

Intelligent Systems on the World Wide Web

Semantic Web

Lecture Slides
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Semantische Technologien

“While the industry is busy creating the underpinnings of open computing with standards like Extensible Markup Language, still **missing are what Plattner calls "semantic" standards**, or how to make different computers recognize data about a business partner, a customer, or an order and know what to do with it. In other words, said Plattner, the software industry is building an alphabet but hasn't yet invented a common language.”

Hasso Plattner, SAP, in CNet News, 27.März 2002.

Slide 2

1 Tutorials (Übungen)

Michael Setzer (uioi@rz.uni-karlsruhe.de)
Raphael Volz (rvo@aifb.uni-karlsruhe.de)

1 Overview

Syntax is not enough – B2B

```
<Bestellung>  
  <Anzahl>500</Anzahl>  
  <Objekt>Schekel</Objekt>  
  .....  
</Bestellung>
```

Slide 3

Slide 4

1 Overview

Syntax is not enough – B2B

<Bestellung>
 <Anzahl>500</Anzahl>
 <Objekt>Schekel</Objekt>

 </Bestellung>



1 Overview

Syntax is not enough – ~~PDA~~ PDWC

By the way: I forgot some devices!!!!!!!!!!!!

Syntax is not enough - Search

Ask Google „Ich suche Akku für Gateway Solo“

What you find:



- Advertisements of Gateway Solo (including Akku)
- Some Akkus for whatever (not necessarily Gateway Solo)
- A lot of data garbage attached to virtually empty web sites

What you don't find:

- Akkus for Gateway Solo (at least not directly)

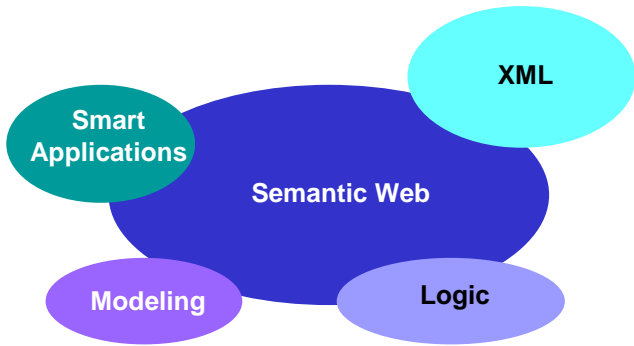
1 Overview

Motivation

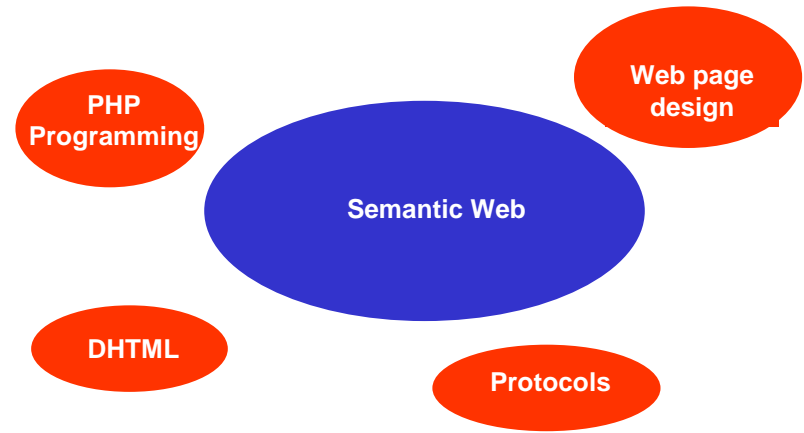
The primary goal is
 to make the Web (internet or intranet)
 more like a library and less like a heap of messy
 books on the floor.

Tim Bray

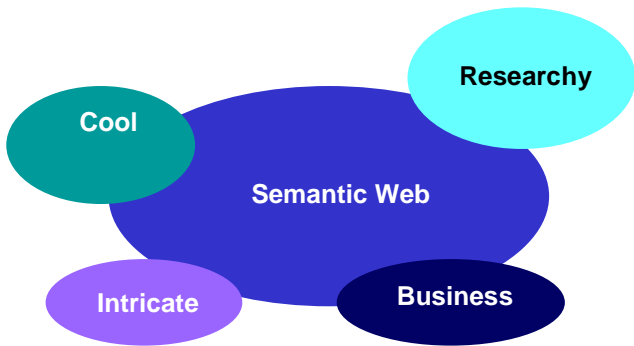
Intelligent Systems on the Web – what it is



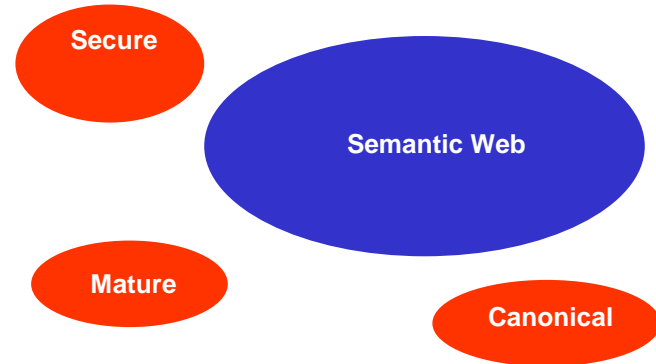
Intelligent Systems on the Web – what it is not



Intelligent Systems on the Web – what it is



Intelligent Systems on the Web – what it is not



1 Overview

1 Overview

Some Principal Ideas

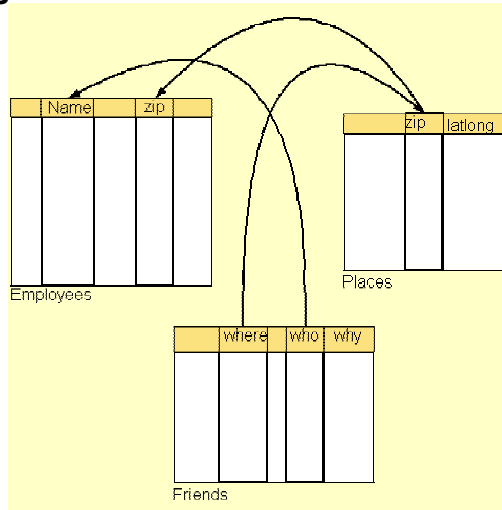
- URI – uniform resource identifiers
- XML – common syntax
- Interlinked
- Layers of semantics – from database to knowledge base to proofs

Tim Berners-Lee, Weaving the Web

Design principles of WWW applied to Semantics!!

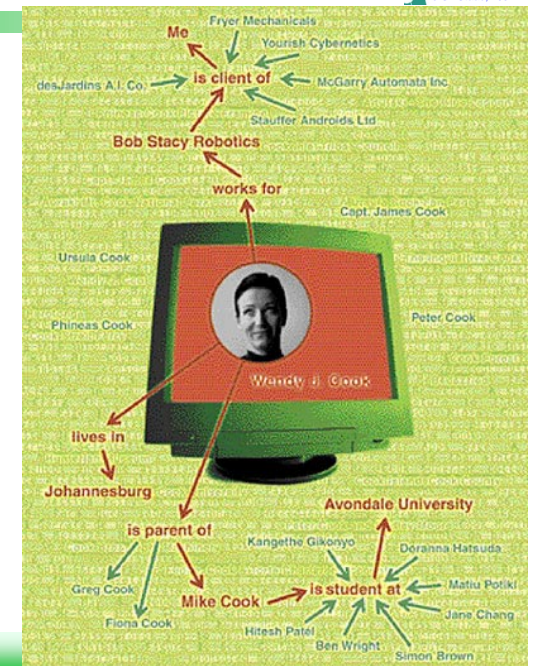
1 Overview

Knowledge in Linked Tables

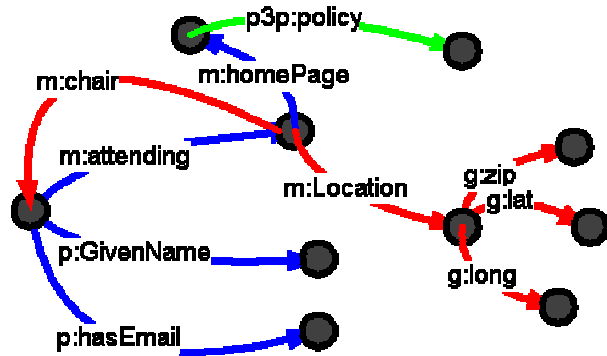


1 Overview

Knowledge in Graphs



Knowledge in Superimposed Graphs



Why XML is not enough - Skill DB Example

```
<skill-database>
  <people>
    <Person>
      <name>Markus</name>
      <knowHow>SGML</knowHow>
    </Person>
    <Hacker>
      <name>Jürgen</name>
      <pgp>CB FC A8 17</pgp>
      <knowHow>SGML</knowHow>
      <knowHow>Java</knowHow>
    </Hacker>
    <Person name="Rainer">
      <knowHow>Mike</knowHow>
    </Person>
  </people>
```

```
<seminars>
  <Seminar topic="SGML"
    id="SGML-19990808">
    <attendant>
      <name>Dieter</name>
      <name>Robert</name>
      <name>Rainer</name>
    </attendant>
  </Seminar>
</seminars>
</skill-database>
```

Give me all persons!

XQL: //person/name

Returns only „ <name>Markus</name>“!

Give me all persons!

```
<skill-database>
  <people>
    <Person>
      <name>Markus</name>
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  </Seminar>
</seminars>
</skill-database>
```

1 Overview

What is missing?

- Hackers are persons.
- Seminar attendants are persons.
- There may be syntactic variations that are semantically equally valid.

1 Overview

Give me all people knowledgable about SGML!

SQL: //person[knowhow=SGML]/name

Returns only „ <name>Markus</name>“!

1 Overview

Give me all people knowledgable about SGML!

```
<skill-database>
  <people>
    <Person>
      <name>Markus</name>
      <knowHow>SGML</knowHow>
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      <knowHow>Java</knowHow>
    </Hacker>
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        <name>Rainer</name>
      </attendant>
    </Seminar>
  </seminars>
</skill-database>
```

1 Overview

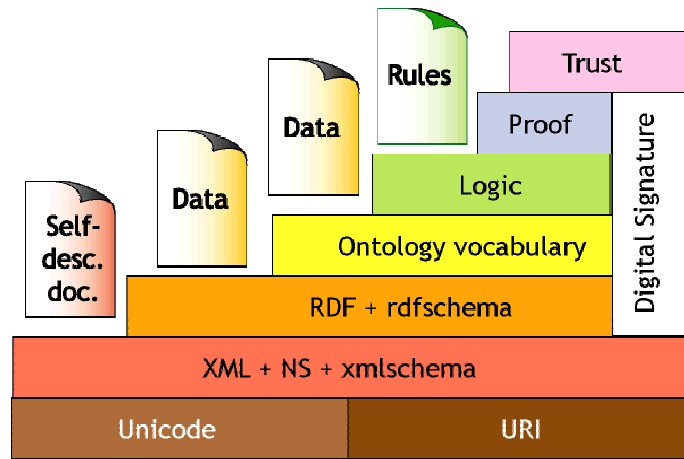
XML is an important basis, but not enough

XML at the syntax layer!

Build on top!

1 Overview

(One) Layer Model of the Semantic Web



1 Overview

Applications

- AIFB Intranet
- Community Web Portal
 - Research Community
 - Soccer Fans
 - opinions (www.epinions.com)
- B2B Portal
 - Procurement (VerticalNet)
- B2C Portal
 - Added-value selling (Agent-based Trading)
- Knowledge Management (mostly intranet)
 - Supporting Business Analysts

<http://aifbhades.aifb.uni-karlsruhe.de/demos.html>
(currently being overhauled!!)

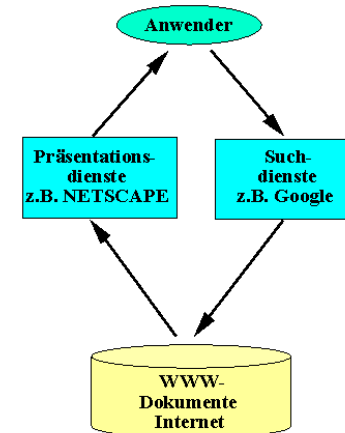
Was sind Netzagenten?

PDA's
SOFTBOTS
SOFTWARE AGENTS
Autonomous Agents
MESSENGERS
Spiders
WANDERERS
WWW Robots
Crawlers

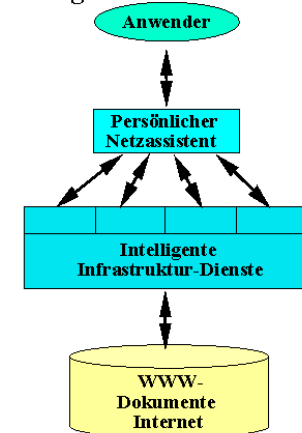
... ein *Netzagent* ist ein auf der Agententechnologie beruhendes Programm, das Aufträge des Benutzers ausführt, indem es Netzdienste selbstständig ansteuert, auswertet, interpretiert und die Verarbeitungsergebnisse benutzeradaptiv präsentiert.

Intelligente Software-Assistenten für die Infobahn

Heute



Zukünftig



Nachteile konventioneller Internet-Suchsysteme

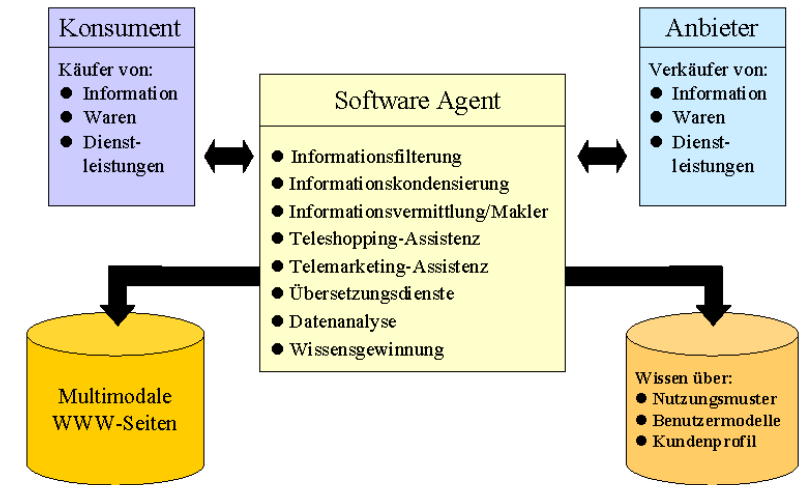
Suche in manuell erstellten Verzeichnissen (z.B. Yahoo!)

- ⊖ Für große dynamische Kategorien werden aktuelle Verweise nicht gefunden (Klassifikation zu aufwendig und zu langsam)
- ⊕ Für kleine und statische Informationskategorien viele korrekte und vollständige Suchergebnisse

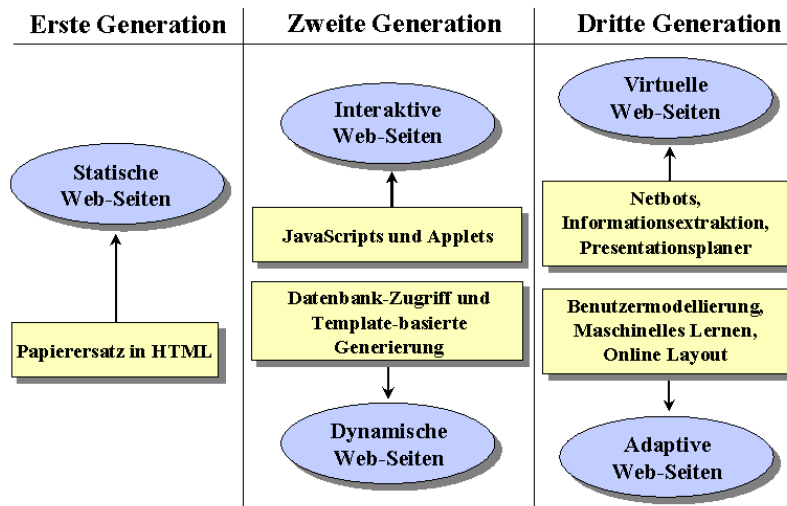
Suche in automatisch generierten Verzeichnissen (z.B. AltaVista)

- ⊖ Sehr umfangreiche und unpräzise Ergebnisse, die vom Benutzer weiter gefiltert werden müssen
- ⊕ Relativ vollständig bis auf aktuelle Seiten, die noch nicht indiziert wurden

Intelligente Infrastruktur-Dienste auf der Infobahn



Drei Generationen von Web-Seiten



1 Overview

Objectives

- Machine processable information
- Intelligent structuring
- Intelligent access
- Intelligent provisioning
- Intelligent combinations!!
- Fast adaptations!!!

Modelling vs. Programming