

<http://log.disit.org>

***Linked Open Graph: browsing  
multiple SPARQL entry points  
to build your own LOD views***

Pierfrancesco Bellini, Paolo Nesi,  
Alessandro Venturi

Dipartimento di Ingegneria dell'Informazione, DINFO

Università degli Studi di Firenze

Via S. Marta 3, 50139, Firenze, Italy

Tel: +39-055-4796567, fax: +39-055-4796363

**DISIT Lab**

<http://www.disit.dinfo.unifi.it> *alias* <http://www.disit.org>  
[paolo.nesi@unifi.it](mailto:paolo.nesi@unifi.it)

Proc. of the 20th International Conference on Distributed Multimedia Systems,  
Pittsburgh, USA, August 2014

# ***Context and motivations***

- **Open Data vs Linked Data / Linked Open Data**
  - OD → hundreds of formats
  - Linked Data URI as a large network of definitions: triples, not quereable
- **Linked Open Data towards RDF Stores + SPARQL entry point**
  - RDF Stores as Knowledge base storing, quereable
  - Huge number of OD, limited of LD, a few RDF-SPARQL entry point services
  - SPARQL entry points services present many dialects and maturity (versions)

# Grow-up Knowledge base

- **Developing knowledge base, distributed knowledge base**
  - Reusing: Definitions, Ontologies, SKOS, vocabularies,...
  - Reusing / linking: LD triples, RDF Stores + SPARQL
  - A unique storage by copying  $\leftrightarrow$  linking:
  - Distributing RDF segments  $\rightarrow$  SPARQL queries
- ***$\rightarrow$  Exploiting the KB***
  - *Integrating multiple RDF Stores & LD*
  - *Understanding and browsing: RDF Stores, LD*
  - *Enriching KB with other triples, LD / URI*

Linked Open Graph

Type of relations

<input checked="" type="checkbox"/> country	<input type="checkbox"/> depiction	<input type="checkbox"/> hasPhotoCollection	<input type="checkbox"/> homepage	<input type="checkbox"/> is after of	<input type="checkbox"/> is almaMater
<input checked="" type="checkbox"/> is award of	<input checked="" type="checkbox"/> is based of	<input type="checkbox"/> is battle of	<input type="checkbox"/> is battles of	<input type="checkbox"/> is beatifiedPlace of	<input type="checkbox"/> is beatifiedPl
<input type="checkbox"/> is birthPlace of	<input checked="" type="checkbox"/> is birthPlace of	<input type="checkbox"/> is body of	<input type="checkbox"/> is capital of	<input type="checkbox"/> is capital of	<input type="checkbox"/> is city of
<input type="checkbox"/> is cityServed of	<input checked="" type="checkbox"/> is cityofbirth of	<input type="checkbox"/> is cityofdeath of	<input type="checkbox"/> is combatant of	<input type="checkbox"/> is comune of	<input type="checkbox"/> is death of
<input checked="" type="checkbox"/> is deathPlace of	<input checked="" type="checkbox"/> is deathPlace of	<input type="checkbox"/> is destination of	<input type="checkbox"/> is destinations of	<input type="checkbox"/> is education of	<input type="checkbox"/> is employer of
<input type="checkbox"/> is end of	<input checked="" type="checkbox"/> is foundation of	<input type="checkbox"/> is foundationPlace of	<input type="checkbox"/> is garrison of	<input type="checkbox"/> is garrison of	<input type="checkbox"/> is ground of
<input type="checkbox"/> is headquarter of	<input checked="" type="checkbox"/> is headquarters of	<input type="checkbox"/> is hometown of	<input type="checkbox"/> is leadersSeat of	<input type="checkbox"/> is locale of	<input type="checkbox"/> is locatedInA
<input type="checkbox"/> is locationSigned of	<input type="checkbox"/> is locationTown of	<input type="checkbox"/> is majorShrine of	<input type="checkbox"/> is nearestCity of	<input type="checkbox"/> is nearestCity of	<input type="checkbox"/> is nearestTown of
<input type="checkbox"/> is nearestCity of	<input type="checkbox"/> is nearestCity of	<input type="checkbox"/> is nearestTown of	<input type="checkbox"/> is place of	<input type="checkbox"/> is place of	<input type="checkbox"/> is place of

**LOG.disit.org**

LodLive

type  
E39\_Actor

value  
Accademia dei Georgofili

Accademia dei Georgofili

responsible

**LodLive**

Gruff 5.2.1 on AllegroGraph 4.13.2 test

File View Test Search Display Link Remove

Comment

Director

Dis

Label

Starting

Type

Multiple Predicates

Actor129765278

Best Actor Academy Award

Entry Award winners

Film106613696

Literal

No Type

**GRUFF**

# *Major Features categories*

- **Access and Query**
  - Access to multiple distributed LD, browsing, searching, etc.
- **Relationships vs Entities**
  - Establishing links, showing, discovering, etc.
- **General Manipulation** of the elements
  - Manipulating the graph elements and the graph
- **URI Details**
  - Showing and exploiting attributes and values
- **Non Functional**
  - Scalability, removing duplicates, working via WEB

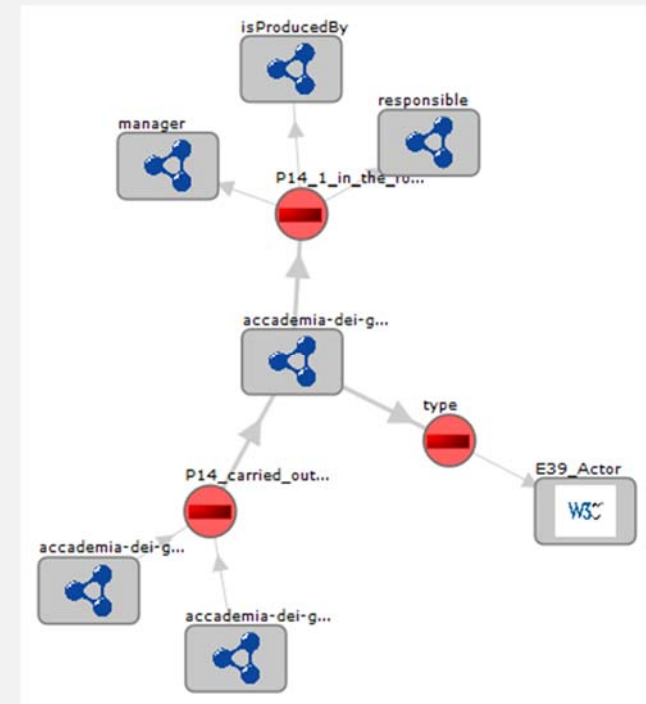
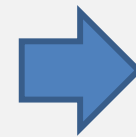
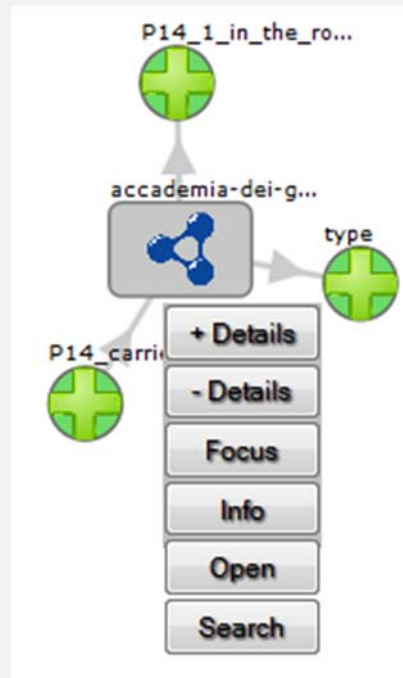




	LOG	LodLive	Gruff
<b>Access and Query</b>			
Access and rendering of LD	Y	Y	N
Access and rendering URI from SPARQL entry point	Y	Y	Y
Managing Entry Points with different URL in URI.	Y	N	Y
Multiple SPARQL entry points	Y(10)	N	N
Making keyword based query	Y	Y	Y
Inspecting entry point for searching classes	Y	Y	Y
<b>Relationships vs entities</b>			
Showing relationships, turning on/off, singularly or globally	Y(3)	Y(2)	Y(2)
Representing relationships (managing complexity)	Y	Y(4)	Y(4)
Discovering inbound/outbound relationships, URI and queries	Y	Y	Y(7)
<b>Discovering /searching single element from 1:N relation , or samples</b>	Y	N	N
Discover paths between URI	N	N	Y
Creating triples/relationships	N	N	Y
Expand all relationships	Y	Y	N
Close all relationships	Y	N	N
Counting number of elements	Y	Y	Y
"sameAs" management	Y	Y	Y
Blank nodes rendering	Y	Y	Y
<b>General Manipulation</b>			
Undo actions performed, "back"	Y	N	Y
Save and Load LOD graphs	Y	N	(Y)
Share and collaborative LOD graphs	Y	N	N
Export of RDF graph triples	N	N	N
Re-laying out the graph	Y(6)	N	Y
Focusing on an URI	Y	Y	N
Zooming the graph	Y	N	Y(8)
Centering the graph	Y	N	N
Panning the graph with mouse/finger	Y	Y	Y
<b>URI Details</b>			
URI attributes (showing info or an URI)	Y	Y	Y(1)
Map allocation of URI	Y(9)	Y(9)	N
URL to resources	Y	Y	N
Open play resources	Y	Y	Y
Representing entities	Y	Y(5)	Y(5)
<b>Non Functional</b>			
Web based tool	Y	Y	N
Embed in web pages of third party service: ECLAP	Y	N	N

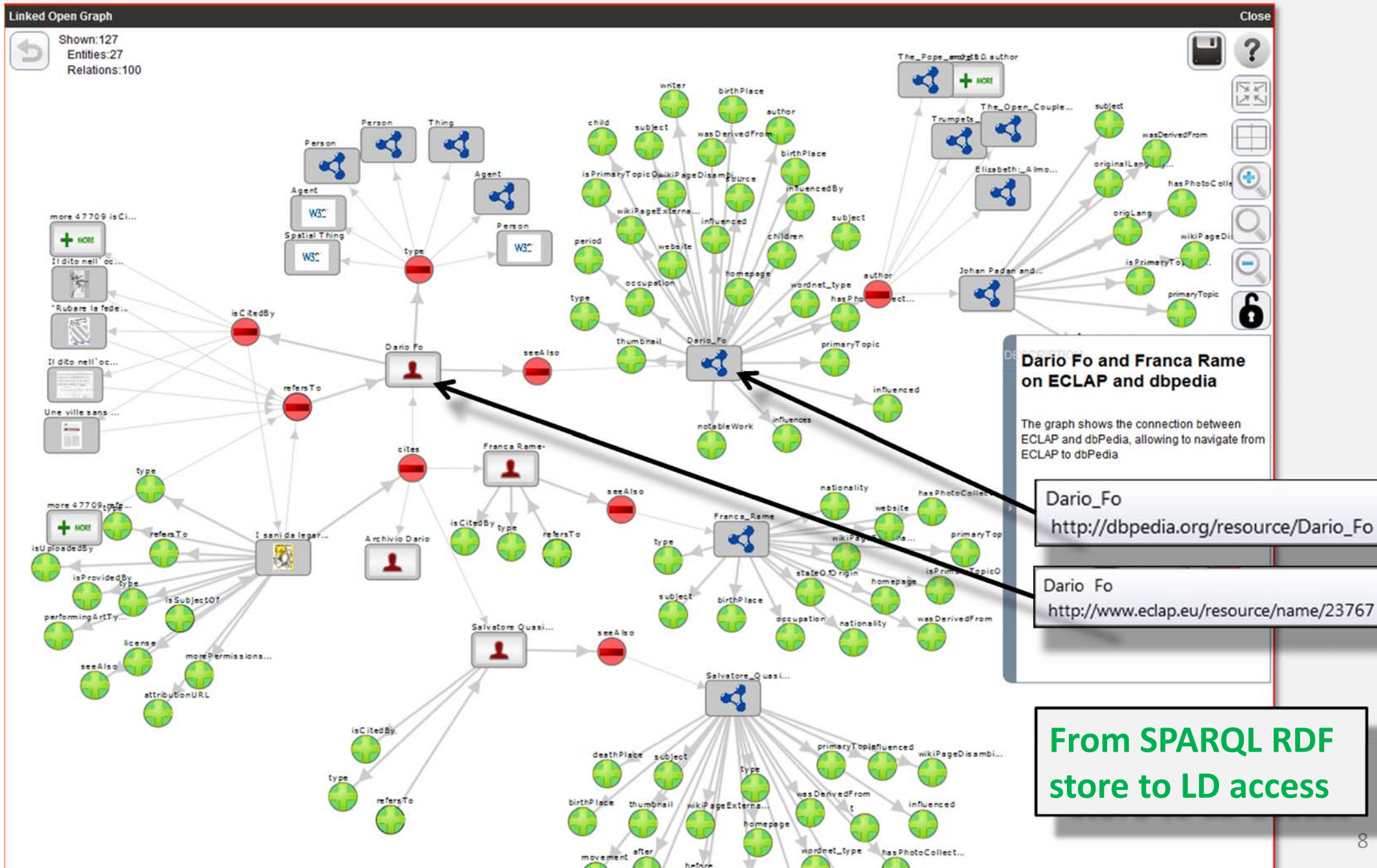
# Access and rendering

- Several kinds of relationships, same direction, etc.: type, sameAs, blank nodes, subject,
- Access and rendering of LD
- Access and rendering URI from a SPARQL entry point



Type of relations	
<input type="button" value="Select all"/>	<input type="button" value="Deselect all"/>
<input type="button" value="Invert"/>	<input type="checkbox"/> Hide all inverse
<input checked="" type="checkbox"/> P14_1_in_the_role_of	<input checked="" type="checkbox"/> P14_carried_out_by
<input checked="" type="checkbox"/> depiction	<input checked="" type="checkbox"/> sameAs
<input checked="" type="checkbox"/> seeAlso	<input checked="" type="checkbox"/> type

<http://log.disit.org/service/?graph=cfd084d874318c96205f2f8770ef3b1b>





# Access and Rendering

- **Managing Entry Points with different URLs in URI**
  - Multiple ontologies, entities, sources...
- **Inspecting entry point for searching classes**
- **Making keyword based query**
- **→ Multiple SPARQL entry points**

Select a SPARQL endpoint:  
**FactForge live**

Examples:  
• [Peretola Aereoporto](#)

Choose a class:  
Search for keyword

keyword:  
Florence

uri: <http://dbpedia.org/resource/Florence>

Request

Choose a class:  
Search for keyword

Search for keyword

<http://www.w3.org/1999/02/22-rdf-syntax-ns#Property>

<http://www.w3.org/2000/01/rdf-schema#Class>

<http://www.w3.org/2000/01/rdf-schema#Resource>

<http://www.w3.org/2002/07/owl#SymmetricProperty>

<http://www.w3.org/2002/07/owl#TransitiveProperty>

<http://dbpedia.org/ontology/President>

<http://www.ontotext.com/proton/protontop#Agent>

<http://dbpedia.org/ontology/Lieutenant>

<http://dbpedia.org/ontology/Mayor>

<http://dbpedia.org/ontology/Pope>

<http://dbpedia.org/ontology/VicePrimeMinister>

<http://dbpedia.org/ontology/Chancellor>

<http://dbpedia.org/ontology/Congressman>

<http://www.w3.org/2000/01/rdf-schema#Datatype>

<http://www.ontotext.com/proton/protonext#OutOfLaws>

<http://dbpedia.org/ontology/PopulatedPlace>

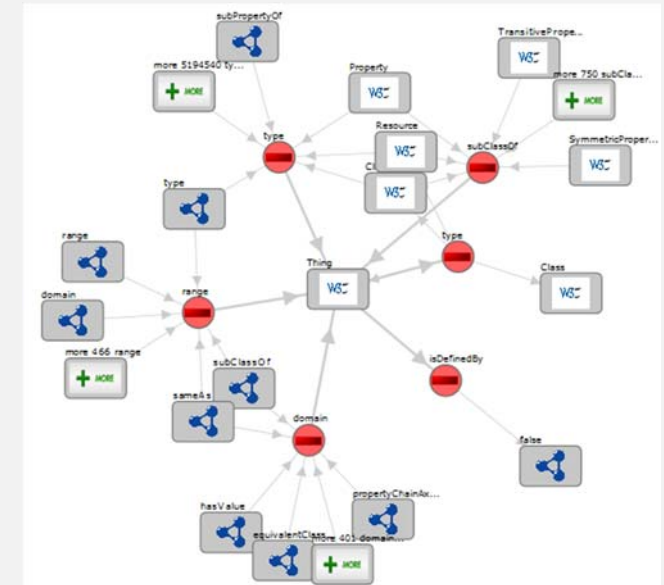
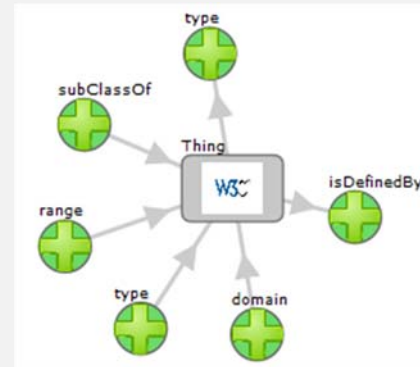
<http://dbpedia.org/ontology/BritishRoyalty>

<http://dbpedia.org/ontology/PolishKing>

<http://dbpedia.org/ontology/Cleric>

# Relationships vs entities

- Showing relationships, turning on/off, singularly or globally
  - Expand all relationships
  - Close all relationships
  - “sameAs” management
  - Blank nodes rendering
- Counting number of elements
- **Discovering inbound/outbound relationships, URI and queries**
- *Discovering /searching single element from relation*
- *Representing relationships (managing complexity)*



## From local stores

- Discover paths between URI
- Creating triples/relationships

Thing	URI	Results	Action
inside outbound	<a href="http://192.168.0.205:8080/openrdf-sesame/repositories/siimobilityultimate">http://192.168.0.205:8080/openrdf-sesame/repositories/siimobilityultimate</a>	6 results:	View
inside inbound	<a href="http://192.168.0.205:8080/openrdf-sesame/repositories/siimobilityultimate">http://192.168.0.205:8080/openrdf-sesame/repositories/siimobilityultimate</a>	5194980 results:	View
endpoint inbound	<a href="http://dbpedia-live.openlinksw.com/sparql/">http://dbpedia-live.openlinksw.com/sparql/</a>	3665258 results:	View
endpoint inbound	<a href="http://collection.britishmuseum.org/sparql">http://collection.britishmuseum.org/sparql</a>	40348775 results:	View
endpoint inbound	<a href="http://factforge.net/sparql">http://factforge.net/sparql</a>	15535331 results:	View
endpoint inbound	<a href="http://linkedgeodata.org/sparql">http://linkedgeodata.org/sparql</a>	0 results:	View
endpoint inbound	<a href="http://europeana.ontotext.com/sparql">http://europeana.ontotext.com/sparql</a>	0 results:	View
endpoint inbound	<a href="http://dati.culturaitalia.it/sparql/">http://dati.culturaitalia.it/sparql/</a>	42 results:	View
endpoint inbound	<a href="http://linkeddata.comune.fi.it:8080/sparql">http://linkeddata.comune.fi.it:8080/sparql</a>	0 results:	View
endpoint inbound	<a href="http://dati.senato.it/sparql">http://dati.senato.it/sparql</a>	5 results:	View
endpoint inbound	<a href="http://dati.camera.it/sparql">http://dati.camera.it/sparql</a>	22 results:	View
endpoint inbound	<a href="http://vocab.getty.edu/sparql">http://vocab.getty.edu/sparql</a>	0 results:	View
endpoint inbound	<a href="http://lod.openlinksw.com/sparql">http://lod.openlinksw.com/sparql</a>	8284548 results:	View
endpoint inbound	<a href="http://ieevis.tw.rpi.edu/sparql">http://ieevis.tw.rpi.edu/sparql</a>	431 results:	View
endpoint inbound	<a href="http://192.168.0.106:8080/openrdf-sesame/repositories/icaro7">http://192.168.0.106:8080/openrdf-sesame/repositories/icaro7</a>	0 results:	View
endpoint inbound	<a href="http://192.168.0.106:8080/openrdf-sesame/repositories/msptest2">http://192.168.0.106:8080/openrdf-sesame/repositories/msptest2</a>	6107 results:	View
endpoint inbound	<a href="http://openmind.disit.org:8080/openrdf-sesame/repositories/osim-rdf-store">http://openmind.disit.org:8080/openrdf-sesame/repositories/osim-rdf-store</a>	832 results:	View
endpoint inbound	<a href="http://www.eclap.eu/sparql">http://www.eclap.eu/sparql</a>	185617 results:	View



# Discovering /searching single element from relation (RDF store -vs- LD URI)

Shown:127  
Entities:27  
Relations:100

more 47709 isCi...  
+ MORE

Il dito nell'oc...  
"Rubare la fede...  
Il dito nell'oc...  
Una ville sans ...

isCitedBy

more 47709 refe...  
+ MORE

plodedBy  
is ProvidedBy  
performingArtTy...  
is SubjectOf

Salvatore Quasi... seeAlso

RESULT Close

Search with a keyword:

Search

More result for <http://purl.org/spar/cito/isCitedBy>  
Of: Dario Fo

Add to graph	Object
Add	Une ville sans dessus dessous! ( <a href="http://www.eclap.eu/resource/object/urn%3Aaxmedis%3A00000%3Aobj%3Ae3ed41e-cb17-4ed5-a973-d516b000749b">http://www.eclap.eu/resource/object/urn%3Aaxmedis%3A00000%3Aobj%3Ae3ed41e-cb17-4ed5-a973-d516b000749b</a> )
Add	"Rubare la fede" di Francesco Stella ( <a href="http://www.eclap.eu/resource/object/urn%3Aaxmedis%3A00000%3Aobj%3Af4274023-3a08-4798-9a3b">http://www.eclap.eu/resource/object/urn%3Aaxmedis%3A00000%3Aobj%3Af4274023-3a08-4798-9a3b</a> )
Add	Il dito nell'occhio - 1953, Rivista in due atti di Parenti - Fo - Durano. ( <a href="http://www.eclap.eu/resource/object/urn%3Aaxmedis%3A00000%3Aobj%3Aab38f18b-8566-4d71-accd">http://www.eclap.eu/resource/object/urn%3Aaxmedis%3A00000%3Aobj%3Aab38f18b-8566-4d71-accd</a> )
Add	Il dito nell'occhio - 1953, Rivista in due atti di Parenti - Fo - Durano. ( <a href="http://www.eclap.eu/resource/object/urn%3Aaxmedis%3A00000%3Aobj%3Ad3df3e25-c1f5-4f4d-a750-b">http://www.eclap.eu/resource/object/urn%3Aaxmedis%3A00000%3Aobj%3Ad3df3e25-c1f5-4f4d-a750-b</a> )
Add	I sani da legare - 1954, Rivista in due atti di Parenti - Fo - Durano

RESULT Close

Search with a keyword is not available for Linked Data.  
For more results use the 'search' option on the parent node, or scroll the below results.

More result for <http://dbpedia.org/ontology/author>  
Of: Dario\_Fo

Add to graph	Object
Add	Trumpets_and_Raspberries ( <a href="http://dbpedia.org/resource/Trumpets_and_Raspberries">http://dbpedia.org/resource/Trumpets_and_Raspberries</a> )
Add	The_Pope_and_the_Witch ( <a href="http://dbpedia.org/resource/The_Pope_and_the_Witch">http://dbpedia.org/resource/The_Pope_and_the_Witch</a> )
Add	Elizabeth:_Almost_by_Chance_a_Woman ( <a href="http://dbpedia.org/resource/Elizabeth:_Almost_by_Chance_a_Woman">http://dbpedia.org/resource/Elizabeth:_Almost_by_Chance_a_Woman</a> )
Add	The_Open_Couple ( <a href="http://dbpedia.org/resource/The_Open_Couple">http://dbpedia.org/resource/The_Open_Couple</a> )
Add	Johan_Padan_and_the_Discovery_of_the_Americas ( <a href="http://dbpedia.org/resource/Johan_Padan_and_the_Discovery_of_the_Americas">http://dbpedia.org/resource/Johan_Padan_and_the_Discovery_of_the_Americas</a> )
Add	Accidental_Death_of_an_Anarchist ( <a href="http://dbpedia.org/resource/Accidental_Death_of_an_Anarchist">http://dbpedia.org/resource/Accidental_Death_of_an_Anarchist</a> )
Add	Can't_Pay%3F_Won't_Pay! ( <a href="http://dbpedia.org/resource/Can't_Pay%3F_Won't_Pay!">http://dbpedia.org/resource/Can't_Pay%3F_Won't_Pay!</a> )

The\_Pope\_and\_the\_Witch author  
+ MORE

The\_Open\_Couple...  
Trumpets\_an...  
Elizabeth:\_Almo...  
subject  
wasDerivedFn...  
originalLangua...  
hasPhot...  
wiki...  
topic...  
primar...

Dario\_Fo

notableWork

France\_R

subject  
birthPlace  
occupation  
nationality  
wasDerivedFrom

# General Manipulation

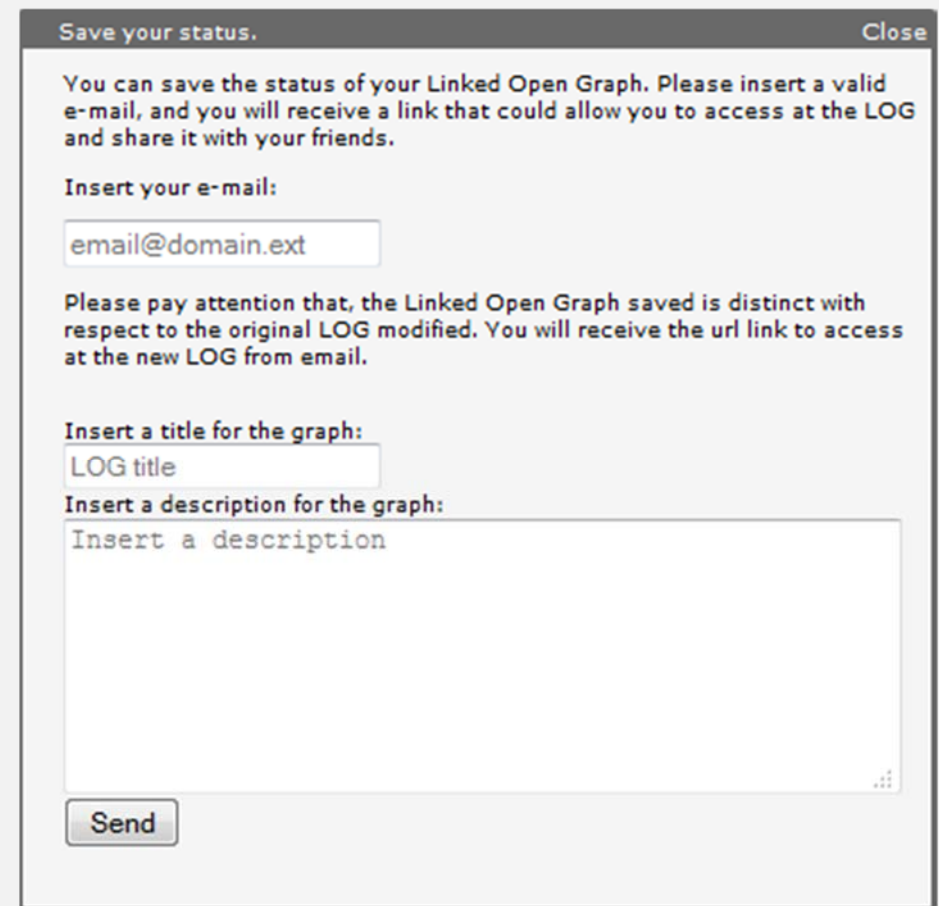
- Undo actions performed, “back”
- **Save and Load LOD graphs**
- **Share and collaborative LOD graphs**

## Classical features

- Re-laying out the graph
- Focusing on an URI
- Zooming the graph
- Centering the graph
- Panning the graph with mouse/finger

## Not yet

- Export of RDF graph triples



The screenshot shows a dialog box titled "Save your status." with a "Close" button in the top right corner. The main text reads: "You can save the status of your Linked Open Graph. Please insert a valid e-mail, and you will receive a link that could allow you to access at the LOG and share it with your friends." Below this is a label "Insert your e-mail:" followed by a text input field containing "email@domain.ext". Another paragraph of text follows: "Please pay attention that, the Linked Open Graph saved is distinct with respect to the original LOG modified. You will receive the url link to access at the new LOG from email." Below this is a label "Insert a title for the graph:" followed by a text input field containing "LOG title". Then, a label "Insert a description for the graph:" is followed by a large text area containing the placeholder text "Insert a description". At the bottom left of the dialog is a "Send" button.



# URI Details

- URI attributes (showing info or an URI)
- Map allocation of URI
- URL to resources
- **Open play resources**
  - Images in local
  - Video in remote
  - etc.
- **Learning how to compose queries**
- Representing entities

## Identifier:

<http://www.eclap.eu/resource/object/urn%3Aaxmedis%3A00000%3Aobj%3A89a1c27a-113c-4c81-b902-639aba410a05>

## Image:



## Info:

**http://www.w3.org/2000/01/rdf-schema#label:**

I sani da legare - 1954, Rivista in due atti di Parenti - Fo - Durano

**http://purl.org/dc/elements/1.1/date:**

1954

**http://purl.org/dc/elements/1.1/description:**

Programma di sala della rivista in due tempi "I sani da legare" di Parenti - Fo - Durano con alcuni giudizi della stampa e una presentazione di Salvatore Quasimodo.

Italia

**http://www.eclap.eu/schema/eclap/performingArtsGroup:**

Parenti Fo Durano

## Sparql Query:

ENDPOINT:

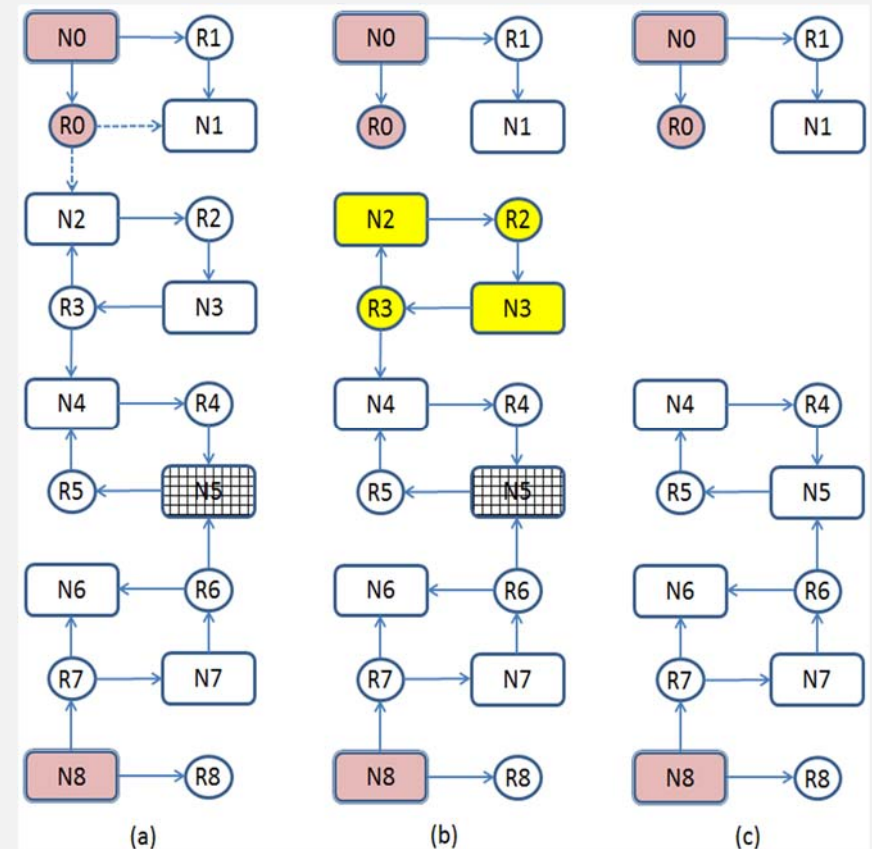
<http://www.eclap.eu/sparql>

QUERY:

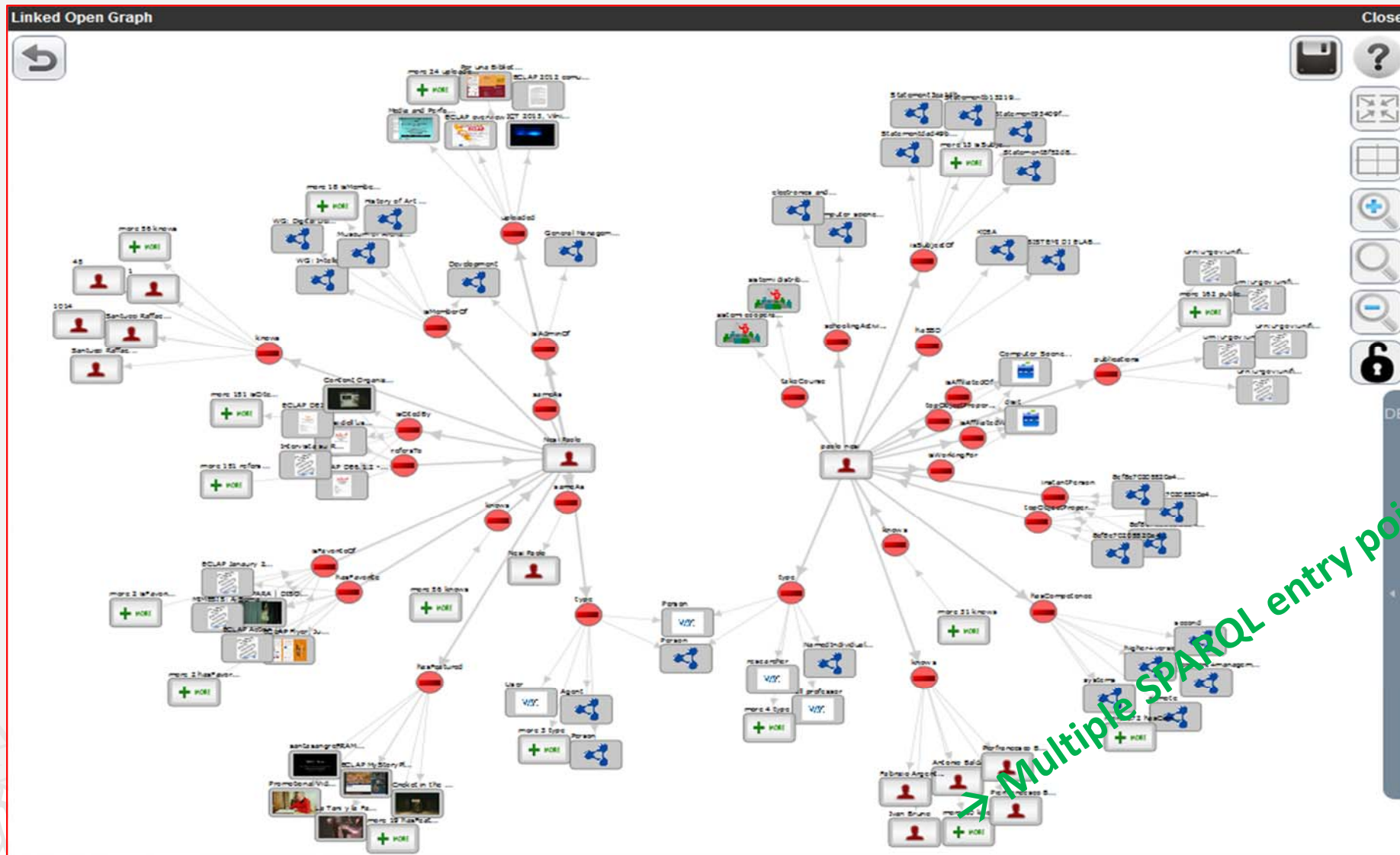
```
SELECT ?subject ?property ?object
WHERE{{ <http://www.eclap.eu/resource/object/urn%3Aaxmedis%3A00000%3Aobj%3A89a1c27a-113c-4c81-b902-639aba410a05> ?property ?object } UNION { ?subject ?property <http://www.eclap.eu/resource/object/urn%3Aaxmedis%3A00000%3Aobj%3A89a1c27a-113c-4c81-b902-639aba410a05> } }
```

# LOG.disit.org computing

- A) **LOG case with two roots:** N0 and N8, share node N5 that holds a double multiplicity (belonging to two graphs).
  - **user closes R0** (double click on it): 2 relationships related arcs dotted are deleted.
  - According to that action, a graph **analysis is needed**.
- B) **performing a labeling process** from both roots N0 and N8.
  - identifying all nodes that are connected from some root (all except N2, N3) in the graph.
    - elements which are not connected have to be removed (see B): N2, N3, R3 and R2.
    - shared nodes, such as node N5 lose their multiplicity.
- C) **final results** after the application of the above described “closure” algorithm
  - some elements passed from one root to the other.
- complementary operation is needed when an inbound link of a node is opened
  - Example: N3 request the opening of R3, then a situation similar to B can be reached.



# A LOG RDF graph analysing connection and structures of the same user on ECLAP and OSIM RDF stores





# Applications

- **With the aim of exploiting available knowledge sources**
  - Integrating multiple sources for KB building
  - Via: SPARQL entry points, ontologies/LD, LD, vocabularies/LD, etc.
- **Understanding, browsing, simulating: RDF Stores, LD**
  - Discovering connections among RDF Stores and LD
  - Comparing Ontologies and representation
- **Building and Exploiting merged KB!!**
- **Applications:**
  - **ECLAP**: CH representation, multiple ontologies, links with dbPedia, Geonames
  - **Europeana**: Ch representation, multiple ontologies, links with ECLAP
  - **Sii-Mobility**: as a support for defining rules about smart city conditions and for developers to identify viable query for advanced smart applications
  - **OSIM**: for Cloud model browsing and understanding.
  - **Add yours!!!**

dbpedia live  
British Museum  
FactForge live  
LinkedGeoData  
Europeana  
Cultura Italia  
Comune Firenze  
Senato, Italiano  
Camera dei deputati, Italiano  
Getty Vocabularies  
Open Link SW  
IEEE Video Stanford representation  
SiiMobility (by DISIT)  
ICARO cloud (by DISIT)  
MyStoryPlayer (by DISIT)  
OSIM (by DISIT)  
ECLAP (by DISIT)



# Conclusions

- **LOG.DISIT, a new Model and Tool**
  - as a support for KB development in the advanced semantic web era.
  - advanced and more complete features with respect to the state of the art tools, solving and enabling
    - collaborative work, and sharing
    - progressive browsing of the graphs
    - graph composition: multiple SPARQL entry, plus LD, ..
    - support to pose specific queries
    - progressive discovering/selection of instances
- **currently used in a number of projects and activities in the area of semantic web. *Add yours!!!***

# References

- T. Berners-Lee, “Linked Data”, <http://www.w3.org/DesignIssues/LinkedData.html>, 2006.
- C. Bizer, T. Heath and T. Berners-Lee (2009) Linked Data - the story so far. Int. Journal on Semantic Web and Information Systems, 5, (3), 1-22.
- G. Klyne, J. Carroll, “Resource Description Framework (RDF): Concepts and Abstract Syntax - W3C Recommendation”, 2004
- FOAF, <http://www.foaf-project.org/>
- G. Tummarello, R. Delbru, and E. Oren. 2007. Sindice.com: weaving the open linked data. In Proc. of ISWC'07/ASWC'07, Springer, Berlin, Heidelberg, pp.552-565.
- O. Hartig, C. Bizer, J.-C. Freytag. 2009. Executing SPARQL Queries over the Web of Linked Data. In Proc. of ISWC '09, Springer, pp.293-309.
- S. Ramakrishnan and A. Vijayan. 2014. A study on development of cognitive support features in recent ontology visualization tools. Artif. Intell. Rev. 41, 4 (April 2014), pp.595-623.
- Protégé <http://protege.stanford.edu/>
- iSPARQL, <http://oat.openlinksw.com/isparql/index.html>,
- O. Ambrus, K. Moller, S. Handschuh, “Konduit VQB: a Visual Query Builder for SPARQL on the Social Semantic Desktop”, proc of VISSW2010, IUI2010, 2010, Hong Kong, China.
- A. Russell, P.R. Smart, D. Braines, Dave, N.R. Shadbolt, “NITELIGHT: A Graphical Tool for Semantic Query Construction”, In, *SWUI 2008*, Florence, Italy,
- Gfacet, <http://www.visualdataweb.org/gfacet.php>
- D. V. Camarda, S. Mazzini, A. Antonuccio. 2012. LodLive, exploring the web of data. In *Proc. of the I-SEMANTICS '12*, ACM, pp.197-200. <http://lodlive.it>
- P. Bellini, P. Nesi, "Modeling Performing Arts Metadata and Relationships in Content Service for Institutions", *Multimedia Systems Journal*, Springer, 2014. <http://www.eclap.eu>
- D3, Data-Driven Documents, <http://d3js.org/>
- P. Bellini, P. Nesi, N. Rauch, “Smart City data via LOD/LOG Service”, Workshop Linked Open Data: where are we?, [LOD2014](http://lod2014.org), org. by W3C.
- Prud'hommeaux, E., Seaborne, A., SPARQL Query Language for RDF, <http://www.w3.org/TR/2004/WD-rdf-sparql-query-20041012/>
- OTN, Ontology of Transportation Networks, Deliverable A1-D4, Project REVERSE, 2005 <http://reverse.net/deliverables/m18/a1-d4.pdf>
- <http://dublincore.org>, <http://dublincore.org/documents/dcmi-terms/>
- VCARD, <http://www.w3.org/TR/vcard-rdf/>
- wgs84, [http://www.w3.org/2003/01/geo/wgs84\\_pos](http://www.w3.org/2003/01/geo/wgs84_pos)
- dbPedia, <http://dbpedia.org/resource/>

# Thank you!

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

Paolo Nesi

Dipartimento di Ingegneria dell'Informazione, DINFO

Università degli Studi di Firenze

Via S. Marta 3, 50139, Firenze, Italy

Tel: +39-055-4796567, fax: +39-055-4796363

DISIT Lab

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

[paolo.nesi@unifi.it](mailto:paolo.nesi@unifi.it)

