Master MABIDA, 2017

Overview from DISITLab vs Big Data

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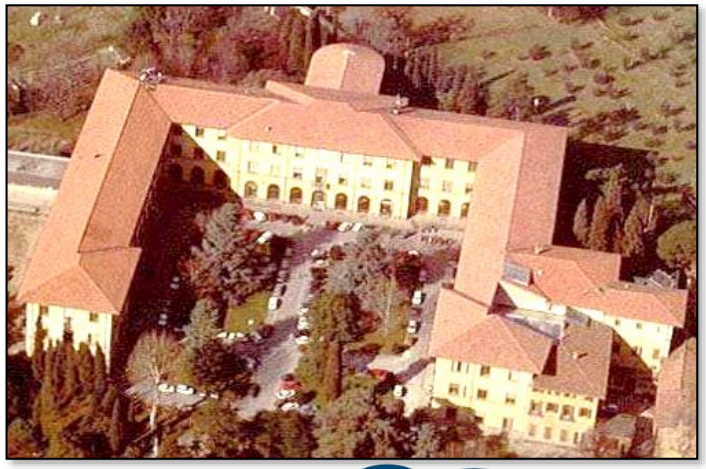
paolo.nesi@unifi.it

UNIVERSITÀ DEGLI STUDI FIRENZE | DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE | DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB

DISIT Lab



- Researchers: 20
- Current Active Projects: 10
- Project in the last 4 years: 19
- Research Budget: 1.2M€
- Foreseen Research Budget (next 2 years): 2.2M€
- Record:
  - 17 progetti Europei
  - + regionali, nazionali, convezioni, etc..
  - Active since 1994

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

UNIVERSITÀ DEGLI STUDI FIRENZE
DINFO DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE
DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB

DISIT Lab, Distributed Data Intelligence and Technologies
Distributed Systems and Internet Technologies
Department of Information Engineering (DINFO)
http://www.disit.dinfo.unifi.it

Con chi lavoriamo

swarco First in Traffic Solutions.
vARgroup
THALES
BUSITALIA NORD GRUPPO FERROVIE DELLO STATO ITALIANE
BBC
TIM
LEONARDO
ALTAIR CHIMICA
ECM
COSTRUZIONI NOVICROM
ataf
NORD CTT
BMG
europeana think culture
COMPUTER GROSS
Hewlett Packard Enterprise
eutelsat
ENGINEERING
liberologico
SIAE Società Italiana degli Autori ed Editori
Rai
PHILIPS
tiscali:
Effective Knowledge s.r.l.
GIUNTI EDITORE
Fondazione per la ricerca e l'innovazione
e-distribuzione
CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS
ENTE CASSA DI RISPARMIO DI FIRENZE
CITTÀ METROPOLITANA DI FIRENZE
COMUNE DI FIRENZE
Fraunhofer
Consiglio Nazionale delle Ricerche
cini
cnit consorzio nazionale interuniversitario per le telecomunicazioni
UNIVERSITY OF PITTSBURGH
Camera di Commercio Firenze
ARPAT Agenzia regionale per la protezione ambientale della Toscana
REGIONE TOSCANA
National Technical University of Athens
ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE
UNIVERSITÀ DEGLI STUDI DI MILANO BICOCCA
UNIVERSITÀ DEGLI STUDI DI CAGLIARI
APRE TOSCANA AGENZIA PER LA PROMOZIONE DELLA RICERCA EUROPEA
ACCADEMIA NAZIONALE DI SANTA CECILIA
CONSORZIO LaMMA

DISIT: Competences

- **Technologies**:
  - **Big Data and Analytics:** data management, user analysis, user engagement, prediction, predictive maintenance, early detection, anomaly detection, data intelligence, …
  - **Data Mining:** artificial intelligence, machine learning, natural language processing, semantic computing, semantic reasoner, expert systems, statistic analysis, ..
  - **IOT/IOE:** internet of things/everything, brokers, microservices, ..
  - **Cloud:** smart cloud, cloud simulation, optimization, containers, ..
  - **Mobile Computing:** mobile application, user behavior analysis, ..
  - **NLP and Sentiment Analysis:** response vigilance, interaction, answering, ..
- **See projects on: http://www.disit.org/5501**

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Big Data analytics Aree Applicative DISIT Lab

- Smart manufacturing
- Personal assistants
- Autonomous engines, semantic reasoners
- Experts systems, decision support systems
- Smart Cloud, elastic computing
- Services and microservices integration
- Industrie farmaceutiche
- Mobilità e Trasporti
- Turismo e Cultura
- Smart City, Innovation Lab, Living Lab
- Servizi alla persona

Aree di Intervento DISIT

- Big data introduction:
  - NoSQL, graph database, ..
- Web crawling, XML, text analysis
  - Natural Language Processing, Sentiment Analysis
  - Case Study: OSIM, TV
- Semantic computing
  - XML, RDF, PWL, logic, Reasoning and inferential
- Social Media:
  - user profiling, recommendations
  - Case Study: Twitter Vigilance, sentiment analysis
- Architecture:
  - Parallel Architecture, cloud/container, Hadoop, GPU
- General case study:
  - smart city, IOT, smart mobility, smart parking, user behavior analysis
  - smart Cloud

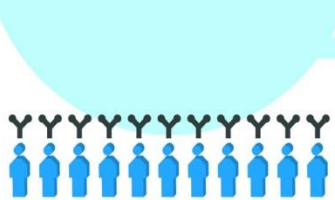
The FOUR V's of Big Data

From traffic patterns and music downloads to web history and medical records, data is recorded, stored, and analyzed to enable the technology and services that the world relies on every day. But what exactly is big data, and how can these massive amounts of data be used?

As a leader in the sector, IBM data scientists break big data into four dimensions: **Volume, Velocity, Variety and Veracity**

Depending on the industry and organization, big data encompasses information from multiple internal and external sources such as transactions, social media, enterprise content, sensors and mobile devices. Companies can leverage data to adapt their products and services to better meet customer needs, optimize operations and infrastructure, and find new sources of revenue.

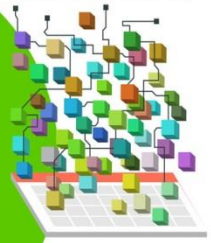
By 2015
4.4 MILLION IT JOBS
will be created globally to support big data, with 1.9 million in the United States



Volume
SCALE OF DATA

40 ZETTABYTES
[43 TRILLION GIGABYTES]
of data will be created by 2020, an increase of 300 times from 2005

It's estimated that
2.5 QUINTILLION BYTES
[2.3 TRILLION GIGABYTES]
of data are created each day



6 BILLION PEOPLE
have cell phones

Most companies in the U.S. have at least
100 TERABYTES
[100,000 GIGABYTES]
of data stored

Variety
DIFFERENT FORMS OF DATA

As of 2011, the global size of data in healthcare was estimated to be
150 EXABYTES
[161 BILLION GIGABYTES]

By 2014, it's anticipated there will be
420 MILLION WEARABLE, WIRELESS HEALTH MONITORS

4 BILLION+ HOURS OF VIDEO
are watched on YouTube each month

30 BILLION PIECES OF CONTENT
are shared on Facebook every month

400 MILLION TWEETS
are sent per day by about 200 million monthly active users

Velocity
ANALYSIS OF STREAMING DATA

The New York Stock Exchange captures
1 TB OF TRADE INFORMATION
during each trading session

Modern cars have close to
100 SENSORS
that monitor items such as fuel level and tire pressure

By 2016, it is projected there will be
18.9 BILLION NETWORK CONNECTIONS
– almost 2.5 connections per person on earth

Veracity
UNCERTAINTY OF DATA

1 IN 3 BUSINESS LEADERS
don't trust the information they use to make decisions

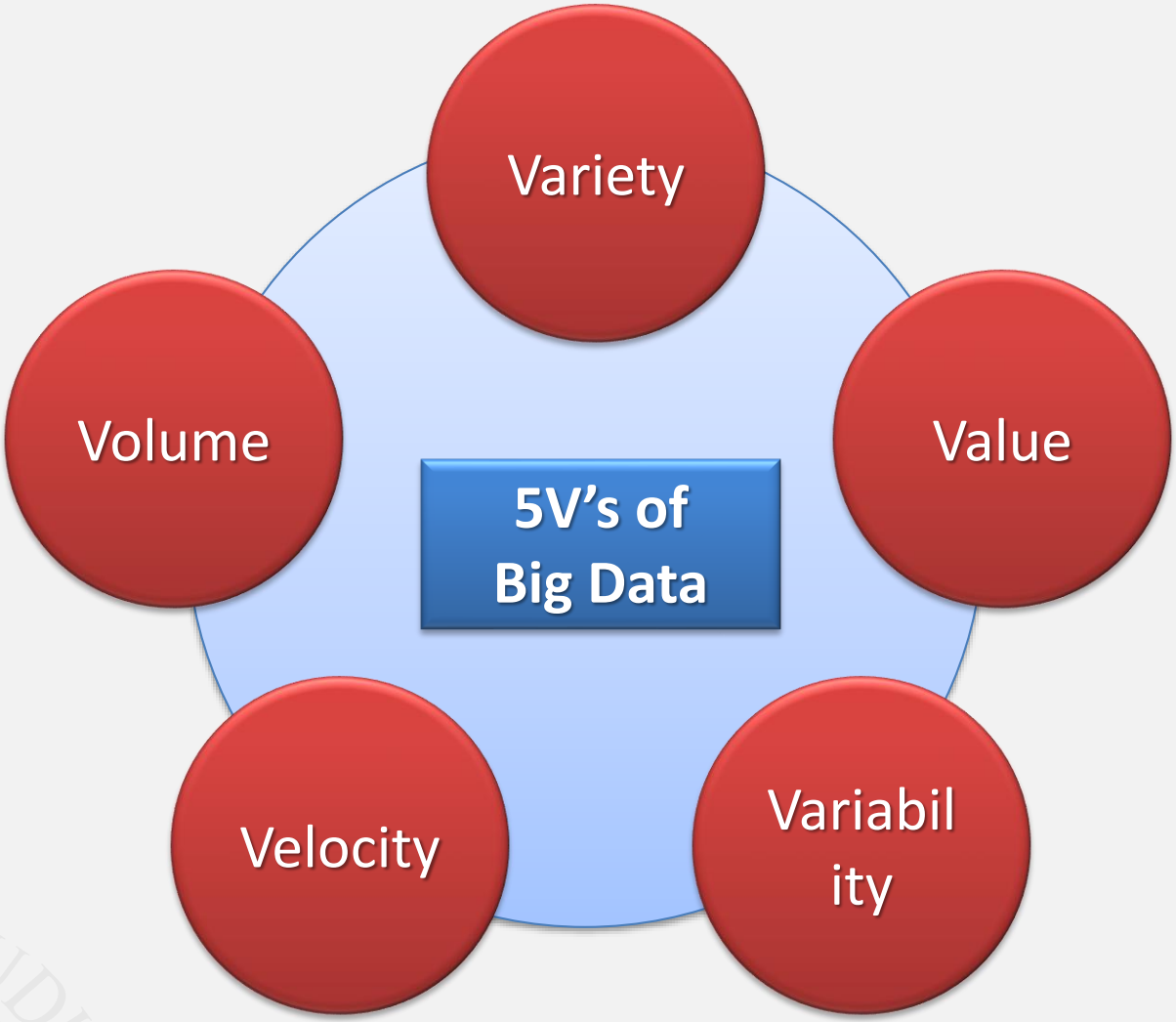
in one survey were unsure of how much of their data was inaccurate

Poor data quality costs the US economy around
$3.1 TRILLION A YEAR

Sources: McKinsey Global Institute, Twitter, Cisco, Gartner, EMC, SAS, IBM, MEPTEC, QAS

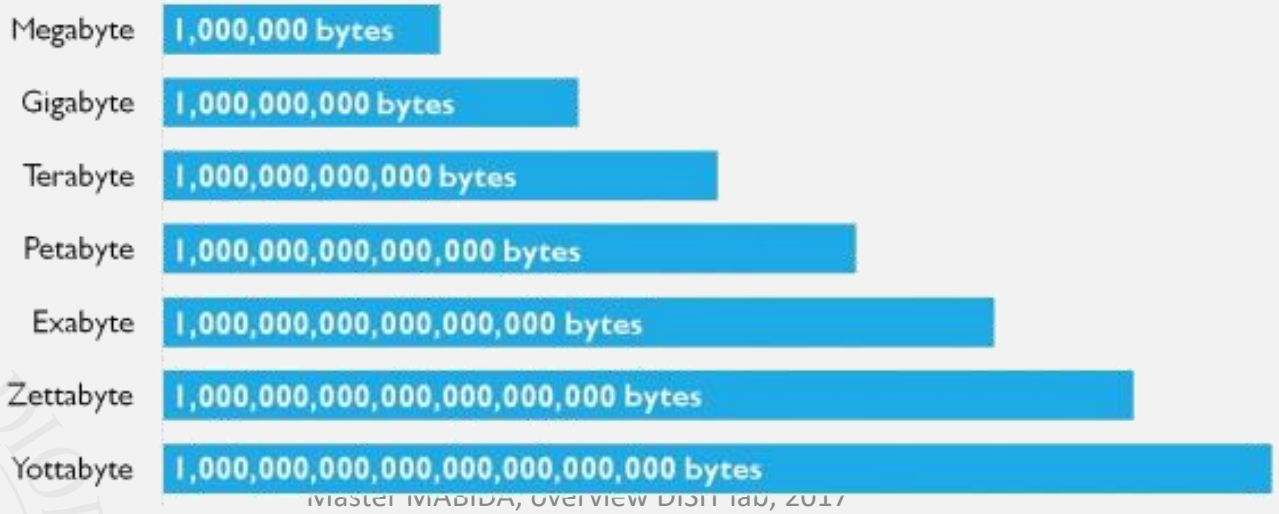
IBM

5V of Big Data



5V of Big Data…or more?

- In **2010** it was estimated a production of **1.2 zettabytes** of data (**1ZB = one trillion GB**).
- In **2011**, grew up in **1,8ZB**.
- In **2013** came to **2,7ZB**.
- The prediction for **2015** is about **4,8ZB**.



Big Data High-level Architecture

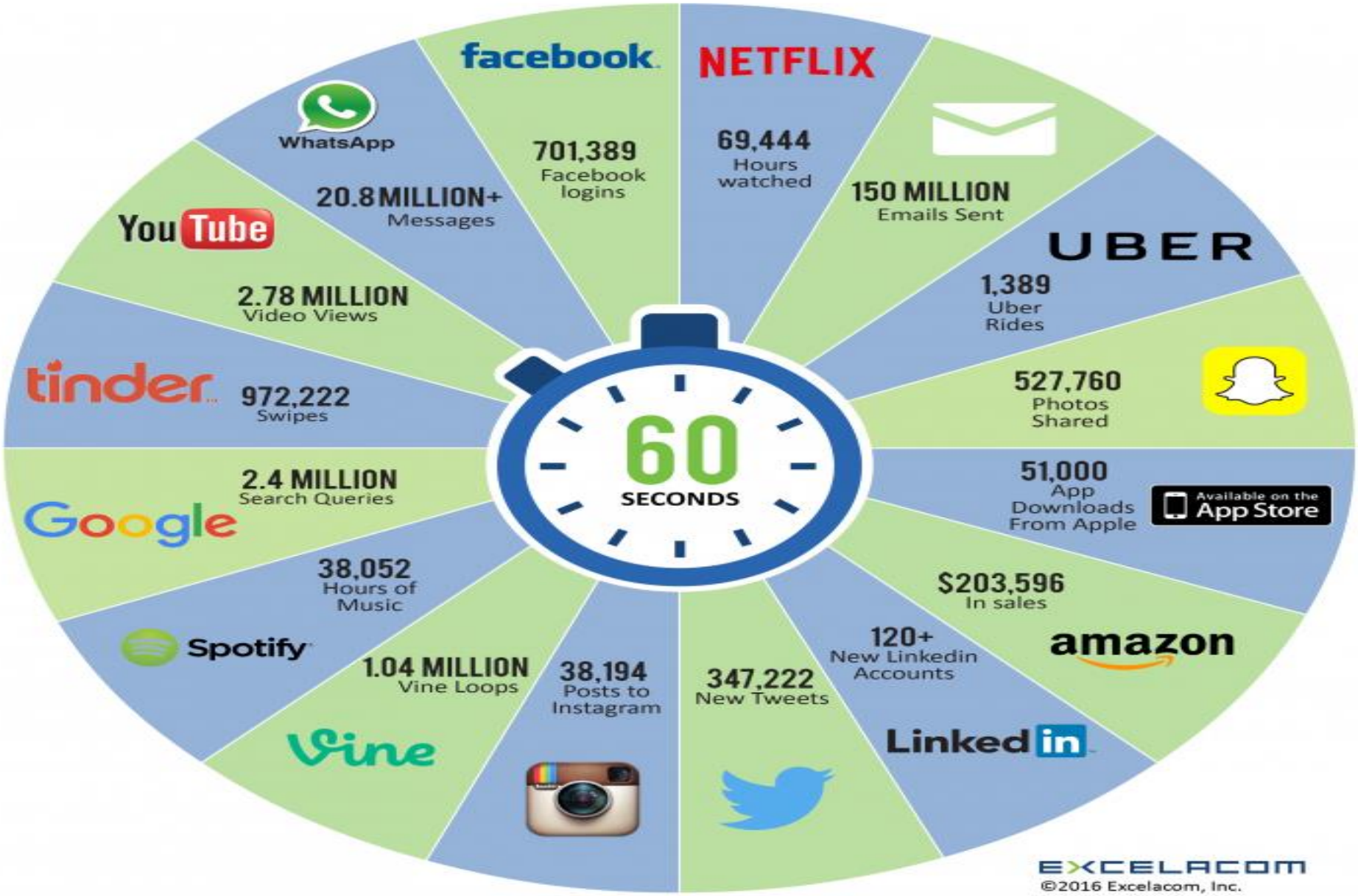
RCG GLOBAL SERVICES

http://pennystocks.la/internet-in-real-time/

http://www.webpagefx.com/internet-real-time/

http://www.retale.com/info/retail-in-real-time/

2016 What happens in an INTERNET MINUTE?



EXCELACOM

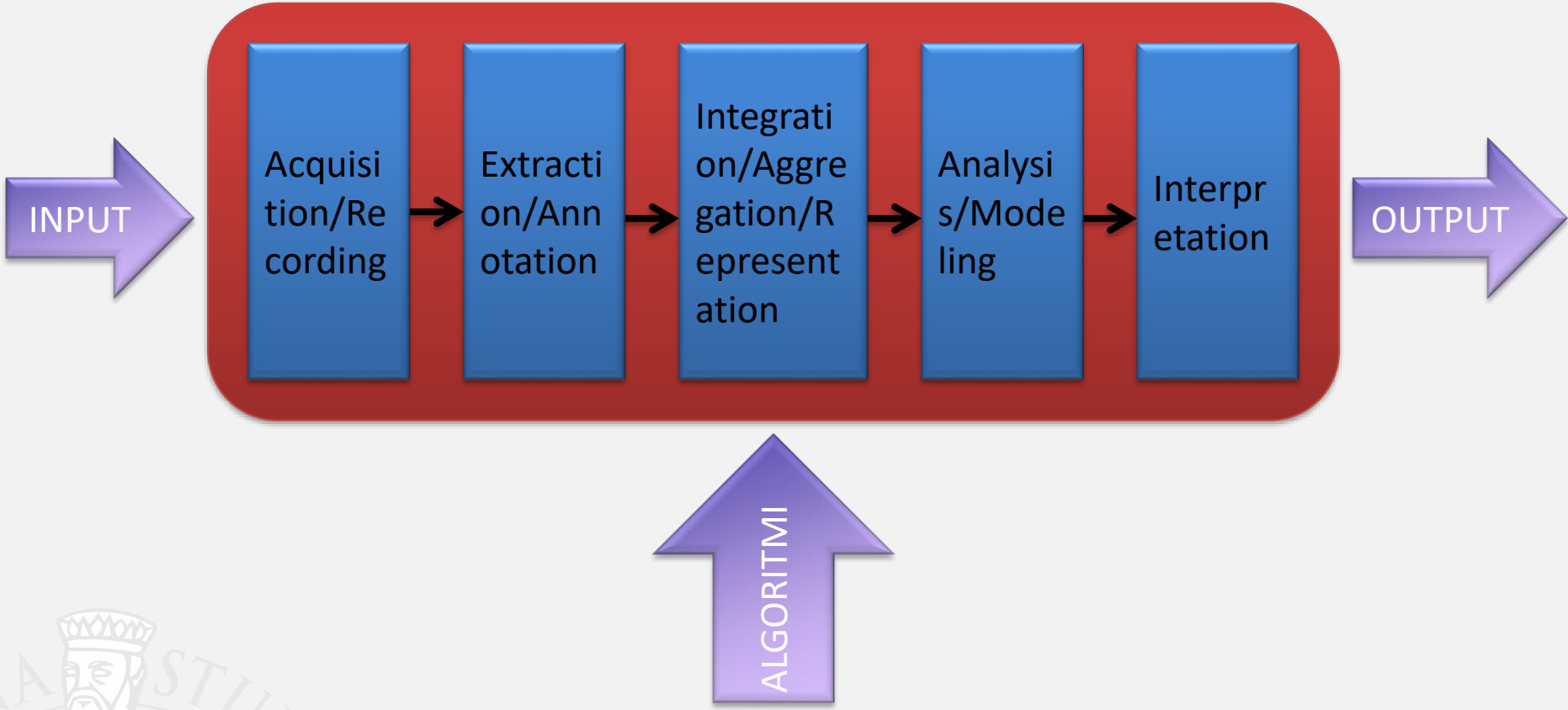
2017 This Is What Happens In An Internet Minute

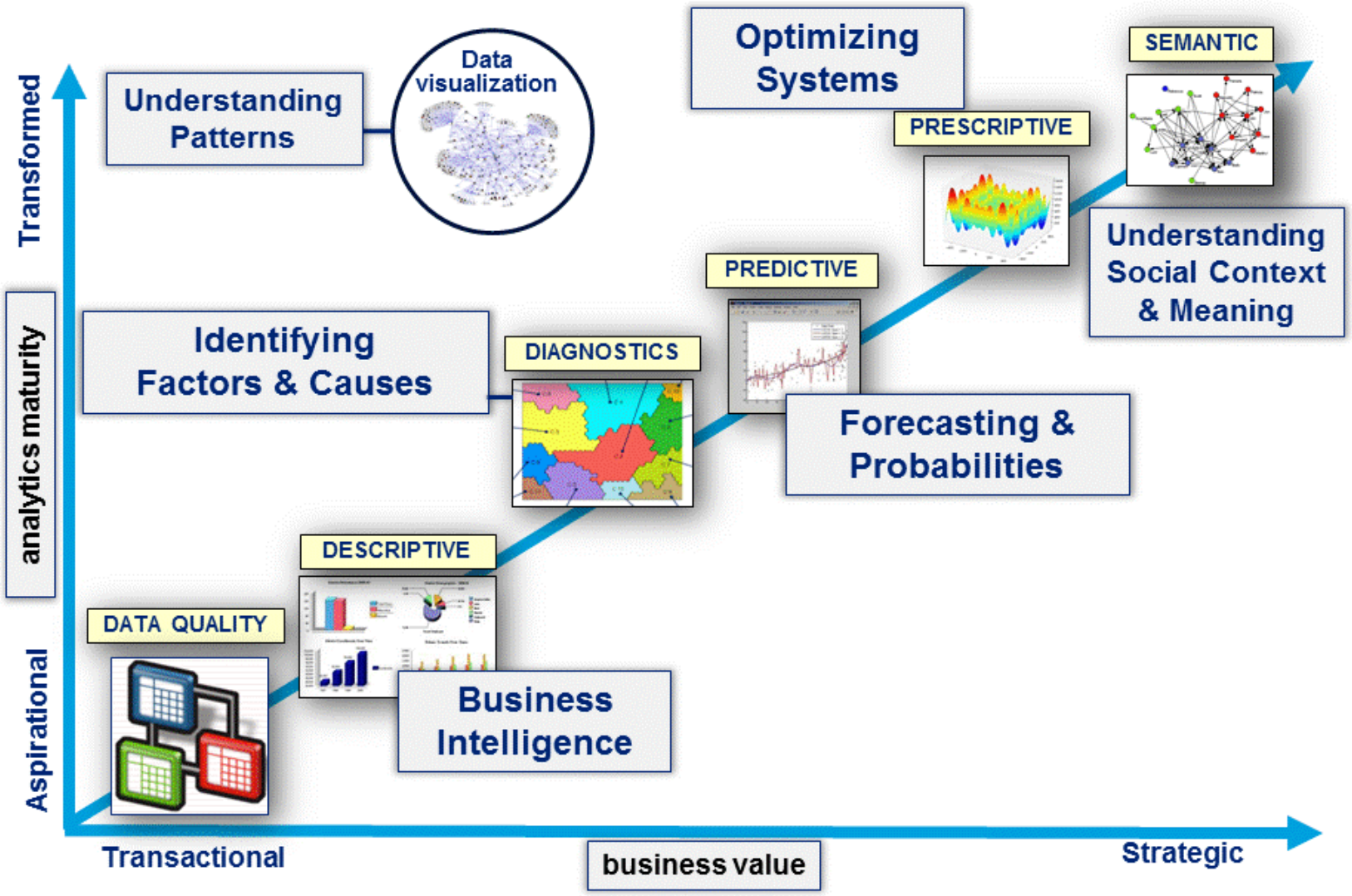
Application Fields

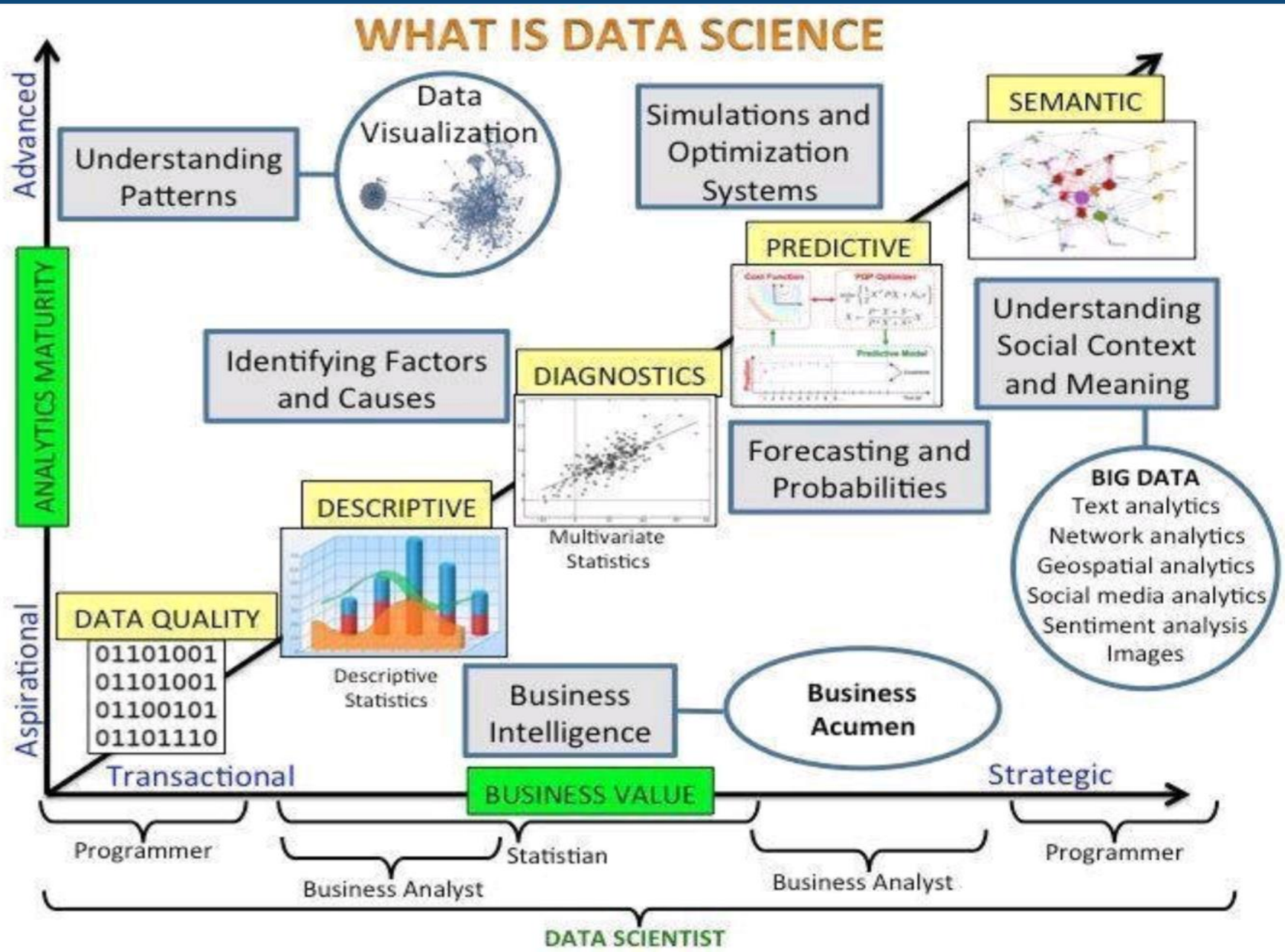
Increasing investments in Big Data can lead to interesting discoveries in **science**, **medicine**, benefits and gains in the **ICT sector** and in **business** contexts, new services and opportunities for digital **citizens** and **web users**.

- Healthcare and Medicine
- Data Analysis – Scientific Research
- Energy and Transportation
- Social Network – Internet Service – Web Data
- Educational
- Financial/Business
- Security
- Industry 4.0

Pipeline

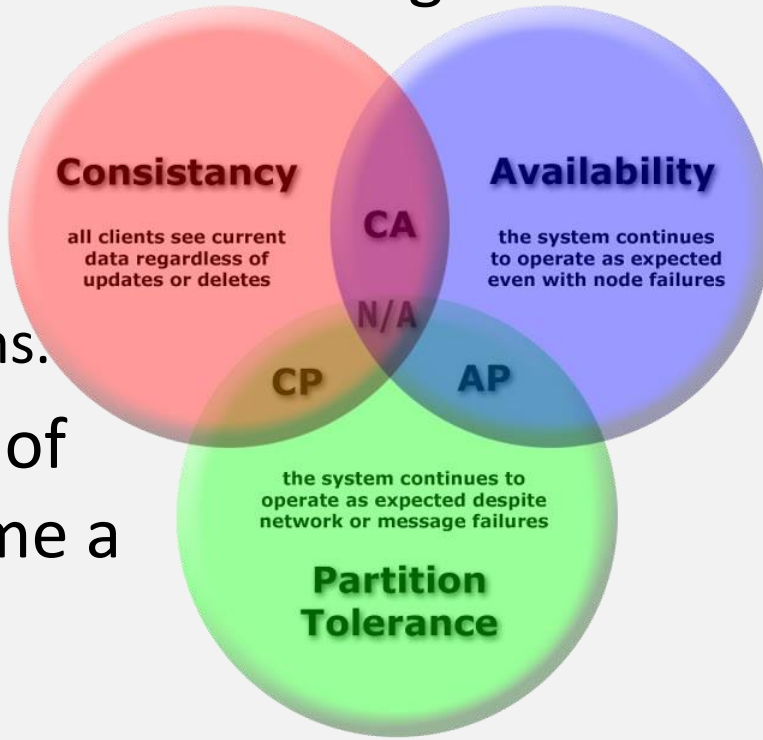

INPUT
Acquisition/Recording
Extraction/Annotation
Integration/Aggregation/Representation
Analysis/Modeling
Interpretation
OUTPUT
ALGORITMI

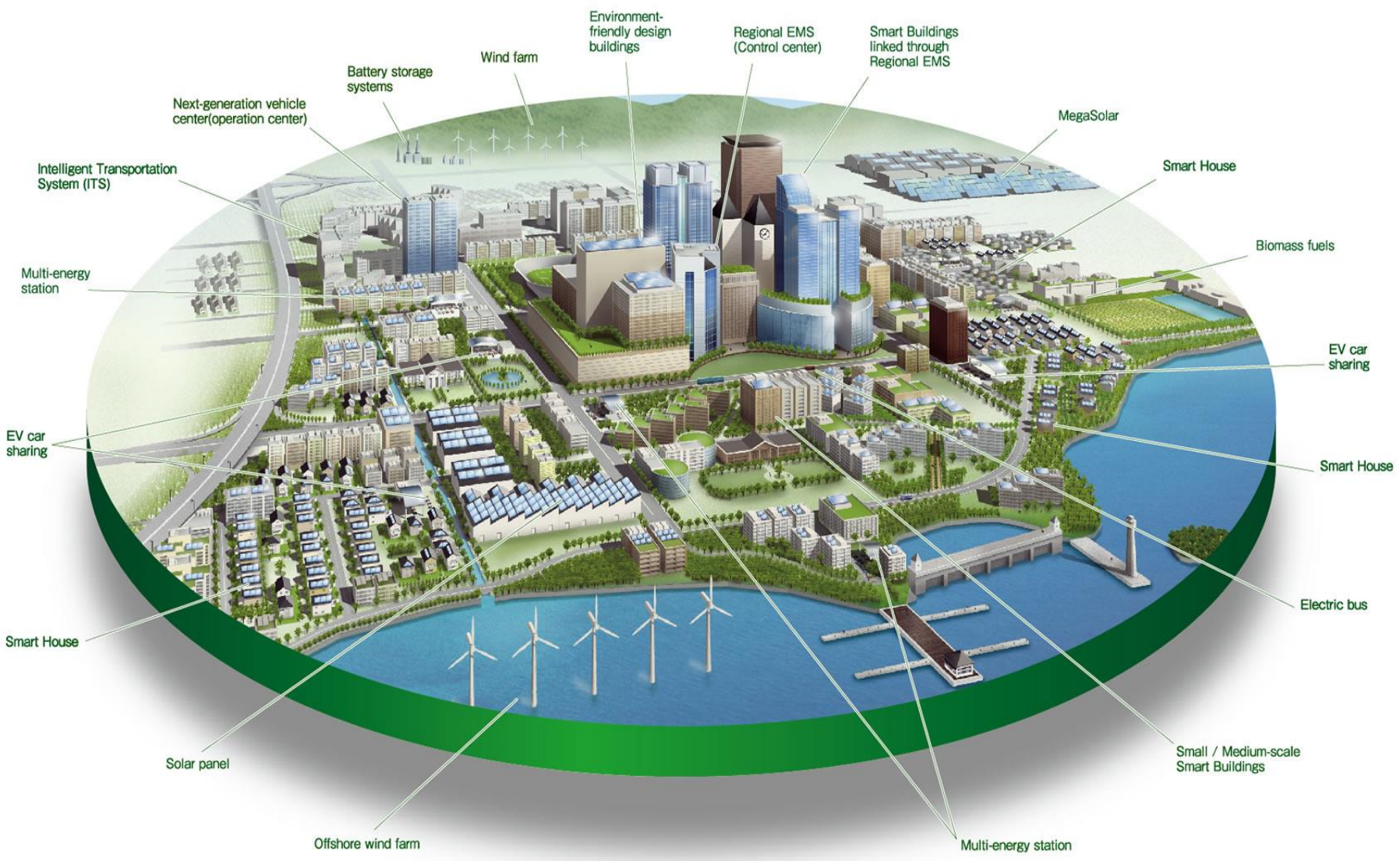

Transformed
analytics maturity
Aspirational
Transactional
business value
Strategic
Understanding Patterns
Data visualization
Optimizing Systems
SEMANTIC
PRESCRIPTIVE
Understanding Social Context & Meaning
PREDICTIVE
Identifying Factors & Causes
DIAGNOSTICS
Forecasting & Probabilities
DESCRIPTIVE
DATA QUALITY
Business Intelligence


WHAT IS DATA SCIENCE
Advanced
ANALYTICS MATURITY
Aspirational
Understanding Patterns
Data Visualization
Simulations and Optimization Systems
SEMANTIC
PREDICTIVE
Understanding Social Context and Meaning
Identifying Factors and Causes
DIAGNOSTICS
Forecasting and Probabilities
BIG DATA
Text analytics
Network analytics
Geospatial analytics
Social media analytics
Sentiment analysis
Images
Multivariate Statistics
DESCRIPTIVE
DATA QUALITY
01101001
01101001
01100101
01101110
Descriptive Statistics
Business Intelligence
Business Acumen
Transactional
BUSINESS VALUE
Strategic
Programmer
Business Analyst
Statistian
Business Analyst
Programmer
DATA SCIENTIST

CAP theorem

- The **CAP theorem** (Consistency - Availability - Partition tolerance) is essential to **understand** the **behavior** of **distributed SW systems**, and **how** to **design** the **architecture** in order to meet stringent requirements, such as:
  - High **performance**.
  - Continued **availability**.
  - **Geographically distributed** systems.
- Working on billions and trillions of data every day, **scalability** became a key concept.




Environment-friendly design buildings
Regional EMS (Control center)
Smart Buildings linked through Regional EMS
Wind farm
Battery storage systems
Next-generation vehicle center(operation center)
MegaSolar
Intelligent Transportation System (ITS)
Smart House
Biomass fuels
Multi-energy station
EV car sharing
EV car sharing
Smart House
Electric bus
Smart House
Small / Medium-scale Smart Buildings
Solar panel
Offshore wind farm
Multi-energy station

Privati Statici

- Codice fiscale
- Foto non condivise
- Aspetti legali
- Cartella clinica
- ..

- Movimenti personali non pubblicati
- Relazioni personali non pubblicate

Pubblici statici (open data)

statistiche: incidenti, censimenti, votazioni

- Statistiche accessi alla ZTL
- Strutture pubbliche UNIFI

posizione dei punti di interesse

- Musei
- Strutture della città
- Servizi attivi

- comportamenti
- social media
- contributi
- consumi

- Traffico personale
- Posizione mezzi,
- Parcheggi
- Posizione taxi
- Posizione CarSharing
- ...

- Info traffico
- video camere
- Info Meteo
- Info Ambiente
- Code ai musei pubblici
- Terremoti
- Parcheggi

- Stato accessi alla ZTL
- Stato dei servizi

Privati Tempo reale

Pubblici Tempo reale (open data)

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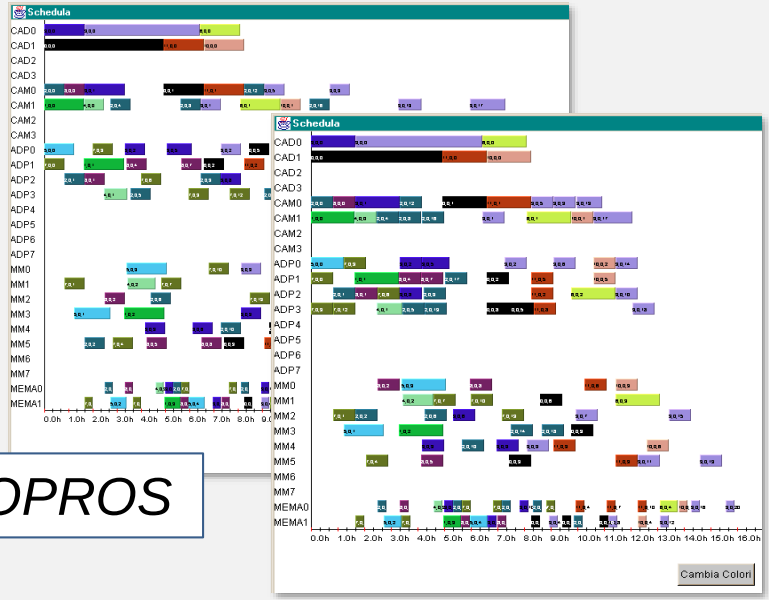
Big Data & Analytics

- **IOT/IOE, Internet of Thing/Internet of Everything vs Industria 4.0**
  - Oggetti intelligenti, oggetti che (conoscono come si) producono/lavorano, collaudano, …
  - Sensorizzazione di impianti per l'automazione e il maggior controllo
  - Sistemi mobili, e soluzioni di distribuzione integrati
- **Algoritmi e soluzioni per**
  - Ottimizzazione della produzione, anche decentrata
  - Visual Analytics, Business Intelligence
  - Manutenzione, prevenzione, controllo
- **Tecnologie di base**
  - Architetture parallele
  - Data Analytics
  - IOT/IOE



SAMOPROS

UNIVERSITÀ DEGLI STUDI FIRENZE
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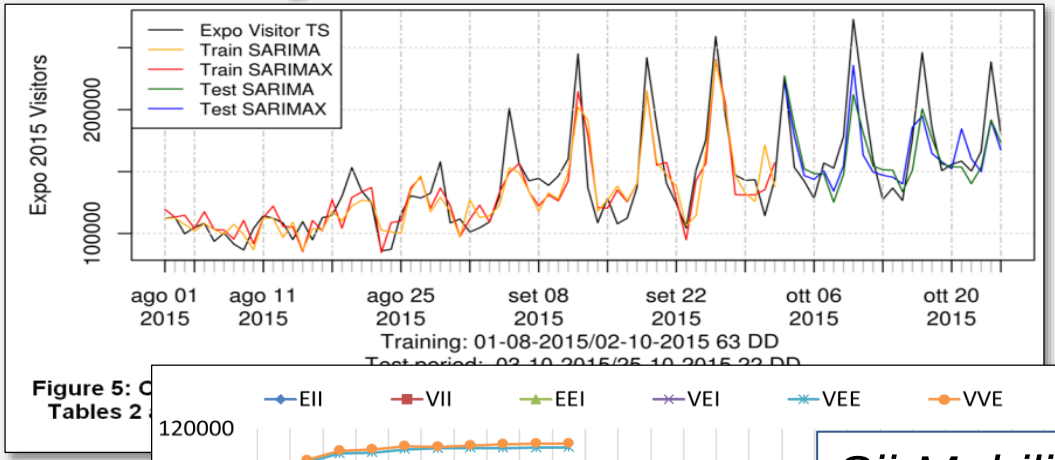
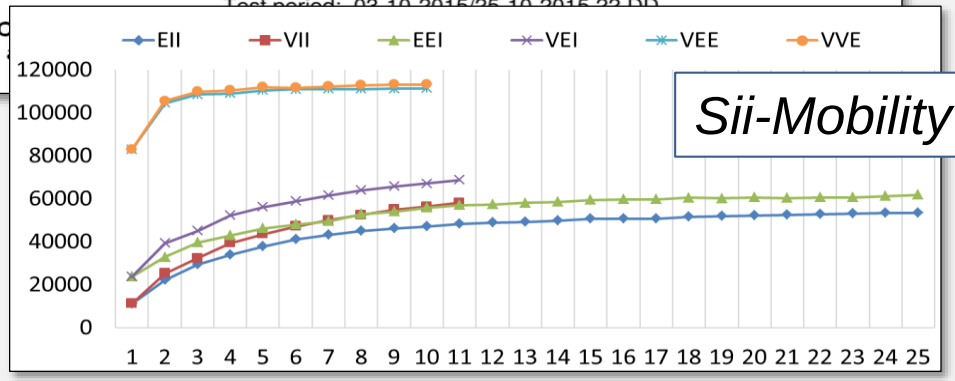
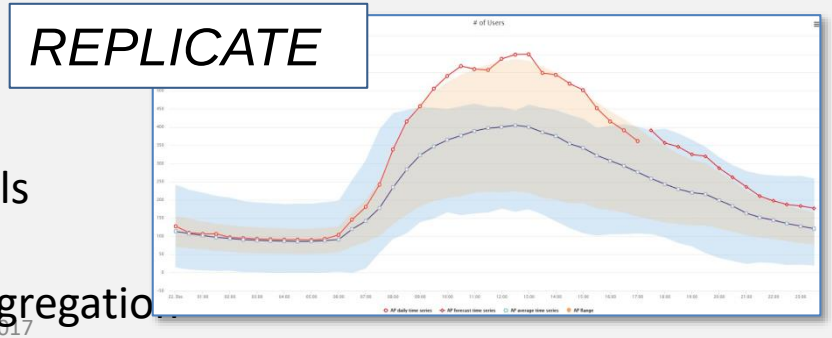
Big Data & Analytics

- **Solutions for**
  - **Predicting models**
  - **Early detection**
  - **Anomaly detection**
- **Data Analytics**
  - Data mining, Clustering
  - Semantic computing
  - Machine learning
  - Natural Language Processing, Sentiment Analysis
- **Architetture parallele**
  - Hadoop, Spark, Kafka, map reduce
  - Hdfs, Hbase, Mongo, Virtuoso, RDF stores
  - Distributed Scheduling
  - GPU
- **IOT/IOE**
  - Protocols
  - Devices
  - Data aggregation







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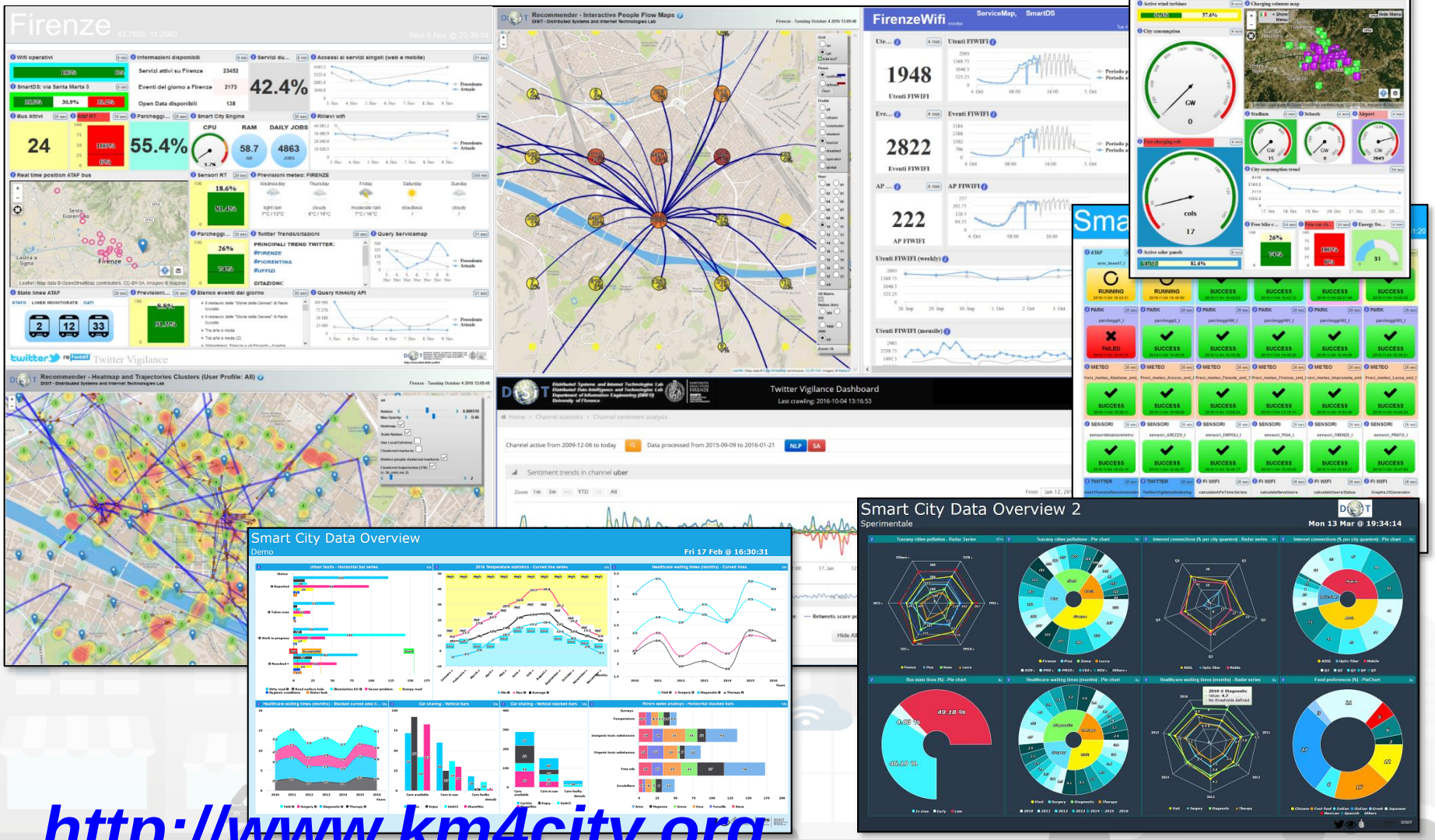
REPLICATE

Horizon 2020 European Union Funding for Research & Innovation

KM 4 CITY

Dashboard: Control Room



http://www.km4city.org


Firenze Ambiente e Salute HD
Dati ambientali su Firenze (demo)
Sat 10 Jun @ 22:49:06
Previsioni Meteo su Firenze
Saturday
Sunday
Monday
Tuesday
Wednesday
Temperatura - Andamento giornaliero
Umidità - Andamento giornaliero
Livelli di inquinamento ambientale quartieri
Substances / Quarters
OZN
PM2
PM10
CO2
NO2
Q1 120 41 36 4
Q2 33 25 123 45
Q3 225 153 342 193 217
Q4 174 221 87 122 93
Q5 79 87 23 27 65
PM10 andamento settimanale
PM2 andamento settimanale
CO2 andamento settimanale
Ozono andamento settimanale
NO2 Gramsci - andamento settimanale
Temperatura - Andamento settimanale
Umidità - Andamento settimanale
Temperatura - Andamento mensile
Umidità - Andamento mensile
Temperatura - Andamento annuale
PROTEZIONE CIVILE
NULLO BASSO MEDIO ALTO
RISCHIO IDRAULICO
RISCHIO TEMPORALI
RISCHIO IDROGEOLOGICO
RISCHIO NEVE
RISCHIO GHIACCIO
RISCHIO VENTO
RISCHIO MAREGGIATE
TRIAGE Florence - Overview
Red code
Yellow code
Green code
Blue code
White code
PS SAN GIOVANNI DI DIO TORREGALLI 1 13 30 1 0
PS AO CAREGGI 2 25 29 8 0
PS SANTA MARIA NUOVA 0 11 25 3
Firenze Energia e Colonnine HD
(demo, dati simulati)
Sat 10 Jun @ 22:48:16
Fast Recharge Status
Fast Recharge Week trend
EMS position
EMM Actual Status
EMM Week trend
EMM position
Accumulated Energy
Accumulated Energy Weekly Trend
Energy Consumption
Energy Consumption Weekly Trend
Firenze Sociale e Social Media (HD)
(dati non completi)
Citazioni Twitter
#NEWS #FIRENZE
#UFFIZI
#PONTEVECCHIO
#CULTURA #FIRENZE
#DUOMO #FIRENZE
#TURISMO #FIRENZE
#FIRENZECARD
#FIRENZE #RIFIUTI
#LOROCIUFFENNA
@UNI_FIRENZE
@MUSEOFIRENZE
@NAZIONE_FIRENZE
@HUBFIRENZE
@ILSITODIFIRENZE
@FIRENZETURISMO
@PROTCIVCOMUNEFI
@FIRENZEATAF
@NOVEDAFIRENZE
Eventi a Firenze oggi
COSTA SAN GIORGIO 2
ROBOT FEVER - IL SAMURAI NELL'ERA DEL CHOGOKIN
VIA FEDERIGO STIBBERT 26
NERO SU NERO. DA FONTANA E KOUNELLIS A GALLIANI
Cam Duomo
Cam P.Vecchio
Cam Piazzale
Cam S.Croce
Cam Signoria
Cam Repubbl.
Cam Trinita
Cam Firenze 1
Cam Firenze 2
Firenze Mobilità e Trasporti HD
(demo, dati non completi)
Sat 10 Jun @ 22:46:34
Posizione Bus ATAF
Flusso traffico in Firenze
Eventi traffico Firenze
CHIUSURA TRATTO STRADALE 09/06/2017 14:10:00
MANIFESTAZIONI SPORTIVE 09/06/2017 14:10:00
CHIUSURA TRATTO STRADALE 09/06/2017 14:10:00
INCIDENTE IN EMPOLI, VIALE FRANCESCO... 08/06/2017 11:19:00
TRAFFICO BLOCCATO IN FIRENZE, VIA PIETRO... 08/06/2017 11:18:00
MATERIALE OLEOSO SULLA STRADA IN FIRENZE... 08/06/2017 11:16:57
Previsione giornaliera disponibilità parcheggi
Traffic Flow Reconstruction in Florence
Stato Parcheggio SMN
Stato Parcheggio Mercato Centrale
Stato Parcheggio Parterre
Stato Parcheggio Fortezza
Disponibilità Parcheggio Merca...
Previsione disponibilità parcheggio Mercato Centrale (in %)
Disponibilità Parcheggio SMN
Previsione disponibilità parcheggio SMN (in %)
100 %
0 %
55.94 %
44.06 %
Free
Complementary
http://www.km4city.org/?controlRoom#realtimeData

First aids overview - Tuscany

Service status of main first aids

Thu 25 May @ 11:00:34

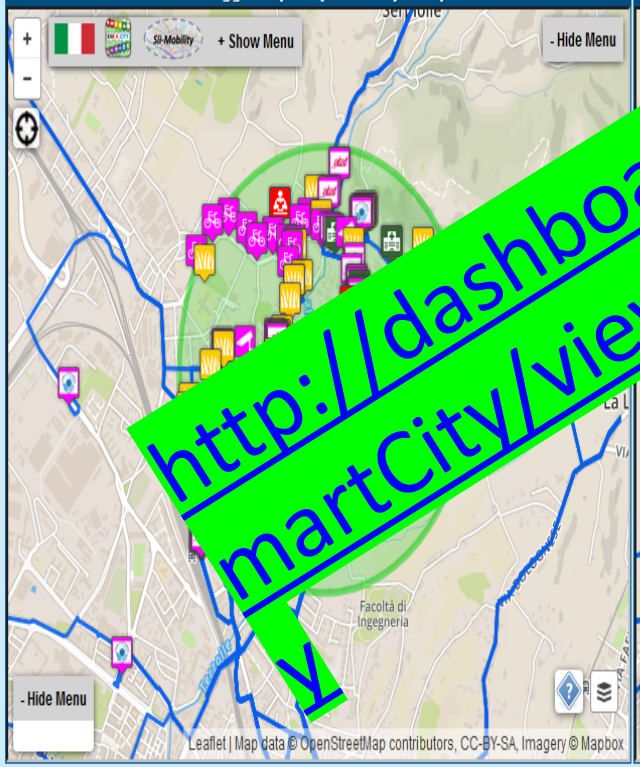
Careggi hospital (Florence) - Details

Priority\Status	Red code	Yellow code	Green code	Blue code	White code
Addressed	1	4	3	0	0
Waiting	0	2	9	2	0
In visit	1	9	18	3	0
In observation	4	19	2	0	0
Totals	6	34	32	5	0

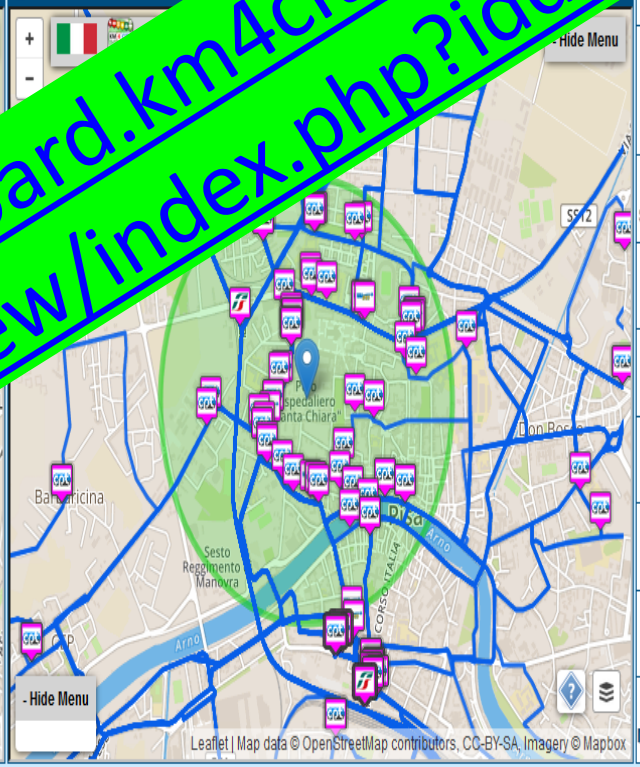
Santa Chiara hospital (Pisa) - Details

Priority\Status	Red code	Yellow code	Green code	Blue code	White code
Waiting	0	1	7	9	
In visit	0	7	1		
Totals	0	8			

Careggi hospital (Florence) - Map



Santa Chiara hospital (Pisa) - Map



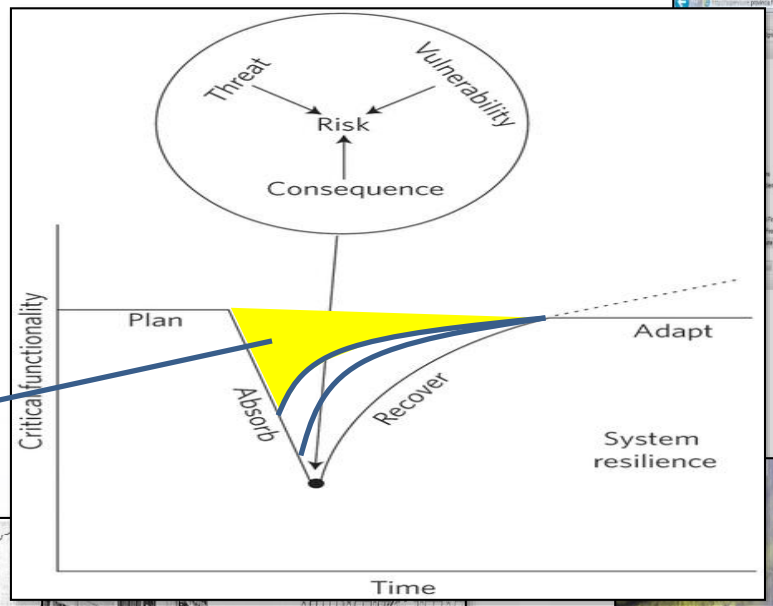
Summary

Priority\Hospit					
			Green code	Blue code	White code
			20	1	0
	1	14	12	3	0
PS AO CAREGGI	6	34	32	5	0
PS SANTA MARIA ANNUNZIATA	1	8	11	1	0
PS BORGO SAN LORENZO	0				0
PS OSPEDALI RIUNITI	3				1
PS CASENTINO					
PS SANTA CROCE					
PI PO CORTONA					
PS CIVILE PIOMBINO					
PS LA MISERICORDIA					

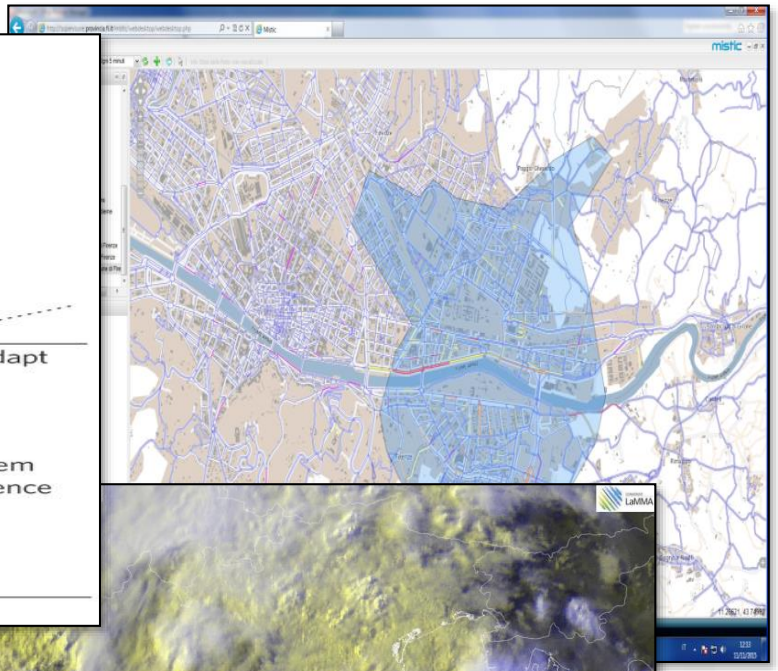
City Resilience

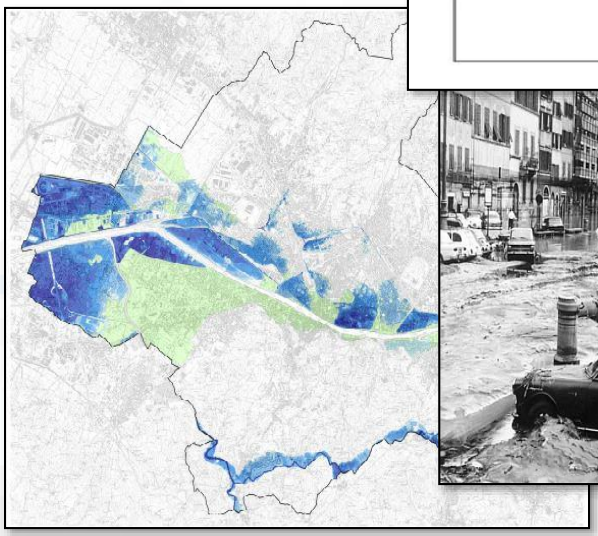
Early warning, detection

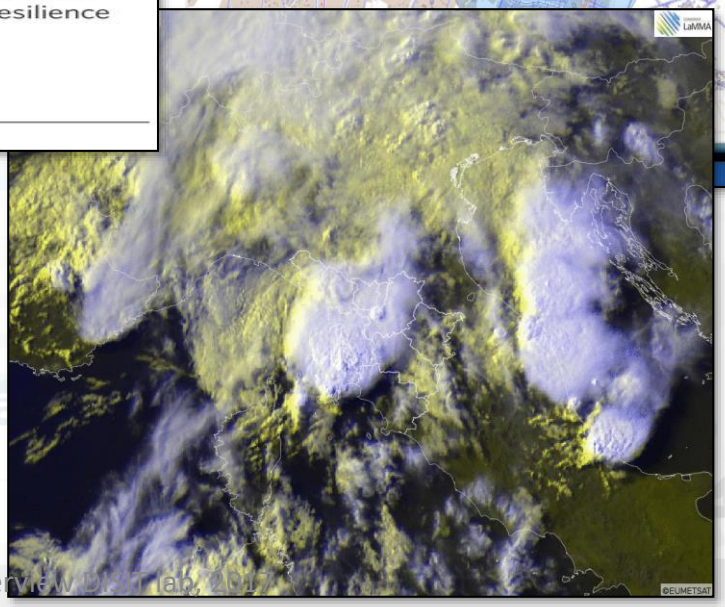
Prepare
Absorb
Recover
Adapt

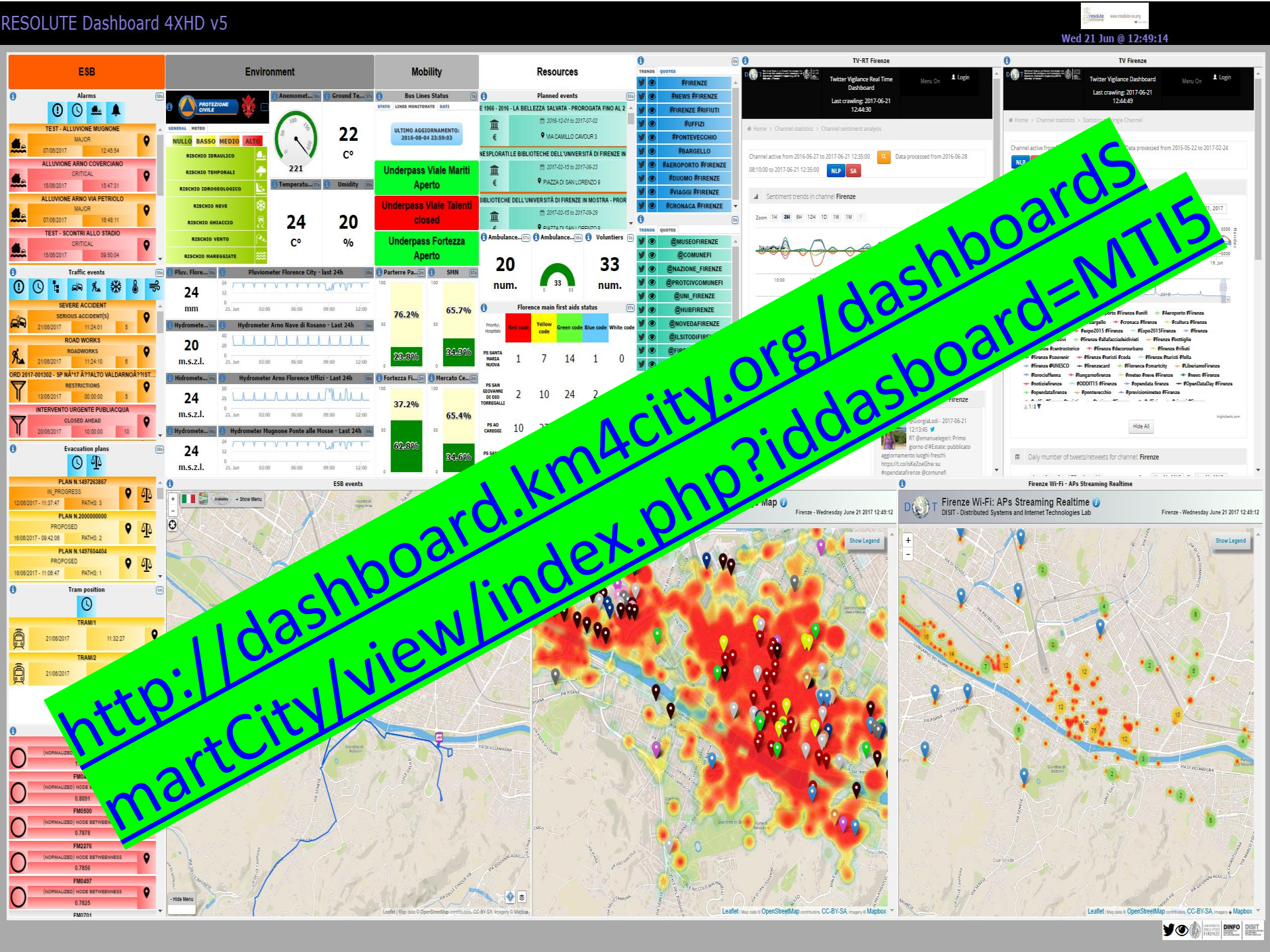


dama ge








RESOLUTE Dashboard 4XHD v5
Wed 21 Jun @ 12:49:14
ESB
Environment
Mobility
Resources
TV-RT Firenze
TV Firenze
ESB events
Firenze Wi-Fi: APs Streaming Realtime
DISIT - Distributed Systems and Internet Technologies Lab
http://dashboard.km4city.org/dashboards
martCity/view/index.php?iddasboard=MTI5

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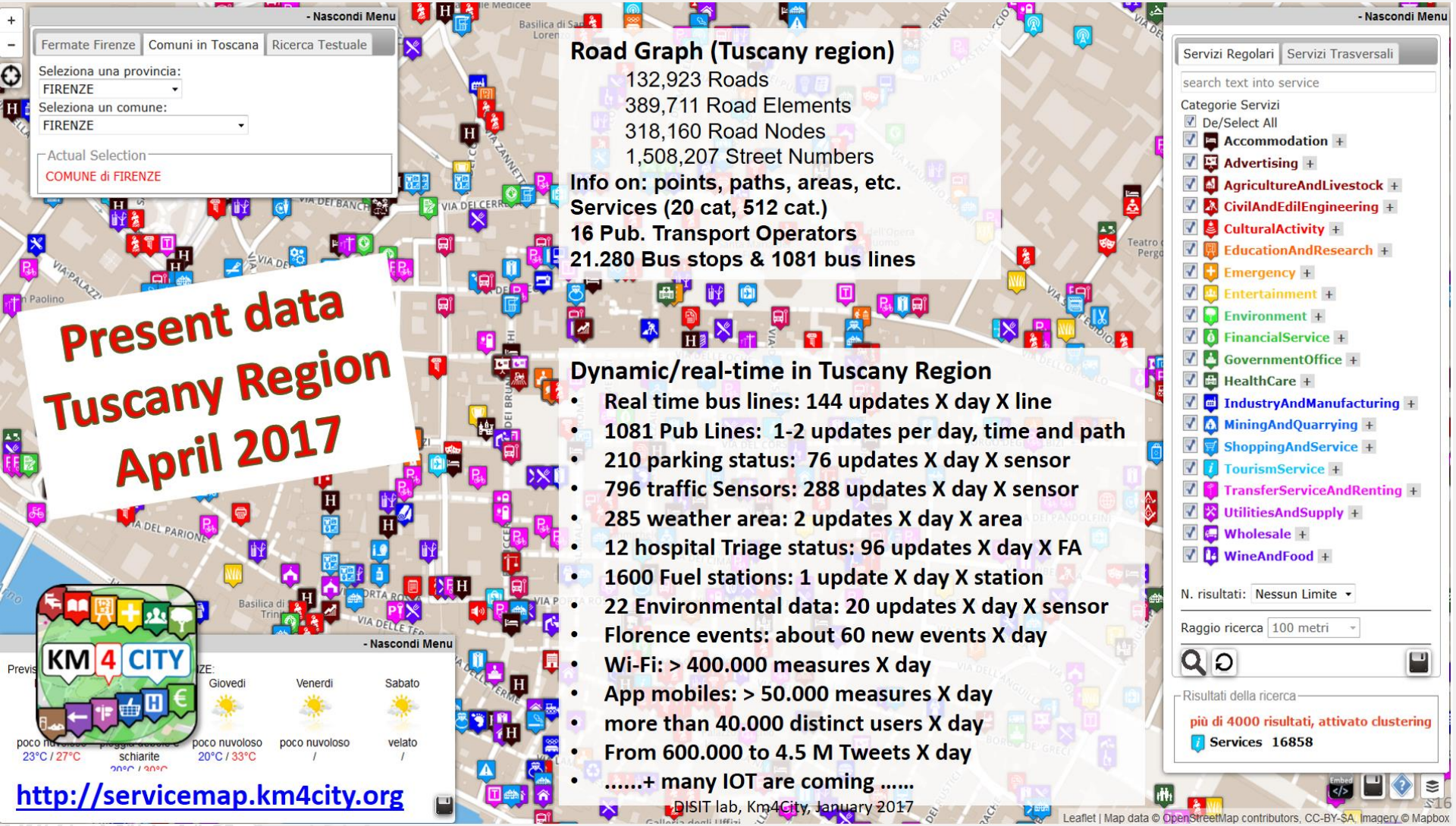
http://www.disit.dinfo.unifi.it

Smart City

http://www.km4city.org



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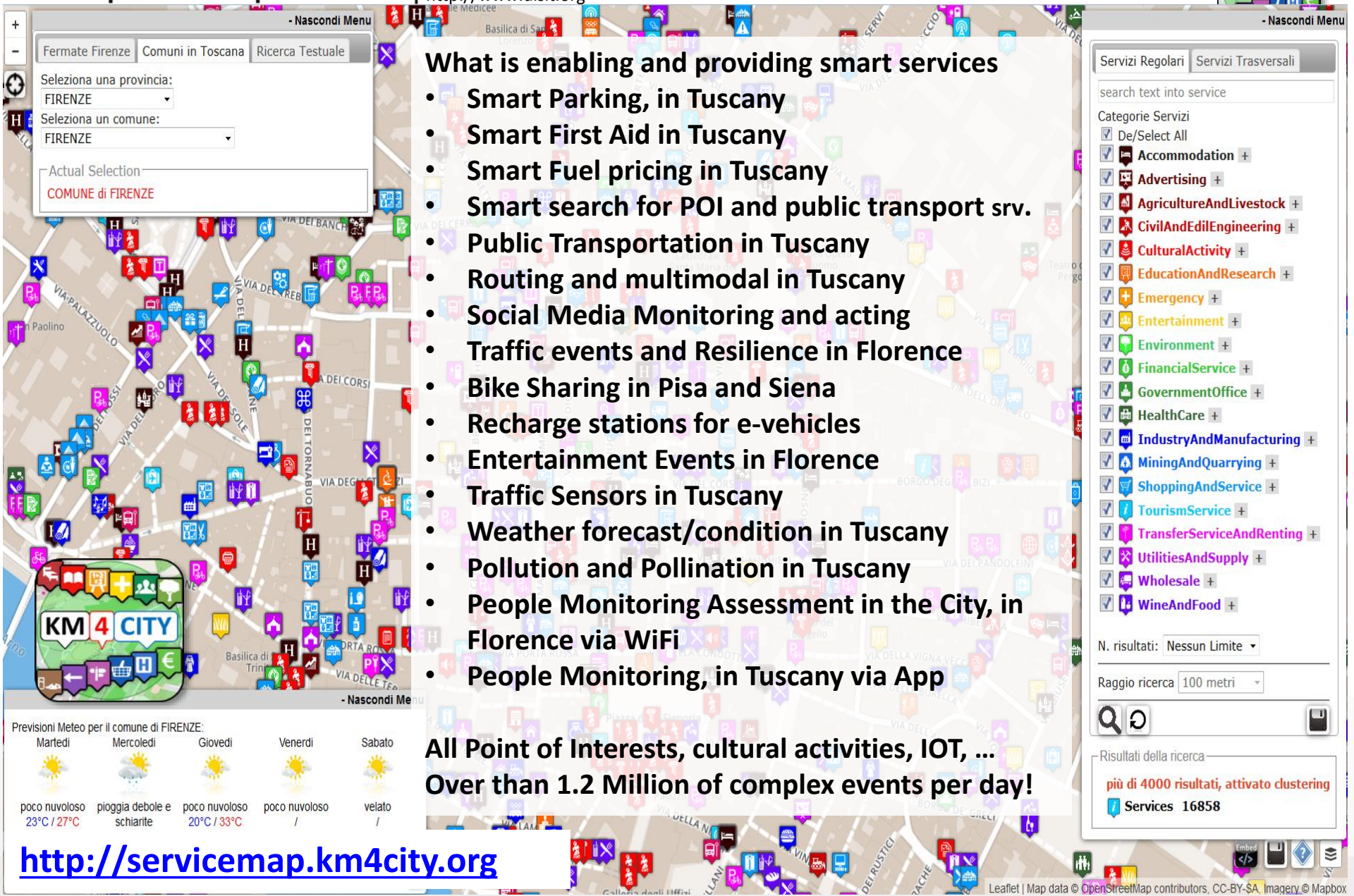
http://www.disit.org

KM 4 CITY



What is enabling and providing smart services

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

All Point of Interests, cultural activities, IOT, …

Over than 1.2 Million of complex events per day!

http://servicemap.km4city.org

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Smart City

- **Smart City of Florence Metropolitan Area**
- **Km4City**: http://www.km4city.org
- **RESOLUTE H2020, EC:**
  - http://www.resolute-eu.org
- **REPLICATE H2020, SCC1, EC flagship**
  - http://replicate-project.eu/
- **Sii-Mobility SCN MIUR**:
  - http://www.sii-mobility.org
- **Coll@bora Social Innovation, MIUR.**
  - http://www.disit.org/5479
- **TRACE-IT, RAISSS, TESYSRAIL, ….**
- **Mobile Emergency:**
  - http://www.disit.org/5404

Trace-IT

RAISSS

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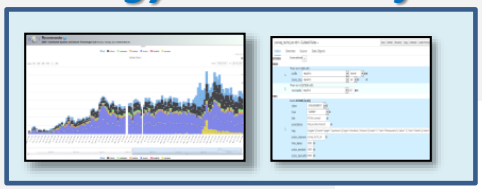
Feedback Project

Personal Assisstant

Operators

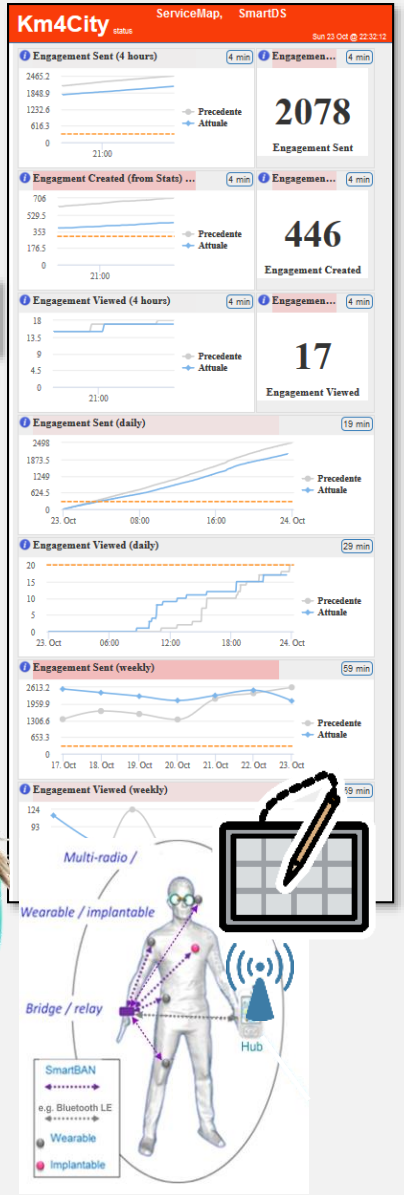
Strategy Editor and feedback



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 Flore
daily_event_en	ENGAGEMENT	1720 (2.12%)	70 (7.1%)	4.07%	Suggest (in english) an event currently on in Florence
	- commuter	5 (0.29%)	0 (0%)	0 (0%)	
	- student	14 (0.81%)	0 (0%)	0 (0%)	
	- tourist	1462 (85%)	25 (35.71%)	25 (1.71%)	
	- citizen	113 (6.57%)	39 (55.71%)	39 (34.51%)	
	- operator	0 (0%)	0 (0%)	0 (0%)	
	- disabled	0 (0%)	0 (0%)	0 (0%)	
	- all	119 (6.92%)	6 (8.57%)	6 (5.04%)	
daily_event_es	ENGAGEMENT	6 (0.01%)	4 (0.41%)	66.67%	Suggest (in spanish) an event currently on in Florence
daily_event_fr	ENGAGEMENT	6 (0.01%)	0 (0%)	0%	Suggest (in french) an event currently on in Florence
daily_event_it	ENGAGEMENT	5459 (6.73%)	296 (30.02%)	5.42%	Suggest (in italian) an event currently on in Florence
parking_en	ASSISTANCE	141 (0.17%)	128 (12.98%)	90.78%	Alert (in english) if the user parked in a residential parking zone
parki					parked in a residential parking zone
parkin					parked in a residential parking zone
shoot					ion for a nearby point-of-interest

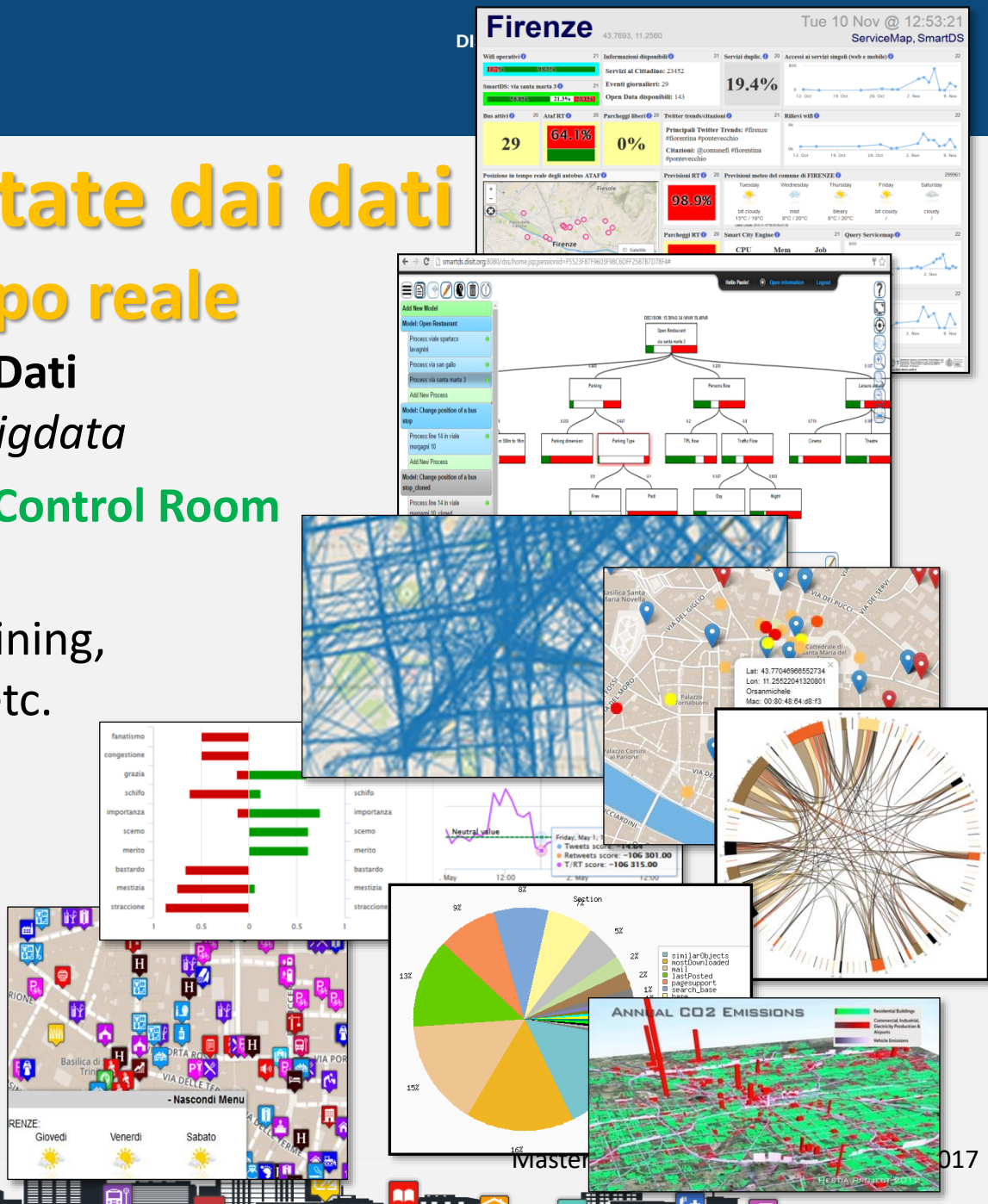
Inform
Engage
Stimulate / recommend
Anomalies Detection
Provide Bonus, incentives

IOT/IOE



Decisioni supportate dai dati periodiche ed in tempo reale

- **Condivisione e Integrazione Dati multidominio:** *semantica e bigdata*
- **Dati →Smart City Engine → Control Room**
- **analisi**: monitoraggio, flussi e comportamenti, sondaggi, mining, correlazioni, cause – effetti, etc.
  - Per il miglioramento di servizi correnti
  - Per reagire ad eventi, incremento della resilienza,
  - Per la creazione servizi innovativi
  - …

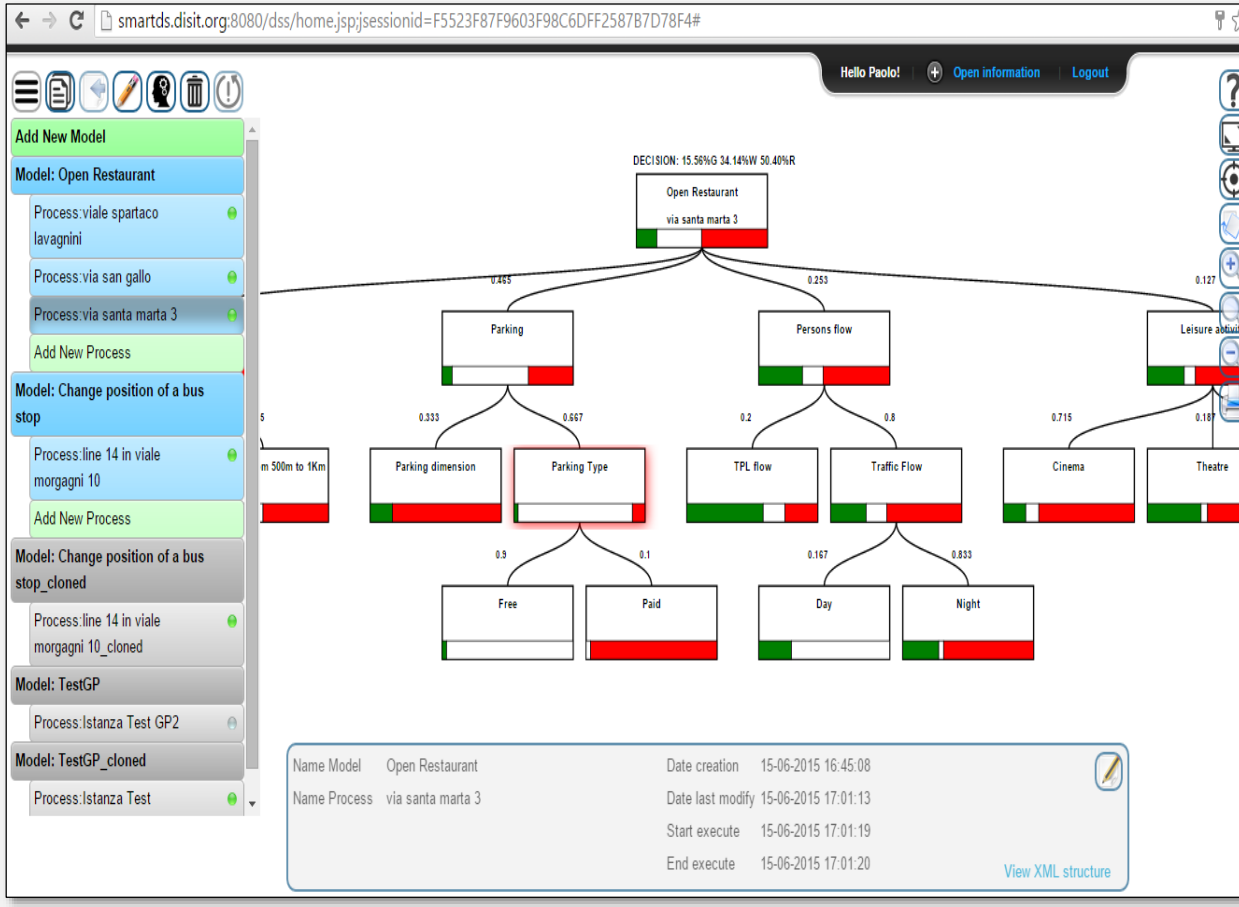


Smart City Decision Support

- ***Smart Decision Support System*** *based on System Thinking plus*
- Actions to city reaction, resilience, smartness..

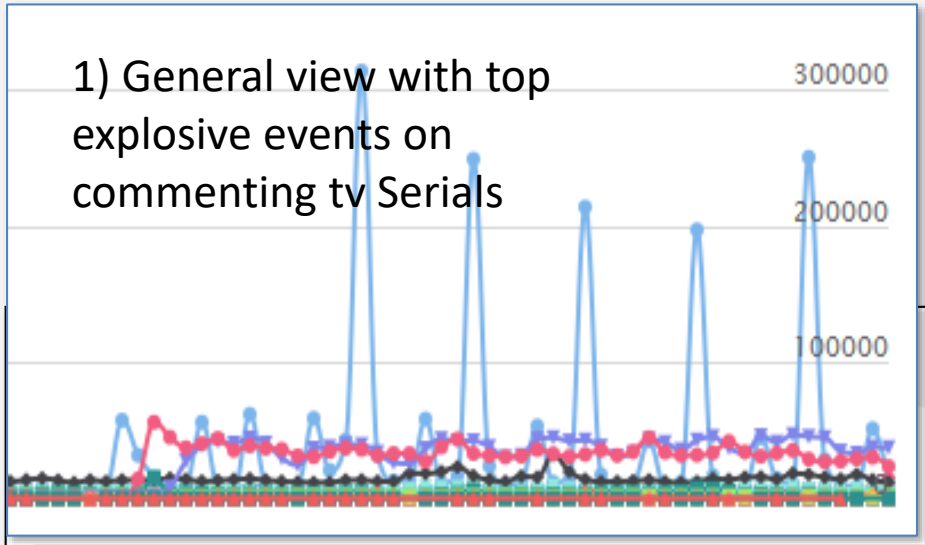
Enforcing

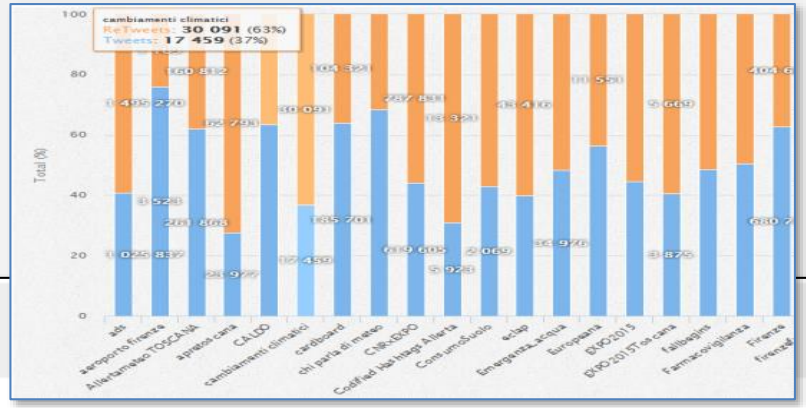
- Mathematical model for propagation of decision confidence..
- Collaborative work…,
- Processes connected to city data: DB, RDF Store, Twitter, etc.
- Production of alerts/alarms
- Data analytics process
- Twitter Processes
- reuse, copy past, …



All Channels (private information)

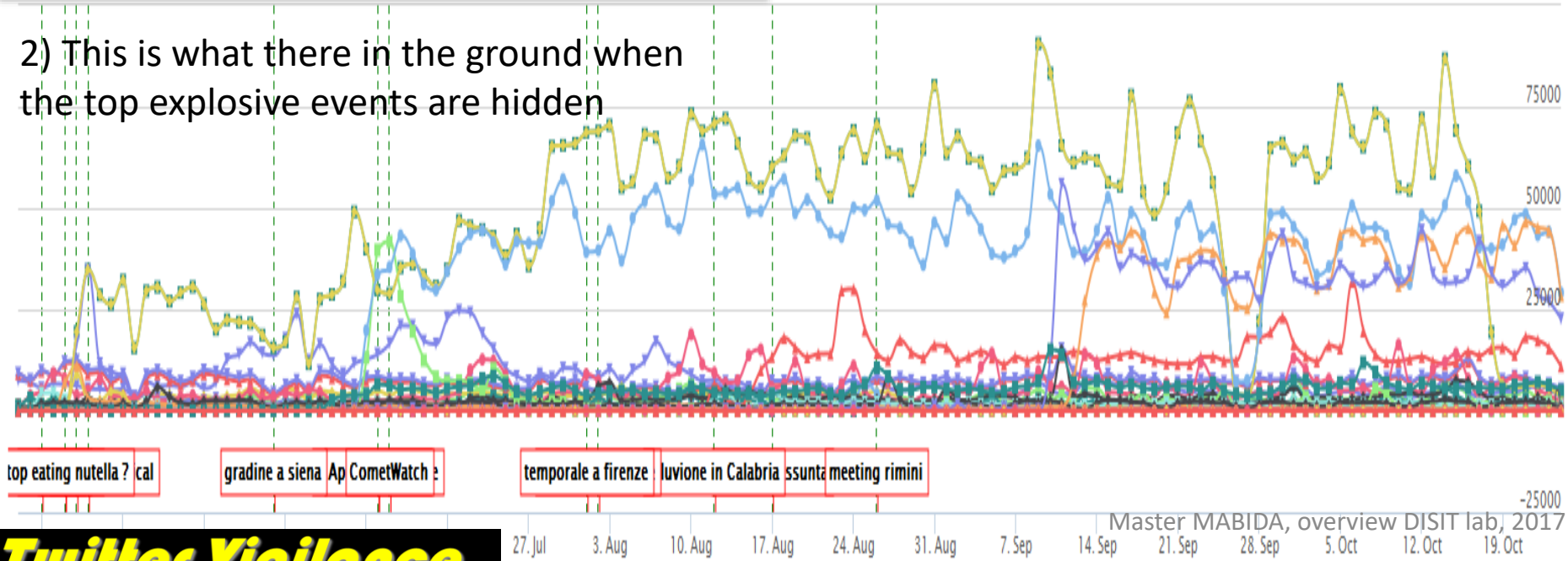
1) General view with top explosive events on commenting tv Serials





From Jun 12, 2015 To Oct 24, 2015

2) This is what there in the ground when the top explosive events are hidden



Twitter Vigilance

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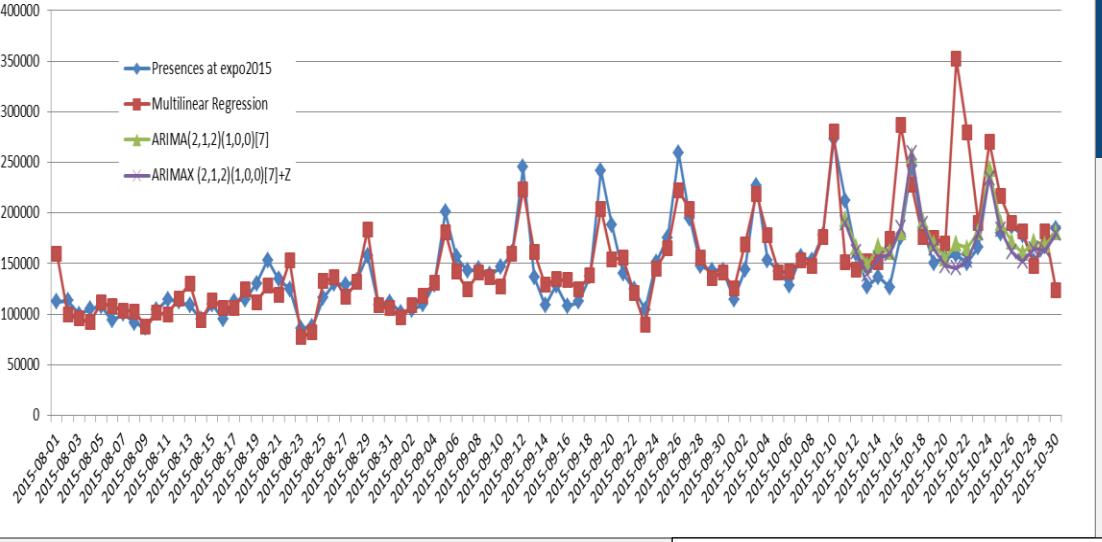
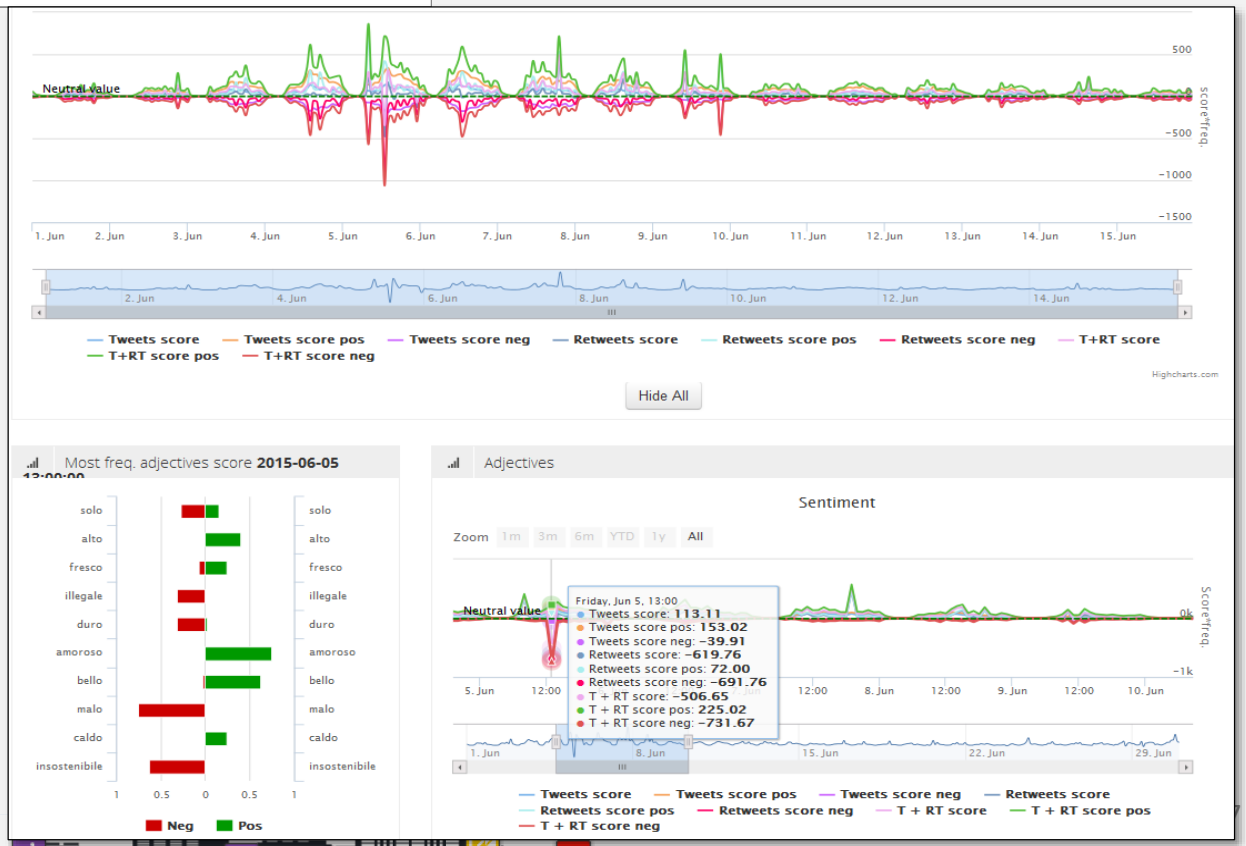
Modelli predittivi

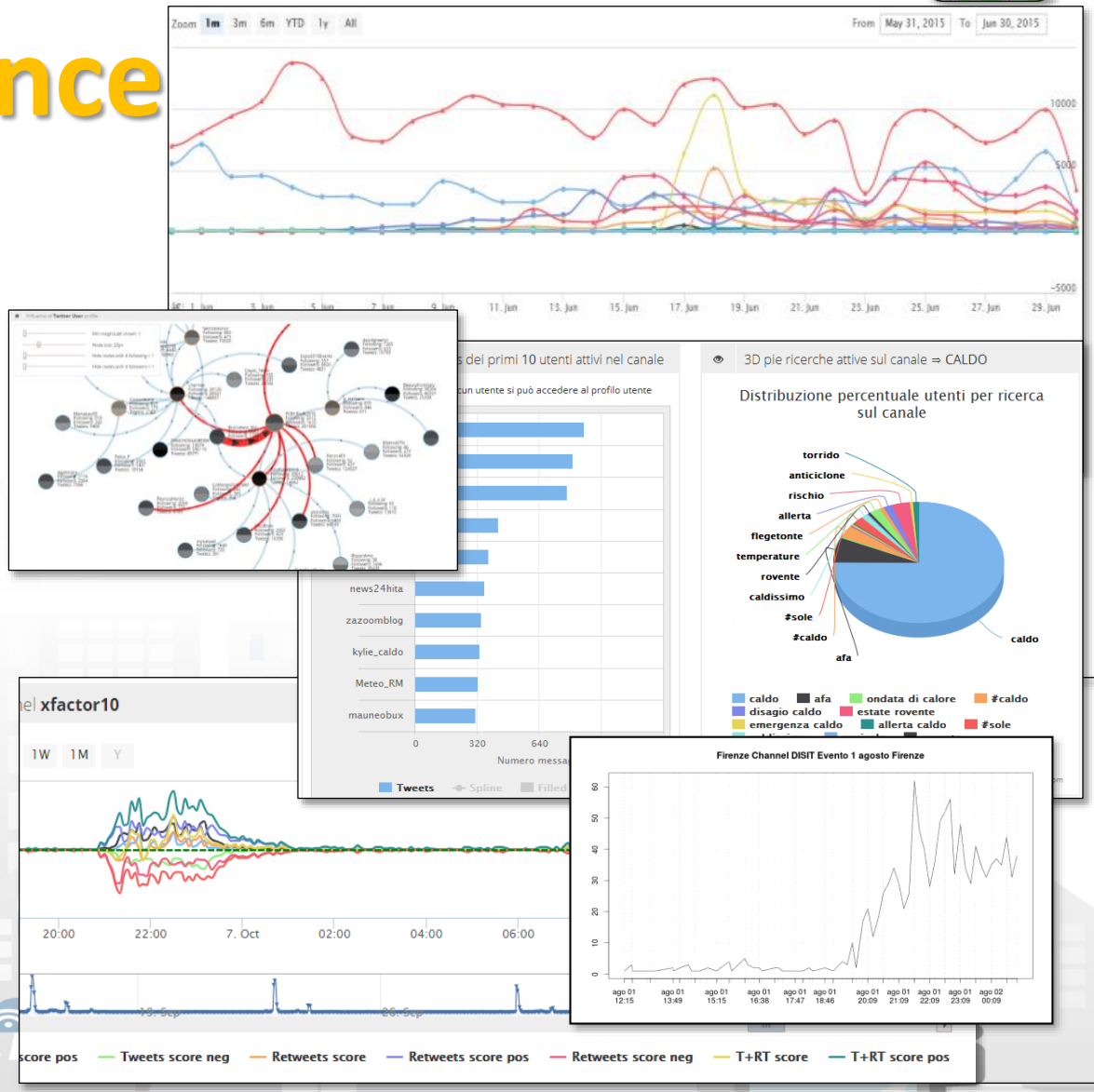


Sentiment Analisis



Twitter Vigilance

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



Twitter Vigilance

Toscana dove cosa, ...

- Tutta la Toscana
- Personalizzabile
- Profilata per tipo di utente

- Trasporto pubblico
- Traffico, percorsi, navigazione
- Parcheggi liberi
- Costi benzina
- Suggerimenti
- Assistenza
- Protezione civile
- Meteo
- Biglietti bus
- Punti di Interesse
- Contributi degli utenti

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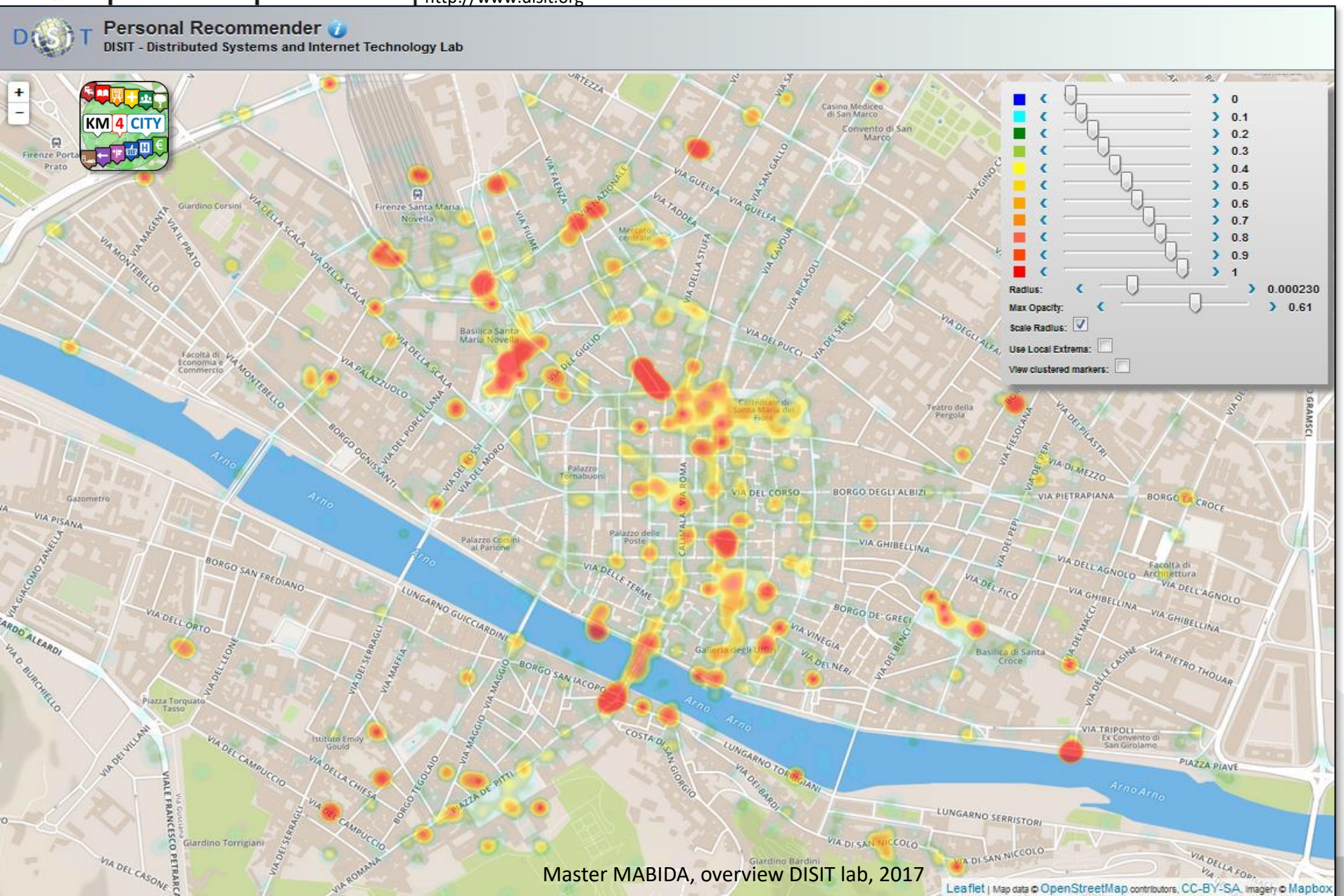
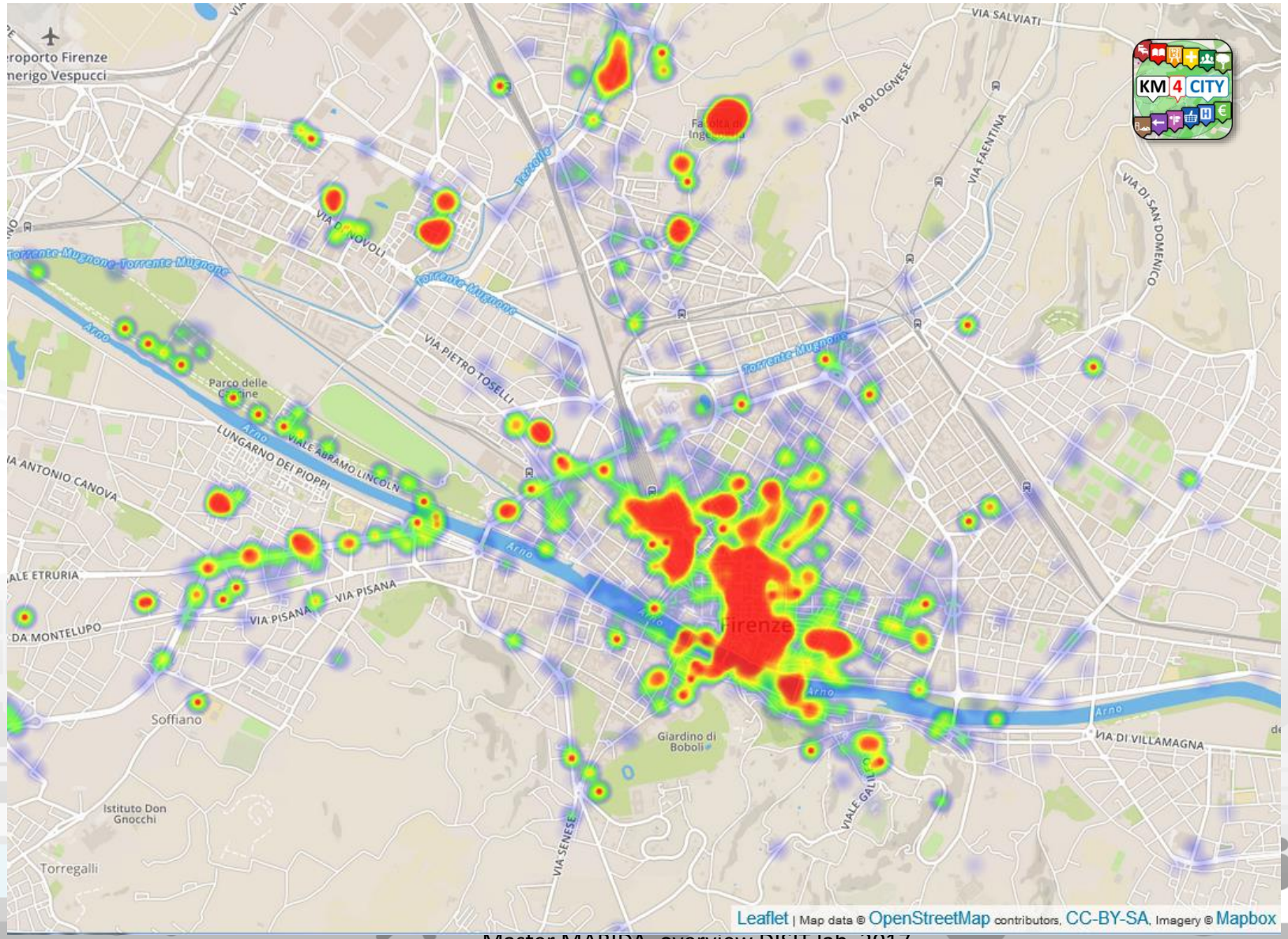
Tourists in Florence



Master MABIDA, overview DISIT lab, 2017

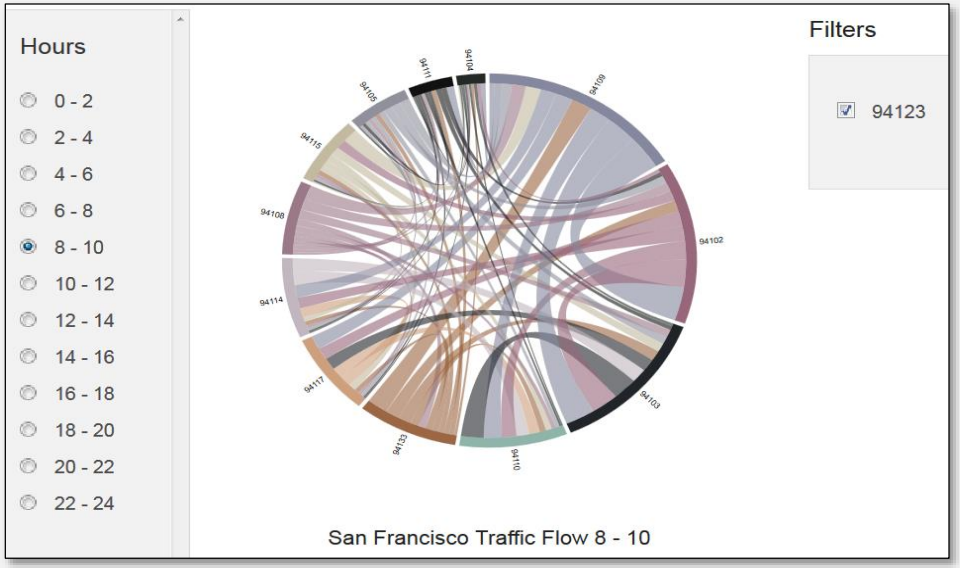
Hot WiFi in Florence

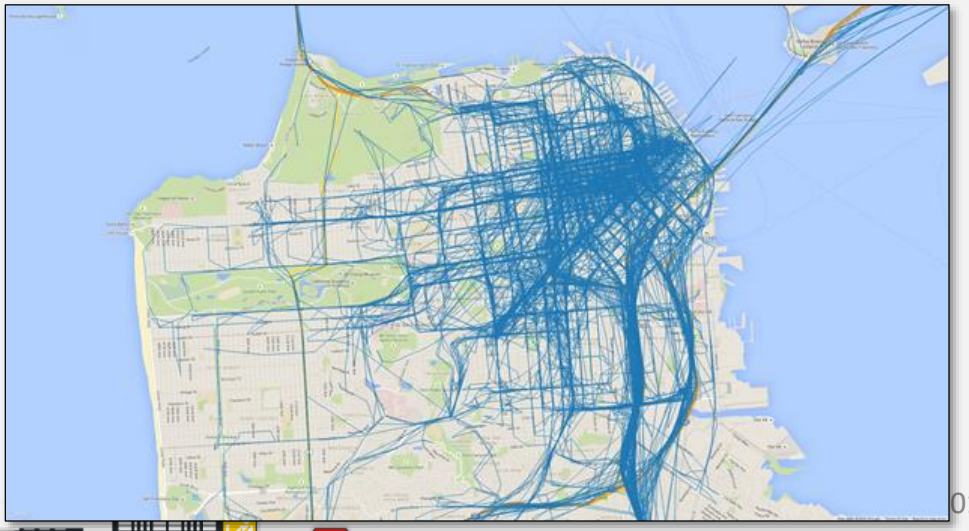


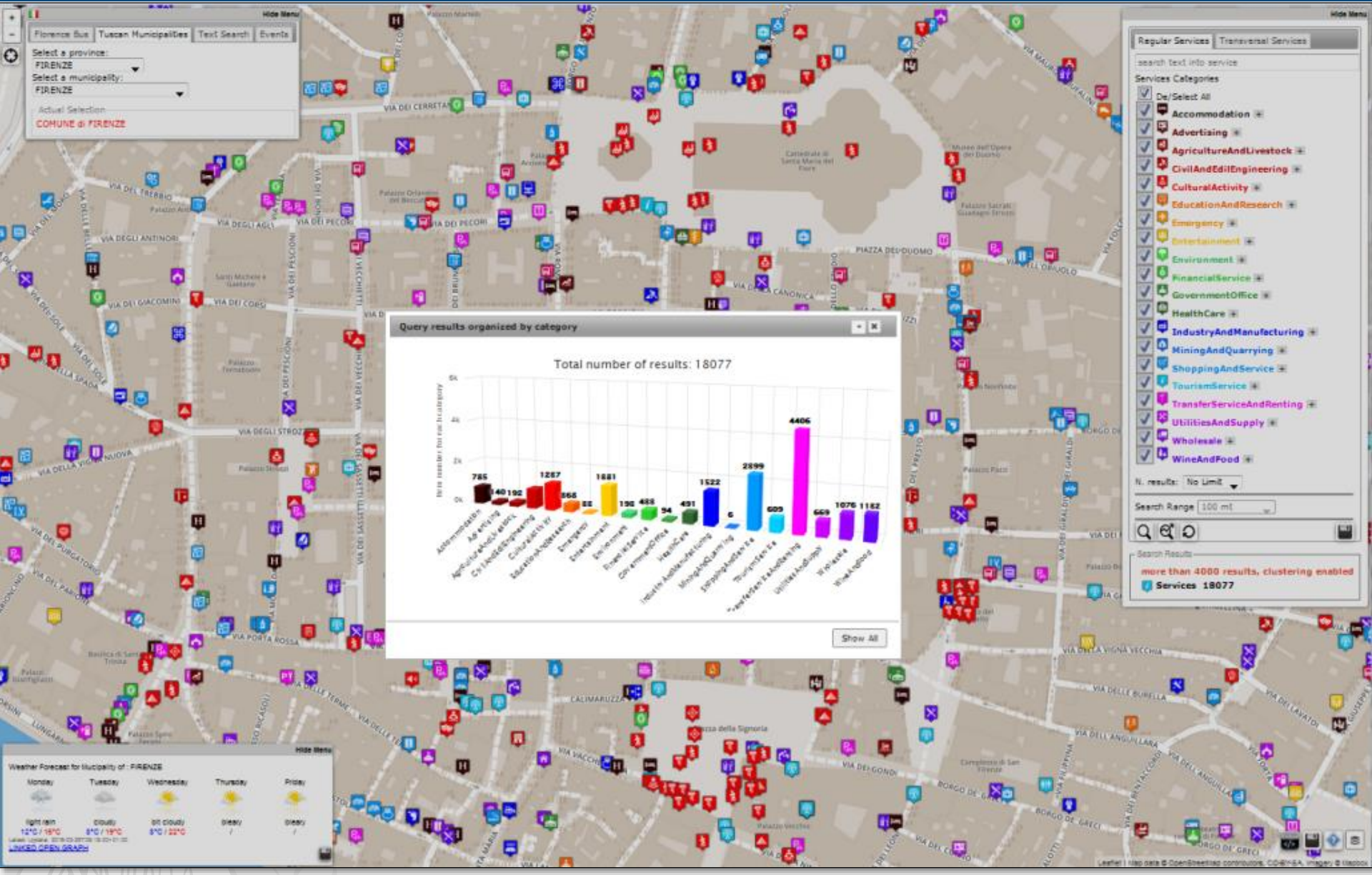
Traffic and People Flow Assessment

- **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

http://www.disit.org/6694



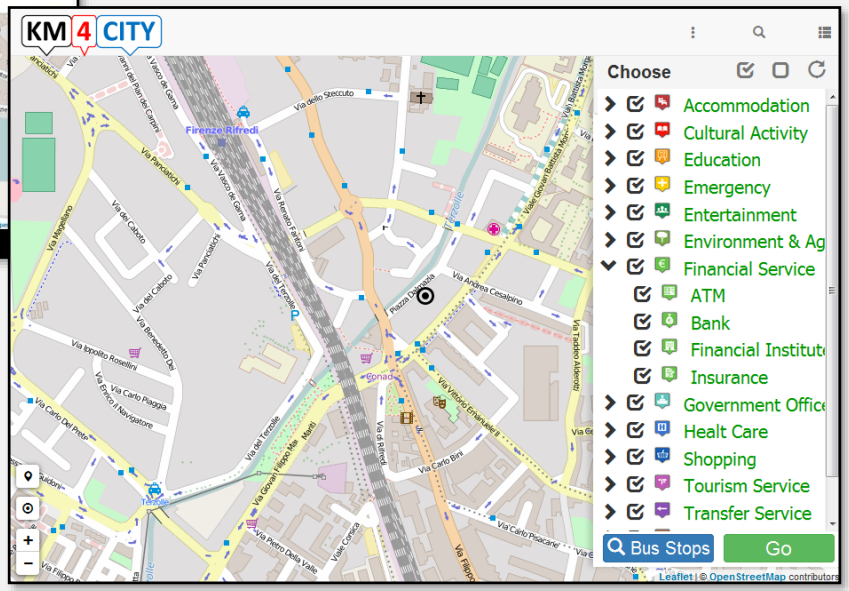



Florence Bus
Tuscan Municipalities
Text Search
Events
Select a province:
FIRENZE
Select a municipality:
FIRENZE
Actual Selection
COMUNE di FIRENZE
Query results organized by category
Total number of results: 18077
Show All
Regular Services
Transversal Services
Services Categories
Accommodation
Advertising
AgricultureAndLivestock
CivilAndEdilEngineering
CulturalActivity
EducationAndResearch
Emergency
Entertainment
Environment
FinancialService
GovernmentOffice
HealthCare
IndustryAndManufacturing
MiningAndQuarrying
ShoppingAndService
TourismService
TransferServiceAndRenting
UtilitiesAndSupply
Wholesale
WineAndFood
more than 4000 results, clustering enabled
Services 18077
Weather Forecast for Municipality of : FIRENZE

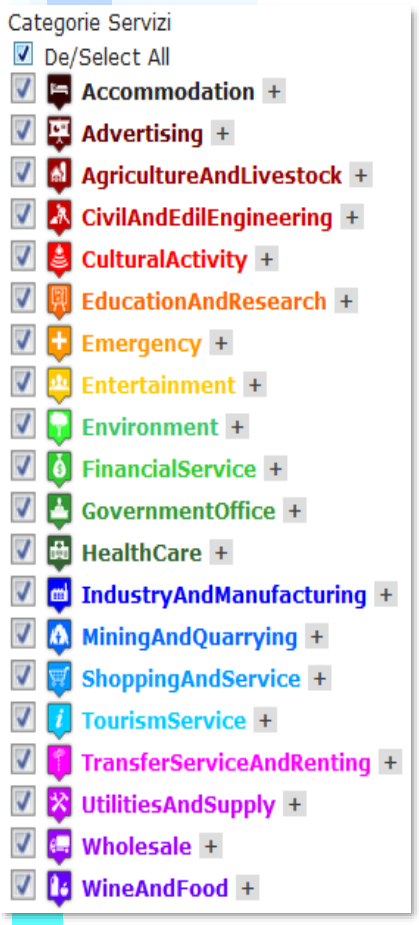
Km4CityMobile App: all stores

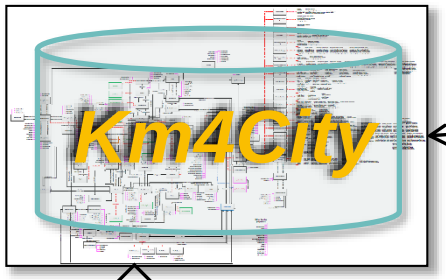
web application

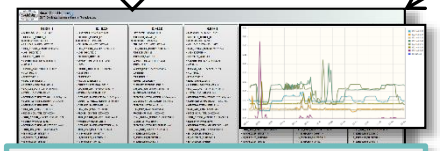
http://www.km4city.org



Proximity Suggestion Architecture







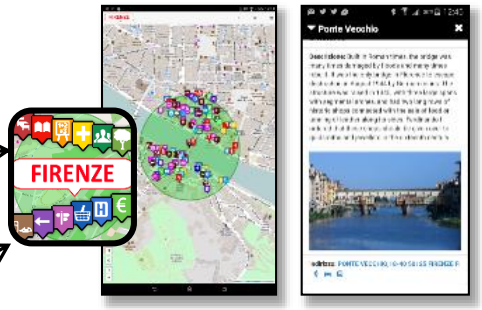
Suggestions on Demand, machine learning

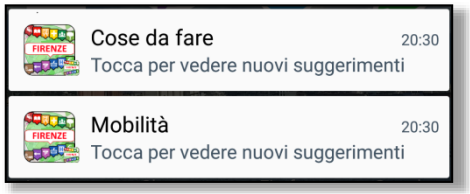
User Profiling Collective Profiling

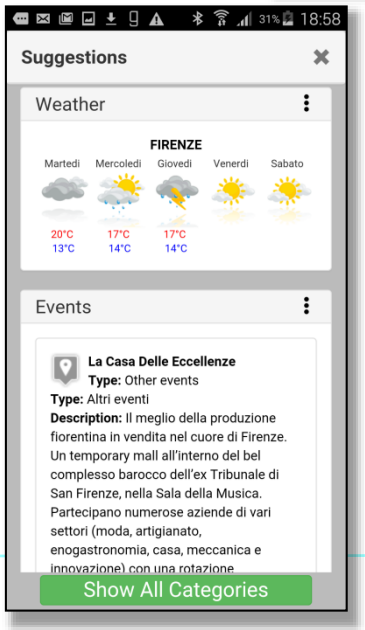
Km4City Smart City API

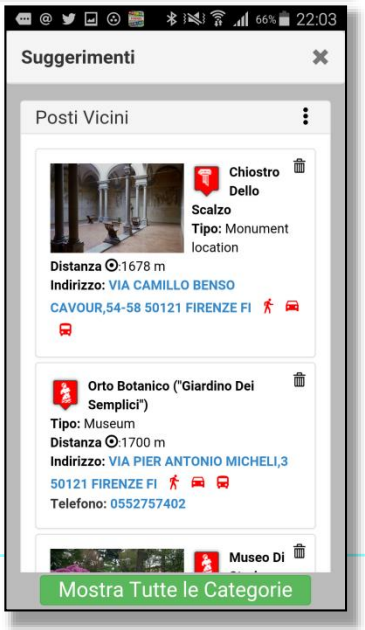
Proximity search

Suggestion request









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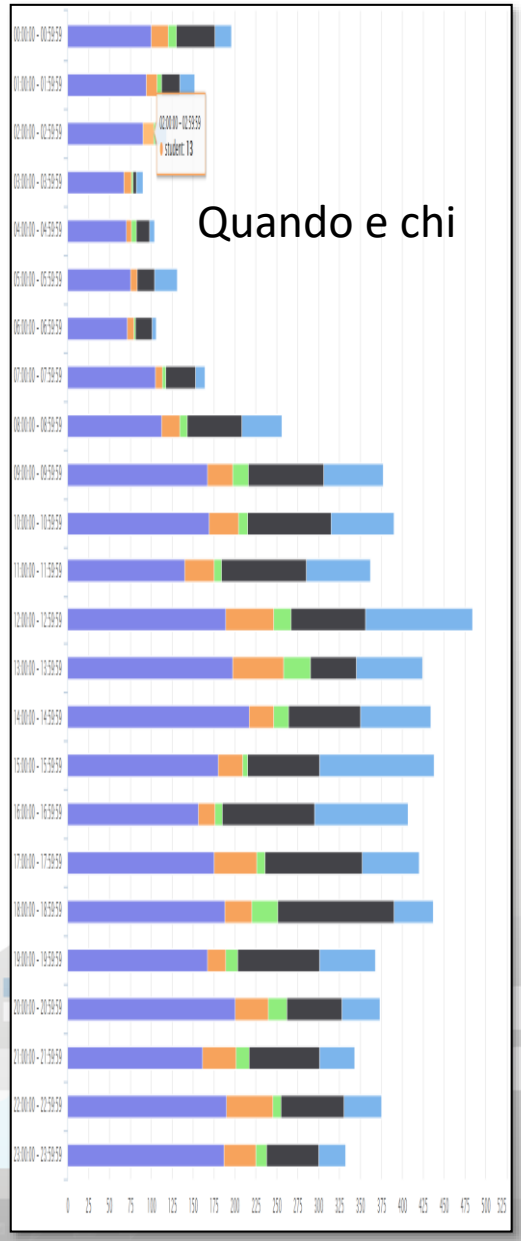
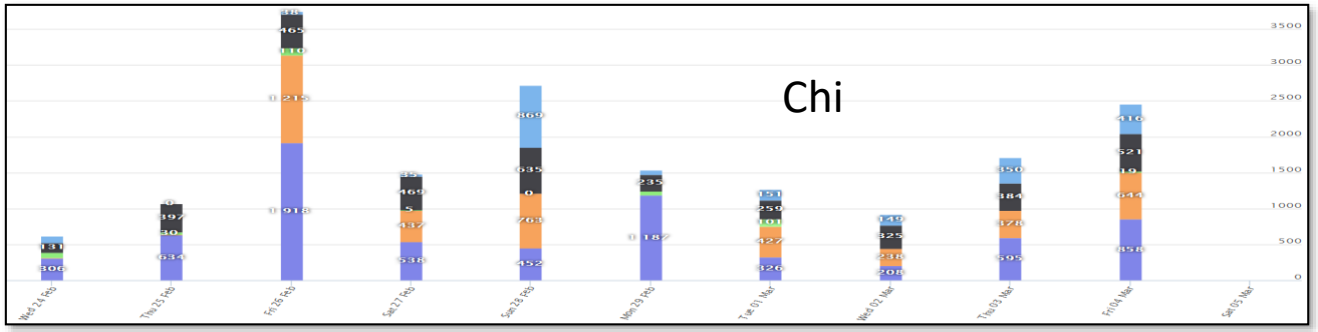
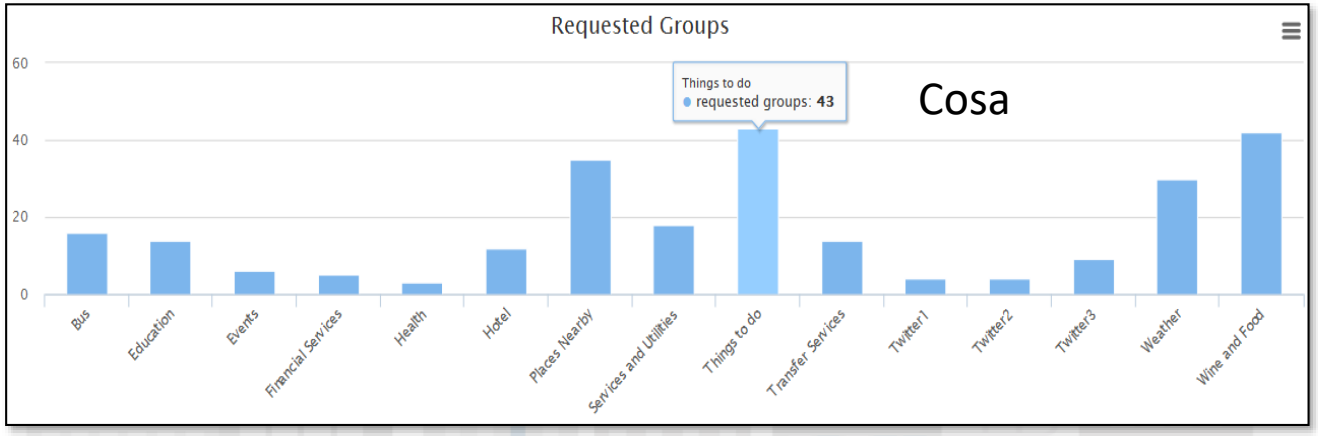
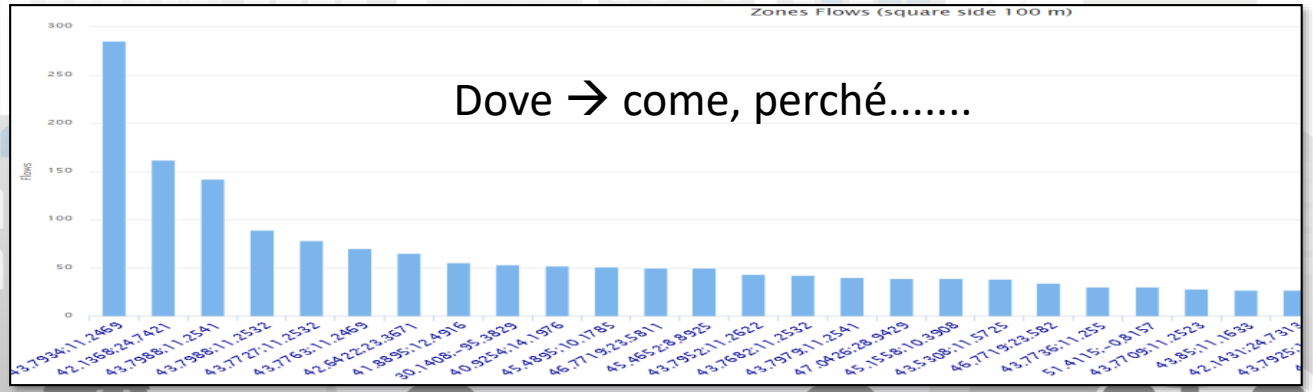
Recommender









Transport systems
Mobility, parking

Public Services
Govern, events,

Sensors, IOT
Cameras, ..

Environment,
Water, energy

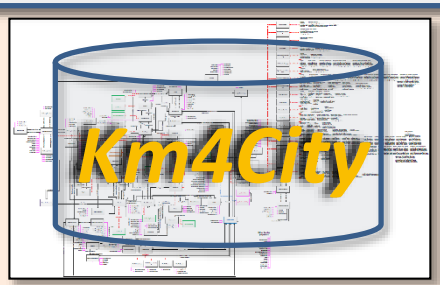
Shops, services,
operators

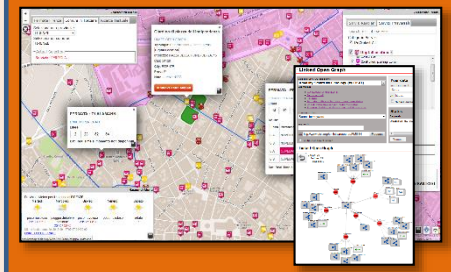
Social Media
WiFi, network

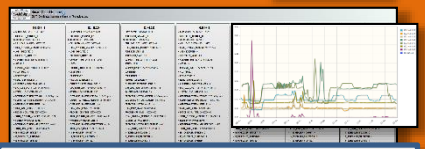
Static, Slow and Real Time data flows

DISCES -- Distributed and parallel architecture on Cloud

Km4City Smart City Engine

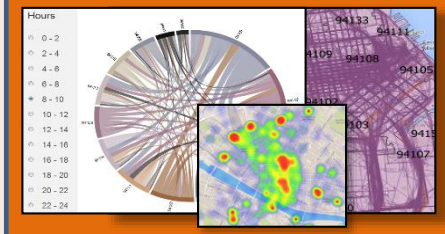






User Profiling and
Suggestions on Demand

Flow and Origin Destination Matrix
Http://www.disit.org/odsf

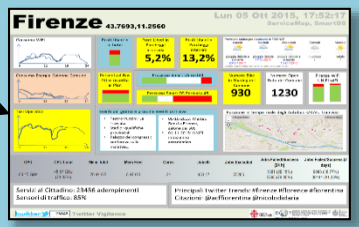


Km4City Tools for Developers

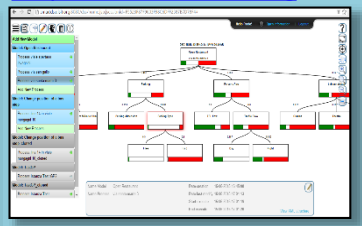
Km4City Smart City API

Tools for City Operators and Decision Makers

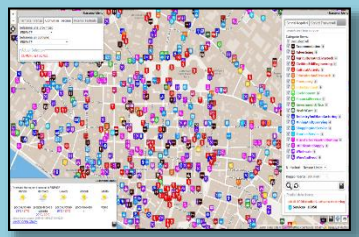
Smart City Dashboard
Http://www.disit.org/dash



Smart Decision Support
Http://Smartds.disit.org

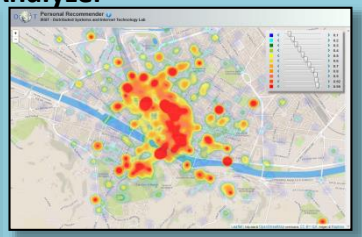


Service map browser
Http://servicemap.disit.org



Twitter Vigilance
Http://www.disit.org/tv

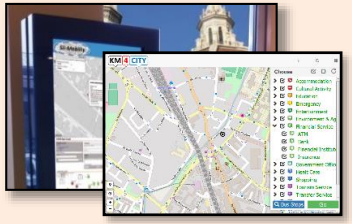
Collective User behavior Analyzer



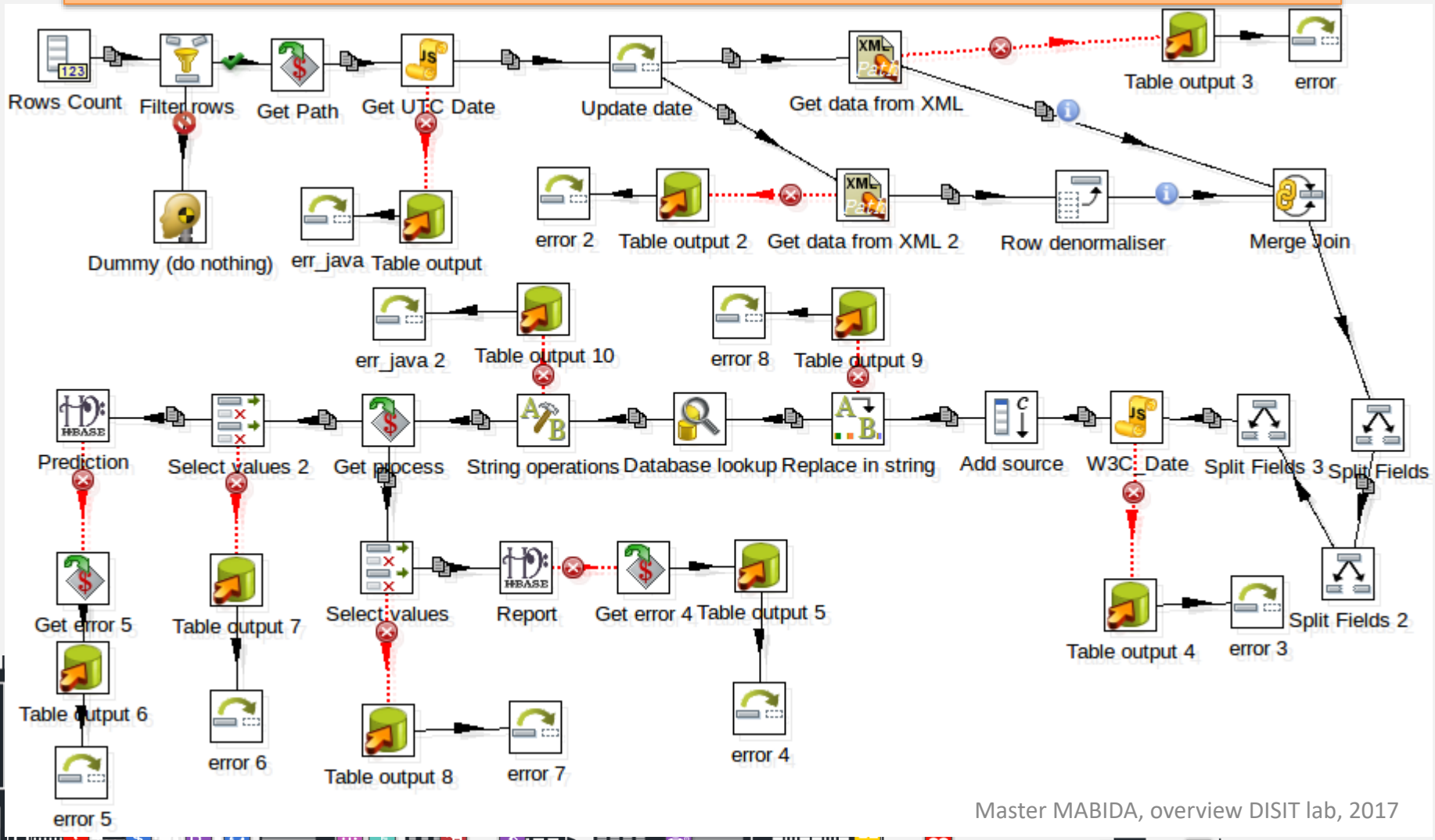
Tools for Final Users

Mobile e Web Apps

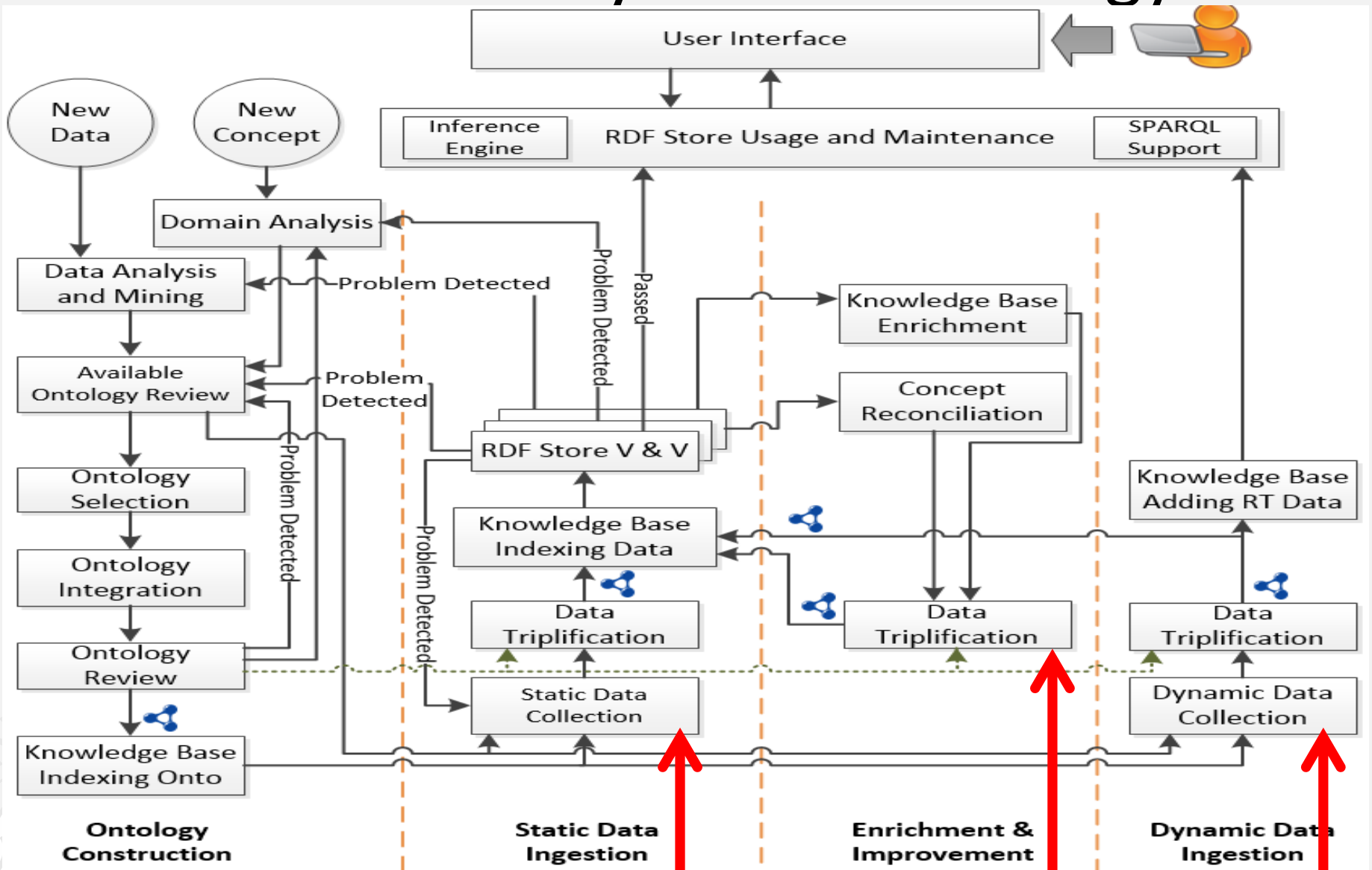
Http://www.km4city.org



Example of Ingestion process



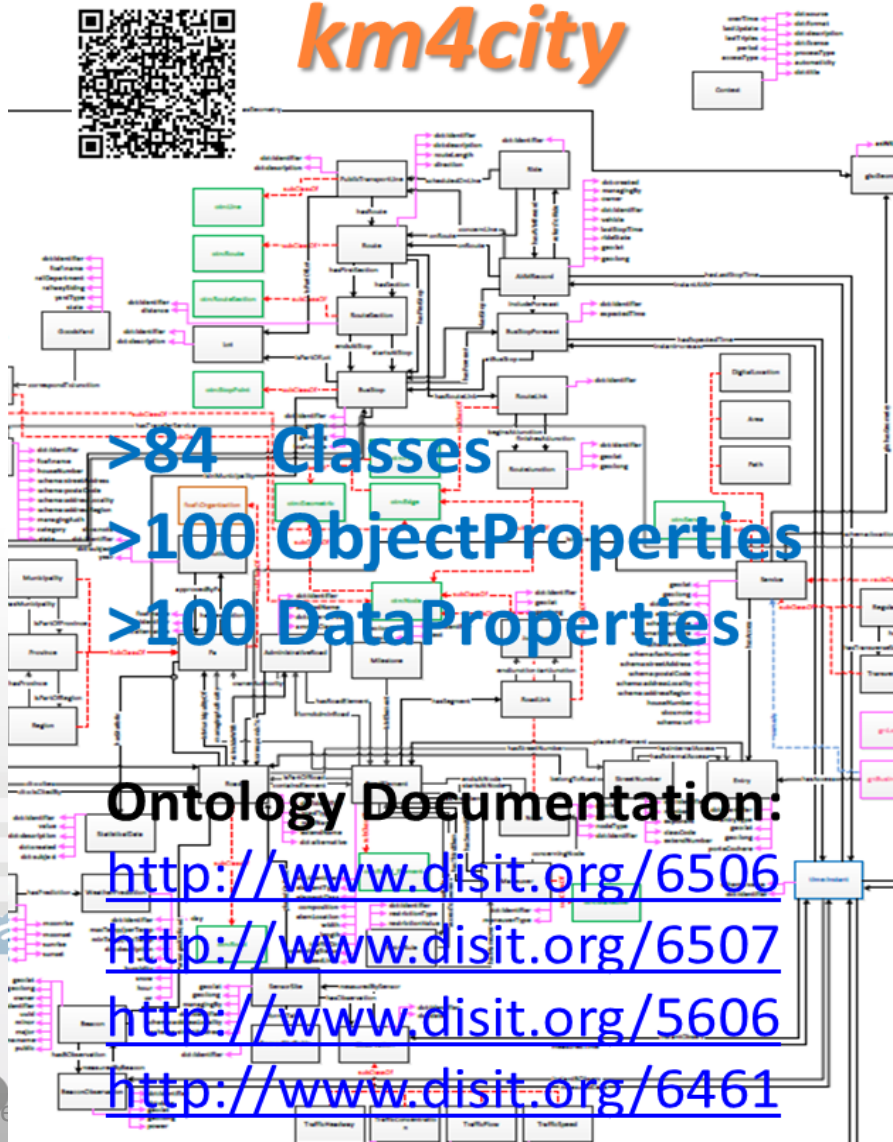
RDF KB life cycle methodology



I Dati

- **Collezionamento dati** statici, quasi statici e real time, stream
  - **Dati open**: geo localizzati, servizi, statistiche, censimenti, etc.
  - **Dati privati degli operatori**: con licenze limitate per non permettere di fare profitto ad altri operatori sulla base dei loro dati
  - **Dati personali delle persone**: profili, comportamenti tramite APP, IOT, sensori, web, etc.
- **Integrazione dati per renderli *semanticamente interoperabili***, ed operare deduzioni (time, space…)
  - I tradizionali ***collettori di open data*** danno visioni statistiche ma **non sono adatti a produrre servizi integrati**
  - ***Integrazione con modelli semantici unificanti come Km4City***

Smart-city Ontology km4city



Ontology Documentation:

http://www.disit.org/6506

http://www.disit.org/6507

http://www.disit.org/5606

http://www.disit.org/6461

Linked Open Graph

log.disit.org/service/?graph=df5b4f67f01b7d96071475d62068e0fe

Linked Open Graph

SiiMobility (by DISIT)

Examples:

- VIA GIACOMO MATTEOTTI
- Bagno a ripoli
- Florence

Choose a class:

Search for keyword

keyword:

uri: http://... Request

Your data

sparql endpoint: (optional)

http://...

uri: http://... Request

Status

Requests:

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

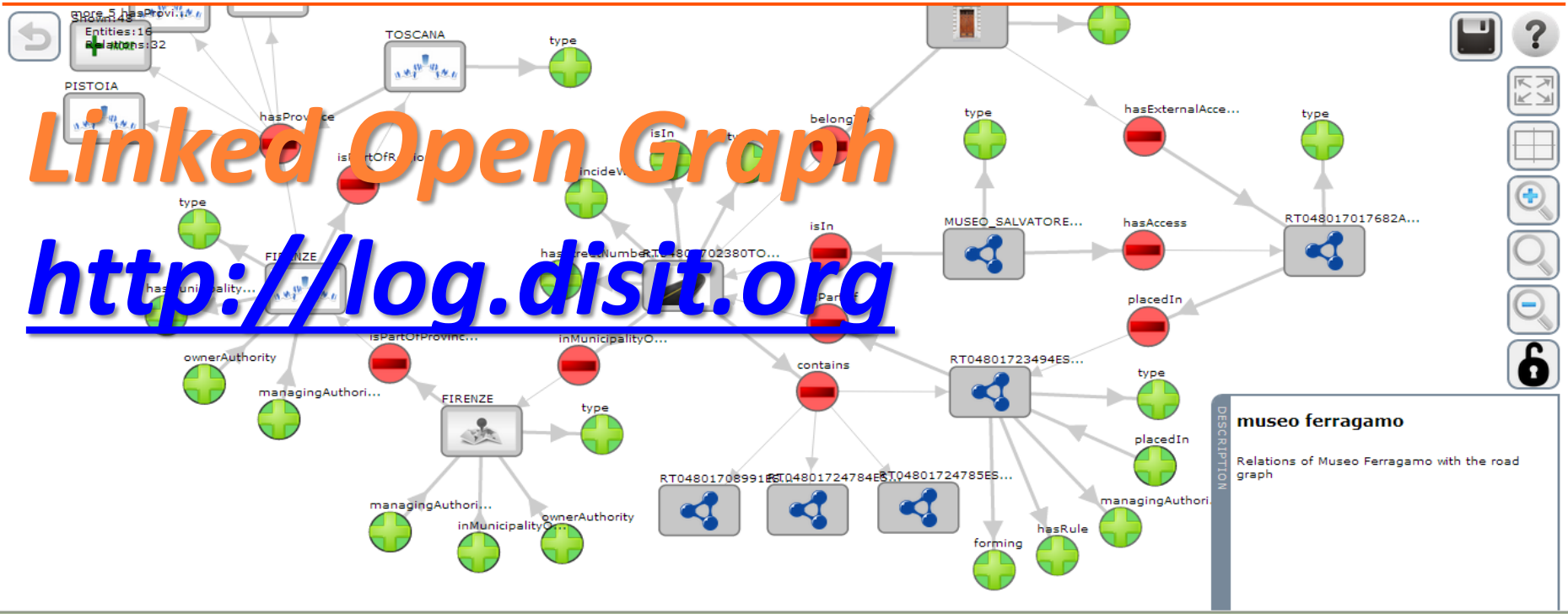
Remove Clear

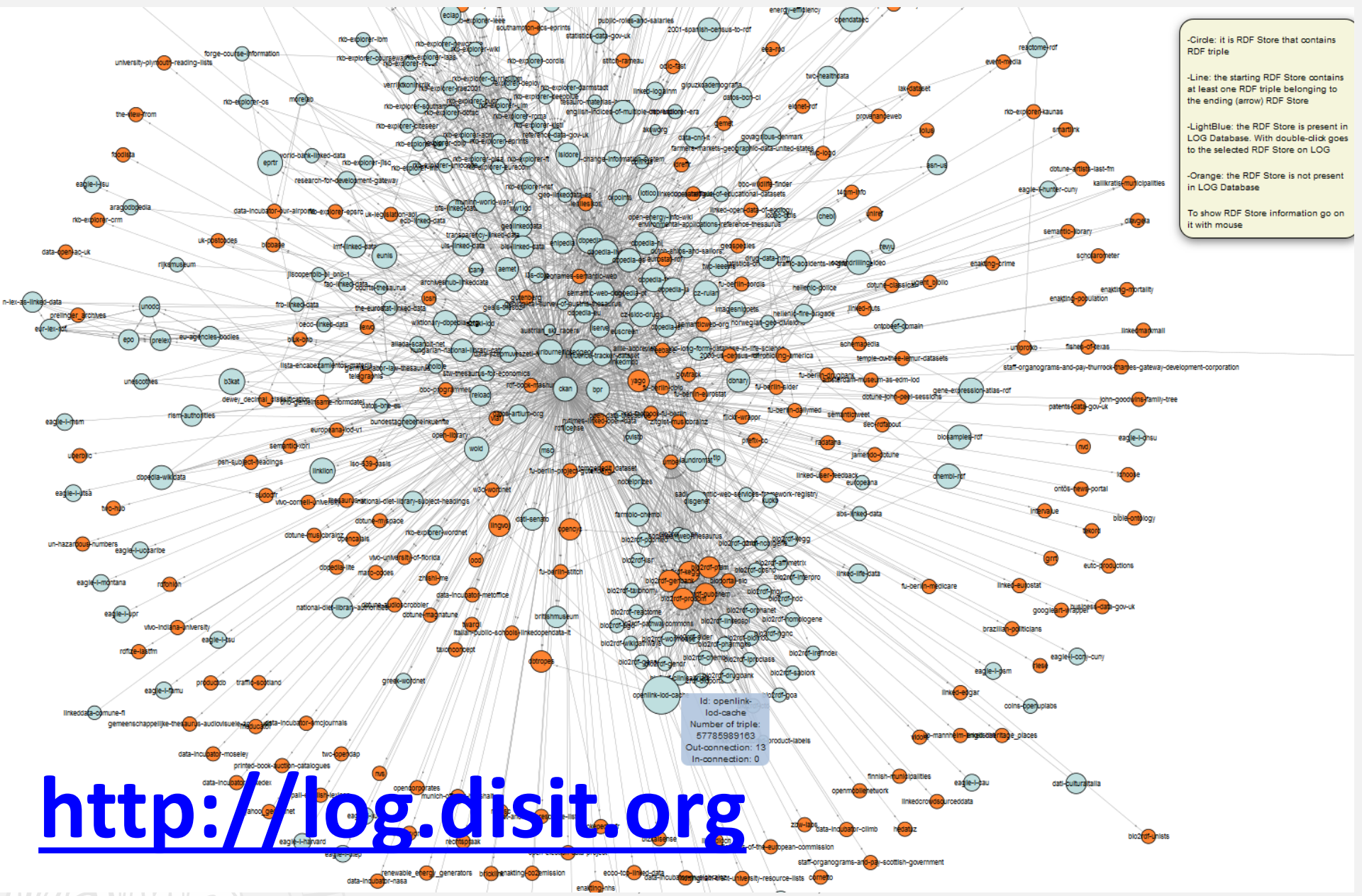
Type of relations

Select all | Deselect all | Invert | Hide all inverse

belongTo	coincideWith
contains	depiction
ends	forming
has	hasAccess
hasExternalAccess	hasMunicipality
hasProvince	hasRule
hasStreetNumber	inMunicipalityOf
isIn	isPartOf
isPartOfProvince	isPartOfRegion
managingAuthority	ownerAuthority
placedIn	sameAs
seeAlso	starts

Linked Open Graph





http://log.disit.org

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http://www.disit.org

Km4City Roadmap

SELECT for Cities

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 recharhe pillar
- Wi-Fi
- Events in the city

2015

RESilience management guidelines and Operationalization appLied to Urban Transport Environment

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

Km4City 1.5
- SmartDS
- Km4City App

RESOLUTE H2020
2015-2018 - Started

Sii-Mobility
http://www.sii-mobility.org

2016

REPLICATE H2020
2016-2021 - Started

REPLICATE
REnaissance of PLaces with Innovative Citizenship And TEchnology

WEEE
2017-2020

6/2017

Sii-Mobility SCN
2016-2018 – Started

Km4City 1.6.2
- Suggestions on demand
- User Behaviour Analysis
- Trajectories and OD

Today

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

GHOST SIR
2016-2019 - Started

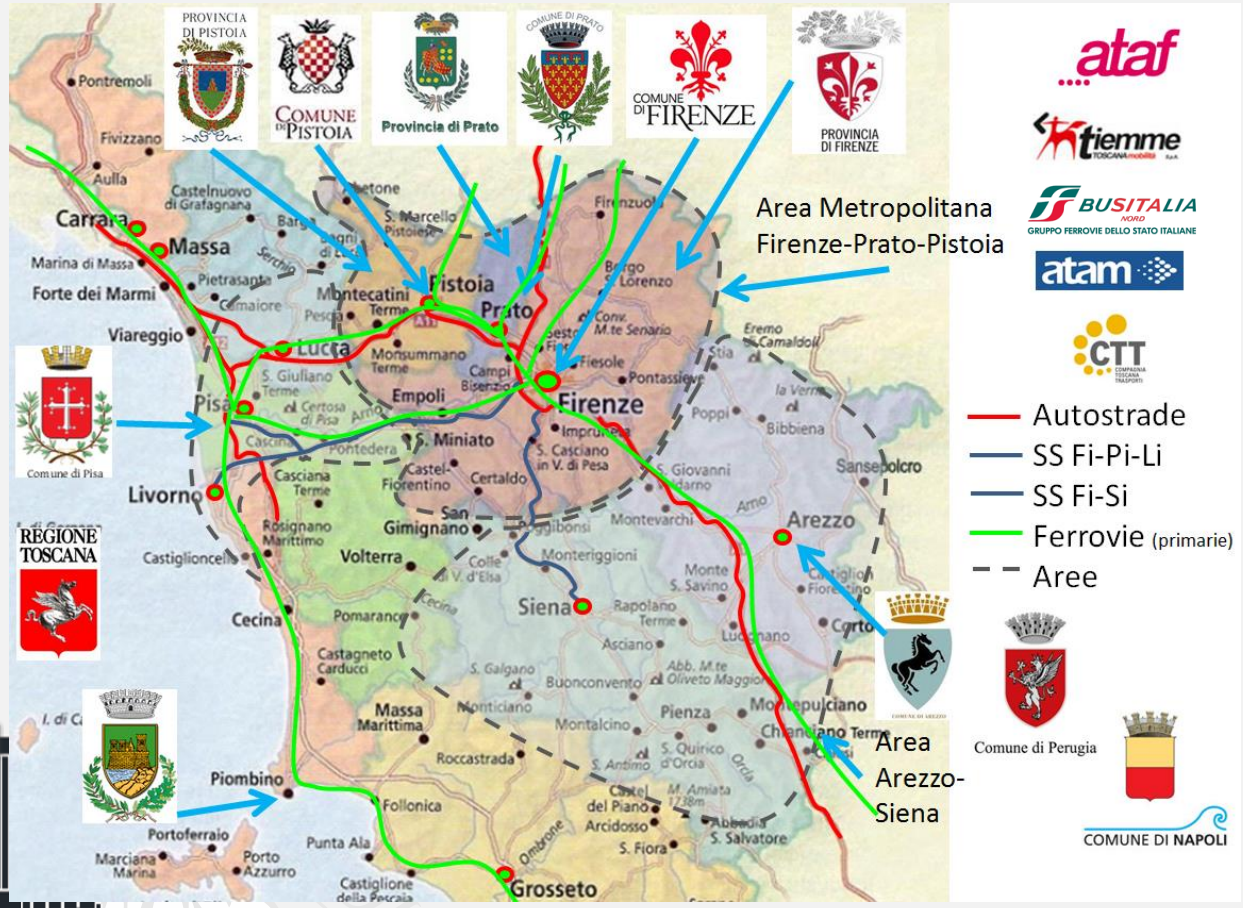
2021

Snap4City waste
- Territorial areas and paths
- Health, Bike sharing
- Statistics, Energy, ICT, ...
- E-vehicles

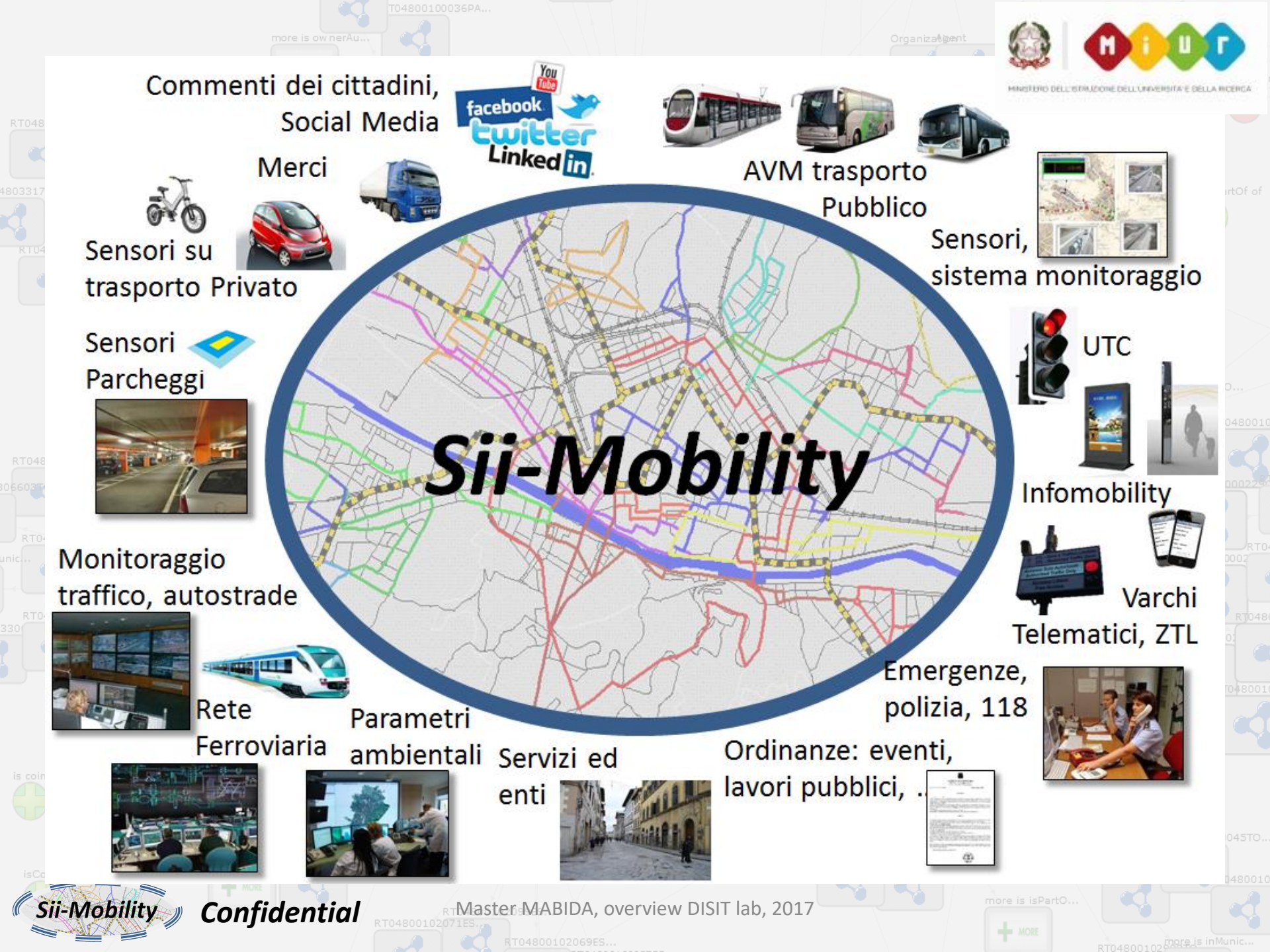
- Risk analysis
- Environmental, water
- Data Licensing models
- Energy Meters
- Fi-Ware compliant

FIWARE

- *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*



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


Commenti dei cittadini,
Social Media
Merci
AVM trasporto
Pubblico
Sensori su
trasporto Privato
Sensori,
sistema monitoraggio
Sensori
Parcheggi
UTC
Sii-Mobility
Infomobility
Monitoraggio
traffico, autostrade
Varchi
Telematici, ZTL
Emergenze,
polizia, 118
Rete
Ferroviaria
Parametri
ambientali
Servizi ed
enti
Ordinanze: eventi,
lavori pubblici, ..

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**

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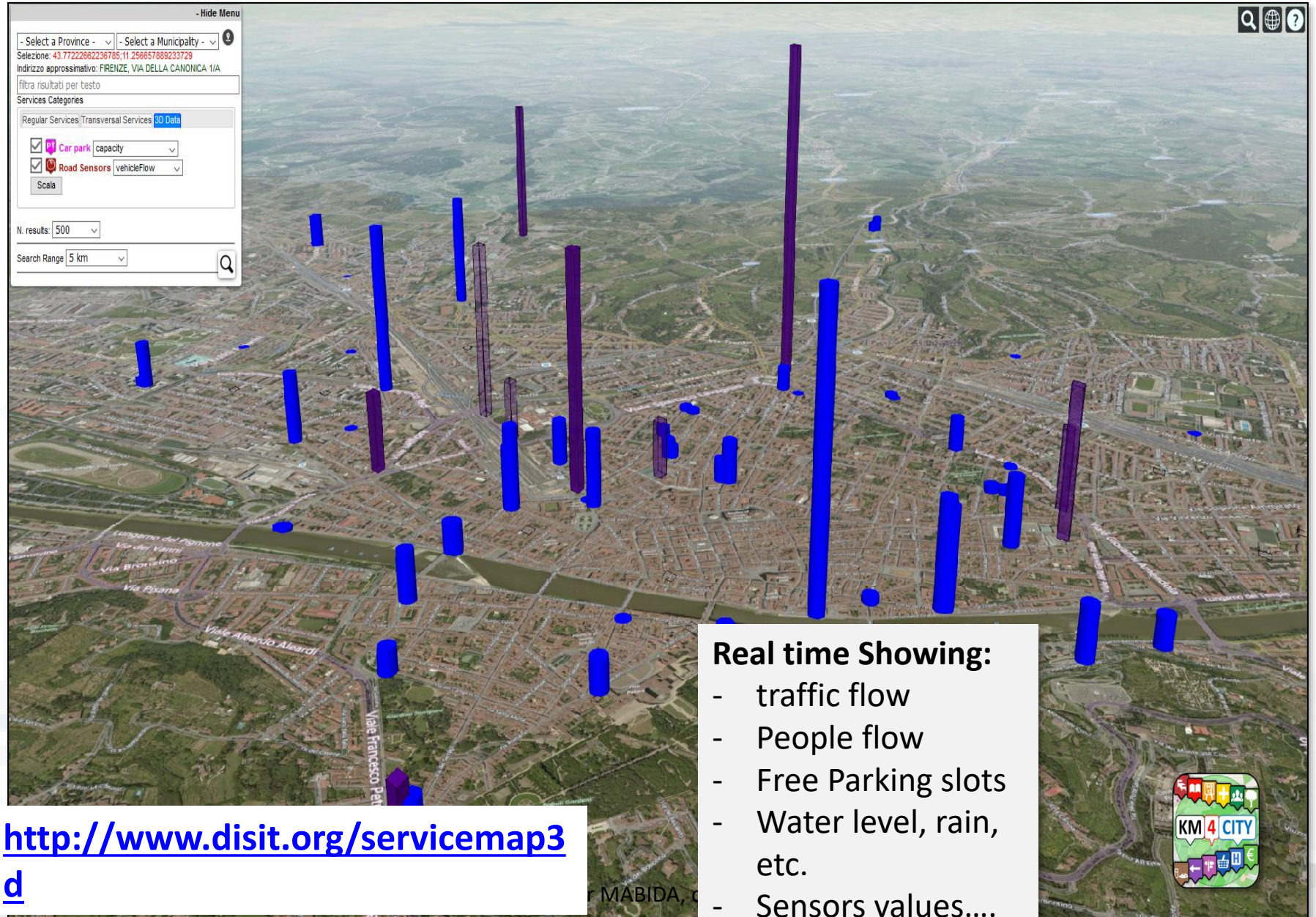
RealTime Values 3D

Sii-Mobility



Real time Showing:

- traffic flow
- People flow
- Free Parking slots
- Water level, rain, etc.
- Sensors values….

http://www.disit.org/servicemap3d

r MABIDA, c

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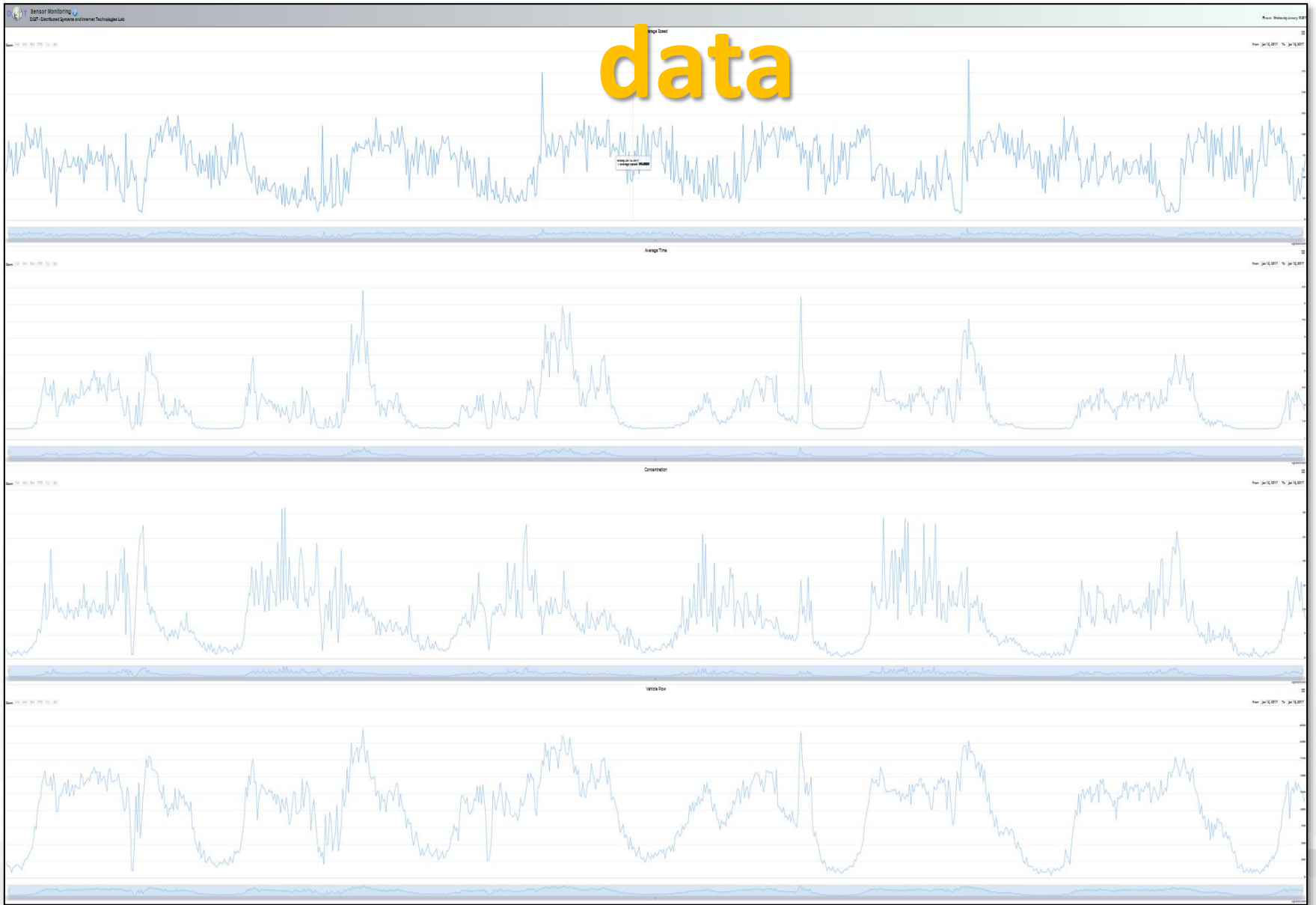
DISIT DISTRIBUTED SYSTEMS AND INTERNET TECHNOLOGIES LAB
http://www.disit.org

Traffic Flow data



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Traffic Flow Reconstruction

KM4CITY

Sii-Mobility

http://www.disit.org/siimobilitytraf

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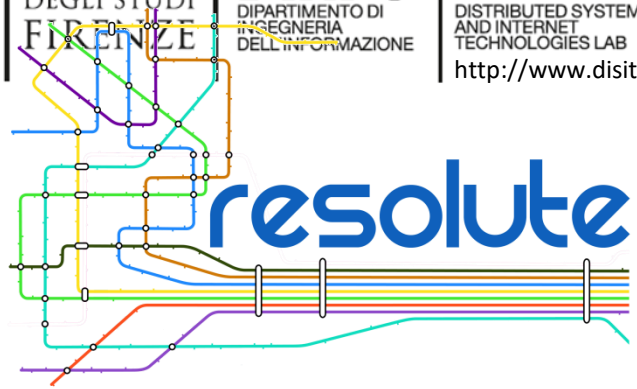
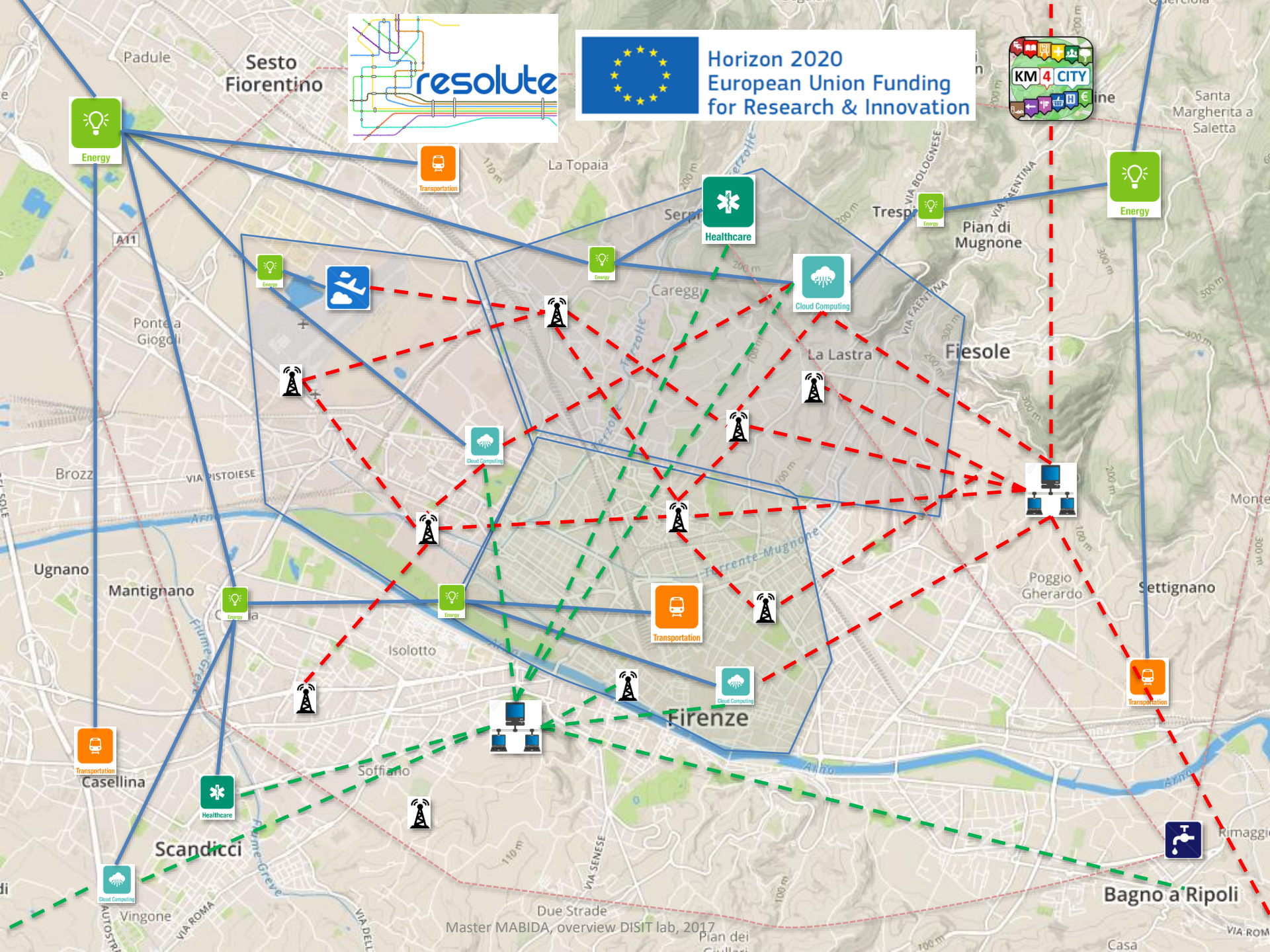
Horizon 2020
European Union Funding
for Research & Innovation



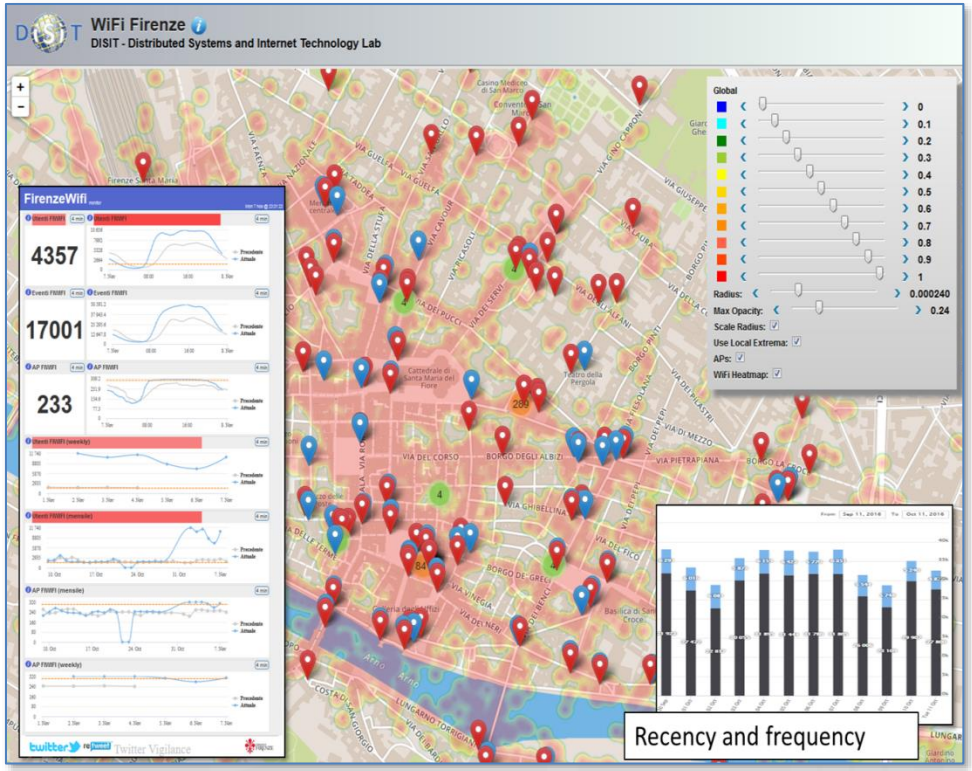
http://www.resolute-eu.org

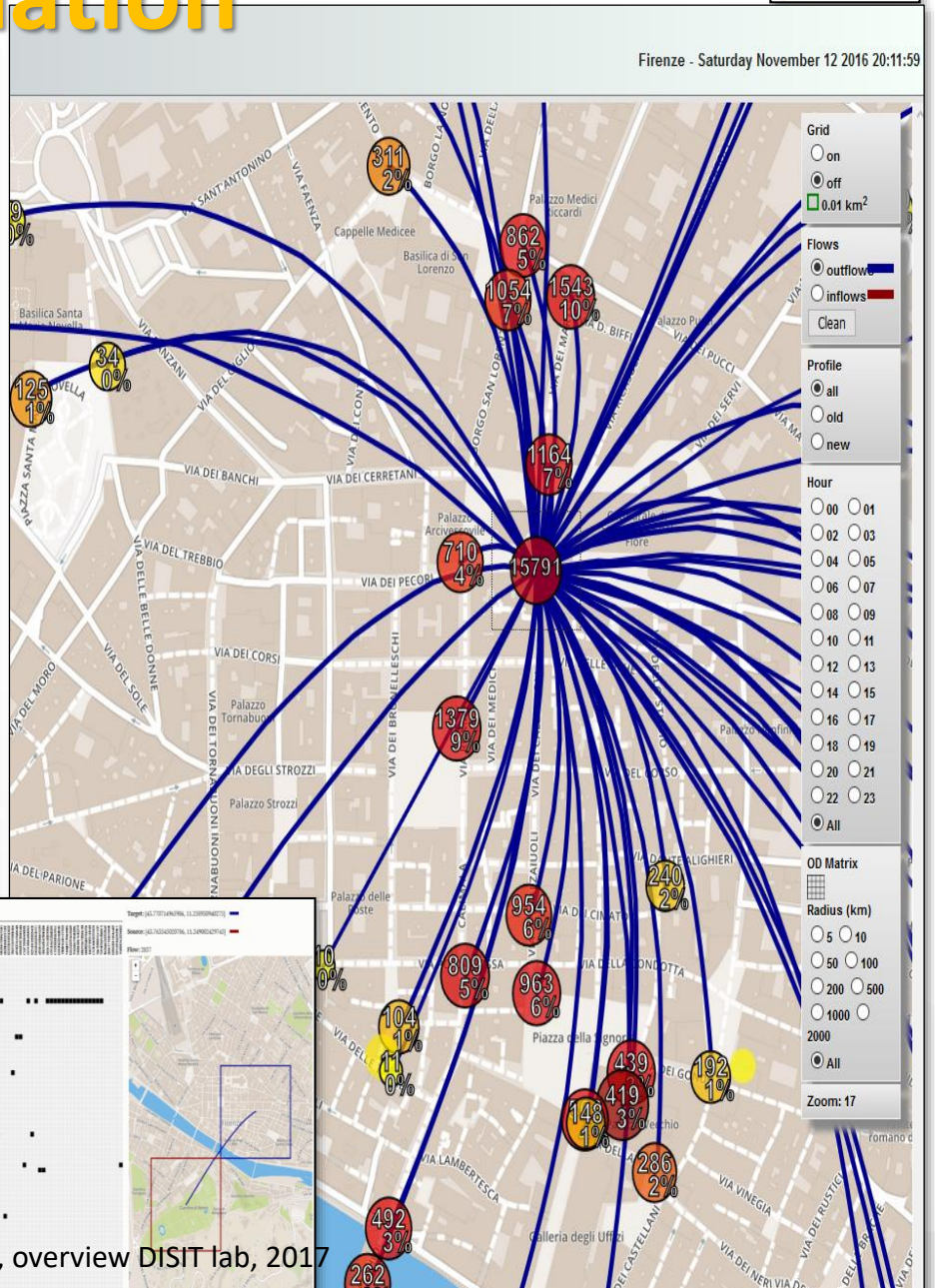
- **Develop European Resilience Management Guidelines (ERMG)**
  - Develop a conceptual framework for creating/ maintaining Urban Transport Systems
- Enhance resilience through improved support of human decision making processes, particularly by training professionals and civil users on the ERMG and 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

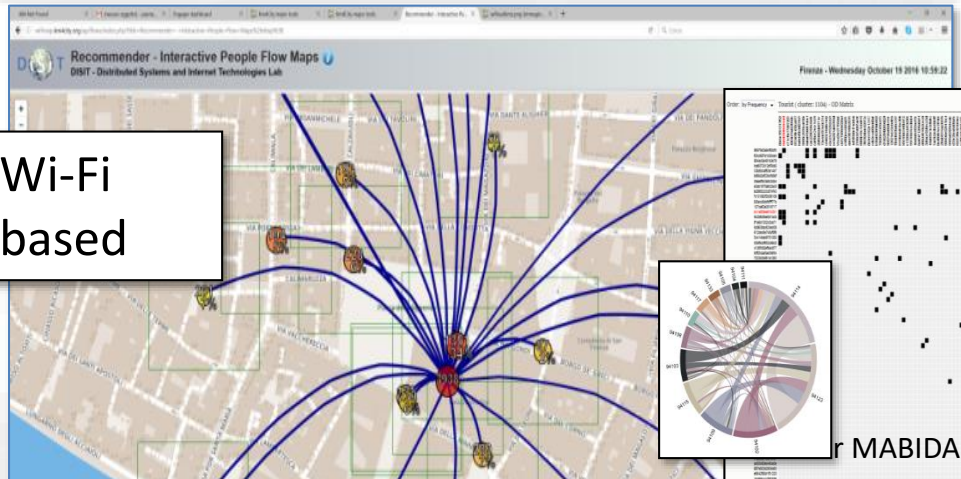
University of Florence: DISIT lab DINFO (Proj coordinator), DISIA and DST	UNIFI	IT
THALES	THALES	IT
ATTIKOMetro	ATTIKO	GR
Comune di Firenze	CDF	IT
Centre for Research and Technology Hellas	CERTH	GR
Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.	FHG	DE
HUMANIST	HUMANIST	FR
SWARCO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


resolute
Horizon 2020
European Union Funding
for Research & Innovation
KM 4 CITY
Energy
Transportation
Healthcare
Cloud Computing
Padule
Sesto
Fiorentino
La Topaia
Pian di
Mugnone
Fiesole
Ponte a
Giogoli
La Lastra
Careggi
Ugnano
Mantignano
Isolotto
Firenze
Poggio
Gherardo
Settignano
Casellina
Soffiano
Scandicci
Vingone
Bagno a Ripoli
Due Strade
Master MABIDA, overview DISIT lab, 2017

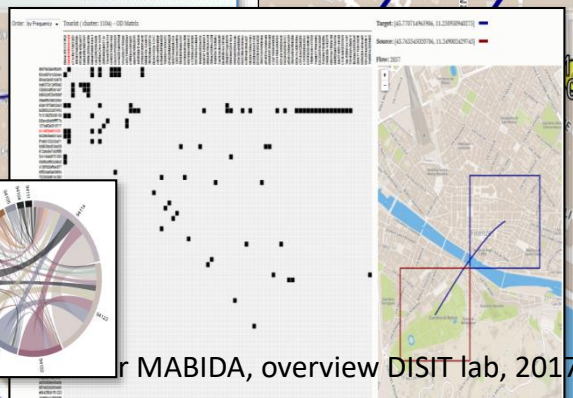
Origin Destination Matrix Estimation







Wi-Fi based

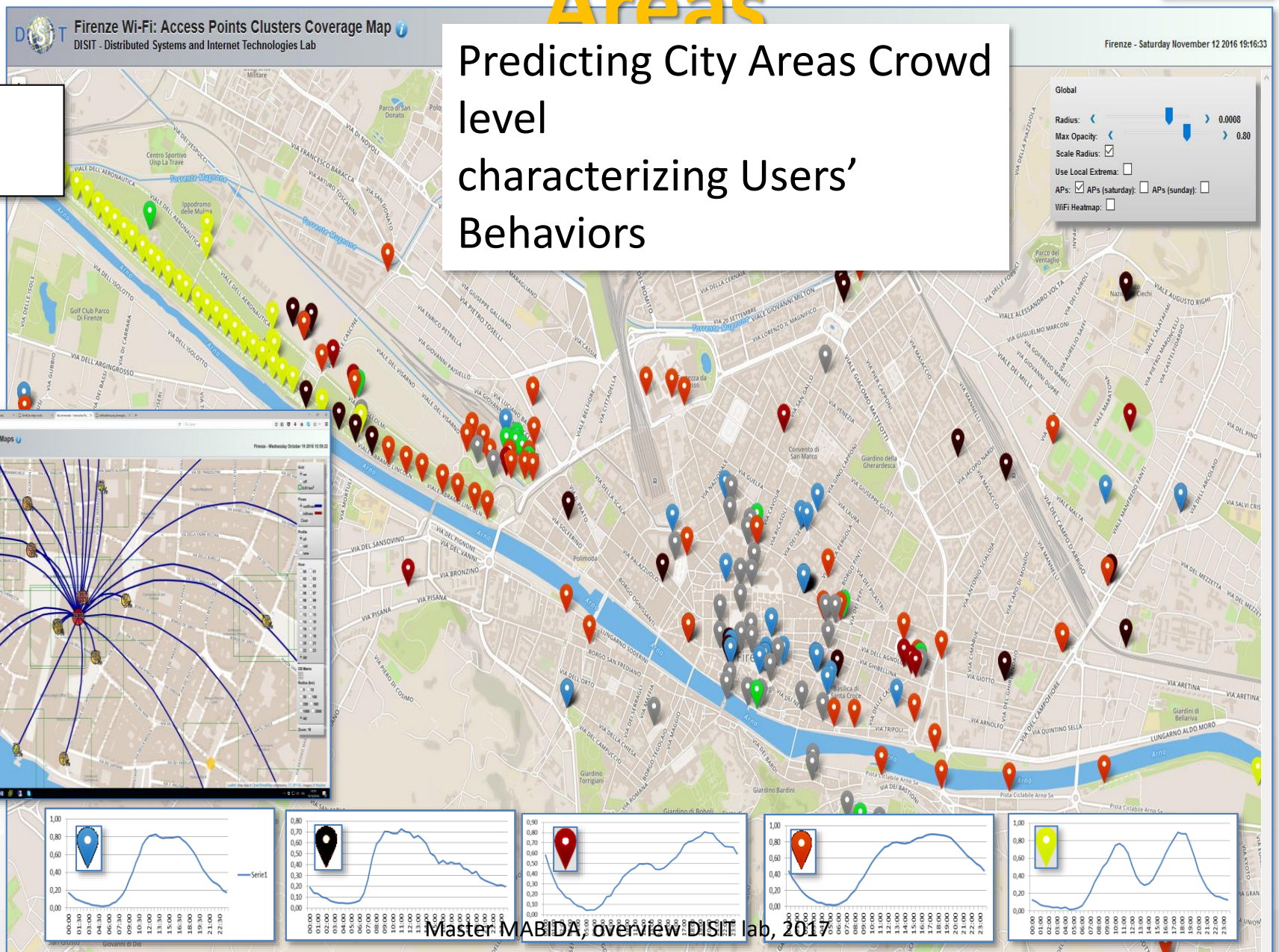


r MABIDA, overview DISIT lab, 2017

Characterizing City Areas

Wi-Fi based

Predicting City Areas Crowd level characterizing Users' Behaviors



REPLICATE

Horizon 2020
European Union Funding
for Research & Innovation

REnaissance of PLaces
with Innovative Citizenship
And TEchnology

COMUNE DI FIRENZE
Smart Florence Plan

- ***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, DIEF
21 THALES ITALIA, SPA THALES ITALY
22 ZABALA INNOVATION CONSULTING ZABALA SPAIN
23 TECHNOMAR TECHNOMAR GERMANY
24 UNIVERSITY OF BRISTOL UOB UNITED KINGDOM
25 UNIVERSITY OF OXFORD UOXF UNITED KINGDOM
26 BRISTOL IS OPEN, LTD BIO UNITED KINGDOM
27 ZEETTA NETWORKS ZEETTA UNITED KINGDOM
28 KNOWLE WEST MEDIA CENTRE, LGB KWMC UNITED KINGDOM
29 TOSHIBA RESEARCH EUROPE, LTD TREL UNITED KINGDOM
30 ROUTE MONKEY, LTD ROUTE MONKEY UNITED KINGDOM
31 ESOTERIX SYSTMES, LTD ESOTERIX UNITED KINGDOM
32 NEC LABORATORIES EUROPE, LTD NEC UNITED KINGDOM
33 COMMONWHEELS CAR CLUB CIC CO-WHEELS UNITED KINGDOM
34 UNIVERSITY OF THE WEST OF ENGLAND UWE UNITED KINGDOM
35 ESADE BUSINESS SCHOOL ESADE SPAIN
36 SISTELEC SOLUCIONES DE TELECOMUNICACION, S.L. SISTELEC SPAIN

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REPLICATE

Horizon 2020
European Union Funding
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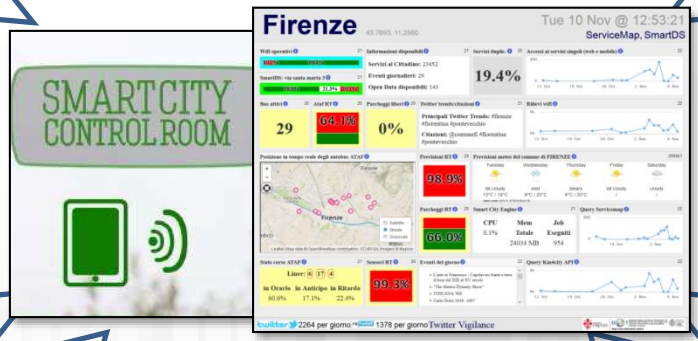
REPLICATE a Firenze: Energia, ICT e Mobilità



APRE TOSCANA
AGENZIA PER LA PROMOZIONE DELLA RICERCA EUROPEA

HOME CHI SIAMO SERVIZI EVENTI COMUNITÀ ADERIRE RICERCHE MIC

torna indietro

pal-1: disit lab (distributed sy...

responsabile: paolo nesi

evento: matchmaking - pisa cnr, 15-05-2014

disit e' un lab. di ricerca, innovazione e trasferimento tecnologico, ad accesso aperto sulle tecnologie della semantic computing, big data, smart city, social media, nlp, data intelligence, cloud ...

seleziona/rimuovi la tua prenotazione con questo laboratorio.

occupato | prenotato da te | tuoi meeting. | libero | no tavoli

9:30 - 10:00	Tav.1: viene Carlo | Megatech	
10:00 - 10:30	Tav.12: viene Gino Rossi | Eco bat	
10:30 - 11:00		
11:30 - 12:00	Tav. A1: vai da Ugo Red | It9	
12:00 - 12:30	Ala est. Tav.3: viene ELEN | ELEN	
12:30 - 13:00	**tua prenotazione**	✓
14:00 - 14:30		
14:30 - 15:00	Tav.54: vai J. R. Baric | Miscos	
15:00 - 15:30		
16:00 - 16:30	spazio esaurito	

MatchMaking: demand vs offers

DISIT Lab, Distributed Data Intelligence and Technologies
Distributed Systems and Internet Technologies
Department of Information Engineering (DINFO)
http://www.disit.dinfo.unifi.it

http://OSIM.disit.org

Back

NESI PAOLO urn:u-gov:unifi:AC_AB0:8cf8e70205520a44e90211a34e6b7a9e

Registrato CINECA

More Info (on: Managing Person Knowledge)

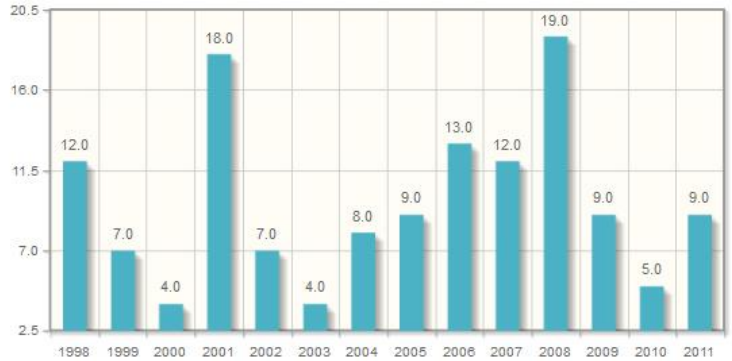
Author subject:

INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE
SC. E TEC. PER UNA SOCIETÀ DELL'INFORMAZIONE E DEL

Tipo di pubblicazioni dell'autore:

1a - Articolo su rivista (44)
1a - Articolo su rivista ISI (1)
2a - Art/Cap/Saggio libro scient/tech (11)
3f - Libro scientifico/tecnico (7)
4a - Articolo in atti di congresso (94)
5o - Rapporti di ricerca pubblicati (1)
7a - Curatela (8)
7d - Curatela di libro scientifico/tecnico (1)

Totale pubblicazioni: 167



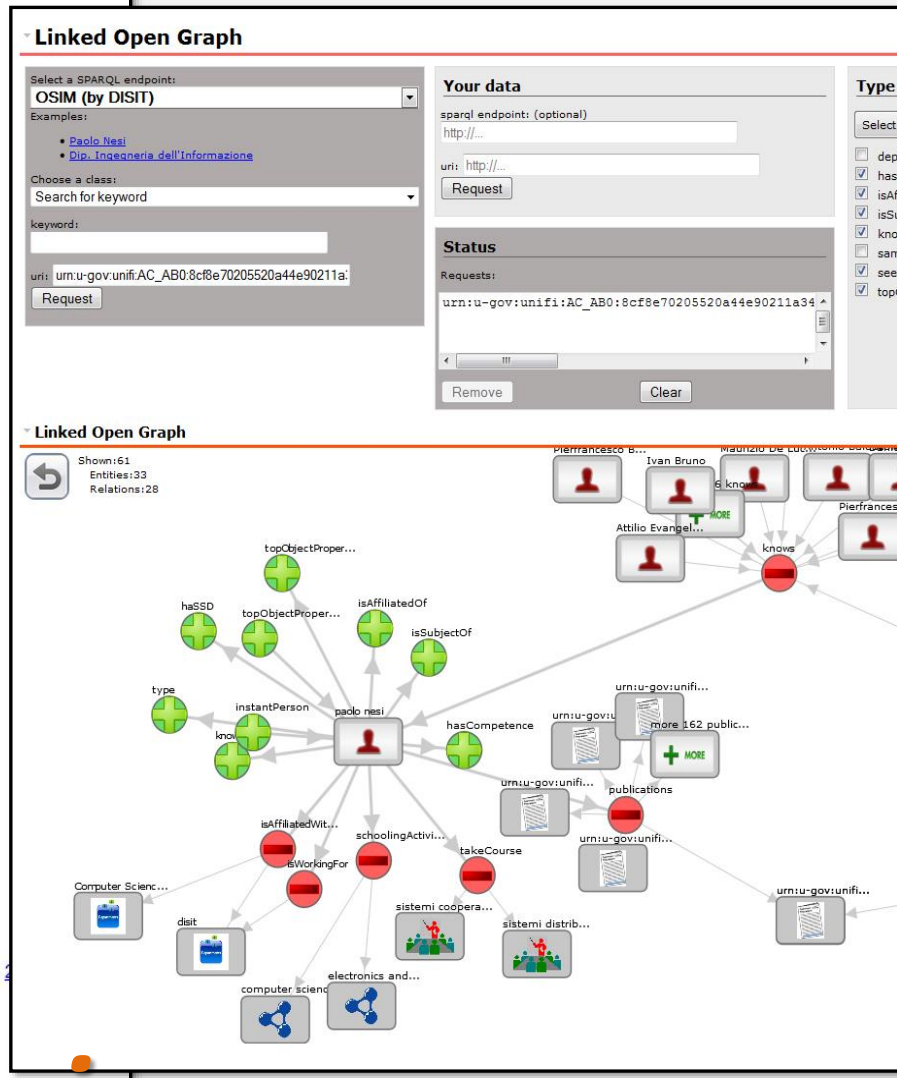
Anno:

1998 (12) 1999 (7) 2000 (4) 2001 (18) 2002 (7) 2003 (4) 2004 (8) 2005 (9) 2006 (13) 2007 (12) 2008 (19) 2009 (9) 2011 (9)

Elenco di tutte le pubblicazioni (167)

Autori di [illegible] lavorato [illegible]

ARGENTI FABRIZIO (Registrato CINECA)	Visualizza le pubblicazioni in comune (2)
BALDASSARRE ANTONIO (Registrato CINECA)	Visualizza le pubblicazioni in comune (1)
BELLINI PIERFRANCESCO (Registrato CINECA)	Visualizza le pubblicazioni in comune (41)
BRUNO IVAN (Registrato CINECA)	Visualizza le pubblicazioni in comune (22)



Knowledge analysis

Dario Fo e Franca Rame, evento 20 ottobre 2011, live

RELOAD ACTIONS

RELATED OBJECTS BY TEXT


ECLAP MyStoryPlayer, ECLAP networking,


Dario Fo e Franca

ECLAP Opportunities


Una vista del portale

COMMENTS MORE

METADATA

Metadata languages

Title
Dario Fo e Franca Rame, evento 20 ottobre 2011, live

Creator marco

Classification

IPR information

Technical

Location

Subject
Dario Fo e Franca Rame, evento 20 ottobre 2011, live

Description
Dario Fo e Franca Rame, evento 20 ottobre 2011, live

Provider DSI

Short url http://www.eclap.eu/63497

ACTIONS

CONTENT

- Featured
- Popular
- Popular in the period
- Last Posted
- Top Rated
- Location
- Timeline

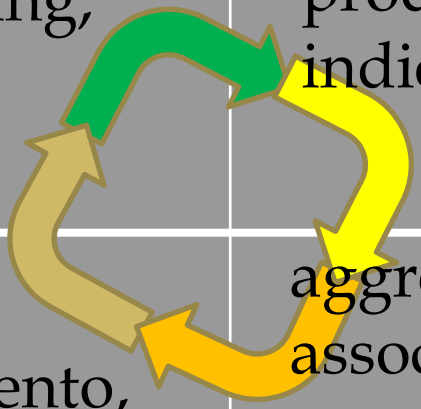
CLASSIFICATION

THEMATIC GROUPS

Best practice network for performing arts

User engagement X creazione e accrescimento della conoscenza

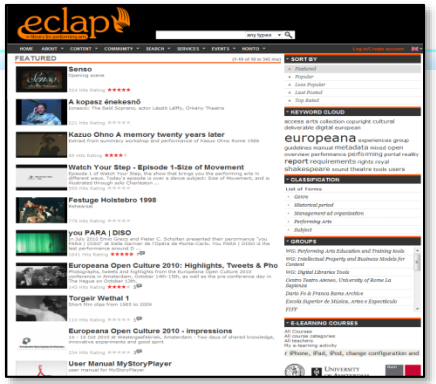
DA \ A	tacita	esplicita
tacita	**Socializzazione** gruppi, forum, chat, meeting, workflow **Incontri**	**Esternalizzazione** pubblicazione, produzione, indicizzazione **Database**
esplicita	**Interiorizzazione** studio, apprendimento, newsletter, e-learning **Manuali, documenti**	**Aggregazione** aggregazione, associazioni, annotazioni, Natural Lang. Processing **Ontologie, modelli semantici, inferenze, algoritmi**



Mapping Nonaka & Takeuchi, 1995, model

Semantic Flows: ECLAP

AXCP backoffice
- Grid Scheduler
- Grid Node
- Grid Node
- Grid Node



- *Rule based system*
- *Automated formatting*
  - *Inferential engine processing*
  - *Adaptation*
  - *enrichement*
- *Multilingual index and search*
  - *Text Analysers*
  - *Indexer*
  - *Fuzzy search*

- *User Profile*
- *Dynamic User Profile*
  - *User behavior*
  - *Use data*
- *Content*
  - *DC+IDs*
  - *AXInfo: ver, prod., rights,..*
  - *Descriptors*
- *Groups: users, content..*
- *Ontology/Taxonomy Domain*

- *Local User Profile*
- *Local Dynamic User Profile*
  - *Local User behavior*
  - *Local Use data*
- *Content*
  - *DC+IDs*
  - *AXInfo: ver, prod, rights, ...*
  - *Descriptors*
- *Groups*
- *Taxonomy classification*

contributions, actions on content, social actions, preferences, queries, use data,..

- *Suggestions*
  - *Similarity distances*
  - *Clustering*

- *Suggestions on the basis of:*
  - *Static and dynamic user profile, decriptors, domain*

Content Organiser

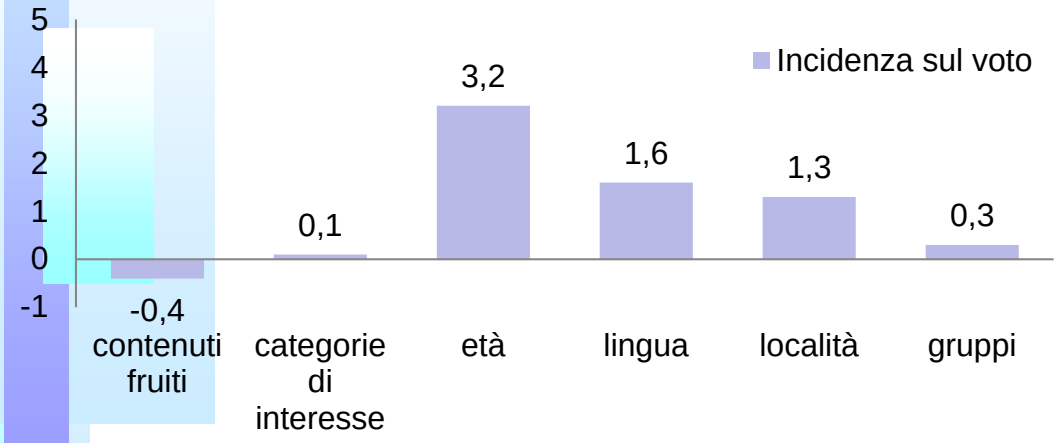
- *Local Suggestions on the basis of user profiles, local content, local collected data*

AXCP BackOffice

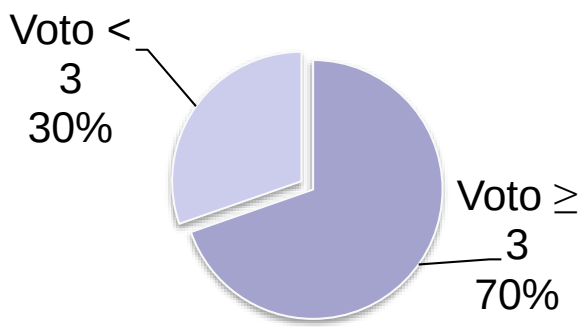
Front End Portal

Content Organizer and Players Users

La validazione

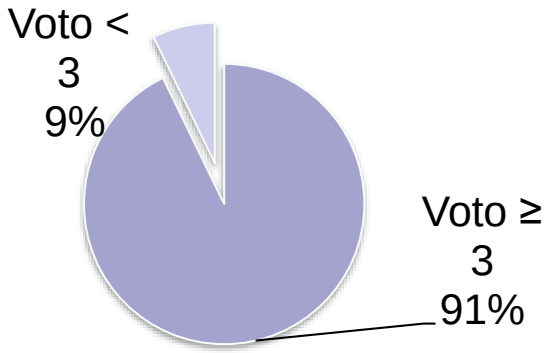


Statistica della regressione	
R multiplo	0, 9624
F - Value	131,7795
Significatività di F	2,3389E-33



Tipologia Serendipity

- ✓ *Competenze*
- ✓ *Gruppi di appartenza*

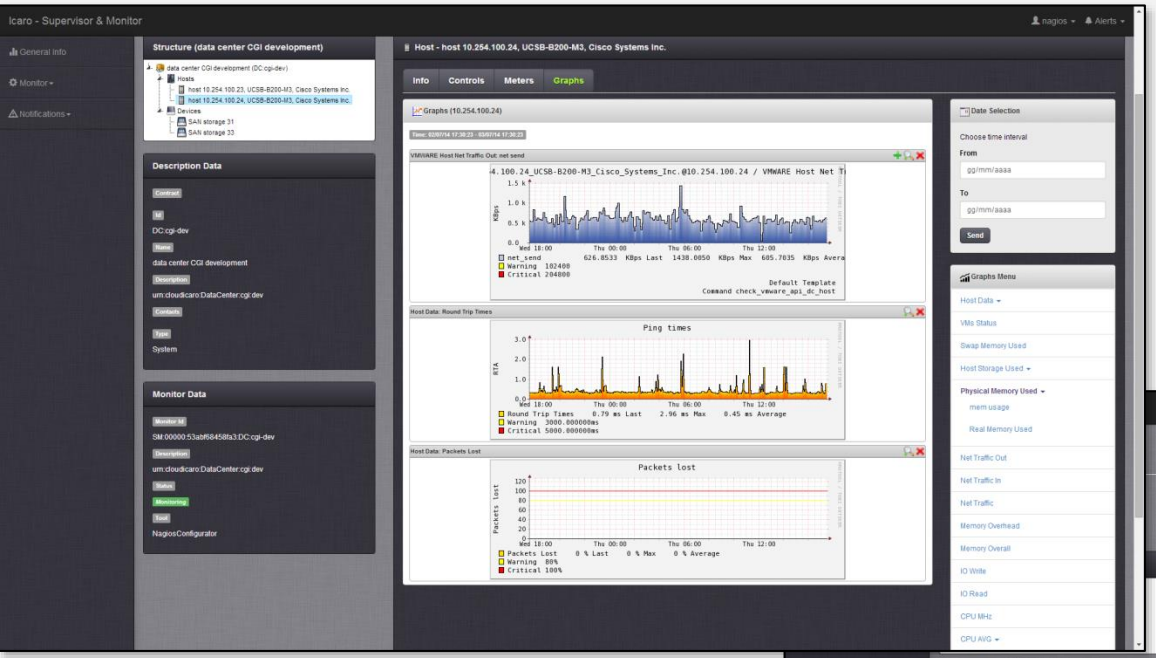


Tipologia Strategici

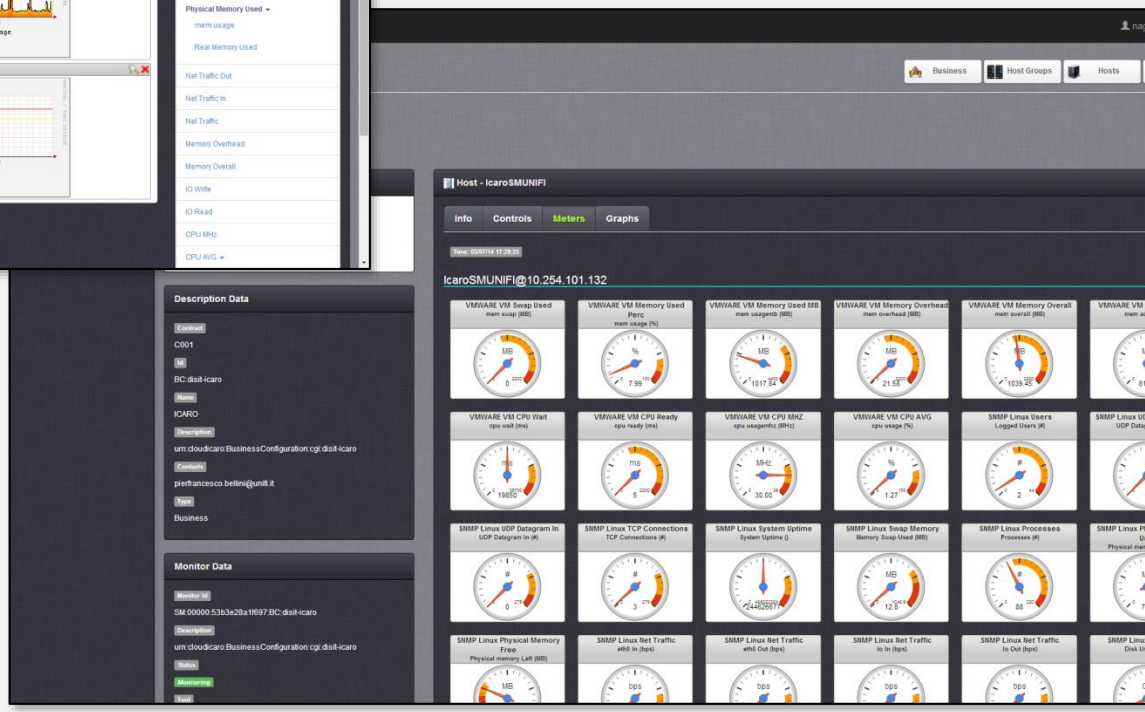
- ✓ *Popolarità*

http://www.cloudicaro.it

Cloud Supervisor & Monitor



http://www.cloudicaro.it

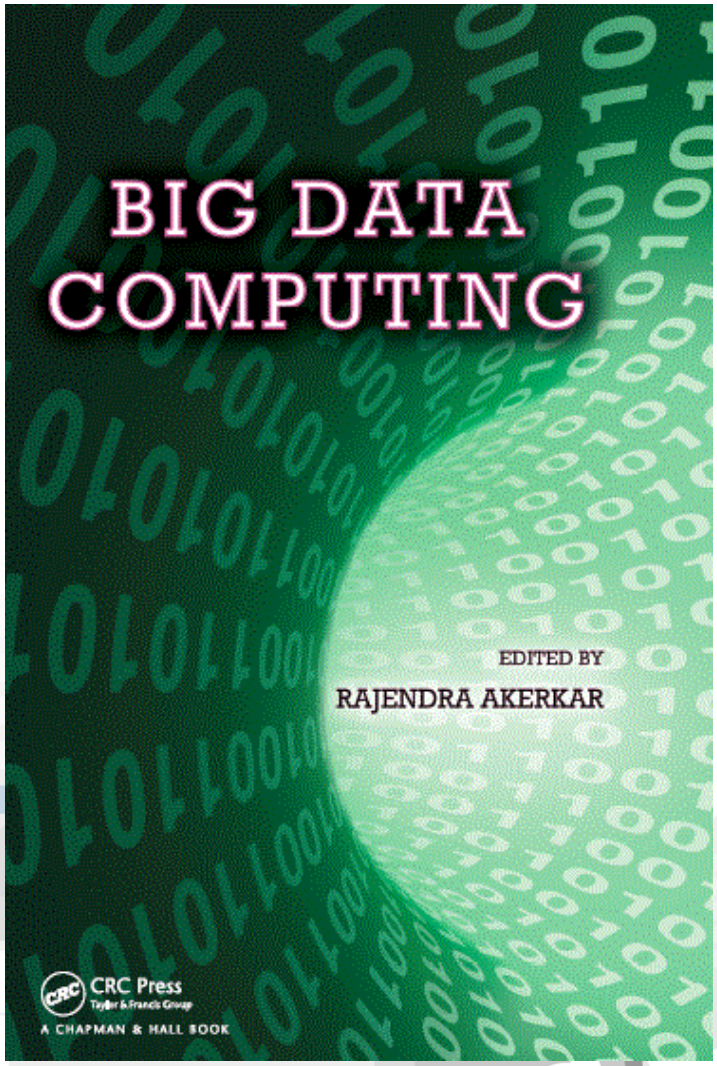


- Monitoring real business configuration, SLA
- Uplayer wrt classical monitoring tools


Smart Cloud Engine

P. Bellini, M. Di Claudio, P. Nesi, N. Rauch, "Tassonomy and Review of Big Data Solutions Navigation", in "Big Data Computing", Ed. Rajendra Akerkar, Western Norway Research Institute, Norway, Chapman and Hall/CRC press, ISBN 978-1-46-657837-1, eBook: 978-1-46-657838-8, **july 2013**, in press.

http://www.tmrfindia.org/bigdata.html



Main & Recent Projects

Sii-Mobility

http://www.sii-mobility.org

http://www.cloudicaro.it

Firenze OpenDataDay
www.disit.org/fodd

international open data day italia 2015

http://www.disit.org/fodd

Coll@bora

http://www.disit.org/5479

eclap
e-library for performing arts
ICT PSP

http://www.eclap.eu

OSIM

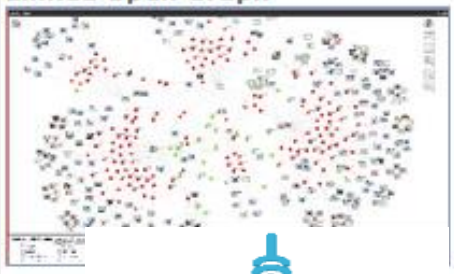
http://osim.disit.org

APRE TOSCANA
AGENZIA PER LA PROMOZIONE DELLA RICERCA EUROPEA

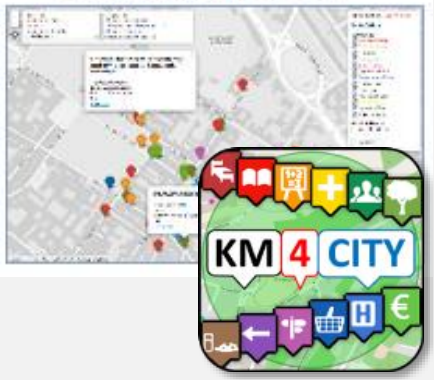
http://www.apretoscana.org

TESYS RAIL

Linked Open Graph



ServiceMap for LOD



MATCH MAKING multiplatform

http://www.disit.org/5530

REPLICATE

RAISSS

Trace-IT

axmedis

ISO/IEC JTC1/SC29 WG11 MPEG
MOVING PICTURE EXPERTS GROUP

http://www.axmedis.org

Smart Communities Tech
Italian Technology Cluster for Smart Communities

http://www.disit.org/6588

resolute