



Km4City: Smart City Ontology Building for Effective Erogation of Services

For: Cognitive Systems Institute Group Speaker Series

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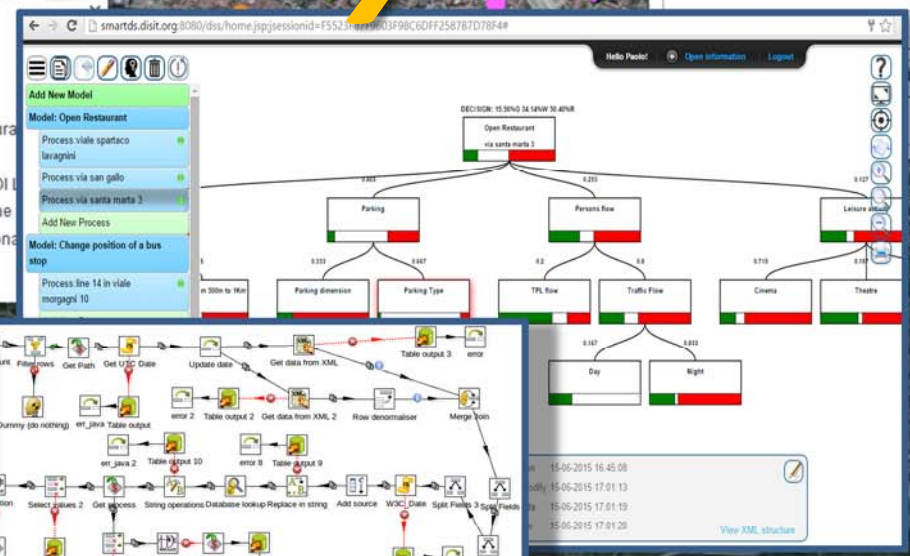
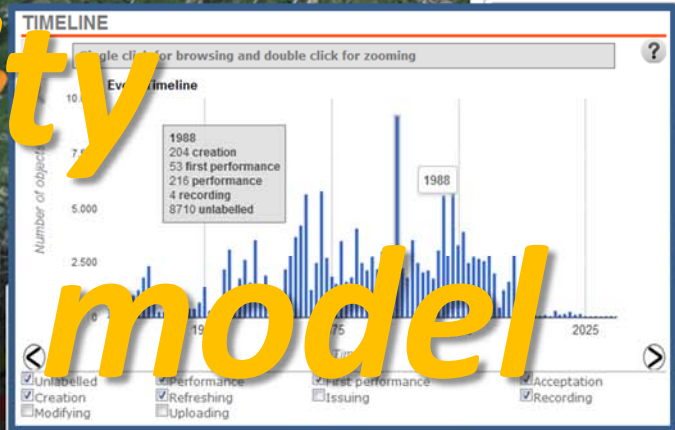
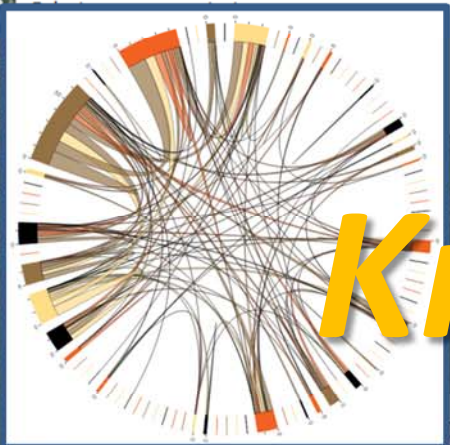
tel: +39-055-2758515, fax: +39-055-2758570

<http://www.disit.dinfo.unifi.it> , <http://www.disit.org>

paolo.nesi@unifi.it



Km4City Knowledge model for the city

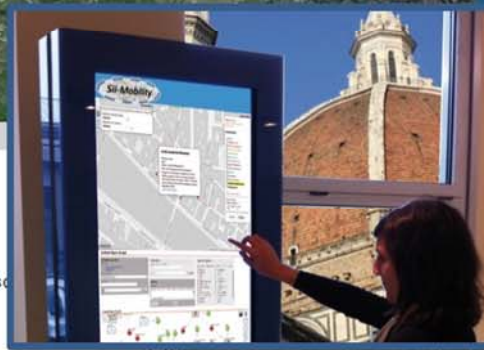


Previsioni Meteo per il comune di FIRENZE:

Martedì	Mercoledì	Giovedì	Venerdì
poco nuvoloso 26°C / 34°C	sereno 19°C / 35°C	poco nuvoloso 20°C / 36°C	poco nuvoloso /

Ultimo Aggiornamento: 2015-06-30T09:04:00+02:00

[LINKED OPEN GRAPH](#)



Km4City Objectives

- **Provides a unique point of service** with integrated and aggregated data and tools for
 - Qualified users: public administrations → developers
 - Operators: mobility, energy, tourism, cultural, SME, shops, → developers
 - Final users → citizens, students, pendular, tourists
- **Problems:**
 - Aggregated Data are not available:
 - not semantically interoperable, heterogeneous for: format, vocabulary, structure, velocity, volume, ownership/control, access / license, ...
 - As OD, LD, LOD, private data, ..
 - Lack of Services and tools to make the adoption *simple*

Km4City Tools

- **Final Users' Tools:**

- *Km4City mobile app with personal assistant is coming...*
- Km4City **mobile** applications: Google Play, Apple Store, ...
- Km4City web application: <http://www.km4city.org>
- Open Source Mobile Application, FODD: an example in open source <http://www.disit.org/6595>

- **Public Administrators' Tools:**

- Smart decision support system, <http://smartds.disit.org>

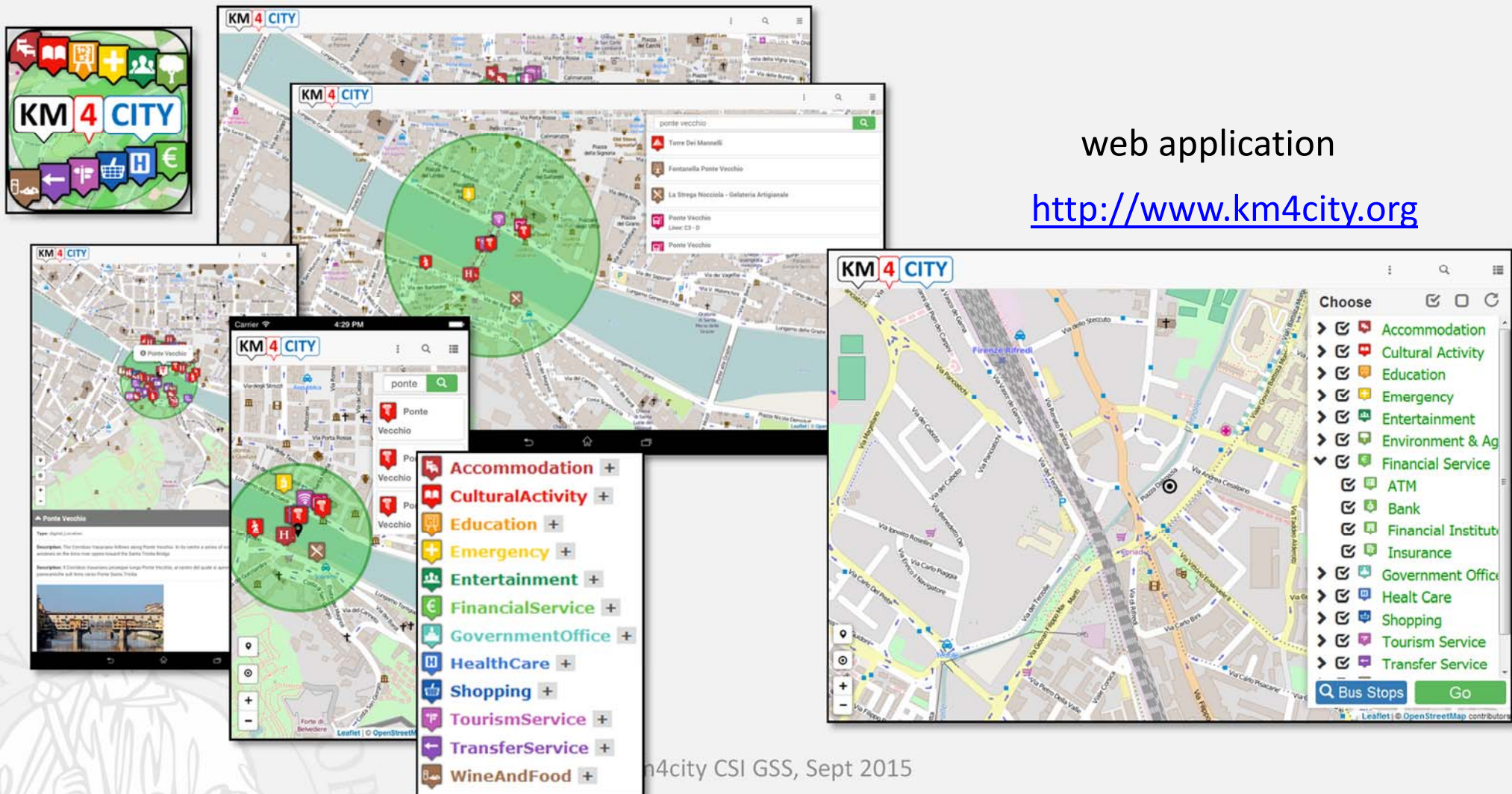
- **Developers** <http://www.disit.org/km4city> **tools:**

- Service Map Server, plus API, <http://servicemap.disit.org>
- LOG LOD browser: an ultimate visual tool to browse the RDF Store.
- Ontology Documentation: an ultimate tool to understand, if needed !!



Km4CityMobile App: Google Play and Apple Store

- <https://play.google.com/store/apps/details?id=org.disit.siiMobile>
- <https://itunes.apple.com/us/app/florence-km4city/id1028356115?mt=8>



<https://play.google.com/store/apps/details?id=org.disit.fodd>



Source code on <http://www.disit.org/6595>

Open Data Day App Menu

- Programma
- Servizi Vicini
- Previsioni Meteo
- Stato alla Pensilina
- Parcheggio Stazione
- Sensore Empoli
- Leggimi
- Exit

Servizi Vicini

Previsioni Meteo

FIRENZE
sereno
Ultimo aggiornamento 2

Prossimi giorni

- Martedì sereno
- Mercoledì sereno
- Giovedì sereno
- Venerdì nuvoloso

Sensore Empoli

Informazione Tempo Reale Sensore EM0100102
VIALE GIOVANNI BOCCACCIO - EMPOLI

Aggiornamento del 2015-02-21T01:00:00.000+01:00

Distanza Media (m)	585.90
Temp Medio (s)	63.20
Occupazione (%)	0.01
Concentrazione (auto/km)	1.00
Flusso (auto/h)	9.00
Velocità Media (Km/h)	35.22
Soglia (%)	0.00
Velocità Percentile (%)	Not Available

Ponte Vecchio (DL)

Ponte Vecchio

Costruito in epoca romana, il Ponte fu più volte danneggiato dalle alluvioni e ricostruito e fu l'unico ponte a non essere distrutto nel agosto 1944 dalle mine tedesche. La struttura fu rialzata nel 1345 con tre ampi valichi: arco ribassato e aveva il passaggio calpestio fiancheggiato da due file lunghe botteghe legate al commercio alimentare

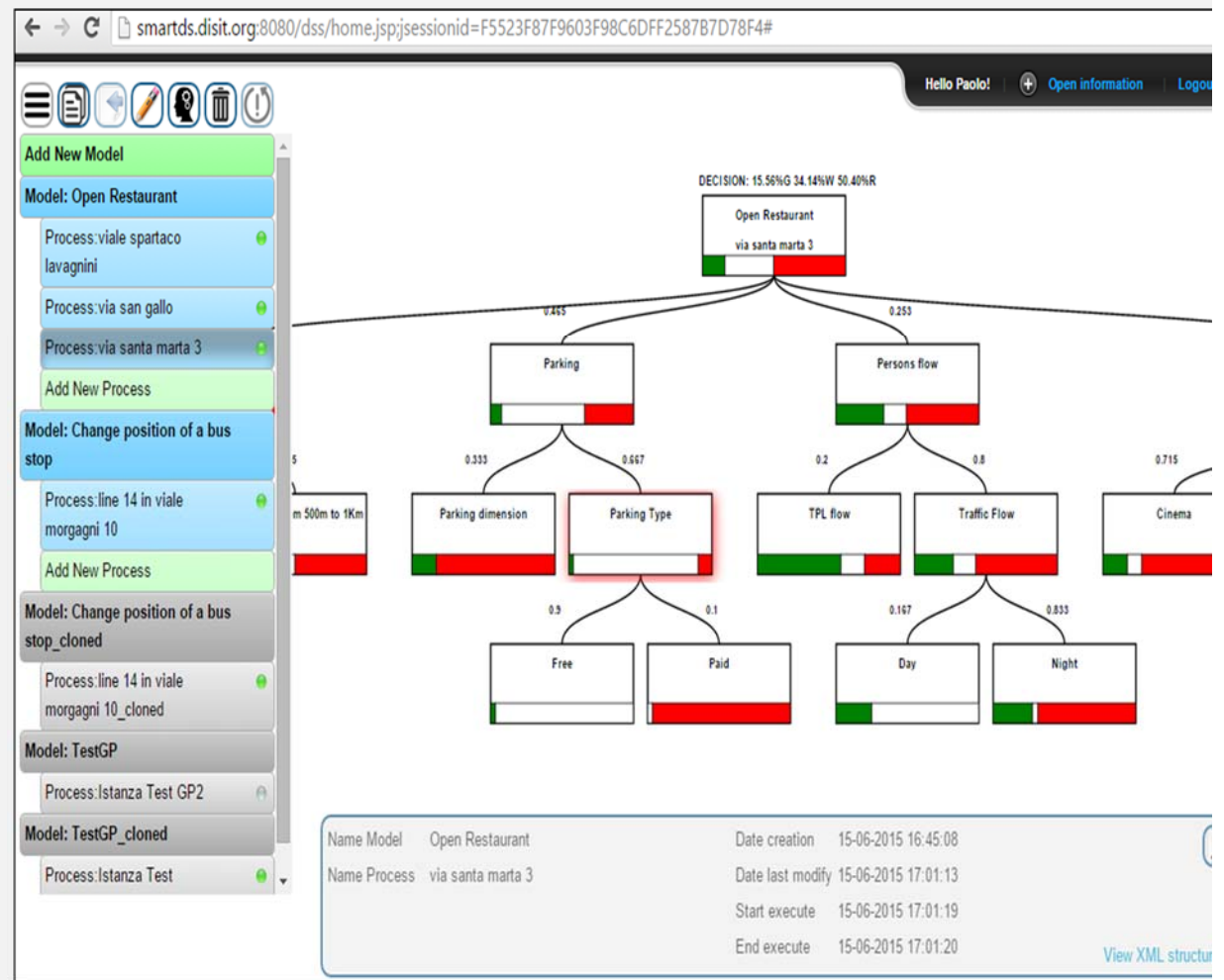
Smart City Decision Support

- <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..



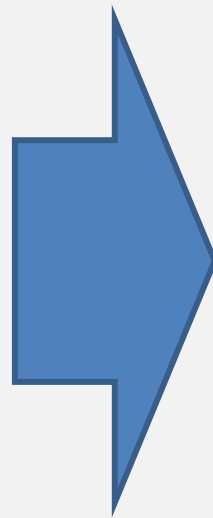
km4City Tools

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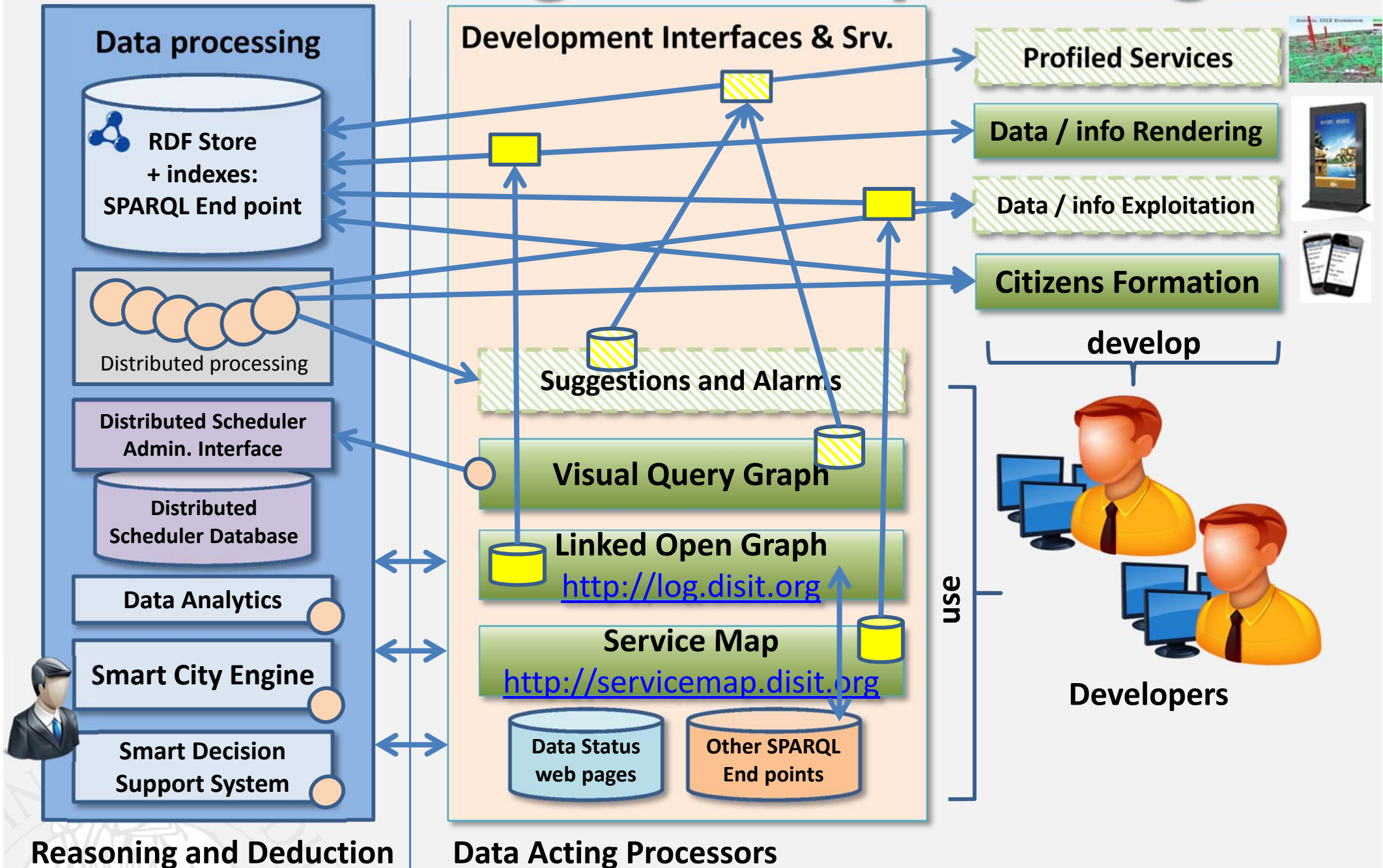
Km4City Developers for APPs

- **SME, not skilled on semantics, reasoning..**
 - SPARQL ?, RDF ?
- Simple development tools, mainly visual
- Accessible examples
- Not depending on data
- Hackathons ..
- Tutorials..



- **THUS:**
 - **ServiceMap** Tool, plus API and documentation, <http://servicemap.disit.org>
 - **LOG LOD browser:** an ultimate visual tool to browse the RDF Store.
 - **Ontology** Documentation: an ultimate tool to understand, if needed !!

Reasoning and Exploiting



Km4City

Service map front end

Development tool and API

<http://servicemap.disit.org>

The screenshot displays the Km4City service map interface. The main map shows Florence, Italy, with numerous colored markers representing different services. A search panel on the right allows filtering by service categories (e.g., Accommodation, Education, Financial Service) and setting search radius and results count. A weather forecast panel at the bottom left shows the forecast for Florence for the next five days. A central popup window displays details for a specific sensor (FI055ZTL00301).

- Nascondi Menu

Fermate Firenze Comuni in Toscana Posizione

Seleziona una provincia:
FIRENZE

Seleziona un comune:
FIRENZE

Actual Selection: Seleziona: FI055ZTL00301

- Hide Menu

Servizi Regolari Servizi Trasversali

Categorie Servizi

- De/Select All
- Accommodation +
- CulturalActivity +
- Education +
- Emergency +
- Entertainment +
- FinancialService +
- GovernmentOffice +
- HealthCare +
- Shopping +
- TourismService +
- TransferService +
- WineAndFood +

Raggio di Ricerca:
100 metri

Numero massimo di risultati:
100

Road Sensors

Raggio di Ricerca:
100 metri

Numero massimo di risultati:
100

Bus Stops

Raggio di Ricerca:
100 metri

Numero massimo di risultati:
100

Previsioni Meteo per il comune di FIRENZE:

Martedì	Mercoledì	Giovedì	Venerdì	Sabato
nuvoloso 10 - 16	sereno 5 - 19	sereno 4 - 19	velato -	pioggia debole e schiarite

Ultimo Aggiornamento: "2015-03-17T14:24:00.00+02:00"
[LINKED OPEN GRAPH](#)

Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

Km4City Servicemap & API

- <http://www.disit.org/6597>
 - REST API: serviceURI or Selection or GPS
 - REST API: Query ID
 - Receive an email
 - Get a JSON, HTML, ...
- EMBED facility in third party web pages

The screenshot shows two information windows for train stations:

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

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

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

The 'Save your information for services' dialog box contains the following fields:

- email@domain.ext
- Insert a title: Service title
- Insert a description: Insert a description
- Send button

<http://servicemap.disit.org>

Km4City Servicemap & API

- <http://www.disit.org/6597>
 - REST API: serviceURI or Selection or GPS
 - REST API: Query ID
 - Receive an email
 - Get a JSON, HTML, ..
- EMBED facility in third party web pages

The screenshot shows two overlapping information windows for transit stops. The top window is for 'FERMATA : STATUTO 04' and the bottom window is for 'FERMATA : STAZIONE PENSILINA'. Both windows show a 'LINKED OPEN GRAPH' button and a list of lines. The bottom window also displays a 'Prossimi transiti' table with columns for 'Orario', 'Linea', 'Stato', and 'Ride'.

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

Overlaid on the right is a 'Save your information for services' dialog box with the following fields:

- email@domain.ext
- Insert a title: Service title
- Insert a description: Insert a description
- Send button

<http://LOG.disit.org>

Linked Open Graph

<http://log.disit.org>

A bus stop info....

Linked Open Graph

Select a SPARQL endpoint:

Km4City SmartCity Ontology (by DISIT)

- dbpedia live
- British Museum
- FactForge live
- LinkedGeoData
- Europeana
- Cultura Italia
- Comune di Firenze
- Senato, Italiano
- Camera dei deputati, Italiano
- Getty Vocabularies
- Open Link SW
- IEEE Video Stanford representation
- Km4City SmartCity Ontology (by DISIT)**
- ICARO Smart Cloud Ontology (by DISIT)
- MyStory Player (by DISIT)
- OSIM UNIFI Competences (by DISIT)
- ECLAP Performing Arts Network (by DISIT)
- lodlaundromat.org
- geo.linkeddata.es

Relations: 14

km4city CSI GSS

Linked Open Graph

Select a SPARQL endpoint:

Km4City SmartCity Ontology (by DISIT)

Examples:

- VIA GIACOMO MATTEOTTI
- Bagno a ripoli
- Florence
- Fermata di Piazza San Marco, real time status
- Empoli traffic flow sensor, real time status
- Florence, Parking at the station, real time status

Choose a class:

Search for keyword

keyword:

uri: <http://www.disit.org/km4city/resource/FM0084> Request

Multiple endpoint search

Your data

sparql endpoint: (c

uri: http://...

Multiple endpo

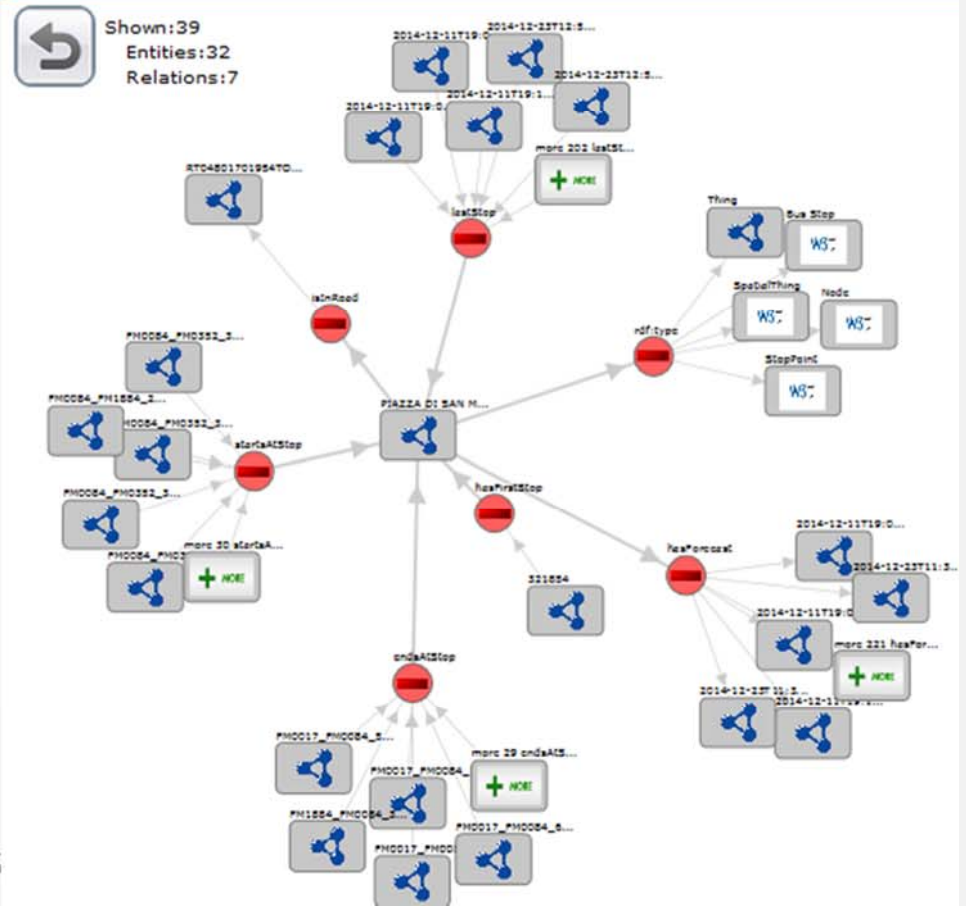
Status

Requests:

Fermata di Pi

Remove

Linked Open Graph

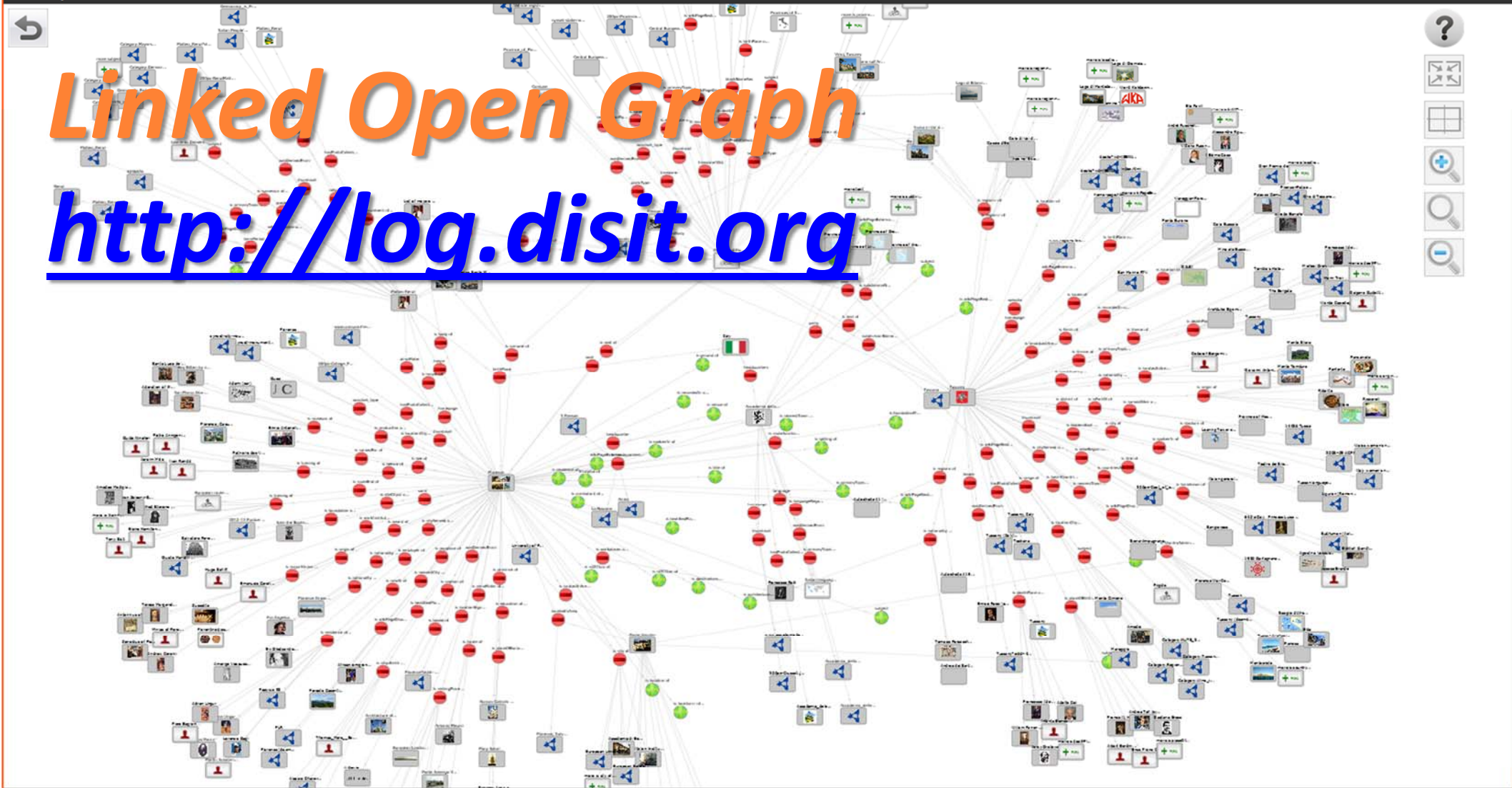


Data Graph

Close

Linked Open Graph

<http://log.disit.org>



Type of relations

<input type="checkbox"/> sameAs	<input type="checkbox"/> depiction	<input checked="" type="checkbox"/> seeAlso	<input type="checkbox"/> is province of	<input type="checkbox"/> is region of	<input type="checkbox"/> country	<input type="checkbox"/> mayorParty	<input checked="" type="checkbox"/> saint	<input checked="" type="checkbox"/> mayor	<input type="checkbox"/> region	<input type="checkbox"/> type
<input checked="" type="checkbox"/> subject	<input checked="" type="checkbox"/> homepage	<input type="checkbox"/> wikiPageUsesTemplate	<input checked="" type="checkbox"/> thumbnail	<input checked="" type="checkbox"/> wikiPageExternalLink	<input checked="" type="checkbox"/> wasDerivedFrom	<input checked="" type="checkbox"/> hasPhotoCollection	<input checked="" type="checkbox"/> wordnet_type	<input type="checkbox"/> isPrimaryTopicOf	<input type="checkbox"/> is battles of	<input checked="" type="checkbox"/> is training of
<input checked="" type="checkbox"/> is restingPlace of	<input checked="" type="checkbox"/> is comune of	<input type="checkbox"/> is after of	<input checked="" type="checkbox"/> is museum of	<input checked="" type="checkbox"/> is title of	<input type="checkbox"/> is origin of	<input checked="" type="checkbox"/> is headquarters of	<input checked="" type="checkbox"/> is location of	<input checked="" type="checkbox"/> is city of	<input type="checkbox"/> is battle of	<input checked="" type="checkbox"/> is see of
<input type="checkbox"/> is restingPlace of	<input checked="" type="checkbox"/> is province of	<input type="checkbox"/> is place of	<input checked="" type="checkbox"/> is origin of	<input checked="" type="checkbox"/> is production of	<input checked="" type="checkbox"/> is placeOfBurial of	<input type="checkbox"/> is place of	<input checked="" type="checkbox"/> is nonplace of	<input checked="" type="checkbox"/> is recordedIn of	<input checked="" type="checkbox"/> is mainShrine of	<input checked="" type="checkbox"/> is route function of

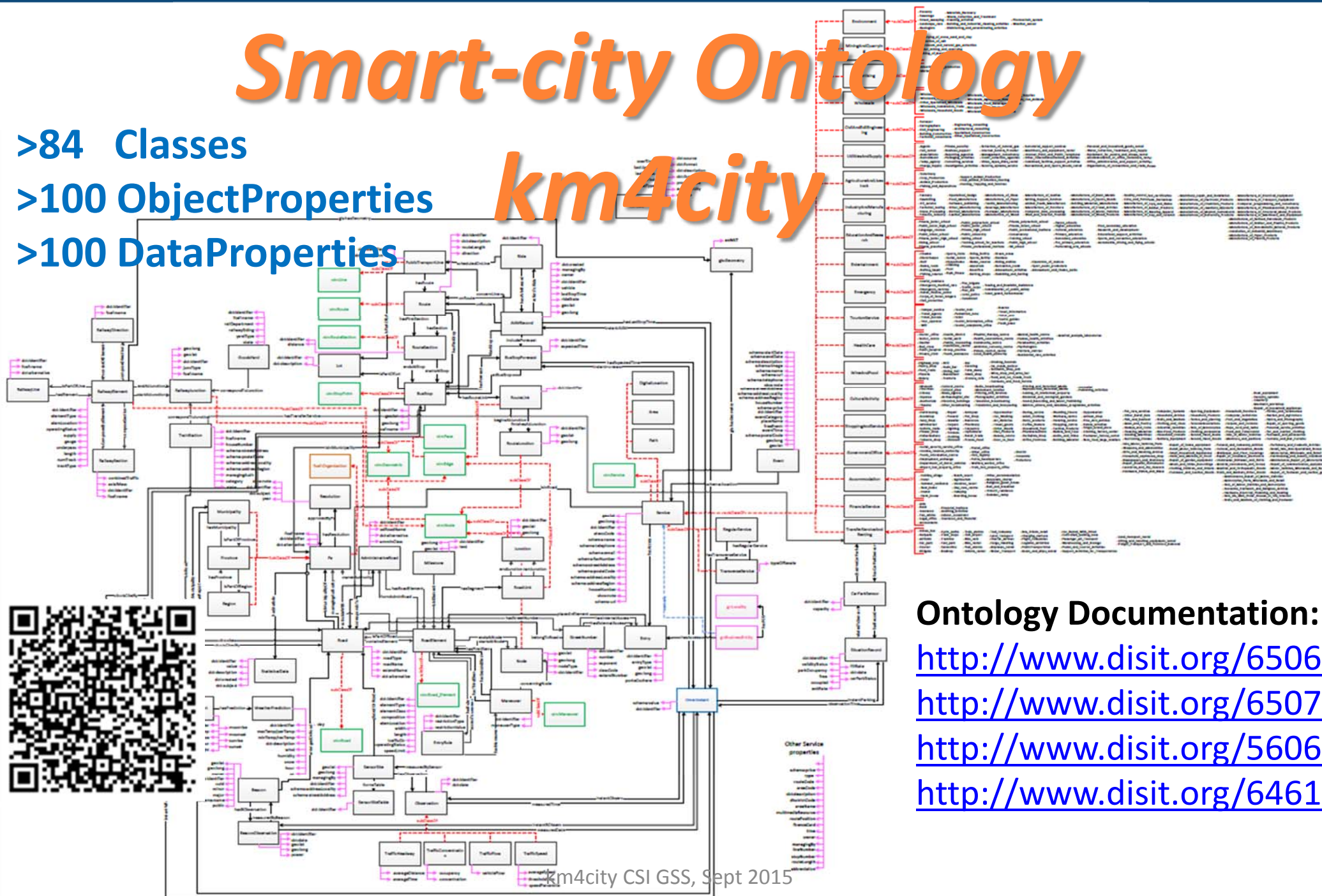
Smart-city Ontology

km4city

>84 Classes

>100 ObjectProperties

>100 DataProperties



Ontology Documentation:

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

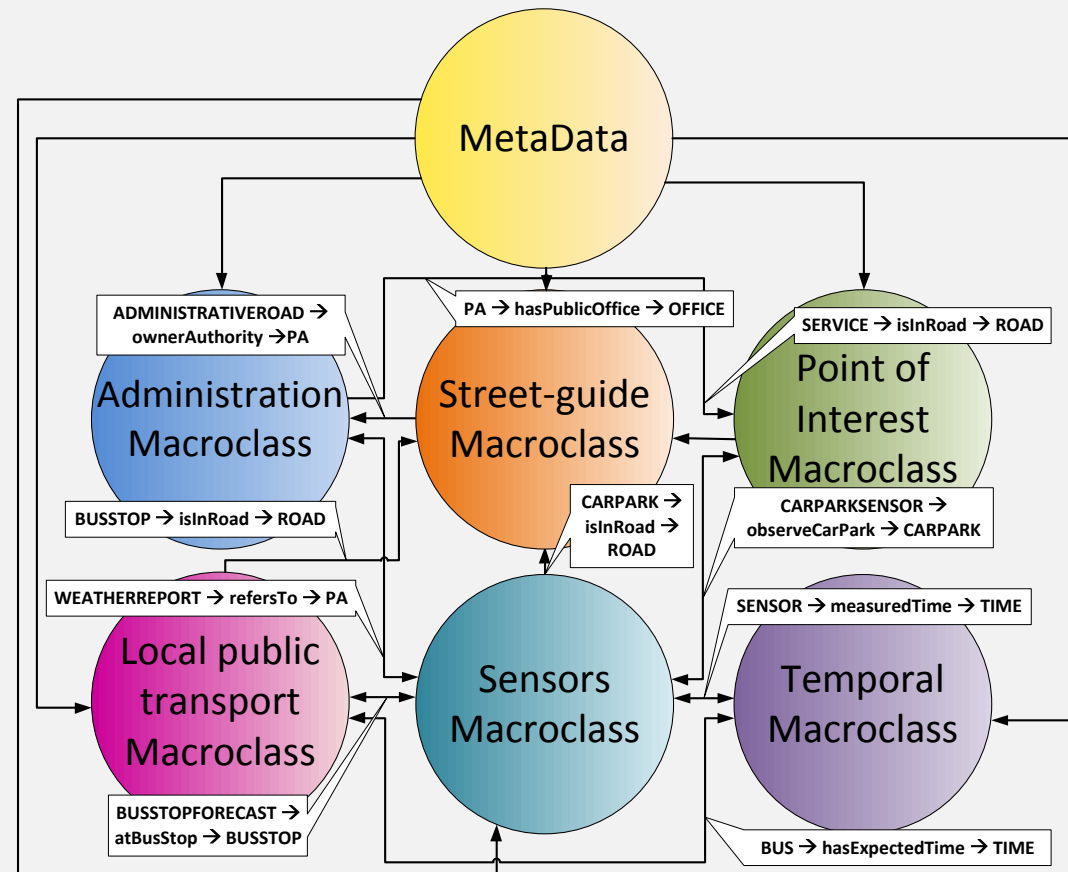
<http://www.disit.org/6507>

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

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

Smart-city Ontology

- The data model provided have been mapped into the ontology, it covers different aspects:
 - Administration
 - Street-Guide
 - Points of interest
 - Citations from strings
 - Local public transport
 - Sensors..
 - Temporal aspects
 - Metadata on the data
 - → Statistics
 - → Risk assessment

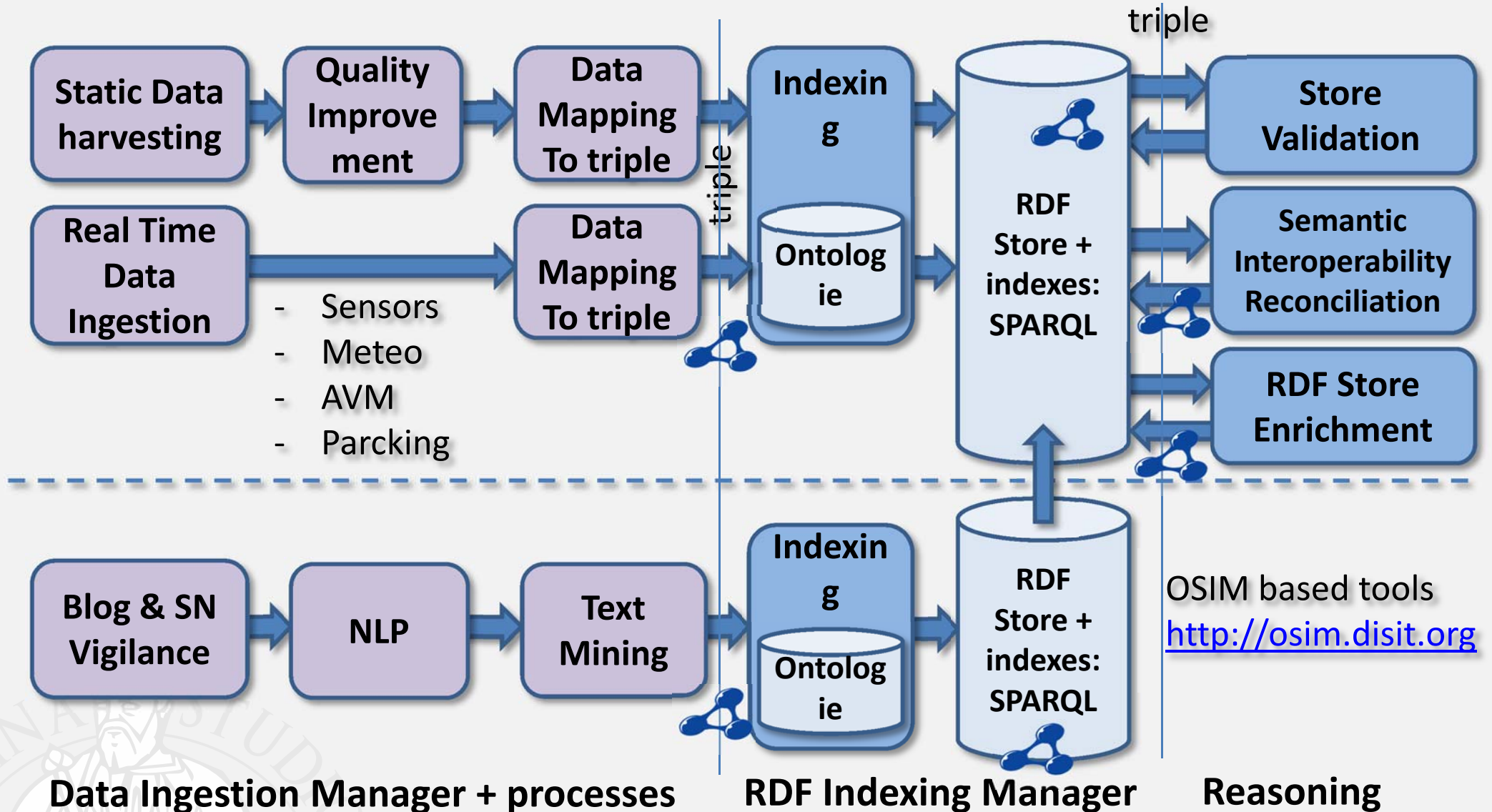


km4City Back Office Tools

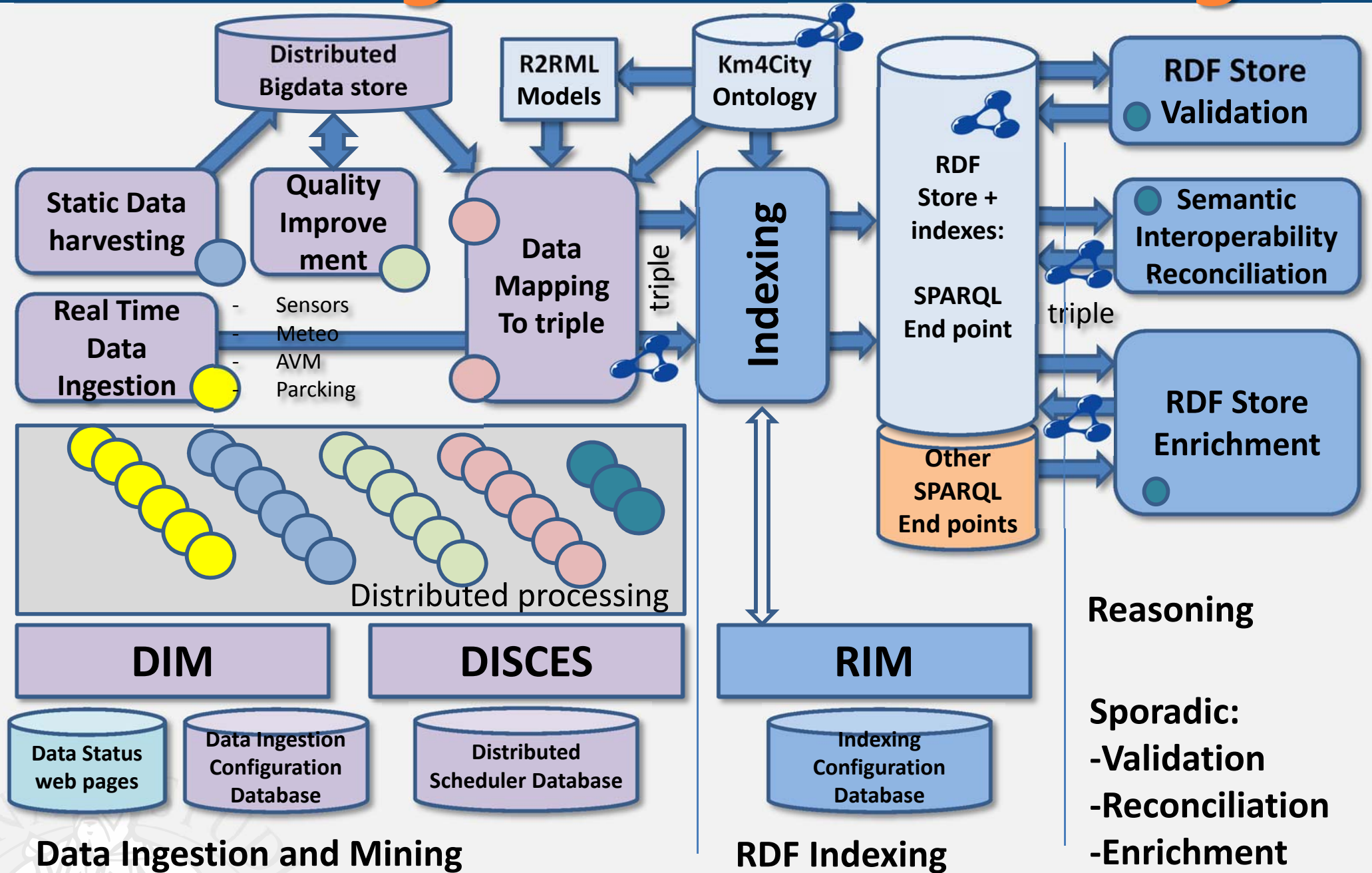
- **The dirty work of Km4City service**
 - Data Ingestion Manager, DIM
 - RDF Indexer Manager, RIM
 - ..
 - RDF Store Methodology
 - RDF store enricher: dbPedia, ..
 - Distributed SCE Scheduler, DISCES
 - SCE: Smart City Engine
 - ...
 - [Doc and info on http://www.disit.org/km4city](http://www.disit.org/km4city)



Data Ingestion and Mining



Data Ingestion and Mining



DIM and RIM

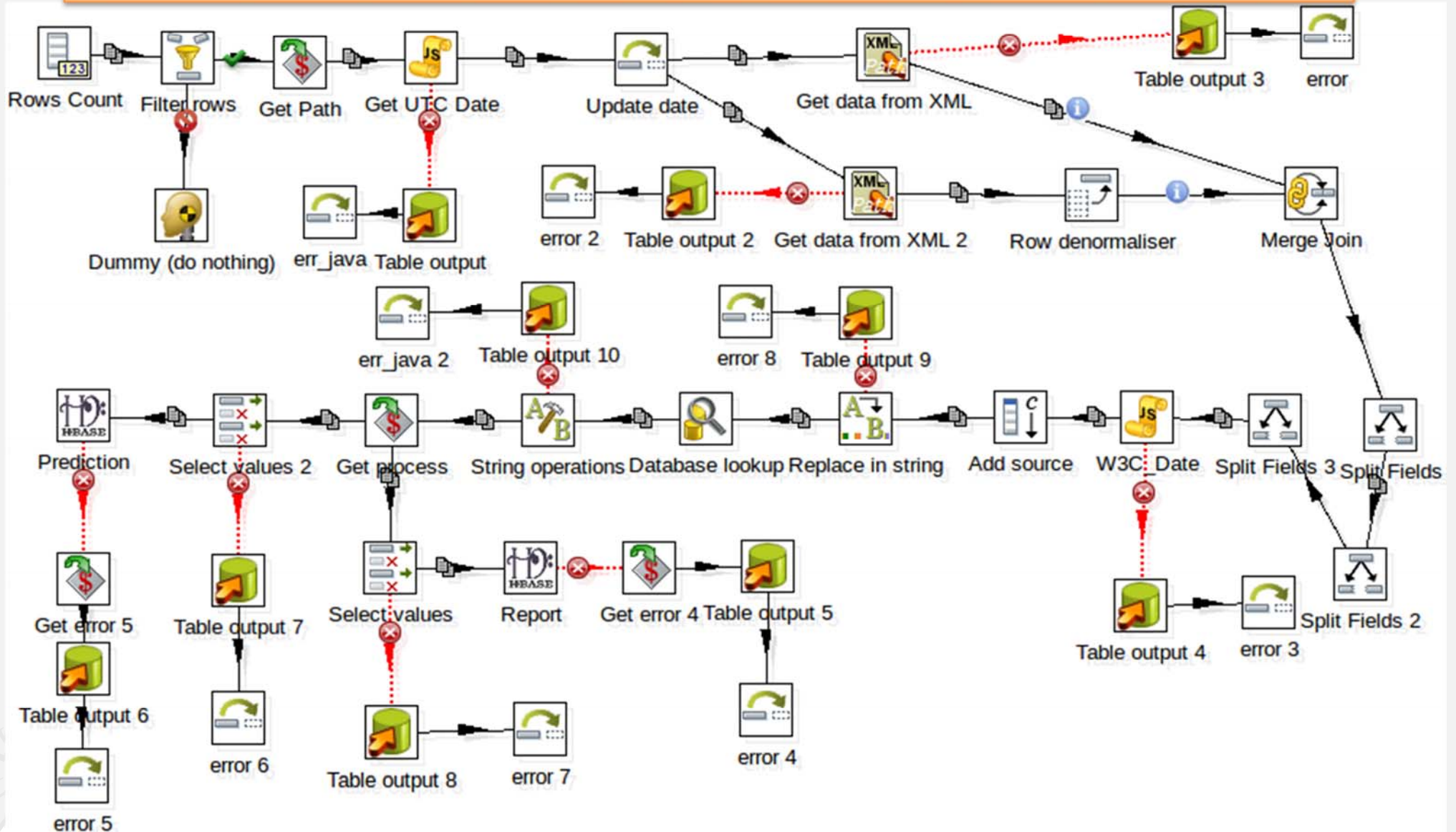
- **Data Ingestion Manager and SCE**

- Managing workflow of thousands of different data sources
- Scheduling activities
- Executing processes on parallel and distributed architecture HBASE
- ETL and ++ : **harvesting**, ingestion, enrichment, mapping, producing **triples**, etc., etc.,
- <http://www.disit.org/6732>

- **RDF Indexing Manager**

- Supporting methodology for **ontology integration** and **RDF store building**
- RDF store versioning
 - Recovering from snapshots, phases, ..
- Making verification and validation of produced RDF stores
- <http://www.disit.org/6750>

Example of Ingestion process





Distributed SCE Scheduler

Sil-Mobility Smart Cloud Engine
DISIT - Distributed Systems and Internet Technology Lab

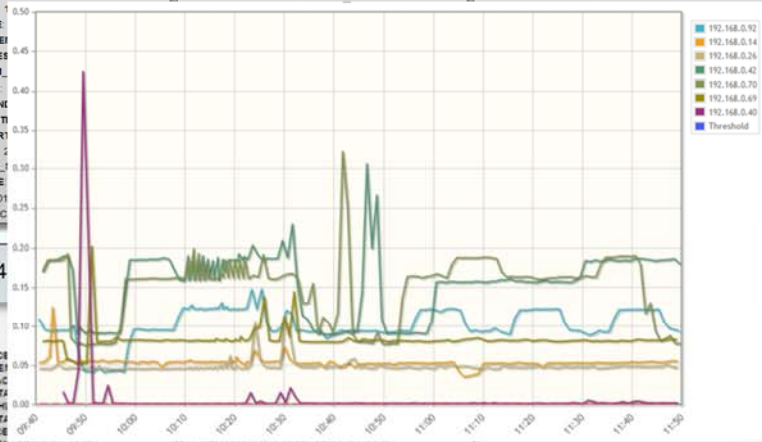
<p>192.168.0.14</p> <ul style="list-style-type: none"> LAST_CHECK: 2014-12-16 11:29:04 SCHEDULER_INSTANCE_ID: hadoopnode01d1418718662488 CPU_LOAD: 0.05322341999577256 FREE_PHYSICAL_MEMORY: 4686650584 JOBS_EXECUTED: 0 SCHEDULER_NAME: SCE CURRENT_TIME: 2014-12-16 11:29:58 JOBS/h: 0 RUNNING_SINCE: 2014-12-16 09:31:02 CLUSTERED: 1 PERSISTENCE: 1 REMOTE_SCHEDULER: 0 CURRENTLY_EXECUTING_JOBS: 0 CPU_LOAD_JVM: 8.8776157206962143E-4 SYSTEM_LOAD_AVERAGE: 0.0 OPERATING_SYSTEM_VERSION: 3.13.0.24-generic COMMITTED_VIRTUAL_MEMORY: 3679342592 OPERATING_SYSTEM_NAME: Linux FREE_SWAP_SPACE: 12860071936 PROCESS_CPU_TIME: 3287000000 TOTAL_PHYSICAL_MEMORY: 12600922112E10 NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12881752064E10 IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 232154175360 UNALLOCATED_DISK_SPACE: 1937102204928 USABLE_DISK_SPACE: 18197650923840 PREV_FIRE_TIME: 2014-12-15 23:09:17 CPU: Intel(R) Xeon(R) CPU X3470 @ 2.93GHz 	<p>192.168.0.26</p> <ul style="list-style-type: none"> LAST_CHECK: 2014-12-16 11:29:04 SCHEDULER_INSTANCE_ID: hadoopnode06c1418718723312 CPU_LOAD: 0.04810651796883606 FREE_PHYSICAL_MEMORY: 10056519680 JOBS_EXECUTED: 0 SCHEDULER_NAME: SCE CURRENT_TIME: 2014-12-16 11:29:58 JOBS/h: 0 RUNNING_SINCE: 2014-12-16 09:32:03 CLUSTERED: 1 PERSISTENCE: 1 REMOTE_SCHEDULER: 0 CURRENTLY_EXECUTING_JOBS: 0 CPU_LOAD_JVM: 8.425309630128908E-4 SYSTEM_LOAD_AVERAGE: 0.13 OPERATING_SYSTEM_VERSION: 3.13.0.24-generic COMMITTED_VIRTUAL_MEMORY: 3679342592 OPERATING_SYSTEM_NAME: Linux FREE_SWAP_SPACE: 12633508848 PROCESS_CPU_TIME: 3977000000 TOTAL_PHYSICAL_MEMORY: 12600922112E10 NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12881752064E10 IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 232154175360 UNALLOCATED_DISK_SPACE: 1938265976832 USABLE_DISK_SPACE: 1820929695744 PREV_FIRE_TIME: 2014-12-15 23:14:19 CPU: Intel(R) Xeon(R) CPU E5-4620 @ 2.20GHz 	<p>192.168.0.40</p> <ul style="list-style-type: none"> LAST_CHECK: 2014-12-16 11:29:11 SCHEDULER_INSTANCE_ID: hadoopnode01d1418719522697 CPU_LOAD: 0.0013337223356812403 FREE_PHYSICAL_MEMORY: 10849054720 JOBS_EXECUTED: 20 SCHEDULER_NAME: SCE CURRENT_TIME: 2014-12-16 11:29:58 JOBS/h: 14.91 RUNNING_SINCE: 2014-12-16 09:45:22 CLUSTERED: 1 PERSISTENCE: 1 REMOTE_SCHEDULER: 0 CURRENTLY_EXECUTING_JOBS: 0 CPU_LOAD_JVM: 5.0014558758804651E-4 SYSTEM_LOAD_AVERAGE: 0.0 OPERATING_SYSTEM_VERSION: 3.13.0.24-generic COMMITTED_VIRTUAL_MEMORY: 3687526400 OPERATING_SYSTEM_NAME: Linux FREE_SWAP_SPACE: 12881752064 PROCESS_CPU_TIME: 1899000000 TOTAL_PHYSICAL_MEMORY: 12600922112E10 NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12881752064E10 IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 212522098688 UNALLOCATED_DISK_SPACE: 195266711552 USABLE_DISK_SPACE: 18515676368 PREV_FIRE_TIME: 2014-12-16 09:53:47 CPU: Intel(R) Xeon(R) CPU X2690 @ 3.47GHz 	<p>192.168.0.42</p> <ul style="list-style-type: none"> LAST_CHECK: 2014-12-16 11:29:35 SCHEDULER_INSTANCE_ID: hadoopnode061418718994668 CPU_LOAD: 0.16369819341126463 FREE_PHYSICAL_MEMORY: 1921798144 JOBS_EXECUTED: 0 SCHEDULER_NAME: SCE CURRENT_TIME: 2014-12-16 11:29:58 JOBS/h: 0 RUNNING_SINCE: 2014-12-16 09:36:34 CLUSTERED: 1 PERSISTENCE: 1 REMOTE_SCHEDULER: 0 CURRENTLY_EXECUTING_JOBS: 0 CPU_LOAD_JVM: 7.651759904778099E-4 SYSTEM_LOAD_AVERAGE: 1.04 OPERATING_SYSTEM_VERSION: 3.13.0.24-generic COMMITTED_VIRTUAL_MEMORY: 3679342592 OPERATING_SYSTEM_NAME: Linux FREE_SWAP_SPACE: 12159328256 PROCESS_CPU_TIME: 2962000000 TOTAL_PHYSICAL_MEMORY: 12600922112E10 NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12881752064E10 IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 232154175360 UNALLOCATED_DISK_SPACE: 1937021210624 USABLE_DISK_SPACE: 1819684929536 PREV_FIRE_TIME: 2014-12-15 23:09:17 CPU: Intel(R) Xeon(R) CPU E5-2640 v2 @ 2.00GHz 	<p>192.168.0.69</p> <ul style="list-style-type: none"> LAST_CHECK: 2014-12-16 11:29:56 SCHEDULER_INSTANCE_ID: hadoopnode021418718833378 CPU_LOAD: 0.081939516810272 FREE_PHYSICAL_MEMORY: 5102755840 JOBS_EXECUTED: 0 SCHEDULER_NAME: SCE CURRENT_TIME: 2014-12-16 11:29:58 JOBS/h: 0 RUNNING_SINCE: 2014-12-16 09:33:55 CLUSTERED: 1 PERSISTENCE: 1 REMOTE_SCHEDULER: 0 CURRENTLY_EXECUTING_JOBS: 0 CPU_LOAD_JVM: 8.025004223686434E-4 SYSTEM_LOAD_AVERAGE: 0.6 OPERATING_SYSTEM_VERSION: 3.13.0.24-generic COMMITTED_VIRTUAL_MEMORY: 3683553280 OPERATING_SYSTEM_NAME: Linux FREE_SWAP_SPACE: 12881752064 PROCESS_CPU_TIME: 2962000000 TOTAL_PHYSICAL_MEMORY: 12600922112E10 NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12881752064E10 IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 232154175360 UNALLOCATED_DISK_SPACE: 1937021210624 USABLE_DISK_SPACE: 1819684929536 PREV_FIRE_TIME: 2014-12-15 23:09:17 CPU: Intel(R) Xeon(R) CPU E5-2640 v2 @ 2.00GHz 	<p>192.168.0.70</p> <ul style="list-style-type: none"> LAST_CHECK: 2014-12-16 11:29:43 SCHEDULER_INSTANCE_ID: hadoopnode01c141871882292 CPU_LOAD: 0.16330841042537914 FREE_PHYSICAL_MEMORY: 8749056560 JOBS_EXECUTED: 0 SCHEDULER_NAME: SCE CURRENT_TIME: 2014-12-16 11:29:58 JOBS/h: 0 RUNNING_SINCE: 2014-12-16 09:34:42 CLUSTERED: 1 PERSISTENCE: 1 REMOTE_SCHEDULER: 0 CURRENTLY_EXECUTING_JOBS: 0 CPU_LOAD_JVM: 8.870865543023698E-4 SYSTEM_LOAD_AVERAGE: 0.89 OPERATING_SYSTEM_VERSION: 3.13.0.24-generic COMMITTED_VIRTUAL_MEMORY: 3679342592 OPERATING_SYSTEM_NAME: Linux FREE_SWAP_SPACE: 12881752064 PROCESS_CPU_TIME: 2962000000 TOTAL_PHYSICAL_MEMORY: 12600922112E10 NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12881752064E10 IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 232154175360 UNALLOCATED_DISK_SPACE: 1937021210624 USABLE_DISK_SPACE: 1819684929536 PREV_FIRE_TIME: 2014-12-15 23:09:17 CPU: Intel(R) Xeon(R) CPU X3470 @ 2.93GHz 	<p>192.168.0.92</p> <ul style="list-style-type: none"> LAST_CHECK: 2014-12-16 11:29:23 SCHEDULER_INSTANCE_ID: hadoopnode01c1418718921761 CPU_LOAD: 0.09430552637108637 FREE_PHYSICAL_MEMORY: 7336054784 JOBS_EXECUTED: 0 SCHEDULER_NAME: SCE CURRENT_TIME: 2014-12-16 11:29:58 JOBS/h: 0 RUNNING_SINCE: 2014-12-16 09:35:21 CLUSTERED: 1 PERSISTENCE: 1 REMOTE_SCHEDULER: 0 CURRENTLY_EXECUTING_JOBS: 0 CPU_LOAD_JVM: 0.0010086152553057364 SYSTEM_LOAD_AVERAGE: 0.46 OPERATING_SYSTEM_VERSION: 3.13.0.24-generic COMMITTED_VIRTUAL_MEMORY: 3679342592 OPERATING_SYSTEM_NAME: Linux FREE_SWAP_SPACE: 12881752064 PROCESS_CPU_TIME: 2962000000 TOTAL_PHYSICAL_MEMORY: 12600922112E10 NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12881752064E10 IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 232154175360 UNALLOCATED_DISK_SPACE: 1937021210624 USABLE_DISK_SPACE: 1819684929536 PREV_FIRE_TIME: 2014-12-15 23:09:17 CPU: Intel(R) Xeon(R) CPU X3470 @ 2.93GHz
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CPU: 18.01 GHz

CPU Load: 1.48 GHz (8.19%)

Mem Tot: 82.15 GB

Mem Free: 45.4



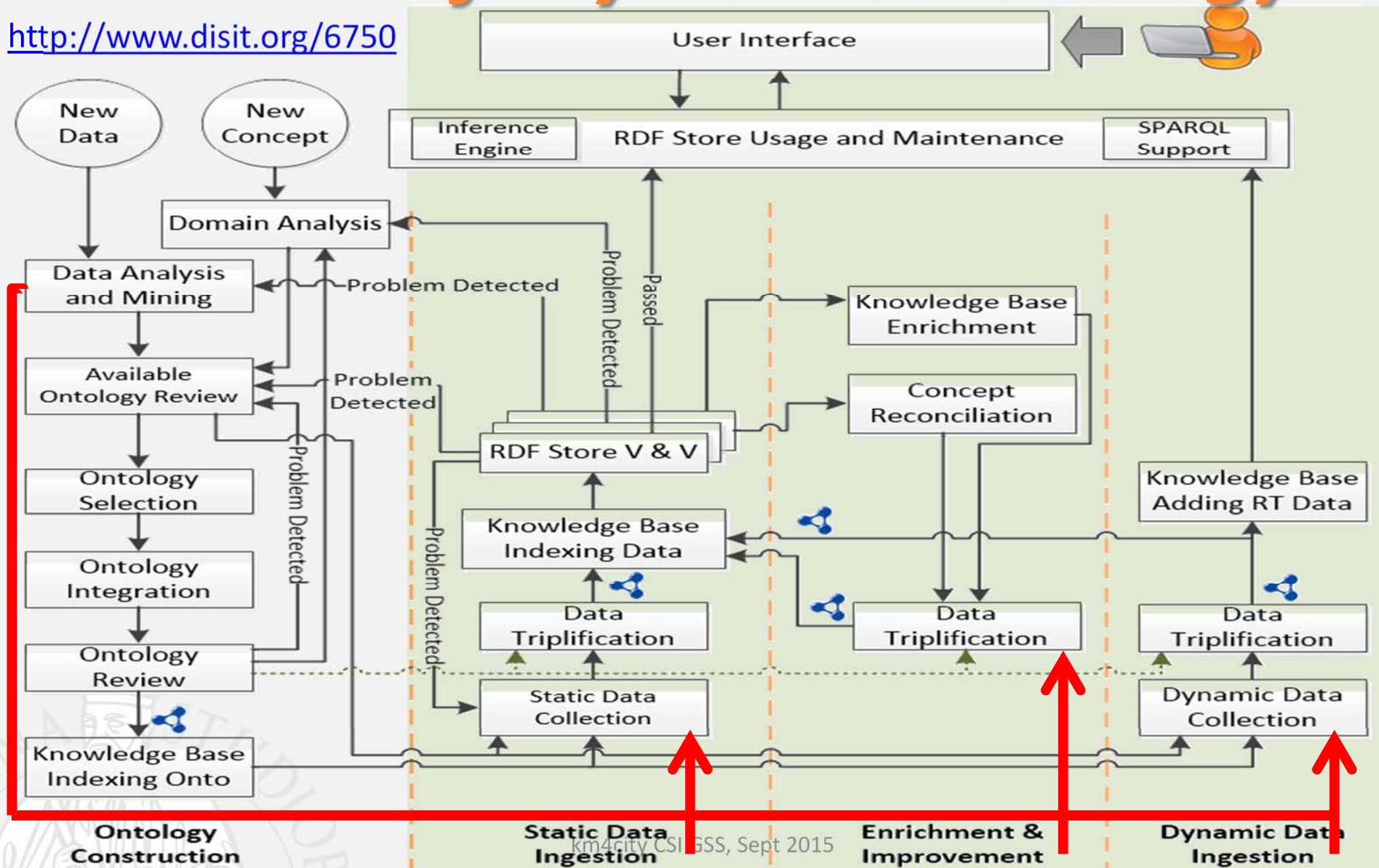
<ul style="list-style-type: none"> NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12 GB IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 2.11 TB UNALLOCATED_DISK_SPACE: 1.44 TB USABLE_DISK_SPACE: 1.33 TB PREV_FIRE_TIME: 2015-07-24 10:28:48 CPU: Intel(R) Xeon(R) CPU X3470 @ 2.93GHz 	<ul style="list-style-type: none"> NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12 GB IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 2.11 TB UNALLOCATED_DISK_SPACE: 1.43 TB USABLE_DISK_SPACE: 1.33 TB PREV_FIRE_TIME: 2015-07-24 10:29:26 CPU: Intel(R) Xeon(R) CPU X3690 @ 3.47GHz 	<ul style="list-style-type: none"> NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12 GB IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 2.11 TB UNALLOCATED_DISK_SPACE: 1.44 TB USABLE_DISK_SPACE: 1.33 TB PREV_FIRE_TIME: 2015-07-24 10:30:29 CPU: Intel(R) Xeon(R) CPU E5-2640 v2 @ 2.00GHz 	<ul style="list-style-type: none"> NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12 GB IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 2.11 TB UNALLOCATED_DISK_SPACE: 1.44 TB USABLE_DISK_SPACE: 1.33 TB PREV_FIRE_TIME: 2015-07-24 10:28:14 CPU: Intel(R) Xeon(R) CPU E5-2640 v2 @ 2.00GHz 	<ul style="list-style-type: none"> NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12 GB IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 2.11 TB UNALLOCATED_DISK_SPACE: 1.44 TB USABLE_DISK_SPACE: 1.33 TB PREV_FIRE_TIME: 2015-07-24 10:30:33 CPU: Intel(R) Xeon(R) CPU X3470 @ 2.93GHz 	<ul style="list-style-type: none"> NUMBER_OF_PROCESSORS: 4 OPERATING_SYSTEM_ARCHITECTURE: amd64 TOTAL_SWAP_SPACE: 12 GB IS_SCHEDULER_STANDBY: 0 IS_SCHEDULER_SHUTDOWN: 0 IS_SCHEDULER_STARTED: 1 TOTAL_DISK_SPACE: 2.11 TB UNALLOCATED_DISK_SPACE: 1.44 TB USABLE_DISK_SPACE: 1.33 TB PREV_FIRE_TIME: 2015-07-24 10:28:47 CPU: Intel(R) Xeon(R) CPU X3470 @ 2.93GHz
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CPU	CPU Load	Mem Total	Mem Free	Cores	Jobs/h	Jobs Executed	Jobs Failed/Success (24 h)	Jobs Failed/Success (7 days)
63.45 GHz	4.32 GHz (6.81%)	70.41 GB	12.27 GB	24	262.69	151060	354 (5.47%) 6117 (94.53%)	3335 (7.48%) 41241 (92.52%)

<http://www.disit.org/6746>

RDF KB life cycle methodology

<http://www.disit.org/6750>

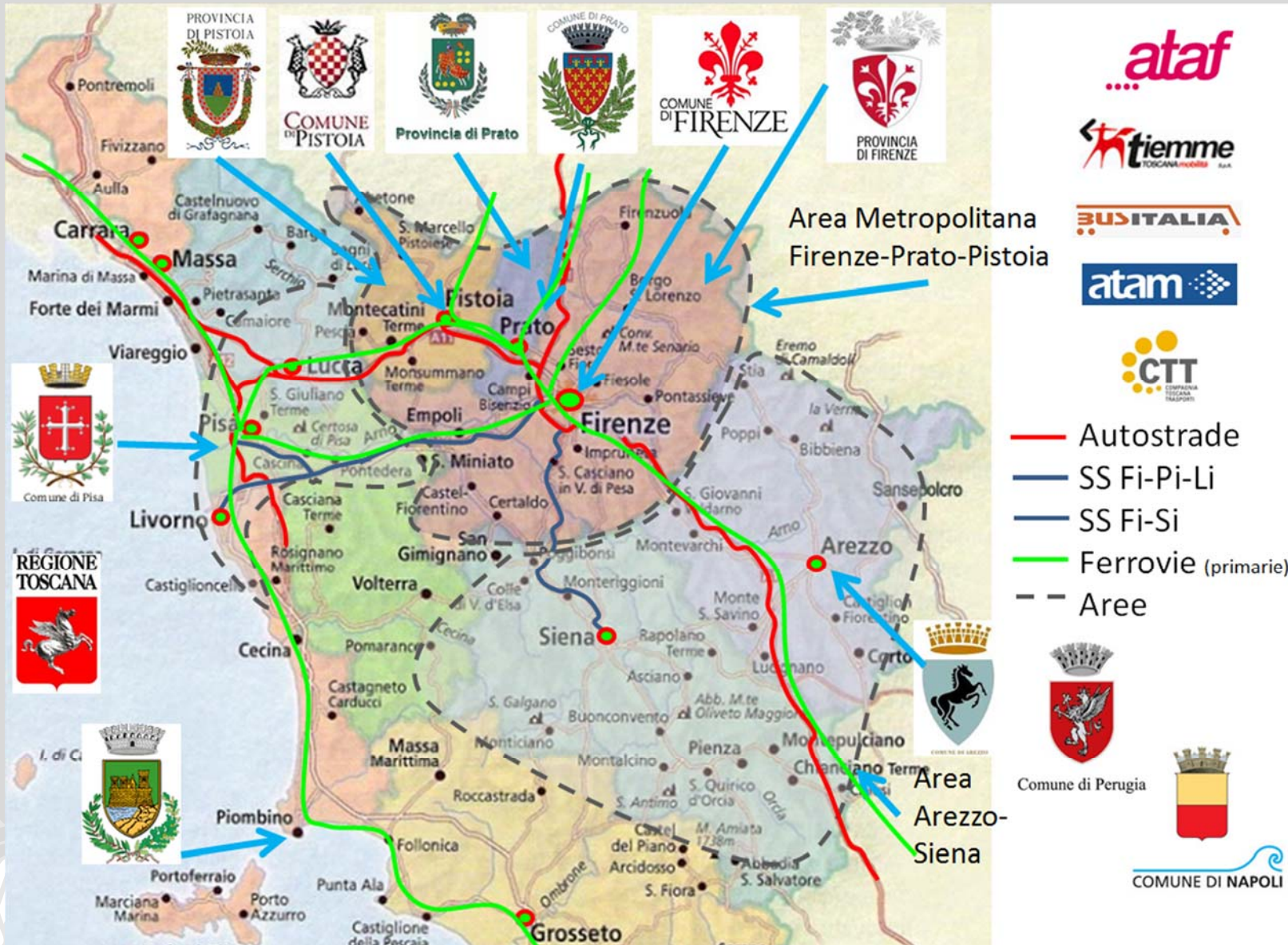




RDF Triples generated

Macro Class	Static Triples	Reconciliation Triples	Real Time Triples Loaded	Total on 1.5 months
Administration	2.431	0	--	2.431
Metadata of DataSets	416	0	--	416
Point of Interest (35.273 POIs in Tuscany)	471.657	34.392	--	506.049
Street-guide (in Tuscany)	68.985.026	0	--	68.985.026
Local Public Transport (<5 lines of FI)	644.405	2.385	135.952 per line per day, to be filtered, read every 30 s, they respond in minutes	(static) 646.790
Sensors (<201 road sensors, 63 scheduled every two hours)	--	4.240	102 per sensor per read, every 2 hours, they are very slow in responding	51.111.078
Parking (<44 parkings, 12 scheduled every 30min)	--	1.240	7920 per park per day, 3 read per hour, they respond in seconds	
Meto (286 municipalities, all scheduled every 6 hours)	--	--	185 per location per update, 1-2 updates per day	
Temporal events, time stamp	--	--	6 for each event	
Total	70.103.935	42.257		122.966.893

- Experimentations and validation in Tuscany
- Integration with present central station and subsystems





H2020 RIA project

- Develop a conceptual framework for creating/ maintaining Urban Transport Systems
- Develop European Resilience Management Guidelines (ERMGM)
- Operationalize and validate the ERMGM by implementing the RESOLUTE Collaborative Resilience Assessment and Management Support Systems (CRAMSS) for Urban Transport Systems addressing Road and Urban Rail Infrastructures
- Enhance resilience through improved support of human decision making processes, particularly by training professionals and civil users on the ERMGM and the RESOLUTE system
- Adoption of the ERMGM at EU and Associated Countries level

Conclusions

- ***Km4City model and tools are:***
 - Scalable, smart and flexible: solving the smart city data dilemma....
 - Supported by tools for developers, backoffice, public administrators, decision makers, and final users
 - Beyond the pure information retrieval exploiting
 - inference on (sameAs, sub, equivalent, inverse, transitive, symmetrical..,
 - reasoning on space, time,
 - Enrichment and textual indexing All together
 - Ready for Personal Assistants as a Service, PAaaS



Km4City: Smart City Ontology Building for Effective Erogation of Services

For: Cognitive Systems Institute Group Speaker Series

Paolo Nesi

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