

Semantic web and Theory of affordances

Branislav Bošanský
(bbosansky@zoznam.sk)

Outline

- Semantic web
 - motivation (Do we need one ?)
 - data representation (ontology, RDF, OWL, ...)
- Theory of affordances
 - in general way
 - on the Semantic Web

Once upon a time ...

Lucy



Pete



Current Web

- Web pages
 - HTML and it's derivations (XHTML, DHTML, ...)
- Web services
 - WSDL, UDDI

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD  
    HTML 4.01 Transitional//EN">  
<html lang="cs">  
<head>  
<title>Matematicko-fyzikální  
    fakulta</title>  
<a href="http://www.cuni.cz"  
    class="nadpis">Univerzita  
    Karlova v Praze</a><br>
```

Agents on the web ?

Problem of providing disabled people access to buildings
[S.Chandrasekharan]

- all-powerful, James Bond-style vehicle
- vehicle based on the environment study
- changing the environment for simple vehicle
- all-powerful, smart environment

Ontology

- philosophical definition
 - systematic account of Existence
- “our” definition
 - “An ontology is an explicit specification of a conceptualization.” [Tom Gruber]
 - what "exists" is that which can be represented

Ontology and WWW

- triplets
 - the things being described have properties which have values
 - subject, predicate, object
 - <http://www.example.org/index.html> has a **creator** whose value is **John Smith**



RDF

- XML & XML-Schema

Resource Description Framework

- a language for representing information about resources in the World Wide Web
- provides a way to express simple statements about resources
- example (RDF/XML)

```
<?xml version="1.0"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:exterms="http://www.example.org/terms/"
  <rdf:Description rdf:about="http://www.example.org/index.html">
    <exterms:creation-date>August 16, 1999</exterms:creation-date>
  </rdf:Description>
</rdf:RDF>
```

RDF Schema (RDFS)

- Class, subclassOf (type, category)
- provides the facilities needed to describe such classes
- in the form of an RDF vocabulary

```
<rdf:Description rdf:ID="MotorVehicle">
  <rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
</rdf:Description>
<rdf:Description rdf:ID="PassengerVehicle">
  <rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
  <rdfs:subclassOf rdf:resource="#MotorVehicle"/>
</rdf:Description>
```

Web Ontology Language (OWL)

- ontology mapping (equivalentClass, equivalentProperty, sameAs, differentFrom, AllDifferent)
- complex classes (intersectionOf, unionOf, complementOf, oneOf, disjointWith)
- property restrictions
- three sublanguages
 - OWL Lite
 - OWL DL
 - OWL Full

Theory of affordances (1)

- J.J.Gibson, 1977
 - what the thing offers, provides or furnishes
 - relative to a particular actor
 - independent of the actor's ability to perceive it
 - does not change as the needs and goals of the actor change
 - binary - they either exist or they do not exist

Theory of affordances (2)

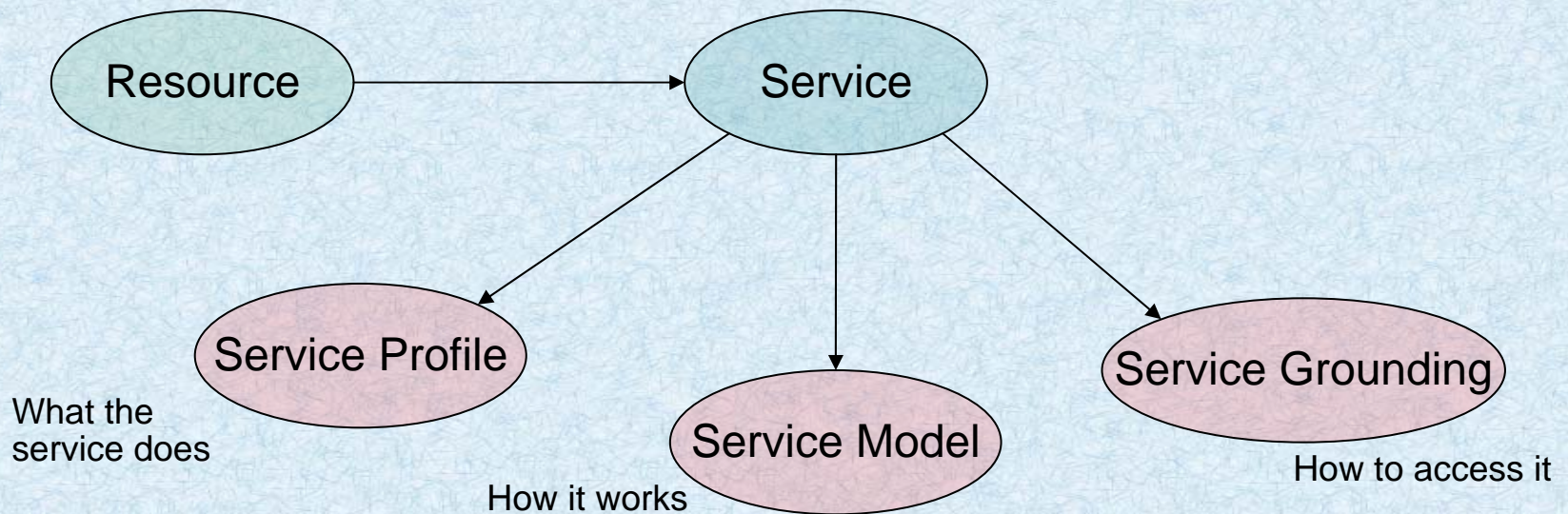
- Norman, 1988
 - perceived properties that may or may not actually exist
 - provide strong clues to the operations of things
 - suggest the range of possibilities
 - action can be difficult or easy
- Gaver, 1991
 - the design that suggests the affordance
 - nested affordances
 - sequential affordances

Affordances on the Web

- Web services
 - self-contained, self-describing, modular applications that can be published, located, and invoked across the Web
 - perform functions, which can be anything from simple requests to complicated business processes
 - other applications (and other Web services) can discover and invoke the deployed service
 - WSDL, SOAP, UDDI
- Problems
 - New Car Dealers \neq Automobile Dealers

Services on the Semantic Web

- OWL-S
 - ontology for Web services
 - extends OWL



Current state of Semantic Web

- existing Semantic Web portals
 - <http://www.ontoweb.org>
- existing ontology repositories
- existing tools
 - NUIN Agent architecture
 - Simile PiggyBank - <http://simile.mit.edu/piggy-bank/>

End.

References

- W3C Semantic Web (<http://www.w3.org/2001/sw/>)
- The DARPA Agent Markup Language Homepage (<http://www.daml.org>)
- Berners-Lee, T., Hendler, J., and Lassila, O. The Semantic Web. Scientific American.
- Srinivasan N., Paolucci M., Sycara K. (2004) : Adding OWL S to UDDI, implementation and throughput
- McGrenere, J., Ho, W. (2000): Affordances: Clarifying and Evolving a Concept.
- Gaver, W.W. (1991). Technology affordances
- Chandrasekharan , S. (2004) : The Semantic Web: knowledge representation and affordance