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(cc)

Il Progetto RESOLUTE:

http://www.disit.org/km4city Paolo Nesi, paolo.nesi@unifi.it

http://www.resolute-eu.org





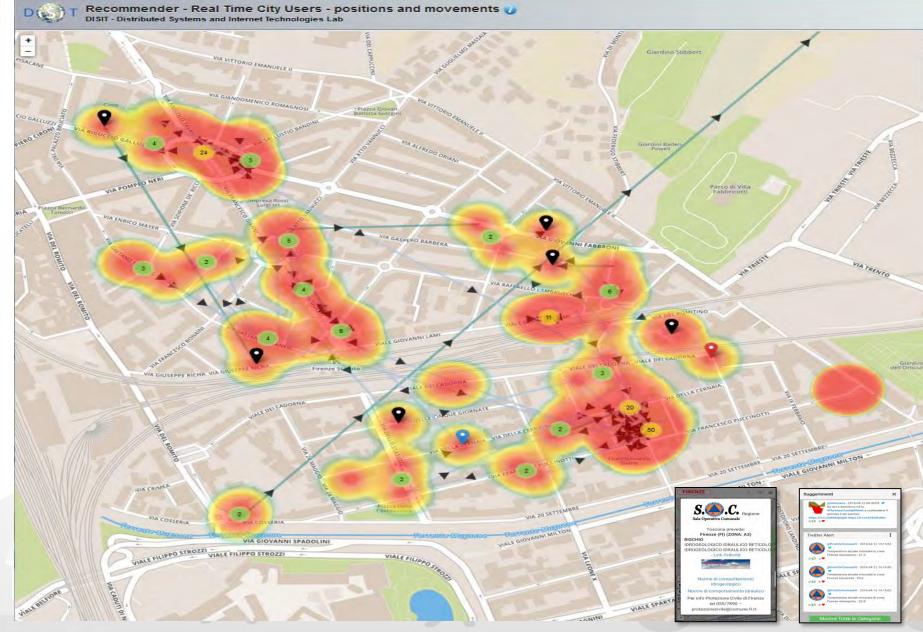


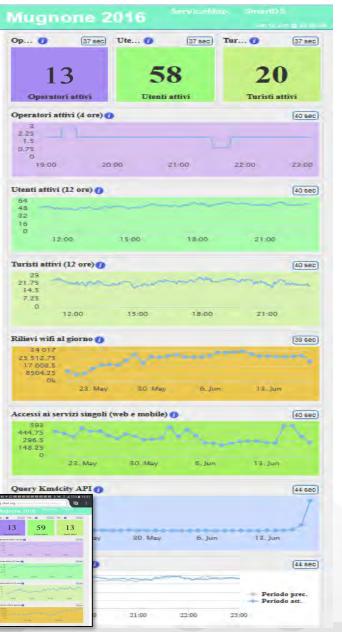






Mugnone 2016





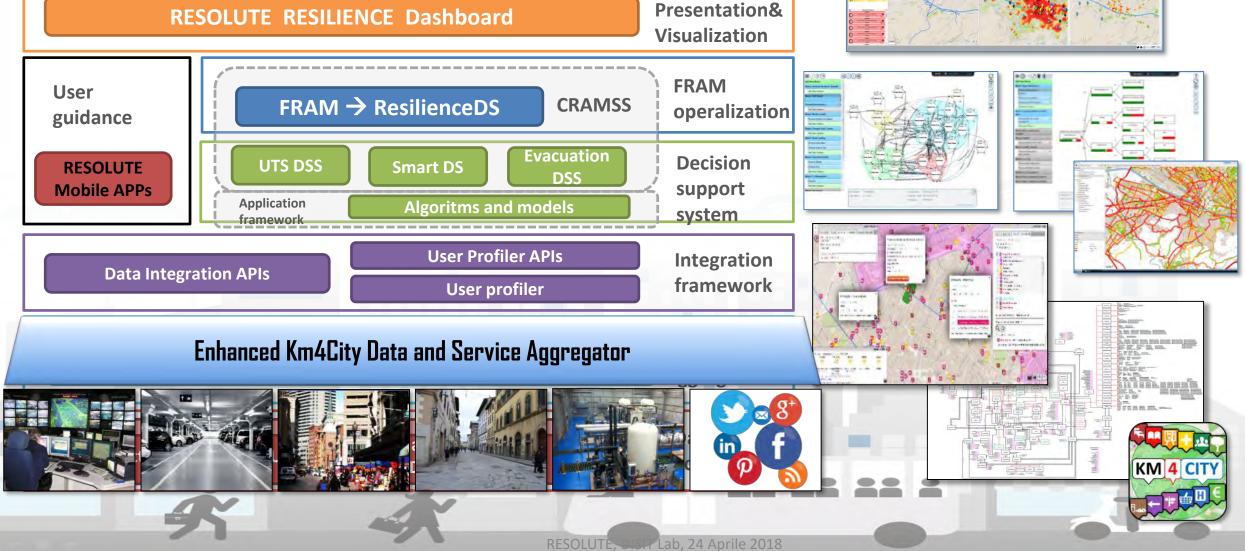


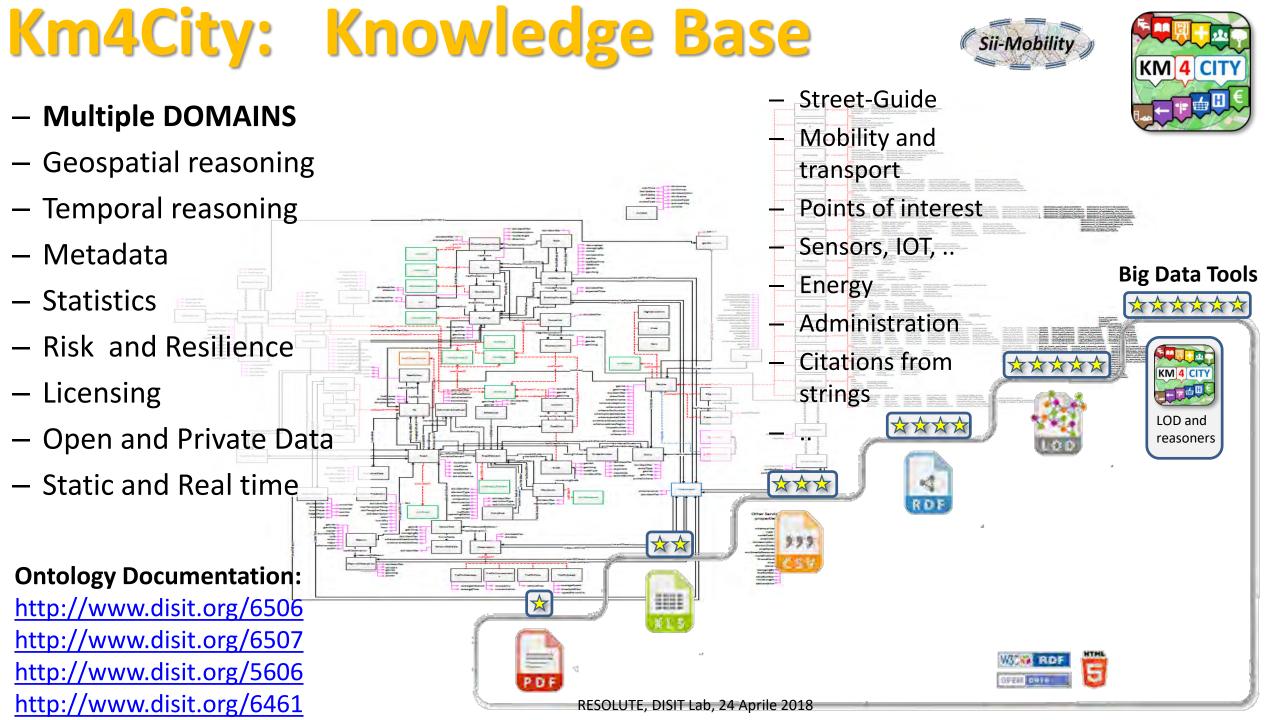


DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB http://www.disit.org









H H - Nascondi Menu **Road Graph (Tuscany region)** Fermate Firenze Comuni in Toscana Ricerca Testuale 132,923 Roads, 389,711 Road Elements Seleziona una provincia: 318,160 Road Nodes, 1,508,207 Street Numbers FIRENZE Info on: points, paths, areas, etc. Seleziona un comune: FIRENZE Services (20 cat, 512 cat.) -Actual Selection **16 Public Transport Operators** COMUNE di FIRENZE 21.280 Bus stops & 1081 bus lines Dynamic/real-time in Tuscany Region

Nascondi Menu

velato

poco nuvoloso

Present data on

**

Previs

KM 4 CITY

schiarite

Tuscany Region January 2018

20°C / 33°C

http://servicemap.km4city.org

Real time bus lines: 144 updates X day X line

1081 Transport Pub Lines: 1-2 up per day, time-path

auta –

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



+

Risultati della ricerca

Services 16858

Map data © OpenStreetMap contributors, CC-BY-SA, Imagen

più di 4000 risultati, attivato clustering





• Restricted Traffic Zone Gates

UNIVERSITÀ Degli studi

FIRENZE

- Passages, payment, alerts,
- Wi-Fi control, RFI control, etc.

INGEGNERIA DELL'INFORMAZIONE

AND INTERNET TECHNOLOGIES LAE

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



- Environmental Sensors:
 - Air, temperature, humidity,
 - water level in rivers
 - Status of underpass and bridges

Risk assessment

- Value of the buildings,
- hydrogeological risk map,
- earthquake risk map, ...
- people distribution and location
- Position of recover places,
- Traffic Zone Gates
 - Passages, alerts,
 - etc.



resolute





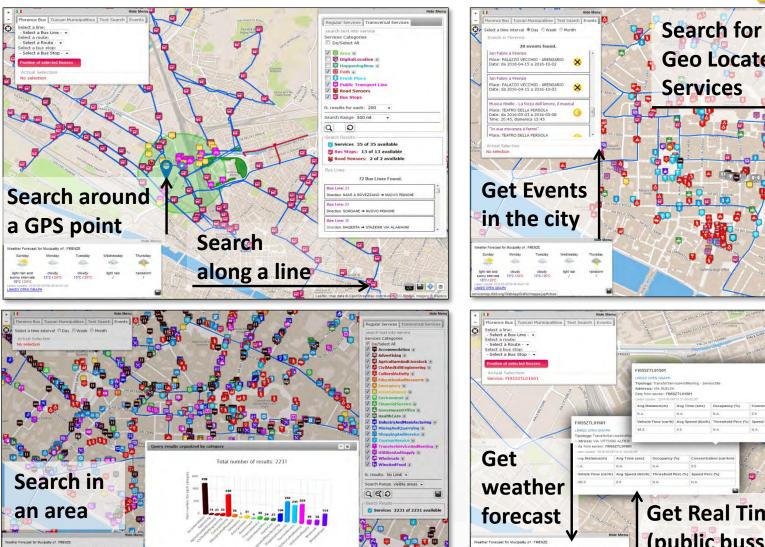


DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB http://www.disit.org





Sii-Mobility



Show All

-

-



egular Services Transversal Service

rvices Categories

De/Select All









- Line e Corse dei mezzi pubblici, orari, tempo reale
- Bus, tramvia, treni, traghetti
- Parcheggi ed aree di sosta
- Ciclabili, preferenziali, ZTL, etc.
- Pannelli a Messaggio Variabile
- Eventi di traffico, ordinanze, etc.
- Pulizia delle strade, raccolta dei rifiuti
- Ricerca: vicino a un punto, lungo linea, in aree,
- Special Routing: modale e multimodale

Regular Services Transversal Services Services Categories De/Select All Accommodation + Advertising + AgricultureAndLivestock + CivilAndEdilEngineering + CulturalActivity + EducationAndResearch + Emergency + Environment + FinancialService + GovernmentOffice + HealthCare + IndustryAndManufacturing + MiningAndQuarrying + ShoppingAndService + U TourismService + TransferServiceAndRenting + 🛛 🔀 UtilitiesAndSupply + Wholesale + WineAndFood + search text into service N, results: 10 Search Range 100 mt Search Area select. 980

www.ilsitodifirenze.i

Leaflet | Map data @ OpenStreetMap contributors, CC-BY-SA, Imagery @ I

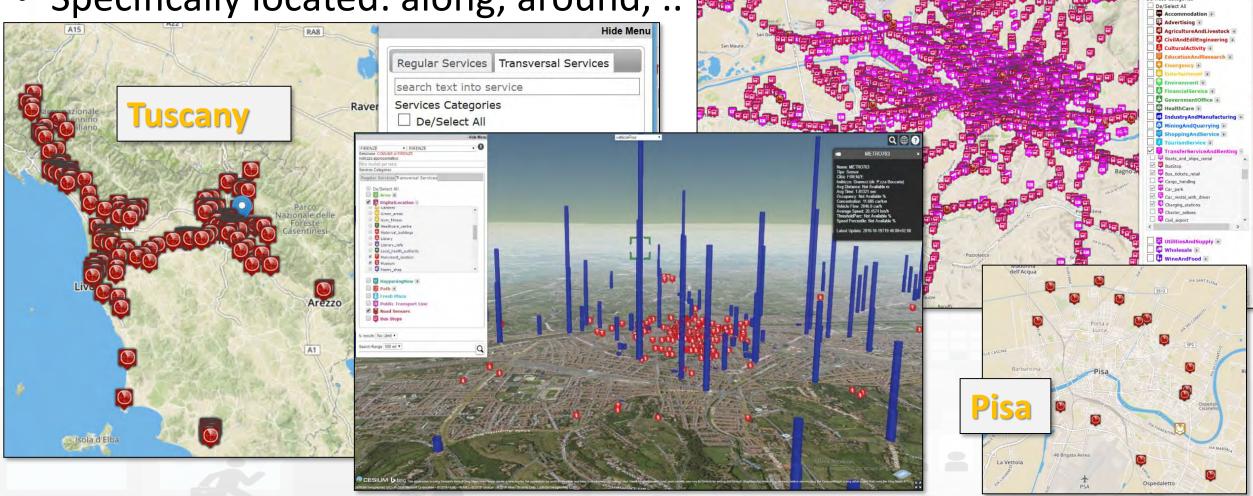
Gherardo



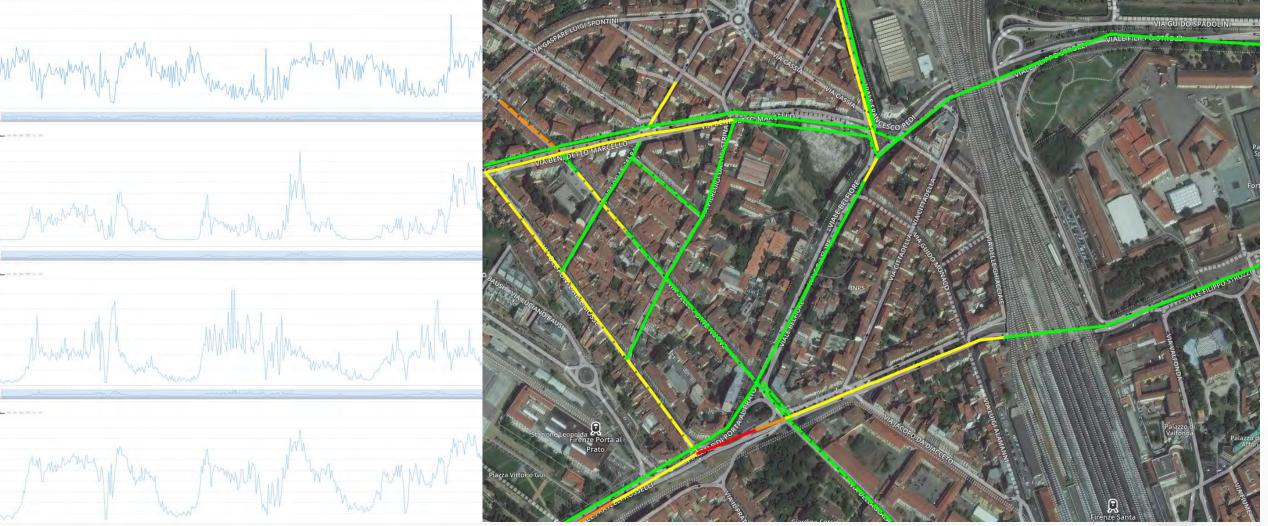


vices Categorie

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













Private Mobility: routing and navigation paths

- To get the path from two points:
 - Shortest for pedestrian
 - -Quietest for pedestrian
 - -Shortest for private vehicles
 - -Multimodal with Public transport
- <u>http://www.disit.org/ServiceMap</u>

| St-Mobility | - Hide Menu |
|--|--|
| | |
| Florence Bus Tuscan Municipalities Text Search Eve | ents |
| Select an agency: | |
| - Select an Agency - 🗸 🗸 | Torreinte MUSDO |
| Select a line; | ha casa |
| - Select a Line - 🗸 | |
| Select a route: | 3 Fortezza da |
| - Select a Route - 🗸 | Basso |
| Select a bus stop: | Of the second se |
| - Select a Stop - 🗸 | Fortezza da Basso Portezza da Basso Portezza da Basso |
| Position of selected Busses | Partie Besso Natie Besso |
| Quick address/location search | |
| exclude POI: | E agente and an and and |
| | La offer R The state |
| | E Marcato Centrale |
| Actual Soloction | Fan or start |
| Actual Selection | |
| Coord: 43.7681,11.2537 | |
| Address: LUNGARNO DEGLI ARCHIBUSIERI, 18, FIRENZE | folimoda Mapa |
| Path from here Path to here | 0001) |
| Sports_facility: Area sportiva Canottieri di Firenze (dist:0,0 | 0001) |
| Tourist_trail: Firenze Card (dist:0,0002) | Sol Contraction of the second se |
| Tourist_trail: Il percorso del Principe - The Prince s way | |
| (dist:0.0000) | CONGAD TO CONTRACT OF THE OWNER |
| Path | BORGO SAN FREDIANO |
| From: PIAZZA DELLA STAZIONE, 42, FIRENZE | SAN FREDIA |
| To: LUNGARNO DEGLI ARCHIBUSIERI, 18, FIRENZE | LUORTO |
| Route via: foot_shortest ~ | Le Contraction of the contractio |
| Search Path | |
| Search Faul | VA ORTO |
| | 1 |
| Found 1 paths (in 5.959s) Length: 1262m arrival time:12:58:12 (00:14:24) | * CAMPUS G S |
| | 1 1 S |
| 1. nd 305m (12:43:33) | Giardino |
| 1. foot 13m (12:43:42) 2. foot 15m (12:43:53) | Walth |
| 3. foot 29m (12:44:14) | Giardino di Boboli Forte di |
| 4. foot 35m (12:44:39) | Giardino di Boboli Forte di Belvedere |
| 5. foot 16m (12:44:50) | Giardino di Boboli Forte di Belvedere |
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| E | EN E AM |





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



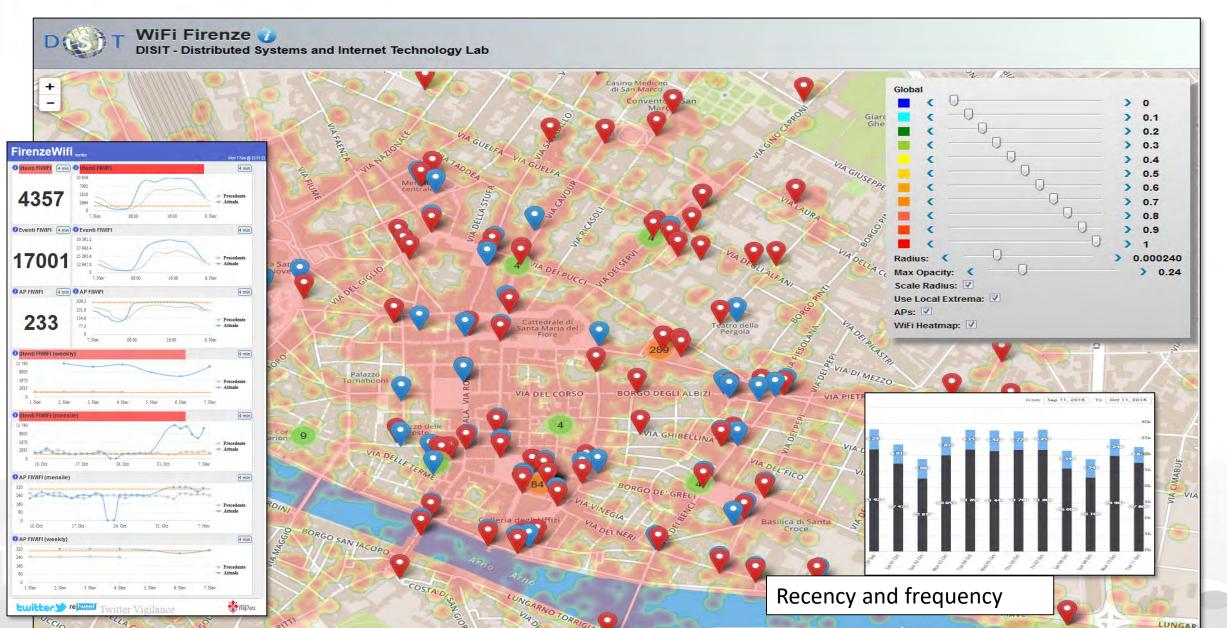


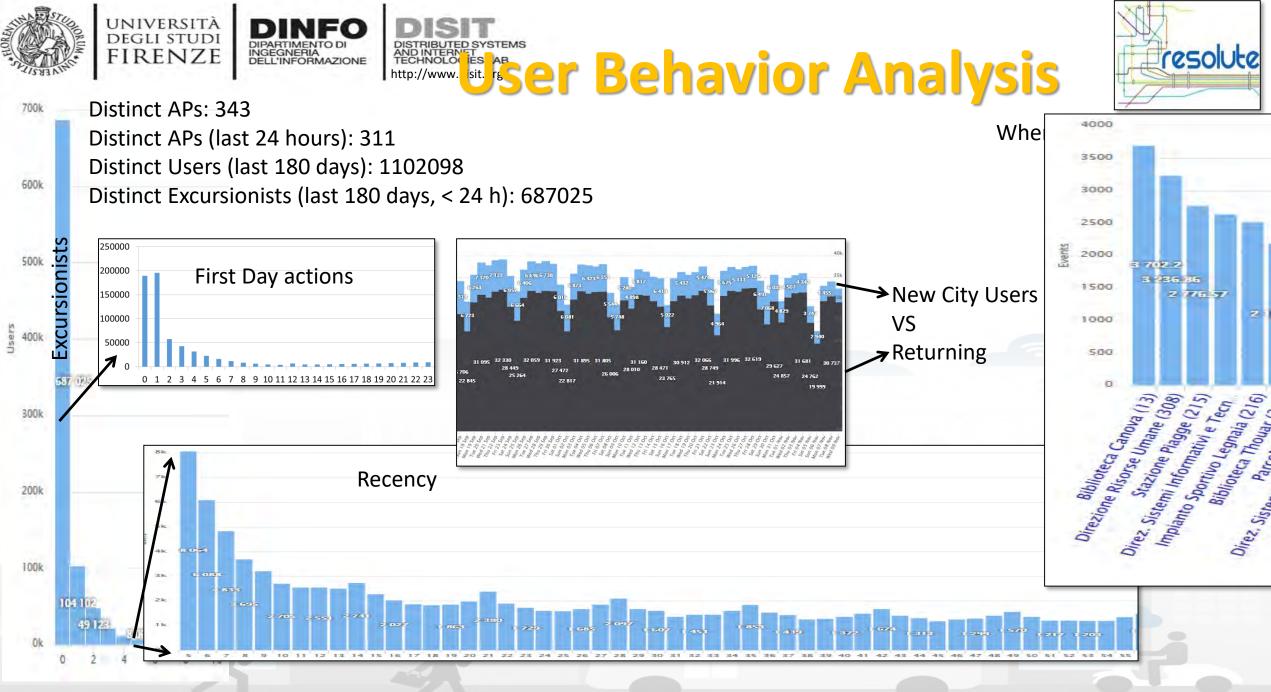


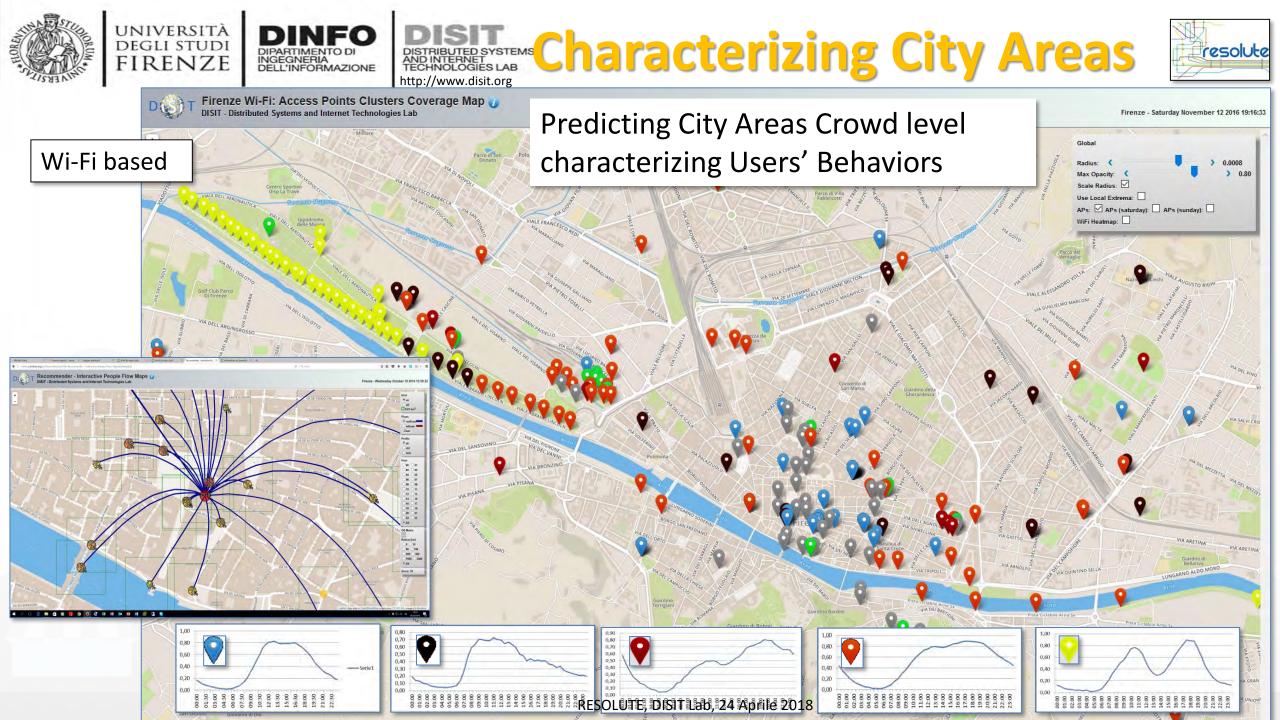


WiFi Monitor tool





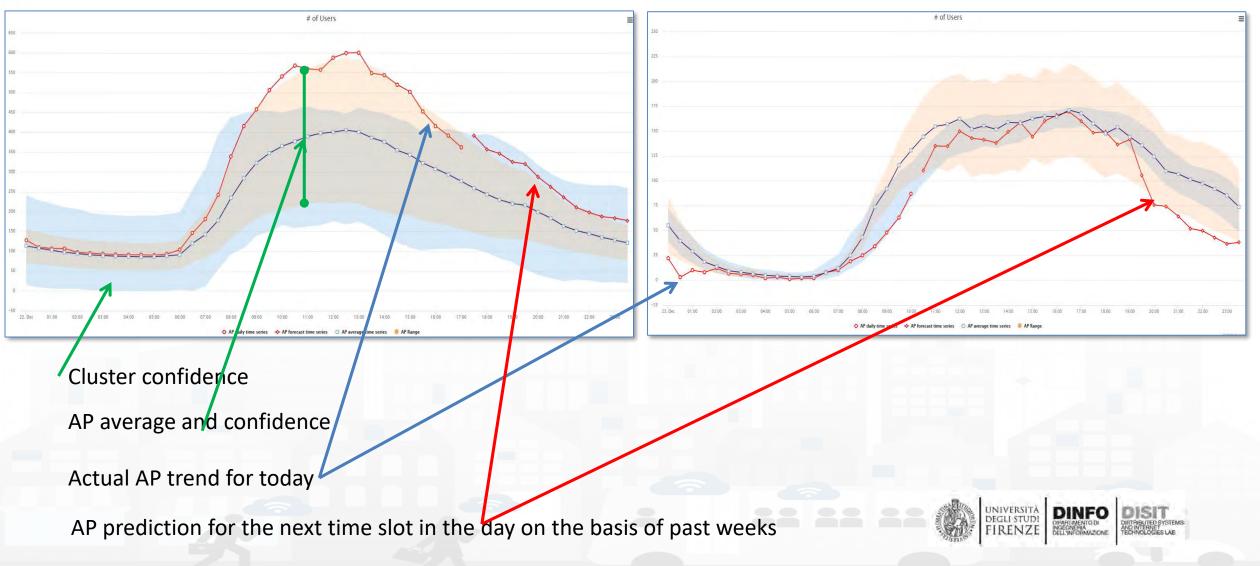




Prediction and identification of anomalies

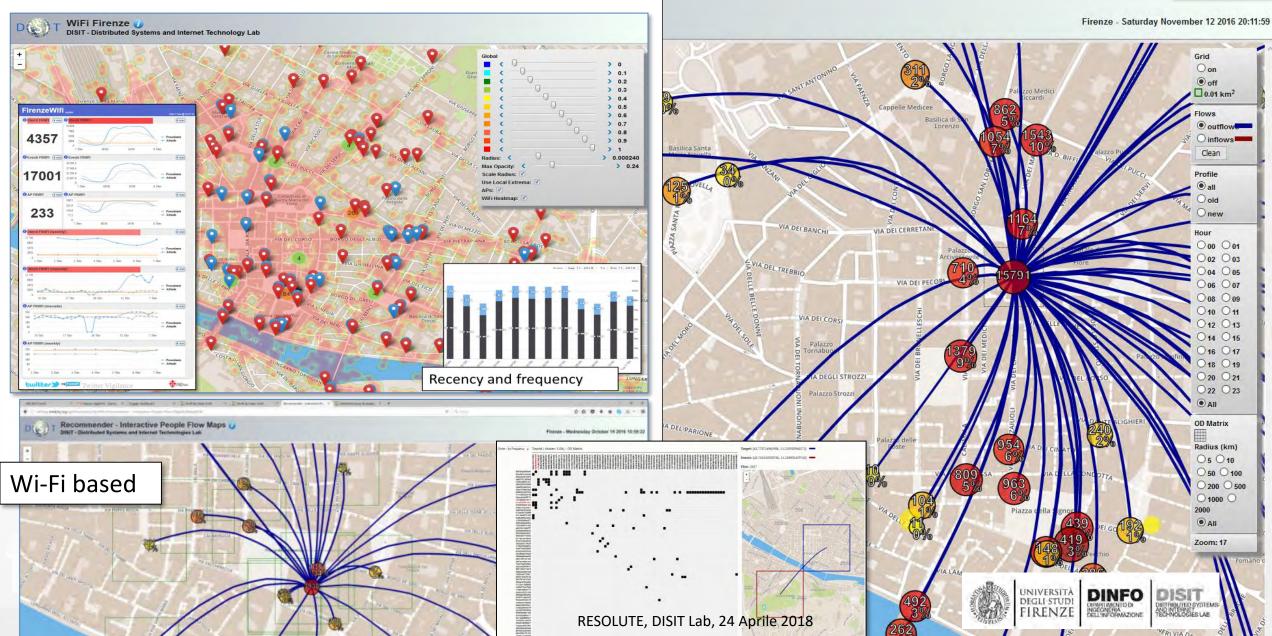


Guessing number of users of Wi-Fi Access Points



Origin Destination Matrix Estimation









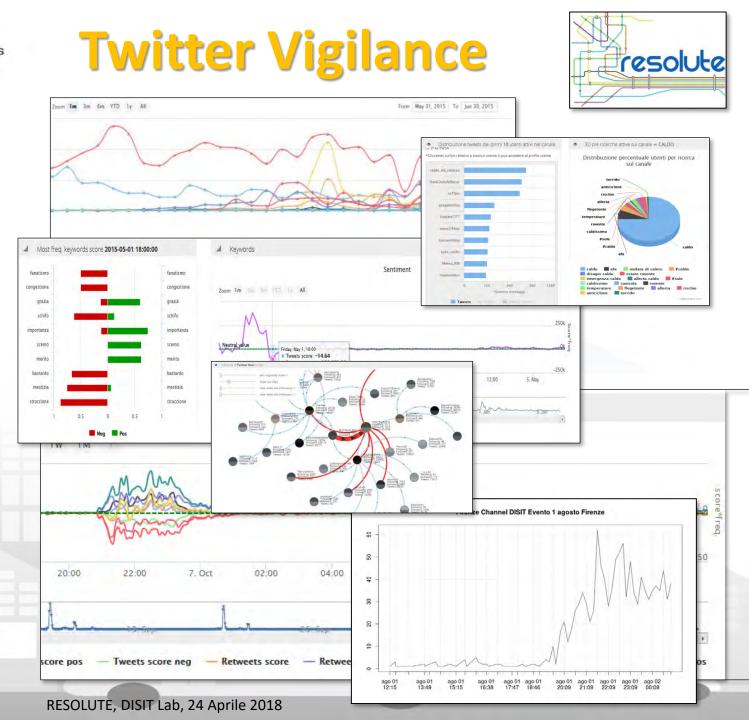




- http://www.disit.org/tv
- http://www.disit.org/rttv
- Citizens as sensors to
 - Assess sentiment on services, events, ...

INGEGNERIA

- Response of consumers wrt...
- Early detection of critical conditions
- Information channel
- Opinion leaders
- Communities
- Formation
- Predicting volume of visitors for tuning the services







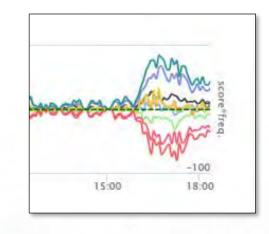
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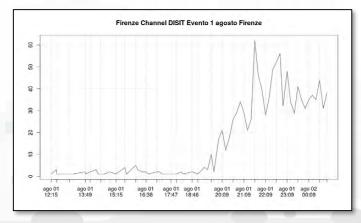


Real Time Twitter Vigilance, Early Warning

| Distributed Data Intelligence and Internet Technologies Lab Distributed Data Intelligence and Technologies Lab University of Florence Tegineering (INIVFO) University of Florence Last crawling: 201 | |
|---|--|
| 2 2 Channel statistics > Channel sentiment analysis | |
| nel active from 2016-06-27 to 2016-11-05 18:30:00 Data processed from 2016-06-28 08:10:00 to 2016-11-05 18:20:00 | LP SA |
| Sentiment trends in channel Firenze | |
| m 1H 3H 6H 12H 1D 1W 1M | |
| eutel velyes_d-man-man fr | and a second |
| 20 18:00 21:00 4. Nev 03:00 06:00 09:00 12:00 15:00 | -100 18:00 21:00 5. Nov 03:00 06:00 09:00 12:00 15:00 18:00 |
| | 20-08 |
| — Tweets score — Tweets score pos — Tweets score neg — Retweets score — Retw | eets score pos - Retweets score neg - T+RT score - T+RT score pos - T+RT score neg Hide All |
| Most Significant Tweets for Sentiment in the period | al Last tweets per channel Firenze |
| @Mario34mg - 2016-11-05 18:20:10 ♥ @alessiarotta FIRENZE Lancio di bottiglie e pietre, cariche della polizia, transenne che volano, fumogeni e petardi https://t.co/553jRiy7aX 0 t → 0 ♥ Sent, Score: 0.0625 | BeettoGigliola - 2016-11-05 18:35:05 💙 RT @augustolilu: Firenze, scontri e feriti al corteo dei manifestanti per il No: cariche e lancio di bottiglie https://t.co /BczStjME9I via |
| | 711 0 🖤 |
| @ReTwitStorm_ita - 2016-11-05 18:20:10 ♥ RT @marcotravaglio: #Leopolda2016. Stasera alle 21.00 sono all'Obihali di Firenze con "Perché No". Vi aspetto PARTECIPA: https://t.co/M3Ffn 37 t 0 ♥ Sent. Score: 0.0113636 | Prato, inchiesta sul pellet: forniture pagate e mai consegnate, pronto maxi esposto dell'Aduc https://L.co /padfJBWa7 via @repubblicait 0 12 0 |

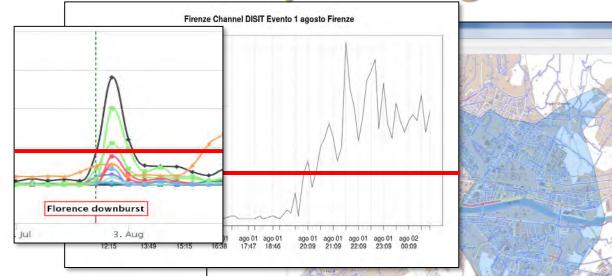
Sentiment Analysis

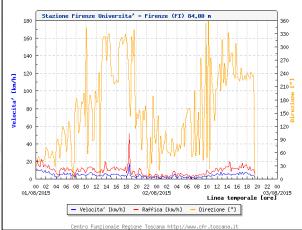


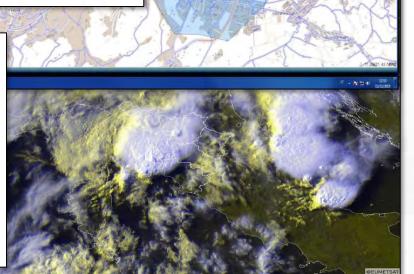






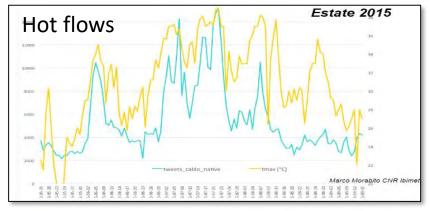






RESOLUTE, DISIT Lab, 24 Aprile 2018

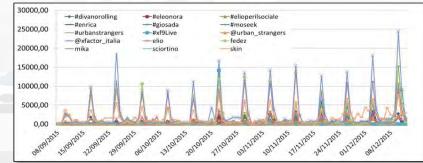
Predictive models



Attendance at long lasting events: EXPO2015



Attendance at recurrent events: TV, footbal



Informing and Monitoring city user via App







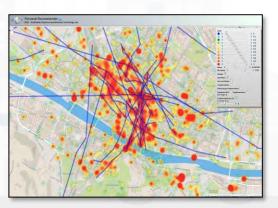


- Personalized menu for Operators
- Providing information and suggestions to citizens
 - Civil Protection Page
 - Twitter Info
 - Geolocalized Info
- Tracking people and operators flows
- Collecting information from citizens
 - Comments
 - Images









Km4City APP

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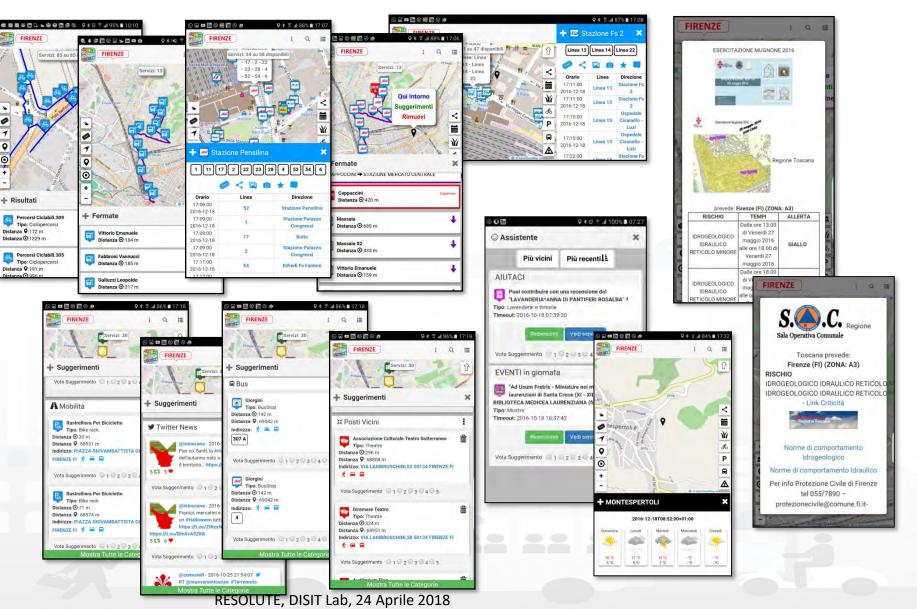
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Mobility

- Paths and stops, time
- Parching + prediction
- Ticketing
- Flow + prediction
- Navigation
- Connection with devices
- XXX Sharing
- **Personal Assistant**
 - Info, Engagement
 - Help, Civil protection
- Suggestions:
 - Personalized and adaptive: banned e typed per city user.
 - POI, Twitter, Events,
 - Weather forecast,
 - **Civil Protection**



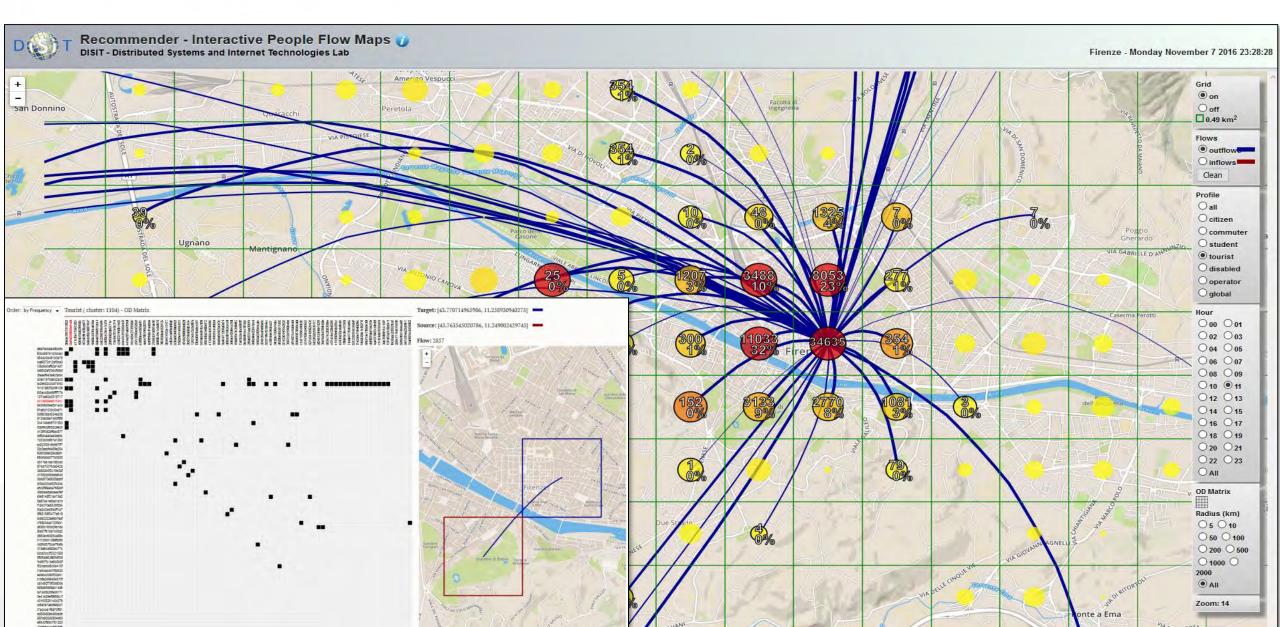






OD Matrix scalabile





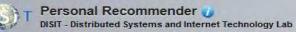


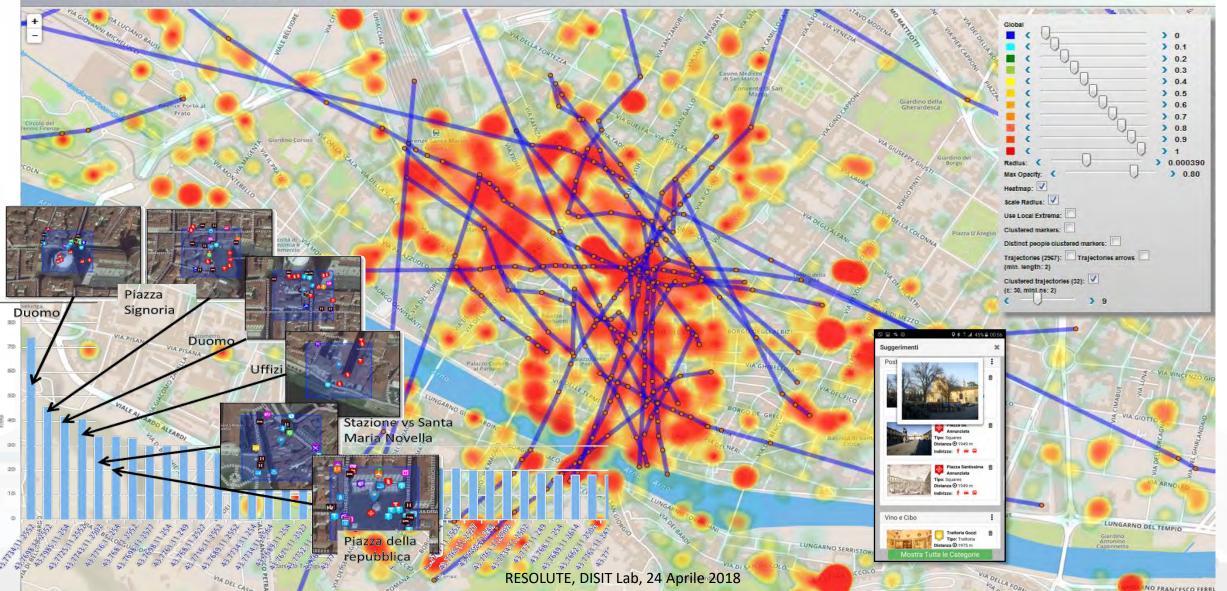




User Behavior Analyzer







UNIN FIR User influencing, engaging, monitoring &

Follow Up



4 min 1 Engagemen ... 4 min

ServiceMap.

Km4City status

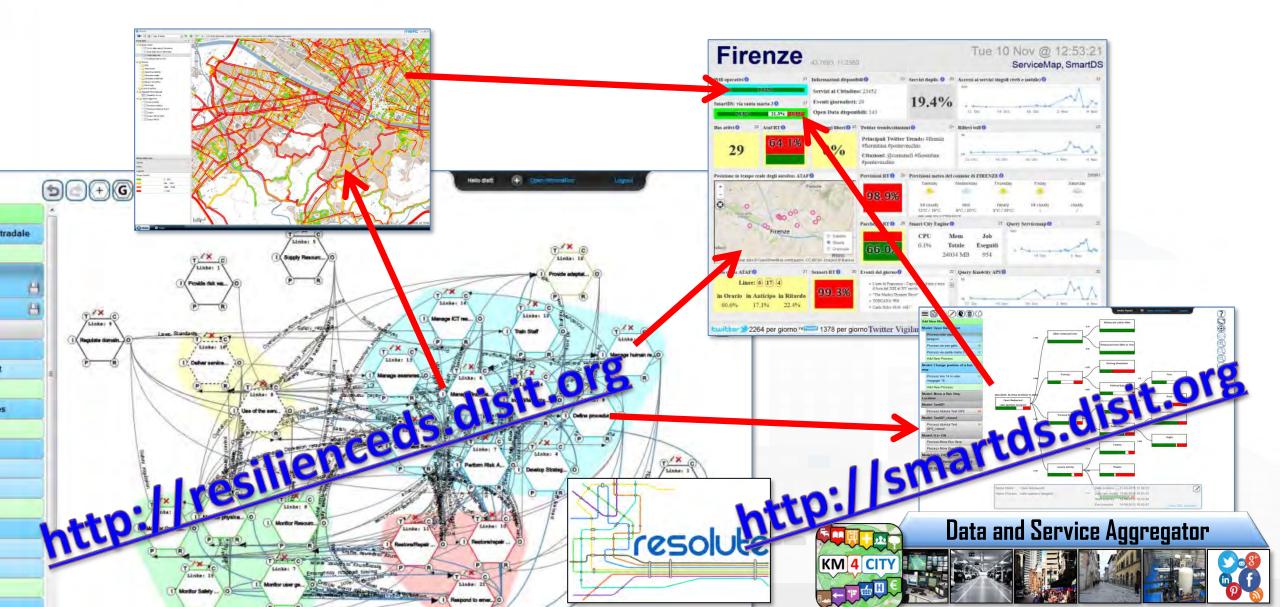
City & City Operators Strategy Editor

| Strategy Editor | Den managementations | 1 | | | | | | | Precedente Attuale | 2078 Engagement Sent | |
|--|---|------------------|--------------|--------------|--|---------------------|---|--|-----------------------|---------------------------|--|
| | | Rule name | Туре | #sent | #viewed | #viewed on #sent | Description | O Engagment Created (from Stats) 706 529.5 333 | | DEngagemen 4 min | |
| | | daily_event_de | ENGAGEMENT | 1 (0%) | 0 (0%) | 0% | Suggest (in german) an event currently on in | 176.5 | Precedente Attuale | 446 Engagement Created | |
| | | daily event en | ENGAGEMENT | 1720 (2.12%) | 70 (7.1%) | 4.07% | Suggest (in english) an event currently on in | 21:00 21:00 Engagement Viewed (4 hours) | 4 min | DEngagemen (4 min) | |
| | | - commuter | 5 (0.29%) | 0 (0%) | 0 (0%) | | 18 | | | | |
| © O 🗎 © Assi | ♀ < ⊗ * ⊿i 100% ∎ 07:27. Ж | | - student | 14 (0.81%) | 0 (0%) | 0 (0%) | | | Precedente Attuale | 17 | |
| | iù recentil 1 | | - tourist | 1462 (85%) | 25 (35.71%) | 25 (1.71%) | | 0 21:00 | | Engagement Viewed | |
| AIUT | wćensliane de) ANTIFERI ROSALBA' ? | | - citizen | | | 19 min | | | | | |
| Tipo: L Tipo: L Tipo: L Tipo: L Tipo: L 657920 G G G G G G G G G G G G G G G G G G G | | | - operator | 0 (0%) | You | - | Precedente | | | | |
| FIRENZE Navigazione Vota Sug p 1 ż | 3 🖏 | | - disabled | 0 (0%) | The | e Road cle | eaning is this night | | | 24. Oct | |
| EVENT rnata rnata ris - Miniatu | EVENTI in giornata | | - all | 119 (6.92%) | The | e waste ir | n S.Andreas Road is full | | | 29 min | |
| BILLIOTECA M & LAURENZ Tipe: Mostre VI 2016-11 0 197-42 | | daily_event_es | ENGAGEMENT | 6 (0.01%) | Engage | | | | 1 | <u></u> | |
| 20 9 11 11 11 11 11 11 11 11 11 11 11 11 1 | | daily_event_fr | ENGAGEMENT | 6 (0.01%) | Provide a comment, a score, etc Stimulate / recommend | | | | | Precedente Attuale | |
| Vota Suggermenta 22 5 Vota Suggermenta 1 2 5 Vota Suggermenta 1 5 | daily_event_it | ENGAGEMENT | 5459 (6.73%) | 24. Oct | | | | | | | |
| | fill this survey! survey about turist came back home Timeout: 2016-10-18 18:00.04 | parking_en | ASSISTANCE | 141 (0.17%) | | | e city, services your may b | e interested, | | (59 min | |
| Risultati X Arena Esterno Notte Poggetto Tipo: Cinema | Sentiengia | parking_es | ASSISTANCE | 3 (0%) | etc. | | | | | - Precedente | |
| Istanza ©.351 m | Vota Suggerimento D 7 2 2 3 4 5 | parking_it | ASSISTANCE | 187 (0.23%) | Provide B | | | | ct 22 | Oct 23. Oct | |
| Tipe: Teatro | Any Mobile | shoot_a_photo_de | ENGAGEMENT | 68 (0.08%) | | - | ave parked here you we ca | - | | (59 min) | |
| | and Web | | | | | | you to leave the car out o e used to by a bus ticket | t the city, this | | Precedente | |
| | Арр | | | | | | | 0 17. Oct 18. Oct 19. Oct 20. Oct | 21. Oct 22 | Oct 23. Oct | |

City Resilience and, DSS, Decision Support Systems



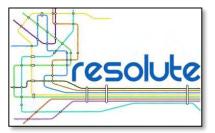
Assessing / Controlling city resilience

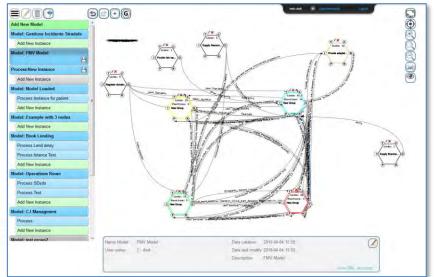


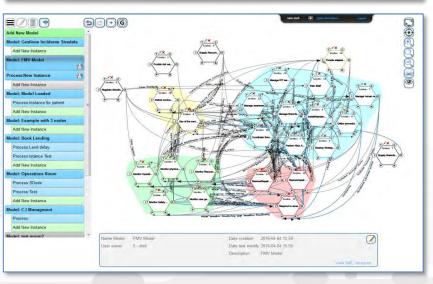
ResilienceDS tool

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

http://resilienceds.disit.org





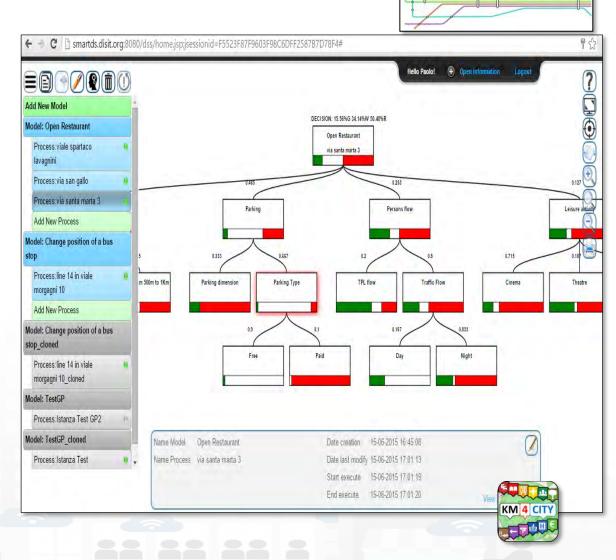








- Smart Decision Support System based on System Thinking plus
- Actions to city reaction, resilience, smartness..
- Enforcing
- Mathematical model for propagation of decision confidence..
- Collaborative work...,
- Processes connected to city data: DB, RDF Store, Twitter, etc.
- Production of alerts/alarms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



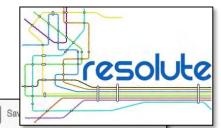
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Risk Assessment



Aerial with labels

Public_hospital

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

2

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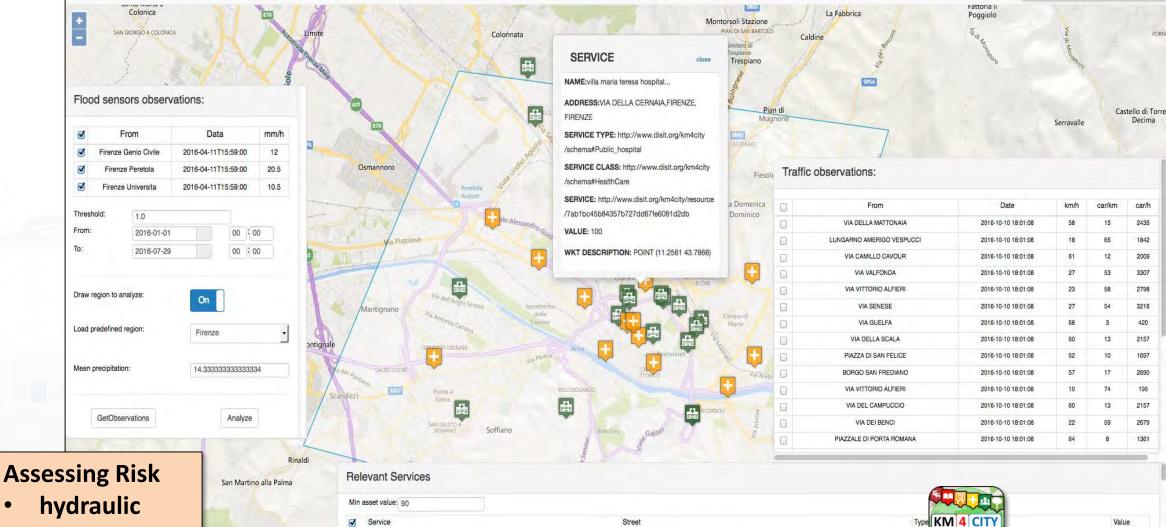
Via di Me

Mosciano

villa delle terme case di cura

villa dei pini srl

Poggio Secco



VIALE MAZZINI GIUSEPPE, FIRENZE

VIA FOSCOLO UGO, FIRENZE

VIA INCONTRI, FIRENZE

Seismic .

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RESOLUTE Dashboard 4XHD v5





Acknowledgement

- Thanks to the European Commission for founding. All slides reporting logo of **RESOLUTE H2020** are representing tools and research founded by European Commission for the RESOLUTE project. **RESOLUTE** has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement n° 653460).
- Thanks to the European Commission for founding. All slides reporting logo of **REPLICATE H2020** are representing tools and research founded by European Commission for the REPLICATE project. **REPLICATE** has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement n° 691735).
- Thanks to the MIUR for co-fouding and to the University of Florence and companies involved. All slides reporting logo of **Sii-Mobility** are representing tools and research founded by MIUR for the Sii-Mobility SCN MIUR project.
- SELEC Thanks to the European Commission for founding. All slides reporting logo of Snap4City http://www.snap4city.org of Select4Cities H2020 are representing tools and research founded by European Commission for the Select4Cities project. Select4Cities has received funding from **Snap4City** the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement n° 688196)
- **Km4City** is an open technology exploited by those projects and line of research of DISIT Lab. Some of the innovative solutions and research issues developed into the above mentioned projects are also compliant and contributing to the Km4City approach and thus are contributing to the open Km4City model of DISIT lab.



resolute

REPLICATE



Horizon 2020

European Union Funding

for Research & Innovation



Horizon 2020 **European Union Funding** for Research & Innovation

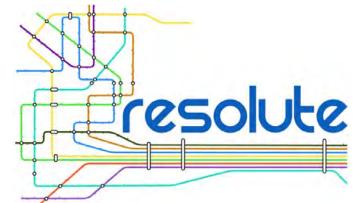


for Cities









Il Progetto RESOLUTE:

http://www.disit.org/km4city Paolo Nesi, paolo.nesi@unifi.it

http://www.resolute-eu.org



