Metadatenmanager der RWTH Aachen als Werkzeug für FDM

Workshop zum Thema Metadatenmanagement in NRW
29.05.2019

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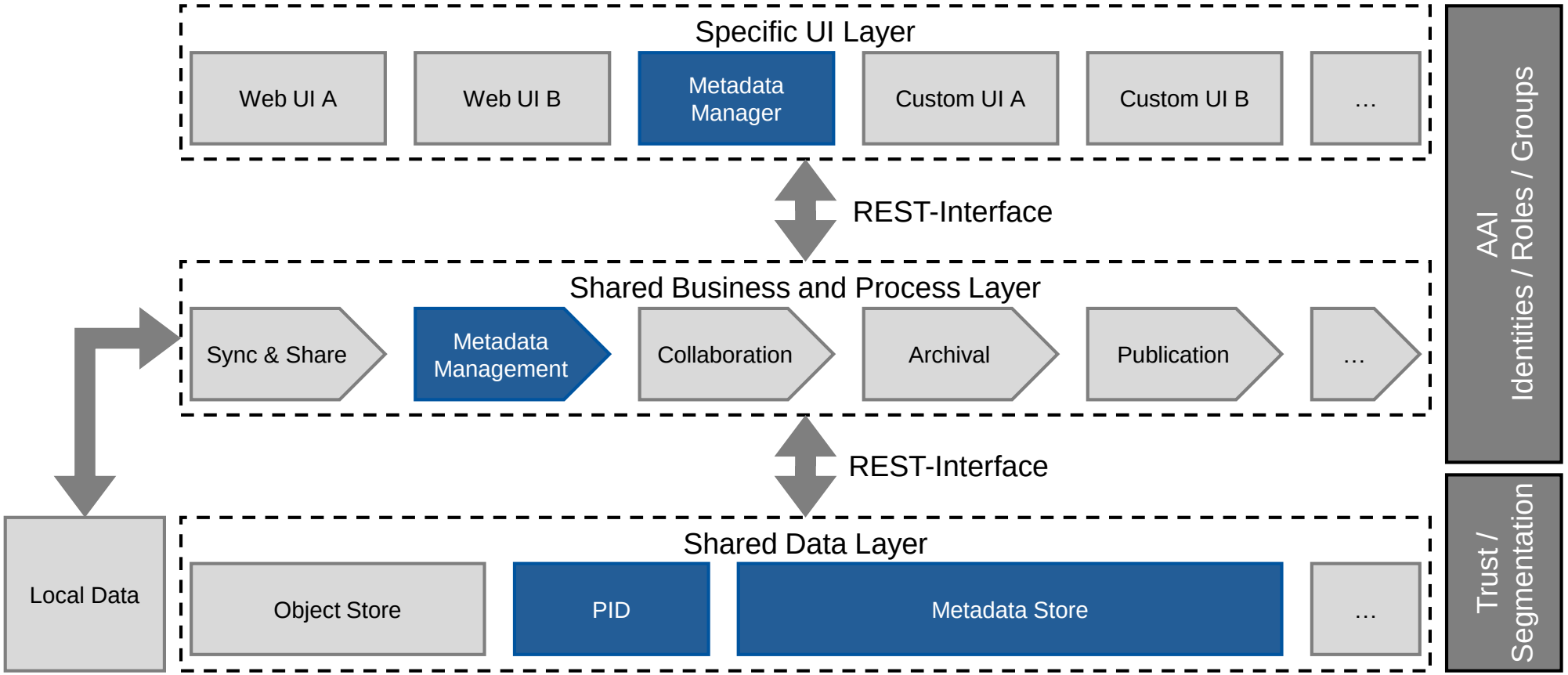
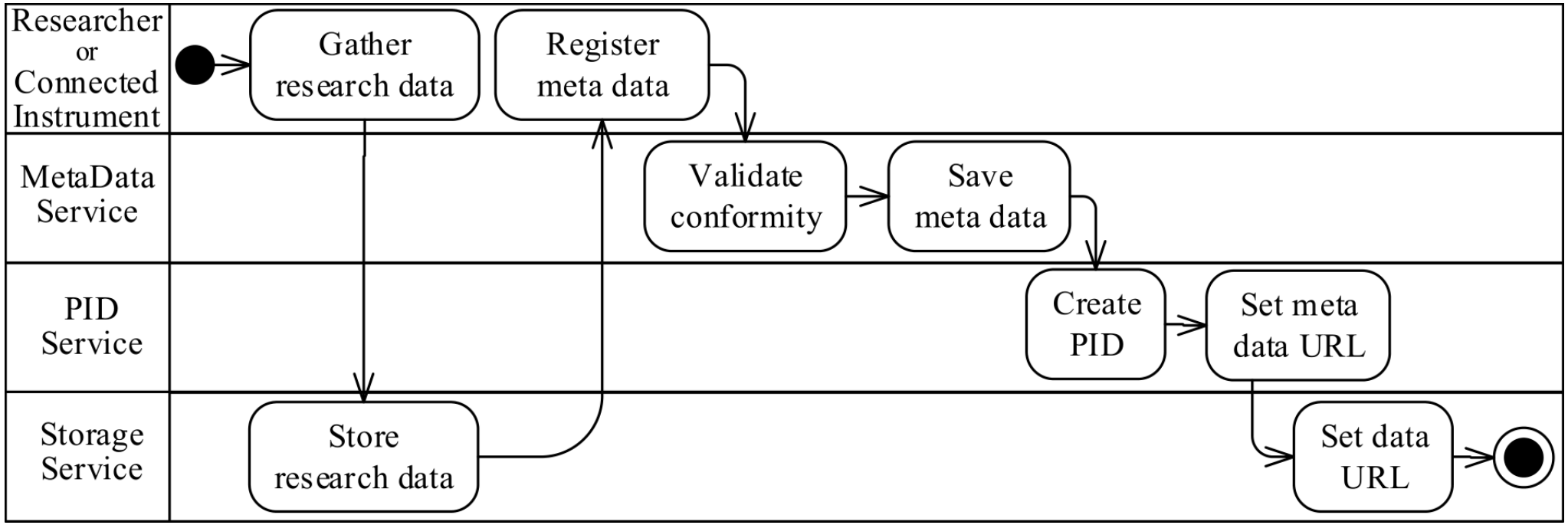
Outline

- Supported Business Processes
- Putting Ontologies into Practice
- Implementation of Prototype Application

Integrated Reseach Data Management System

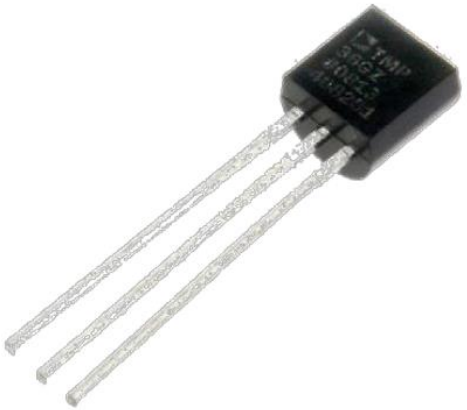


Formalized “Metadata Management Process”



Research Knowledge Graph

Industry 4.0 Example
Semantic Representation of Sensor Data



```
myd:m123245      rdf:type            i40:SensorMeasurement .
myd:m123245      rdf:hasValue        “27.9"^^i40:DegreeCelsius .
myd:m123245      i40:hasMeasureTime  "2016-03-24T12:38:54:12Z"^^xsd:DateTime .
myd:m123245      i40:fromSensor      myd:Sensor123 .
...
# ^ subject      ^ predicate          ^ object
```

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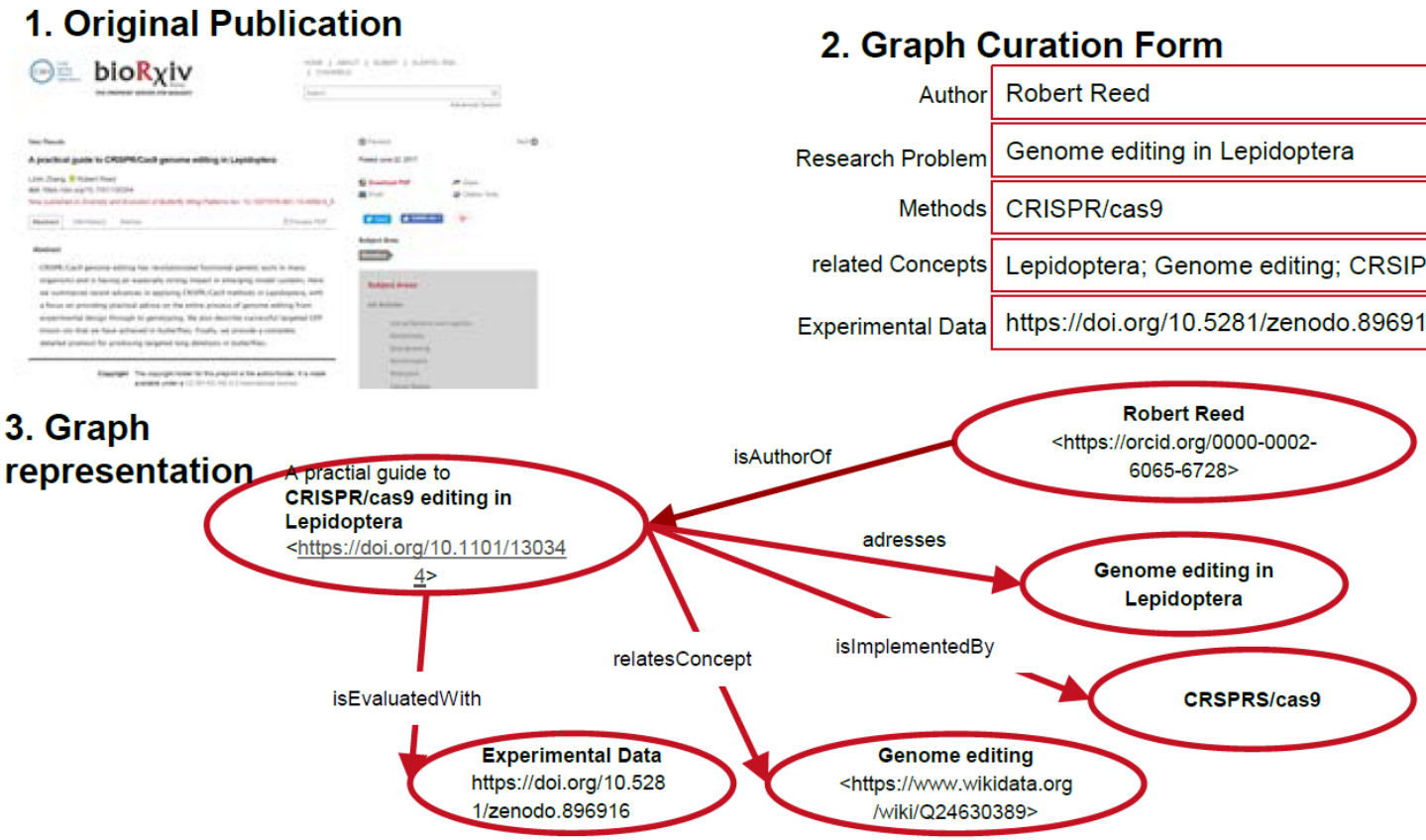
Slide by Sören Auer: Semantische Datenvernetzung für Forschungsdatenmanagement

Research Knowledge Graph



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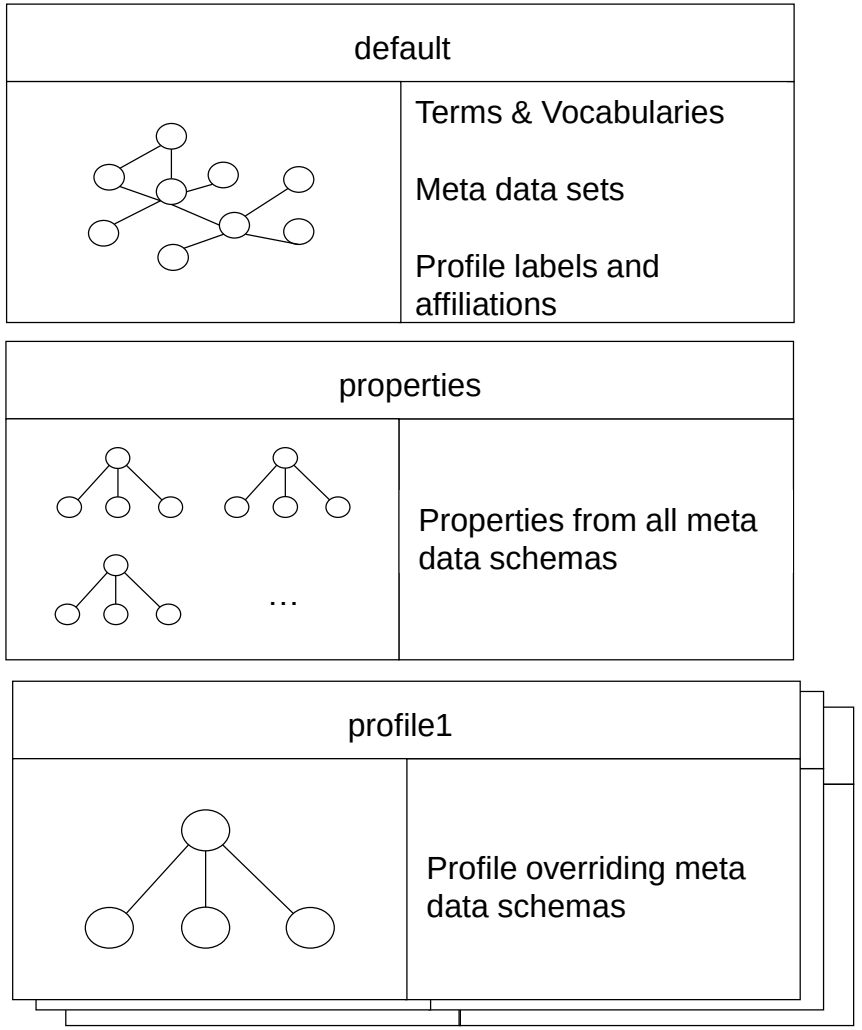
Slide by Sören Auer: Towards an Open Research Knowledge Graph, https://www.slideshare.net/soeren1611/towards-an-open-research-knowledge-graph

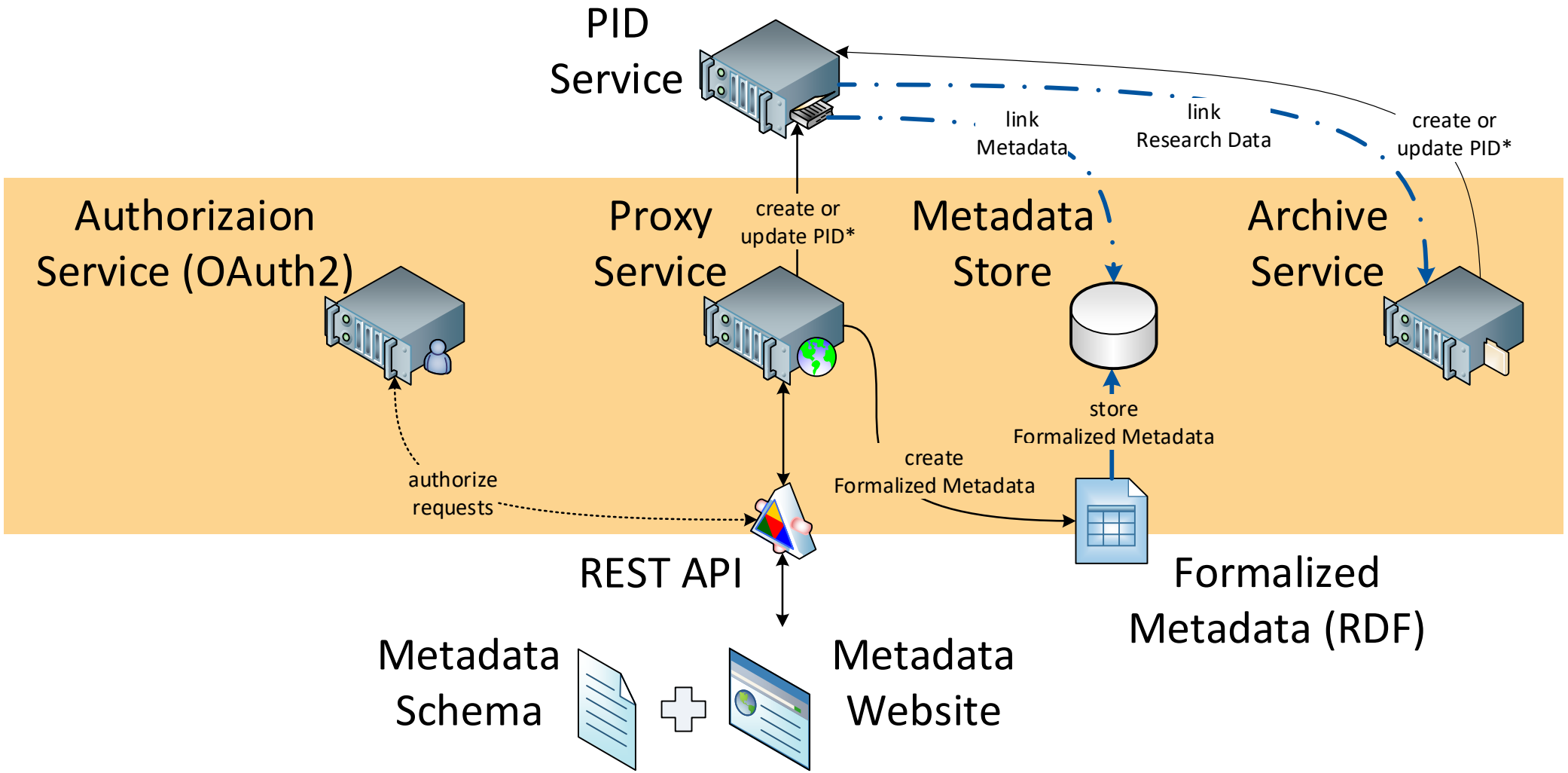
Semantic Data Model: A Path to the Scientific Knowledge Graph

- Using Virtuoso quad-store (Graph, Subject, Predicate, Object)
  - Represent data artifacts by PID
  - Record meta data as triples having the PID as a subject
  - Create a high level “Research Knowledge Graph”

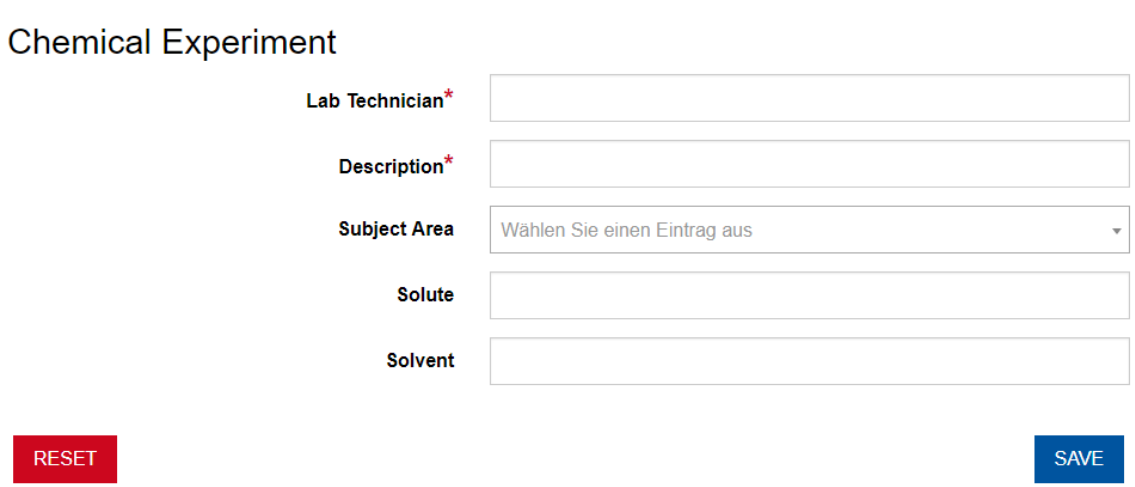
- Separate management of “user generated” and “provided” data
  - Multiple disconnected graphs with different purposes
  - Default:
    - All Terms, Vocabularies, Meta Data, …
    - Default target for storage and search
  - Properties:
    - Includes all Properties from all application profiles
  - Profile1 … ProfileN
    - Application profile specific overrides



Solution Architecture



Prototype Application and Webservice – Rendering Form Based on Application Profile



RDF Range	HTML5 Type
rdfs:Literal	text
xml:dateTime	date
md:metadataVisibility	radio
None	Text
Other	select

```
dc:creator
··a·owl:AnnotationProperty·;
··md:calculatedValue·"{ME}"·;
··md:position·1;
··rdfs:label·"Lab·Technician"@en·;
··rdfs:range·rdfs:Literal·.

dc:title
··a·owl:AnnotationProperty·;
··md:position·2;
··rdfs:label·"Description"@en·.

dc:subject
··a·owl:AnnotationProperty·;
··rdfs:range·<http://udcdata.info/029653>·;
··md:position·3;
··rdfs:label·"Subject·Area"@en·.

:solute
··rdfs:subPropertyOf·csmd:sampletype_molecularFormula·;
··a·owl:AnnotationPropery·;
··md:position·4;
··rdfs:label·"Solute"@en·.

:solvent
··rdfs:subPropertyOf·csmd:sampletype_molecularFormula·;
··a·owl:AnnotationPropery·;
··md:position·5;
··rdfs:label·"Solvent"@en·.
```

Prototype Application and Webservice – Storing Meta Data and Translate to Linked Data


```
POST /metadata/profileN/20.11102/1d53500-75f7-475e-9128-825da4d90664
{
····"Description":·"Solving·salt·in·water",
····"Lab·Technician":·"John·Doe",
····"Subject·Area":·"http://udcdata.info/030042",
····"Solute"·:·"NaCl",
····"Solvent"·:·"H2O"
}
```

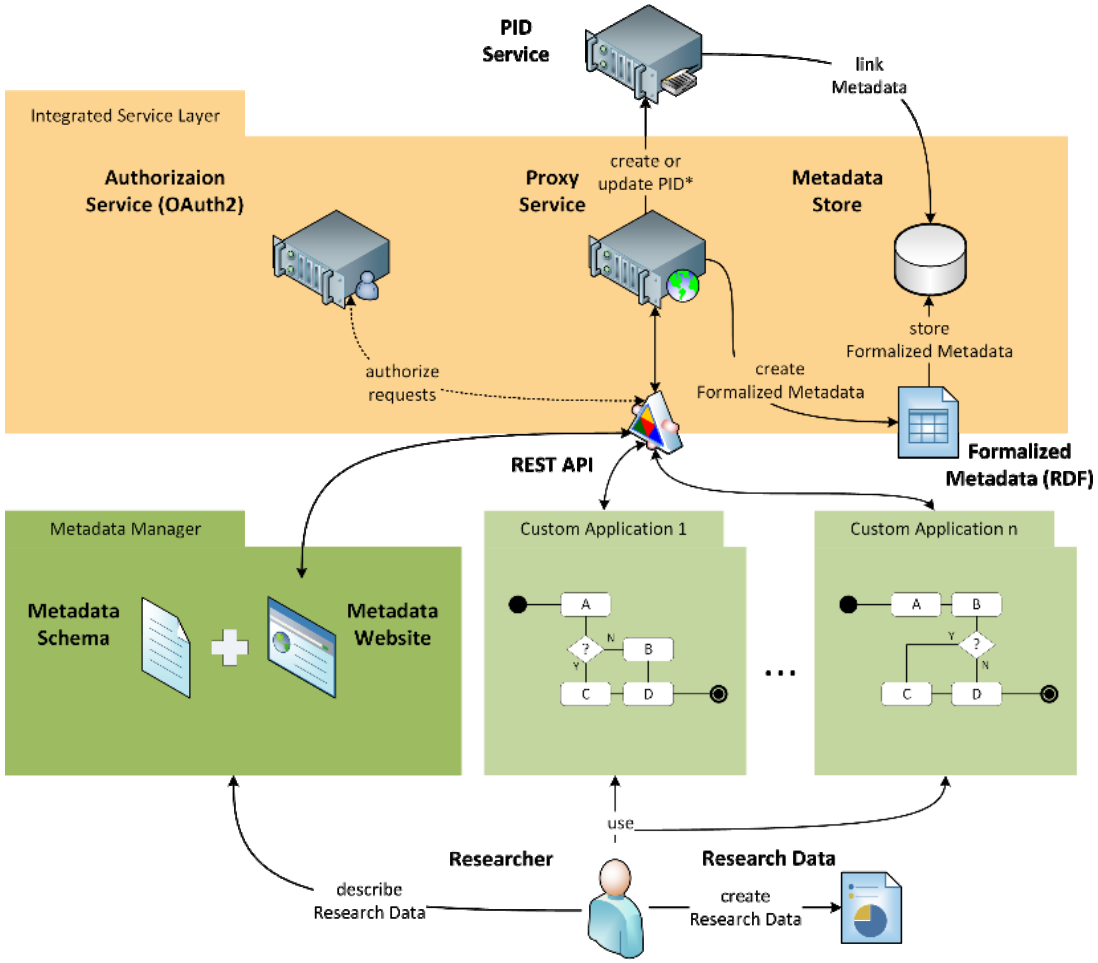
```
SELECT·?s·WHERE·{
····GRAPH·<profileN>·{
········?s·rdf:label·?label·.
········FILTER·REGEX(STR(?label),·"Value",·"i")·.
····}
}
```

```
http://hdl.handle.net/20.11102/1d53500-75f7-475e-9128-825da4d90664
    dc:title "Solving salt in water"@en
    dc:creator "Solving salt in water"@en
    dc:subject http://udcdata.info/030042
    profileN:solute "NaCl"@en
    profileN:solvent "H20"@en
    md:owner "mp42235"
    md:visibility http://purl.org/rwth/md/internal
    md:hasIKZ "022000"
```

Our solution: flexible web services

The web services for PID usage

- Create PIDs
  - Using OAuth2 for authorization
  - Assigned to the person and institute
- Create Formalized Metadata (RDF)
  - Based on Metadata schemas
  - Can be stored locally or in a centralized DB
- Display PID information and Metadata
  - Landing page for published content
  - Contact information to acquire access
- Limit possible operations
  - Only a single PID generator
  - No delete operatation



Future Enhancements

- Enhance creation of application profiles
  - Support standardization process
  - Provide a user interface
  - Goal of AIMS Project
- Enhance search
  - API syntax allows advanced queries
  - Currently implemented: “contains” and “add”
  - User Experience is bad
- Exports for distribution to (institutional) repositories
  - E.g. using DCAT, standard for European Open Data Repositories
- Enhance UI to support…
  - … linking of metadata entries
  - … multi-value properties
  - … anonymous instances as values

Thank you for your attention

Vielen Dank für Ihre Aufmerksamkeit