SMC4LRT

Semantic Mapping Component for
Language Resources and Technology

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Matej Ďurčo, ICLTT, Vienna;

Context

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on **Language Resource and Technology**

- CLARIN – Common Language Resources and Technology Infrastructure
- CMDI - CLARIN Metadata Infrastructure
  heterogeneous collection of (Metadata about) Resources
- ISOcat (ISO 12620) - a framework within ISO TC 37 for defining:
- Data Categories – Definitions of widely accepted linguistic concepts

apply **Semantic Technologies**

- Ontology Mappping / Schema Mapping
- Ontology Browsing / Visualization
- Linked Open Data

Main Goal/s

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- Enhance Metadata Search → **Semantic Search**

  Basic Idea

  query:

  ```
  Actor.Name any Peter
  ```

  \+ relations:
  (#DatCat)

  ```
  #sameAs (#Actor, #Person)
  #sameAs (#Name, #FullName)
  ```

  = expanded query:

  ```
  Actor.Name any Peter
  OR Actor.FullName any Peter
  OR Person.Name any Peter
  OR Person.FullName any Peter
  ```

  (Class level)

- Semantic Browsing
  - Browse Metadata/Resources via ontologies (LT-World) (Instance-Level)
- Interoperability / Reuses
  - Connect dataset to Linked Open Data

Definitions

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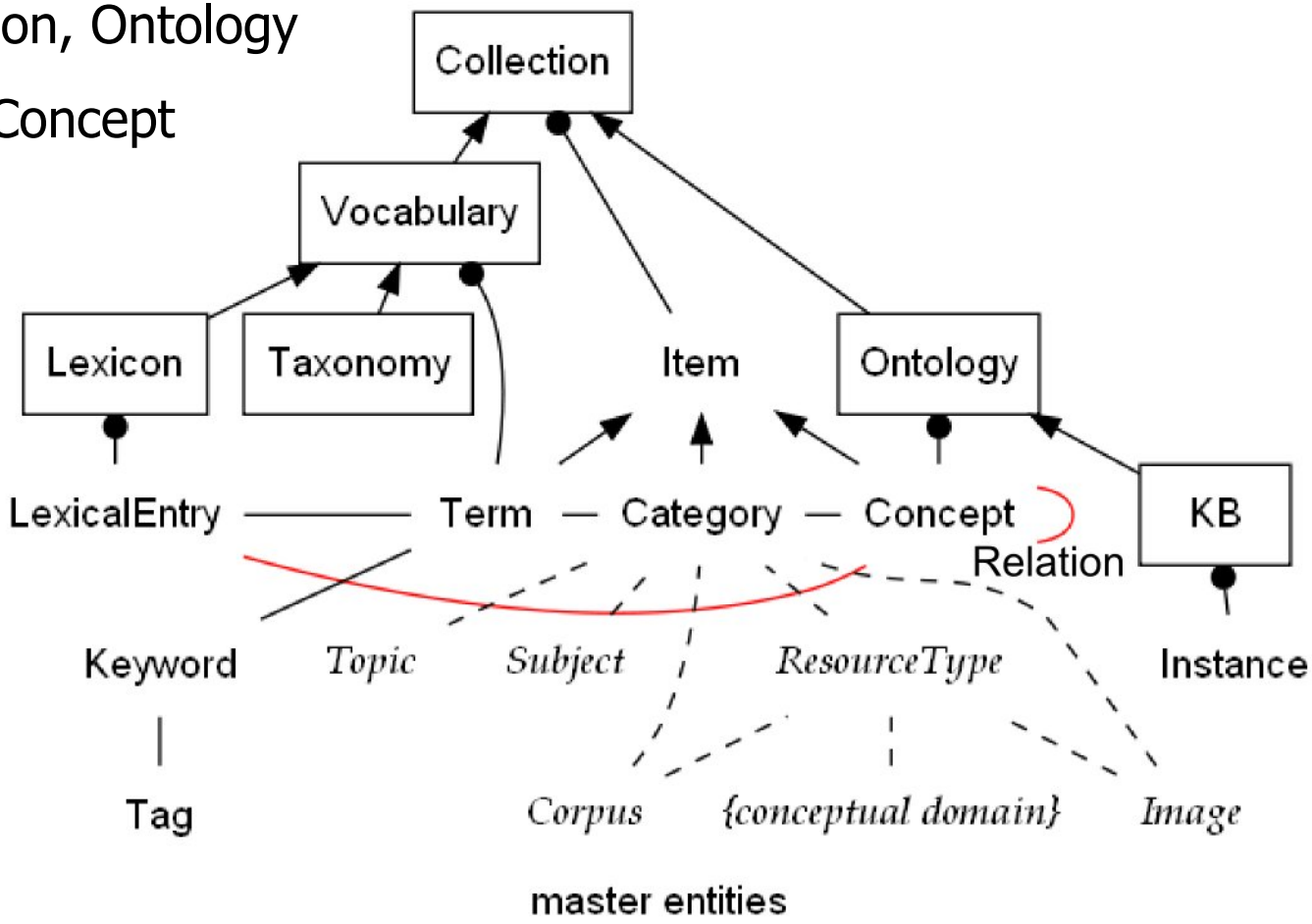
- Vocabulary, Lexicon, Ontology
- Term, Category, Concept



?

- MD Profile / Schema
- MD Description

Components

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- DataCategoryRegistry - isocat DCR (ISO/TC37)
  Define/Standardize a reusable set of (basic) data categories
- CMDI - ComponentRegistry
  define profiles/schemas at will, but reference DatCats!
- CMDRSB - Repository/Service/Browser
  CMDI exploitation-side trinity http://clarin.aac.ac.at/MDService2/
- RelationRegistry
  allows defining relations between DatCats
- VLO - Virtual Language Observatory
  faceted browser for CLARIN Metadata, maps all hetergeneous information from all profiles to 10 facets!
- VAS – Vocabulary Alignment Service (CATCHPlus.nl)
  find concept to literal, find aligned concepts
- LT-World - Domain ontology

Components - CMDI

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Perform search/browsing on the metadata catalog using the ISO DCR and other concept registries and CLARIN relation registry

Create metadata schema from selection of existing components. Allow creation of new components if they have references to ISOcat

Search Service

Semantic Mapping

Relation Registry

ISOcat Concept Registry

DCMI Concept Registry

other Concept Registry

CLARIN Component Registry

Joint Metadata Repository

Metadata harvesting by OAI protocol

Metadata Repository

Metadata Repository

Metadata descriptions created

Metadata component profile was selected from metadata component registry

Components - dependencies

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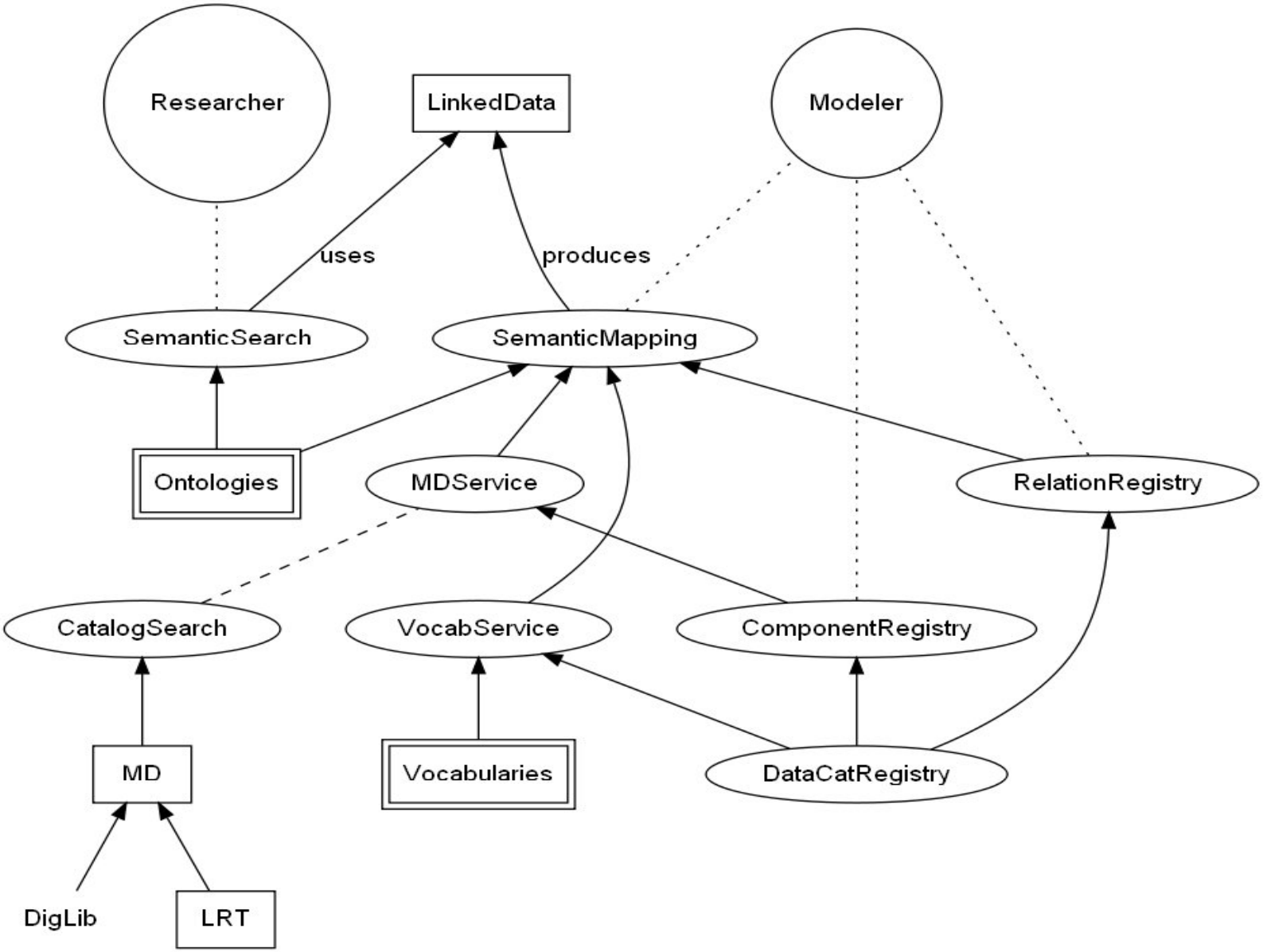

SemMap dependencies

Approach – Class/Concept level

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- Use linkage: Profiles → Data Categories ← Relation Registry

MDRecord

```
<CMD>
<Header>
 <MdProfile>{profileID}</MdProfile>
<Components><{profileName}>
      <{component}>
        <{element}>
```

CMD-Profile-Specification

```
<CMD_ComponentSpec>
 <Header><ID>{profileID}</ID>...</Header>
 <CMD_Component name="{profileName}">
  <CMD_Component name="{component}">
   <CMD_Element name="{element}"
          ConceptLink="{datcat-uri}">
```

Data Category Registry

```
<dcif:dataCategorySelection>
  <dcif:dataCategory
     pid="{datcat-uri}" >
        {detail-information}
```

Relation Registry

```
<rdf:RDF>
<rdf:Description rdf:about="{datcatX-uri}">
<sameAs rdf:resource="{datcatY-uri}"/>
</rdf:Description>
```

1. just mapping based on the ConceptLink resolvable via ComponentRegistry
   different Profile/Elements pointing to the same DatCat

2. use Information from Relation Registry:
   a) equivalence relation between DatCats
   b) equivalence relation also between Component DatCats (yet to come)
   c) use also other relations in Relation Registry (`subClassOf`, synonymy?, …)

3. Apply selected (user-defined) relation-sets from Relation Registry

Approach – Individuals/Instance Level

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One step when (pre)processing incoming new MD-sets

1. Express MD-Records as RDF-triples:

```
<#mdrecord #property "string-value">
```

2. Identify potential target Domain Ontologies/Vocabularies

3. Create inverted Index:

```
label → entity
```

Category	Label	Entity
dc:Organization	„MPI“	#MPI
	„Max-Planck...“	#MPI
	„DFKI“	#DFKI
	„De Fo Kü In“	#DFKI
skos:LCSH	„19th Poetry“	lcsh:19thPoetry
skos:DDC	„19th Poetry“	ddc:19thPoetry

4. Define lookup function:

```
lookup(category, string-value)
  → <external-entity, measure>
```

5. Enrich dataset with new facts:

```
<#mdrecord #property #external-entity>
```

Property-values of Metadata-Records are linked to instances of domain-ontologies

Semantic Mapping - Linking and Data Flow

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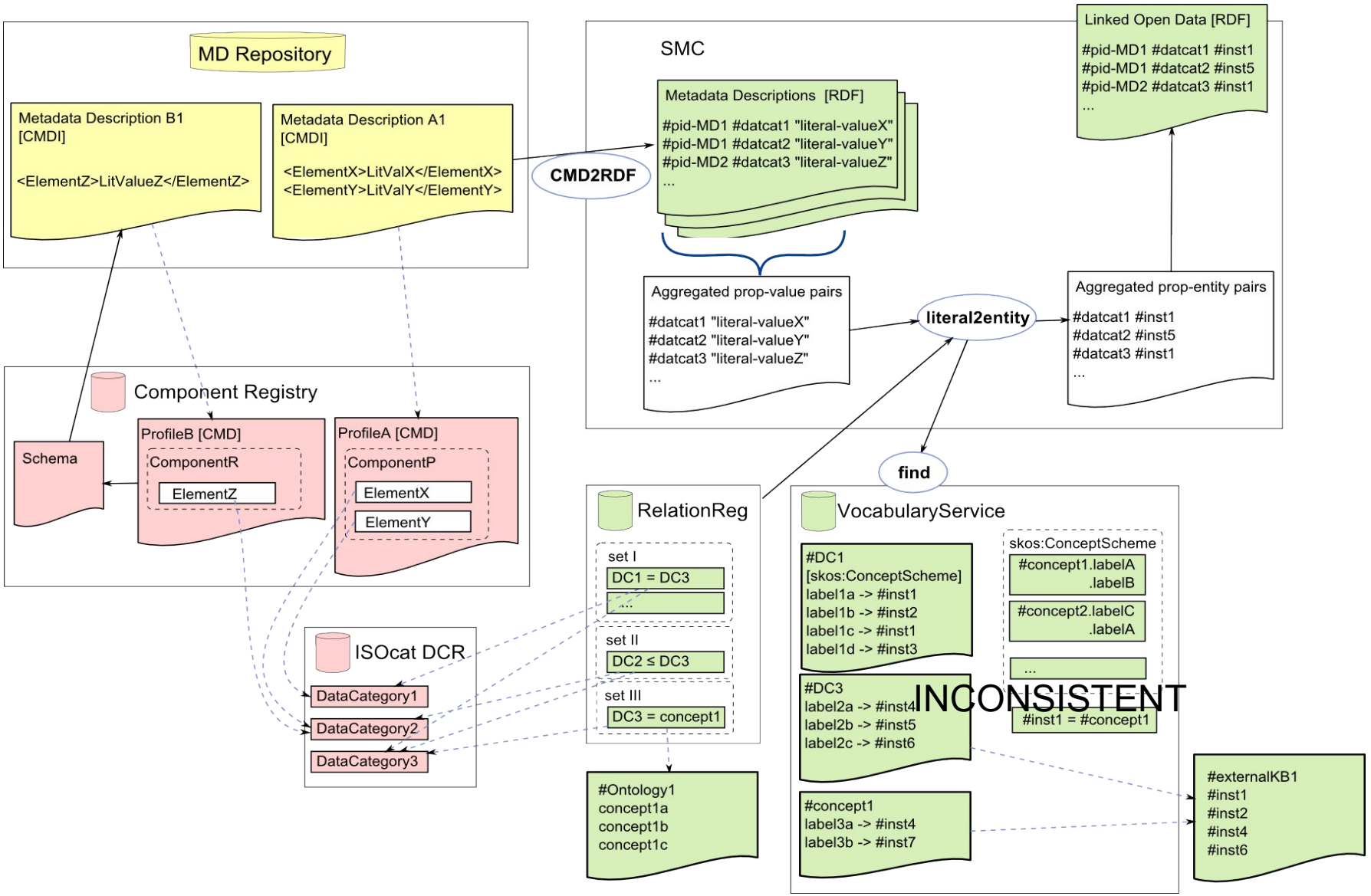

Semantic Search - Query sequence

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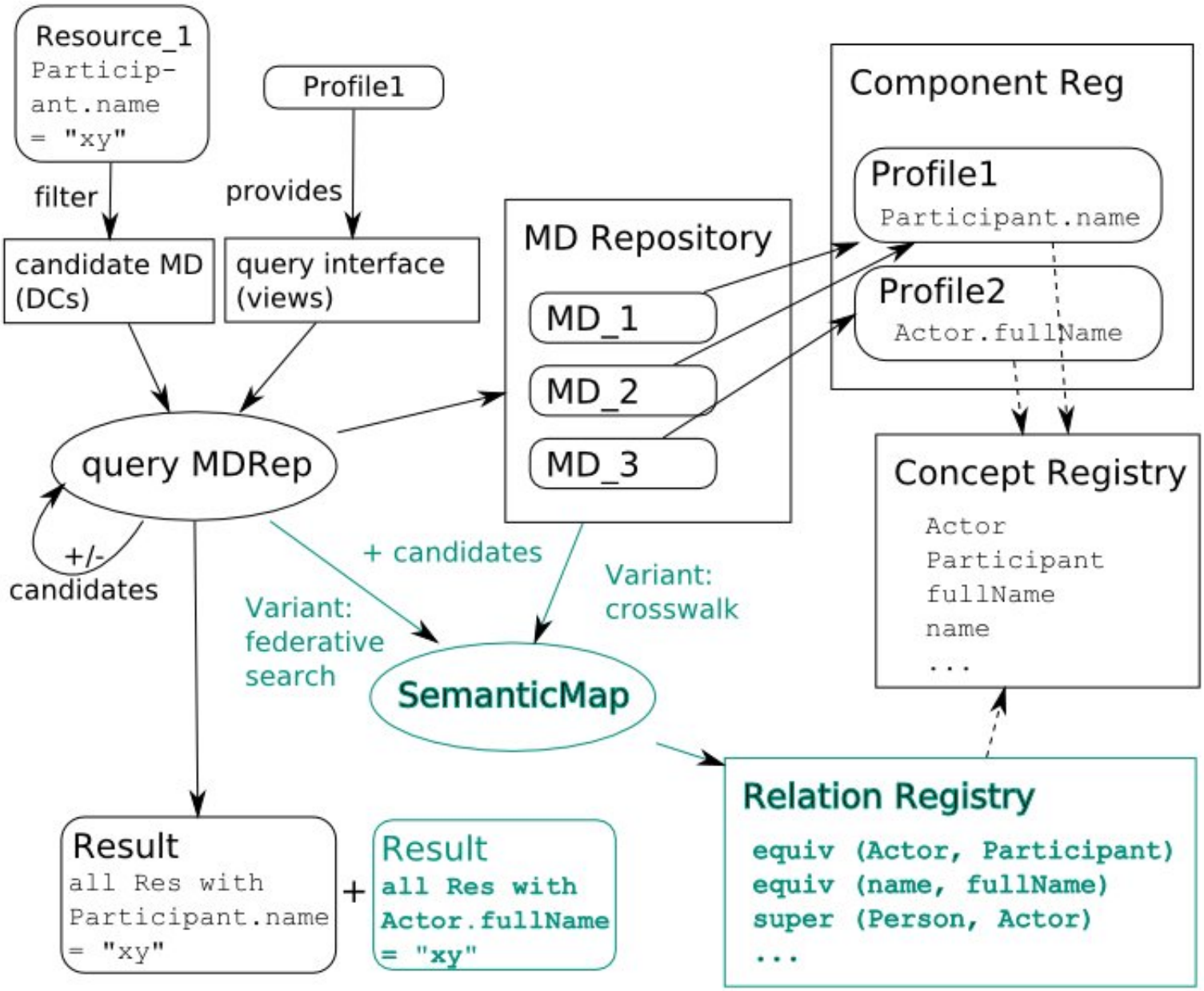

Candidate Categories/Properties

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- ResourceType, Format, AnnotationLevelType
  → *map to:* isocat-DataCategories
  (Thematic Views: Metadata, Morphosyntax, ...)
- Genre, Topic, Subject
  → *map to:* Taxonomies, Library Classification systems
  (LCSH, DDC, Dornseiff,...)
- Project, Institution, Person, Publisher
  open controlled vocabularies (real entities)
  → *map to:* LT-World (perhaps others: LCCN, DBPedia?)

Expected Results

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- Specification + Prototype of a Semantic Mapping Component
  allowing to transform CMD-Metadata into RDF

- Specification + Prototype of a Semantic Search Component
  REST-WebService enriching the MD-Search, allowing query expansion and ontology/concept-based search

- CLARIN Metadata expressed as RDF/LOD-Dataset

Next Steps

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- Literature → Related Work
  - Linked Open Data
  - Ontology Mapping
  - Ontology Browsing/Visualization

- Analyze Data
  - Existing MD-Schemas (DC, OLAC, MODS, TEI, IMDI, CMD, ...)
  - LT-World Ontology
  - SKOS-Data available via Vocabulary Alignement Service
  - LCSH, LCCN
  - DBPedia

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References – Semantic Technologies

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