

Introduction to Semantic Technologies

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October 24, 2013

Syntax versus Semantics

Syntax

Greek συνταξις – arrangement, ordering

„The study of the principles and processes by which sentences are constructed in particular languages“ [Chomsky 1957]

Semantics

(grch. σημαντικός – *about characters*)

“The study of interpretation of signs or symbols as used (...) within particular contexts” [Neurath et al. 1995]

Do you pme#?

Symbols

p,m,e,#

Rules

A sequence of # starts and ends every sentence

Each out of p,m,e is always preceded by a sequence of #

Each out of p,m,e is always followed by a sequence of #

The e is always the last out of p,m,e to be used

The e is always used exactly once

#p#e#, ####m#p#e###, ##p#e#, #m#m#m#p###p###e####

p#p#e#, #p###e, ####

Semantics of pme#

#p#e##

#p##m#e##

###m###e#

#p###e#

##m###e####

###m###e#####

Another interpretation of pme#

#p#m#e##

##m##e####

###m##e#####

#m#e##

#p##m#e##

###m##e#

Semantics and Knowledge

contextualized information applicable for problem solving

[Kienreich 2012]

„an ontology is a formal, explicit specification of a shared conceptualisation” *[Gruber 1993]*

„knowledge is information in (contextualized) action (application)” *[Kuhlen 1995]*

Semantic Technologies

**Technologies for working with
contextualized information (knowledge?)**

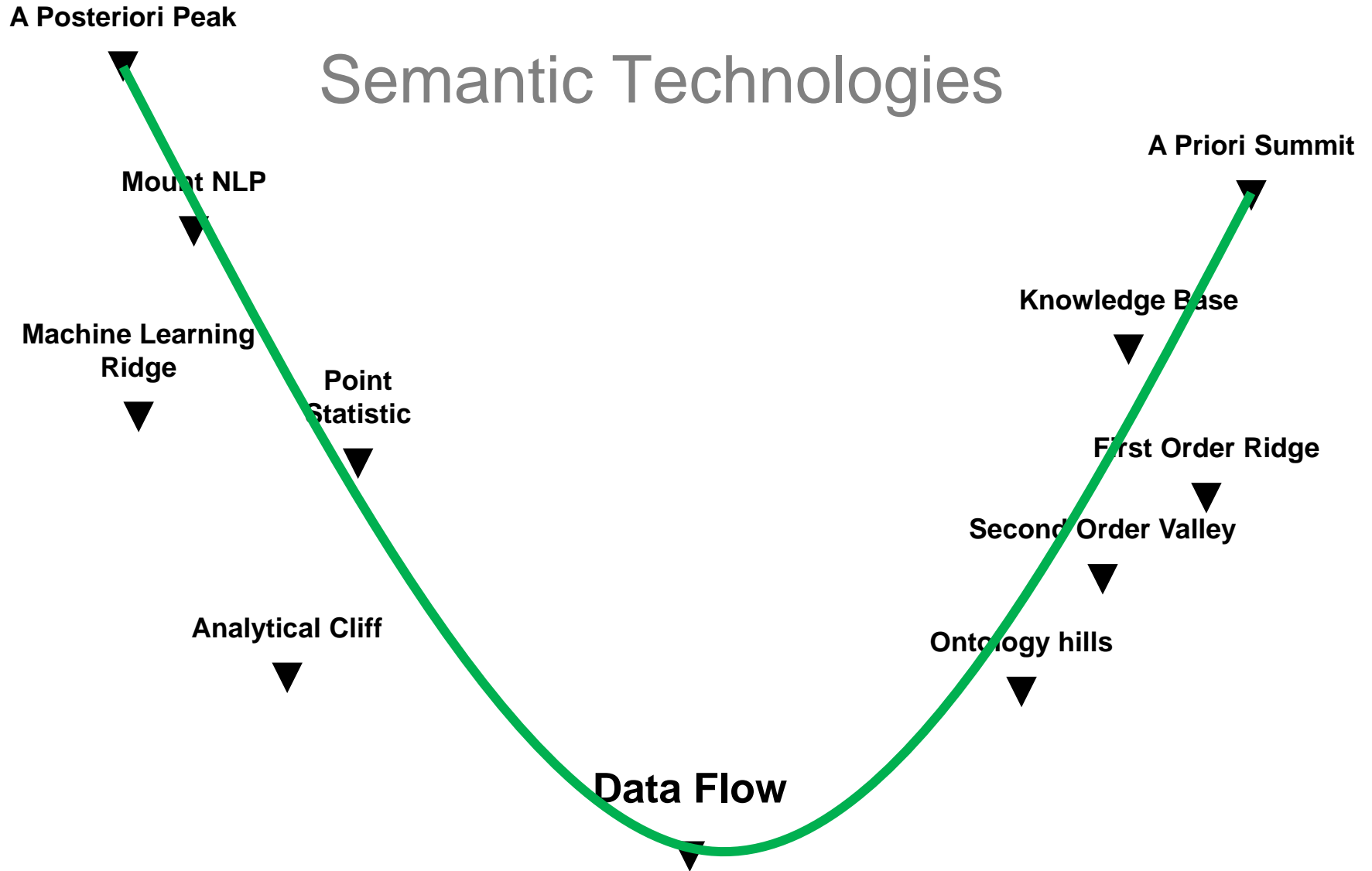
A priori

Explicitly model knowledge

A posteriori

Extract implicit knowledge

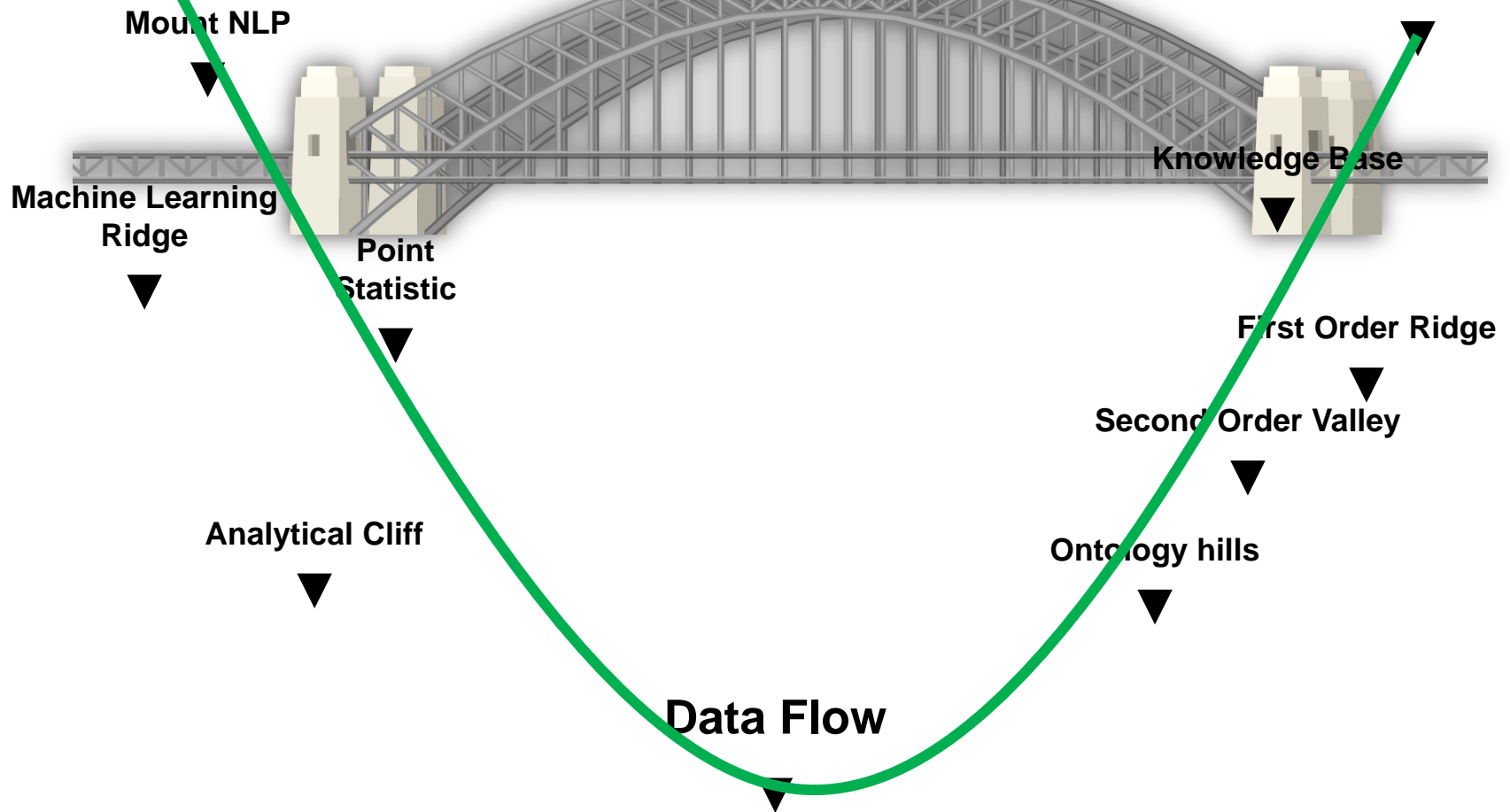
Semantic Technologies



A Posteriori Peak

Semantic Technologies

A Priori Summit



Chris Welty on Semantic Technologies as Bridge

[Download video](#)

Semantic Technologies

Working with contextualized information (knowledge?)

Common understanding: Semantic Technologies are about about encoding meaning and working with it

But there is more:

Semantic Search

Semantic Web

Semantic Mediation

...

Many areas (search...) are saturated with standard (statistical, non context-aware) methods. New, semantic methods are required for the next step

Semantic Technologies

Example: Semantic Search

Information retrieval, search solutions

Indexing of documents based on terms

Fast term lookup to find documents

Spell Checking, Query Expansion, Related Terms, Did You Mean, Result facetation ...

⇒ Need more than just terms in document

⇒ Thesaurus approach to enrichment and retrieval

⇒ Thesaurus is modelled knowledge

Semantic Technologies

Example: Identify semantics in news articles

„Wegen einer Presseaussendung der Staatsanwaltschaft Wien zu einer Hausdurchsuchung klagt der frühere Finanzminister Karl-Heinz Grassler die Republik Österreich. Mit der Klage will er seinen Anspruch auf Schadenersatz feststellen.

Die Staatsanwaltschaft Wien habe durch ihre Aussendung anlässlich der Hausdurchsuchungen beim Ex-Minister am 26. Mai 2011 Grasslers Persönlichkeitsrechte verletzt und insbesondere seinen „wirtschaftlichen Ruf“ beschädigt, heißt es in der Klage beim Landesgericht für Zivilrechtssachen.

Konkret klagt Grasslers Anwalt Michael Rami auf Feststellung eines Schadenersatzanspruches im Rahmen der Amtshaftung für die Justizorgane. Die Klage richtet sich gegen den Bund, der durch die Finanzprokurator vertreten wird.“

Propose some methods, consider a priori and a posteriori

Semantic Web?

The WWW has problems

Content formatted to be human-readable

Many visions require machine understanding

Search

Cross-Language

Fact Validation

Contextualization

=> Semantic Web

Semantic Systems

The WWW is not alone with its problems

Enterprise Information Systems

Smart mobile systems

...

⇒ Semantic Systems

Ballance between

a-priori modelling to ease ai tasks

a-posteriori methods for problem solving

What do we need to do?

Extract knowledge (manually or automatic)

Model knowledge

Reason about knowledge (Expand, Verfiy, Proof...)

Make knowledge available (Query ...)

Display knowledge (Visualization)

What do we have?

lots of technologies

A priori

knowledge representation: skos, rdf, rdfs, (x)tm, owl

triple stores: jena, sesame

querying: sparql

A posteriori

Information retrieval

Machine learning

Social software, tagging, crowdsourcing...

What will we talk about

Focus on A priori

knowledge representation

data modelling

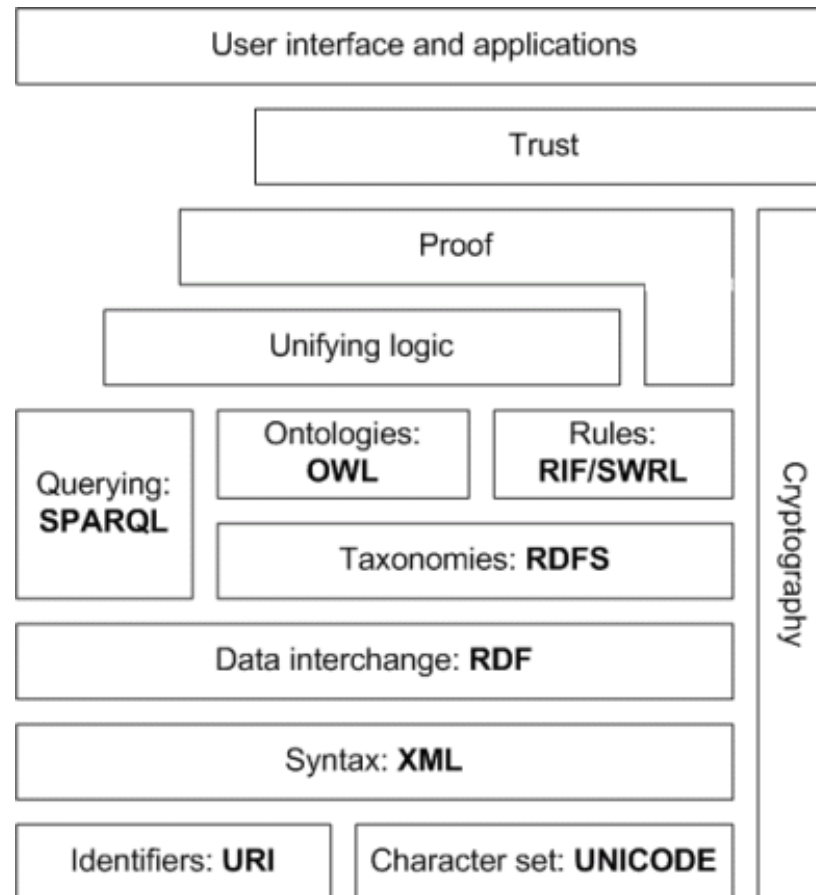
semantic technologies

storage

retrieval

related topics

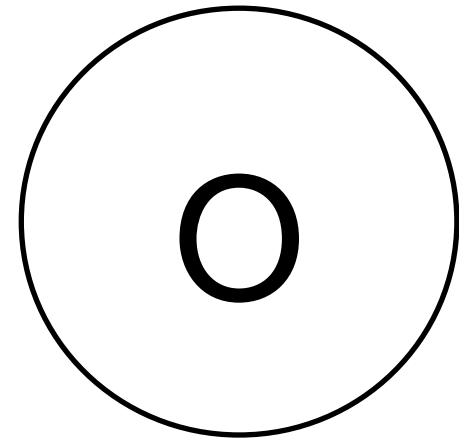
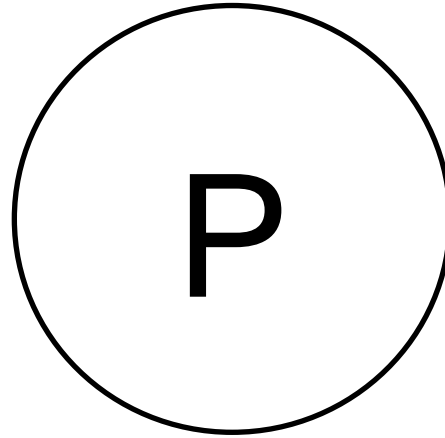
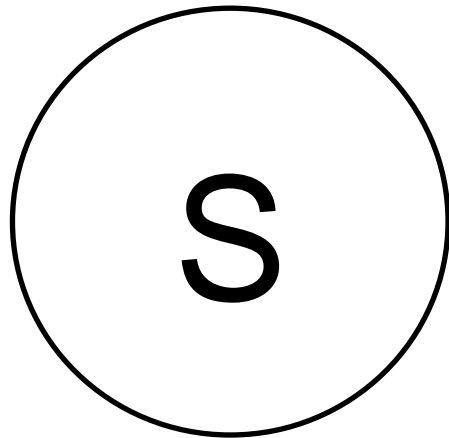
Semantic (Web) Stack



<http://en.wikipedia.org/wiki/File:Semantic-web-stack.png>

Representing Semantics

With Triples



Modelling Standards

<Image removed from public slides – see http://www.mkbergman.com/wp-content/themes/ai3/images/2008Posts/080606_SemanticTechnologies.jpg on site <http://www.mkbergman.com/445/no-semantic-technologies> />

Storage Standards

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<http://www.garshol.priv.no/blog/231.html> >

Semantic (Web) Stack

<Image removed from public slides – see

http://bnode.org/media/2009/07/08/semantic_web_technology_stack.png >

Questions?