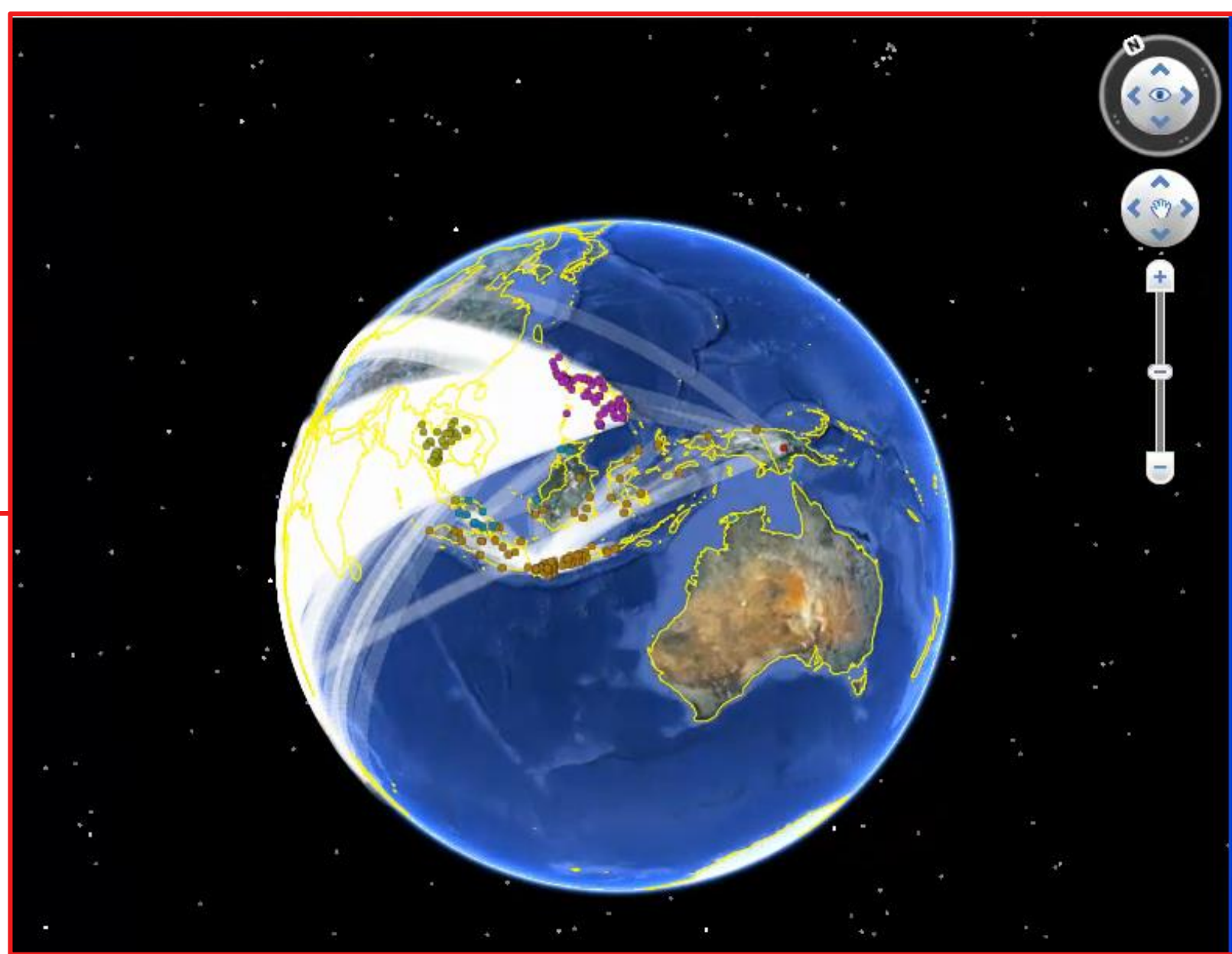


WEB OF DATA &
SEMANTIC WEB
LINKING DATA AND THEIR
SCHEMAS AROUND THE
WORLD.



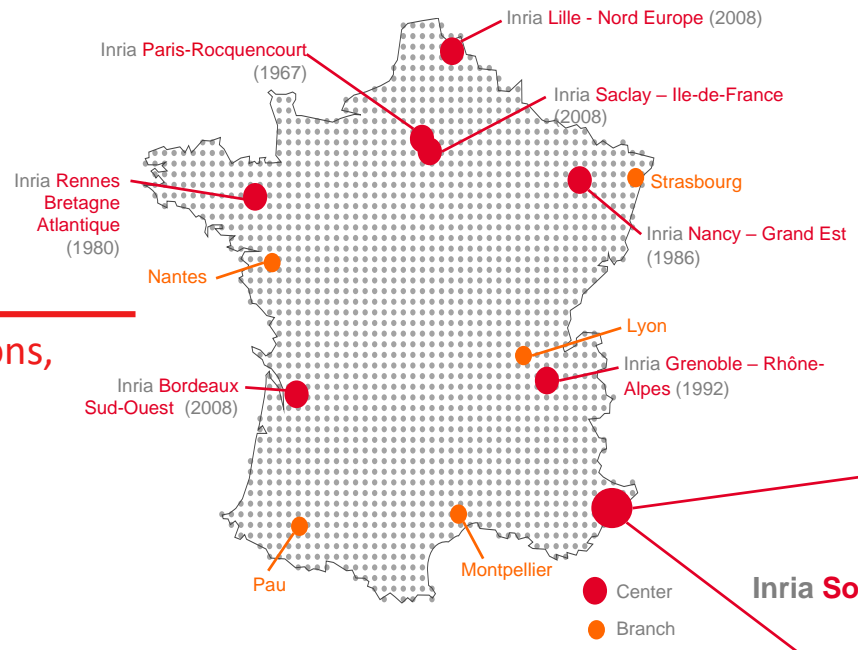
Fabien GANDON, @fabien_gandon <http://fabien.info>



WIMMICS TEAM

Web-Instrumented Man-Machine Interactions,
Communities and Semantics

- Inria
 - CNRS
 - University of Nice
- } I3S



Inria **Sophia Antipolis Méditerranée** (1983)



MULTI-DISCIPLINARY TEAM

- 41 members 2016, 50 in 2015
- 14 nationalities
- 1 DR, 3 Professors
- 3CR, 4 Assistant professors
- 1 SRP

DR/Professors:

- Fabien GANDON, Inria, AI, KR, Semantic Web, Social Web
- Nhan LE THANH, UNS, Logics, KR, Emotions
- Peter SANDER, UNS, Web, Emotions
- Andrea TETTAMANZI, UNS, AI, Logics, Agents,

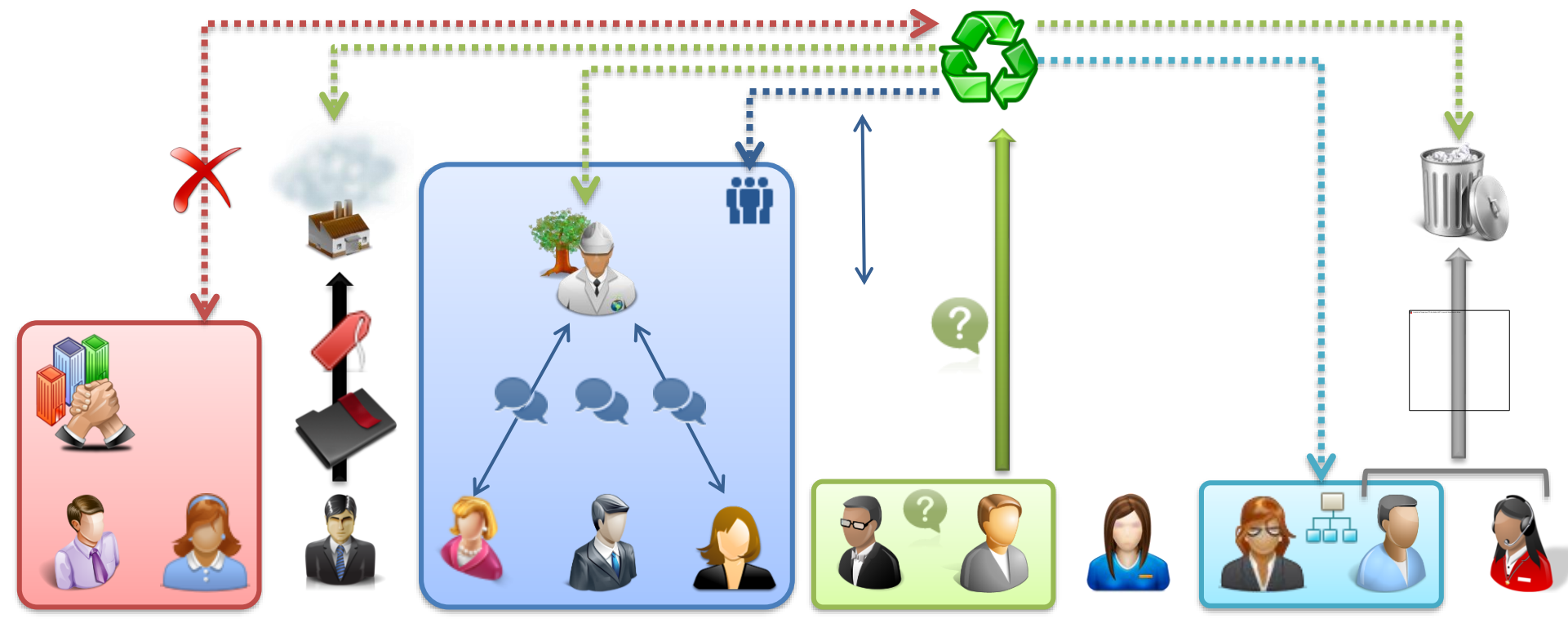
CR/Assistant Professors:

- Michel BUFFA, UNS, Web, Social Media
- Elena CABRIO, UNS, NLP, KR, Linguistics
- Olivier CORBY, Inria, KR, AI, Sem. Web, Programming, Graphs
- Catherine FARON-ZUCKER, UNS, KR, AI, Semantic Web, Graphs
- Alain GIBOIN, Inria, Interaction Design, KE, User & Task models
- Isabelle MIRBEL, UNS, Requirements, Communities
- Serena VILLATA, CNRS, AI, Argumentation, Licenses, Rights

Inria Starting Position: Alexandre MONNIN, Philosophy, Web

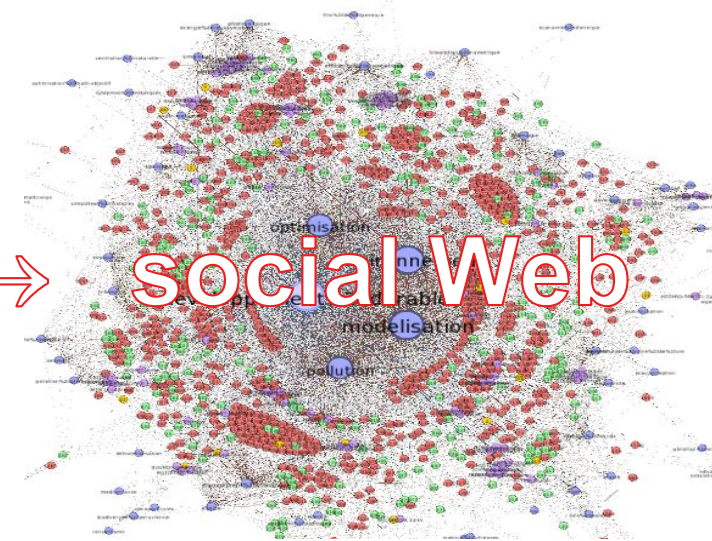
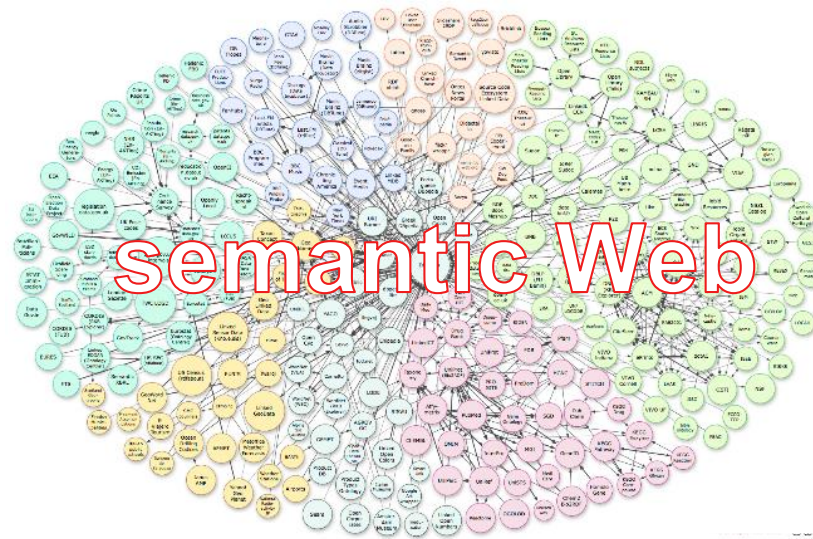
SCENARIO

epistemic communities



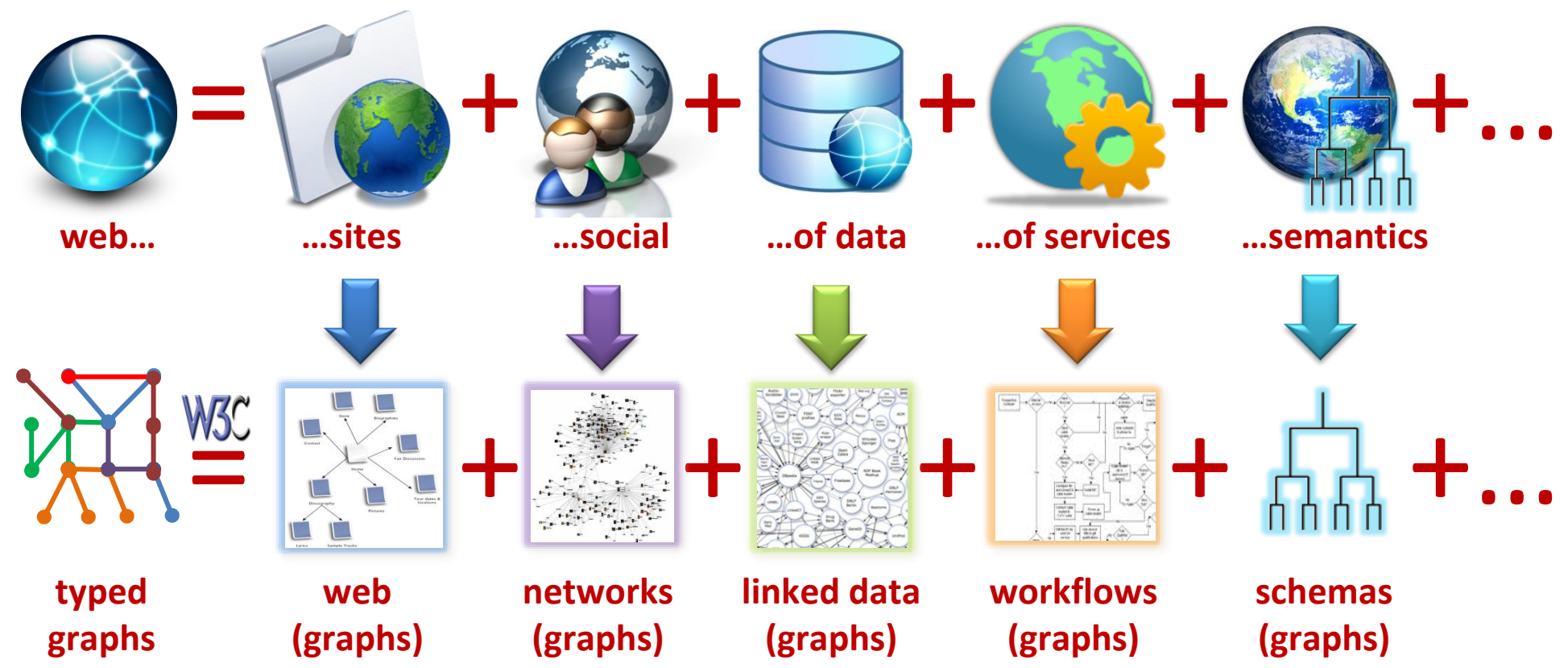
CHALLENGE

to bridge social semantics and formal semantics on the Web



WEB GRAPHS

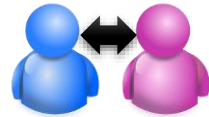
(meta)data of the relations and the resources of the web



CHALLENGES

typed graphs to analyze, model, formalize and implement social semantic web applications for epistemic communities

① multidisciplinary approach for analyzing and modeling



- the many aspects of intertwined information systems
- communities of users and their interactions

② formalizing and reasoning on these models using typed graphs



- new analysis tools and indicators



- new functionalities and better management

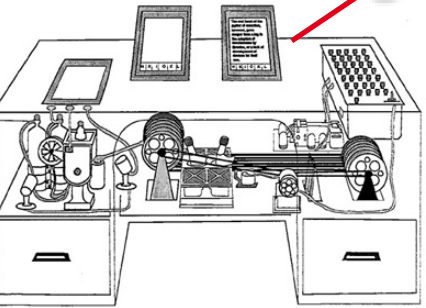


PREVIOUSLY ON... THE WEB

extending human memory

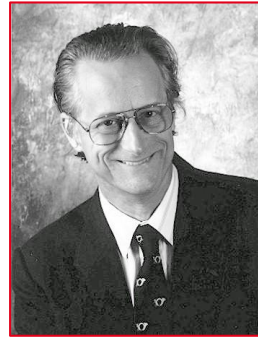


Vannevar Bush



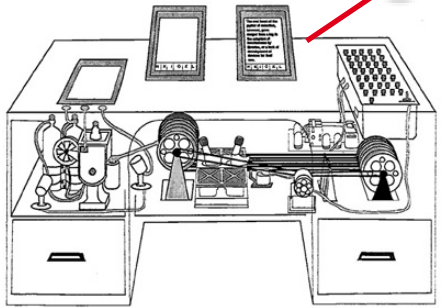
*Memex, Life Magazine,
10/09/1945*

hypermedia structure

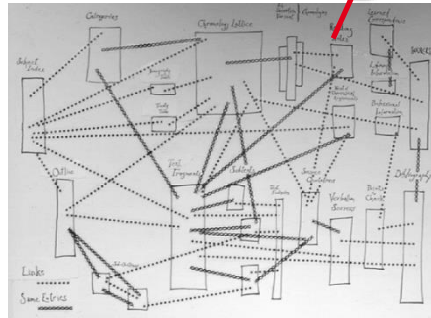


Vannevar Bush

Ted Nelson

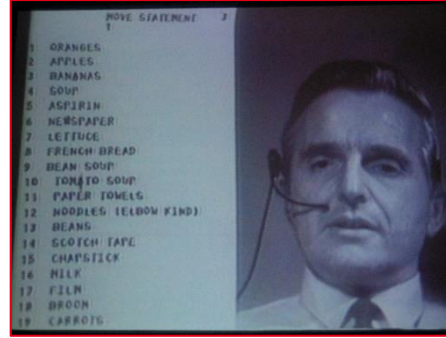
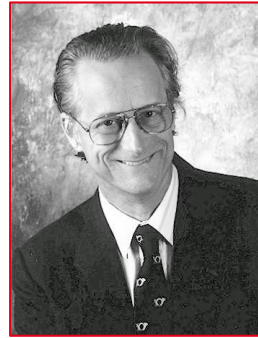


*Memex, Life Magazine,
10/09/1945*



*HyperText, ACM
1965*

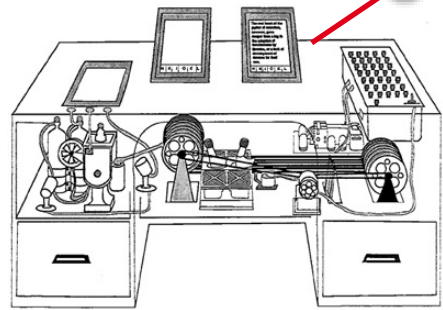
human-computer interaction



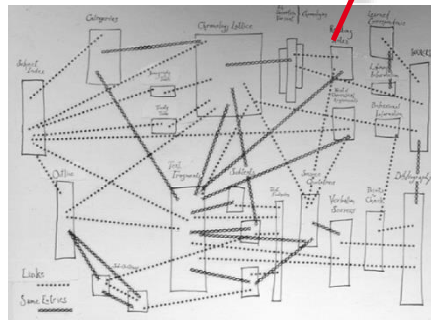
Vannevar Bush

Ted Nelson

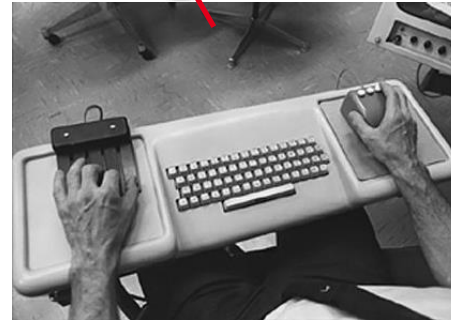
Douglas Engelbart



Memex, Life Magazine,
10/09/1945

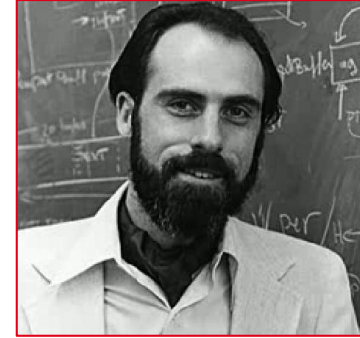
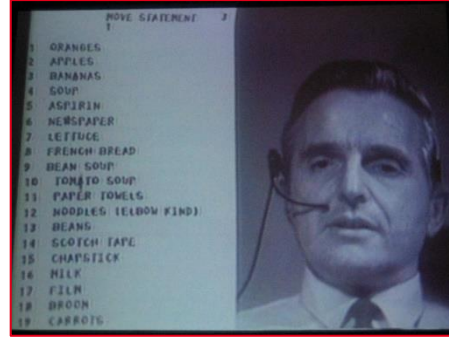
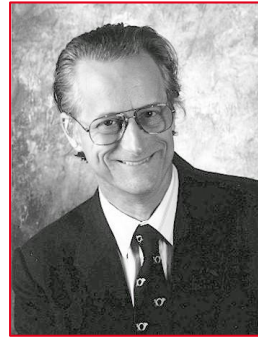


HyperText, ACM
1965



Augment, Mouse, HCI,
1968

inter-networking

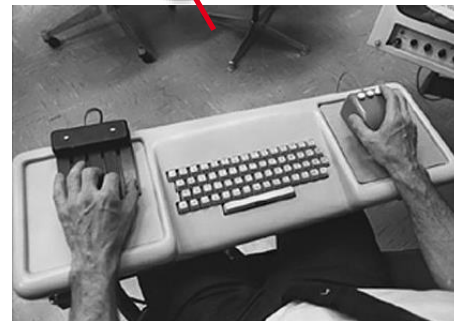
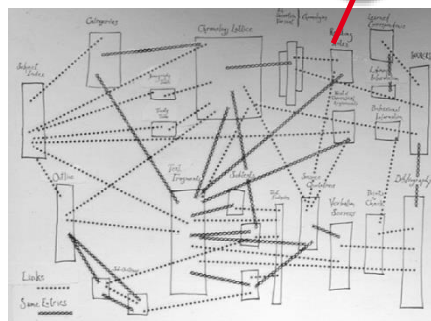
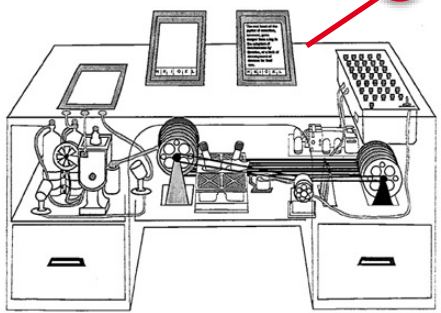


Vannevar Bush

Ted Nelson

Douglas Engelbart

Vinton Cerf



1970

Memex, Life Magazine, 10/09/1945

HyperText, ACM 1965

Augment, Mouse, HCI, 1968

TCP/IP, Internet 1974

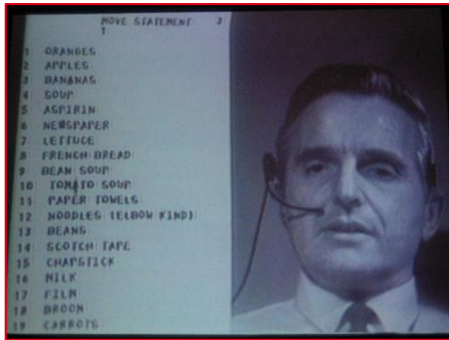
Identify and link across networks



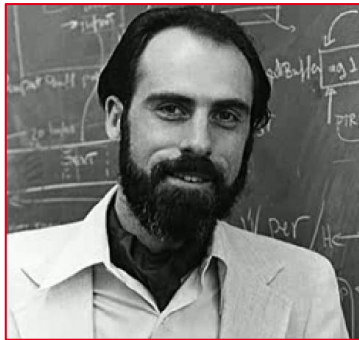
Vannevar Bush



Ted Nelson



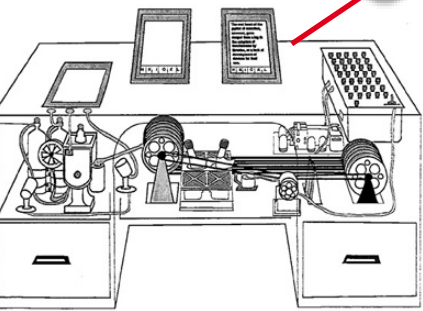
Douglas Engelbart



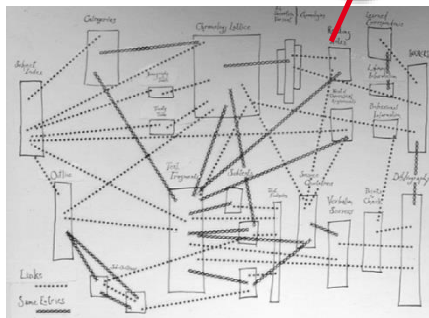
Vinton Cerf



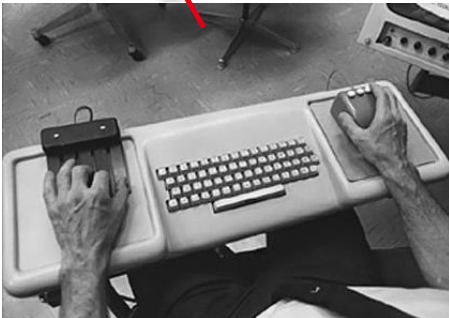
Tim Berners-Lee



Memex, Life Magazine, 10/09/1945



HyperText, ACM 1965

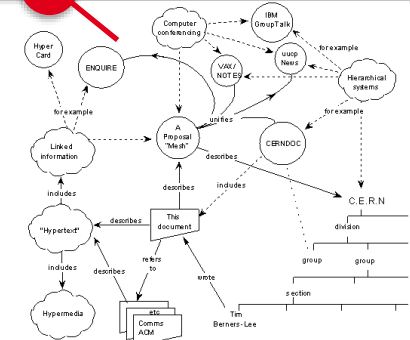


Augment, Mouse, HCI, 1968



1970

TCP/IP, Internet 1974



Information Management: A Proposal CERN, 1989

architecture of the Web



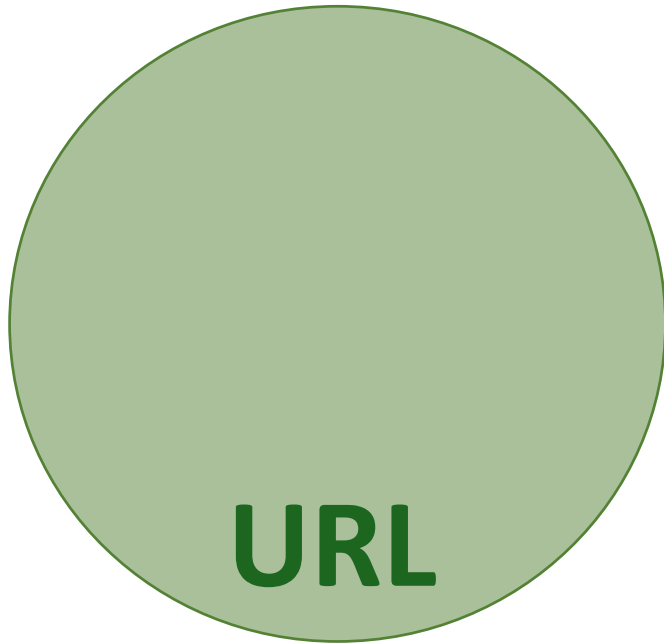
three components of the Web architecture

1. identification (URI) & address (URL)

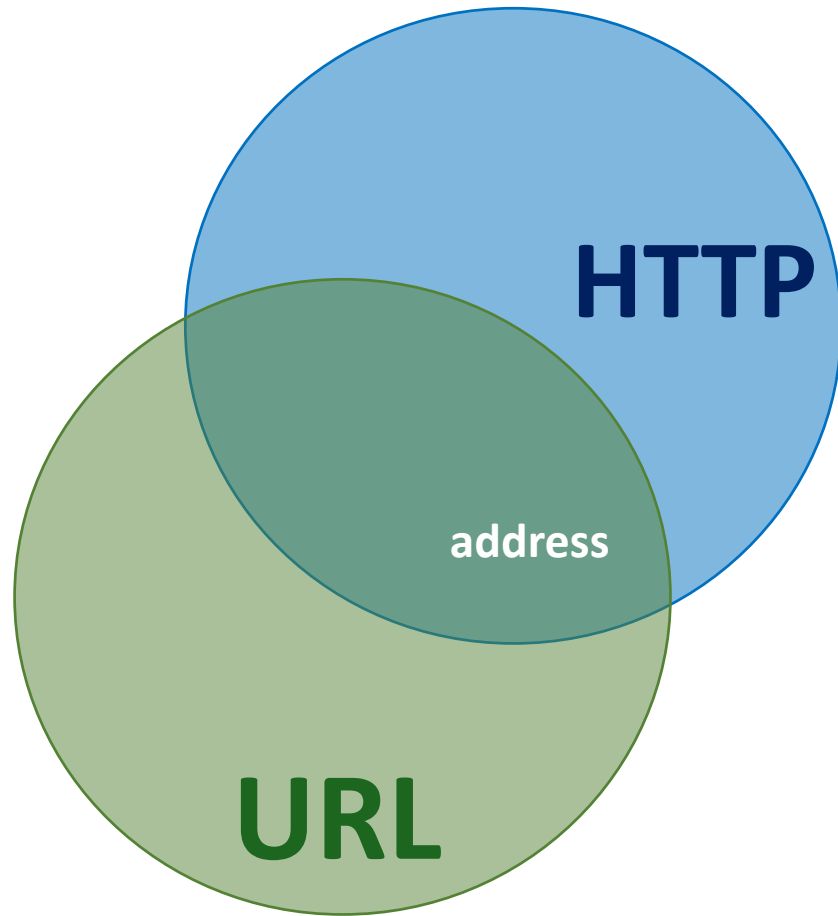
ex. `http://www.inria.fr`



123456789012



three components of the Web architecture



1. identification (URI) & address (URL)

ex. `http://www.inria.fr`



123456789012

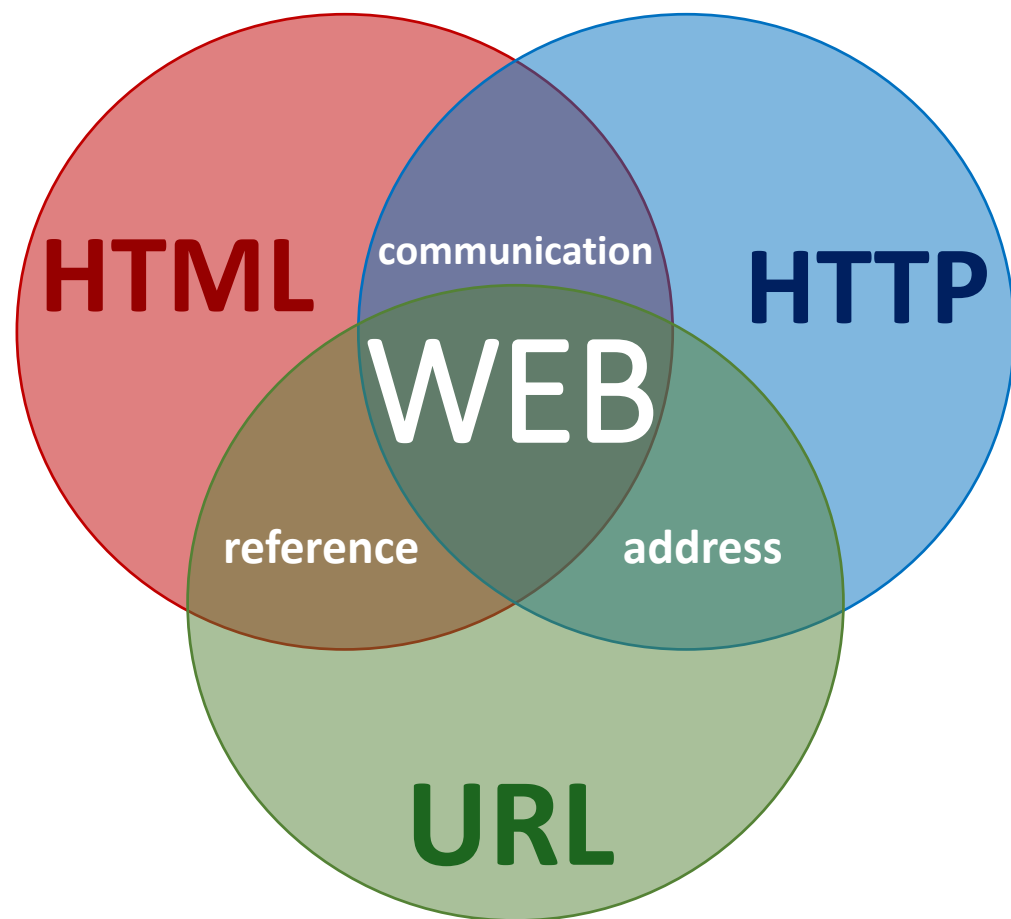
2. communication / protocol (HTTP)

```
GET /centre/sophia HTTP/1.1
```

```
Host: www.inria.fr
```



three components of the Web architecture



1. identification (URI) & address (URL)

ex. `http://www.inria.fr`



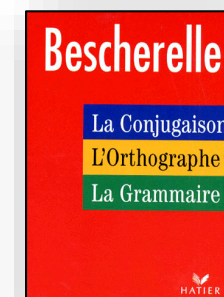
2. communication / protocol (HTTP)

```
GET /centre/sophia HTTP/1.1
Host: www.inria.fr
```



3. representation language (HTML)

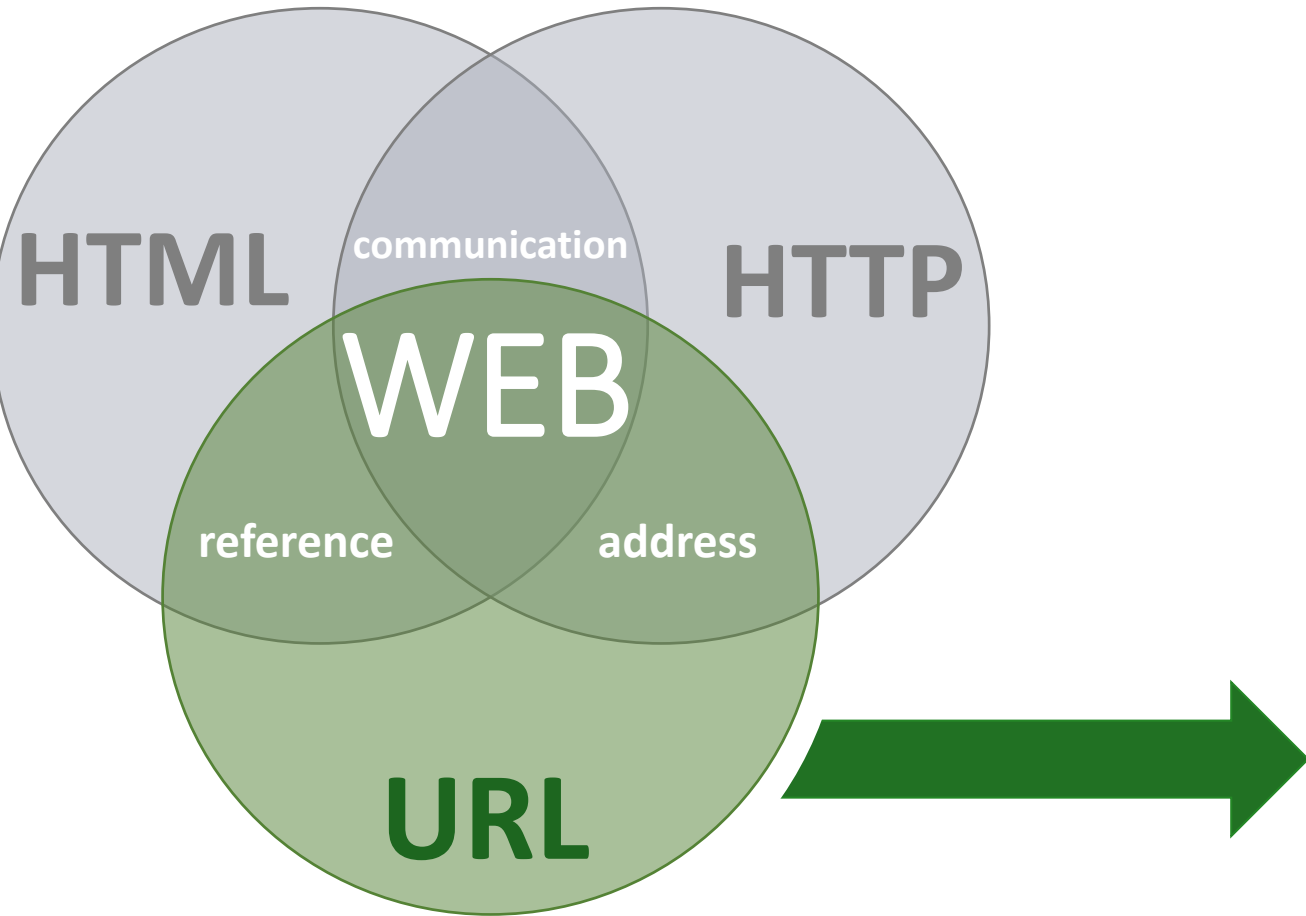
Fabien works at
`Inria`



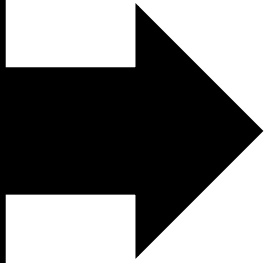
identifying shadows on the Web



multiplying references to the Web



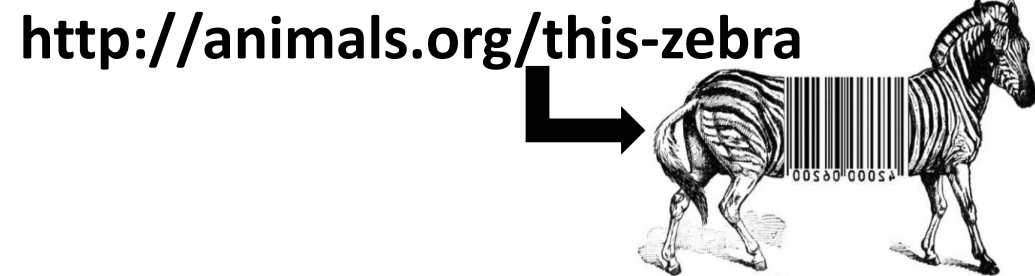
URL



URI

identify what
exists on the
web

identify,
on the web, what
exists



UR Identity

e.g. <http://ns.inria.fr/fabien.gandon#me>



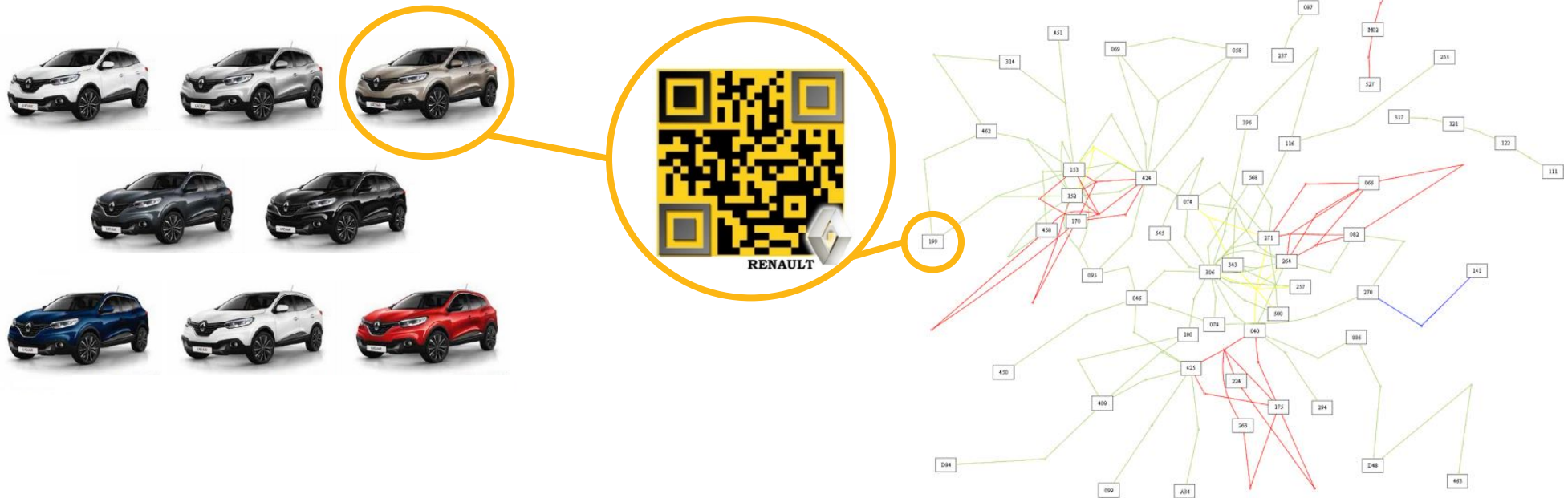
Car configurations as linked data

10^{25} car configurations but only 10^{20} coherent (1/100 000)

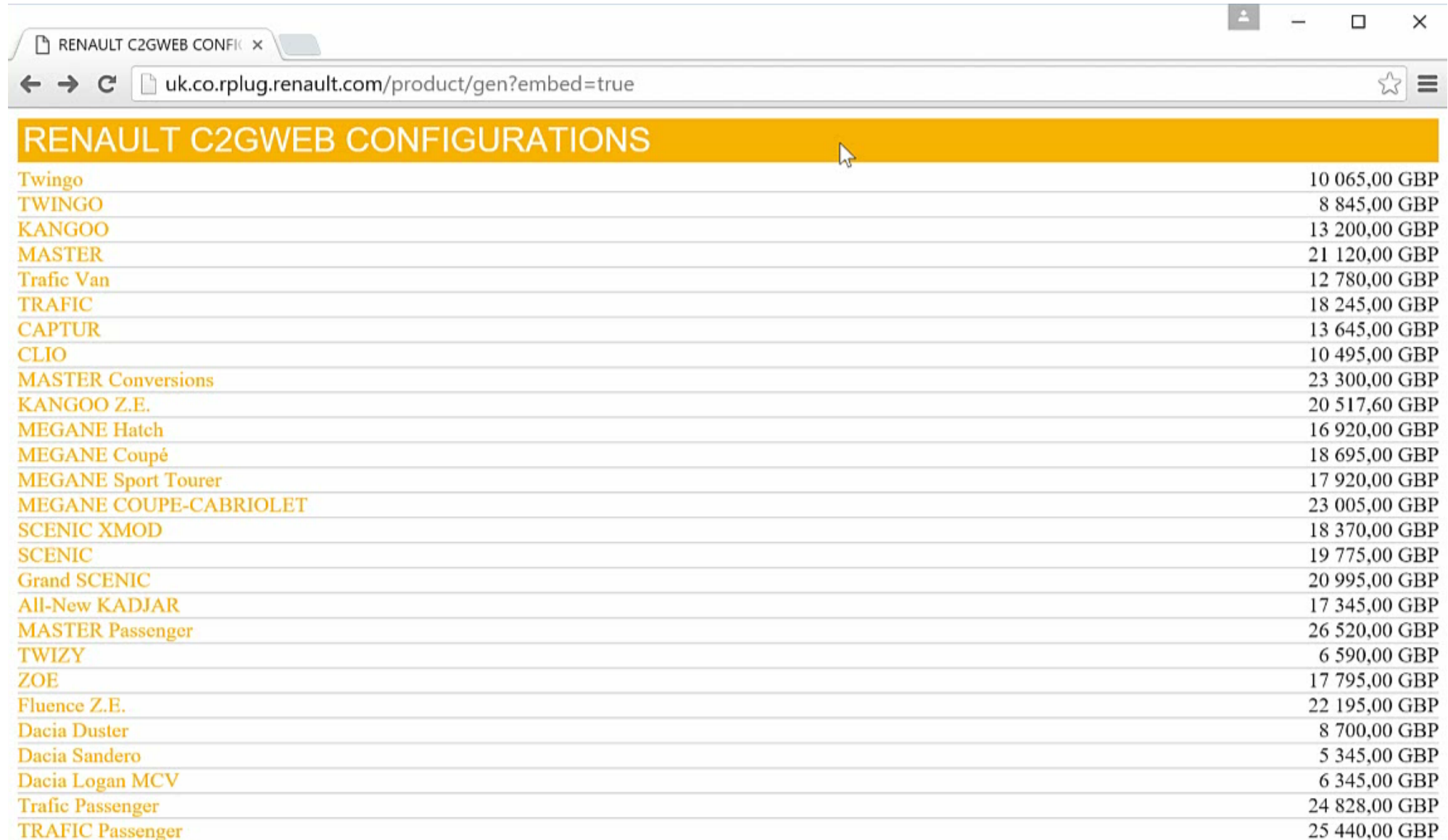
from [François-Paul Servant *et al.* ESWC 2012]



1 (partial) Configuration = 1 URI



every possible state on the Web

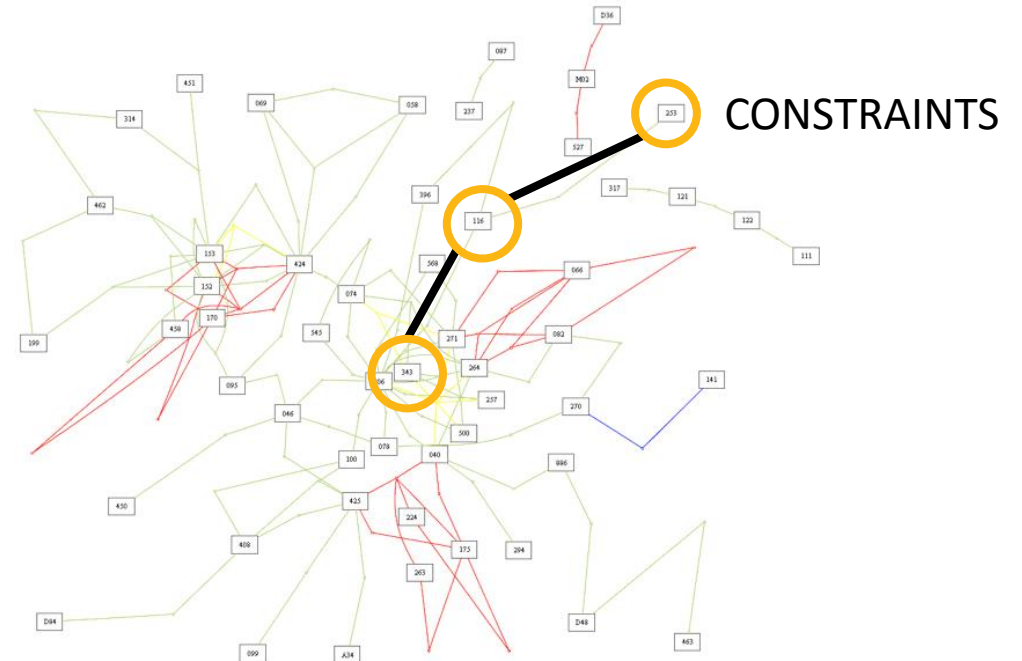


| RENAULT C2GWEB CONFIGURATIONS | |
|-------------------------------|---------------|
| Twingo | 10 065,00 GBP |
| TWINGO | 8 845,00 GBP |
| KANGOO | 13 200,00 GBP |
| MASTER | 21 120,00 GBP |
| Trafic Van | 12 780,00 GBP |
| TRAFIC | 18 245,00 GBP |
| CAPTUR | 13 645,00 GBP |
| CLIO | 10 495,00 GBP |
| MASTER Conversions | 23 300,00 GBP |
| KANGOO Z.E. | 20 517,60 GBP |
| MEGANE Hatch | 16 920,00 GBP |
| MEGANE Coupé | 18 695,00 GBP |
| MEGANE Sport Tourer | 17 920,00 GBP |
| MEGANE COUPE-CABRIOLET | 23 005,00 GBP |
| SCENIC XMOD | 18 370,00 GBP |
| SCENIC | 19 775,00 GBP |
| Grand SCENIC | 20 995,00 GBP |
| All-New KADJAR | 17 345,00 GBP |
| MASTER Passenger | 26 520,00 GBP |
| TWIZY | 6 590,00 GBP |
| ZOE | 17 795,00 GBP |
| Fluence Z.E. | 22 195,00 GBP |
| Dacia Duster | 8 700,00 GBP |
| Dacia Sandero | 5 345,00 GBP |
| Dacia Logan MCV | 6 345,00 GBP |
| Trafic Passenger | 24 828,00 GBP |
| TRAFIC Passenger | 25 440,00 GBP |

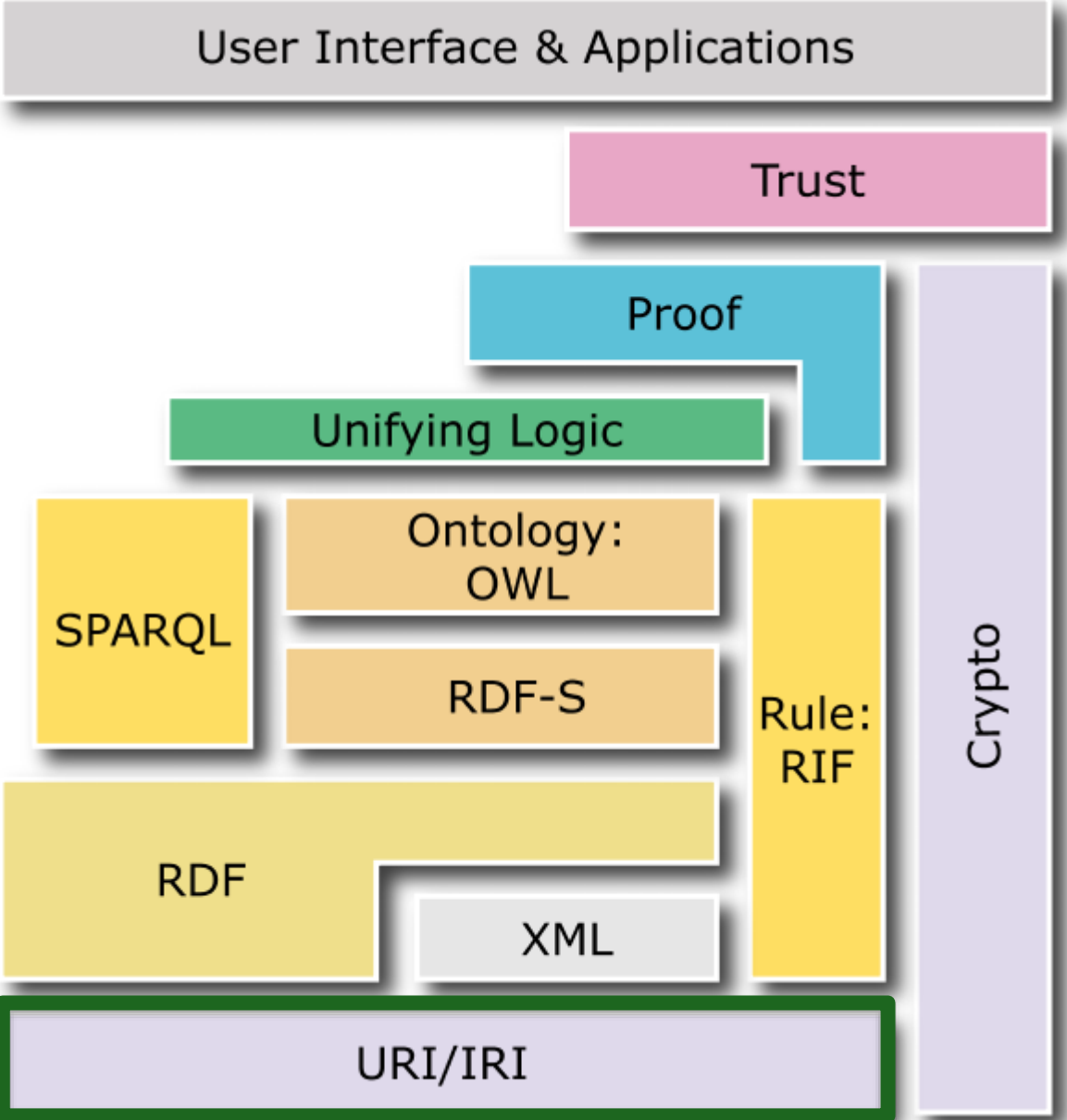
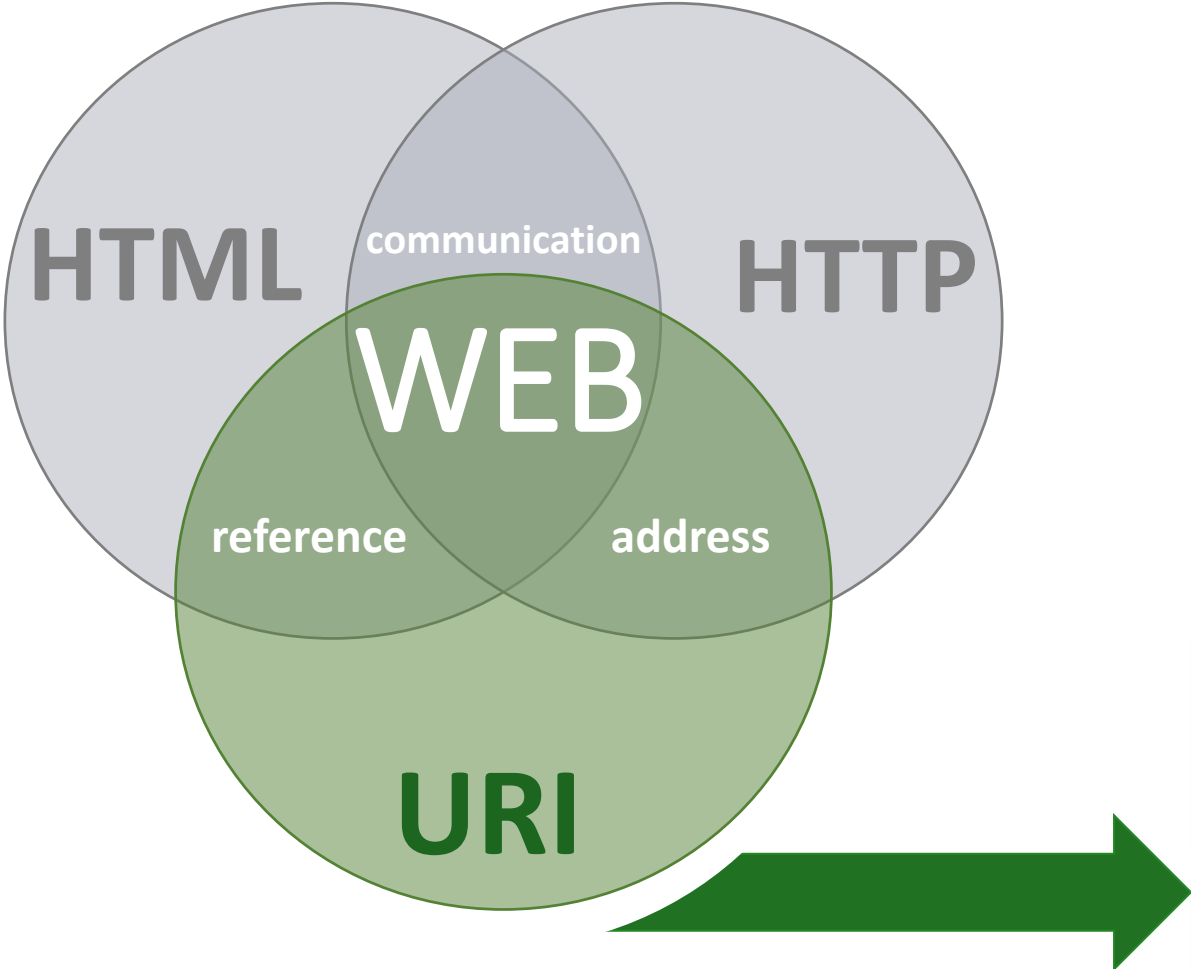
publish data and computations



[Servant *et al.* 2012]

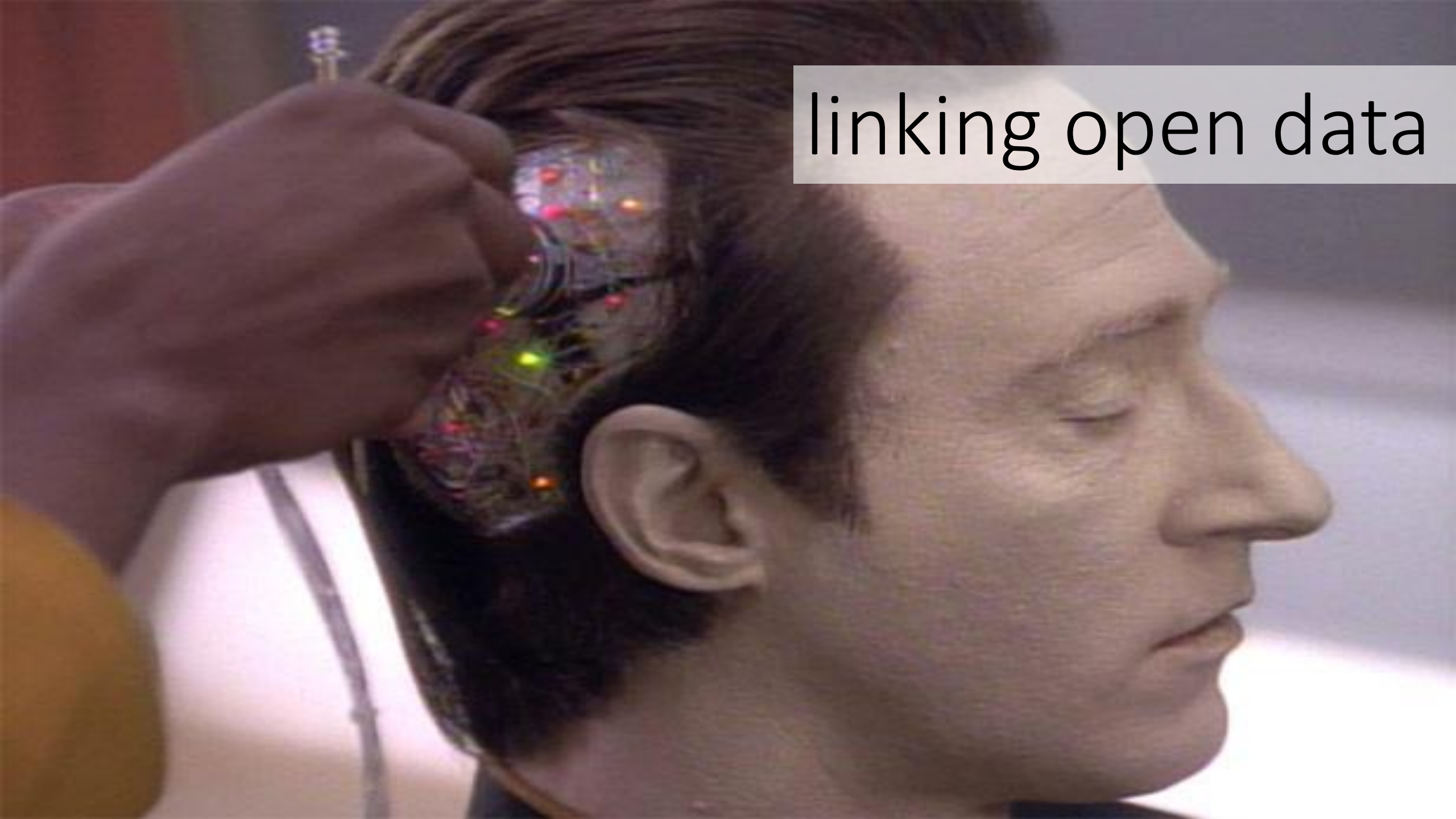


W3C standards

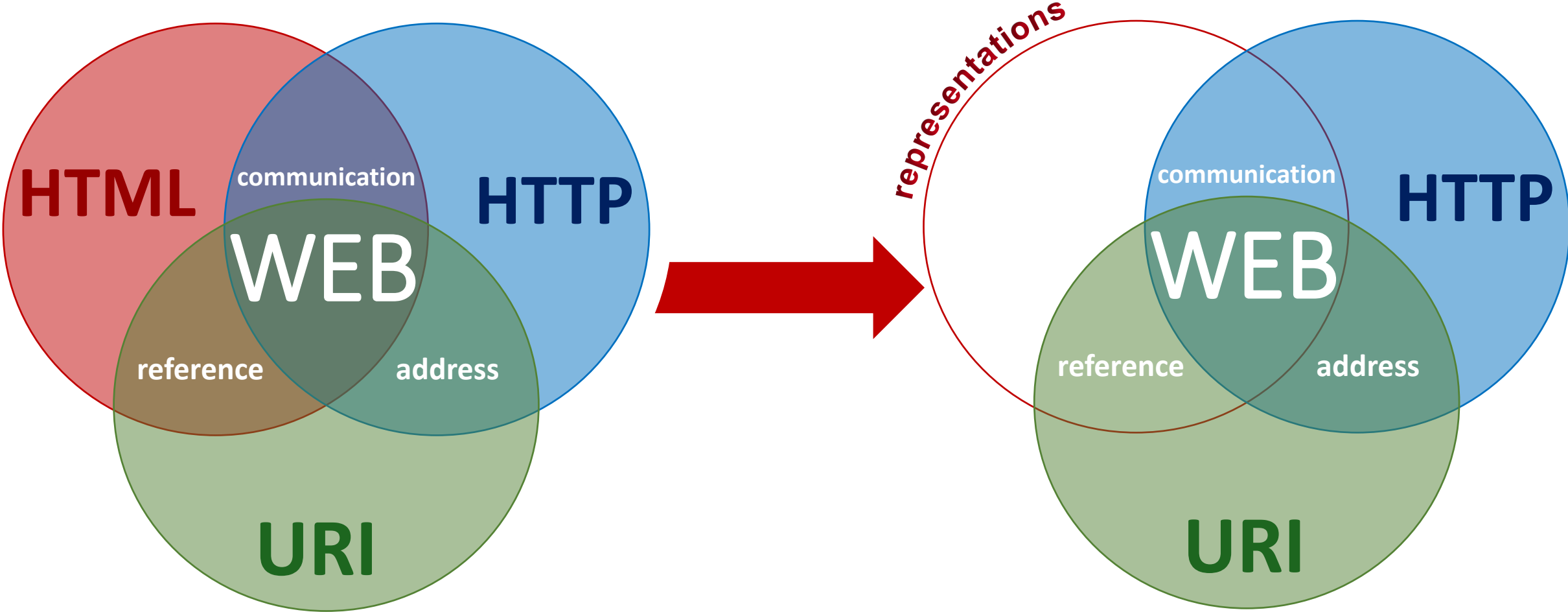


universal nodes and types identification

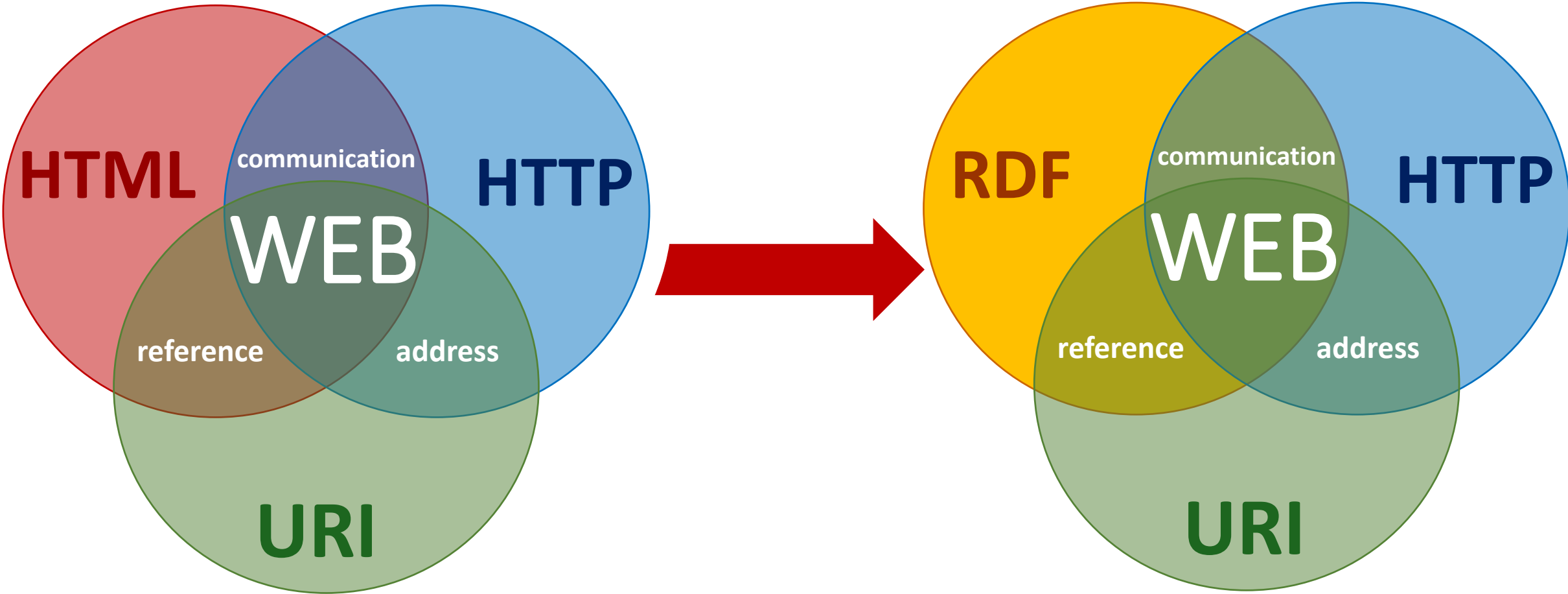
linking open data



Beyond Documentary Representations



pieces of a world-wide graph



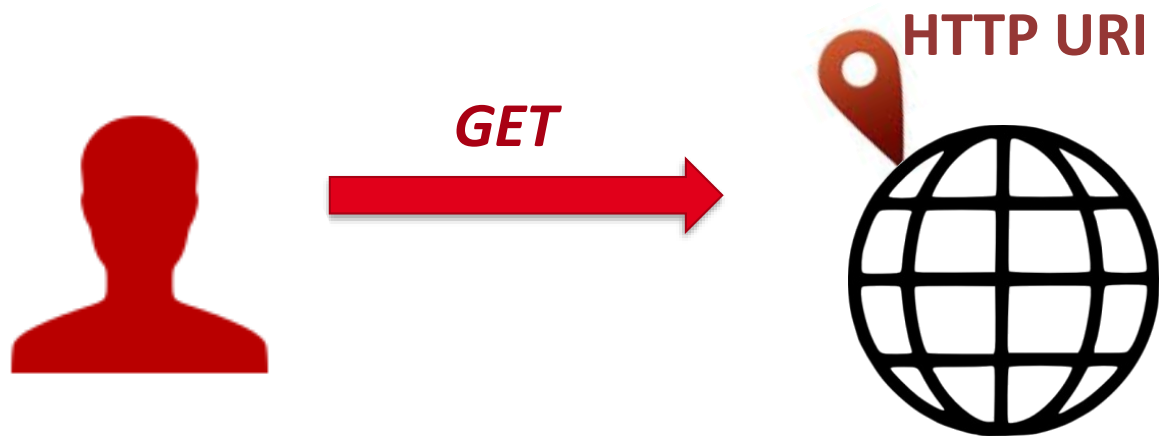
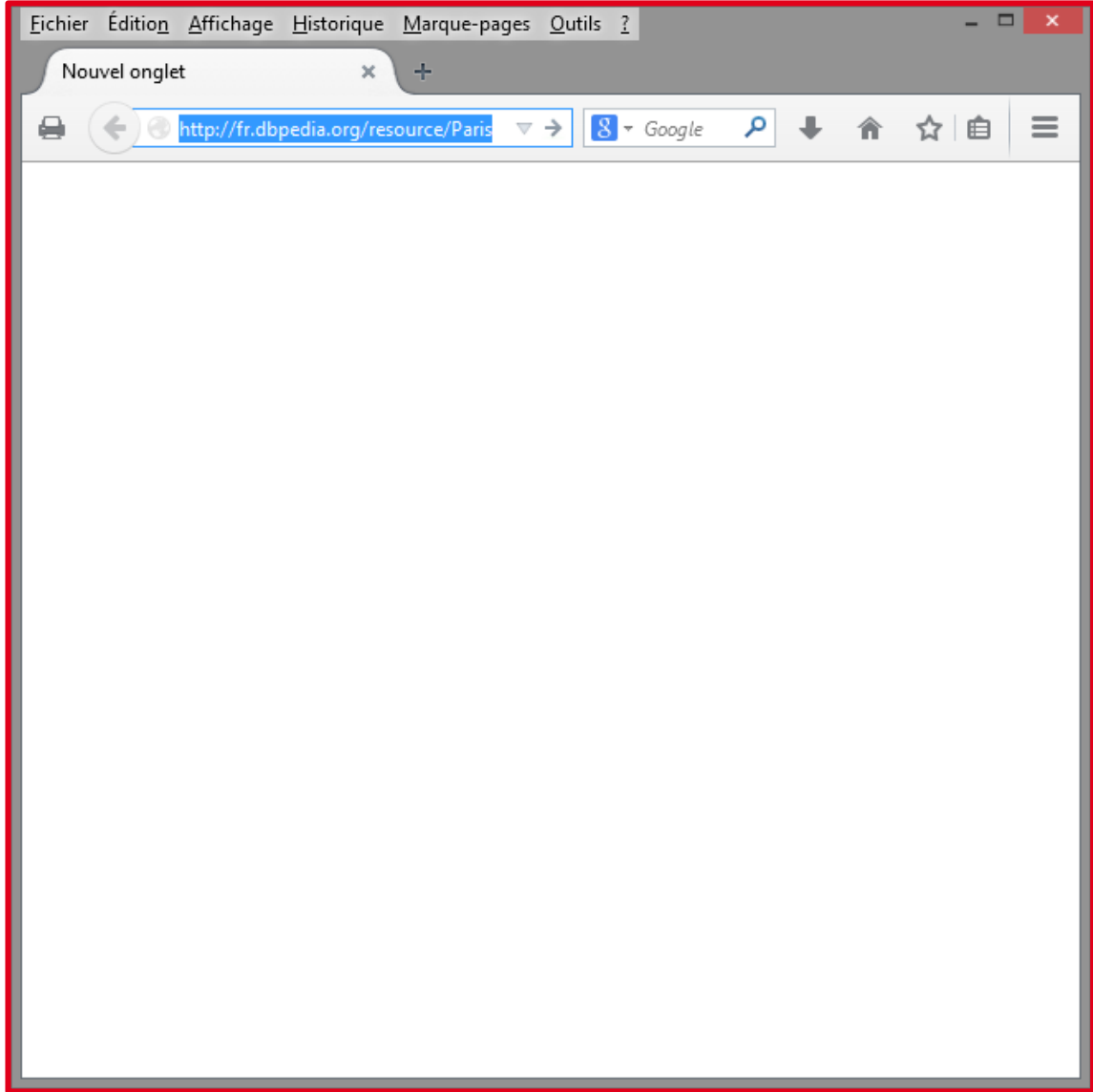
a Web approach to data publication

« <http://fr.dbpedia.org/resource/Paris> »

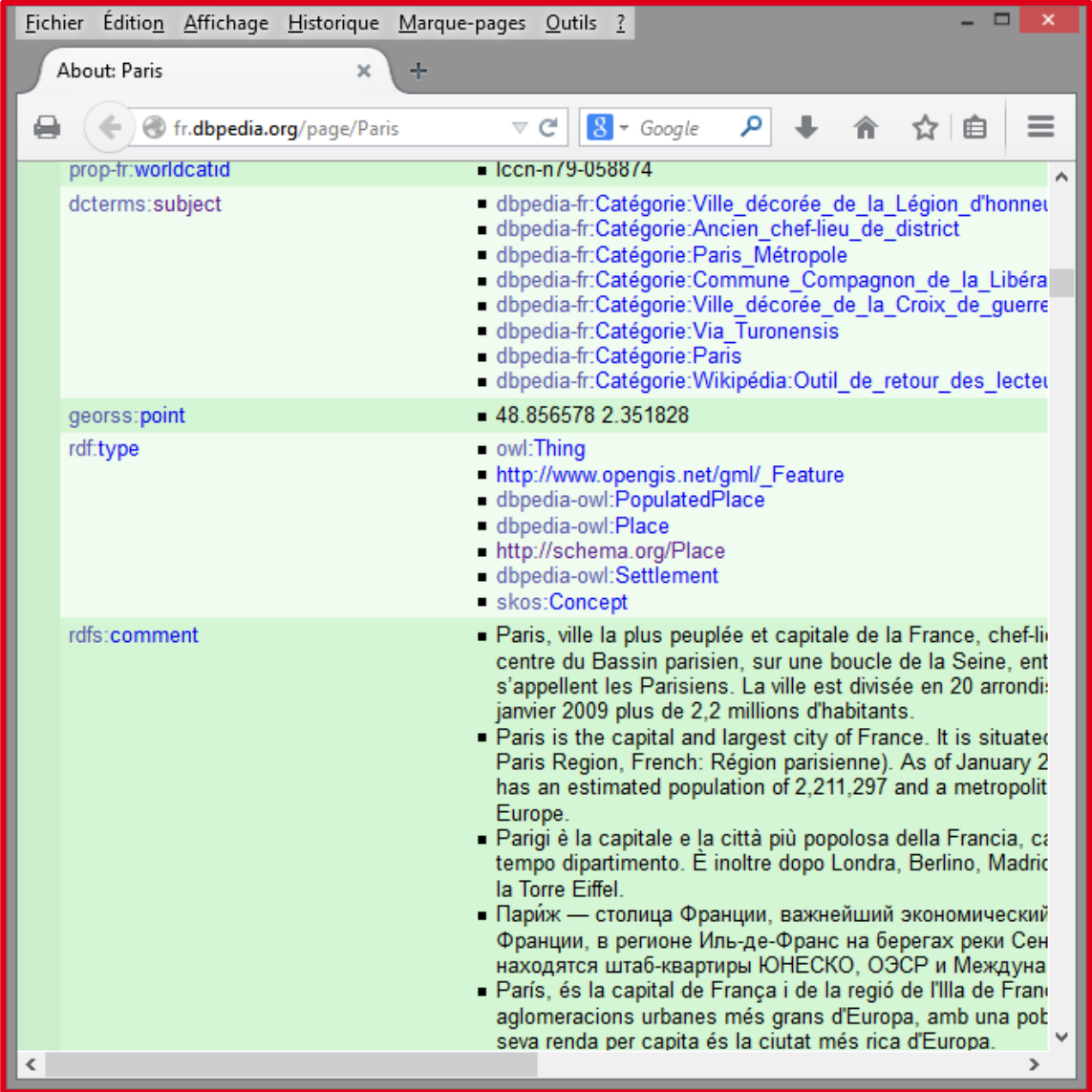
???



a Web approach to data publication



a Web approach to data publication



a Web approach to data publication



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linked data

Fichier Édition Affichage Historique Marque-pages Outils ?

http://fr.dbpedia.org/data/Paris.rdf

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About: Paris

fr.dbpedia.org/page/Paris

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| georss:point | 48.856578 2.351828 |
| rdf:type | <ul style="list-style-type: none">owl:Thinghttp://www.opengis.net/gml/_Featuredbpedia-owl:PopulatedPlacedbpedia-owl:Placehttp://schema.org/Placedbpedia-owl:Settlementskos:Concept |
| rdfs:comment | <ul style="list-style-type: none">Paris, ville la plus peuplée et capitale de la France, chef-lieu du centre du Bassin parisien, sur une boucle de la Seine, est s'appellent les Parisiens. La ville est divisée en 20 arrondissements. En janvier 2009 plus de 2,2 millions d'habitants.Paris is the capital and largest city of France. It is situated in the Paris Region, French: Région parisienne). As of January 2009, it has an estimated population of 2,211,297 and a metropolitan area of 2,351,828 in Europe.Parigi è la capitale e la città più popolosa della Francia, e fa parte del tempo dipartimento. È inoltre dopo Londra, Berlino, Madrid e Mosca la Torre Eiffel.Пари́ж — столица Франции, важнейший экономический центр Франции, в регионе Иль-де-Франс на берегах реки Сена. Здесь находятся штаб-квартиры ЮНЕСКО, ОЭСР и Международного валютного фонда.París, és la capital de França i de la regió de l'Illa de França, i una de les aglomeracions urbanes més grans d'Europa, amb una població de 2.211.297 i una seva renda per capita és la ciutat més rica d'Europa. |



a recipe to link data on the Web

ratatouille.fr

or the recipe for linked data



ratatouille.fr

or the recipe for linked data



ratatouille.fr

or the recipe for linked data



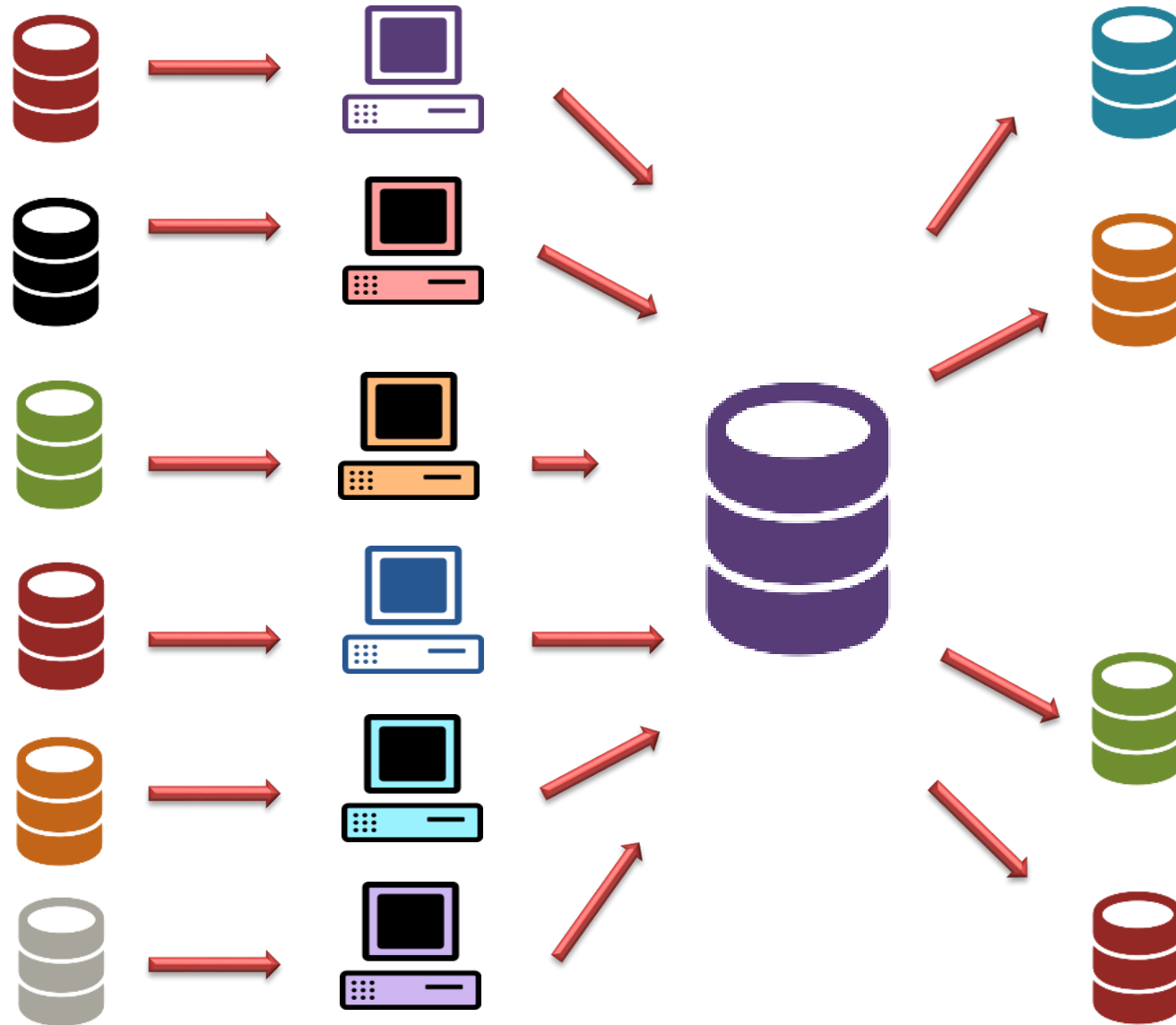
ratatouille.fr

or the recipe for linked data

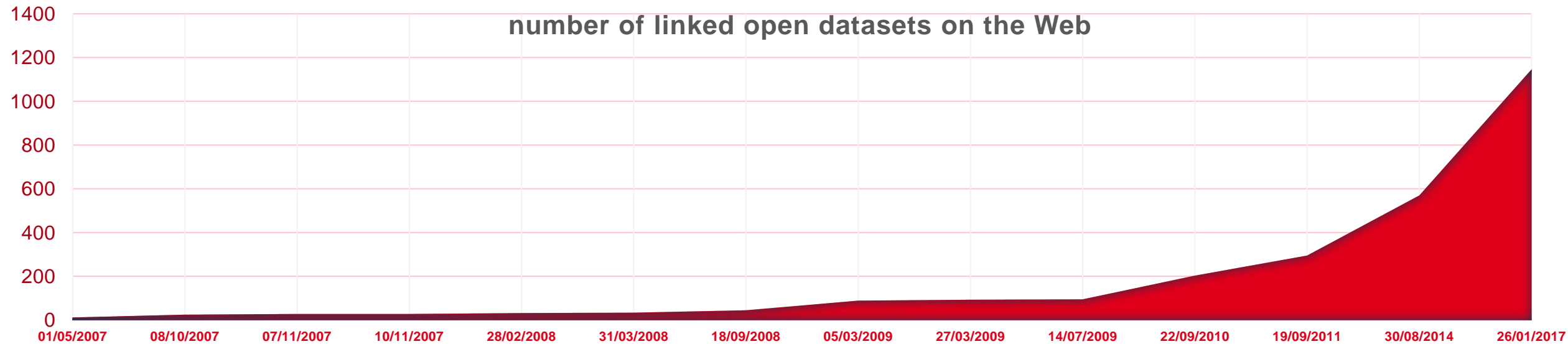
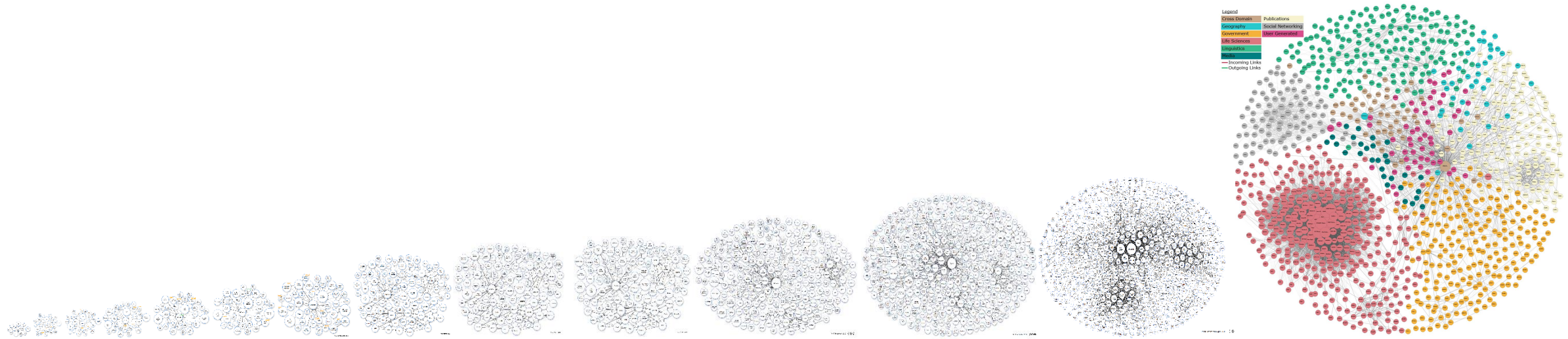


datatouille.fr

or the recipe for linked data





linked open data(sets) cloud on the Web

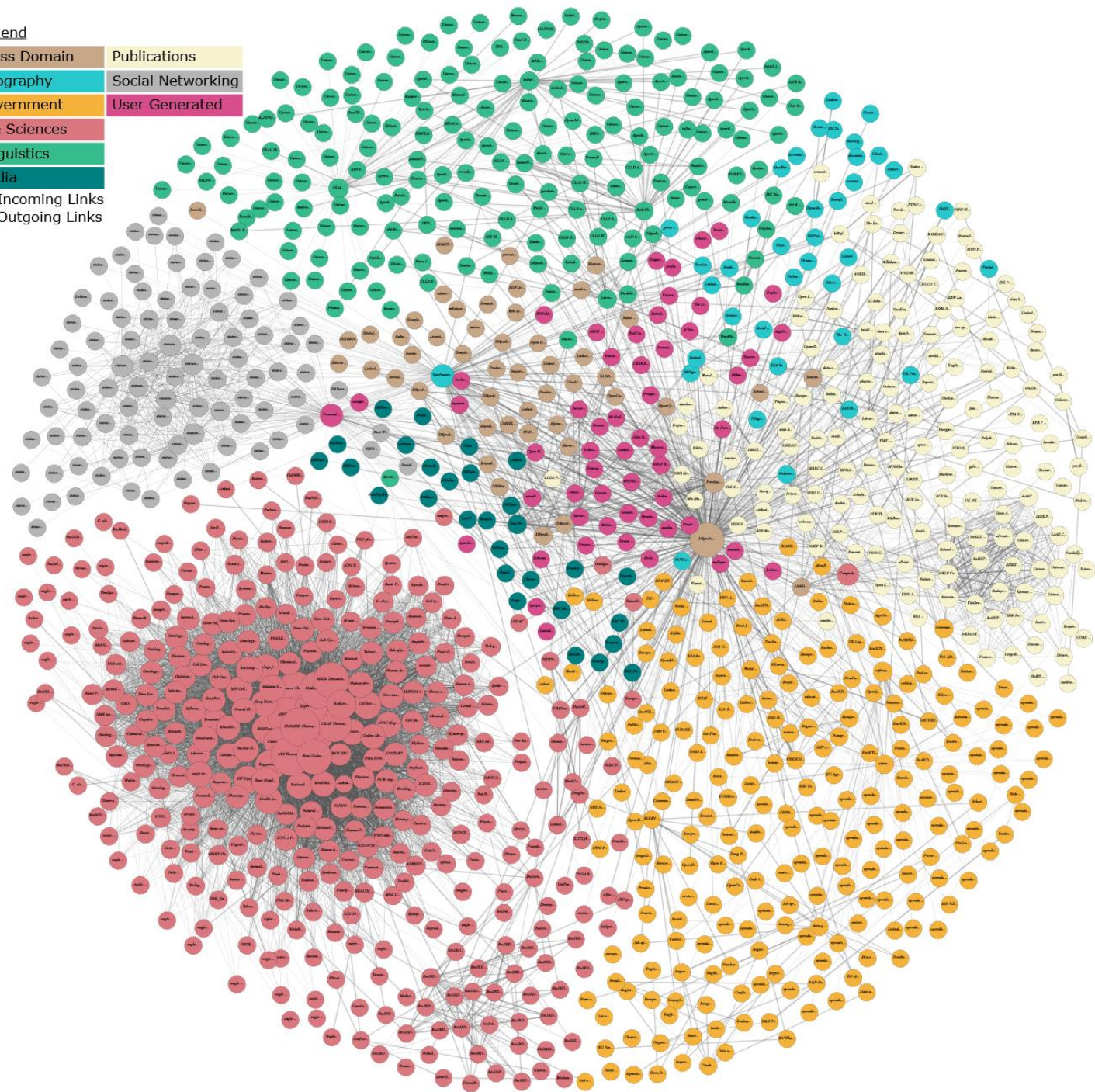


LOD cloud

<http://lod-cloud.net/>

Legend

| | |
|--|-------------------|
| Cross Domain | Publications |
| Geography | Social Networking |
| Government | User Generated |
| Life Sciences | |
| Linguistics | |
| Media | |
|  Incoming Links | |
|  Outgoing Links | |



BBC

(semantic) Web site

The screenshot shows the BBC Nature Wildlife website. At the top, there is a navigation bar with the BBC logo, a search bar, and links for Sign in, News, Sport, Weather, Shop, Earth, and More. Below this is a sub-navigation bar for the 'NATURE WILDLIFE' section, with links for Home, News, Features, Video collections, Wildlife (selected), Prehistoric life, Places, and FAQs.

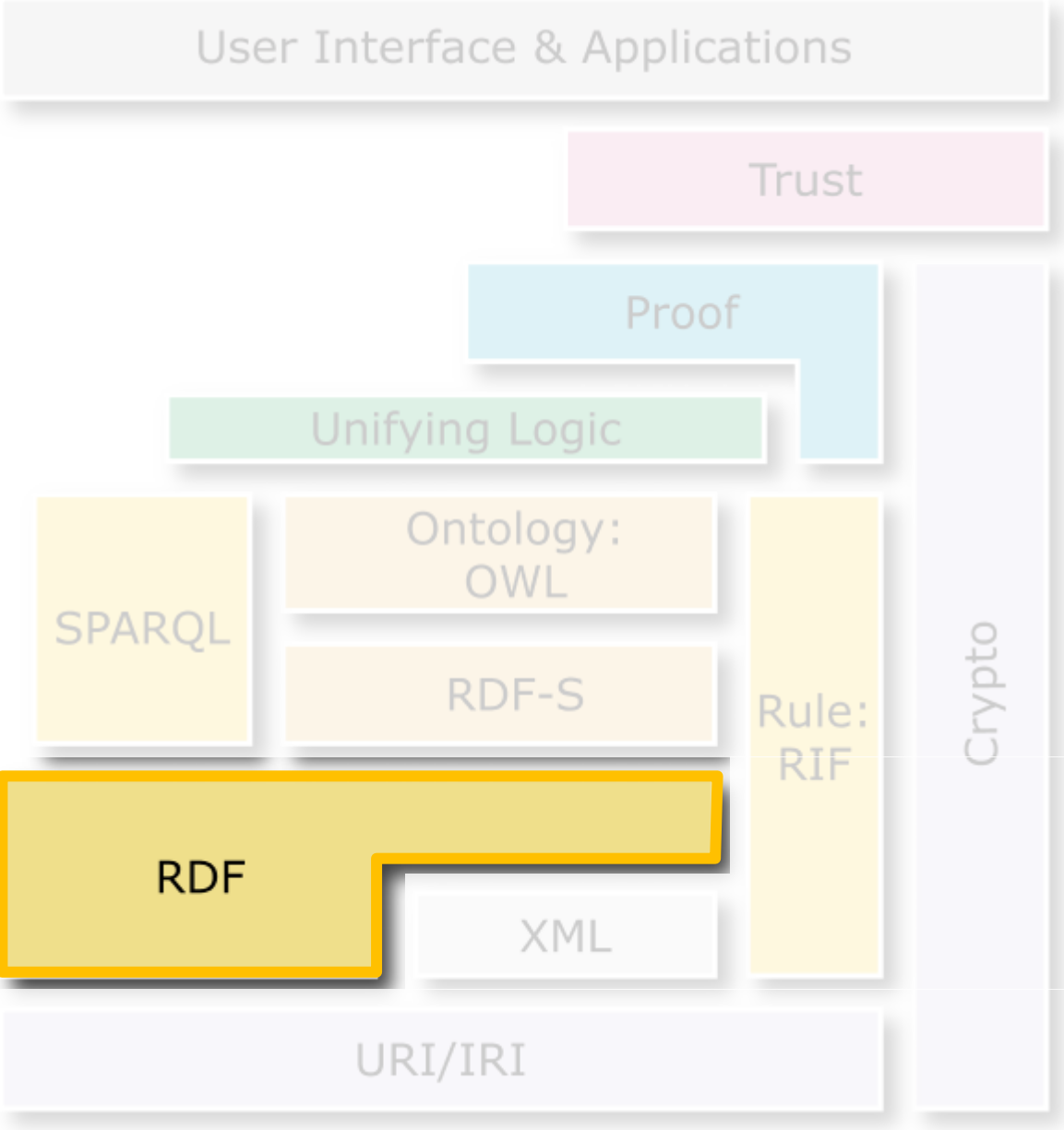
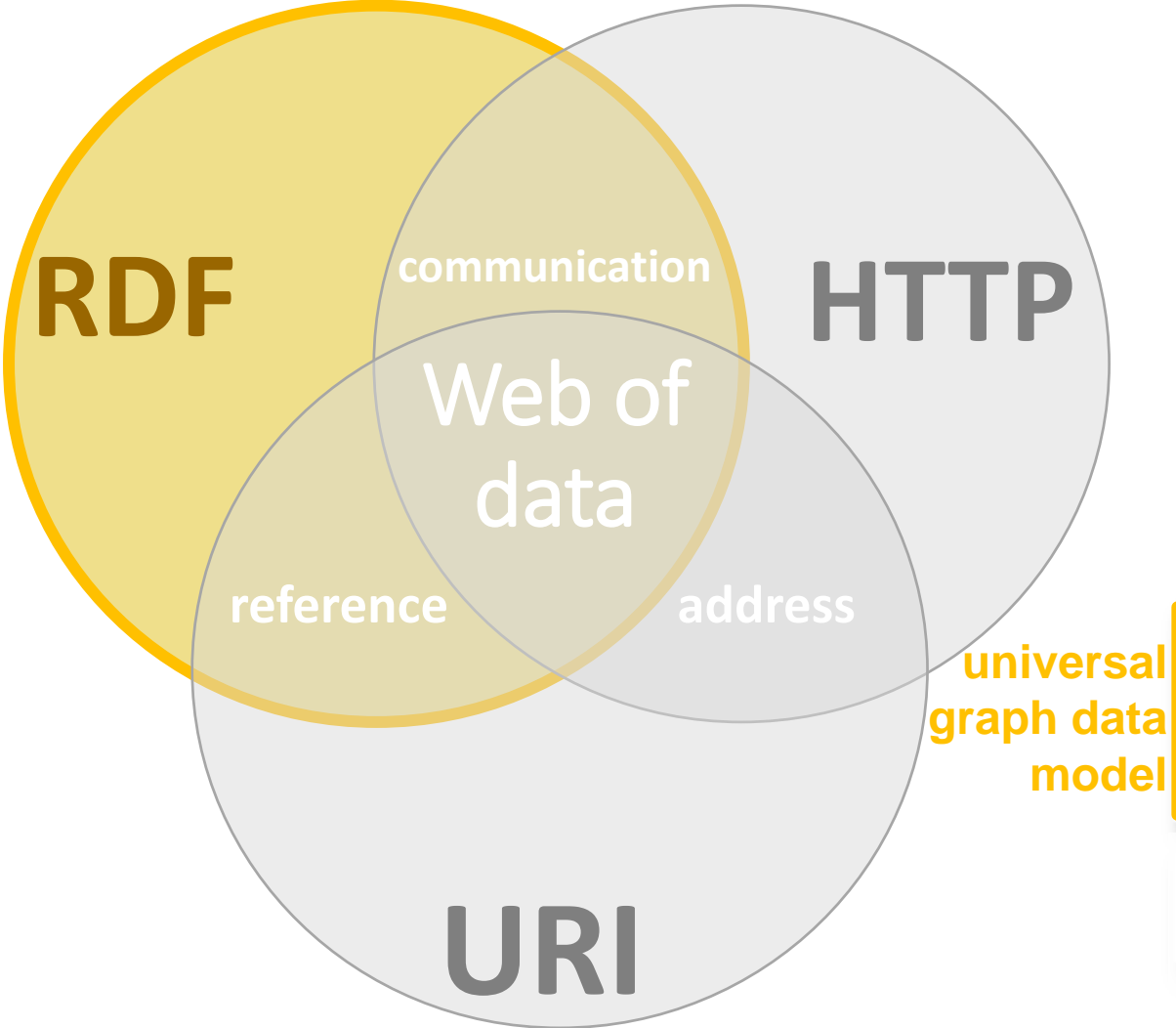
The main content area features a large video player for a snow leopard. The video title is 'Snow leopard' and the description reads: 'Exceptional athletes capable of making spectacular leaps.' To the right of the video player is a text block titled 'The natural world' with a sub-header 'The natural world'. The text describes the BBC's history of wildlife documentaries and mentions various animals like the great white shark, chimpanzees, and tigers.

Below the main content, there is an 'Explore:' section with a grid of categories: Animals (1019), Behaviours (107), Habitats (59), Mammals (359), Reptiles (132), Insects (79), Amphibians (28), Birds (297), Plants (61), Fungus (3), and Fish (39). There are also links for Prehistoric animals, History of life on Earth, and Dinosaurs.

Other sections include 'Sensational summer wildlife' with a butterfly image, 'What's new?' featuring a 'Killer whale' video, 'Places' with a map, and 'Most popular video clips' with a list of videos like 'Wolves vs hyena', 'Congo the creator', 'Coastal wolves', and 'Chimp genius'.

The URL in the browser's address bar is www.bbc.co.uk/nature/wildlife. A small URL www.bbc.co.uk/nature/life/Snow_Leopard is visible at the bottom left of the page.

a Web graph data model



RDF

is a model for directed labeled multigraphs

<http://ns.inria.fr/fabien.gandon#me>



<http://inria.fr/schema#author>

<http://inria.fr/rr/doc.html>

<http://inria.fr/rr/doc.html>

<http://inria.fr/schema#topic>

<http://inria.fr/schema#keyword>

"Music"



- Publications
- Life Sciences
- Cross-Domain
- Social Networking
- Demographic
- Government
- Media
- User Generated Content
- Linguistics

GLOBAL GIANT GRAPH

of linked (open) data on the Web



RESEARCH QUESTIONS

- Crawling, collecting, indexing
- Scalability of storage, server, etc.
- Modularization
- Models and syntaxes (efficient, canonical, etc.)
- Version management, long term preservation
- Validation, transformation
- Linking, named entity recognition,
- Human-Data Interaction (visualize, browse, search, access, create, contribute, update, curate,)
- Social, collective, collaborative interaction

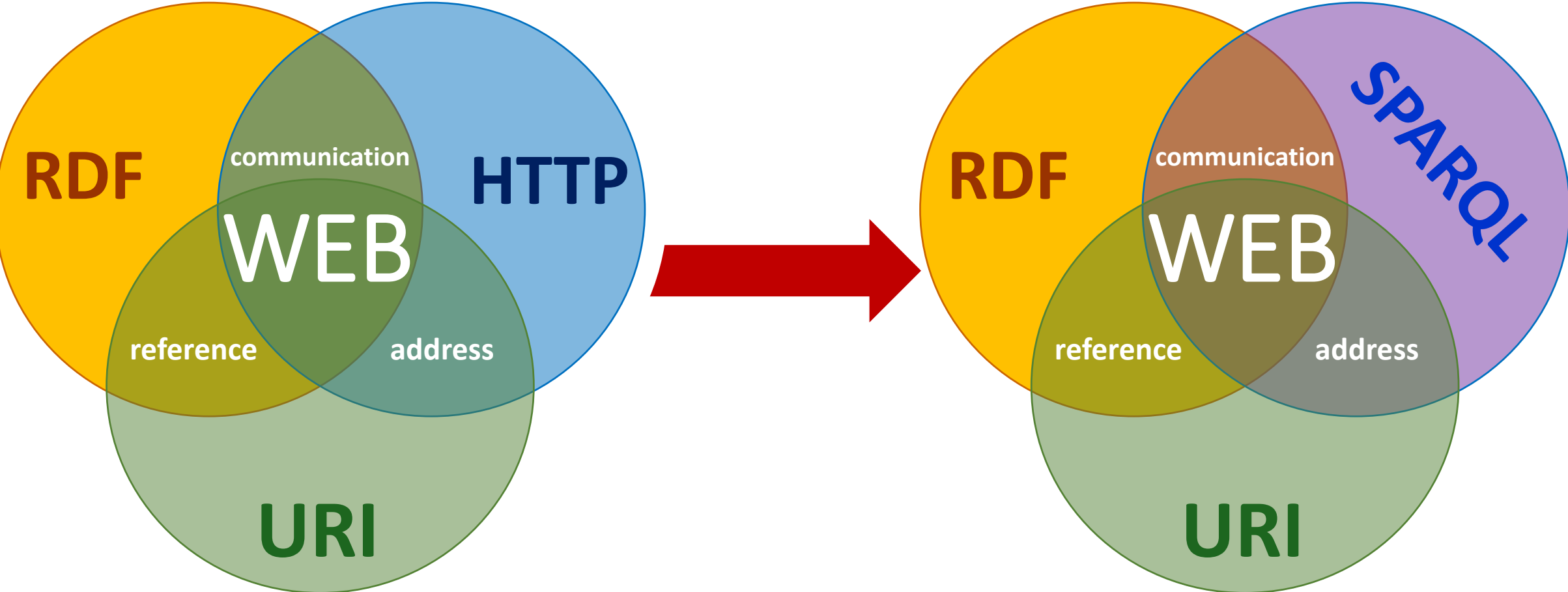


SPOTLIGHT

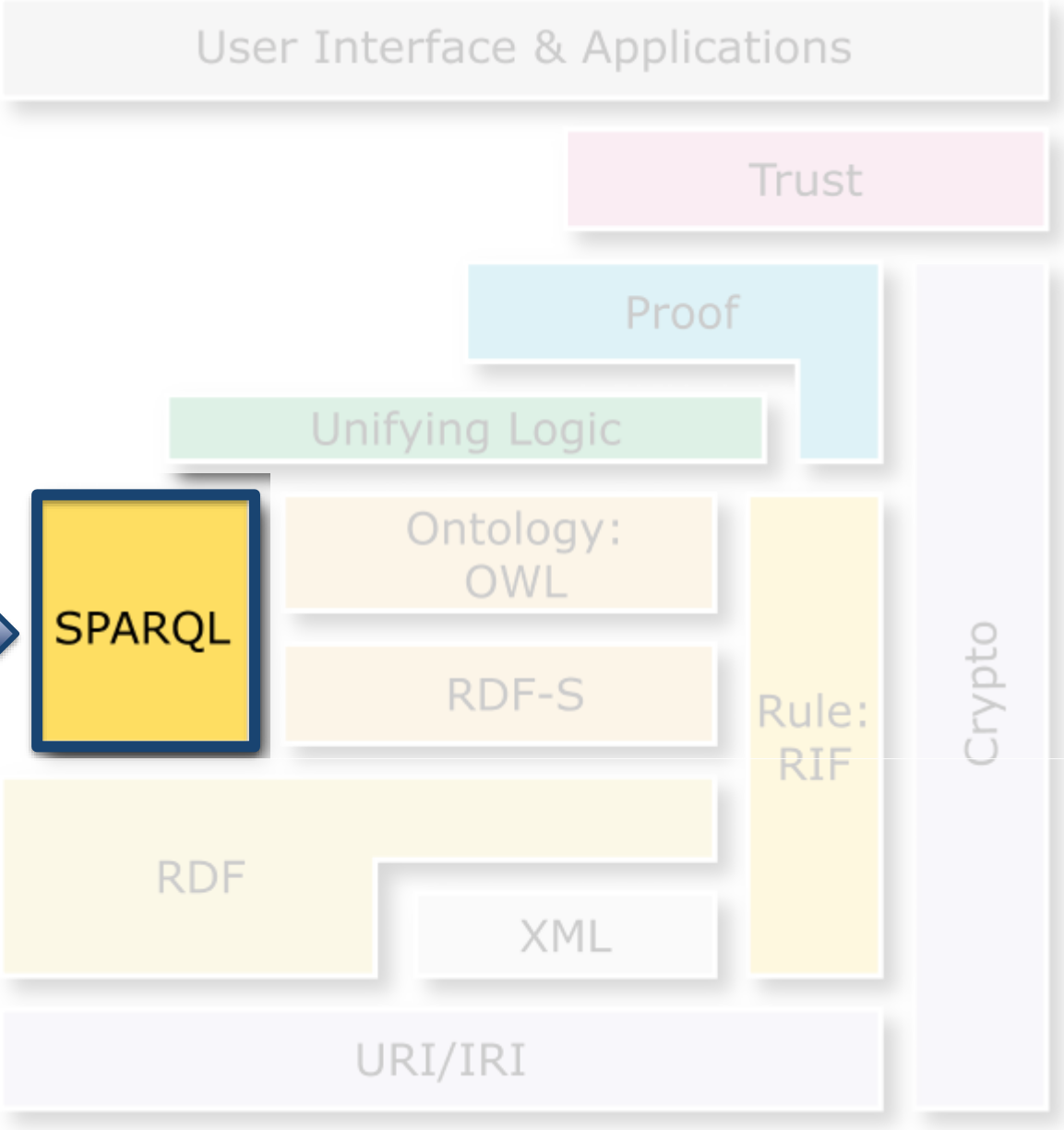
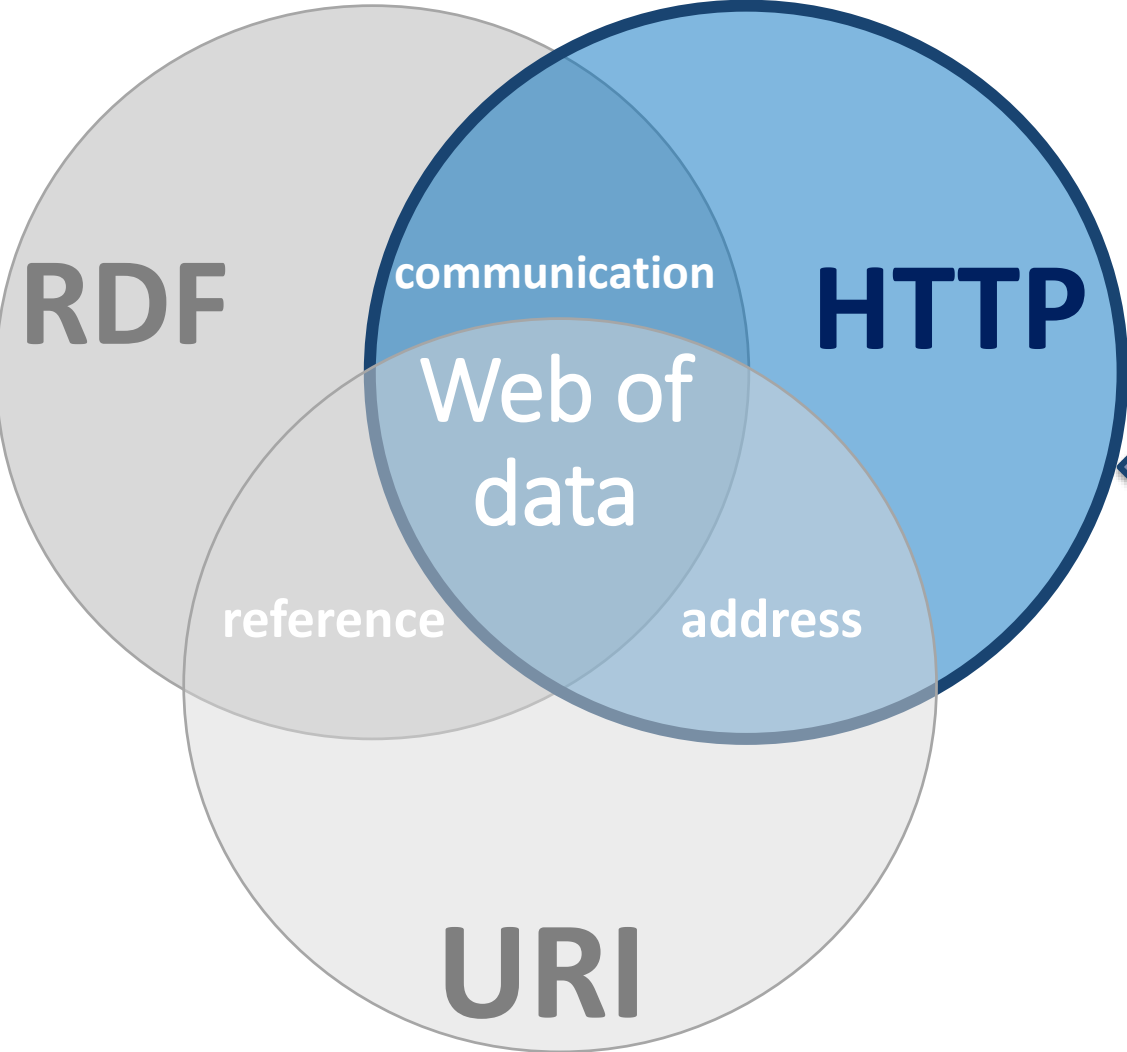
named entity

The screenshot shows the DBpedia Spotlight web application interface. The browser window title is "DBpedia Spotlight - Mozilla Firefox". The address bar shows the URL "spotlight.dbpedia.org/demo/". The page features the DBpedia Spotlight logo at the top, which includes a stylized tree icon and the text "DBpedia Spotlight". Below the logo, there are three sliders for adjusting search parameters: "Confidence:" (set to 0.0), "Contextual score:" (set to 0.0), and "Prominence (support):" (set to 0). To the right of these sliders are three dropdown menus: "No 'common words'", "Default disambiguation", and "Show best candidate". Below these are two buttons: "SELECT TYPES..." and "ANNOTATE". A large empty rectangular area is visible below the controls, intended for displaying search results. At the bottom of the page, the text "You should know" is partially visible.

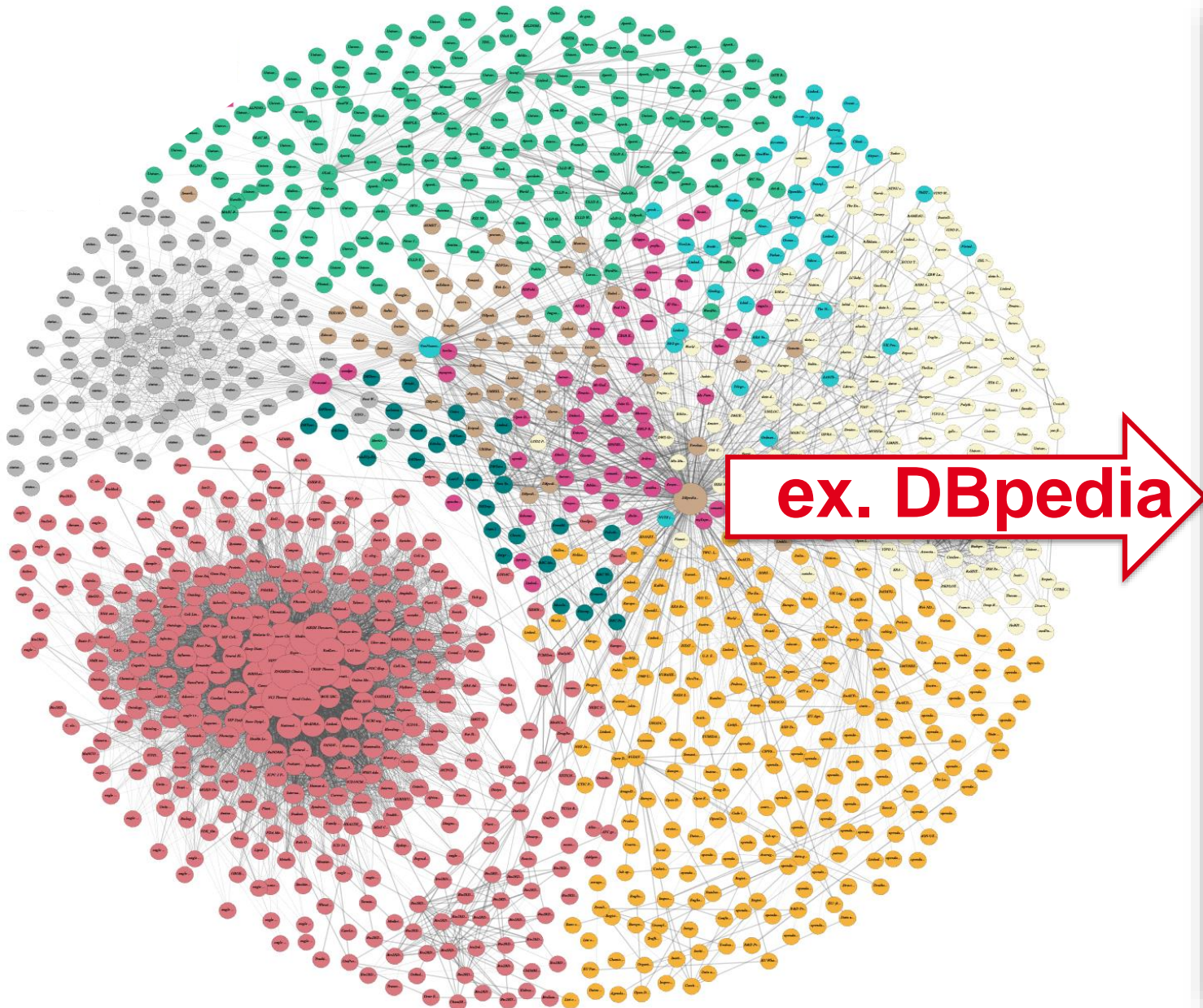
query data sources on the Web



a Web graph access



Get Data, Not Documents



SPARQL Explorer for <http://dbpedia.org/sparql>

```
SPARQL:
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX dc: <http://purl.org/dc/elements/1.1/>
PREFIX : <http://dbpedia.org/resource/>
PREFIX dbpedia2: <http://dbpedia.org/property/>
PREFIX dbpedia: <http://dbpedia.org/>
PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
```

Results:

Powered by [OpenLink Virtuoso](#) and [d2p2](#)



RESEARCH QUESTIONS

- Efficiency storage and querying
- Efficient network access means: HTTP gets, Linked Data Fragments, Linked Data Platform (REST), SPARQL services, protocol and language
- Distribution, federation and hybridization
- Operations on flows
- Dedicated graph operators (e.g. paths)
- Reliable, persistent, trustworthy
- Access control, (homomorphic) encryption, compression

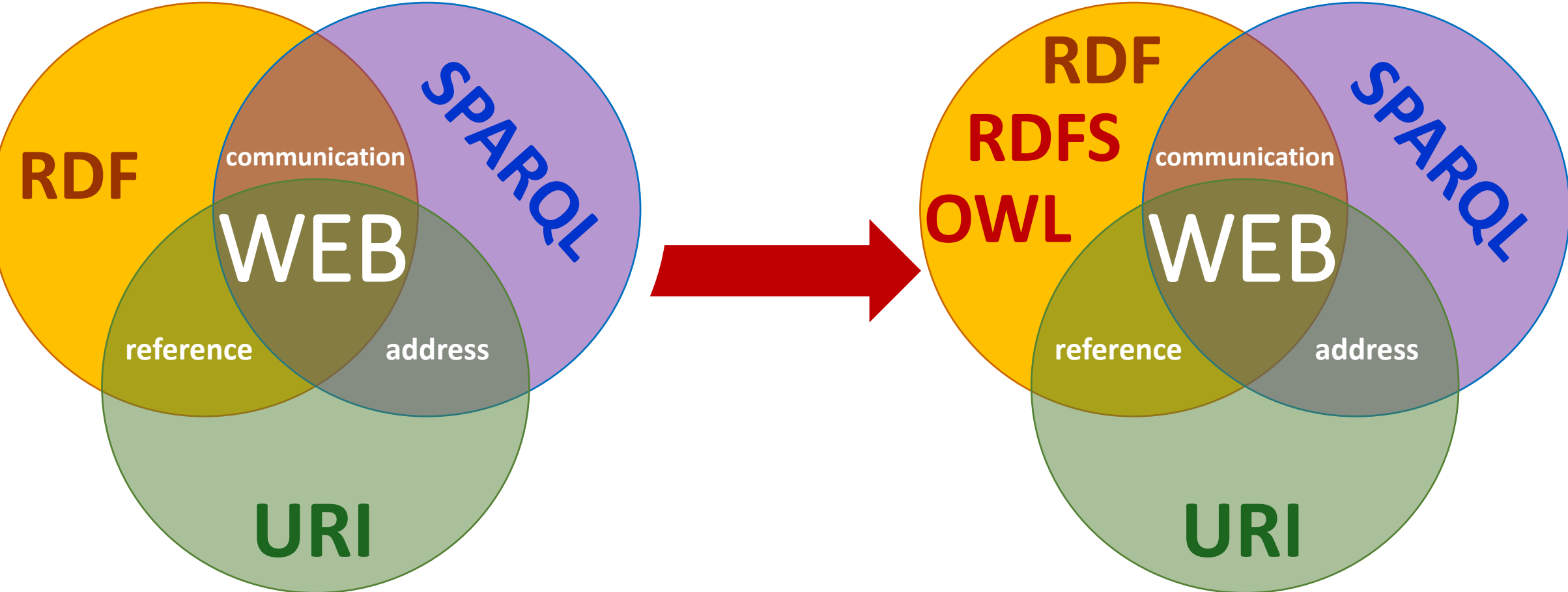




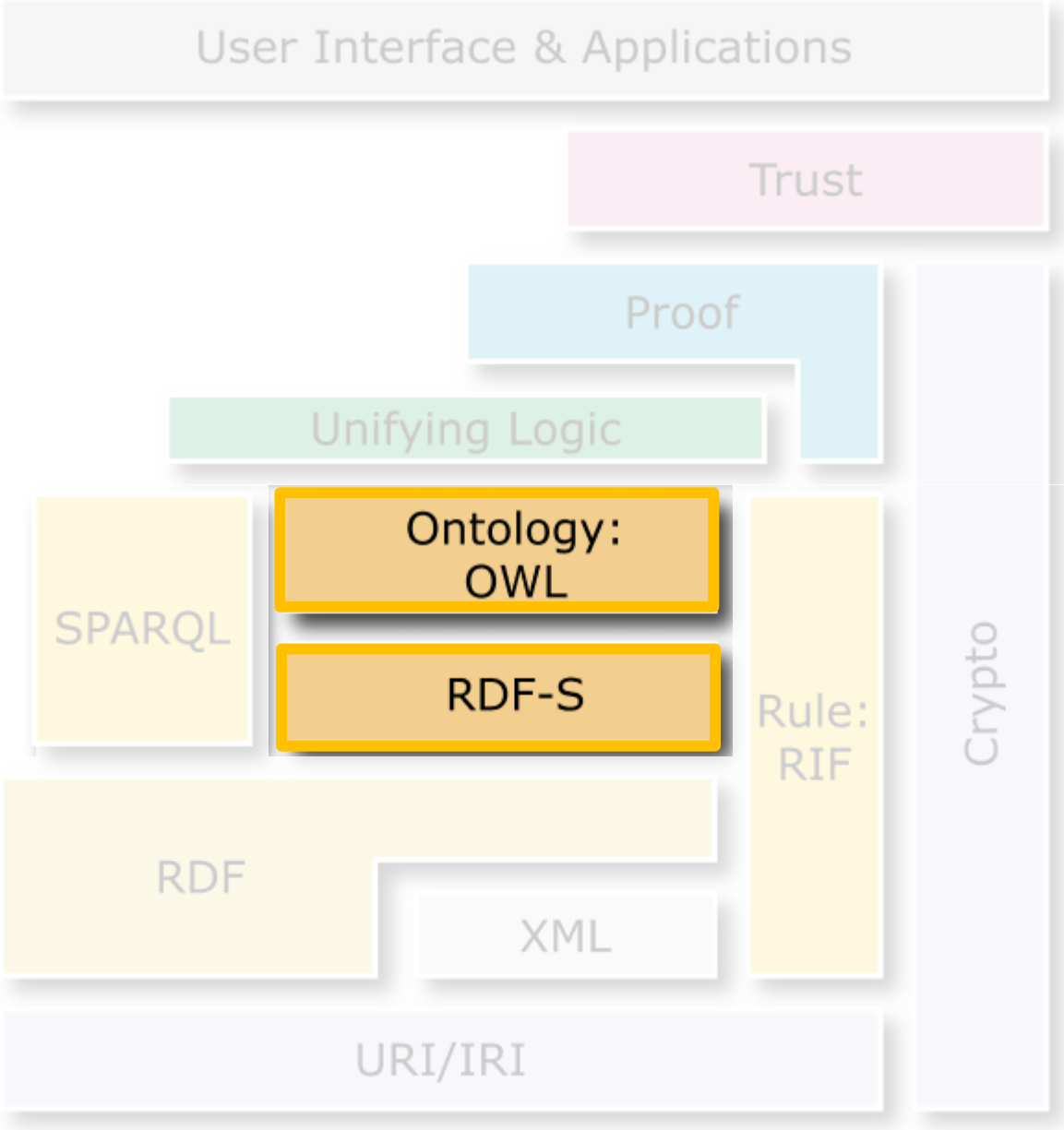
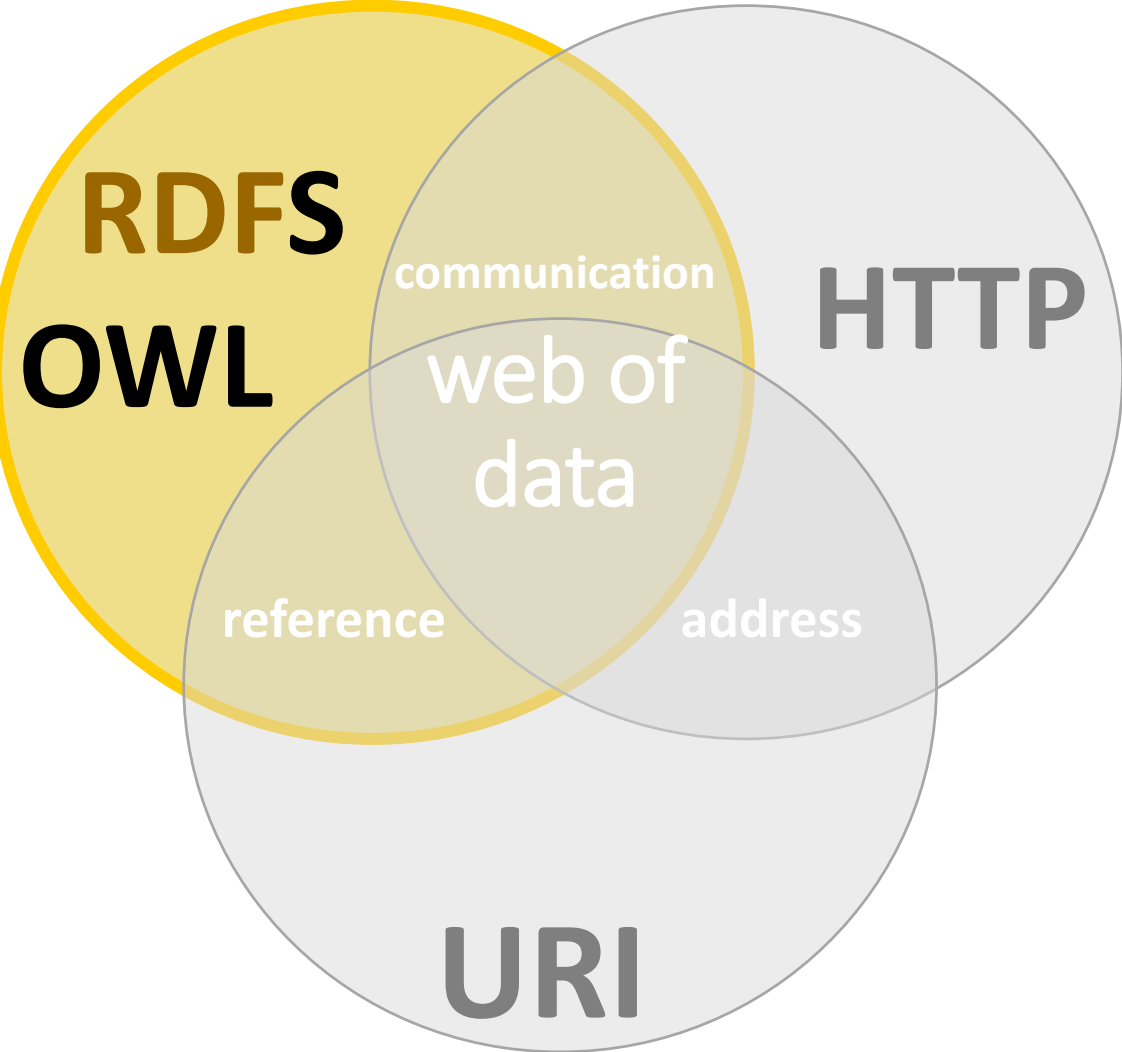
THE THESAURUS

ADDING SEMANTICS WITH VOCABULARIES

infer, reason, with semantics

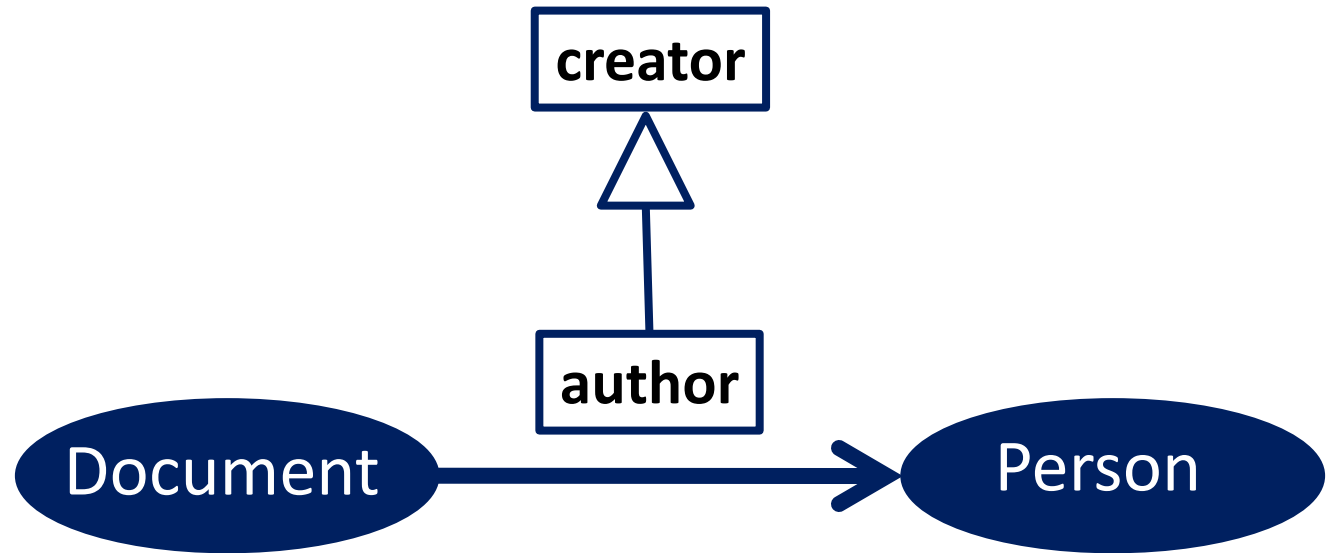
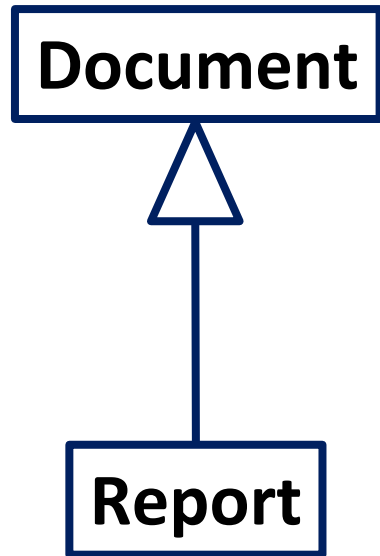


Web ontology languages



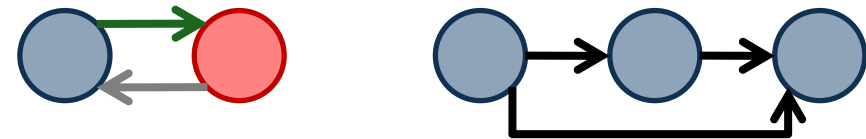
RDFS

to declare classes of resources, properties, and organize their hierarchy



OWL in one...

 algebraic properties



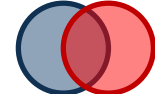
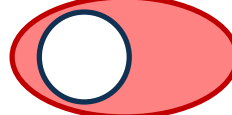
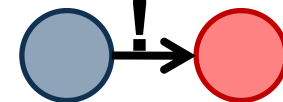
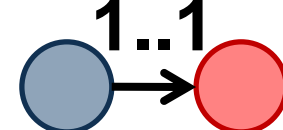


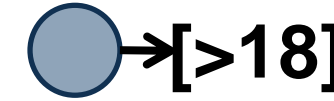

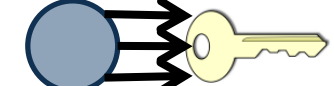


 disjoint properties

 qualified cardinality

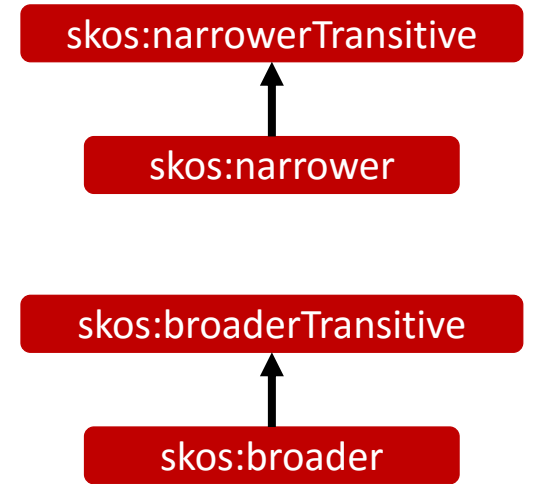
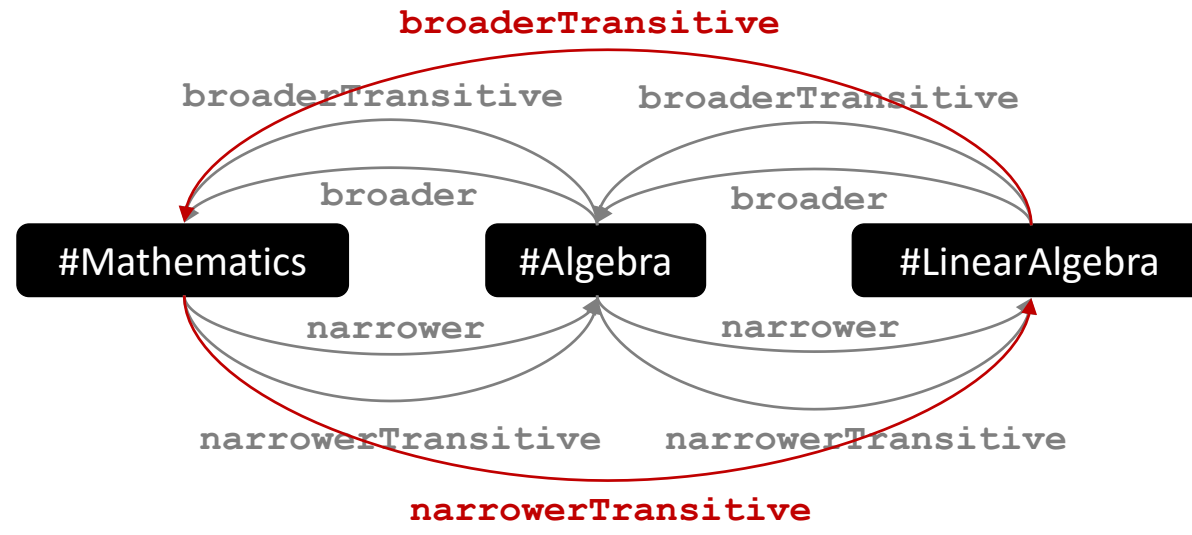
 individual prop. neg

 chained prop.

-  union
-  disjunction
-  intersection
-  complement
-  restriction
-  cardinality
-  equivalence
-  enumeration
-  value restriction
-  disjoint union
-  keys

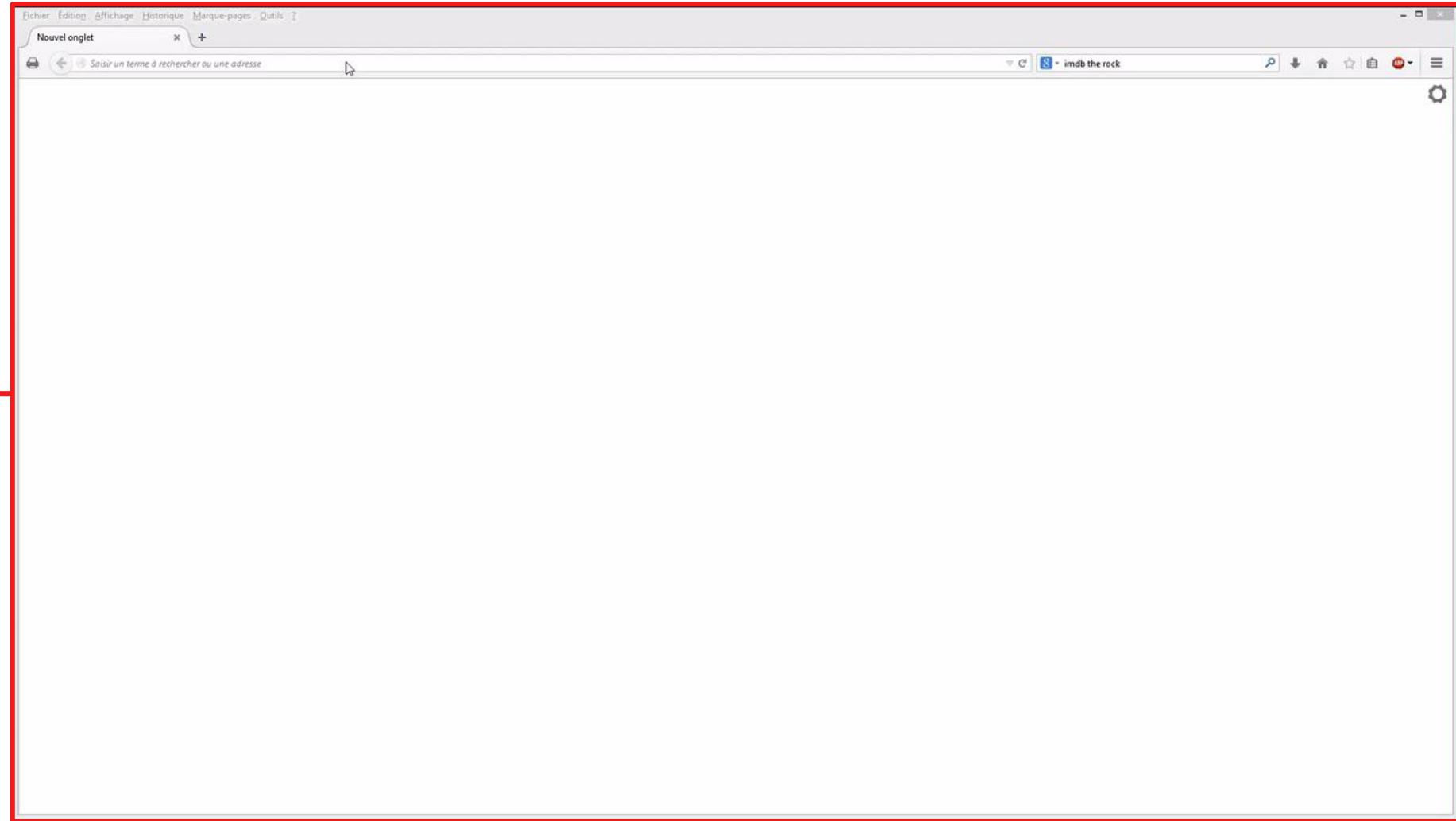
SKOS

thesaurus, lexicon



LOV.OKFN.ORG

Web directory of
vocabularies/schemas/
ontologies

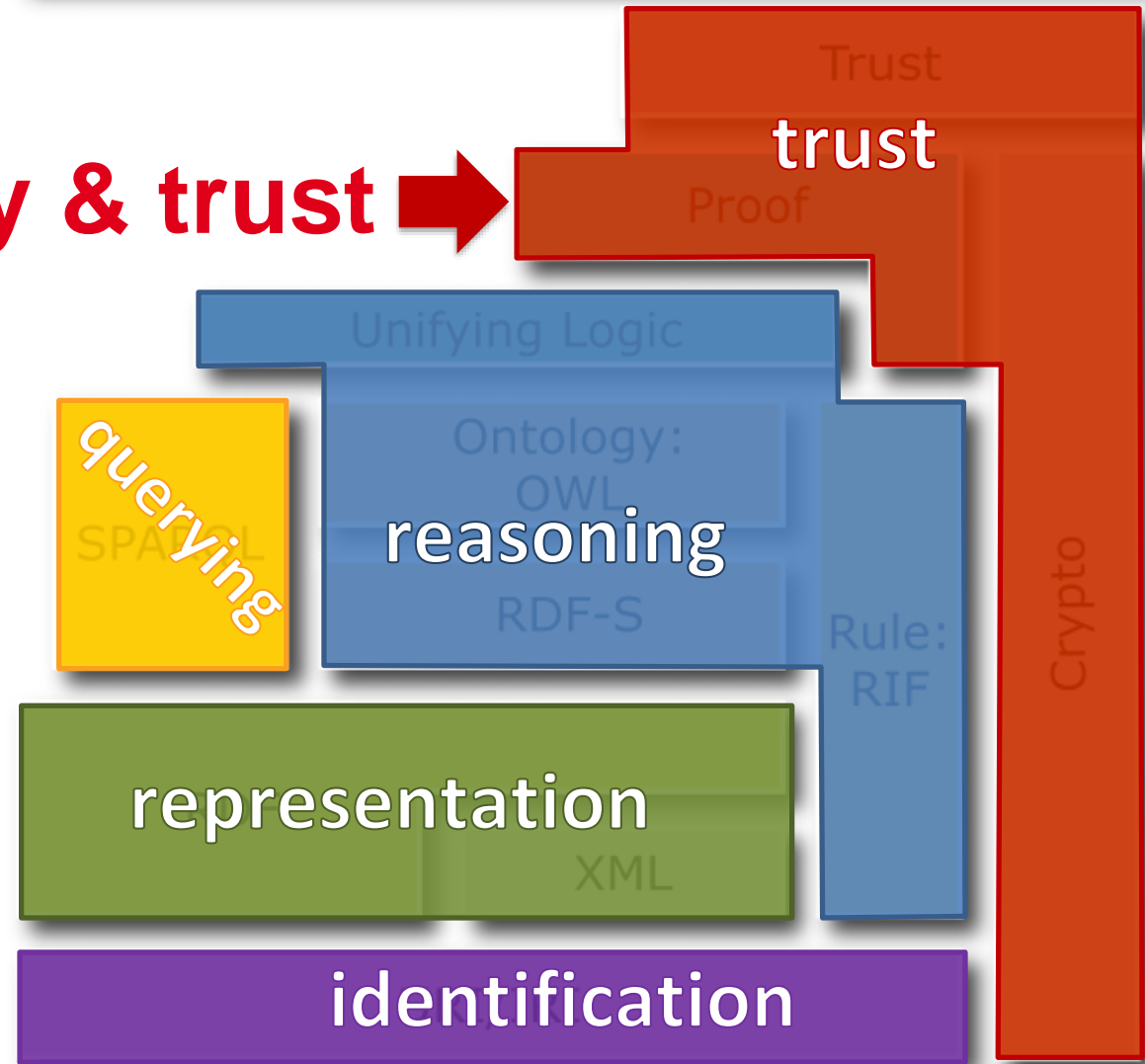


RESEARCH QUESTIONS

- Expressivity, complexity, decidability, completeness
- Schemas validation, verification
- Intelligent processing : classical, reasoning, deontic reasoning, induction, machine learning, data mining
- Hybrid approaches (e.g. reasoning and ML)
- Open world assumption (OWA)
- Scaling, approximating and distributing reasoning
- Heterogeneity
- Alignment of resources and vocabularies
- Uncertainty, data quality, data and processing traceability
- Extraction, learning, mining, etc. of data and vocabularies

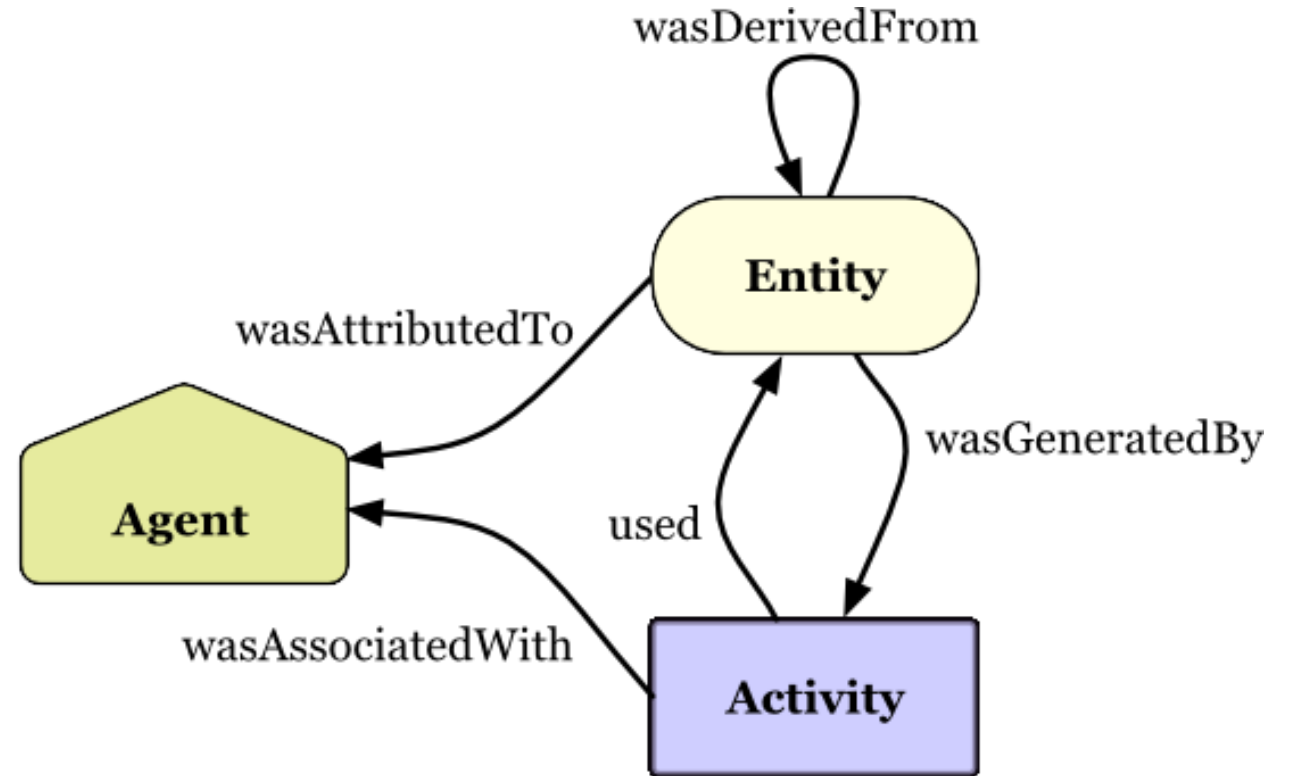
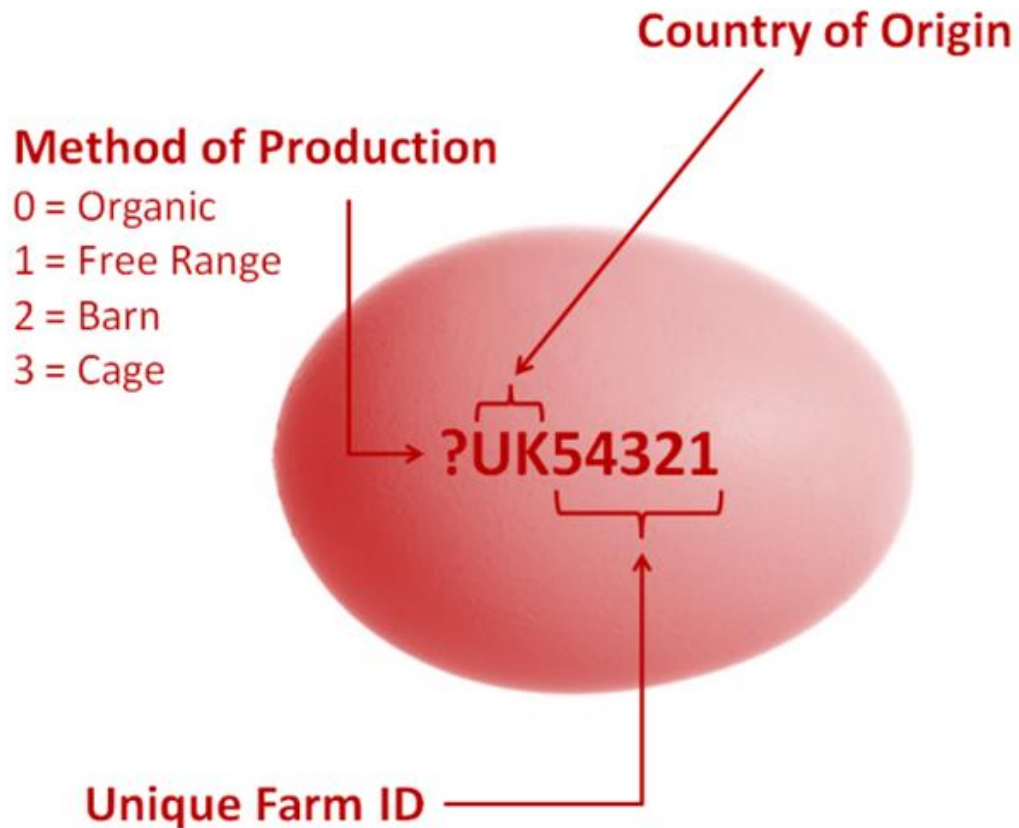


data traceability & trust

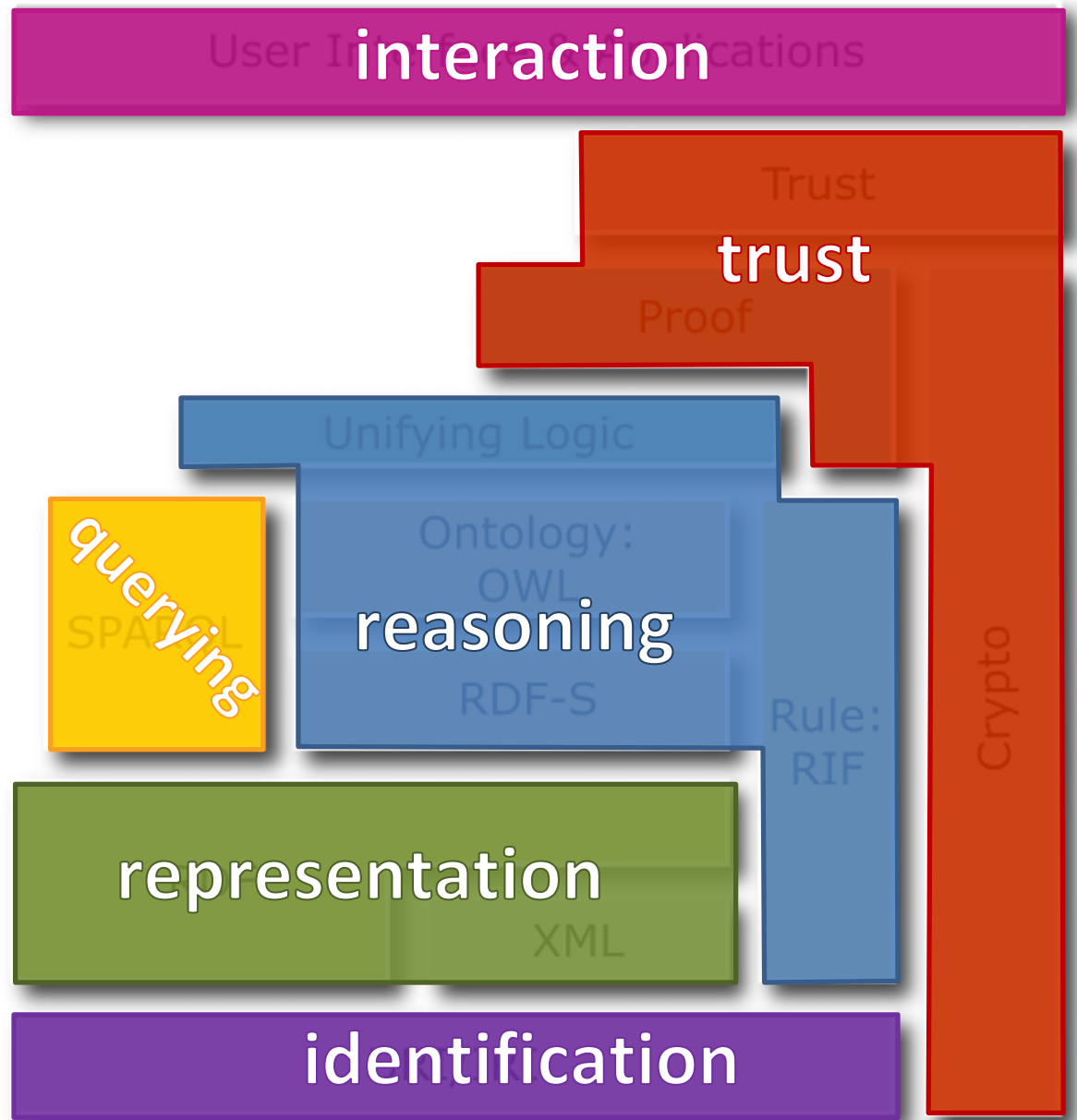


PROV-O: vocabulary for provenance and traceability

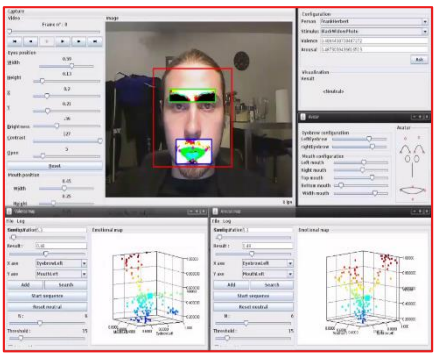
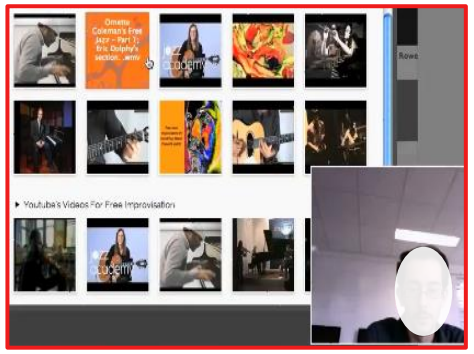
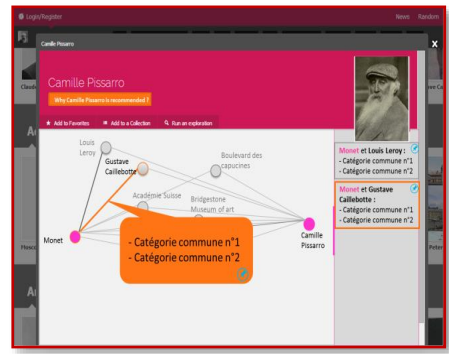
describe entities and activities involved in providing a resource



RESEARCH CHALLENGES



1

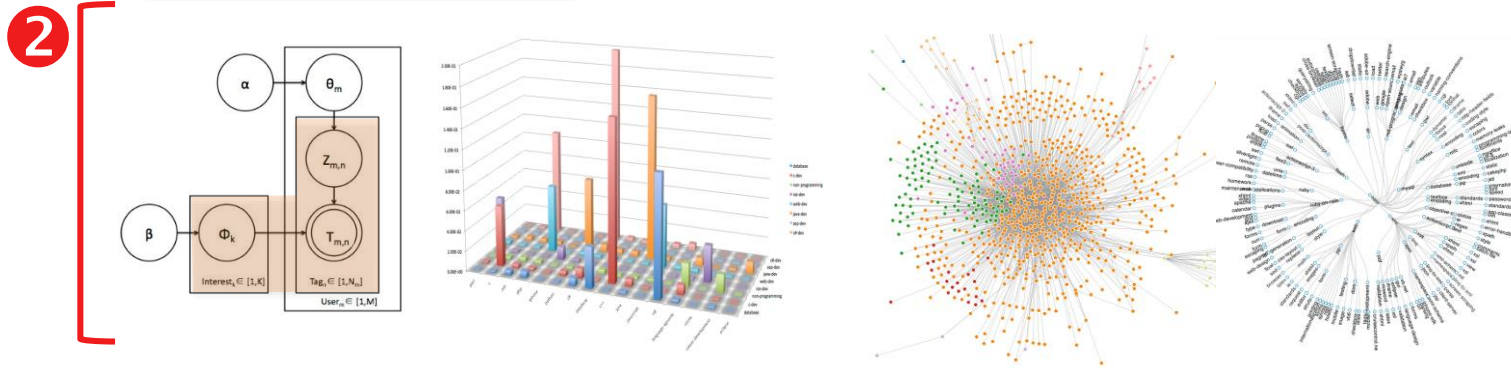
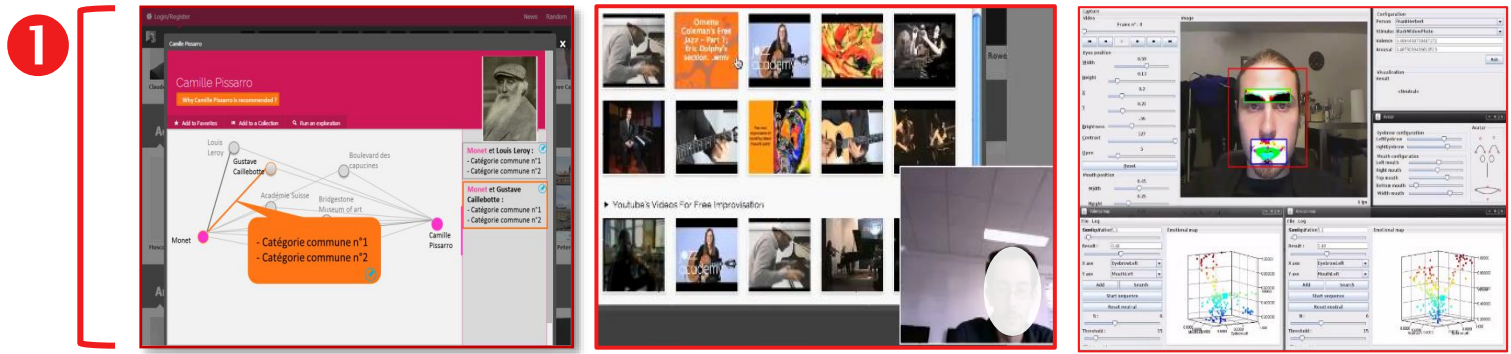


METHODS AND TOOLS

1. user & interaction design

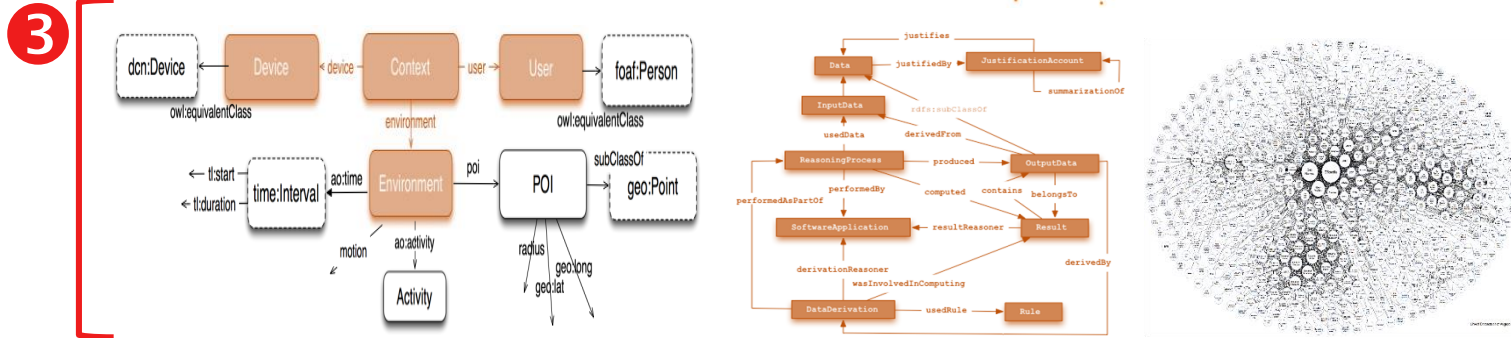
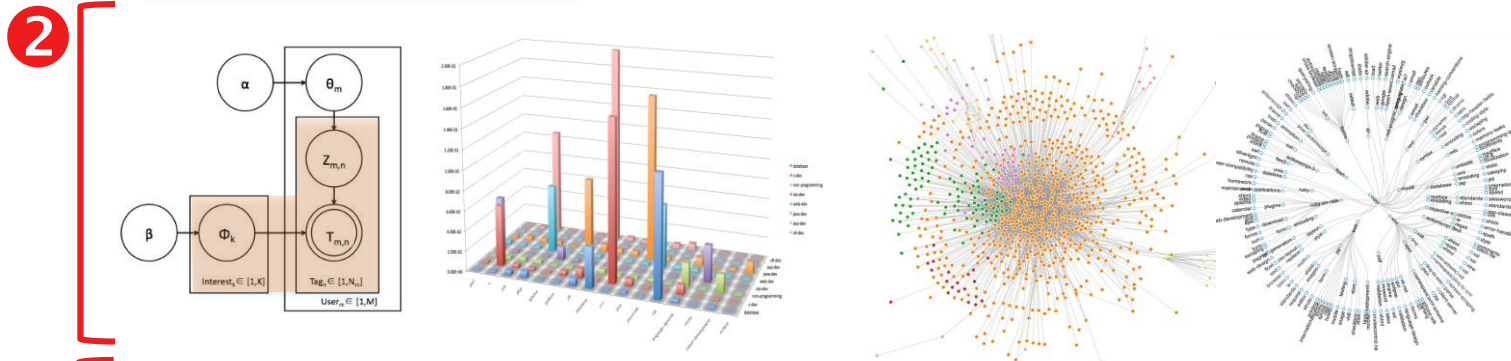
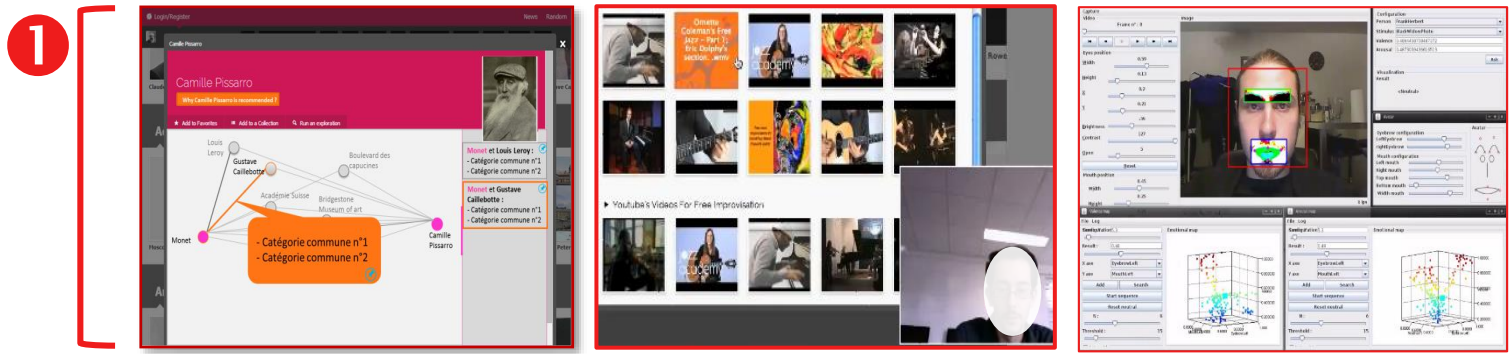
METHODS AND TOOLS

1. user & interaction design
2. communities & social medias



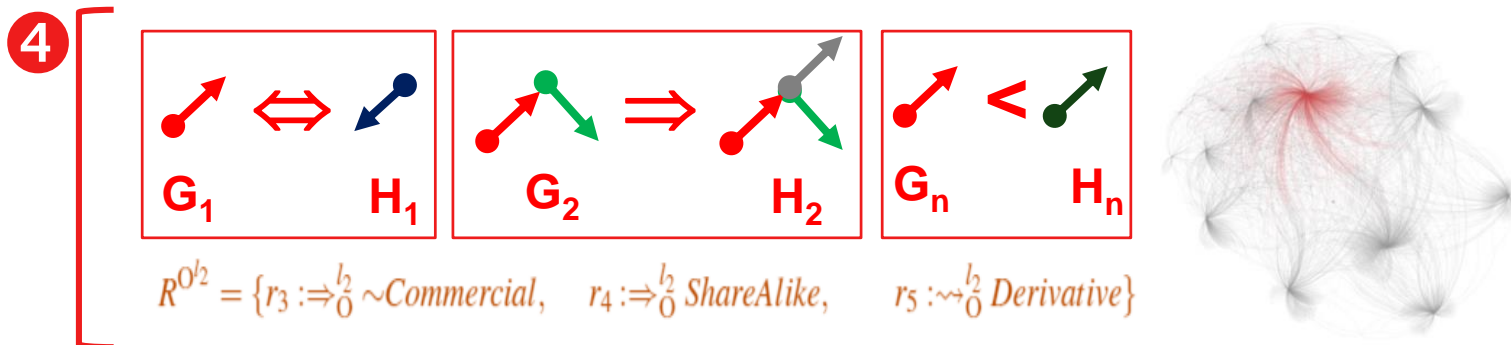
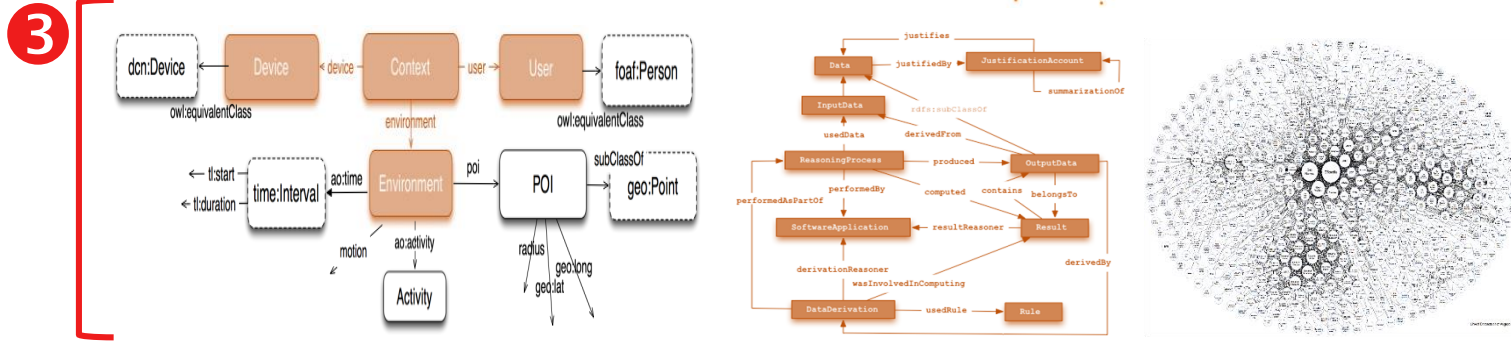
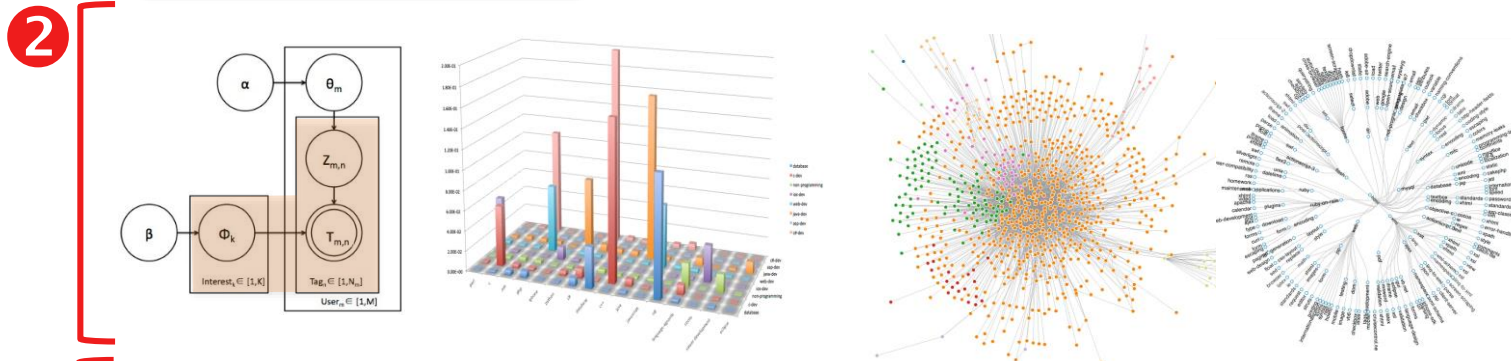
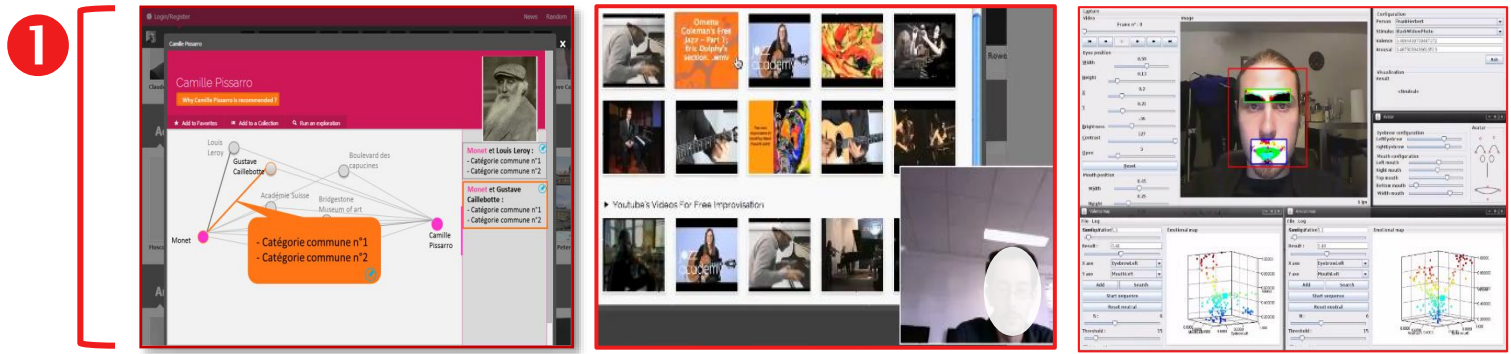
METHODS AND TOOLS

1. user & interaction design
2. communities & social medias
3. linked data & semantic Web



METHODS AND TOOLS

1. user & interaction design
2. communities & social medias
3. linked data & semantic Web
4. reasoning & analyzing



RESEARCH CHALLENGES

1. user & interaction design
2. communities & social networks
3. linked data & semantic Web
4. reasoning & analyzing

① How do we improve our interactions with a semantic and social Web ?

- capture and model the users' characteristics?
- represent and reason with the users' profiles?
- adapt the system behaviors as a result?
- design new interaction means?
- evaluate the quality of the interaction designed?

RESEARCH CHALLENGES

1. user & interaction design
2. communities & social networks
3. linked data & semantic Web
4. reasoning & analyzing

② How can we manage the collective activity on social media?

- analyze the social interaction practices and the structures in which these practices take place?
- capture the social interactions and structures?
- formalize the models of these social constructs?
- analyze & reason on these models of social activity?

RESEARCH CHALLENGES

1. user & interaction design
2. communities & social networks
3. linked data & semantic Web
4. reasoning & analyzing

- ③ What are the needed schemas and extensions of the semantic Web formalisms for our models?
 - formalisms best suited for the models of the challenges 1 & 2 ?
 - limitations and extensions of existing formalisms?
 - missing schemas, ontologies, vocabularies?
 - links and combinations of existing formalisms?

RESEARCH CHALLENGES

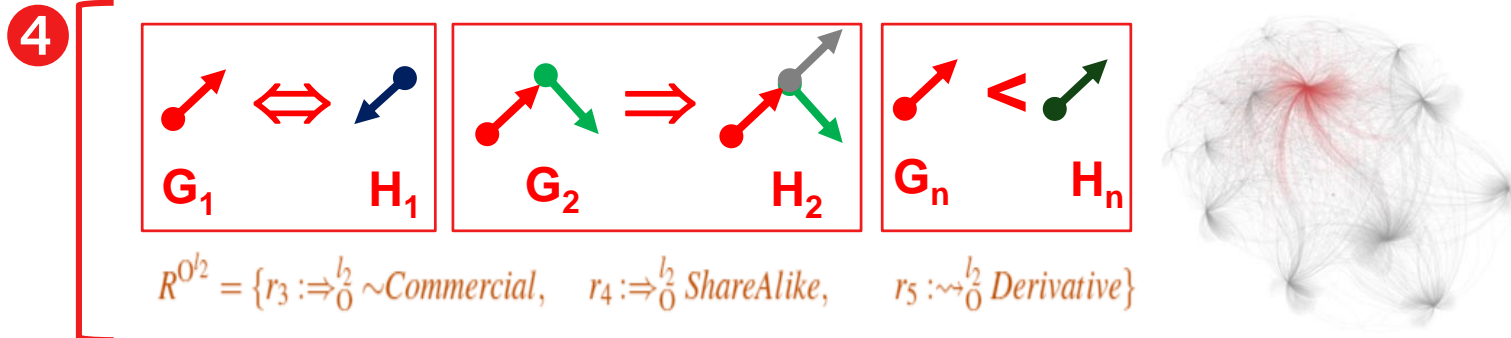
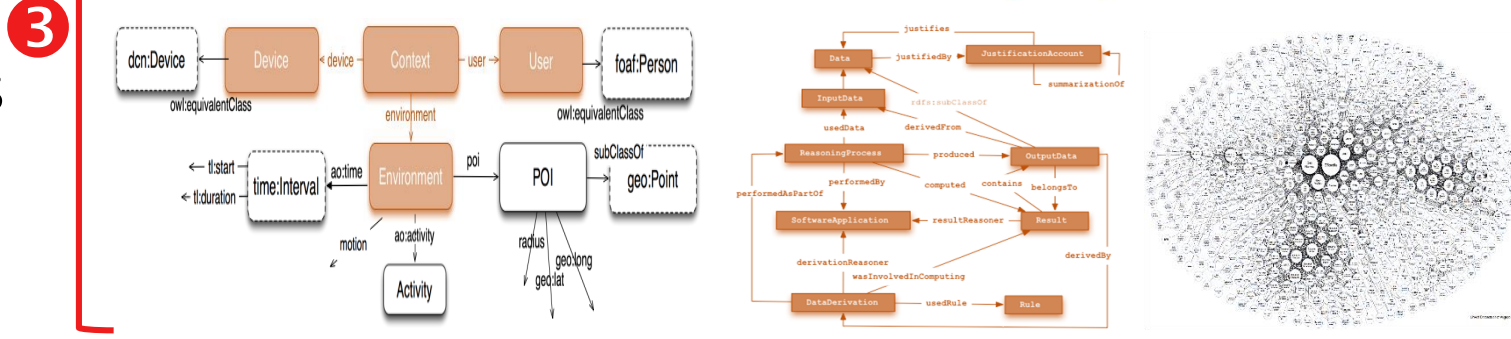
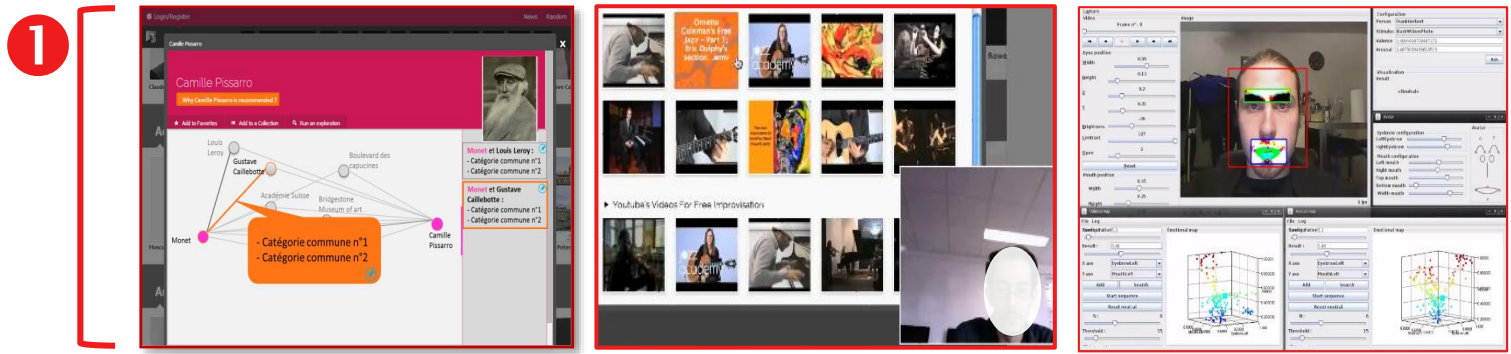
1. user & interaction design
2. communities & social networks
3. linked data & semantic Web
4. reasoning & analyzing

④ What are the algorithms required to analyze and reason on the heterogeneous graphs we obtained?

- analyze graphs of different types and their interactions?
- support different graph life-cycles, calculations and characteristics?
- assist different tasks of our users?
- design the Web architecture to deploy this?

METHODS AND TOOLS

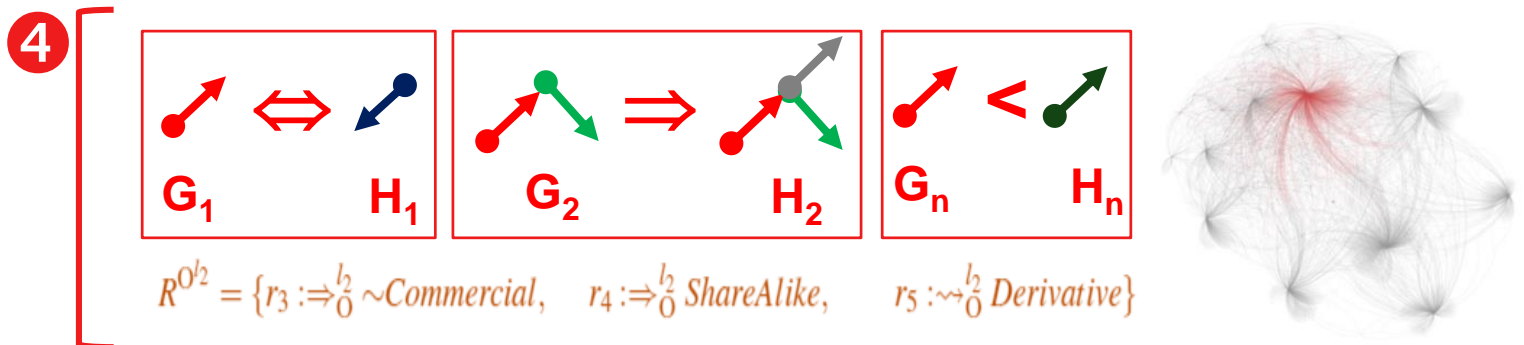
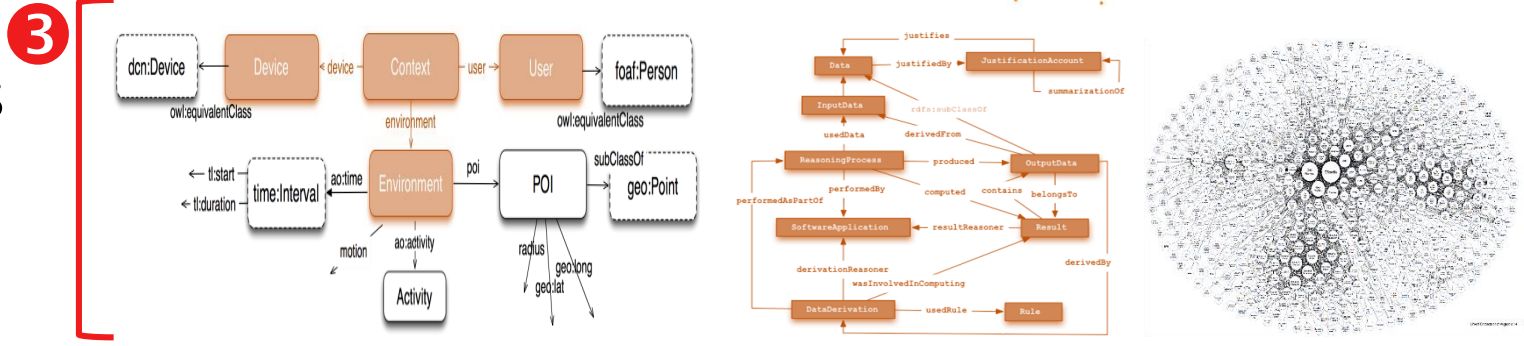
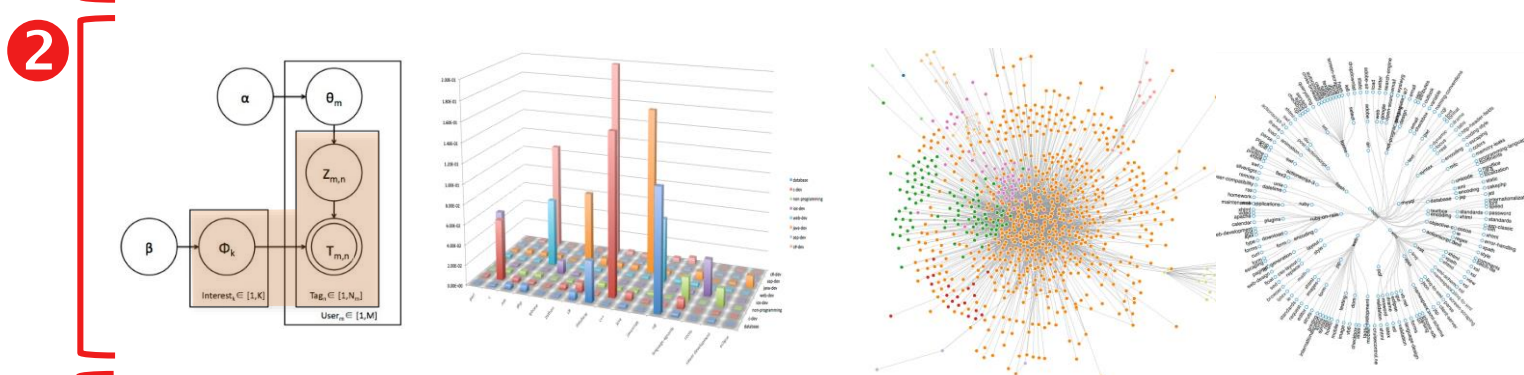
1. user & interaction design
2. communities & social networks
3. linked data & semantic Web
4. reasoning & analyzing



METHODS AND TOOLS

1. user & interaction design
2. communities & social networks
3. linked data & semantic Web
4. reasoning & analyzing

- 1
 - **KB interaction** (context, Q&A, exploration, ...)
 - user models, personas, emotion capture
 - mockups, evaluation campaigns



METHODS AND TOOLS

1. user & interaction design

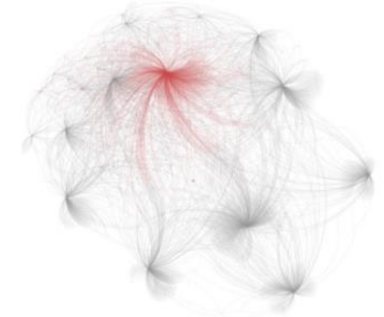
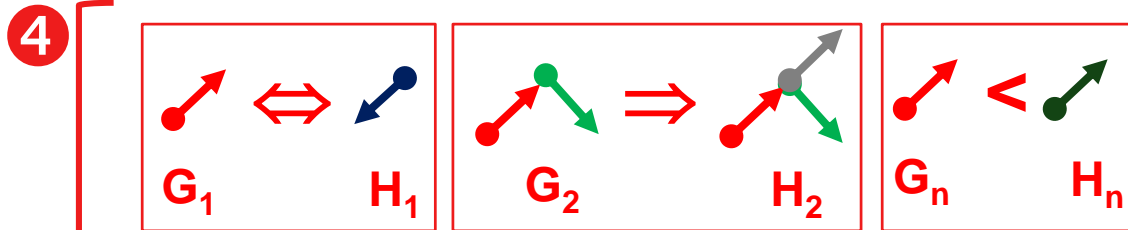
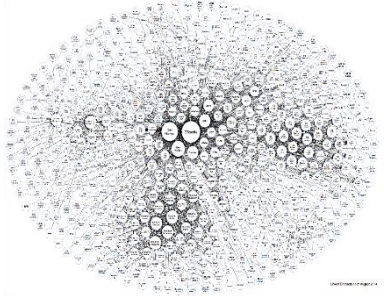
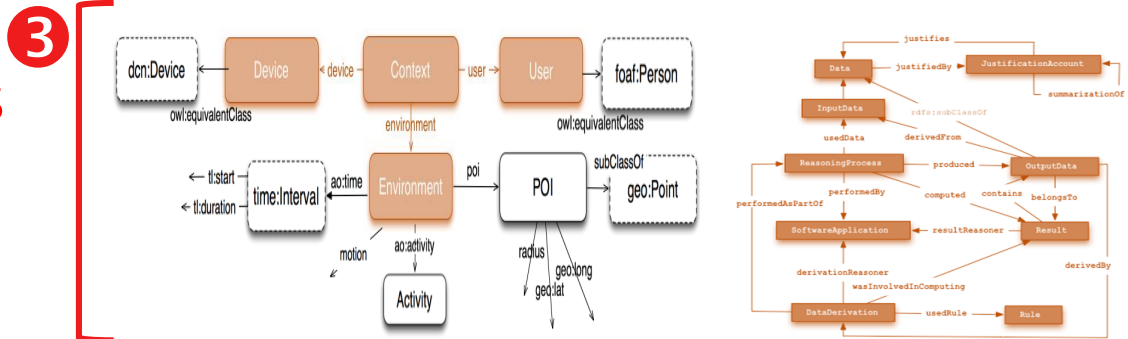
2. communities & social networks

3. linked data & semantic Web

4. reasoning & analyzing

- 1 • KB interaction (context, Q&A, exploration, ...)
- user models, personas, emotion capture
- mockups, evaluation campaigns

- 2 • **community detection, labelling**
- collective personas, coordinative artifacts
- argumentation theory, sentiment analysis



$$R^{O^2} = \{r_3 := \Rightarrow_0^{\perp} \sim \text{Commercial}, \quad r_4 := \Rightarrow_0^{\perp} \text{ShareAlike}, \quad r_5 := \rightsquigarrow_0^{\perp} \text{Derivative}\}$$

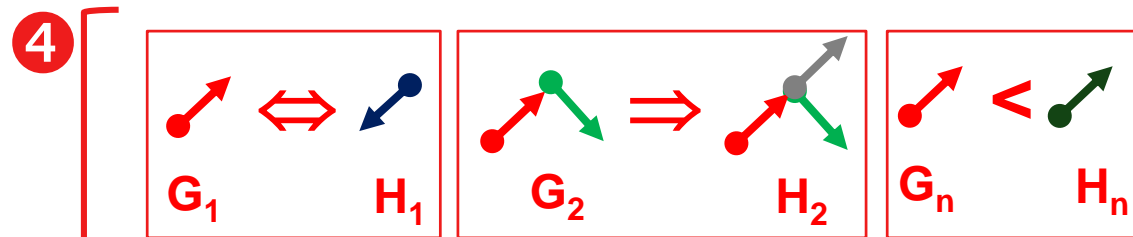
METHODS AND TOOLS

1. user & interaction design
2. communities & social networks
3. linked data & semantic Web
4. reasoning & analyzing

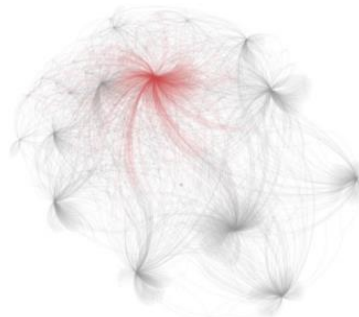
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 - user models, personas, emotion capture
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- 2
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 - collective personas, coordinative artifacts
 - argumentation theory, sentiment analysis

- 3
 - **ontology-based knowledge representation**
 - formalisms: typed graphs, uncertainty
 - knowledge extraction, data translation



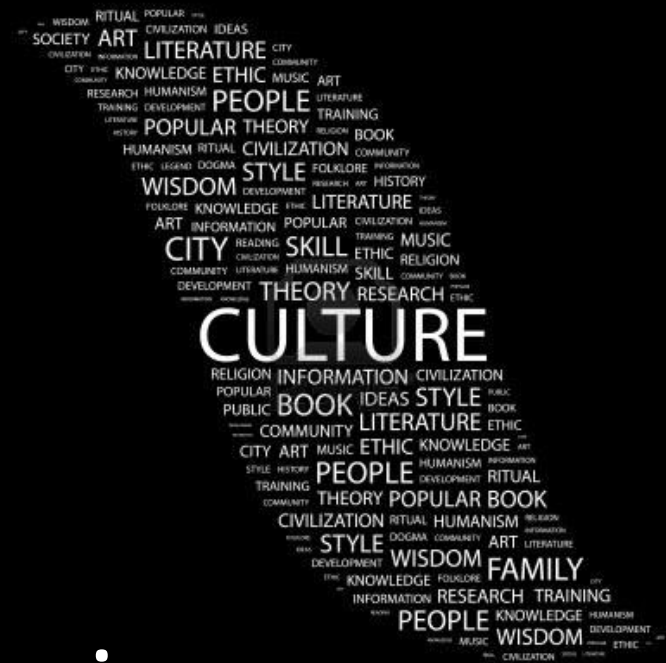
$$R^{O^2} = \{r_3 := \Rightarrow_0^l \sim \text{Commercial}, \quad r_4 := \Rightarrow_0^l \text{ShareAlike}, \quad r_5 := \rightsquigarrow_0^l \text{Derivative}\}$$



METHODS AND TOOLS

1. user & interaction design
2. communities & social networks
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4. reasoning & analyzing

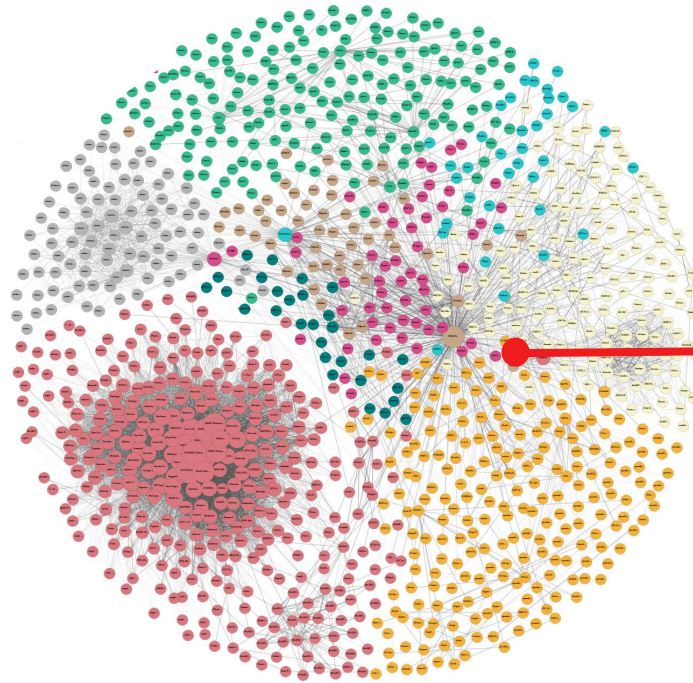
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 - user models, personas, emotion capture
 - mockups, evaluation campaigns
- 2
 - community detection, labelling
 - collective personas, coordinative artifacts
 - argumentation theory, sentiment analysis
- 3
 - ontology-based knowledge representation
 - formalisms: typed graphs, uncertainty
 - knowledge extraction, data translation
- 4
 - **graph querying, reasoning, transforming**
 - induction, propagation, approximation
 - explanation, tracing, control, licensing, trust



e.g. cultural data is a weapon of mass construction

PUBLISHING

- extract data (content, activity...)
- provide them as linked data



DBPEDIA.FR (extraction, end-point)

180 000 000 triples



Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

models

Web architecture



WIKIMEDIA
FRANCE

[Cojan, Boyer et al.]

185 377 686 RDF triples extracted and mapped

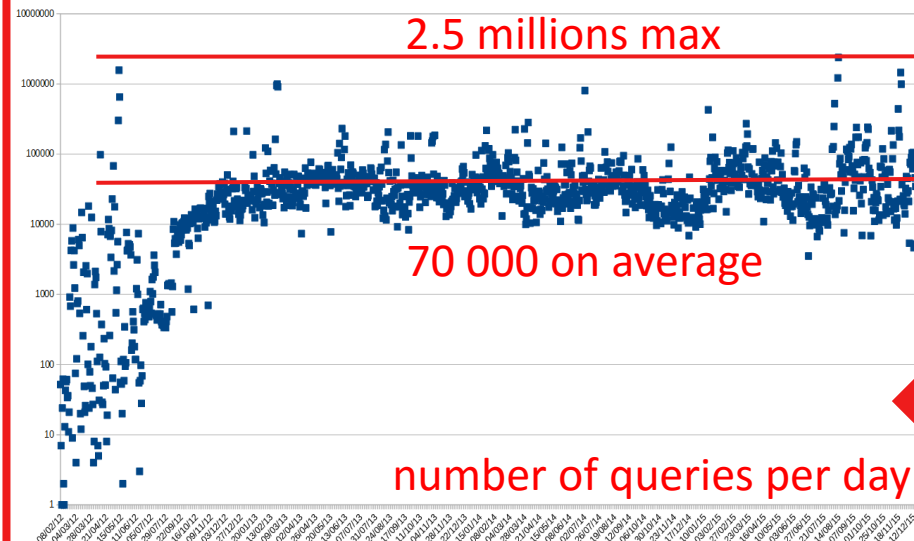
DBpedia.fr website showing the entry for Paris. The page includes a search bar, navigation tabs (CATEGORIES, TYPES, External Links, Same As), a main image of the Eiffel Tower, a map of Paris, and a detailed description of the city. The description mentions that Paris is the capital of France, located on the banks of the Seine, and is divided into 20 arrondissements.

| | |
|------------------------------|---|
| dbpedia-owl:bnfid | 152821567 (xsd:string) |
| dbpedia-owl:canton | dbpedia-fr:Chef-lieu |
| dbpedia-owl:country | dbpedia-fr:France |
| dbpedia-owl:department | dbpedia-fr:Préfecture |
| dbpedia-owl:flag | Marie De Paris.svg (xsd:string) |
| dbpedia-owl:flagCaption | Paris#Héraldique, logotype et devise (xsd:string) |
| dbpedia-owl:geolocDepartment | dbpedia-fr:Arrondissement_de_Paris |
| dbpedia-owl:geolocCountry | dbpedia-fr:France |
| dbpedia-owl:geolocRegion | dbpedia-fr:Île-de-France |
| dbpedia-owl:inseeCode | 75056 et de75101 à 75120 (xsd:string) |
| dbpedia-owl:iccnid | n/79/058874 (xsd:string) |
| dbpedia-owl:peopleName | Parisiens@fr |
| dbpedia-owl:politicalLeader | dbpedia-fr:Paris_1 |
| dbpedia-owl:populationTotal | 2240621 (xsd:nonNegativeInteger) |
| dbpedia-owl:postalCode | 75001 à 75020 et 75116 (xsd:string) |
| dbpedia-owl:region | dbpedia-fr:Île-de-France |
| dbpedia-owl:sudocid | 080467008 (xsd:string) |
| dbpedia-owl:thumbnail | http://commons.wikimedia.org/wiki/Special:FilePath/Paris_-_Effetturn_und_Miarsteid2.jpg?width=300 |
| dbpedia-owl:thumbnailCaption | Latour Eiffel et les gratte-ciel de la Défense en arrière-plan. (xsd:string) |
| dbpedia-owl:viafid | 158822968 (xsd:string) |

public dumps, endpoints, interfaces, APIs...

PUBLISHING

DBpedia.fr usage



Flint SPARQL Editor 1.0.3 interface showing a query. The query is:

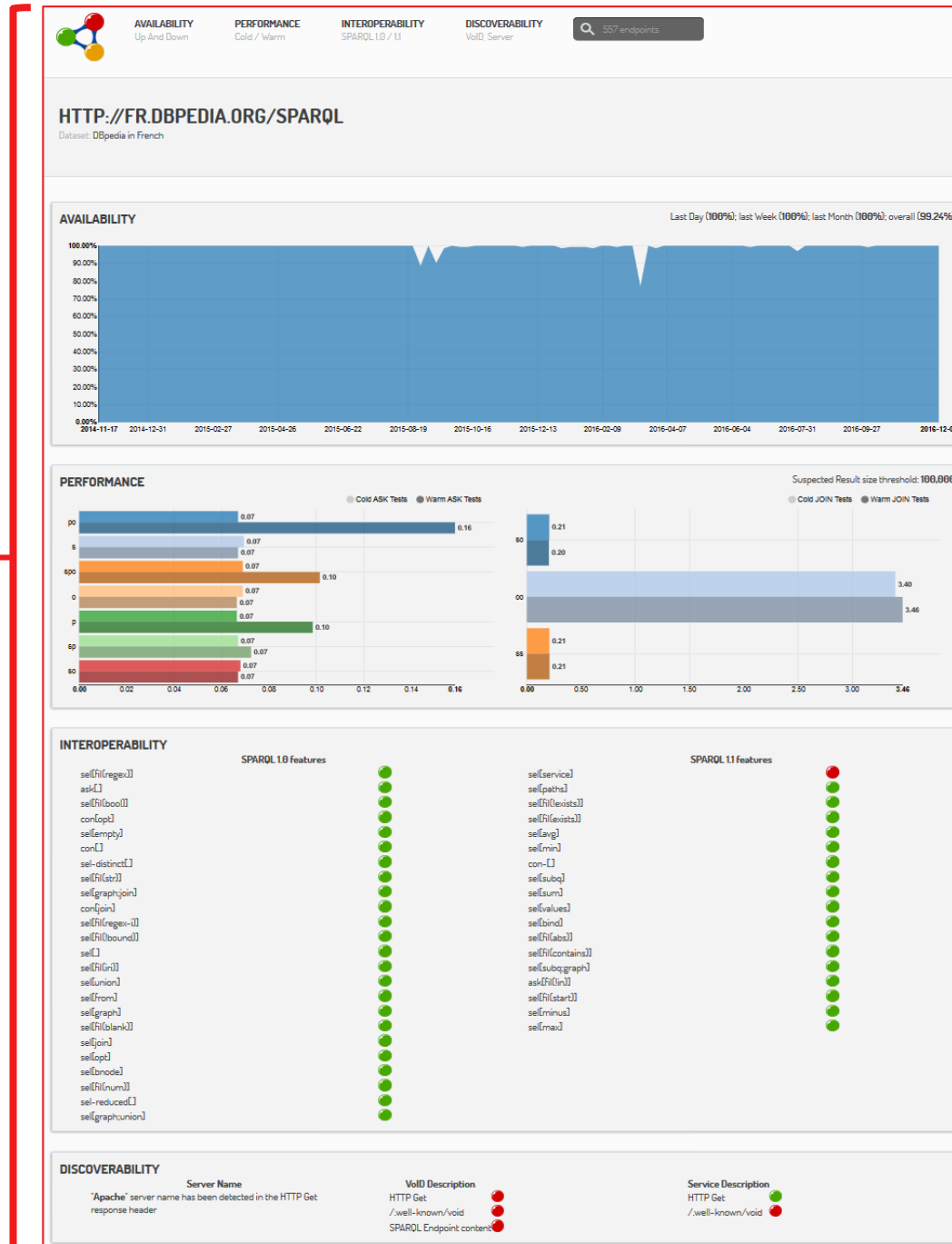
```

1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3
4 SELECT * WHERE {
5   ?s ?p ?o
6 }
7 LIMIT 10

```

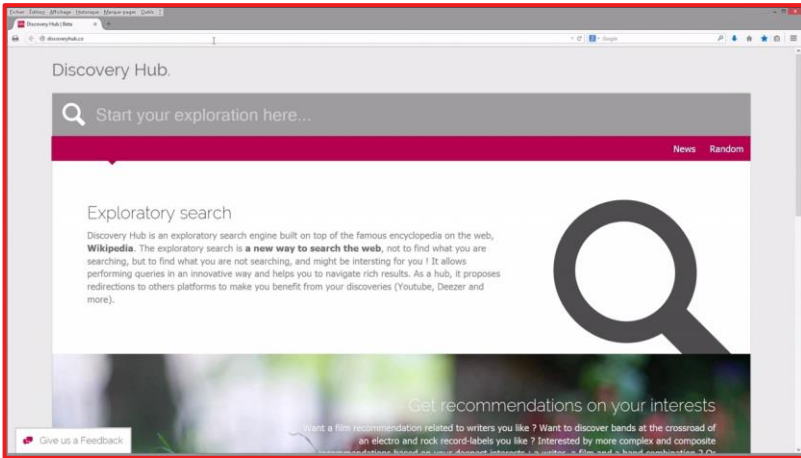
PUBLISHING

DBpedia.fr active since 2012

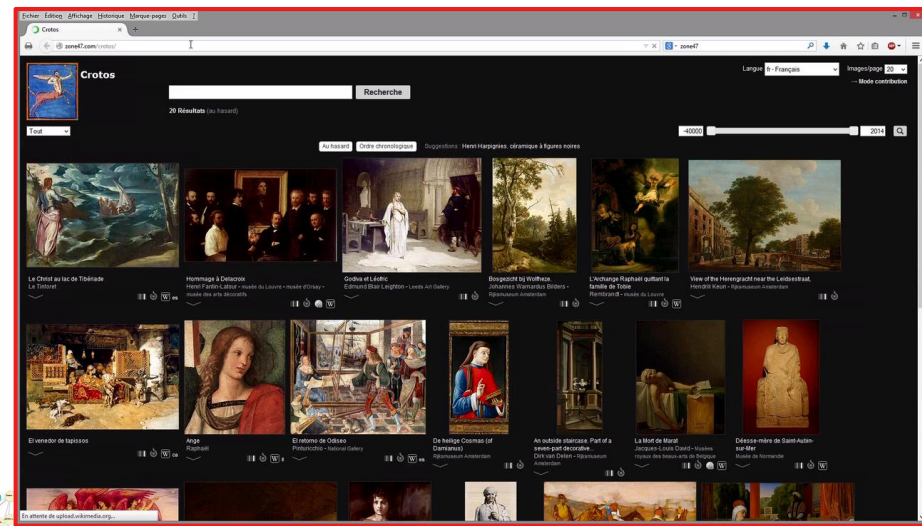


REUSE

- build and help build applications

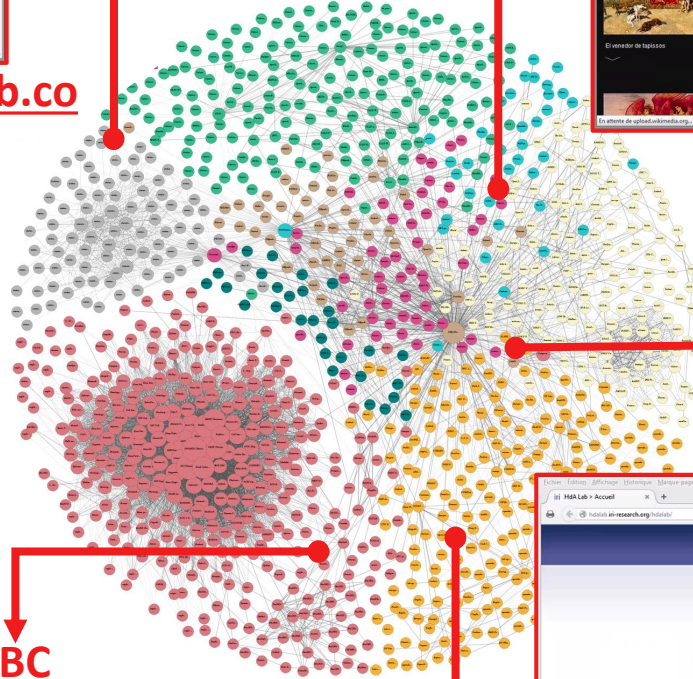


DiscoveryHub.co



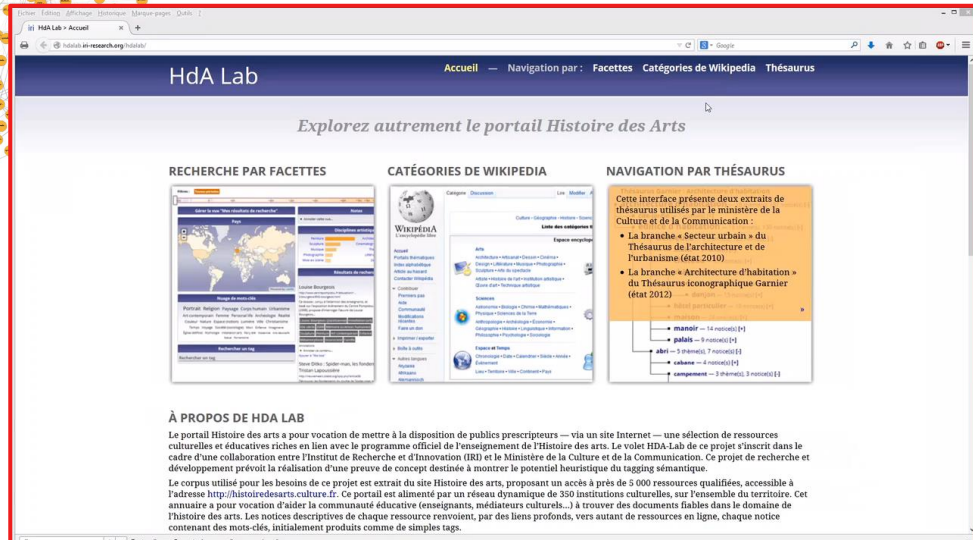
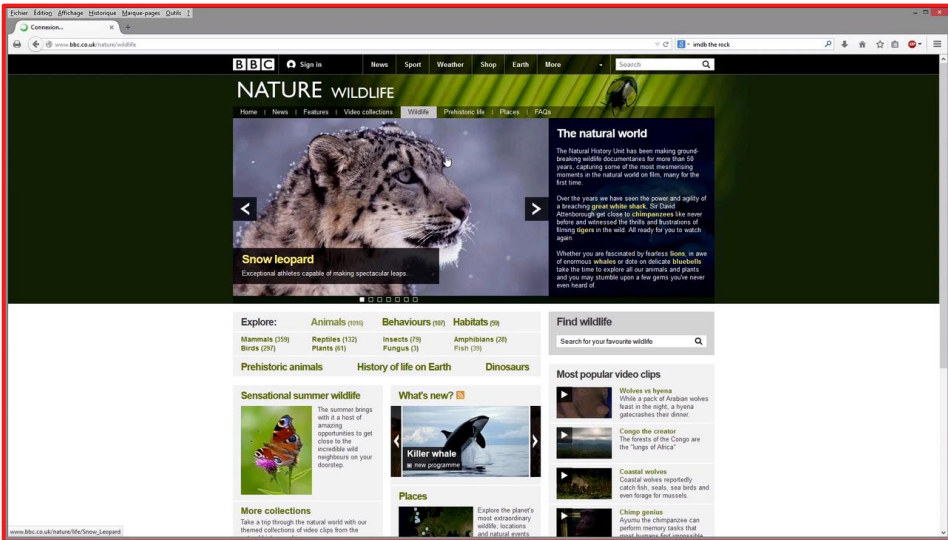
Zone 47

DBPEDIA.FR (extraction, end-point)
180 000 000 triples



BBC

HdA Lab



**TIMES OF DATA &
DATA OF TIMES**





WIKIPEDIA
The Free Encyclopedia

Article [Talk](#)

[Read](#) [Edit](#) [View history](#)

Iraq War

From Wikipedia, the free encyclopedia

This article is about the war in 2003–11. For other uses, see [Iraq War \(disambiguation\)](#).



This article **may be too long to read and navigate comfortably**. Please consider [splitting](#) content into multiple pages and [condensing](#) it. (December 2013)

The **Iraq War**^[nb 1] was an armed conflict in Iraq that consisted of two phases. The first was an invasion of Iraq starting on 20 March 2003 by an invasion force led by the [United States](#).^{[42][43][44][45]} It was followed by a longer phase of fighting, in which an insurgency emerged to oppose the [occupying forces](#) and the newly formed Iraqi government.^[46] The US completed its withdrawal of military personnel in December 2011.^{[47][48]} However, the [insurgency is ongoing](#) and continues to cause thousands of fatalities.

Prior to the war, the governments of the United States and the [United Kingdom](#) claimed that Iraq's alleged possession of [weapons of mass destruction](#) (WMD) posed a threat to their security and that of their coalition/regional allies.^{[49][50][51]} In 2002, the [United Nations Security Council](#) passed [Resolution 1441](#) which called for Iraq to completely cooperate with UN weapon inspectors to verify that Iraq was not in possession of WMD and [cruise missiles](#). Prior to the attack, the [United Nations Monitoring, Verification and Inspection Commission](#) (UNMOVIC) found no evidence of WMD, but could not yet verify the accuracy of Iraq's declarations regarding what weapons it possessed, as their work was still unfinished. The leader of the inspectors, [Hans Blix](#), estimated the time remaining for disarmament being verified through inspections to be "months".^{[nb 2][52][53][54][55]}

After investigation following the invasion, the US-led [Iraq Survey Group](#)^[56] concluded that Iraq had ended its nuclear, chemical and biological programs in 1991 and had no active programs at the time of the invasion, but that they intended to resume production if the [Iraq sanctions](#) were lifted.^[56] Only degraded remnants of misplaced and abandoned chemical weapons were found.^[57] Paul R. Pillar, the CIA official who coordinated US

intelligence on the Middle East from 2000 to 2011, said "I reviewed intelligence assessments had said the same things as the [Duelfer report](#)... I would have lost a few member's votes in Congress, but otherwise the sales campaign—which was much more about Saddam's intention to use weapons of mass destruction—was unchanged. The administration still would have gotten its war." Even Dick Cheney later cited the actual Duelfer report as support for the administration's position.^[58] Osama bin Laden, the former director of central



James Bridle's twelve-volume encyclopedia of all changes to the Wikipedia article on the Iraq War

EXTRACTED

entire edition history as
linked open data

[Gandon, Boyer, Corby, Monnin 2016]

```
<http://fr.wikipedia.org/wiki/Victor_Hugo> a prov:Revision ;
dc:subject <http://fr.dbpedia.org/resource/Victor_Hugo> ;
swp:isVersion "3496"^^xsd:integer ;
dc:created "2002-06-06T08:48:32"^^xsd:dateTime ;
dc:modified "2015-10-15T14:17:02"^^xsd:dateTime ;
dbfr:uniqueContributorNb 1295 ;
(...)
dbfr:revPerYear [ dc:date "2015"^^xsd:gYear ; rdf:value
"79"^^xsd:integer ] ;
dbfr:revPerMonth [ dc:date "06/2002"^^xsd:gYearMonth ;
rdf:value "3"^^xsd:integer ] ;
(...)
dbfr:averageSizePerYear [ dc:date "2015"^^xsd:gYear ;
rdf:value "154110.18"^^xsd:float
] ;
dbfr:averageSizePerMonth [ dc:date
"06/2002"^^xsd:gYearMonth ;
rdf:value "2610.66"^^xsd:float ] ;
(...)
dbfr:size "159049"^^xsd:integer ;
dc:creator [ foaf:nick "Rinaldum" ] ;
sioc:note "wikification"^^xsd:string ;
prov:wasRevisionOf <http:// ... 119074391> ;
prov:wasAttributedTo [ foaf:name "Rémi" ; a prov:Person,
foaf:Person ] .

<http:// ... 119074391> a prov:Revision ;
dc:created "2015-09-29T19:35:34"^^xsd:dateTime ;
dbfr:size "159034"^^xsd:integer ;
dbfr:sizeNewDifference "-5"^^xsd:integer ;
sioc:note "/*Années théâtre*/ neutralisation"^^xsd:string ;
prov:wasAttributedTo [ foaf:name "Thouny" ; a prov:Person,
foaf:Person ] ;
prov:wasRevisionOf <http://... 118903583> .
(...)
<http:// ... oldid=118201419> a prov:Revision ;
prov:wasAttributedTo [ foaf:name "OrlodrimBot" ; a
prov:SoftwareAgent ] ;
(...)
```

The screenshot shows the 'Historique des versions' page for 'Paris' on Wikipedia. The page title is 'Paris : Historique des versions'. It includes a search bar, navigation links, and a list of revisions. A red arrow points from the text on the left to the entry for '5 octobre 2016 à 14:07' by 'GrandCelinien', which is marked as '(+36)'. The entry details include a diff icon, a clock icon, the date and time, the user name, and a link to the revision. The list also shows other revisions with their respective changes and sizes.

1.9 billion triples describing the 107 million revisions since the first page was created

DBpedia History 10/2015

10/2014 << 09/2015 << 10/2015 >> 11/2015 >> 10/2016

1

Angers (492)



Vallée des Aldudes (388)



Europe centrale (368)



Élections régionales
françaises de 2015 (295)



Chevet (277)



**Elections
in France**

DEMO






Facetted history portals

DEMO

Facetted history portals

DBpedia History 10/2015

10/2014 << 09/2015 << 10/2015 >> 11/2015 >> 10/2016





1 Angers (492)  Vallée des Aldudes (388)  Europe centrale (368)  Élections régionales françaises de 2015 (295)  Chevet (277) 

Note: A red arrow points to the 'Élections régionales françaises de 2015' entry.

Elections in France

DBpedia History 06/2015

06/2014 << 05/2015 << 06/2015 >> 07/2015 >> 06/2016

1 Christopher Lee (155)  Luis de León (105)  Henri Matisse (99)  Krystal Jung (96)  Patrick Macnee (92) http://fr.dbpedia.org/resource/Patrick_Macnee

Note: A red arrow points to the 'Christopher Lee' entry.

Death of C. Lee

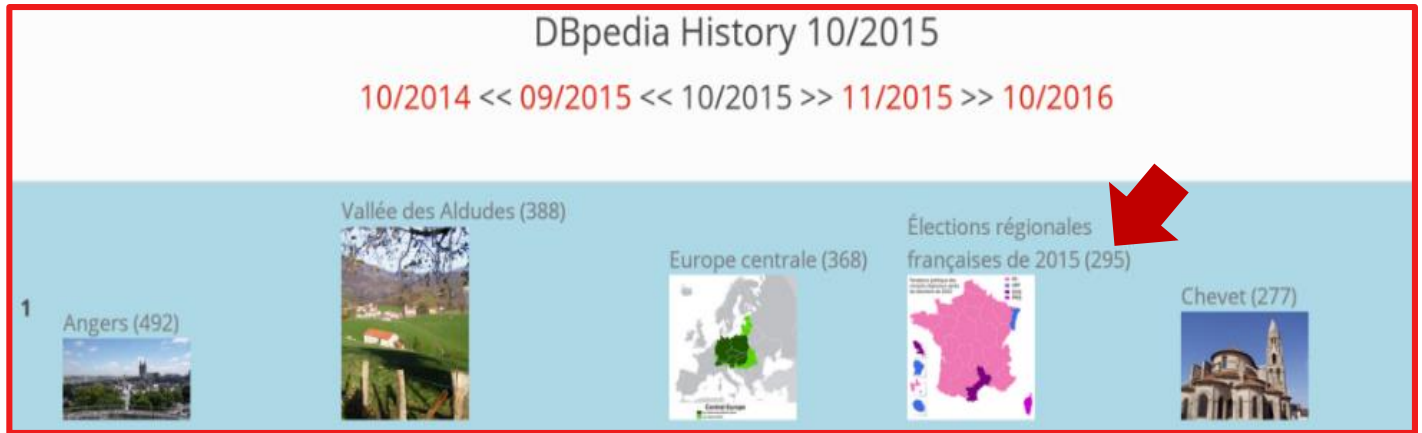
DEMO

Facetted history portals

DBpedia History 10/2015

10/2014 << 09/2015 << 10/2015 >> 11/2015 >> 10/2016

1 Angers (492) Vallée des Aldudes (388) Europe centrale (368) Élections régionales françaises de 2015 (295) Chevet (277)



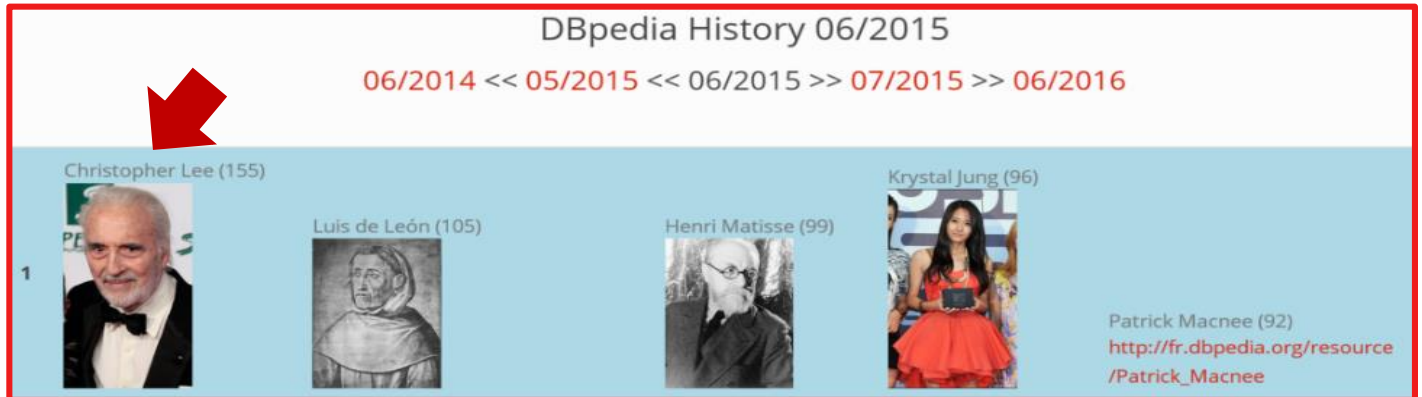
Elections in France

DBpedia History 06/2015

06/2014 << 05/2015 << 06/2015 >> 07/2015 >> 06/2016

1 Christopher Lee (155) Luis de León (105) Henri Matisse (99) Krystal Jung (96) Patrick Macnee (92)

http://fr.dbpedia.org/resource/Patrick_Macnee

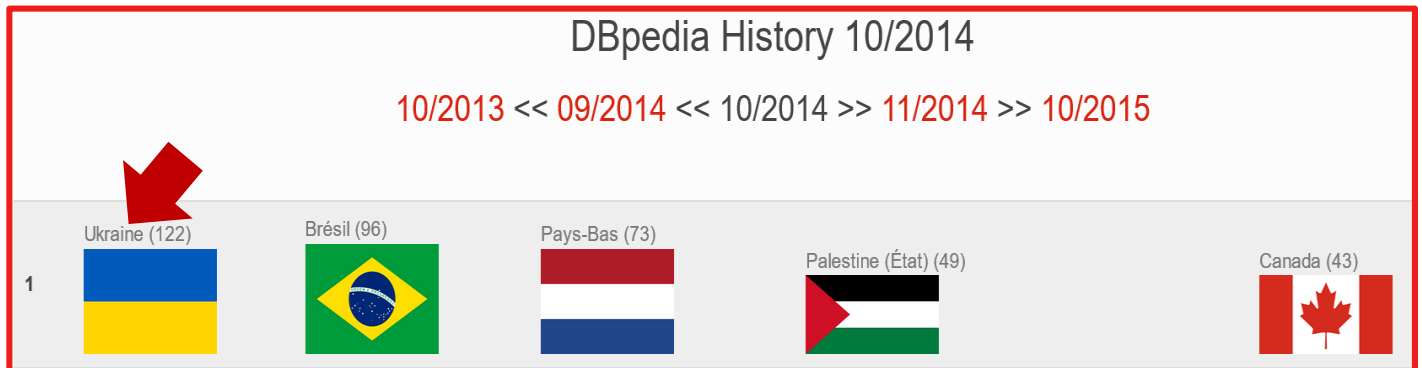


Death of C. Lee

DBpedia History 10/2014

10/2013 << 09/2014 << 10/2014 >> 11/2014 >> 10/2015

1 Ukraine (122) Brésil (96) Pays-Bas (73) Palestine (État) (49) Canada (43)



Events in Ukraine

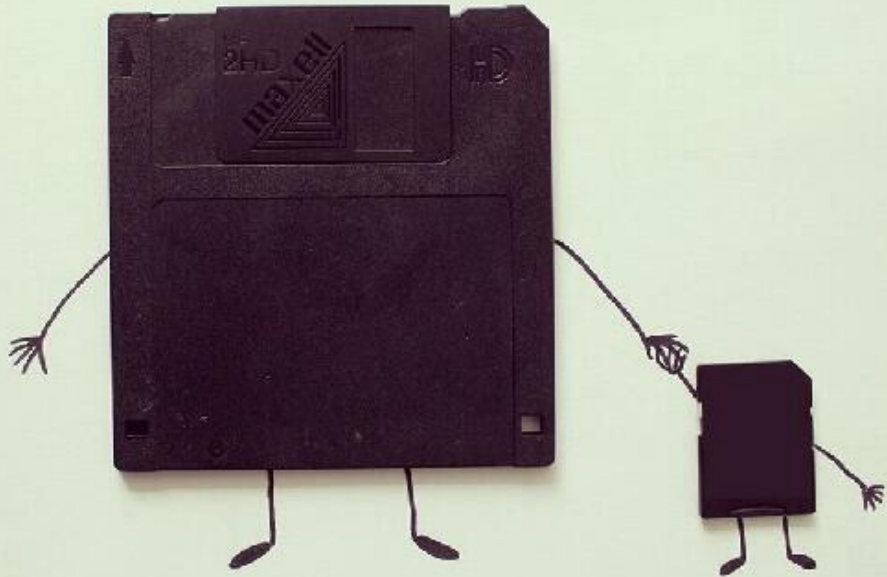
DBPEDIA & STTL

declarative transformation
language from RDF to text
formats (XML, JSON, HTML,
Latex, natural language, GML,
...)

[Cojan, Corby, Faron-Zucker et al.]

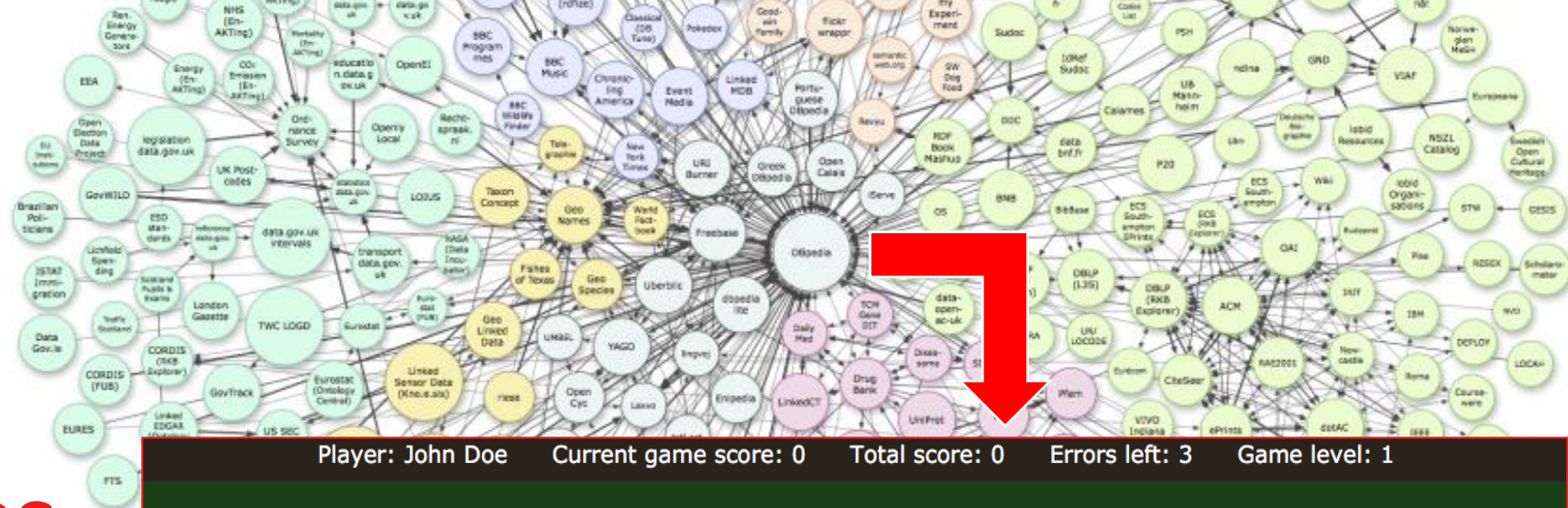


more data, more usages, more users



Build a world where your children
are stronger than you ever were.





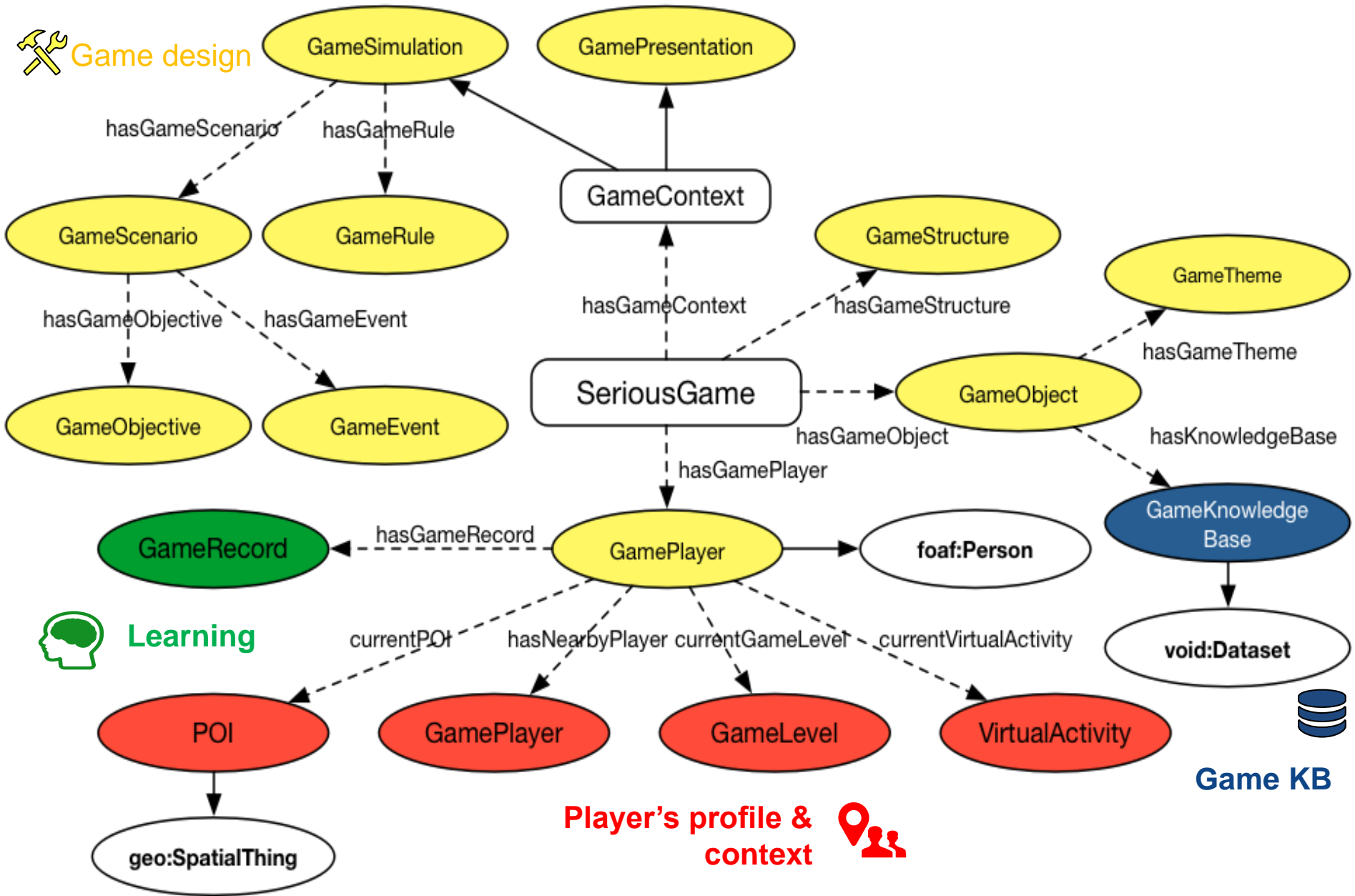
ADAPTING TO USERS

e.g. e-learning & serious games

[Rodriguez-Rocha, Faron-Zucker et al.]

| | | | | |
|-------|---|-----|-----|-----|
| Start | 100 | 300 | 100 | End |
| | 300 | | 300 | |
| 200 | <p>For 200 points: What is the capital of Austria? <input type="button" value="Mexico City"/> <input type="button" value="Vienna"/> <input type="button" value="Dublin"/> <input type="button" value="Hillsborough"/></p> | | | 300 |
| 200 | | | | 100 |
| 200 | | | | 50 |
| 50 | | 200 | | |
| 50 | 300 | 300 | | |

 Game design



 Learning

Player's profile & context 

Game KB 

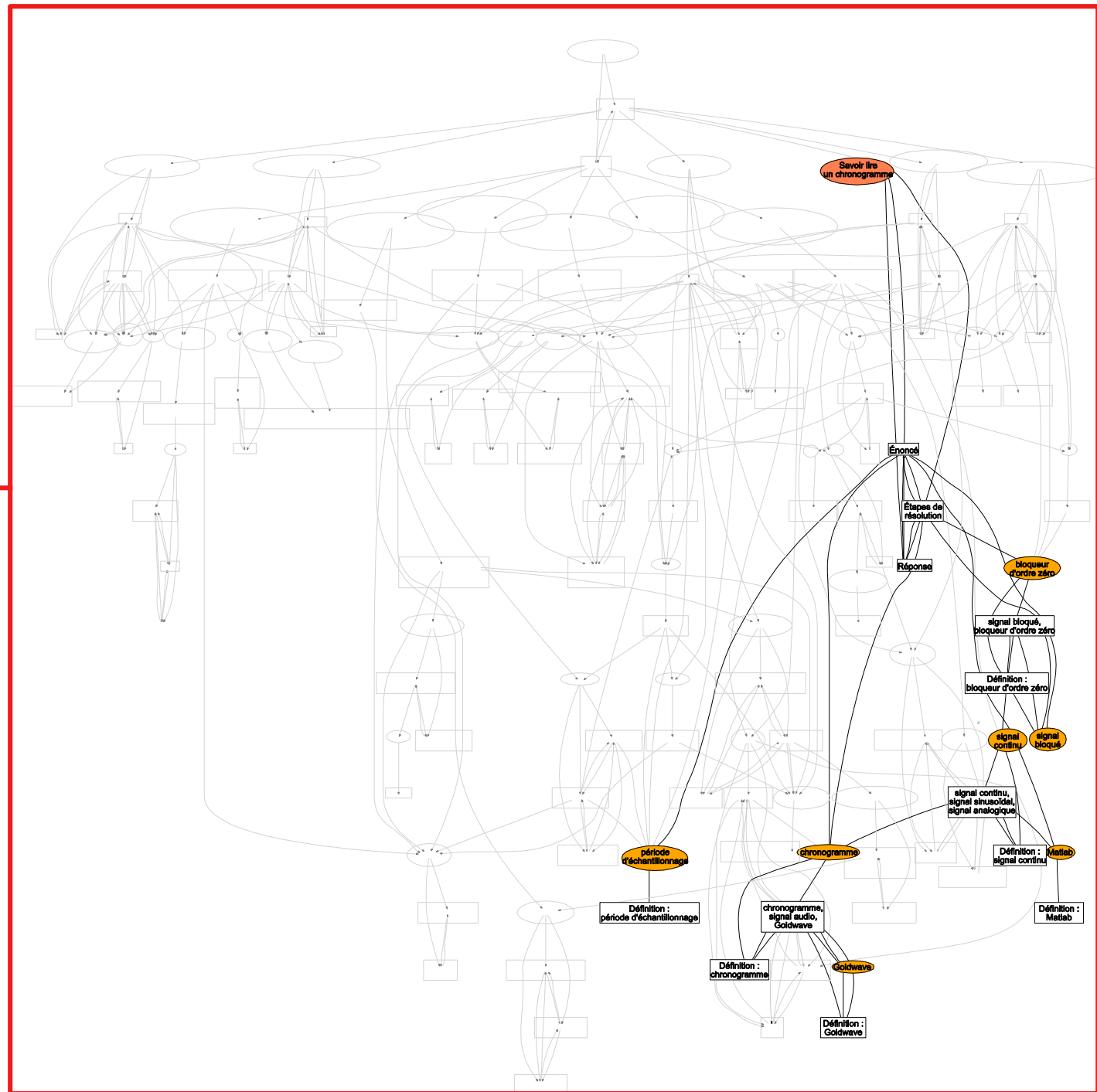
[Rodriguez-Rocha, Faron-Zucker et al.]

LUDO: ontological modeling of serious games

DOCS & TOPICS

link topics, questions, docs,

[Dehors, Faron-Zucker et al.]



MONITORING

e.g. progress of learners

[Dehors, Faron-Zucker et al.]

Analyse Log - Deer Park

File Edit View Go Bookmarks Tools Help

http://localhost:8090/exp_weblearn/analyse_log/index.jsp?dir=analyse_log&dir_td=TD1&mode_group=all&vue=parcours

ANALYSE LOG [COURS COMPLET] [QUESTIONS] [THEMES] [GROUPES] Aide

Username : _all Dernière Modification : Wed Aug 30 13:03:55 MEST 2006 Actualiser Nom des élèves

+ - < > ^ v normal

Transferring data from fr.f260.mail.yahoo.com...

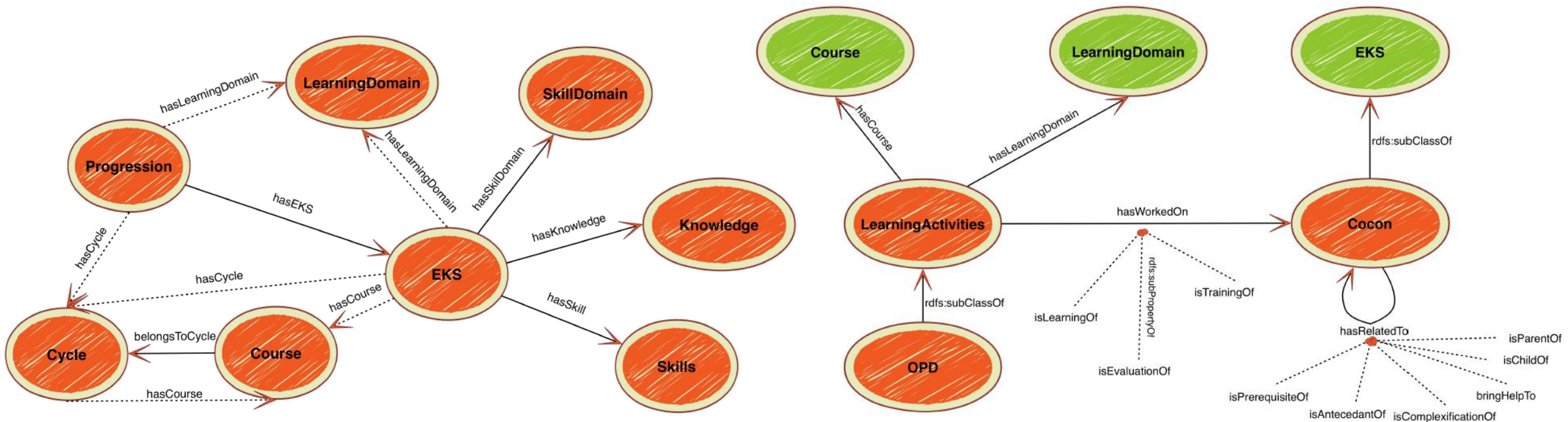
Liste des élèves Outils

- [ACHGAF Loufi](#)
- [AMAOUI Ouadia](#)
- [AMGHARI Mohamed](#)
- [ARMATI Raphaël](#)
- [AUZIAS Céline](#)
- [BARBIER Flavien](#)
- [BELGHAZI Hassan](#)
- [BELKACEM Sophiane](#)
- [BLADIER Guillaume](#)
- [BRICHE Julien](#)
- [CAZIEUX Nicolas](#)
- [CHUNGUE Ludovic](#)
- [CUGLIETTA Alexis](#)
- [DALBIES Benjamin](#)
- [DEBRAY Nicolas](#)
- [DECRÂME Amaury](#)
- [DELANCHE Gwenaëlle](#)
- [DEMANOU TEJIONI Gildas](#)
- [DERUNES Quentin](#)
- [DESSALLES Emilien](#)
- [DUPONT Delphine](#)
- [FEDDAL Karim](#)
- [GÉRARD Nolwenn](#)
- [KHALED Khaled Nouredine](#)
- [LAURENDEAU Jean-Olivier](#)
- [LELÈVRE Alice](#)
- [LOUIS Romain](#)
- [MATHIOT Frédéric](#)
- [MAURIN Vincent](#)
- [MENY Stéphane](#)
- [MERCIER Benoît](#)
- [MERZOUG Imade](#)
- [MEUNIER Sébastien](#)
- [MOSSER Sébastien](#)
- [ORFILA Jérôme](#)
- [ORTEGA Guillaume](#)
- [PELLEGRINI Yvan](#)
- [PENTEL Renaud](#)
- [PERROT William](#)
- [RAVAIN Philippe](#)

- Ontology EduProgression: OWL modeling of scholar program
- Ontology RefEduclever: new education referential for Educlever
- Migration and persistence in graph databases
- Reasoning, query, interactions, recommendation



EDUMICS [Fokou, Faron et al. 2017]





DÉCOUVRIR, APPRENDRE ET RÉUSSIR

QU'EST-CE QUE FUN ?

ACTUALITÉS

LES COURS

LES ÉTABLISSEMENTS

SE DÉCONNECTER

Web sémantique et Web de données

[Gandon, Corby, Faron-Zucker]



présentation

A PROPOS DU COURS

Ce cours vous propose de vous former aux standards du Web de données et du Web sémantique. Il vous présentera les langages qui permettent :

- de représenter et de publier des données liées sur le Web (RDF) ;
- d'interroger et de sélectionner très précisément ces données à distance et au travers du Web (SPARQL) ;

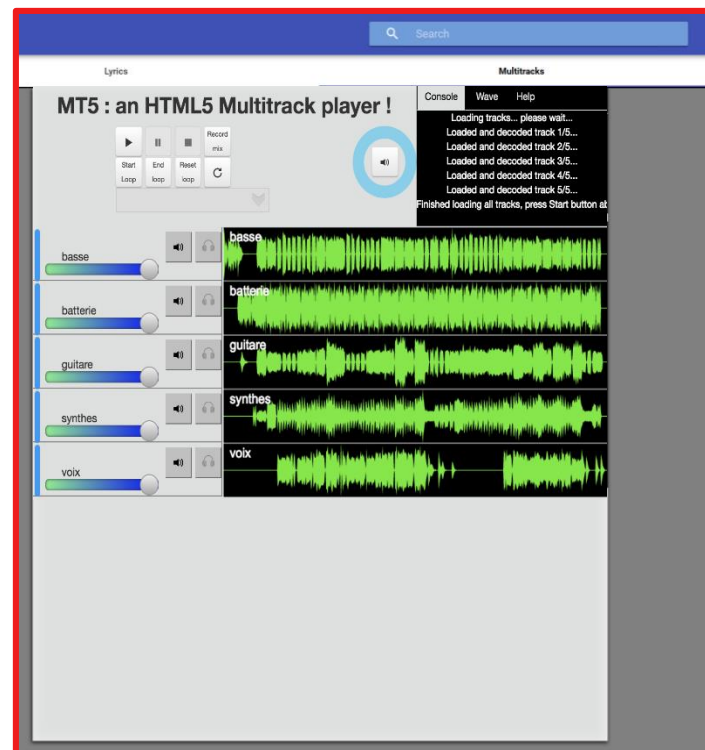
Voir la vidéo de présentation du cours



MOOC

WASABI

NLP & LOD & Lyrics



[Buffa, Jauva et al.]

augmenting musical
experience with the Web

PAINT IT, BLACK
ARTIST: THE ROLLING STONES
ALBUM: ROLLER GOLD

Spotify MusicBrainz iTunes Altimusic Amazon GoEar
Runtime: 202.0,244.0,225.0
Format: Gramophone record
Genre: Psychedelic rock, Psychedelic music, Latin music (genre), Rhythm and blues, Raga, rock, Funk
Producer: Andrew Loog Oldham, Jerry Goldstein (producer)
Record label: Liberty Records, Decca Records, London Records
Writer: Jagger/Richards
Recorded: 1970-03-08
Release Date: 1966-05-07, 1966-05-13

Abstract: "Paint It Black" (originally released as "Paint It, Black") is a song by the English rock band The Rolling Stones, written by the songwriting partnership of Mick Jagger and Keith Richards, and first released as a single on 6 May 1966 (see 1966 in music). It was later included as the opening track to the U.S. version of their 1966 album, *Aftermath*. Musically inspired by the sitar playing of George Harrison and Harhar Rao, "Paint It Black", along with the Jagger and Richards-penned "Mothers' Little Helper", was influential in developing the musical styles of psychedelic rock and raga rock. "Paint It Black" reached number one in both the Billboard Hot 100 and UK Singles Chart. The song became The Rolling Stones' third number one hit single in the US and sixth in the UK. Since its initial release, the song has remained influential as the first number one hit featuring a sitar, particularly in the UK where it has charted in two other instances, and has been the subject of multiple cover versions, compilation albums, and film appearances.

I see a red door and I want it painted black
No colours anymore, I want them to turn black
I see the girls walk by dressed in their summer clothes
I have to turn my head until my darkness goes

I see a line of cars and they're all painted black
With flowers and my love both never to come back
I see people turn their heads and quickly look away
Like a newborn baby, it just happens every day

I look inside myself and see my heart is black
I see my red door and must have it painted black

The Rolling Stones

W 

Années d'activité: 1962-present
Localisation: England, London
Genre: Rock, Rock 'n' Roll, R&B, Blues, Hard Rock
Label: ABKCO, Decca Records, Interscope Records, London Records, Polydor, Rolling Stones Records, Virgin Records
▶ Voir les membres actuels:
▼ Voir les ancien(s) membre(s):

- Brian Jones
 - Instrument: guitar
 - Années d'activités: 1962-1969
- Mick Taylor
 - Instrument: guitar
 - Années d'activités: 1969-1974
- Ian Stewart
 - Instrument: keyboards
 - Années d'activités: 1962-1963
- Dick Taylor
 - Instrument: bass
 - Années d'activités: 1962-1963
- Bill Wyman
 - Instrument: bass
 - Années d'activités: 1963-1993
- Tony Chapman
 - Instrument: drums
 - Années d'activités: 1962-1962

Album: GRRR! 2012

ZOOMATHIA

Cultural transmission of
zoological knowledge
from Antiquity
to Middle Age

[Faron Zucker, et al.]

Recherche de données

Delphinus delphis Linnaeus, 1758

Dauphin commun à bec court, Dauphin commun (Français)

Common Dolphin (English)

(Chordata, Mammalia, Cetacea)

← Nouvelle recherche

| | Paléolithique | | | Mésolithique | | | Néolithique | | | Age du Bronze | | | Age du Fer | | | Antiquité | | | Moyen-Age | | |
|--|---------------|-------|-----------|--------------|-------|-----------|-------------|-------|-----------|---------------|-------|-----------|------------|---------|-----------|-----------|------------|-----------|-----------|------------|--|
| | ancien | moyen | supérieur | ancien | moyen | supérieur | ancien | moyen | supérieur | ancien | moyen | supérieur | Hallstat | La Tène | antérieur | central | postérieur | antérieur | central | postérieur | |
| | | | | | | | | | | | | | | | | | | | | | |

Zoom sur : France métropolitaine et d'outre-mer

Rechercher

Cartographie interactive

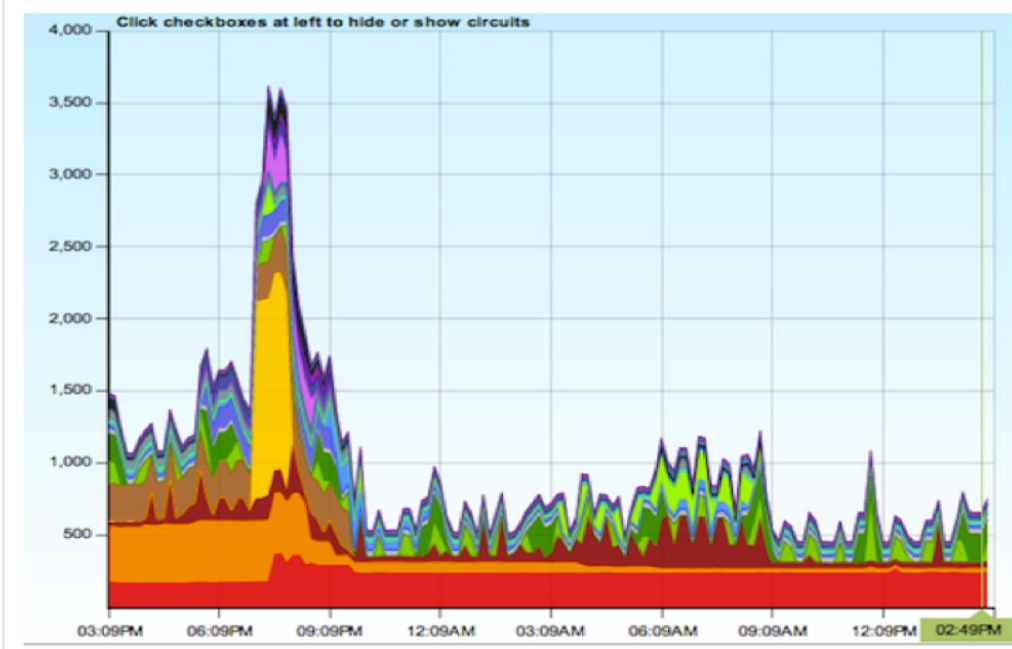
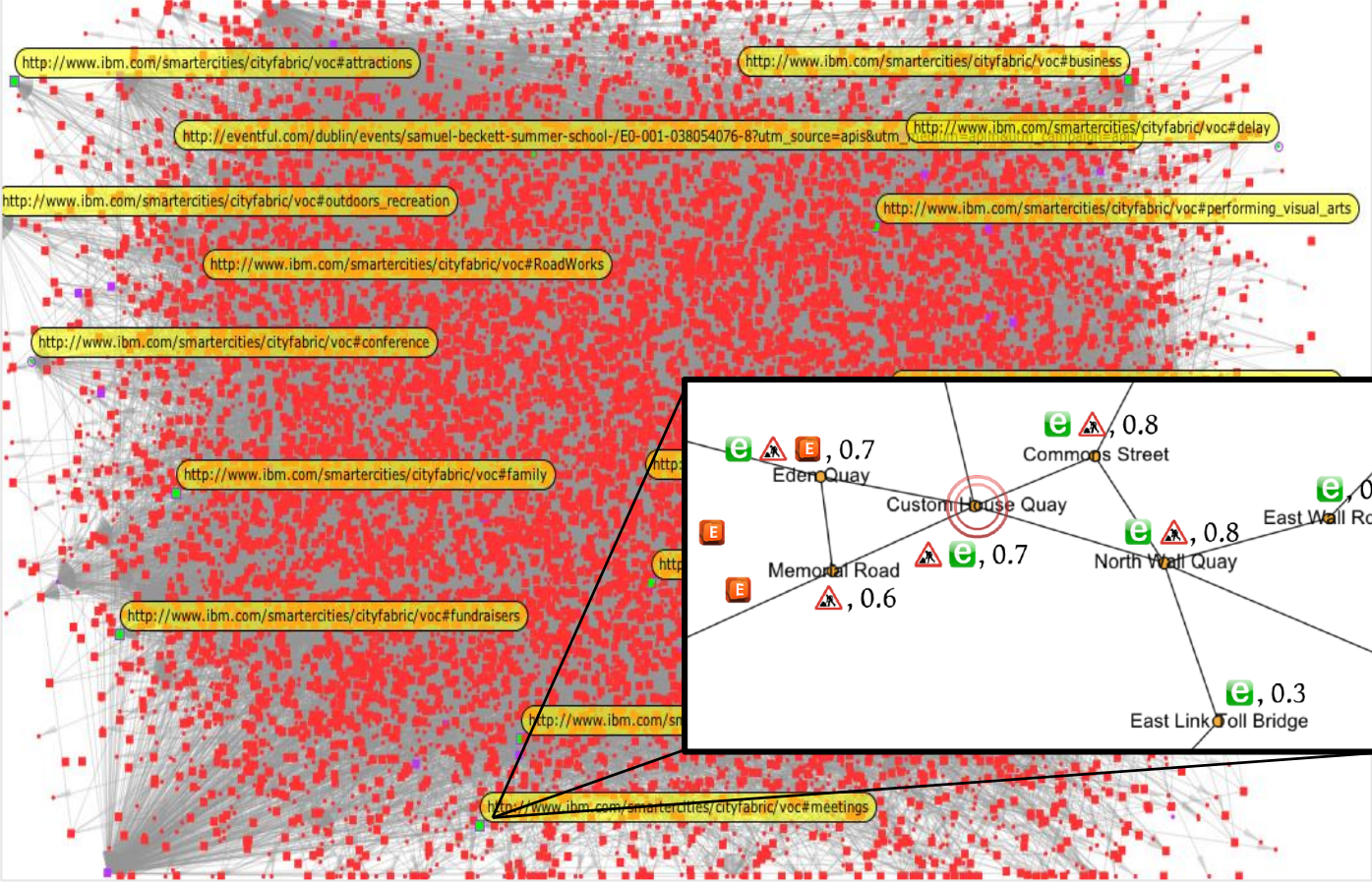
Accéder à l'ensemble des cartographies et des informations sur les espaces naturels de métropole et d'outre-mer.

Rechercher près de chez vous...

Legend:

- Paléolithique
 - ancien
 - moyen
 - supérieur
- Mésolithique
- Néolithique
 - ancien
 - moyen
 - final
- Age du Bronze
- Age du Fer
 - Hallstat
 - La Tène
- Antiquité
- Moyen-Age
 - Haut Moyen-Age
 - Moyen-Age-central
 - Bas Moyen-Age
- Temps modernes

| Nom de référence | Synonymes / Chrésonymes | Nom vernaculaire | Fiche de l'espèce |
|--|---|--|-----------------------|
| <i>Delphinus delphis</i> Linnaeus, 1758 | <i>Delphinus delphis</i> Linnaeus, 1758 | Dauphin commun à bec court, Dauphin commun | Fiche |
| <i>Stenella coeruleoalba</i> (Meyen, 1833) | <i>Delphinus delphis mediterranea</i> Nobre, 1900 | Dauphin bleu et blanc | Fiche |



eventful
 Eventbrite
 NRA
 Dublinked
 Dublin Bus
 DBpedia
 WU
 AA
 Twitter

IBM Research - STAR CITY: Semantic Traffic Analytics and Reasoning for CITY

Close Weather Context

Close Selected Context

Open Control Panel

Events: Road Incidents, Events: Road Works, Events: Social

Diagnosis: Road Incidents, Diagnosis: Road Works, Diagnosis: Social

obstruction:40.625
 closures:9.090909
 music:65.35088
 accident:33.53204
 luas:26.528385
 music:28.47962

Smarter Cities – IBM Dublin

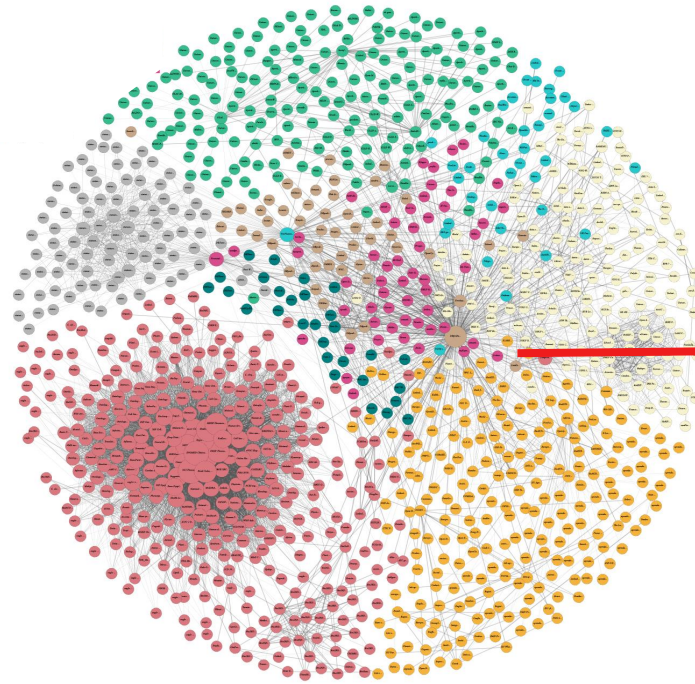
[Lécué, 2015]

“searching” comes in many flavors



SEARCHING

- exploratory search
- question-answering



DBPEDIA.FR (extraction, end-point)

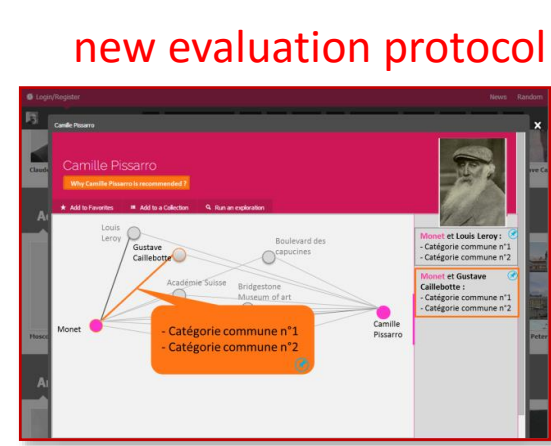
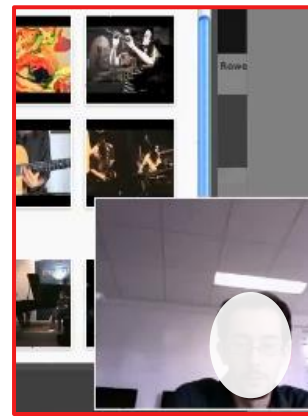
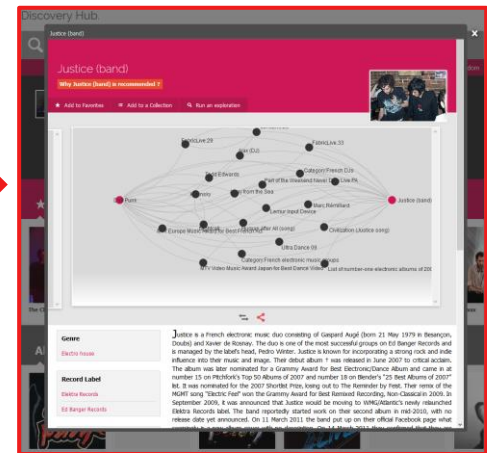
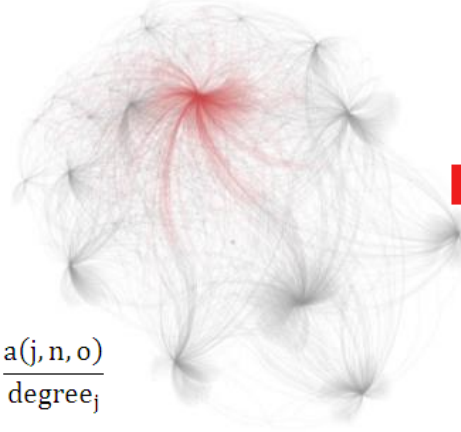
180 000 000 triples

[Cojan, Boyer et al.]

semantic spreading activation

$$a(i, n) = \prod_{o \in O} [a(i, n, o)] / \log(\text{degree}_i)$$

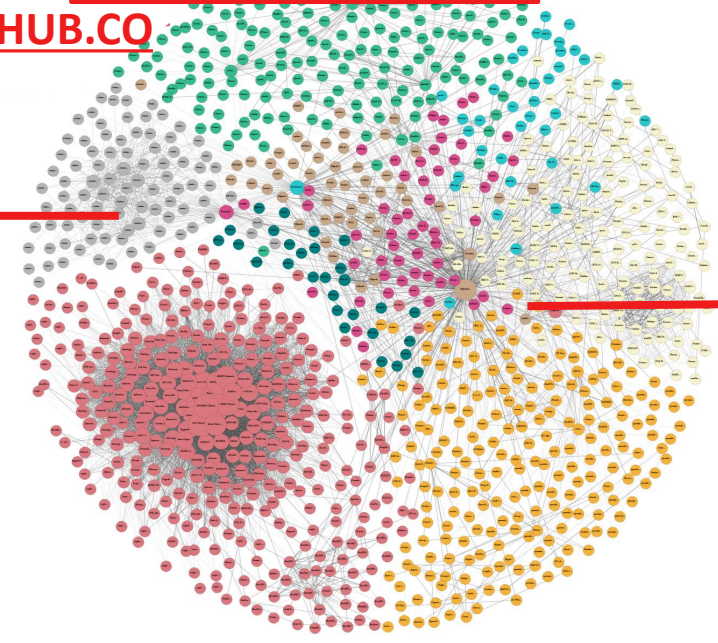
$$a(i, n + 1, o) = s(i, n, o) + \sum_j w(i, o) * \frac{a(j, n, o)}{\text{degree}_j}$$



new evaluation protocol

[Marie, Giboin, Palagi et al.]

DISCOVERYHUB.CO



DBPEDIA.FR (extraction, end-point)
180 000 000 triples

[Cojan, Boyer et al.]

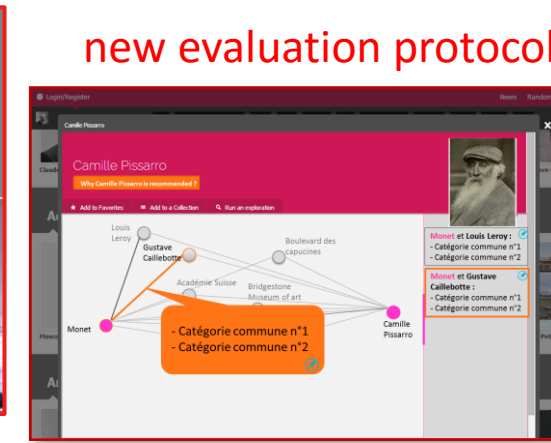
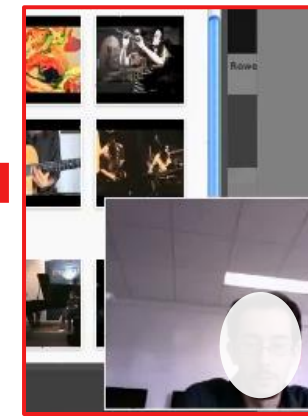
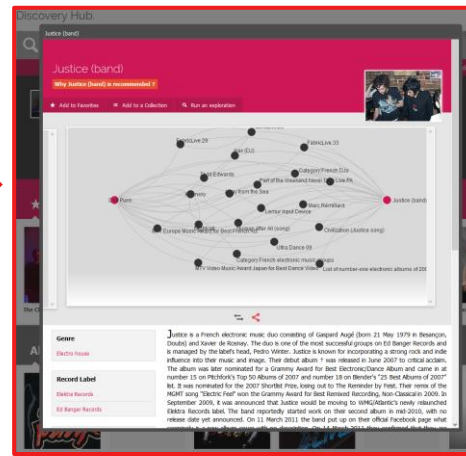
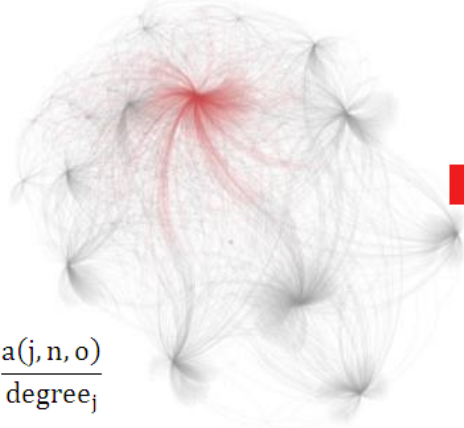
SEARCHING

- exploratory search
- question-answering

semantic spreading activation

$$a(i, n) = \prod_{o \in O} [a(i, n, o)] / \log(\text{degree}_i)$$

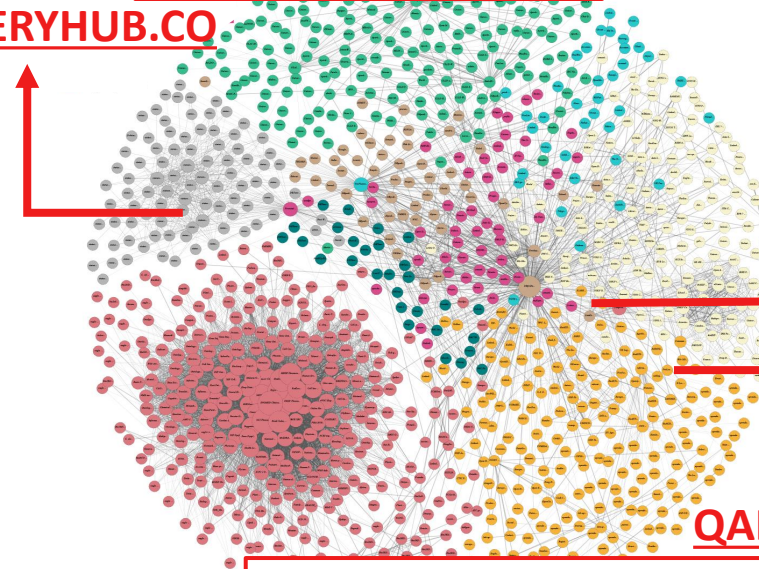
$$a(i, n + 1, o) = s(i, n, o) + \sum_j w(i, o) * \frac{a(j, n, o)}{\text{degree}_j}$$



new evaluation protocol

[Marie, Giboin, Palagi et al.]

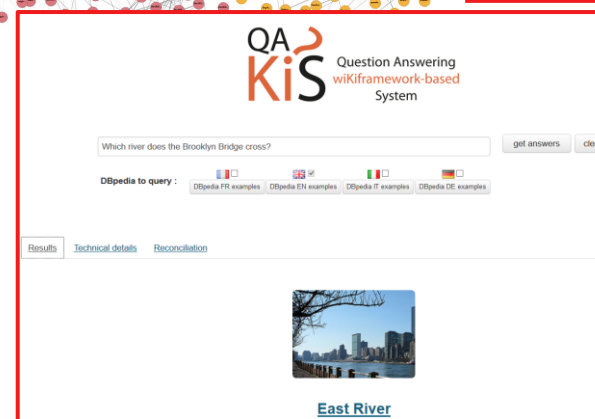
DISCOVERYHUB.CO



DBPEDIA.FR (extraction, end-point)
180 000 000 triples

[Cojan, Boyer et al.]

QAKIS.ORG



named entity recognition
similarity based SPARQL
generation

```
select * where {
  dbpr:Batman_Begins dbp:starring ?v .
  OPTIONAL {?v rdfs:label ?l
    filter(lang(?l)="en") } }
```

[Cabrio et al.]

linguistic relational
pattern extraction

starring(Work, Person)
[D:Work], played by [R:Person]
[D:Work] stars [R:Person]
[D:Work] film stars [R:Person]

SEARCHING

- exploratory search
- question-answering



SEARCHING

e.g. QAKIS

question-answering



Type your question here ... !

get answers

clear

DBpedia to query :



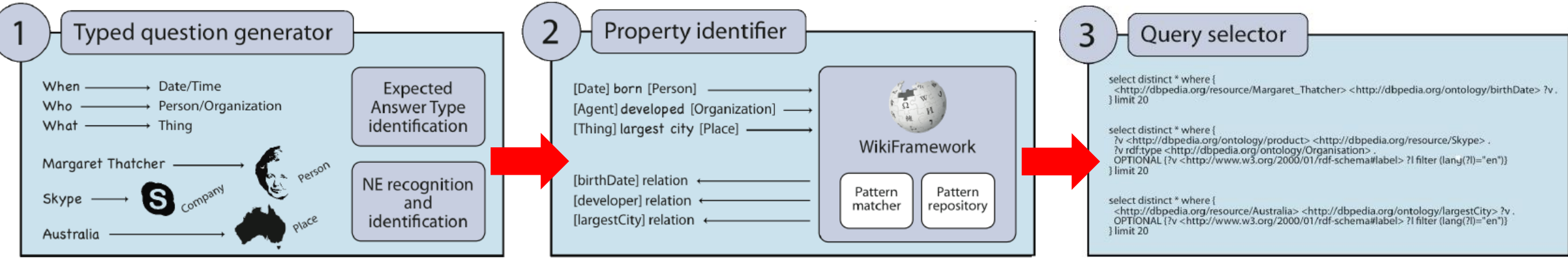
DBpedia FR examples



DBpedia EN examples



DBpedia DE examples



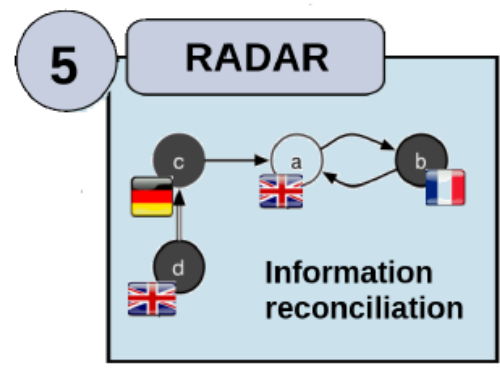
Answers

1925-10-13

Skype Limited

Sydney

multimedia



4 Query Manager

learning linguistic patterns of queries



MULTIMEDIA

answer visualization
through linked data

What is the largest city in Australia?



DBpedia to query :

Sydney



Sydney ^{^{/ˈsiːdni}} is the state capital of New South Wales and the most populous city in Australia and Oceania. Located on Australia's east coast, the metropolis surrounds the world's largest natural harbour, and sprawls towards the Blue Mountains to the west. Residents of Sydney are known as "Sydneyiders".

Facts and Figures

Type : Place
Label : Sydney



Maps and Points Of Interest



BROWSING

e.g. SMILK plugin

[Lopez, Cabrio, et al.]

The screenshot displays a web browser window with several tabs. The active tab shows an article from www.ladepeche.fr titled "La modernité version dior-entre-18eme-siecle-et-futurisme.html". The article text discusses a fashion collection by Raf Simons, mentioning a show at the Louvre and a futuristic theme. A sidebar on the left features the SMILK plugin, which lists categories like "Groupe", "Division", and "Marque", with sub-items such as "1. LVMH", "1. Loewe", "2. Christian Dior", "3. Dior", and "4. JW Anderson".

Overlaid on the bottom of the browser window is a network diagram. The central node is "Chanel" (green circle). It is connected to several other nodes: "Bleu" (orange circle), "Rouge Coco" (orange circle), "Coco Noir" (orange circle), "Allure Homme Sport Eau Extrême" (orange circle), "Logo" (blue circle), "Produits" (white circle), "site Web" (blue circle), "Résumé" (blue circle), "clouds" (white circle), and "NetSentOpinionFil" (grey circle). The "Produits" node is further connected to "Bleu", "Rouge Coco", and "Coco Noir". The "clouds" node is connected to "NetSentOpinionFil" and "NetSentConceptCloud" (grey circle).

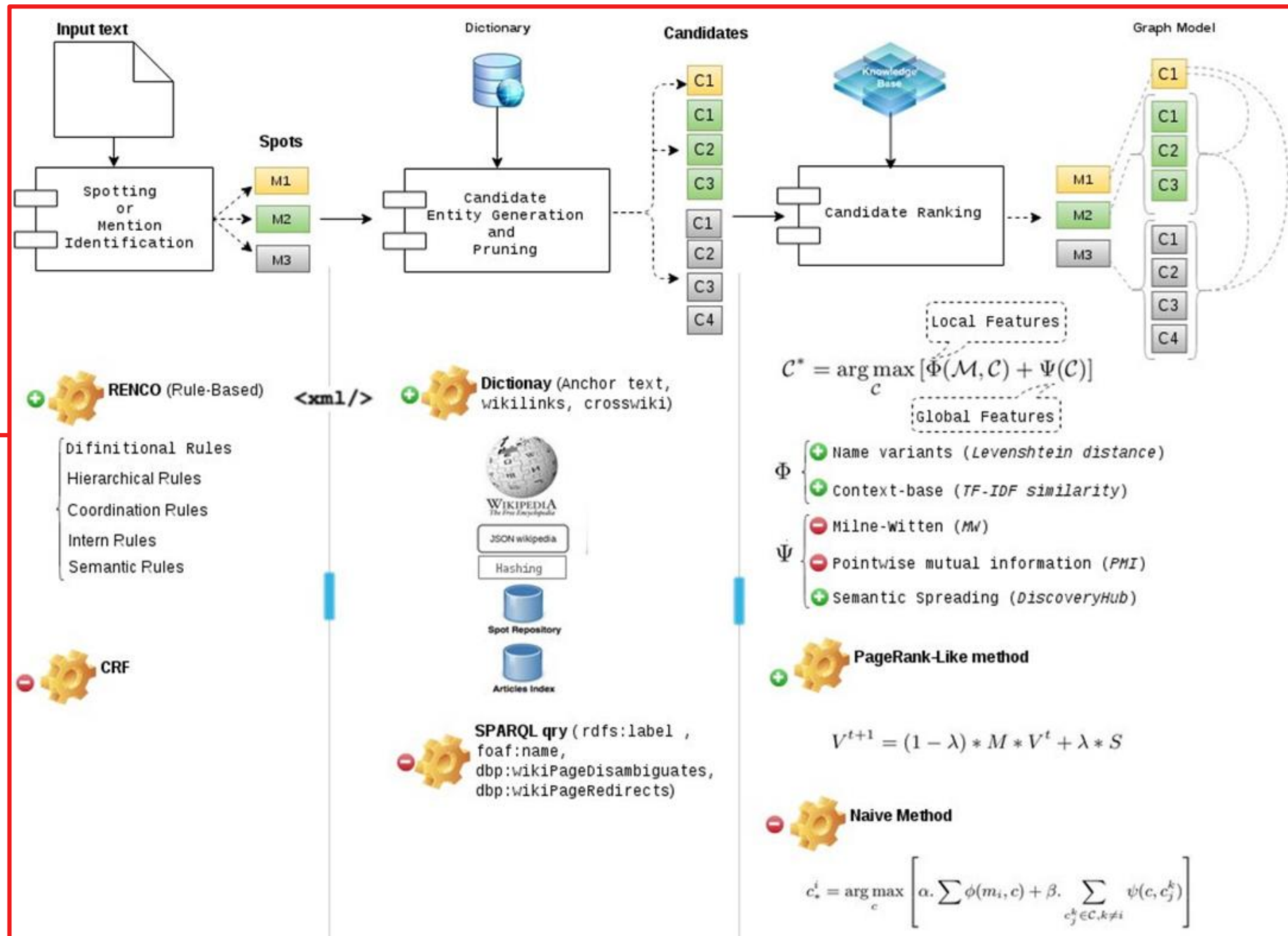
On the right side of the browser window, there is a "DBpedia" window for "Dior". It provides biographical information: "Christian Dior, né le 21 janvier 1905 à Granville, dans la Manche, mort le 24 octobre 1957 à Montecatini Terme en Italie, est un grand couturier français. Il est le fondateur de la maison de couture qui porte son nom." Below this, there is a "Ressources" section with a list of links to various DBpedia pages.

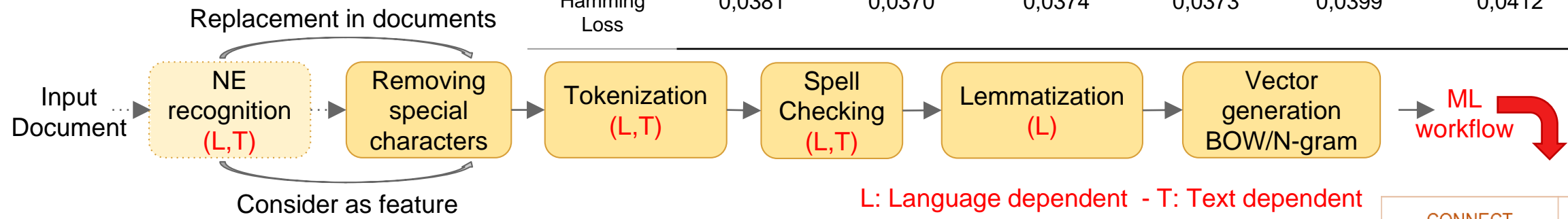
At the bottom right, there is a "NetSent" window. It displays a word cloud with "Dior" and "Chanel" as prominent terms. To the right of the word cloud is a bar chart showing sentiment analysis results: "Positive" with a count of 26 (green bar) and "Negative" with a count of 11 (yellow bar).

BROWSING

e.g. SMILK plugin

[Nooralahzadeh, Cabrio, et al.]





| Metrics | uni | uni⊕bi | uni+bi+tri | uni⊕NE | syn | syn⊕hyper | syn⊕NE |
|--------------|--------|--------|------------|--------|--------|-----------|--------|
| Hamming Loss | 0,0381 | 0,0370 | 0,0374 | 0,0373 | 0,0399 | 0,0412 | 0,0405 |

L: Language dependent - T: Text dependent

QUESTION ROUTING

[Gazzotti, et al. 2017]

- emails to the customer service (eg 350000/day “Crédit Mutuel”)
- detect topics in order to “understand” a question
- 3 humans annotate 142 questions (Krippendorff’s Alpha 0,70)
- NLP and semantic processing for features extraction
- ML performance comparison for question classification
Naive Bayes, Sequential Minimal Optimisation (SMO),
Random Forest, RAndom k-labELsets (RAkEL)

| | |
|-------------|------|
| CONNECT | 2847 |
| CONTRACT | 544 |
| CONTACT | 343 |
| MINFO | 460 |
| CLAIM | 50 |
| PAY | 866 |
| SPONSORSHIP | 44 |
| MAIL | 34 |
| TRIP | 3 |
| OTHER | 91 |
| TRASH | 159 |

Unbalanced Topics

SEARCHING

e.g. DiscoveryHub
exploratory search

The screenshot displays the Discovery Hub website interface. At the top, there is a search bar with the text "Start your exploration here...". Below this, the user profile for "Damien Legrand" is shown, including a profile picture and the username "damien.legrand.06". The profile features two tabs: "Following" (1) and "Followers" (2). A "Favorites" section displays a grid of album covers, including Pink Floyd and NIN. Below the favorites, there are sections for "Collections" (Bands, Movies to see, Funny Gifs) and a "Searches" section at the bottom.

Discovery Hub

Start your exploration here...

Damen Legrand Random

Damen Legrand damien.legrand.06

1 Following 2 Followers

★ Favorites

See all your favorites topics

Collections

Bands 16

Movies to see 7

Funny Gifs

See all your collections

Give Us Feedback searches

Damen Legrand added Crystal Castles (band) to his favorites.

Crystal Castles are an electronic band from Toronto, Ontario, Canada, consisting of producer Ethan Kath and lyricist and vocalist Alice Glass. Crystal Castles are known for their chaotic live shows and their lo-fi home productions. The duo released their first EP, between 2006 and 2007, and two sporadic albums in 2008 and 2010 to widespread critical acclaim.

2 days ago

Damen Legrand added Primary Colours (album) to his favorites.

Primary Colours is the second studio album by British post-punk revival band The Horrors. It was released in the US on 21 April 2009, and in the UK on 4 May 2009 by XL Recordings. The album charted on the UK Albums Chart at #25. According to aggregating website Metacritic, the record was met with "universal critical acclaim", receiving a normalized score of 82% based on 19 reviews.

2 days ago

Damen Legrand added Pink Floyd to his favorites.

Pink Floyd were an English rock band who achieved worldwide success with their progressive and psychedelic rock music. Their work is marked by the use of philosophical lyrics, sonic experimentation, innovative album art, and elaborate live shows. Pink Floyd are one of the most commercially successful and influential rock music groups of all time. They have sold over 200 million albums worldwide, including 74.5 million certified units in the United States.

2 days ago

Damen Legrand added The Girl with the Dragon Tattoo (2011 film) to his favorites.

The Girl with the Dragon Tattoo is an upcoming English-language thriller film that is the second film based on the Swedish novel of the same name by Stieg Larsson. The first film was the 2009 Swedish-language adaptation. The upcoming film is written by Steven Zaillian and directed by David

semantic spreading activation

$$a(i, n + 1, o) = s(i, n, o) + w(i, o) * \sum_{j \in Neighbor(i)} \frac{a(j, n, o)}{degree_j}$$

$$w(i, o) = \begin{cases} 0 & \text{if } \nexists t \in Types(i); t \in CPD(o) \\ 1 + |commontriple(i, o)| & \text{otherwise} \end{cases} \begin{matrix} \text{FILTERING} \\ \text{SIMILARITY} \end{matrix}$$

Where $commontriple(i, o) = \{(i, p, v) \in KB; \exists (o, p, v) \in KB\}$

$$CPD(o) = \left\{ t; (t, c) \in NT(o); \frac{c}{\sum_{(n_i, c_i) \in NT(o)} c_i} \geq threshold \right\}$$

Let KB be the set of all triples in the triple asserted and inferred store.

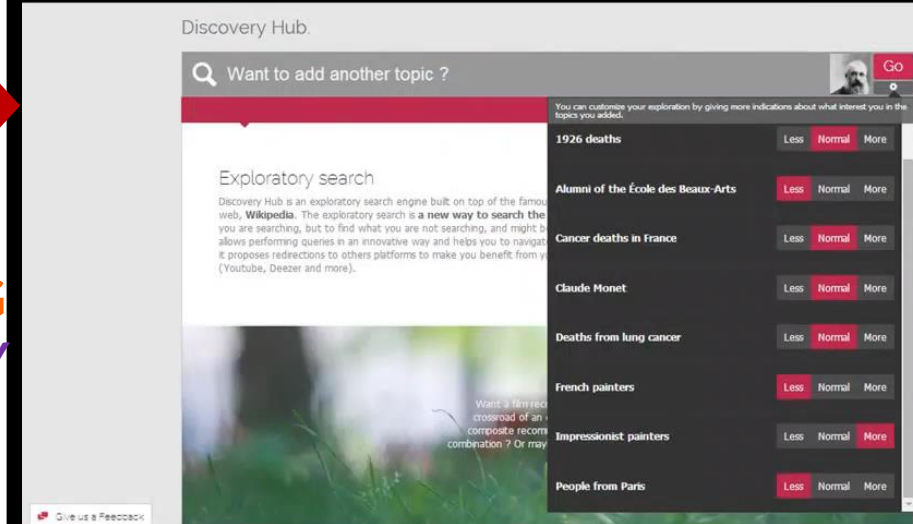
$$depth(t) = \begin{cases} depth(t) = 0 & \text{if } t = T \text{ the root of the hierarchy} \\ depth(t) = 1 + \text{Min}_{s_t; (t, rdf:subClassOf, s_t) \in KB} depth(s_t) & \text{otherwise} \end{cases}$$

$$Types(x) = \{t; (x, rdf:type, t) \in KB\}$$

$$Tmax(x) = \{t \in Types(x); \forall t_i \in Types(x); depth(t) \geq depth(t_i)\}$$

$$Neighbor(o) = \{x; ((o, p, x) \in KB \vee (x, p, o) \in KB) \wedge p \neq rdf:type\}$$

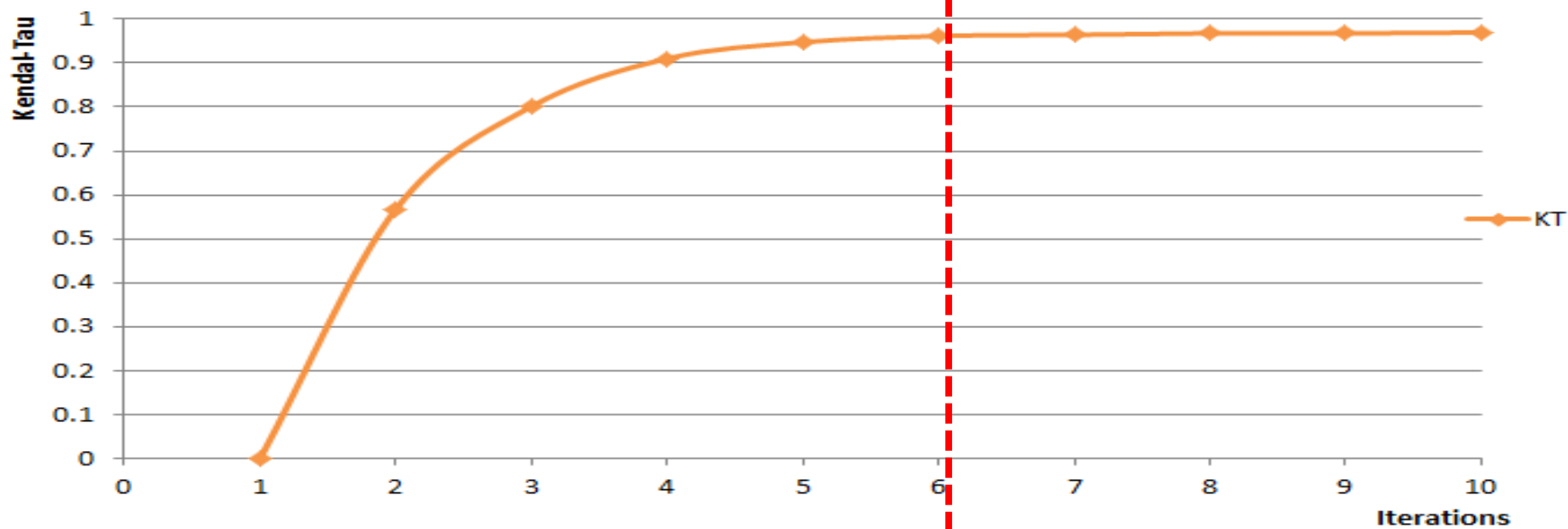
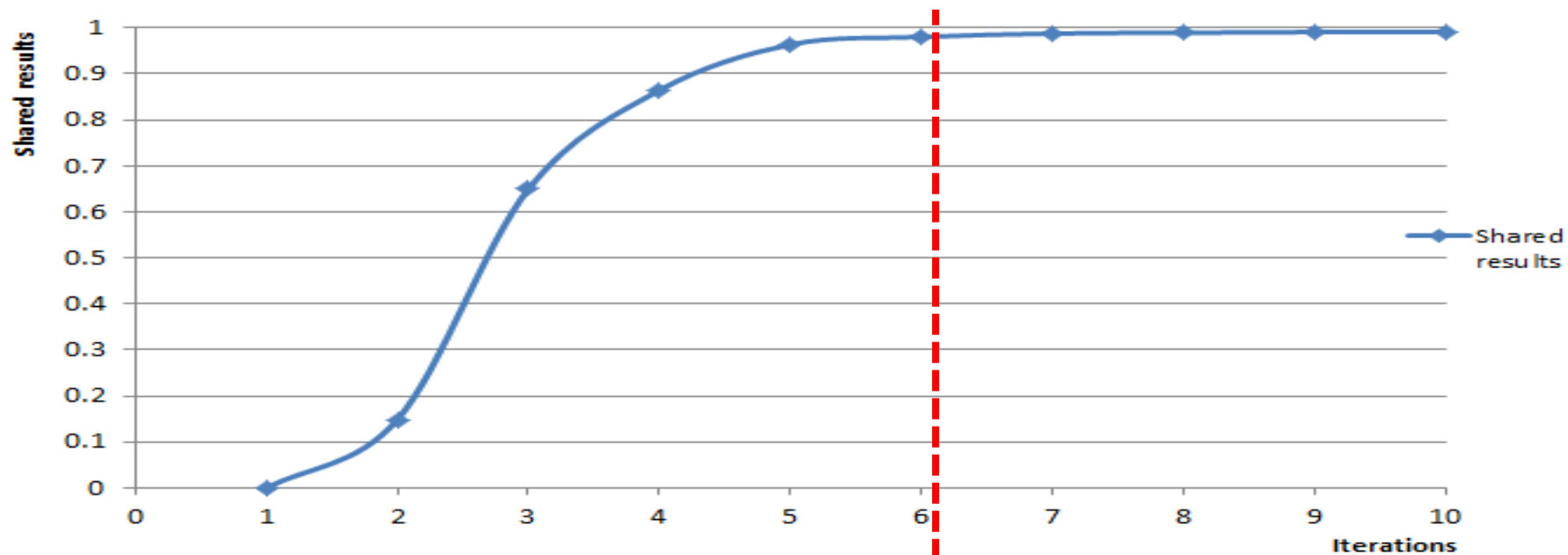
- Query « Impressionist / not French »



discoveryhub.co

CONVERGING

answer visualization
through linked data





users & interaction

SEARCHING

e.g. DiscoveryHub
exploratory search

The screenshot displays the Discovery Hub interface for user Damien Legrand. The browser address bar shows the URL `discoveryhub.co/#me`. The page features a search bar at the top with the text "Start your exploration here...". Below the search bar, the user's profile information is shown, including the name "Damien Legrand" and the username "damien.legrand.06".

The main content area is divided into several sections:

- Following and Followers:** Two tabs labeled "1 Following" and "2 Followers".
- Favorites:** A grid of album covers including Pink Floyd, The Horrors, and others.
- Collections:** A section with sub-sections for "bands" (16 items), "Movies to see" (7 items), and "Funny Gifs".

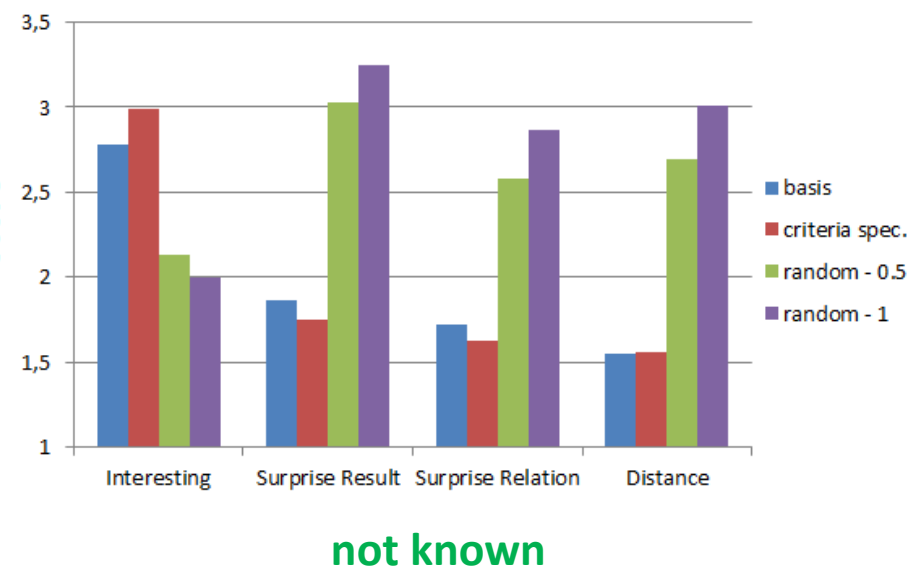
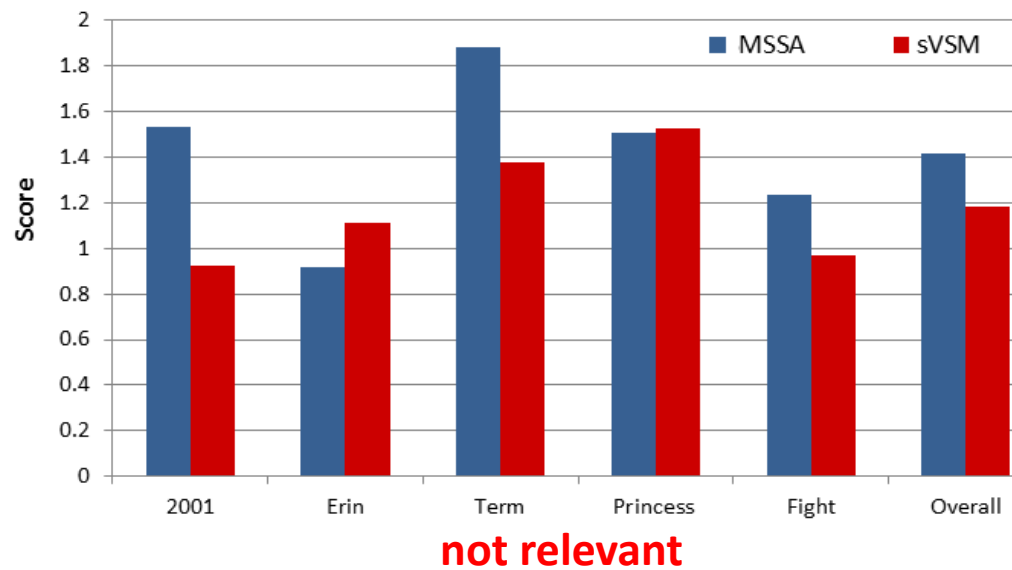
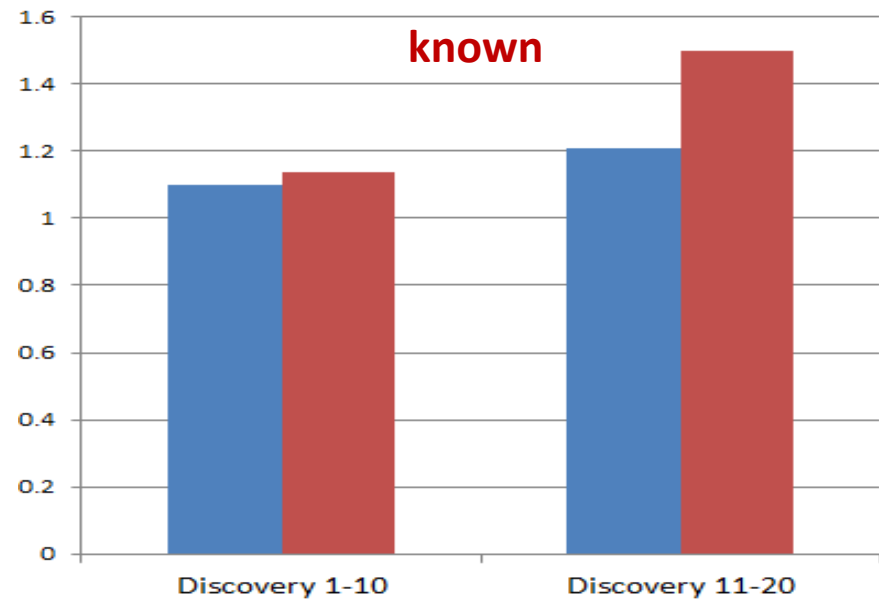
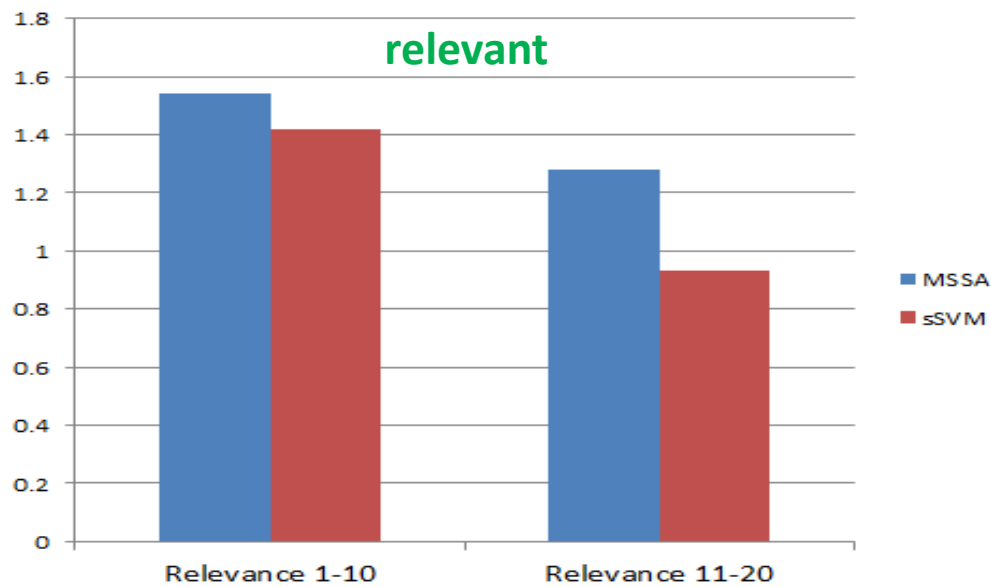
On the right side, there are three recommendation cards, each with a small profile picture of the user and a title:

- Damien Legrand added Crystal Castles (band) to his favorites.** The card includes a description: "Crystal Castles are an electronic band from Toronto, Ontario, Canada, consisting of producer Ethan Kath and lyricist and vocalist Alice Glass. Crystal Castles are known for their chaotic live shows and their lo-fi home productions. The duo released their second EP, between 2006 and 2007, and two sporadic albums in 2008 and 2010 to widespread critical acclaim." It is dated "2 days ago".
- Damien Legrand added Primary Colours (album) to his favorites.** The card includes a description: "Primary Colours is the second studio album by British post-punk revival band The Horrors. It was released in the US on 21 April 2009, and in the UK on 4 May 2009 by XL Recordings. The album charted on the UK Albums Chart at #25. According to aggregating website Metacritic, the record was met with "universal critical acclaim", receiving a normalized score of 82% based on 19 reviews." It is dated "2 days ago".
- Damien Legrand added Pink Floyd to his favorites.** The card includes a description: "Pink Floyd were an English rock band who achieved worldwide success with their progressive and psychedelic rock music. Their work is marked by the use of philosophical lyrics, sonic experimentation, innovative album art, and elaborate live shows. Pink Floyd are one of the most commercially successful and influential rock music groups of all time. They have sold over 200 million albums worldwide, including 74.5 million certified units in the United States." It is dated "2 days ago".
- Damien Legrand added The Girl with the Dragon Tattoo (2011 film) to his favorites.** The card includes a description: "The Girl with the Dragon Tattoo is an upcoming English-language thriller film that is the second film based on the Swedish novel of the same name by Stieg Larsson. The first film was the 2009 Swedish-language adaptation. The upcoming film is written by Steven Zaillian and directed by David..." It is dated "2 days ago".

At the bottom of the page, there is a footer with the text "Give Us Feedback" and "searches 30".

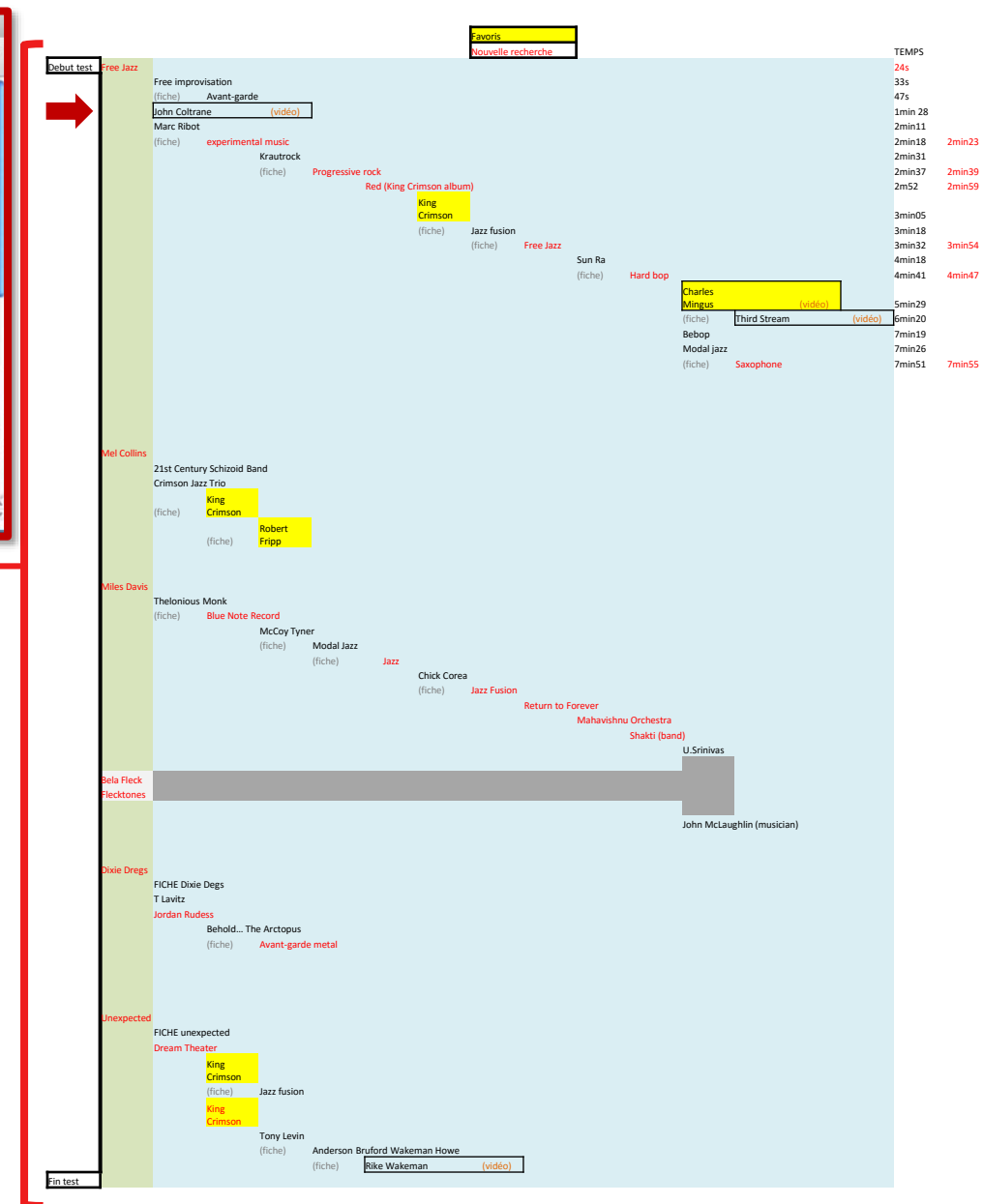
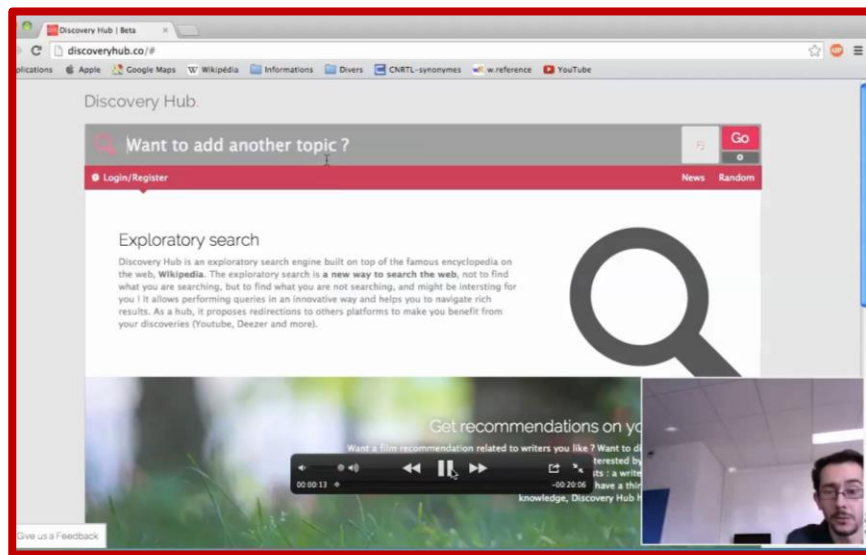
EVALUATING

user-centric studies



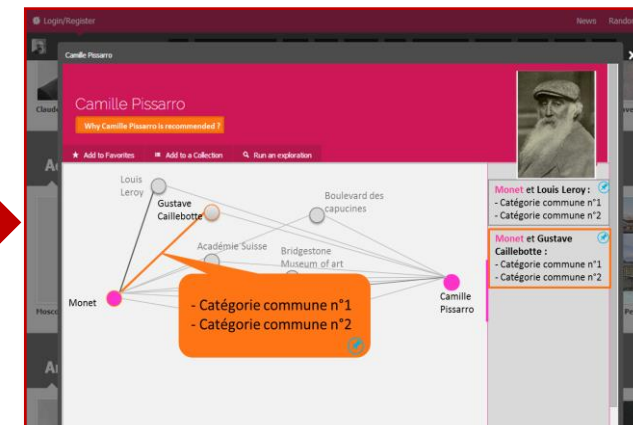
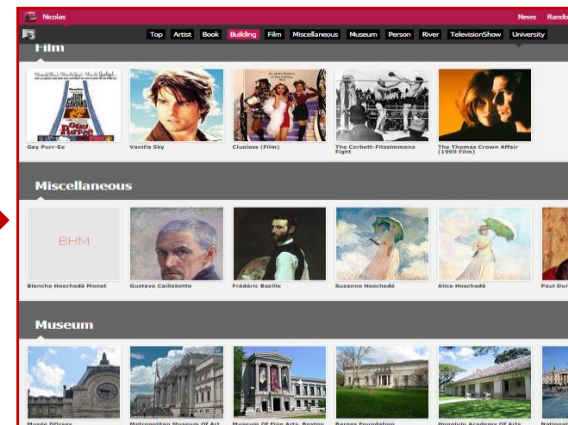
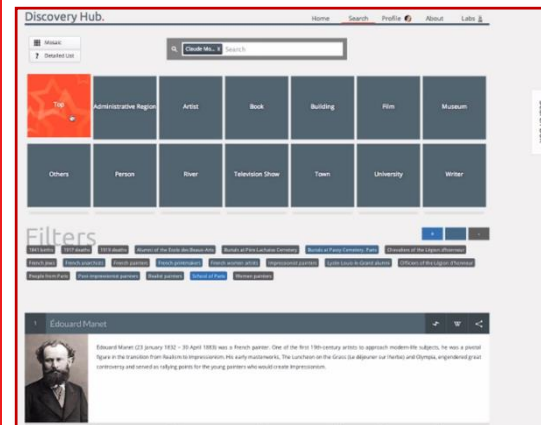
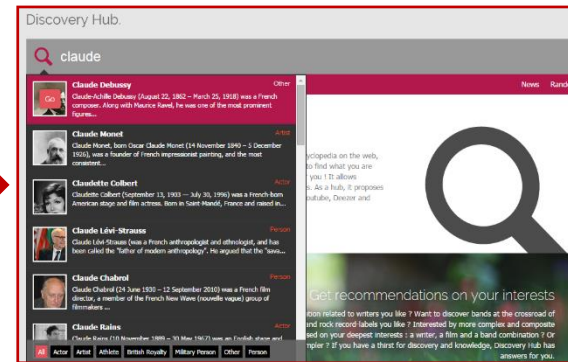
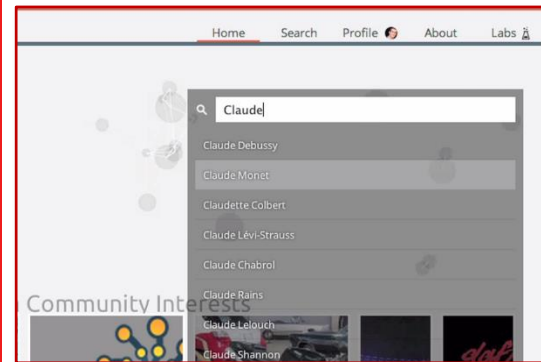
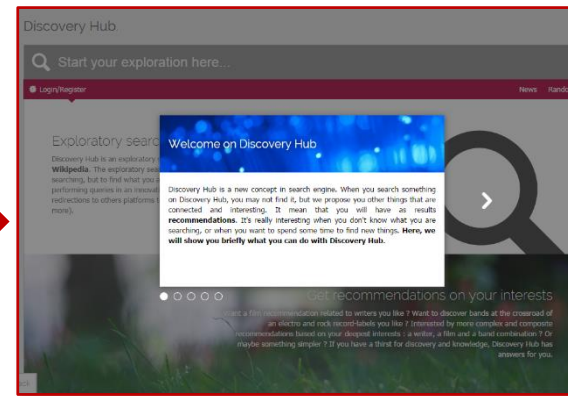
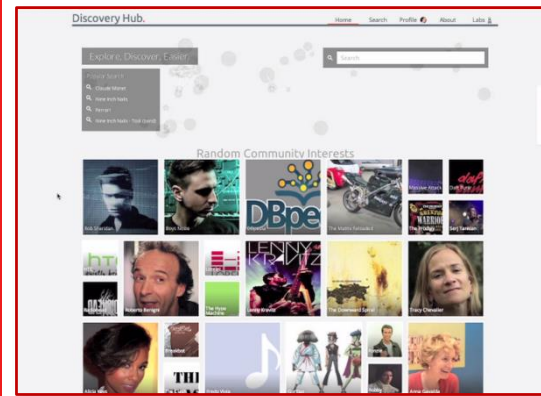
INTERACTION

design and evaluation [Palagi, Marie, Giboin et al.]



(RE)DESIGN

interface evolutions



[Palagi, Marie, Giboin et al.]

METHODS & CRITERIA

- design and evaluation criteria
- exploratory search process model

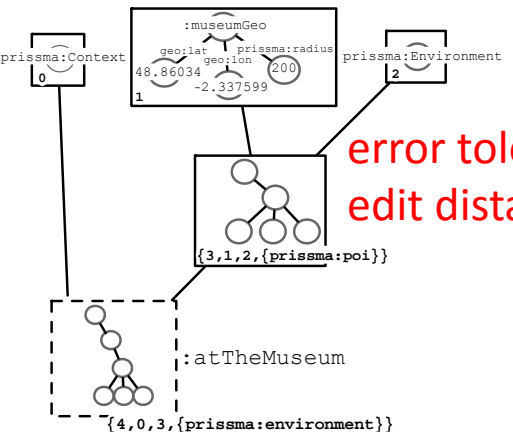
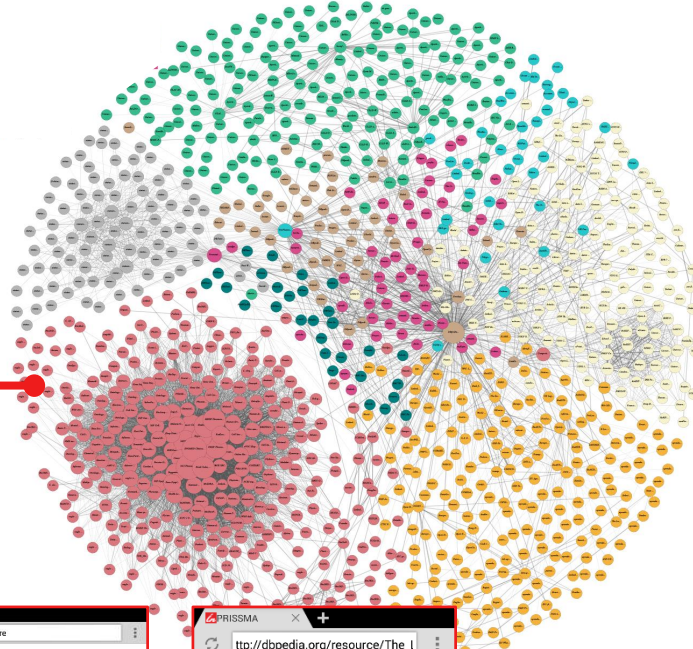
- A. Define the search space
- B. Query (re)formulation
- C. Information gathering
- D. Put some information aside
- E. Pinpoint search
- F. Change of goal(s)
- G. Backward/forward steps
- H. Browsing results
- I. Results analysis
- J. Stop the search session

| Previous features | Feature | Next features |
|-----------------------|---------|---------------------------|
| NA | A | B ; J |
| A ; F | B | G ; H ; I ; J |
| D ; E ; I | C | D ; E ; F ; G ; H ; J |
| E ; I | D | C ; F ; G ; J |
| G ; H ; I | E | C ; D ; F ; G ; J |
| C ; D ; E ; G ; H ; I | F | B ; H ; I ; J |
| B ; D ; E ; H ; I | G | E ; F ; H ; I ; J |
| B ; F ; G ; I | H | E ; F ; G ; ; I ; J |
| B ; F ; G ; H | I | C ; D ; E ; F ; G ; H ; J |
| all | J | NA |

[Palagi, Giboin et al. 2017]

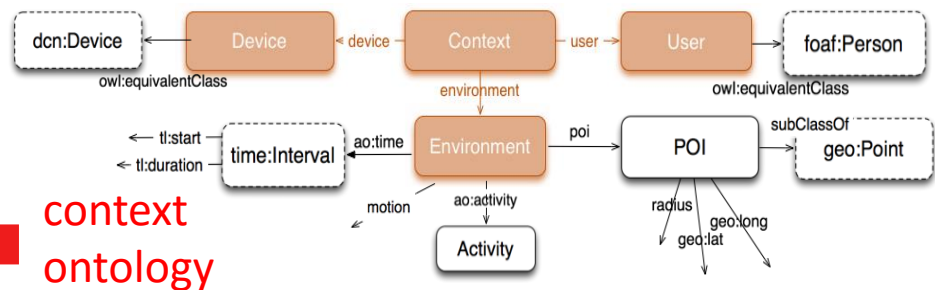
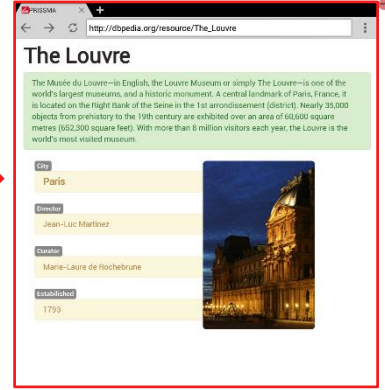
MODELING USERS

- individual context
- social structures

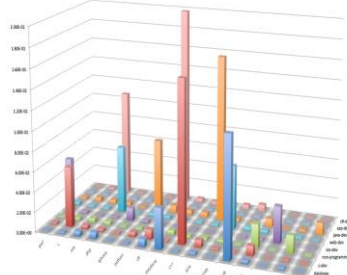
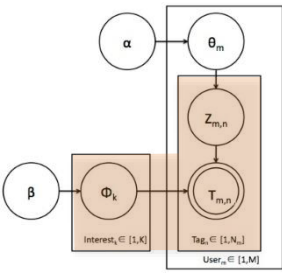


error tolerant graph
edit distance

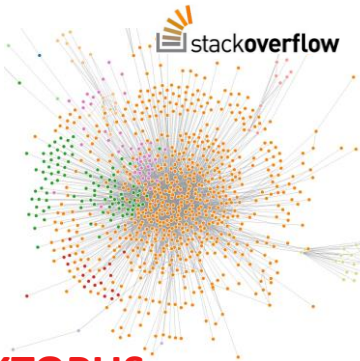
PRISSMA



context
ontology



tag, topic, user distribution



OCKTOPUS

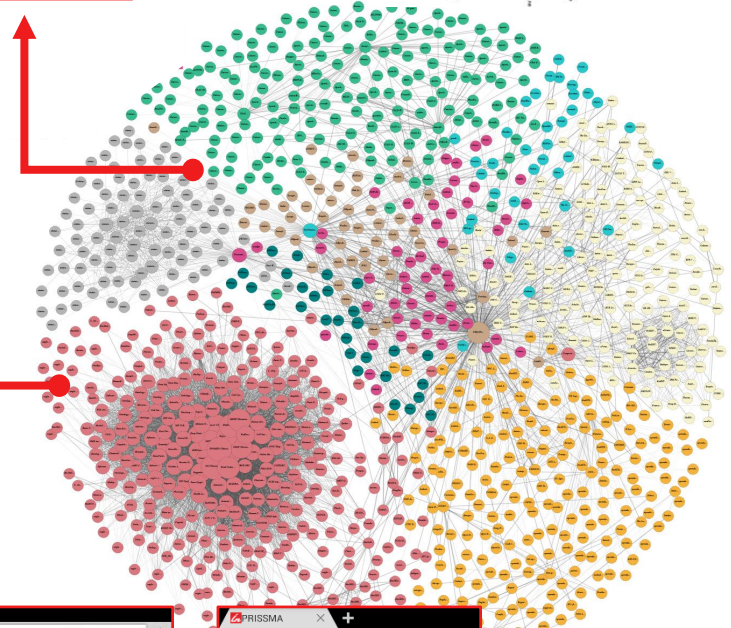
tag and folksonomy restructuring with prefix trees



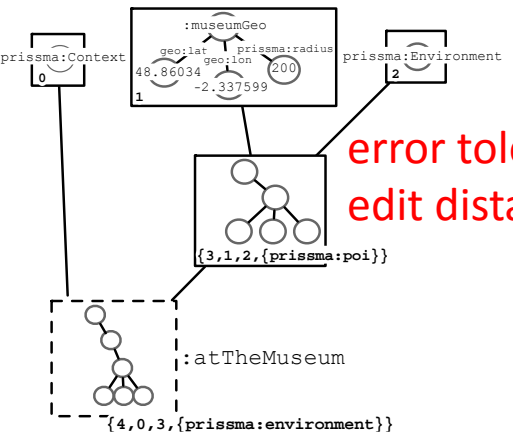
[Meng et al.]

MODELING USERS

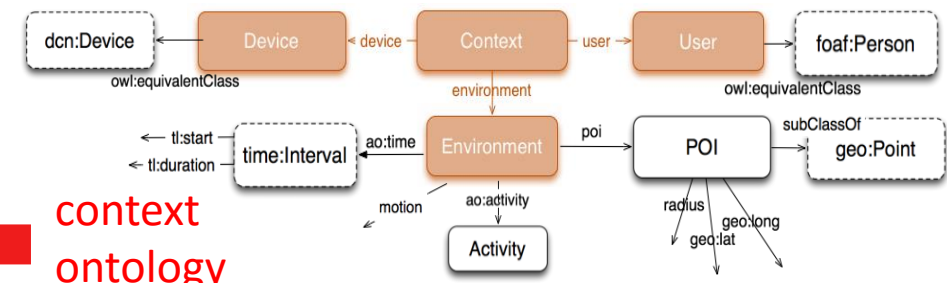
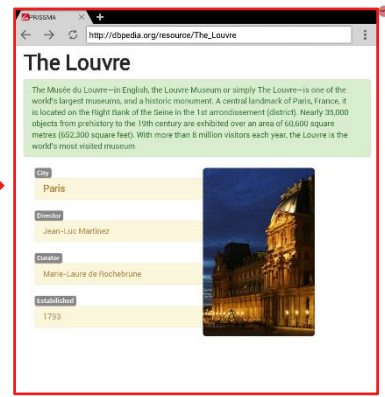
- individual context
- social structures



PRISSMA

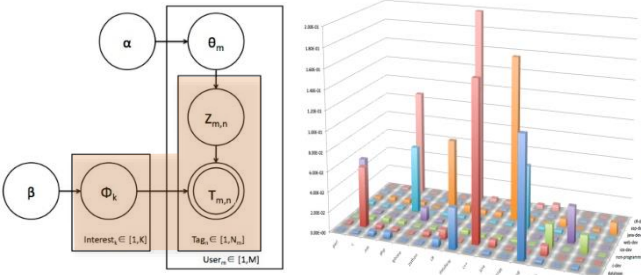


error tolerant graph edit distance

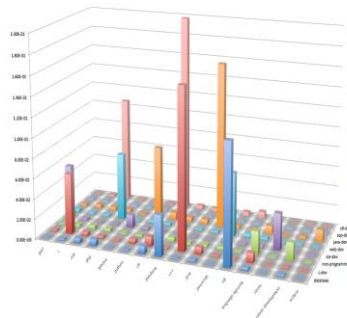


context ontology

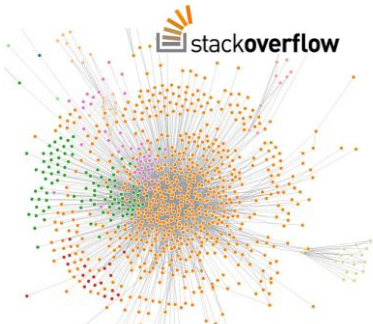
[Costabello et al.]



[Meng et al.]



tag, topic, user distribution



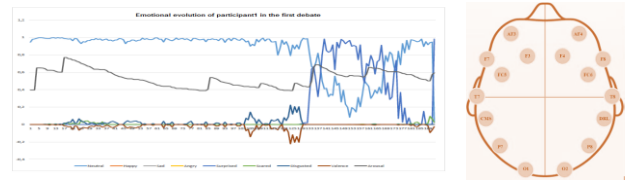
tag and folksonomy restructuring with prefix trees

[Villata, Cabrio et al.]

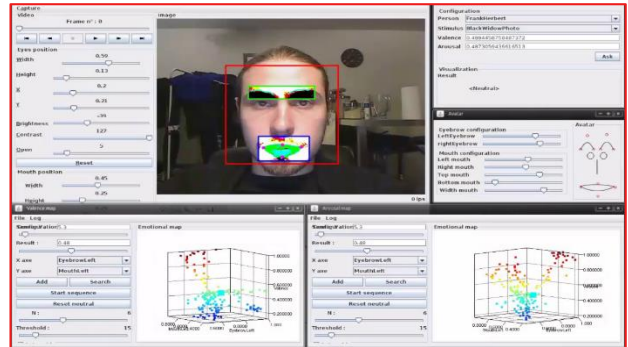


OCKTOPUS

EMOCA&SEEMPAD

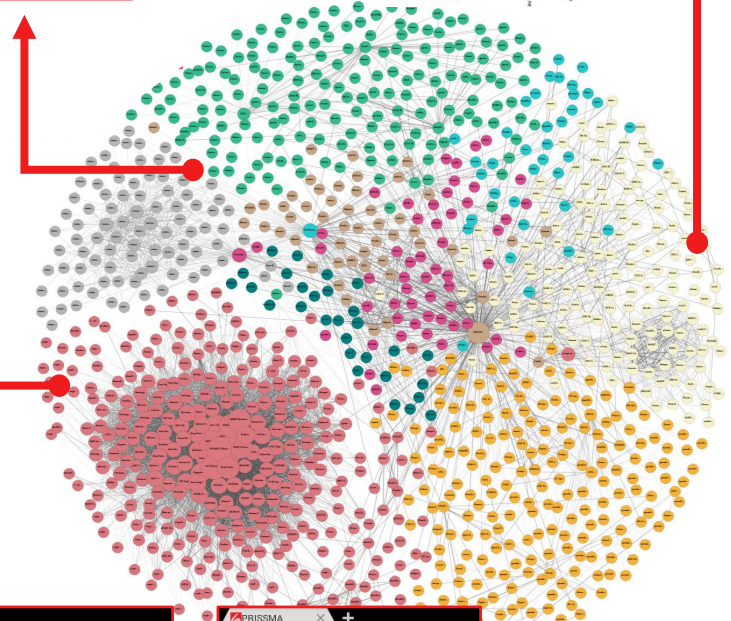


emotion detection & annotation

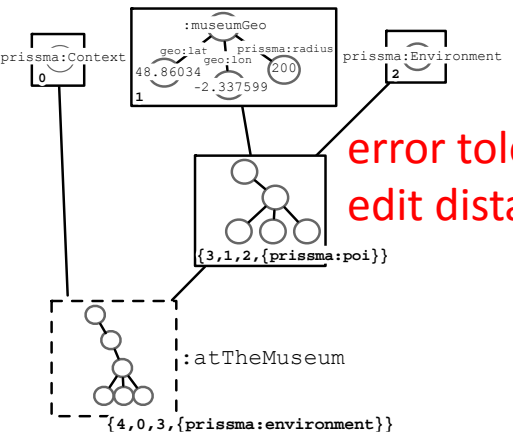


MODELING USERS

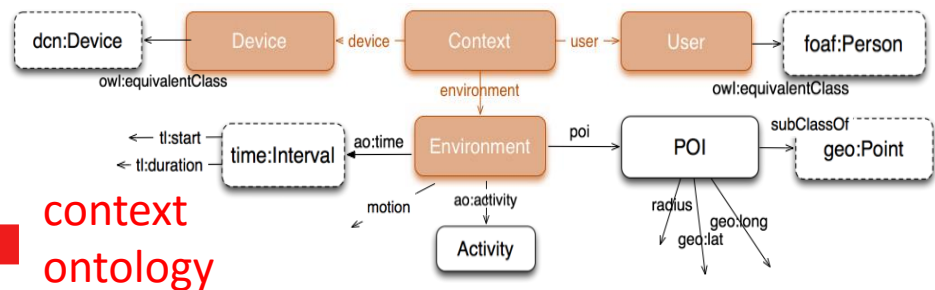
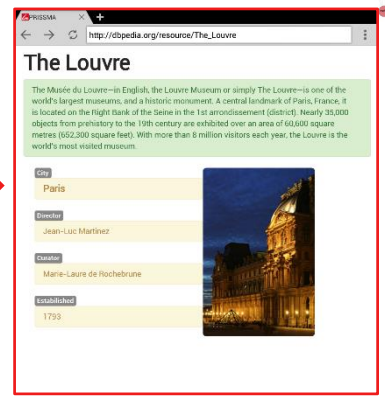
- individual context
- social structures



PRISSMA



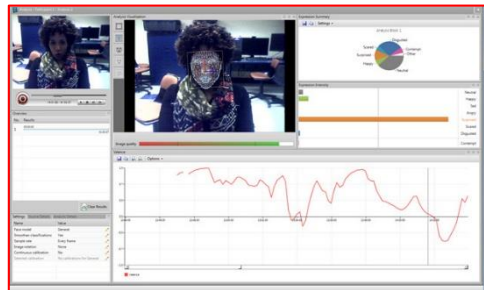
error tolerant graph edit distance



context ontology

[Costabello et al.]

DEBATES & EMOTIONS

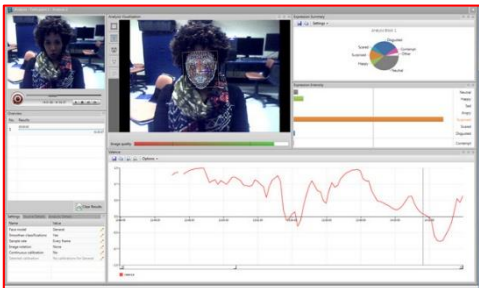


#IRC



| Dataset | | | | |
|--|------------|------------|------------|------------|
| Topic | #arg | #pair | #att | #sup |
| BAN ANIMAL TESTING | 49 | 28 | 18 | 10 |
| GO NUCLEAR | 40 | 24 | 15 | 9 |
| HOUSEWIVES SHOULD BE PAID | 42 | 18 | 11 | 7 |
| RELIGION DOES MORE HARM THAN GOOD | 46 | 23 | 11 | 12 |
| ADVERTISING IS HARMFUL | 71 | 16 | 6 | 10 |
| BULLIES ARE LEGALLY RESPONSIBLE | 71 | 12 | 3 | 9 |
| DISTRIBUTE CONDOMS IN SCHOOLS | 68 | 27 | 11 | 16 |
| ENCOURAGE FEWER PEOPLE TO GO TO THE UNIVERSITY | 55 | 14 | 7 | 7 |
| FEAR GOVERNMENT POWER OVER INTERNET | 41 | 32 | 18 | 14 |
| BAN PARTIAL BIRTH ABORTIONS | 41 | 26 | 15 | 11 |
| USE RACIAL PROFILING FOR AIRPORT SECURITY | 31 | 10 | 1 | 9 |
| CANNABIS SHOULD BE LEGALIZED | 43 | 33 | 20 | 13 |
| TOTAL | 598 | 263 | 136 | 127 |

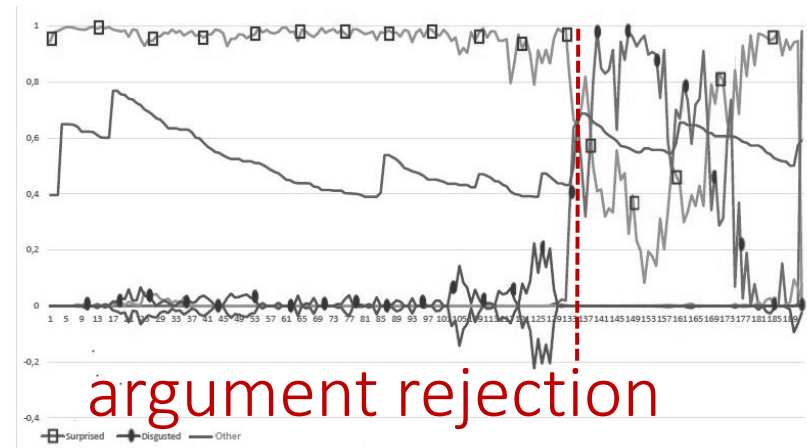
DEBATES & EMOTIONS



#IRC



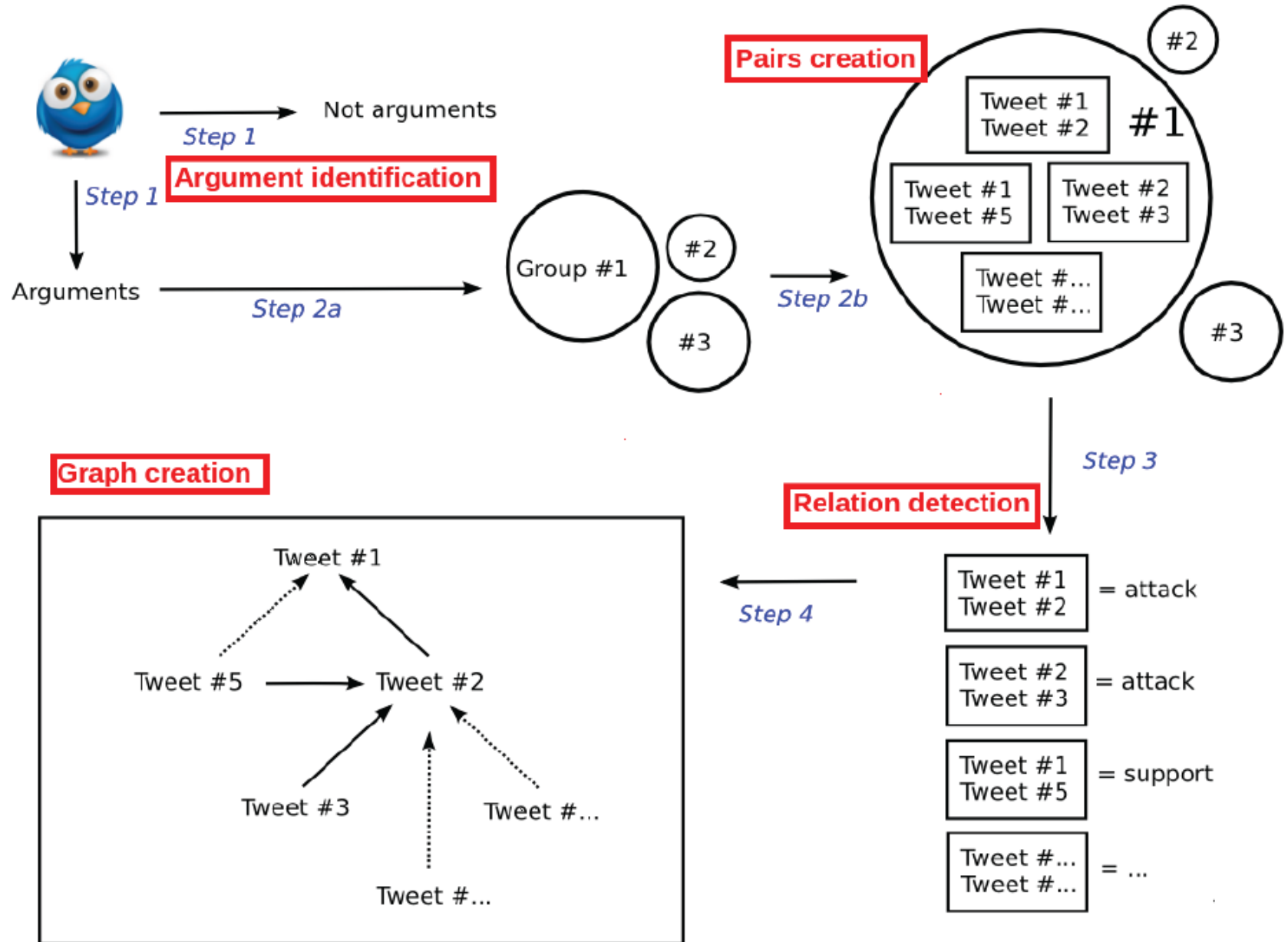
| Dataset | | | | |
|--|------------|------------|------------|------------|
| Topic | #arg | #pair | #att | #sup |
| BAN ANIMAL TESTING | 49 | 28 | 18 | 10 |
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| ENCOURAGE FEWER PEOPLE TO GO TO THE UNIVERSITY | 55 | 14 | 7 | 7 |
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| USE RACIAL PROFILING FOR AIRPORT SECURITY | 31 | 10 | 1 | 9 |
| CANNABIS SHOULD BE LEGALIZED | 43 | 33 | 20 | 13 |
| TOTAL | 598 | 263 | 136 | 127 |



| | NB ARG | ATTACK | SUPPORT |
|------------|---------|---------|---------|
| Pleasant | 0,7067 | -0,3383 | -0,3800 |
| Unpleasant | -0,7067 | 0,3383 | 0,3800 |
| High ENG | -0,6903 | -0,3699 | -0,1117 |
| LowENG | -0,1705 | 0,5337 | -0,0615 |
| Neutral | 0,8887 | -0,0895 | -0,3739 |
| Disgusted | 0,1017 | 0,8379 | 0,5227 |
| Scared | 0,2606 | -0,4132 | -0,7107 |
| Angry | -0,7384 | -0,5072 | -0,0937 |

attacks-disgust

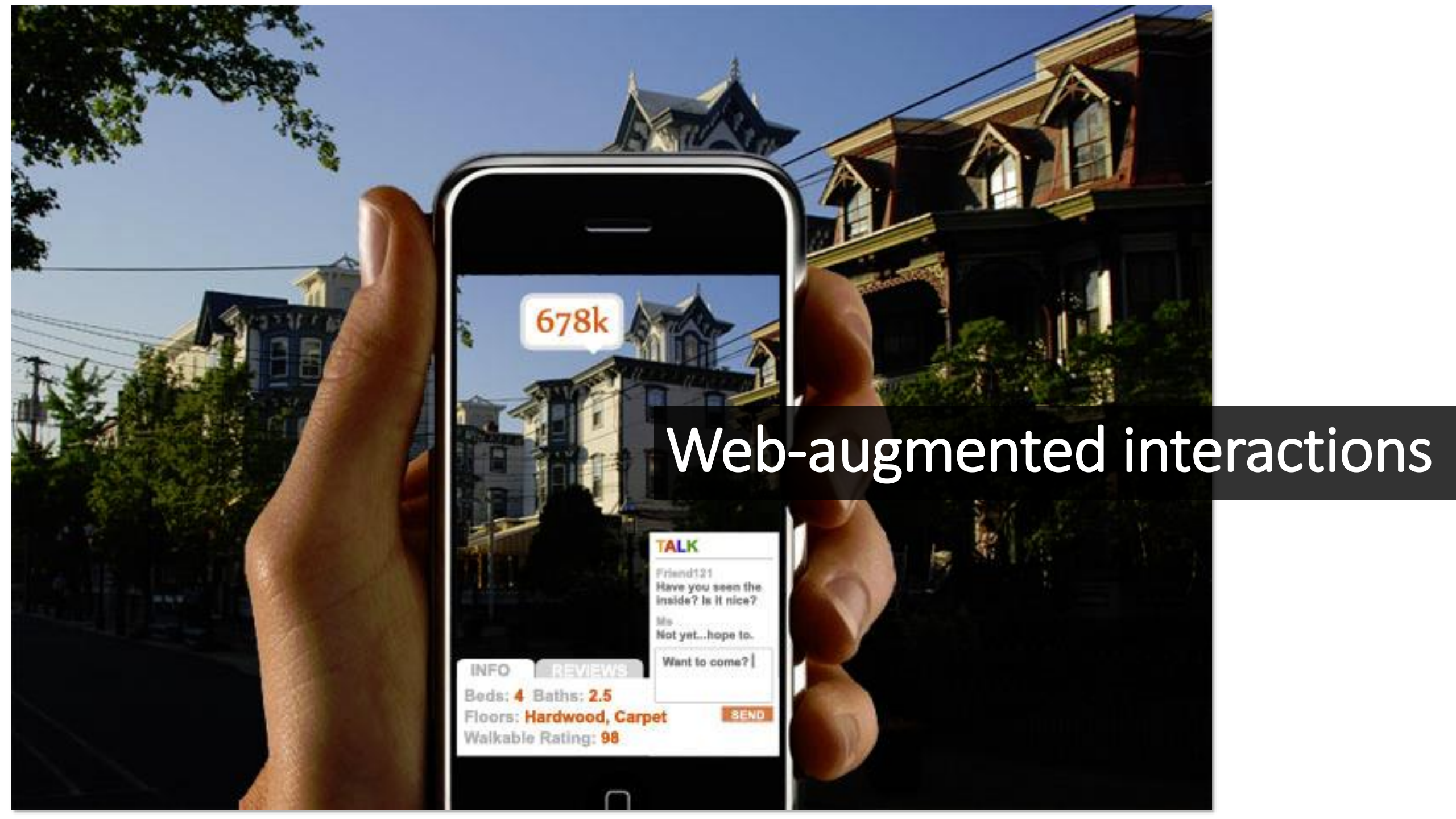
Argument mining pipeline



OPINIONS

NLP, ML and arguments

[Villata, Cabrio, et al.]



678k

Web-augmented interactions

TALK

Friend121
Have you seen the
inside? Is it nice?
Me
Not yet...hope to.

Want to come? |

SEND

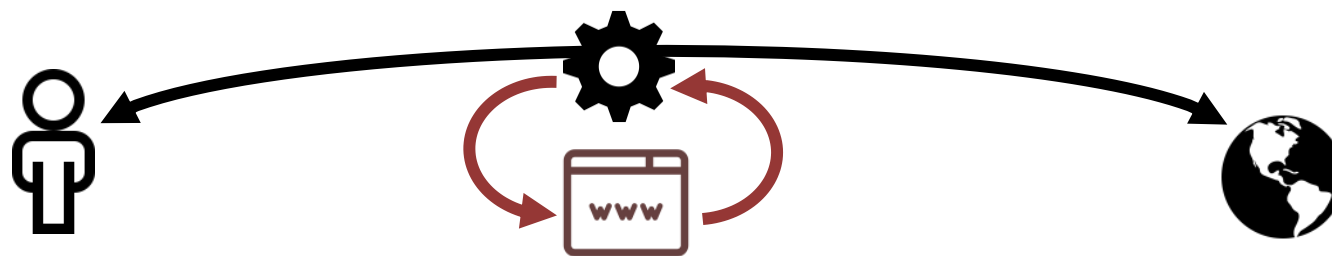
INFO

REVIEWS

Beds: 4 Baths: 2.5

Floors: Hardwood, Carpet

Walkable Rating: 98



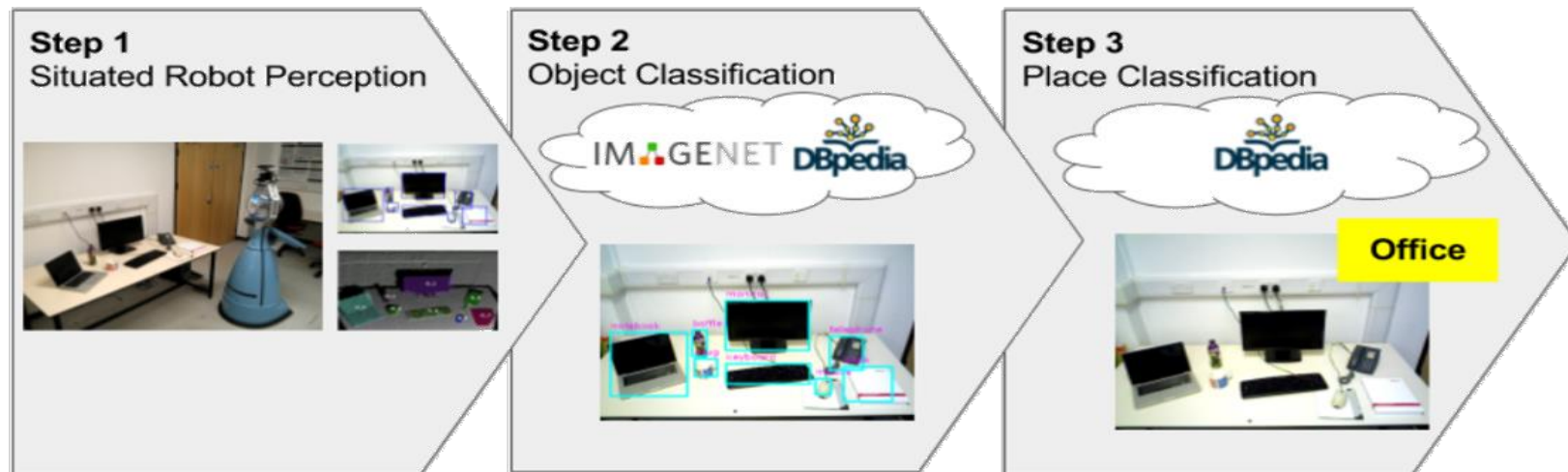
« *a Web-Augmented Interaction (WAI) is a user's interaction with a system that is improved by allowing the system to access Web resources* »



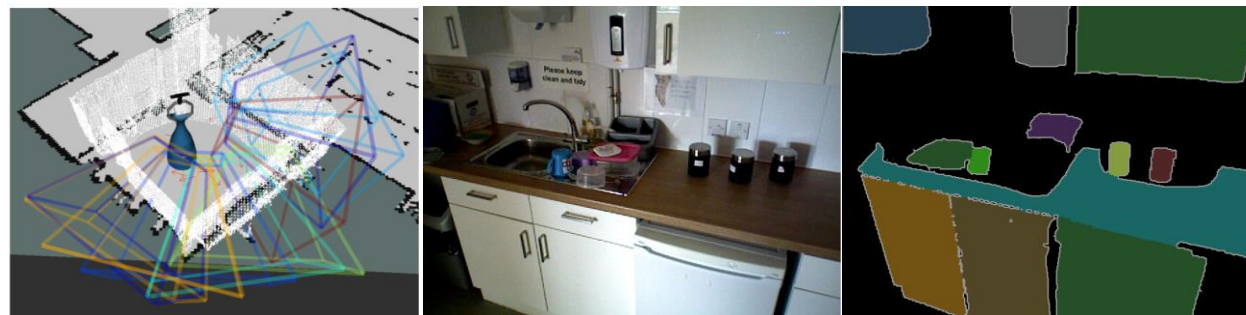
[Gandon, Giboin, WebSci17]



[Cabrio, Basile et al.]

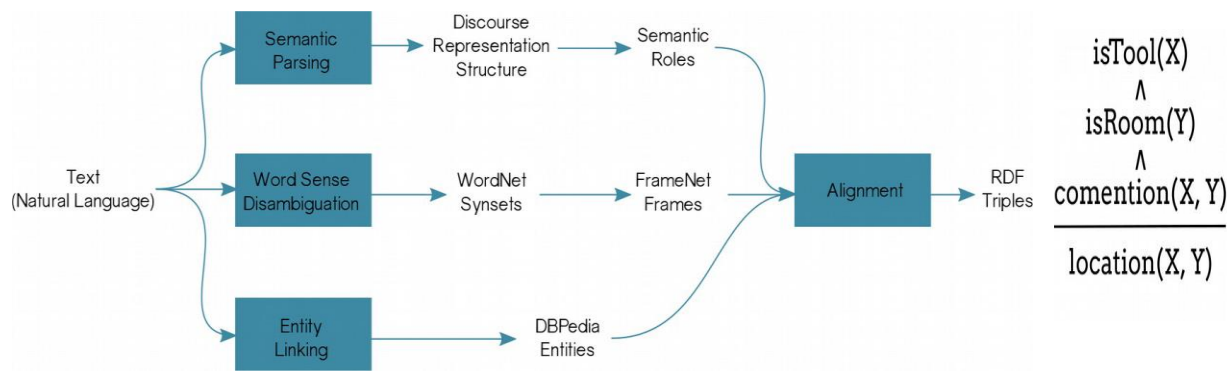


ALOOF: Web and Perception



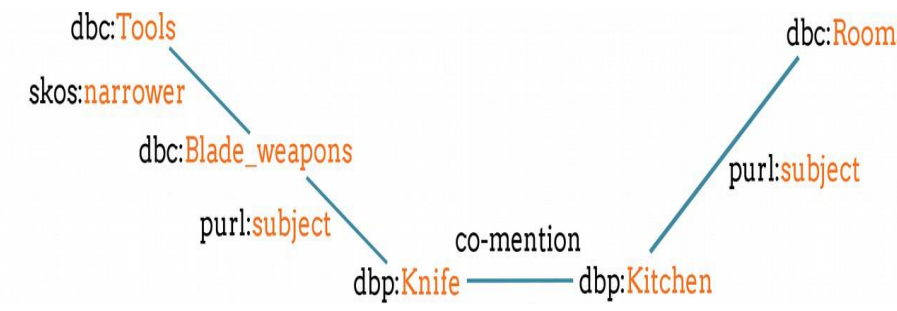
Semantic Web-Mining and Deep Vision for Lifelong Object Discovery (ICRA 2017)

Making Sense of Indoor Spaces using Semantic Web Mining and Situated Robot Perception (AnSWeR 2017)



isTool(X)
 \wedge
 isRoom(Y)
 \wedge
 comention(X, Y)

 location(X, Y)



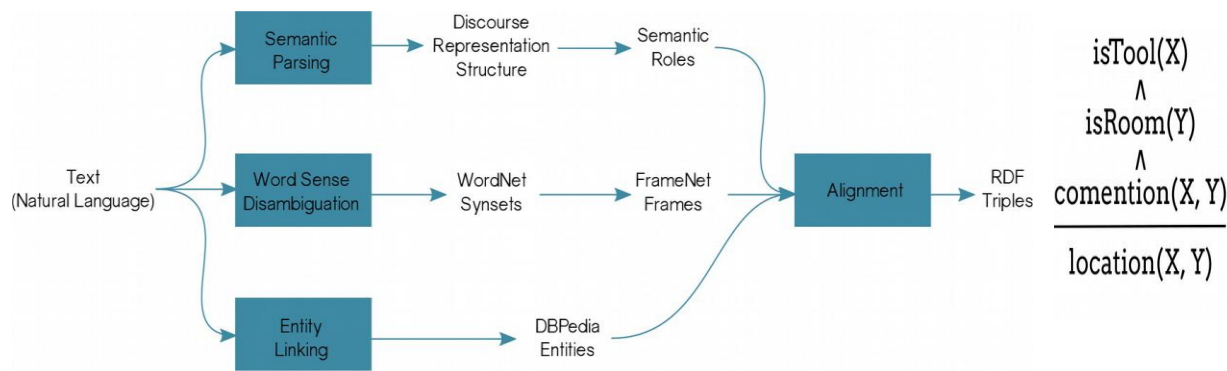
Annie cuts the bread in the kitchen with her knife → **dbp:Knife alsoof:Location dbp:Kitchen**

ALOOF: robots learning by reading on the Web

[Cabrio, Basile et al.]

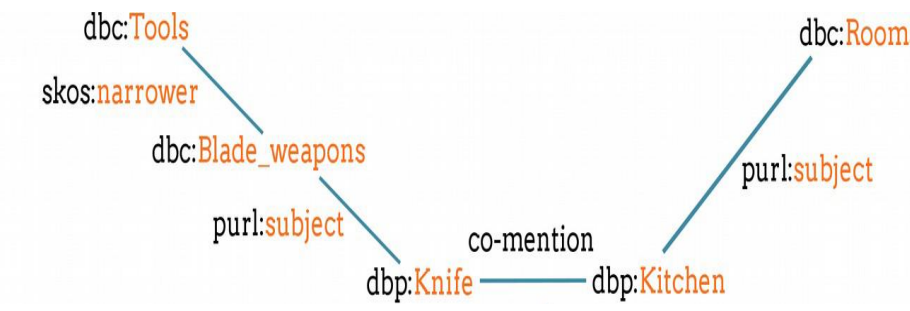


[Cabrio, Basile et al.]



isTool(X)
 \wedge
 isRoom(Y)
 \wedge
 comention(X, Y)

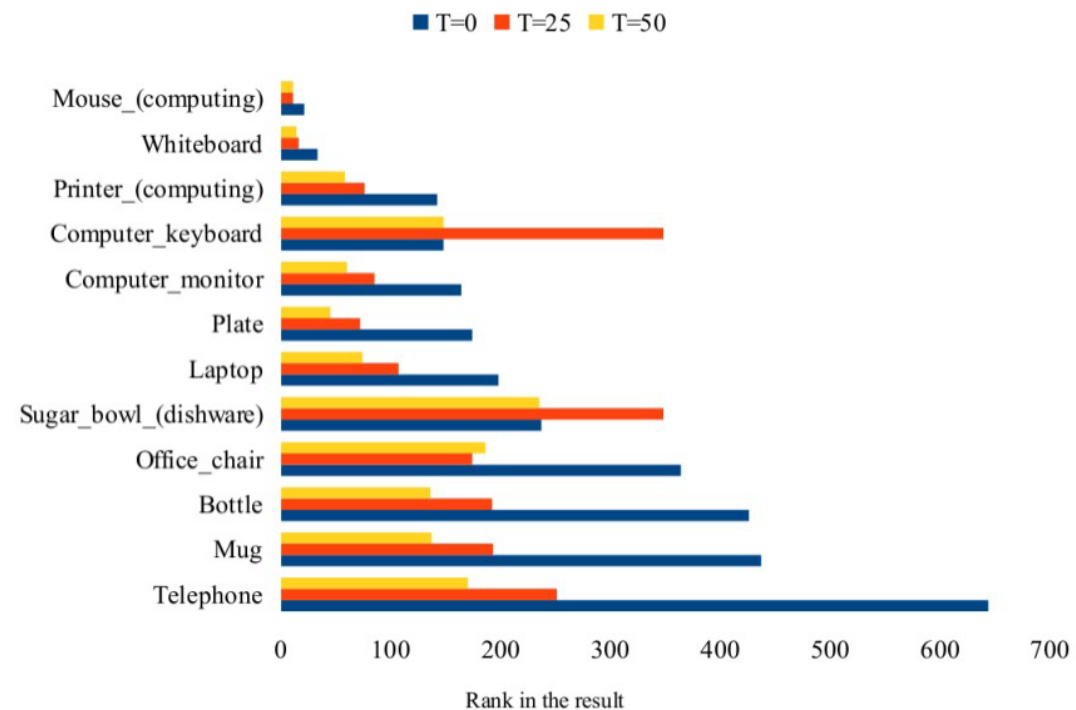
 location(X, Y)



Annie cuts the bread in the kitchen with her knife \rightarrow dbp:Knife alsoof:Location dbp:Kitchen

ALOOF: robots learning by reading on the Web

- First Object Relation Knowledge Base: 46212 co-mentions, 49 tools, 14 rooms, 101 “possible location” relations, 696 tuples <entity, relation, frame>
- Evaluation: 100 domestic implements, 20 rooms, 2000 crowdsourcing judgements
- Object co-occurrence for coherence building



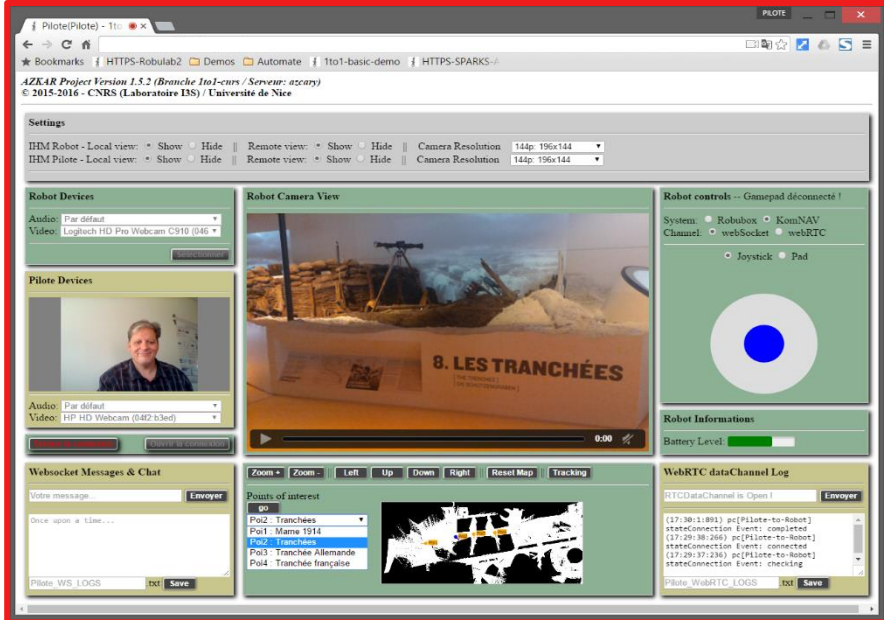
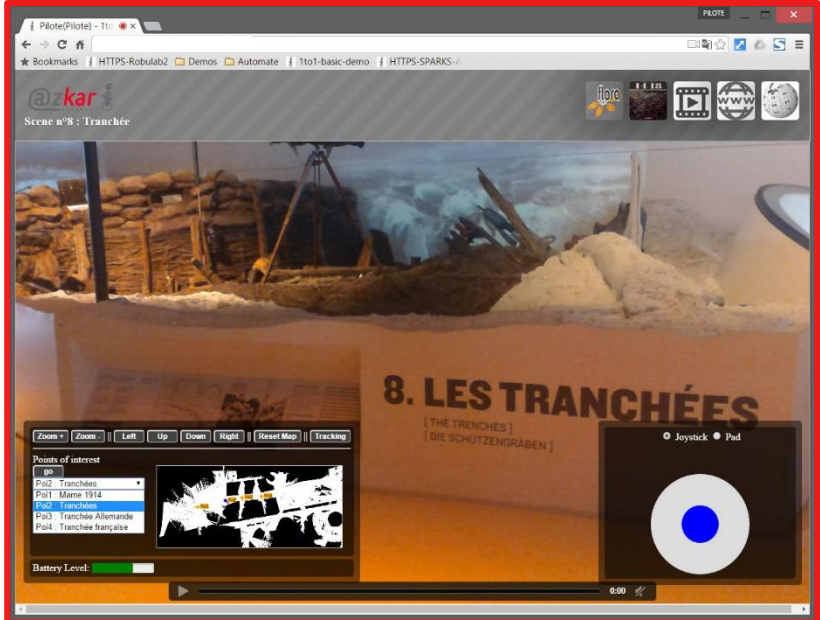


DeKO

ALOOF: RDF dataset about objects

- common sense knowledge about objects: classification, prototypical locations and actions
- knowledge extracted from natural language parsing, crowdsourcing, distributional semantics, keyword linking, ...

[Cabrio, Basile et al.]

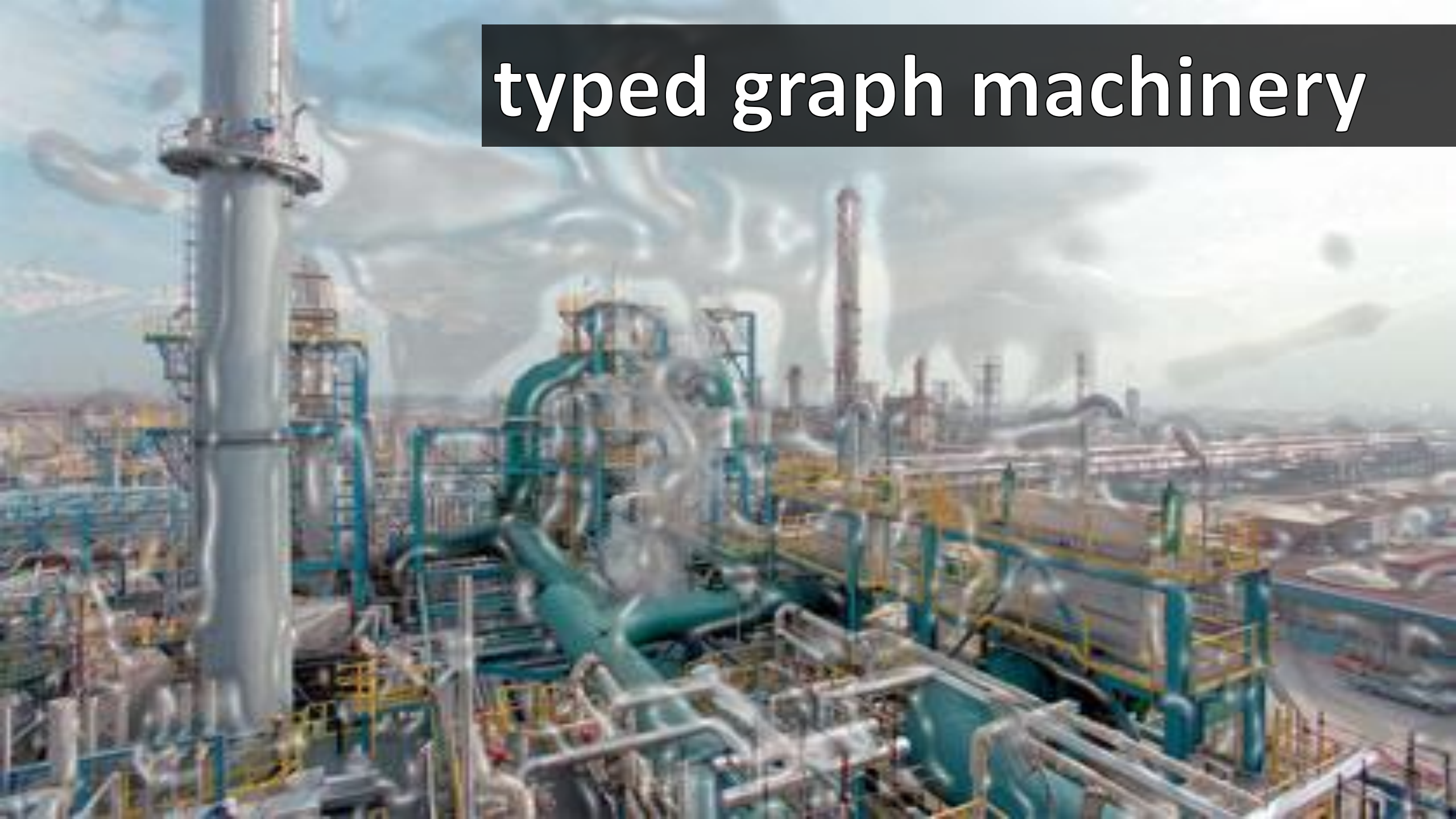


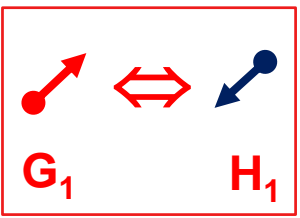
AZKAR

remotely visit and interact with a museum through a robot and via the Web

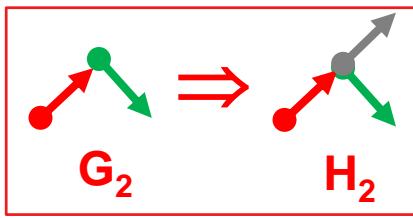


typed graph machinery

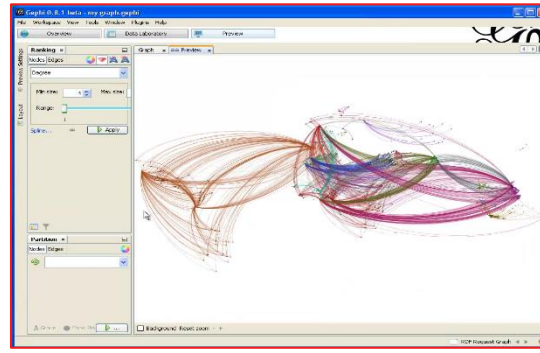
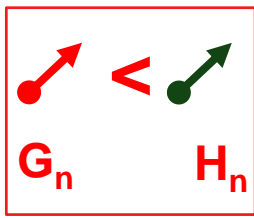




&



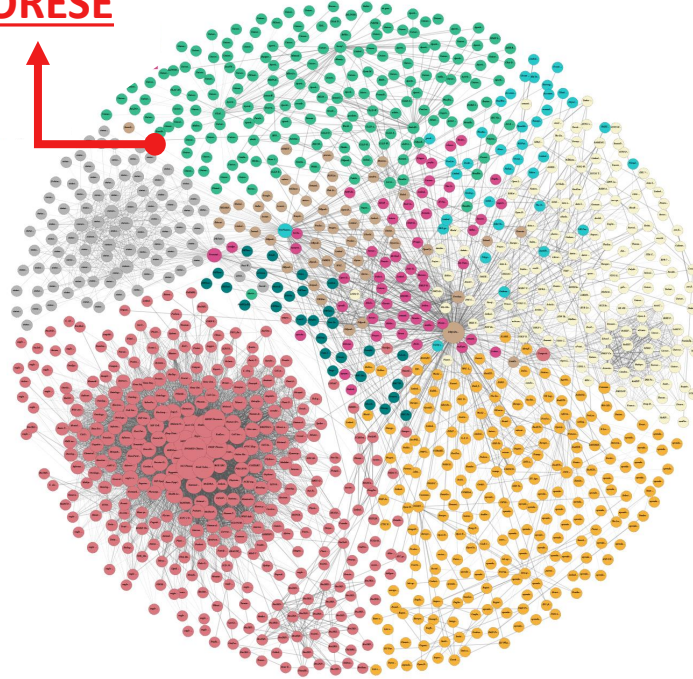
&



[Corby, Faron-Zucker et al.]

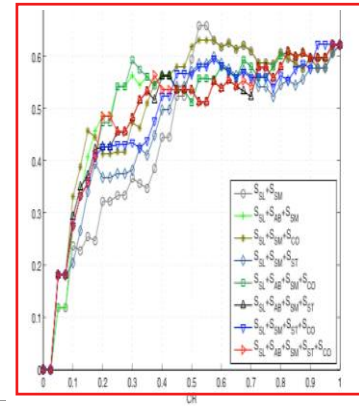
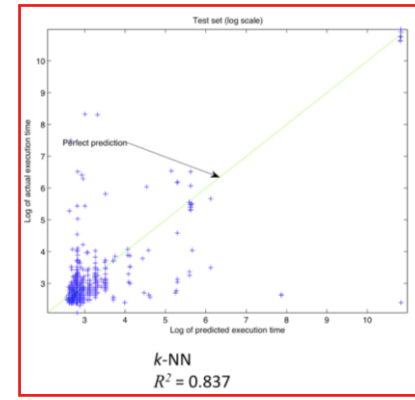
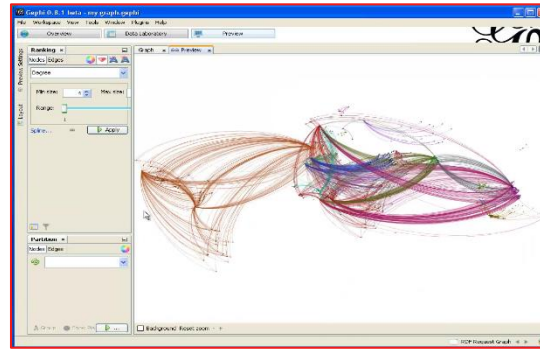
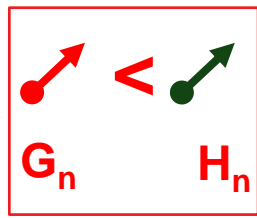
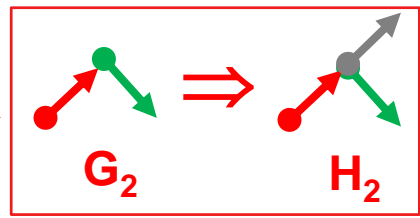
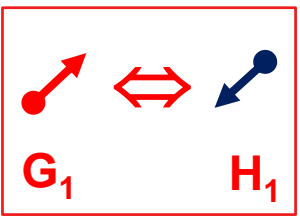
abstract graph machine
STTL

CORESE



QUERY & INFER

- graph rules and queries
- deontic reasoning
- induction



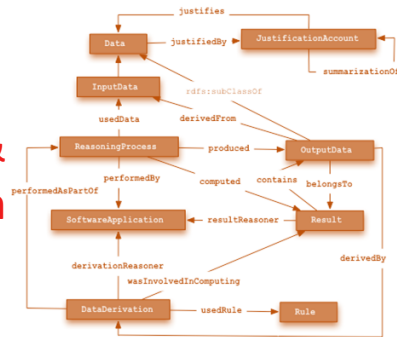
[Corby, Faron-Zucker et al.]

abstract graph machine
STTL

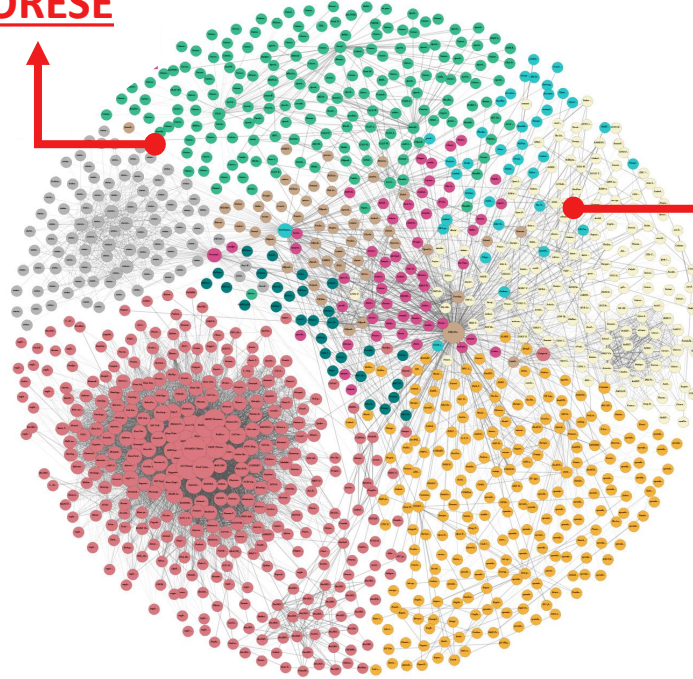
CORESE

RATIO4TA

predict & explain

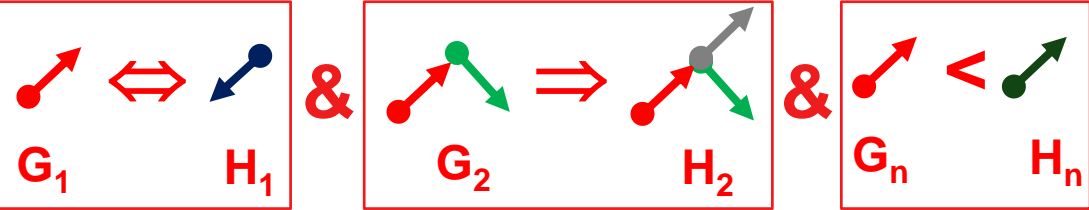


[Hasan et al.]



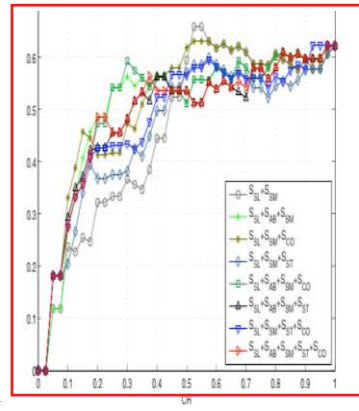
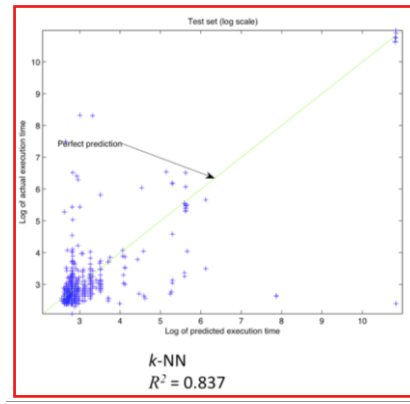
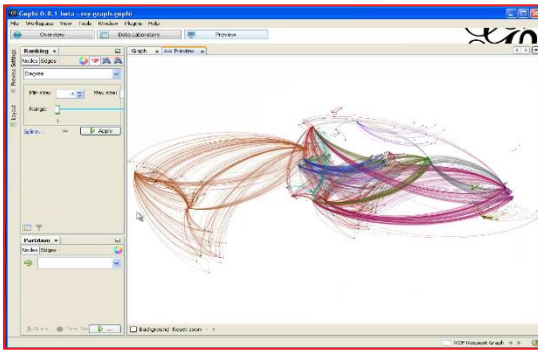
QUERY & INFER

- graph rules and queries
- deontic reasoning
- induction



[Corby, Faron-Zucker et al.]

abstract graph machine
STTL

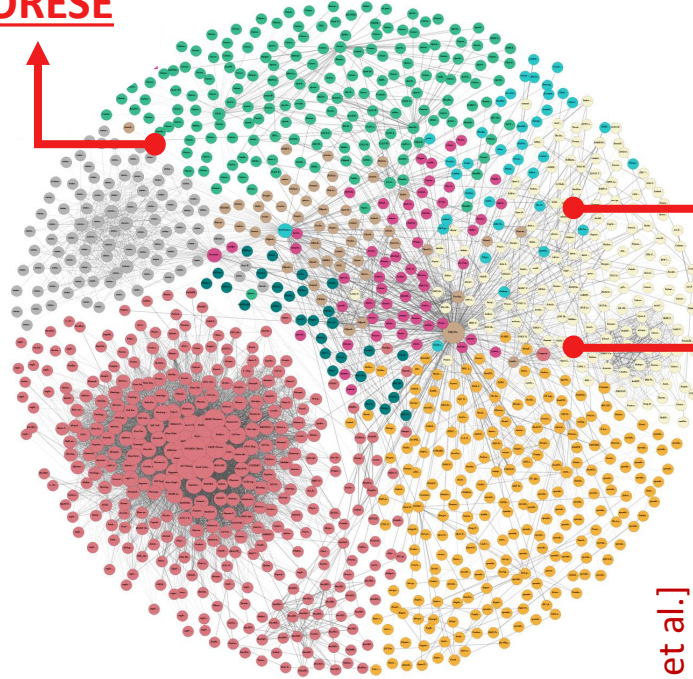


QUERY & INFER

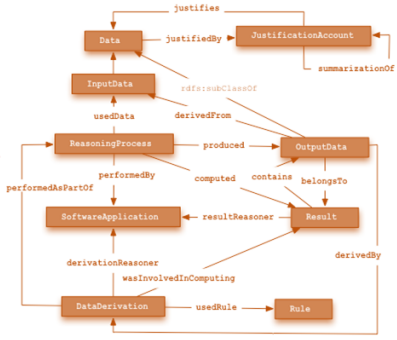
- graph rules and queries
- deontic reasoning
- induction

CORESE

RATIO4TA



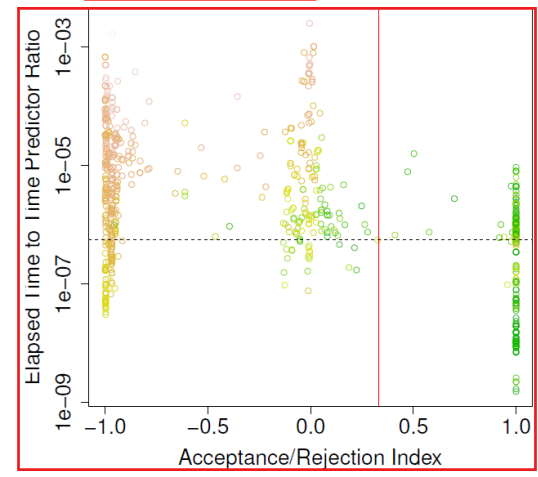
predict & explain



[Hasan et al.]

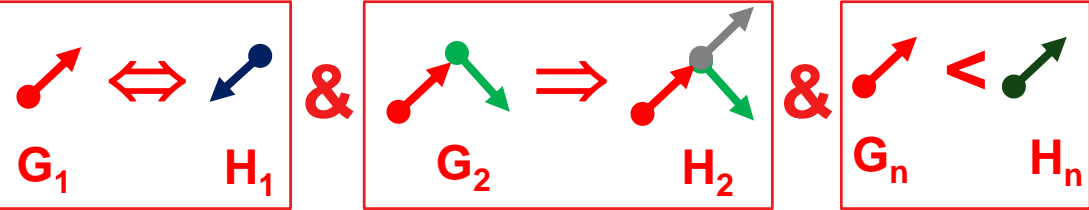
INDUCTION

[Tettamanzi et al.]



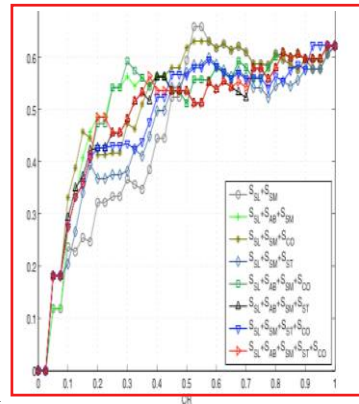
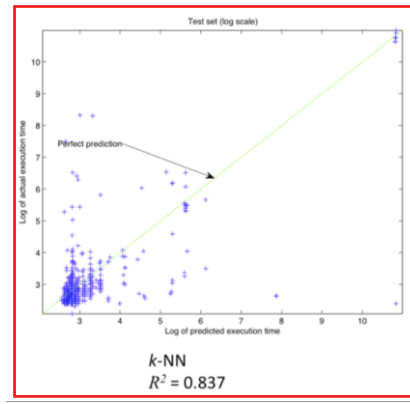
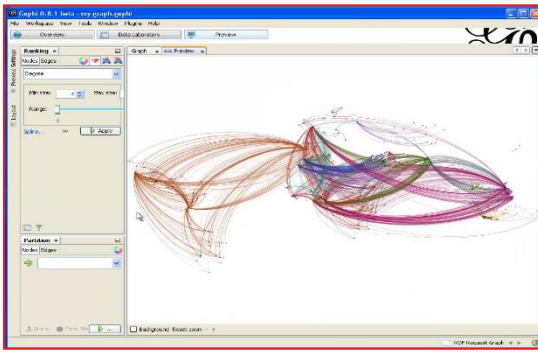
find missing knowledge

$\phi = \text{SubClassOf}(\text{dbo:LaunchPad } \text{dbo:Infrastructure})$



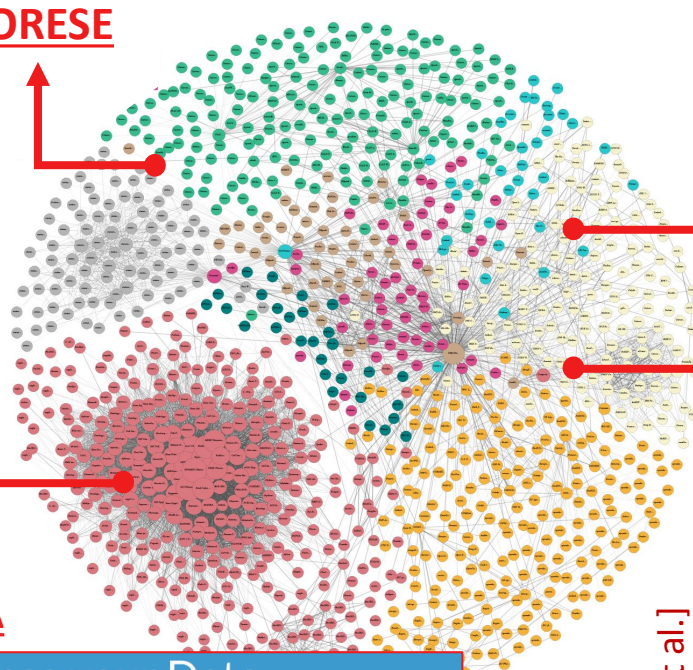
[Corby, Faron-Zucker et al.]

abstract graph machine
STTL



QUERY & INFER

- graph rules and queries
- deontic reasoning
- induction



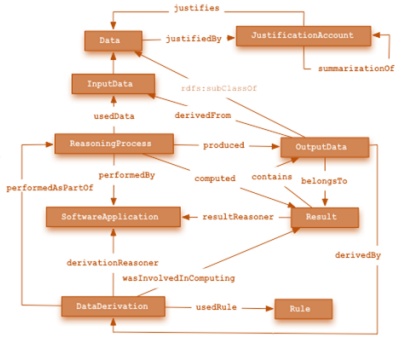
CORESE

RATIO4TA

LICENTIA

INDUCTION

predict & explain



[Hasan et al.]

License your Data

Licentia is a suite of services to support you in looking for a suitable license for your data. Select the service you need from the list below!

| | | |
|----------------------------------|--|-----------------------------------|
| Find a license for your Data | Check if a license is compatible with your needs | Visualize & download licenses |
|----------------------------------|--|-----------------------------------|

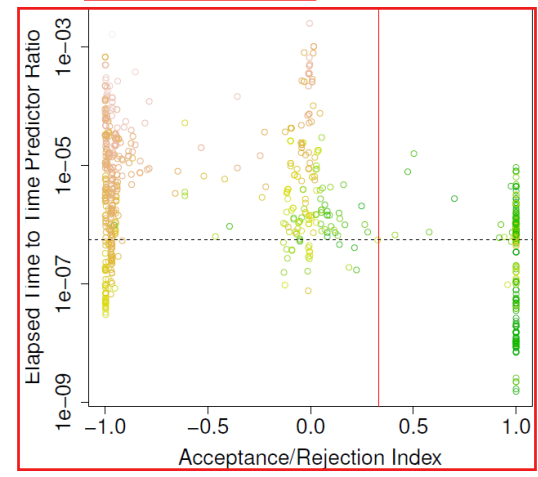
deontic reasoning, license compatibility and composition
[Villata et al.]

$$L = \{l_1, l_2\}$$

$$R^{O1} = \{r_1 : \Rightarrow_0^{l_1} Attribution, \quad r_2 : \rightsquigarrow_0^{l_1} Commercial\}$$

$$R^{O2} = \{r_3 : \Rightarrow_0^{l_2} \sim Commercial, \quad r_4 : \Rightarrow_0^{l_2} ShareAlike, \quad r_5 : \rightsquigarrow_0^{l_2} Derivative\}$$

[Tettamanzi et al.]

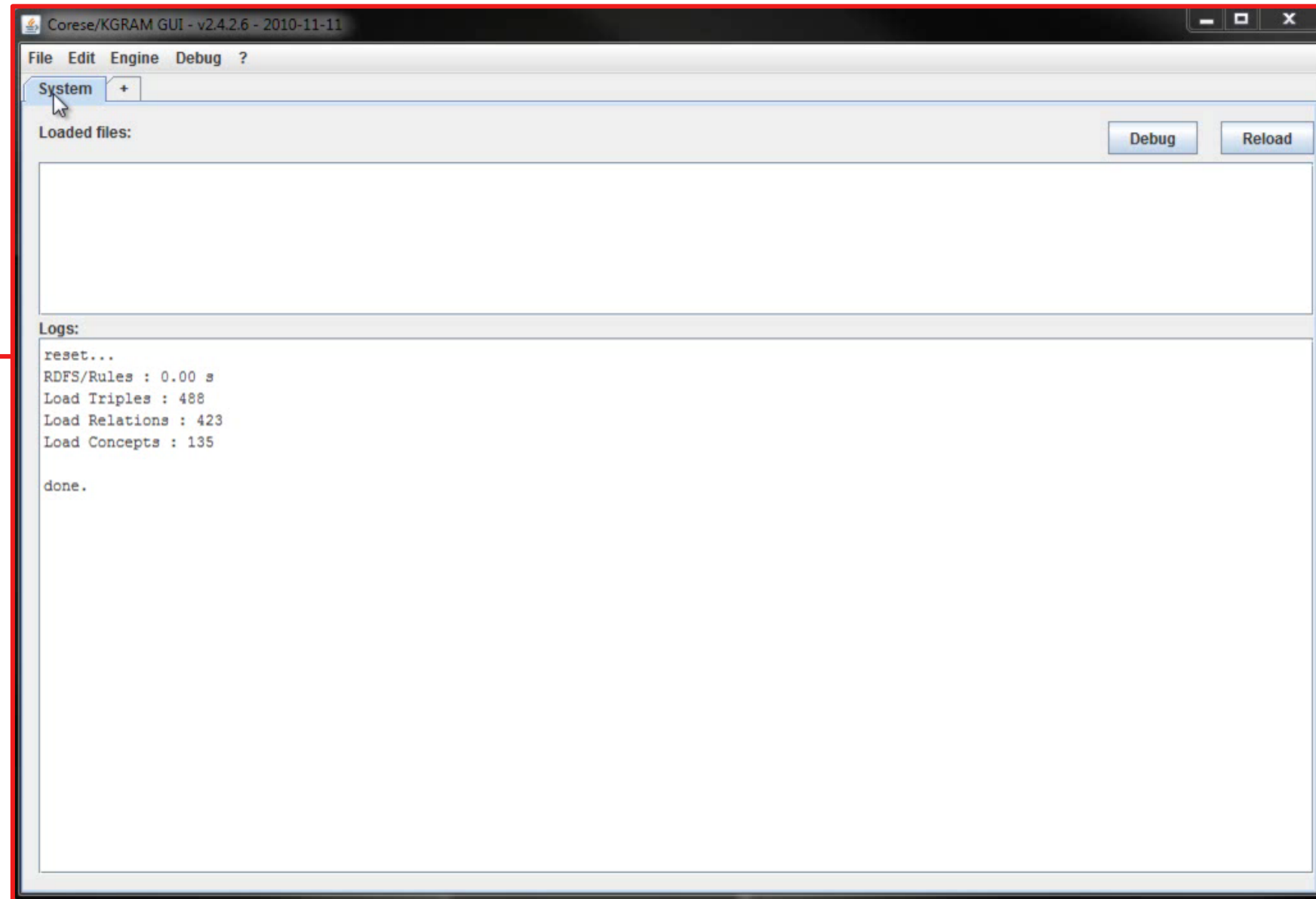


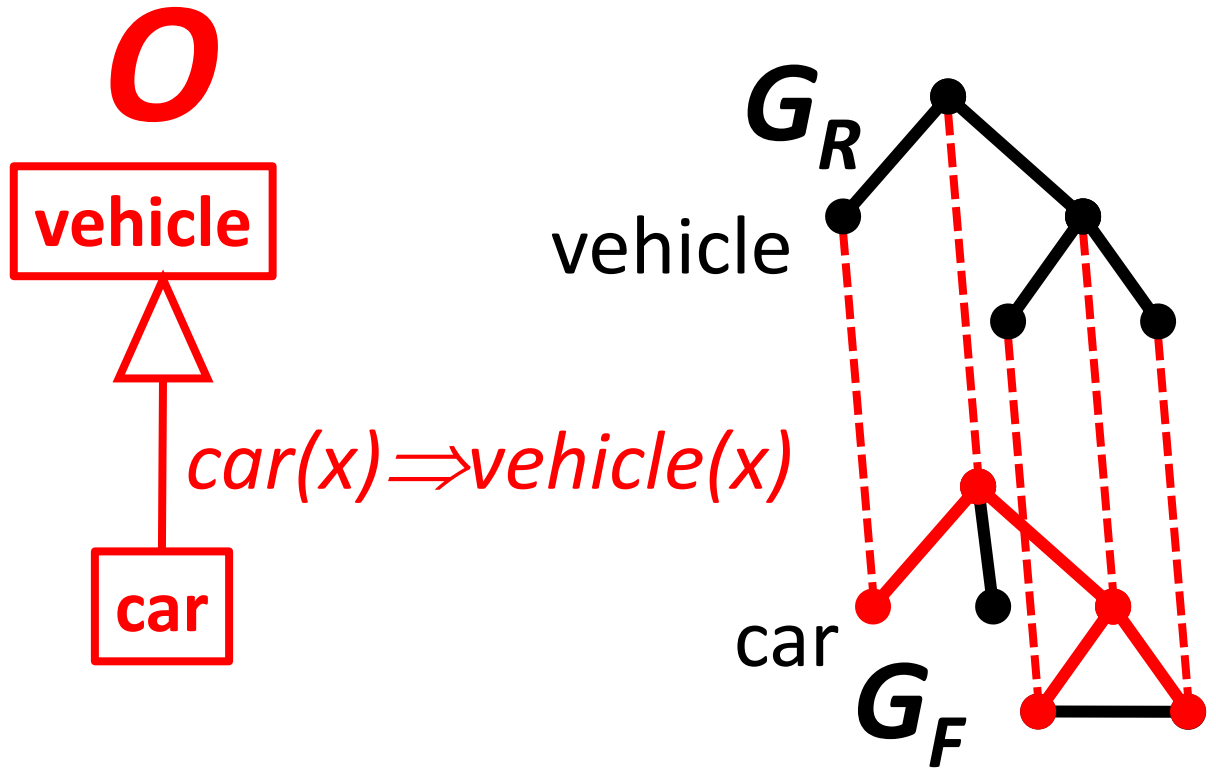
find missing knowledge

$$\phi = \text{SubClassOf}(\text{dbo:LaunchPad} \text{ dbo:Infrastructure})$$

QUERY & INFER

e.g. CORESE/KGRAM
[Corby et al.]



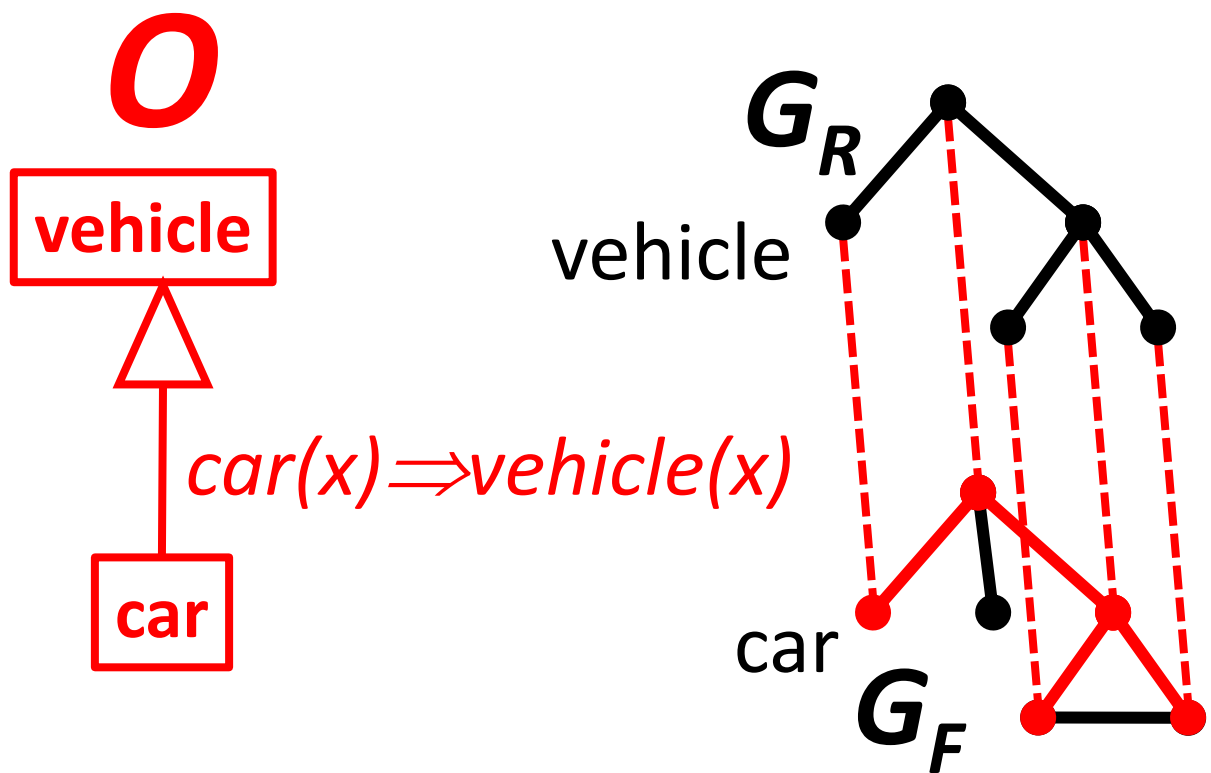


$F \wedge O \rightarrow R \Leftrightarrow G_F \leq G_R$

mapping modulo an ontology

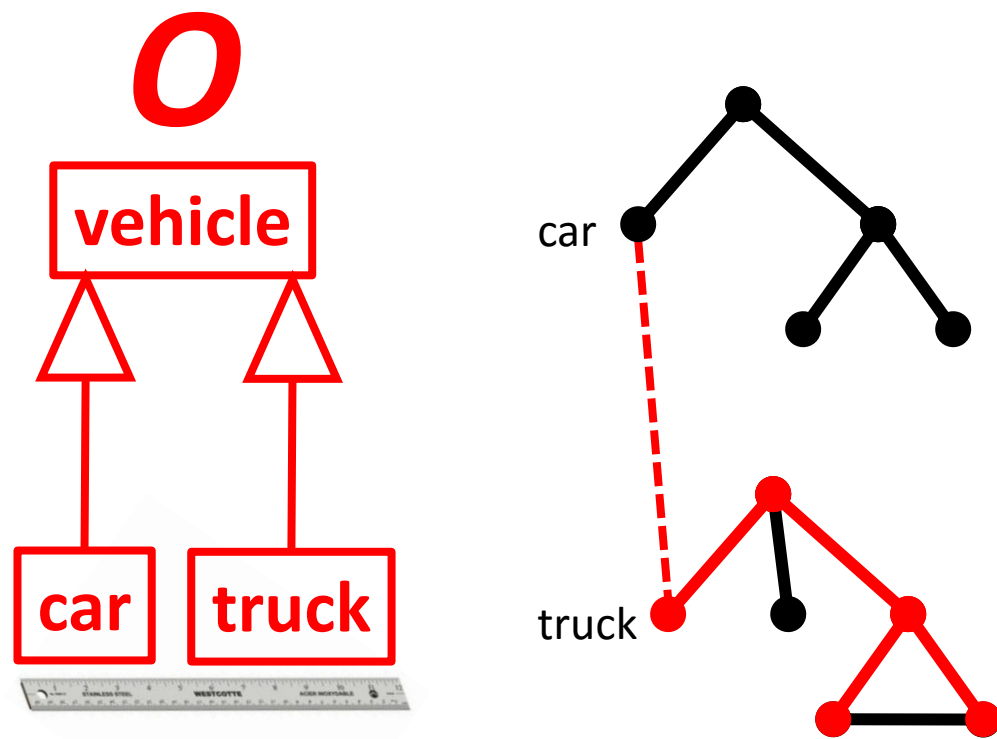
| RIF-BLD | SPARQL | RIFSPARQL |
|--|--|-----------|
| ?x | ?x | ✓ |
| C | C | ✓ |
| List(T ₁ ... T _n) | (T ₁ '... T _n ') | ✓ |
| OpenList(T ₁ ... T _n T) | ✓ | ✓ |
| External(op((T ₁ ... T _n))) | Filter(op' (T ₁ '... T _n ')) | ✓ |
| T ₁ = T ₂ | Filter(T ₁ ' = T ₂ ') | 📦 |
| X # C | X' rdf:type C' | ✓ |
| T ₁ ## T ₂ | T ₁ ' rdfs:subClassOf T ₂ ' | ✓ |
| C(A ₁ ->V ₁ ...A _n ->V _n) | | ✓ |
| C(T ₁ ... T _n) | | ✓ |
| AND(A ₁ ... A _n) | A ₁ '... A _n ' | ✓ |
| Or(A ₁ ... A _n) | {A ₁ '}...UNION {A _n '} | ✓ |
| ✓ | OPTIONAL{B} | ✓ |
| Exists ?x1... ?xn (A) | A' | ✓ |
| Forall ?x1... ?xn (H) | ✓ | ✓ |
| Forall ?x1... ?xn (H:- B) | CONSTRUCT { H' WHERE{ B'} | 📦 |

equivalence
 restrictions
 no equivalence
 extensions



$$F \wedge O \rightarrow R \Leftrightarrow G_F \leq G_R$$

mapping modulo an ontology



$$t_1(x) \Rightarrow t_2(x) \rightarrow d(t_1, t_2) < \text{threshold}$$

$$\forall (t_1, t_2) \in H_c^2 \text{ let } dist(t_1, t_2) = \min_{\{t \geq t_1, t \geq t_2\}} (l_{H_c}(t_1, t) + l_{H_c}(t_2, t))$$

$$\forall (t_1, t_2) \in H_c^2; t_1 \leq t_2 \text{ let } l_{H_c}(t_1, t_2) = \sum_{\{t \in \langle t_1, t_2 \rangle, t \neq t_1\}} \left[\frac{1}{2^{\text{depth}(t)}} \right]$$

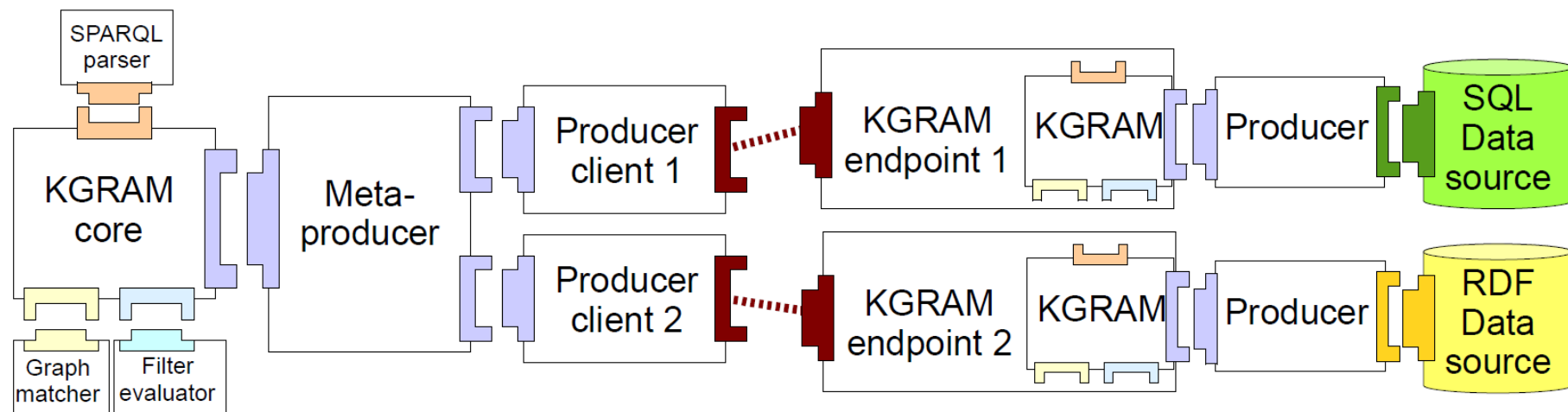
LDSCRIPT [Corby, Faron Zucker, Gandon, ISWC 2017]

a Linked Data Script Language

```
FUNCTION us:status(?x) {  
IF (EXISTS { ?x ex:hasSpouse ?y } || EXISTS { ?y ex:hasSpouse ?x },  
    ex:Married, ex:Single) }
```

$$\frac{}{\mu, \rho[x=v] \vdash x \rightarrow v} \quad (1) \quad \frac{x \notin \rho}{\mu[x=v], \rho \vdash x \rightarrow v}$$
$$\frac{f() \Rightarrow f() = \text{body} \wedge \emptyset, \emptyset \vdash \text{body} \rightarrow \text{res}}{\mu, \rho \vdash f() \rightarrow \text{res}}$$
$$\frac{f(e_1, \dots, e_n) \Rightarrow f(x_1, \dots, x_n) = \text{body}}{\mu, \rho \vdash e_1 \rightarrow v_1}$$
$$\dots$$
$$\frac{\mu, \rho \vdash e_n \rightarrow v_n \quad \emptyset, [x_1 := v_1; \dots, x_n := v_n] \vdash \text{body} \rightarrow \text{res}}{\mu, \rho \vdash f(e_1, \dots, e_n) \rightarrow \text{res}}$$
$$\frac{\mu, \rho \vdash e_1 \rightarrow v_1 \wedge \mu, \rho[x := v_1] \vdash e_2 \rightarrow \text{res}}{\mu, \rho \vdash \text{let}(x = e_1, e_2) \rightarrow \text{res}}$$
$$\frac{\mu, \rho \vdash e \rightarrow (v_1, \dots, v_n) \quad \mu, \rho[x := v_1] \vdash b \rightarrow r_1 \quad \dots \quad \mu, \rho[x := v_n] \vdash b \rightarrow r_n}{\mu, \rho \vdash \text{for}(x = e, b) \rightarrow \text{true}}$$
$$\frac{\mu, \rho \vdash e \rightarrow (v_1, \dots, v_n) \quad \mu, \rho \vdash f(v_1) \rightarrow r_1 \quad \dots \quad \mu, \rho \vdash f(v_n) \rightarrow r_n}{\mu, \rho \vdash \text{map}(f, e) \rightarrow \text{true}}$$
$$\frac{\mu, \rho \vdash e \rightarrow f \wedge \mu, \rho \vdash f(e_1, \dots, e_n) \rightarrow v}{\mu, \rho \vdash \text{funcall}(e, e_1, \dots, e_n) \rightarrow v}$$
$$\frac{\mu, \rho \vdash e \rightarrow (v_1, \dots, v_n) \quad \mu, \rho \vdash \text{apply}(f, (v_1, \dots, v_n)) \rightarrow v}{\mu, \rho \vdash \text{apply}(f, e) \rightarrow v}$$
$$\frac{\mu, \rho \vdash f() \rightarrow v}{\mu, \rho \vdash \text{apply}(f, ()) \rightarrow v}$$
$$\frac{\mu, \rho \vdash \text{apply}(f, (v_2, \dots, v_n)) \rightarrow r \quad \mu, \rho \vdash f(v_1, r) \rightarrow v}{\mu, \rho \vdash \text{apply}(f, (v_1, \dots, v_n)) \rightarrow v}$$
$$\frac{\mu, \rho \vdash \text{apply}(f, (v_1, \dots, v_n)) \rightarrow v}{\text{sparql}(\mu, \rho \vdash \text{exp} \rightarrow v) \quad \mu, \rho \vdash \text{exp} \rightarrow v}$$

DISTRIBUTED



Querying heterogeneous and distributed data [Gaignard, Corby et al.]

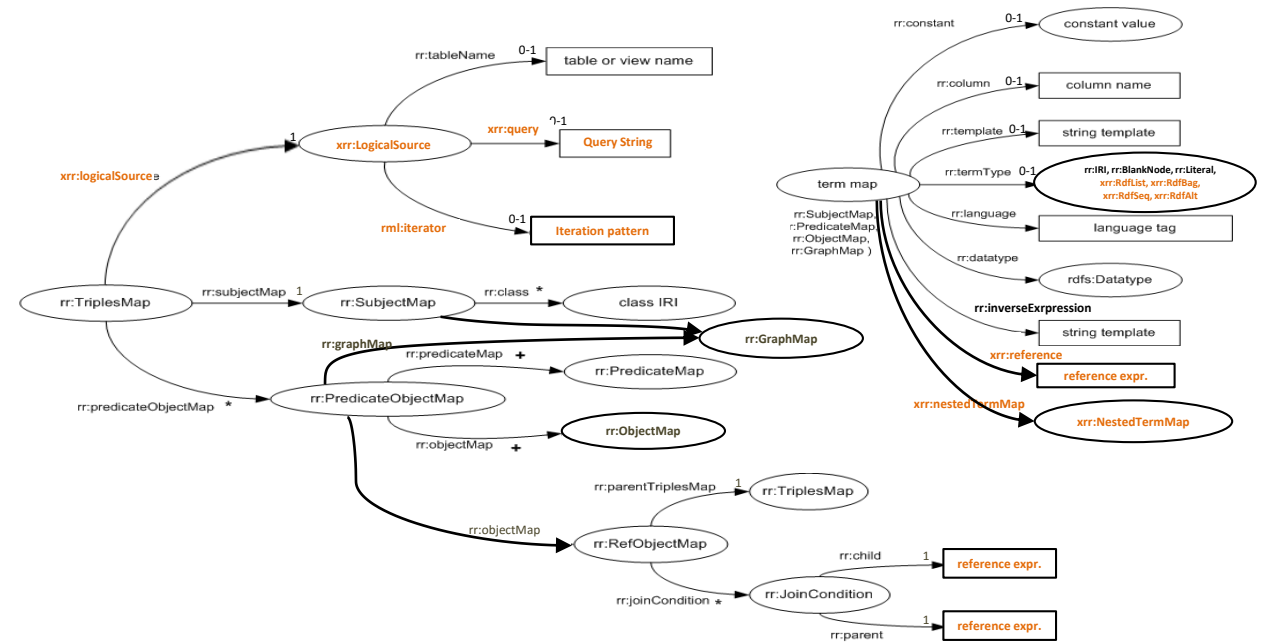
The screenshot shows the web application interface for KGRAM. The browser address bar indicates the URL is `localhost:8080`. The page title is "Corese/KGRAM webapp".

The interface includes several sections:

- Data sources configuration**: A section with two input fields for data source URLs (e.g., `http://localhost:8080/kgam/s`) and an "Add data source" button.
- Federated SPARQL querying**: A section for defining queries. It includes a "Demo federated query" dropdown menu and a text area containing a SPARQL query:

```
PREFIX idemo:<http://rdf.insee.fr/def/demo#>
PREFIX igeo:<http://rdf.insee.fr/def/geo#>
SELECT ?departement ?nom ?popTotale WHERE {
  ?region igeo:codeRegion "24" .
  ?region igeo:subdivisionDirecte ?departement .
  ?departement igeo:nom ?nom .
  ?departement idemo:population ?popLeg .
  ?popLeg idemo:populationTotale ?popTotale .
} ORDER BY ?popTotale
```

Below the query text area is a "Query" button. At the bottom right, there is a large orange button with the text: "Federated SPARQL querying on both DS#1 and DS#2".



HETEROGENEITY [Michel et al.]

xR2RML mapping language
and SPARQL query rewriting



```

<AbstractQuery> ::= <AtomicQuery> | <Query> |
                  <Query> FILTER <SPARQL filter> | <Query> LIMIT <integer>
<Query>          ::= <AbstractQuery> INNER JOIN <AbstractQuery> ON {v1, ... vn} |
                  <AtomicQuery> AS child INNER JOIN <AtomicQuery> AS parent
                    ON child/<Ref> = parent/<Ref> |
                  <AbstractQuery> LEFT OUTER JOIN <AbstractQuery> ON {v1, ... vn} |
                  <AbstractQuery> UNION <AbstractQuery>
<AtomicQuery>   ::= {From, Project, Where, Limit}
<Ref>           ::= a valid xR2RML data element reference
  
```

QUERY & INFER

e.g. Gephi+CORESE/KGRAM

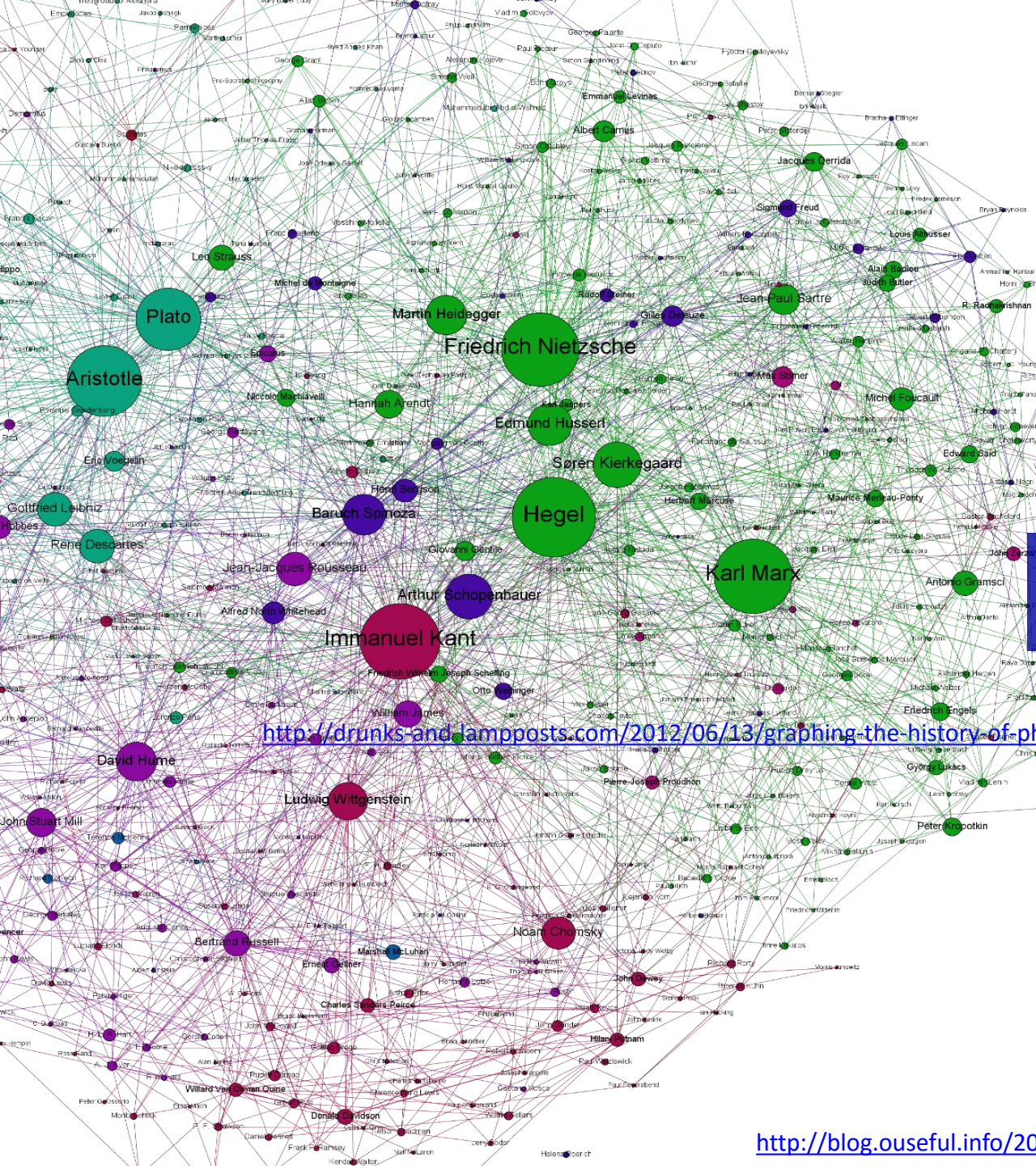
The screenshot displays the Gephi 0.8.1 beta interface with a Semantic Web Import window open. The SPARQL query is as follows:

```
1 prefix dbpedia-owl: <http://dbpedia.org/ontology/>
2 prefix dbpedia-pro: <http://dbpedia.org/property/>
3 prefix geo: <http://www.w3.org/2003/01/geo/wgs84_pos#>
4 prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5 prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
6 prefix geonames: <http://sws.geonames.org/>
7 prefix wgs84_pos: <http://www.w3.org/2003/01/geo/wgs84_pos#>
8 prefix gephi: <http://gephi.org/>
9 prefix owl: <http://www.w3.org/2002/07/owl#>
10
11 construct {
12   ?city1 owl:sameLanguage ?city2 .
13   ?city1 gephi:label ?city_name1 ;
14     gephi:longitude ?long1 ;
15     gephi:latitude ?lat1 ;
16     gephi:image ?im1 ;
17     gephi:language ?language ;
18     gephi:populationTotal ?population1 .
19
20   ?city2 gephi:label ?city_name2 ;
21     gephi:longitude ?long2 ;
22     gephi:latitude ?lat2 ;
23     gephi:image ?im2 ;
24     gephi:language ?language ;
25     gephi:populationTotal ?population2 .
26 }
27 where {
28   {
29     service <http://live.dbpedia.org/sparql/> {
```

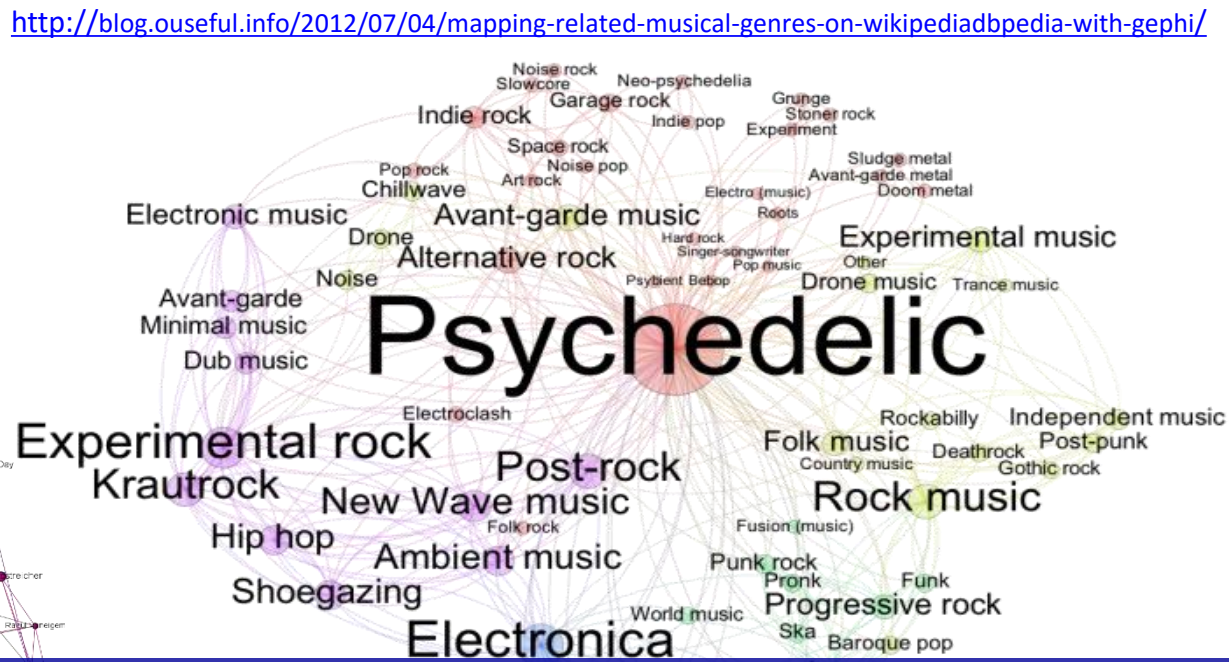
The interface also shows a Context panel on the right with the following statistics:

- Nodes: 765
- Edges: 2184
- Directed Graph

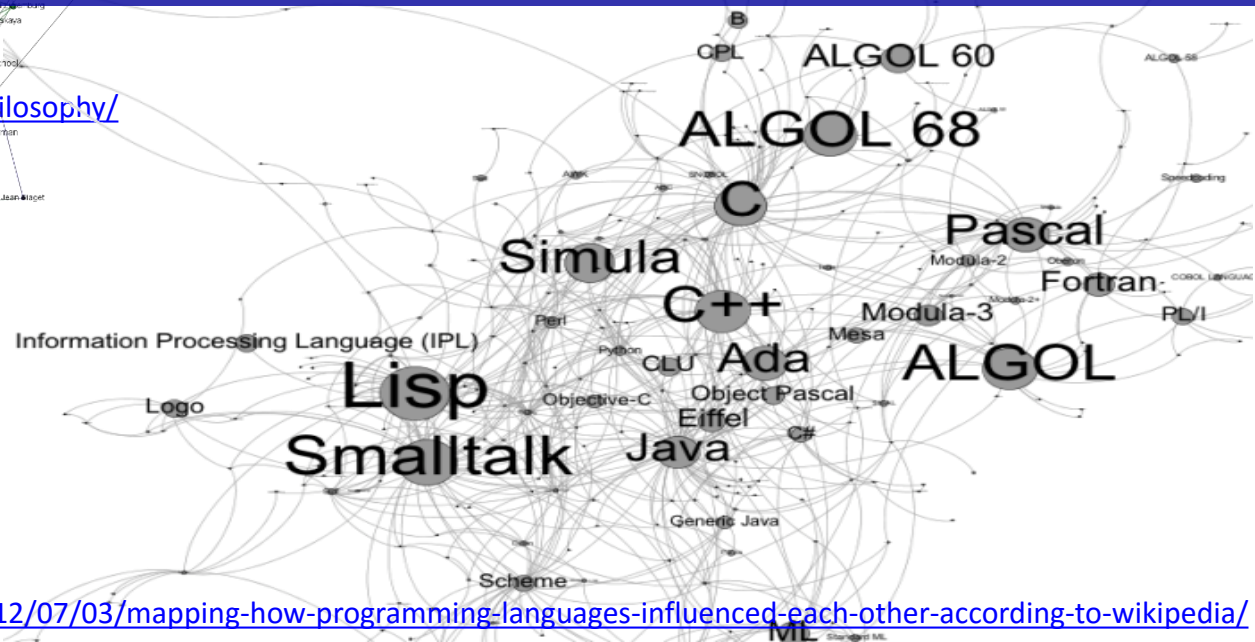
The Network Overview panel lists various metrics such as Average Degree, Avg. Weighted Degree, Network Diameter, Graph Density, HITS, Modularity, PageRank, Erdős Number, Connected Components, Avg. Clustering Coefficient, SW Type Statistics, Clustering Coefficient, Eigenvector Centrality, Avg. Path Length, and Neighborhood Overlap, Embeddedness.



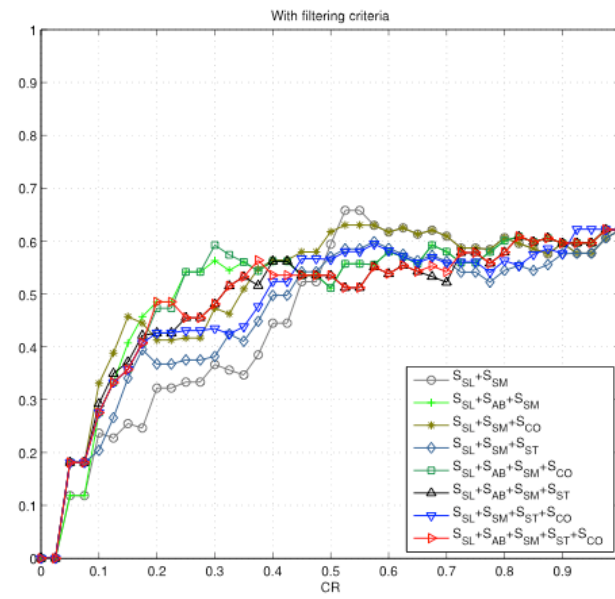
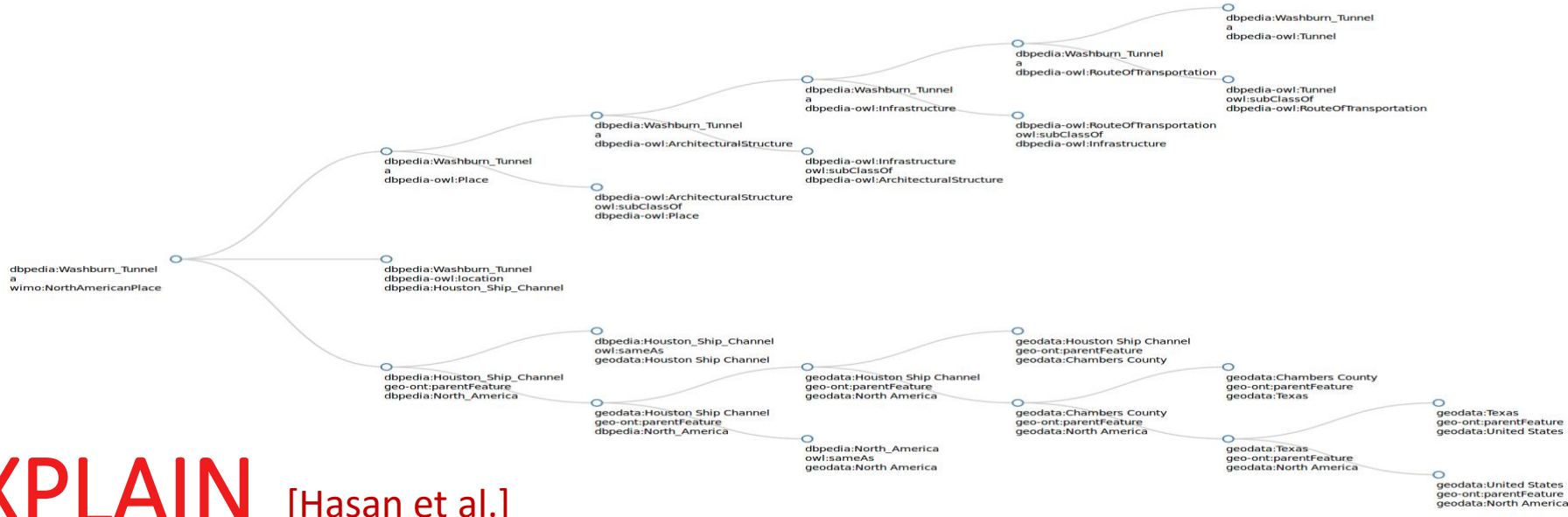
<http://drunks-and-lampposts.com/2012/06/13/graphing-the-history-of-philosophy/>



explore different domains

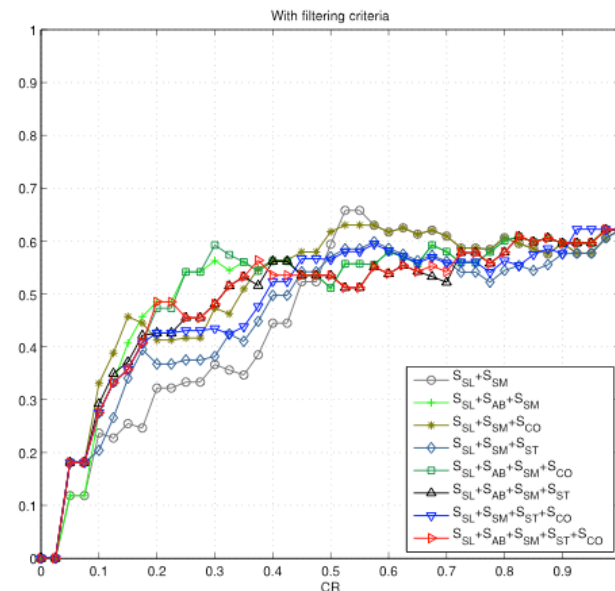
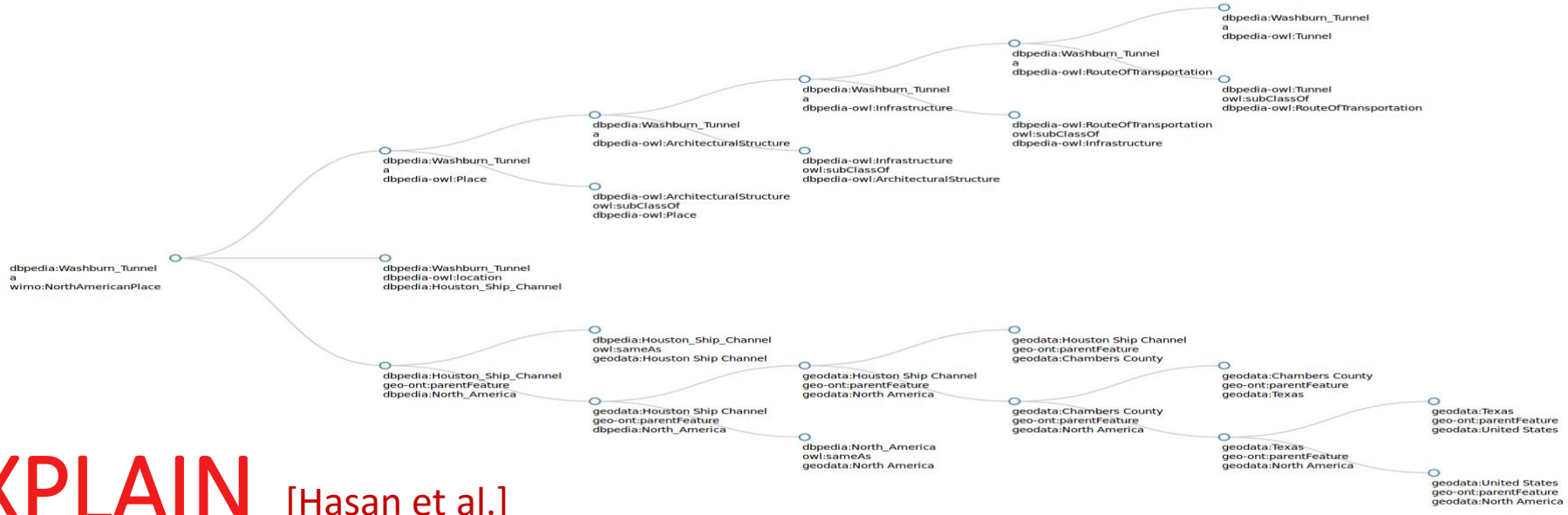


<http://blog.ouseful.info/2012/07/03/mapping-how-programming-languages-influenced-each-other-according-to-wikipedia/>



EXPLAIN [Hasan et al.]

- justify results
- predict performances



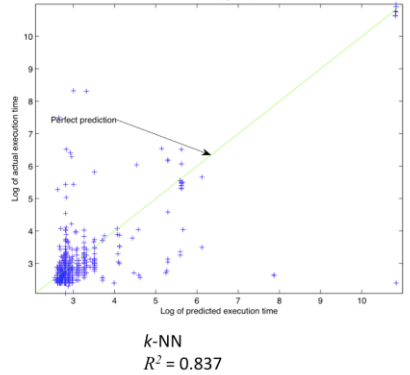
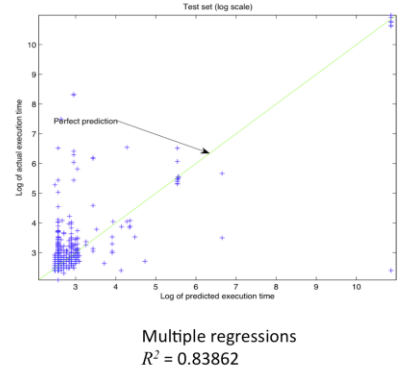
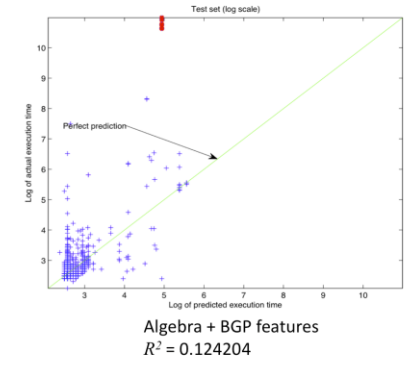
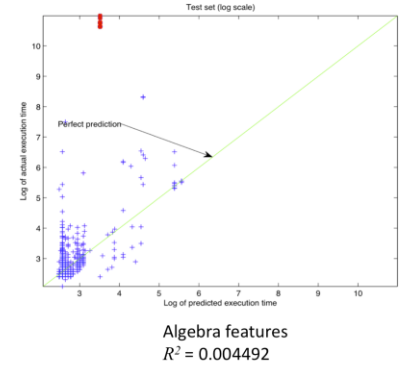
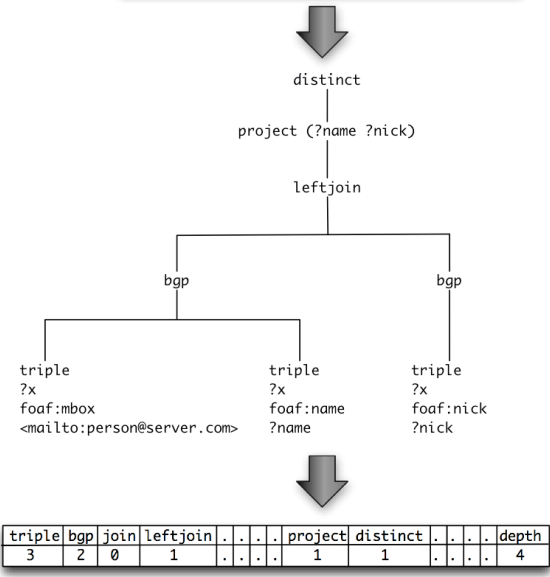
EXPLAIN [Hasan et al.]

- justify results
- predict performances

```

PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT DISTINCT ?name ?nick WHERE {
  ?x foaf:mbox <mailto:person@server.com> .
  ?x foaf:name ?name
  OPTIONAL { ?x foaf:nick ?nick }
}

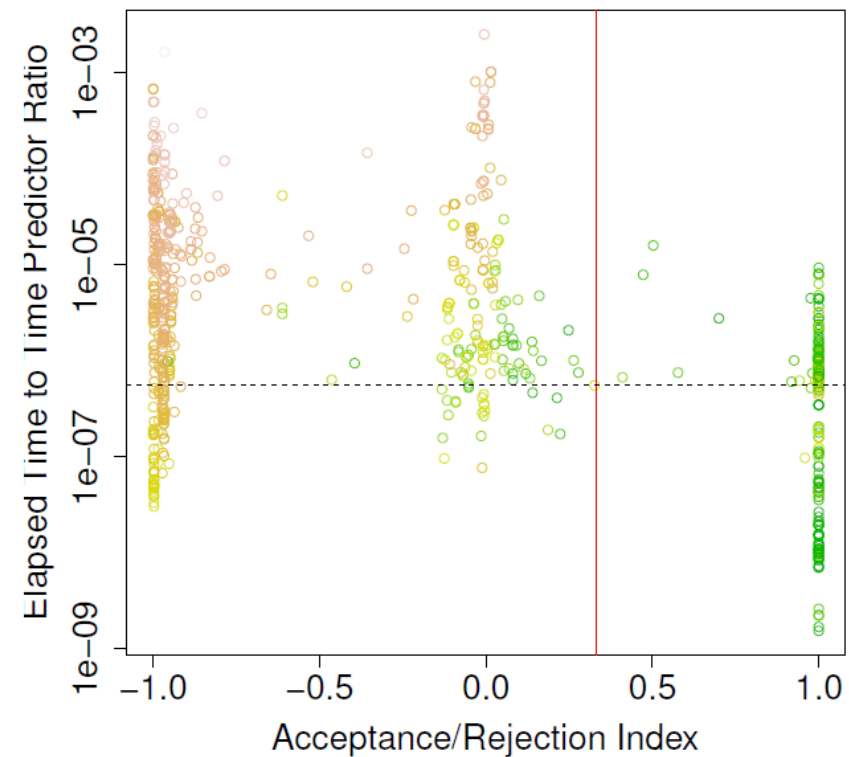
```



INDUCTION

$\phi = \text{SubClassOf}(\text{dbo:LaunchPad} \text{ dbo:Infrastructure})$

learning axioms from linked
data on the Web [Tettamanzi et al.]



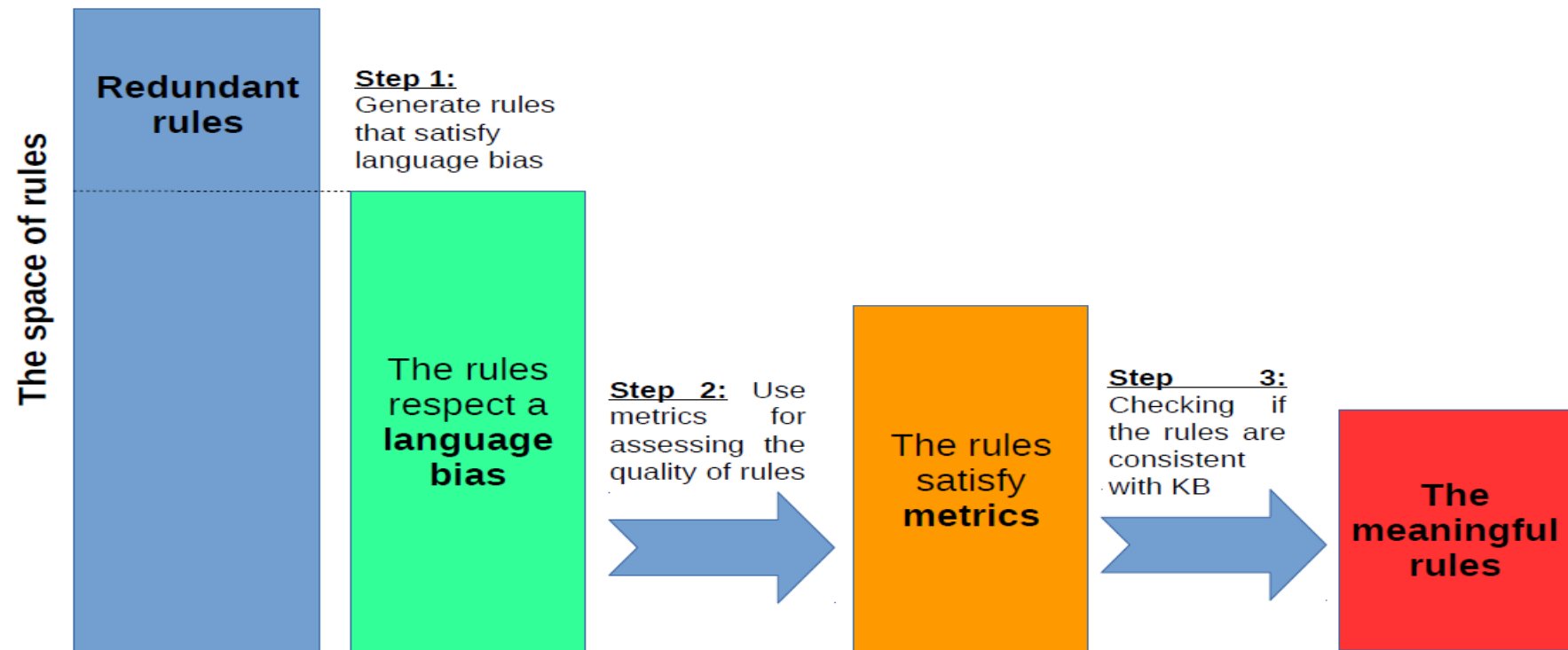
$\text{isParent}(x, y) \leftarrow \text{isFather}(x, y)$
 $\text{isParent}(x, y) \leftarrow \text{isMother}(x, y)$

$\text{isParent}(\text{Maria}, \text{Anna})$ $\text{isMother}(\text{Maria}, \text{Anna})$
 $\text{isParent}(\text{Maria}, \text{Alli})$ $\text{isMother}(\text{Maria}, \text{Alli})$
 $\text{isParent}(\text{Carlos}, \text{Anna})$ $\text{isFather}(\text{Carlos}, \text{Anna})$
 $\text{isParent}(\text{Carlos}, \text{Alli})$ $\text{isFathe}(\text{Carlos}, \text{Alli})$

Rules induced by (**Facts₁** \cup **Facts₂**)

[Tran, Tettamanzi, 2017]

DISCOVERING ASSOCIATION RULES



| Ontology | Samp. | # The total number of rules discovered | | | |
|-----------|-------|--|----------------|------------|-------|
| | | EDMAR | [5] | RARD | AMIE |
| Financial | 20% | 27 ± 3 | 94 ± 34 | 177 | 2 |
| | 30% | 26 ± 3 | 86 ± 32 | 181 | 2 |
| | 40% | 24 ± 4 | 78 ± 50 | 180 | 2 |
| Biopax | 20% | 132 ± 10 | 144 ± 47 | 298 | 8 |
| | 30% | 118 ± 12 | 188 ± 26 | 283 | 8 |
| | 40% | 137 ± 12 | 159 ± 38 | 272 | 0 |
| NTNMerged | 20% | 1,834 ± 782 | 1,046 ± 593 | 243 | 1,129 |
| | 30% | 1,235 ± 495 | 946 ± 218 | 225 | 1,022 |
| | 40% | 1,810 ± 733 | 897 ± 473 | 239 | 1,063 |

[Tran, Tettamanzi, 2017]

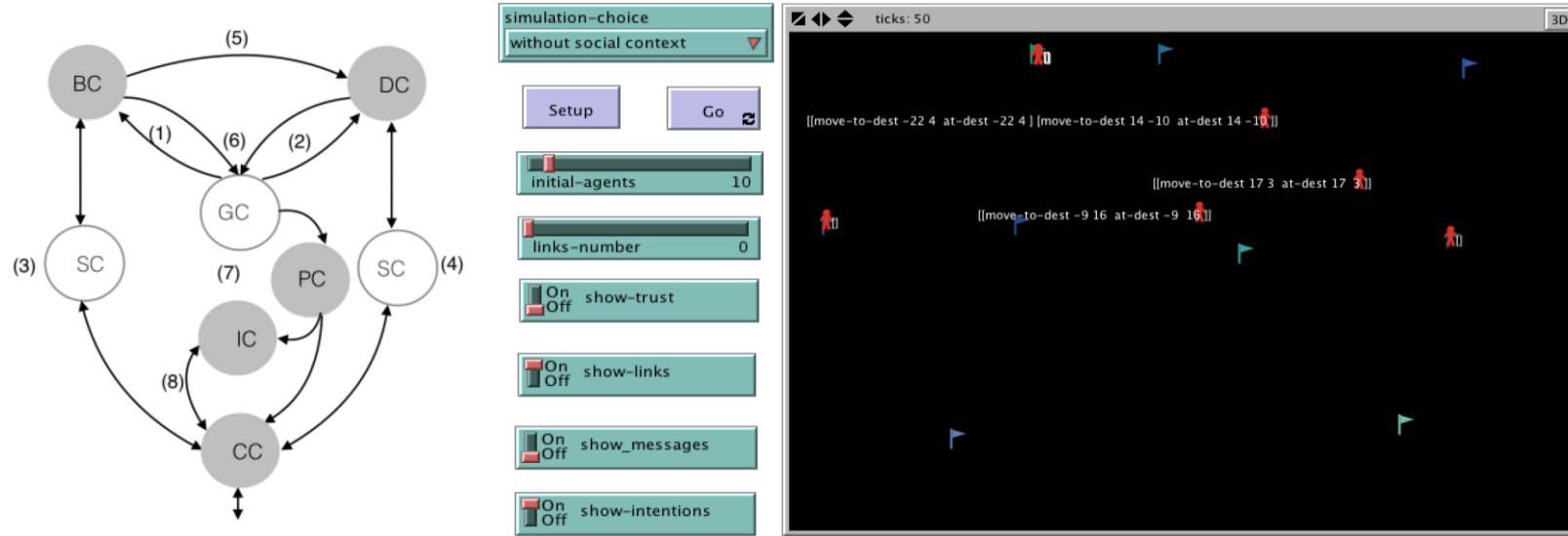
DISCOVERING ASSOCIATION RULES

- Discovering Multi-Relational Association Rules in the Semantic Web $H1 \wedge \dots \wedge Hm \leftarrow B1 \wedge B2 \wedge \dots \wedge Bn$

- Inductive Logic Programming (ILP)
= Logic Programming \cap Machine Learning

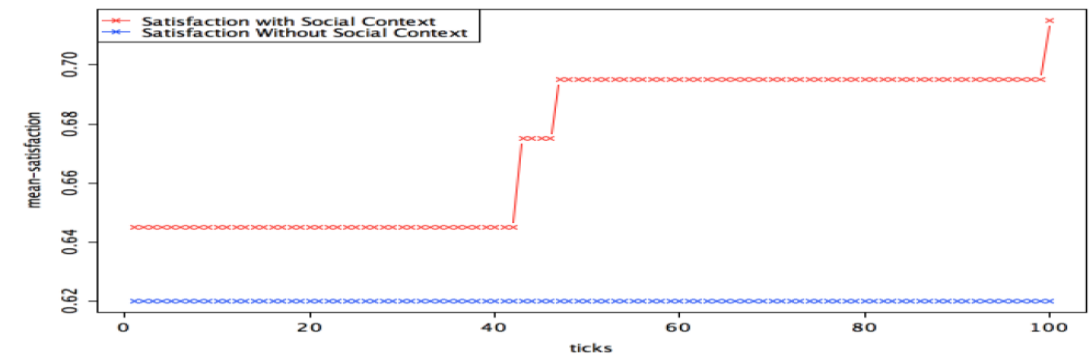
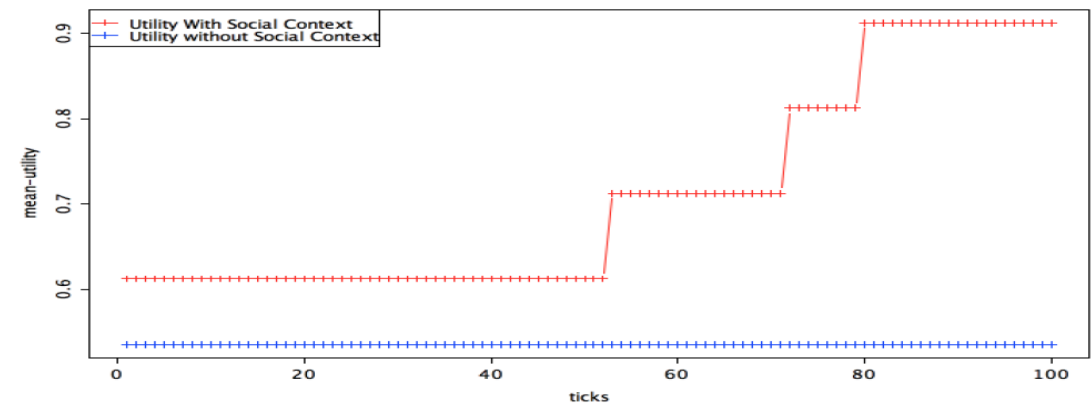
- Learning logic rules from examples and background knowledge

- Evolutionary approach (genetic algo)



DISTRIBUTED AI [Ben Othmane, Tettamanzi, Serena Villata et al. 2017]

- Agent-based Simulation for a Multi-context BDI Recommender
- Solitary agents vs social agents: social agents have better performance than solitary ones
- Trust/Distrust score to detect malicious agents
- Possibility theory is an uncertainty theory dedicated to handle incomplete information



QUERY & INFER

e.g. Licencia

[Villata et al.]

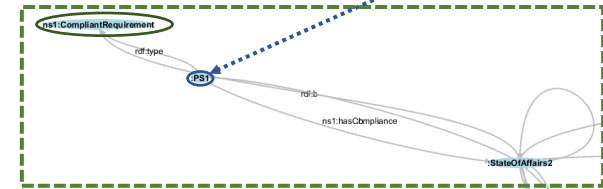


DEONTICS

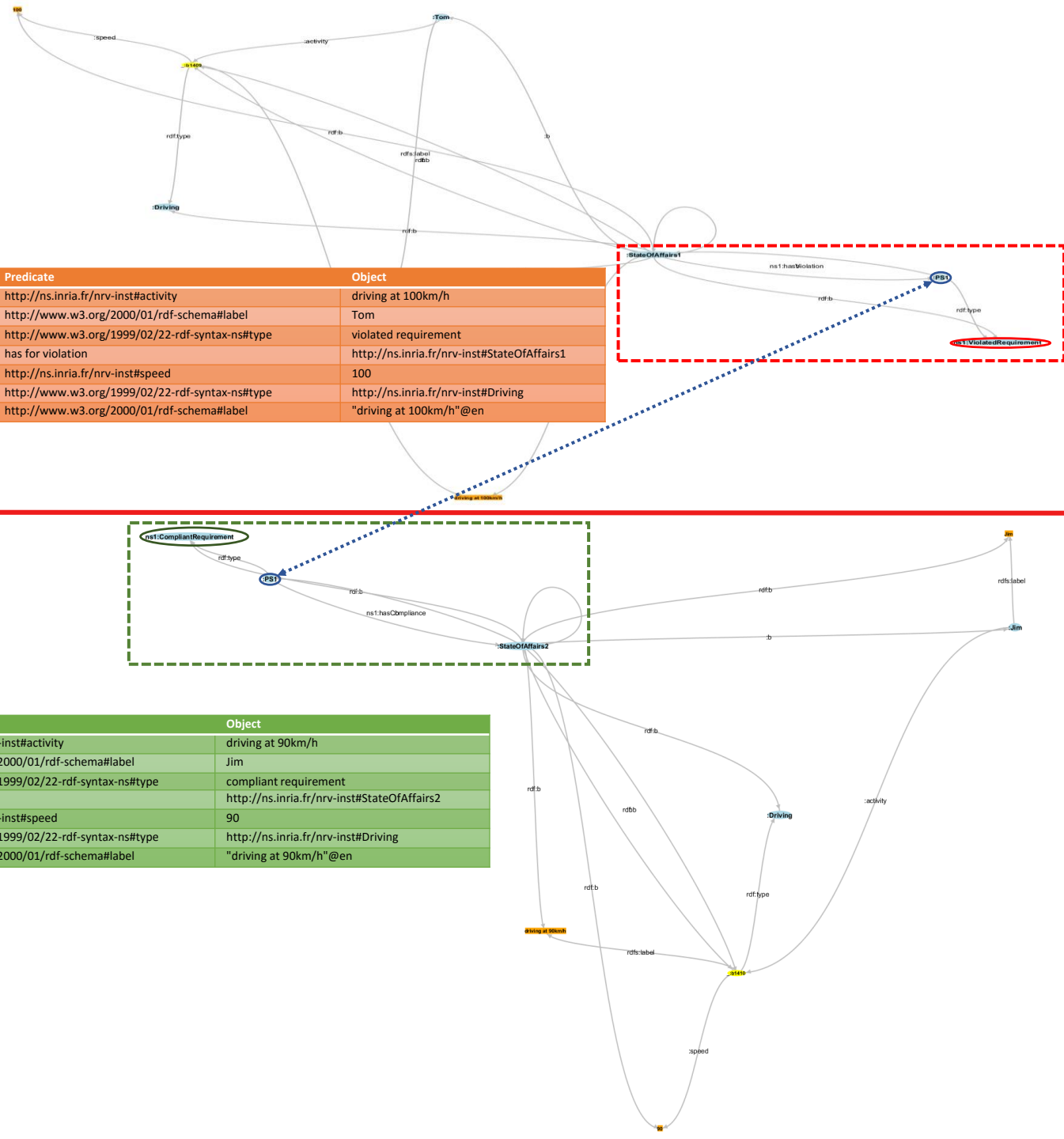
Legal Rules on the Semantic Web

OWL + Named Graphs + SPARQL Rules

| Named Graph (state of affair) | Subject | Predicate | Object |
|---|-----------------------|---|---|
| http://ns.inria.fr/nrv-inst#StateOfAffairs1 | Tom | http://ns.inria.fr/nrv-inst#activity | driving at 100km/h |
| http://ns.inria.fr/nrv-inst#StateOfAffairs1 | Tom | http://www.w3.org/2000/01/rdf-schema#label | Tom |
| http://ns.inria.fr/nrv-inst#StateOfAffairs1 | can't drive over 90km | http://www.w3.org/1999/02/22-rdf-syntax-ns#type | violated requirement |
| http://ns.inria.fr/nrv-inst#StateOfAffairs1 | can't drive over 90km | has for violation | http://ns.inria.fr/nrv-inst#StateOfAffairs1 |
| http://ns.inria.fr/nrv-inst#StateOfAffairs1 | driving at 100km/h | http://ns.inria.fr/nrv-inst#speed | 100 |
| http://ns.inria.fr/nrv-inst#StateOfAffairs1 | driving at 100km/h | http://www.w3.org/1999/02/22-rdf-syntax-ns#type | http://ns.inria.fr/nrv-inst#Driving |
| http://ns.inria.fr/nrv-inst#StateOfAffairs1 | driving at 100km/h | http://www.w3.org/2000/01/rdf-schema#label | "driving at 100km/h"@en |



| Named Graph (state of affair) | Subject | Predicate | Object |
|---|-----------------------|---|---|
| http://ns.inria.fr/nrv-inst#StateOfAffairs2 | Jim | http://ns.inria.fr/nrv-inst#activity | driving at 90km/h |
| http://ns.inria.fr/nrv-inst#StateOfAffairs2 | Jim | http://www.w3.org/2000/01/rdf-schema#label | Jim |
| http://ns.inria.fr/nrv-inst#StateOfAffairs2 | can't drive over 90km | http://www.w3.org/1999/02/22-rdf-syntax-ns#type | compliant requirement |
| http://ns.inria.fr/nrv-inst#StateOfAffairs2 | can't drive over 90km | has for compliance | http://ns.inria.fr/nrv-inst#StateOfAffairs2 |
| http://ns.inria.fr/nrv-inst#StateOfAffairs2 | driving at 90km/h | http://ns.inria.fr/nrv-inst#speed | 90 |
| http://ns.inria.fr/nrv-inst#StateOfAffairs2 | driving at 90km/h | http://www.w3.org/1999/02/22-rdf-syntax-ns#type | http://ns.inria.fr/nrv-inst#Driving |
| http://ns.inria.fr/nrv-inst#StateOfAffairs2 | driving at 90km/h | http://www.w3.org/2000/01/rdf-schema#label | "driving at 90km/h"@en |

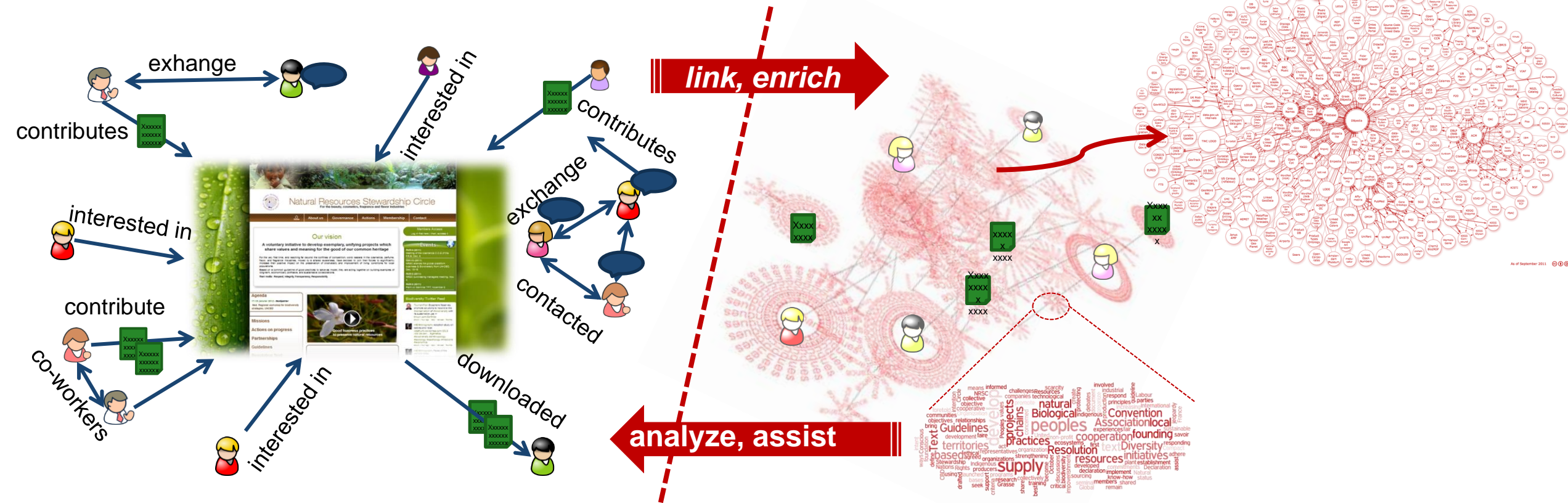


cooperative company, spin-off wimmics

integrate to IS, intelligence, enterprise social medias



mnemotix
WHEN DATA MAKE SENSE





**DOGGY
BAG**

*«If you are not acquiring Knowledge,
you are losing it »*



Yuval Shahaar

Web 1.0, ...

The screenshot shows the Amazon.com product page for the book "The Quark and the Jaguar: Adventures in the Simple and the Complex" by Murray Gell-Mann. The page includes a book cover image, a "Click to LOOK INSIDE!" button, the title, author name, star rating, price, and a table of available formats. The paperback format is highlighted in yellow. Below the table, there is a "Product Details" section with information about the book's page count, publisher, language, ISBNs, dimensions, and weight.

amazon.com

Click to **LOOK INSIDE!**

The Quark and the Jaguar: Adventures in the Simple and the Complex [Paperback]
Murray Gell-Mann (Author)
★★★★☆ (30 customer reviews)

Price: **\$13.59**

In Stock.
Ships from and sold by **Amazon.com.**

| Formats | Amazon Price | New from | Used from |
|------------------|----------------|----------|-----------|
| Hardcover | -- | \$13.67 | \$0.55 |
| Paperback | \$13.59 | \$10.01 | \$7.84 |

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Product Details

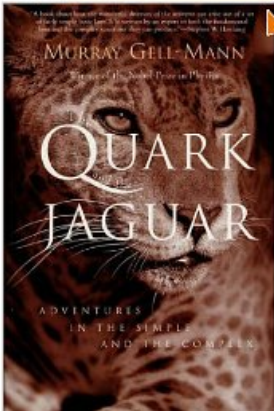
Paperback: 392 pages
Publisher: St. Martin's Griffin (September 15, 1995)
Language: English
ISBN-10: 0805072535
ISBN-13: 978-0805072532
Product Dimensions: 9.1 x 6.1 x 1.2 inches
Shipping Weight: 1.2 pounds ([View shipping rates and policies](#))

Web 1.0, 2.0...

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amazon.com

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Web 1.0, 2.0, 3.0 ...

amazon.com

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Amazon Bestsellers Rank: #373,365 in Books

Customer Reviews

30 Reviews

| | |
|---------|---|
| 5 star: | 9 |
| 4 star: | 8 |
| 3 star: | 7 |
| 2 star: | 4 |
| 1 star: | 2 |

Average Customer Review
★★★★☆ (30 customer reviews)



THE **WEB**
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LYON, FRANCE
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"bridging natural and artificial intelligence worldwide"

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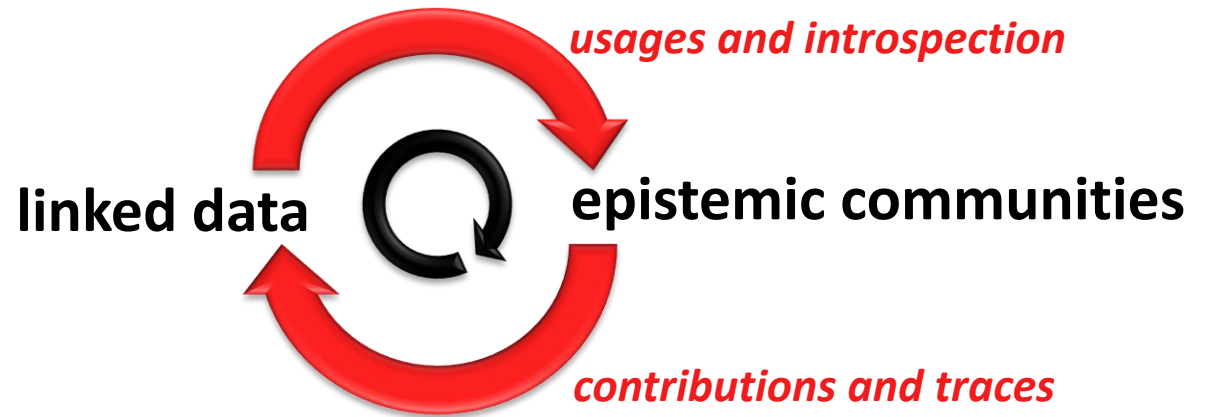
Other tracks (in alphabetical order):

- [Challenges track](#)
- [Demos track](#)
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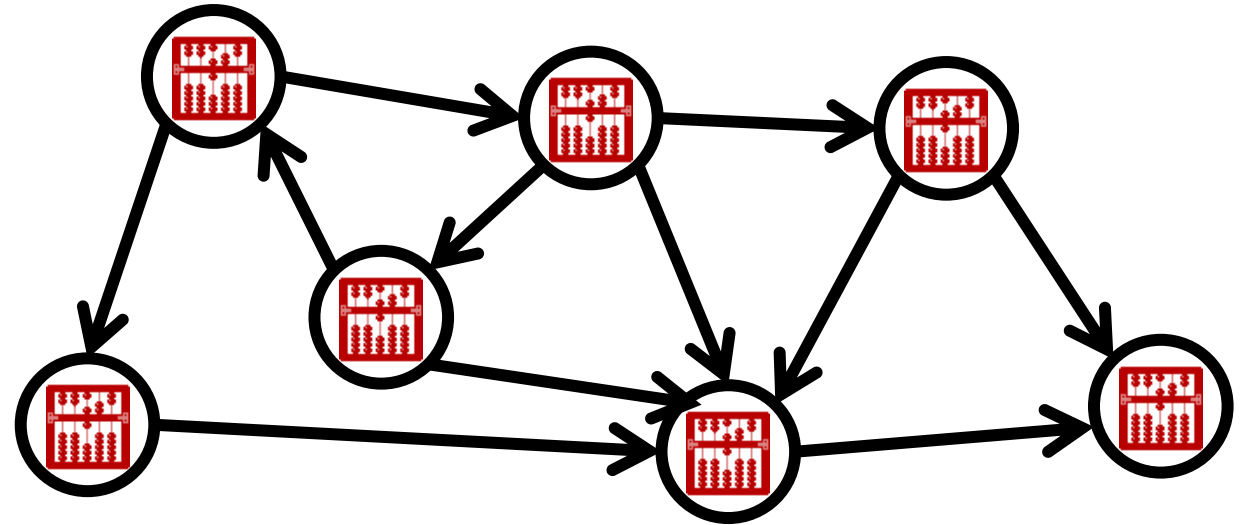
- [Hackathon/Hackateen](#)
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WIMMICS

1. user & interaction design
2. communities & social networks
3. linked data & semantic Web
4. reasoning & analyzing



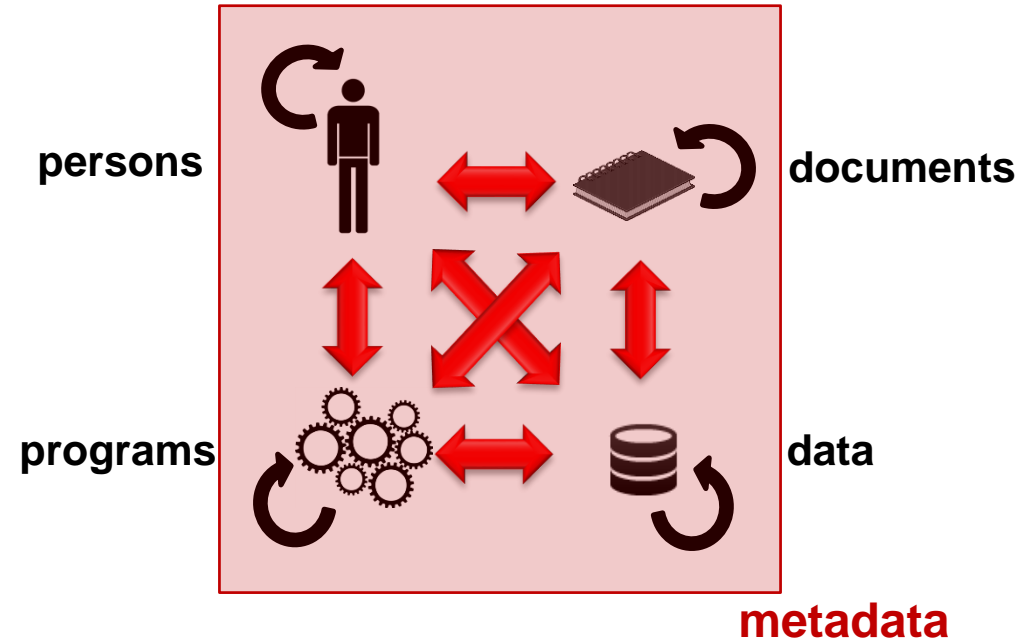
Toward a Web of Programs



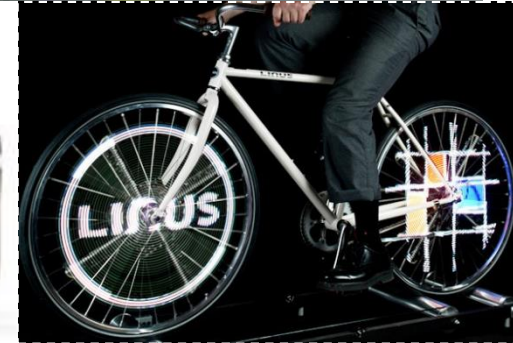
“We have the potential for every HTML document to be a computer — and for it to be programmable. Because the thing about a Turing complete computer is that ... anything you can imagine doing, you should be able to program.”

(Tim Berners-Lee, 2015)

one Web ... a unique space in every meanings:



Toward a Web of Things



he who controls metadata, controls the web
and through the *world-wide* web many things in our world.



Fabien Gandon - @fabien_gandon - <http://fabien.info>

Web-instrumented man-machine interactions, communities and semantics
Technical details: <http://bit.ly/wimmics-papers>

