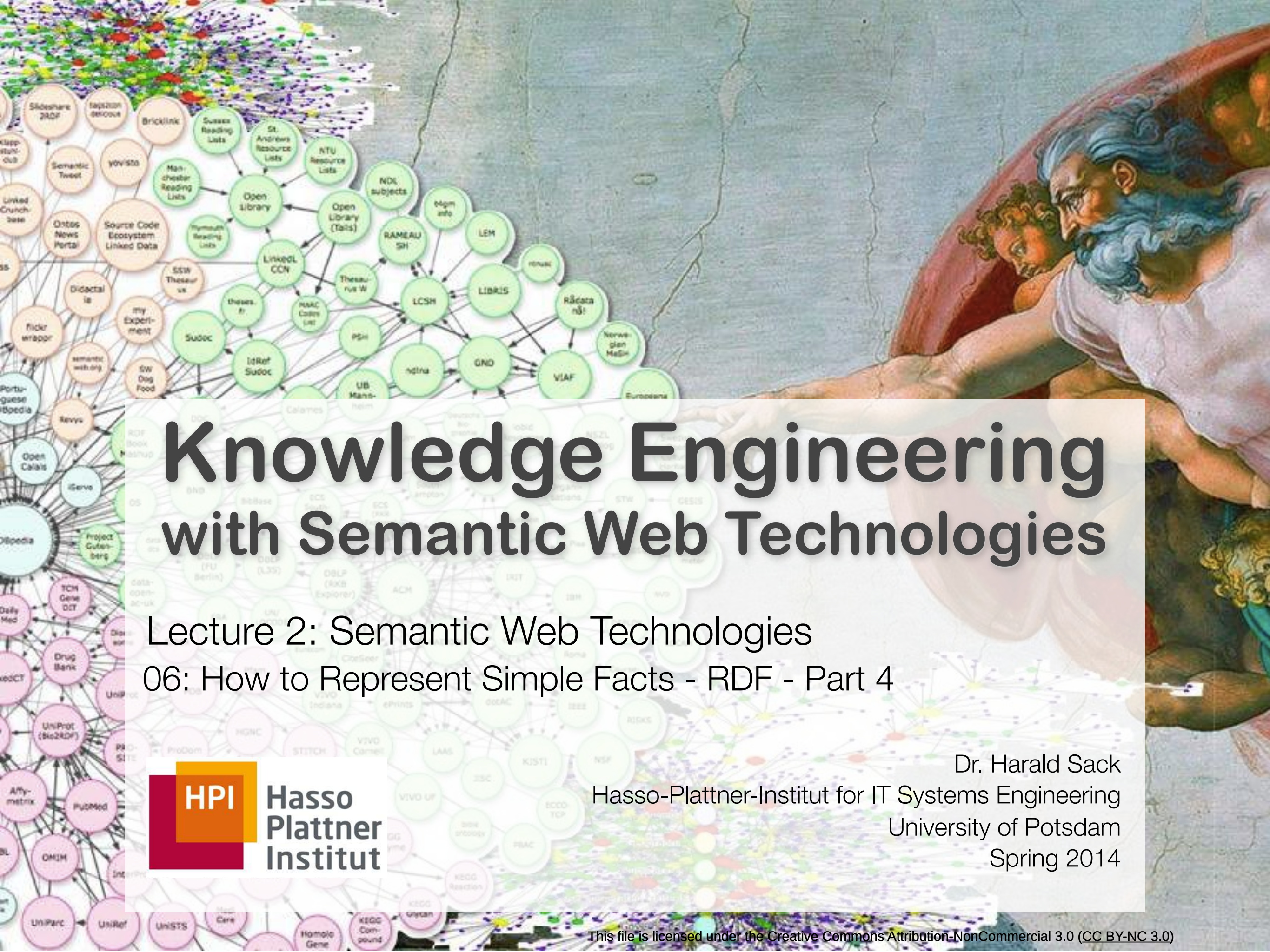




Knowledge Engineering with Semantic Web Technologies

Lecture 2: Semantic Web Technologies

06: How to Represent Simple Facts - RDF - Part 4

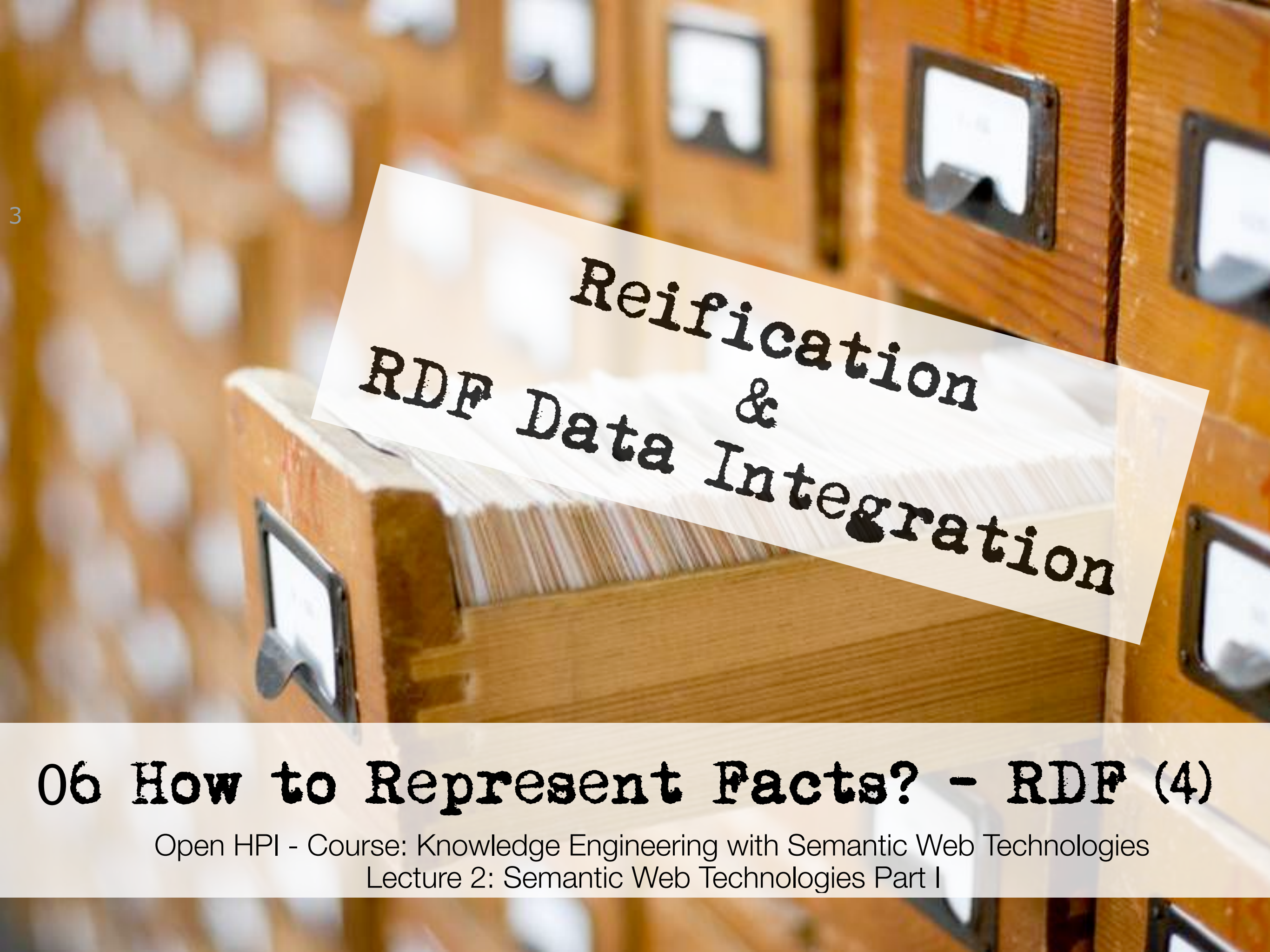


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University of Potsdam
Spring 2014



Lecture 2: Semantic Web Technologies - Part 1

Open HPI - Course: Knowledge Engineering with Semantic Web Technologies



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Reification & RDF Data Integration

06 How to Represent Facts? - RDF (4)

Open HPI - Course: Knowledge Engineering with Semantic Web Technologies
Lecture 2: Semantic Web Technologies Part I





„My dear Watson,
...I suppose that it was the
Gardener who has killed
the Butler!“



Resource Description Framework

RDF-Reification

- RDF permits interleaving of statements, i.e. to make statements about statements
- Example:
 - Sherlock Holmes supposes that the Gardener has killed the Butler



Resource Description Framework

RDF-Reification

- RDF permits interleaving of statements, i.e. to make statements about statements
- Example:
 - Sherlock Holmes supposes that the Gardener has killed the Butler
 - **Part 1:** The Gardener has killed the Butler
`exv:Gardener exv:hasKilled exv:Butler .`



Resource Description Framework

RDF-Reification

- RDF permits interleaving of statements, i.e. to make statements about statements
- Example:
 - Sherlock Holmes supposes that the Gardener has killed the Butler
 - **Part 1:** The Gardener has killed the Butler
`exv:Gardener exv:hasKilled exv:Butler .`
 - **Part 2:** Sherlock Holmes supposes....
`exv:SherlockHolmes exv:supposes ???? .`



Resource Description Framework

RDF-Reification

- **rdf:Statement**
defines an RDF Statement, consisting of Subject, Predicate and Object
- **rdf:subject**
 - the described resource
- **rdf:predicate**
 - the original property
- **rdf:object**
 - the value of the property

The Gardener has killed the Butler



Resource Description Framework

RDF-Reification

- **rdf:Statement**

defines an RDF Statement, consisting of Subject, Predicate and Object

- **rdf:subject** - the described resource
- **rdf:predicate** - the original property
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The Gardener has killed the Butler



Resource Description Framework

RDF-Reification

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defines an RDF Statement, consisting of Subject, Predicate and Object

- **rdf:subject** - the described resource
- **rdf:predicate** - the original property
- **rdf:object** - the value of the property

The Gardener has killed the Butler

rdf:Statement

rdf:subject

rdf:predicate

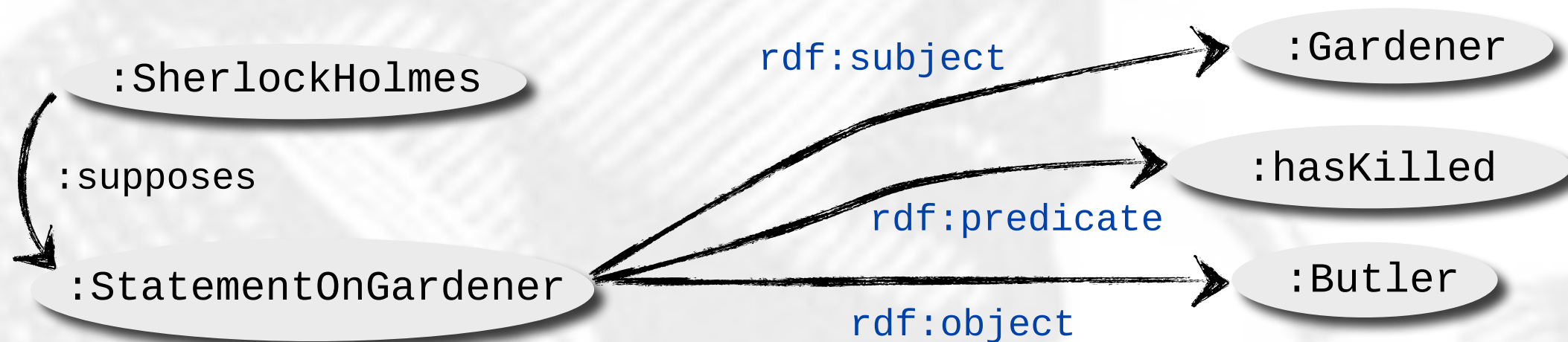
rdf:object



Resource Description Framework

RDF-Reification

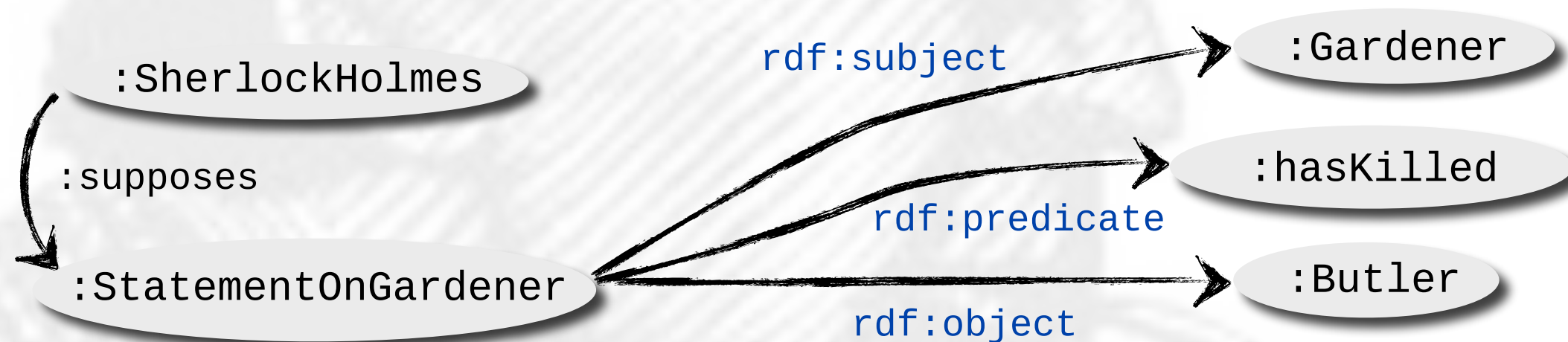
Sherlock Holmes supposes that the Gardener has killed the Butler



```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .  
@prefix : <http://example.org/Crimestories#> .
```



Resource Description Framework



```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix : <http://example.org/Crimestories#> .

:SherlockHolmes :supposes :StatementOnGardener .
:StatementOnGardener a rdf:Statement ;
    rdf:subject :Gardener ;
    rdf:predicate :hasKilled ;
    rdf:object :Butler .
```



Resource Description Framework

RDF-Reification

- Is Reification really necessary?
 - Modeling **data provenance**
 - Formalizing statements about **Reliability** (Trust)
 - Definition of **Metadata about Statements** (Assertions, Statements)
- for (general) knowledge representation (Ontologie Construction):
 - Transformation of Relations into Classes
- **But be careful:** Reification causes type conflicts
(classes, individuals, statements)



Resource Description Framework

Example

RDF Vocabulary

RDF Container `rdf:List` `rdf:nil` `rdf:first` `rdf:rest`

RDF Collection `rdf:Seq` `rdf:Bag` `rdf:Alt` `rdf:_1` `rdf:_2` ...

RDF Reification `rdf:Statement` `rdf:subject` `rdf:predicate` `rdf:object`
`rdf:type` `rdf:Property` `rdf:XMLLiteral`



RDF and Data Integration



RDF and Data Integration

- Simple Example: Bibliography Database

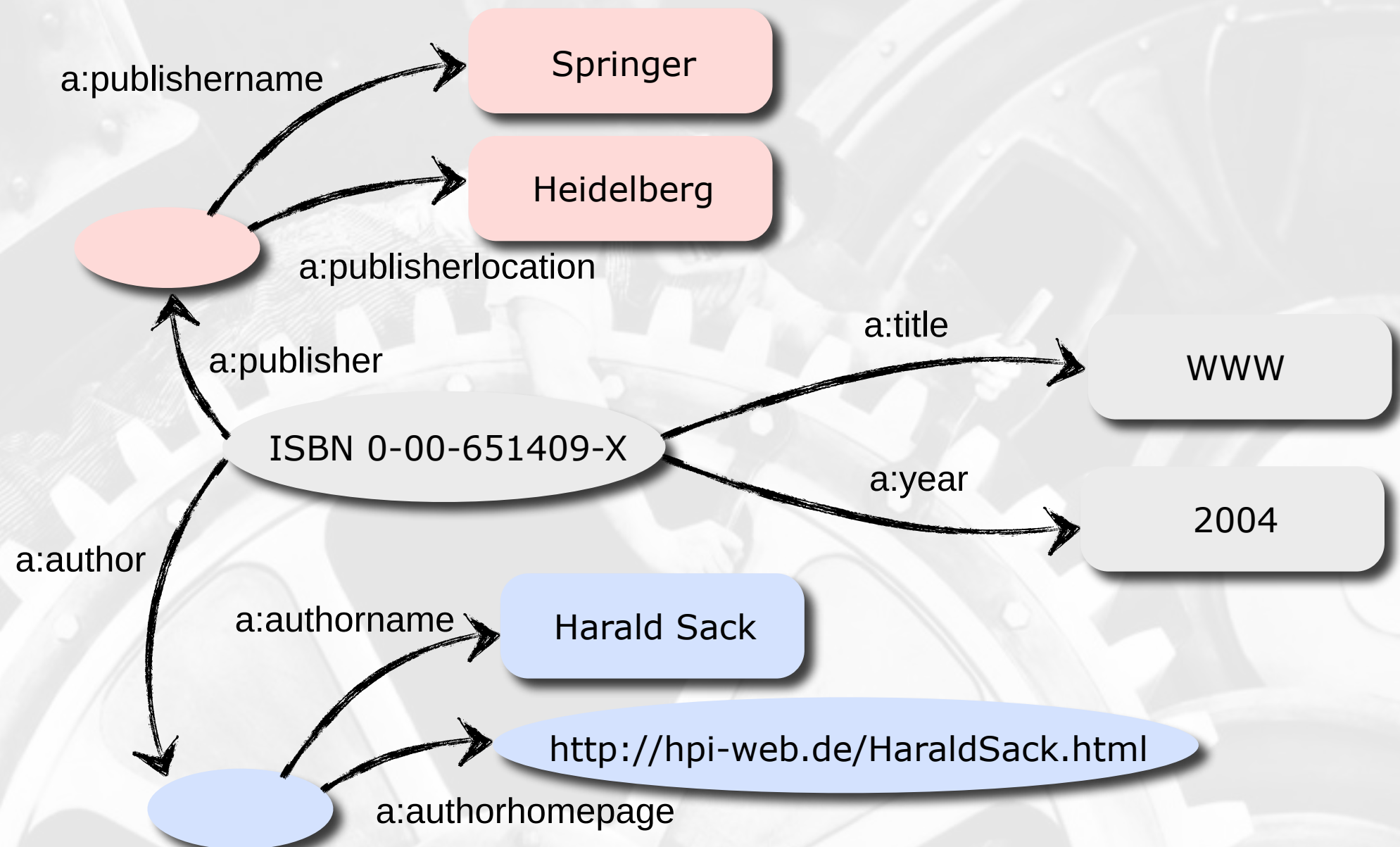
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ISBN 0-00-651409-X	HS-123	WWW	S-001	2004

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HS-123	Harald Sack	http://hpi-web.de/HaraldSack.html

ID	Publisher	Location
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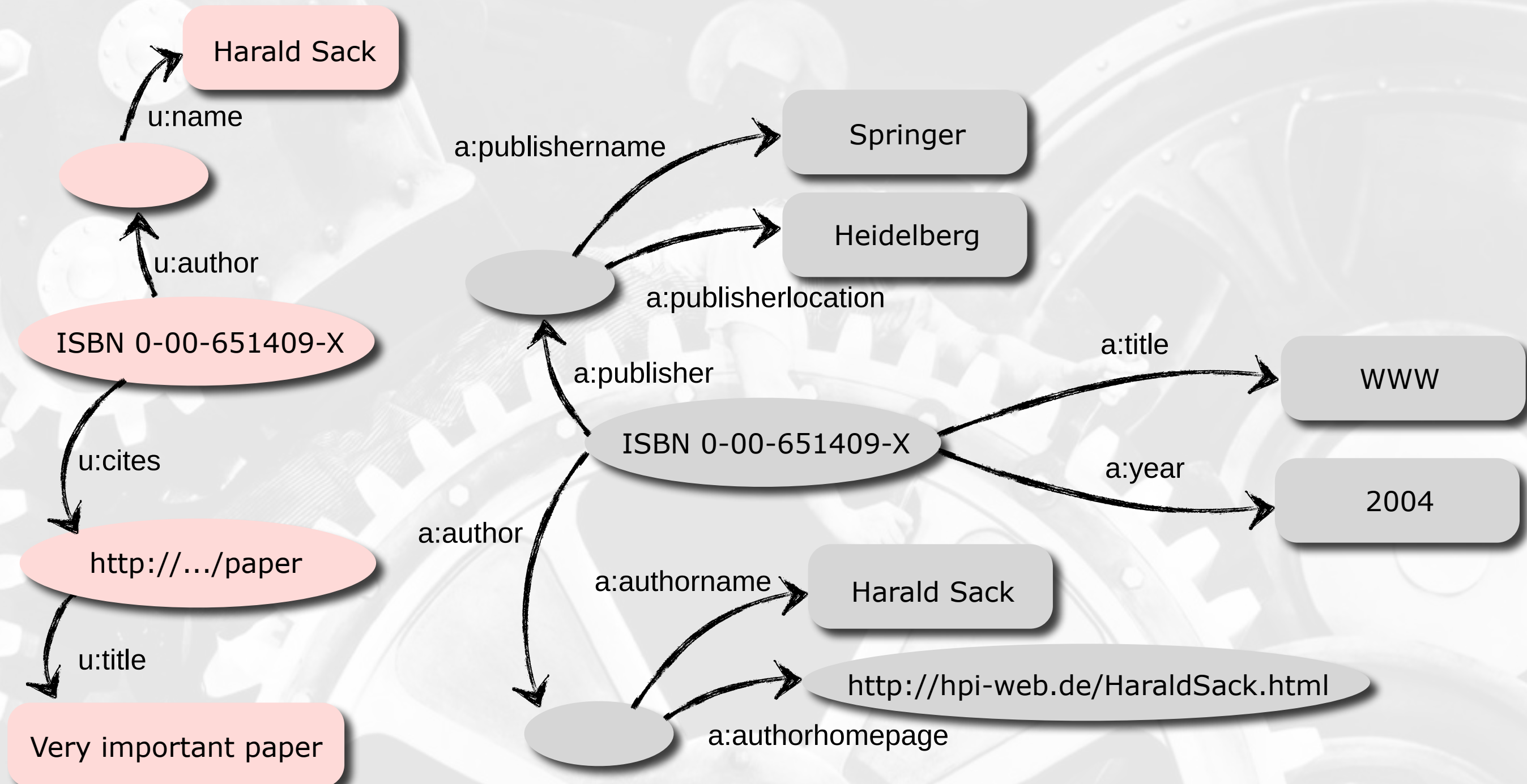
RDF and Data Integration

- Database export into a set of relations



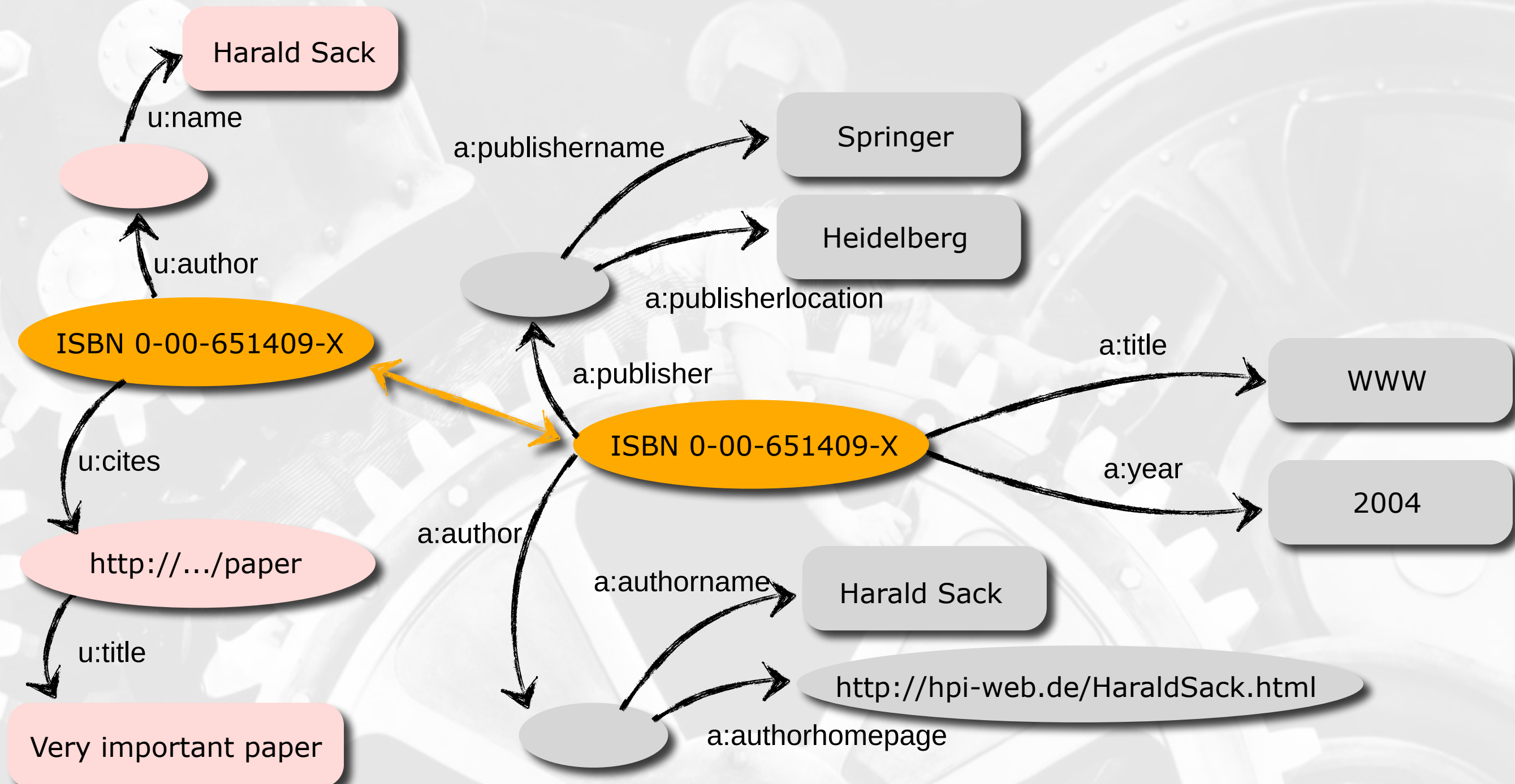
RDF and Data Integration

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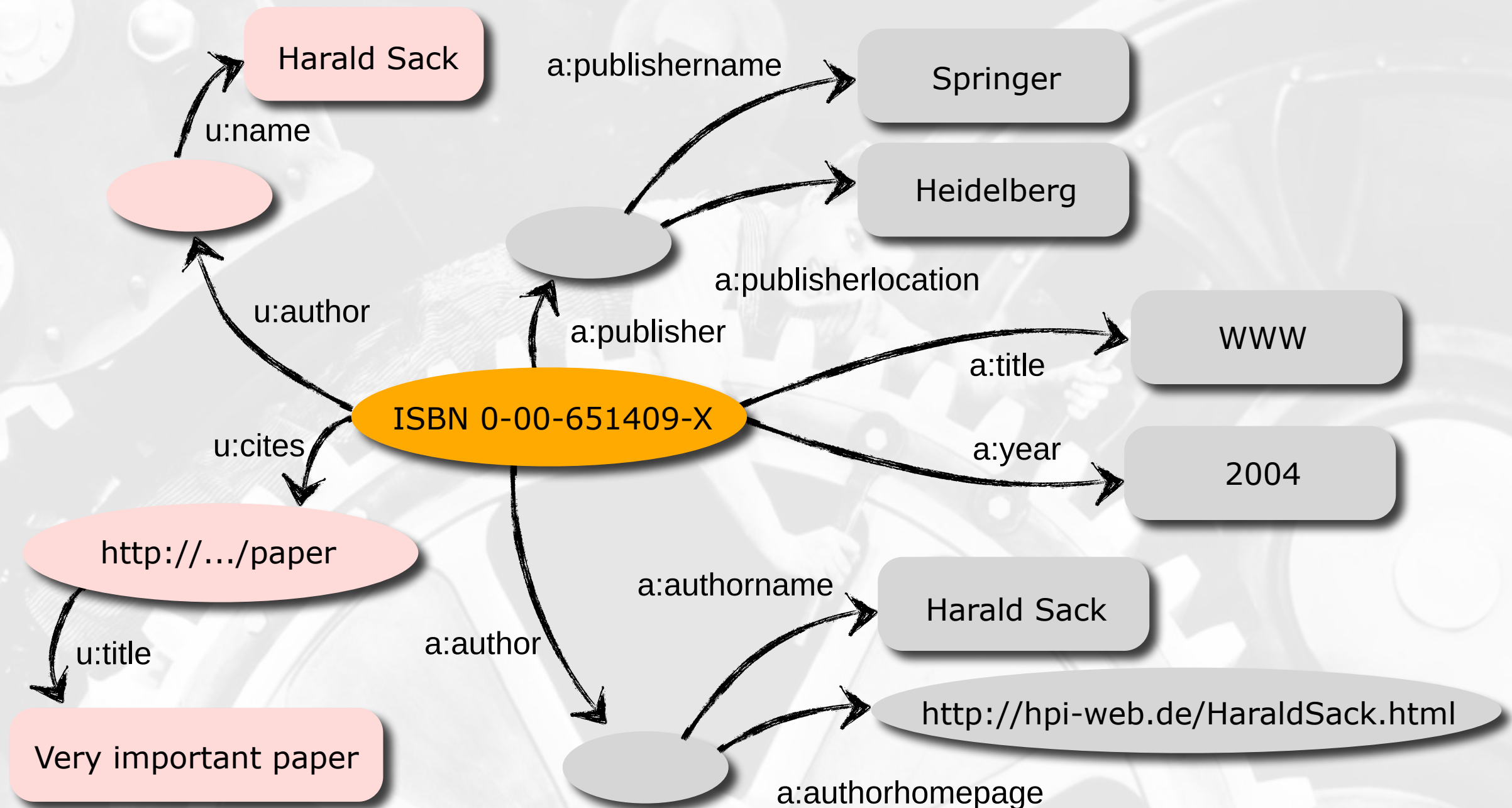
RDF and Data Integration

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RDF and Data Integration

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07 How to represent more complicated models? - RDFS

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Lecture 2: Semantic Web Technologies Part I



SO ... WE NEED A WAY TO
DEFINE RDF SCHEMATA FOR
CLASSES AND RELATIONS ?!