

**WEBS2002**  
**Interdisciplinary Project**  
**Visual Literacy**

# Think about your visual literacy

- The purpose of this session is to prompt you to
  - review your visual literacy
- As a result you may:
  - Identify how you might communicate using visual methods
  - Develop a wider understanding of the power and use of visualisations

# Question

- How many different visualisation methods can you name?
- Think, pair, share
- Start you list individually
- Then pair and discuss
- Then feedback to class

# A PERIODIC TABLE OF VISUALIZATION METHODS

<b>C</b> continuum	<b>Data Visualization</b> Visual representations of quantitative data in schematic form (either with or without axes)											<b>Strategy Visualization</b> The systematic use of complementary visual representations in the analysis, development, formulation, communication, and implementation of strategies in organizations.					<b>G</b> graphic facilitation						
<b>Tb</b> table	<b>Ga</b> cartesian coordinates	<b>Information Visualization</b> The use of interactive visual representations of data to amplify cognition. This means that the data is transformed into an image, it is mapped to screen space. The image can be changed by users as they proceed working with it											<b>Metaphor Visualization</b> Visual Metaphors position information graphically to organize and structure information. They also convey an insight about the represented information through the key characteristics of the metaphor that is employed					<b>Me</b> meeting trace	<b>Mm</b> metro map	<b>Tm</b> temple	<b>St</b> story template	<b>Tr</b> tree	<b>Ct</b> cartoon
<b>Pi</b> pie chart	<b>L</b> line chart	<b>Concept Visualization</b> Methods to elaborate (mostly) qualitative concepts, ideas, plans, and analyses.											<b>Compound Visualization</b> The complementary use of different graphic representation formats in one single schema or frame					<b>Co</b> communication diagram	<b>Fp</b> flight plan	<b>Cs</b> concept skeleton	<b>Br</b> bridge	<b>Fu</b> funnel	<b>Ri</b> rich picture
<b>B</b> bar chart	<b>Ac</b> area chart	<b>R</b> radar chart cobweb	<b>Pa</b> parallel coordinates	<b>Hy</b> hyperbolic tree	<b>Cy</b> cycle diagram	<b>T</b> timeline	<b>Ve</b> venn diagram	<b>Mi</b> mindmap	<b>Sq</b> square of oppositions	<b>Cc</b> concentric circles	<b>Ar</b> argument slide	<b>Sw</b> swim lane diagram	<b>Gc</b> gant chart	<b>Pm</b> perspectives diagram	<b>D</b> dilemma diagram	<b>Pr</b> parameter ruler	<b>Kn</b> knowledge map						
<b>Hi</b> histogram	<b>Sc</b> scatterplot	<b>Sa</b> sankey diagram	<b>In</b> information lens	<b>E</b> entity relationship diagram	<b>Pt</b> petri net	<b>Fl</b> flow chart	<b>Cl</b> clustering	<b>Lc</b> layer chart	<b>Py</b> minto pyramid technique	<b>Ce</b> cause-effect chains	<b>Tl</b> toulmin map	<b>Dt</b> decision tree	<b>Cp</b> cpm critical path method	<b>Cf</b> concept fan	<b>Co</b> concept map	<b>Ic</b> iceberg	<b>Lm</b> learning map						
<b>Tk</b> tukey box plot	<b>Sp</b> spectrogram	<b>Da</b> data map	<b>Tp</b> treemap	<b>Cn</b> cone tree	<b>Sy</b> system dyn./ simulation	<b>Df</b> data flow diagram	<b>Se</b> semantic network	<b>So</b> soft system modeling	<b>Sn</b> synergy map	<b>Fo</b> force field diagram	<b>Ib</b> ibis argumentation map	<b>Pr</b> process event chains	<b>Pe</b> pert chart	<b>Ev</b> evocative knowledge map	<b>V</b> Vee diagram	<b>Hh</b> heaven 'n' hell chart	<b>I</b> informal						

- Cy** Process Visualization
- Hy** Structure Visualization
- Overview
- Detail
- Detail AND Overview
- Divergent thinking
- Convergent thinking

Note: Depending on your location and connection speed it can take some time to load a pop-up picture.  
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version 1.5

<b>Su</b> supply demand curve	<b>Pe</b> performance charting	<b>St</b> strategy map	<b>Oc</b> organisation chart	<b>Ho</b> house of quality	<b>Fd</b> feedback diagram	<b>Ft</b> failure tree	<b>Mq</b> magic quadrant	<b>Ld</b> life-cycle diagram	<b>Po</b> porter's five forces	<b>S</b> s-cycle	<b>Sm</b> stakeholder map	<b>Is</b> ishikawa diagram	<b>Tc</b> technology roadmap
<b>Ed</b> edgeworth box	<b>Pf</b> portfolio diagram	<b>Sg</b> strategic game board	<b>Mz</b> mintzberg's organigraph	<b>Z</b> zwicky's morphological box	<b>Ad</b> affinity diagram	<b>De</b> decision discovery diagram	<b>Bm</b> bcg matrix	<b>Stc</b> strategy canvas	<b>Vc</b> value chain	<b>Hy</b> hype-cycle	<b>Sr</b> stakeholder rating map	<b>Ta</b> taps	<b>Sd</b> spray diagram

# Visual-literacy.org

## Towards A Periodic Table of Visualization Methods for Management

Ralph Lengler & Martin J. Eppler  
Institute of Corporate Communication  
University of Lugano,  
Switzerland

[Ralph.Lengler@lu.unisi.ch](mailto:Ralph.Lengler@lu.unisi.ch), [Martin.Eppler@lu.unisi.ch](mailto:Martin.Eppler@lu.unisi.ch)

### ABSTRACT

In this paper, we describe the effort of defining and compiling existing visualization methods in order to develop a systematic overview based on the logic, look, and use of the periodic table of elements. We first describe the current fragmented state of the visualization field. Then we outline the rules and criteria we applied in conducting our research in order to present a revised periodic table of 100 visualization methods with a proposition how to use it.

### KEY WORDS

knowledge visualization, knowledge visualization methods, periodic table, problem solving, classification, selection framework, visualisation types

### 1 The Realm of Visualization Methods

The discipline of visualization studies is an emergent one and as such represents a so far still highly unstructured domain of research that includes scholars from such distant domains as human-computer interaction, graphic design, management, or architecture. Thus, there are many parallel, unconnected streams and development activities in this field that may move forward without mutually acknowledging or integrating efforts under way elsewhere. In order to contribute to the consolidation of these efforts and to the emergence of a distinct field that achieves cumulative research progress this article proposes an integrative overview on one aspect of the visualization field, namely the development of easily applicable visualization methods, that is to say systematic graphic formats, that can be used to create, share, or codify knowledge (in the sense of insights, experiences, contacts, or skills). In this paper, we present a simple structure, inspired by the use, look, and logic of the periodic table of elements developed in the domain of chemistry. There are numerous benefits that can be achieved through such a structure: First, it can provide a descriptive overview over the domain [1, p. 12] and can function as an inventory or repository like a structured toolbox. In this

way this structure can also become a problem solving heuristic [2, p. 68] that relates possible visualization methods to visualization challenges. Thus this structure reduces the complexity inherent in choosing a visualization method for a particular application context. As a further benefit, it helps to recognize the similarities and differences among different types of visualization methods as well as to compare different types of visualization methods along pertinent criteria. Its main purpose is therefore to be user-centered in its focus to assist researchers and practitioners in identifying relevant visualization methods and assess their application parameters. Our understanding of a visualization method is, in a first step, an ample one, as we strive to develop a preliminary broad compilation of methods (that employ visual means to structure information). We use the following general formula as a working definition for visualization methods:

A visualization method is a systematic, rule-based, external, permanent, and graphic representation that depicts information in a way that is conducive to acquiring insights, developing an elaborate understanding, or communicating experiences.

Prototype members of this category of elaborate visualization tools are, in our view, methods (from realms as diverse as education, requirements engineering and argumentation theory) such as concept mapping, evocative knowledge diagrams, argumentation diagrams, or rich visual metaphors. In this paper, however, we only focus on methods with potential applicability in the realm of management. In management the key for better execution is to engage employees. To succeed the communicator not only needs to convey the message, but also needs to tailor it to the recipient's context, so that he can re-construct the knowledge, integrate it and put it to meaningful action. Therefore we see a high potential of complimentary visualizations to engage different stakeholders. Unfortunately in management very few visualization methods are used, and little is known about visualization methods of other domains with potential to management, their requirements, benefits and application areas.

Q

- Look though the periodic table, which methods would you like to see?
- Follow work in progress
- Use the periodic table in an interactive method to learn about the different methods

<http://www.visual-literacy.org/pages/documents.htm>

Su White <http://www.edshare.soton.ac.uk/13665/>

# THE ENCROACHMENTS of INTERDISCIPLINARY PEOPLES in THE TWILIGHT of OLD ACADEMIA

The emergence of the term "interdisciplinarity" within academic circles signifies the obsolescence of the insular, feudal, political structure of the academic acient regime, under which petty lords — university departments — have, for hundreds of years, erected walls around their personal scientific fiefdoms. The new "open borders" policies of many academic fields have cultivated innovation, friendship, and a greater awareness among practitioners of their research efforts basing on the greater good, the universal good, that is the birthplace of philosophy.

Observing this phenomenon, many researchers have attempted to measure the extent of interdisciplinarity and published those attempts. Recent studies have widely employed statistical and bibliometric methods (such as cross-citation analysis) to this purpose, lending

them the dignity of science, rigorous and objective. Simultaneously, this appearance has, in many cases, obscured the diplomatic complexities attending instances of collaboration, not uncommonly qualified as much by the machinations university staff. The unity of all knowledge, the ideal which initially fostered the academy and, ensingly, the university, we yet see but dimly adumbrated on history's horizon.

To produce this map of interdisciplinarity relationships in 2013, we, the cartographers, conducted research using the more antiquated method of literary review in imitation of classical, and especially medieval, cartographers. By closely reading 30 essays written on the subject of interdisciplinarity, but that did not utilize bibliometric

methods, we trace arguments made about interdisciplinarity — whether in certain cases it does or does not, should or should not, exist. By this method we not only trace interdisciplinarity relationships, but offer new definitions of the pertinent fields in terms of those relationships, much in the way a medieval cartographer would have identified an exotic nation or people by correlating instances of a name recorded in the literature available to him.






THE MAP HERE PRESENTED depicts interdisciplinarity relations by lines connecting or dividing the territories therein engaged. For each international relation, on the instigator's shore lie icons symbolizing the matter for which exchange the relation arises and the dominant type of argument for that relation. On the corresponding terminating shore lies an icon symbolizing the type of relation. For each intranational relation, both icons lie on arbitrary ends of a line forming a border between two territories. An explanatory text distinguishes the relation's instigator.

### INTERNATIONAL RELATIONS

-  **Pillaging**  
Indicating a relation wherein one discipline appropriates the matter of another discipline for its own use.
-  **Colonization**  
Indicating a relation wherein one discipline imports its matter into another discipline.
-  **Collaboration**  
Indicating a relation wherein two disciplines retain their respective autonomy and pool their matter toward the solution of a given problem.




### TYPES OF ARGUMENTS

-  **Pathos**  
An appeal to emotion; a way of convincing an audience by creating an emotional response such as sympathy or anger.
-  **Ethos**  
An appeal to ethics; a means of convincing someone of the character or credibility of the persuader. Ethos is used to show an audience that the speaker is a credible source and is worth listening to.
-  **Logos**  
"Words by which inward thought is expressed." An appeal to logic; aims to convince an audience by use of reason.

### TYPES OF MATTER

-  **Methods**  
Indicating the particular tools a discipline employs to solve problems or that characterize research conducted therein.
-  **Paradigms**  
Indicating the corpus of exemplary instances of problem-solving or research within a discipline, and to which practitioners of that discipline look as models.
-  **Root concepts**  
Indicating the terminology employed by practitioners of a discipline to frame problems or constitute a starting point for research.
-  **Research terrain**  
Indicating the class of phenomena identified by a discipline as its own purview, and which that discipline claims it is uniquely qualified to address.

### INTRANATIONAL BORDERS

-  **Secession**  
Indicating a relation wherein a discipline separates into two distinct sub-disciplines on grounds of the matter uniquely pertinent to one of them and not the other.
-  **Privatization**  
Indicating a relation wherein a discipline separates into two undistinct sub-disciplines which possess identical matter, but differ in terms of focus.
-  **Synocicism**  
Indicating a relation wherein two previously separate disciplines conjoin into one super-discipline, uniting their matter into one body.

Images you might know

# **CLASSIC DIAGRAMS FROM WEB SCIENCE**

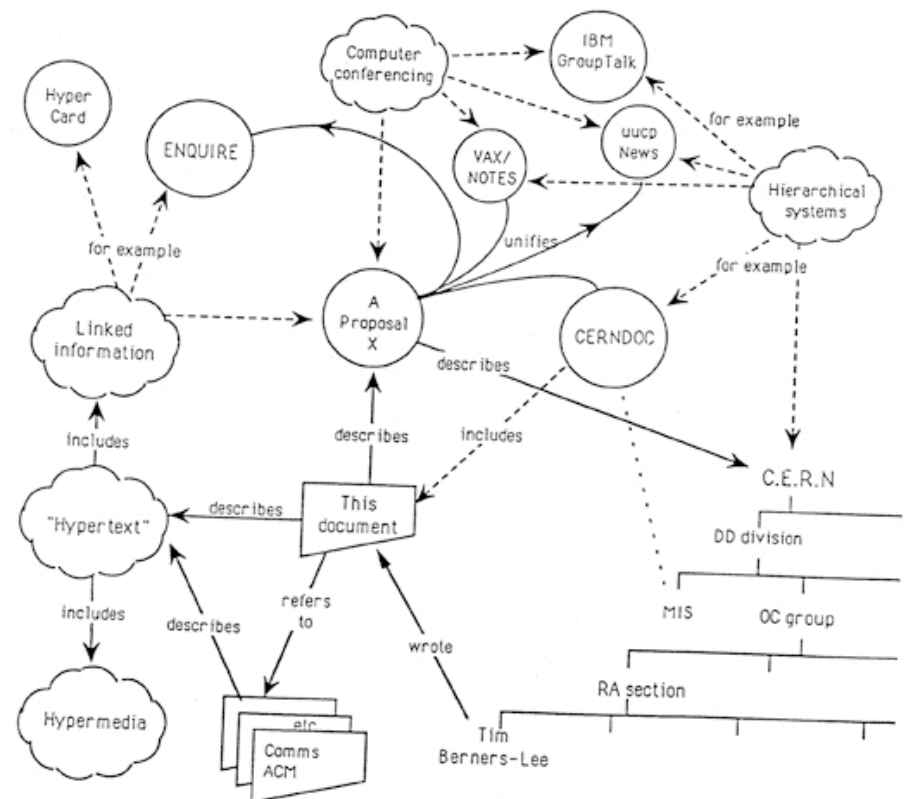
Vague but exciting...

# Information Management: A Proposal

## Abstract

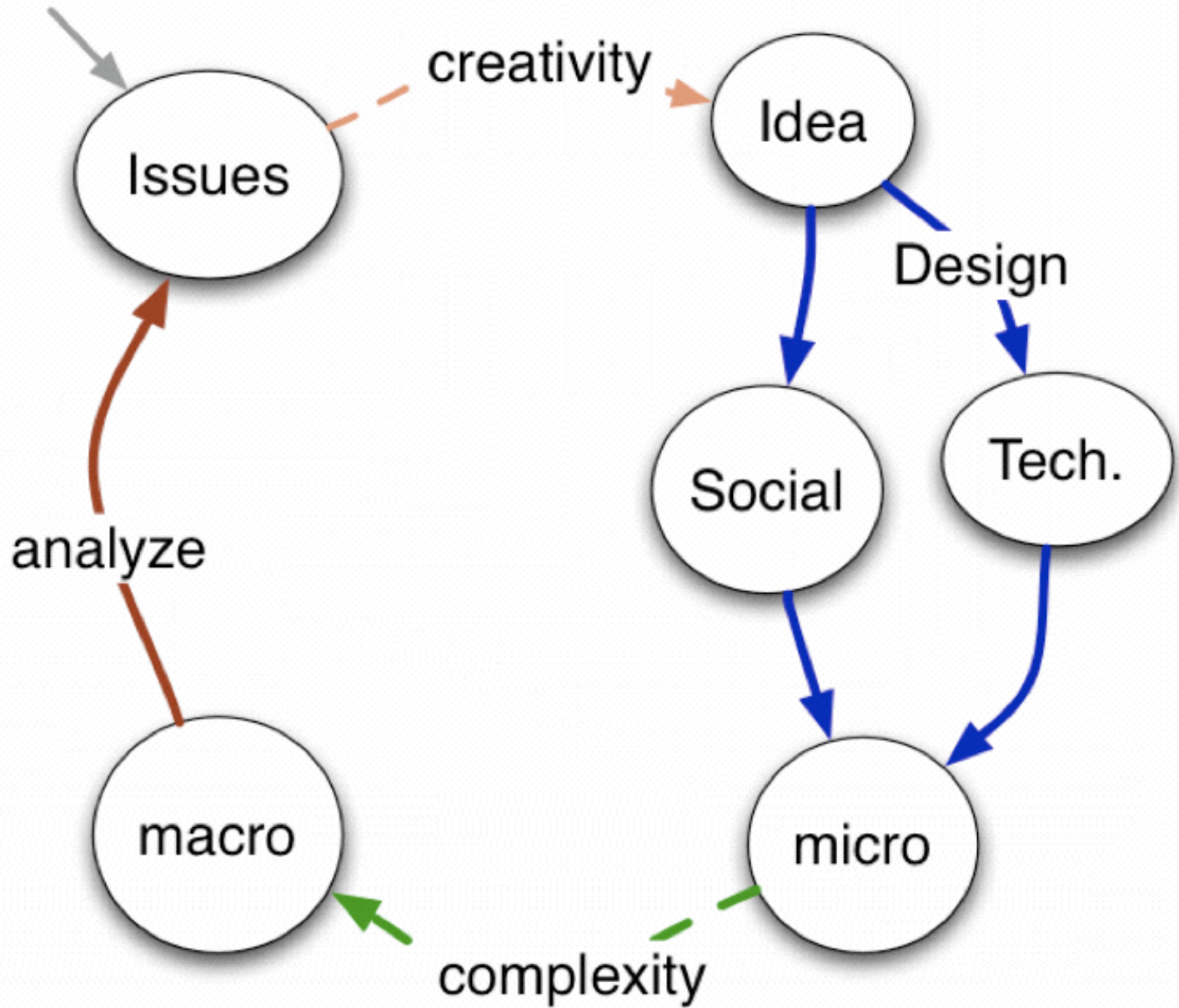
This proposal concerns the management of general information about accelerators and experiments at CERN. It discusses the problems of loss of information about complex evolving systems and derives a solution based on a distributed hypertext system.

Keywords: Hypertext, Computer conferencing, Document retrieval, Information management, Project control





values

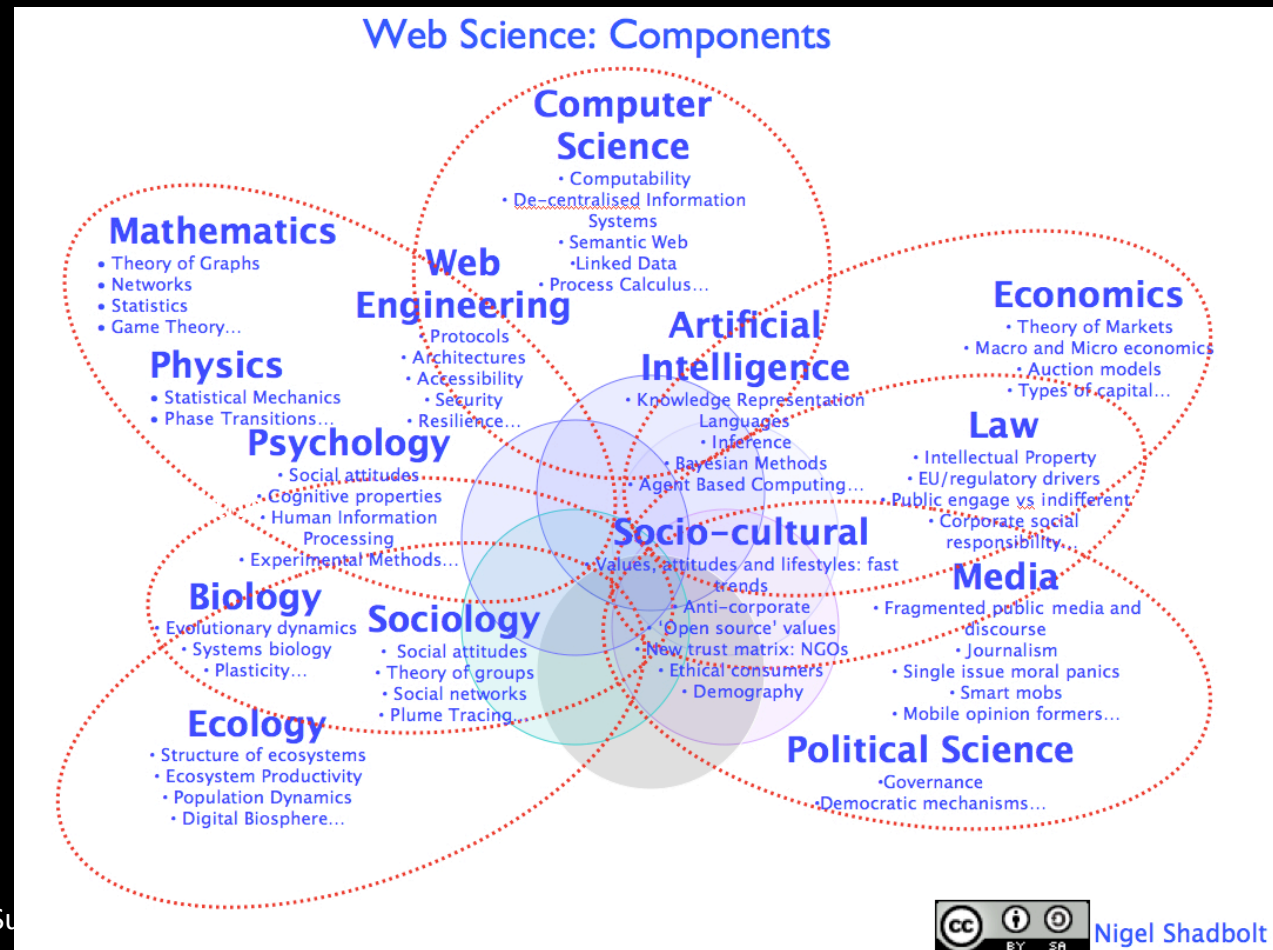


# Web Science and additionality

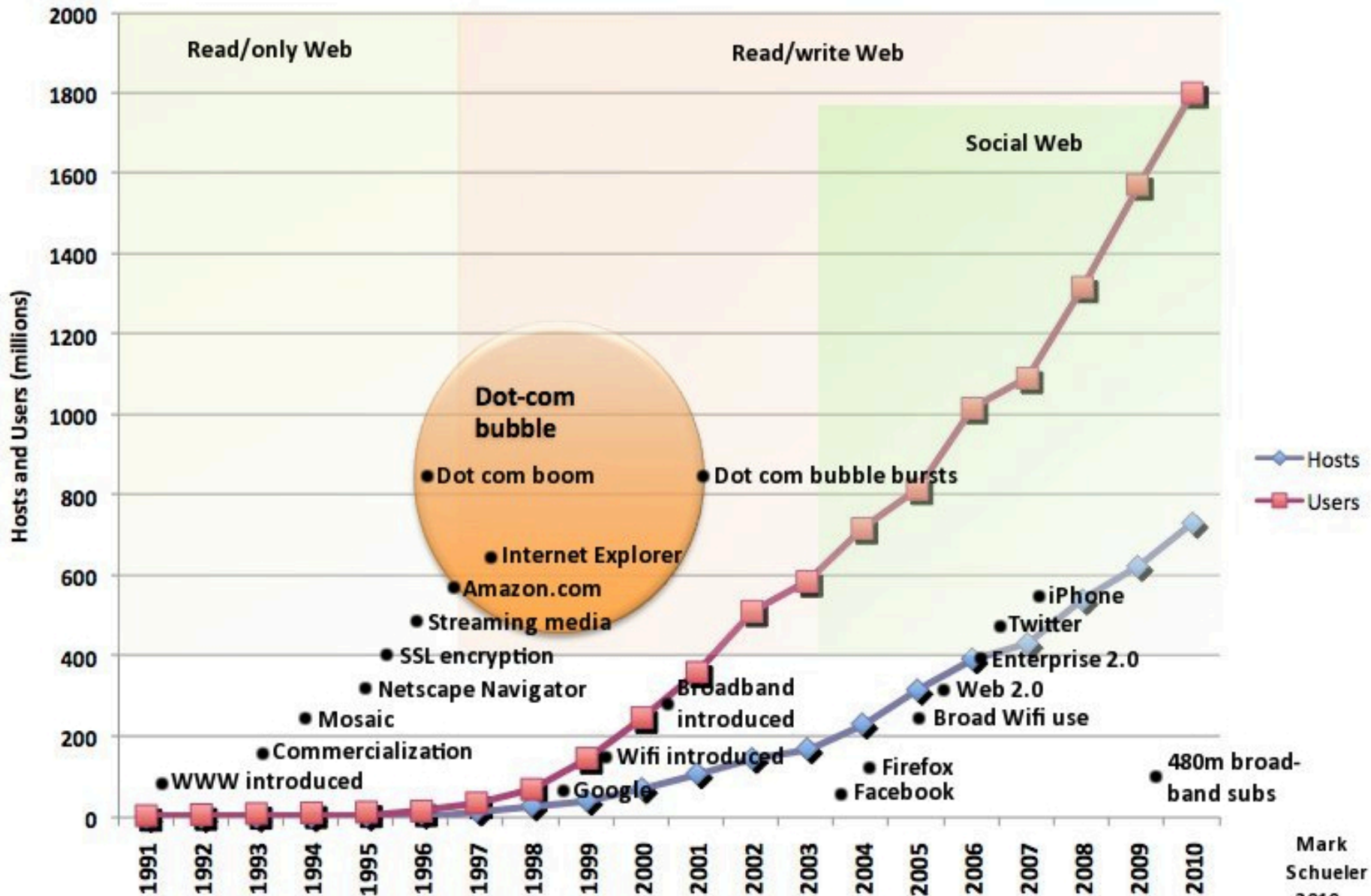
Not the union  
of  
the disciplines

But  
more than their  
intersection

Applicable  
in many contexts



# Internet Growth - Usage Phases - Tech Events

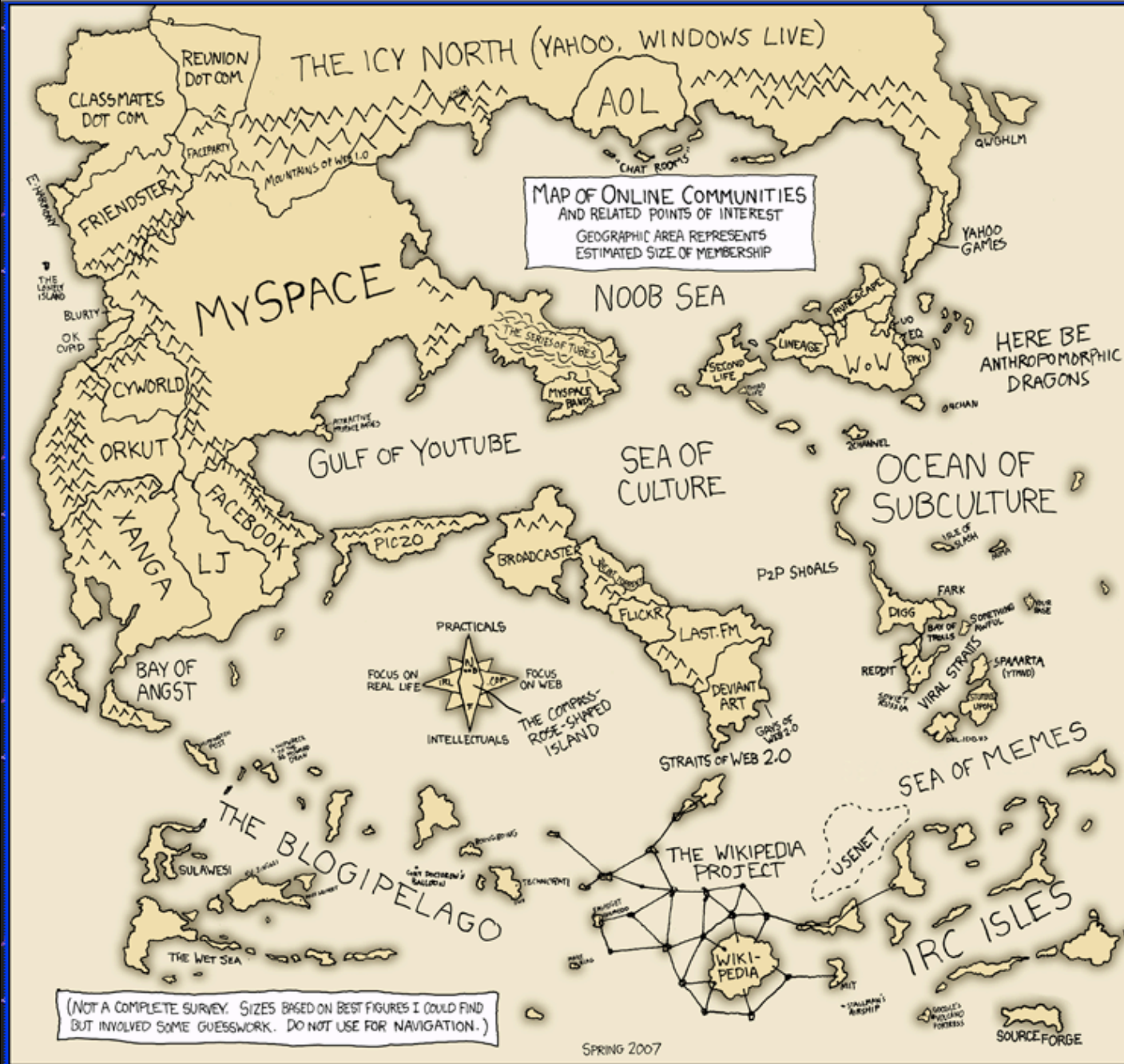


Note - events shown relate to the time axis only.

Mark Schueler  
2010



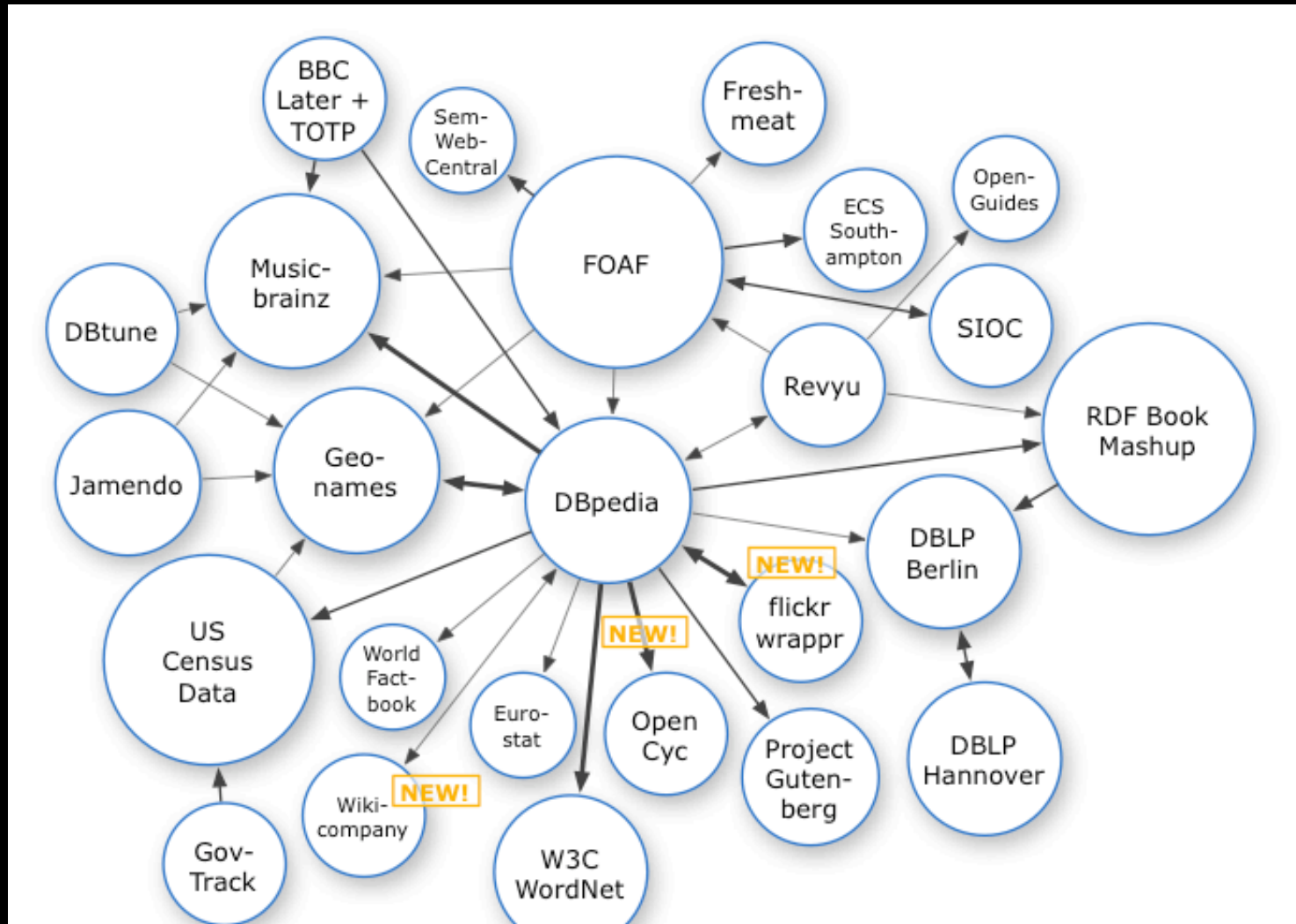
# We Need A Web Science Road Map





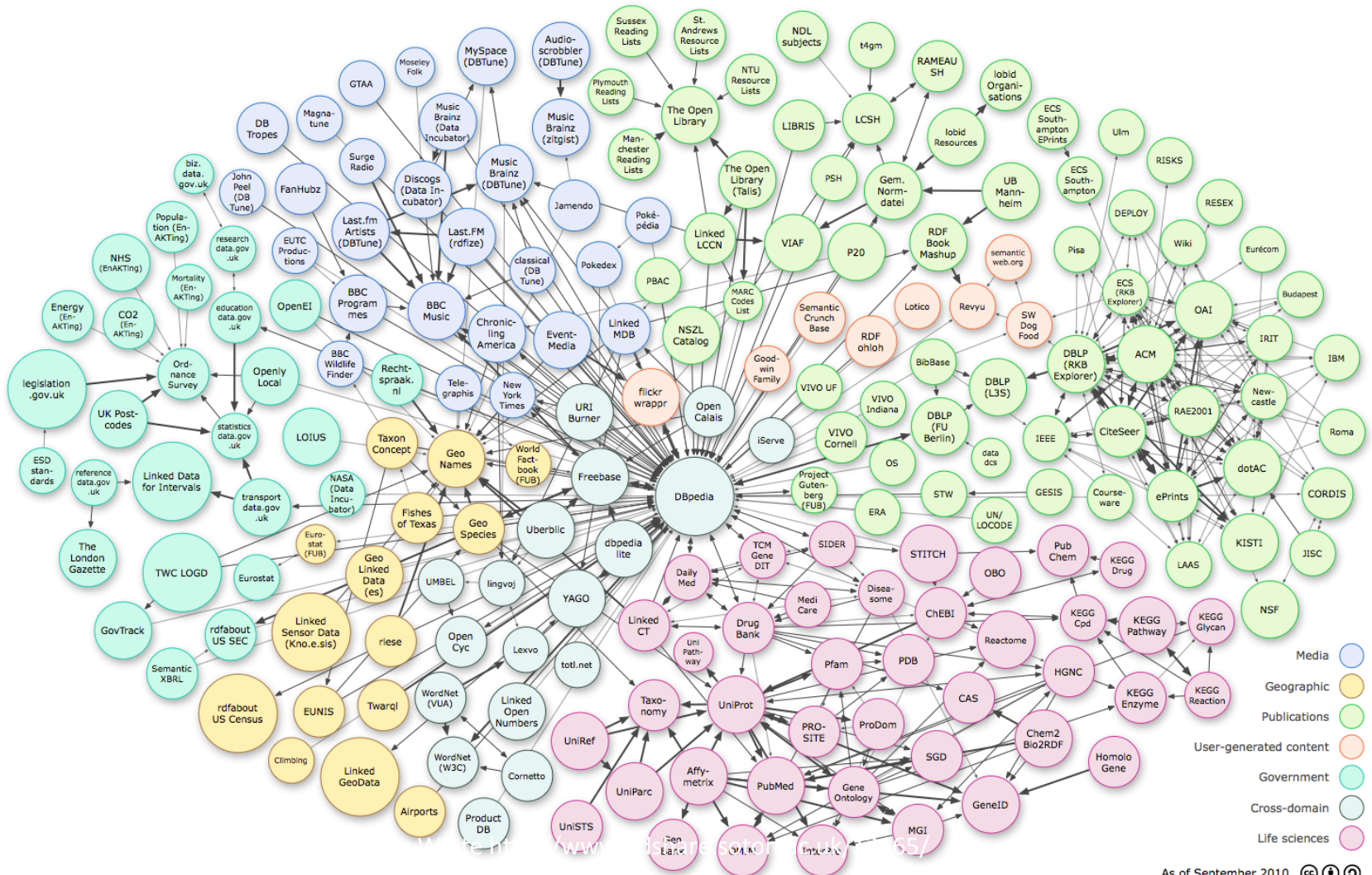
# The Web

emergent networks of linked data



# The Web

## an emergent networks of linked data



**Table 1. An abridged representation of the Web Science Curriculum.**NB: The full version at <http://webscience.org/2010/wssc.html> also specifies level 3 headings

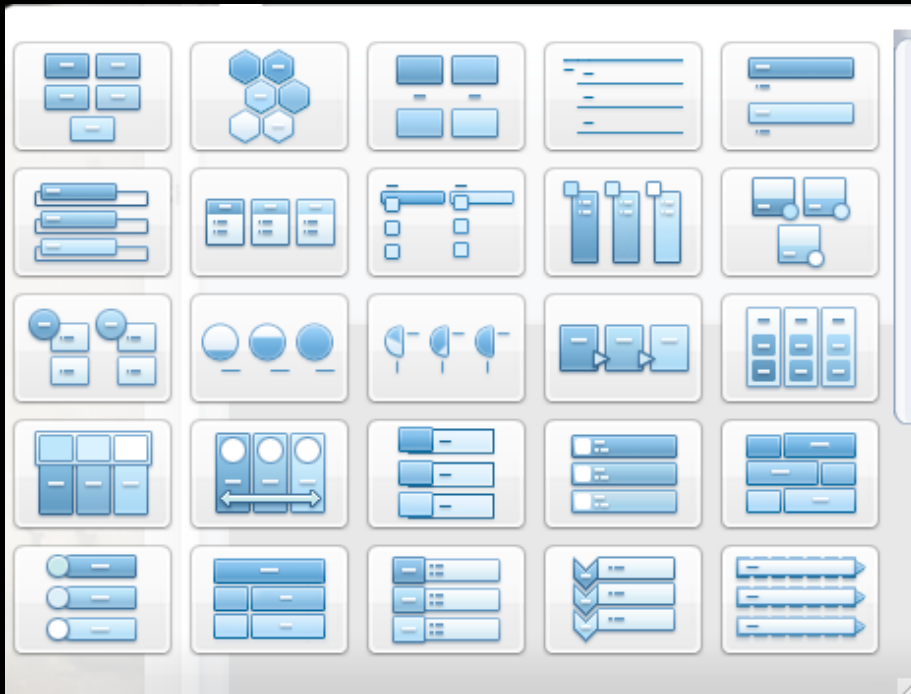
<b>A General – not concerned with course content</b>	
<b>Web History and Methodology</b> B.1 General Web History and Methodology B.2 Web History Web Forerunners; Biographies and related stories B.3 Web Science Theory and Epistemology Two Magics of Web Science; Actor Network Theory	<b>E. Web Society</b> E.1a Economics Goods in the Web; The Web economy; Antitrust Issues and Policies in the Web; Intellectual property and digital rights management; Web-based economic development E.1b Business E-commerce Business models in the Web; Advertising in the Web; sponsored search E.2 Social Engagement and Social Science Social networks; Mass phenomena; Collective intelligence; Peer production; Globalization; Systems; Social structures and processes; Virtual communities, groups and identity; Social capital and power inequality in the Web; On-line lives, intergenerational differences; Mass media E.3 Personal Engagement and Psychology System Psychology and Behaviour; Child and adolescent psychiatry; Tele-working E.4 Philosophy Philosophy of information; Objects; Reference and Cognition in the Web; Ethics in the Web E.5 Law Intellectual Property in the Web; Digital Rights Management; Digital crime; Laws for Web access; Antitrust Law E.6 Politics and Governance Political science; E-Government; E-Politics; E-Democracy; Policy and Regulation; Web Governance; Privacy; Trust; Security; Network neutrality; E-Inclusion
<b>Web Technologies</b> C.1 General Web Technologies C.2 Web Milieux Document technologies; Hypertext technologies; Internet technologies; Mobile Web technologies; Grid and Cloud computing technologies C.3 Basic Web Architecture HTTP and related technologies; URIs; HTML; XML; CSS and related technologies; Interfaces and Browsers; Servers Web Services C.4 Web 2.0 technologies C.5 Semantic Web/Linked Data Metadata; Knowledge Representation; Ontology Languages; Linked Data; Natural Language Processing; Provenance systems in the Web C.6 Internet/Web of Things	
<b>D. Web Analysis</b> D.1 General Web Analysis D.2 Mathematical Methods of Web analysis Web data sampling and analytics; Logic and Inference in the Web; Statistical Inference in the Web; Statistical Analysis of the Web; Web as a Complex System; Graphs; Networks; Mathematical methods for describing Web services; Crawling; Indexing and Searching; Data Mining; Information Retrieval and Machine Learning; Other Algorithms for the Web	
<b>F Teaching the web – not concerned with course content</b>	



# Using other people's diagrams

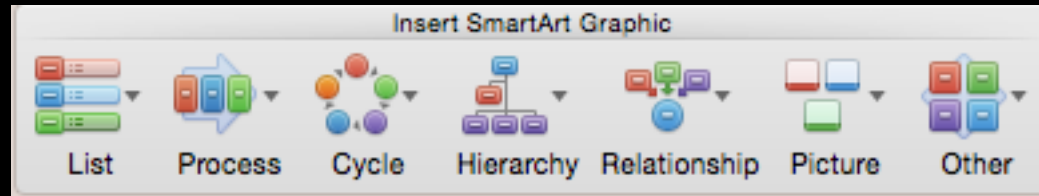
- Identify the source
- Acknowledge in the figure title

# Office tools

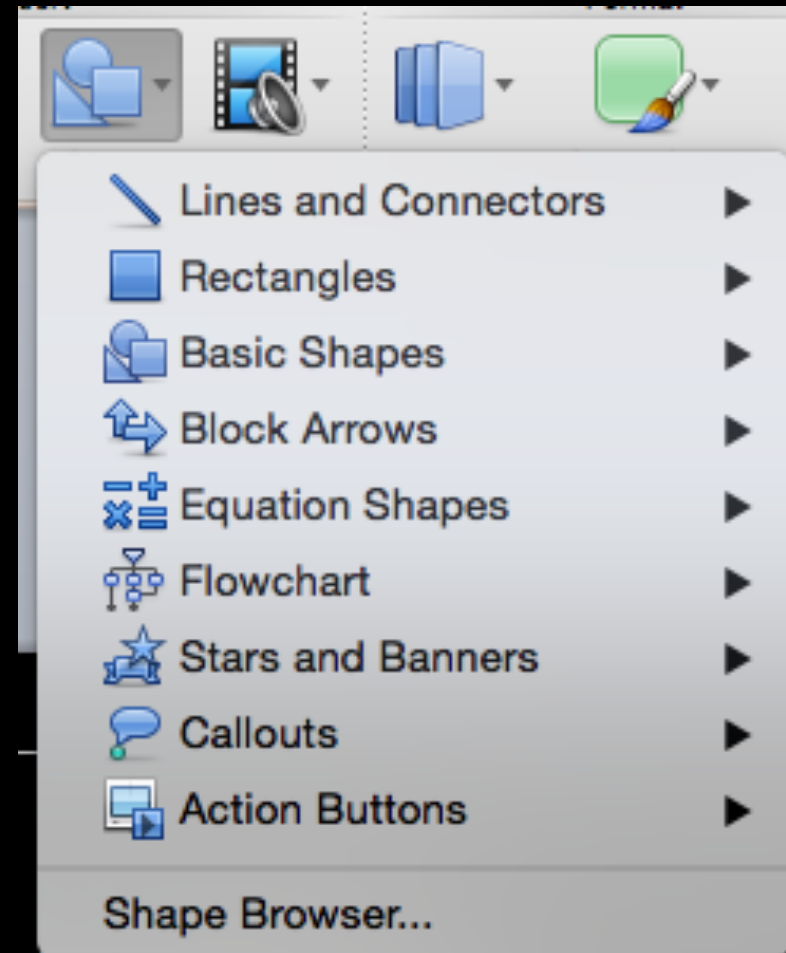
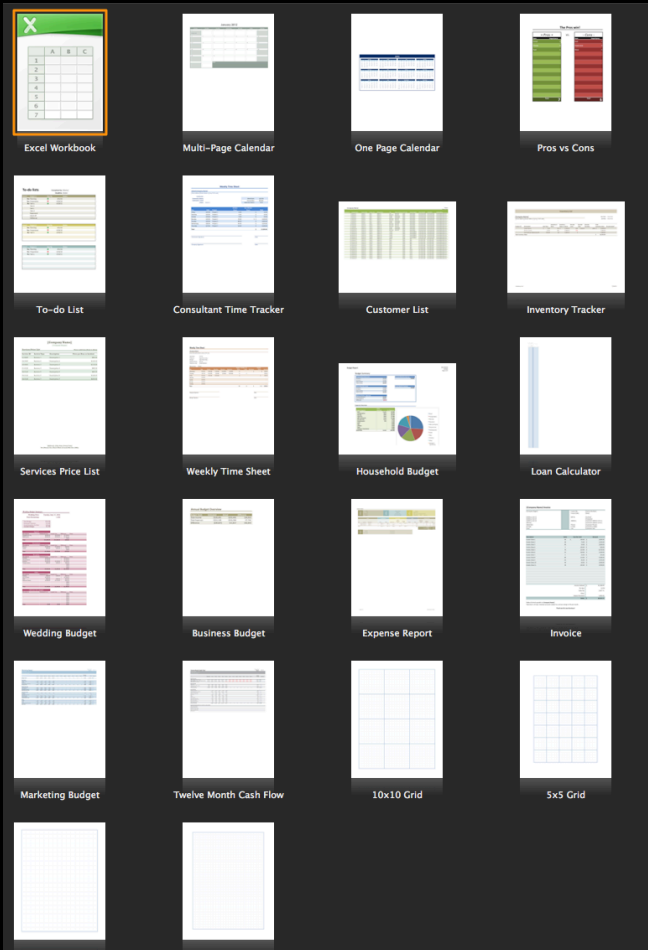


How much do you know about the tools you use?

DEMO?

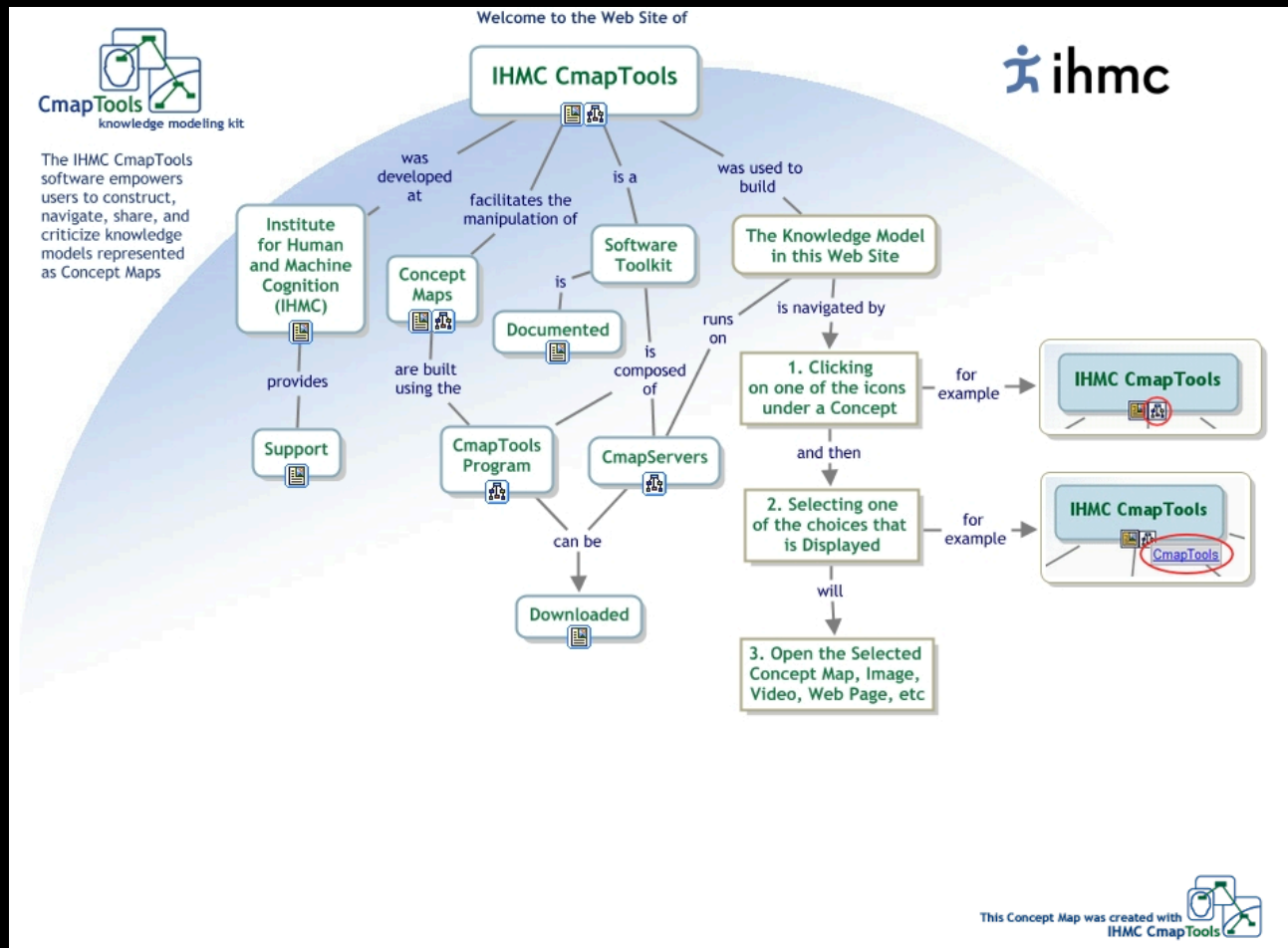


# Templates and objects



Not all will be useful or relevant!

# Simple (free) tools



# Remember...

- Visualisations can make order and save words
- Visualisation can help creativity
- It can be good to get away from the computer
- You can always photograph a sketch or set of post-its



# Why and how visuals can be useful?

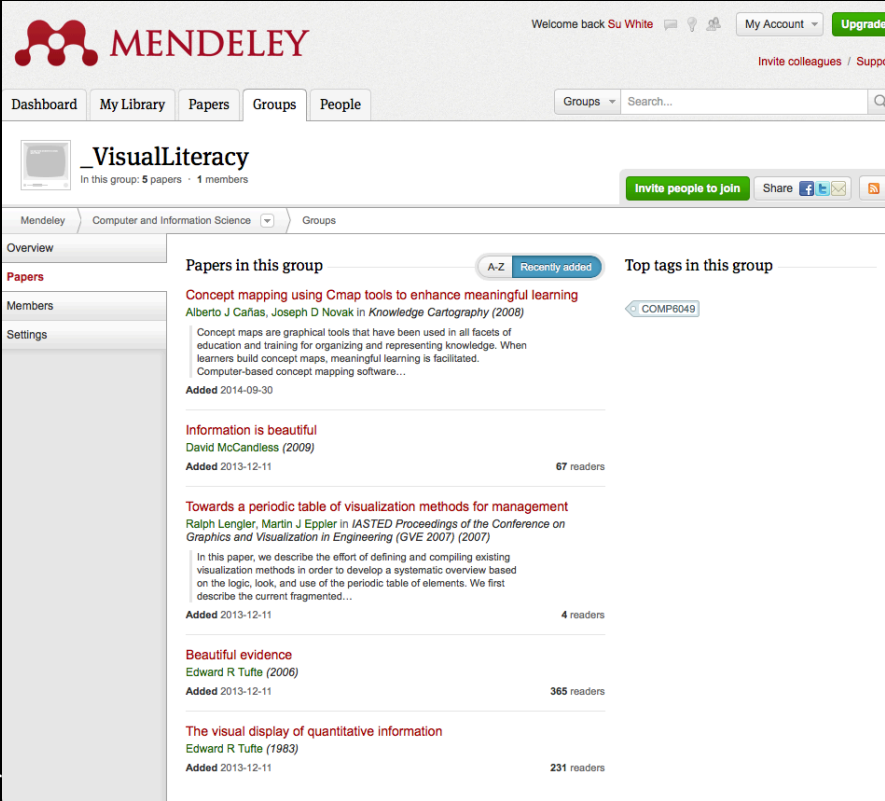
- A tool for thinking
- Create a table or draw a diagram
- You can then systematically explain the diagram in the text
- Use a series of diagrams to explain building ideas or evolving understandings/designs

# Over to you

- What might you use?
- What tools?
- How might you use them?

# references

- Visual Literacy Mendeley Group
- <http://www.mendeley.com/groups/3963921/visualliteracy/papers/>



The screenshot shows the Mendeley website interface for the 'VisualLiteracy' group. The page displays a list of papers in this group, including titles, authors, and reader counts. The Mendeley logo is at the top left, and the user 'Su White' is logged in at the top right. The group name 'VisualLiteracy' is prominently displayed, along with the number of papers (5) and members (1). The list of papers includes:

- Concept mapping using Cmap tools to enhance meaningful learning** by Alberto J Cañas, Joseph D Novak in *Knowledge Cartography (2008)*. Added 2014-09-30. 67 readers.
- Information is beautiful** by David McCandless (2009). Added 2013-12-11. 67 readers.
- Towards a periodic table of visualization methods for management** by Ralph Lengler, Martin J Eppler in *IASTED Proceedings of the Conference on Graphics and Visualization in Engineering (GVE 2007) (2007)*. Added 2013-12-11. 4 readers.
- Beautiful evidence** by Edward R Tufte (2006). Added 2013-12-11. 365 readers.
- The visual display of quantitative information** by Edward R Tufte (1983). Added 2013-12-11. 231 readers.



# Further Browsing

- GapMinder: <http://www.gapminder.org>
- Guardian Data Store Flickr Group  
<http://www.flickr.com/groups/1115946@N24/>
- Information Is Beautiful  
<http://www.informationisbeautiful.net>
- Many Eyes: <http://www-958.ibm.com/>
- Visual-Literacy:  
<http://www.visual-literacy.org/>