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Web Science: Why Study the Web?

Professor Nigel Shadbolt

Royal Society
8th March 2010

The Challenge
the elephant in the room

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- 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

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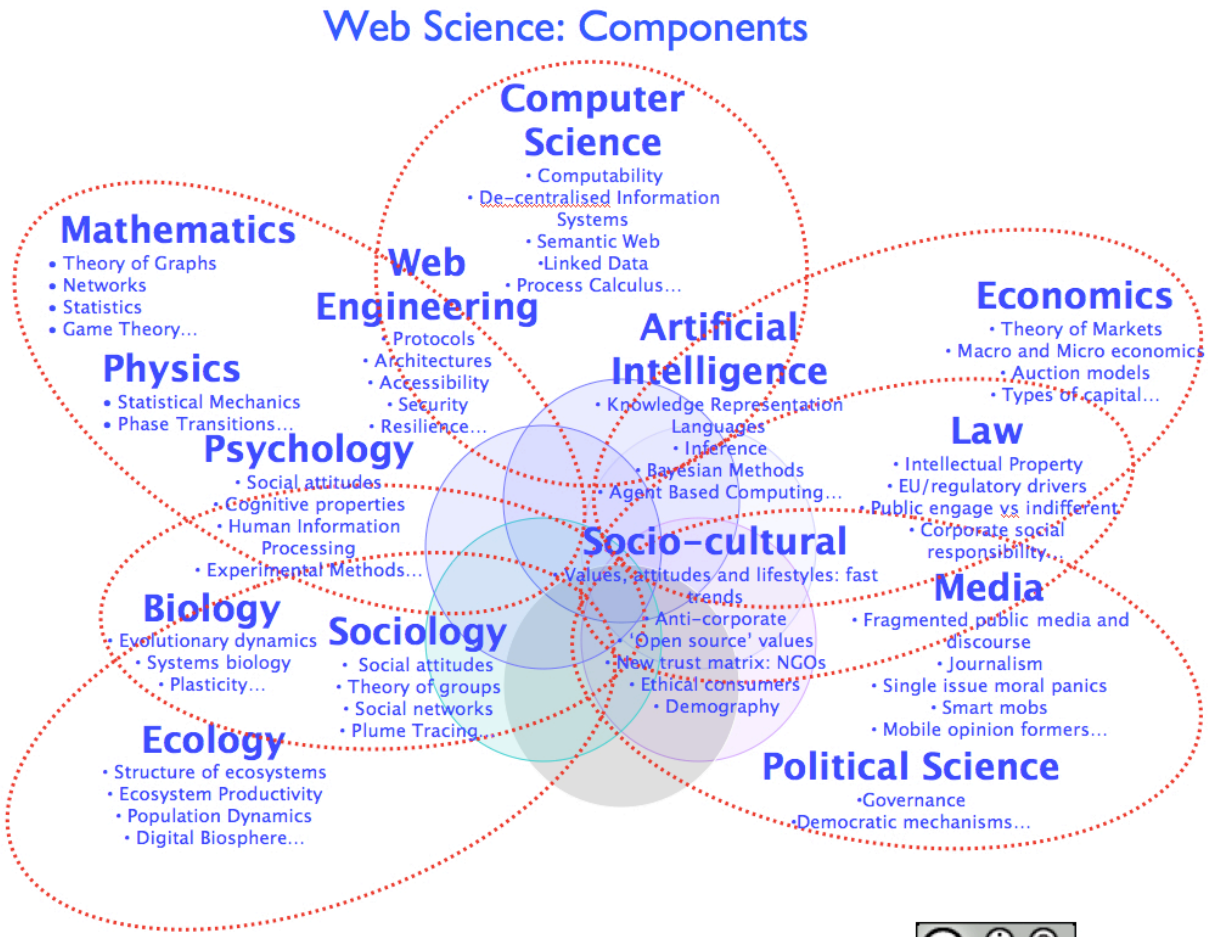
Not the union of the disciplines

But more than their intersection



Web Science
existing insights

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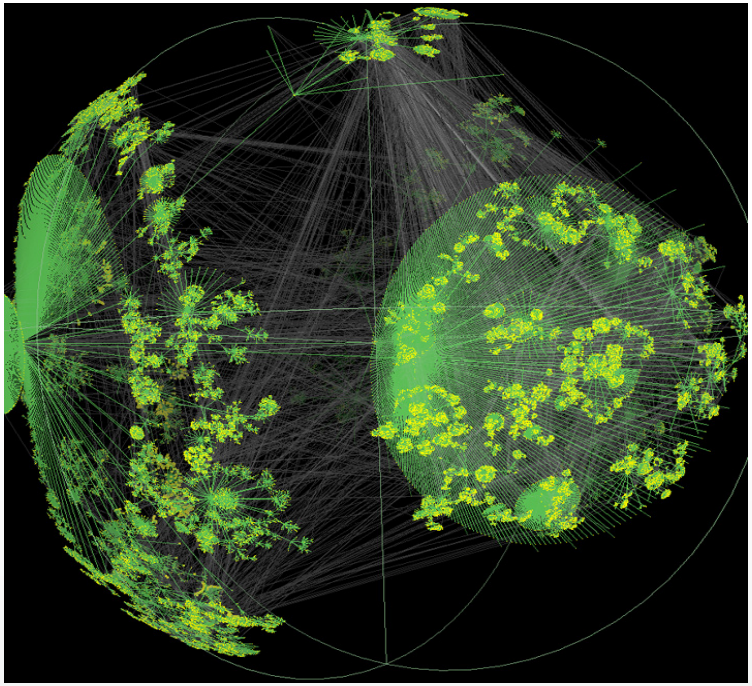
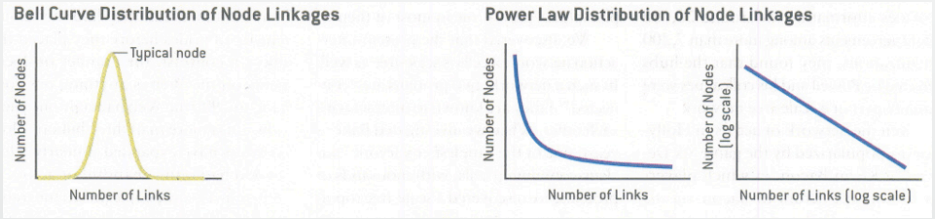


- Scale-free
- Power laws
- Small worlds
- Hubs and authorities



Web Science
where additionality helps

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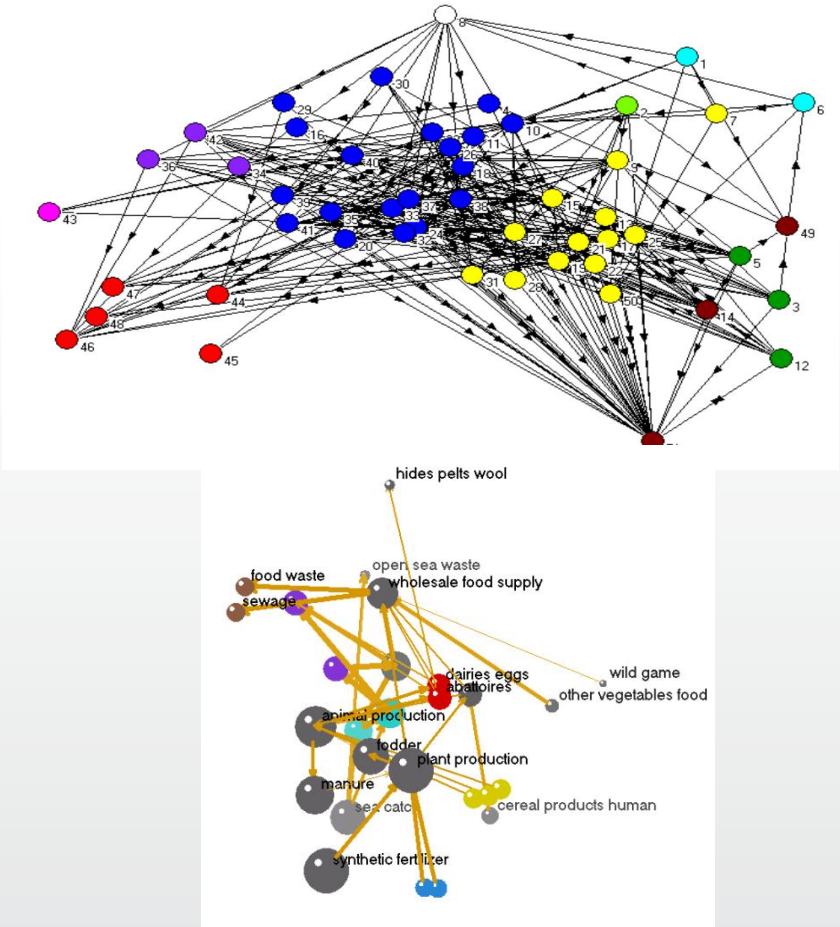

- Ubiquity of Scale Free Networks
- Stability of networks
- Elimination and addition
- Issues of sampling and modelling
- Robert M. May "Network structure and the biology of populations" *TRENDS in Ecology and Evolution* Vol.21 No.7 July 2006

Web Science

an example: the dynamic Web

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- 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

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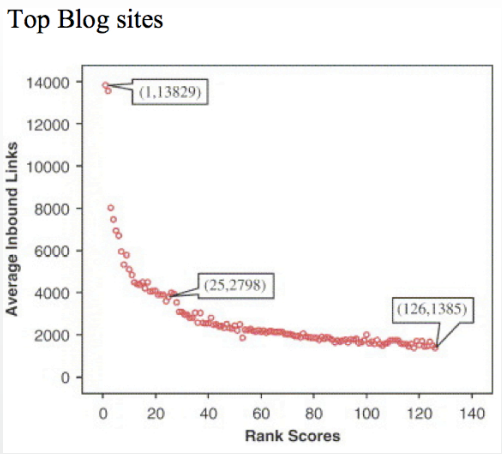
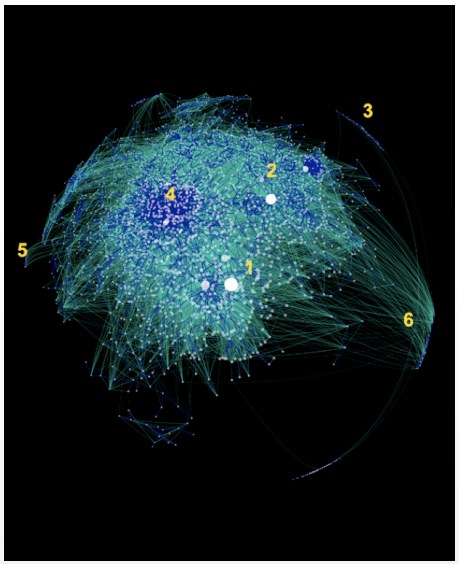
- When and why did the blogosphere take off?
- Who blogs and how much?
- Why do they blog?
- Is it the same everywhere?





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an example: understanding blogs

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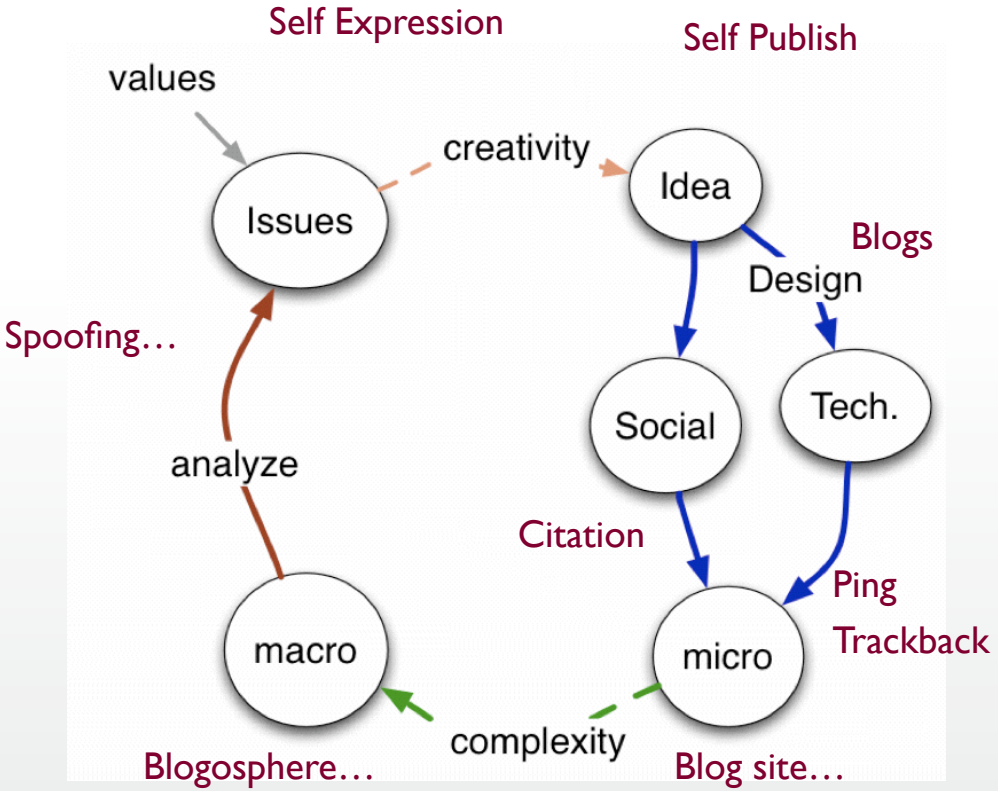
- creative innovation
- design and engineering
- the social and the technical
- interpretation and analysis



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an example: Social Networks

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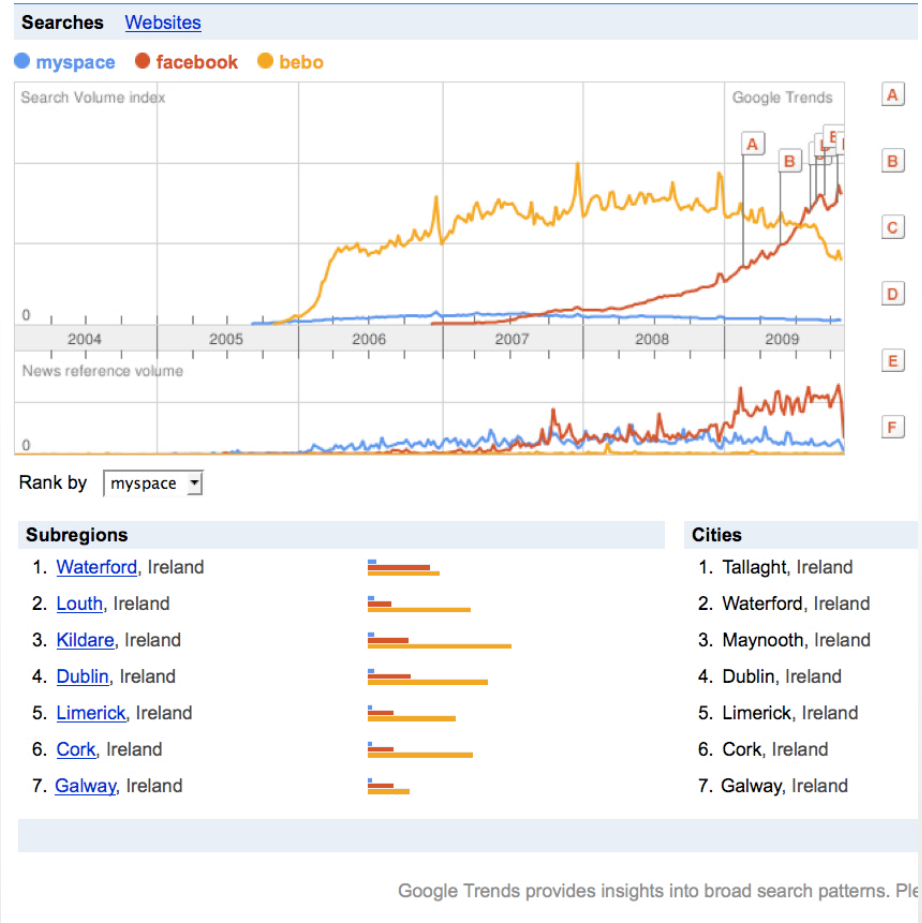

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an example: Social Networks

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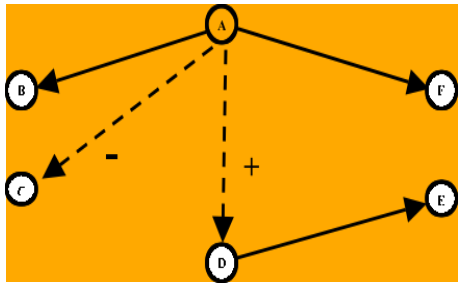
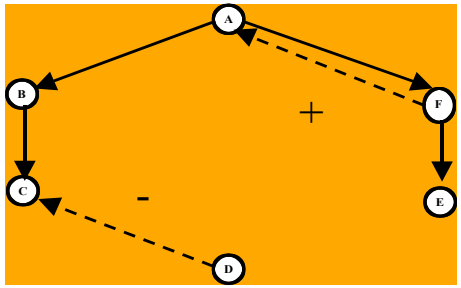
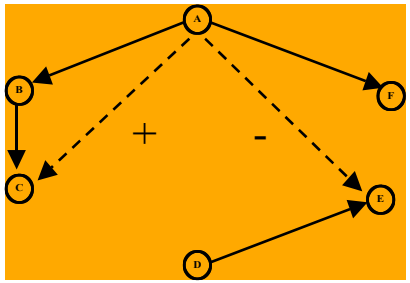


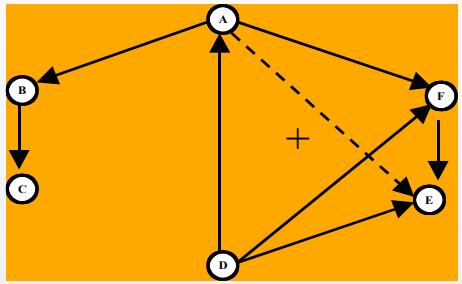
Theories of Self interest



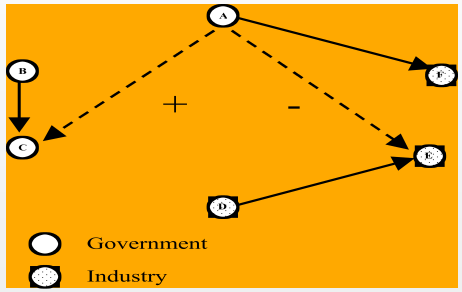
Theories of Exchange



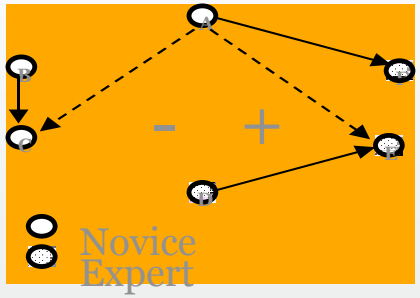
Theories of Balance



Theories of Collective Action



Theories of Homophily



Theories of Cognition

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*.

Web Science

an example: collective intelligence

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

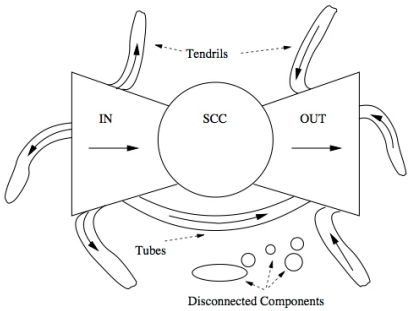
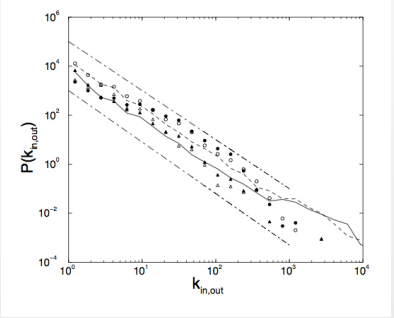


FIG. 1: The shape of the Wikipedia network



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an example: collective intelligence

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Motivation	Mean
Fun	**6.10** (1.15) [0.322***]
Ideology	**5.59** (1.71) [0.110]
Values	**3.96** (1.55) [0.175*]
Understanding	**3.92** (1.48) [0.296***]
Enhancement	**2.97** (1.39) [0.313***]
Protective	**1.97** (1.05) [0.306***]
Career	**1.67** (0.94) [0.185*]
Social	**1.51** (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."

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an example: linked data

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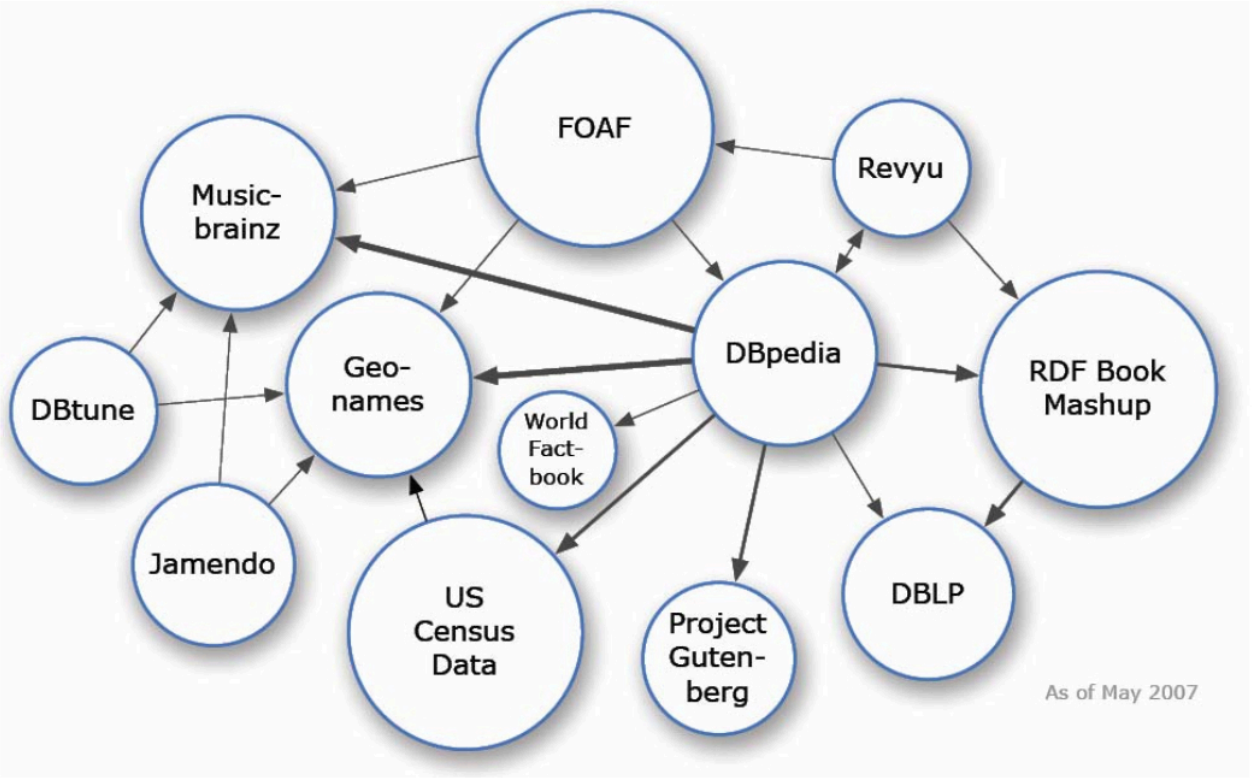

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an example: linked data

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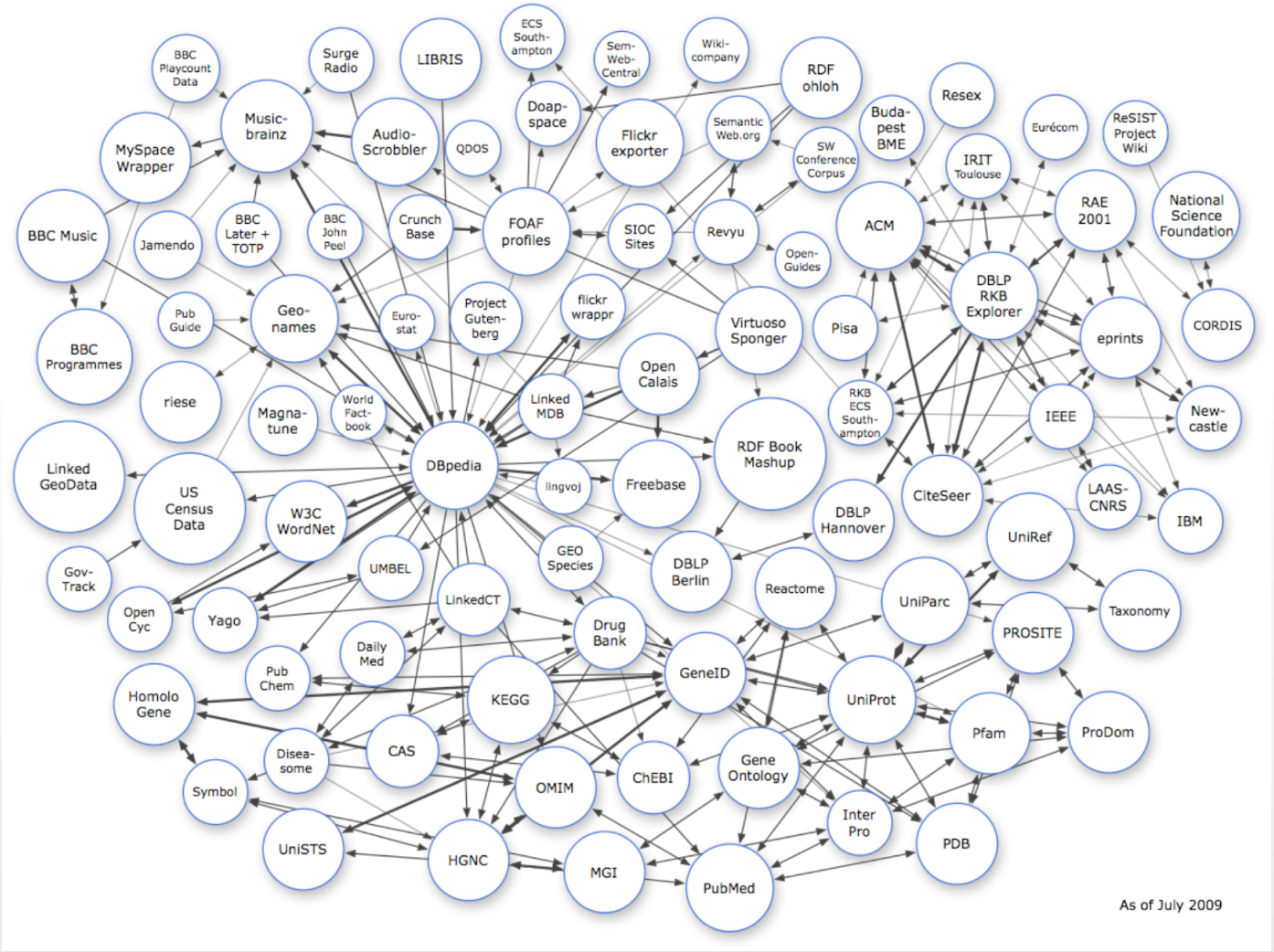

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an example: government linked data

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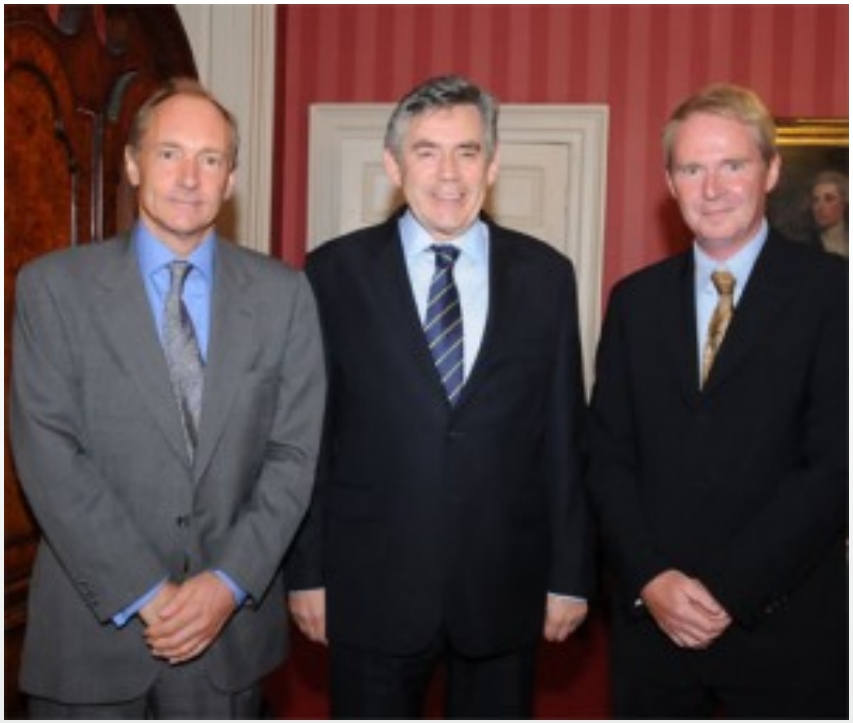

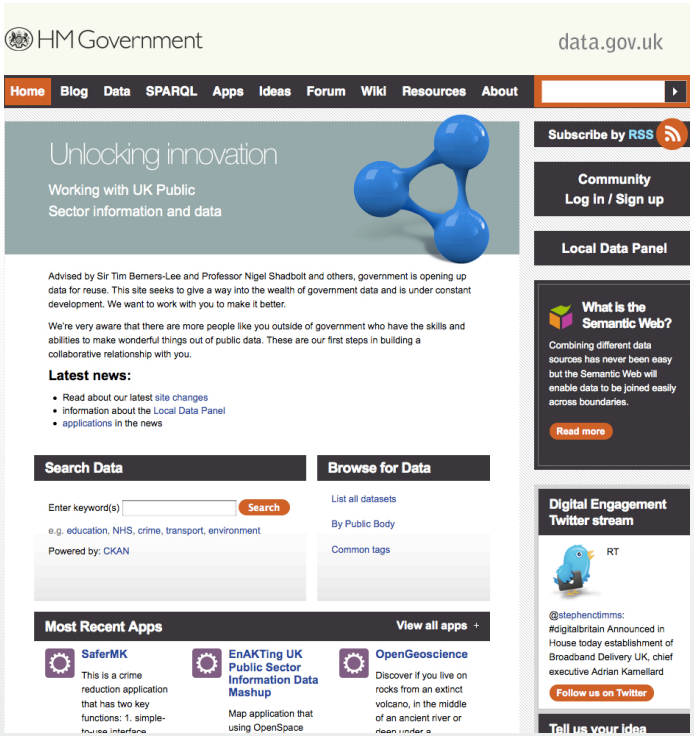

Web Science

an example: trust and privacy

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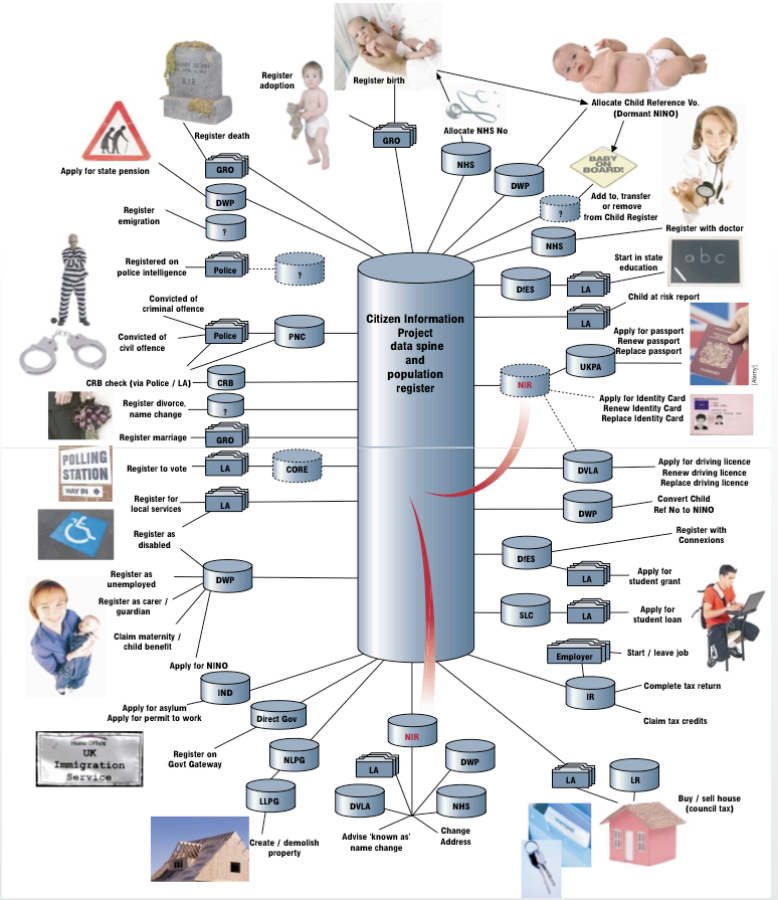
- What is the nature of trust relations between individuals, groups and organizations in the Web
- How and why do trust and privacy and break down?
- How does it change the Web if they do?
- What is the balance between social and technical solutions to these problems?
- Can we develop appropriate legal frameworks and institutions



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an example: life logging

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

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an example: the mobile Web

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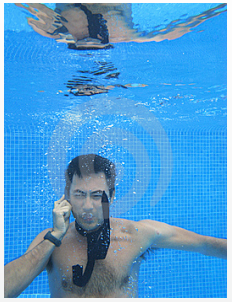





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Web Science
why this matters

- 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