

CC6202-1

LA WEB DE DATOS

PRIMAVERA 2015

Lecture 1: Introduction

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THE WEB

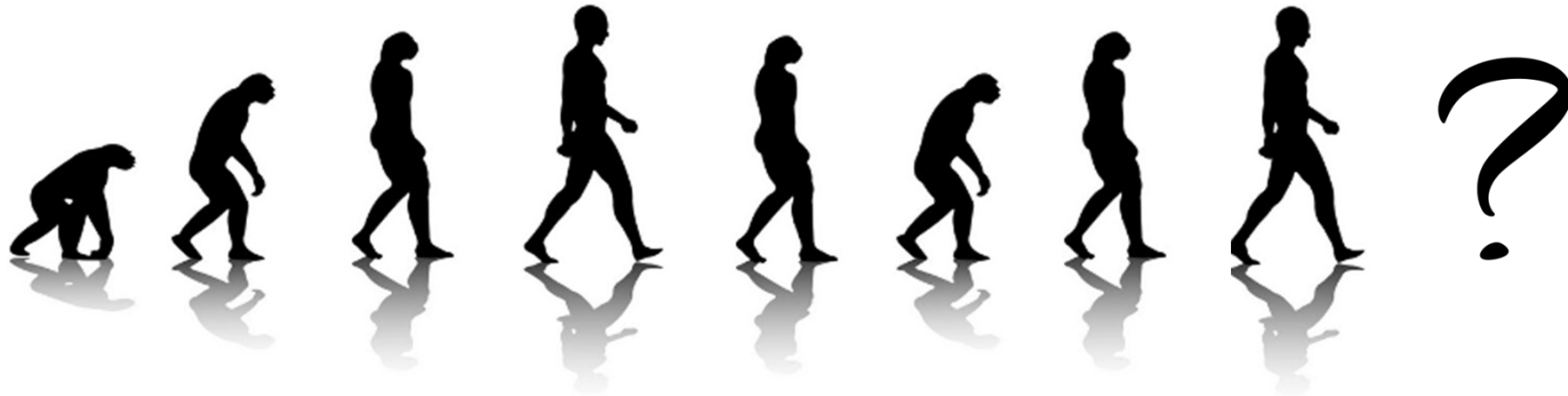
The Web is now 26 years old



Evolution of the Web



Evolution of the Web



What will the Web be like in 25 more years?

CC6202-1
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PRIMAVERA 2015

Lecture 1: Introduction

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Hint:

THE “SEMANTIC WEB”

The “Semantic Web”



... what is the “Semantic Web”?

Semantic Web?



semantic web



Google Search

I'm Feeling Lucky

Semantic Web?



“The Semantic Web will bring structure to the meaningful content of Web pages, creating an environment where software agents roaming from page to page can readily carry out sophisticated tasks for users.”

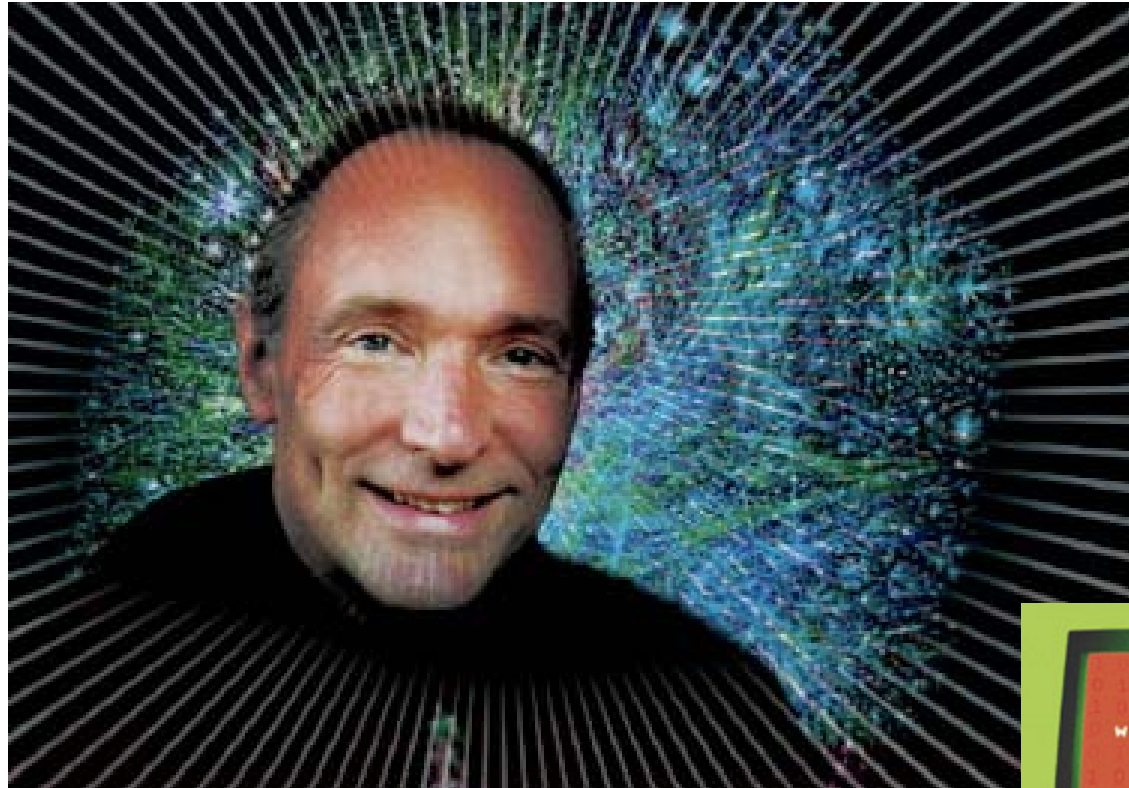
– Berners-Lee

“The Semantic Web”
American. 284(5):34–43.

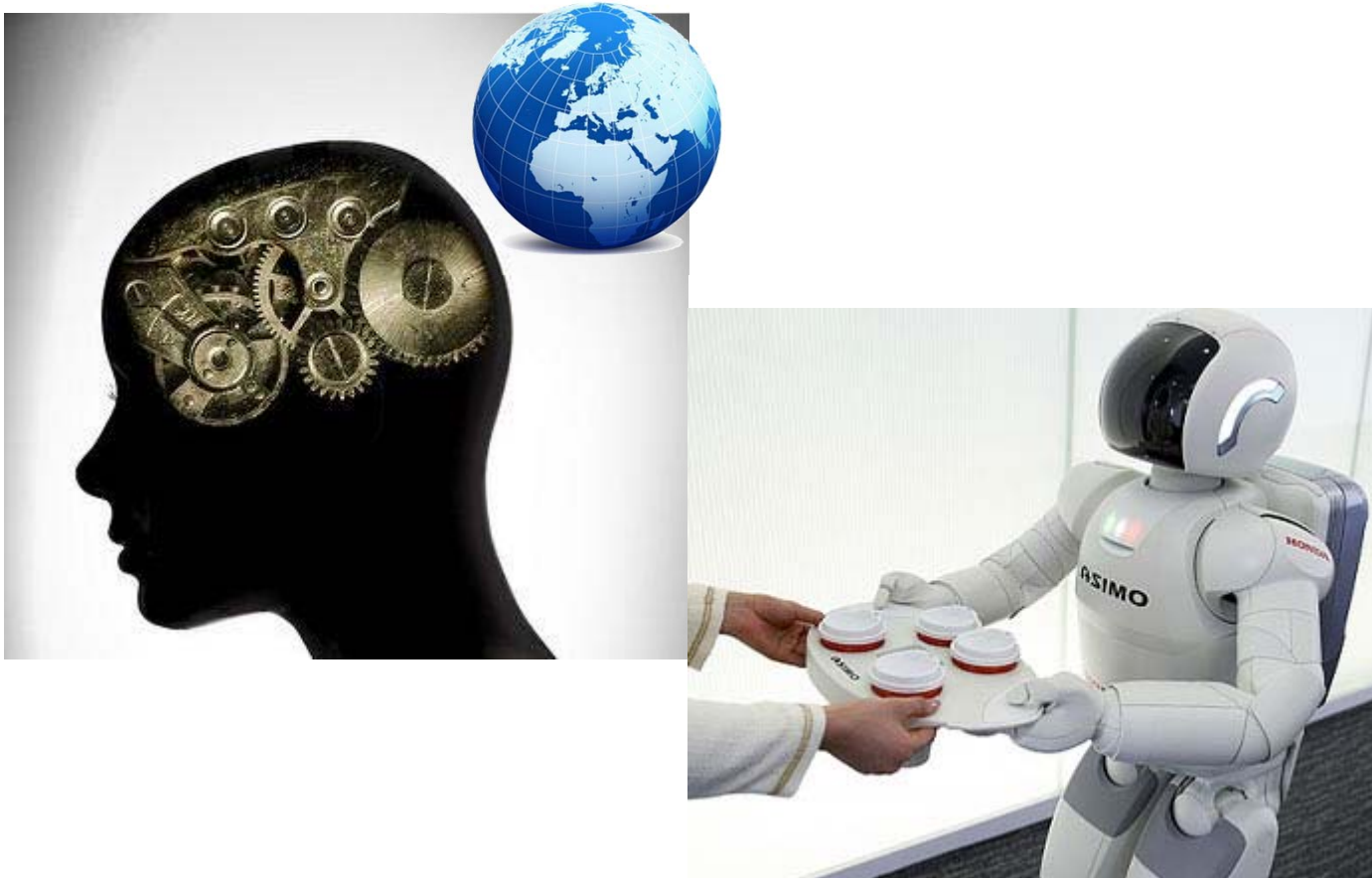


Huh?

The Semantic Web is ...
... Tim Berners-Lee's vision of the future Web?



The Semantic Web is ...
... intelligent machines making sense of the Web?



The Semantic Web is Linking together Open Data?

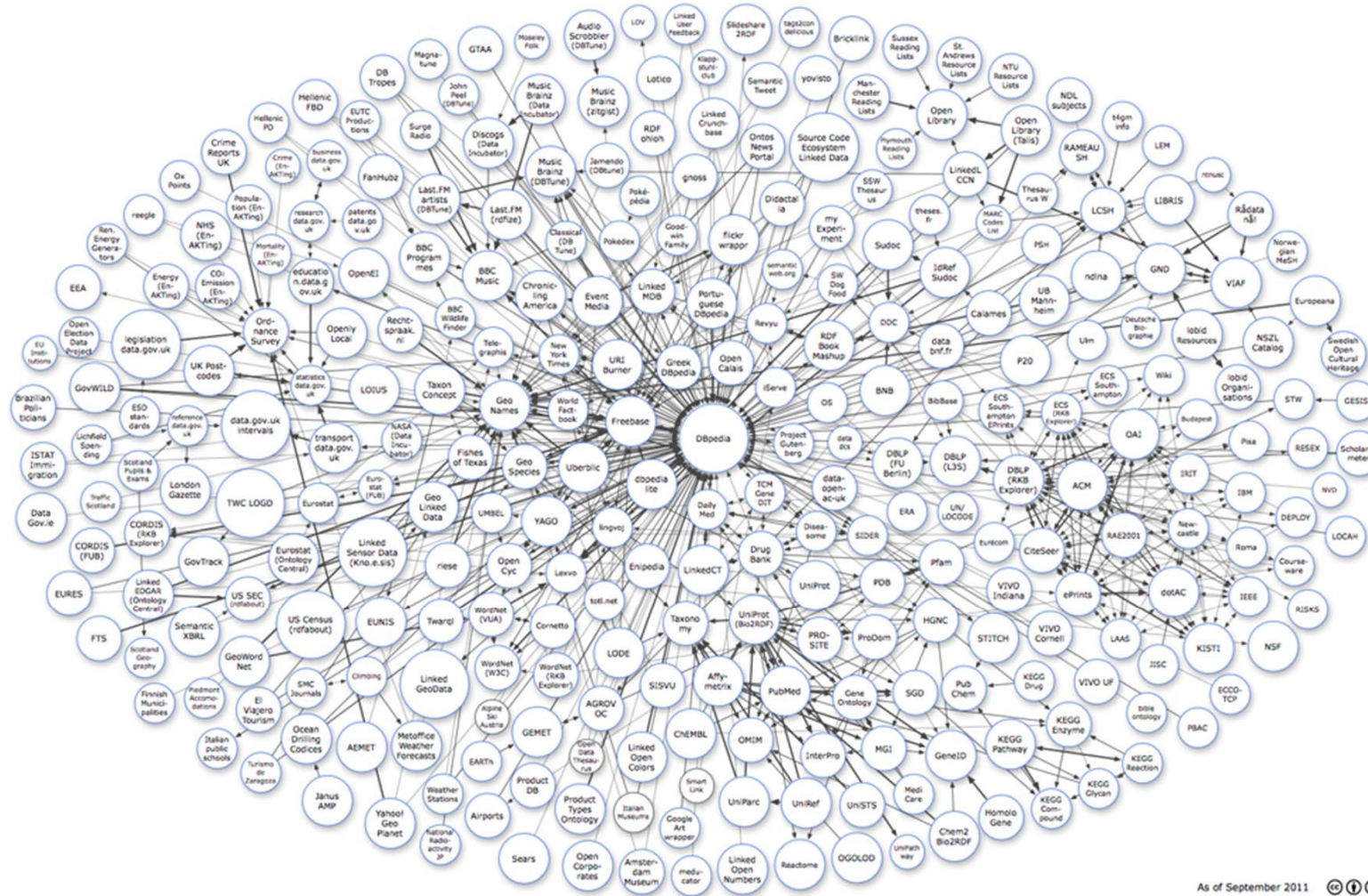
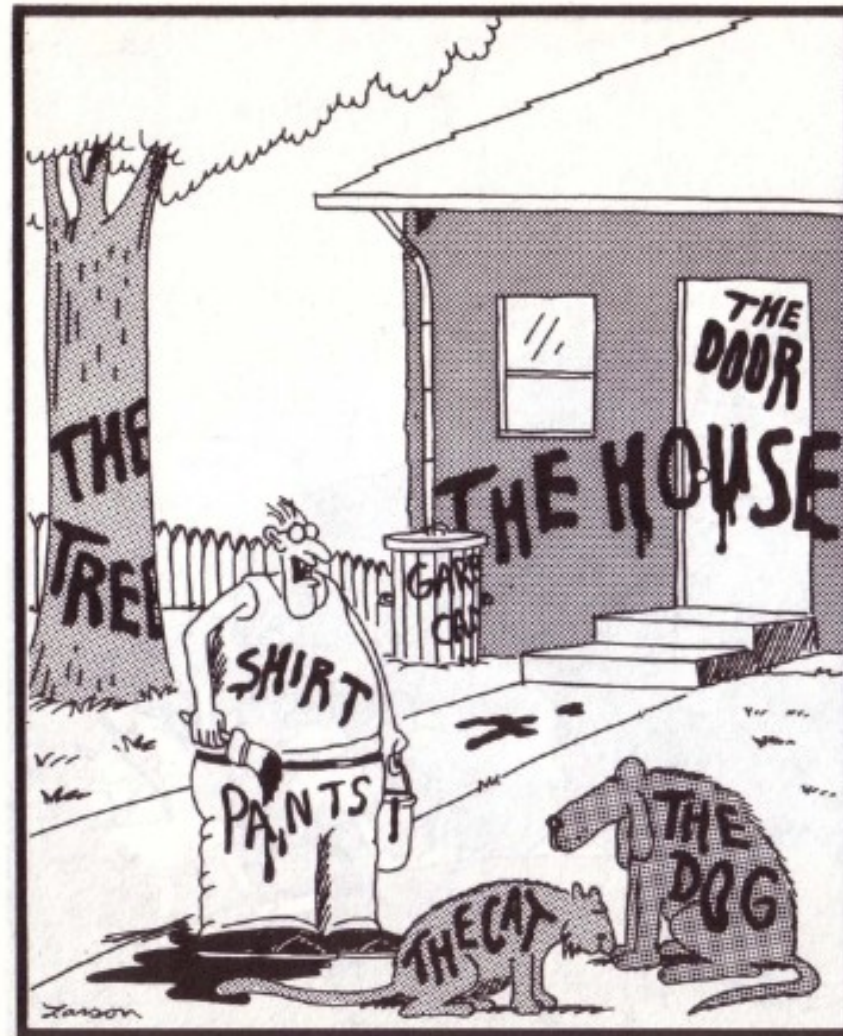


Image by Cyganiak & Jentzsch ; <http://lod-cloud.net>

The Semantic Web is ...
... naming everything?



"Now! ... *That* should clear up
a few things around here!"

The Semantic Web is ...
... breaking down the walls between sites?

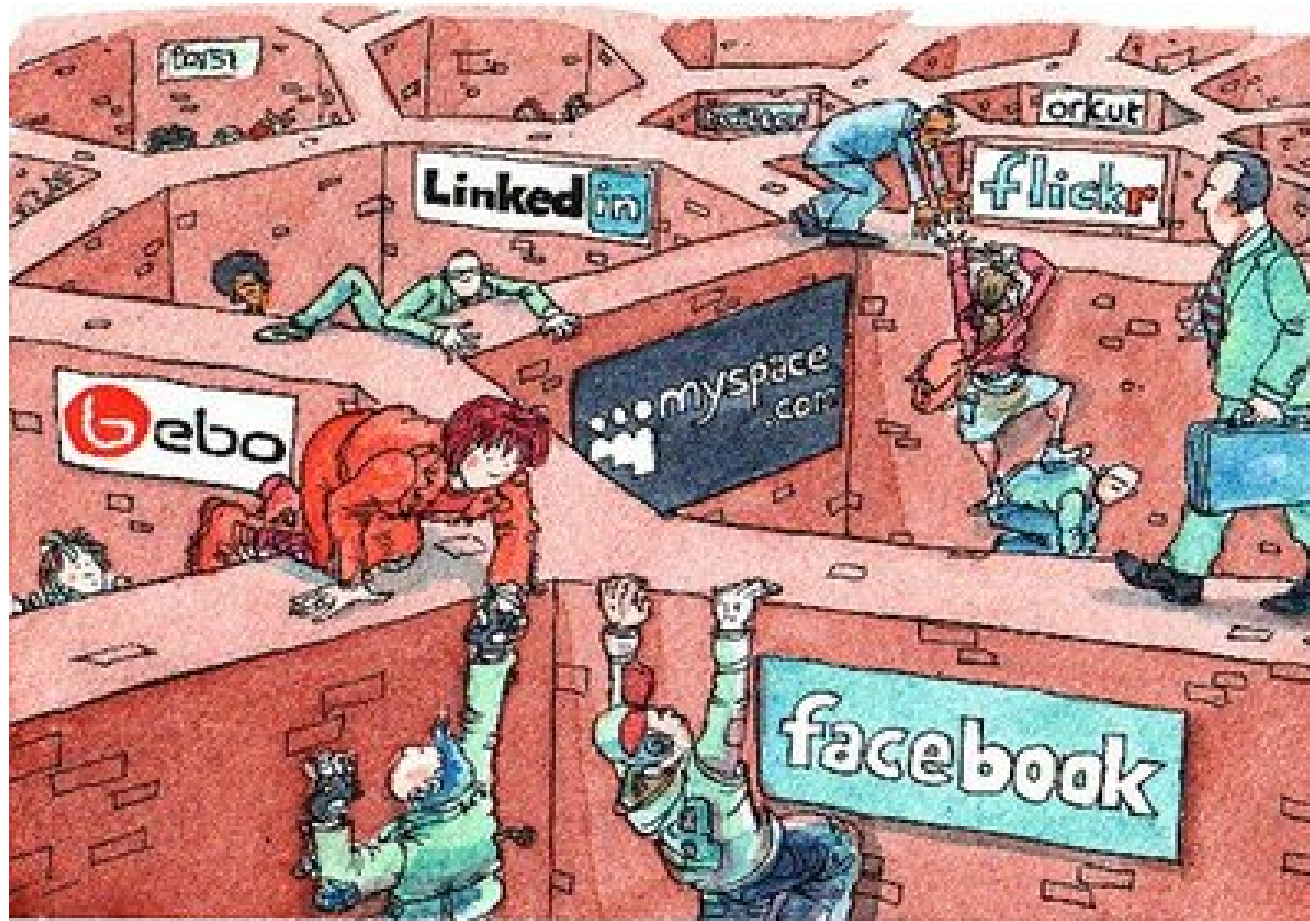


Image from <http://www.digitaltimes.ie>

The Semantic Web is ...

... Web 3.0?

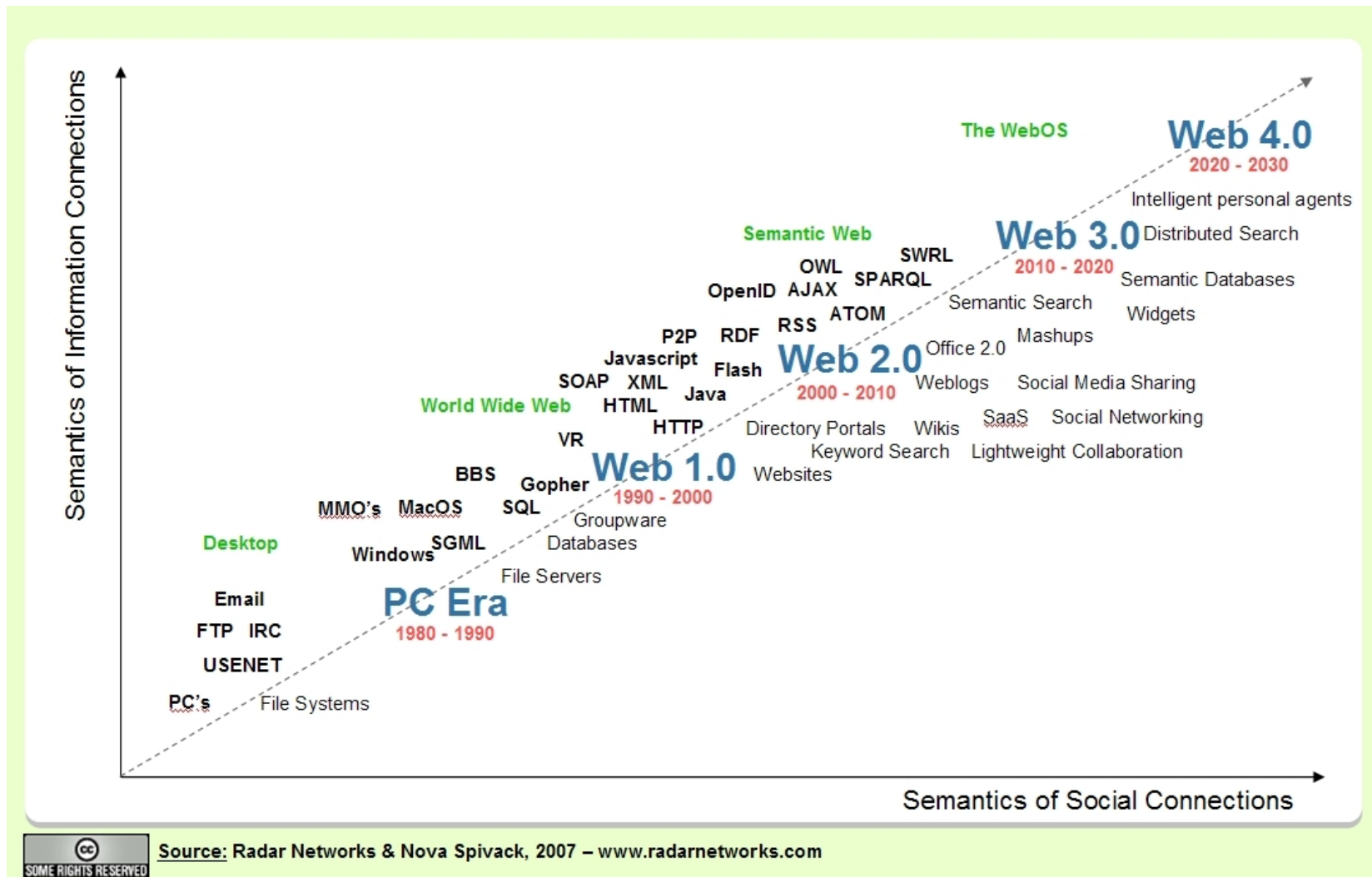


Image by Radar Networks; Nova Spivak; <http://memebox.com/futureblogger/show/824>

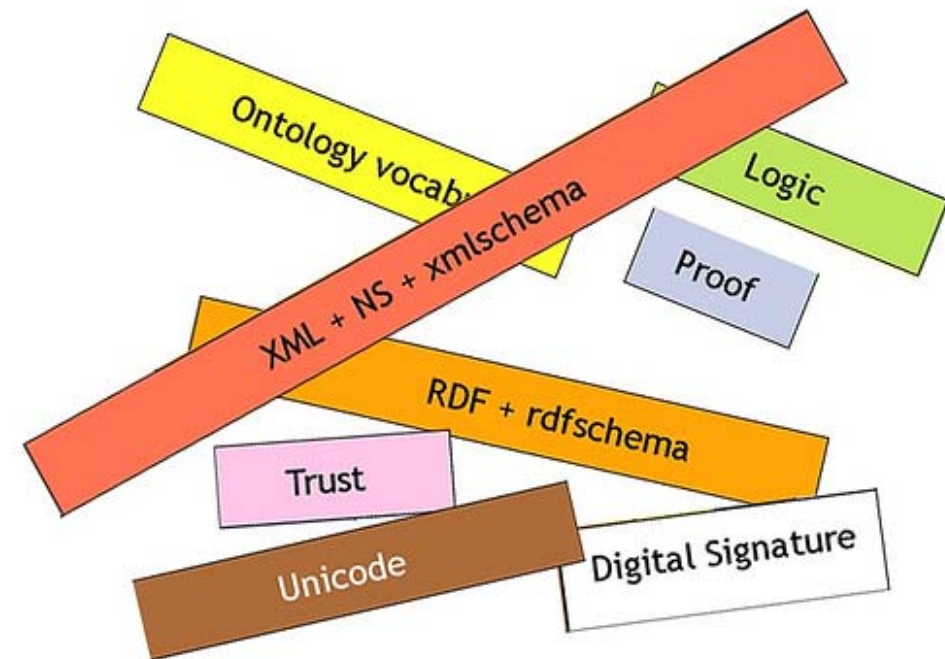
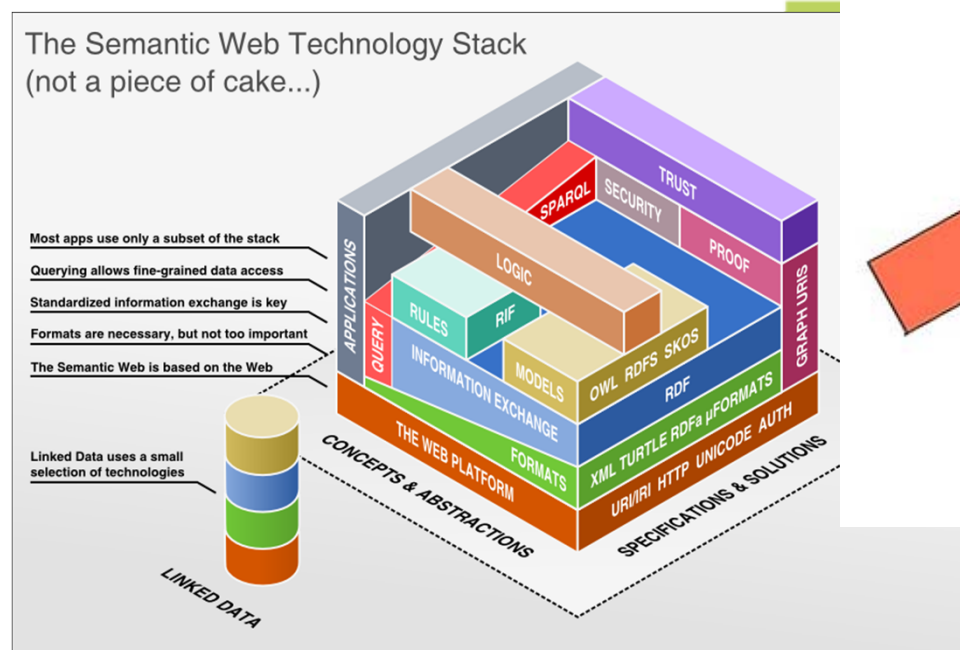
The Semantic Web ...

... is an active area of research in Comp. Sci.?

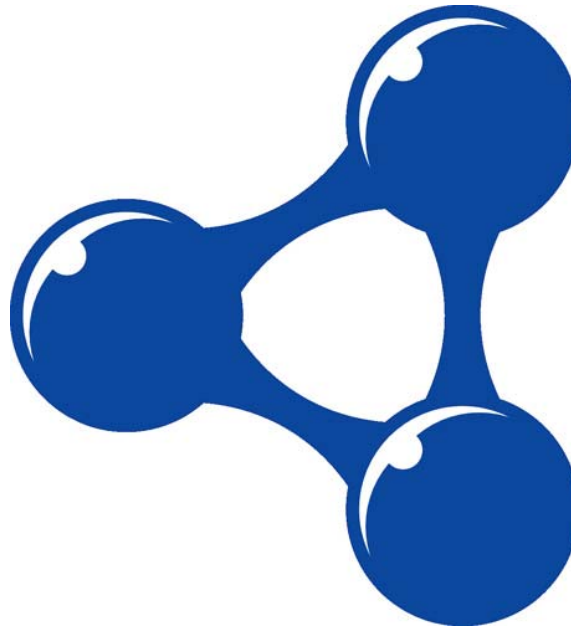


Not pictured:

The Semantic Web is a stack of technologies?



The Semantic Web is ...
... a stack of Web standards for interoperability?

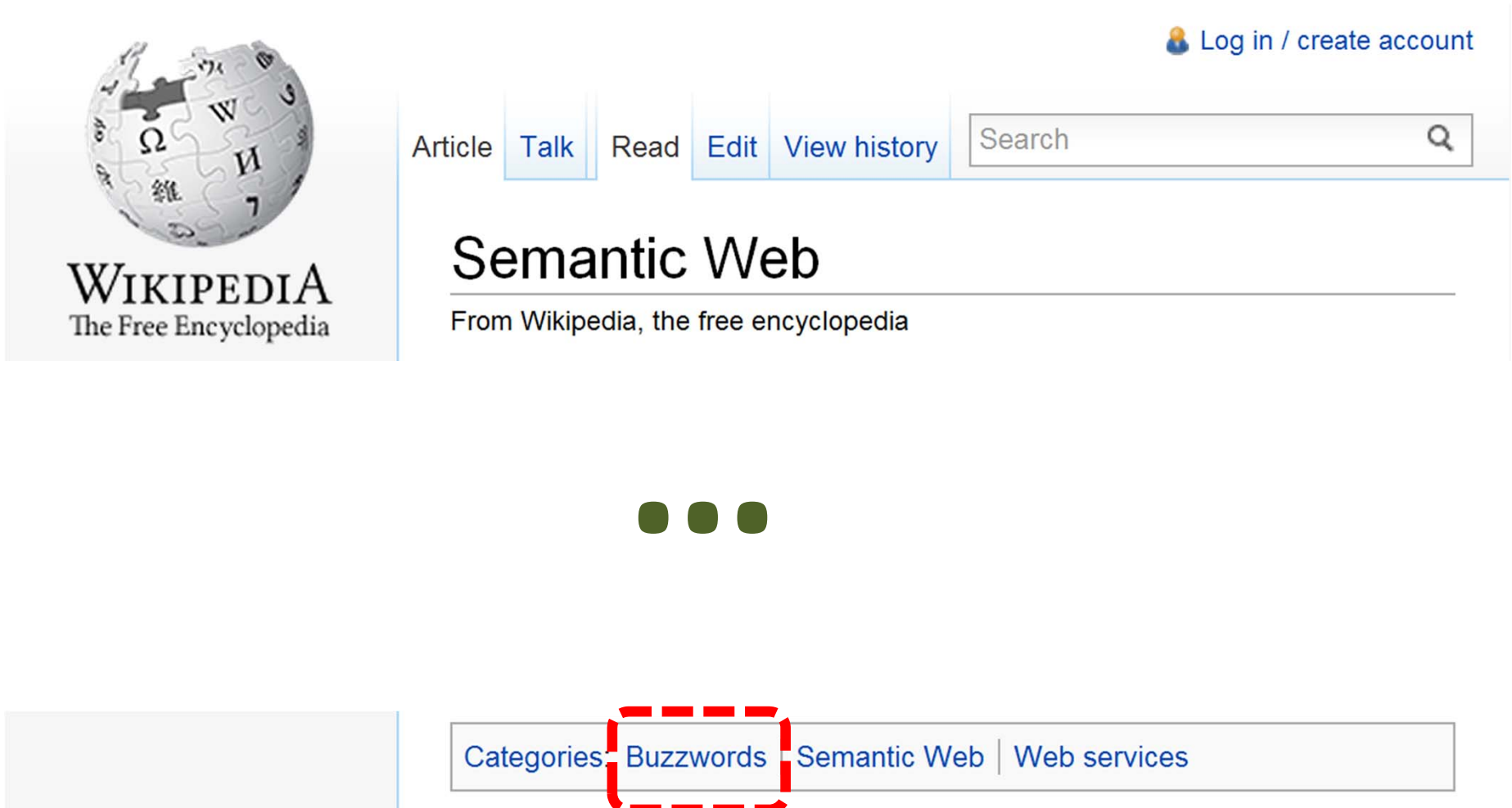


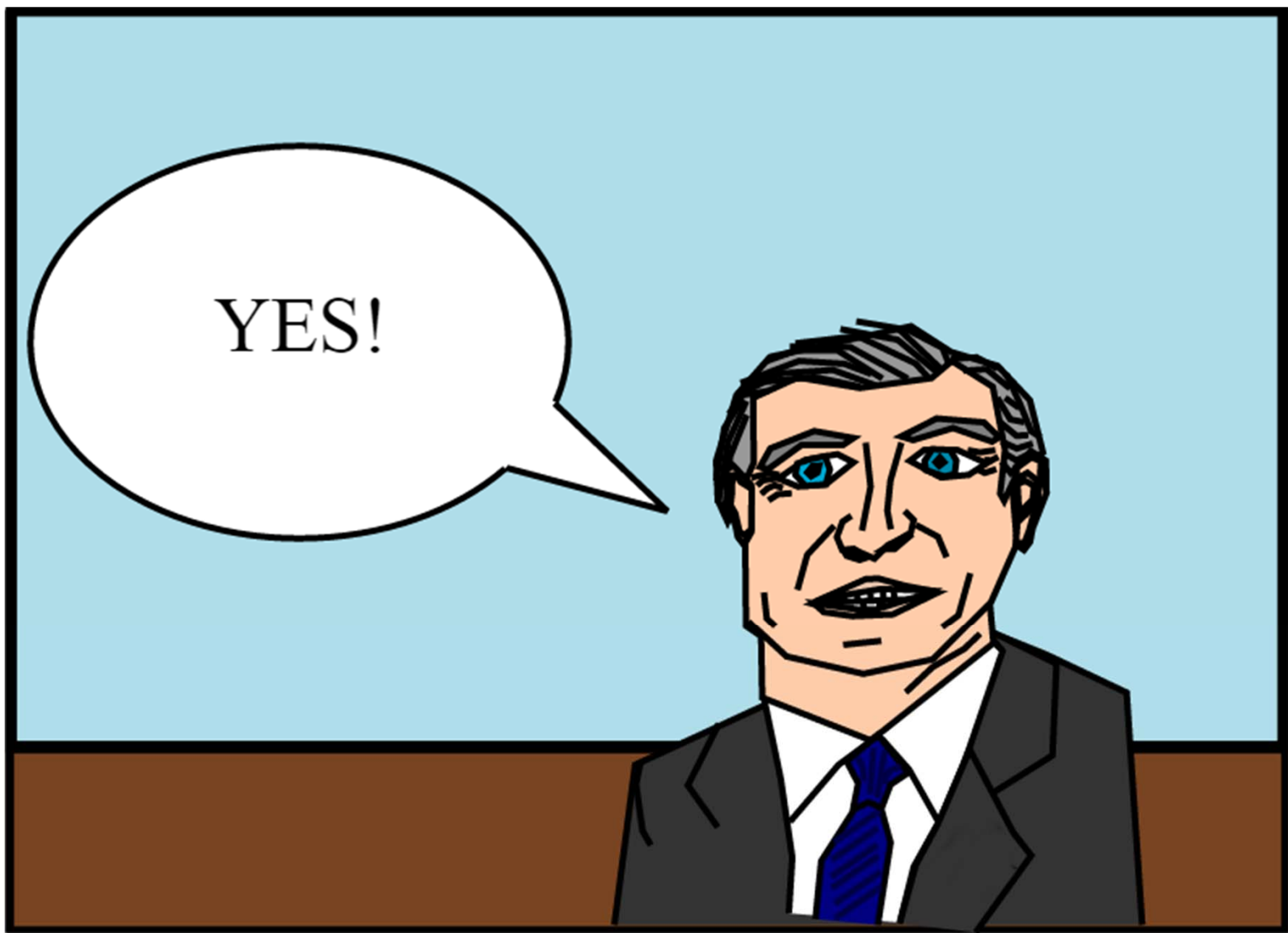
The Semantic Web is ...
... something we should kill with fire?



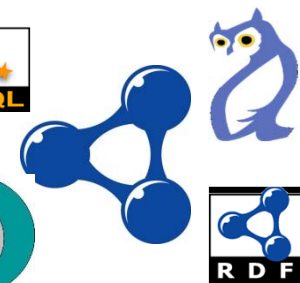
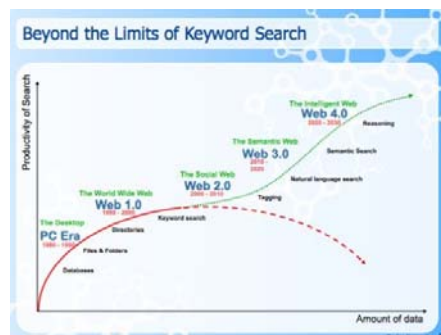
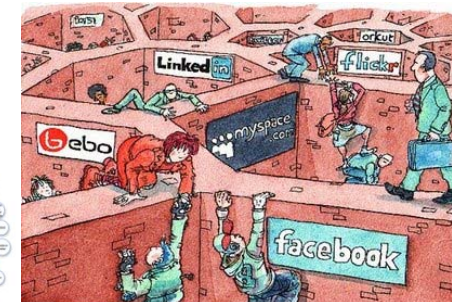
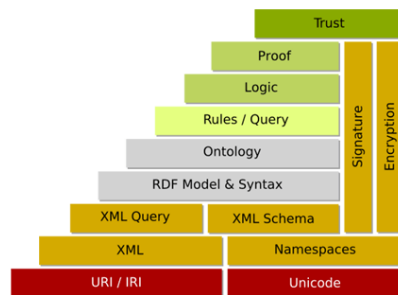
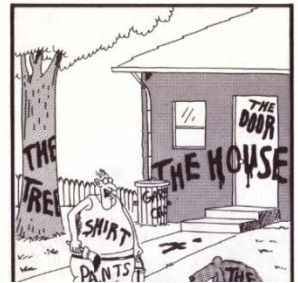
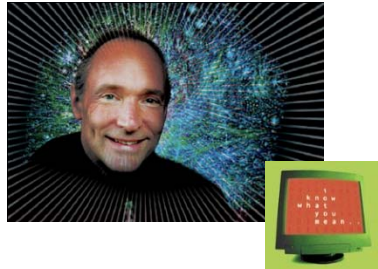
Tom Coates; See talk: <https://vimeo.com/21829271>

The Semantic Web is a Buzzword?





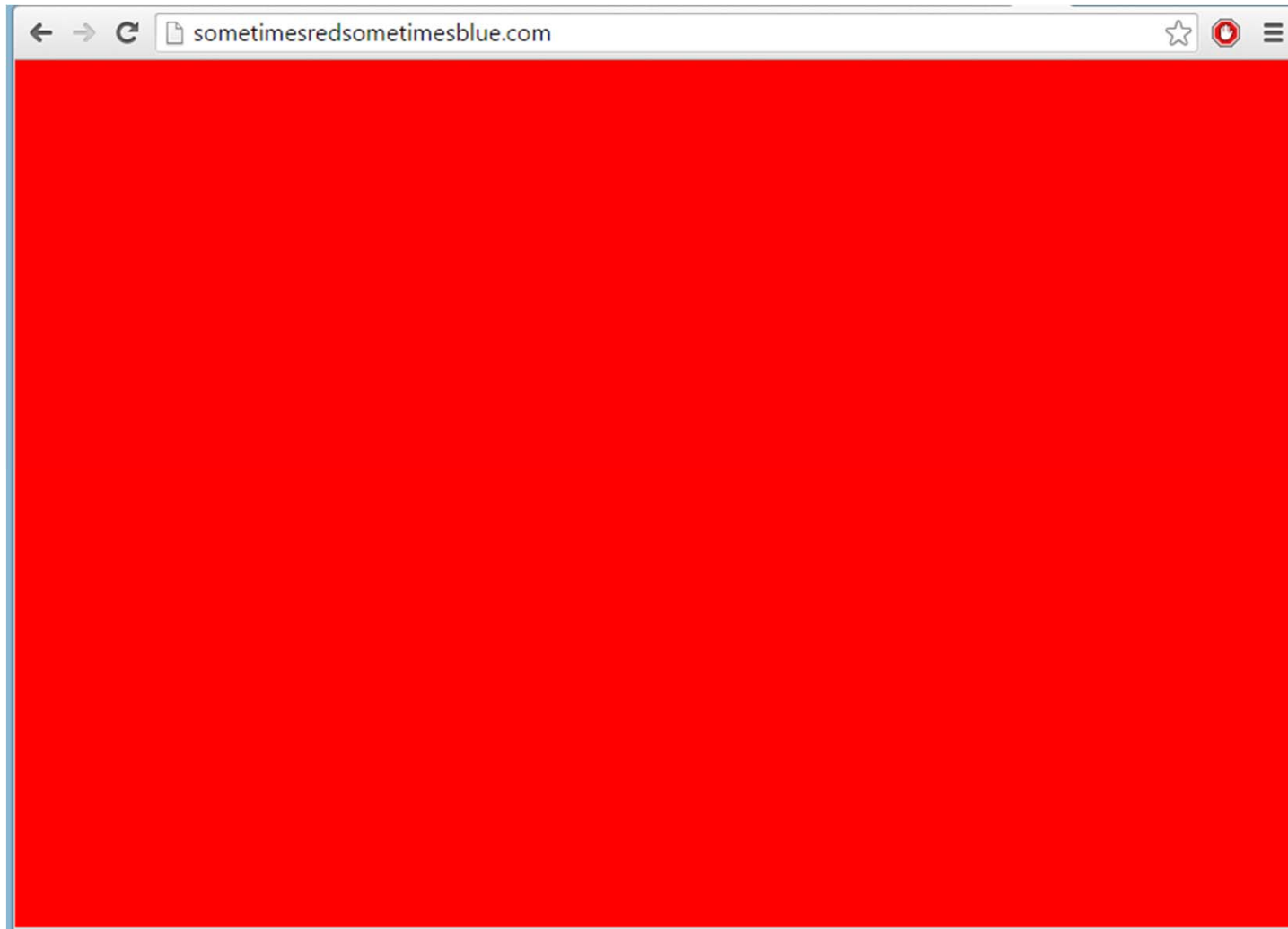
The Semantic Web is...



...cf. *“What is the Web?”*

**WHAT'S WRONG WITH THE
CURRENT WEB?**

The current Web is fantastic!



... but can the Web be better?

The current Web is document-centric

`http://ex.org/Ireland`



`http://ex.org/Dublin`



`<html>`

`</html>`

The current Web is document-centric

http://ex.org/Ireland



http://ex.org/Dublin



```
<html>
  <body>
    <h1>Ireland</h1>
    <div class="flag"></div>
    <p>Ireland is a European country.</p>
    <p>Its capital is <a href="http://ex.org/Dublin">Dublin</a>.</p>
    ...
  </body>
</html>
```

(Most of it) Makes sense to humans

<http://ex.org/Ireland>

Ireland



Ireland is a European country.

Its capital is [Dublin](#).

<http://ex.org/Dublin>

Dublin



Dublin is [Ireland](#)'s capital.

Its population is one million.



... assuming they speak the language

<http://ex.org/Ireland>

Ireland



Ireland is a European country.

Its capital is [Dublin](#).

<http://ex.cl/Dublín>

Dublín



Dublín es la capital de [Irlanda](#).

Su población es un millón.



Even worse for machines

`http://ex.org/Ireland`

Ireland



Ireland is a European country.

Its capital is [Dublin](#).

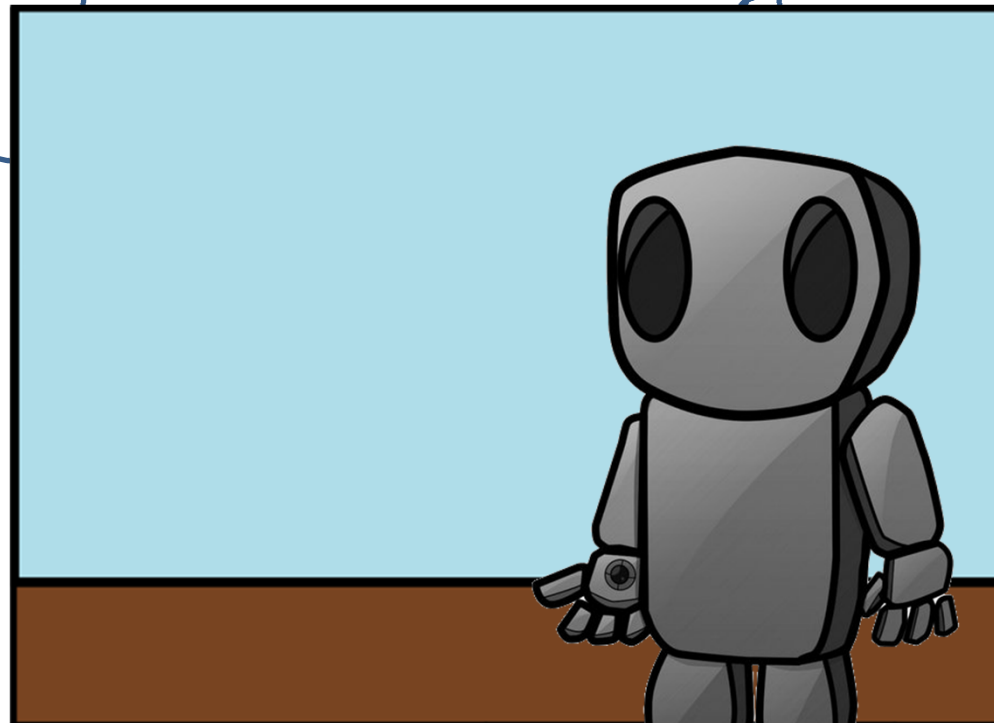
`http://ex.cl/Dublín`

Dublín



Dublín es la capital de [Irlanda](#).

Su población es un millón.



Even worse for machines

<http://ex.org/ħ>

ħ



ħ ℳ ≈ √ ∇.

⊗ ♂ ℳ ⚡.

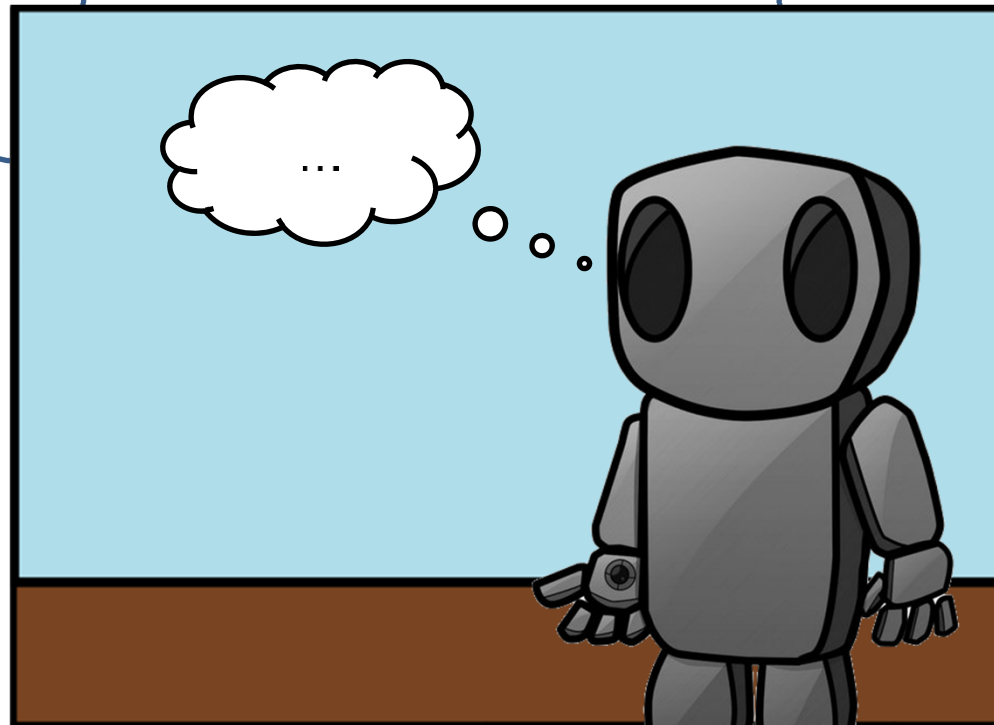
<http://ex.cl/⌞>

⌞



⌞ 4 ∏ ♂ ∞ ⚡.

⊙ ∅ 4 ♂ ∇.



What machines on the Web can do



`http://ex.org/`



Ireland



Ireland is a European country.

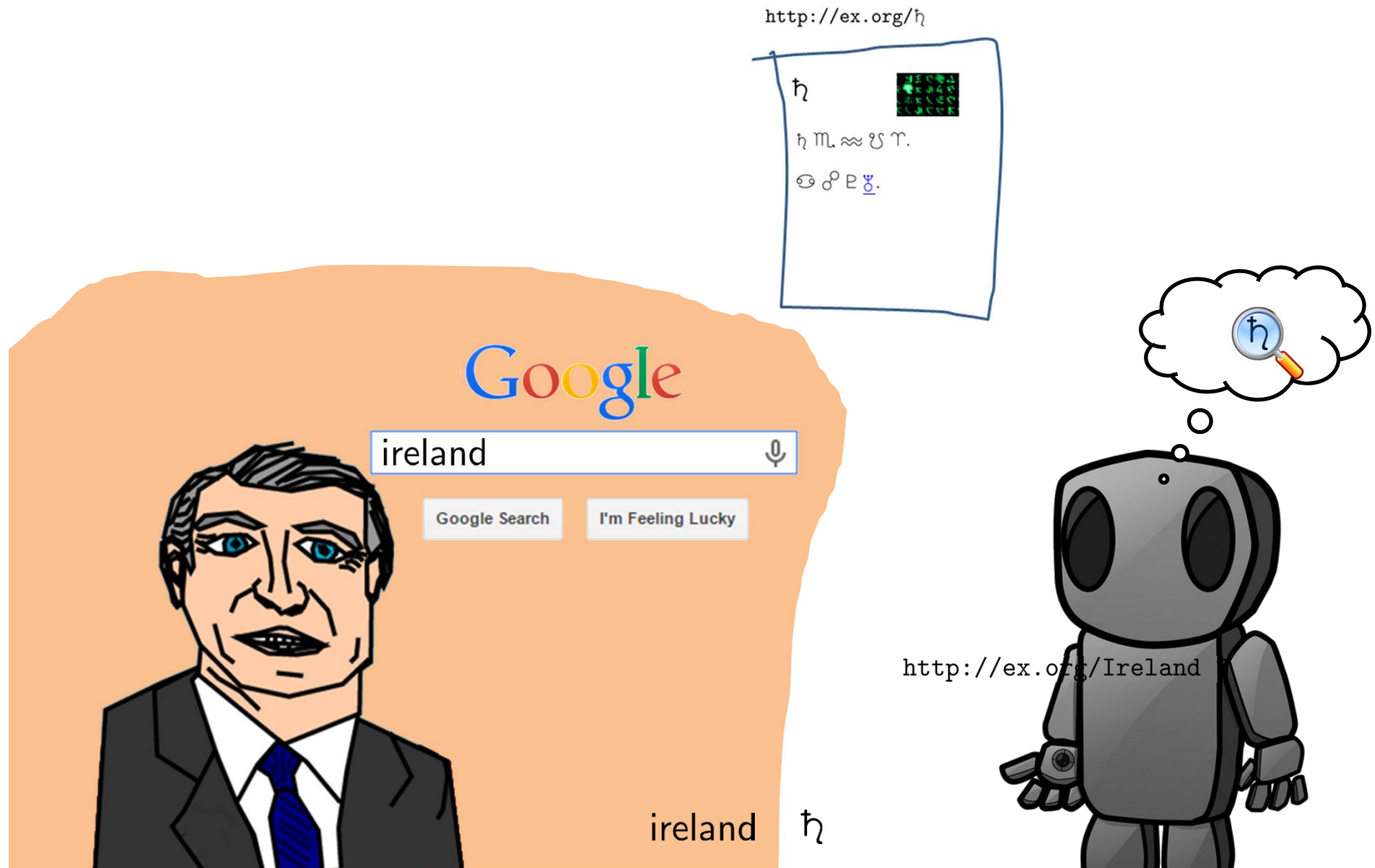
Its capital is [Dublin](#).

`http://`

HTML



What machines on the Web can do



This (with some "tricks") works really well

Google

that one movie where the guy breaks his leg and spies on his neighbor

Web Videos News Images Shopping More Search tools

About 64,700,000 results (0.91 seconds)

Rear Window (1954) - IMDb
www.imdb.com/title/tt0047396/ - Internet Movie Database
★★★★★ Rating: 8.6/10 - 274,497 votes

Google

da da da dum symphony

Web Videos News Shopping Images More Search tools

About 107,000 results (0.36 seconds)



Beethoven - Symphony No. 5 in C Minor (1) - YouTube
www.youtube.com/watch?v=W2qW6fOtAMY






sometimes when i'm

- sometimes when i'm **alone i use comic sans**
- sometimes when i'm **alone i google myself**
- sometimes when i'm **alone i cry**
- sometimes when i'm **all alone**
- sometimes when i'm **dreaming**
- sometimes when i'm **sad i like to cut myself**
- sometimes when i'm **dreaming lyrics**
- sometimes when i'm **alone**
- sometimes when i'm **driving on the road at night**
- sometimes when i'm **alone i wonder**

Google Search I'm Feeling Lucky

Can even get “direct answers” now

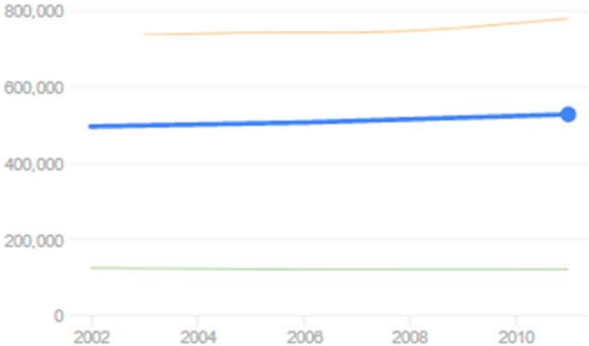


[Web](#) [Images](#) [News](#) [Maps](#) [Shopping](#) [More ▾](#) [Search tools](#)



About 66,700,000 results (0.48 seconds)

Dublin / Population

527,612 (2011)



City	Population (2011)
Amsterdam	779,808
Dublin	527,612
Cork	119,230



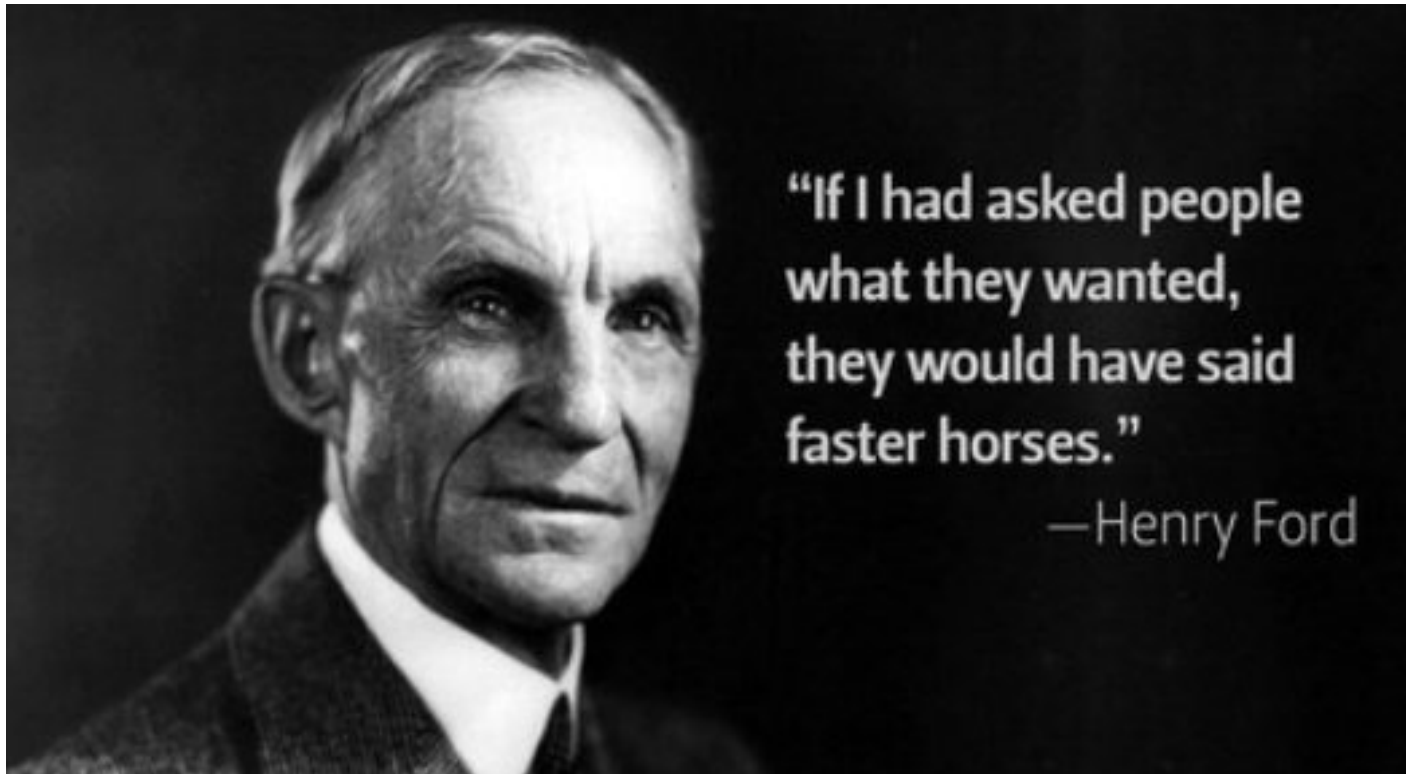
Dublin

Capital of Republic of Ireland

Dublin, capital of the Republic of Ireland, is on Ireland's east coast at the mouth of the River Liffey. Its medieval buildings include 13th-century Dublin Castle and imposing St. Patrick's Cathedral, founded in 1191. Temple Bar is a riverside nightlife and cultural quarter, home to the Irish Film Institute. Bustling, largely pedestrianised Grafton Street is the city's principal shopping area, also famed for its buskers.

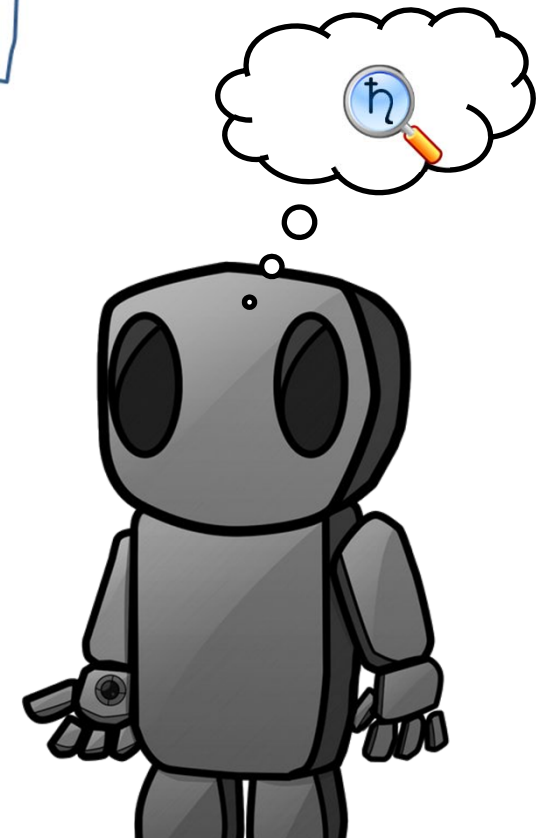
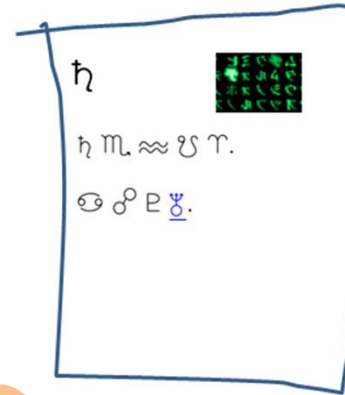
**THE WEB IS GREAT ...
... WHAT'S THE PROBLEM ...**

Horses were great too ...



At its core, Google is still just doing ...
(... but really *really* well)

<http://ex.org/h>



Google does not change the fact that ...

<http://ex.org/ħ>

ħ



ħ m ≈ υ r.

⊙ ♂ m ⊕.

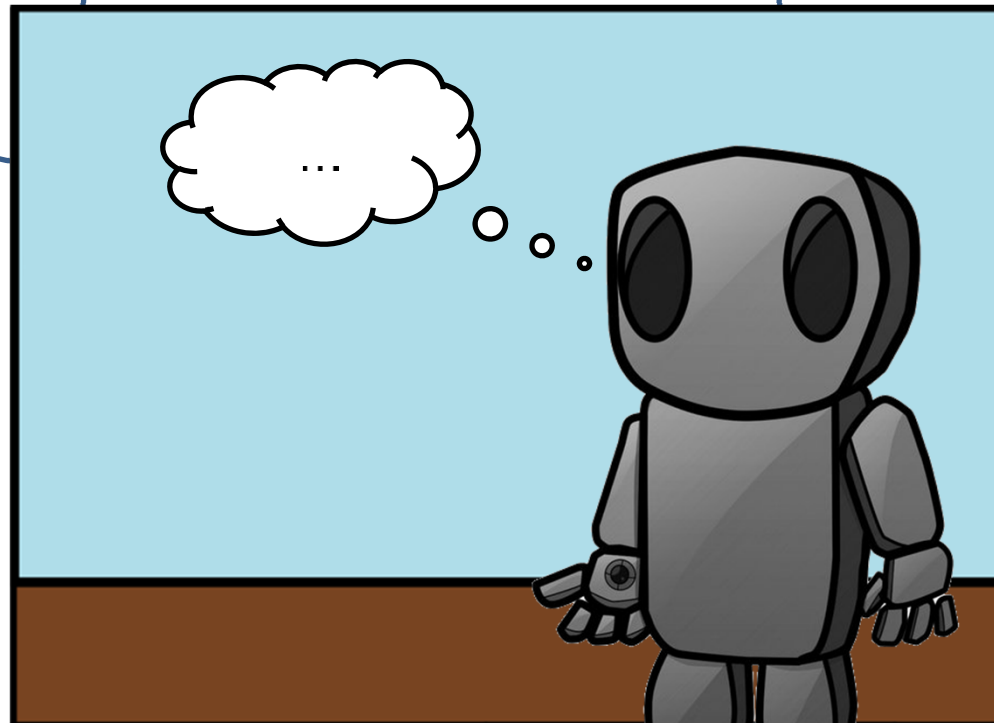
<http://ex.cl/⌞>

⌞

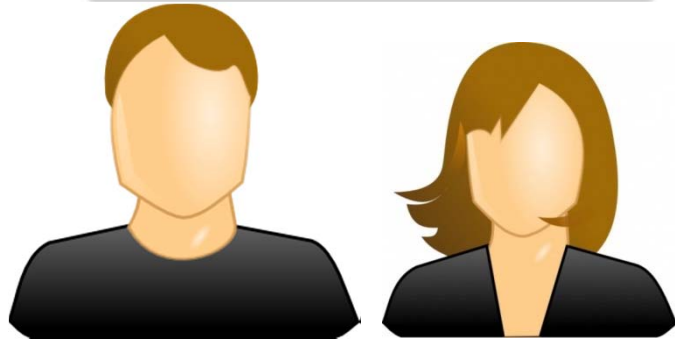


⌞ 4 ∏ ♂ ρ ⊕.

⊙ ♂ 4 ♂ ∂.



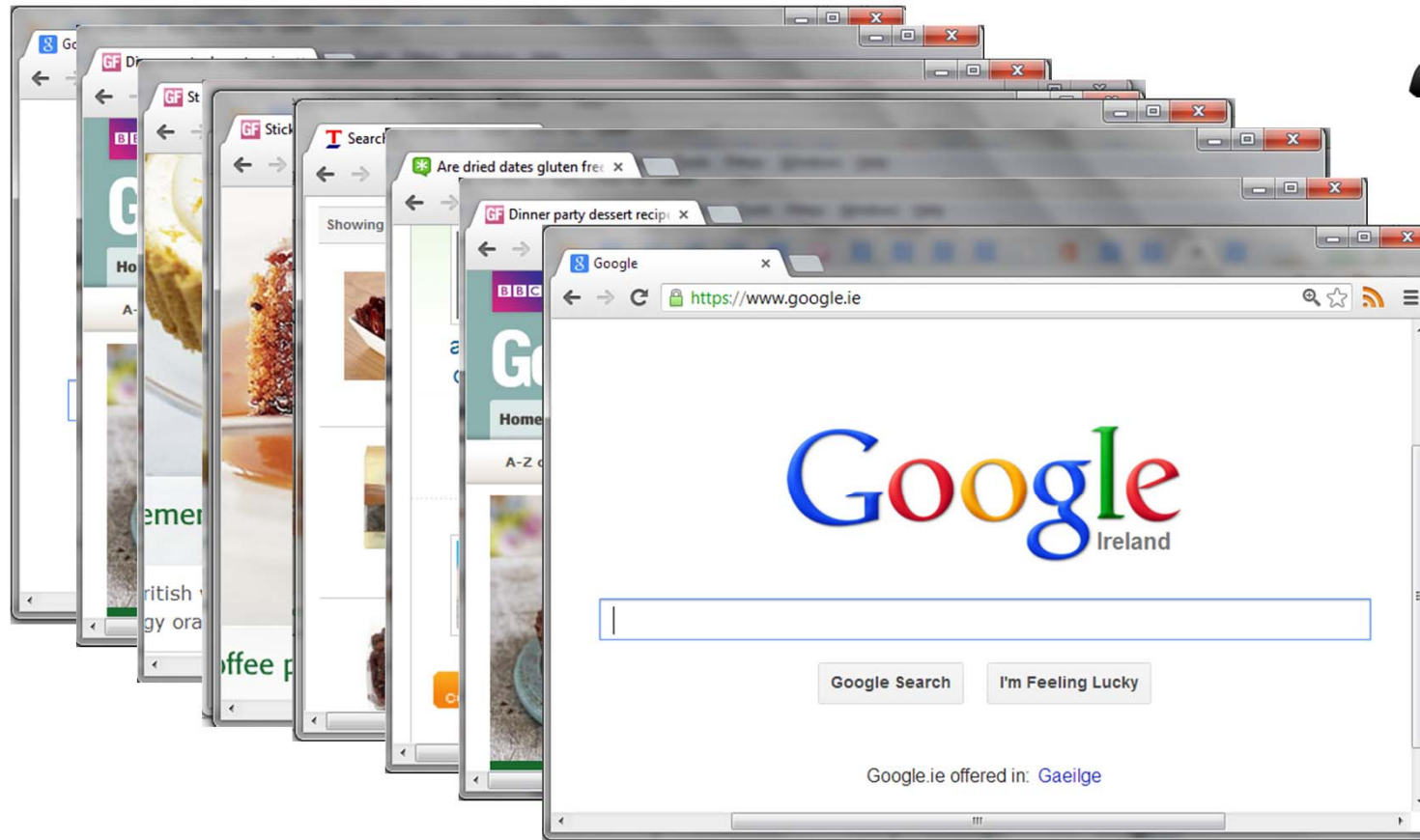
Using Google to find the right dessert ...



Requirements:

- Must be a dessert
- Must be citrus-free
- Must be gluten-free
- Ingredients available in local supermarket(s)
- Cheap (students)
- **Must be delicious**

Using the Current Web ...



The Dessert Algorithm (25 years on)



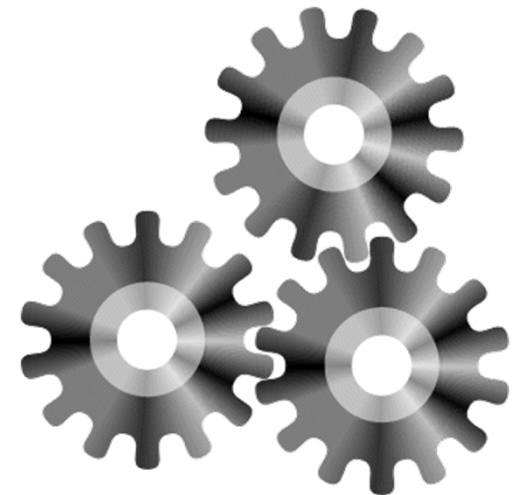
```
candidates := ∅
for all recipe-site in google-results
  for all dessert-recipe in recipe-site
    if dessert-recipe type looks-delicious
      suitable := true
      for all ingredient in dessert-recipe
        if searchNutrition(ingredient) type wheat or lemon or lime ...
          suitable := false
        else if searchShops(ingredient) type null or expensive
          suitable := false
        end
      end
      if suitable add dessert-recipe to candidates end
    end
  end
end
return candidates
```



The Dessert Algorithm (50 years on?)



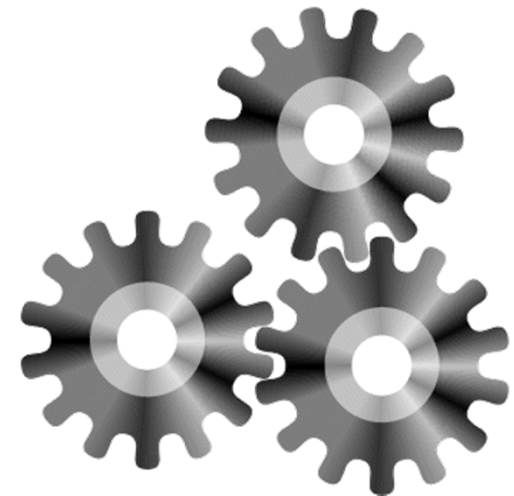
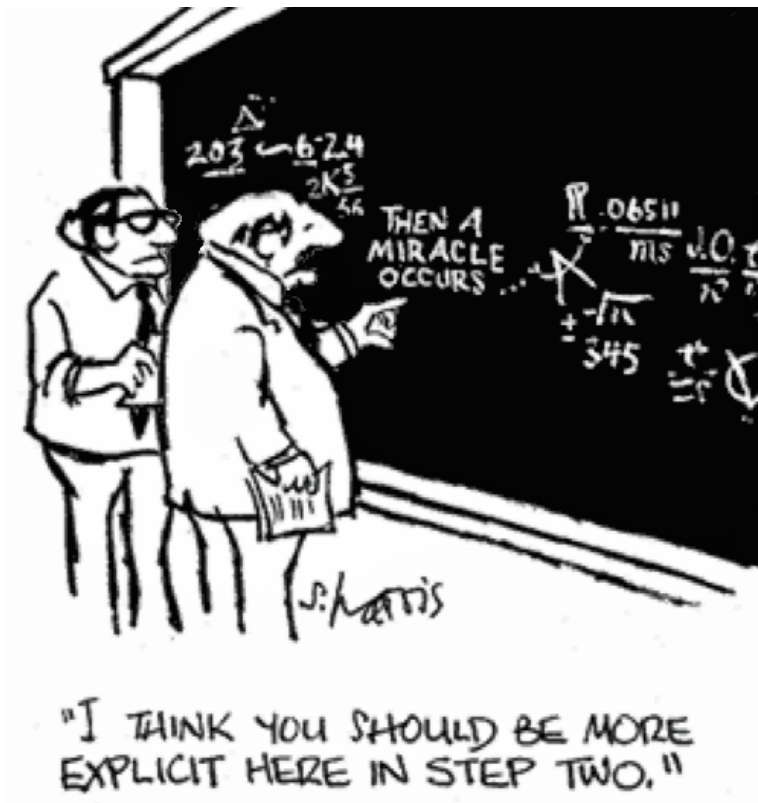
```
candidates :=  $\emptyset$   
for all safe-cheap-local-dessert-recipe in magical-sem-web-results()  
  if safe-cheap-local-dessert-recipe type looks-delicious  
    add safe-cheap-local-dessert-recipe to candidates end  
  end  
end  
return candidates
```



The Dessert Algorithm (50 years on?)

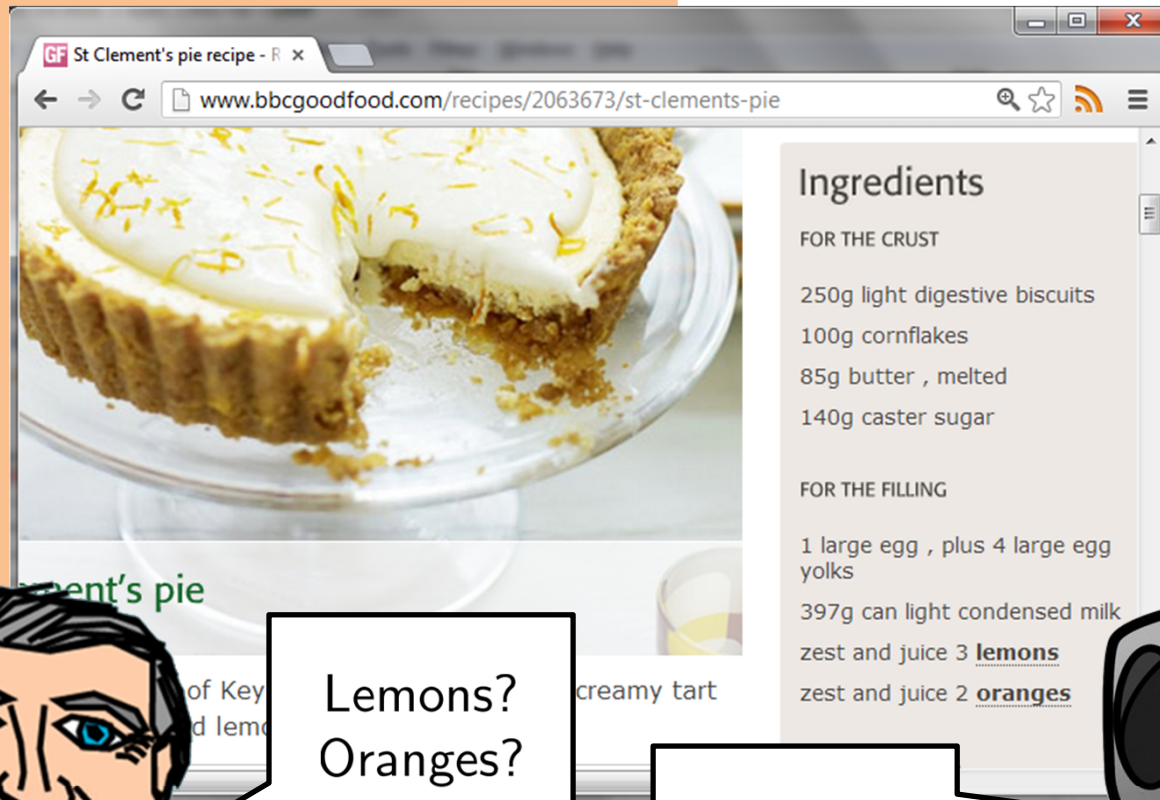


for all *safe-cheap-local-dessert-recipe* in [magical-sem-web-results\(\)](#)



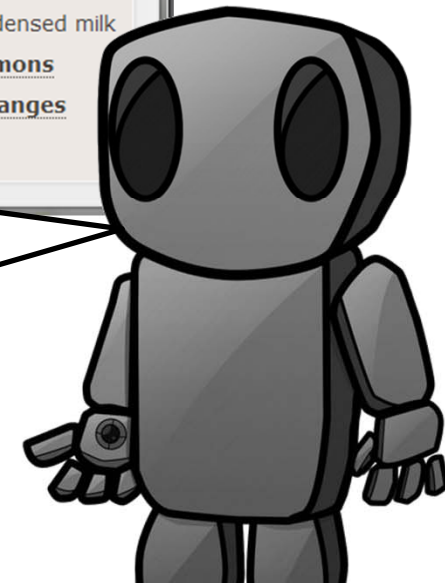
BEING MORE EXPLICIT ON STEP 2

Let's look at this recipe ...



Lemons?
Oranges?
Citrus!!

♂?
♂?
♂?

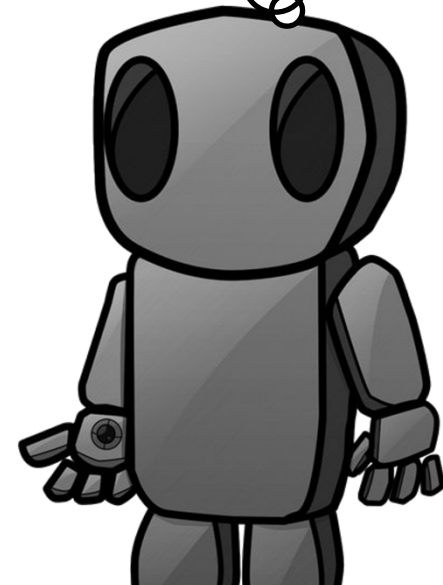
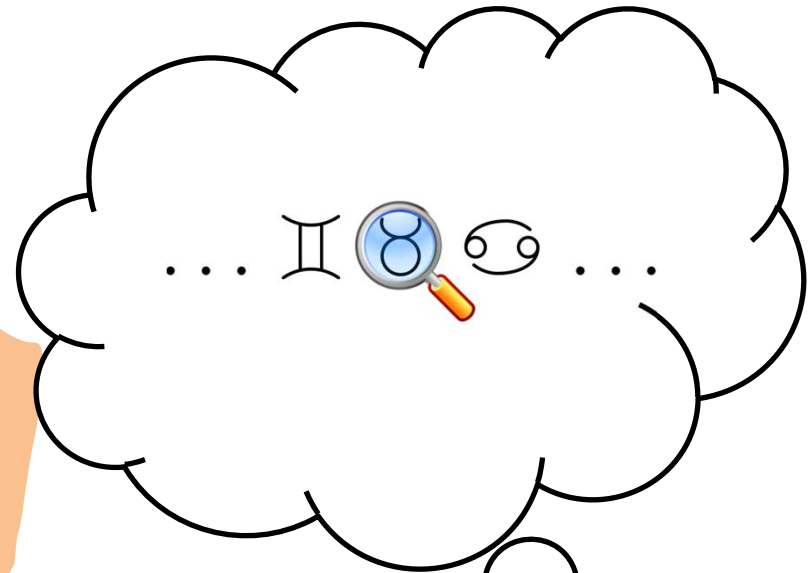


Can machines be taught to understand?

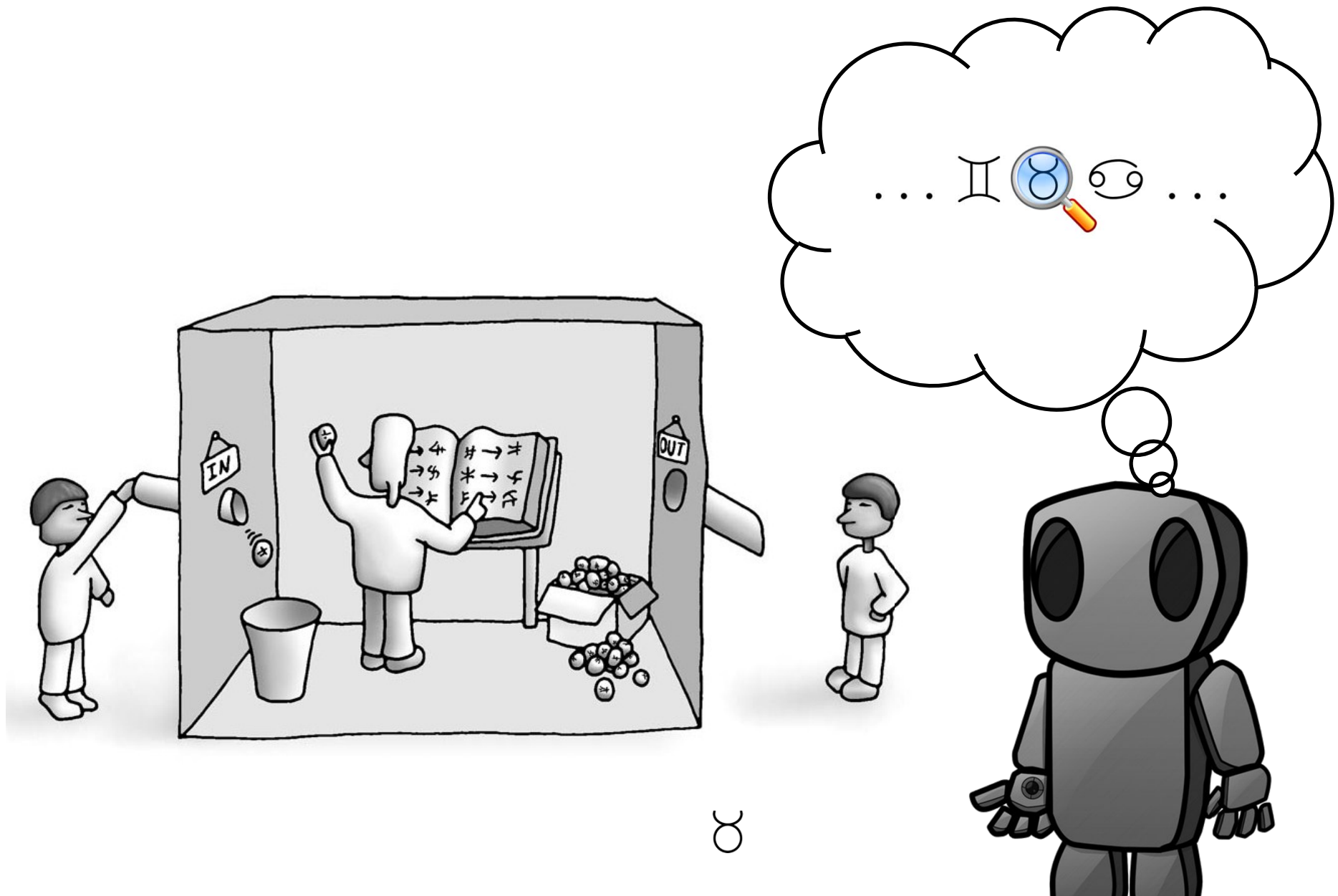


Lemon

∞



Searle's Chinese Room ...



Searle's Chinese Room: B214

INPUT: “𐄂 𐄃 𐄄 𐄅 𐄆 𐄇 𐄈 𐄉 𐄊?”

http://ex.org/𐄂

𐄂



𐄂 𐄃 ≈ 𐄅 𐄆.

𐄇 𐄈 𐄃 𐄉.

http://ex.org/𐄉

𐄉



𐄉 𐄃 𐄄 𐄅 𐄆 𐄊 𐄂.

𐄇 𐄅 𐄃 𐄈 𐄊.

... what should the output be?

OUTPUT: “𐄈 𐄊”

Multiple symbols, one meaning ...



Ireland

IE

Irlanda

Rep. of Ireland

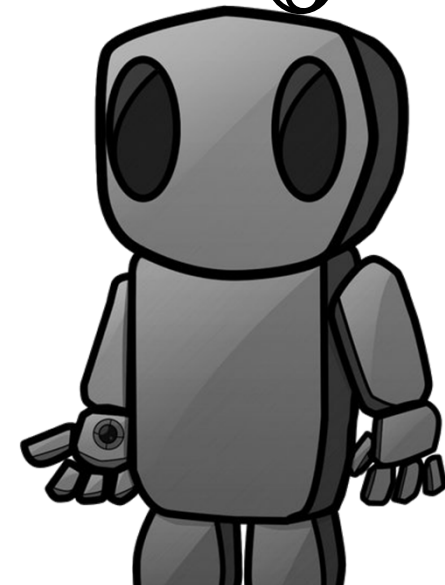


ℙ

♂

☾

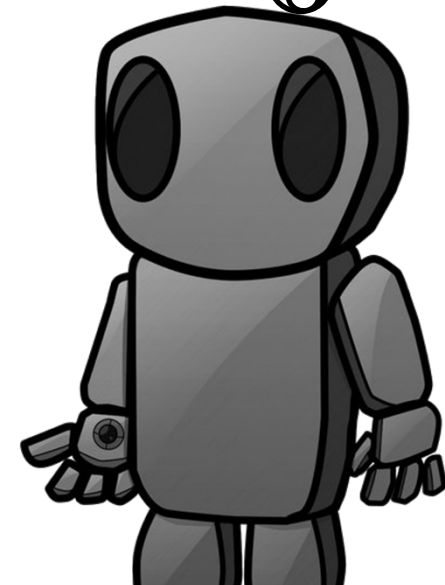
ℏ



One symbol, multiple meanings ...



Dublín



Multiple ways to say the same thing ...

Dublin's population is one million.

...

Dublin has a population of one million.

...

Dublin's population is 1,000,000.

...

Dublin has 1,000,000 inhabitants.

...

One million people live in Dublin.

...

[Dublin] Its population is one million.

...

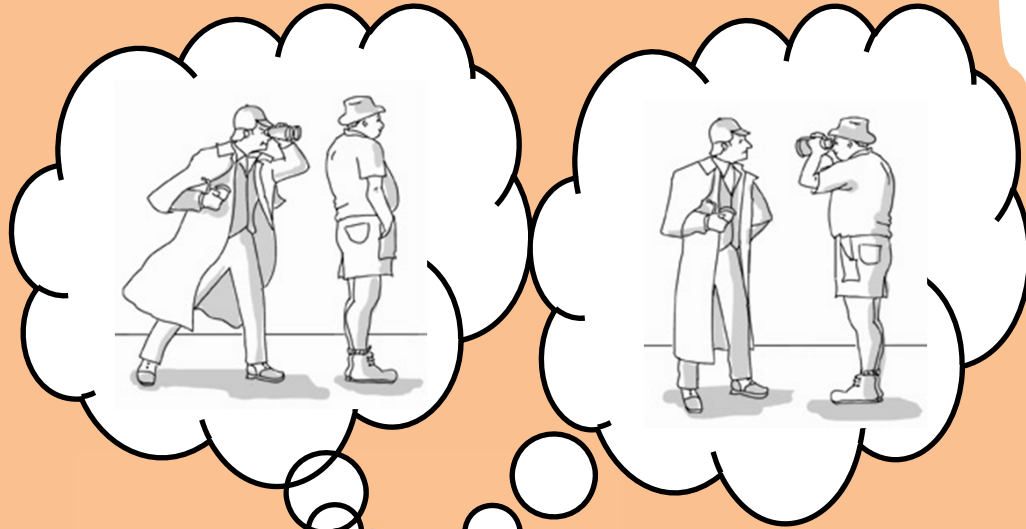
La población de Dublín es un millón.

...



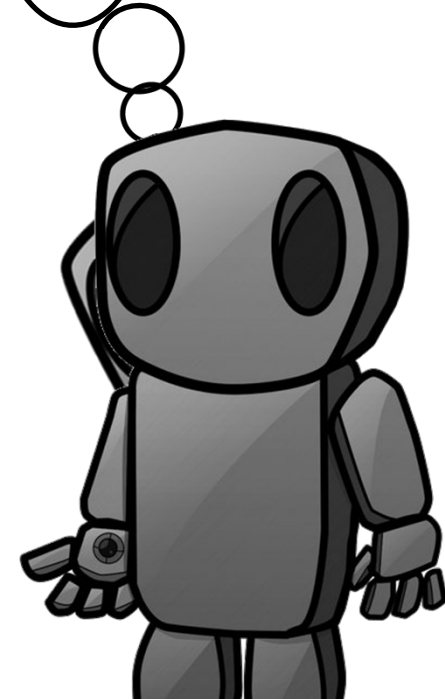
Multiple meanings for the same saying ...

Sherlock saw the man using binoculars.



Not saying what is meant ...

Fred está arriba la pelota.



You get the idea ...

THE SEMANTIC GAP



BRIDGING THE SEMANTIC GAP ON THE WEB

Searle's Chinese Room

INPUT: “𐄂 𐄃 𐄄 𐄅 𐄆 𐄇 𐄈 𐄉?”

<http://ex.org/𐄂>

𐄂



𐄂 𐄃 ≈ 𐄇 𐄈.

𐄉 𐄈 𐄃 𐄊.

<http://ex.org/𐄉>

𐄉

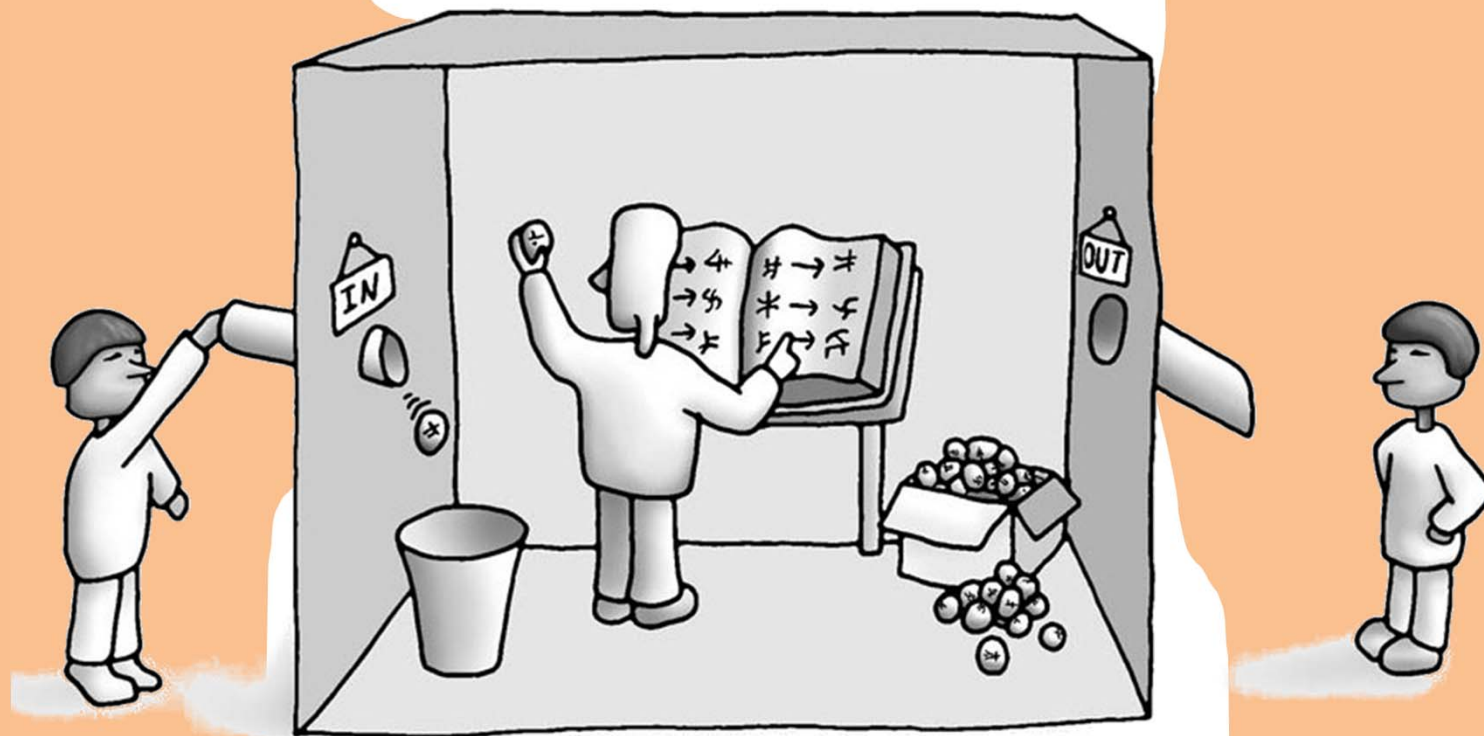


𐄉 𐄃 𐄄 𐄈 𐄆 𐄊.

𐄉 𐄅 𐄃 𐄋 𐄌.

OUTPUT: “𐄋 𐄌”

What if we could “structure” everything ...



One symbol, one meaning ...



Ireland

IE

Irlanda

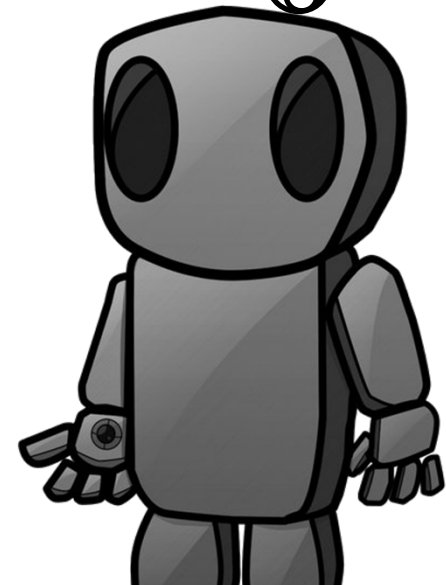
Rep. of Ireland

ℙ

♂

☾

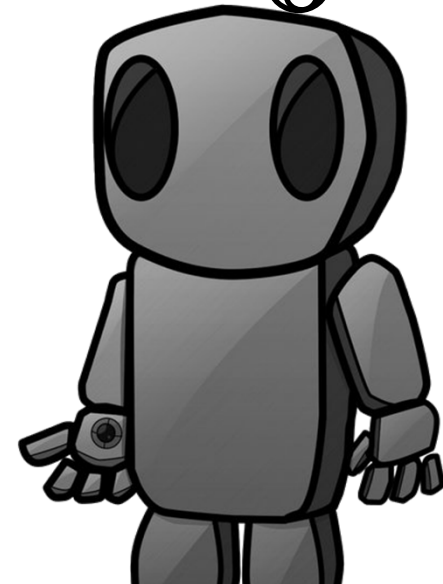
ℏ



One symbol, one meaning ...



Dublín



One (simple) way to say one thing ...

Dublin's population is one million.

Dublin has a population of one million.

Dublin's population is 1,000,000.

Dublin has 1,000,000 inhabitants.

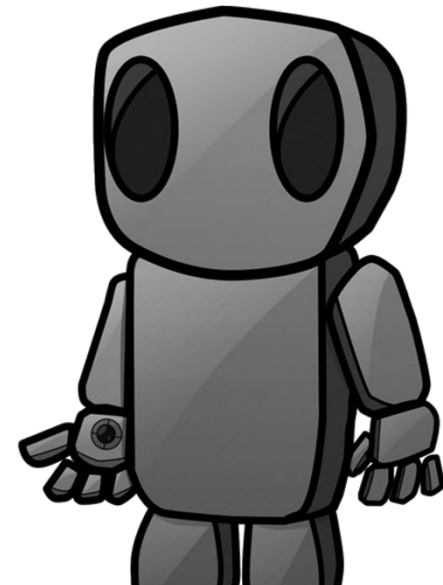
One million people live in Dublin.

[Dublin] Its population is one million.

La población de Dublín es un millón.

(Dublin,population,1000000)

$(\Psi, \sigma, 1000000)$

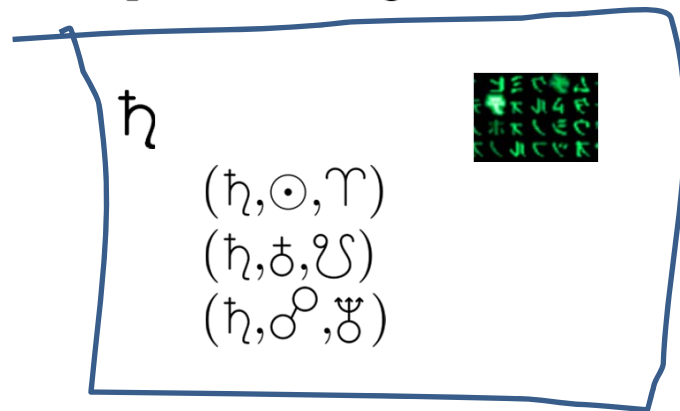


Structured Chinese Room

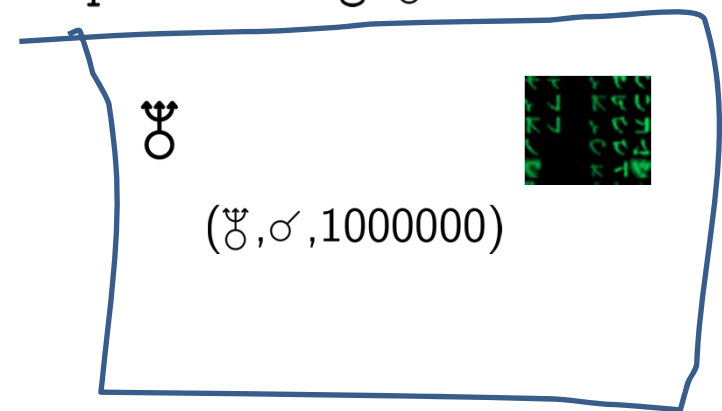
INPUT: “ $(\mathfrak{h}, \sigma^{\rho}, x), (x, \sigma, y)$ ”

DATA:

<http://ex.org/\mathfrak{h}>



<http://ex.org/\mathfrak{Y}>



... what might the output be?

OUTPUT: $\{(x \mapsto \mathfrak{Y}, y \mapsto 1000000)\}$

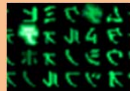
Structured Chinese Room

INPUT: “(Ireland,capital, x), (x ,population, y)”

DATA:

<http://ex.org/Ireland>

Ireland



(Ireland,partOf,Europe)
(Ireland,a,Country)
(Ireland,capital,Dublin)

<http://ex.org/Dublin>

Dublin



(Dublin,population,1000000)

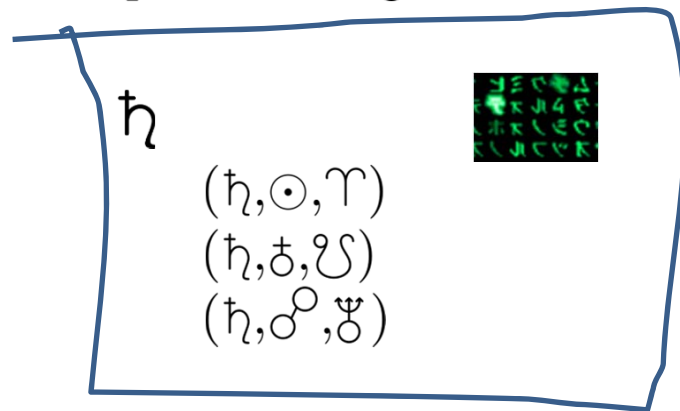
OUTPUT: $\{(x \mapsto \text{Dublin}, y \mapsto 1000000)\}$

Structured Chinese Room II

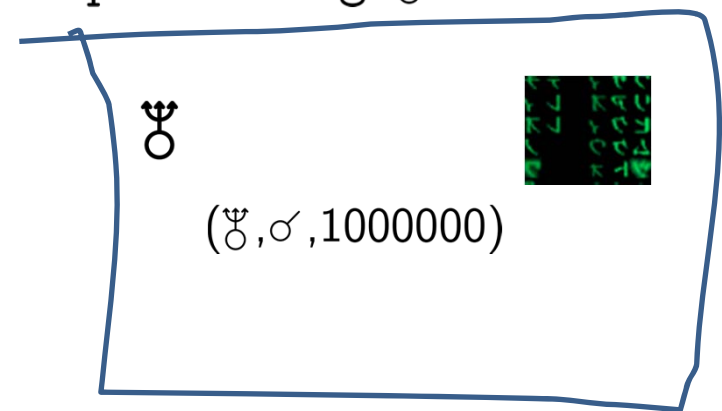
INPUT: “ (x, \odot, y) ”

DATA:

<http://ex.org/h>



<http://ex.org/\Psi>



... what might the output be?

OUTPUT: $\{(x \mapsto h, y \mapsto \Upsilon)\}$?

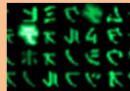
Structured Chinese Room II

INPUT: “ (x, partOf, y) ”

DATA:

<http://ex.org/Ireland>

Ireland



(Ireland, partOf, Europe)
(Ireland, a, Country)
(Ireland, capital, Dublin)

<http://ex.org/Dublin>

Dublin



(Dublin, population, 1000000)

$(x \mapsto \text{Dublin}, y \mapsto \text{Ireland}) ?$

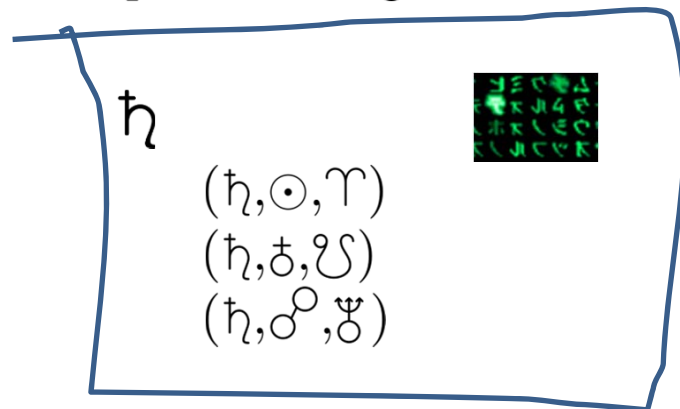
OUTPUT: $\{(x \mapsto \text{Ireland}, y \mapsto \text{Europe})\}$

Structured Chinese Room II

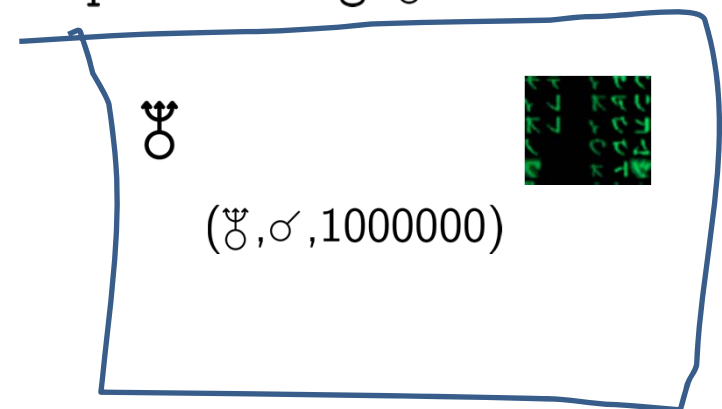
INPUT: “ (x, \odot, y) ”

DATA:

<http://ex.org/h>



<http://ex.org/\Psi>



RULES: $(a, \sigma^{\circ}, b) \rightarrow (b, \odot, a)$

OUTPUT: $\{(x \mapsto \mathfrak{h}, y \mapsto \Upsilon), (x \mapsto \Psi, y \mapsto \mathfrak{h})\}$

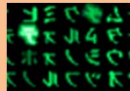
Structured Chinese Room II

INPUT: “ (x, partOf, y) ”

DATA:

<http://ex.org/Ireland>

Ireland



(Ireland, partOf, Europe)
(Ireland, a, Country)
(Ireland, capital, Dublin)

<http://ex.org/Dublin>

Dublin



(Dublin, population, 1000000)

RULES: $(a, \text{capital}, b) \rightarrow (b, \text{partOf}, a)$

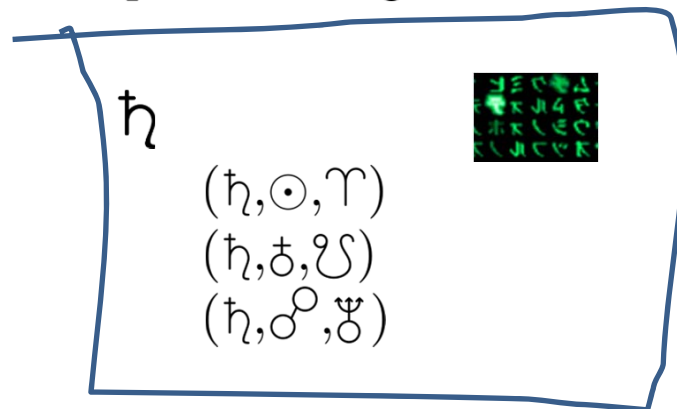
OUTPUT: $\{(x \mapsto \text{Ireland}, y \mapsto \text{Europe}), (x \mapsto \text{Dublin}, y \mapsto \text{Ireland})\}$

Structured Chinese Room II

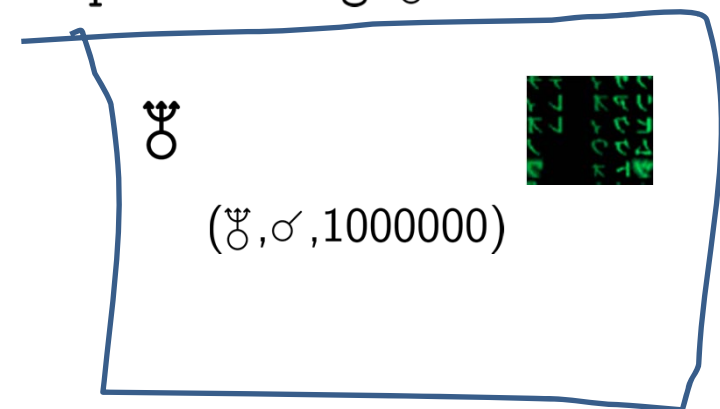
INPUT: “ (x, \odot, y) ”

DATA:

<http://ex.org/h>



<http://ex.org/Psi>



RULES: $(a, \sigma, b) \rightarrow (b, \odot, a)$
 $(c, \odot, d), (d, \odot, e) \rightarrow (c, \odot, e)$

OUTPUT: $\{(x \mapsto h, y \mapsto \Upsilon), (x \mapsto \Psi, y \mapsto h), (x \mapsto \Psi, y \mapsto \Upsilon)\}$

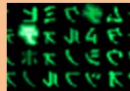
Structured Chinese Room II

INPUT: “ (x, partOf, y) ”

DATA:

<http://ex.org/Ireland>

Ireland



(Ireland, partOf, Europe)
(Ireland, a, Country)
(Ireland, capital, Dublin)

<http://ex.org/Dublin>

Dublin



(Dublin, population, 1000000)

RULES: $(a, \text{capital}, b) \rightarrow (b, \text{partOf}, a)$
 $(c, \text{partOf}, d), (d, \text{partOf}, e) \rightarrow (c, \text{partOf}, e)$

OUTPUT: $\{(x \mapsto \text{Ireland}, y \mapsto \text{Europe}), (x \mapsto \text{Dublin}, y \mapsto \text{Ireland})$
 $(x \mapsto \text{Dublin}, y \mapsto \text{Europe})\}$

(1) Data, (2) Query, (3) Rules/Ontologies

INPUT: “ (x, partOf, y) ”

DATA:

<http://ex.org/Ireland>

Ireland



$(\text{Ireland}, \text{partOf}, \text{Europe})$
 $(\text{Ireland}, a, \text{Country})$
 $(\text{Ireland}, \text{capital}, \text{Dublin})$

<http://ex.org/Dublin>

Dublin



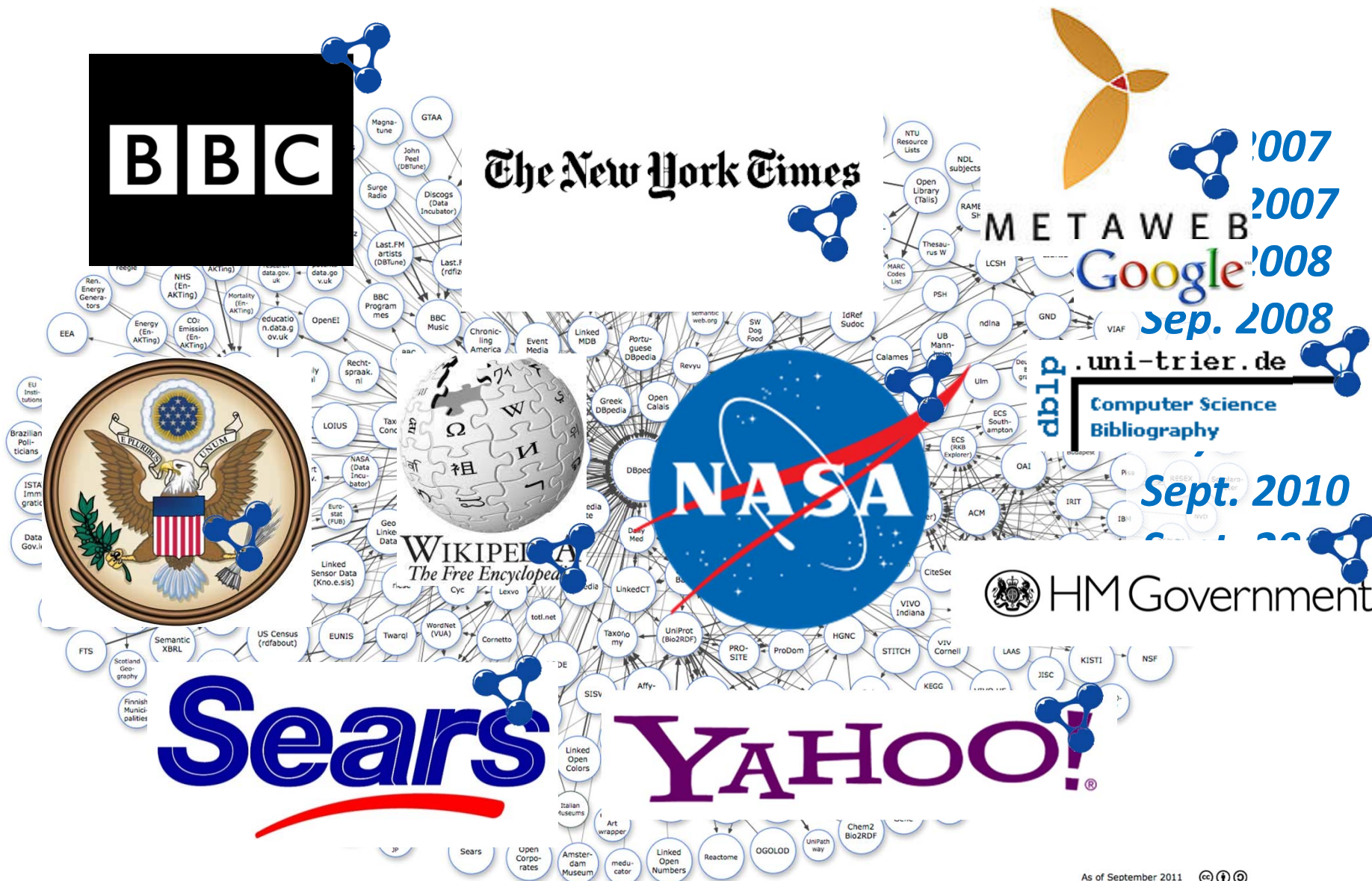
$(\text{Dublin}, \text{population}, 1000000)$

RULES: $(a, \text{capital}, b) \rightarrow (b, \text{partOf}, a)$
 $(c, \text{partOf}, d), (d, \text{partOf}, e) \rightarrow (c, \text{partOf}, e)$

OUTPUT: $\{(x \mapsto \text{Ireland}, y \mapsto \text{Europe}), (x \mapsto \text{Dublin}, y \mapsto \text{Ireland})$
 $(x \mapsto \text{Dublin}, y \mapsto \text{Europe})\}$

**THE SEMANTIC WEB:
NOT JUST PURELY ACADEMIC**

The Linked Data Cloud



Geographical Data: Geonames

The screenshot displays the Geonames web application interface. At the top, there is a navigation bar with links: GeoNames, About, Browse, Download, API, and Help. A search bar contains the text "Paris, Mount Everest, New York". On the right, a user profile icon is labeled "anonymous".

A light blue banner across the top of the map area states "Found 35 items in this area". On the left side, there is a vertical toolbar with a person icon, a zoom slider, a "Layers" button, and a "31" icon. The map itself is a satellite view of a coastal region in Crete, Greece. A popup window is open over a location labeled "Kalamaki".

The popup window for "Kalamaki" contains the following information:

- Kalamaki** (with a close button 'x')
- P PPL populated place (with a blue box containing the number 7874338)
- Greece GR » Crete ESVE43 » Irákleion 45 » Faistos 0308
- Coordinates: 35.0281, 24.76009
- Coordinates: N 35°01'41" E 24°45'36"
- Icons for various data types (point, line, area, etc.)
- Download links: geotree, .kml, .rdf

The map shows various road networks and place names. An inset map in the bottom right corner shows the location of the main map area within the context of the island of Crete. The bottom of the page features a footer with map data copyright information: "Map data ©2013 Google Imagery ©2013 Cnes/Spot Image, DigitalGlobe, European Space Imaging, Landsat", a scale bar for 1 km, and links for "Terms of Use" and "Report a map error".

Linked Government Data: data.gov

An Official Web Site of the United States Government Tuesday, May 24, 2011 Text: A+ A- A Share

DATA.GOV
EMPOWERING PEOPLE

HOME DATA ▼ APPS COMMUNITY METRICS OPEN DATA SITES GALLERY WHAT'S NEW

Earthquake and Tsunami Datasets and Information

- Worldwide M1+ Earthquakes, Past 7 Days
- RadNet Map Interface for Near-Real-Time Radiation Monitoring Data
- Search other related datasets
- World Earthquake Interactive Map Demo

WORLDWIDE M1+ EARTHQUAKES, PAST 7 DAYS
Real-time, worldwide earthquake list for the past 7 days

SEARCH OUR CATALOGS
Search our catalogs.. SEARCH ▶

DATA AND APPS

389,714 raw and geospatial datasets
977 government apps
236 citizen-developed apps

COMMUNITIES

Come explore, discuss, meet others in the same field, and develop the data and apps in the community that you care about. Join in the

OPEN GOVERNMENT

Latest News: Japanese Earthquake and Radiation Data

Linked Government Data: data.gov.uk

The screenshot shows the data.gov.uk website. At the top is a black header with the HM Government logo and a 'Log in or sign up' link. Below this is the 'data.gov.uk BETA' logo and the tagline 'Opening up government'. A search bar with the placeholder 'What are you looking for?' and a 'Search' button is on the right. A green navigation bar contains links: Home, Data, Apps, Ideas, Forum, Wiki, Blogs, Linked Data, Resources, and About. The main content area features a large video player with a green overlay titled 'Instructions for data publishers' and a 'PAUSE' button. To the left of the video are four links: 'Call for dataset requests', 'Instructions for data publishers', 'Public Data Corporation', and 'Met office data'. To the right of the video is a section titled 'Over 6,900 datasets to view' with a sub-header 'Inside Government Data'. This section includes a paragraph about finding data and three links: 'Government spend over £25,000, by department', 'Who does what in Whitehall - and how much are they paid?', and 'Hospitality, gifts and expenses'. Below the video player is a 'Share this' button with social media icons. At the bottom is a dark grey bar titled 'Facts, figures, apps and more'. This bar contains three sections: 'Find data of interest' with a description and a video thumbnail, 'Apps' with a description and a thumbnail, and 'Tags' with a list of popular tags and their counts: health (2,328), care (1,646), transparency (1,594), and communities (1,318).

HM Government Log in or sign up

data.gov.uk^{BETA}
Opening up government

What are you looking for? Search

Home Data Apps Ideas Forum Wiki Blogs Linked Data Resources About

Call for dataset requests

Instructions for data publishers

Public Data Corporation

Met office data

Instructions for data publishers
Calling all data publishers - new guide to publishing to data.gov.uk

PAUSE

Over 6,900 datasets to view

Inside Government Data

Who's who in Government and where does the money go? Follow these links to find the data that opens it all up.

- Government spend over £25,000, by department
- Who does what in Whitehall - and how much are they paid?
- Hospitality, gifts and expenses

Share this

Facts, figures, apps and more

Find data of interest

Looking for something specific, or just want to know more about how Government spends your money? You'll find datasets here to help you get answers.

Apps

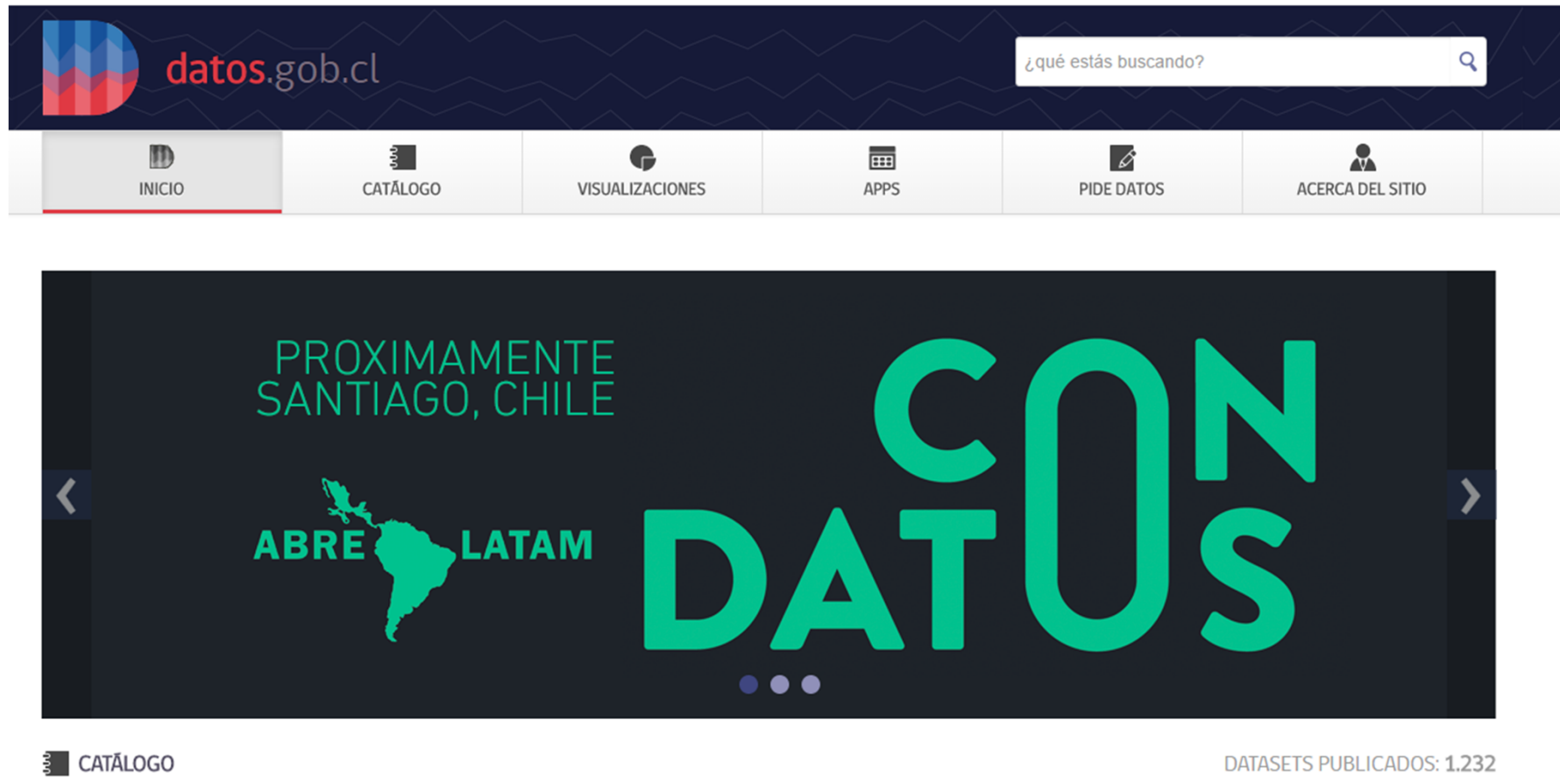
Want your phone to wake you when you get to your train station? Discover over 100 apps harnessing public data to make your life easier.

Tags

Can't decide where to start? You can browse the data by clicking on popular topics. Try one of the tags here to find what you're most interested in.

health (2,328) care (1,646)
transparency (1,594) communities (1,318)

Linked Government Data: datos.gob.cl



Life Sciences



The screenshot shows the HealthData.gov website. At the top, there's a network diagram with nodes labeled AHRQ, CDC, HRSA, CMS, IHS, ATSDR, SAMHSA, ACL, NIH, FDA, ACF, and ONC. Below this is a navigation bar with links: Home, Data, Blog, Q & A, Ideas, Developers, and social media icons for Facebook and Twitter. A search bar is on the right. The main content area features a large image of a person wearing a smart shirt with a sensor, titled "Smart Clothes—A Wearable Air Quality Sensor". To the right, there are two promotional boxes: "HDI Starter Kit" and "Suggest a Dataset". Below these are three columns: "Search the Data" with search filters, "Recent Datasets" with a list of datasets, and "Recent Blog Entries" with a list of blog posts. At the bottom, there are five icons representing different data categories: Medicare, Medicaid, Epidemiology, Treatments, and Population Statistics.

HealthData.gov

Home Data Blog Q & A Ideas Developers

Search entire site...

Smart Clothes—A Wearable Air Quality Sensor
A sensor a year in the making! See the winning sensor that was developed and announced at Health Datapalooza IV from the My Air, My Health Challenge. [Read more »](#)

HDI Starter Kit - Learn about all of the HHS data available to you.
[Get the Kit!](#)

Found a great health-related dataset on another site? Tell us about it!
[Suggest a Dataset](#)

Search the Data

Search for

Sub-Agency

Subject Area

[Search](#)

Recent Datasets

Prevention Agenda 2013 - 2017 Tracking...
Measuring Prevention More Broadly, An...
Environmental Radiation Surveillance Nine...
Environmental Radiation Surveillance...
Environmental Radiation Surveillance Ginna...
[View more »](#)

Recent Blog Entries

Looking for HHSentpreneurs to Work on Two...
CMS Health Care Innovations Awards Round Two...
Opportunity to Provide Commentary to Centers...
Top 6 Awesome Advancements for Healthdata.gov
CMS Progress Towards Greater Data...
[View more »](#)

Medicare
Cost report data from

Medicaid
General information on

Epidemiology
Public health databases

Treatments
Information and

Population Statistics
Metrics on community

Life Sciences

ClinicalTrials.gov

A service of the U.S. National Institutes of Health

ClinicalTrials.gov is a registry and results database of publicly and privately supported clinical studies of human participants conducted around the world. [Learn more about clinical studies](#) and [about this site](#), including relevant history, policies, and laws.

[Find Studies](#) [About Clinical Studies](#) [Submit Studies](#) [Resources](#) [About This Site](#)

ClinicalTrials.gov currently lists **151,056 studies** with locations in all 50 states and in **184 countries**.

[Text Size](#) ▼

Search for Studies

Example: "Heart attack" AND "Los Angeles"

[Search](#)

[Advanced Search](#) | [See Studies by Topic](#)
[See Studies on a Map](#)

Search Help

- [How to search](#)
- [How to find results of studies](#)
- [How to read a study record](#)

Locations of Recruiting Studies



- Non-U.S. Only (50%)
- U.S. Only (44%)
- Both U.S. & Non-U.S. (6%)

Total N = 30,860 studies
Data as of August 27, 2013

- [See more trends, charts, and maps](#)

Learn More

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- [Glossary of common site terms](#)

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 [Using our RSS Feeds](#)

For Patients & Families

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- [See studies by topic](#)
- [Learn about clinical studies](#)
- [Learn more...](#)

For Researchers

- [How to submit studies](#)
- [Download content for analysis](#)
- [About the results database](#)
- [Learn more...](#)

For Study Record Managers

- [Why register?](#)
- [How to register study records](#)
- [FDAAA 801 Requirements](#)
- [Learn more...](#)

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[U.S. National Library of Medicine](#) | [U.S. National Institutes of Health](#) | [U.S. Department of Health & Human Services](#)

Life Sciences

DRUGBANK

Open Data Drug & Drug Target Database

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Search:

[Help / Advanced](#)

The DrugBank database is a unique bioinformatics and cheminformatics resource that combines detailed drug (i.e. chemical, pharmacological and pharmaceutical) data with comprehensive drug target (i.e. sequence, structure, and pathway) information. The database contains 6811 drug entries including 1528 FDA-approved small molecule drugs, 150 FDA-approved biotech (protein/peptide) drugs, 87 nutraceuticals and 5080 experimental drugs. Additionally, 4294 non-redundant protein (i.e. drug target/enzyme/transporter/carrier) sequences are linked to these drug entries. Each DrugCard entry contains more than 150 data fields with half of the information being devoted to drug/chemical data and the other half devoted to drug target or protein data.

DrugBank is supported by [David Wishart](#), Departments of [Computing Science & Biological Sciences](#), [University of Alberta](#).

DrugBank is also supported by [The Metabolomics Innovation Centre](#), a Genome Canada-funded core facility serving the scientific community and industry with world-class expertise and cutting-edge technologies in metabolomics.

[More about DrugBank](#)

Tweets



Wishart Lab
@WishartLab

16 Jun

You can now browse Reactions ([drugbank.ca/reactions](#)) in DrugBank, data is in BETA. Feedback appreciated, more data coming soon! [#drugbank](#)

[Expand](#)

[Load More](#)

Compose new Tweet...

Recent Comments

[PEOPLE](#) [RECENT](#) [POPULAR](#)

Recent Comments



Brenton Home

In Australia it is a Schedule 8 (controlled) drug.

E-Commerce

Feedback

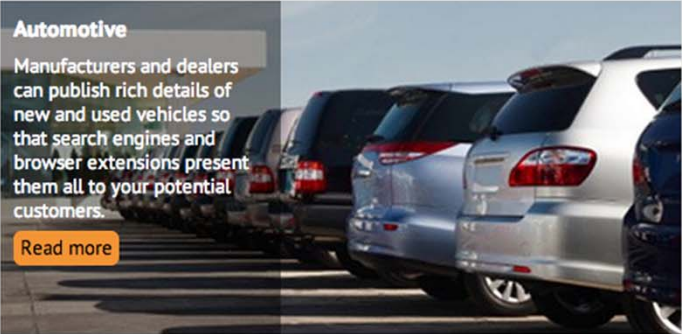
GoodRelations
The Web Vocabulary for E-Commerce

[Main](#) [Quickstart](#) [Cookbook](#) [User's Guide](#) [Specification](#) [Tools](#) [Community](#)

Automotive

Manufacturers and dealers can publish rich details of new and used vehicles so that search engines and browser extensions present them all to your potential customers.

[Read more](#)



<<Prev Next>>

The most powerful Web vocabulary for e-commerce
A paradigm shift for e-commerce. Since 2008.

Only 5% of all potential visitors of your site will actually see your offers in their original beauty. 95% will never get beyond a reduced preview of your great products and services as provided by a Web search engine.

GoodRelations is the most powerful vocabulary for publishing all of the details of your products and services in a way friendly to search engines, mobile applications, and browser extensions. By adding a bit of extra code to your Web content, you make sure that potential customers realize all the great features and services and the benefits of doing business with you, because their computers can extract and present this information with ease.

Video



Contact

Univ.-Prof. Dr. Martin Hepp

Who uses GoodRelations?


Google
Yahoo!
BestBuy
sears.com
kmart.com

... and 10,000 more

See [here](#) for additional references.

News from Twitter

License

The GoodRelations ontology is  **creative**

Acknowledgments

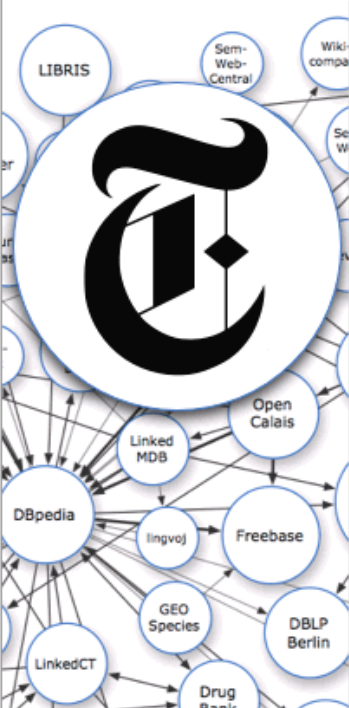
Many organizations and individuals have supported

New York Times Meta-data

The New York Times

Linked Open Data BETA


[View Application Source](#)



Alumni In The News

Enter a school name below
and see our coverage of that school's alumni.

San Francisco State University



George Miller
Attorney
Born: May 17, 1945

[Congress Considers Concussion Protections](#) - September 24, 2010
[EDITORIAL; Fairness for Older Workers](#) - September 14, 2010
[EDITORIAL; Saving the Teachers](#) - May 06, 2010
[House Bill Would Assure Workers Paid Sick Days](#) - November 04, 2009
[EDITORIAL; Preventing Age Discrimination](#) - October 13, 2009
[OP-ED COLUMNIST; Someday, a Bill Will Pass](#) - September 17, 2009
[Obama Plan to End Role of Banks in Federal Student Loans Wins Support](#) - July 11, 2009
[House Unveils Health Bill, Minus Key Details](#) - June 20, 2009
[Democrats Nearing Consensus on Health](#) - June 10, 2009
[U.S. Charges 7 Accused of Ties To Bonannos](#) - August 29, 2008

Please note that portions of this application rely on user generated data from external sources.
It is hoped but not guaranteed that this data is accurate.

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<http://data.nytimes.com/schools/schools.html>

schema.org (Bing, Google, Yahoo!, Yandex)

schema.rdfs.org

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What is Schema.RDFS.org?

In early June 2011, the three big search engines Bing, Google and Yahoo! introduced **Schema.org**, a collection of terms that webmasters can use to markup their pages to improve the display of search results. This site is a complementary effort by people from the Linked Data community to support Schema.org deployment and usage with a special focus on **Linked Data**:

- We provide markup **examples** and **tutorials** about publishing & consuming data with Schema.org terms.
- We maintain **mappings** from Web Data vocabularies such as the **DBpedia ontology** to Schema.org terms.
- We list **tools** and libraries that are able to consume or produce Schema.org-based data.
- We automatically **scrape** the Schema.org terms on a daily basis and generate the following formats:



RDF/Turtle



RDF/XML



RDF/NTriples



JSON



CSV: all classes, all properties

Note that the official **OWL** version of the terms is directly maintained at Schema.org and independent from the above presented formats. Various **tools** that use or produce Schema.org terms are already available or in preparation. Stay tuned!

BBC Music

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MUSIC
[HOME](#) | [SHOWCASE](#) | [REVIEWS](#) | [GENRES](#) Search By Artist...

The Beatles

Formed 1957. Disbanded 10 April 1970.

BBC TWO

ARENA | BBC TWO

Brian Epstein Finds The Beatles

Brian Epstein, Paul McCartney and John Lennon talk about the early days of The Beatles in the Arena documentary, The Brian Epstein Story (1998)

THE BEATLES 1-4 OF 15 **Featured on BBC MUSIC SHOWCASE**

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Watch and listen to exclusive music clips

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Tomorrow Never Knows
BBC 6 MUSIC | RADCLIFFE AND MACONIE WEDNESDAY - JOHNNY SHARP

She Loves You
BBC RADIO 2 | KEN BRUCE CLAUDIA WINKLEMAN SITS IN

Sgt Pepper's Lonely Hearts/With A Little Help
BBC RADIO 2 | STEVE WRIGHT IN THE AFTERNOON PATRICK KIELTY SITS IN

BBC World Cup

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MUSIC

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The Beatles

Formed 1957. Disbanded 10 April 1970.

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BBC 6 MUSIC | RADCLIFFE AND MACONIE WEDNESDAY - JOHNNY SHARP

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BBC RADIO 2 | KEN BRUCE CLAUDIA WINKLEMAN SITS IN

Sgt Pepper's Lonely Hearts/With A Little Help
BBC RADIO 2 | STEVE WRIGHT IN THE AFTERNOON PATRICK KIELTY SITS IN

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SPORT WORLD CUP 2010

SPORT FOOTBALL WORLD CUP 2010 GROUPS & TEAMS FIXTURES & RESULTS VIDEO BBC COVERAGE

Uruguay 2-3 Netherlands
Highlights and report

Germany 0-1 Spain
Highlights and report

Uruguay 2-3 Germany
Highlights and report

Netherlands 0-1 Spain
Highlights and report

Blogs

Dan Walker
My World Cup memories
Dan Walker's bus trip around South Africa nears its conclusion

David Bond
South Africa kicks off new era
David Bond on how the Rainbow Nation and the World Cup

Spain return to rapturous welcome

Spain's victorious World Cup squad return to Madrid amid scenes of joyous celebration in the capital city.

- * Feature: Spain's party of a lifetime
- * Netherlands 0-1 Spain (aet)
- * Iniesta the inspiration
- * Photos of Spain's victory parade

Group tables

	A	B	C	D	E	F	G	H
GROUP H TEAMS	W	D	L	GD	PTS			
Spain	2	0	1	2	6			
Chile	2	0	1	1	6			
Switzerland	1	1	1	0	4			
Honduras	0	1	2	-3	1			

Top scorers

PLAYER	TEAM	GOALS
Mueller	GER	5
Villa	ESP	5
Sneijder	NED	5
Forlan	URU	5
Higuain	ARG	4

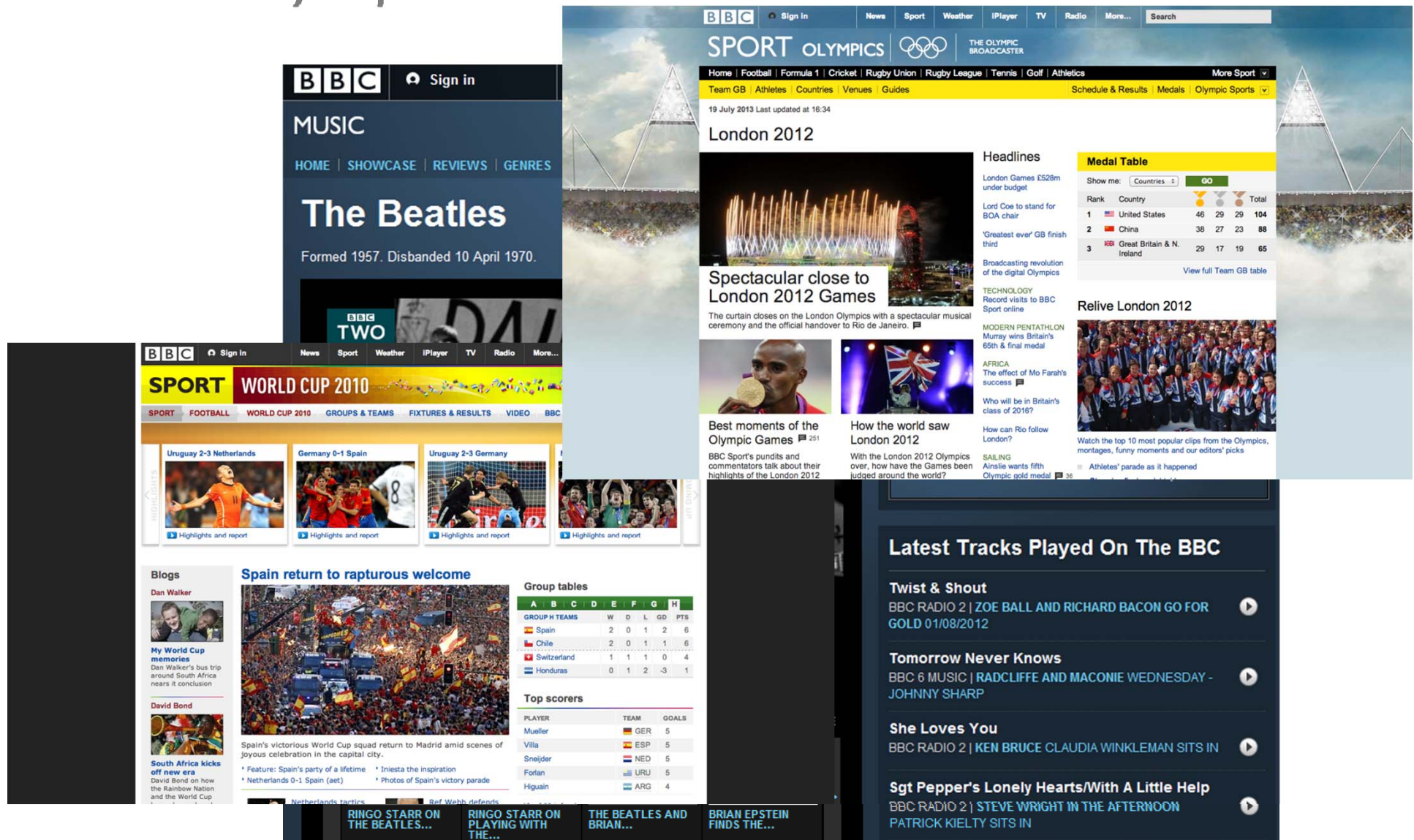
RINGO STARR ON THE BEATLES...

RINGO STARR ON PLAYING WITH THE...

THE BEATLES AND BRIAN...

BRIAN EPSTEIN FINDS THE...

BBC Olympics



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SYRIA CONFLICT

29 August 2013 Last updated at 08:24

Shadow of Iraq
How much are thoughts of that conflict shaping approaches to Syria?

Chemical weapons attack

Features and Analysis

Tent city
How families live in Zaatari refugee camp

Madness of war
Face-to-face with 'heart-eating cannibal'

South Africa kicks off new era
David Bond on how the Rainbow Nation and the World Cup

What first?
Spain's victorious World Cup squad return to Madrid amid scenes of joyous celebration in the capital city.

Assad's options
* Feature: Spain's party of a lifetime
* Netherlands 0-1 Spain (aet)
* Iniesta the inspiration
* Photos of Spain's victory parade

I saw matters

Mueller	GER	5
Villa	ESP	5
Sneijder	NED	5
Forlan	URU	5
Higuain	ARG	4

How it happened

She Loves You
BBC RADIO 2 | KEN BRUCE CLAUDIA WINKLEMAN SITS IN

Sgt Pepper's Lonely Hearts Club Band
BBC RADIO 2 | STEVE WRIGHT IN THE AFTERNOON
PATRICK KELTY SITS IN

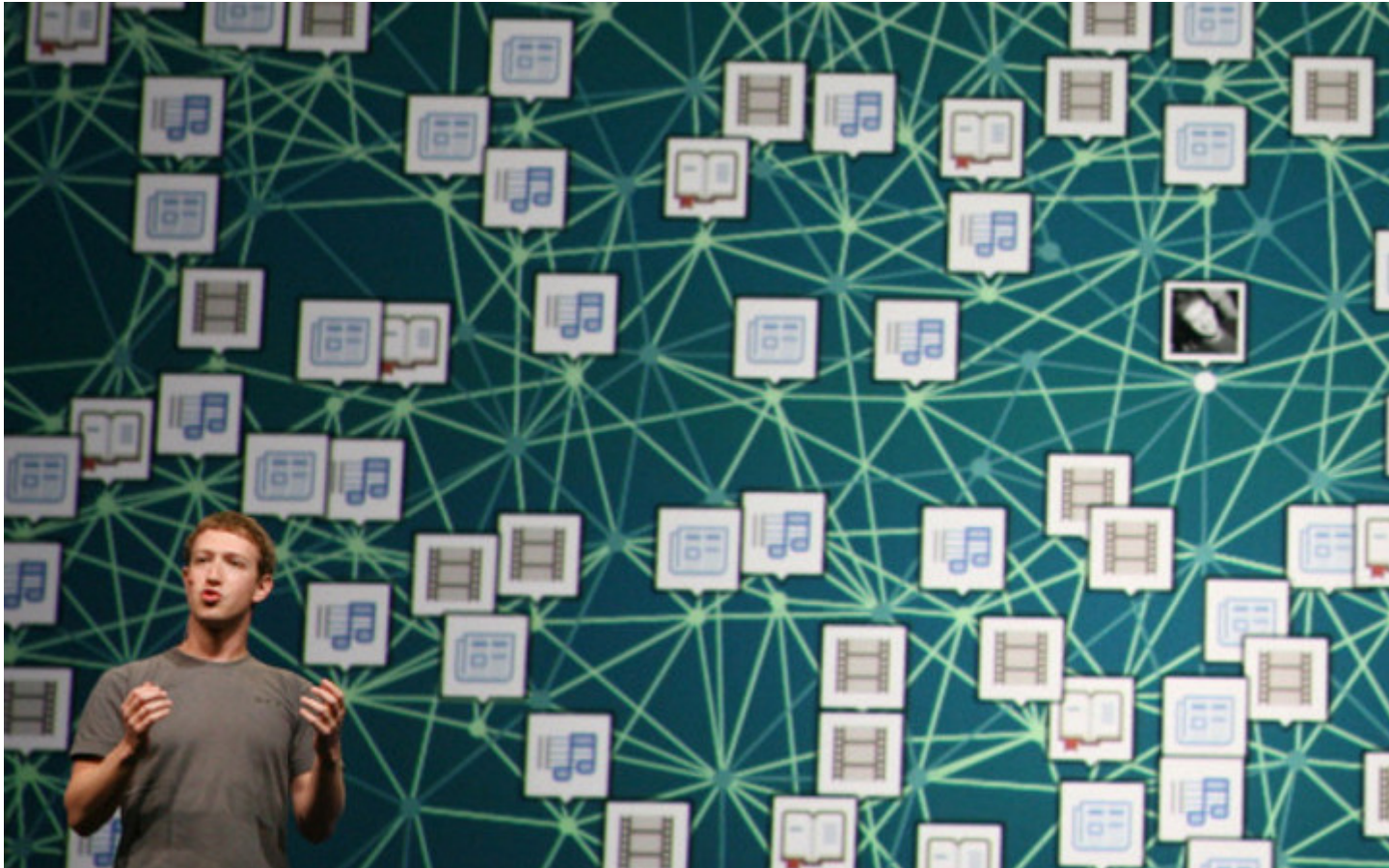
RINGO STARR ON THE BEATLES...

RINGO STARR ON PLAYING WITH THE...

THE BEATLES AND BRIAN...

BRIAN EPSTEIN FINDS THE...

Facebook Open Graph Protocol



Google's Knowledge Graph

+You Search Images Maps Play YouTube News Gmail Drive Calendar More


Google Larry Page

Web Images Maps Shopping News More Search tools


About 350,000,000 results (0.24 seconds)

Larry Page - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/Larry_Page
Lawrence "Larry" Page (born March 26, 1973) is an American computer scientist and Internet entrepreneur who is the co-founder of Google, alongside Sergey ...
Marissa Mayer - Carrie Southworth - PageRank - Forbes 400

News for Larry Page

 **Larry Page Gets A Literal Android KitKat**
Ubergizmo - 3 days ago
Android 4.4 KitKat marks a milestone for Google as they have named their mobile operating system after a branded chocolate – although ...


Larry Page - Forbes
www.forbes.com/profile/larry-page/
Larry Page on Forbes - #20 Billionaires, #20 Powerful People, #13 Forbes 400.

Larry Page - Google+
 <https://plus.google.com/+LarryPage>
by Larry Page - in 6,606,272 Google+ circles
Dear Google users— You may be aware of press reports alleging that Internet companies have joined a secret U.S. government program called PRISM to give ...

Management team – Company – Google
www.google.com/about/company/facts/management/
Larry Page and Sergey Brin founded Google in September 1998. Since then, the company has grown to more than 30,000 employees worldwide, with a ...

Larry Page Biography - Facts, Birthday, Life Story - Biography.com
www.biography.com/People
You don't need a search engine to find out all there is to know about Larry Page, co-

Knowledge Graph



Larry Page
6,606,633 followers on Google+

Lawrence "Larry" Page is an American computer scientist and Internet entrepreneur who is the co-founder of Google, alongside Sergey Brin. On April 4, 2011, Page succeeded Eric Schmidt as the chief executive officer of Google. Wikipedia

Born: March 26, 1973 (age 40), East Lansing, MI
Height: 5' 11" (1.80 m)
Spouse: Lucinda Southworth (m. 2007)
Siblings: Carl Victor Page, Jr.
Education: East Lansing High School (1987–1991), More
Awards: Marconi Prize, TR100

Recent posts
Just opened the new Android release. KitKat! Sep 3, 2013

IBM Watson

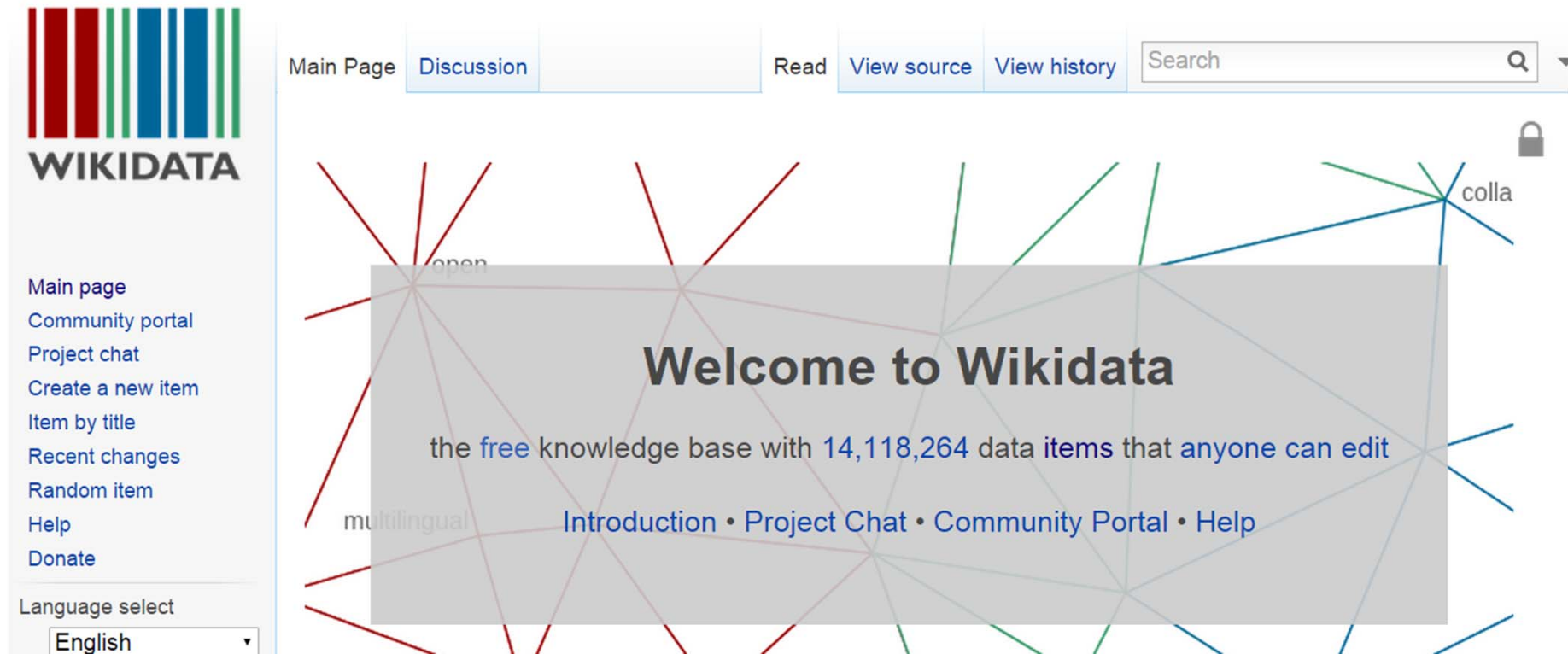
WILLIAM WILKINSON'S
"AN ACCOUNT OF THE
PRINCIPALITIES OF
WALLACHIA AND
MOLDAVIA" INSPIRED
THIS AUTHOR'S MOST
FAMOUS NOVEL

Hidden within the Web ... let's have a look



A MORE IN-DEPTH USE-CASE: WIKIDATA

What is Wikidata?



The image shows the Wikidata Main Page interface. On the left is a sidebar with the Wikidata logo and navigation links. The top navigation bar includes tabs for 'Main Page', 'Discussion', and 'Read', along with links for 'View source' and 'View history', and a search box. The main content area features a large grey box with the text 'Welcome to Wikidata' and 'the free knowledge base with 14,118,264 data items that anyone can edit'. Below this is a link to 'Introduction • Project Chat • Community Portal • Help'. A network diagram with red, green, and blue lines is overlaid on the page, with labels 'open', 'multilingual', and 'colla' near specific nodes.

WIKIDATA

Main page
Community portal
Project chat
Create a new item
Item by title
Recent changes
Random item
Help
Donate

Language select
English

Main Page Discussion Read View source View history Search

Welcome to Wikidata

the free knowledge base with 14,118,264 data items that anyone can edit

Introduction • Project Chat • Community Portal • Help

open multilingual colla

Problem 1: Different language versions manually edited by users

Alexis Sánchez



Sánchez with Chile in 2013

Personal information	
Full name	Alexis Alejandro Sánchez Sánchez ^[1]
Date of birth	19 December 1988 (age 26) ^{[1][2]}
Place of birth	Tocopilla, Chile ^{[3][2]}

National team [†]			
2007	Chile U20	12	(2)
2006–	Chile	82	(26)

Alexis Sánchez 



Datos personales

Nombre completo Alexis Alejandro Sánchez Sánchez

Carrera internacional	
Selección	 Chile
Part. (goles)	82 (26)
Debut	2006

Alexis



Alexis Sánchez im Dezember 2011

Spielerinformationen	
Voller Name	Alexis Alejandro Sánchez Sánchez
Geburtstag	19. Dezember 1988
Geburtsort	Tocopilla, Chile












Nationalmannschaft ²		
2007	Chile U-20	
2006–	Chile	76 (25)

Problem 2: Complex lists of things manually edited by users

List of countries by alcohol consumption per capita

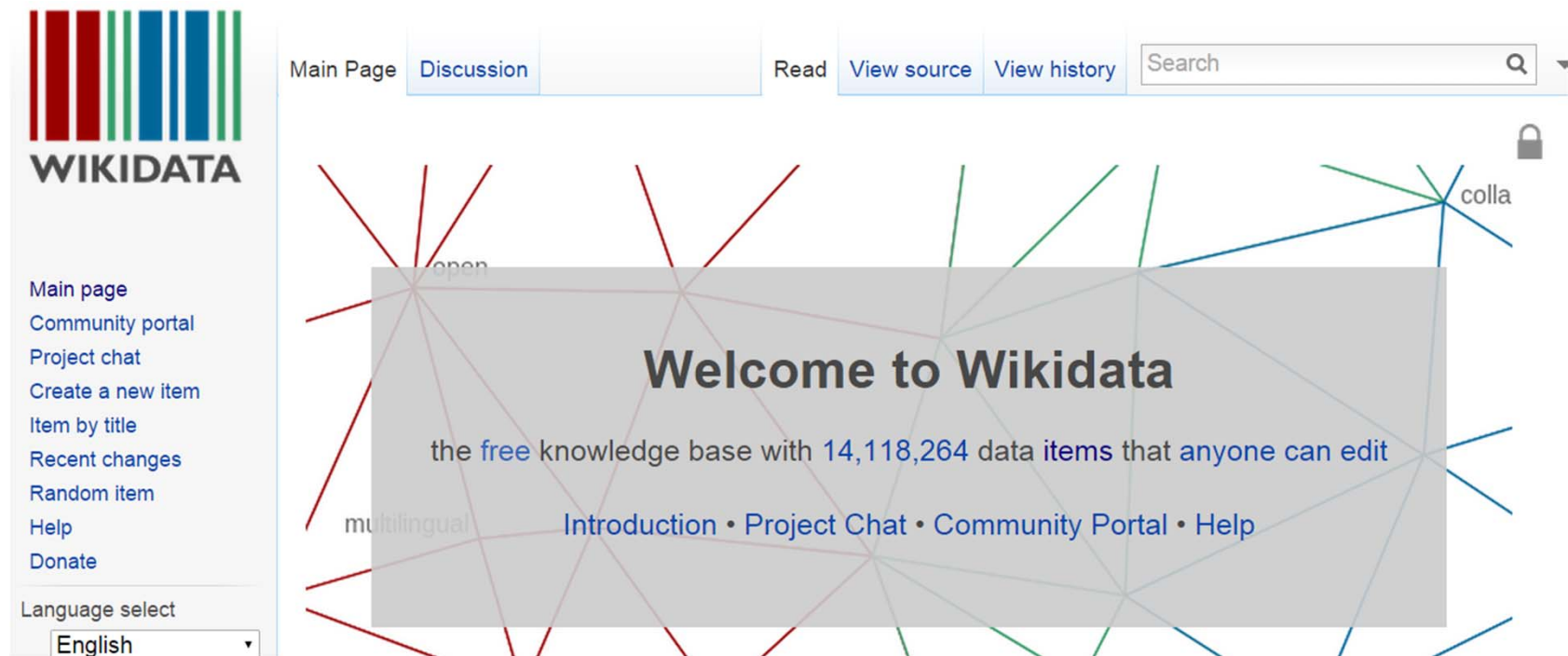
From Wikipedia, the free encyclopedia

This is a [list of countries](#) by [alcohol consumption](#) measured in equivalent litres of pure [ethanol](#) consumed [per capita](#) per year.

Rank ↕	Country ↕	Litres per capita ^[1] ↕	Relative size ↕	Year ↕
1	 Estonia	12.3	<div></div>	2011
2	 Austria	12.2	<div></div>	2011
3	 France	12	<div></div>	2011
4	 Ireland	11.7	<div></div>	2011
5	 Czech Republic	11.5	<div></div>	2011
6	 Hungary	11.4	<div></div>	2011
7	 Germany	11	<div></div>	2011
7	 Portugal	11.4	<div></div>	2007
7	 Spain	11.4	<div></div>	2009
10	 Belgium	10.8	<div></div>	2008
22	 Chile	8.6	<div></div>	2009

Solution: Wikidata

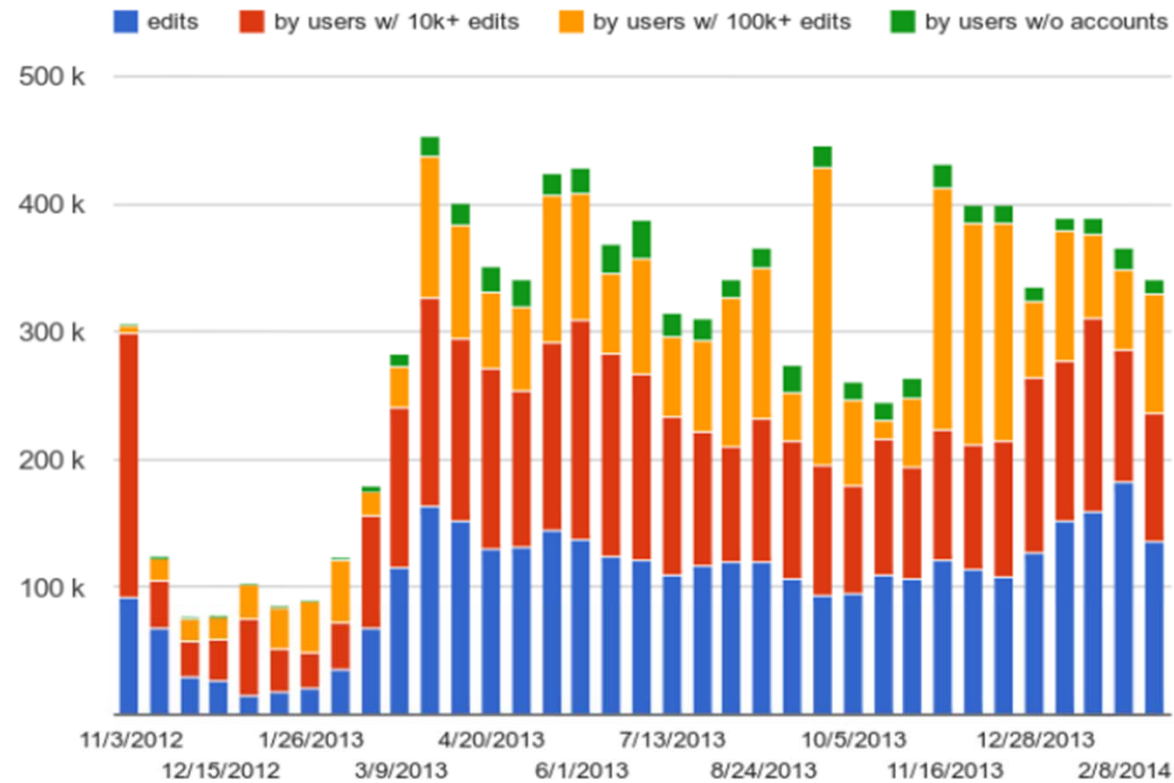
- Collaboratively edit structured data in one place, with multi-lingual labels



Wikidata Activity

Activity

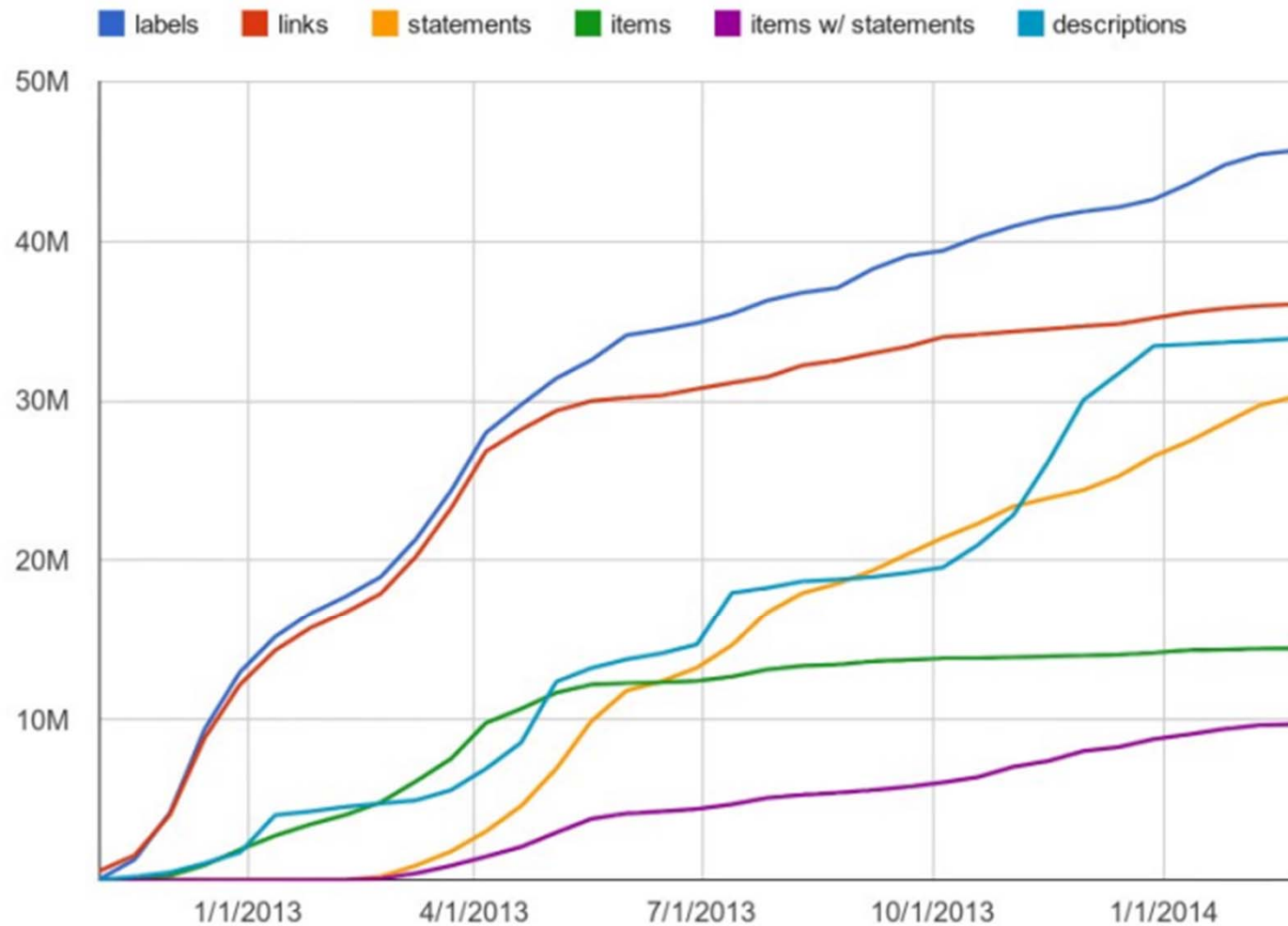
(Feb 2014)



- 42k contributors – 5k contributors with 5+ edits in Jan 2014
- Well over 100M edits so far – up to 500k per day

Wikidata Activity

Growth (up to Feb 2014)



Wikidata facts about Abraham Lincoln



Abraham Lincoln (Q91)

American politician, 16th President of the United States in office from 1861 to 1865

Abe Lincoln | Lincoln | Honest Abe

[► In more languages](#)

place of death



Petersen House

[\[edit\]](#)

[► 1 reference](#)

position held



President of the United States of America

start time

4 March 18

end time

15 April 18

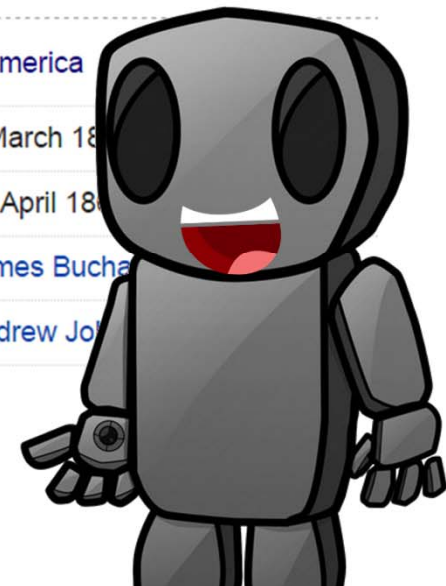
replaces

James Bucha

succeeded by

Andrew Jo

[► 1 reference](#)



ABOUT THE COURSE ...

Topics Covered

- RDF (triple-based data model)
- Linked Data / Web of Data
- SPARQL (query language)
- RDFS/OWL (ontological languages)
- RDB2RDF (importing databases to Sem. Web.)
- Consuming the data
- Applications, research, discussion



Structure of the course

- Each week:
 - Class on Monday (learn concepts)
 - Lab on Wednesday (see concepts in practice)
- Marking structure (**TBD**) but roughly:
 - 40% labs
 - 25% project
 - 30% exam
 - 5% reading group
 - open to discussion (e.g., “controlles”?)
- Spanglish es okay

Outcomes: Learn About the Semantic Web!

- An ongoing research topic here in the DCC
- Apply database, logic, AI, etc., to the Web!
- Mix of concepts and practical exercises
- See what the future Web (might) look(s) like!

Questions?

