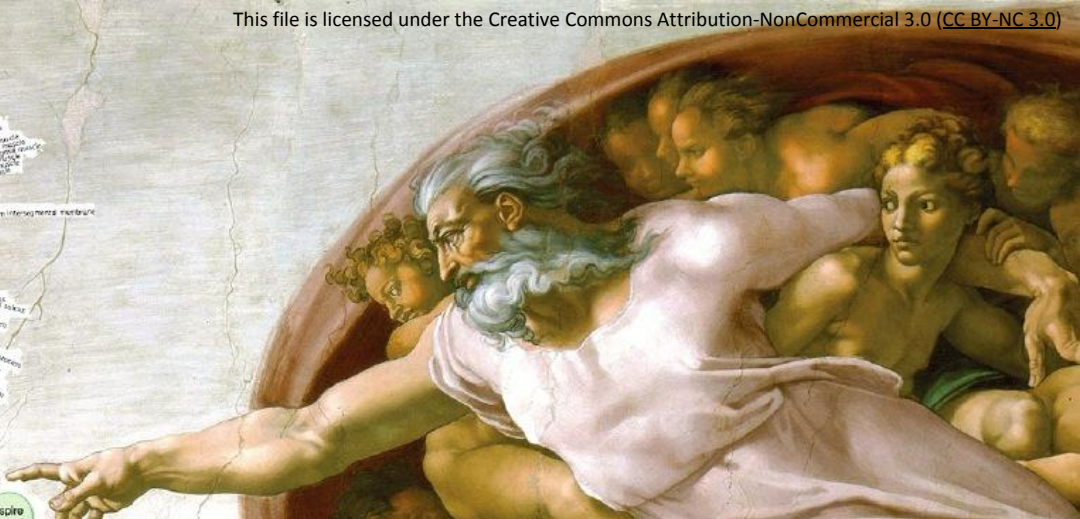




HPI Hasso Plattner Institut

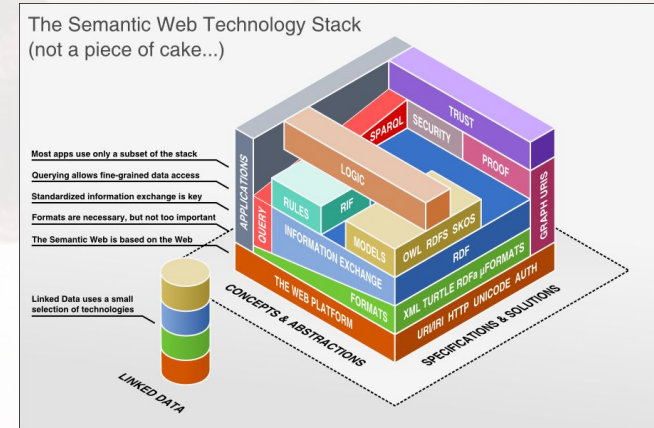


Leibniz Institute for Information Infrastructure
Karlsruhe Institute of Technology
Spring 2018

Information Service Engineering

Lecture 3: Linked Data Engineering I

- 3.1 Understanding Data on the Web
- 3.2 Towards a Universal Data Representation
- 3.3 How to Identify and Access Linked Data**
- 3.4 Representing Facts with RDF
- 3.5 RDF Turtle Serialization
- 3.6 Model Building with RDFS
- 3.7 Logical Inference with RDF(S)



What is this?



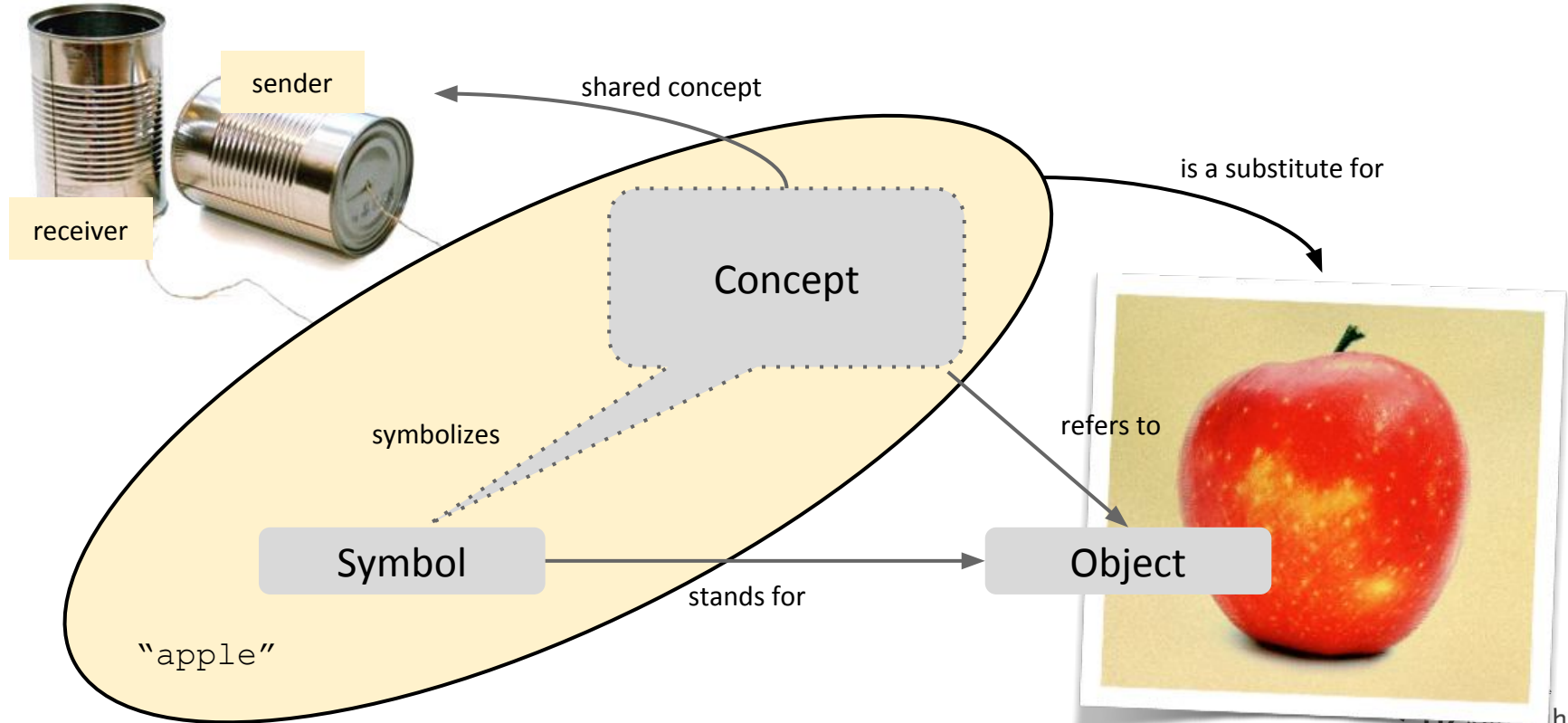


Ceci n'est pas une pomme.

Semiotic Triangle

Information Service Engineering - Lecture 3 Linked Data Engineering I - 3.3 How to Identify and Access Linked Data

Ogden, Richards: Semiotic Triangle, 1923



Uniform Resource Identifier

Information Service Engineering - Lecture 3 Linked Data Engineering I - 3.3 How to Identify and Access Linked Data

- A **Uniform Resource Identifier (URI)** defines a simple and extensible schema for worldwide unique identification of abstract or physical resources (RFC 3986).

https://www

Uniform Resource Identifier

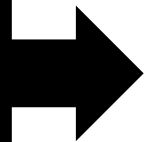
Information Service Engineering - Lecture 3 Linked Data Engineering I - 3.3 How to Identify and Access Linked Data

- A **Uniform Resource Identifier (URI)** defines a simple and extensible schema for worldwide unique identification of abstract or physical resources (RFC 3986).
- A **Resource** can be every object with a clear identity (according to the context of the application)
 - as e.g., web pages, books, locations, persons, relations among objects, abstract concepts, etc.
- URI concept is already established in various domains, as e.g.,
 - the Web (URL),
 - Books and publications (ISBN, ISSN),
 - Digital Object Identifier (DOI)

URL

identify
what exists
on the web

<http://www.mywebsite.org/>



URI

identify
on the web
what exists

http://hpi.de/harald_foaf.rdf#me

URI

<http://www.tour-eiffel.fr/>

Resource

identifies

Presentation

represents (stands for)

Designatum

Representation

describes

defines

Designator

Metadata:

Content-type: text/html

Data:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01
Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">
<html>
  <head>
    <title>Le site officiel de la Tour Eiffel</title>
    ...
  </html>
```

The Eiffel Tower is described
(**designated**) by the web page

What if a URI does not exist (yet)?

Information Service Engineering - Lecture 3 Linked Data Engineering I - 3.3 How to Identify and Access Linked Data

- Define a URI by yourself:
 - **avoid overlaps** → use your own website as namespace
 - enable **documentation at the same place** → HTTP Content Negotiation
- Use **separate URIs** for the **resource (*Designatum*)** and **its documentation (*Designator*)** via
 - HTTP Content Negotiation and/or
 - URI references (e.g. via "#" fragment identifier)

HTTP Content Negotiation

Information Service Engineering - Lecture 3 Linked Data Engineering I - 3.3 How to Identify and Access Linked Data

1

HTTP GET request

Accept Header: text/html

http://dbpedia.org/resource/Eiffel_Tower

URI represents *Designatum*

2

HTTP/2 303 See Other

http://dbpedia.org/page/Eiffel_Tower

3

HTTP GET request

Accept Header: text/html

URI represents *Designator*

4

HTML Document

HTTP Content Negotiation

Information Service Engineering - Lecture 3 Linked Data Engineering I - 3.3 How to Identify and Access Linked Data

1 HTTP GET request
Accept Header: application/rdf+xml

http://dbpedia.org/resource/Eiffel_Tower

URI represents *Designatum*

2 HTTP/2 303 See Other

http://dbpedia.org/data/Eiffel_Tower

3

URI represents *Designator*

HTTP GET request
Accept Header: application/rdf+xml

4

RDF Document

HTTP Content Negotiation

Information Service Engineering - Lecture 3 Linked Data Engineering I - 3.3 How to Identify and Access Linked Data

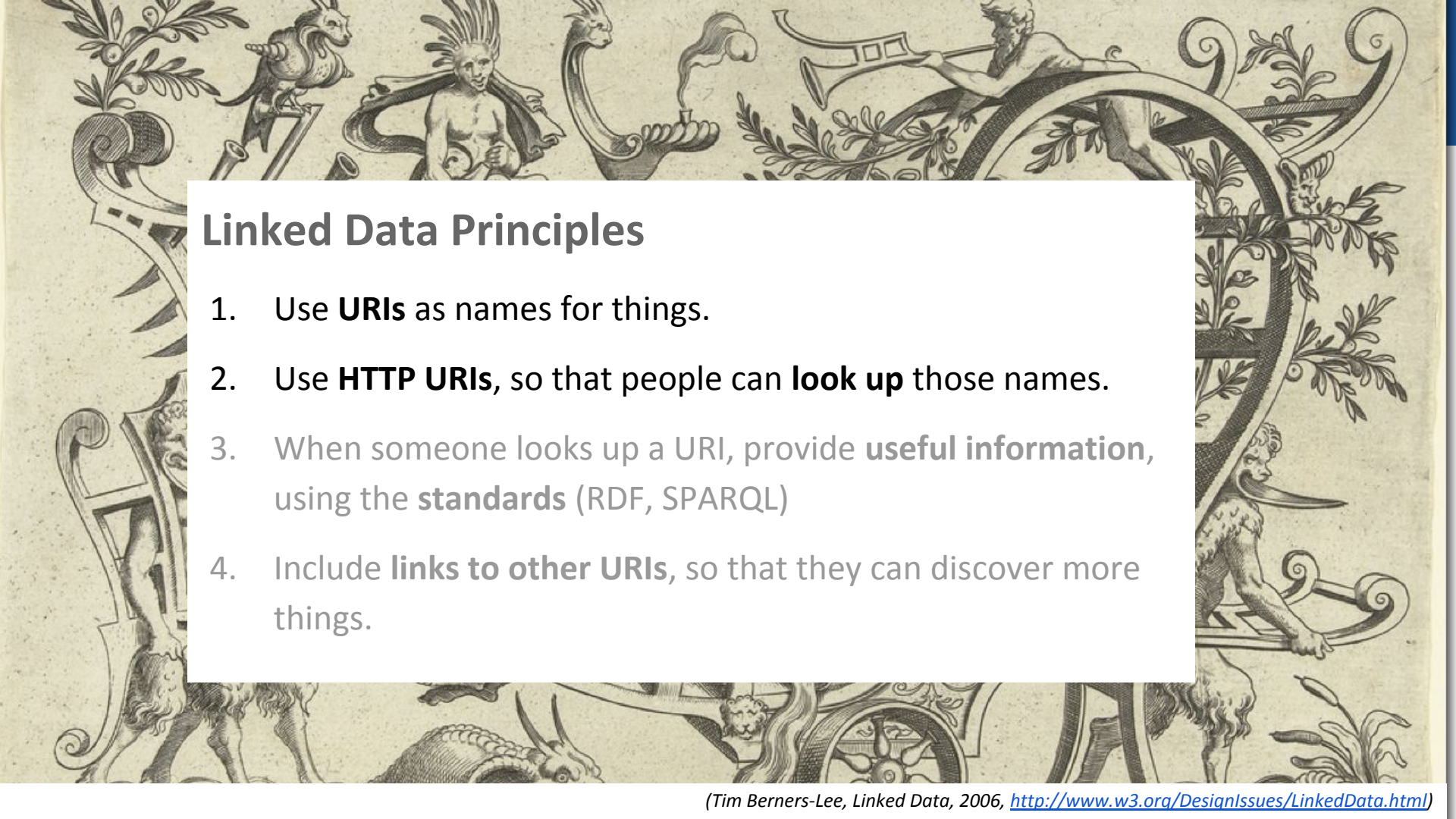
Let's try it ourselves:

- I want to have **human readable information** about the Eiffel Tower from DBpedia

```
curl -L -H "Accept: text/html" http://dbpedia.org/resource/Eiffel_Tower
```

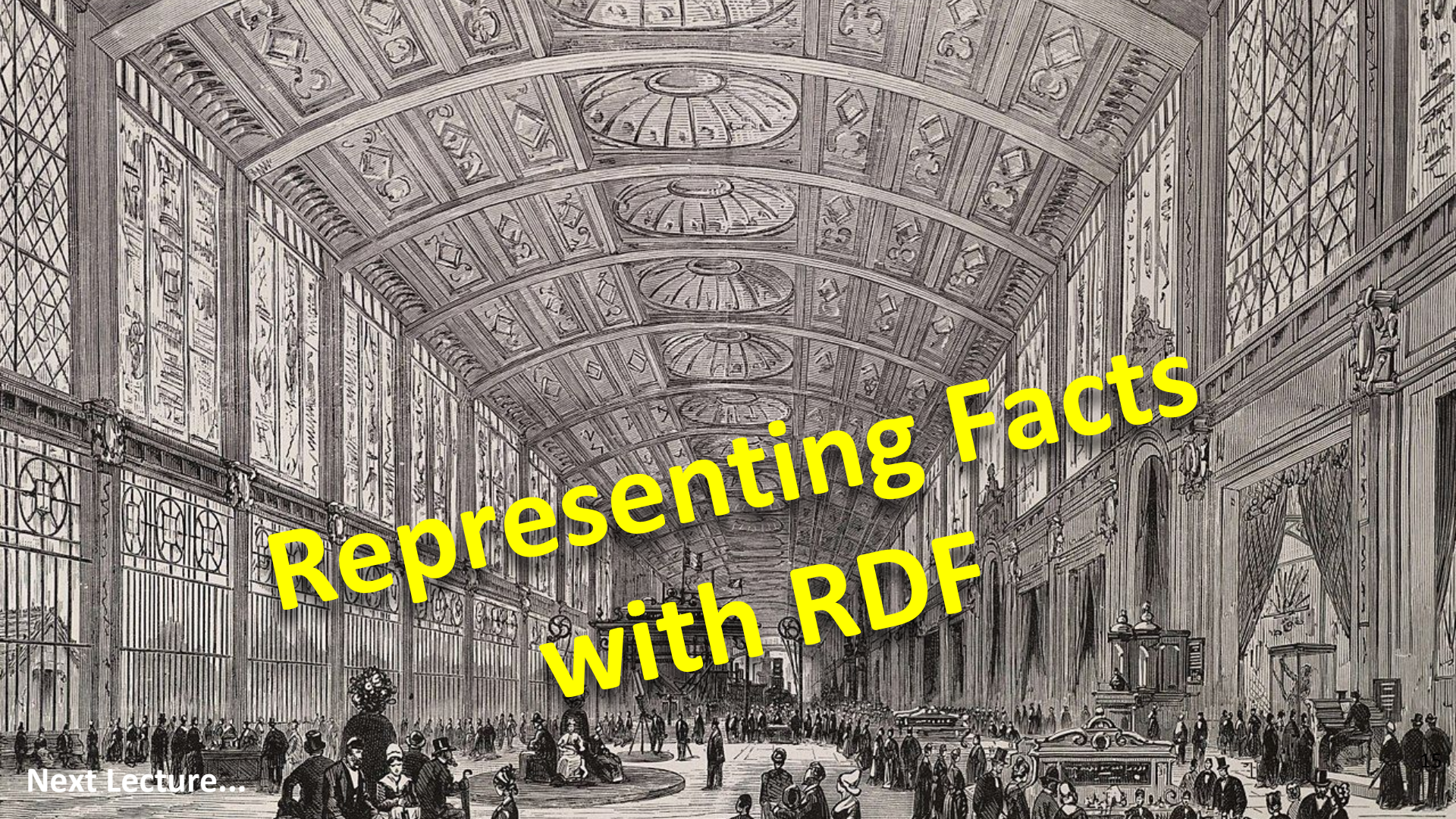
- I want to have **machine readable information** about the Eiffel Tower from DBpedia

```
curl -L -H "Accept: application/rdf+xml" http://dbpedia.org/resource/Eiffel_Tower
```

The background of the slide is a detailed, sepia-toned illustration. It features a variety of figures and symbols: a unicorn-like creature on the left, a figure with a large feathered headdress in the center, a hand holding a smoking pipe, a figure playing a trumpet, and a figure with a long, curved horn. The scene is framed by elaborate, swirling acanthus leaves and scrolls.

Linked Data Principles

1. Use **URIs** as names for things.
2. Use **HTTP URIs**, so that people can **look up** those names.
3. When someone looks up a URI, provide **useful information**, using the **standards** (RDF, SPARQL)
4. Include **links to other URIs**, so that they can discover more things.



Representing Facts with RDF

Next Lecture...

Picture References:

- P.3: Apple, Johannes Osterhoff
- P.4: Ceci n'est pas une pomme, Johannes Osterhoff
- P.8,9: The new https protocol, <https://commons.wikimedia.org/wiki/File:Internet2.jpg>
- P.9-13: [http://commons.wikimedia.org/wiki/File:Eiffel tower from trocadero.jpg](http://commons.wikimedia.org/wiki/File:Eiffel_tower_from_trocadero.jpg)
- P.14: Chariot of grotesques and scrollwork drawn by two fantasy animals and pushed by a satyr, whose head is trapped in a large shell, by Cornelis Bos (1550s),
<https://www.rijksmuseum.nl/nl/zoeken/objecten?q=%22cornelis+bos%22&p=18&ps=12&st=Objects&ii=5#/RP-P-OB-6266,209>
- P.15: Trichon, La galerie du travail manuel, dans le palais du Champ-de-Mars.(1879)
[https://commons.wikimedia.org/wiki/File:La galerie du travail manuel, dans le palais du Champ-de-Mars.jpg](https://commons.wikimedia.org/wiki/File:La_galerie_du_travail_manuel,_dans_le_palais_du_Champ-de-Mars.jpg)