

The Development of the Web, Security and Privacy

WEB SCIENCE Institute

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Beginning of the Web

- Developed at Central European Nuclear Research facility
- In 1989 the Web established itself in CERN, then international academia, industry and the rest of the world



Expansion of the Web

- The Web spread the conditions of its initial creation throughout the whole of society as it underwent an initial inflationary phase.
- The academy has
 - government patronage
 - large-scale co-operation
 - sharing of intellectual property with others

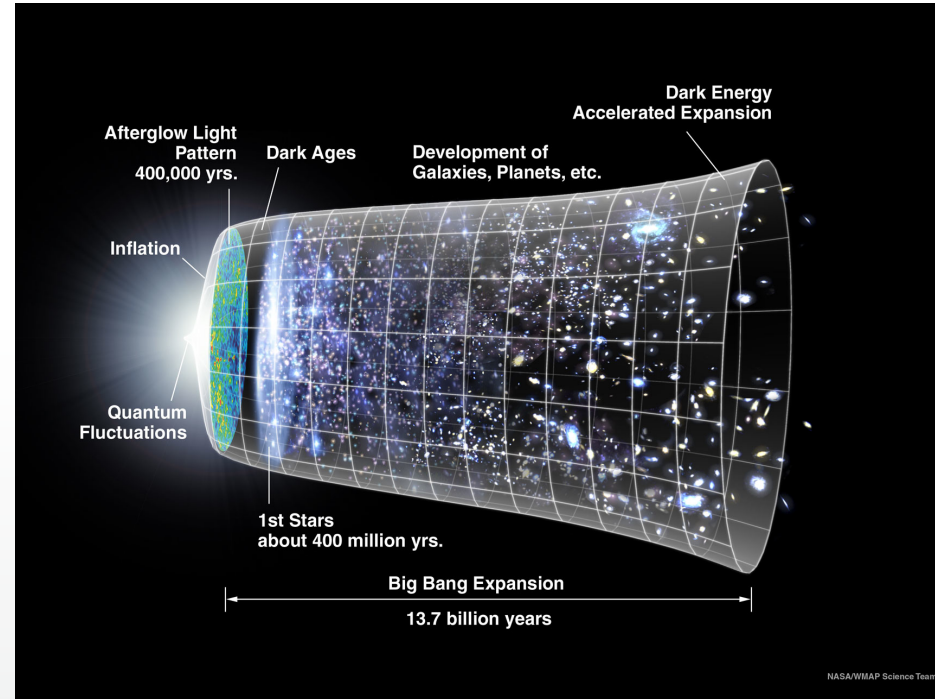


Diagram: Big Bang Expansion (NASA).

This is not like other areas of society – e.g. media, industry, commerce.

Society is Diverse. One Web Fits All?



Institution	Objective
Academy	Create and transmit knowledge
Commerce	Make and trade goods
Press	Investigate and report news
Media	Create and broadcast content
Police	Maintain order and public surveillance
Judiciary	Apply law and resolve disputes
Government	Control society and share resources

The development of society as a whole (nuanced and structured and refined) is inextricably related to the technology of information provision, consumption and dissemination (e.g. writing, reading, printing, education). *Different parts of society have different objectives and hence incompatible Web requirements, e.g. openness, security, transparency, privacy.*

Historic Attempts at Webs

Sponsor	System	Scope	Real	Date	Important Properties
Finance / Press	Reuters	Professional, centralised	✓	1850	News & stock information (originally carrier pigeon and subsequently telegraph)
Private Institution	Mundaneum	Public, centralised	✓	1920	Based on indexing technology (the library card)
Military	Memex	Scholarly, individual, centralised	✗	1945	Aimed at Scientists and Technologists in WWII
Media	Xanadu	Public, decentralised	✗	1960	Focused on DRM, reuse and writing for “creatives”
Media	CEEFAX	Public, national, centralised	✓	1970	Broadcast, linked, not participatory
Government	Minitel	Public, national, centralised	✓	1980	Commercial services and information
Academy (CS & HEP)	FTP / Archie / Anarchie	Public, decentralised	✓	1985	Download resources (papers, reports) to hard drives and print them on LaserWriters.
Commerce	Hypercard, HyperTIES	Private, centralised	✓	1988	Personal applications, sometimes tied to multimedia resources on CDROMs / video disks
Academy (HEP)	WWW	Public, global, decentralised	✓	1990	Universal naming, linking, interoperability, participative. However no writing, no indexing in public version.
Academy (CS)	Microcosm	Private, centralised	✓	1990	Sophisticated linking and openness for personal information stores
Academy (CS)	HyperG	Public, centralised	✓	1990	Extension of Web for with support for writing, indexing and consistency management.
Commerce	AOL, CompuServ	Public, centralised	✓	1990	Dialup walled garden access to email, forums, chat rooms and information resources

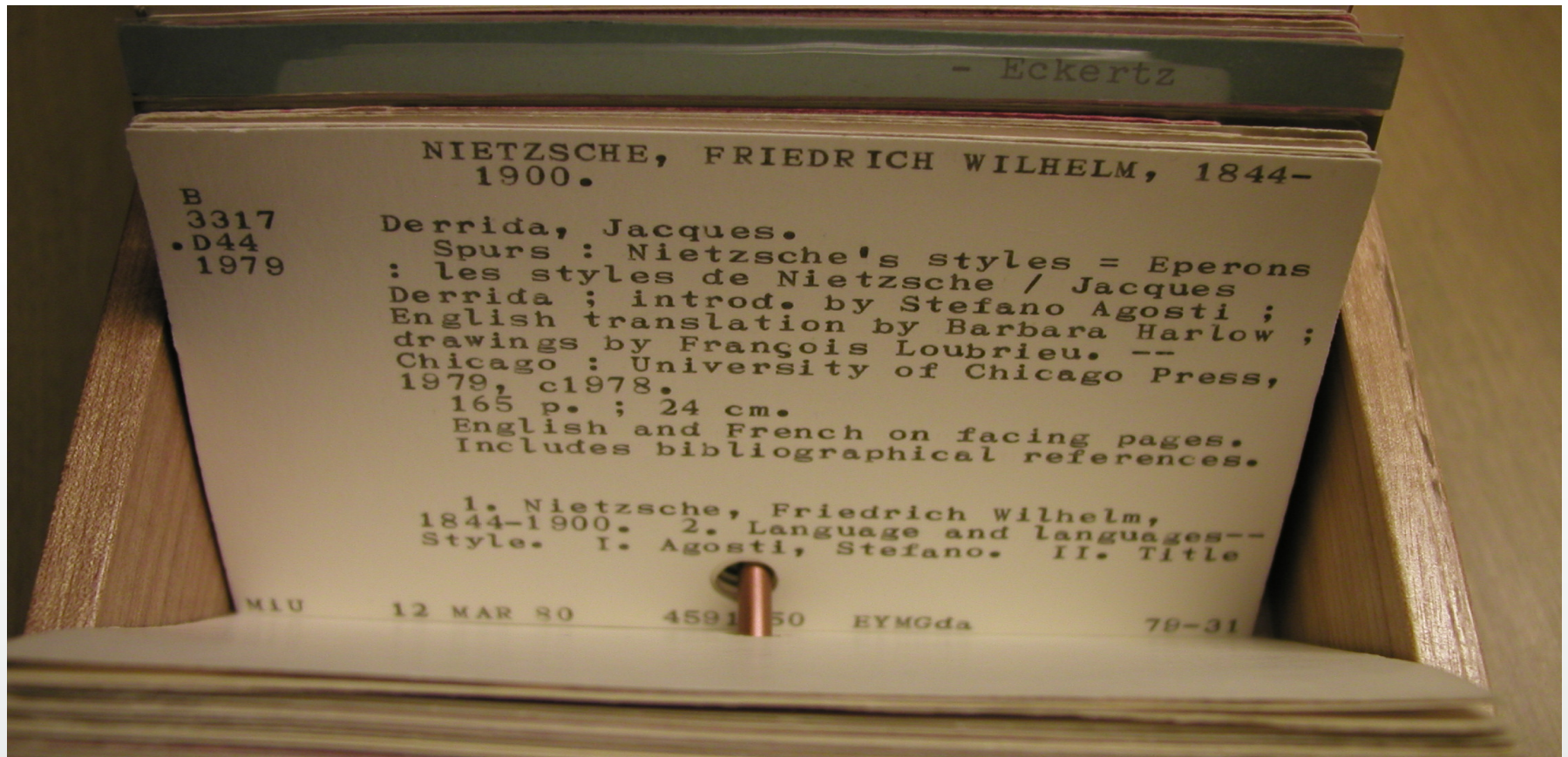
Paul Otlet, 1868-1944

- Belgian lawyer
- Introduced US 3"x5" library card to Europe
- *Traité de Documentation* (1934)
 - the systematic organisation of all knowledge and thought



Mundanaeum: 15 million index card bibliographic index, 1 million documents and images, classified and searchable. *Query became part of the bibliographic record. Content was interlinked.*

Available Technology



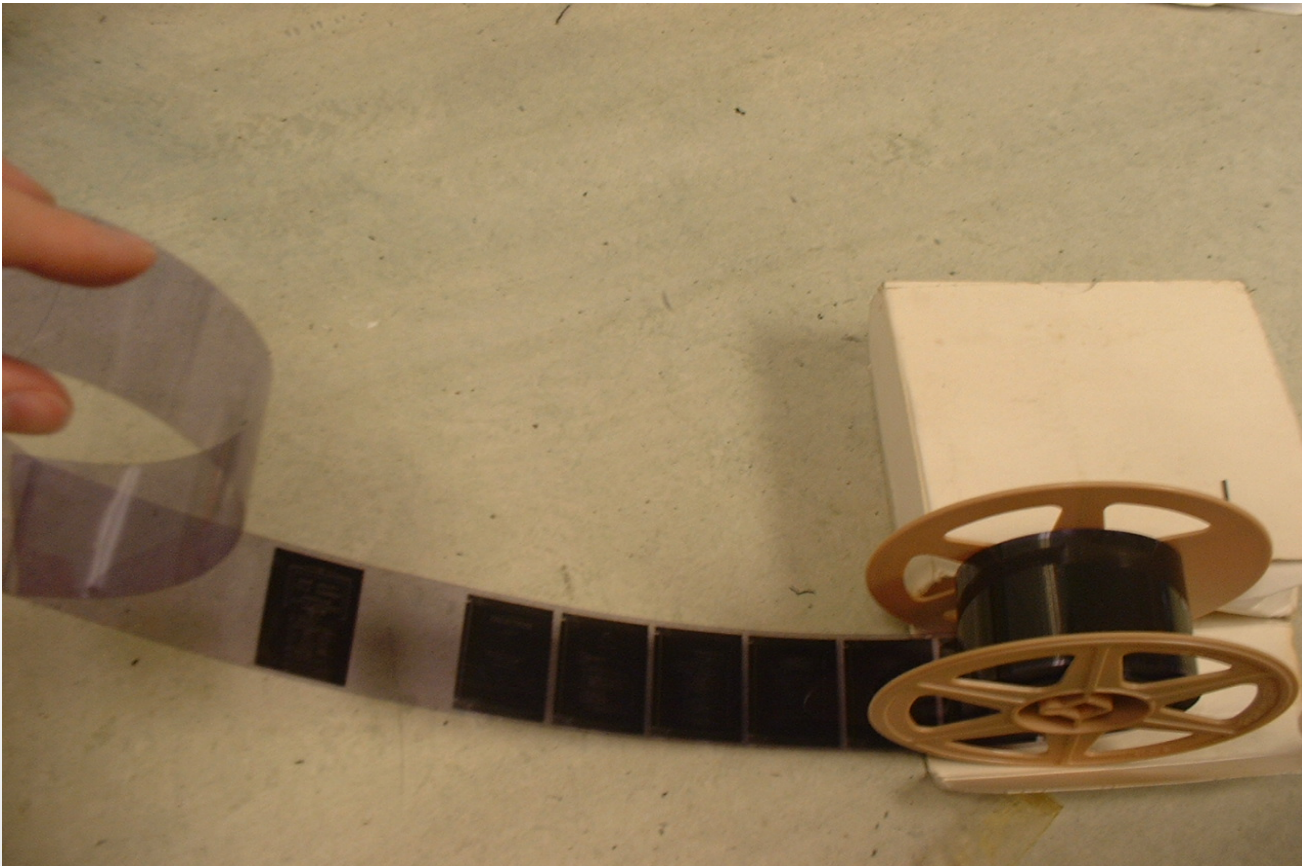
The library card, used for the mundaneum



H. G. Wells, *World Brain: The Idea of a Permanent World Encyclopaedia*, Encyclopédie Française, August, 1937

- Encyclopaedias of the past sufficed for the needs of a cultivated minority
 - universal education was unthought of
 - gigantic increase in recorded knowledge
 - more gigantic growth in the numbers of human beings requiring accurate and easily accessible information
- Discontent with the role of universities and libraries in the intellectual life of mankind
- Universities multiply but do not enlarge their scope
 - thought & knowledge organization of the world
- **No obstacle** to the creation of an efficient index to *all* human knowledge, ideas and achievement

Available Technology



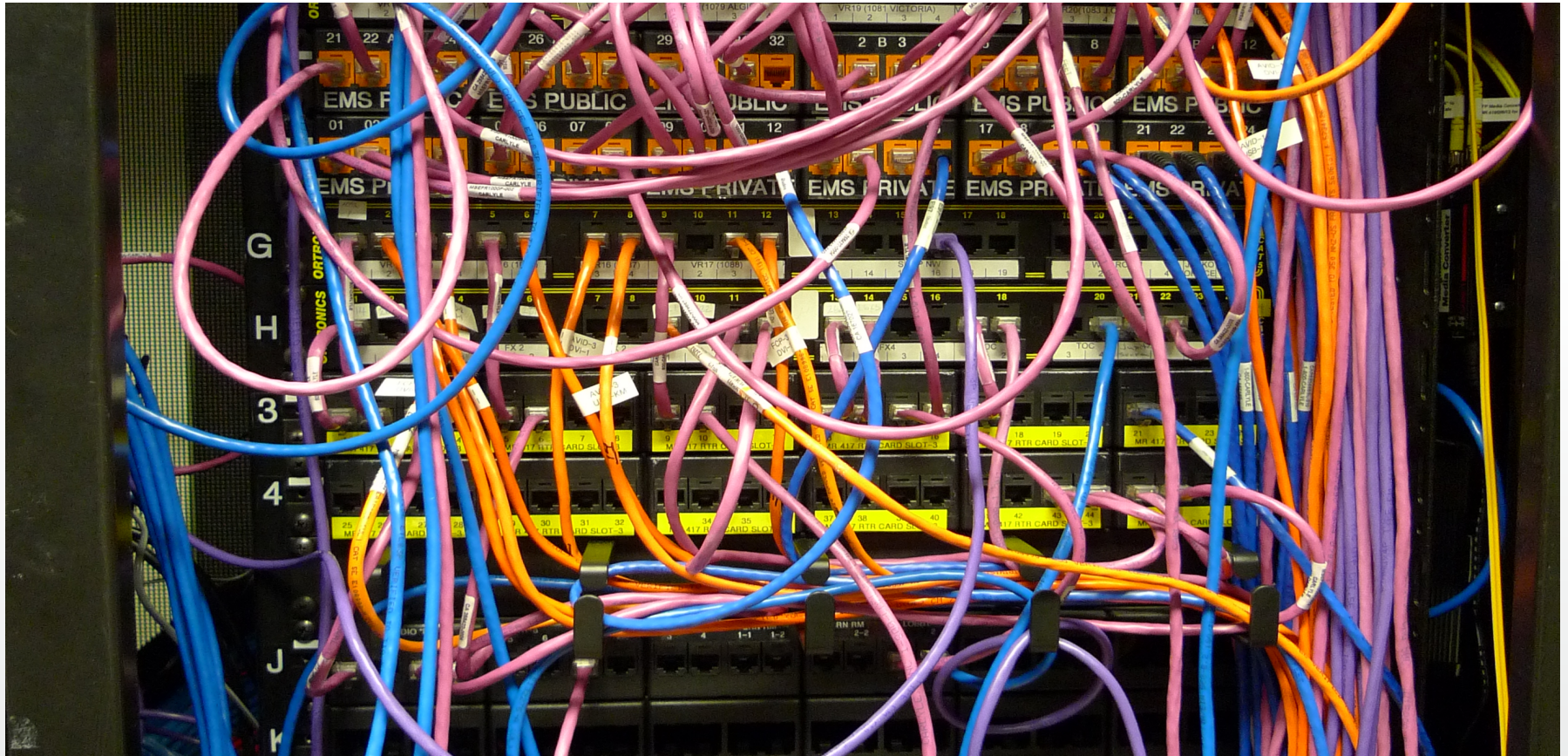
The microfilm (modern example), proposed for the World Brain

Tim Berners-Lee

- The “inventor of” the Web
 - Browsing
 - HTTP, HTML, URL
- A network of interconnected documents built on a network of interconnected servers by a network of interconnected people.



Available Technology



The Internet - the interconnected networks of wires and computers that exchange messages with each other.

The Web is Evolving

- Pretty much **none of the things** that we do on the Web were invented by Tim or available to Tim
 - Searching for things on Google
 - Looking up facts in Wikipedia
 - Sharing photos on Flickr
 - Blogging about professional issues
 - Watching catchup TV on Netflix
 - Updating your Facebook status on your smartphone

What Was Tim's Web Missing?

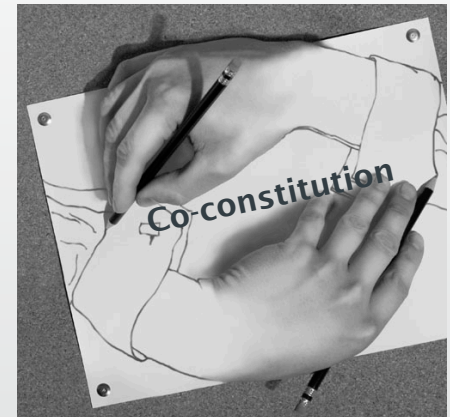
- Digital Cameras (1994)
- Search engine (1996)
- Wifi (2000, first campus coverage in US)
- Broadband (2000, UK BT)
- Smartphone (2007)



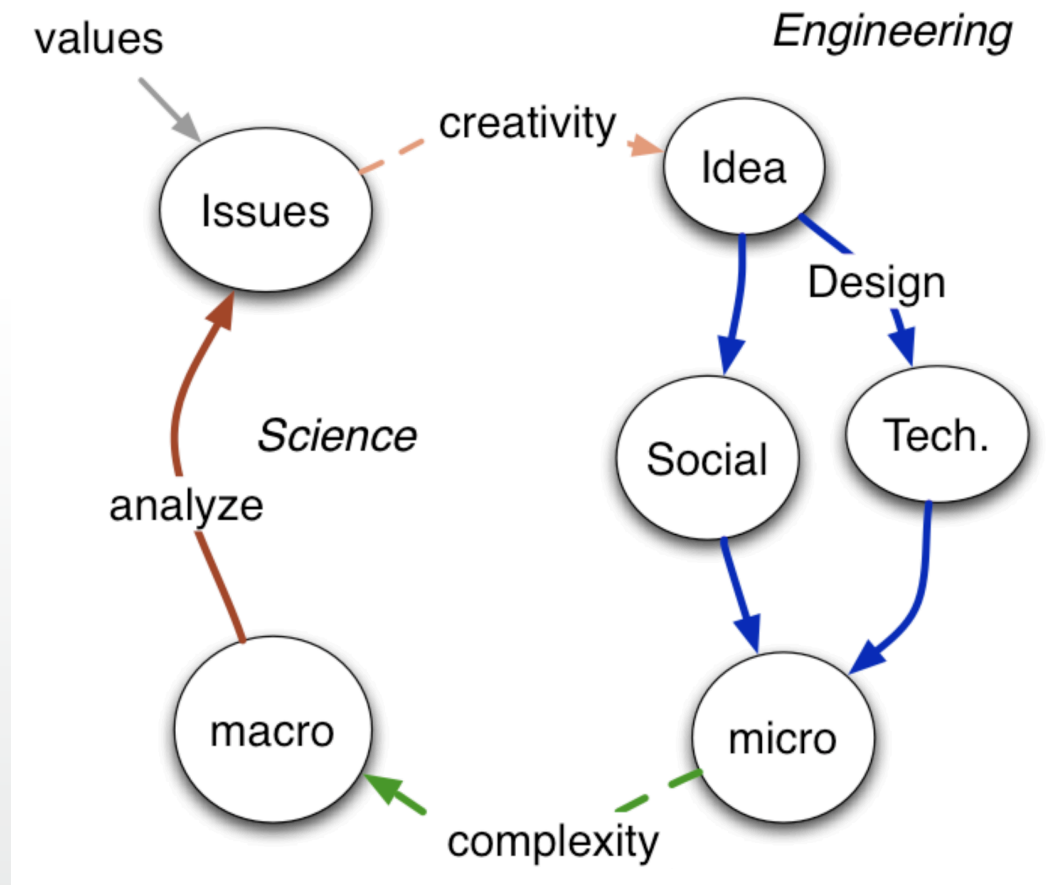
Web Development

- The Web isn't a thing but an activity
 - the active and ongoing creation of a *network of information by a network of individuals.*
- The Web wasn't invented by Tim Berners-Lee,
 - it is being invented by all of us as we gradually adapt our tools and change our practice.
 - co-opting existing networks and existing practices

The web both *shapes* and *is shaped by* society.



The “Magic” of Web Science



- People design web systems in the lab (the micro) and release them into the wild (the macro).

Understanding the Web

- It's not just a technology but a socio-technical hybrid
- **The Web is a collection of Web Activities**
 - Online Shopping, Online Banking, E-Government, Social Networking, etc.
 - These activities reflect *human interaction* and *technological development*
- **Web Activities are not exclusive**
 - They develop together with other activities
 - Their development are *internally* and *externally* co-constructive