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Data Modelling Challenges in Europeana

Carlo Meghini

CNR ISTI

Objectives

- To identify the main issues that affect interoperability among large digital libraries
  - Europeana in particular
- To discuss to what extent the availability of a formal framework can facilitate the achievement of appropriate interoperability solutions
  - A Reference Model in particular

Interoperability

- Interoperability is the ability of two or more systems or components to exchange information and to use the information that has been exchanged [IEEE Standard Computer Dictionary 1990].
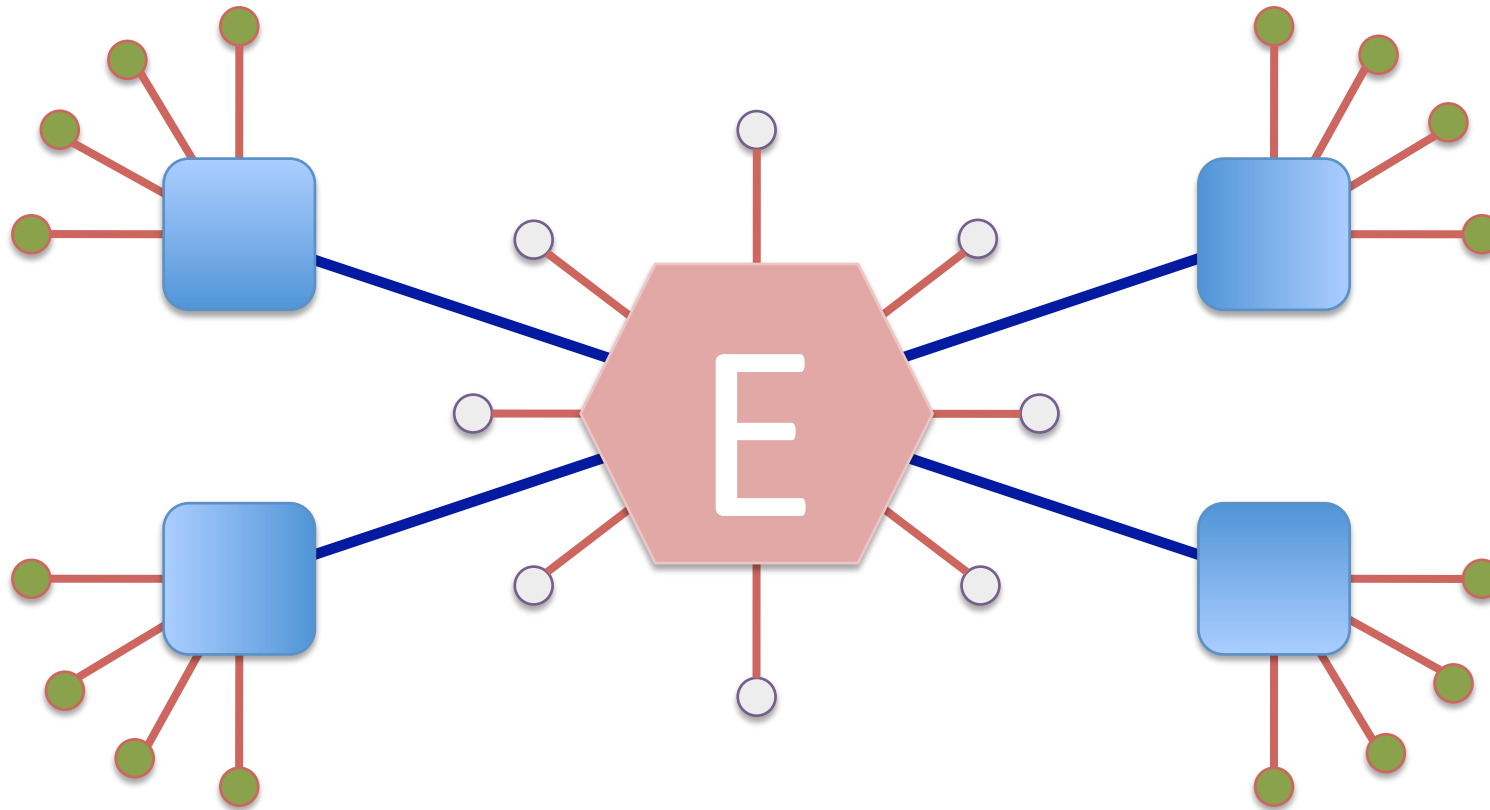
A Large Digital Library

- [Europeana](#)

Interoperability & Europeana

To see the interoperability problem, we must step back from Europeana as a portal for discovery & access and take a look at the wider picture.

The wider picture

The wider picture

A number of institutions offering services to their users over their contents …

… and also contributing …

… descriptions of their objects to Europeana

In other words …

The wider picture

An information integration system, consisting of:

- Local sources with data structured according to local schemas

- A global source with data structured according to a global schema

- A set of mappings between these schemas

"The main issues that affect interoperability"

Lack of awareness of the general problem and of the many efforts that have been done in the database area to solve it (since the 90's).

- Very little or no effort at all directed towards the application of the existing results.

- Not trivial!

- But … what else?

Good news

Basic results:
- ontology matching
- ontology mapping
- mapping evolution

Ontology Matching

- In general, there will be several ontologies for a given domain, just like there will often be several database schemas for the same kind of data.

- Consequently, much research has focused on
  - matching and aligning tools (i.e., finding corresponding terms/elements between two ontologies/schemas), and

  - merging ontologies (i.e., combining two ontologies into one).

Ontology mapping

- Given ontologies O1 and O2 with correspondences between their elements, we want to construct a mapping from a O1 query to an O2 query.

- This kind of mapping enables the population of a digital library ontology with descriptions from other sources (ontologies).

- The mappings can be expressed in a language such as Datalog or SPARQL and are generally very complex, even for simple schemas.

Mapping evolution

- Given two ontologies O1 and O2 with a mapping M between them, as well as a change δ to O1, we want to incrementally change M to M(δ) to reflect the change of the mapping.

- As with the mapping discovery problem, in general there will be many possible M(δ) solutions.

- An approach consists in letting the user choose the right one.

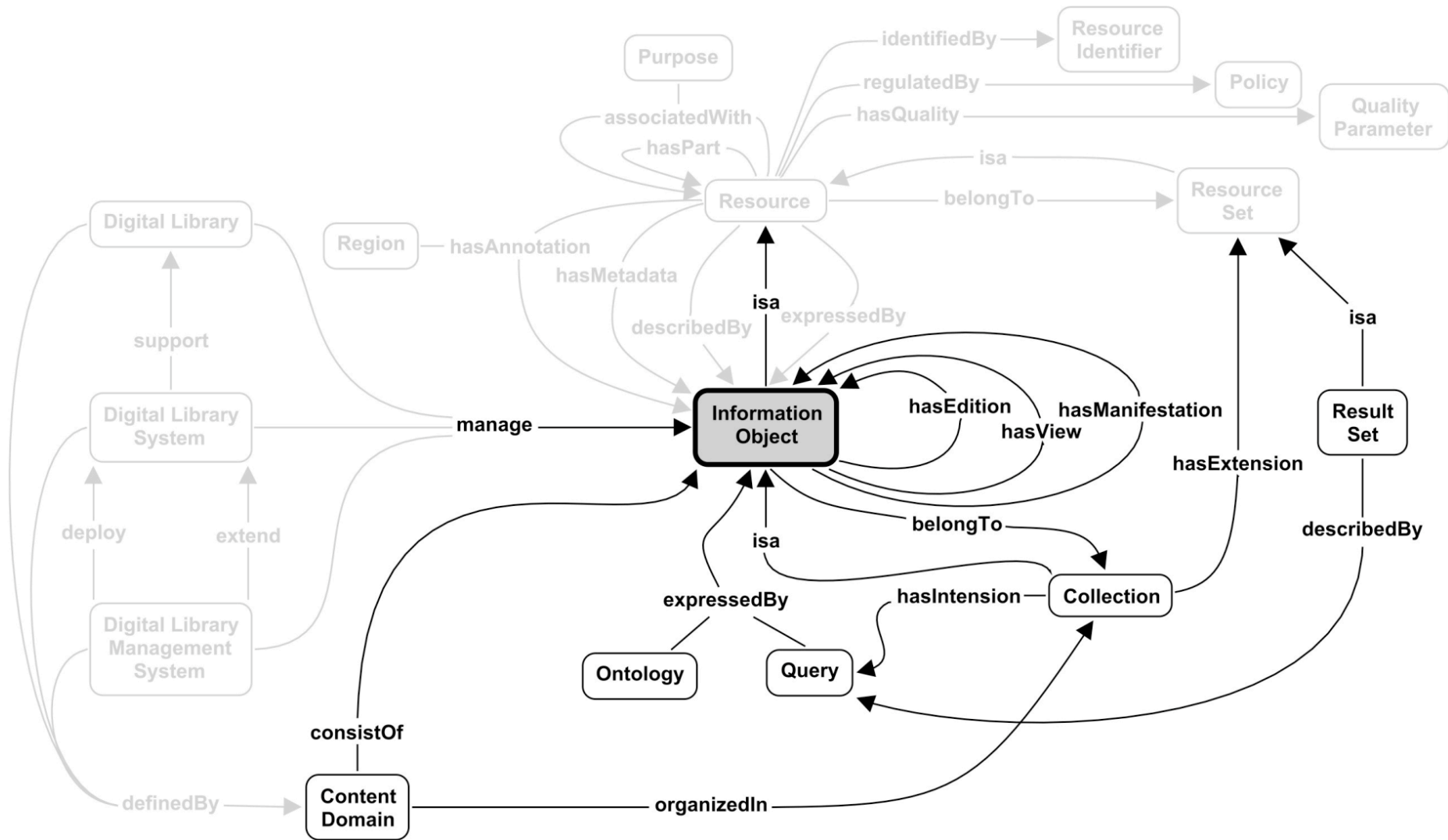# "to what extent the availability of a formal framework can facilitate ..."

- A reference model can help significantly:
  - Extend the classical DL model with the notions for representing and managing ontology mappings
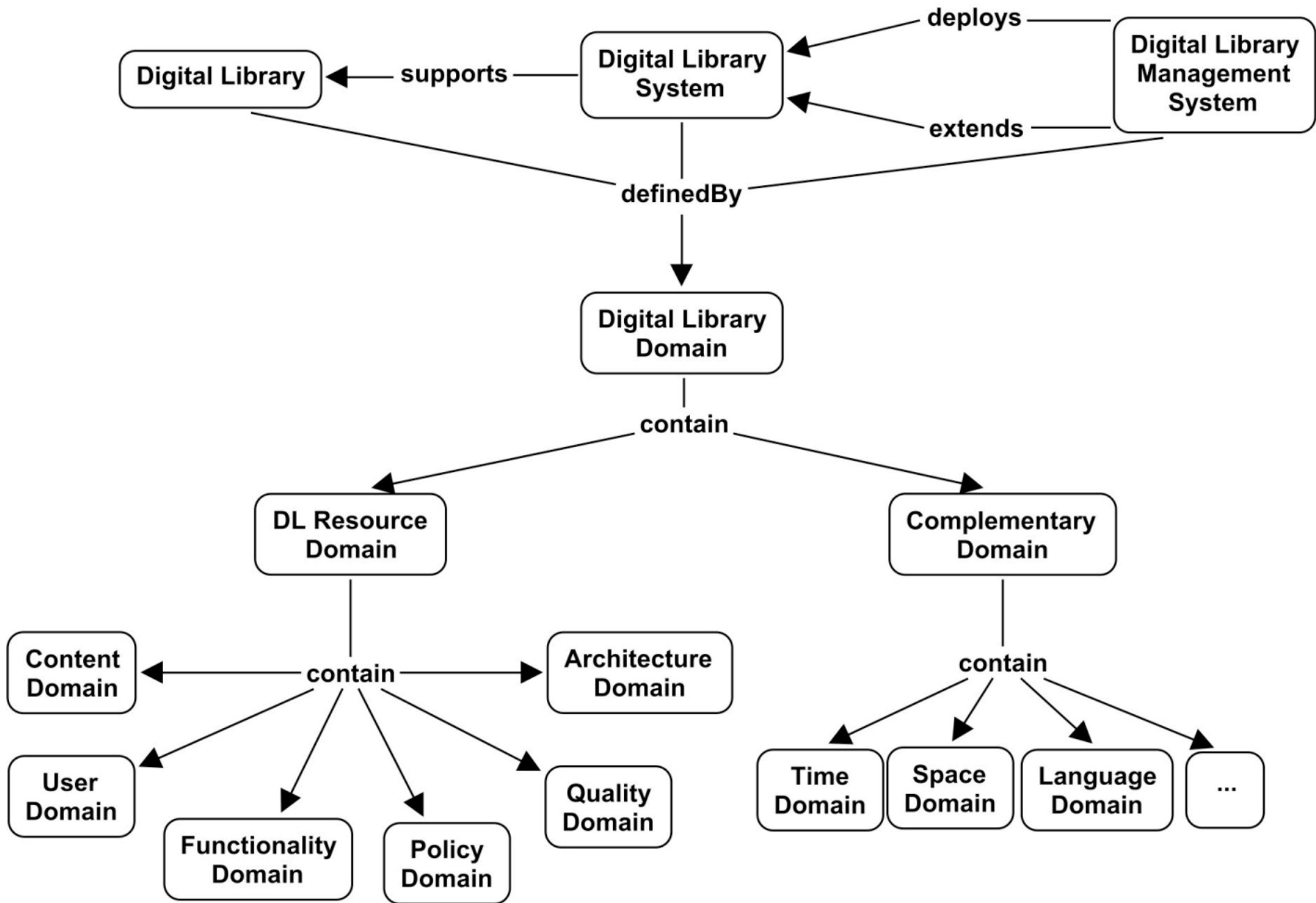
Resource Domain
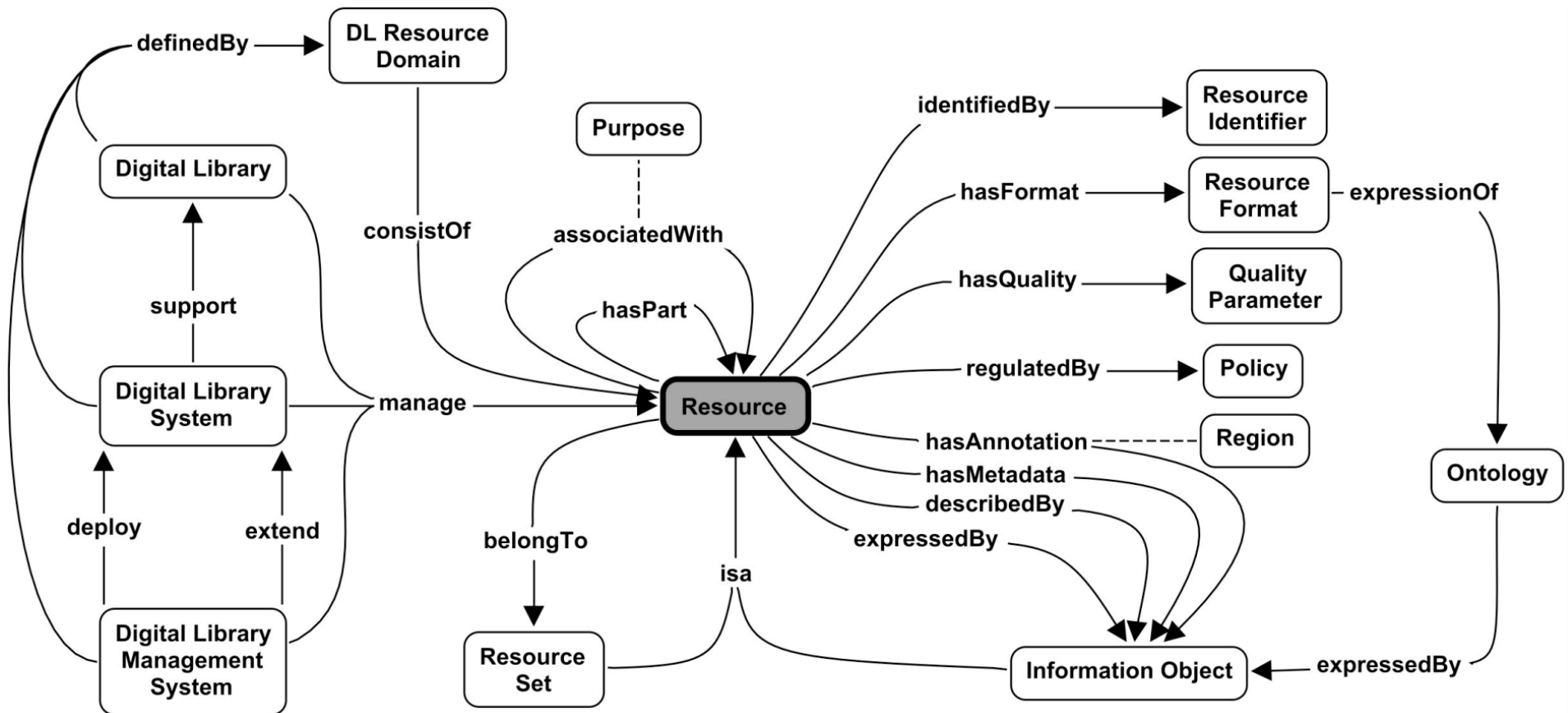
Information Domain

"to what extent the availability of a formal framework can facilitate …"

- Benefits:
  - Raise awareness in the DL community
  - Direct towards the right direction
  - Motivate researchers to look into existing results and work on applying them in DLs
  - Promote projects

Conclusions

- Issues: applying (if necessary extend) existing results on ontology mapping to digital libraries

- Reference model: an important tool to this end

Thank you

Questions?