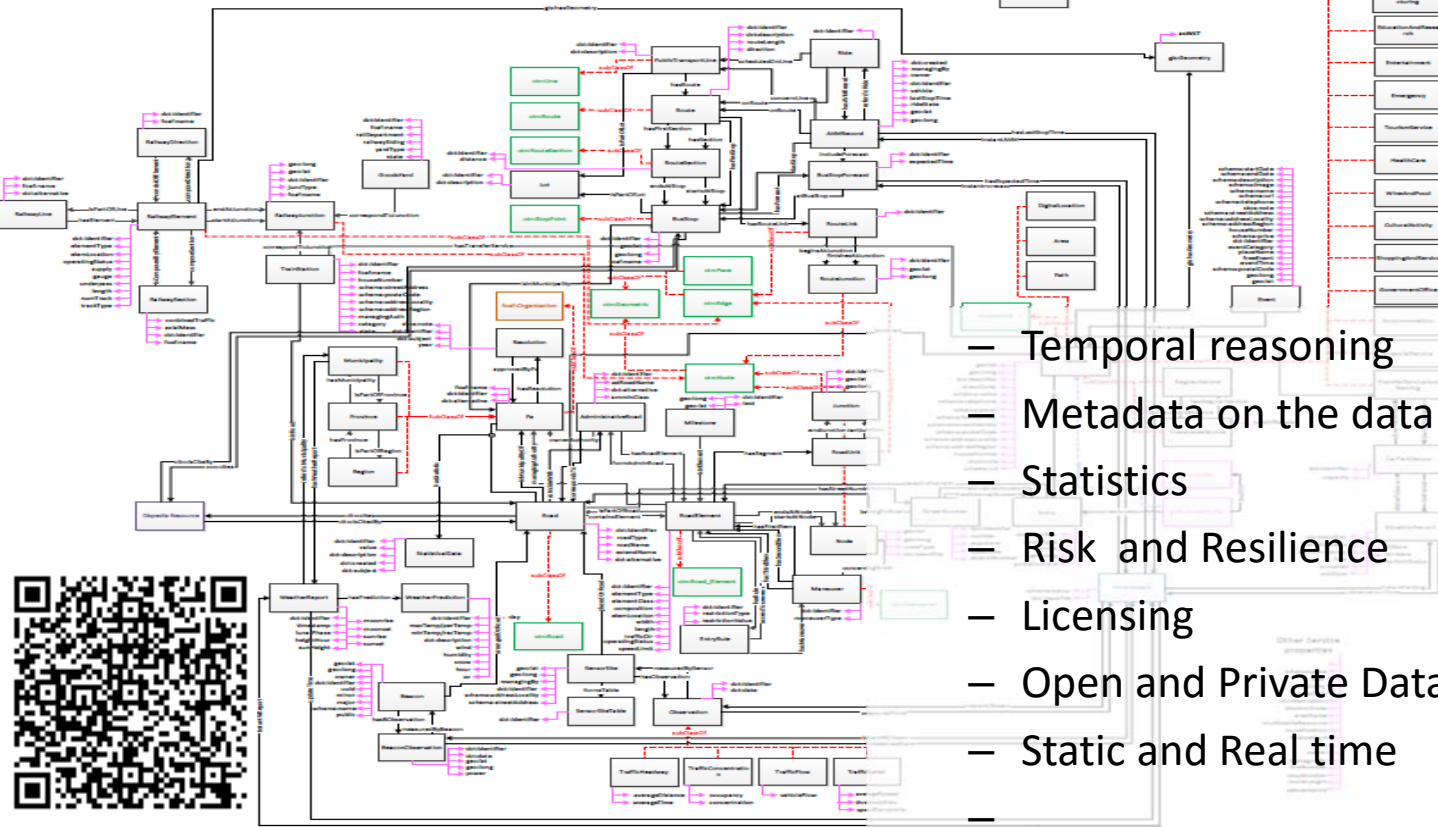
Km4City Ontology - RDF Store



- >84 Classes
- >100 ObjectProperties
- >100 DataProperties

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

- Temporal reasoning
- Metadata on the data
- Statistics
- Risk and Resilience
- Licensing
- Open and Private Data
- Static and Real time
- ..



Ontology Documentation:
<http://www.disit.org/6506>
<http://www.disit.org/6507>
<http://www.disit.org/5606>
<http://www.disit.org/6461>

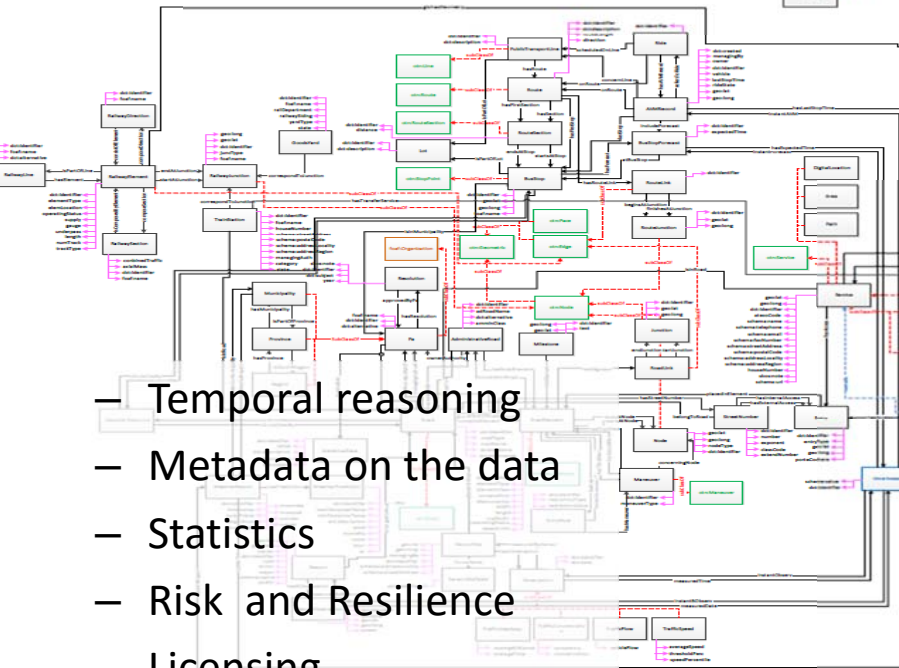


Km4City Ontology - RDF Store



Km4City is a new generation of Urban Platforms

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



- Temporal reasoning
- Metadata on the data
- Statistics
- Risk and Resilience
- Licensing
- Open and Private Data
- Static and Real time
- ..

Big Data Tools



LOD and reasoners





Development tools

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 - **Data /Service Aggregator**: open, flexible and suitable access
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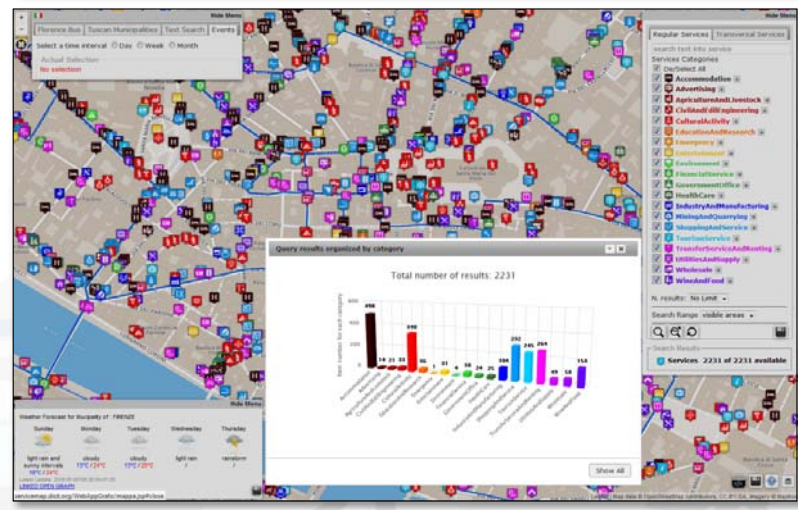
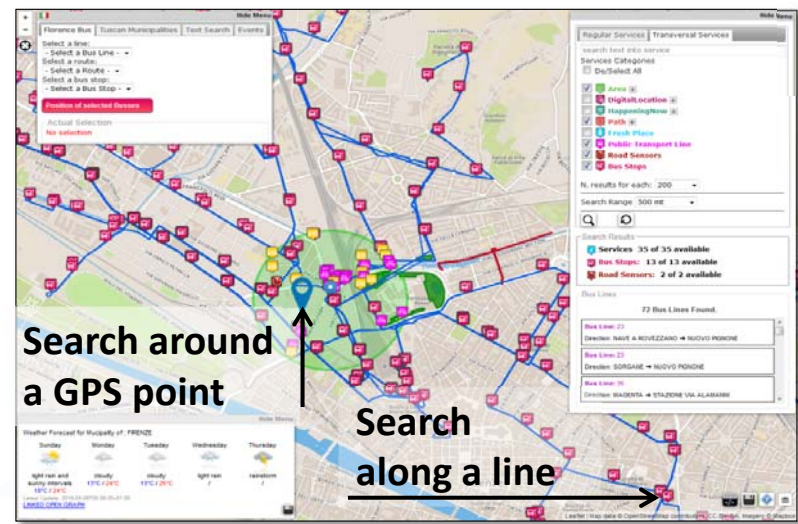


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ServiceMap Dev Tool



Smart City API call generation

Web App HTML5

Mobile Apps

Embed into Web pages

Sii-Mobility

DISPONIBILE SU
Google play

Scarica da
App Store

Scarica da
Windows Store

KM4CITY

Giardino Di Boboli

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

Indirizzo: VIALE DELLA MERIDIANA, 5
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Distributed Data Intelligence and Technologies Lab
Department of Information Engineering (DINFO)
University of Florence
<http://www.disit.dinfo.unifi.it>

HOME ABOUT RESEARCH INNOVATION EDUCATION AND COURSES HOWTO EVENTS

KM4CITY SERVICE MAP EMBEDDED

Km4City Smart City Ecosystem, January 2017

<http://www.disit.org/6873>



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ServiceMap



Search around a GPS point

Search along a line

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

73 Bus Lines Found.

Search for Geo Located Services

Get Events in the city

20 events found.

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

33 Bus Lines Found.

Search in an area

Total number of results: 2231

Regular Services: 2231 of 2231 available

Get weather forecast

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

Regular Services: 25 of 25 available
Bus Stops: 3 of 3 available



Km4city ServiceMap Km4City API

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

FERMATA : STATUTO 04
LINKED OPEN GRAPH
Linee: 20 28 4 54 8
Prossimi transiti:

FERMATA : STAZIONE PENSIлина
LINKED OPEN GRAPH
Linee: 11 17 22 23 36 4 52 54 6
Prossimi transiti:

Orario	Linea	Stato	Ride
13:01:40	4	In orario	5084813
13:05:04	17	Ritardo	4933186
13:07:24	6	In orario	4829621
13:09:02	17	In orario	4848688
13:12:02	6	Anticipo	4867907
13:12:20	6	In orario	4829654

Save your information for services.
You can save this service on ServiceMap. Please insert a valid e-mail, and you will receive a link that could allow you to access at the results and share it with your friends.
Insert your e-mail: email@domain.ext
Insert a title:
Insert a description:

Save your information for services.
You can save this query on ServiceMap. Please insert a valid e-mail, and you will receive a link that could allow you to access at the results and share it with your friends.
Insert your e-mail: michela.paolucci@unifi.it
Insert a title: My Query
Insert a description: Busses available at Florence station

From Data to Services for the Sentient Cities

Open Source and inter-operable tools to

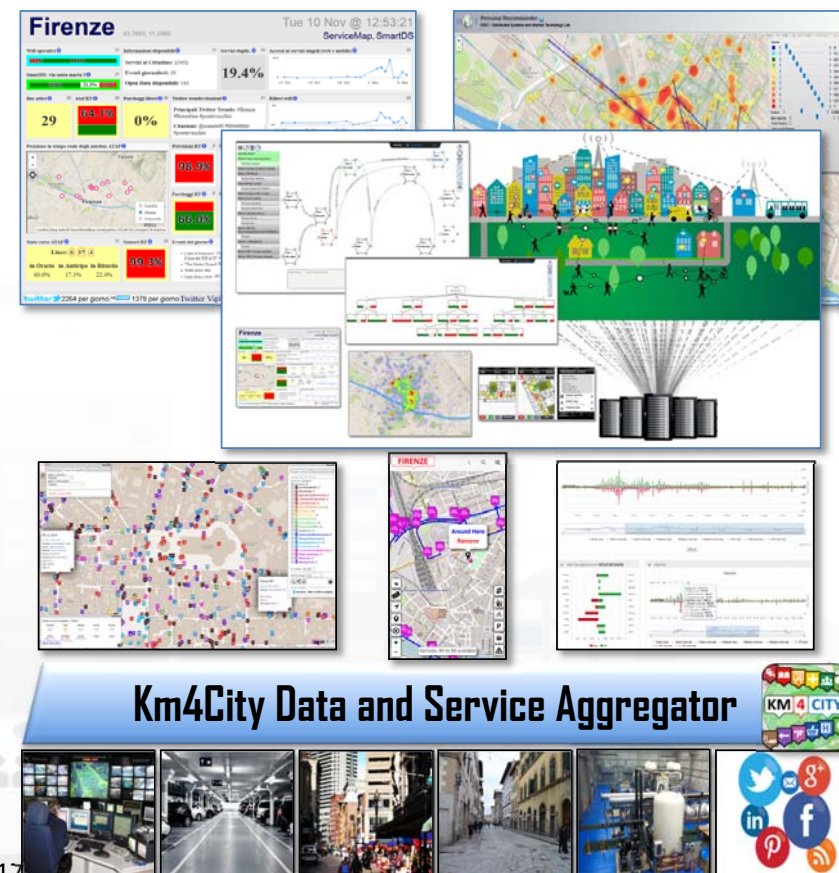
1. keep city under control via personalized dashboards

- transform data in value for the city,
- influence city users

2. Technical details:

- dashboard development
- data aggregation
- **Projects contributing**

3. improve city resilience, reducing risks and decision support



Info and Docs



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GET IT ON
Google play

Download on the
App Store

Download from
Windows Phone Store



Home Sentient City Control Room City Users' Tools Back Office and Dev Tools Info and Docs

Km4City Information, Documentation, Tutorial, Training

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www.Km4City.org



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Km4City Roadmap




2021

12/2017

- 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 

Today

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

GHOST SIR
2016-2019 - Started



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

2016

REPLICATE H2020
2016-2021 - Started



Sii-Mobility SCN
2016-2018 - Started
Km4City 1.6.2



Km4City 1.5
- SmartDS
- Km4City App

RESOLUTE H2020
2015-2018 - Started



2015

Km4City 1.4

- Embed
- More API
- iBeacon

API

Twitter Vigilance

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

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

2014

Km4City 1.1

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

2013



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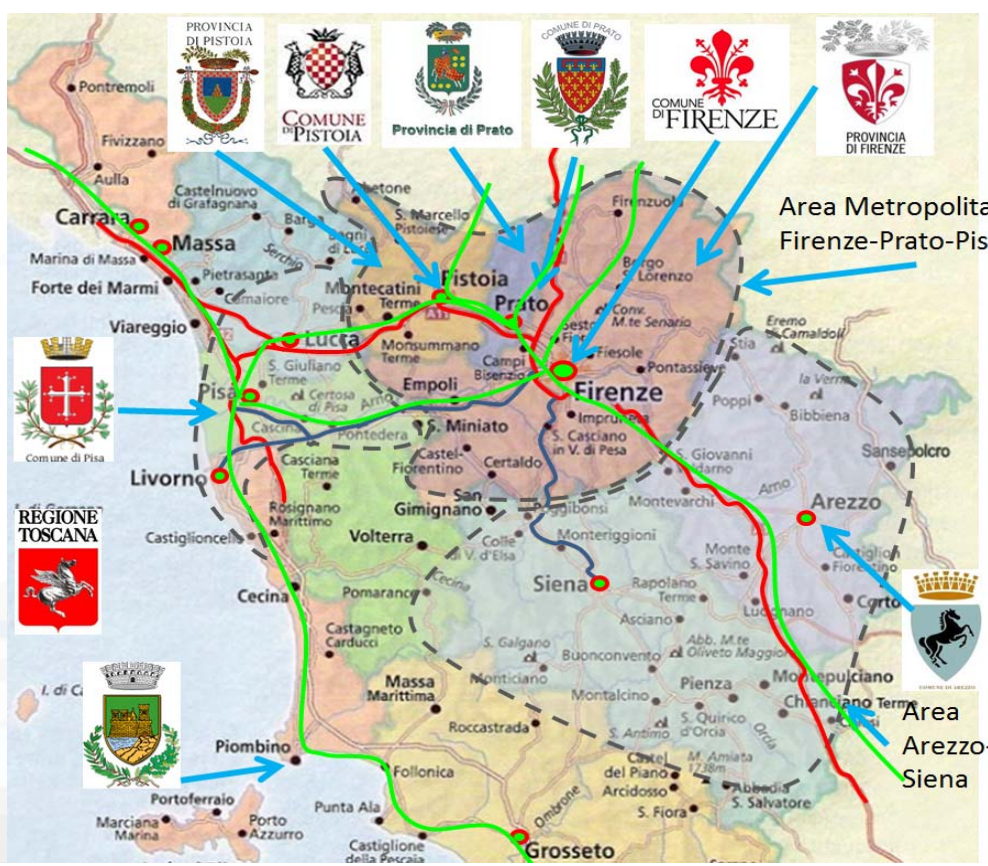
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AND INTERNET
TECHNOLOGIES LAB
<http://www.disit.org>

Sii-Mobility



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

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



- 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*

January 2017



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Sii-Mobility



Commenti dei cittadini,
Social Media



AVM trasporto
Pubblico

Merci



Sensori su
trasporto Privato

Sensori
Parcheggi

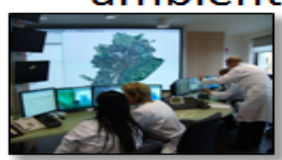


Monitoraggio
traffico, autostrade



Rete
Ferroviaria

Parametri
ambientali



Servizi ed
enti



Ordinanze: eventi,
lavori pubblici, .



Emergenze,
polizia, 118



Sensori,
sistema monitoraggio



UTC



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



- 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 SYSTEMS, LTD ESOTERIX UNITED KINGDOM
- 32 NEC LABORATORIES EUROPE, LTD NEC UNITED KINGDOM
- 33 COMMONWHEELS CAR CLUB CIC CO-WHEELS UNITED KINGDOM
- 34 UNIVERSITY OF THE WEST OF ENGLAND UWE UNITED KINGDOM
- 35 ESADE BUSINESS SCHOOL ESADE SPAIN
- 36 SISTELEC SOLUCIONES DE TELECOMUNICACION, S.L. SISTELEC SPAIN



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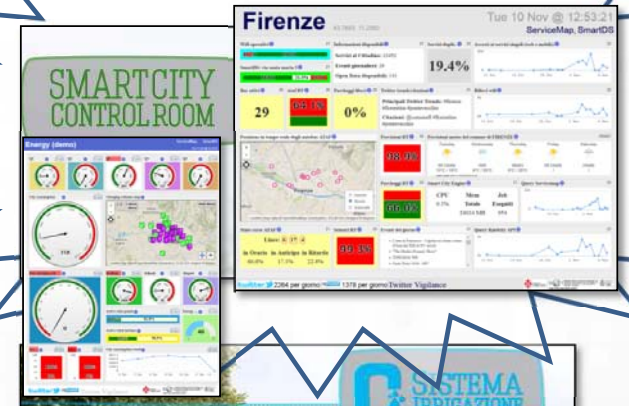
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REPLICATE in Firenze: Energy, ICT & Mobility



em, January 2017

DISIT Lab actions for REPLICATE

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





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

<http://sites.unica.it/ghost>

An aerial photograph of a city at sunset. The sky is a mix of orange, red, and purple. In the foreground, a river flows through the city, reflecting the lights. The city is densely packed with buildings, many of which are illuminated. A large, prominent dome is visible in the center-right. To the left, there is a tall, slender tower. The overall scene is a vibrant and detailed view of a city at dusk.

**3 - improve city
resilience,
reducing risks and
decision support**



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From Data to Services for the Sentient Cities

Open Source and inter-operable tools to

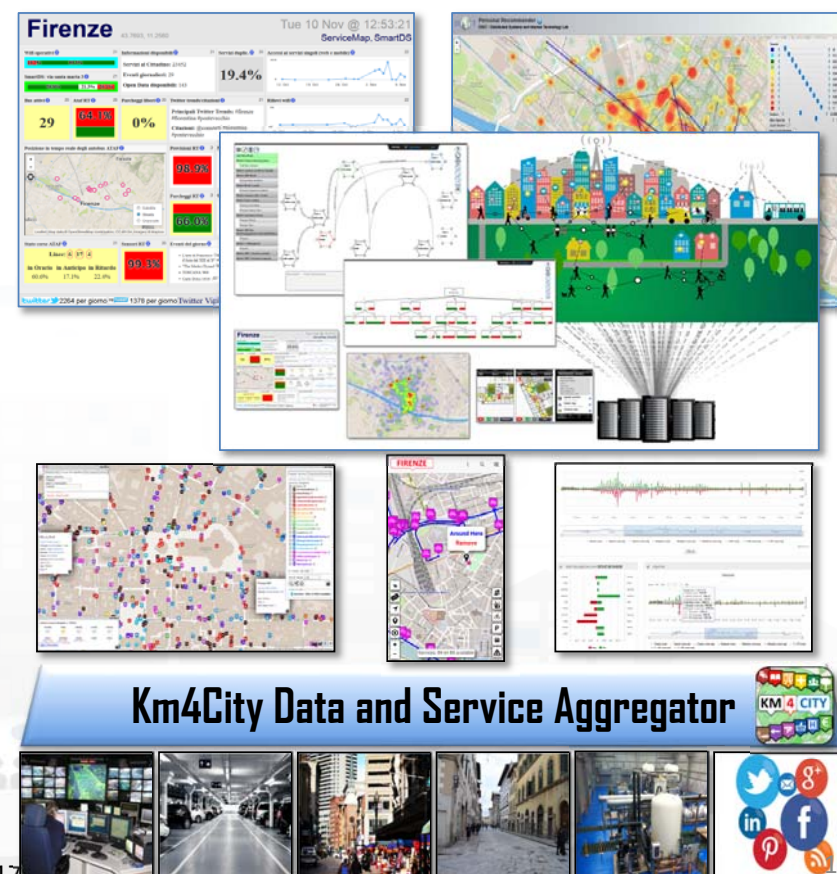
1. keep city under control via personalized dashboards

- transform data in value for the city,
- influence city users

2. Technical details:

- dashboard development
- data aggregation
- Projects contributing

3. improve city resilience, reducing risks and decision support



Sentient City Control Room

www.Km4City.org



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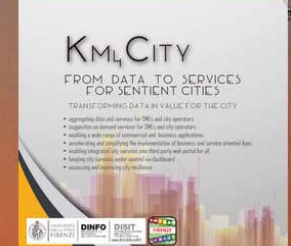
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GET IT ON
Google play

Download on the
App Store

Download from
Windows Phone Store



Home Sentient City Control Room City Users' Tools Back Office and Dev Tools Info and Docs

Real Time Monitoring Tools for Control Room Dashboards

Real Time Control Room Dashboard ⓘ

Monitoring City Users by Wi-Fi (*) ⓘ

Monitoring City Users Behaviour via Mobile App (*) ⓘ

Monitoring Real Time Data on 3D: traffic and parking (*) ⓘ

Monitoring Parking Areas Status in Florence (*) ⓘ

Monitoring Traffic Sensors in Tuscany Region (*) ⓘ

Getting moods and alerts via Twitter Sentiment Analysis (*) ⓘ

Early Warning and Prediction Tools ⓘ

Smart Decision Support System, SmartDS (*) ⓘ

Smart City Control Room, Dashboard, Real Time Data ⓘ

Firenze

DataCenter

Km4City

FirenzeWiFi

Energy (demo)

Mugnone 2011

SmartCity Processes

Servizi agli Utenti

Big Data Analytics Tools, Business Intelligence, Decision Support Tools

City Resilience Decision Support System, ResilienceDS (*) ⓘ

City Risk & Vulnerability Analysis Tool ⓘ

Assessing and Analysing Wi-Fi Coverage (*) ⓘ

Origin Destination Matrix by Wi-Fi data (*) ⓘ

City Users Recency and Frequency by Wi-Fi data (*) ⓘ

City Users Origin Destination Matrix via Mobile App (*) ⓘ

Heatmaps and Trajectories of City Users Tourists (*) ⓘ

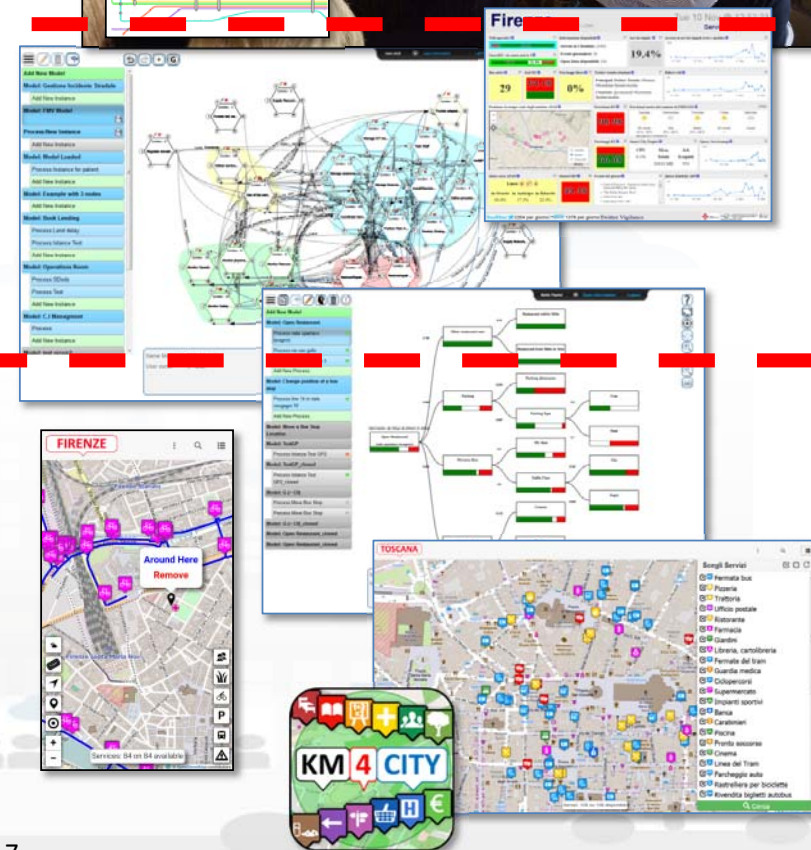
Analysing City Users' Behavior (*) ⓘ

Social Media Twitter Vigilance (*) ⓘ

Twitter Data Analysis Tool (*) ⓘ

Improve city resilience, reducing risks and decision support

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





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Problems and issues

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





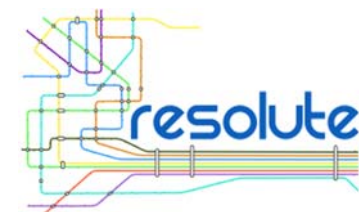
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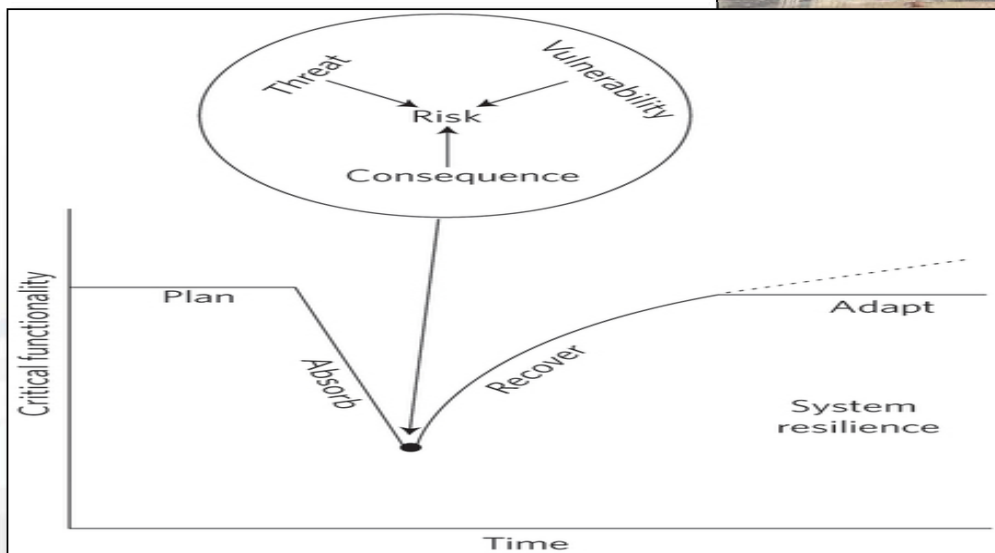
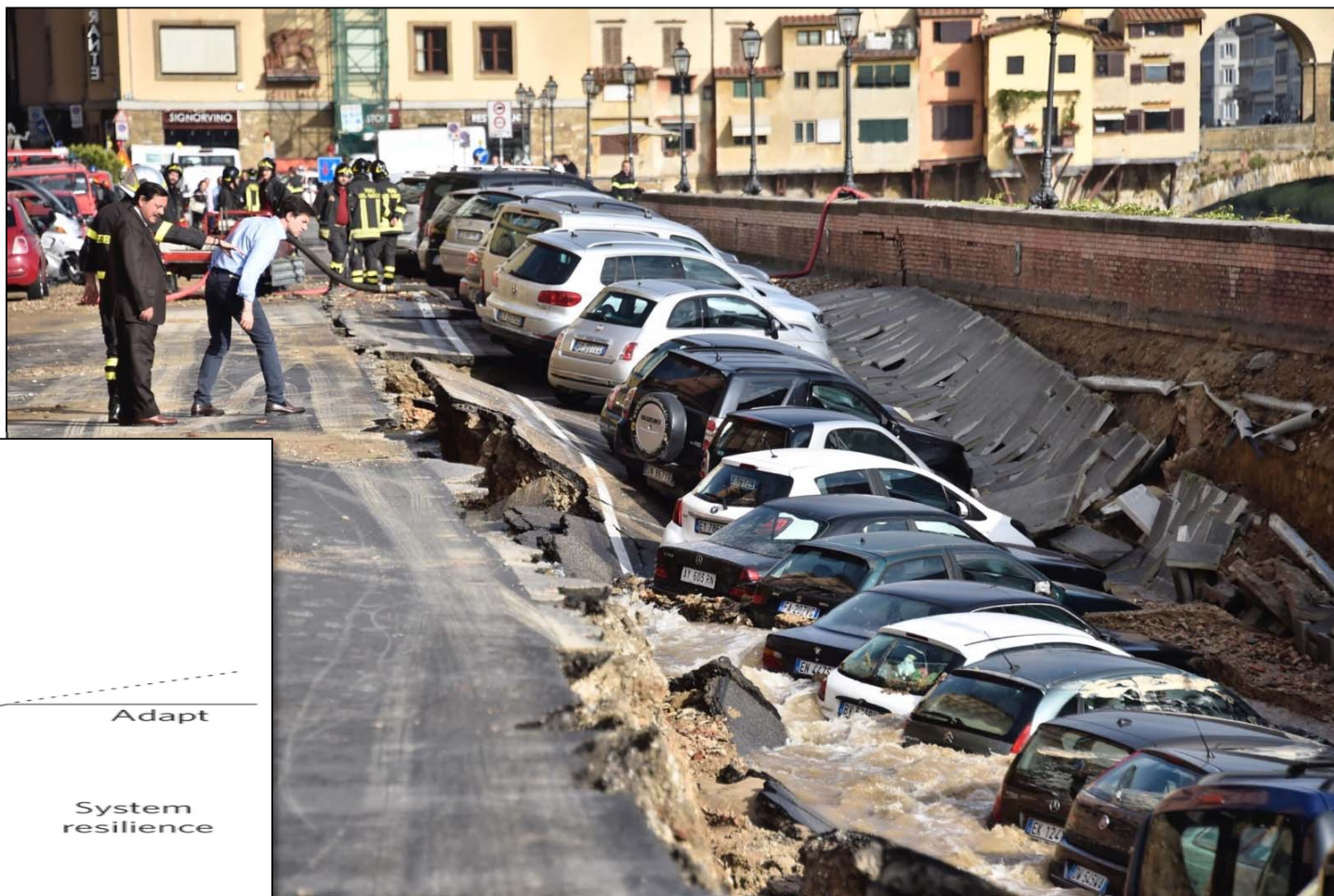
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City Resilience



Prepare
Absorb
Recover
Adapt



City Ecosystem, January 2017



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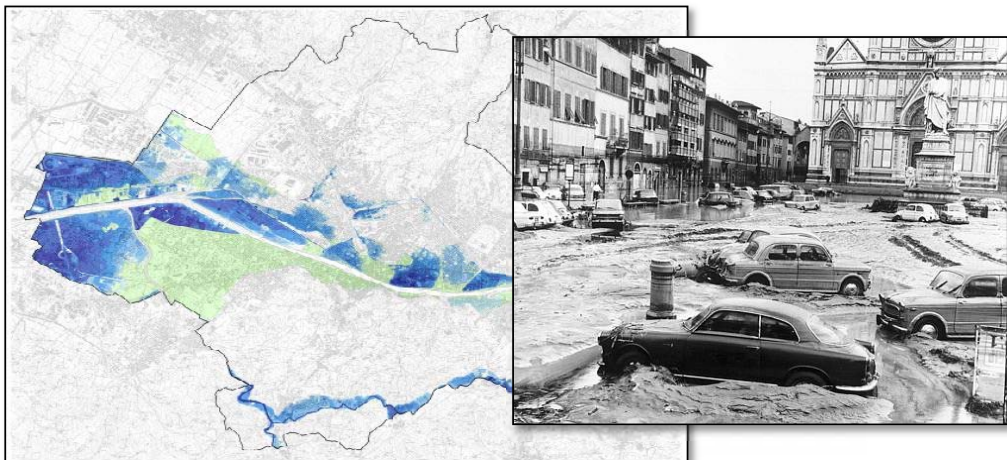
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City Resilience ERMG



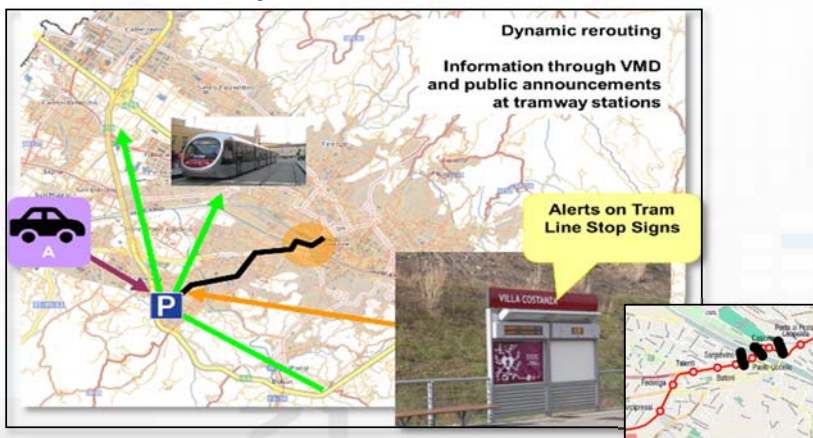
200 years probability Arno flooding



30 years probability Arno flooding



Arno Flood Impact on Tram Line & Traffic



Water bomb (down burst) in South Florence



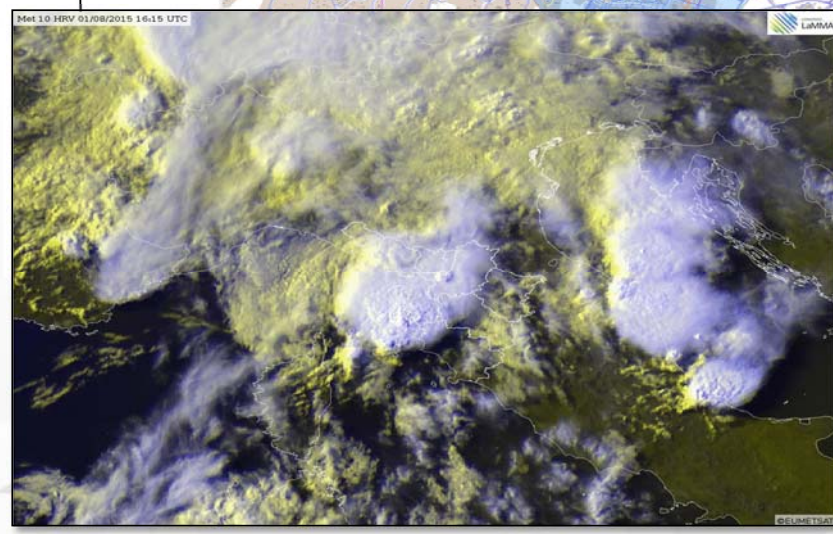
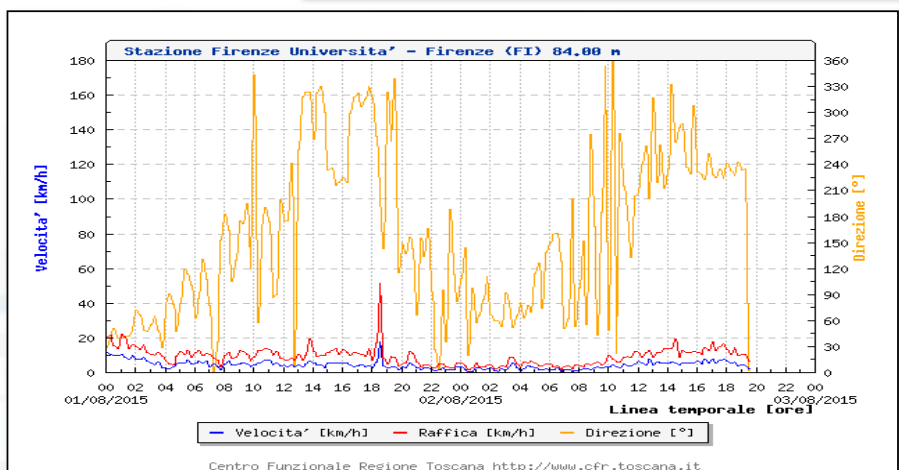
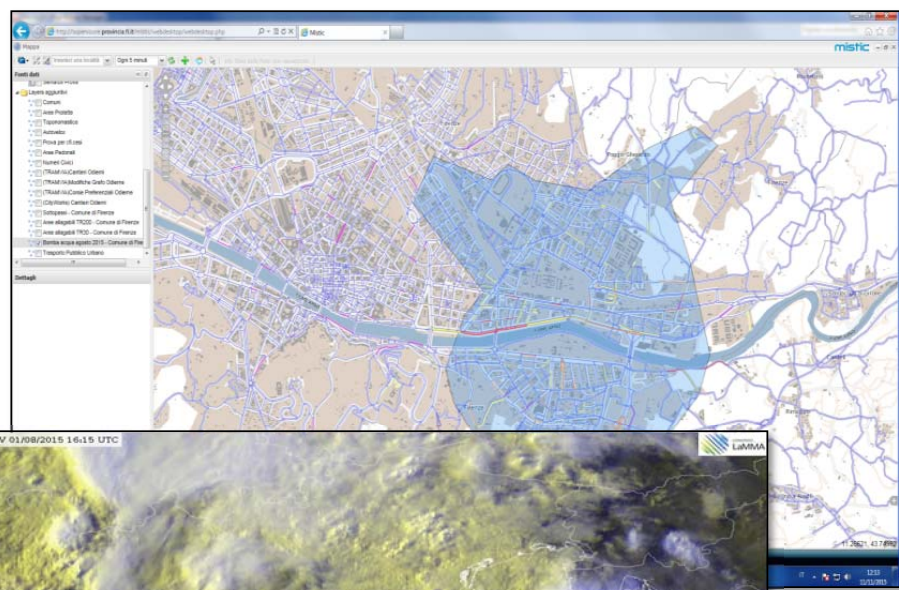
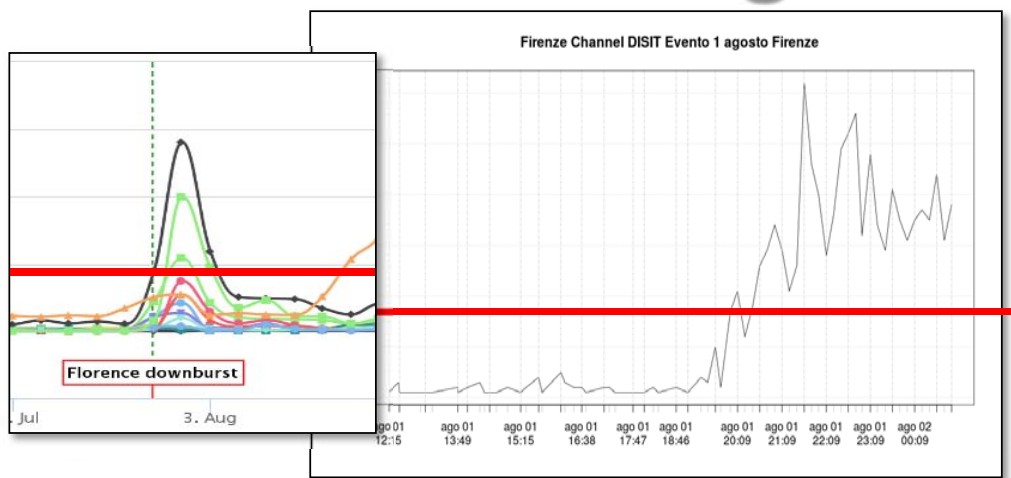


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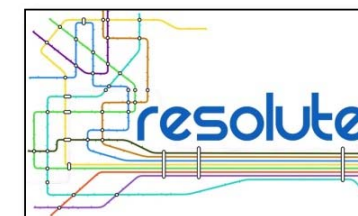
Early Warning Twitter Vigilance and Water Bomb



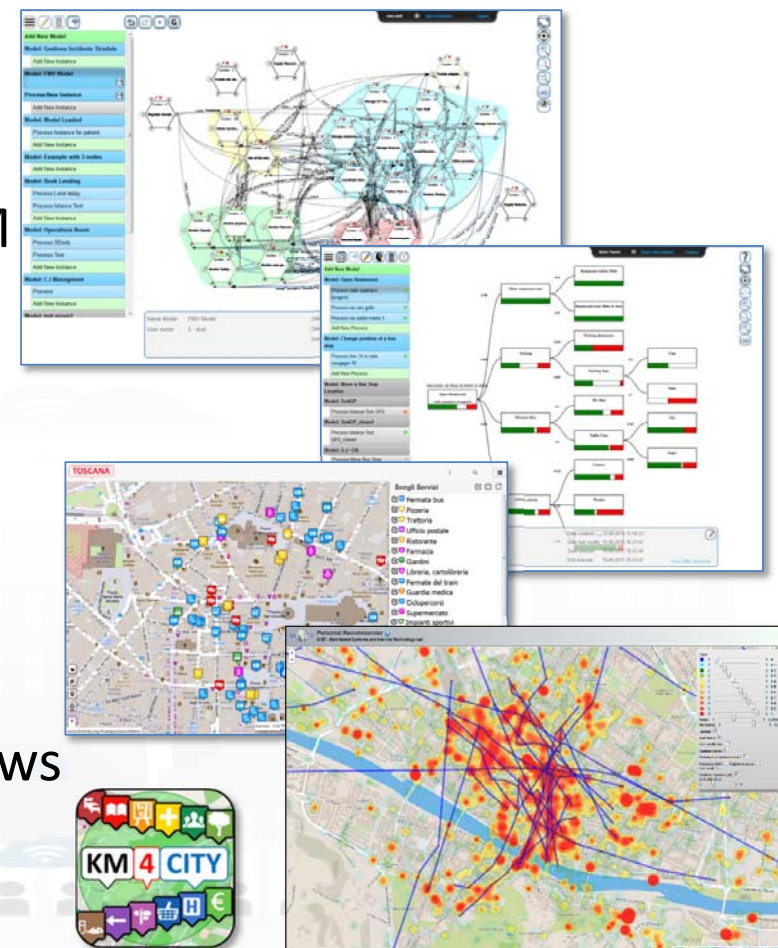
Twitter Vigilance

Km4City Smart City Ecosystem, January 2017

Main Approach



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





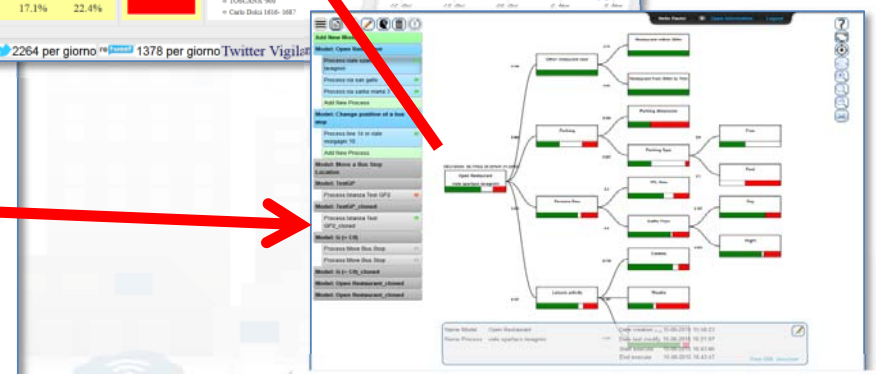
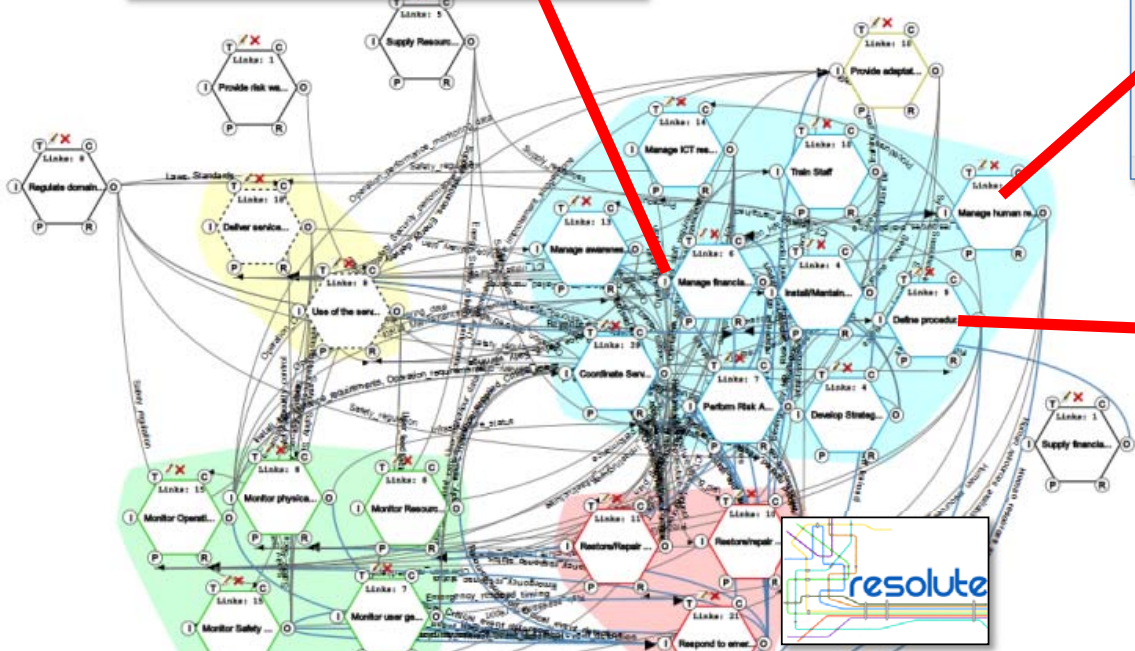
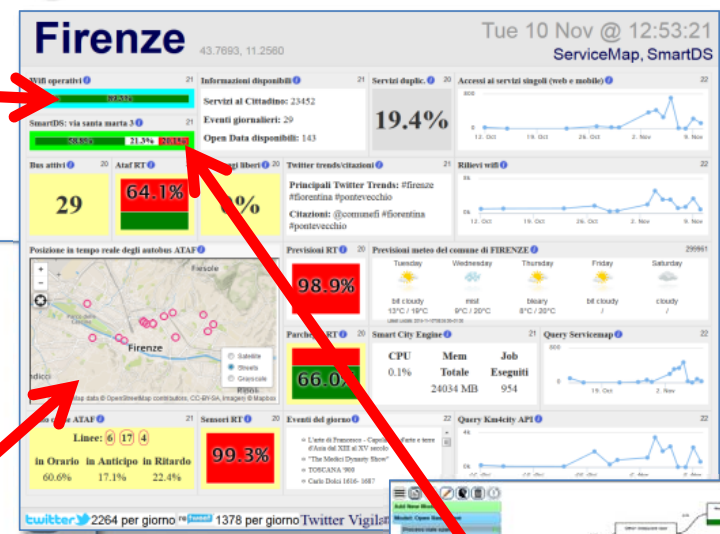
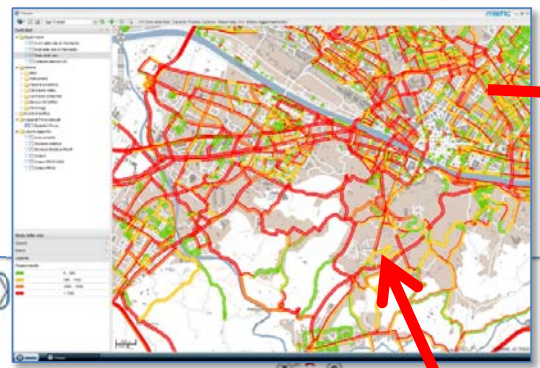
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Dashboarding city resilience

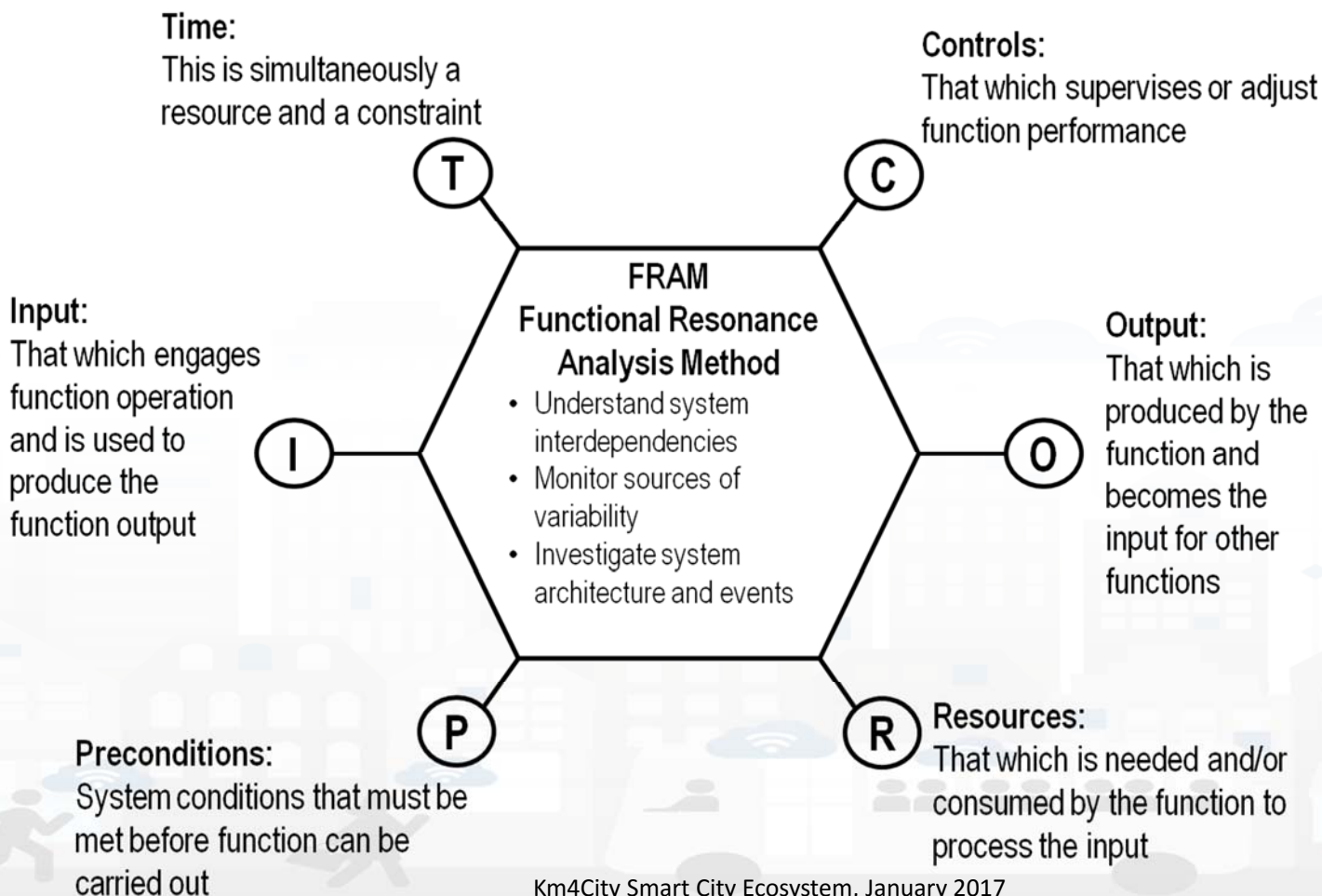


Data and Service Aggregator



2017

Functional Resonance Analysis Method



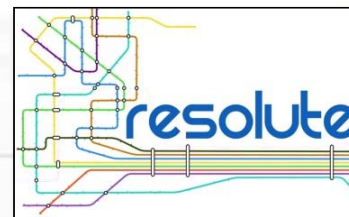
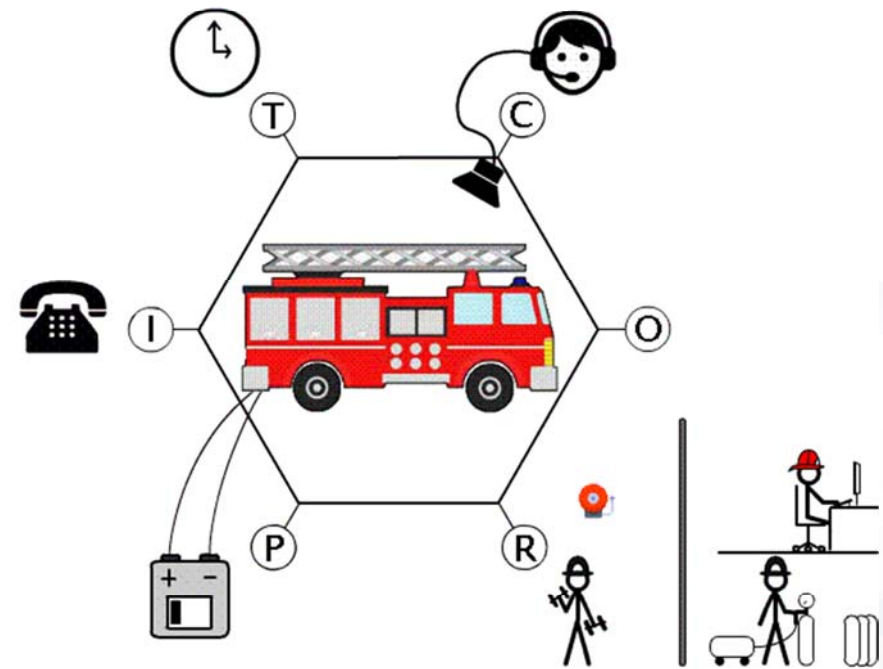
- Success and failure are equivalent in the sense that they both emerge from performance variability.
- Variability, intended as a way for people to adjust tools and procedures to match operating conditions.
- Emergence of either success or failure is due to unexpected combination of variability from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

Functional Resonance Analysis Method

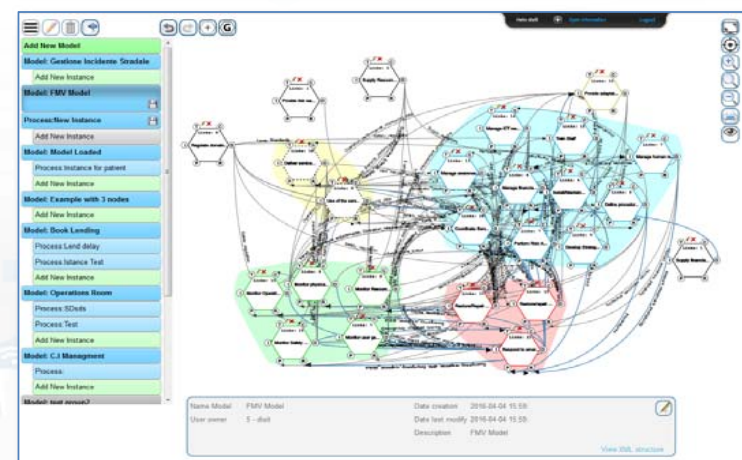
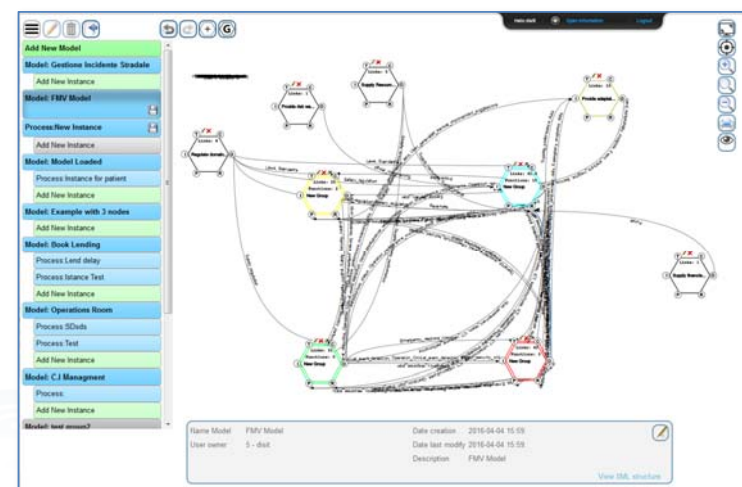


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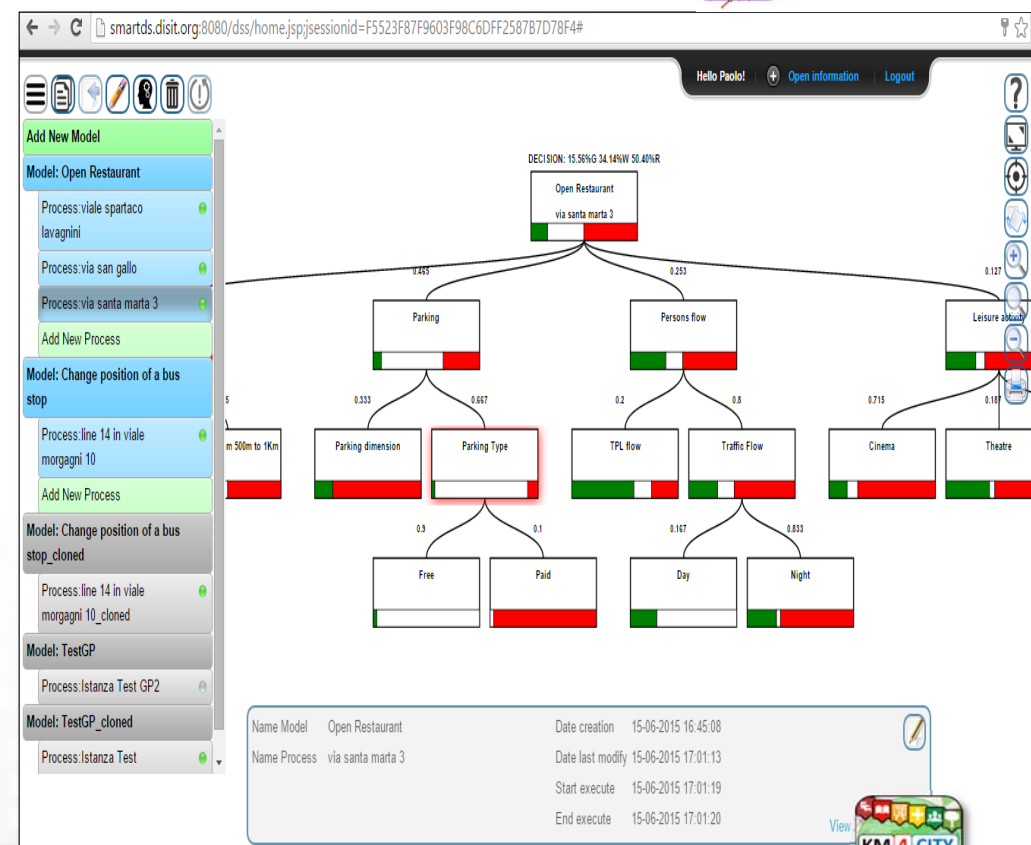
Functional Resonance Analysis Method



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

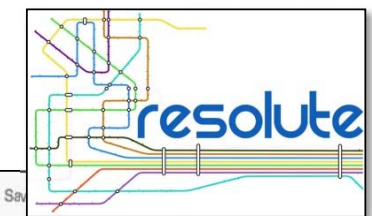


- Smart Decision Support System based on System Thinking plus
- Actions to city reaction, resilience, smartness..
- Enforcing
- Mathematical model for propagation of decision confidence..
- Collaborative work...,
- Processes connected to city data: DB, RDF Store, Twitter, etc.
- Production of alerts/alarms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





Risk Assessment



Flood Event | Flood Observation | Traffic Observation | Damage analysis | Layers panel | Vulnerability info | Service Observation

Aerial with labels

Flood sensors observations:

<input checked="" type="checkbox"/>	From	Data	mm/h
<input checked="" type="checkbox"/>	Firenze Genio Civile	2016-04-11T15:59:00	12
<input checked="" type="checkbox"/>	Firenze Peretola	2016-04-11T15:59:00	20.5
<input checked="" type="checkbox"/>	Firenze Universita	2016-04-11T15:59:00	10.5

Threshold:

From:

To:

Draw region to analyze: On

Load predefined region:

Mean precipitation:

SERVICE

NAME: villa maria teresa hospital...

ADDRESS: VIA DELLA CERNAIA, FIRENZE, FIRENZE

SERVICE TYPE: http://www.disit.org/km4city/schema#Public_hospital

SERVICE CLASS: <http://www.disit.org/km4city/schema#HealthCare>

SERVICE: <http://www.disit.org/km4city/resource/77ab1bc45b84357b727dd67fe6081d2db>

VALUE: 100

WKT DESCRIPTION: POINT (11.2561 43.7866)

Traffic observations:

<input type="checkbox"/>	From	Date	km/h	car/km	car/h
<input type="checkbox"/>	VIA DELLA MATTONAIA	2016-10-10 18:01:08	58	15	2435
<input type="checkbox"/>	LUNGARNO AMERIGO VESPUCCI	2016-10-10 18:01:08	18	65	1842
<input type="checkbox"/>	VIA CAMILLO CAVOUR	2016-10-10 18:01:08	61	12	2009
<input type="checkbox"/>	VIA VALFONDA	2016-10-10 18:01:08	27	53	3307
<input type="checkbox"/>	VIA VITTORIO ALFIERI	2016-10-10 18:01:08	23	58	2798
<input type="checkbox"/>	VIA SENESE	2016-10-10 18:01:08	27	54	3216
<input type="checkbox"/>	VIA GUELFA	2016-10-10 18:01:08	68	3	420
<input type="checkbox"/>	VIA DELLA SCALA	2016-10-10 18:01:08	60	13	2167
<input type="checkbox"/>	PIAZZA DI SAN FELICE	2016-10-10 18:01:08	62	10	1687
<input type="checkbox"/>	BORGO SAN FREDIANO	2016-10-10 18:01:08	57	17	2690
<input type="checkbox"/>	VIA VITTORIO ALFIERI	2016-10-10 18:01:08	10	74	195
<input type="checkbox"/>	VIA DEL CAMPUCCIO	2016-10-10 18:01:08	60	13	2157
<input type="checkbox"/>	VIA DEI BENCI	2016-10-10 18:01:08	22	59	2679
<input type="checkbox"/>	PIAZZALE DI PORTA ROMANA	2016-10-10 18:01:08	64	8	1361

Relevant Services

Min asset value:

<input checked="" type="checkbox"/>	Service	Street
<input checked="" type="checkbox"/>	villa delle terme case di cura	VIALE MAZZINI GIUSEPPE, FIRENZE
<input checked="" type="checkbox"/>	villa dei pini srl	VIA FOSCOLO UGO, FIRENZE
<input checked="" type="checkbox"/>	Poggio Secco	VIA INCONTRI, FIRENZE

KM 4 CITY

Type	Value
Publ	100
Publ	100
Public_hospital	100

Assessing Risk

- hydraulic
- Seismic

Present data Tuscany Region

Road Graph (Tuscany region)

- 132,923 Roads
- 389,711 Road Elements
- 318,160 Road Nodes
- 1,508,207 Street Numbers

- Services (20 cat, 512 cat.)
- 16 Pub. Transport Operators
- 21.280 Bus stops & 1081 bus lines
- 210 Parking areas
- 796 Traffic Sensors
- Info on: points, paths, areas, etc.

Dynamic/real-time

- bus lines: 144 updates X day X line
- **NEW:** Timeline PT: 1081 lines, 1-2 updates per day
- parking status: 76 updates X day X sensor
- traffic Sensors: 288 updates X day X sensor
- weather: 2 updates X day for 285 areas
- **NEW:** Triage status: 96 updates per day, per hospital
- **NEW:** Fuel stations: 1 update per day, 1600 stations
- events: about 60 new events X day
- Wi-Fi: > 350.000 measures X day
- mobiles: > 50.000 measures X day
- more than 35.000 distinct users X day
- From 600.000 to 4.5 M Tweets X day
-+ many IOT are coming

- Nascondi Menu

Fermate Firenze Comuni in Toscana Ricerca Testuale

Seleziona una provincia:
FIRENZE

Seleziona un comune:
FIRENZE

Actual Selection
COMUNE di FIRENZE

- 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

KM4 CITY

Previs

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

<http://servicemap.km4city.org>



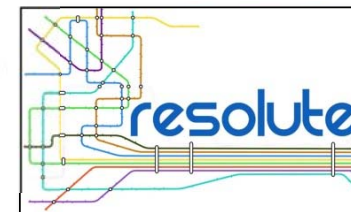
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INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

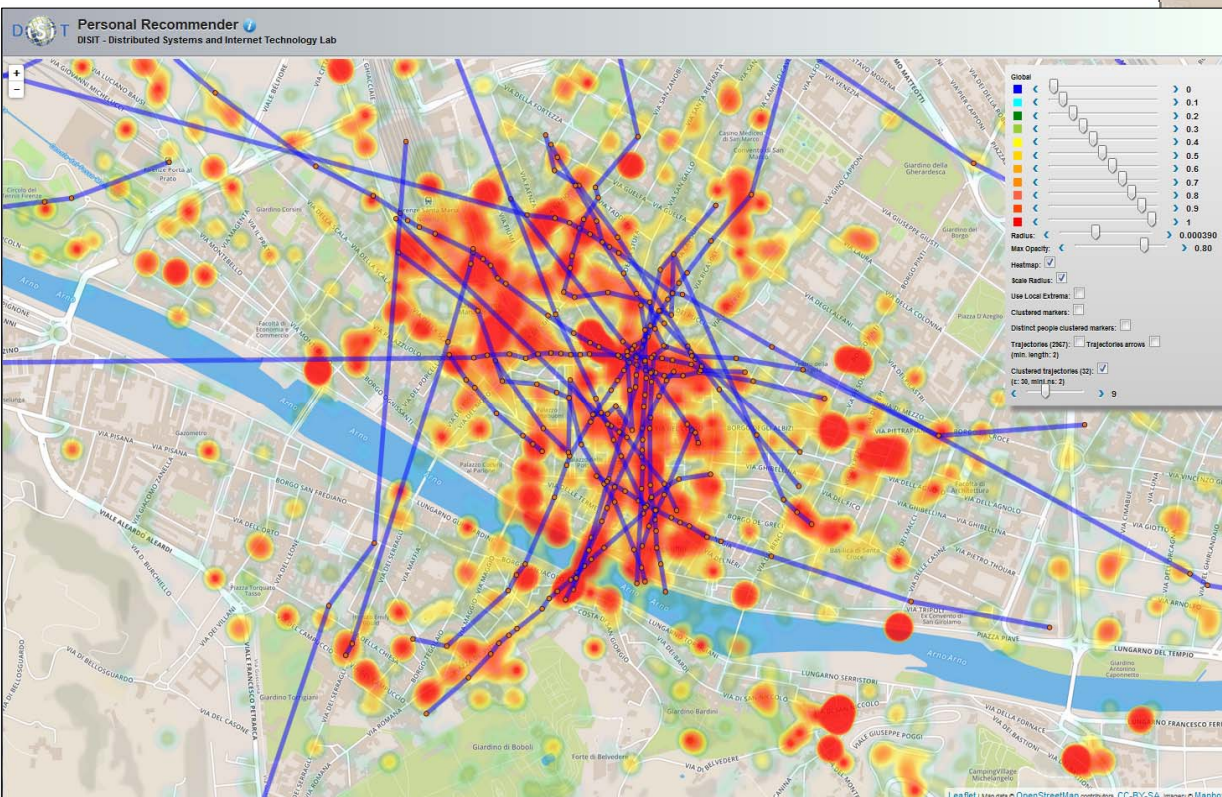
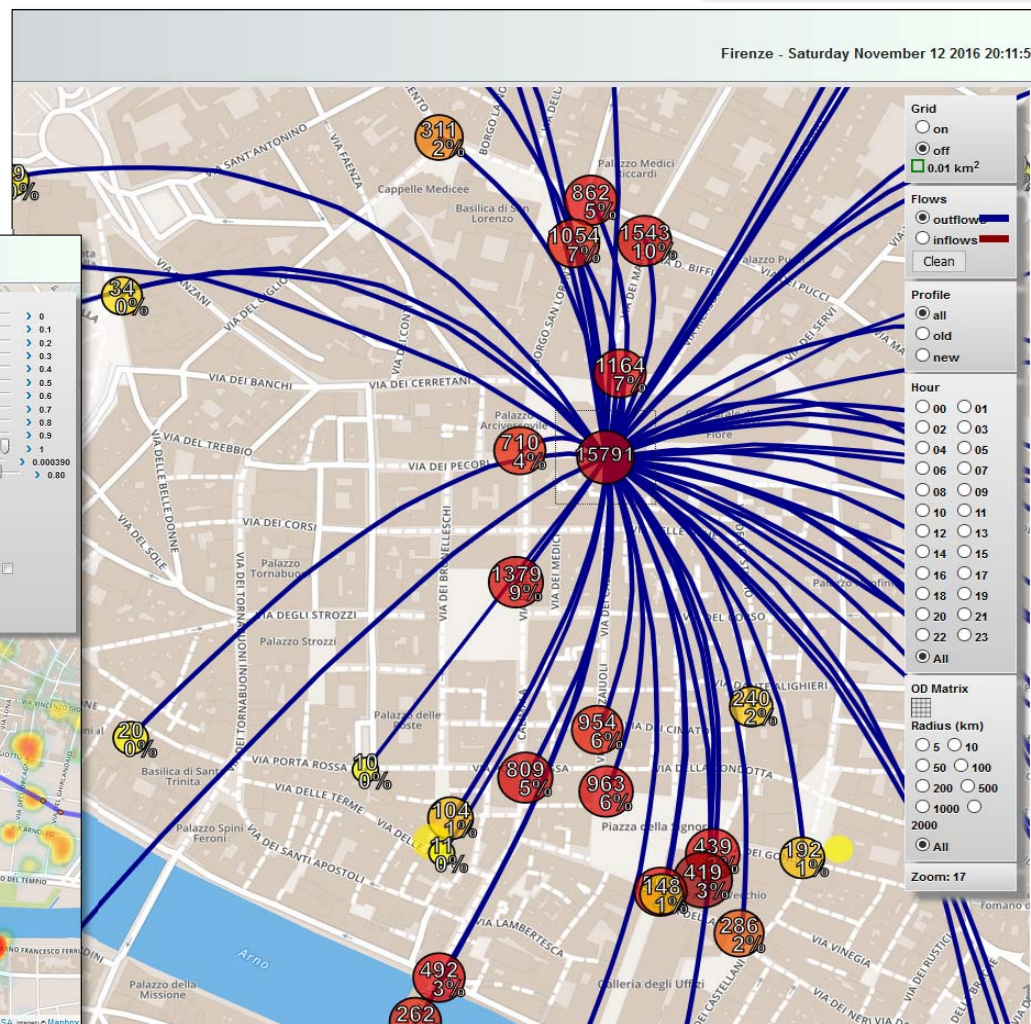
<http://www.disit.org>

User Behavior Analyzer



- Heat maps
- Trajectories
- OD matrixes

Firenze - Saturday November 12 2016 20:11:59





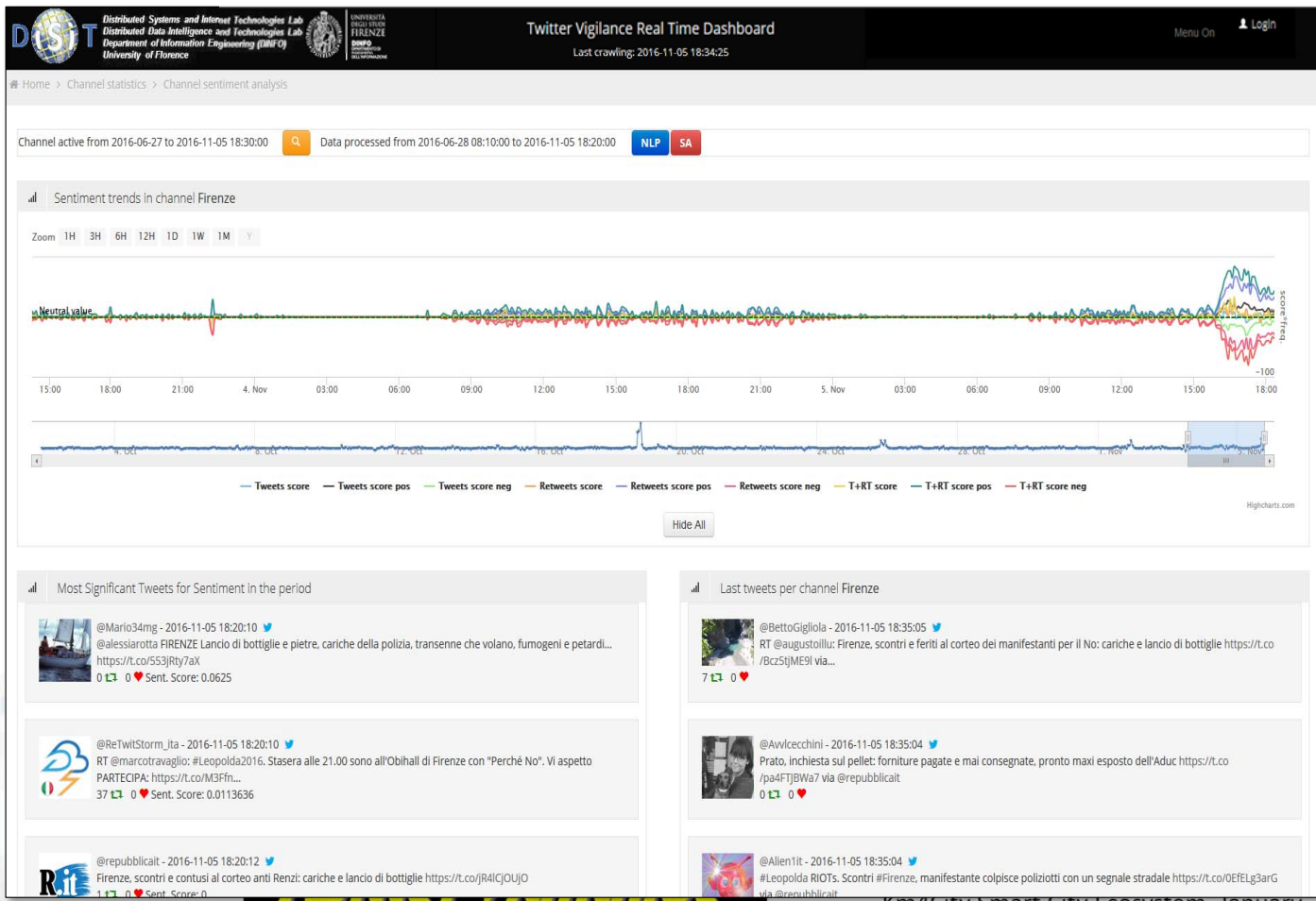
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INGEGNERIA
DELL'INFORMAZIONE

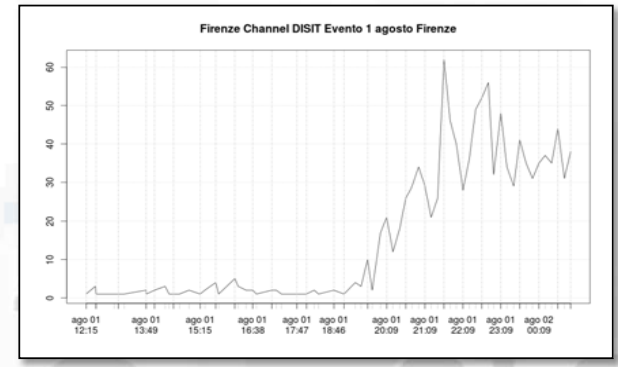
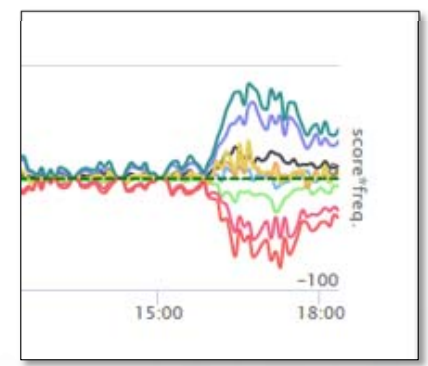
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DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB
<http://www.disit.org>

Twitter Vigilance

Real Time Twitter Vigilance, Early Warning

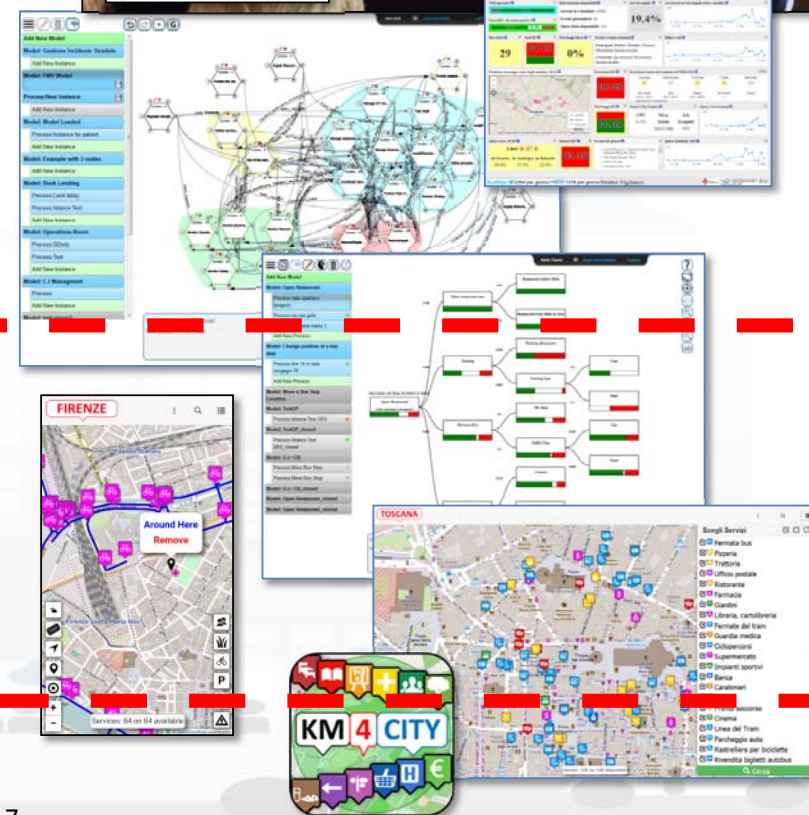


Sentiment Analysis



Improve city resilience, reducing risks and decision support

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





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Km4CityMobile App



What do you want to do?

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

Choose Services

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

Giardino Di Boboli

Tipo: Digital Location

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

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

ESERCITAZIONE MUGNONE 2016

prevede: Firenze (FI) (ZONA: A3)

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

Suggerimenti

Piazza SS. Annunziata
Tipo: Squares
Distanza: 1949 m
Indirizzo: [Icone]

Piazza Santissima Annunziata
Tipo: Squares
Distanza: 1949 m
Indirizzo: [Icone]

Trattoria Gozzi
Tipo: Trattoria
Distanza: 1975 m

Mostra Tutte le Categorie

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

Windows Phone interface with tiles for Calendar, Posta, Netflix, Microsoft Edge, Roma, Xbox, Anteprima Sk..., Tuneln Radio, Twitter, and Soda.

DISPONIBILE SU Google play

Scarica da App Store

Scarica da Windows Store

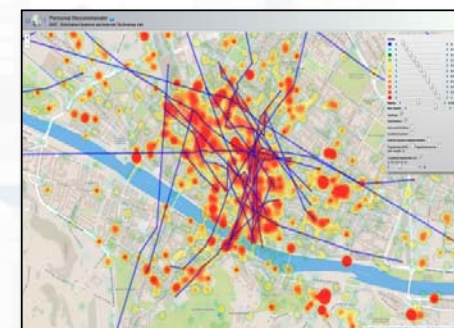
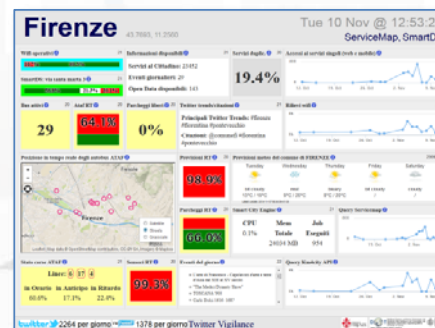
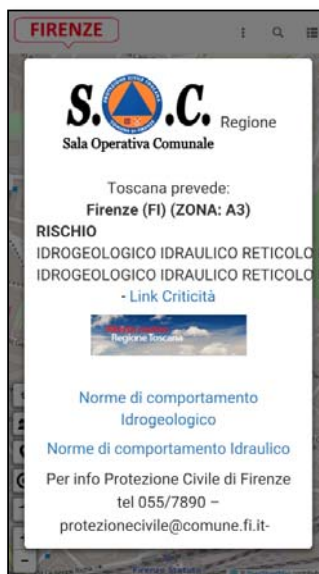


Km4City Smart City Ecosystem, January 2017

Mobile Emergency



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





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Km4City Roadmap




2021

12/2017

- 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 

Today

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

GHOST SIR
2016-2019 - Started



 **RESOLUTE H2020**
2015-2018 - Started

Km4City 1.5
- SmartDS
- Km4City App



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

2015

Km4City 1.4

- Embed
- More API
- iBeacon

- <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>

2016

REPLICATE H2020
2016-2021 - Started



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

2013

Km4City 1.1

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

2014

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

A nighttime photograph of a city, likely Florence, Italy, featuring the Florence Cathedral (Duomo) with its large red-tiled dome. The city is illuminated by streetlights and building lights, with the lights reflecting on a river in the foreground. The sky is a deep orange and red, suggesting sunset or sunrise. The text '- Before City contributions' is overlaid in large, bold, yellow letters.

- Before City contributions



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Km4City Roadmap




2021

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- Mobility and transport
- Resilience Decision Support

GHOST SIR
2016-2019 - Started



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

RESOLUTE H2020
2015-2018 - Started

Km4City 1.5
- SmartDS
- Km4City App



Sii-Mobility SCN
2016-2018 - Started
Km4City 1.6.2

2016

REPLICATE H2020
2016-2021 - Started



REPLICATE
RÉnaissance of Places
with Innovative Citizenship
And Technology

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

2015

Km4City 1.4

- Embed
- More API
- iBeacon

API
Twitter Vigilance

2016

REPLICATE H2020
2016-2021 - Started



REPLICATE
RÉnaissance of Places
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And Technology

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2013

Km4City 1.1

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- <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

Transport systems
Mobility, parking



Public Services
Govern, events, ...



Sensors, IOT
Cameras, ...



Environment,
Water, energy



Shops, services,
operators



Social Media
WiFi, network

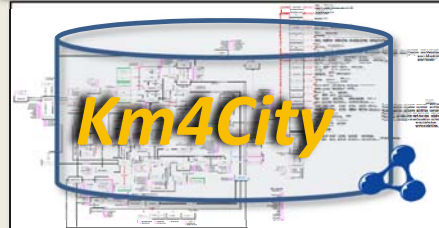


Static, Slow and Real Time data flows

DISCES -- Distributed and parallel architecture on Cloud



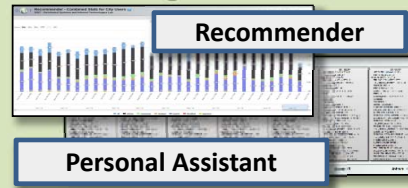
Km4City Smart City Engine



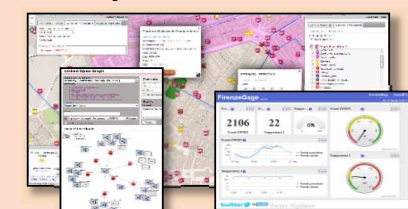
Big Data Analytics



Smartening Tools



Development Tools



Km4City Smart City API

City Operators and Decision Makers

Dashboards



Smart Decision Support



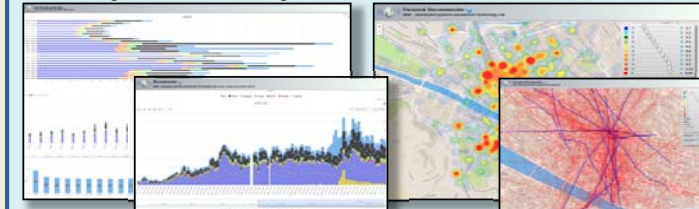
ServiceMap browser



Twitter Vigilance

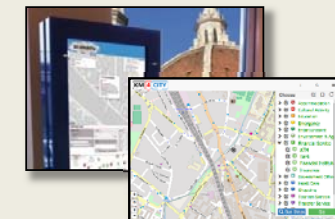


Analyzers of City User Behavior



Tools for Final Users

Mobile e Web Apps





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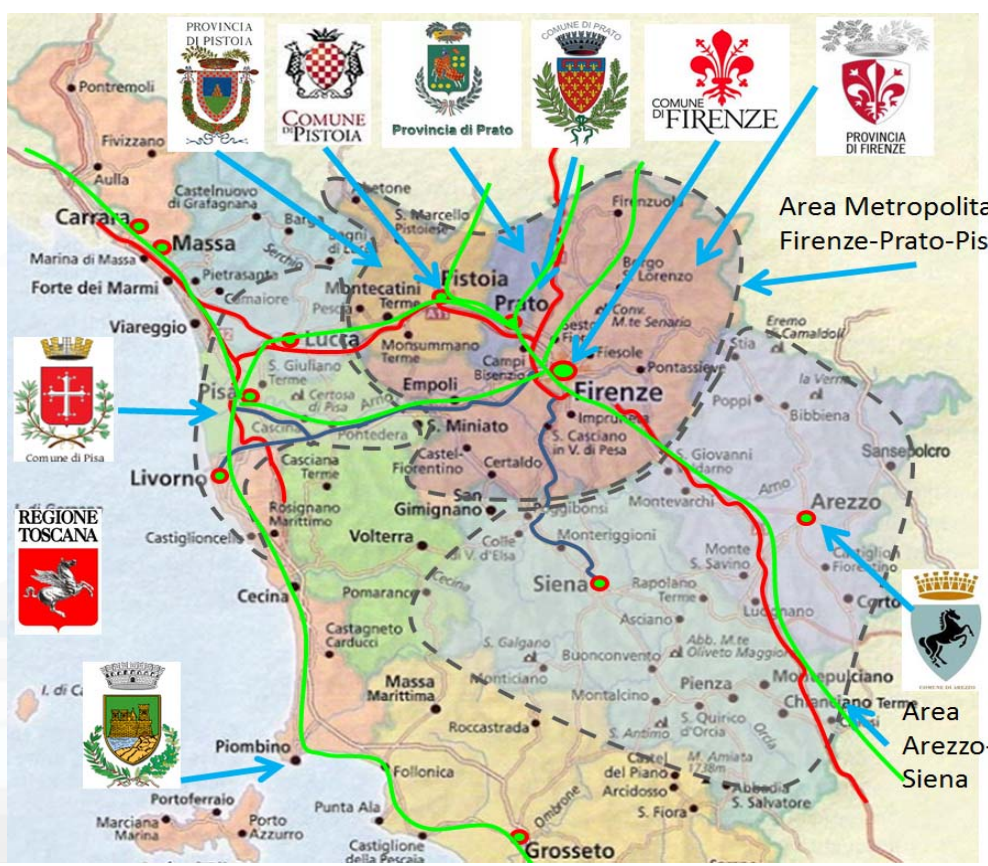
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<http://www.disit.org>

Sii-Mobility



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

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



ataf

tiemme

BUSITALIA
GRUPPO FERROVIE DELLO STATO ITALIANE

atam

CTT
CORRISPONDENZA TELEGRAFICA ITALIANA

— 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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<http://www.disit.org>

Sii-Mobility



Commenti dei cittadini,
Social Media



AVM trasporto
Pubblico

Merci

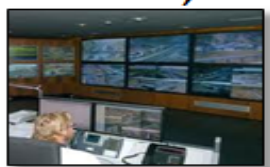


Sensori su
trasporto Privato

Sensori
Parcheggi

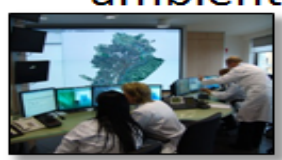


Monitoraggio
traffico, autostrade



Rete
Ferroviaria

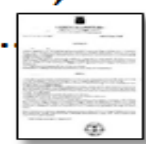
Parametri
ambientali



Servizi ed
enti



Ordinanze: eventi,
lavori pubblici, .



Sensori,
sistema monitoraggio



UTC



Infomobility



Varchi
Telematici, ZTL



Emergenze,
polizia, 118





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



- 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 SYSTEMS, LTD ESOTERIX UNITED KINGDOM
- 32 NEC LABORATORIES EUROPE, LTD NEC UNITED KINGDOM
- 33 COMMONWHEELS CAR CLUB CIC CO-WHEELS UNITED KINGDOM
- 34 UNIVERSITY OF THE WEST OF ENGLAND UWE UNITED KINGDOM
- 35 ESADE BUSINESS SCHOOL ESADE SPAIN
- 36 SISTELEC SOLUCIONES DE TELECOMUNICACION, S.L. SISTELEC SPAIN



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

<http://sites.unica.it/ghost>

Acknowledgement

- Thanks to the European Commission for founding. All slides reporting logo of **RESOLUTE H2020** are representing tools and research founded by European Commission for the RESOLUTE project. **RESOLUTE** has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement n° 653460).
- Thanks to the European Commission for founding. All slides reporting logo of **REPLICATE H2020** are representing tools and research founded by European Commission for the REPLICATE project. **REPLICATE** has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement n° 691735).
- Thanks to the MIUR for co-founding and to the University of Florence and companies involved. All slides reporting logo of **Sii-Mobility** are representing tools and research founded by MIUR for the Sii-Mobility SCN MIUR project.
- **Km4City** is an open technology exploited by those projects and line of research of DISIT Lab. Some of the innovative solutions and research issues developed into the above mentioned projects are also compliant and contributing to the Km4City approach and thus are contributing to the open Km4City model of DISIT lab.





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Km4City

Open Urban Platform for a Sentient Smart City

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

www.Km4City.org

Paolo Nesi, paolo.nesi@unifi.it

