

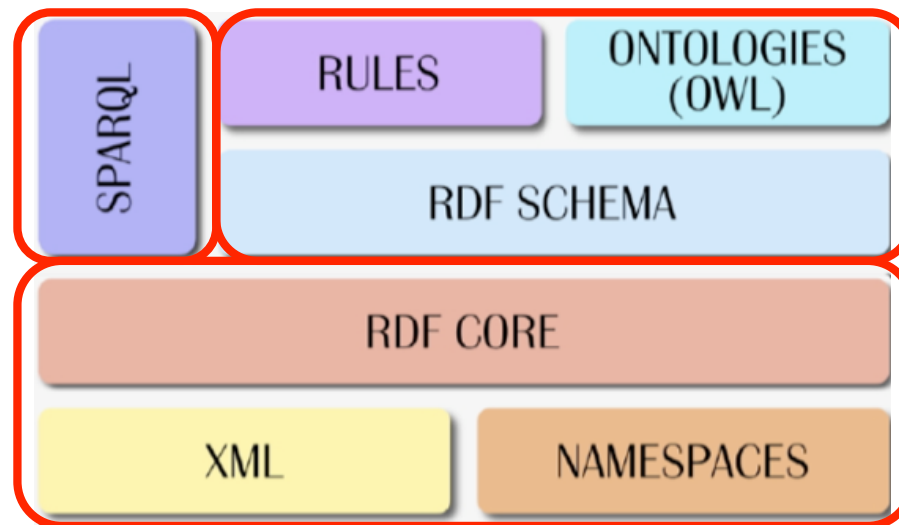


Semantic Web Technologies: Theory & Practice

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The Semantic Web in W3C's view:

3. Shall allow us to ask
structured queries on
the Web

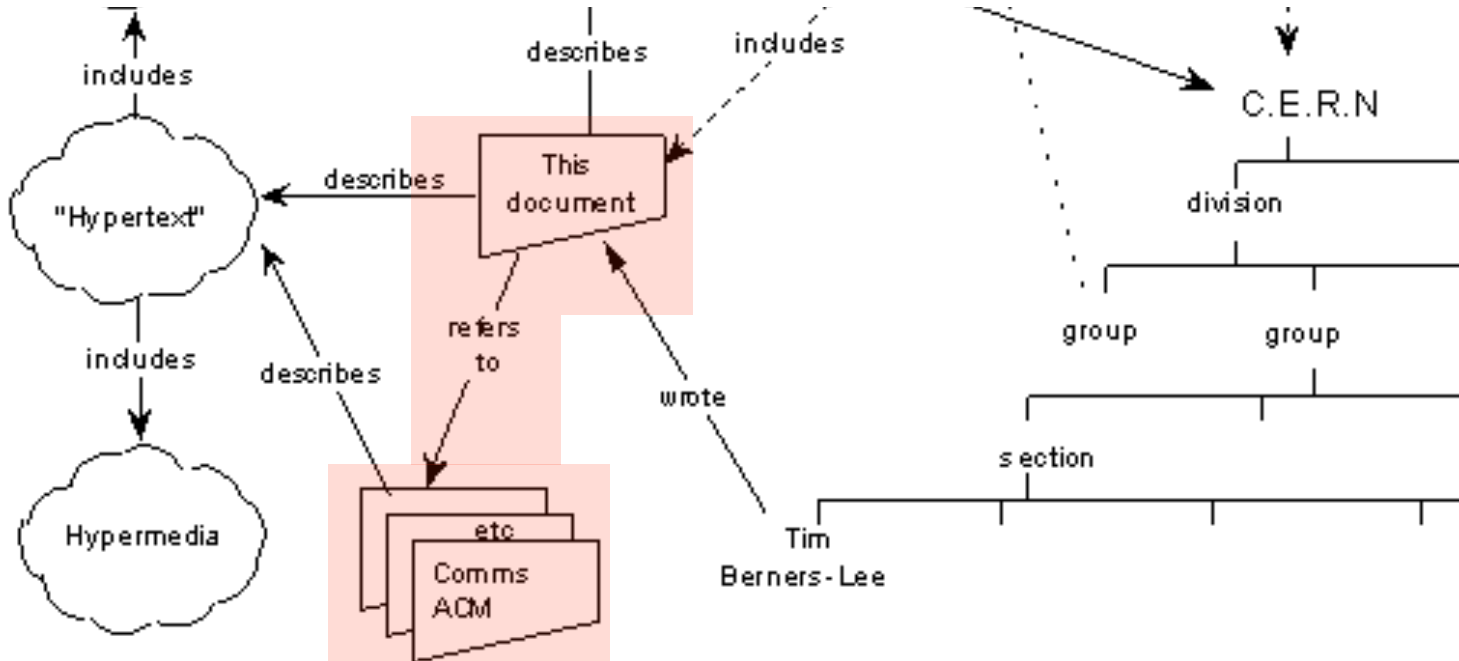


2. Shall allow us to describe
the structure of informa-
tion in machine readable
form: **RDFS+OWL+RIF**

1. Shall allow us to publish
structured information
on the Web: **XML+RDF**



*“This proposal concerns the **management of general information** about accelerators and experiments at CERN [...] based on a **distributed hypertext system**. “*



```
<p>I studied <a href="http://www.tuwien.ac.at">here</a></p>
```

polleres.net#me

Document

www.tuwien.ac.at

Document

Globally Unique identifiers

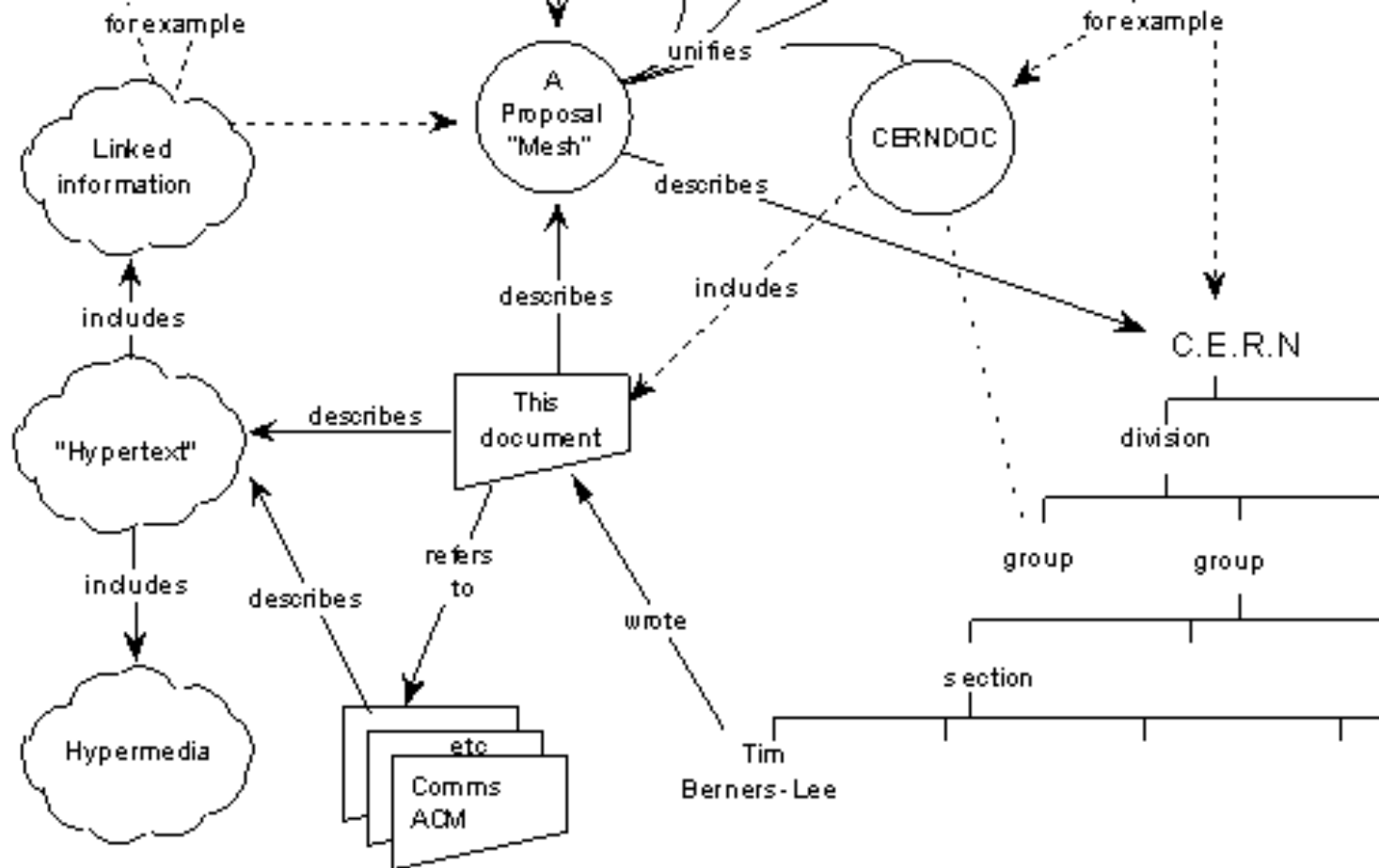
URIs

Links between Documents (href)

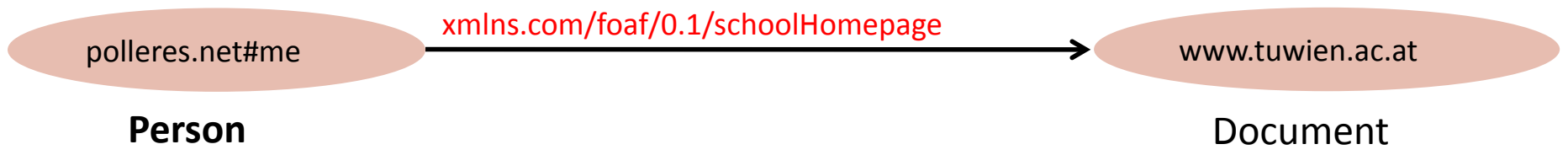
A common protocol

HTTP





```
<p about="#me">I studied <a rel="foaf:schoolHomepage" href="http://www.tuwien.ac">here</a></p>
```



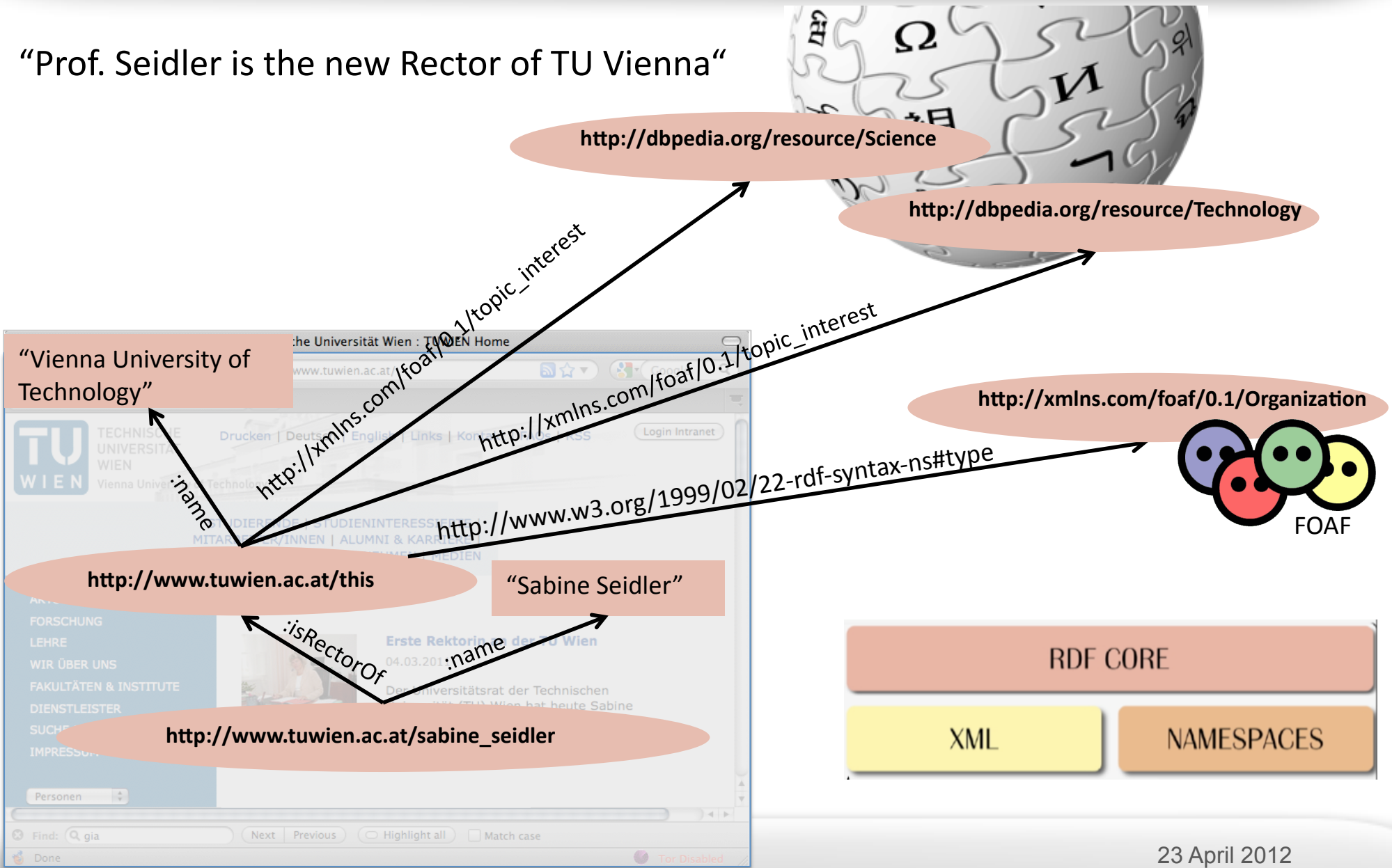
Globally Unique identifiers
Typed Links between **Entities**
 A common protocol

URIs
 RDF
 HTTP

Expressing Meaning

1. Publish Structured Data on the Web

“Prof. Seidler is the new Rector of TU Vienna“



RDF

```
<http://www.tuwien.ac.at/person1> :name "Sabine Seidler" .  
<http://www.tuwien.ac.at/person1> :isRectorOf <http://www.tuwien.ac.at/this> .  
<http://www.tuwien.ac.at/this> :name "Vienna University Of Technology".  
<http://www.tuwien.ac.at/this> rdf:type <http://xmlns.com/foaf/0.1/Organization> .
```

.1/Organization

The screenshot shows a web browser window with a search bar containing 'gia'. The page content includes a navigation menu on the left with items like 'FORSCHUNG', 'LEHRE', and 'WIR ÜBER UNS'. The main content area features a news article titled 'Erste Rektorin der TU Wien' dated '04.03.2011'. The browser's status bar at the bottom shows 'Done' and 'Tor Disabled'.

<http://www.tuwien.ac.at/this>

"Sabine Seidler"

:isRectorOf

:name

<http://www.tuwien.ac.at/person1>

2. RDF can be described in terms of Schema Information (in “Semantic Web speak” these schemata are called Ontologies)

8

```
:person1      :isRectorOf   :tuwien.  
...  
:person9225749 :lecturesAt   :tuwien.  
:person9225749 :name         "Axel Polleres".
```

RDF Data & OWL & Rules means implicit knowledge! (inference)

```
 $\forall X \forall Y (worksWith(Y, X) \rightarrow Organisation(X))$   
 $\forall X \forall Y (isRectorOf(Y, X) \rightarrow worksWith(X, Y))$   
 $\forall X \forall Y \forall Z (isRectorOf(X, Z) \wedge isRectorOf(Y, Z) \rightarrow X = Y)$ 
```

ExternalLecturer(P)

$\leftarrow lecturesAt(P, U), \text{ not } worksWith(P, U).$

```
:tuwien      rdf:type :Organisation .  
:person1     :worksWith :tuwien .  
:person9225749 rdf:type :ExternalLecturer .
```

RULES

ONTOLOGIES
(OWL)

RDF SCHEMA

23 April 2012

2. Structured queries over Web data

SPARQL

- SPARQL = “SQL look-and-feel query language for the Web”
- allows us to ask structured queries such as:
“Persons who work for a technology organization”

```
SELECT ?P
{
  ?P rdf:type :Person.
  ?P :worksWith ?O .
  ?O :topic_interest dbpedia:Technology
}
```

Unions of conjunctive queries, but also advanced features such as outer joins (OPTIONAL), value filtering, etc.

This lecture:

- We will learn:
 - How to use those standards
 - Theoretical foundations of these standards
 - How inferencing over and querying Web Data works
 - Practical applications of Linked Data

- Course Web page:

http://www.polleres.net/teaching/SemWebTech_2012/

Organization:

- Schedule/Dates:
 - 7 lecture dates, that we need to agree upon now (blocked in May)
 - Final presentations (in June)
- Communication:
 - via TISS forum or email directly to me: axel.polleres@siemens.com
 - via the course homepage (see prev. slide)
- Evaluation:
 - **Small** Homework for each lecture
 - Final Project OR Presentation on a theoretical topic:
 - E.g. you read some paper and give an overview presentation
 - E.g. foundations of SPARQL1.1, Rules on the Web
 - or you do a nice project based on Linked Data
 - (should use more than one RDF dataset, should involve some SPARQL, OWL, etc.)
 - Optional Exam

Dates (pick 7):

- *Disclaimer (might need later rescheduling based on business trips)*
- Thu 26.4. 8:30-10:30 (von Neumann Seminarraum)
- Mo 7.5. 16-18 (von Neumann Seminarraum)
- Thu 10.5. 16-18 (El 6, Gußhausstr. old building, top floor)
- Fr 11.5. 16-18 (Seminarraum 8, Karlsplatz 13, next to HS 8)
- Mo 14.5. 16-18 (von Neumann Seminarraum)

- Mo 4.6. 8:30-10:30 (von Neumann Seminarraum)
- Wed 6.6. 8:00-10:00 (von Neumann Seminarraum)

- Final presentations date to be decided!