

# Semantic MediaWiki



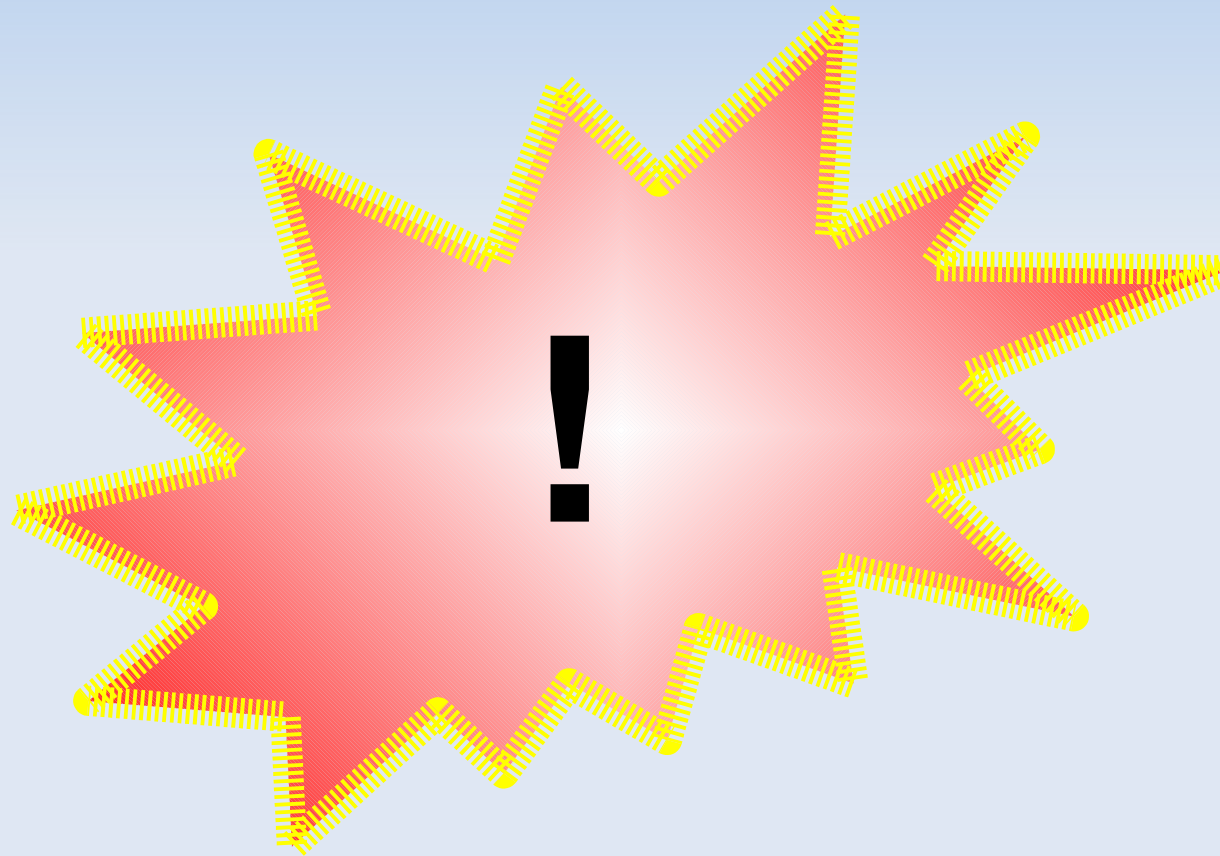
A community database  
*... and more!*

**Dan Bolser**

NETTAB 2010 workshop: Biological Wikis  
November 29th, 2010



# Do ask questions



# Overview

- What is SMW?
  - Motivation
  - Frontend
    - What you see as a user of SMW
  - Backend
    - What you do as a SMW site developer



# Overview

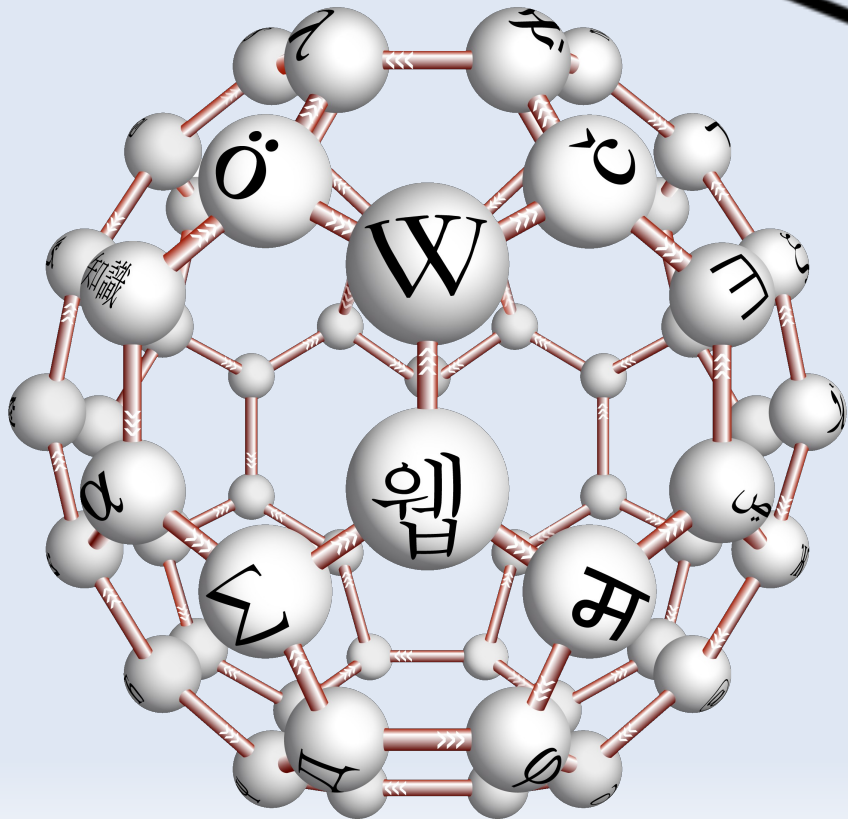
- What is SMW?
  - **Motivation**
  - Frontend
    - What you see as a user of SMW
  - Backend
    - What you do as a SMW site developer



# What is SMW?

- SMW is a regular wiki
  - MediaWiki → **Wikipedia**
- With some new features:
  - Knowledge management
  - Add 'facts' to pages
  - New functionality emerges

Can't we have a common way of maintaining and sharing structures?



# Knowledge, Structure, and other Stuff

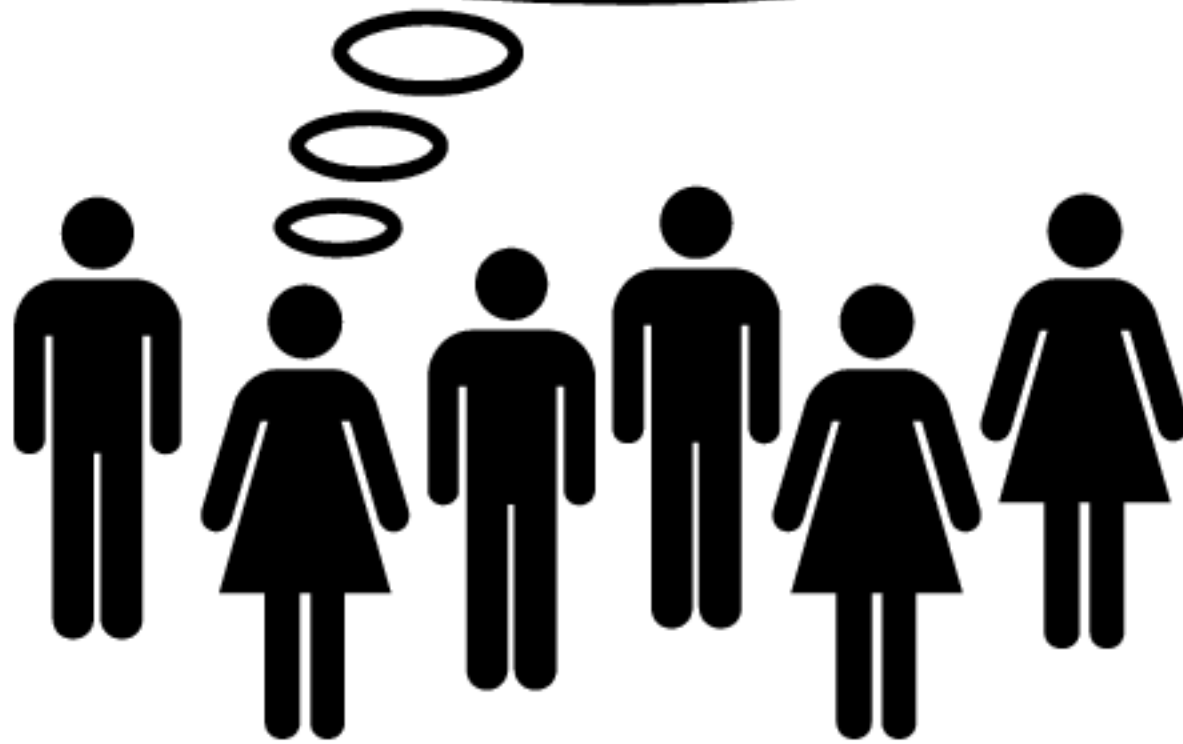
Markus Krötzsch

SMW Project  
Universität Karlsruhe (TH)  
Ontoprise GmbH Karlsruhe

Knowledge should be  
available to everyone.



How can we share  
knowledge?





How can we collect  
knowledge?



How can we exchange  
knowledge?



And what's  
that knowledge thing  
anyway?





# Wiki Paradigm



# Wiki Paradigm



# Wiki Paradigm



# Wikipedia



The answer to all questions.



Why can't computers  
answer questions for us?

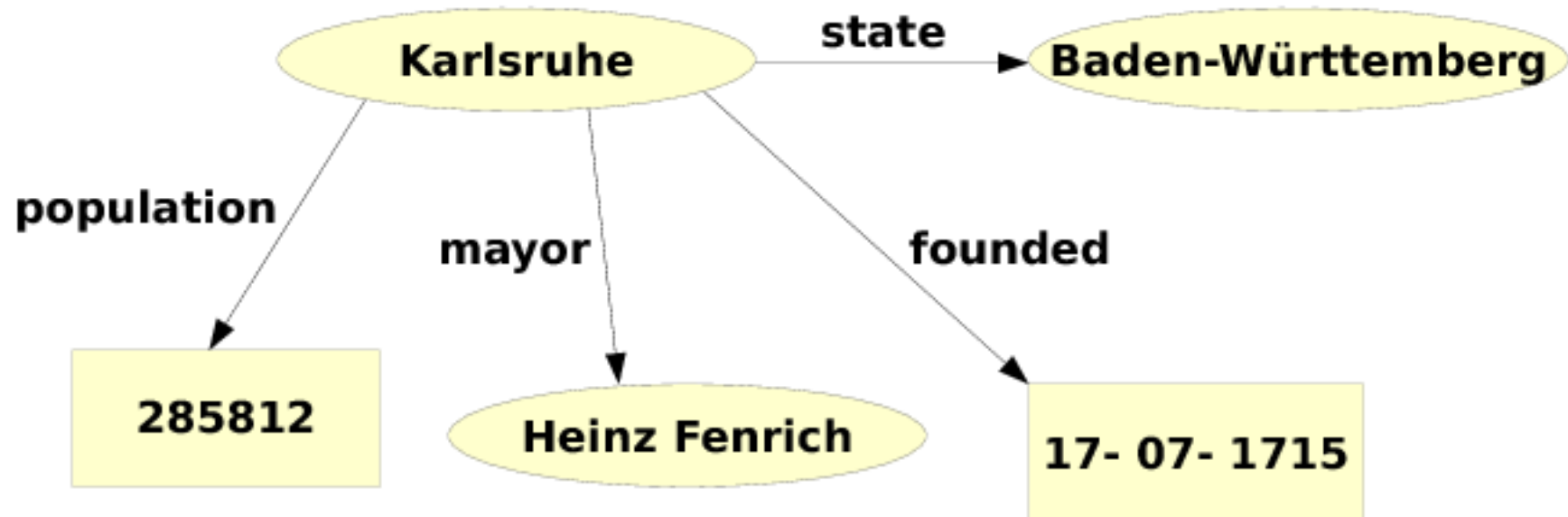
**Because computers are stupid.**

knowledge is more than text

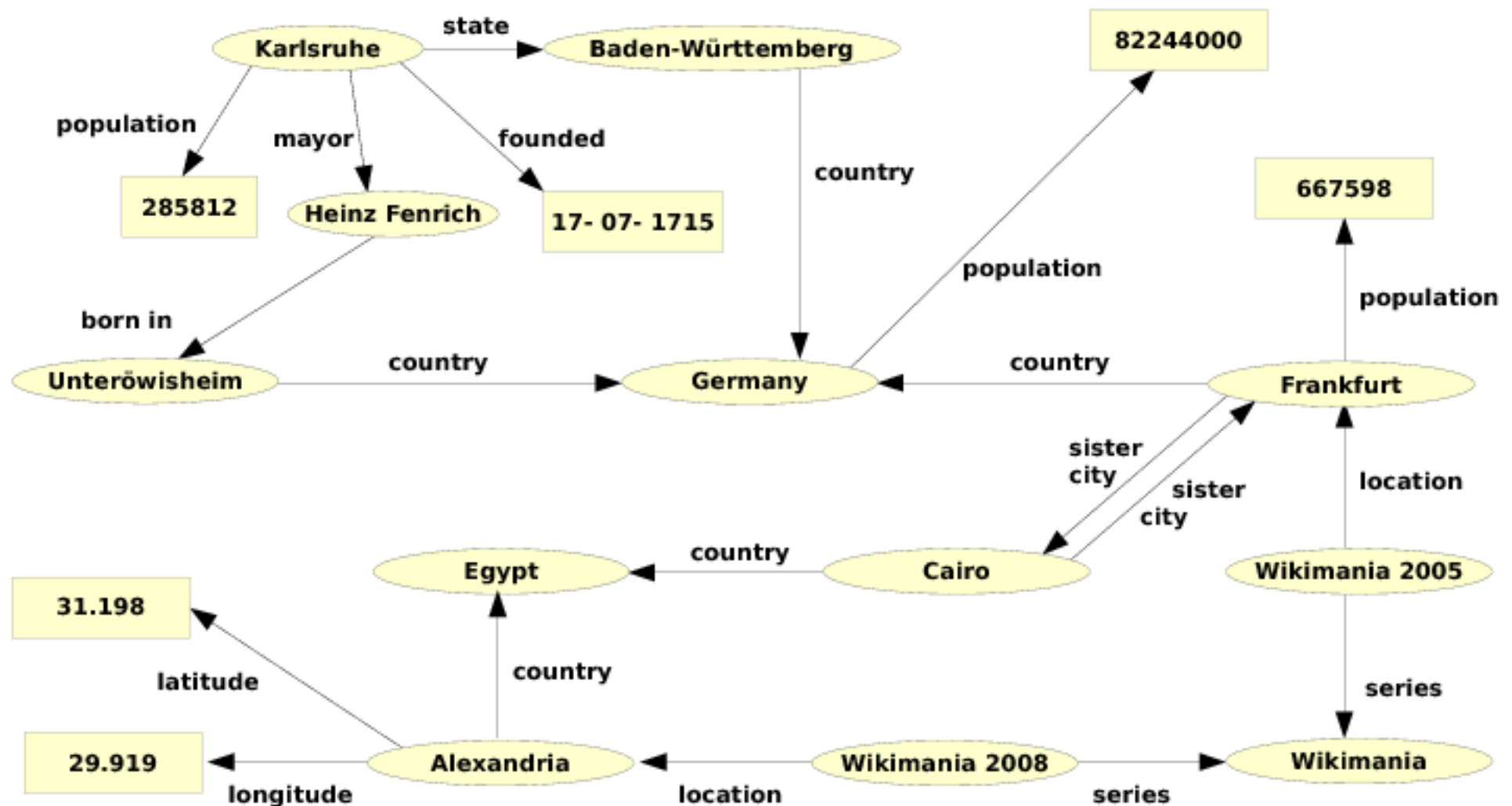
knowledge includes how pieces  
relate to each other

knowledge is *structured*

# What do we mean with «structure»?



# What do we mean with «structure»?

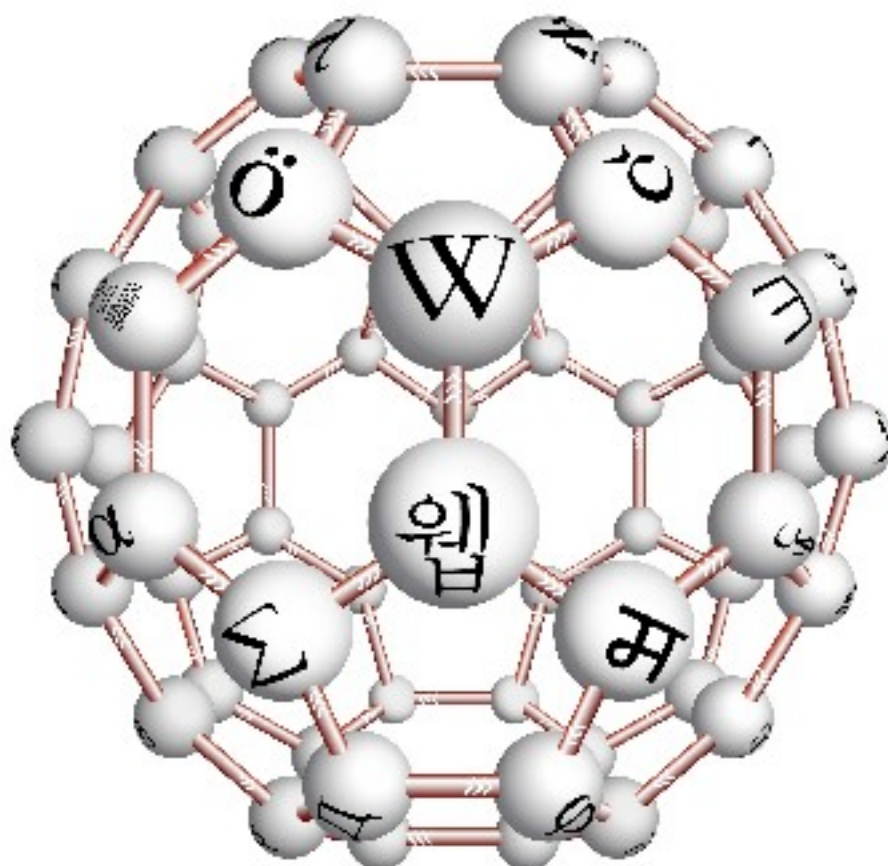


Can't we have a common  
way of maintaining and  
sharing structures?





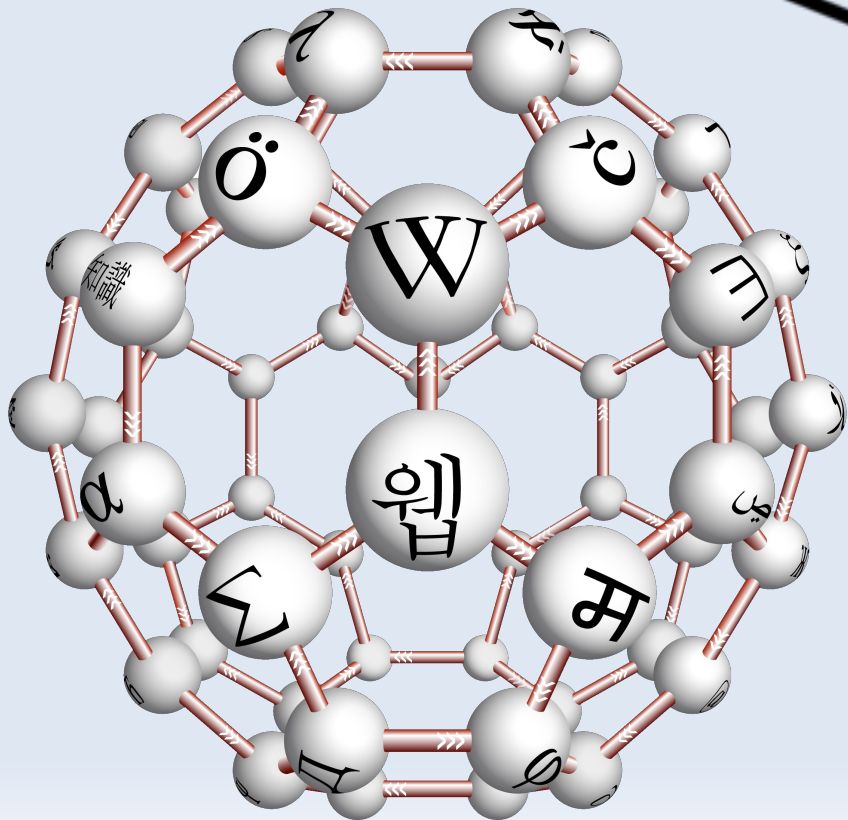
# Semantic MediaWiki



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# Example 'facts'

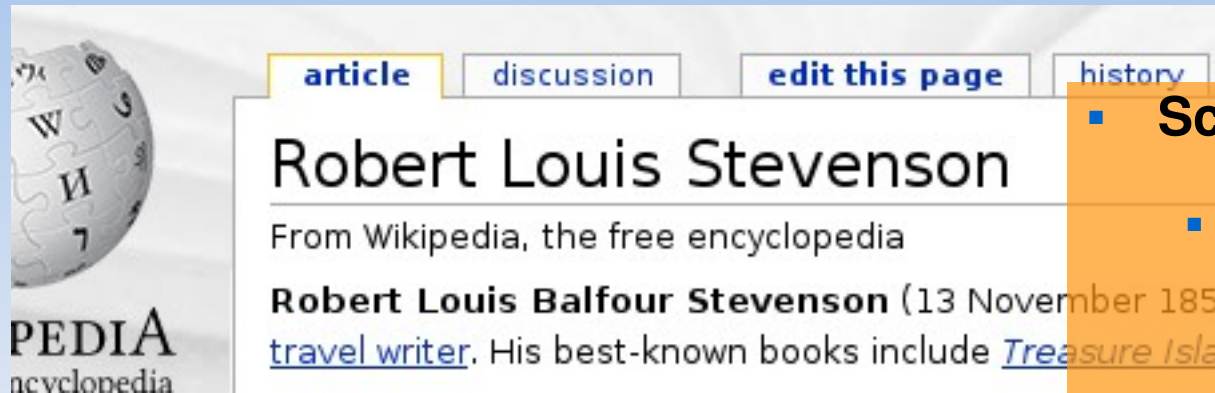


# Example 'facts'



Categories: [Robert Louis Stevenson](#) | [Alumni of the University of Edinburgh](#) | [British non-fiction outdoors writers](#) | [Deaths from cerebral hemorrhage](#) | [Edinburgh Academical](#) | [Lallans poets](#) | [People from Edinburgh](#) | [People illustrated on sterling banknotes](#) | [Scottish children's writers](#) | [Scottish historical novelists](#) | [Scottish horror writers](#) | [Scottish novelists](#) | [Scottish poets](#) | [Scottish Presbyterians](#) | [Scottish short story writers](#) | [Scottish travel writers](#) | [1850 births](#) | [1894 deaths](#) | [19th-century Scottish people](#)

# Example 'facts'



- **Scottish writer**
  - **Novels, poetry, children's, historical, horror, short stories, travel.**
  - **Born Edinburgh, 1850. Died of cerebral hemorrhage, 1894.**

Categories: [Robert Louis Stevenson](#) | [Alumni of the University of Edinburgh](#) | [British non-fiction outdoors writers](#) | [Deaths from cerebral hemorrhage](#) | [Edinburgh Academical](#) | [Lallans poets](#) | [People from Edinburgh](#) | [People illustrated on sterling banknotes](#) | [Scottish children's writers](#) | [Scottish historical novelists](#) | [Scottish horror writers](#) | [Scottish novelists](#) | [Scottish poets](#) | [Scottish Presbyterians](#) | [Scottish short story writers](#) | [Scottish travel writers](#) | [1850 births](#) | [1894 deaths](#) | [19th-century Scottish people](#)

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# SMW Demo

<http://pgscdemo.referata.com>


<http://prodstat.referata.com>

<http://discoursedb.org>

<http://sandbox.referata.com>



# SMW Demo



**navigation**

- [Main page](#)
- [Institutes](#)
- [Members](#)
- [Browse data](#)


**add data**

- [Add a new Member](#)

**help**

- [Help](#)
- [Referata help](#)

**search**

 [Log in / create account](#)

 [Log in with OpenID](#)

page



discussion

edit

history

## Main Page

*Demo site for the Potato Genome Sequencing Consortium (PGSC) Semantic MediaWiki (SMW).*

- [Read about the PGSC](#) 
- [Read about SMW](#) 

Here you can:


- View the project [members database](#).
- View the project [dataset tracking database](#).

Internals:


- View the [class and property index](#).

Technical:

- [Recent changes](#) to the wiki.



# SMW Demo



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## Glenn Bryan



[Click here to see all the member in the wiki.](#)

<b>Email address</b>	<a href="mailto:glenn.bryan@scri.ac.uk">glenn.bryan@scri.ac.uk</a> 
<b>Institute</b>	<a href="#">Scottish Crop Research Institute,</a>
<b>Role</b>	Principle investigator
<b>Project contribution</b>	



Glenn Bryan works at the SCRI, and has 10% of his time allocated to the PGSC.

Category: [Member](#)


### Facts about Glenn Bryan

 RDF feed 


Email

[glenn.bryan@scri.ac.uk](mailto:glenn.bryan@scri.ac.uk)  + 

Role

Principle investigator + 

Works in

[Scottish Crop Research Institute](#) + 

[page](#)[discussion](#)[edit with form](#)[edit](#)[history](#)

## navigation

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## search

# Edit Member: Glenn Bryan

**Warning:** You are not logged in. Your IP address will be recorded in this page's edit history.

<b>Email:</b>	<input type="text" value="glenn.bryan@scri.ac.uk"/>
<b>Works in:</b>	<input type="text" value="Scottish Crop Research Institute"/>
<b>Role:</b>	<input type="text" value="Principle investigator"/>
<b>Contribution:</b>	<input type="text"/>

### Free text:

Summary:

☐ This is a minor edit ☐ Watch this page

[Cancel](#)

[page](#)[discussion](#)[edit](#)[history](#)

# Member/table

[< Member](#)

## Table of Members

[\[edit\]](#)

### navigation


















- [Main page](#)
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### add data

- [Add a new Member](#)

### help

- [Help](#)
- [Referata help](#)

	 <b>Email</b>	 <b>Works in</b>
Bicheng Yang	<a href="mailto:yangbicheng@genomics.org.cn">yangbicheng@genomics.org.cn</a> 	BGI-Shenzhen
Boris Kuznetsov	<a href="mailto:bkuznetsoff@gmail.com">bkuznetsoff@gmail.com</a> 	Centre for Bioengineering RAS
Boris Sagredo	<a href="mailto:bsagredo@inia.cl">bsagredo@inia.cl</a> 	Instituto de Investigaciones Agropecuarias
Brett Whitty	<a href="mailto:whitty@msu.edu">whitty@msu.edu</a> 	Michigan State University
Christian Bachem	<a href="mailto:chris.bachem@gmail.com">chris.bachem@gmail.com</a> 	Wageningen University
Dan Bolser	<a href="mailto:dan.bolser@gmail.com">dan.bolser@gmail.com</a> 	Dundee University
Dan Milbourne	<a href="mailto:dan.milbourne@teagasc.ie">dan.milbourne@teagasc.ie</a> 	Teagasc Agriculture and Food Development Authority
David Marshall	<a href="mailto:david.marshall@scri.ac.uk">david.marshall@scri.ac.uk</a> 	Scottish Crop Research Institute
David Martin	<a href="mailto:dmamartin@dundee.ac.uk">dmamartin@dundee.ac.uk</a> 	Dundee University
Desheng Mu	<a href="mailto:mudesheng@genomics.org.cn">mudesheng@genomics.org.cn</a> 	BGI-Shenzhen
Erwin Datema	<a href="mailto:erwin.datema@wur.nl">erwin.datema@wur.nl</a> 	Wageningen University
Gaetano Perrotta	<a href="mailto:gaetano.perrotta@enea.it">gaetano.perrotta@enea.it</a> 	Italian National Agency for New Technologies, Energy and Sustainable Development
Gerard Bishop	<a href="mailto:g.bishop@imperial.ac.uk">g.bishop@imperial.ac.uk</a> 	Imperial College, London
Giovanni Giuliano	<a href="mailto:giovanni.giuliano@enea.it">giovanni.giuliano@enea.it</a> 	Italian National Agency for New Technologies, Energy and Sustainable Development





The user-powered  
database of political  
commentary

#### Navigation

[Main Page](#)  
[About](#)  
[Help](#)  
[Recent changes](#)

#### Data

[Browse data](#)  
[Recent items](#)  
[Opinion item calendar](#)  
[Semantic search](#)  
[View XML](#)  
[RDF](#)  
[Analysis](#)

#### Contribute

[Add an opinion item](#)  
[Add an author](#)  
[Add a source](#)  
[Add a topic](#)  
[How to add content](#)

Page [Discussion](#)

[Read](#)

[Edit](#)

[View history](#)

[Go](#)

[Search](#)

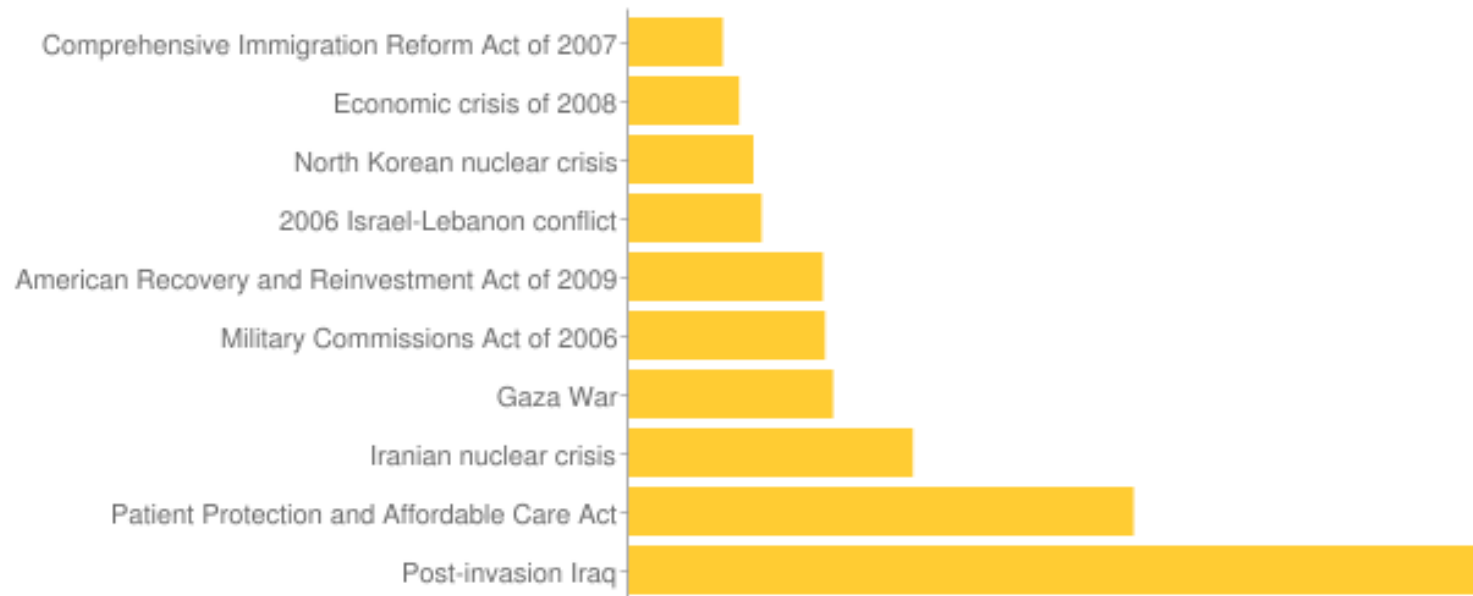
## Topic breakdown

Here are some ways to view the distribution of topics for opinion items on this site. The numbers seen here are the values of the [Has number of opinion items](#) property, which is itself set within the [Topic template](#).

### Google bar graph

[\[edit\]](#)

The 20 most popular topics:



### Google pie chart

[\[edit\]](#)

The 10 most popular topics:



The user-powered  
database of political  
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Navigation

[Main Page](#)

[About](#)

[Help](#)

[Recent](#)

Data

[Browse](#)

[Recent](#)

[Opinion](#)

[Semantic](#)

[View X](#)

[RDF](#)

[Analysis](#)

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Page

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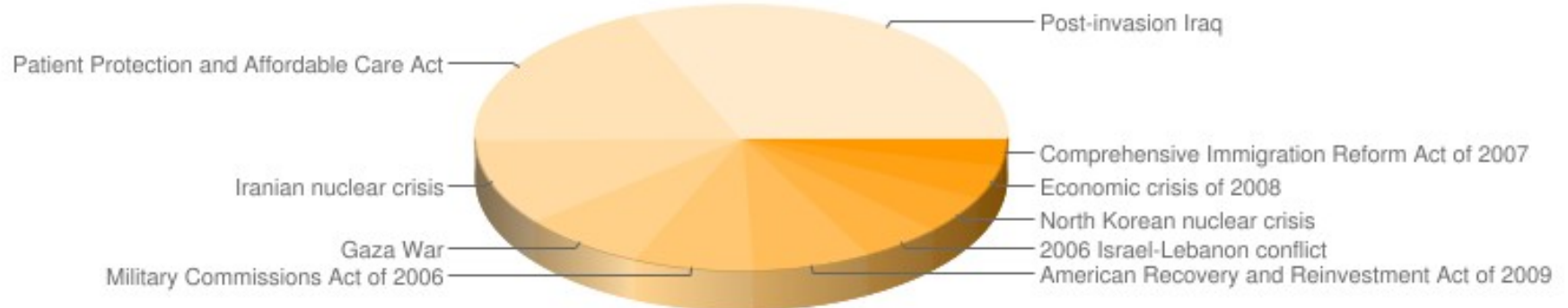
[\[edit\]](#)

The 20 most popular topics:

### Google pie chart

[\[edit\]](#)

The 10 most popular topics:



### Google pie chart

[\[edit\]](#)

The 10 most popular topics:

# SMW Demo

## Program

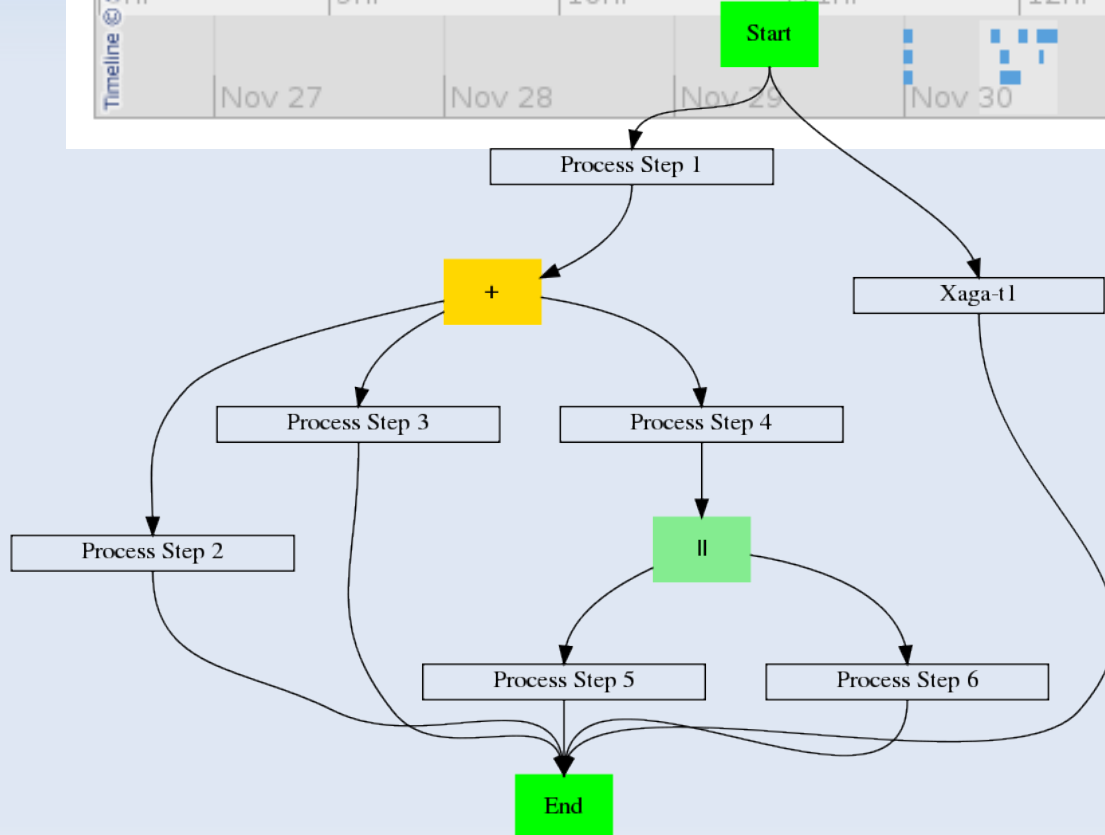
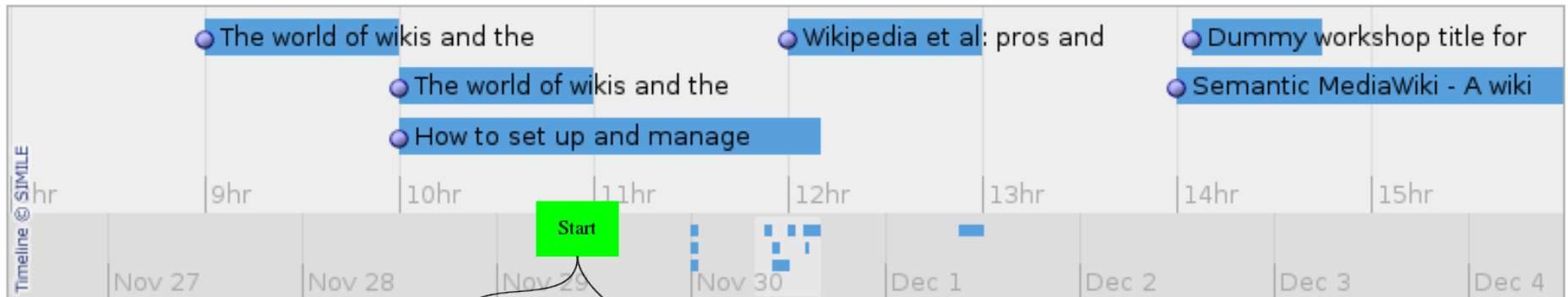
[\[edit\]](#)



# SMW Demo

## Program

[\[edit\]](#)

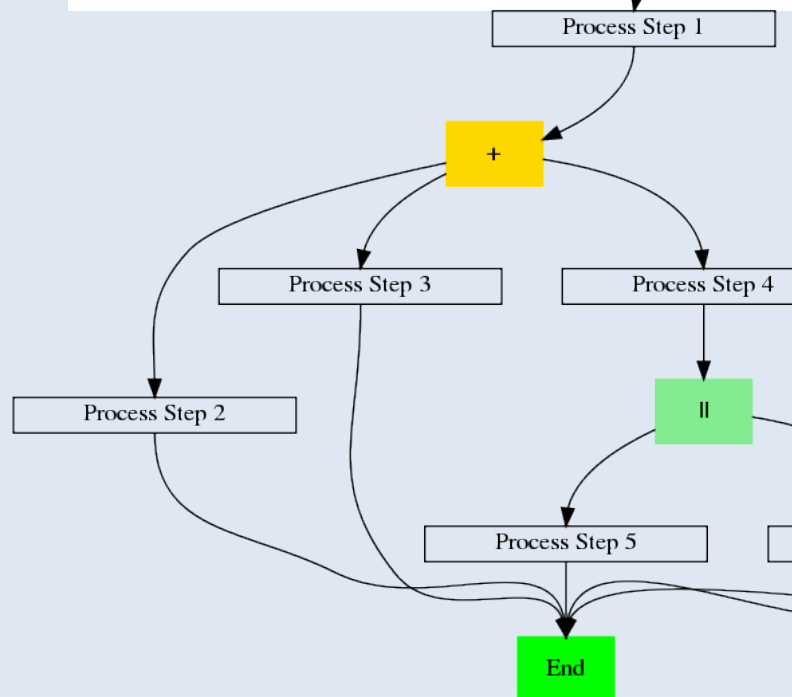
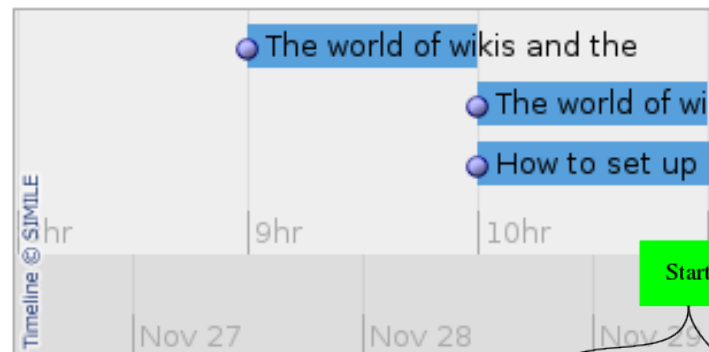




# SMW Demo

## Program

[\[edit\]](#)



# SMW Demo

## Facts about Robert Louis Stevenson ⓘ

RDF feed 

Attended Edinburgh University + 🔍

Born in Edinburgh + 🔍

Died of cerebral hemorage + 🔍

Has date of birth 1850 + 🔍

Has date of death 1884 + 🔍

# SMW Demo

## data export

- [View XML](#)
- [RDF](#)

### Facts about Robert Louis Stevenson ⓘ

RDF feed 

Attended [Edinburgh University](#) + 

Born in [Edinburgh](#) + 

Died of [cerebral hemorage](#) + 

Has date of birth [1850](#) + 

Has date of death [1884](#) + 

## data export

- View XML
- RDF

## Facts about Robert Louis Stevenson

Attended

Born in

Died on

Has date of birth

Has date of death

1884 + 🔍

```
-<rdf:RDF>
  <!-- exported page data -->
  -<swikt:Subject rdf:about="http://referata.com
/wiki/Special:URIResolver/RLS">
    <rdfs:label>Robert Louis Stevenson</rdfs:label>
    <swikt:page rdf:resource="http://sandbox.referata.com
/wiki/RLS"/>
    <rdfs:isDefinedBy rdf:resource="http://sandbox.referata.com
/wiki/Special:ExportRDF/RLS"/>
    <property:Attended rdf:datatype="http://www.w3.org
/2001/XMLSchema#string">Edinburgh University
  </property:Attended>
    <property:Born_in rdf:datatype="http://www.w3.org
/2001/XMLSchema#string">Edinburgh </property:Born_in>
    <property:Died_of rdf:datatype="http://www.w3.org
/2001/XMLSchema#string">cerebral hemorage
  </property:Died_of>
    <property:Has_date_of_birth rdf:datatype="http://www.w3.org
/2001/XMLSchema#dateTime">1850-01-01T00:00:00
  </property:Has_date_of_birth>
    <property:Has_date_of_death rdf:datatype="http://www.w3.org
/2001/XMLSchema#dateTime">1884-01-01T00:00:00
  </property:Has_date_of_death>
  </swikt:Subject>
</rdf:RDF>
```

# Overview

- What is SMW?
  - Motivation
  - **Frontend**
    - **What you see as a user of SMW**
  - Backend
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# Overview

- 1) Data
- 2) Properties and types
- 3) Classes
- 4) Templates
- 5) Forms
- 6) Queries

*Zzz...*

# Data

- Triples are used for modelling data
  - Similar to relational data models
  - More generic
- A triple has three parts:
  - **Subject** – **Predicate** – **Object**
- In SMW this is simplified to match the page model of the wiki (facts on a page):
  - **Page** – **Property** – **Value**



# Properties

- Properties are added to pages using very simple syntax:

**Stan Bolton:**

**[[Has name::Stan]]**

**[[Has initials::SB]]**

**[[Has dob::16/02/78]]**

**[[Has weight::90 kg]]**

# Properties

- Properties are added to pages using very simple syntax:

**Stan Bolton:**

[[Has name::Stan]]

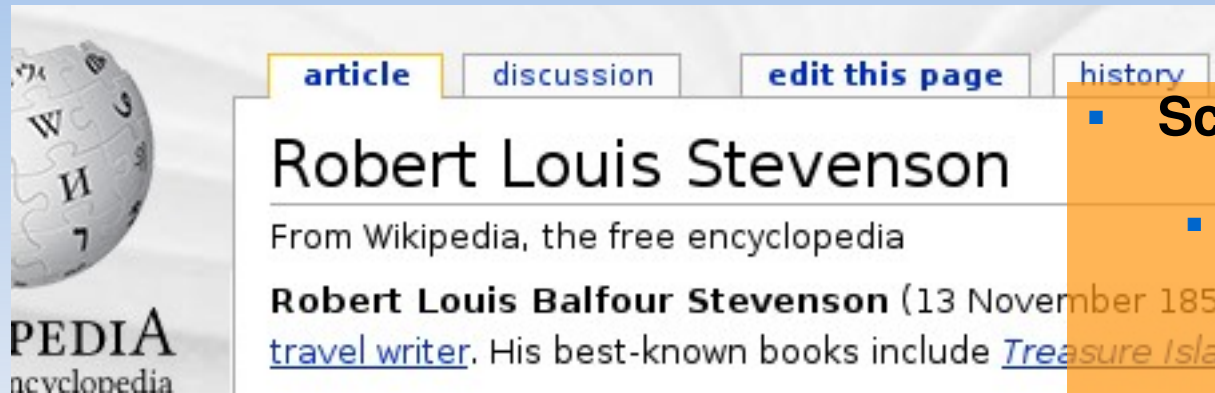
[[Has initials::SB]]

[[Has dob::16/02/78]]

[[Has weight::90 kg]]



# Example 'facts'



- **Scottish writer**
  - **Novels, poetry, children's, historical, horror, short stories, travel.**
  - **Born Edinburgh, 1850. Died of cerebral hemorrhage, 1894.**

Categories: [Robert Louis Stevenson](#) | [Alumni of the University of Edinburgh](#) | [British non-fiction outdoors writers](#) | [Deaths from cerebral hemorrhage](#) | [Edinburgh Academical](#) | [Lallans poets](#) | [People from Edinburgh](#) | [People illustrated on sterling banknotes](#) | [Scottish children's writers](#) | [Scottish historical novelists](#) | [Scottish horror writers](#) | [Scottish novelists](#) | [Scottish poets](#) | [Scottish Presbyterians](#) | [Scottish short story writers](#) | [Scottish travel writers](#) | [1850 births](#) | [1894 deaths](#) | [19th-century Scottish people](#)

# Example 'facts'

**Robert Louis Stevenson:**

**[[born in::Edinburgh]]**

**[[has dob::1850]]**

**[[died of::cerebral hemorrhage]]**

**[[has dod::1894]]**

**[[attended university::Edinburgh]]**

Scottish writer

Novels, poetry, children's, historical, horror, short stories, travel.

Born Edinburgh, 1850. Died of cerebral hemorrhage, 1894.

Attended Edinburgh university.

# Property types

- Each property has its own page in the wiki
- By setting the **value** of a '*special property*' on the property's **page**, you set the type of the property

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**Property:has name:**  
[[*has type*::String]]

**Property:has dob:**  
[[*has type*::Date]]

**Property:has weight:**  
[[*has type*::Number]]

# Property types

- Allow the proper layout of values in a table
- Allow queries to have proper range constraints
- Allow forms to be validated against user input



Properties have simple types:  
string, date, number, etc.

How do we 'type' a page?

**Classes**

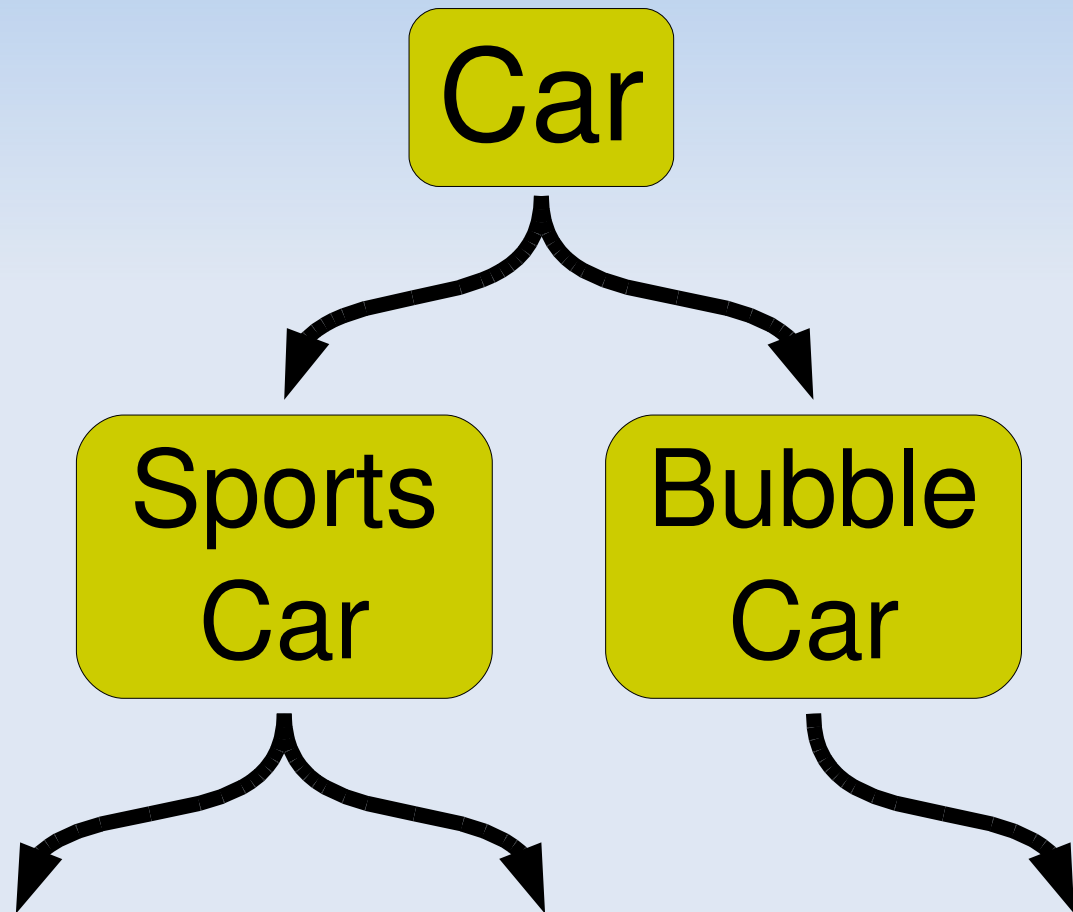


# Classes

- Pages can be 'typed' by defining them as members of a **class**
  - Class membership is determined by using wiki **categories**
- Pages in a class are expected to carry a similar set of properties...

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# Classes

- **Car**

- Top speed
- Doors
- Price
- ...



# Glenn Bryan

[Click here to see all the member in the wiki.](#)

<b>Email address</b>	<a href="mailto:glenn.bryan@scri.ac.uk">glenn.bryan@scri.ac.uk</a> 
<b>Institute</b>	<a href="#">Scottish Crop Research Institute</a> ,
<b>Role</b>	Principle investigator
<b>Project contribution</b>	


Glenn Bryan works at the SCRI, and has 10% of his time allocated to the PGSC.

[Category: Member](#)

## Facts about Glenn Bryan ⓘ

RDF feed 

Email [glenn.bryan@scri.ac.uk](mailto:glenn.bryan@scri.ac.uk)  + 

Role Principle investigator + 

Works in [Scottish Crop Research Institute](#) + 

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- [Main page](#)
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### add data



- [Add a new Member](#)
- [Add a new Dataset](#)

### help

- [Help](#)
- [Referata help](#)

### search

 [log in / create account](#)  [Log in with OpenID](#)

### special page

## Add an Institute to the wiki: Scottish Crop Research Institute

**Warning:** You are not logged in. Your IP address will be recorded in this page's edit history.

Homepage:

Country:

Free text:

Summary of edit:

☐ This is a minor edit ☐ Watch this page

[Cancel](#)



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Homepage:

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**Property:works in:**  
[[*has type*::Page]]  
[[*has default form*::  
**Institute**]]

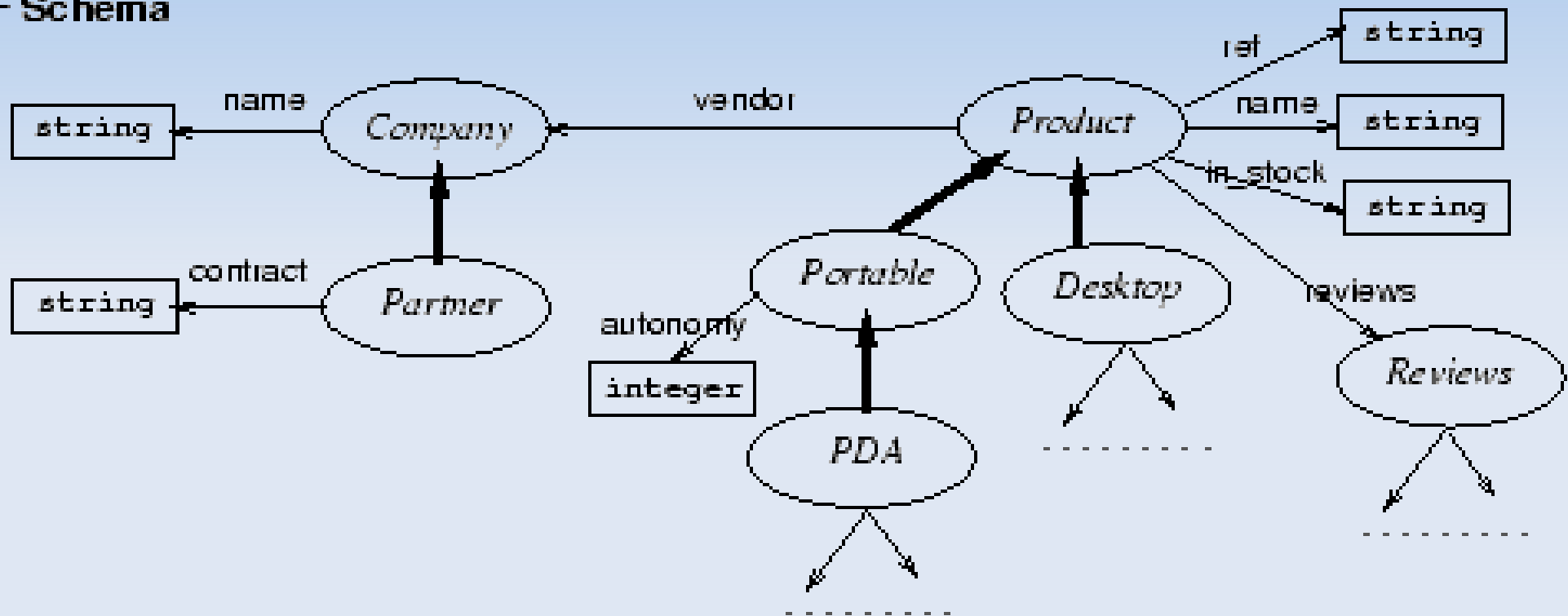
Summary of edit:

☐ This is a minor edit ☐ Watch this page

[Cancel](#)

# RDF

## RDF Schema



# Overview

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- 5) Forms
- 6) Queries

*Zzz!!!*



# Templates

- A **template** is 'called' from any other page
  - Very useful feature
- Used for common things
- Used for data (presentation)

```
{{ car  
  | top speed = 200  
  | doors = 5  
  | price = 120000  
  | ...  
}}
```

# Templates

Ferrari 612 Scaglietti



<b>Manufacturer</b>	Ferrari
<b>Production</b>	2004-present
<b>Predecessor</b>	Ferrari 456 M
<b>Successor</b>	incumbent
<b>Class</b>	Grand tourer
<b>Body style(s)</b>	2-door coupé
<b>Layout</b>	FMR layout
<b>Engine(s)</b>	5.7 L <i>Tipo F133F</i> V12
<b>Transmission(s)</b>	6-speed manual 6-speed 'F1A' semi-auto
<b>Wheelbase</b>	2949 mm (116.1 in)
<b>Length</b>	4902 mm (193.0 in)
<b>Width</b>	1956 mm (77.0 in)
<b>Height</b>	1344 mm (52.9 in)
<b>Curb weight</b>	1725 kg (3803 lb)
<b>Designer</b>	Pininfarina under Frank Stephenson

## Ferrari 612 Scaglietti:

{{ Infobox Automobile

| name = Ferrari 612 Scaglietti

| manufacturer = Ferrari

| body\_style = 2-door coupé

| production = 2004-present

| engine = 5.7 L

| length = 4902

| width=1956

| ...

}}

# Templates

- Used for data (presentation)
- Can be reused for data definition...
  - Semantic Templates
  - The place where facts are defined

# Templates

- Used for data (presentation)
- Can be reused for data definition...
  - Semantic Templates
  - The place where facts are defined

**Template:Car:**

**[[Has top speed::  
{{{top speed}}} ]]**

**[[Has doors::  
{{{doors}}} ]]**

**[[Has price::  
{{{price}}} ]]**

...

**[[ Category:Car ]]**

Category: Car

**Facts about Some Car** ⓘ

RDF feed 

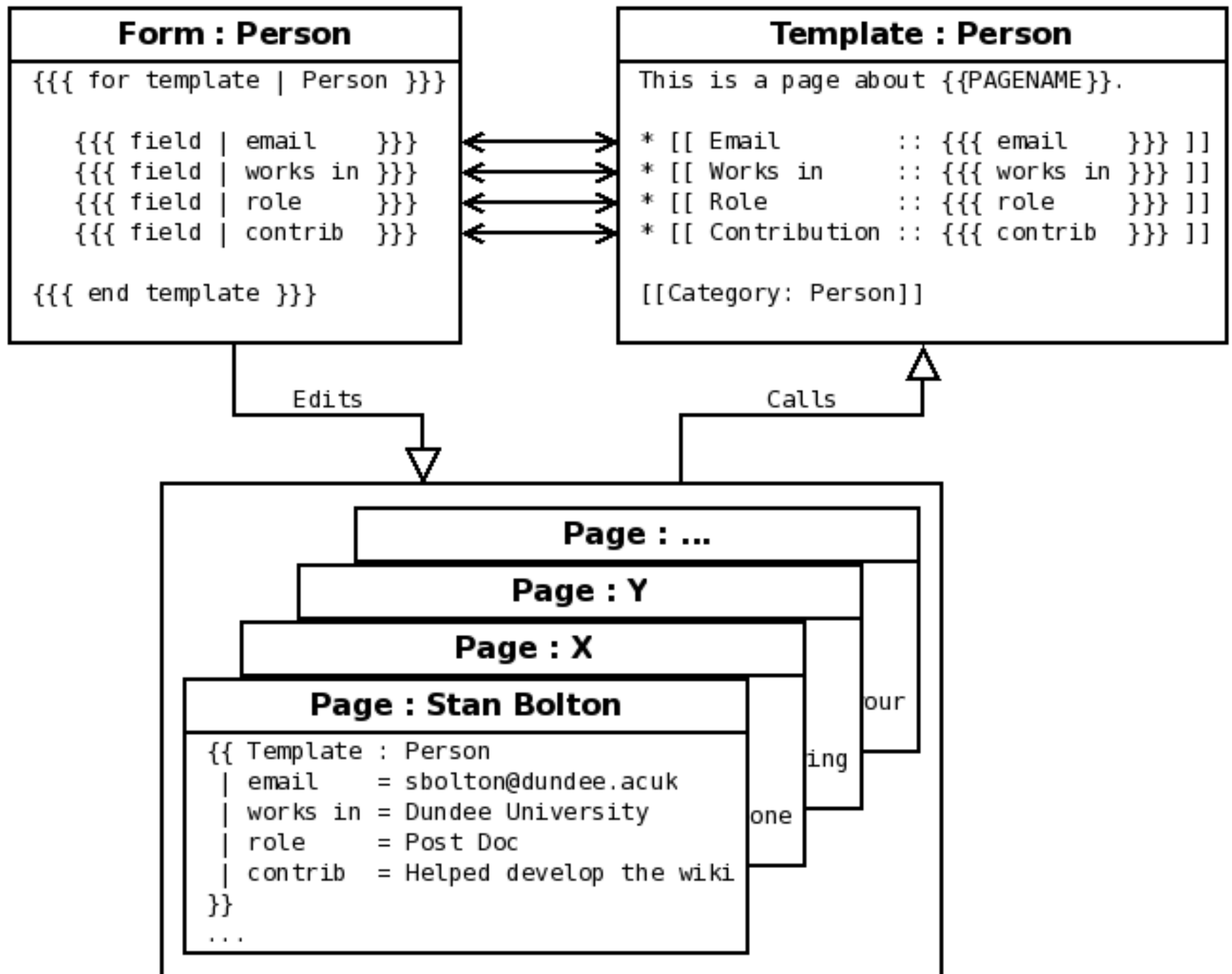
Has doors 5 + 

Has price 120,000 usd (89,773.322 eur, 76,122.811 gbp) + 

Has top speed 161 km/h (100.041 mph) + 

# Forms

- Forms are used to edit templates
  - Very useful feature in their own right
- Typically, each class has one form
  - Form fields edit template parameters
    - Template parameters set properties
  - Each field is automatically 'typed' according to it's property!
  - Fields auto complete based on existing property values!



# Ask queries

- Ask for all pages in a Class:  

```
{{#ask: [[ Category: <my class> ]] }}
```
- The same, but return some specific properties:  

```
{{#ask: [[ Category: <my class> ]]  
  |? <my prop1> |? <my prop2> |? ]}}
```
- Ask for some cheap goods:  

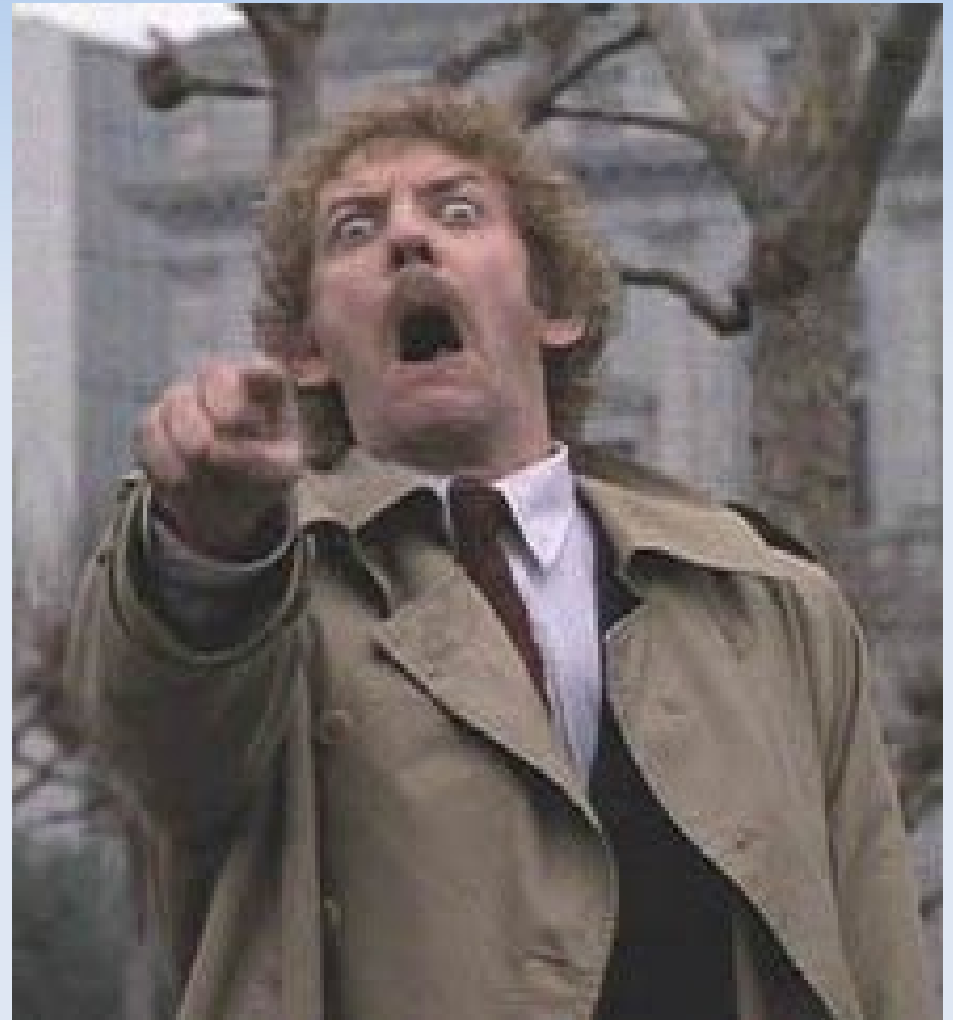
```
{{#ask: [[ Price ::< 5 usd ]] }}
```





# SMW provides new functionality

- Structure
- Forms for editing
- Dynamic queries
  - Visualization
- Linked data
- Navigation



# Acknowledgements

- Markus Krötzsch
- Denny Vrandečić
  - All SMW developers
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- Yaron Koren
  - All SMW extension devs.
- People who do what they love



# Appendices

# 'Getting started'

- 1) Figure out your data structure
  - Classes and properties
- 2) Create templates and properties
- 3) Create forms
  - To add and edit the different page 'types'
- 4) Enable links to forms
  - **[[*Has default form*:: ... ]]**
- 5) Add data!

# BioWikis using SMW

- SNPEdia
  - <http://snpedia.org>
- SEQwiki
  - <http://seqwiki.org>
- NeuroLex
  - <http://neurolex.org>
- GeneWiki (?)
  - <http://genewiki.org>
- Many more...
  - <http://nettab.referata.com/wiki/BioWiki>

# Systems similar to SMW

- Dynamic page lists
  - <http://www.mediawiki.org/wiki/DynamicPageList>
- Table edit
  - <http://www.mediawiki.org/wiki/Extension:TableEdit>
- OmegaWiki
  - <http://www.omegawiki.org>
- Others...
  - [http://en.wikipedia.org/wiki/Semantic\\_wiki](http://en.wikipedia.org/wiki/Semantic_wiki)

# References

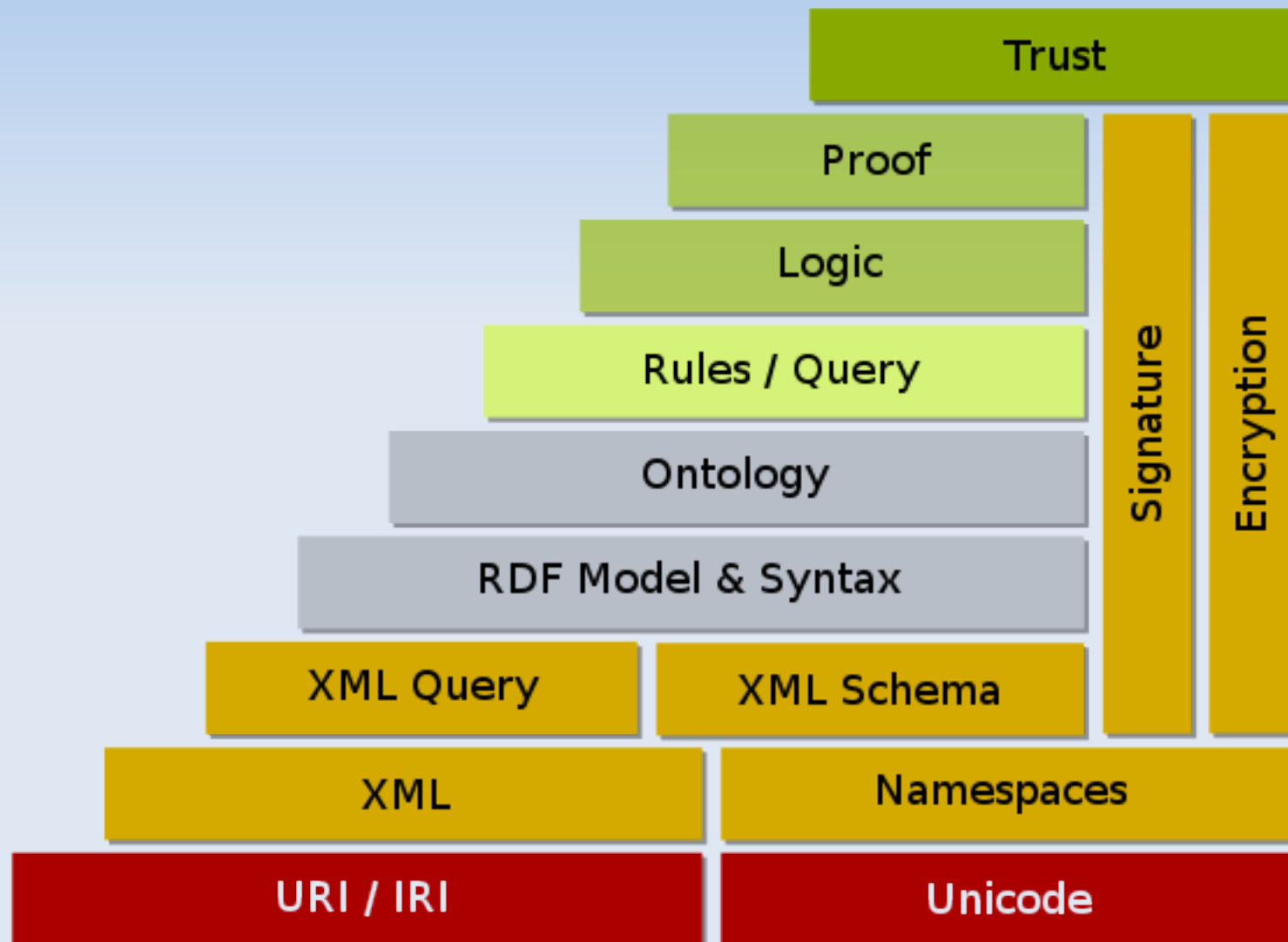
- SMW
  - <http://semantic-mediawiki.org>
- Properties with units:
  - [http://semantic-mediawiki.org/wiki/Custom\\_units](http://semantic-mediawiki.org/wiki/Custom_units)
- Classes
  -
- Templates
  - <http://www.mediawiki.org/wiki/Help:Templates>



# References

- Forms
  - [http://www.mediawiki.org/wiki/Extension:Semantic\\_Forms](http://www.mediawiki.org/wiki/Extension:Semantic_Forms)
- Ask queries
  - [http://semantic-mediawiki.org/wiki/Help:Inline\\_queries](http://semantic-mediawiki.org/wiki/Help:Inline_queries)
-

# *Your* semantic web!



# He said what?

