

Mobile Learning in Nature

A field guide to plants as smartphone application

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Zeitgeist Problem

Environmental awareness is rising:

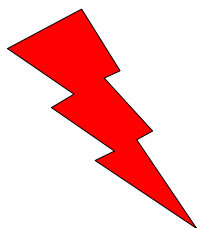
- World climate concerns
- Fossil fuel problems
- Biotechnology risks
- Genetic engineering of plants
- Toxic waste in food
- Etc., etc.

=> „Green“ parties on the rise

=> Public programs
„Bird of the year“,
„Plant of the year“

Environmental knowledge in decline:

- Fear of natural processes
- „Mama, there's a bug, kill it please“
- Wild carnivores are hardly tolerated in civilized areas
- Genes are something bad
- ...
- Etc., etc.



Knowledge gives security
to make proper decisions

How does one increase public knowledge ?

- One of the most deficient areas in public knowledge is the knowledge about local natural species:
 - Exotic animal species may be seen in the zoo or on television, but...
 - A plant in the local forest is not recognized



Project Biodiversity 2.0

- Project: Development of an innovative new field guide / taxonomy handbook to local species
 - Based on a central knowledge server
 - Communicating with distributed smartphone clients
 - Work done in collaboration Dr. Jacqueline Henning (Steinbeis) and student Oliver Eichner
- Difference to iSpot (<http://www.ispot.org.uk>)
 - Not (yet) community centered in the frontend
 - Not focused on very detailed keys for a few species, but on identifying one from a large number of species
 - Central knowledge store based on a proper ontology
 - Ontology = consistent vocabulary of terms and relations

Biodiversity knowledge store

State of the Art:

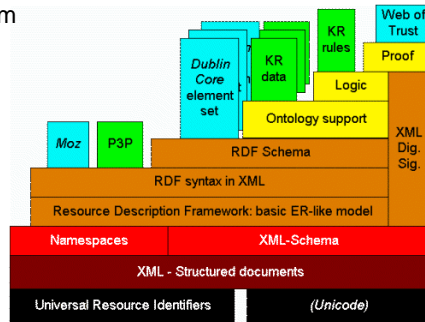
- Knowledge is stored as **data** plus **meta data** describing its meaning
- **Semantic annotation** allows to find information according to attribute values
- Queries like

– Which plant grows at the forest rim
and has blue flowers ?

q=[[Standort::Waldrand]]

[[Blütenfarbe::Blau]]

are understood and interpreted




Semantic Web – Stack (Berners-Lee, 2000)

Semantic Media Wiki SMW

- **Semantic MediaWiki** (SMW) is an open-source extension to MediaWiki
- Editing and storing pages works very similar to Wikipedia
- Additional tags allow for arbitrary attributes in pages. Examples:
 - [[Standort::Waldrand]]
 - [[Blütenfarbe::Blau]]
- Many extensions, e.g.
 - Ontology editors
 - RDF reader/writer
 - Semantic Maps to render geographical data as maps
 - SMWAskAPI to process semantic queries coming in as http requests


SMW Example



Günsel

Kriechender Günsel sind Kräuter mit langen Ausläufern, die sich an den Knoten bewurzeln. Sie bilden deshalb oft bodendeckende Bestände auf Wiesen, am Waldrand oder in Gärten. Die Blätter sind eiförmig, die Blüten blau und in Scheinquirlen in den Blattachsen angeordnet.

Blätter des Günsels sollen gegen Sodbrennen und Mundschleimhautentzündungen helfen.



Günsel	
Latein. Name:	Ajuga reptans
Ordnung:	Lippenblütenartige (Lamiales)
Familie:	Lippenblütler (Lamiaceae)
Wuchsform:	Kräuter
Wuchshöhe:	ca. 10 bis 30 cm

Currently >50 Plants in SMW

> 1000 in Wikipedia

Estimated 500.000 Plant species known

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- Android App
 - Communicating with SMW server
- Displays a list of all attributes
 - Dynamically obtained from server
- Each attribute may take one of a list of values
 - Dynamically obtained from server
- Aggregation of SMW query



Result of an api call

[http://www.ice-karlsruhe.de/wiki/api.php?action=ask&q=\[\[Standort::Waldrand\]\]\[\[Blütenfarbe::Blau\]\]](http://www.ice-karlsruhe.de/wiki/api.php?action=ask&q=[[Standort::Waldrand]][[Blütenfarbe::Blau]])

```
<api>
  <ask result="Success">
    <query q="[[Standort::Waldrand]][[Blütenfarbe::Blau]]" />
    <results count="4">
      <items>
        <list-item title="Günsele" uri="...wiki/index.php?title=Günsele">
          <properties type="Pflanzen" />
        </list-item>
      </items>
    </results>
  </ask>
</api>
```

Artenkenntnis 2.0 - 2



API call results in zero, one or more hits

- Zero hits:
 - Plant is overspecified incorrectly => weaken selection criteria
 - Plant is unknown => place in SMW along with picture from the smartphone camera
- One hit: Display single page
 - Processing button
- More hits: Display selectable list of possible plants



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From Knowledge to Knowledge Management

- Knowledge ⇔ Individual
- Knowledge Management:
 - Acquisition and dropping of knowledge
 - Transfer of knowledge among individuals
 - Formalization of informal knowledge
 - Sharing of knowledge
 - Collective knowledge
- In connection with **Biodiversity 2.0**:
 - Store the data „Plant *Günsel* found here and now“
 - Retrieve the data „Other plants *Günsel* found there and then“

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WB3 project

- Management of knowledge about urban structures
 - Several awards since 2006
- Mainly grounds, houses, streets, city objects
- Textual, 2D and 3D output in various formats, export to Google Earth etc.
- **Plants as solitary plants and plant covers**
- **Plant prototypes linked to plant SMW**
- <http://www.wb3-project.de>



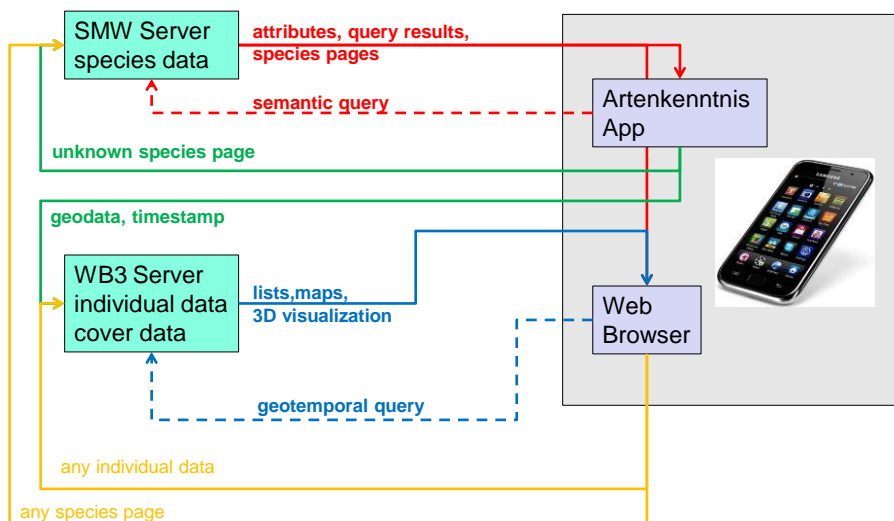
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Knowledge flow



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And finally...

Augmenting nature:

Walking through the forest and identifying every single plant ?

=> Strong interest of the public forest service.



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