Distributed Data Intelligence and Technologies Lab
Distributed Systems and Internet Technologies Lab

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

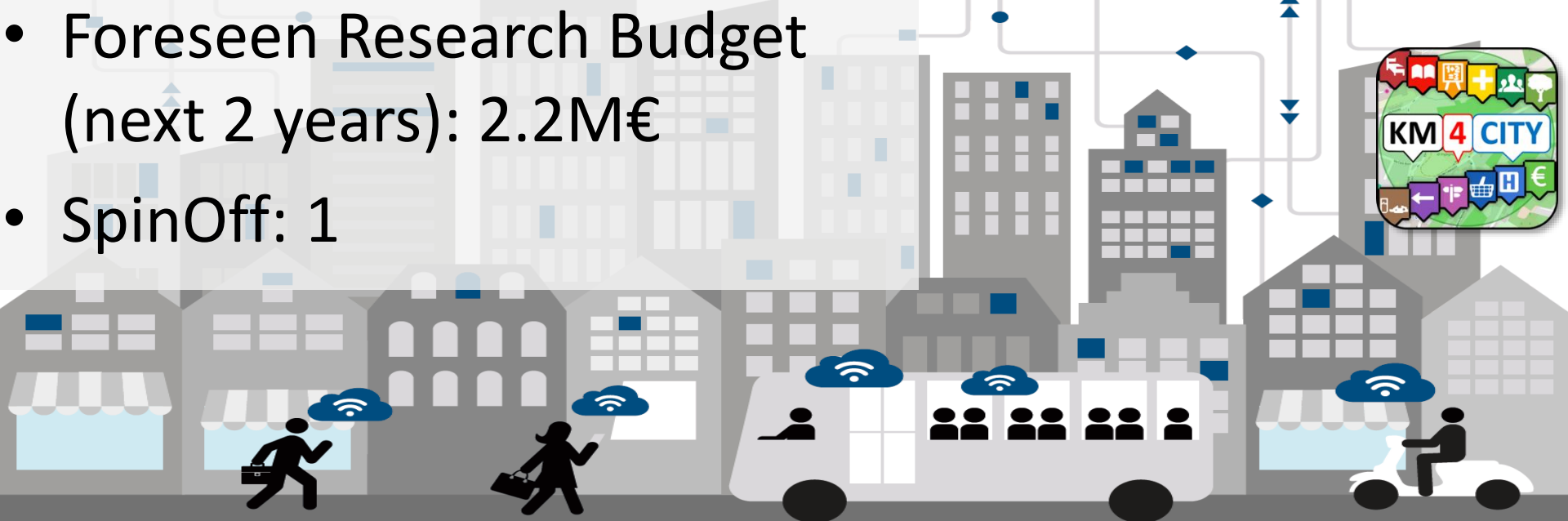paolo.nesi@unifi.it , http://www.disit.dinfo.unifi.it/nesi/

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: 17

- Research Budget: 1.2M€

- Foreseen Research Budget (next 2 years): 2.2M€

- SpinOff: 1

DISIT Lab, http://www.disit.dinfo.unifi.it

Con chi lavoriamo

Main Research Sectors

- **Smart City: data management, mobility, user engagement, …**

- **Social Media and Media: collaborative work, Twitter Vigilance**

- **Mobile Computing: mobile application, user behavior analysis**

- **Smart Cloud: cloud simulation, optimization**

- **Smart manufacturing: Industry** 4.0, Factory 4.0, e-factory

- **Smart Retail:** user behavior analysis, engagment, ..

- **Autonomous drivers:** operators, high speed trains, driverless

- **………** **projects:** http://www.disit.org/5501

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
- **5G – Prato Wind Open Fiber**
- **Coll@bora Social Innovation, MIUR:**
  - http://www.disit.org/5479
- **TRACE-IT, RAISSS, TESYSRAIL**, …
- **Mobile Emergency:**
  - http://www.disit.org/5404

Trace-IT
RAISSS

Sii-Mobility

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

■ **http://www.Sii-Mobility.org**

Area Metropolitana
Firenze-Prato-Pistoia

— Autostrade
— SS Fi-Pi-Li
— SS Fi-Si
— Ferrovie (primarie)
- - - Aree

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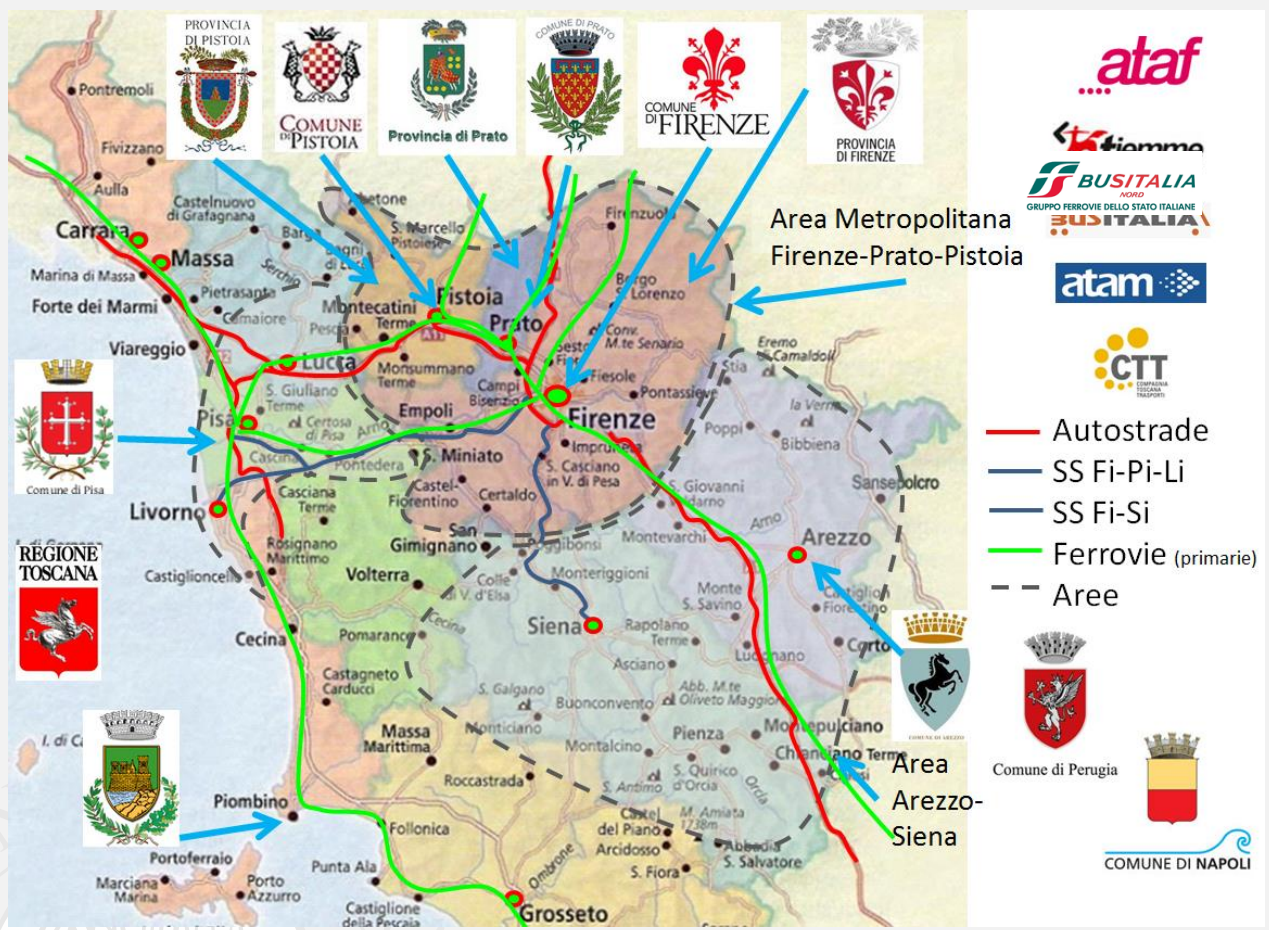
ECM; Swarco Mizar; Inventi In20; Geoin; QuestIT; Softec; T.I.M.E.; LiberoLogico; MIDRA (autostrade, motorola); ATAF; Tiemme; CTT Nord; BUSITALIA; A.T.A.M.; Effective Knowledge; eWings; Argos Engineering; Elfi; Calamai & Agresti; Project; Negentis

DISIT lab overview, Febbraio 2018, Florence

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

DISIT lab overview, Febbraio 2018, Florence

REPLICATE

Horizon 2020 European Union Funding for Research & Innovation

REnaissance of PLaces with Innovative Citizenship And TEchnology

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

Snap4City

Snap4City *has been proposed in response to* *Select4Cities* *challenges and PCP –* Pre-Commercial Procurement Project (http://www.select4cities.eu/).

Team University of Florence – Department of Information Engineering (lead contractor) - Italy

www.unifi.i⁺

EFFECTIVE KNOWLEDGE SRL - Italy

UNIVERSITY OF MILAN - Italy

SELECT for Cities

Home   Challenge   Winners   Outputs   Blog   Contact

Welcome to SELECT for Cities
Knowledge Hub

Benefit from experience and lessons learned from the ongoing SELECT for Cities Pre-Commercial Procurement Project to develop a data-driven, Internet-of-Everything (IoE) platform for large-scale urban app co-creation

About Internet-of-Everything

About SELECT's City Platforms

About Smart Procurement

Smart Cities involved:
- Antwerp
- Copenaghen
- Helsinki

Winners of each Phase in our competition to create large scale city innovation labs

See Call for Tender Winners → See Phase 1 Winners → Phase 2: Prototyping *In Progress* → Phase 3: Validation

Snap4City

City marks the current phase.

Grafo strade regionale (Toscana)

132,923 strade
389,711 elementi stradali
318,160 nodi stradali
1,508,207 numeri civici

Servizi in 20 cat, 512 sottocat.
16 Operatori di trasporto pubblico
21.280 Fermate bus e 1081 linee
210 Parking areas
796 Traffic Sensors
Info on: points, paths, areas, etc.

Dynamic/real-time
   Linee TPL: 1 update X giorno
• Gira PT 1081 linee, 1-2 updates per giorno
   Stato parcheggi: 76 update X giorno X parcheggio
   Sensorio traffico: 288 update X giorno X sensore
• **Meteo: 2 updates X giorno for 285 aree**
• **Triage status: svariati update x gio. per ospedale**
• **Costi carburanti: 1 update x giorno, x 1600 stations**
• **Eventi a Fi: circa 60 eventi X giorno**
• **Wi-Fi: > 350.000 misure X giorno**
• **APP: > 50.000 misure X giorno**
• **> 35.000 utenti distinti X giorno**
• **Da 600.000 a 4.5 M Tweet X giorno**
• **......+ many IOT are coming ……**

Dati presenti per la Toscana

http://servicemap.disit.org

http://servicemap.km4city.org

Seleziona una provincia:
FIRENZE
Seleziona un comune:
FIRENZE
Actual Selection
COMUNE di FIRENZE

- Nascondi Menu
Fermate Firenze | Comuni in Toscana | Ricerca Testuale

Servizi Regolari | Servizi Trasversali
search text into service
Categorie Servizi
☑ De/Select All
☑ Accommodation +
☑ Advertising +
☑ AgricultureAndLivestock +
☑ CivilAndEdilEngineering +
☑ CulturalActivity +
☑ EducationAndResearch +
☑ Emergency +
☑ Entertainment +
☑ Environment +
☑ FinancialService +
☑ GovernmentOffice +
☑ HealthCare +
☑ IndustryAndManufacturing +
☑ MiningAndQuarrying +
☑ ShoppingAndService +
☑ TourismService +
☑ TransferServiceAndRenting +
☑ UtilitiesAndSupply +
☑ Wholesale +
☑ WineAndFood +

N. risultati: Nessun Limite ▾
Raggio ricerca 100 metri ▾

Risultati della ricerca
più di 4000 risultati, attivato clustering
Services 16858

Smart-city Ontology km4city

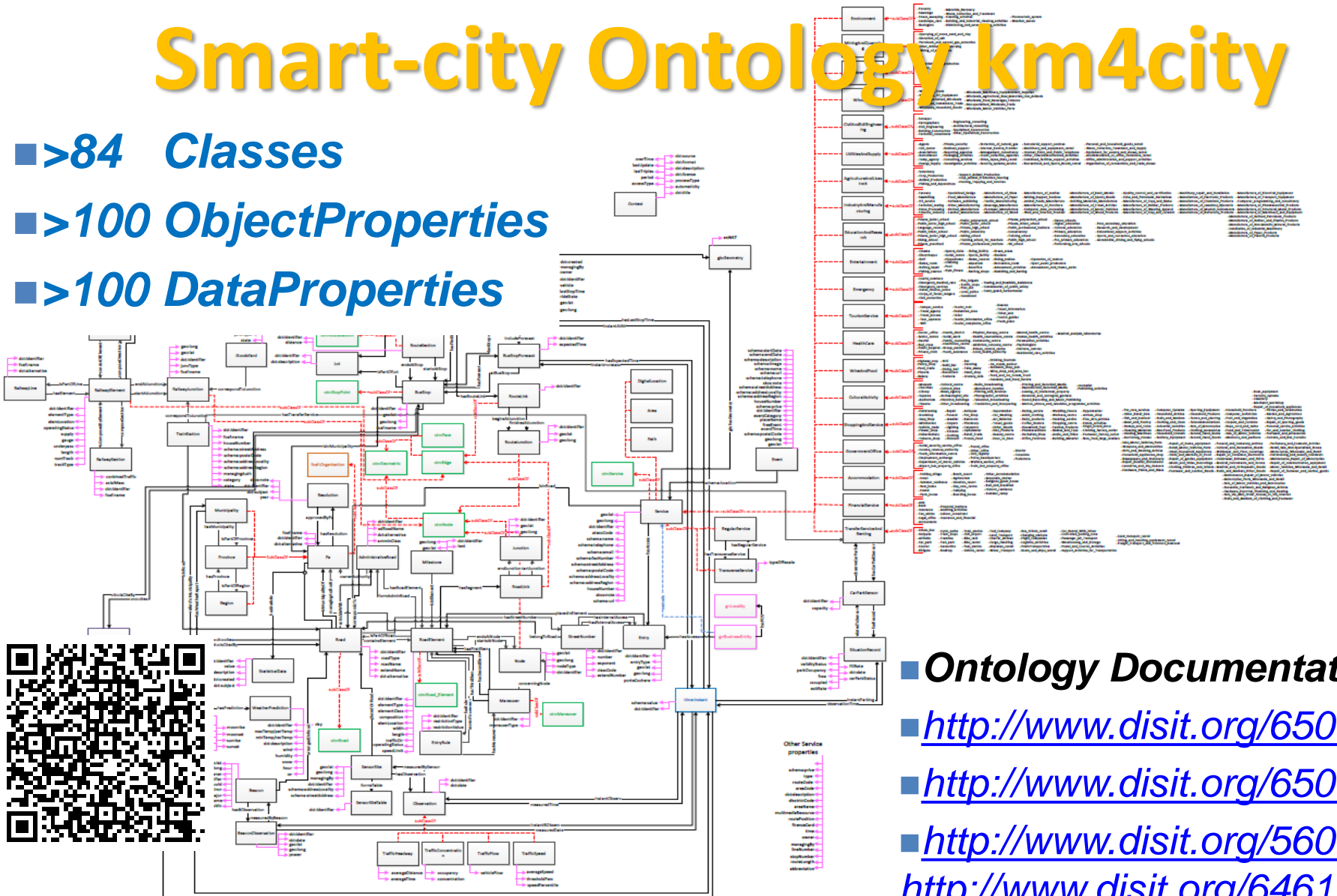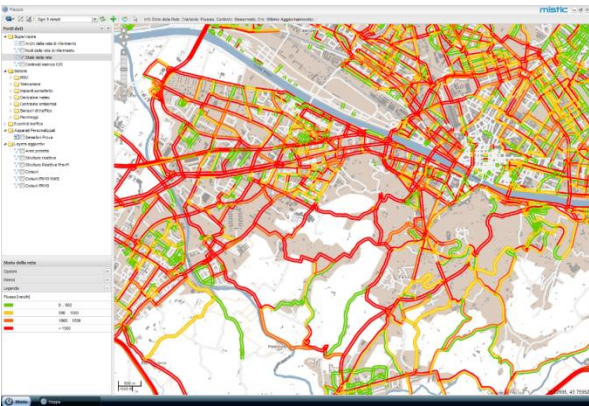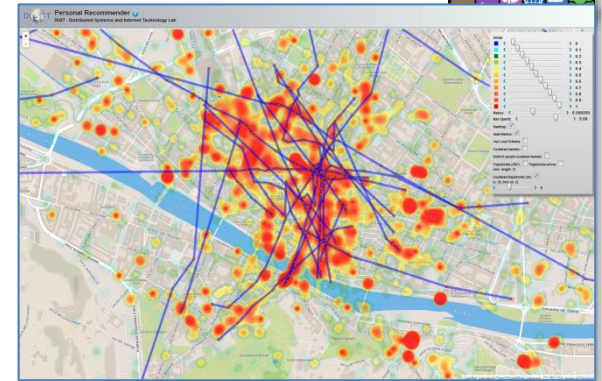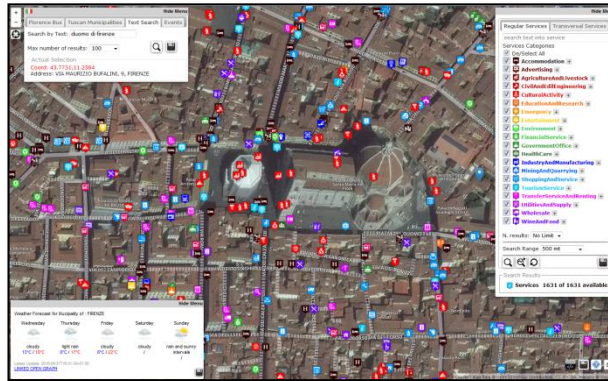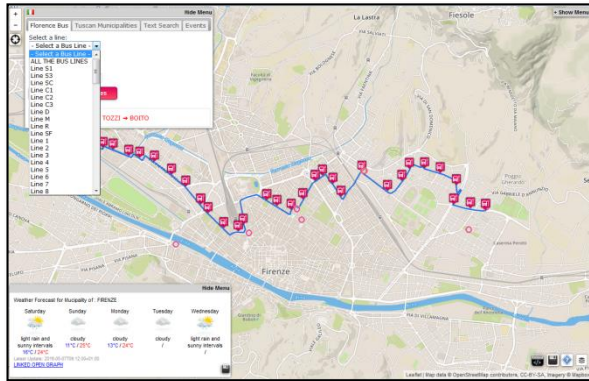- **>84 Classes**
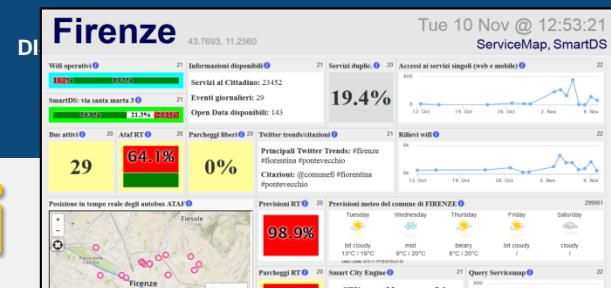- **>100 ObjectProperties**
- **>100 DataProperties**

- **Ontology Documentation:**
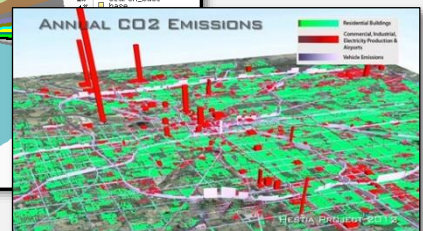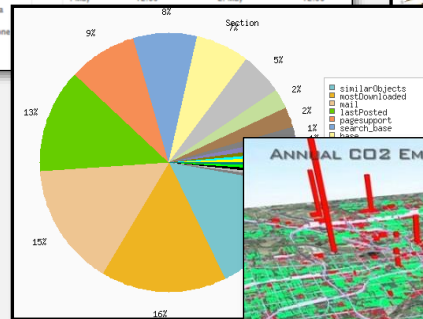- *http://www.disit.org/6506*
- *http://www.disit.org/6507*
- *http://www.disit.org/5606*
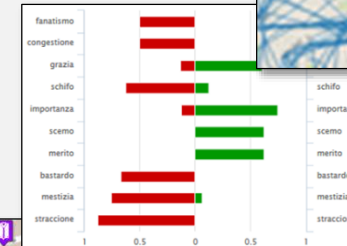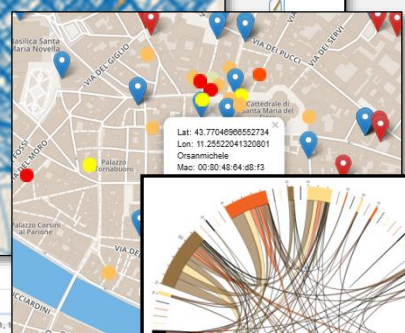 *http://www.disit.org/6461*

DISIT lab overview, Febbraio 2018, Florence

Smart City Dashboard
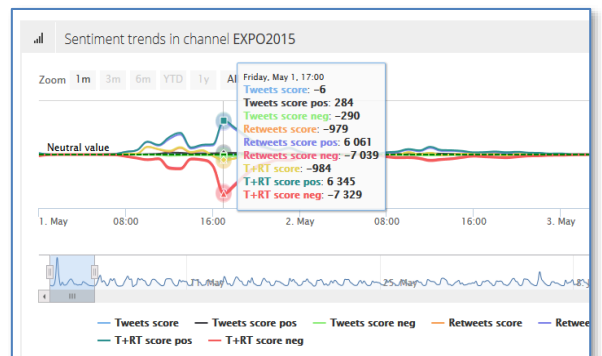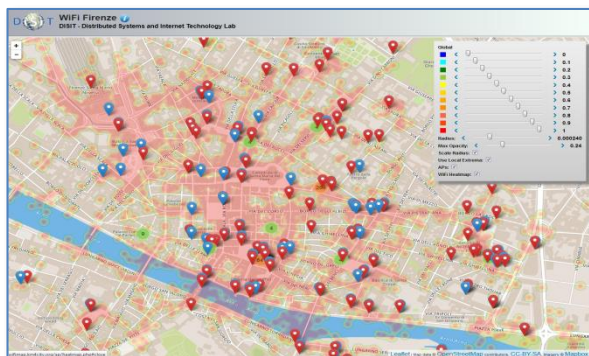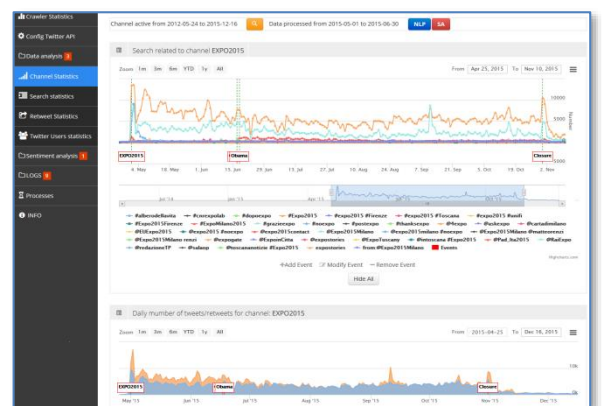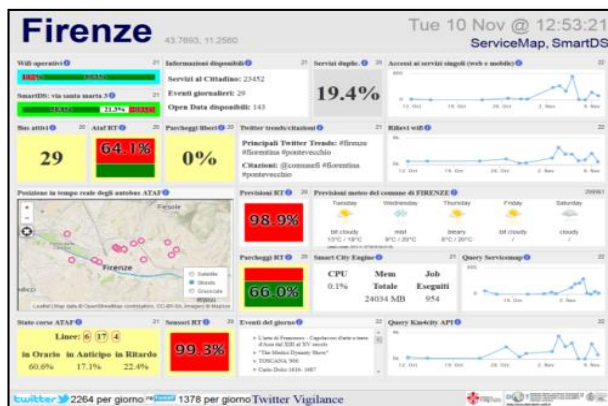
DISIT lab overview, Febbraio 2018, Florence

Decisioni supportate dai dati periodiche ed in tempo reale

- **Condivisione e Integrazione Dati multi-dominio:** *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 CITIES for a better world
FIRENZE. Venerdì 26 febbraio 2016
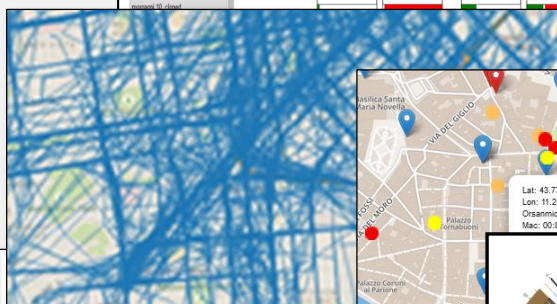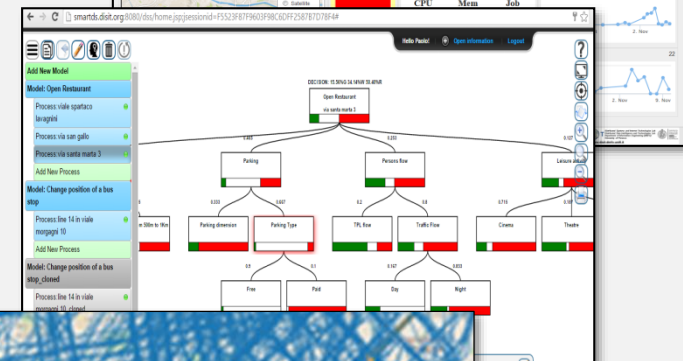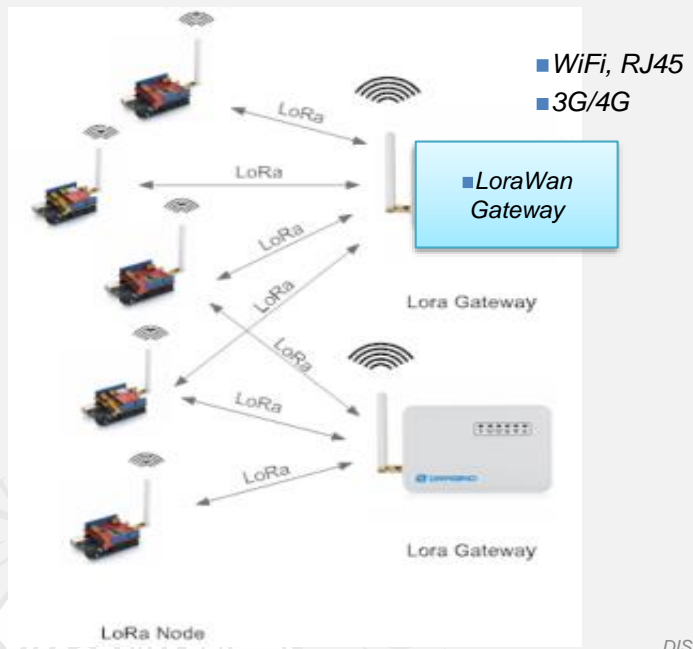
Internet of Things

■*WiFi, RJ45*
■*3G/4G*

■*LoraWan Gateway*

DISIT lab overview, Febbraio 2018, Florence

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http://www.disit.org

KM4CITY
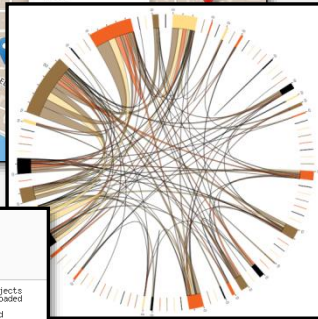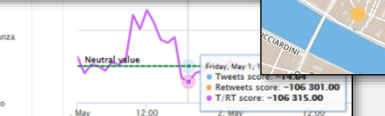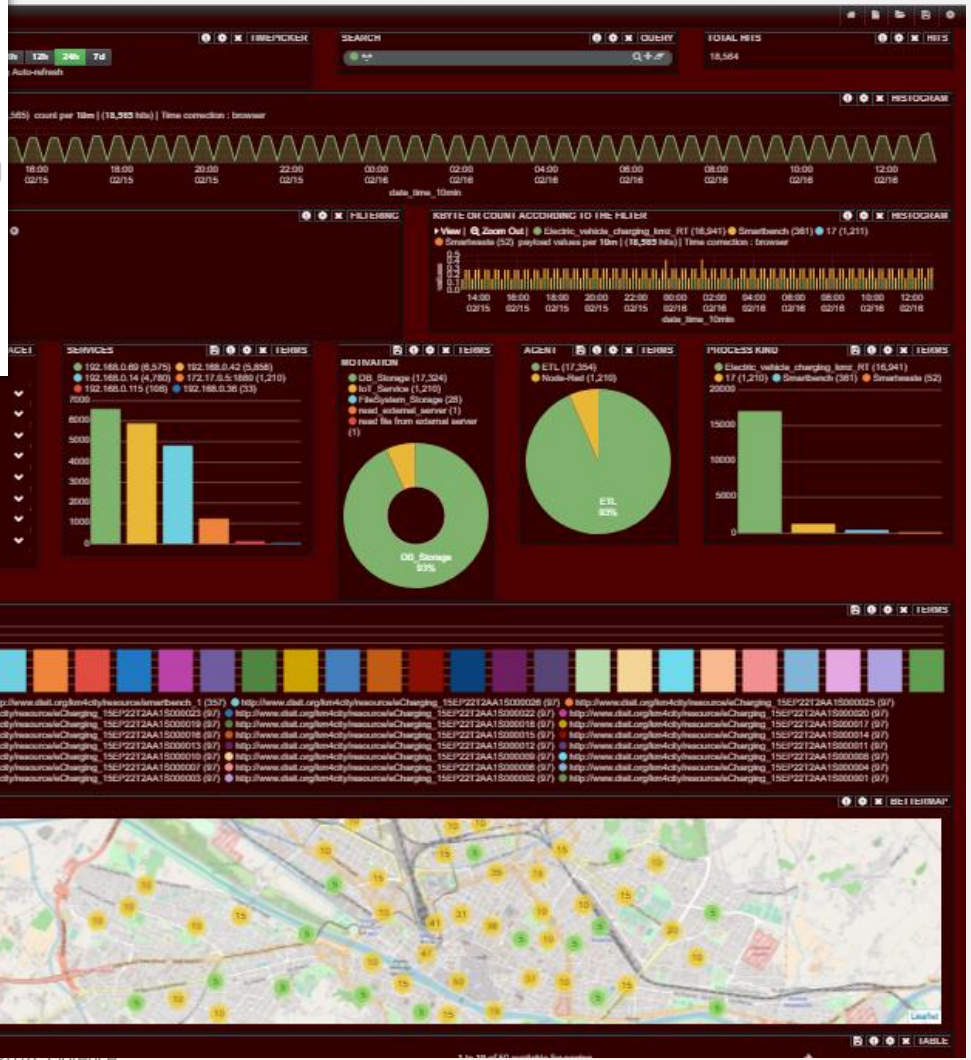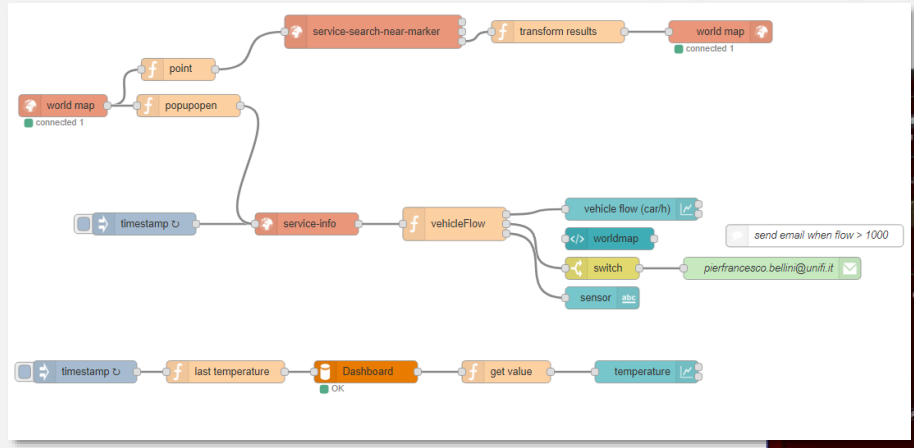
# *Smart Retail and Human monitoring/engaging*

- **Feedback Project, from Feb 2017**
  - Flexible Advanced Engagement Exploiting User Profiles and Product/Production Knowledge
  - VAR, PatriziaPepe (Tessilform), DISIT, Effective Knowledge, SICE
  - Keywords: retail, GDO, …

- **Goals and drivers:**
  - adaptive user engagement, customer experience
  - Advanced user profiling, user behavior analysis
  - Predictive models for engagement
  - IOT and instrumentation
  - Integrated incity customer experience

Smart Manufactory
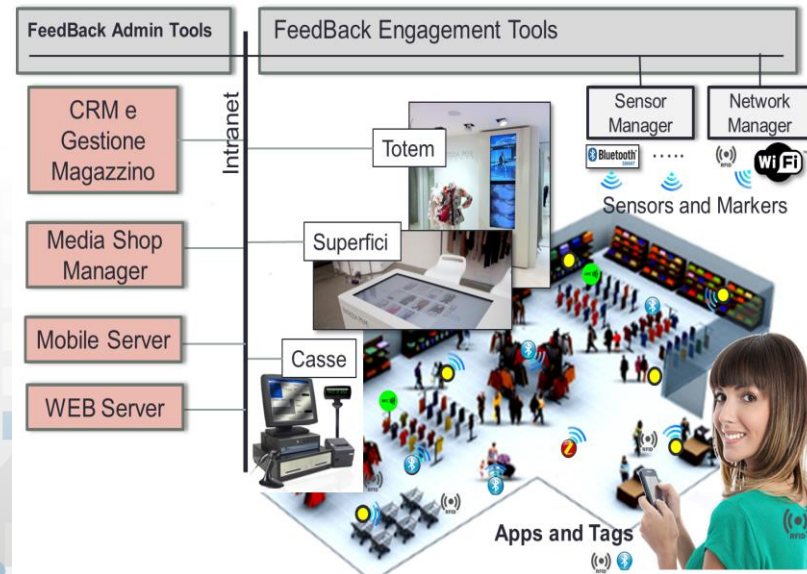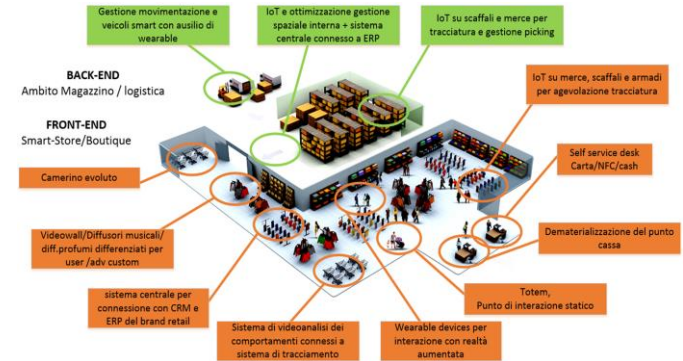
- **Riduzione costi e incremento efficienza**

  - **Automazione** della manutenzione e della produzione

  - **Navigazione** indoor – Outdoor integrata

  - **Ottimizzazione** flussi per utensili, pezzi e materiali

- **Progetti Regionali** con PMI e GI
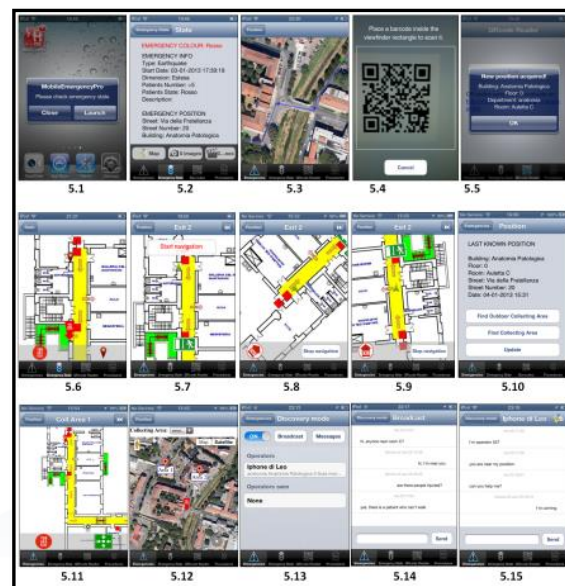
Smart Factory, Factory 4.0

- **Frontman (Novicrom)**
  - Improving efficiency into the production process via a set of heterogeneous numerical control machines

- **Green Capacity (ALTAIR)**
  - Optimizing chemical plant, automating maintenance and control in large chemical plant, dashboarding

- **Indoor/outdoor navigation system for maintenance**

- → → costs reduction, increase efficiency

Smart City Decision Support

- http://smartds.disit.org (user paolo.nesi@unifi.it, password= prova)

- ***System Thinking***, well known tool for Smart City decision support sys..

Plus:

➢ Collaborative work…,

➢ Reuse, copy past, …

➢ Processes connected with RDF Store of the city via SPARQL queries

➢ Mathematical model for propagation of decision confidence..
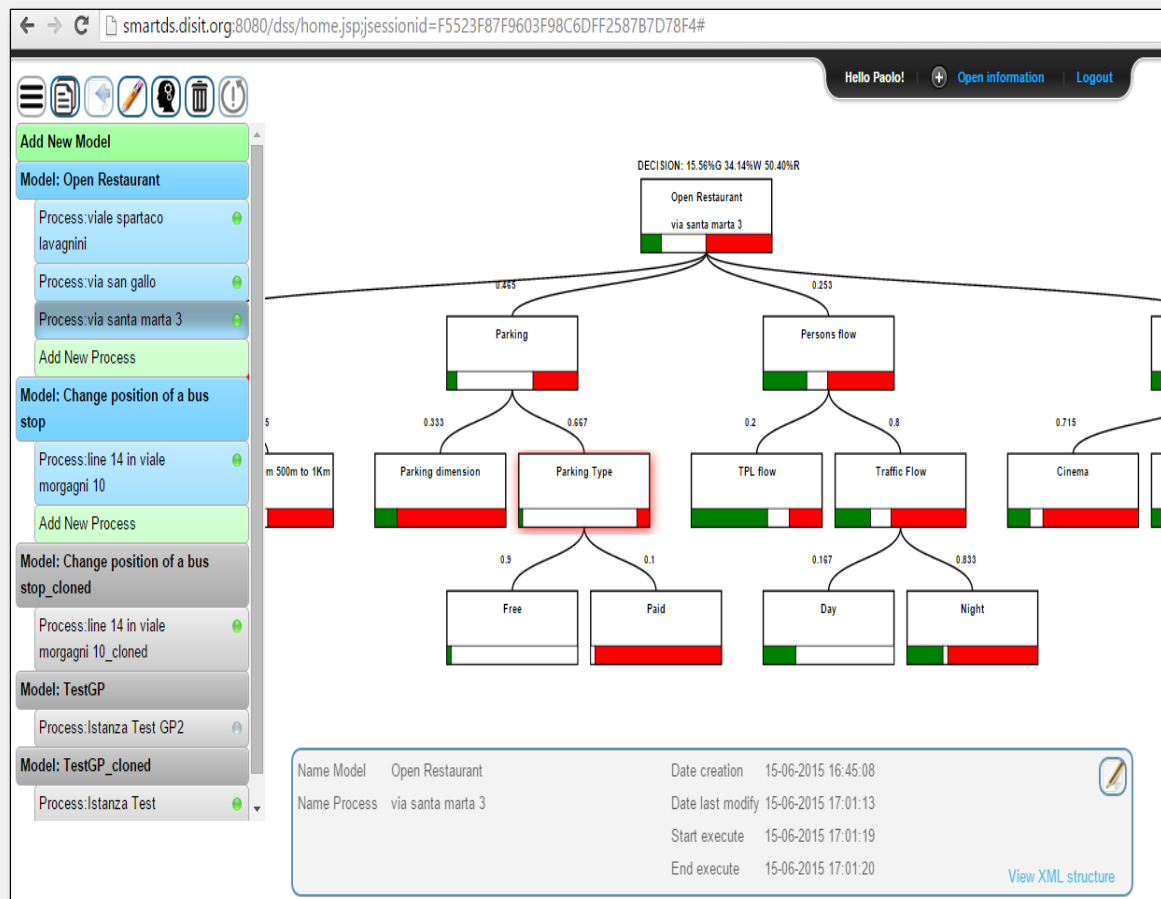
Analysing: Predicting, detection

- Aiming at managing
  - Appreciation
  - User relationships
  - quality of service
  - workload
  - early warning/detection
  - Dysfunction
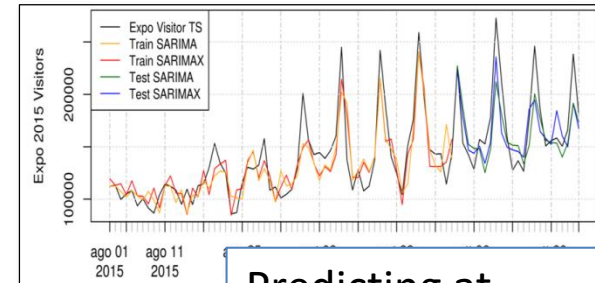 - Habitudes
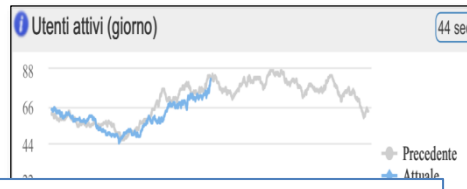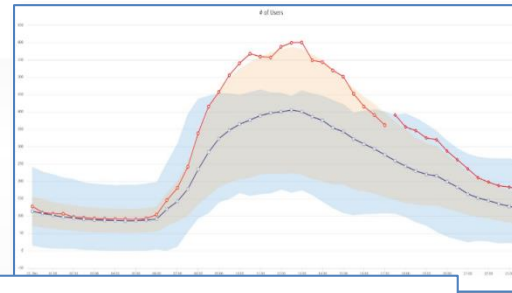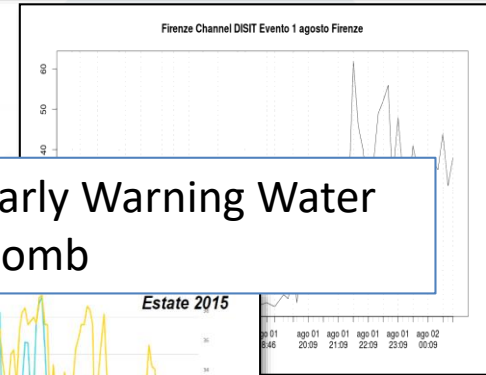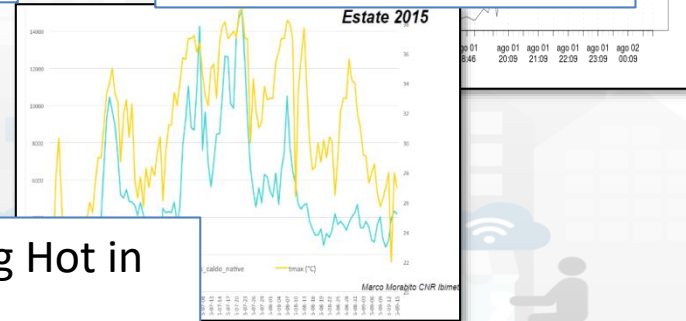
Predicting City Users on Areas

Predicting at EXPO2015

User behaviuor

Early Warning Water Bomb
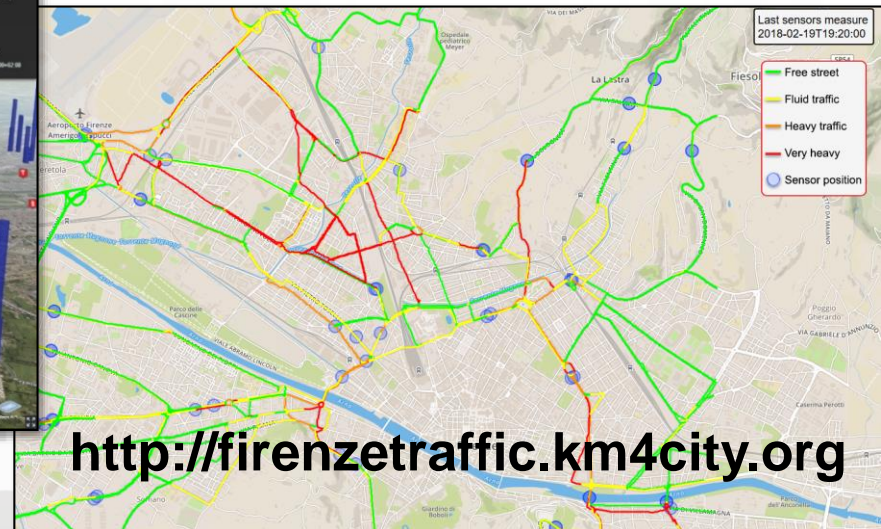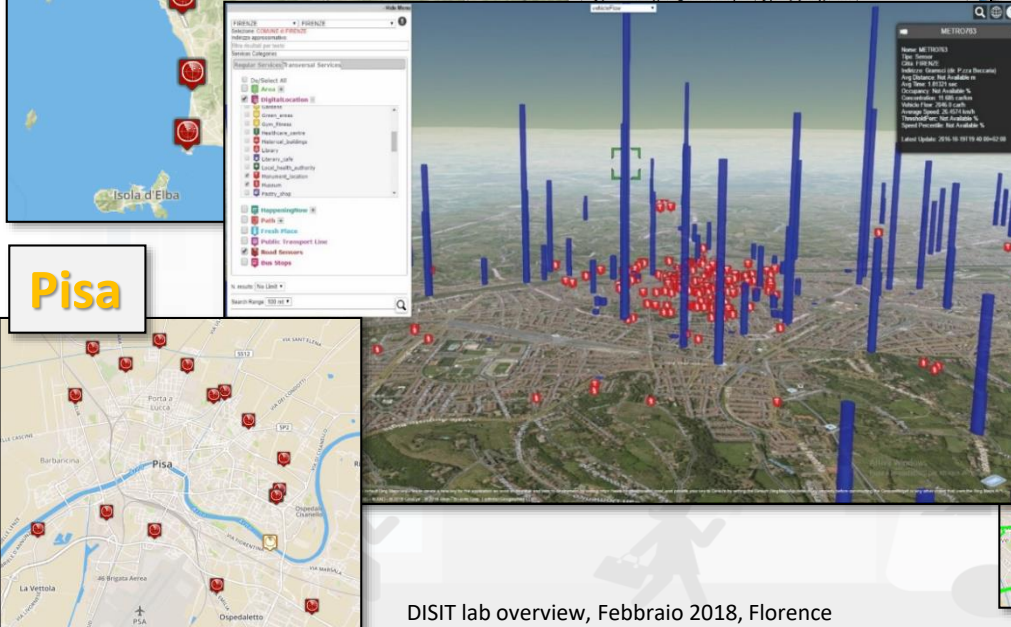
Early Warning Hot in Tuscany

Traffic Flow Tools

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

Tuscany

Pisa

http://firenzetraffic.km4city.org
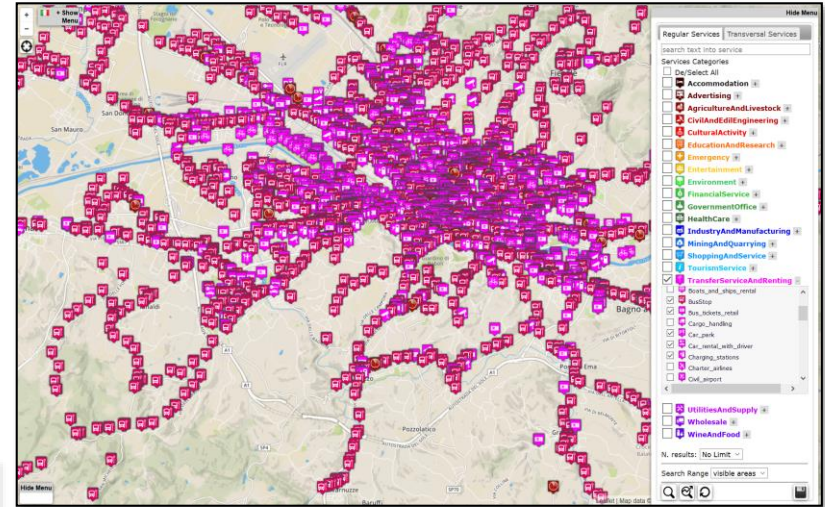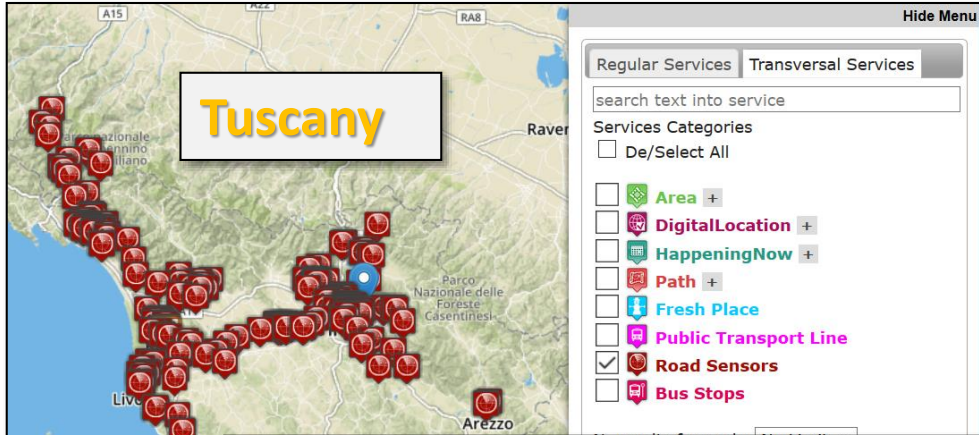
Smart Cloud - Computing

- **Projects:** http://www.disit.org/5501
  - ICARO: http://www.disit.org/5482
  - Social Museum and Smart Tourism
- **Tools:** http://www.disit.org/5489
  - Smart Cloud Engine and reasoner http://www.disit.org/6544
  - Cloud ontology and tools: http://www.disit.org/5604
    - Configuration analysis and checker
    - Service Level Analyzer and control
  - Cloud Simulation, ICLOS
  - Cloud Monitoring, SM

http://www.cloudicaro.it

http://www.disit.org/6588

Text and Web Mining

- **Projects:** http://www.disit.org/5501
  - OSIM: http://www.disit.org/5482
  - SACVAR: http://www.disit.org/5604
  - Blog/Twitter Vigilance
- **Tools:** http://www.disit.org/5489
  - Text and web mining, Natural Language Processing
  - Service localization
  - Web Crawling
  - Competence analysis
  - Blog Vigiliance, sentiment analysis

http://osim.disit.org

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
    - Communities
    - Formation
    - **Predicting volume of visitors for tuning the services**
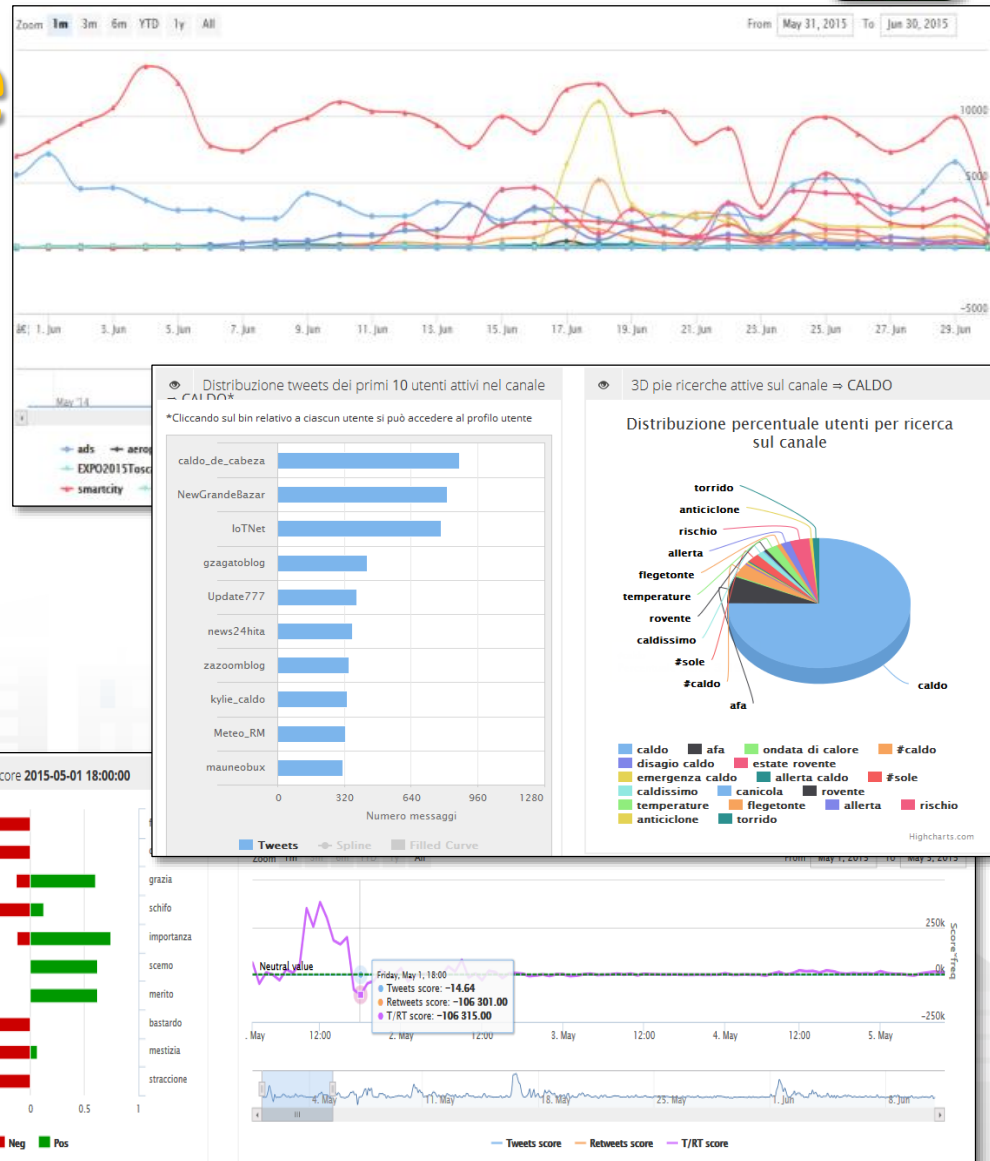
Mobile Computing

- **Km4City:** Smart City mobile applications
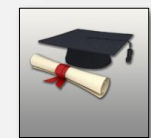 - Http://www.km4city.org/app
- **Content Organizer:** Media Distribution and Social Support, e-learning
- **Mobile Emergency:** navigation and collaborative emergency management
  - http://www.disit.org/5500
- **Mobile Medicine:** http://mobmed.axmedis.org
- **Coll@bora**: support for impaired people
- **FODD 2015:** http://www.disit.org/6593
- **Other**: Monitoring Cloud, monitoring camper, …

Toscana dove cosa, ...
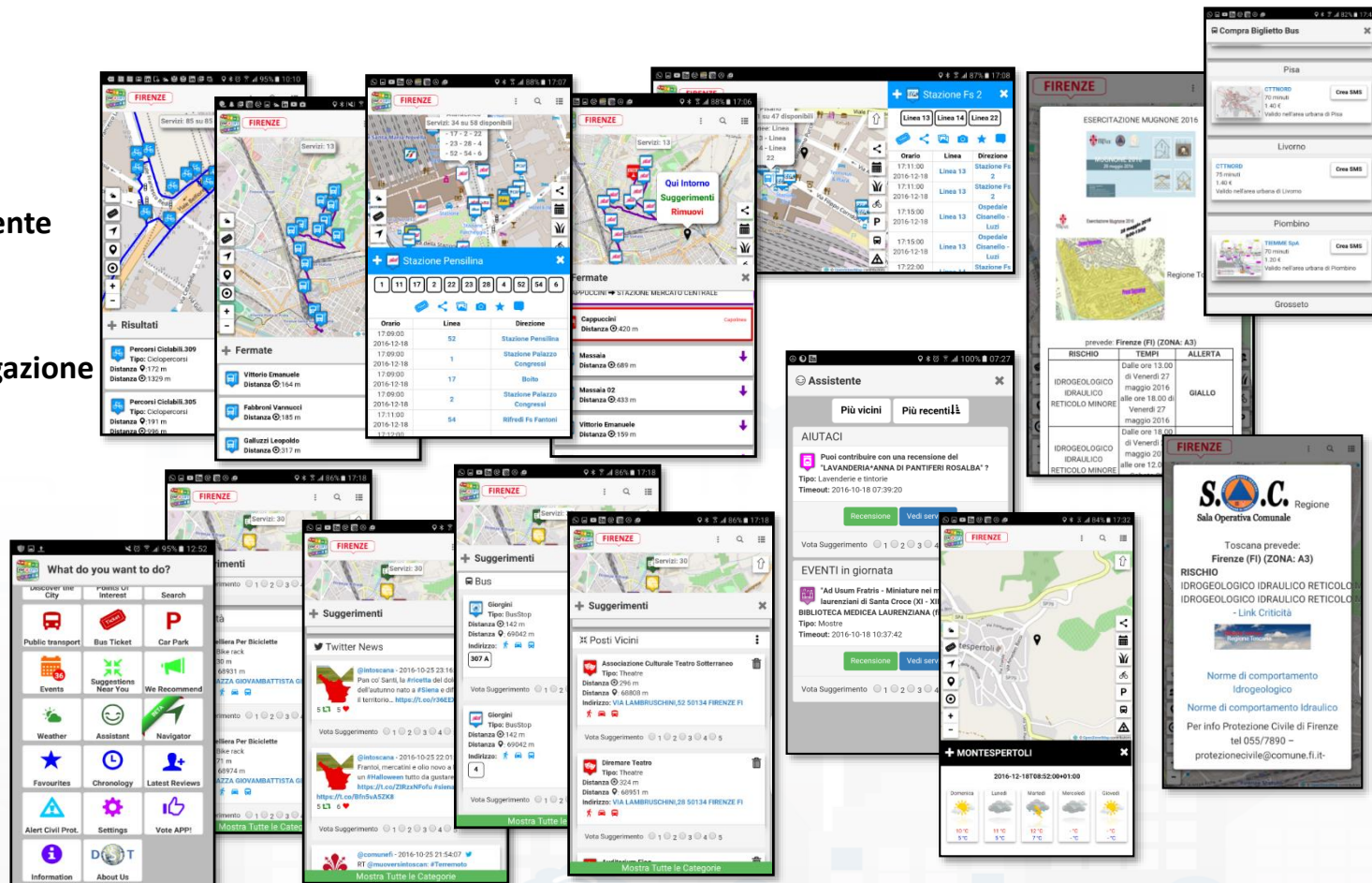
Sii-Mobility

- **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**

http://www.km4city.org/app

Corsi di docenti afferenti al Disit

- Triennale
  - Sistemi Distribuiti – Prof. Paolo Nesi
  - Sistemi Operativi – Pierfrancesco Bellini
  - Fondamenti di Informatica per Ingegneria Gestionale – Michela Paolucci
  - Fondamenti di Informatica per Infermieristica – Gianni Pantaleo

- Magistrale
  - Big Data and IoT – Prof. Nesi (Big Data, Architecture, Cloud, IoT)
  - Knowledge Engineering and Security – Pierfrancesco Bellini (Knowledge Engineering, Web Security, Natural Language Processing)

- Altri corsi:
  - Data Intelligence – Corso di Intelligence e Sicurezza Nazionale – Prof. Paolo Nesi
  - Master in Big Data-Mabida: architetture, Big Data, Knowledge engineering, Natural Language Processing, cloud, etc.

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DISIT Lab

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