

# Digital Map Lab Holy Roman Empire

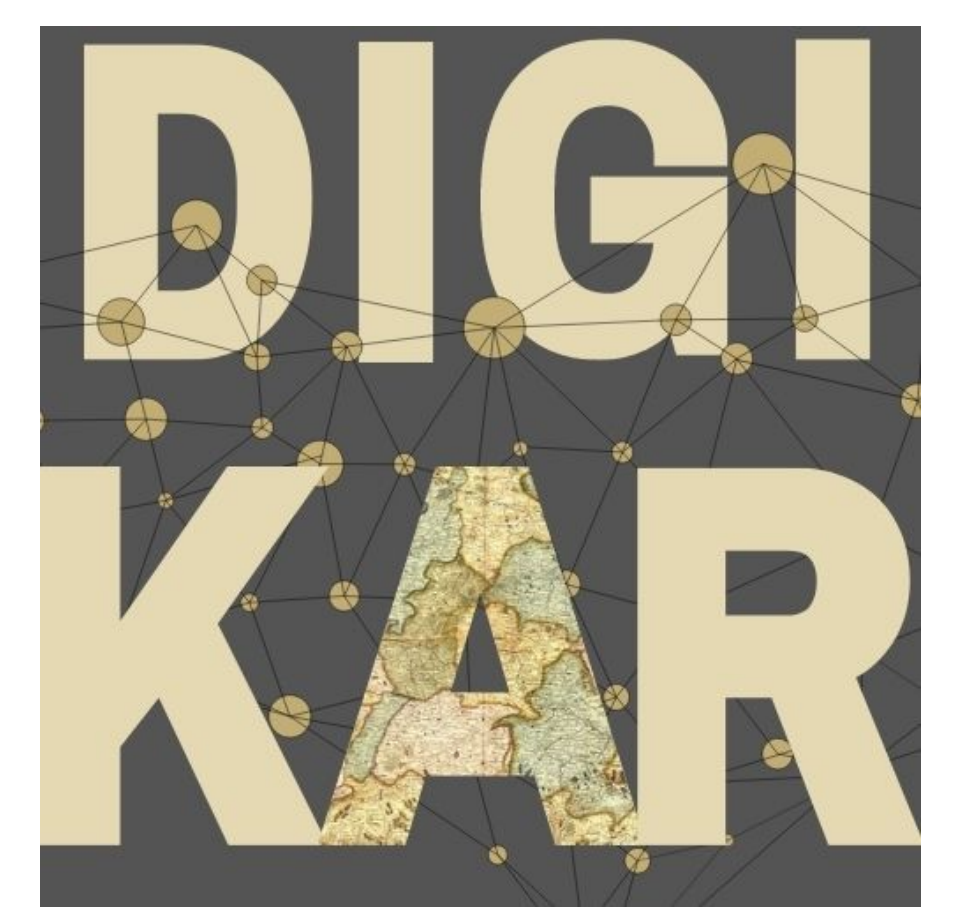
## Ontology-based Modeling of Time, Places, Agents in the Project DigiKAR

Ingo Frank

Leibniz Institute for East and Southeast European Studies  
frank@ios-regensburg.de

Monika Barget

Leibniz Institute of European History  
barget@ieg-mainz.de



### Project Context

The project **DigiKAR (Digitale Kartenwerkstatt Altes Reich)** develops and tests new approaches for the collection, **modeling** and **visualization** of early modern spatial data from the **Holy Roman Empire** (especially 17th and 18th century).

### Objectives

**Problem** Traditional modeling of geospatial data limits the possibilities to integrate, distribute, retrieve, and reuse the data [see detailed list of limitations in 4].

**Approach** The Linked Data paradigm enables new ways to tackle these issues [cf. 4]. Thus, we follow a Linked Data approach towards modeling geospatial information extracted from different historical sources.

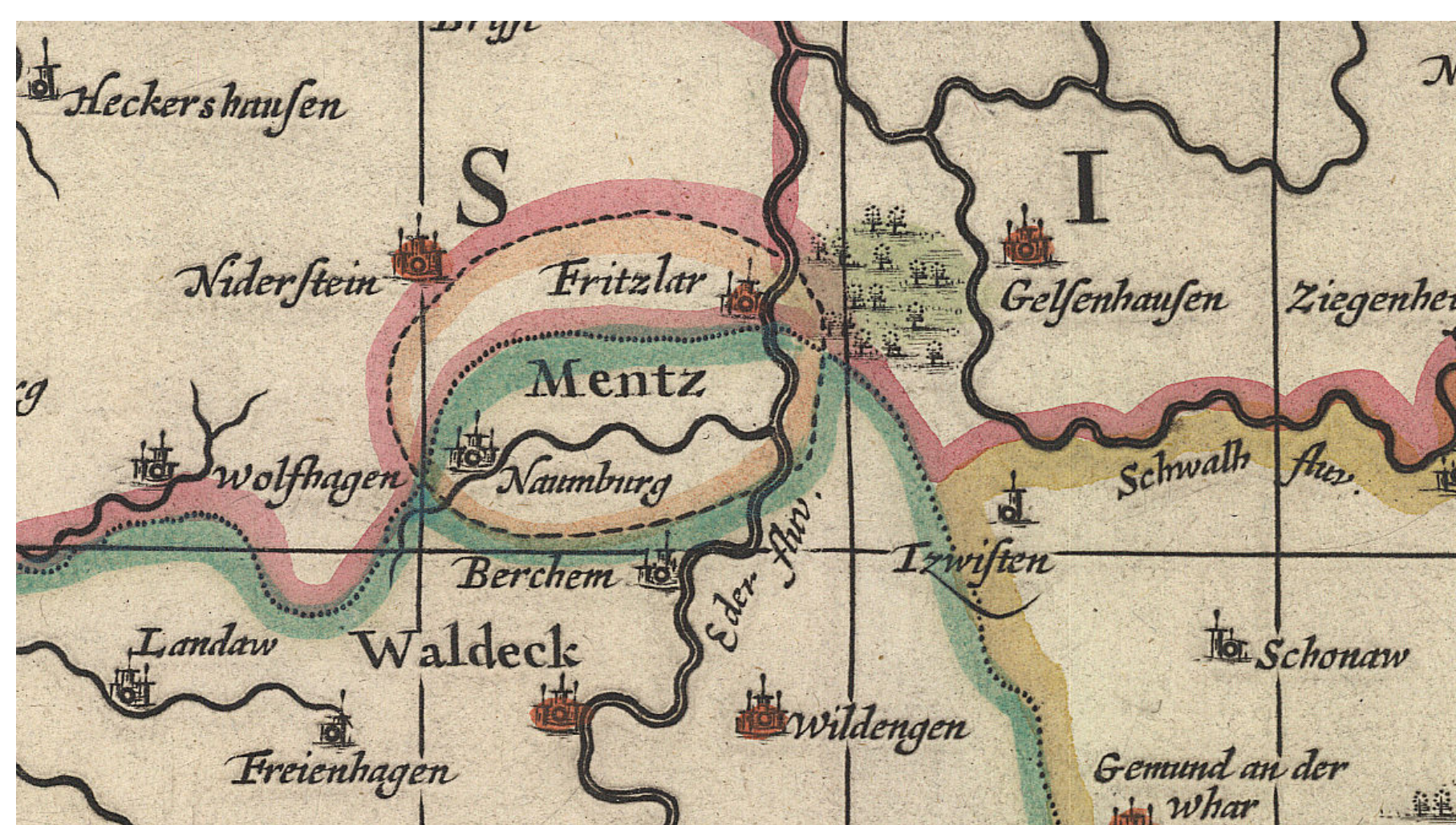
**Requirements Analysis** Instead of coercing historians to apply conventional (H)GIS technology, we intend to “apply GIS to historical research at their own terms, rather than what GIScience and geography proscribe” [5, p. 236]. To achieve this, we apply requirements engineering guided by ontology-based modeling.

**Ontology-based Modeling** We consider ‘ontology-based’ not only as

- data modeling by means of an *information system ontology*, but also
- designing such an ontology informed by *philosophical ontology*—i. e. *applied ontology*.

### Case Studies

The interdisciplinary research group (consisting of historians, geographers and information scientists) will pursue two case studies from different geographical regions and political entities of the Holy Roman Empire: **Electorate of Mainz** and **Electorate of Saxony**.



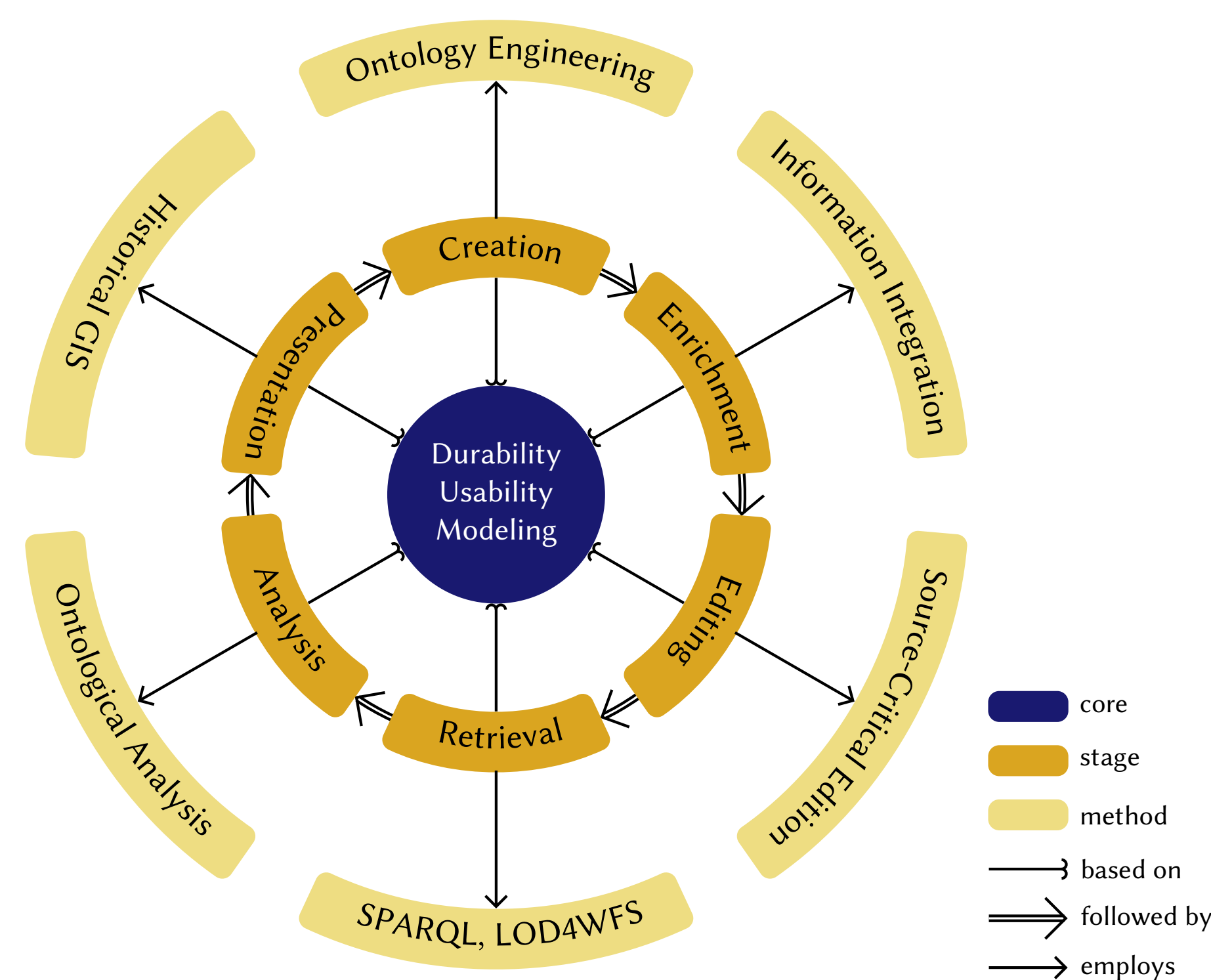
**Figure 1:** A disputed enclave of Mainz depicted on a historical map from c. 1680 (Source: [https://commons.wikimedia.org/wiki/File:Map\\_-\\_Special\\_Collections\\_University\\_of\\_Amsterdam\\_-\\_OTM-\\_HB-KZL\\_31-32-33.tif](https://commons.wikimedia.org/wiki/File:Map_-_Special_Collections_University_of_Amsterdam_-_OTM-_HB-KZL_31-32-33.tif))

### Methodology

We adapt a method from ontology engineering to satisfy the needs of historians, geographers, cartographers and information visualization specialists: The eXtreme Design methodology [1] is an **iterative procedure** to design ontology design patterns:

1. The design process starts with the collection of **user stories**, which describe requirements in a short, structured form.
2. In the next step, so-called **competency questions** are derived from each user story.
3. On the basis of the competency questions, **ontology design patterns** are selected, extended, or where necessary developed from scratch.

### Research Data Life Cycle

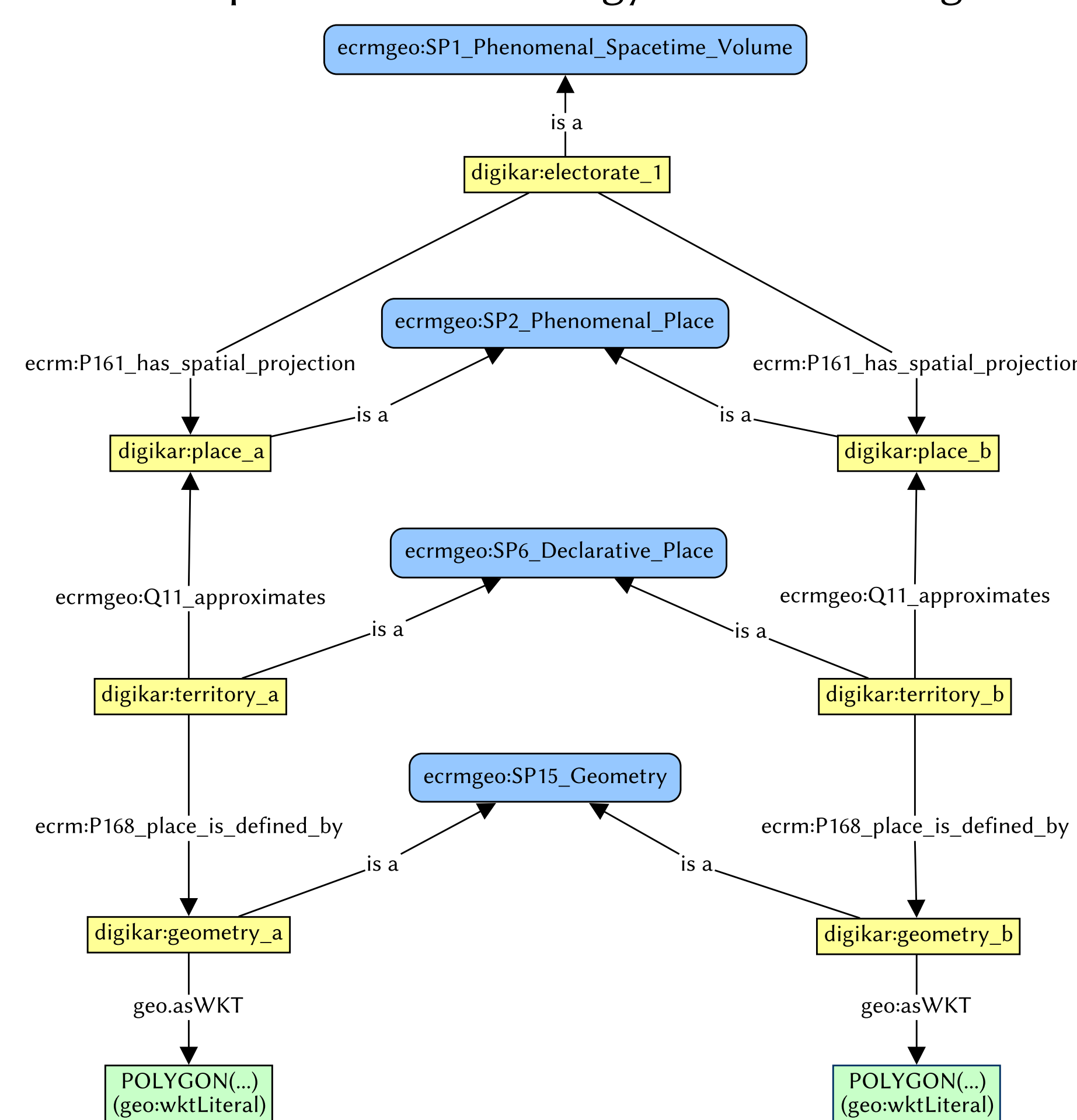


**Figure 2:** Historical Information Life Cycle for the project DigiKAR

- Ontologies are mostly used in the *enrichment* stage and *editing* stage of the *historical information life cycle* [cf. 6, p. 10].
- Ontology as a philosophical discipline—i. e. as *applied ontology*—should also be applied in the *analysis* stage.
- The method of *ontological analysis* will support and guide the “modeling for [historical] understanding” as well as the “modeling for production [of maps]” [2] in iterative cycles.

### Ontology-based Modeling

We use CRM and the CRMgeo extension [3] to conduct our first experiments in ontology-based modeling.



**Figure 3:** CRMgeo pattern to represent divergent territorial claims or contested borders as they may be depicted in different historical maps



**Figure 4:** A boundary stone located in the Eichsfeld as an example for our point-based approach to borders (Source: [https://commons.wikimedia.org/wiki/File:Grenzstein\\_Eichsfeld\\_Bistum\\_Mainz\\_-\\_panoramio.jpg](https://commons.wikimedia.org/wiki/File:Grenzstein_Eichsfeld_Bistum_Mainz_-_panoramio.jpg))

### Conclusions

- We use **Semantic Web** and **Linked Data** technology as central building blocks to create the project’s research data infrastructure.
- We apply **ontological analysis** as a method informed by the philosophical discipline of ontology in order to clarify and analyze concepts of political and social entities in the domain of early modern history.
- By means of **ontology-based modeling** of integrated data from different historical sources, we gain representation systems suitable for diagrammatic reasoning in the sense of “gistory” [5, p. 237].

### Outlook

“Rather than a visualisation tool, GIS should be used as a painting tool: a tool to creatively engage with one’s sources” [5, p. 237]. The use and reuse of the integrated spatiotemporal data within our project’s research data life cycle will enable **mapmapping** [see 7, p. 143] and **diagrammatic reasoning** beyond mere cartography and can include:

- Voronoi diagrams to estimate and overlay spheres of influence on different levels,
- network diagrams of political and religious networks based on dynamic network analysis,
- cognitive maps to analyze the perceptions of historical agents (e. g. possible actions within several overlapping institutional spheres of influence).

### References

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