

# Web Science: Why Study the Web?

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Royal Society  
8th March 2010

# The Challenge

## the elephant in the room

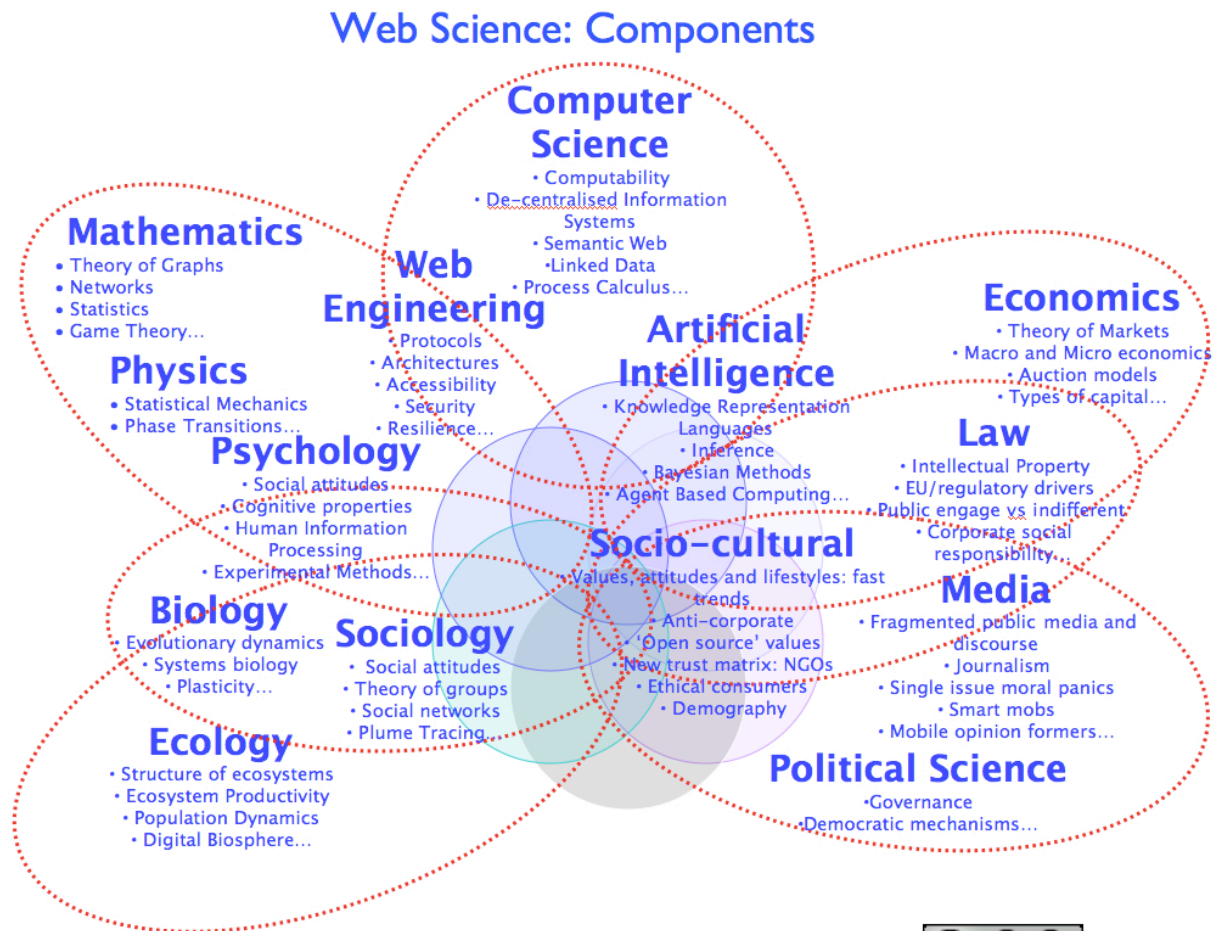
- The Internet and the Web have been transformational
- we need to understand them
- anticipate future developments
- identify opportunities and threats



# Web Science is about additionality

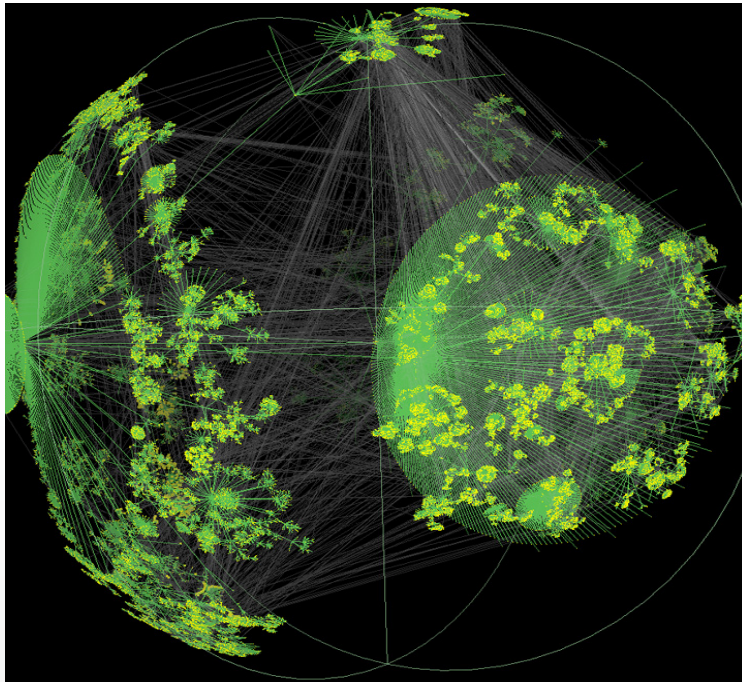
Not the union of the  
disciplines

But more than their  
intersection

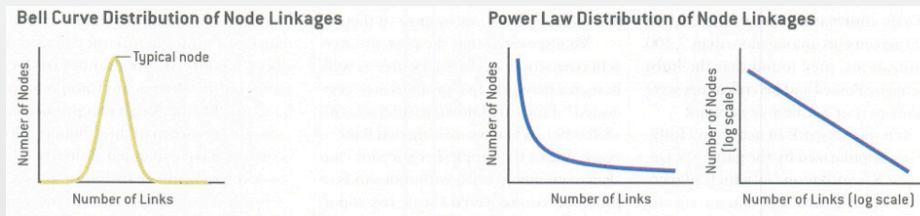


# Web Science

## existing insights



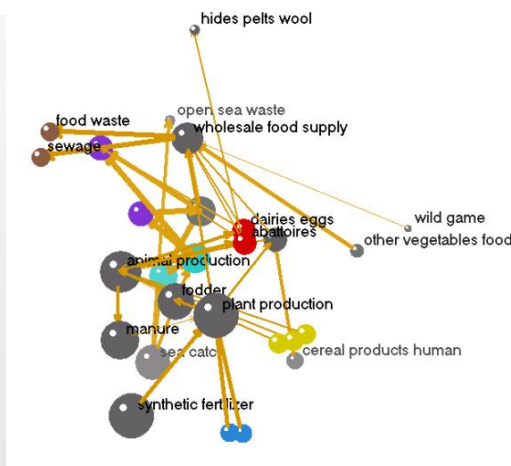
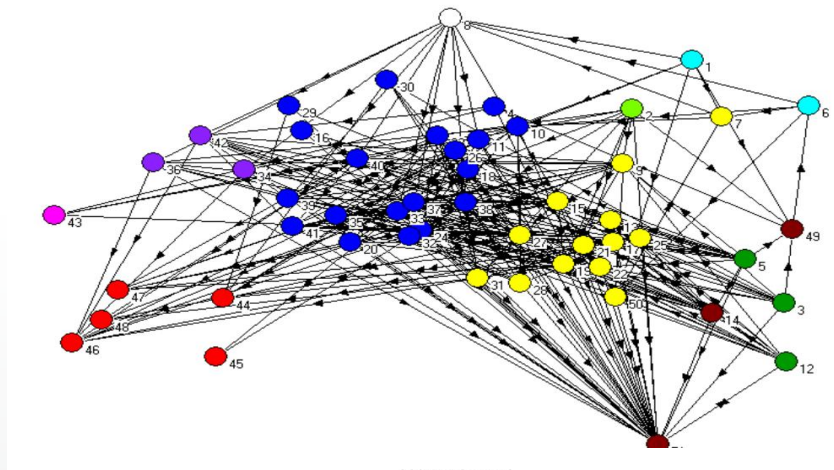
- Scale-free
- Power laws
- Small worlds
- Hubs and authorities





# Web Science

## where additionality helps



- Ubiquity of Scale Free Networks
- Stability of networks
- Elimination and addition
- Issues of sampling and modelling
- Robert M. May “Network structure and the biology of populations” *TRENDS in Ecology and Evolution* Vol.21 No.7 July 2006

# Web Science

## an example: the dynamic Web

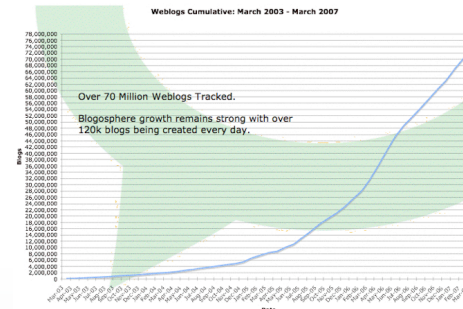
- Is the Web changing faster than our ability to observe it?
- How to measure or instrument the Web?
- How to identify behaviours and patterns ?
- How to analyse the changing structure of the Web?



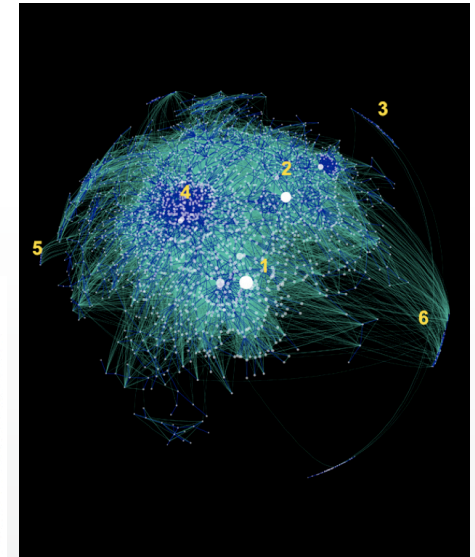
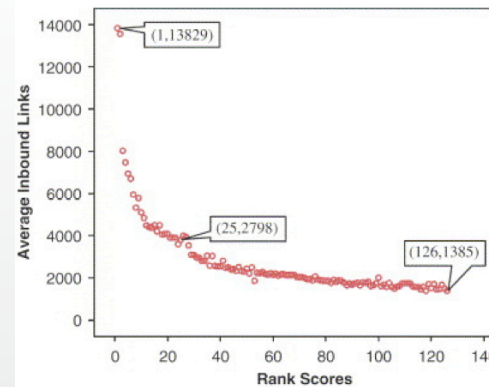
# Web Science

## an example: understanding blogs

- When and why did the blogosphere take off?
- Who blogs and how much?
- Why do they blog?
- Is it the same everywhere?



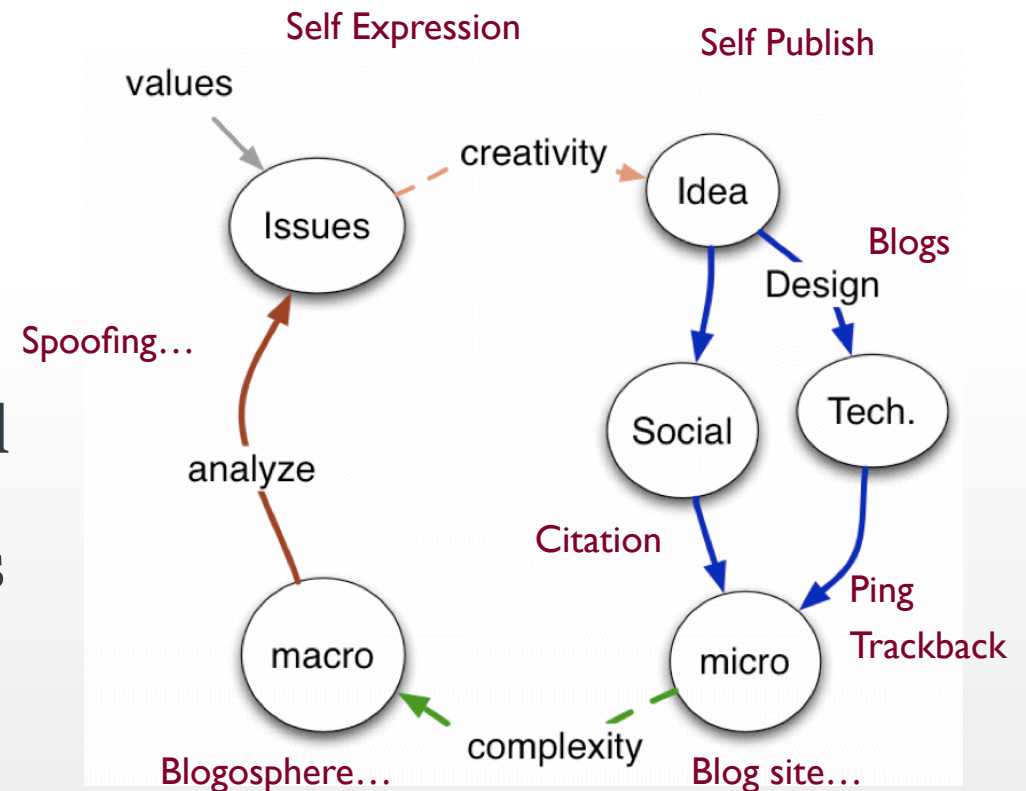
Top Blog sites



# Web Science

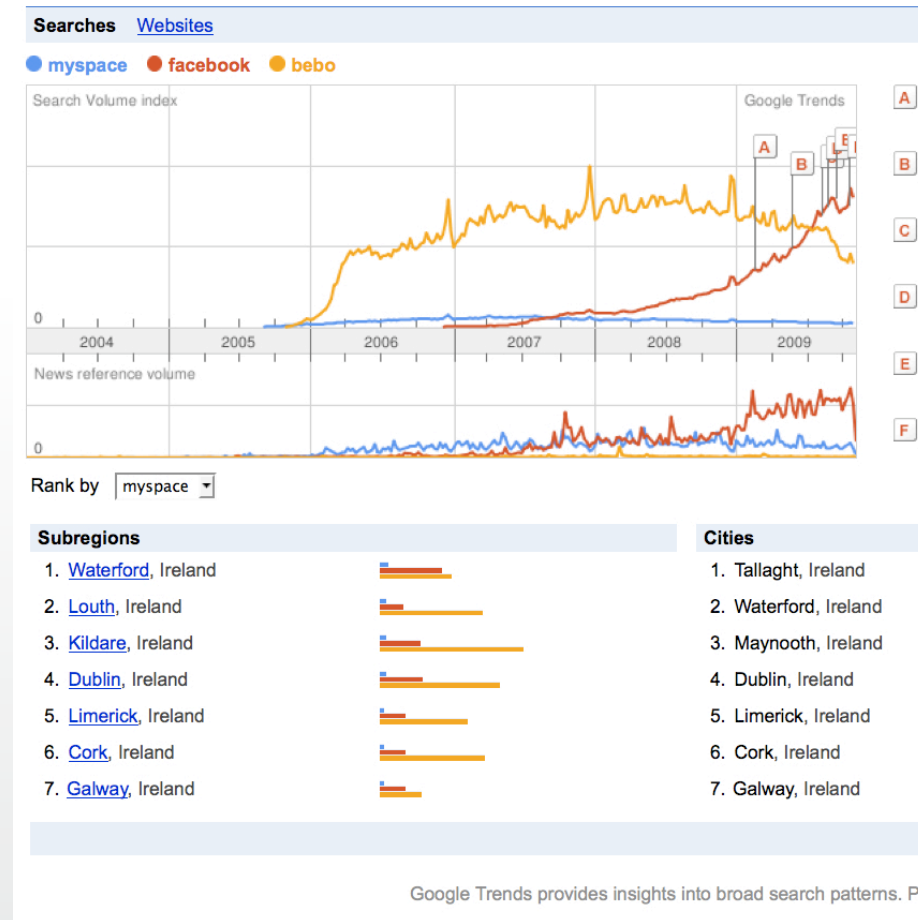
## an example: understanding blogs

- creative innovation
- design and engineering
- the social and the technical
- interpretation and analysis



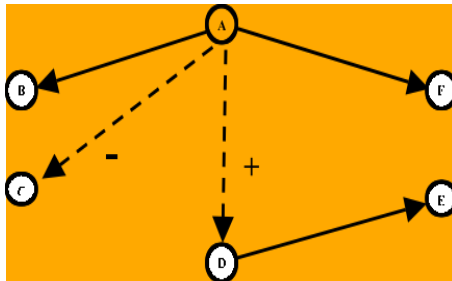
# Web Science

## an example: Social Networks

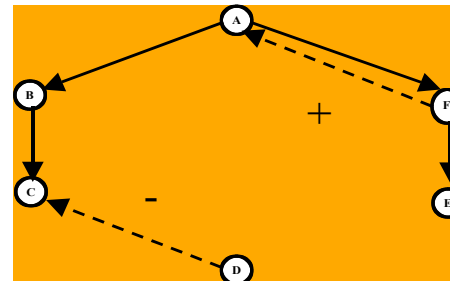


# Web Science

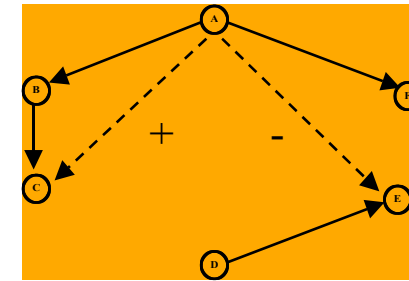
## an example: Social Networks



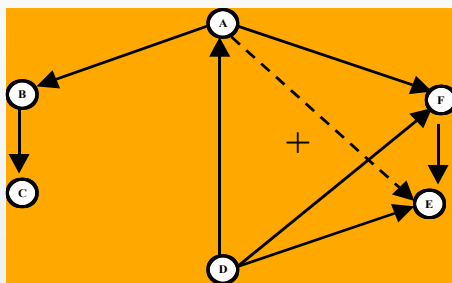
Theories of Self interest



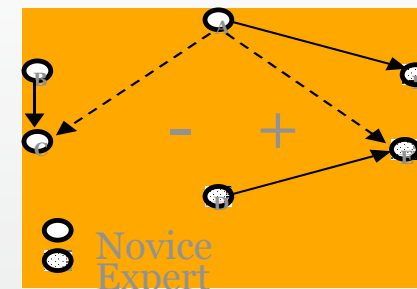
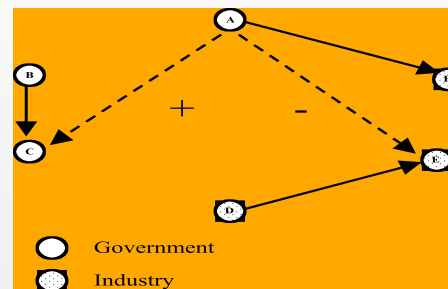
Theories of Exchange



Theories of Balance



Theories of Collective Action



### Sources:

Contractor, N. S., Wasserman, S. & Faust, K. (2006). Testing multi-theoretical multilevel hypotheses about organizational networks: An analytic framework and empirical example. *Academy of Management Review*.



## an example: collective intelligence

- Shape and structure
- Scale free
- Preferential attachment
- Communities
- Values and obligations
- Incentives

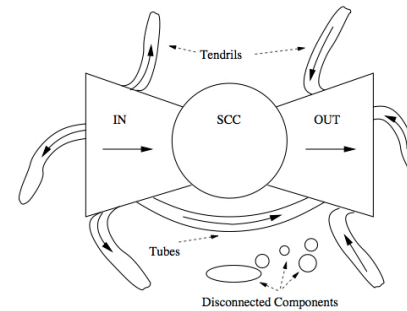
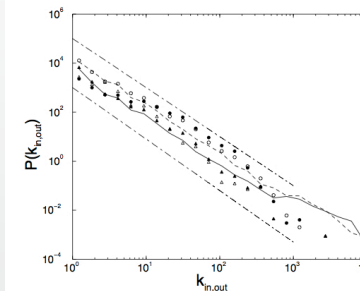


FIG. 1: The shape of the Wikipedia network



# Web Science

## an example: collective intelligence

- Shape and structure
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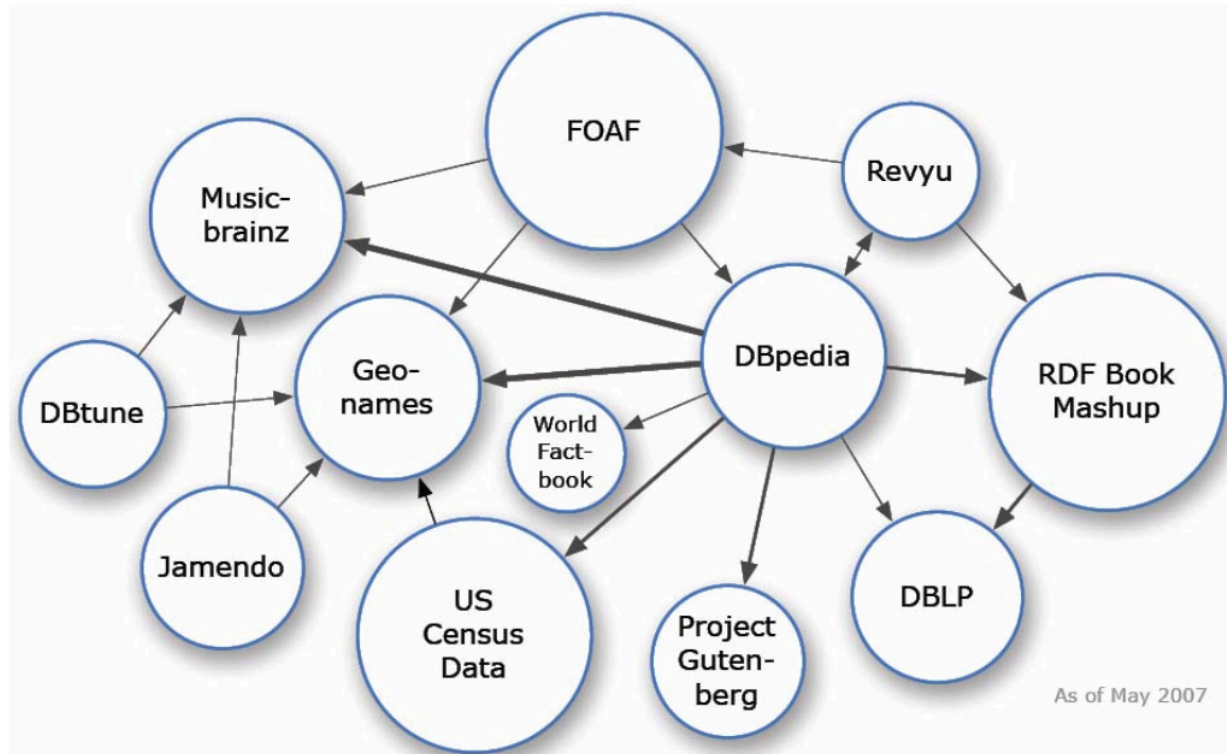
Motivation	Mean
Fun	<b>6.10</b> (1.15) [0.322***]
Ideology	<b>5.59</b> (1.71) [0.110]
Values	<b>3.96</b> (1.55) [0.175*]
Understanding	<b>3.92</b> (1.48) [0.296***]
Enhancement	<b>2.97</b> (1.39) [0.313***]
Protective	<b>1.97</b> (1.05) [0.306***]
Career	<b>1.67</b> (0.94) [0.185*]
Social	<b>1.51</b> (0.92) [0.027]

\*significant at 0.05 level  
\*\*significant at 0.01 level  
\*\*\*significant at 0.001 level

Motivation	Question example
Protective	"By writing/editing in Wikipedia I feel less lonely."
Values	"I feel it is important to help others."
Career	"I can make new contacts that might help my business or career."
Social	"People I'm close to want me to write/edit in Wikipedia."
Understanding	"Writing/editing in Wikipedia allows me to gain a new perspective on things."
Enhancement	"Writing/editing in Wikipedia makes me feel needed."
Fun	"Writing/editing in Wikipedia is fun."
Ideology	"I think information should be free."

# Web Science

## an example: linked data





# Web Science

## an example: government linked data



HM Government data.gov.uk

Home Blog Data SPARQL Apps Ideas Forum Wiki Resources About

Unlocking innovation  
Working with UK Public Sector information and data

Advised by Sir Tim Berners-Lee and Professor Nigel Shadbolt and others, government is opening up data for reuse. This site seeks to give a way into the wealth of government data and is under constant development. We want to work with you to make it better.

We're very aware that there are more people like you outside of government who have the skills and abilities to make wonderful things out of public data. These are our first steps in building a collaborative relationship with you.

**Latest news:**

- Read about our latest site changes
- Information about the Local Data Panel
- Applications in the news

**Search Data**

Enter keyword(s)

e.g. education, NHS, crime, transport, environment

Powered by: CKAN

**Browse for Data**

List all datasets

By Public Body

Common tags

**Most Recent Apps** [View all apps +](#)

- SaferMK**  
This is a crime reduction application that has two key functions: 1. simple-  
house interface
- EnAKTing UK Public Sector Information Data Mashup**  
Map application that using OpenSpace
- OpenGeoscience**  
Discover if you live on rocks from an extinct volcano, in the middle of an ancient river or  
deep under a

**Subscribe by RSS**

**Community**  
Log in / Sign up

**Local Data Panel**

**What is the Semantic Web?**  
Combining different data sources has never been easy but the Semantic Web will enable data to be joined easily across boundaries.  
[Read more](#)

**Digital Engagement Twitter stream**

RT

@stephendimms:  
#digitalbritain Announced in House today establishment of Broadband Delivery UK, chief executive Adrian Kamellard  
[Follow us on Twitter](#)

**Tell us your idea**

School of Electronics  
and Computer Science

- [illegible]



# Web Science

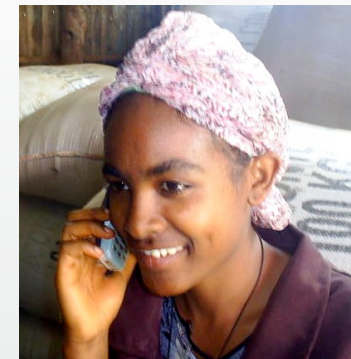
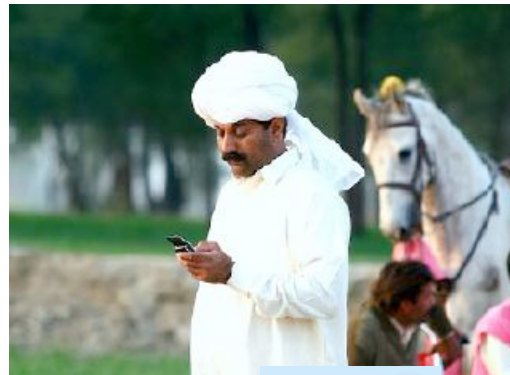
## an example: life logging

- 75 years of awake experience  
 $1.5610 \times 10^9$  secs
- 2.5 Mb/sec for digital video
- $7.3195 \times 10^{13}$  for a year of  
digital video awake life ~ 73  
terabytes
- $5.4896 \times 10^{15}$  for entire awake  
life ~ 5.5 petabytes



# Web Science

## an example: the mobile Web



# Web Science

## why this matters

- the Web matters
- an essential part of humanity
- An essential part of the current and future economy
- understanding the Web is a major challenge as big as any other global cause

