Linked Biondo
Modelling Geographical Features in Renaissance Texts and Maps

Guenther Goerz, Chiara Seidl, Martin Thiering

Bibliotheca Hertziana –Max Planck Institute for the History of Art, Rome
FAU Erlangen-Nuremberg, Department of Computer Science, Digital Humanities
Technical University Berlin, Department of Linguistics

Research

Research Projects of the Institute

- Historical spaces in texts and maps (Biondo-Project)
- Rome Contemporary
- Digital art history
- Images of Europe Beyond Europe
- Early Modern Materiality and Mediality
- Italy in a Global Context
- Editionsprojekt Bellori
- Heinrich Wölfflins Gesammelte Werke
- Roma communis patria

Research of the Academic Staff

Associated Projects

Emeriti

Historical spaces in texts and maps – A cognitive-semantic analysis of Flavio Biondo's "Italia Illustrata"

In the research of Department III (Michalsky), questions about the historical understanding of social space and its change in the so-called long Middle Ages play a central role. The study of the relations between historical maps and texts aims to explore the historical understanding of space and the knowledge associated with it by taking up approaches from cognitive linguistics. Cognitive maps depict culture-specific spatial knowledge and practices. This knowledge is represented in different ways, which change historically through different processes and practices.
The epistemological focus is therefore framed by the following questions:

Which forms of knowledge represent spatial relations?
How can spatial transformation processes be represented and analyzed?
What is the connection between culture-specific practices and cognitive representations?
And what is the relationship between texts and maps?

In order to approach this complex of questions, this project combines cognitive-semantic parameters such as toponyms, landmarks, spatial frames of reference, geometric relations, gestalt principles and different perspectives with computational linguistic analysis methods according to our "Common Sense Geography" approach. Using new text and map markings and corpus-specific quantitative methods, historical texts are processed and reinterpreted.

Historical spaces in texts and maps (Biondo-Project)

Research Group Leader
Prof. Dr. Tanja Michalsky

Scientific Coordinator
PD Dr. Martin Thiering
martin.thiering(at)campus.tu-berlin.de

Research Associates
Prof. Dr. Günther Görz
guenther.goerz(at)fau.de
Prof. Dr. Klaus Geus
klaus.geus(at)fu-berlin.de

Research Assistant
Chiara Seidl, M.A.

Research Question and Methodology

- Cognition of geographical space in history:
  How would you start ?
  - Toponyms and definite place descriptions
    - Text annotation: Named Entity Recognition, geographic verification
  - Spatial relations: topology, orientation, distance,…
    - Cognitive-linguistic annotation
      Constructions *spatial_relation – figure – ground*
  - Comparisons with contemporary maps
- Cognitive maps (*Common Sense Geography*)
  - Spatial objects and relations
  - Epistemological modelling

Problem statement

- *Common sense conceptualizations of geographic concepts and relations in ancient and early modern texts and maps*
  - *Analytic* methods of cognitive computational linguistics
    Corpus construction, annotation, and parsing
  - Formal two-level representation
    - (Cognitive) linguistic
    - Conceptual – *general semantics (onto-logical)*
  - Linguistic and historical interpretation and evaluation
  - Long term goal: *Synthetic*
    Reconstruction of cognitive maps/sketches

Sources: Preparation and Conditioning

- Flavio Biondo *Italia Illustrata* (1474)
  - "Topographically ordered historical account" (Clavuot)
  - Connecting antiquity and presence
- Text editions: Pontari (la), White, Castner (la, en)
- Preprocessing
  - OCR correction, sentence separation, etc.
  - Word lists, statistics, n-grams
    - scripts, antconc, voyant-tools, ...
  - Concordance (KWIC)
  - Part-of-Speech Tagging (TreeTagger, Collatinus)
  - wordij network: "semantic" clustering
- Map image processing

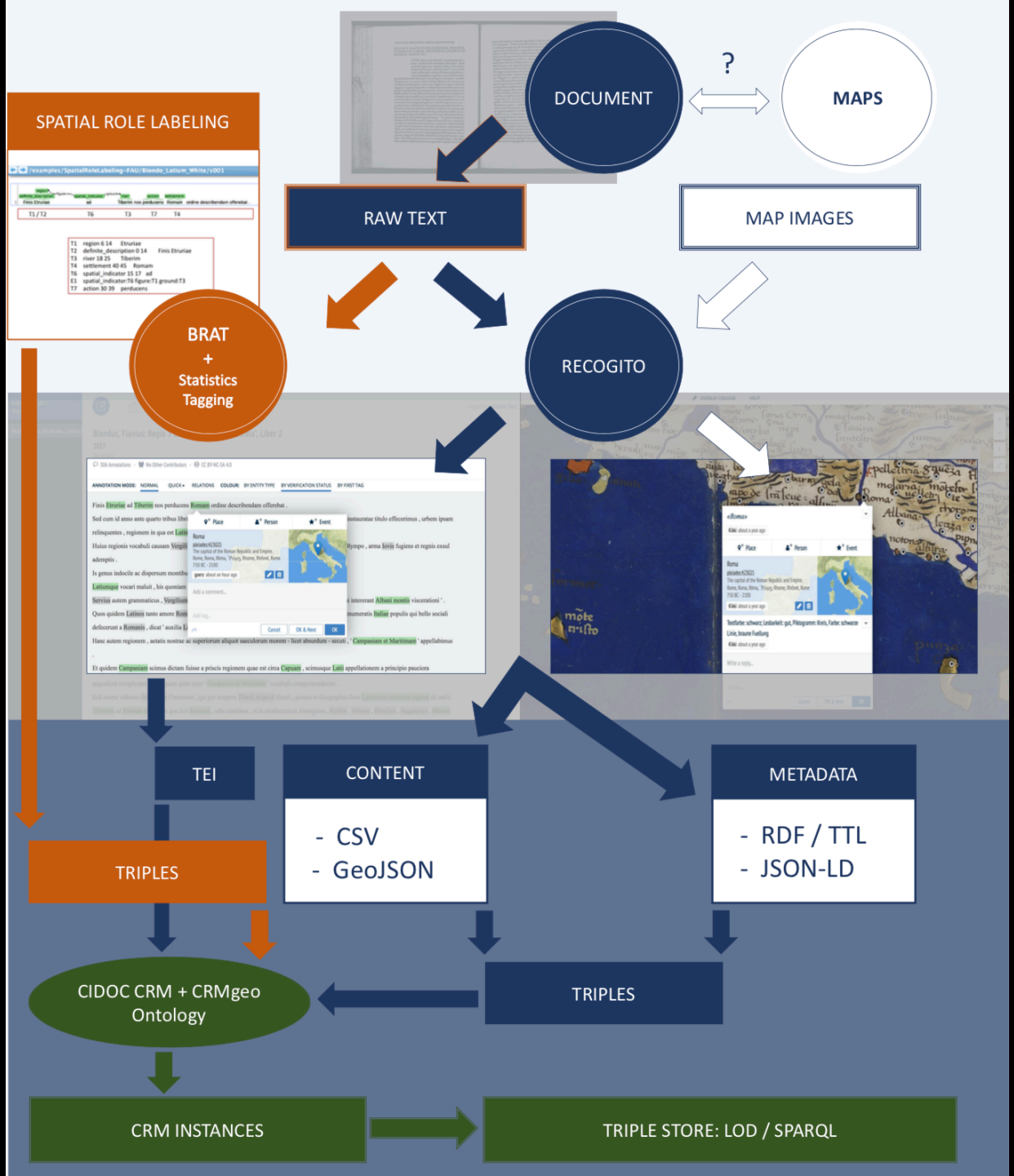
Toponyms and spatial relations

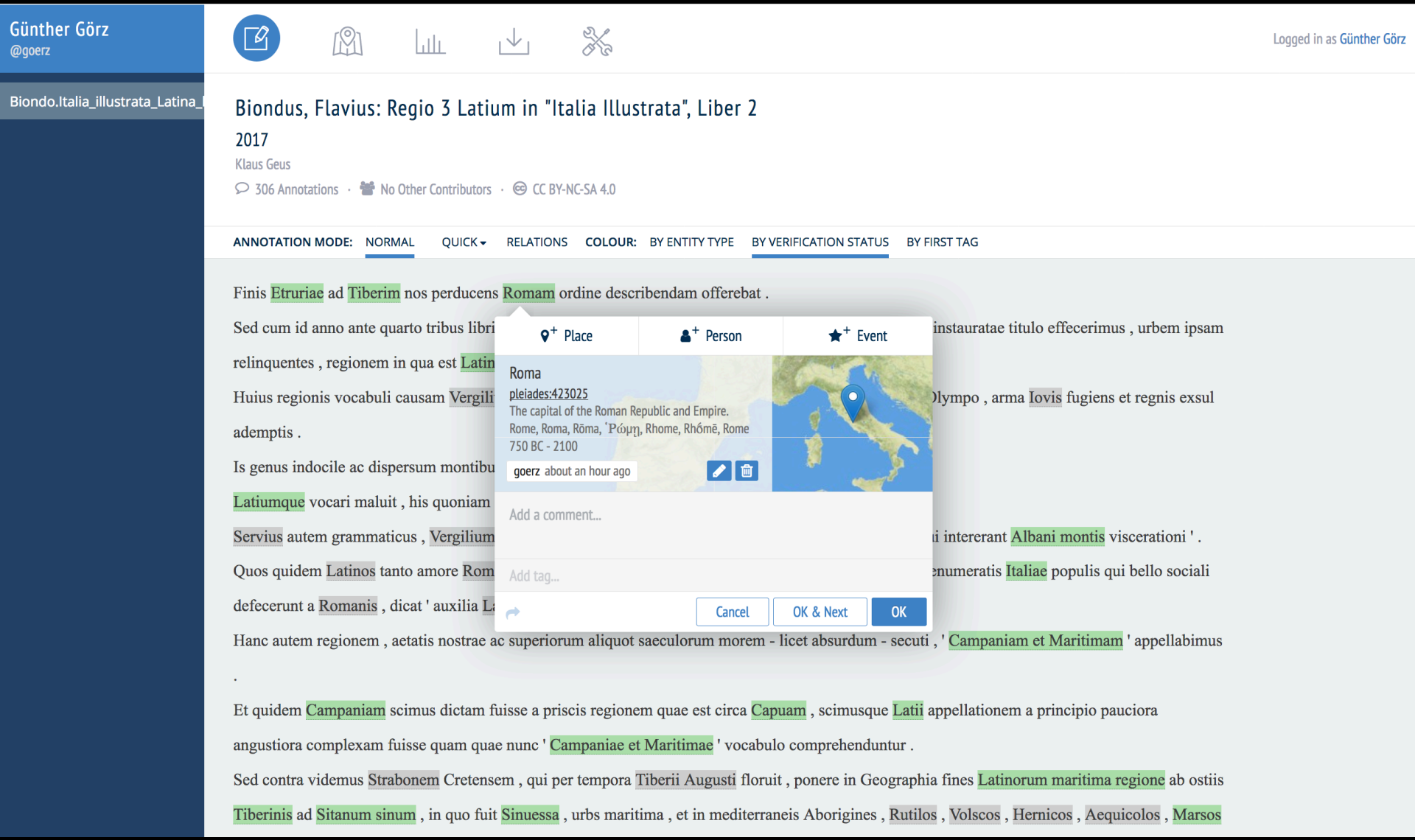
- Text annotation (semi-automatic)
  - Recogito 2 annotation tool with geographic verfication (gazetteers, e.g. Pleiades)
  - Spatial Role Labeling (manually: brat)
    - Machine Learning? … corpus problem
  - Narrative order: virtual trips
- Map annotation
  - Recogito 2 (incl. visualization)
  - Cartometric investigations (Guckelsberger)

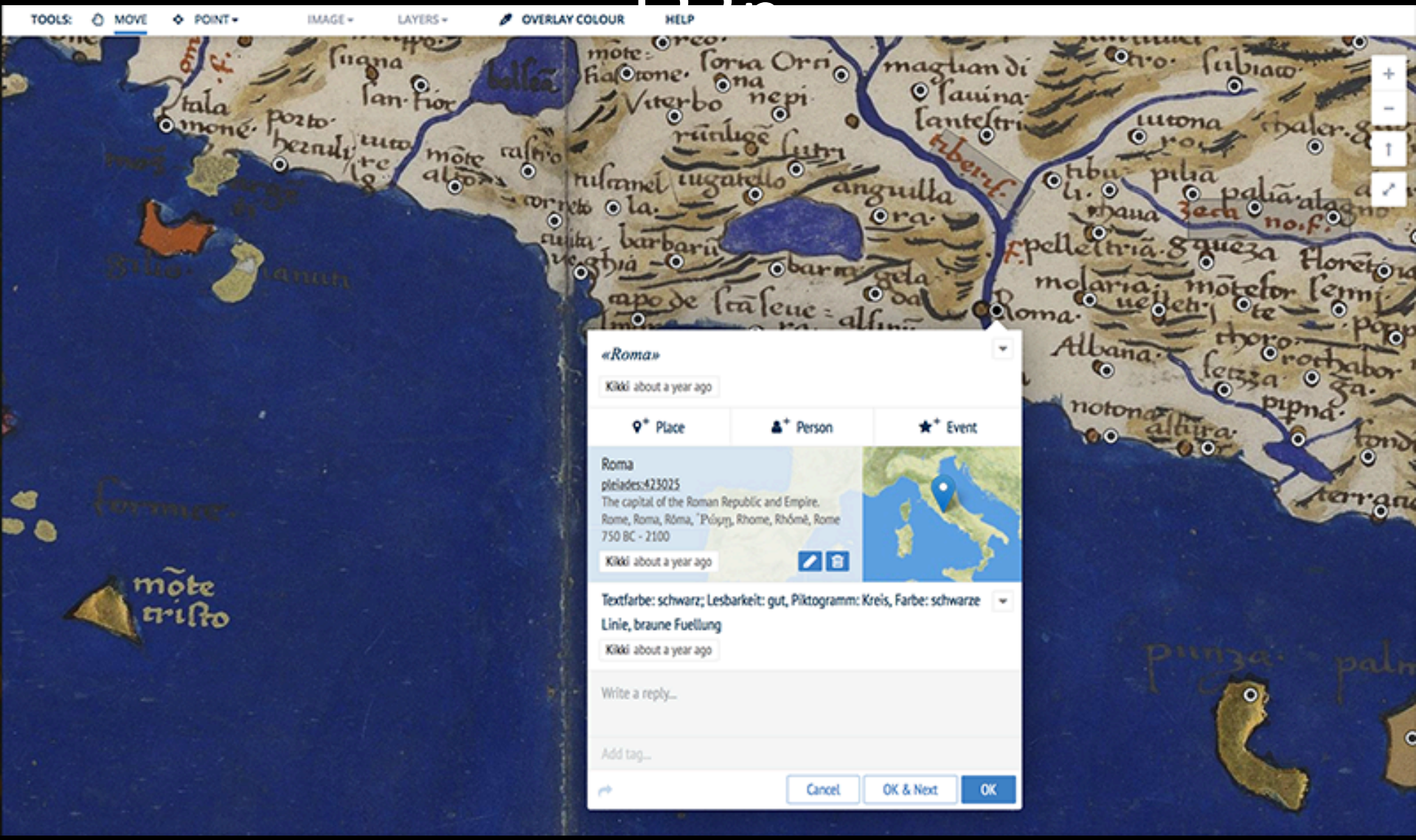
Investigations on Renaissance maps

- Biondo's use of maps ? ("Petrarca", Ptolemy)

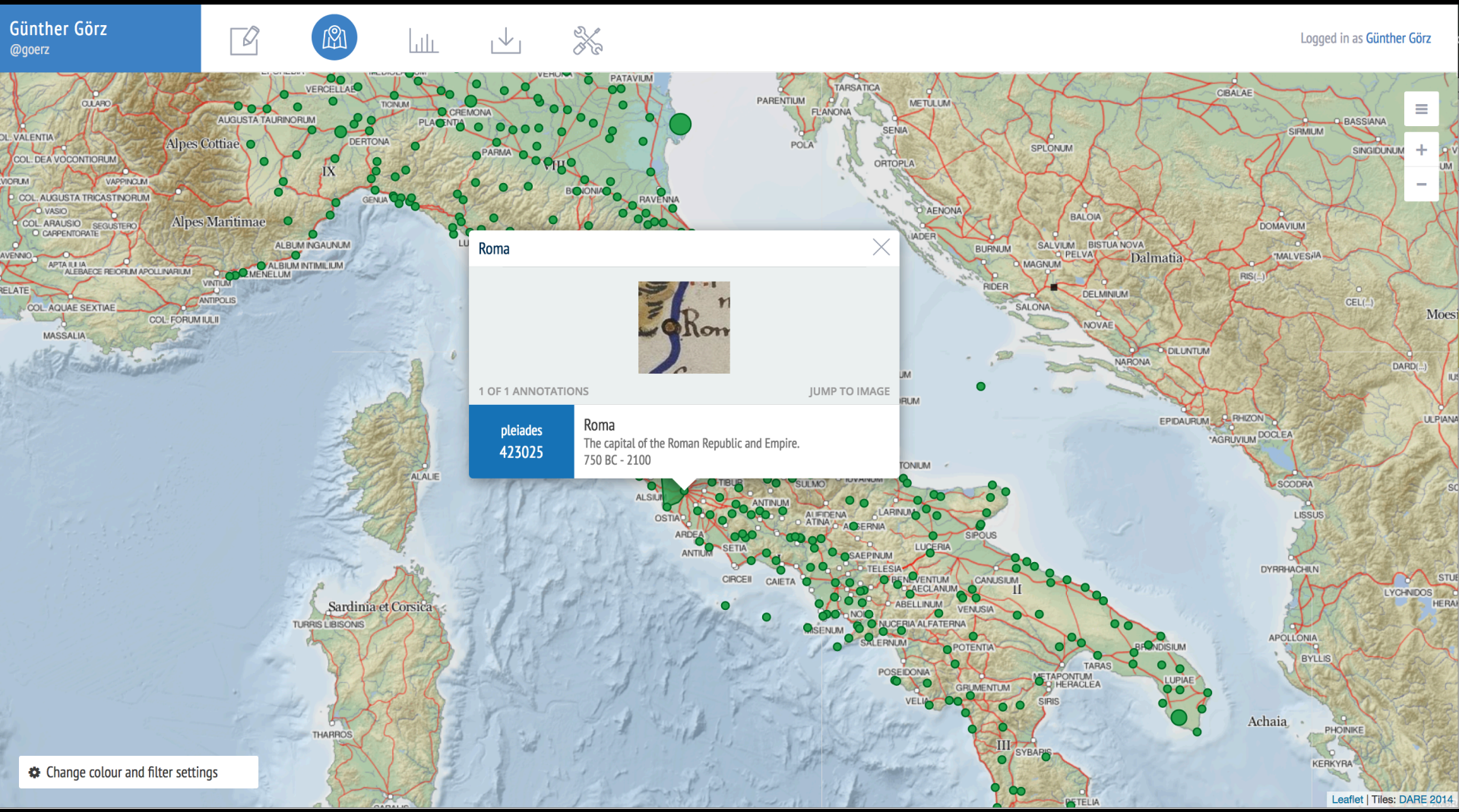
- Which maps to choose ?
  - Six large maps of Italy (15. c.; Milanesi 2007/08); Paulinus Minorita (14. c.); Tabula Peutingeriana
  - Ptolemaic maps (ca. 30 traditional and "novae" – mostly after 1450!)
  - Sea charts (Portolans) before 1450 (max. 10)


DOCUMENT
?
MAPS
SPATIAL ROLE LABELING
RAW TEXT
MAP IMAGES
BRAT
+
Statistics
Tagging
RECOGITO
TEI
CONTENT
- CSV
- GeoJSON
METADATA
- RDF / TTL
- JSON-LD
TRIPLES
CIDOC CRM + CRMgeo
Ontology
TRIPLES
CRM INSTANCES
TRIPLE STORE: LOD / SPARQL


Günther Görz
@goerz
Biondo.Italia_illustrata_Latina_
Logged in as Günther Görz
Biondus, Flavius: Regio 3 Latium in "Italia Illustrata", Liber 2
2017
Klaus Geus
306 Annotations · No Other Contributors · CC BY-NC-SA 4.0
ANNOTATION MODE: NORMAL QUICK RELATIONS COLOUR: BY ENTITY TYPE BY VERIFICATION STATUS BY FIRST TAG
Finis Etruriae ad Tiberim nos perducens Romam ordine describendam offerebat .
Sed cum id anno ante quarto tribus libri
instauratae titulo effecerimus , urbem ipsam
relinquentes , regionem in qua est Latin
Huius regionis vocabuli causam Vergili
Olympo , arma Iovis fugiens et regnis exsul
ademptis .
Is genus indocile ac dispersum montibu
Latiumque vocari maluit , his quoniam
Servius autem grammaticus , Vergilium
i intererant Albani montis viscerationi ' .
Quos quidem Latinos tanto amore Rom
enumeratis Italiae populis qui bello sociali
defecerunt a Romanis , dicat ' auxilia La
Hanc autem regionem , aetatis nostrae ac superiorum aliquot saeculorum morem - licet absurdum - secuti , ' Campaniam et Maritimam ' appellabimus
.
Et quidem Campaniam scimus dictam fuisse a priscis regionem quae est circa Capuam , scimusque Latii appellationem a principio pauciora
angustiora complexam fuisse quam quae nunc ' Campaniae et Maritimae ' vocabulo comprehenduntur .
Sed contra videmus Strabonem Cretensem , qui per tempora Tiberii Augusti floruit , ponere in Geographia fines Latinorum maritima regione ab ostiis
Tiberinis ad Sitanum sinum , in quo fuit Sinuessa , urbs maritima , et in mediterraneis Aborigines , Rutilos , Volscos , Hernicos , Aequicolos , Marsos
Place
Person
Event
Roma
pleiades:423025
The capital of the Roman Republic and Empire.
Rome, Roma, Rōma, Ῥώμη, Rhome, Rhómē, Rome
750 BC - 2100
goerz about an hour ago
Add a comment...
Add tag...
Cancel
OK & Next
OK

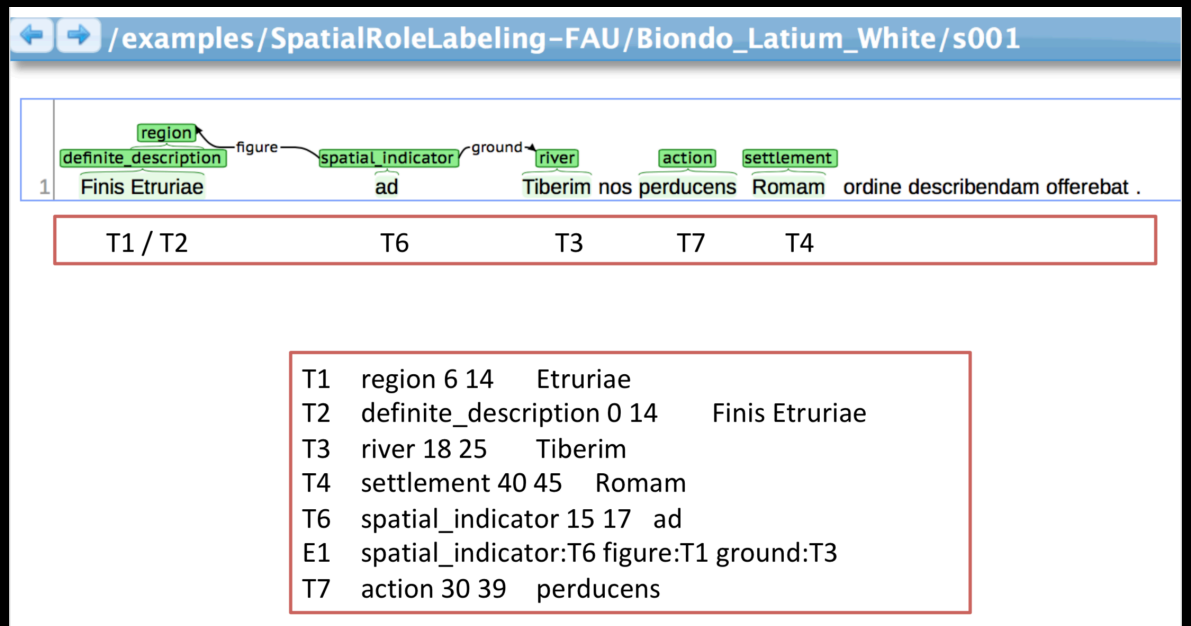

TOOLS:
MOVE
POINT
IMAGE
LAYERS
OVERLAY COLOUR
HELP
«Roma»
Kikki about a year ago
Place
Person
Event
Roma
pleiades:423025
The capital of the Roman Republic and Empire.
Rome, Roma, Rōma, Ῥώμη, Rhome, Rhōmē, Rome
750 BC - 2100
Kikki about a year ago
Textfarbe: schwarz; Lesbarkeit: gut, Piktogramm: Kreis, Farbe: schwarze Linie, braune Fuellung
Kikki about a year ago
Write a reply...
Add tag...
Cancel
OK & Next
OK

DARE map view of Ptolemaeus L23n



Generated research data

- Recogito data export
  - CSV (tables), GeoJSON, RDF/OA, JSON-LD,…
  - Case study: Ptolemaic tabulae novae & text
- Spatial Role Labeling



according to predefined **cognitive-linguistic taxonomy**

Table for Ptolemy L23nova

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d7d812ef-7183-4a59-919b-0fc3c3cf0dd9	L23.Urb.lat.275_0193_fa_0089r.jpg	marati	point:5815,3565	PLACE	http://pleiades.stoa.org/places/452345	Isola S. Janni|Isola Santo Ianni, Maratea	39.9673358	15.715784	island,settlement	VERIFI
a0970fd8-9db9-467a-a7b1-810c8b2162ec	L23.Urb.lat.275_0193_fa_0089r.jpg	cellura	point:6121,3437	PLACE						NOT_II
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3506299d-3006-4ad1-bec6-870f23da3670	L23.Urb.lat.275_0193_fa_0089r.jpg	colloci̇peri	point:4169,2230	PLACE						NOT_II
34b490e0-efc1-4d26-84e5-b0366b35ecdf	L23.Urb.lat.275_0193_fa_0089r.jpg	saona	point:1353,2012	PLACE	http://pleiades.stoa.org/places/383770	Savo/Vicus Virginis?|Savo/Vicus Virginis?, Savona|Savona	44.30491	8.48334	settlement,port	VERIFI
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62dc3df5-0fd7-4043-b165-31686328277b	L23.Urb.lat.275_0193_fa_0089r.jpg	codelago	point:1128,1650	PLACE						NOT_II
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a293406e-0318-4baf-bd6c-6d122c760851	L23.Urb.lat.275_0193_fa_0089r.jpg	piperna	point:4514,2753	PLACE	http://pleiades.stoa.org/places/433052	Privernum|Privernum, Madonna di Mezzagosto, Priverno	41.49056	13.18497	settlement	VERIFI
d124411b-ec8e-4884-9ad5-db74dfdae828	L23.Urb.lat.275_0193_fa_0089r.jpg	fondi	point:4596,2773	PLACE	http://pleiades.stoa.org/places/432855	Fundi|Fundi, Fondi	41.357429	13.427922	settlement	VERIFI
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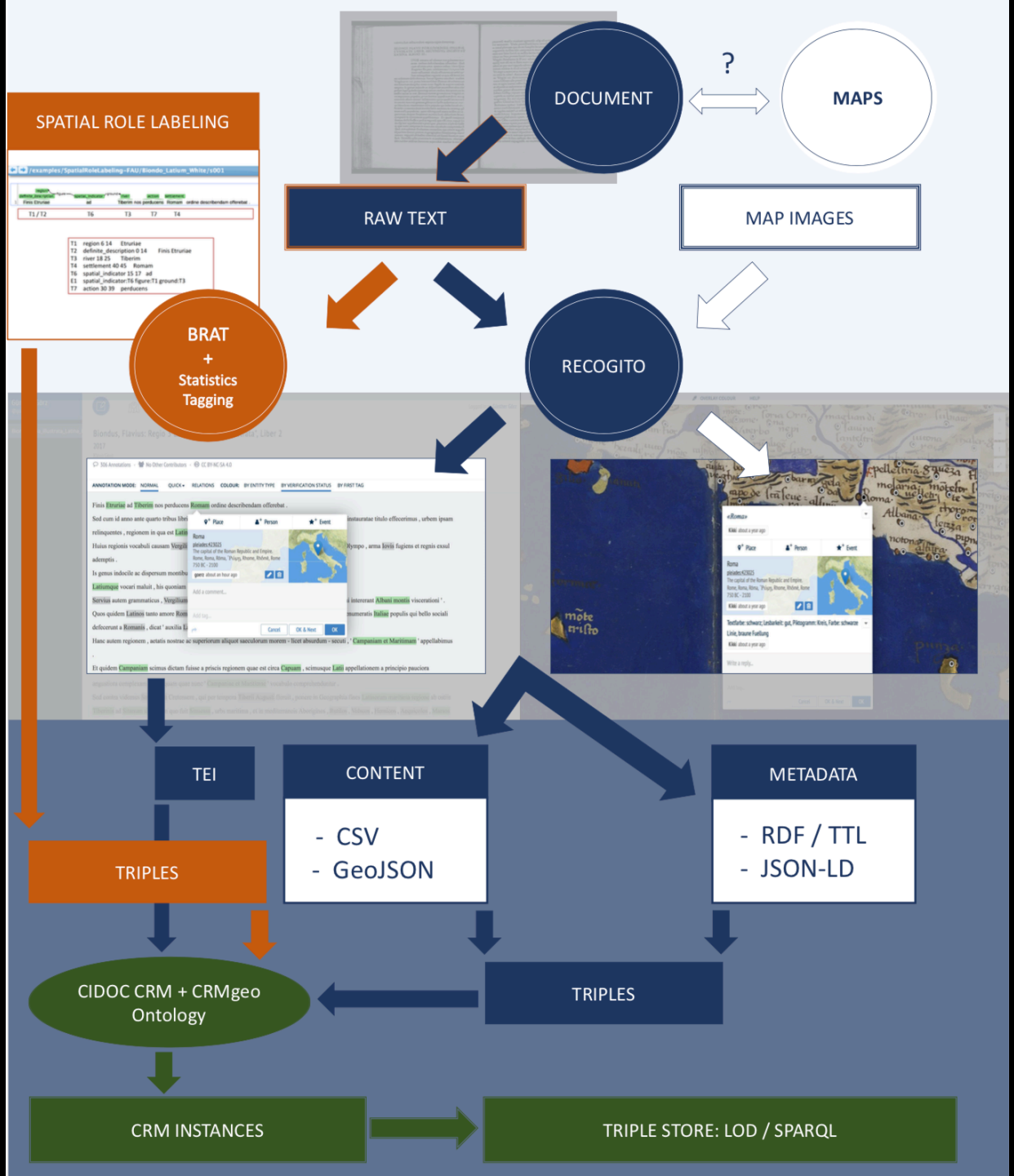
SPATIAL ROLE LABELING
DOCUMENT
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MAPS
RAW TEXT
MAP IMAGES
BRAT
+
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RECOGITO
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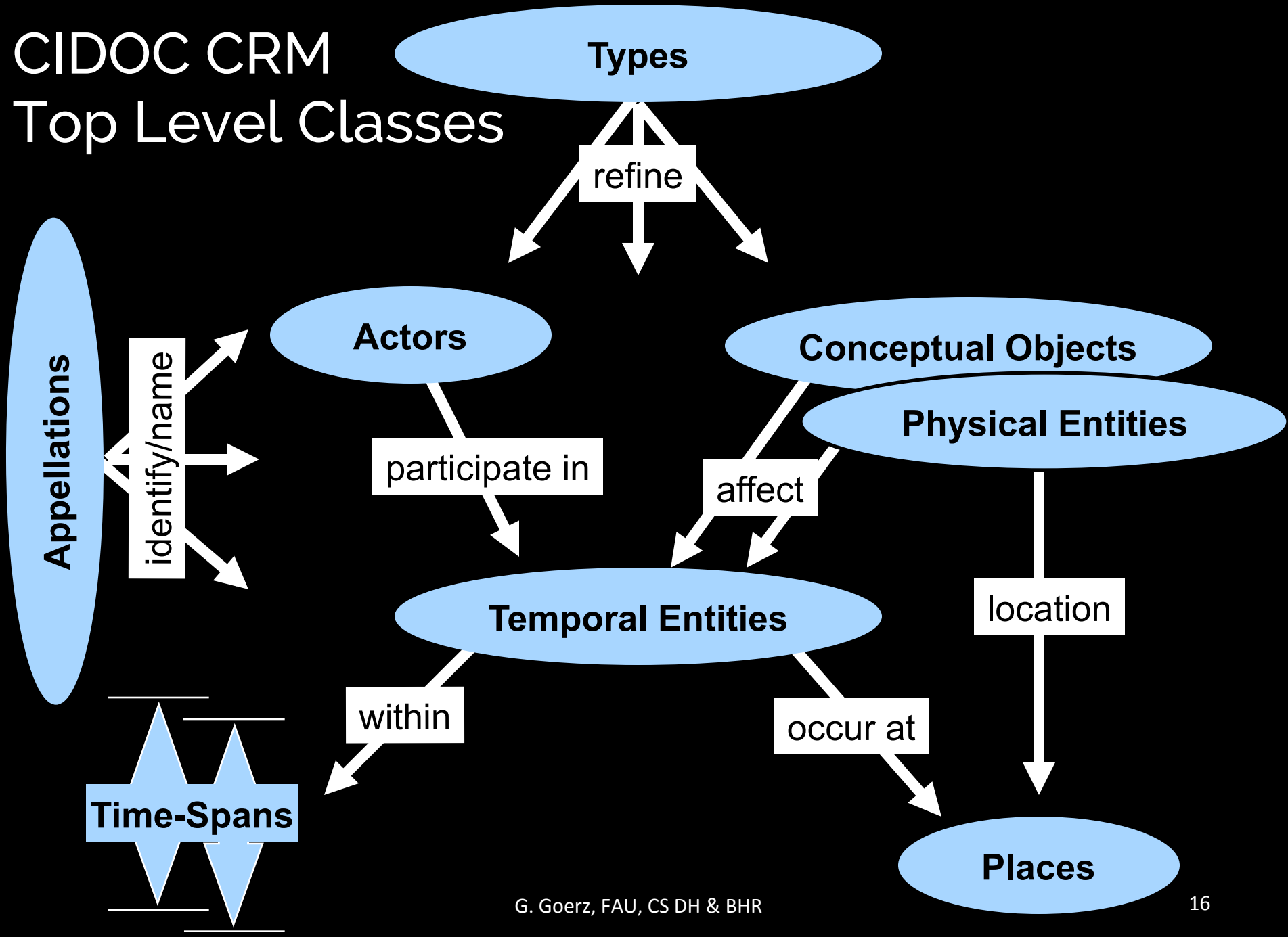
CONTENT
- CSV
- GeoJSON
METADATA
- RDF / TTL
- JSON-LD
TRIPLES
CIDOC CRM + CRMgeo
Ontology
TRIPLES
CRM INSTANCES
TRIPLE STORE: LOD / SPARQL

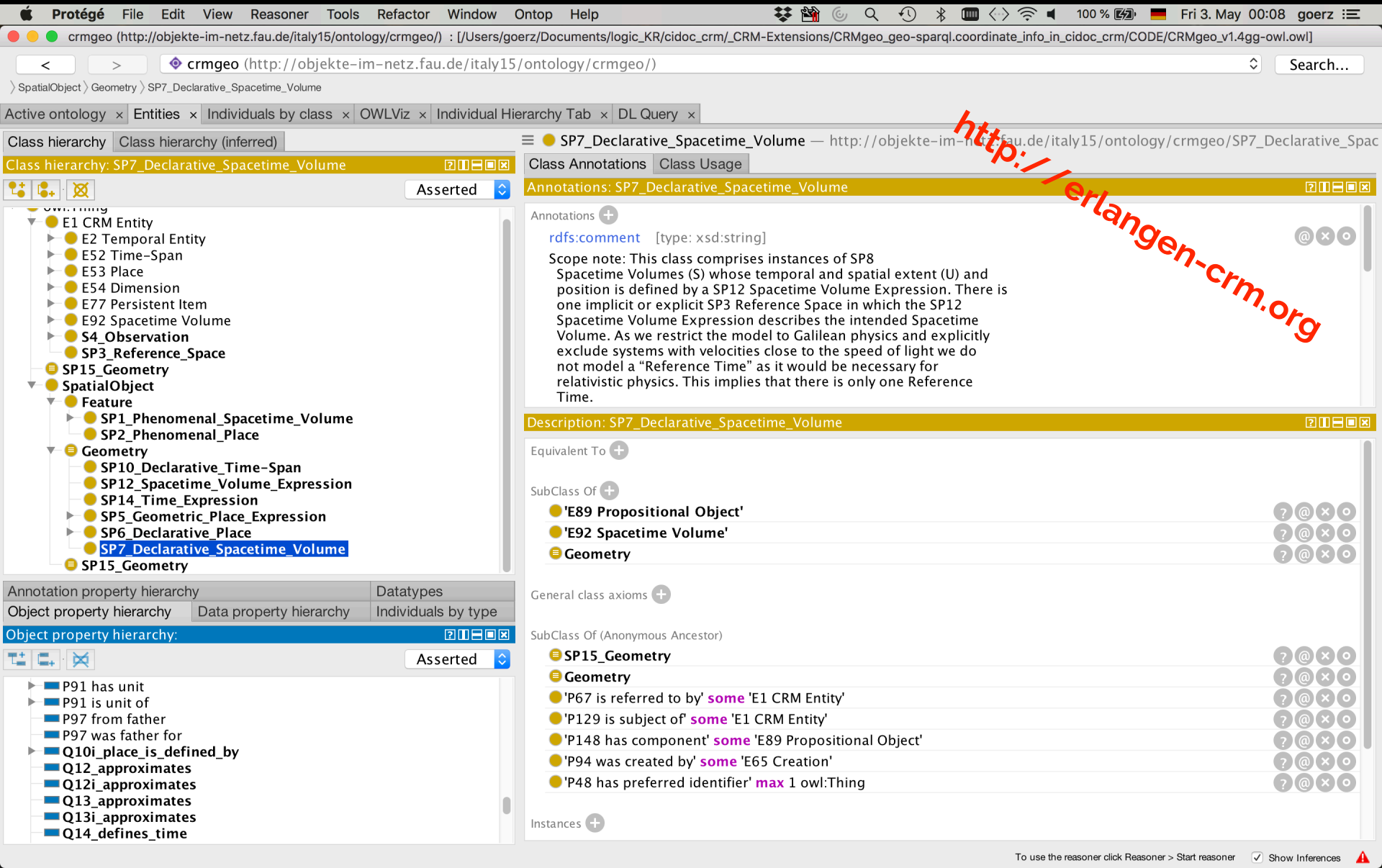
Semantic enhancement of data

- What is the meaning of annotations ?
- Semantics of annotation components defined in terms of a formal ontology
- Formal ontology: knowledge modelling
  - two methodological levels
- Reference ontology CIDOC CRM (*ISO 21127*) with extension CRMgeo
  - CRM ***event-based***; linguistic-pragmatic approach
  - Refining of domain object descriptions with technical terms (“types”) from thesauri (“Pleiades vocabulary”)
  - Use of authority files

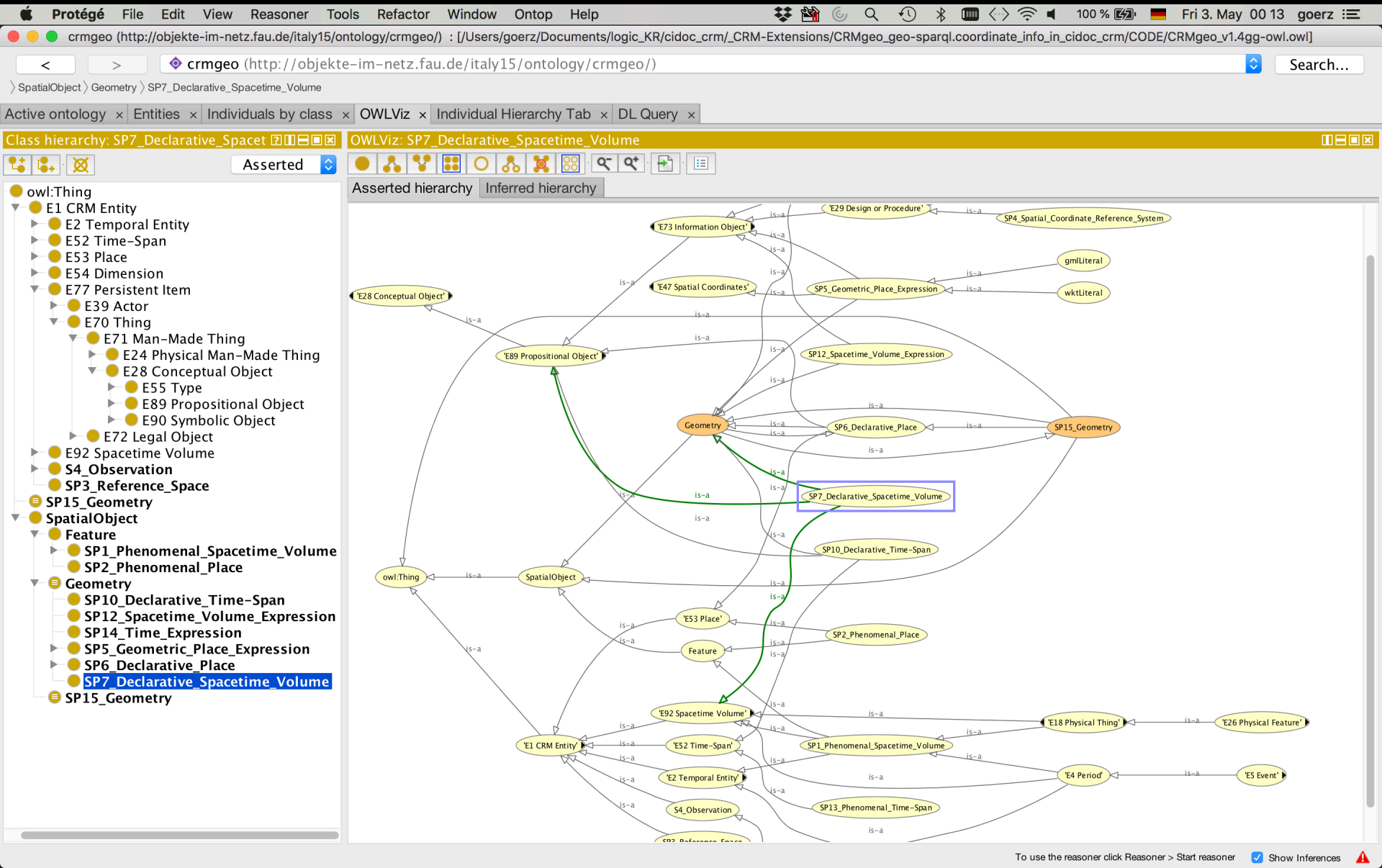
CIDOC CRM Top Level Classes



CRM + CRMgeo in OWL-DL (Protégé)



CRM + CRMgeo in OWL-DL (Protégé)



hmap + CRM + CRMgeo

- hmap: domain ontology for historical maps
  - *Map Metadata*
    ID, Cartographer, Creator, Title, Place, Time, Size, Material, Technique, Projection, Scale, Orientation, Reference System, …
  - *Image (Reproduction) Metadata*: Map, URL, Dimension, Rights,…
  - Content: *Annotated places and connections*
    UUID, Transcription, Anchor, Type, URI (Gazetteer), Label, Lat, Lng, Place Type, Verif_status, …

In search of a semantic platform

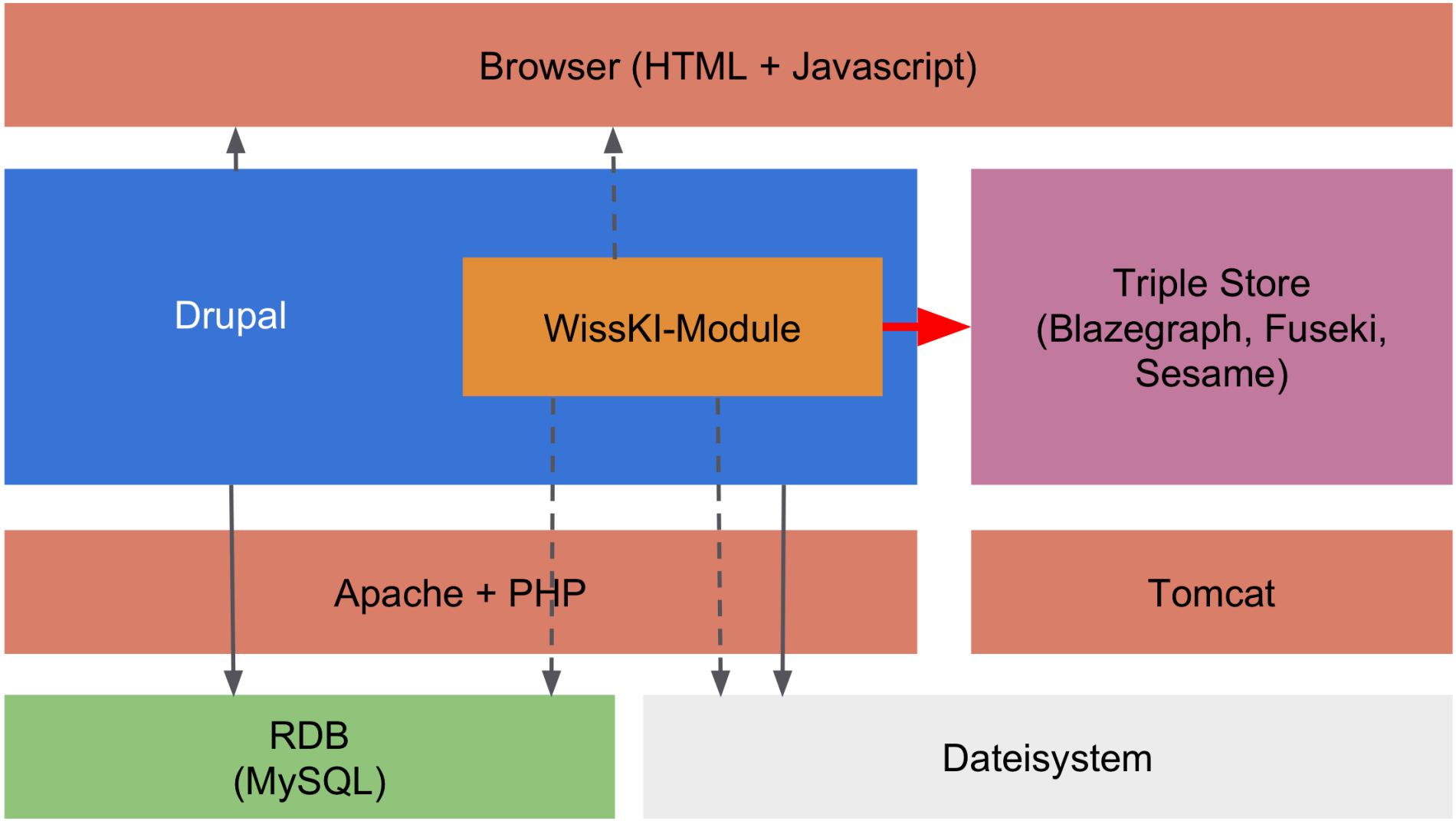
- How can we perform the semantic enhancement of annotation data ?
- How can we publish them as Linked Open Data ?

- Transformation with VRE WissKI, usage as Linked Open Data platform
- SPARQL query interface, RDF export,...

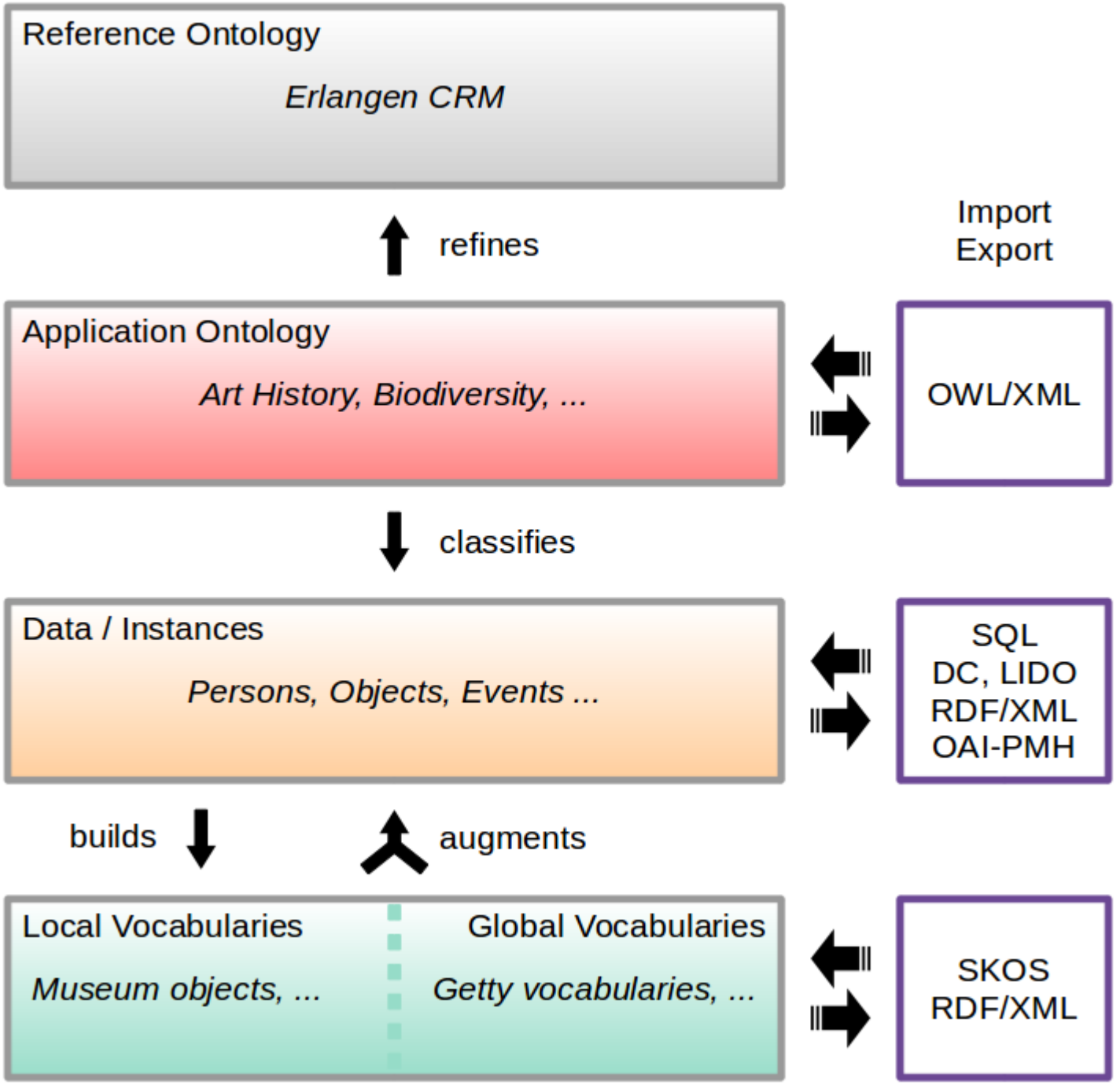
What is WissKI ?
("Scholarly Communication Infrastructure")

- Extension of CMS Drupal, customizable
- Web-based multi-user system
- Open source & open standards (Semantic Web)
- Object-based documentation, multiple media types
- Ontology-based representation (ECRM/OWL), extensible by application ontologies & controlled vocabularies

WissKI Software Architecture



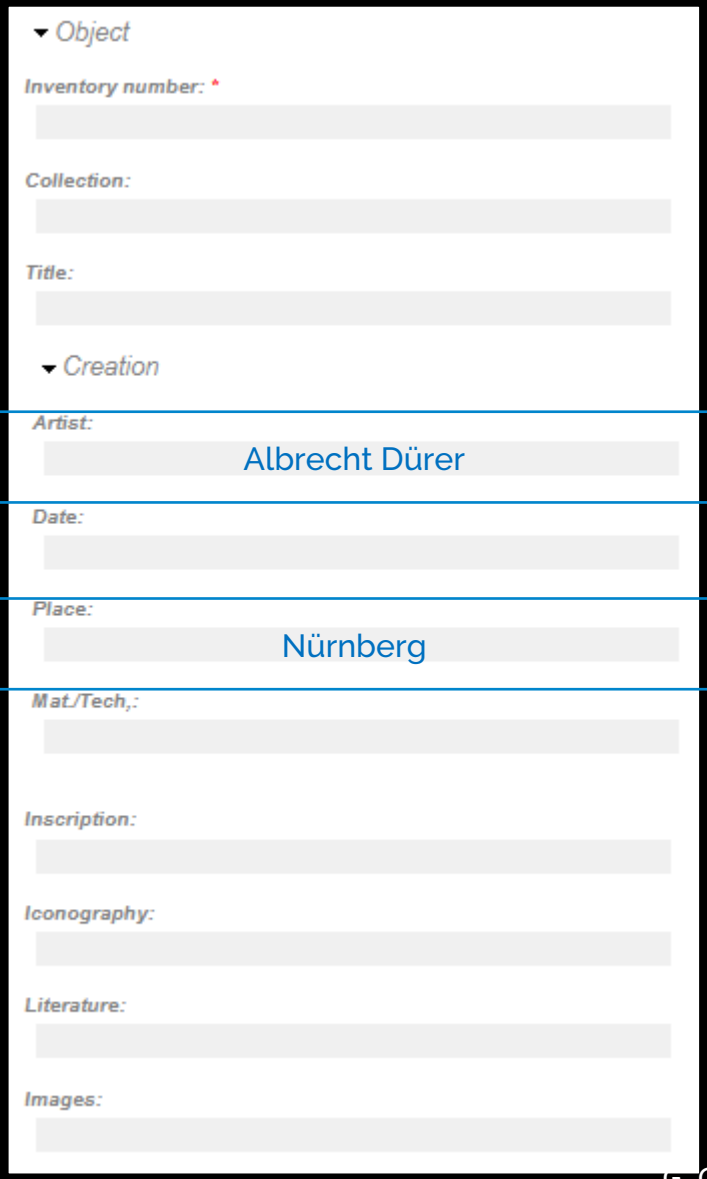
Layered Ontologies



WissKI

- Create, Navigate, Find : main modes
- Create: Data input
  - Form based or text based
  - (automatic) linking
  - data enrichment with external sources
  - various import and export formats
- Pathbuilder: define semantics of fields

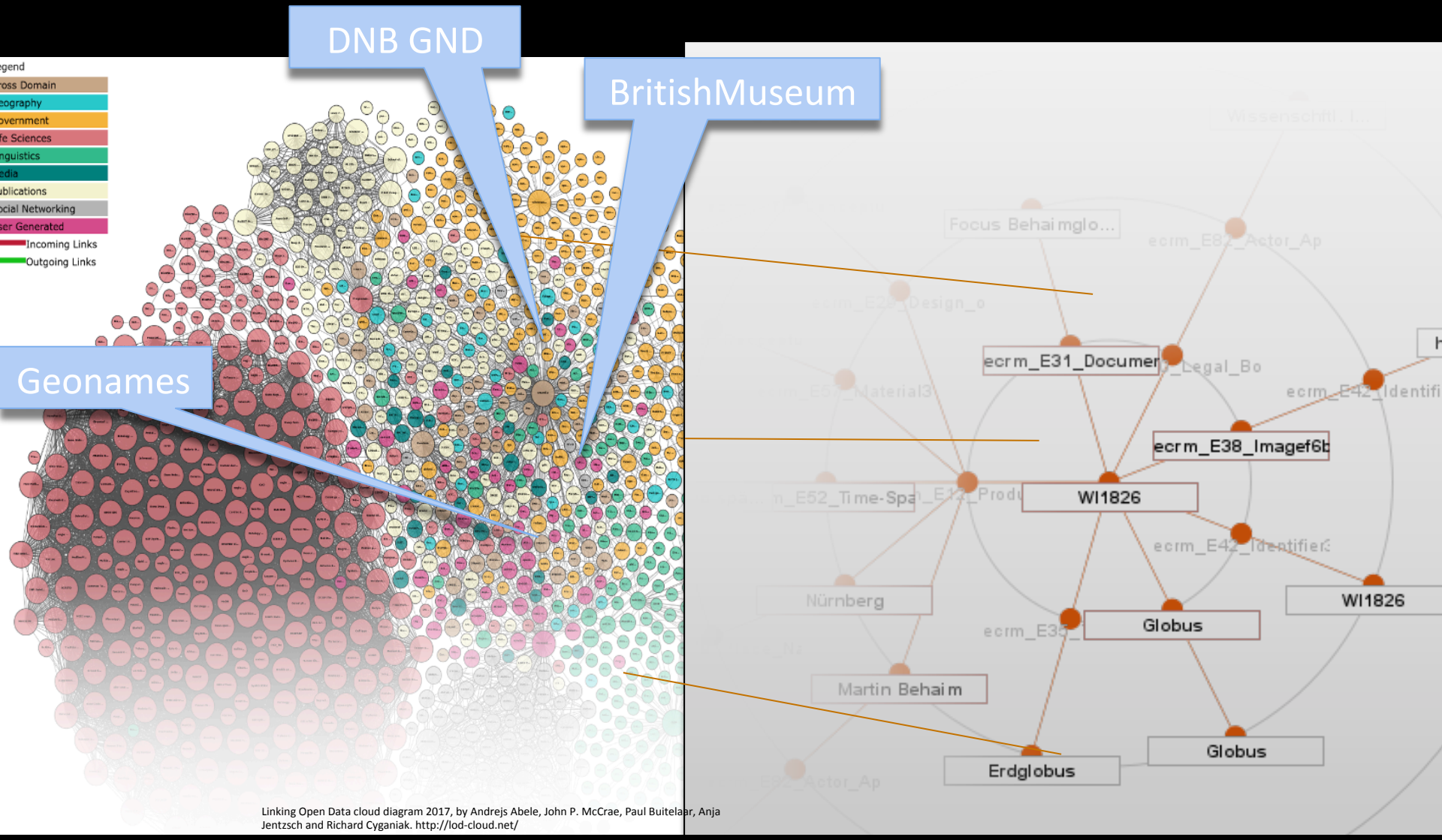
Input Form: Semantic Modelling



E84 Information Carrier
→ P108i was produced by →
E12 Production
→ P14 carried out by →
E21 Person
→ P131 is identified by →
E82 Actor Appellation
→ P3 has note →
„Albrecht Dürer“

E84 Information Carrier
→ P108i was produced by →
E12 Production
→ P7 took place at →
E53 Place
→ P87 is identified by →
E48 Place Name
→ P3 has note →
„Nürnberg “

Linked Open Data (... SPARQL endpoint)



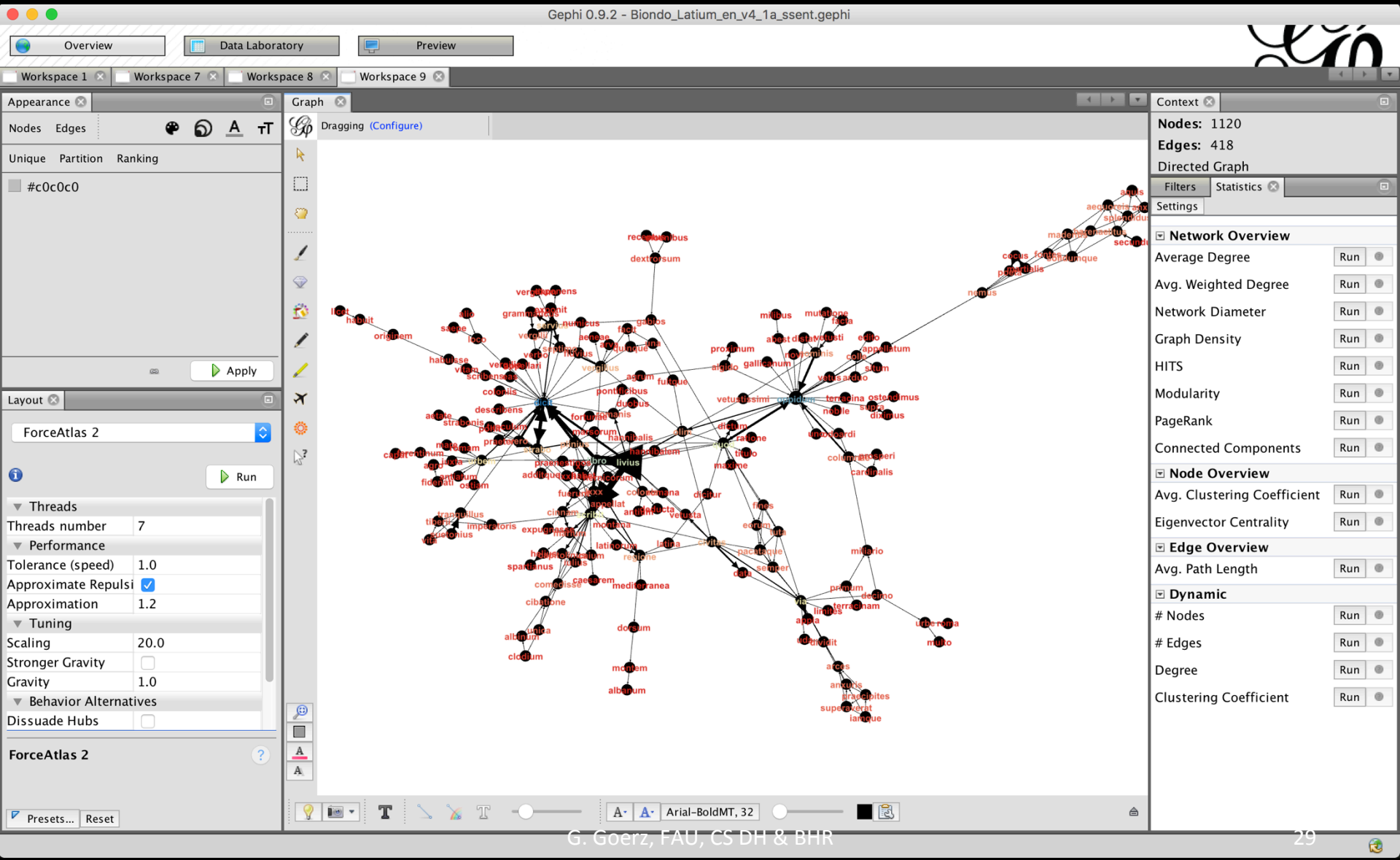
Linking Open Data cloud diagram 2017, by Andrejs Abele, John P. McCrae, Paul Buitelaar, Anja Jentzsch and Richard Cyganiak. http://lod-cloud.net/

Next steps

- *"In the last analysis all maps are cognitive maps"* (Blakemore & Harley)
- Abstract conceptual knowledge represented by object schemata – propositional *and* "depictional"
- Translation of descriptions of spatial objects and their spatial relations
  - Triples [figure, spatial_relation, ground]
  - Constructing a spatial property graph
  - Generating *sketches of cognitive maps* to represent and process reifications of cognitive objects on an *epistemological level*, i.e. frame of reference, topology, direction, trajectory, distance, and shape
- Spatial reasoning ?


Grazie!

wordij network: “semantic” clustering



CRM + CRMgeo in OWL-DL

(Protégé)

http://erlangen-crm.org