



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

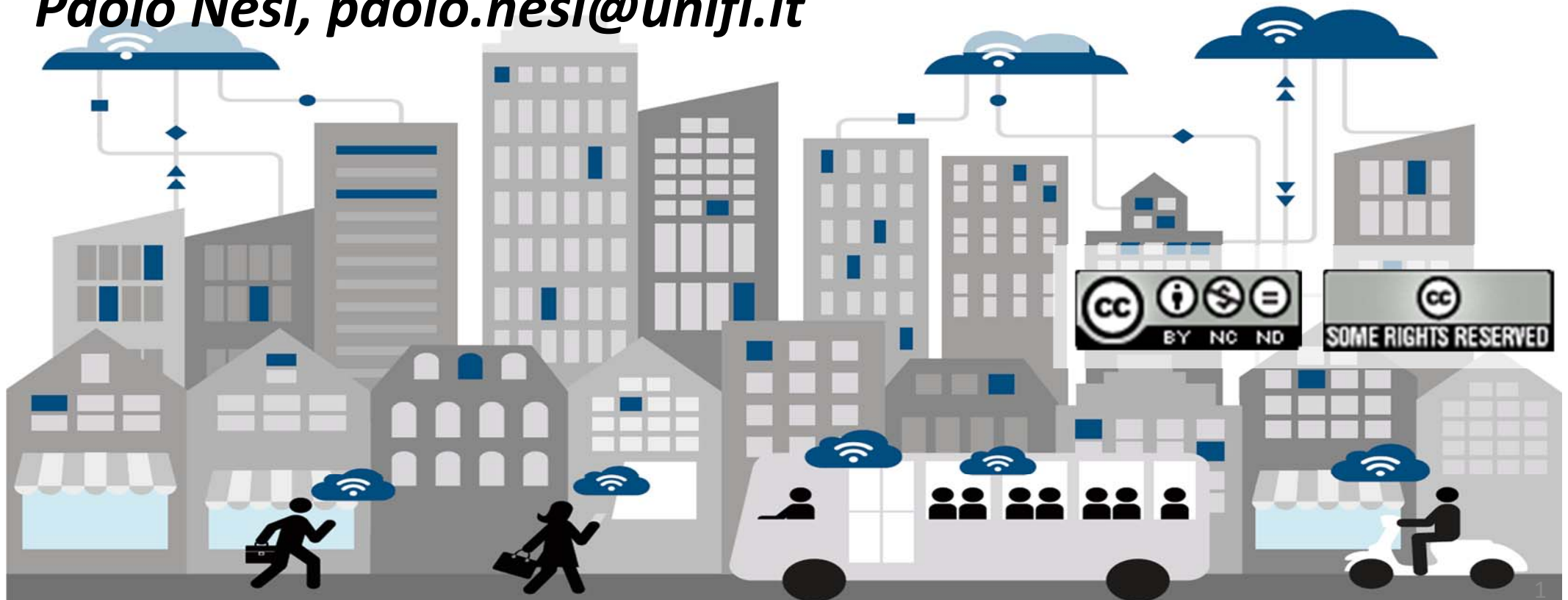


Training Km4City e Meeting Sii-Mobility



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

Paolo Nesi, paolo.nesi@unifi.it





UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

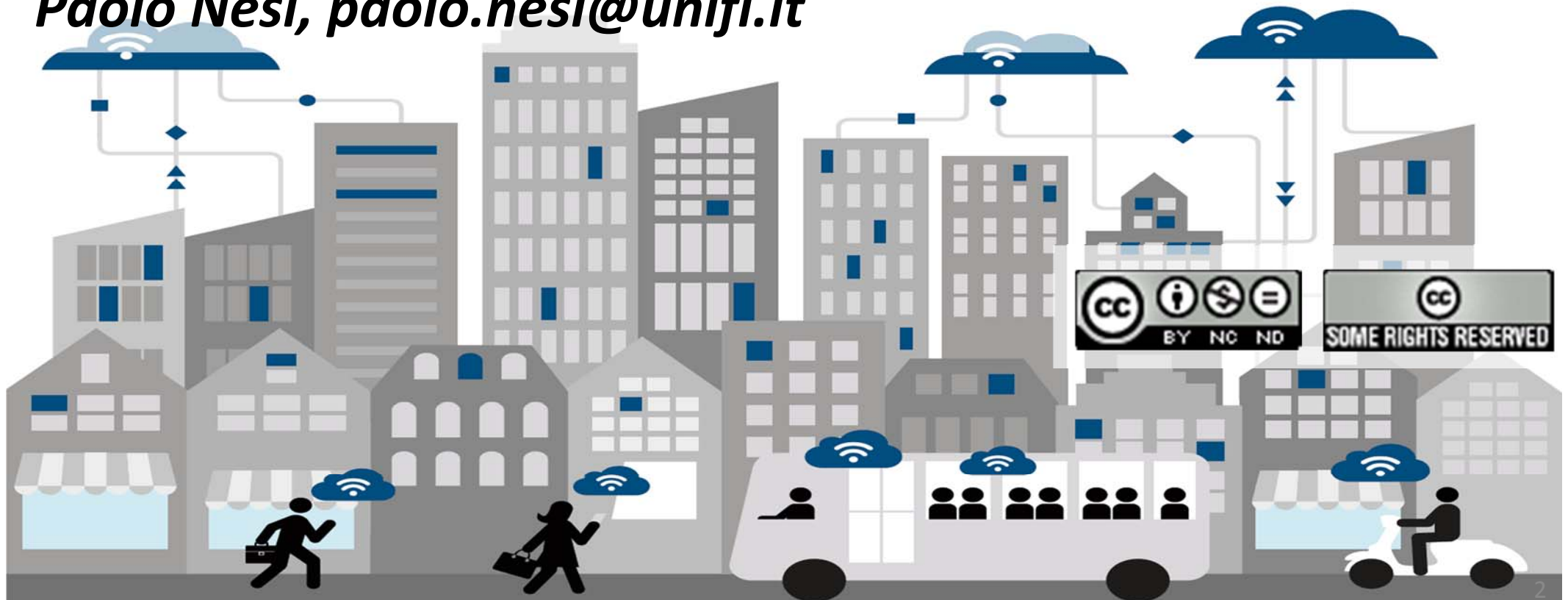
DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB



Km4City Overview

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

Paolo Nesi, paolo.nesi@unifi.it





UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

<http://www.disit.org>



<http://www.km4city.org>



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

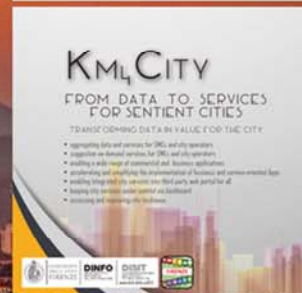
DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB



GET IT ON
Google play

Download on the
App Store

Download from
Windows Phone Store



- | | | | | | | | |
|-------------------|-----------------------------|--------------------------|------------------------|-----------------------------|---------------------------|-------------------|------------------------|
| Service Map | Bus Stops | Real Time Busses (Embed) | Traffic Sensors | Services in Tuscany | Services in Florence | Km4City App Video | Km4City Video 2015 |
| Services in Pisa | Green Areas | Bus Lines | Hotels | Florence Downtown | Events in Florence | DISIT Lab | Km4City Slides |
| Dashboard | Dashboard Mugnone2016 | Linked Open Graph, LOD | SPARQL & Data Licenses | Resilience Decision Support | Smart Decision Support | Km4City Info Page | Km4City Projects |
| Recommendations | Monitoring City Users | City Users Heat Map | Tourists Heat Map | Monitoring Wi-Fi Users | Monitoring Wi-Fi Coverage | Km4City Ontology | Km4City Smart City API |
| Twitter Vigilance | Real Time Twitter Vigilance | Twitter Search | | | | Km4City WebApp | PRIVATE |



UNIVERSITÀ
DEGLI STUDI
FIRENZE

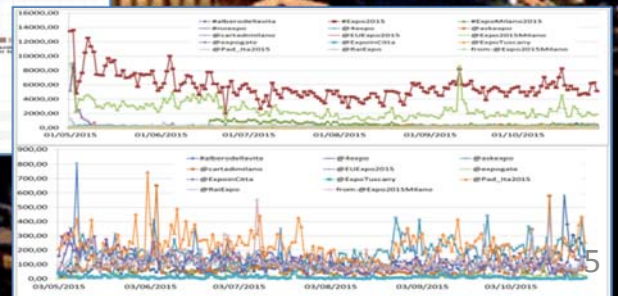
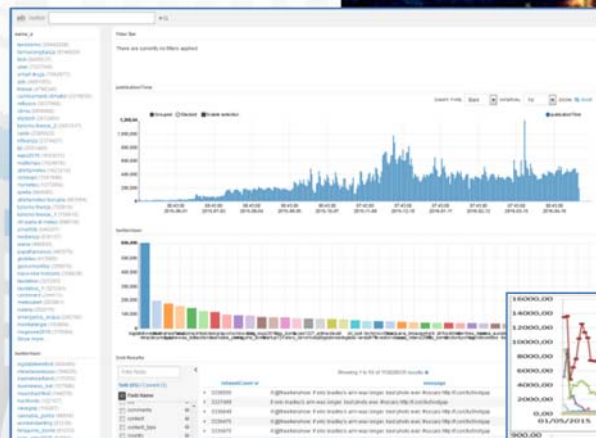
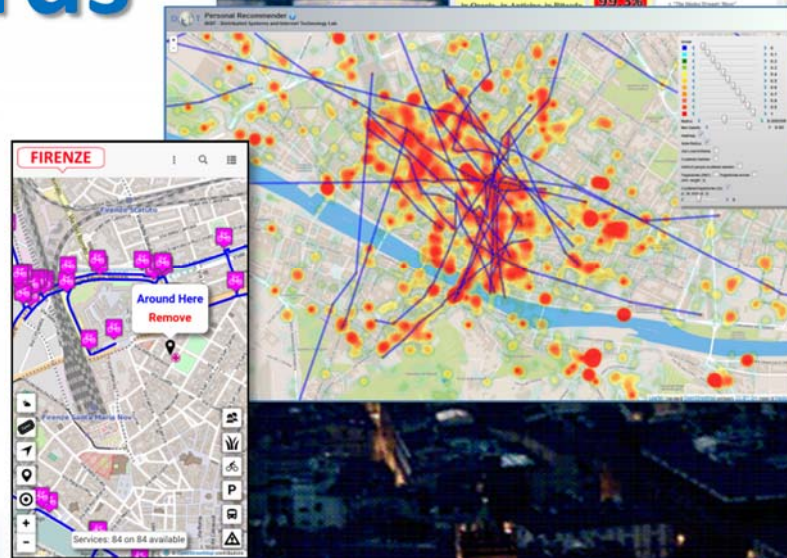
DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

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



keep city under control via personalized dashboards

- monitoring services' status of city operators
 - <http://dashboard.km4city.org>
- monitoring and understanding the city users behaviour
 - Recommender and User Behavior Analyzer
 - Origin Destination matrix tools
- collecting moods, contributions and data from the city users
 - Contribution from Mobile App Km4City Firenze dove Cosa
- monitoring social media for city services and events, event predictions
 - <http://www.disit.org/tv> , <http://tvsolr.disit.org>



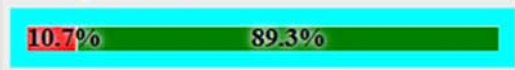
Firenze

43.7693, 11.2560

Tue 10 Nov @ 12:53:21

ServiceMap, SmartDS

Wifi operativi 21



SmartDS: via santa marta 3 21



Informazioni disponibili 21

Servizi al Cittadino: 23452

Eventi giornalieri: 29

Open Data disponibili: 143

Servizi duplic. 20

19.4%

Accessi ai servizi singoli (web e mobile) 22



Bus attivi 20

29

Ataf RT 20

64.1%

Parcheggi liberi 20

0%

Twitter trends/citazioni 21

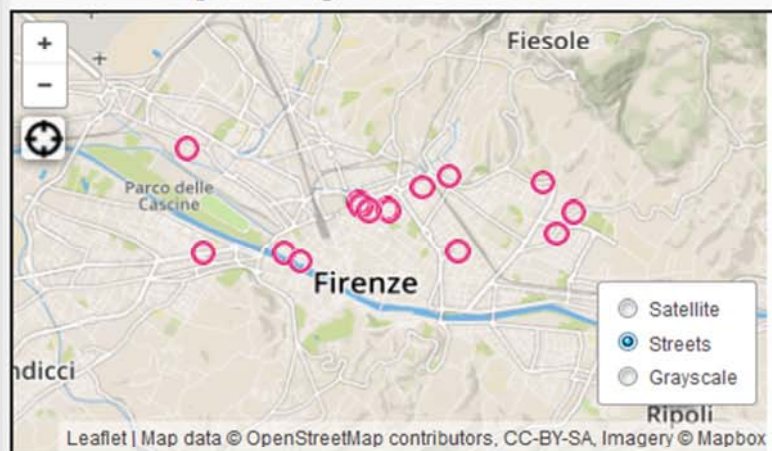
Principali Twitter Trends: #firenze #fiorentina #pontevecchio

Citazioni: @comunefi #fiorentina #pontevecchio

Rilievi wifi 22



Posizione in tempo reale degli autobus ATAF 21



Previsioni RT 20

98.9%

Previsioni meteo del comune di FIRENZE 299961



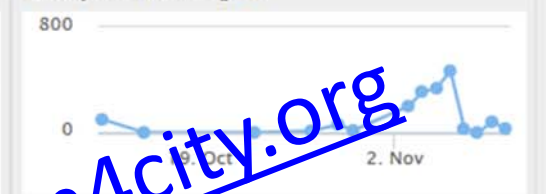
Parcheggi RT 20

66.0%

Smart City Engine 21

CPU	Mem	Job
0.1%	Totale	Eseguiti
	24034 MB	954

Query Servicemap 22



Stato corse ATAF 21

Linee: **6** **17** **4**

in Orario	in Anticipo	in Ritardo
60.6%	17.1%	22.4%

Sensori RT 20

99.3%

Eventi del giorno 22

- L'arte di Francesco - Capolavori d'arte e terre d'Asia dal XIII al XV secolo
- "The Medici Dynasty Show"
- TOSCANA '900
- Carlo Dolce 1616-1687

Query Km4city API 22



<http://dashboard.km4city.org>



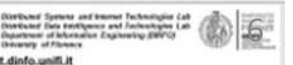
2264 per giorno



1378 per giorno

Twitter Vigilance

Training Km4City - Smart City - Smarting Sii-Mobility, Luglio 2016





UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
NELL'INFORMAZIONE

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

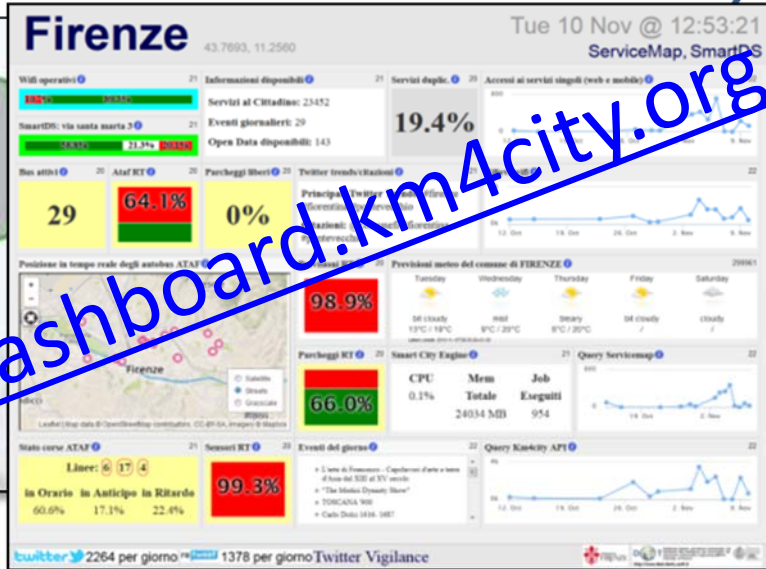
Dashboards



**Transport
systems,
Mobility, Parking**



<http://dashboard.km4city.org>



**Shops,
services,
operators**



**Sensors, IOT
Cameras, ..**



**Social Media,
WiFi, Network**



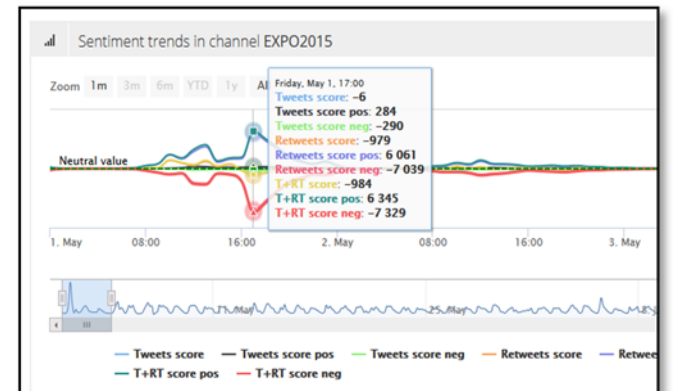
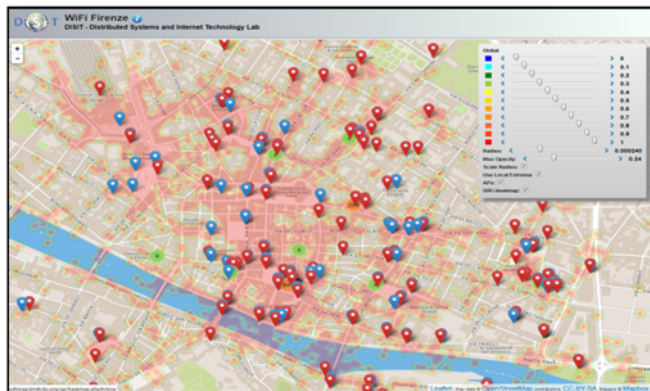
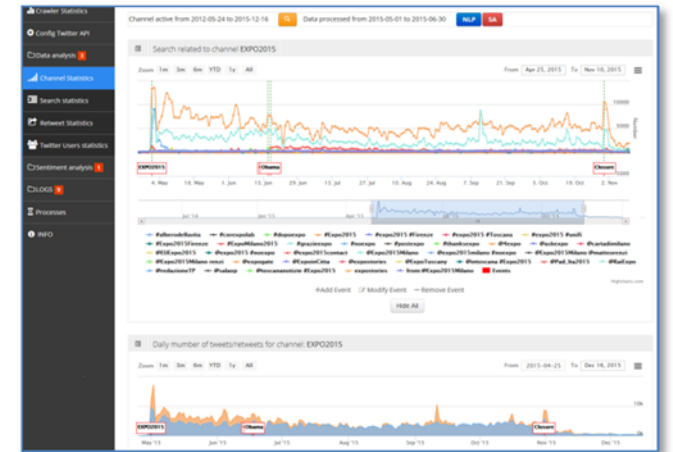
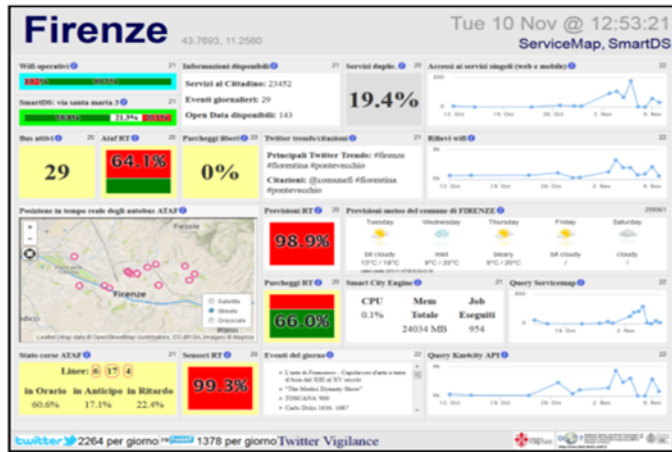
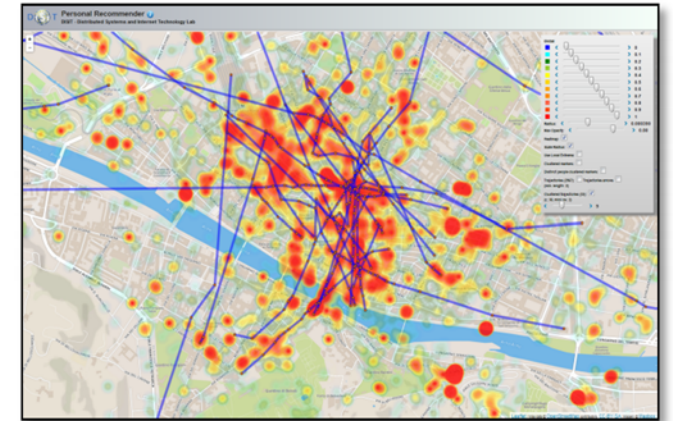
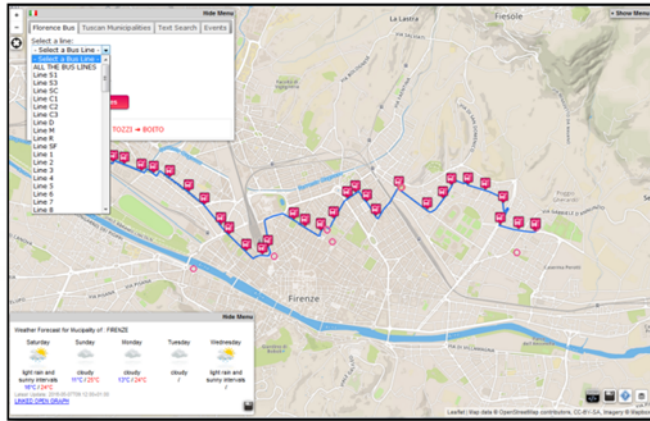
**Public services,
Govern, Events**



**Environment,
Water, energy**



Smart City Dashboard



Mobile APPLICATION

Geo Located Services

Get Suggestions on demand

The mobile application interface includes a search bar with the text "ponte", a list of search results for "Ponte Vecchio", a "Suggerimenti" (Suggestions) section with images of buildings, and a "Vino e Cibo" (Food and Wine) section listing "Trattoria Gozzi". A category list on the left includes: 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 Services, Tourism Service, Transfer Service And Transport, and Utilities And Supply.

WEB APPLICATION

<http://www.km4city.org>

The web application interface shows a map of Florence with a search bar containing "TOSCANA" and a list of services including: Fermata bus, Pizzeria, Teatro, Fermate del tram, Guardia medica, Ciclopercorsi, Supermercato, Impianti sportivi, Banca, Carabinieri, Piscina, Pronto soccorso, Cinema, Linea del Tram, Parcheggio auto, Rastrelliera per biciclette, and Rivendita biglietti autobus.

DISPONIBILE SU
 Google play

Scarica da
 App Store

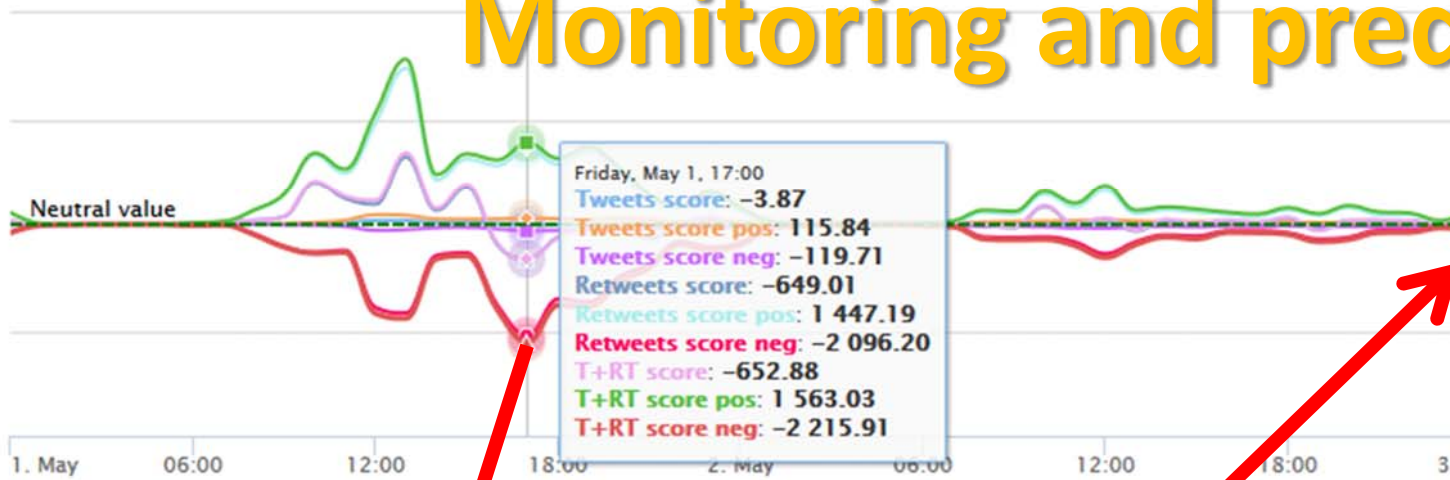
Scarica da
 Windows Store



Twitter Vigilance, Sentiment Analysis, Monitoring and prediction

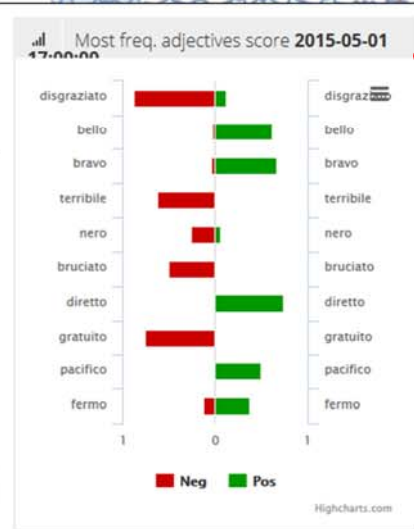
Zoom 1m 3m 6m YTD 1y All

From May 1, 2015 To May 3, 2015



SERENA SÌ
 @SerenaSignorie

Fermate queste bestie. Animali, incivili, ignoranti, mostri. Fateschifo. Mi vergogno di essere italiana. #noexpo #Expo2015



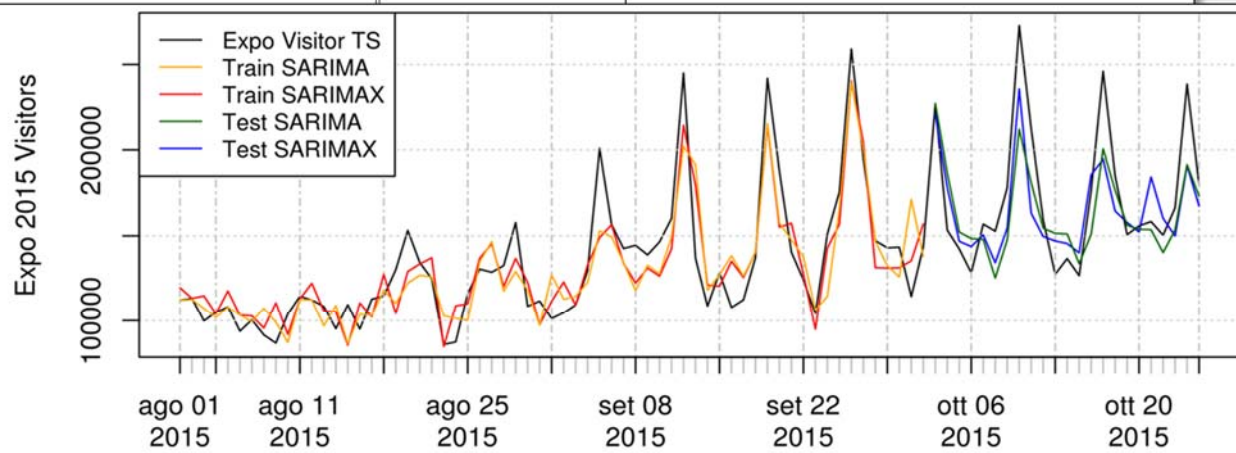
Example tweets

Results 1 - 1 of 1:

message	Fermate queste bestie. Animali, incivili, ignoranti, mostri. Fateschifo. Mi vergogno di essere italiana. #noexpo #Expo2015 http://t.co/PUo3kR...
twitterUser	SerenaSignorie
publicationTime	2015-05-01 18:29:06
locationUser	
retweet	0
twitterId	
originalT	
hashtags	
mentions	
links	
retweetC	
Total Ser	
Score	

Results 1 - 11:

message	Non sei d'accordo quindi macchine di gente che v... Schifo totale #Expo2015
twitterUser	FabrizioColella
publicationTime	2015-05-01 18:53:09
locationUser	In Billico
retweet	0



Training: 01-08-2015/02-10-2015 63 DD
 Test period: 03-10-2015/25-10-2015 22 DD

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



UNIVERSITÀ
DEGLI STUDI
FIRENZE

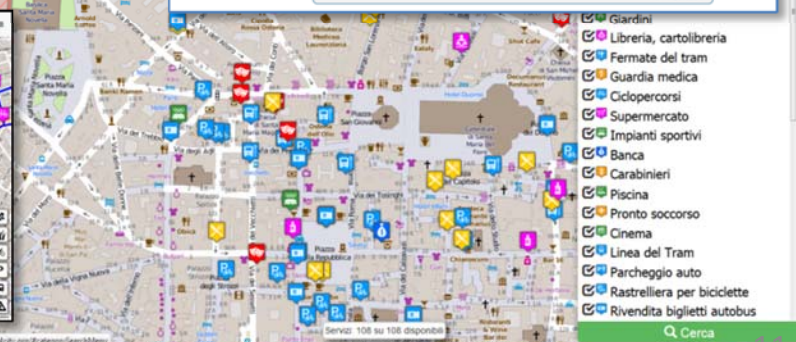
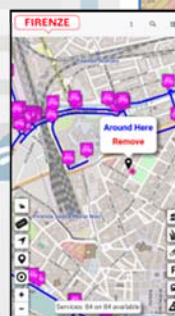
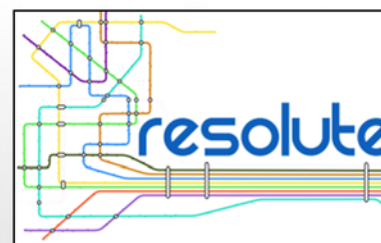
DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

<http://www.fisf.org>

Improve city resilience, reducing risks and decision support

- assessing city resilience level
 - Resilience Decision Support, <http://resilienceds.km4city.org>
 - Smart decision support system, <http://smartds.km4city.org>
- improving city resilience, providing objective hints
 - <http://www.resolute-eu.org> H2020
- improving city users awareness with personal city assistants and participatory tools
 - Dashboard: <http://dashboard.km4city.org>
 - Km4City Web App <http://www.km4city.org>
 - Km4City Mobile App: <http://www.km4city.org/app>



Transport systems
Mobility, parking



Public Services
Govern, events,



Sensors, IOT
Cameras, ..



Environment,
Water, energy



Shops, services,
operators



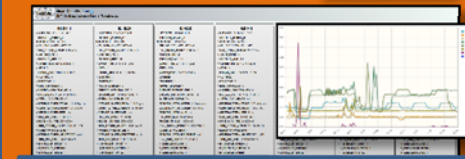
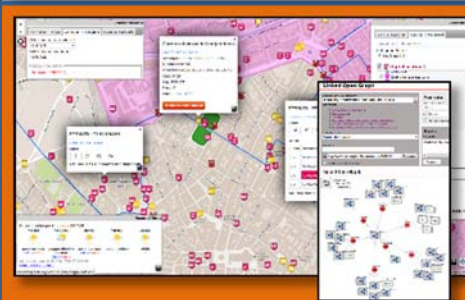
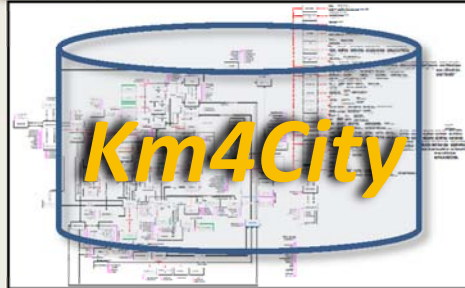
Social Media
WiFi, network



Static, Slow and Real Time data flows

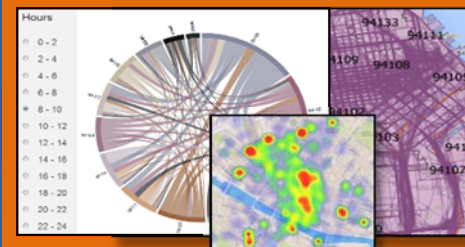
DISCES -- Distributed and parallel architecture on Cloud

Km4City Smart City Engine



User Profiling and Suggestions on Demand

Flow and Origin Destination Matrix
<http://www.disit.org/odsf>



Km4City Tools for Developers

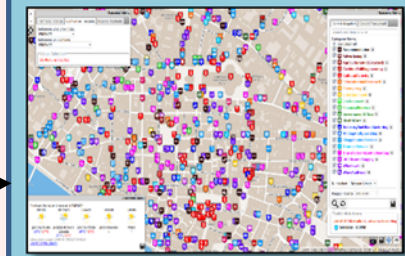
Km4City Smart City API

Tools for City Operators and Decision Makers

Smart City Dashboard <http://dashboard.km4city.org/>
Smart Decision Support <http://Smartds.km4city.org>



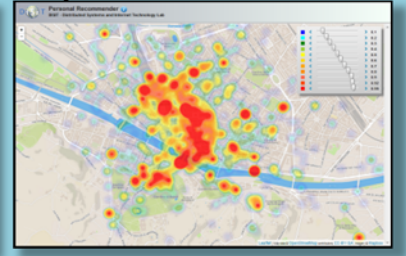
Service map browser
<http://servicemap.km4city.org>



Twitter Vigilance
<http://www.disit.org/tv>

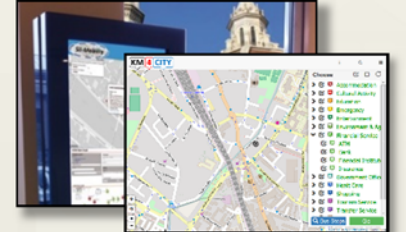


Collective User behavior Analyzer



Tools for Final Users

Mobile e Web Apps <http://www.km4city.org>



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

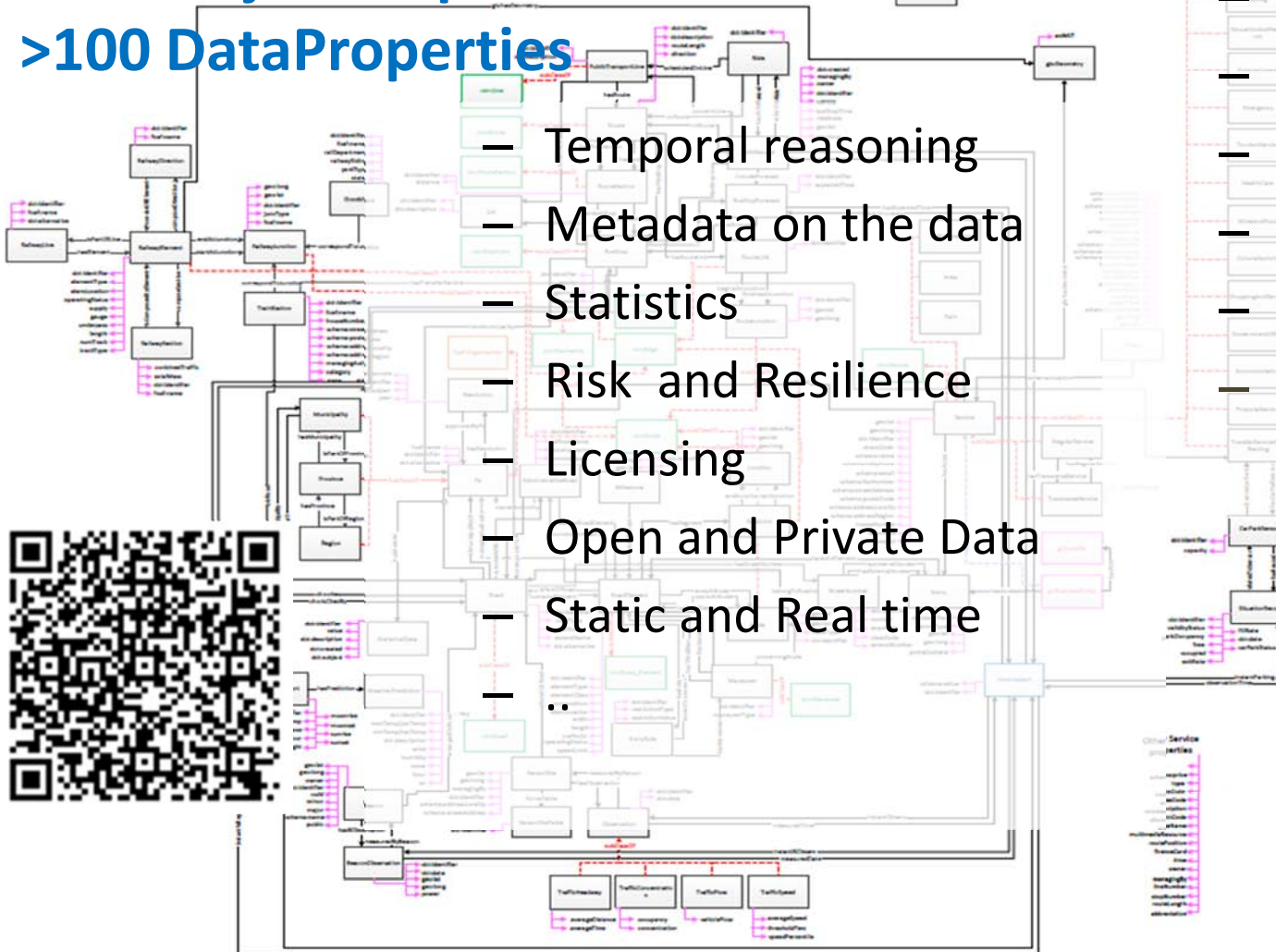


Km4City Ontology

>84 Classes

>100 ObjectProperties

>100 DataProperties



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

- to cover different aspects:

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

Ontology Documentation:

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

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

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

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

Km4City on Firenze & Tuscany

Road Graph (Tuscany region)
132,923 Roads
389,711 Road Elements
318,160 Road Nodes
1,508,207 Street Numbers
110,374 Services (20 cat, 512 cat.)
2,326 Bus stops & 86 bus lines
210 Parking areas
424 Traffic Sensors
Info on: points, paths, areas, etc.

Dynamic/real-time

- bus lines: 200 updates/day per line
- Parking status: 36 updates/day
- Traffic Sensors: 48 updates/day
- Weather: 2 updates/day for 285 areas
- Events: 60 new events/day
- Wi-Fi: 250,000 measures per day

Services List:

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

Weather Forecast for FIRENZE:

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

Ultimo Aggiornamento: 2015-09-15T09:07:00+02:00
[LINKED OPEN GRAPH](#)



ServiceMap



Search around a GPS point

Search along a line

Regular Services Transversal Services

Services Categories

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

N. results for each: 200

Search Range: 500 mt

Search Results

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

Bus Lines: 72 Bus Lines Found.

Bus Line: 23
Direzione: NAVÈ A ROVEZZANO → NUOVO PINONE

Bus Line: 23
Direzione: BORGANE → NUOVO PINONE

Bus Line: 35
Direzione: MADENTA → STAZIONE VIA ALAMANNI

Weather Forecast for Municipality of FIRENZE

Day	Forecast	Temp
Sunday	light rain and sunny intervals	18°C / 24°C
Monday	cloudy	13°C / 24°C
Tuesday	cloudy	13°C / 25°C
Wednesday	light rain	
Thursday	rainstorm	

Search for Geo Located Services

Get Events in the city

Regular Services Transversal Services

Services Categories

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

N. results for each: 500

Search Range: 500 mt

Search Results

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

Bus Lines: 33 Bus Lines Found.

Bus Line: C2
Direzione: PIAZZA BECCARIA → LEOPOLDA

Bus Line: C2
Direzione: PIAZZA BECCARIA → LEOPOLDA

Bus Line: L2
Direzione: STAZIONE PIACCHEDO → PIAZZALE servizi accessibili

Weather Forecast for Municipality of FIRENZE

Day	Forecast	Temp
Sunday	light rain and sunny intervals	18°C / 24°C
Monday	cloudy	13°C / 24°C
Tuesday	cloudy	13°C / 25°C
Wednesday	light rain	
Thursday	rainstorm	

Search in an area

Get weather forecast

Regular Services Transversal Services

Services Categories

- Accommodation
- Advertising
- AgricultureAndLivestock
- CivilAndITEngineering
- CulturalActivity
- EducationAndResearch
- Emergency
- Entertainment
- Environment
- FinancialService
- GovernmentOffice
- HealthCare
- IndustryAndManufacturing
- MiningAndQuarrying
- ShoppingAndService
- TourismService
- TransportServiceAndRenting
- UtilityAndSupply
- Wholesale
- WineAndFood

N. results: No Limit

Search Range: visible areas

Search Results

- Services: 2231 of 2231 available

Query results organized by category

Total number of results: 2231

Category	Number of Results
Accommodation	18
Advertising	21
AgricultureAndLivestock	31
CivilAndITEngineering	14
CulturalActivity	11
EducationAndResearch	14
Emergency	24
Entertainment	24
Environment	21
FinancialService	262
GovernmentOffice	241
HealthCare	264
IndustryAndManufacturing	114
MiningAndQuarrying	
ShoppingAndService	
TourismService	
TransportServiceAndRenting	
UtilityAndSupply	
Wholesale	
WineAndFood	

Weather Forecast for Municipality of FIRENZE

Day	Forecast	Temp
Sunday	light rain and sunny intervals	18°C / 24°C
Monday	cloudy	12°C / 24°C
Tuesday	cloudy	13°C / 25°C
Wednesday	light rain	
Thursday	rainstorm	

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

Regular Services Transversal Services

Services Categories

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

N. results for each: 200

Search Range: 500 mt

Search Results

- Bus Stops: 25 of 25 available
- Road Sensors: 3 of 3 available

Service: F1055ZTL01601

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

Service: F1055ZTL01501

Parameter	Value
Avg Distance(m)	N.A.
Avg Time (sec)	N.A.
Occupancy (%)	N.A.
Concentration (car/km)	0.0
Vehicle Flow (car/h)	48.0
Avg Speed (km/h)	0.0
Threshold Perc (%)	N.A.
Speed Perc (%)	N.A.

Weather Forecast for Municipality of FIRENZE

Day	Forecast	Temp
Sunday	light rain and sunny intervals	18°C / 24°C
Monday	cloudy	12°C / 24°C
Tuesday	cloudy	13°C / 25°C
Wednesday	light rain	
Thursday	rainstorm	

Projects based on KM4City

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



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



RESilience management guidelines
and **O**perationalization app**L**ied to
Urban **T**ransport **E**nvironment



- Replicate, <http://www.disit.org/6778>



Sii-Mobility

Commenti dei cittadini,
Social Media



AVM trasporto
Pubblico



MINISTERO DELL'ISTRUZIONE DELL'UNIVERSITÀ E DELLA RICERCA

Merci



Sensori su
trasporto Privato



Sensori,
sistema monitoraggio

Sensori
Parcheggi



Monitoraggio
traffico, autostrade



Rete
Ferroviaria



Parametri
ambientali



Servizi ed
enti



Ordinanze: eventi,
lavori pubblici, .



UTC



Infomobility



Varchi
Telematici, ZTL

Emergenze,
polizia, 118



Sii-Mobility Obiettivi Generali (sintesi)

- **ridurre i costi sociali della mobilità per le persone**
 - consentendo **minori disagi, maggiore efficienza,**
 - **maggiore sensibilità verso le necessità del cittadino,**
 - minori emissioni, migliori condizioni ambientali;
 - percorsi info-formativi in modo che il **cittadino cambi le abitudini non virtuose;**
 - **ridurre i costi di trasporto ed i tempi di percorrenza** per gli utenti, per i gestori e le amministrazioni, tramite soluzioni di ottimizzazione.
- **semplificare l'uso dei sistemi di mobilità**
 - **sensori innovativi per AVM** e mezzi privati sul territorio
 - **Sistemi integrati di pagamento** e di identificazione
 - **soluzioni di guida/percorso connesso** (connect drive, smart drive o walk)
 - **Integrazione di dati** provenienti da gestori e sorgenti di tipo diverso
 - **Gestione avanzata di mezzi**
 - **misurazione di flussi**
 - **realizzazione di sensori, attuatori**
- **Sperimentazione su comuni e province della Toscana**
- **Contribuire al miglioramento degli standard nazionali ed internazionali**



UNIVERSITÀ
DEGLI STUDI
FIRENZE

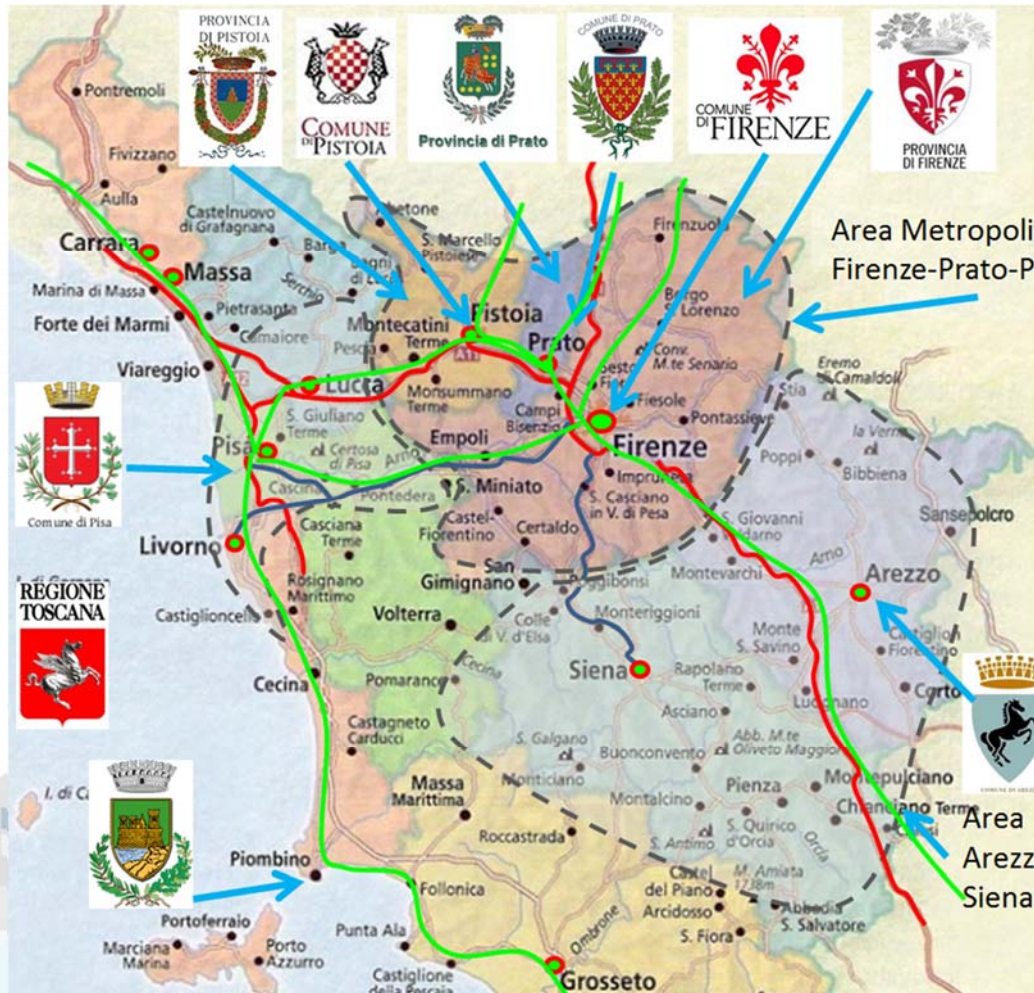
DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

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

Sii-Mobility



- Experimentations and validation in Tuscany ■ <http://www.Sii-Mobility.org>
- Integration with present central station and subsystems
- DISIT lab, Università di Firenze, is the tech-scientific coordinator



ataf

tiemme

BUSITALIA
GRUPPO FERROVIE DELLO STATO ITALIANE

atam

CTT
CENTRO TIRRENICO

— 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



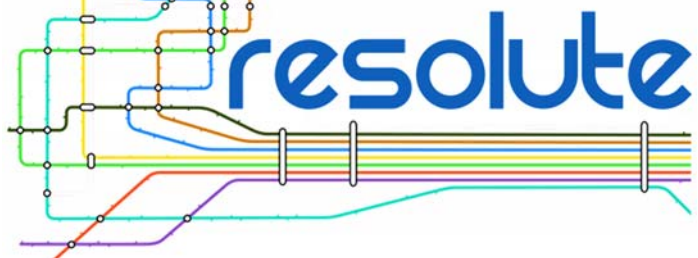
UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

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



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	HUMANIS T	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



Horizon 2020
European Union Funding
for Research & Innovation

**REnaissance of PLaces
with Innovative Citizenship
And Technology**



- **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, DIF**
- **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**

Smart City EcoSystem



Decision Makers, Public administrator tools:

- Smart City Dashboards, <http://dashboard.km4city.org> → Dashboard Builder
- Resilience Decision Support, <http://resilienceds.km4city.org>
- Smart decision support system, <http://smartds.km4city.org>
- Twitter Vigilance, <http://www.disit.org/tv>
- Recommender and User Behavior Analyzer, <http://recommender.km4city.org>
- WiFi monitor, <http://wifimap.km4city.org>
- ServiceMap Server, <http://servicemap.km4city.org>
- Traffic and People Flow Assessment <http://www.disit.org/6694>

Final Users tools:

- Km4City mobile applications, <http://www.km4city.org/app>
- Km4City web application, <http://www.km4city.org>
- Open Source Mobile Application, FODD <http://www.disit.org/6595>

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

- ServiceMap Server, plus API, <http://servicemap.km4city.org>
- Smart City API, <http://www.disit.org/6597>
- Km4City Ontology, <http://www.disit.org/km4city>
- SPARQL query tool and licenser, http://log.disit.org/sparql_query_frontend/
- LOG LOD browser, <http://log.disit.org>

Back Office tools:

- Data Ingestion Manager, DIM, <http://www.disit.org/6732>
- Distributed Smart City Engine, SCE, Scheduler, DISCES <http://www.disit.org/6515>
- RDF Indexer Manager, RIM, <http://www.disit.org/6708>
- RDF store enricher with dbPedia

<https://github.com/disit>

grafo	licenza	link	derivative	share alike	attribution	commercialize	redistribute	access-play	notice
Prati_ristori_Arcidosso_001	CC-BY-NC	https://creativecommons.org/licenses/by-nc/3.0/	✓	✗	✓	✗	✓	✓	✓
DL_controlled_parking_zone	CC-BY	https://creativecommons.org/licenses/by/3.0/	✓	✓	✓	✗	✓	✓	✓
DL_well	CC-BY	https://creativecommons.org/licenses/by/3.0/	✓	✓	✓	✗	✓	✓	✓
DL_rampine	CC-BY	https://creativecommons.org/licenses/by/3.0/	✓	✓	✓	✗	✓	✓	✓
Prati_ristori_Argentario_001	CC-BY-NC	https://creativecommons.org/licenses/by-nc/3.0/	✓	✗	✓	✗	✓	✓	✓
LICENZA FINALE			✓	✗	✓	✗	✓	✓	✓



2013

Km4City 1.1

- Tuscany Map
- Services
- AVM
- Sensors
- Parking

2015

- Cultural Heritage
- Enrichment-cities
- Events in the city
- Digital Locations
- Fresh places

Km4City 1.4

- Embed
- More API
- iBeacon

Km4City 1.5

- SmartDS
- Km4City

RESOLUTE H2020
2015-2018 - Started

- Dashboards
- Risk analysis
- Territorial, areas and paths
- Environmental: water, health
- Statistics, Energy, ICT, ...
- Data Licensing models
- User Engagement

<http://servicemap.disit.org> API
<http://log.disit.org>
<http://www.disit.org/food>
<http://www.disit.org/tv> Twitter Vigilance
<http://smartds.disit.org>

Today

- Suggestion on demand
- People flow tracking

REPLICATE H2020
2016-2021 - Started

2014

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

Sii-Mobility SCN
2016-2018 - Started
Km4City 1.6.2

2016



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

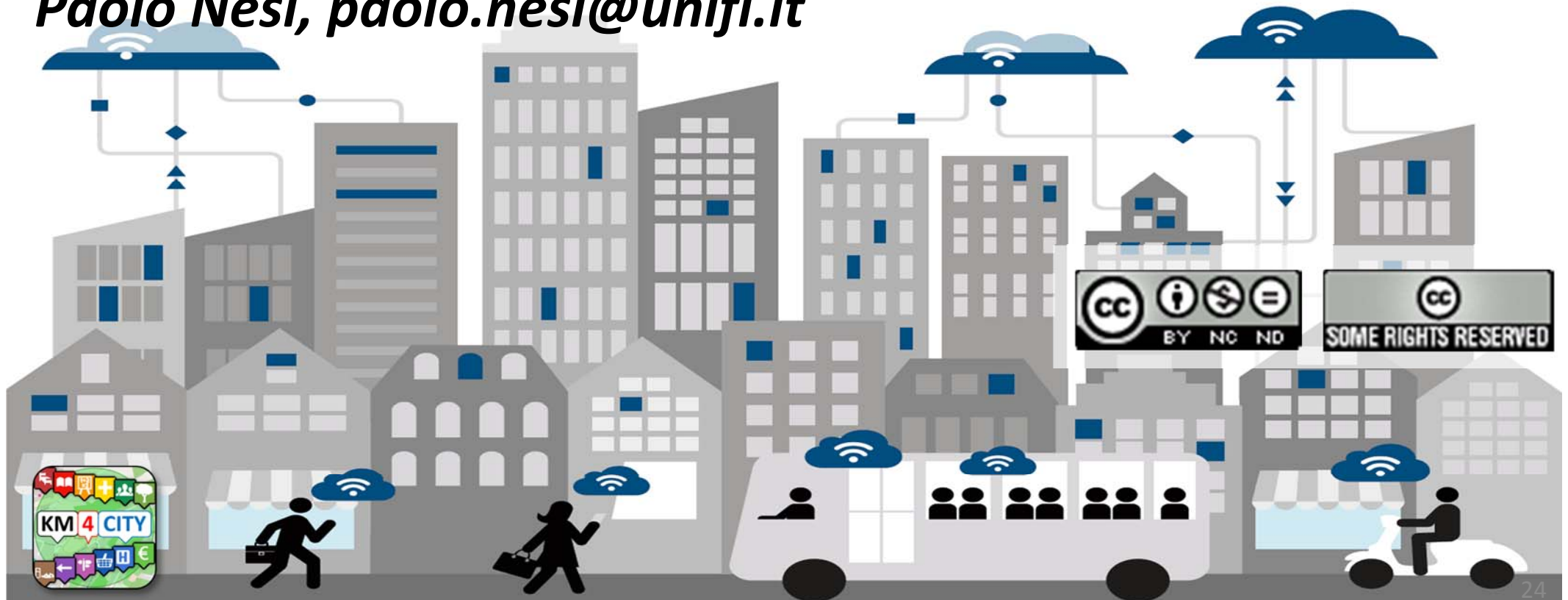
DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB



Data Ingestion Overview

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

Paolo Nesi, paolo.nesi@unifi.it



Transport systems
Mobility, parking



Public Services
Govern, events,



Sensors, IOT
Cameras, ..



Environment,
Water, energy



Shops, services,
operators



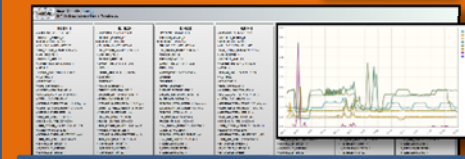
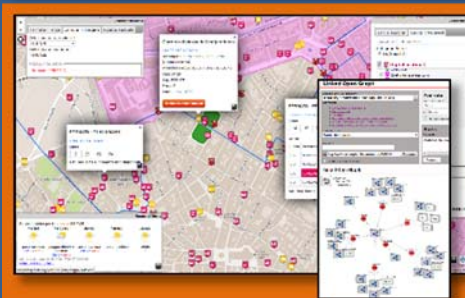
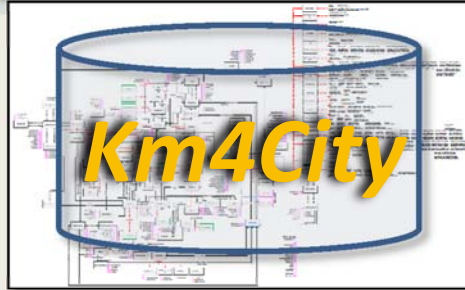
Social Media
WiFi, network



Static, Slow and Real Time data flows

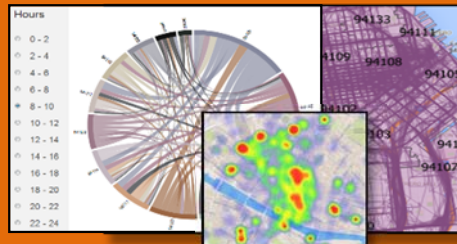
DISCES -- Distributed and parallel architecture on Cloud

Km4City Smart City Engine



User Profiling and Suggestions on Demand

Flow and Origin Destination Matrix
<http://www.disit.org/odsf>



Km4City Tools for Developers

Km4City Smart City API

Tools for City Operators and Decision Makers

Smart City Dashboard

<http://dashboard.km4city.org/>

Smart Decision Support

<http://Smartds.km4city.org>

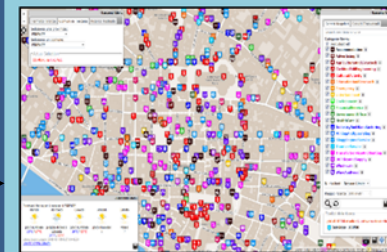


Service map browser

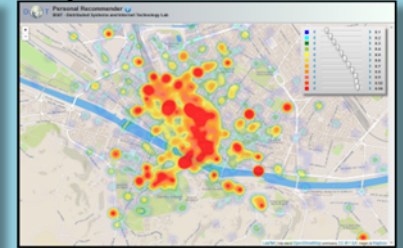
<http://servicemap.km4city.org>

Twitter Vigilance

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



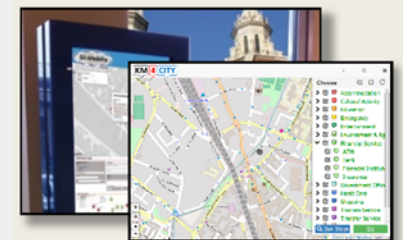
Collective User behavior Analyzer



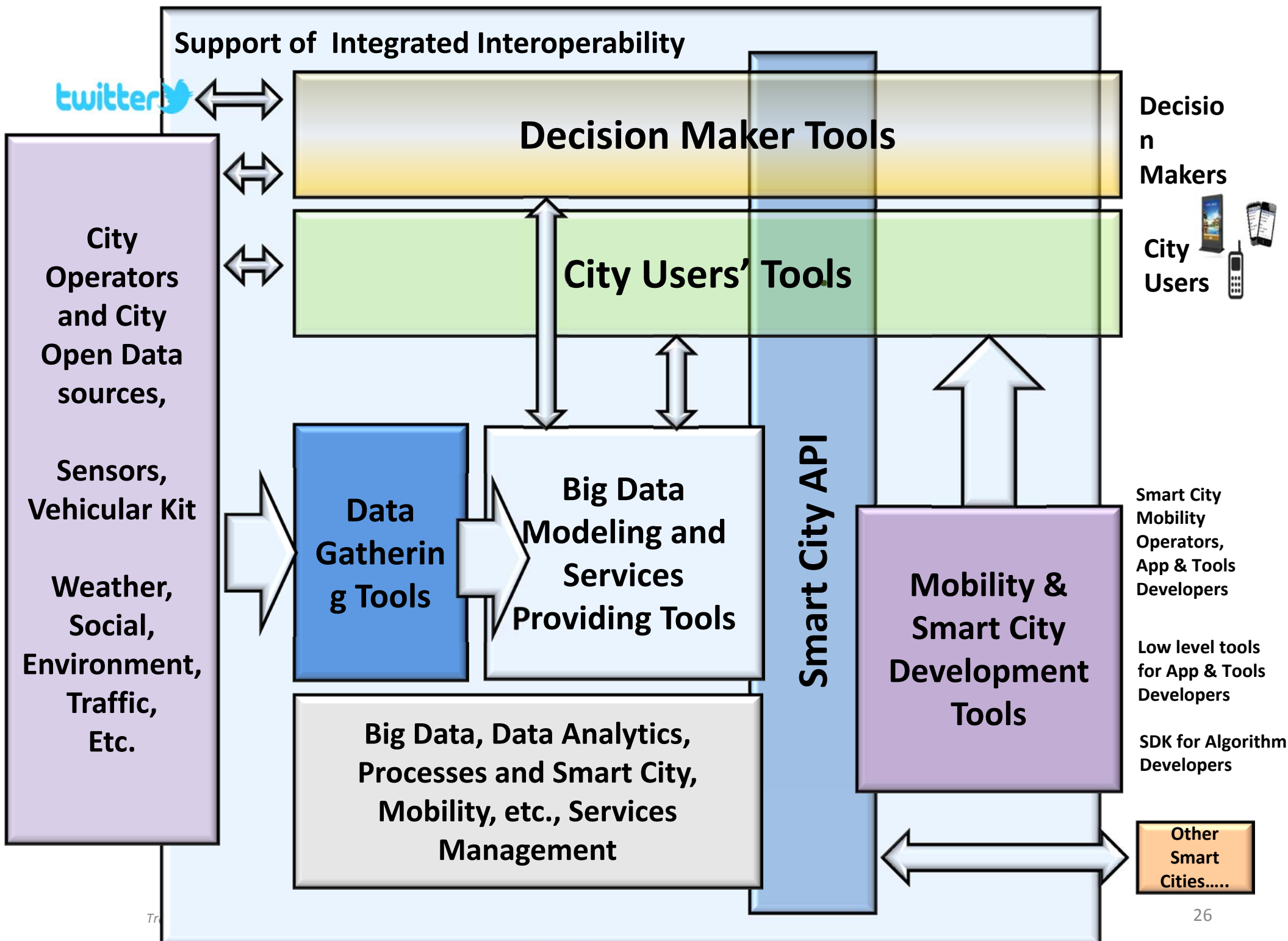
Tools for Final Users

Mobile e Web Apps

<http://www.km4city.org>



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



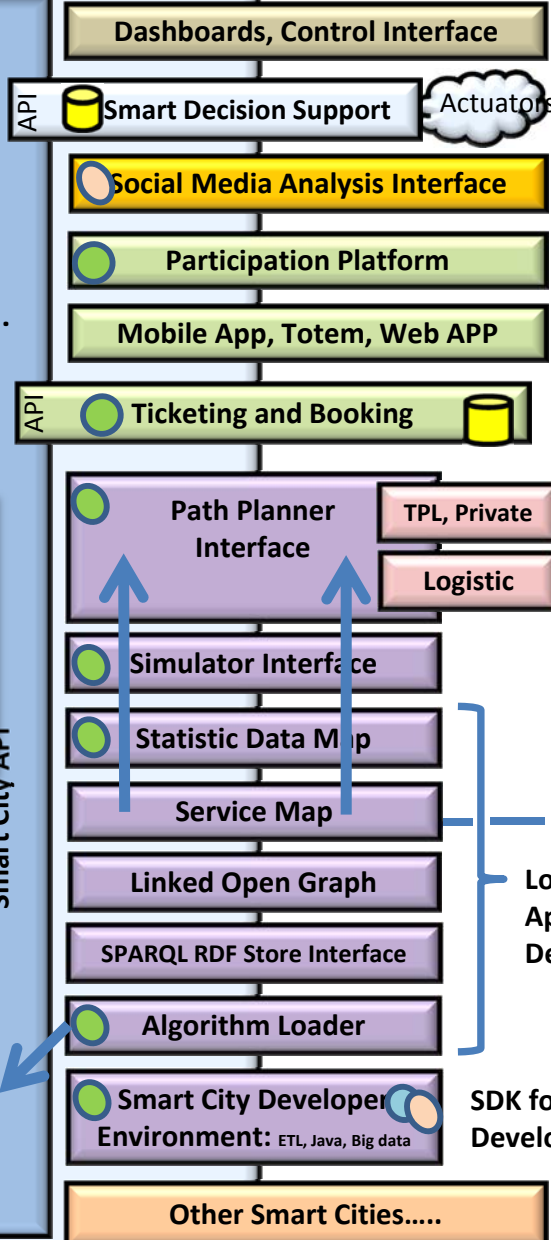
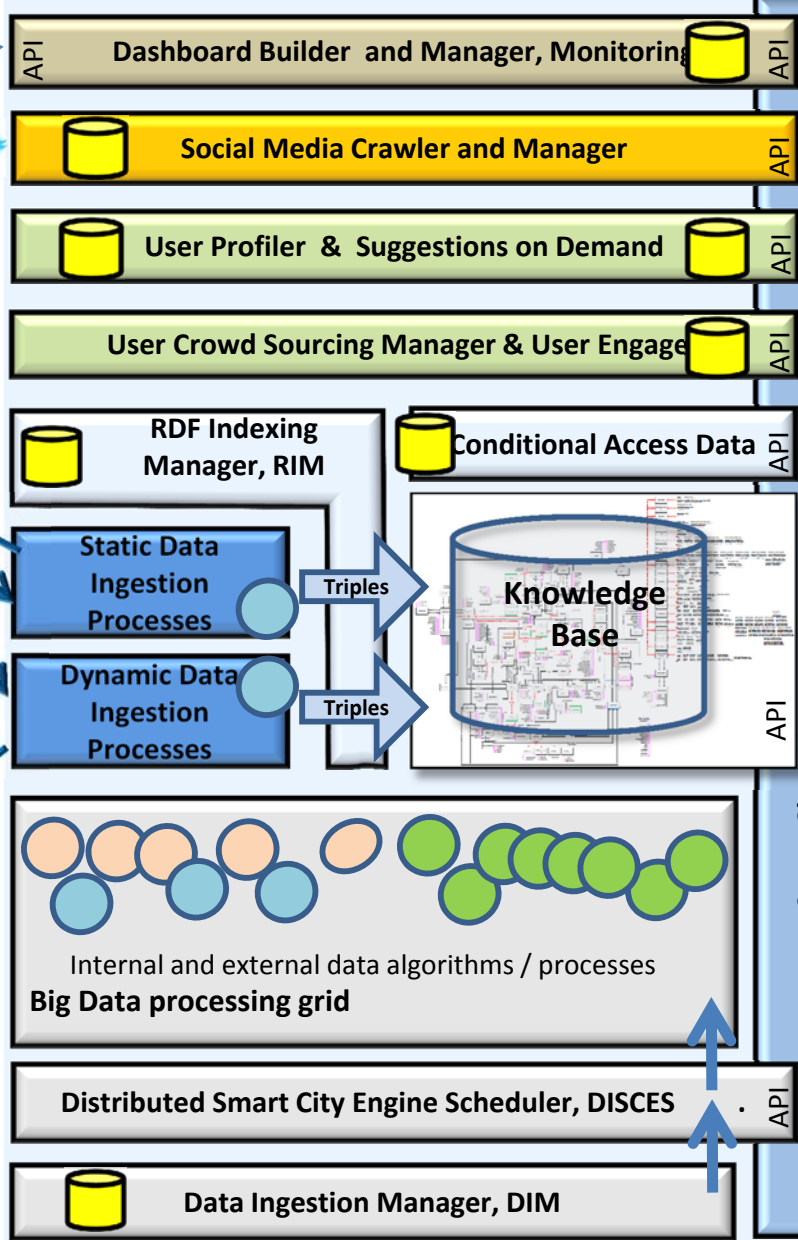
Support of Integrated Interoperability

City Operators 

Social Media 

City Operators Data
 -Graph data, Open Data, Statistics
 -Real time data: sensors, centrals, Events

Kit Vehicular
 Sensors
 Actuators
 Centrale Direzione
 Sensor Server and Manager



Decision Makers

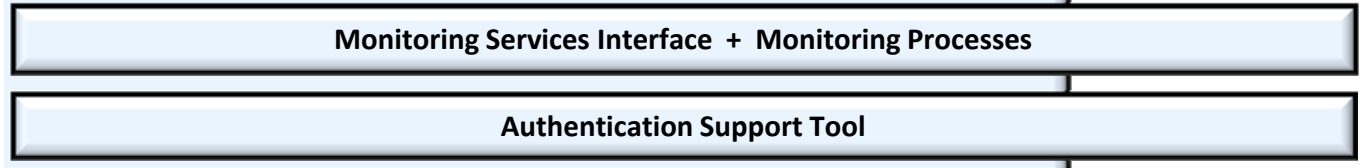
City Users 

Smart City Mobility Operators, App & Tools Developers

Low level tools for App & Tools Developers

SDK for Algorithm Developers

Access and Monitoring



Support of Integrated Interoperability

City Operators 

Social Media 

City Operators Data
-Graph data, Open Data, Statistics
-Real time data from sensors, centrals, Events, ...

Kit Vehicular
Sensors
Actuators
Centrale Direzione
API

API **Dashboard Builder and Manager, Monitoring** API

Social Media Crawler and Manager API

User Profiler & Suggestions on Demand API

User Crowd Sourcing Manager & User Engagement API

RDF Indexing Manager, RIM API

Conditional Access Data API

Static Data Ingestion Processes

Dynamic Data Ingestion Processes

Knowledge Base API

Internal and external data algorithms / processes
Big Data processing grid

Distributed Smart City Engine Scheduler, DISCES API

Data Ingestion Manager, DIM

Dashboards, Control Interface

Smart Decision Support Actuators

Social Media Analysis Interface

Participation Platform

Mobile App, Totem, Web APP

Ticketing and Booking

Path Planner Interface TPL, Private, Logistic

Simulator Interface

Statistic Data Map

Service Map

Linked Open Graph

SPARQL RDF Store Interface

Algorithm Loader

Smart City Developer Environment: ETL, Java, Big data SDK for Algorithm Developers

Other Smart Cities.....

Monitoring Services Interface + Monitoring Processes

Authentication Support Tool

Decision Makers

City Users 

Smart City Mobility Operators, App & Tools Developers

Low level tools for App & Tools Developers

Access and Monitoring



Data Ingestion and Mining

Transport systems
Mobility, parking



Public Services
Govern, events,



Sensors, IOT
Cameras, ..



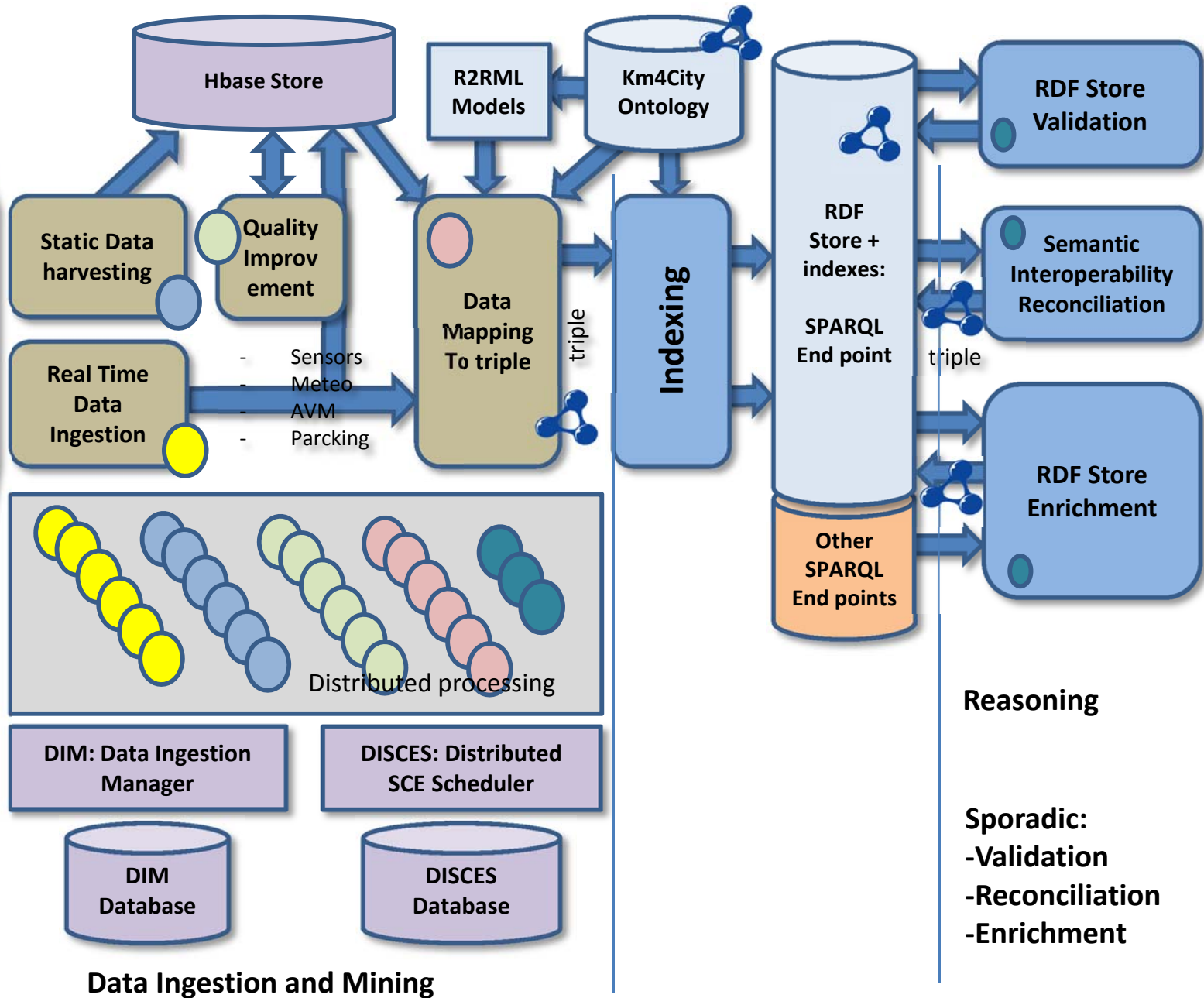
Environment,
Water, energy



Shops, services,
operators



Social Media
WiFi, network



Reasoning

Sporadic:
-Validation
-Reconciliation
-Enrichment

Data Ingestion and Mining

Transport systems
Mobility, parking



Public Services
Govern, events,



Sensors, IOT
Cameras, ..



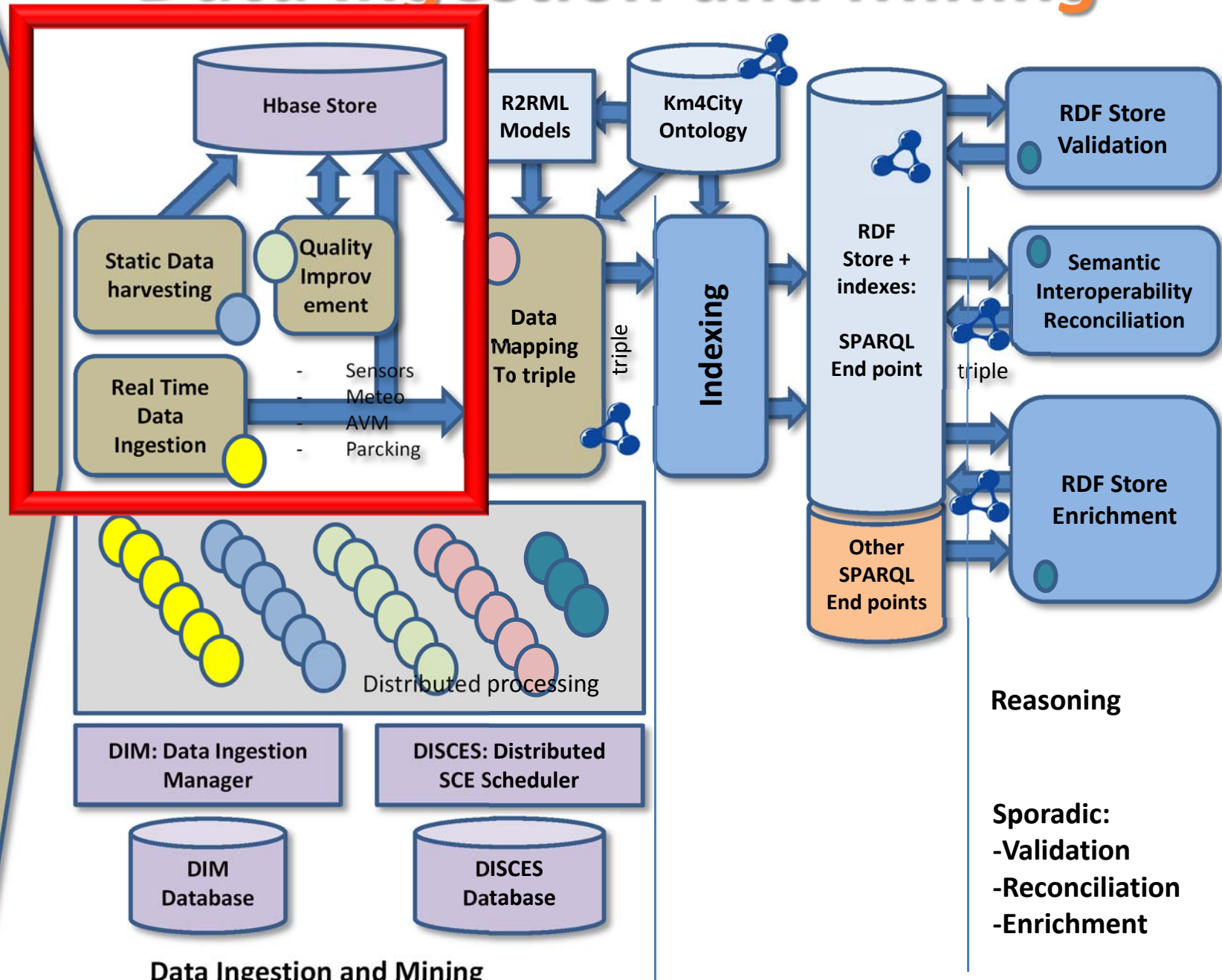
Environment,
Water, energy



Shops, services,
operators



Social Media
WiFi, network



Data Ingestion and Mining

Reasoning

- Sporadic:
 - Validation
 - Reconciliation
 - Enrichment