

Toward a Future Knowledge Society

Stephen Downes

VENUS Seminars
February 14, 2007



Once upon a time
there was order

We had two types



Universal

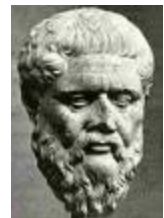
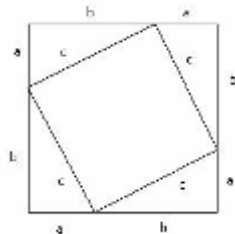
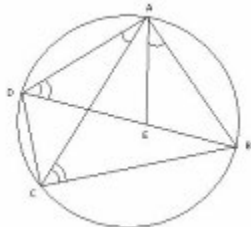
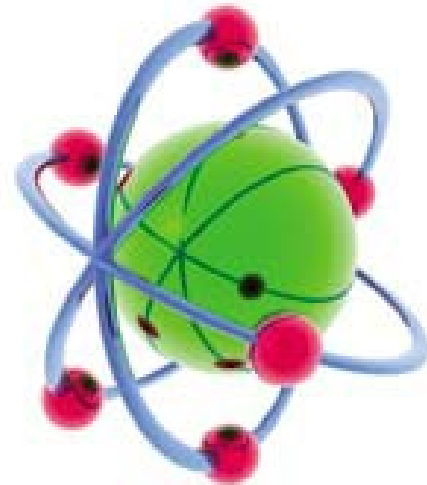
Things like....

- Laws of Nature

- Essential

natures of things

- Mathematical and logical theorems



Plato

Things like:

-circumstances

-instances

-applications

Concrete Particular



It was the good old H-D Model

(Hypothetico-Deductive Model)



Hempel

Terbitan Terkini
Harga
RM19.90

VERSI
VIDEO CD

Learning Science

Space & Animal

- ▶ Earth
- ▶ Moon
- ▶ Sun
- ▶ Carnivorous animal
- ▶ Herbivorous animal
- ▶ Omnivorous animal

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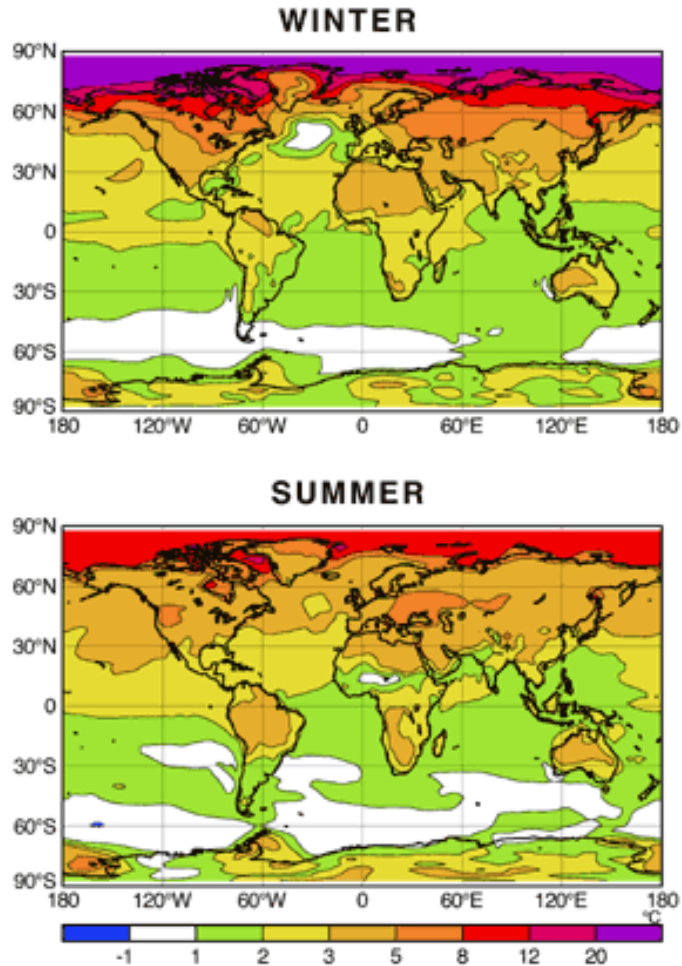
Dr. Vanna's
series

ALLV
EDUCATION

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Based on:

- Observation
- Generalization
- Prediction
- Verification
(or falsification)



Popper



The world
is a totality of facts,
not things

(we still believe this, don't we?)

Wittgenstein

It has all fallen apart...



Feyerabend



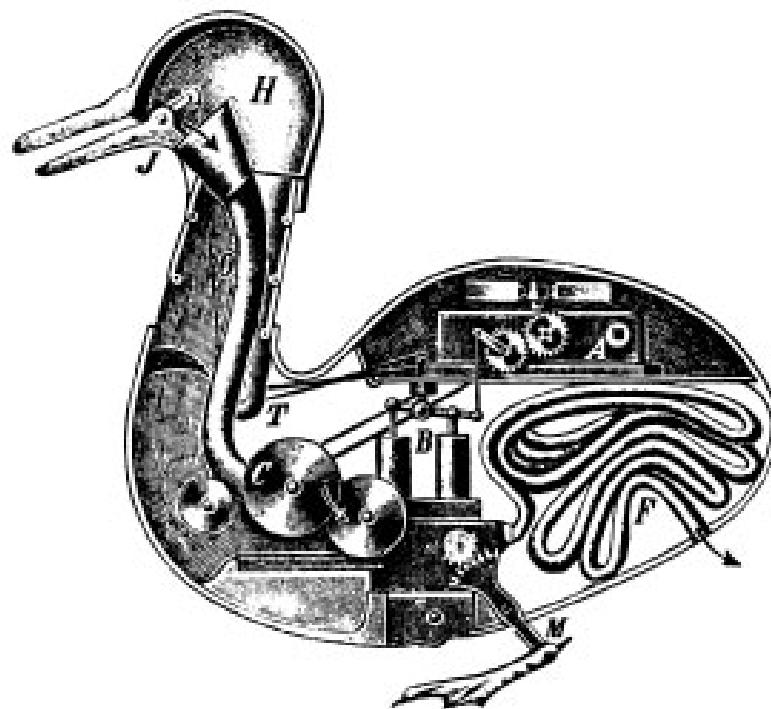
1951

Quine's Two Dogmas of Empiricism

- Analytic vs Synthetic
- Reductionism



Quine



1962

The Structure of Scientific Revolutions

(In *International
Encyclopedia of Unified
Science*)
(On the internet)



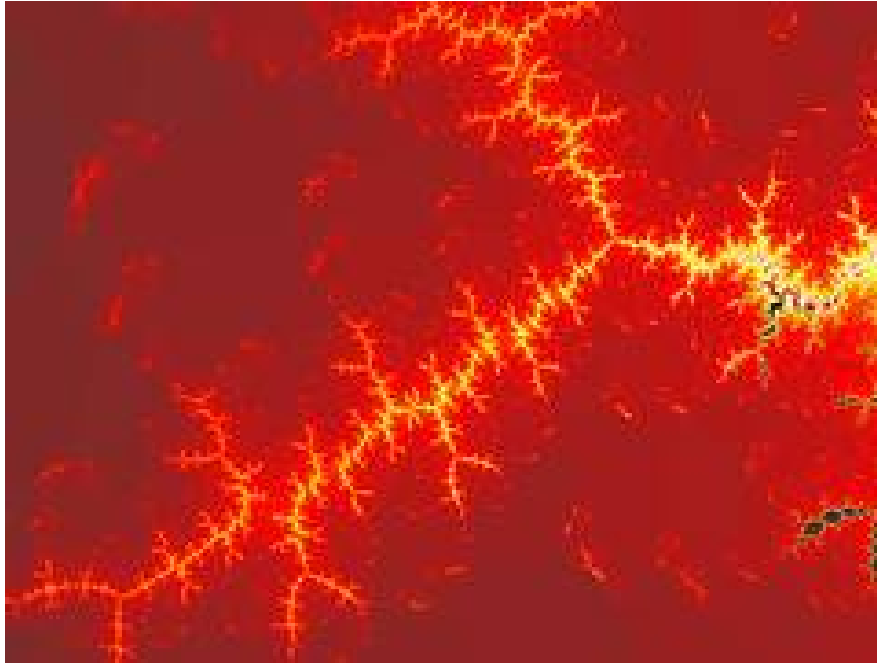
Paradigm shift

Incommensurability

World View



Kuhn



Joel

We didn't start the fire
It was always burning, since
the world's been turning

<http://home.uchicago.edu/~yli5/Flash/Fire.html>

Enter the Network

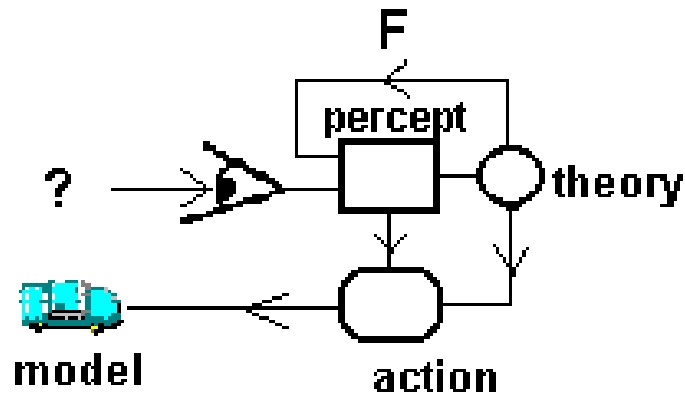


Figure 8

Everything is connected

to everything else

(Theory-laden data)



Lakatos

<http://dsv.su.se/~kjellman/e-subjectoriented.htm>

Enter the Network



It is impossible to

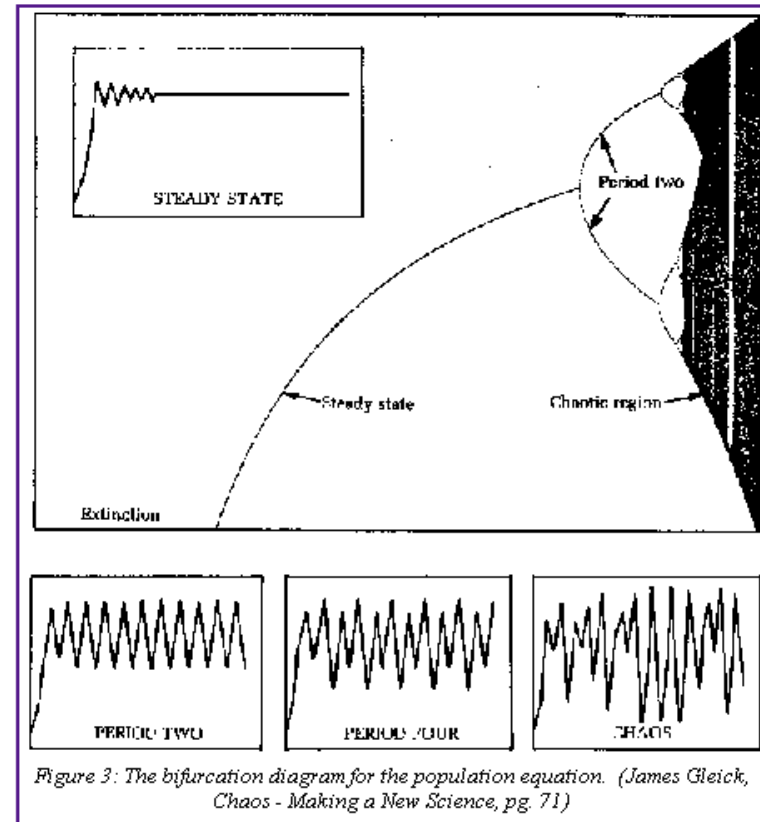
predict anything

(Chaos theory, strange attractors)

<http://www.imho.com/grae/chaos/chaos.html>



Lorenz



Enter the Network



It is the breakdown of order



Derrida

(Postmodernism, ethnocentricity)

(Cluetrain, We The Media)

<http://www.cluetrain.com/>

Into this picture rides...

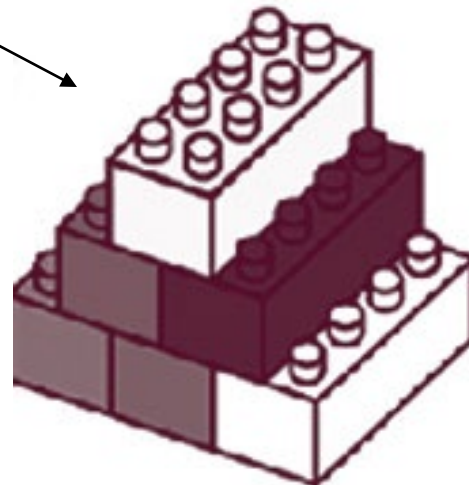
Knowledge management?

the idea...



'Capture' tacit knowledge

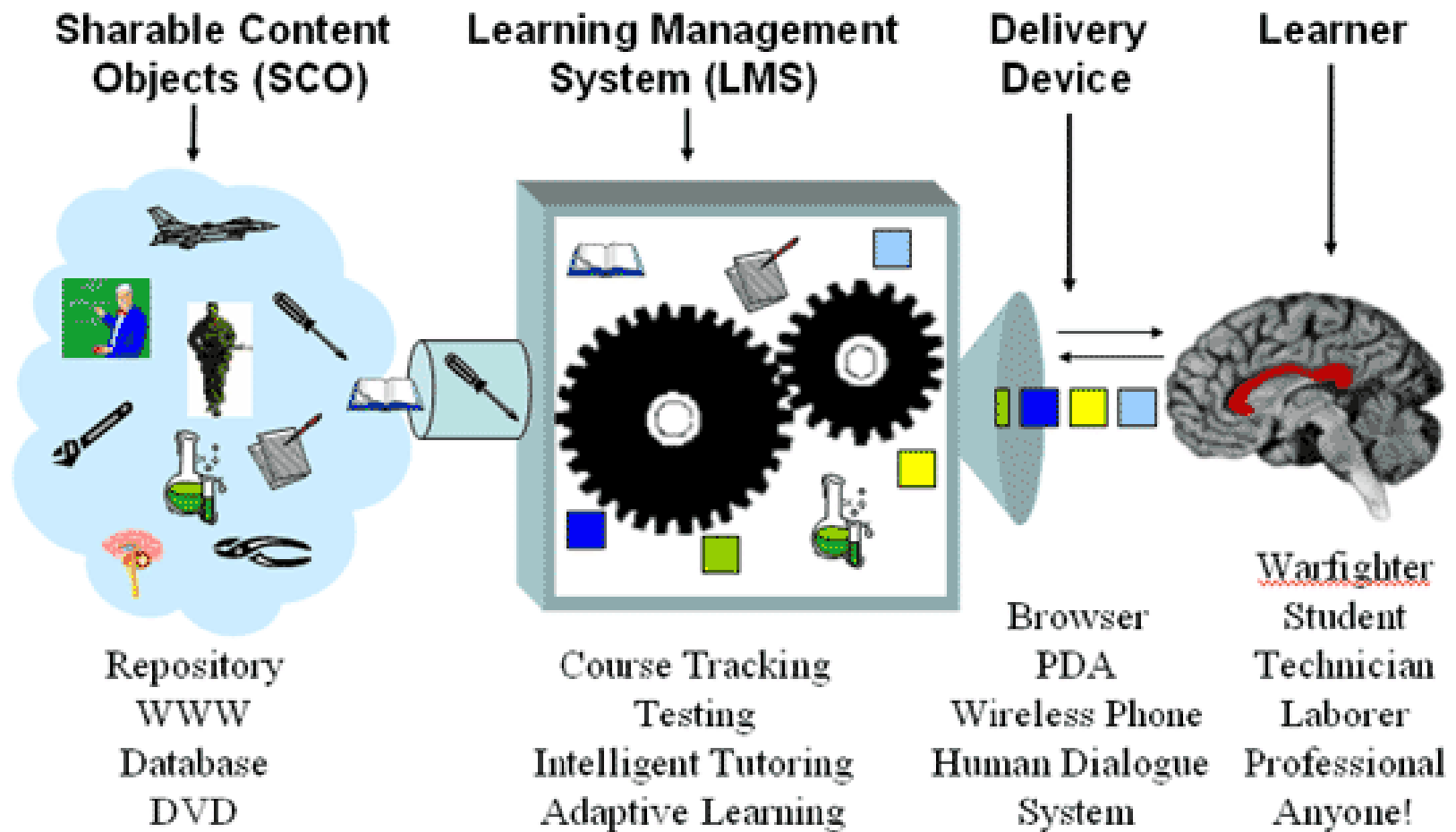
... and then codify it



Learning Objects



Hodgins



<http://www.learningspaces.org/n/papers/objections.html>

You Can't Go Back Again



- personal knowledge

- tacit knowledge



Polanyi

Depends on Context

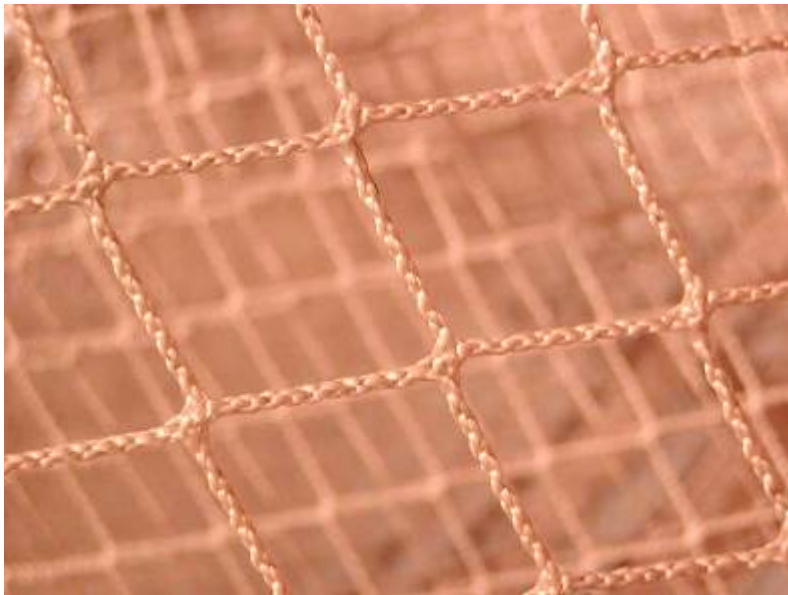
Ineffable

You can't put it into words

You can't generalize it

Patterns in the Mesh

the knowledge is in the network



Old: universals

- rules
- categories

New: patterns

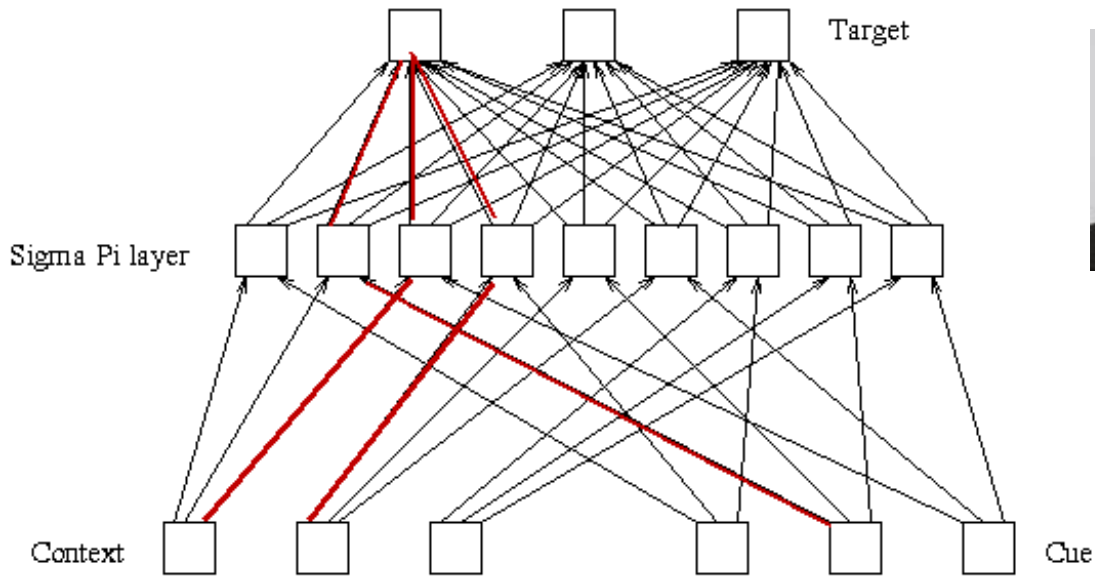
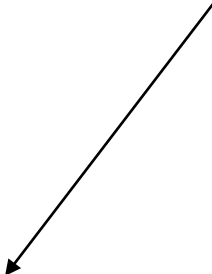
- patterns
- similarities

the knowledge *is* the network

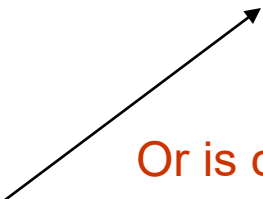


Tenenbaum

stands for?



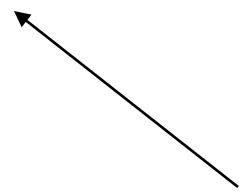
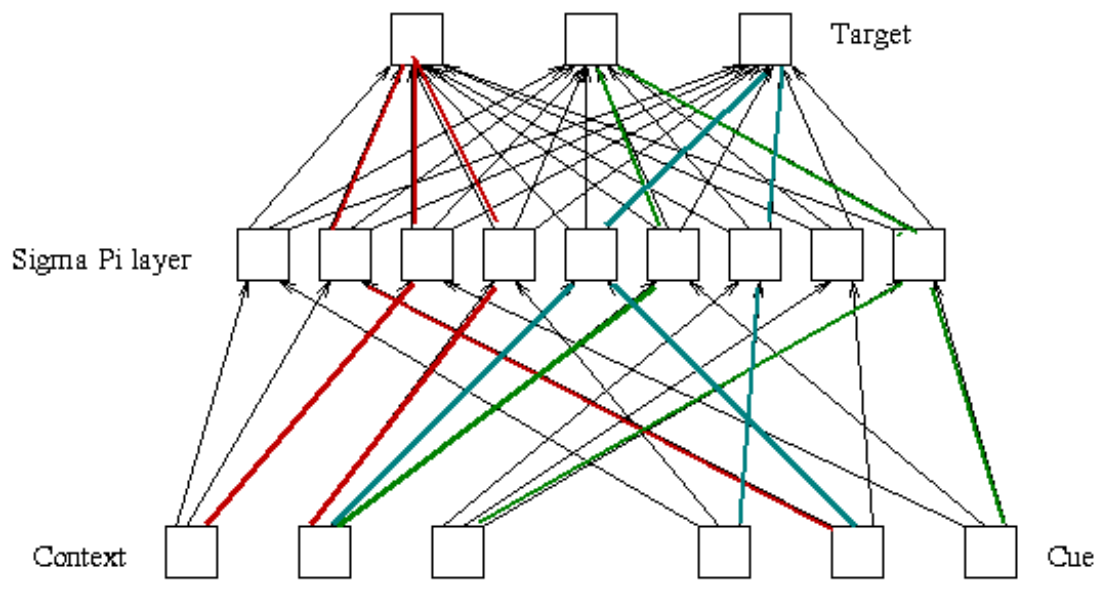
Hopfield



Or is caused by?

Distributed Representation

= a pattern of connectivity



The theory...

Concepts are *not words*...

They are *patterns* in a network

(like the mind, like society)

There is no *specific* place the concept is located – it is distributed as a *set of connections* across the network

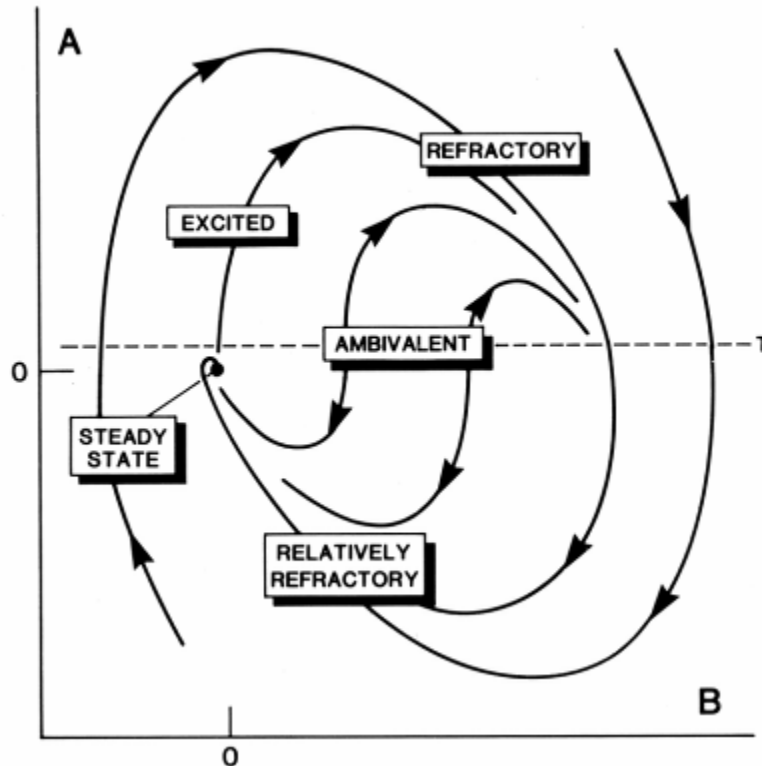
Other concepts are embedded in the same network

they form parts of each other,

they effect each other



APPENDIX



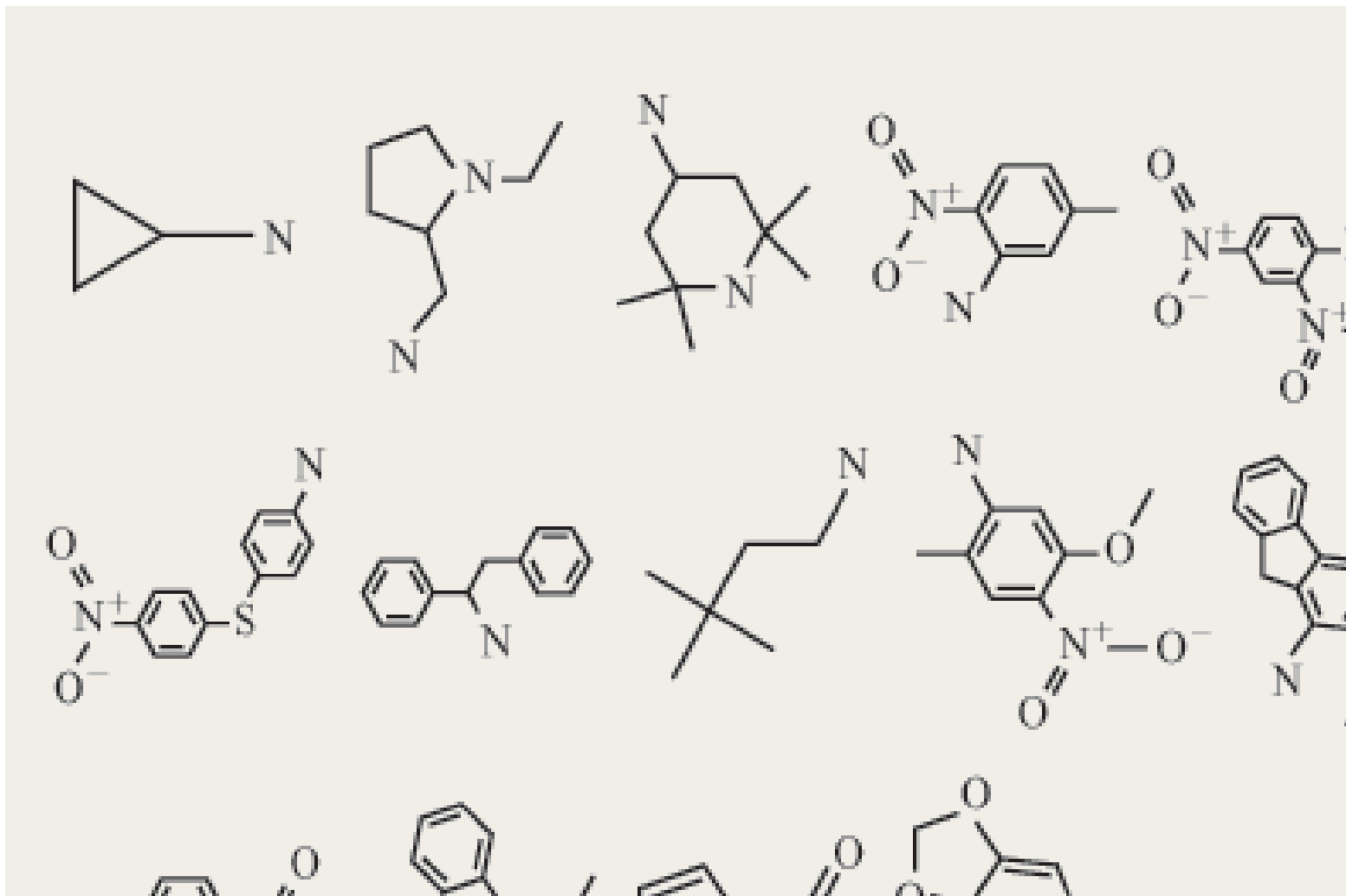
The connections
can self-organize



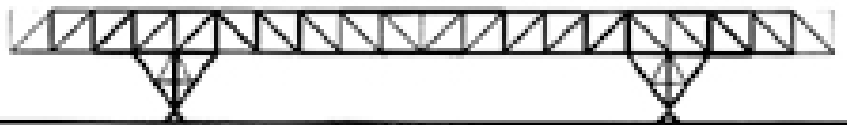
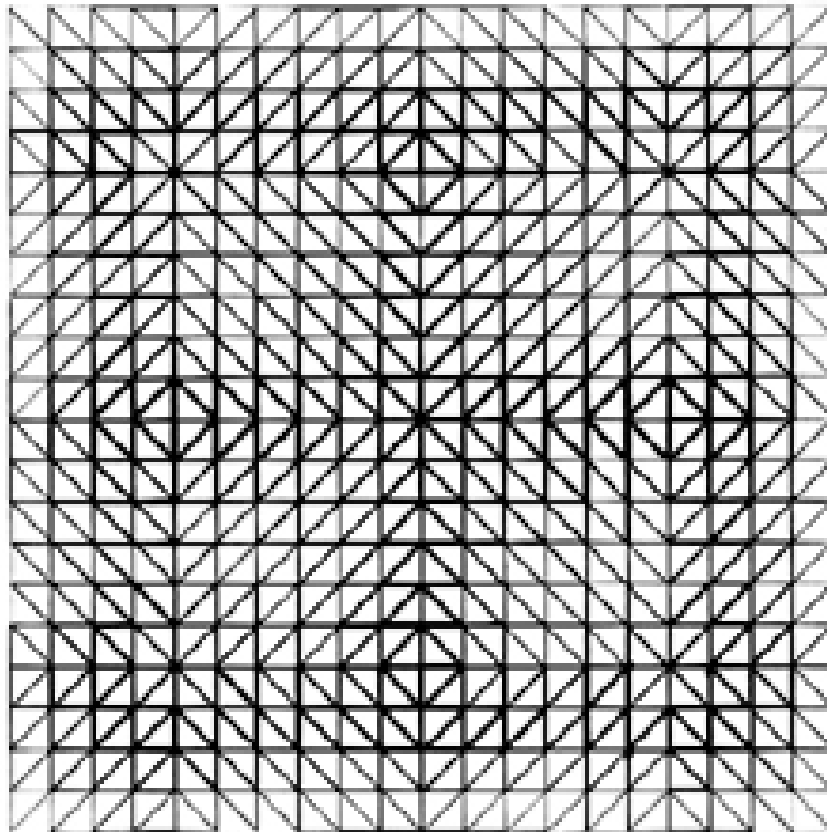
Self-organizing systems acquire new structure without specific interference from the outside. They exhibit qualitative macroscopic changes such as bifurcations or phase transitions.

http://www.christianhubert.com/hypertext/self_organization.html

The way things connect is reflective of the properties of those things



They obey
the laws of
physics



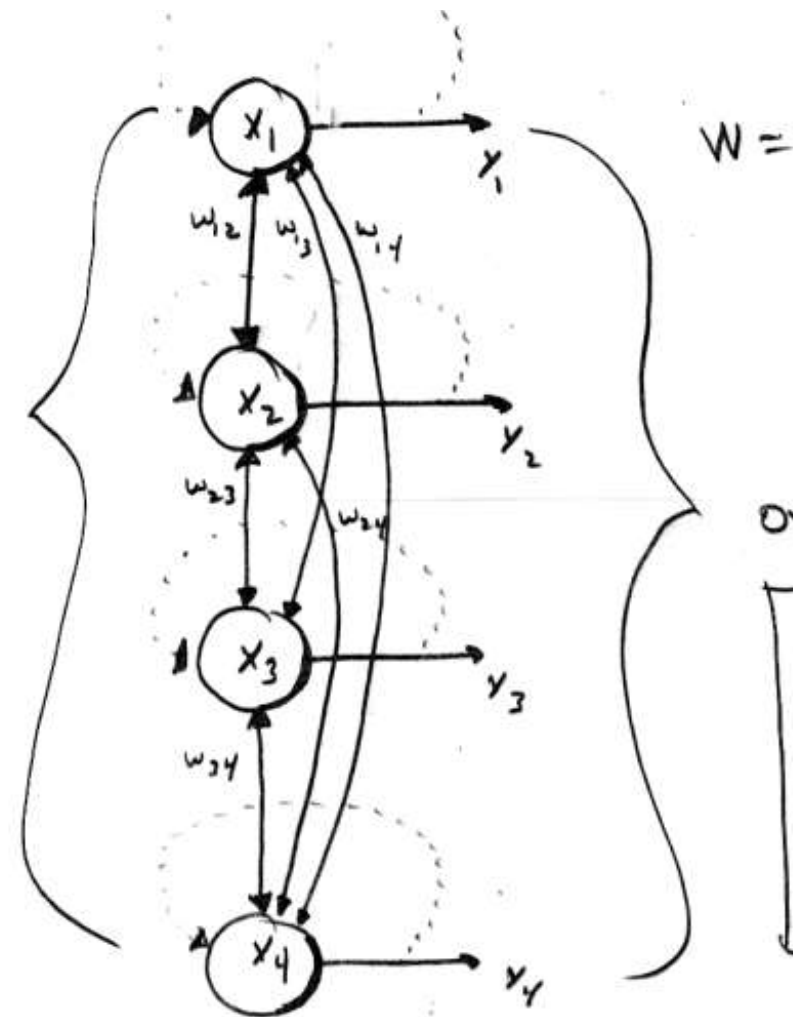
(Force patterns in
construction...

<http://paginas.ufm.edu/arquitemas/ffconclusions03.html>)

Three Types of Organization...

- Hebbian associationism
 - based on concurrency
- Back propagation
 - based on desired outcome
- Boltzman
 - based on 'settling', annealing

Inputs



- Single Layer
- Inputs X_i act as outputs Y_i

Particulars...

- Patterns – the global view – nice, but not very useful
- What does the network look like when you're in the network?



Easy Answers...



It looks like **the internet...**

- Like open source
- Like **Social Networks**
- Like **blogs** and **blogging**
- Like **wikis** and collaborative writing
- Like tagging and Digg and...

It looks like **Web 2.0**



Stallman

Harder Answers

From the inside, you see the tubes

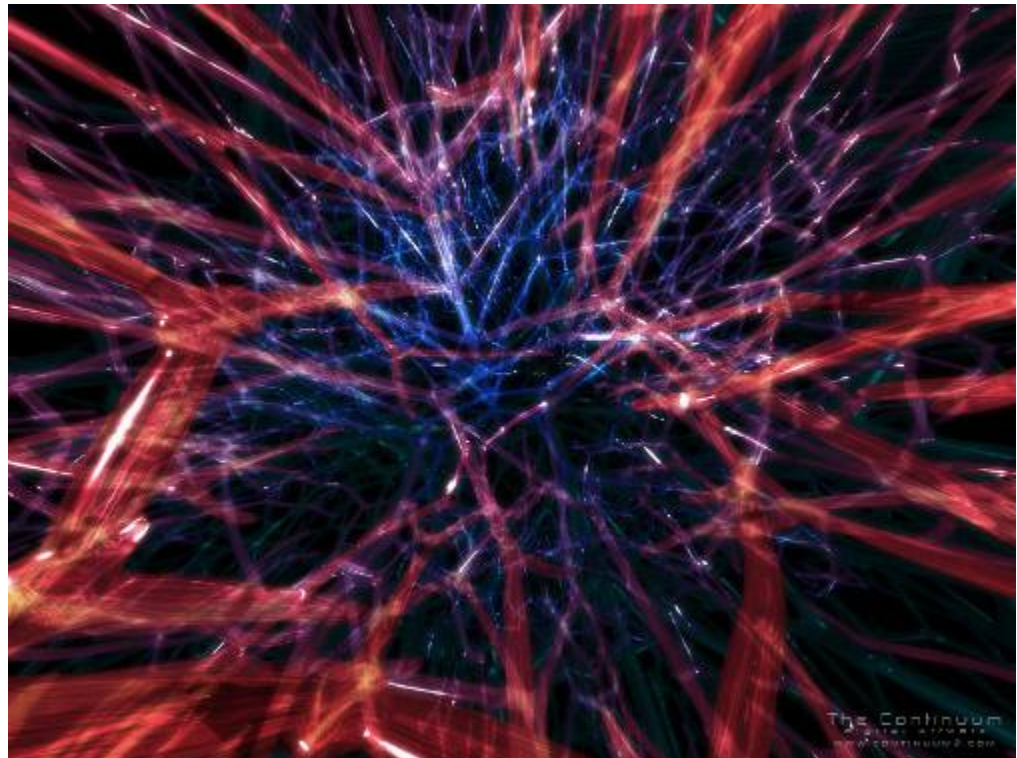
Look for connections, interactions

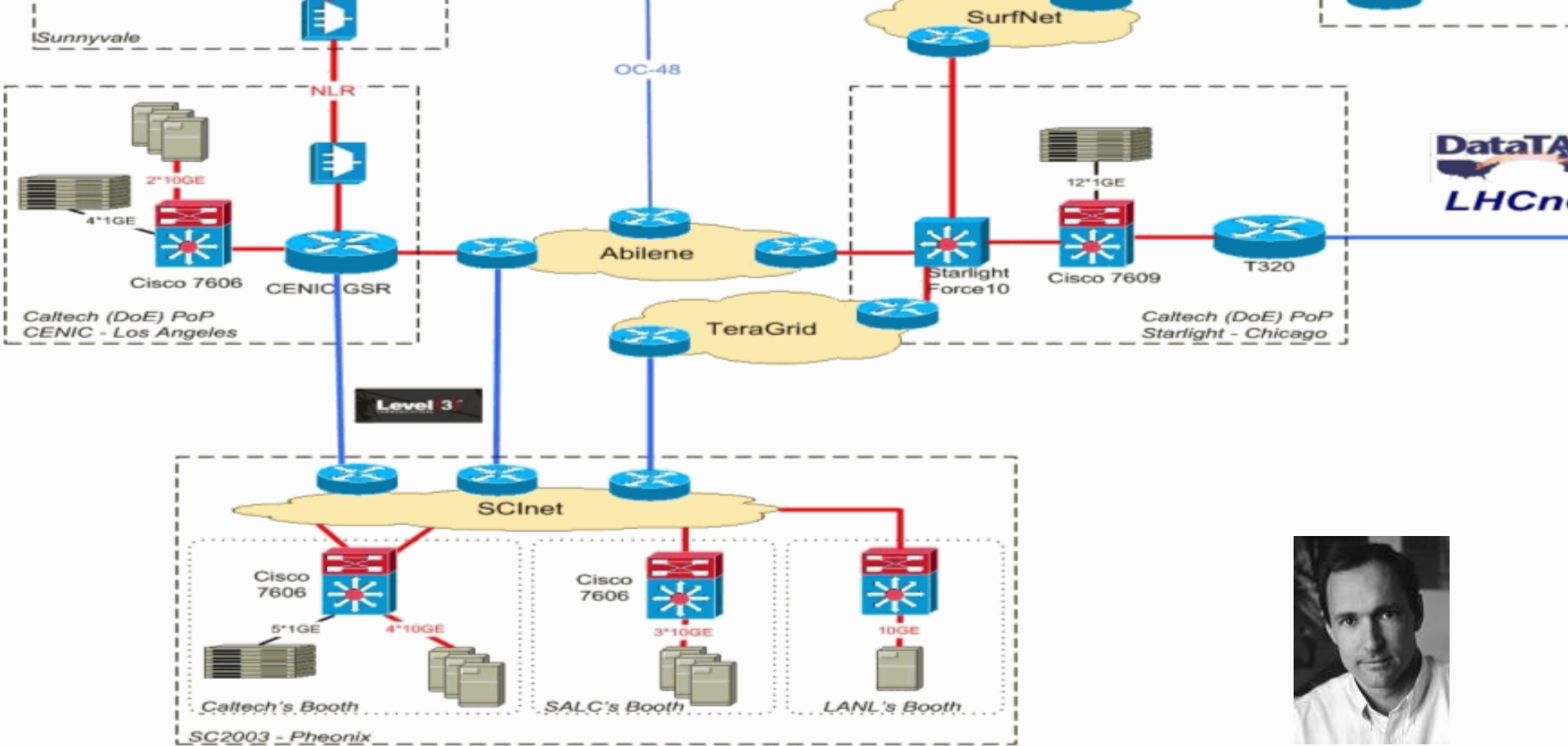
(or more concretely, XML and APIs)

It's not a truck.

It's a series of tubes.

And if you don't understand those tubes can be filled and if they are filled, when you put your message in, it gets in line and its going to be delayed by anyone that puts into that tube enormous amounts of material





Berners-Lee

It's about the *links*

(Something the designers of LOM completely forgot)

Complex Answers

Example:

How do you know this will be good?

Because, in the past:

People like you...

... expressed satisfaction

... with things like this

(this is the basis for recommender systems)

(like Amazon)

← vs →

External,
universal
criteria of
goodness



Bezos

No principles or rules describing 'quality'

- Individual preferences only
- No rubric or metric
- No 'peers' or 'committee of experts'
- Evaluations are *not* an aggregation – no votes



Surowiecki

It's Chaos!

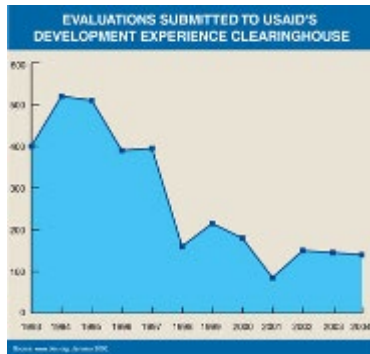
Inside the pipes...

Complex answers link different types of data

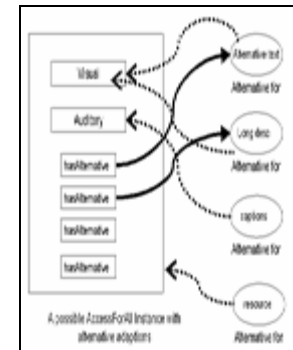


User Profiles

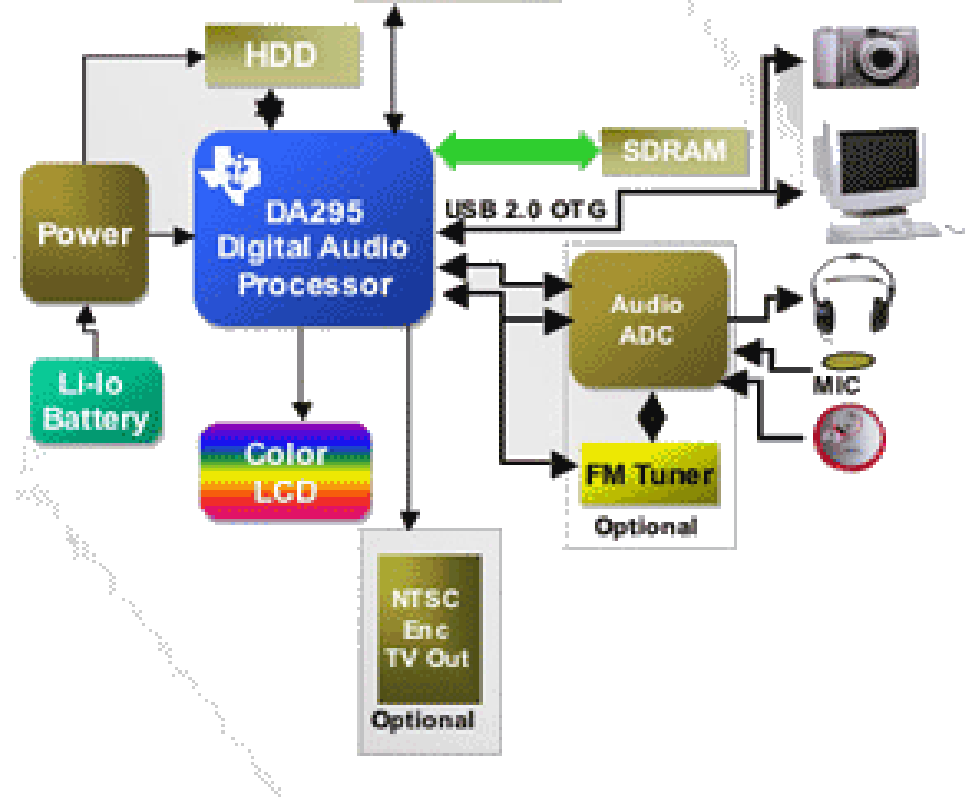
Evaluations



Resource Profiles



Each type of data is a feature set....



Eg. Users described in **FOAF** or **XFN**

Eg. Resources described in **LOM** or **RSS**

Eg. Evaluations described in... ???

(well, it's not all built yet)

That's how we measure



Which
features?

That depends
on *saliency*

*which is why
context is
important*



Tversky

Resource Profiles

Multiple vocabularies

(eg. for different types of objects)

Multiple authors

(eg. content author, publisher, classifier)

Distributed metadata

- located in various repositories
- metadata models
- analogy: personal information

http://www.downes.ca/files/resource_profiles.htm

Metadata

First Person	Second Person	Third Person
<ul style="list-style-type: none">- Bibliographic- Technical- Rights	<ul style="list-style-type: none">- Educational- Sequence and Relational- Interaction	<ul style="list-style-type: none">- Evaluation- Classification
<i>Created by the content author or publisher</i>	<i>Created by the content user (in the process of use)</i>	<i>Created by disinterested third parties</i>

What Will We See?



A record 121 national flags lined up at the opening ceremony. Prime Minister Junichiro Koizumi makes the opening address on March 24.

Beyond recommendations to...

- Classifications (tagging)
- Valuations (markets, Blogshares)

New *types* of knowledge yet to be discovered

Knowledge is like recognition

Learning is like perception

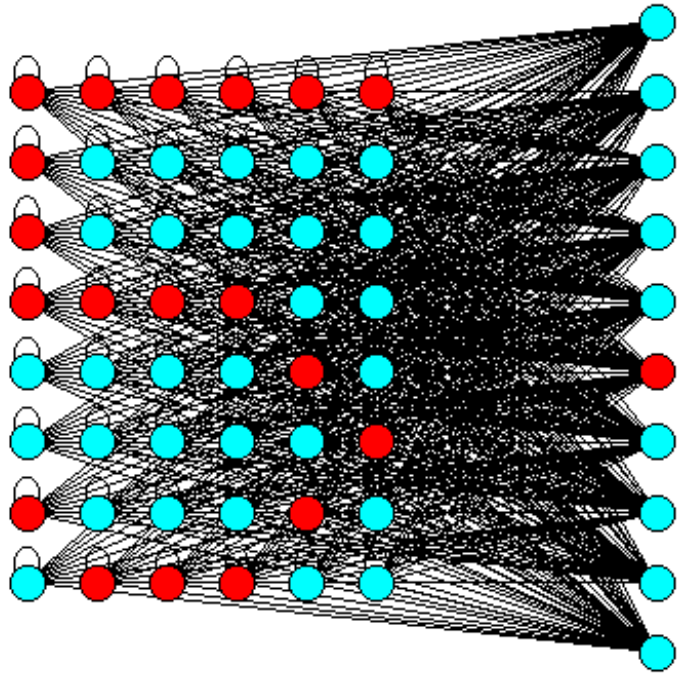
*the acquisition of new patterns
of connectivity*

through experience



Hume





Pattern Recognition...



Gibson

You already know this phenomenon,
you've already seen it

Emergent Learning

<http://growchangelearn.blogspot.com/2007/02/emergent-learning.html>

Tom Haskins



"Now I get it"
A-ha!
"Out of the blue"
"My mind leaped"
"Did an about-face"
"Shut up and did it"
Sudden breakthrough

<http://www.downes.ca/files/osn.html>

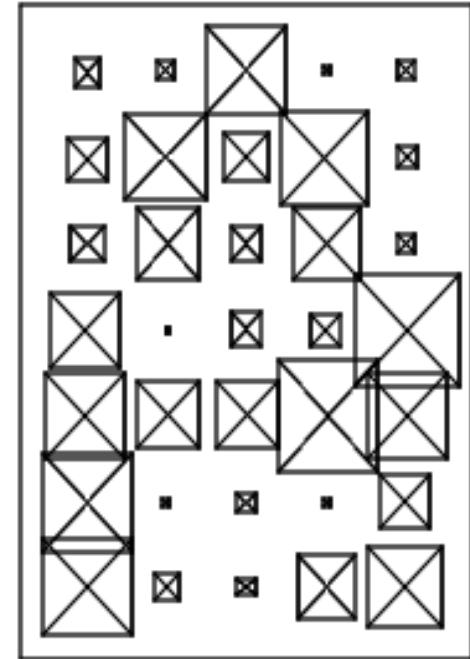
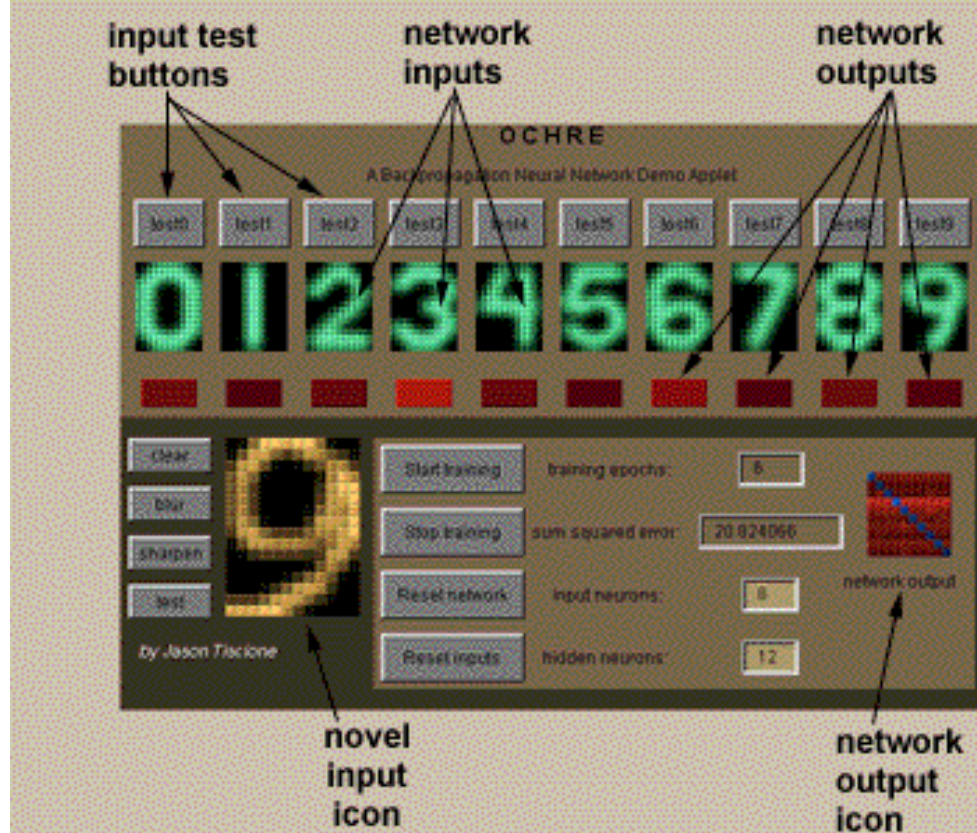
Knowledge is
recognition

It's a belief you
can't not have

Like after
you've *found*
Waldo



Waldo

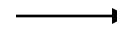
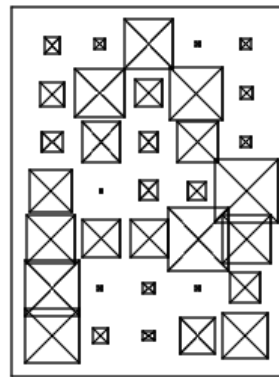
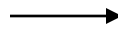
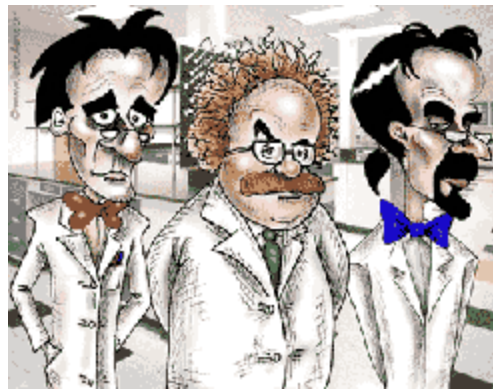


<http://www.sund.de/netze/applets/BPN/bpn2/ochre.html>

Pattern recognition is based on *similarity* between the current phenomenon and previously recognized phenomena

What we *want* is for students to recognize patterns in existing networks – in communities of experts, communities of practice

That's why we model and demonstrate

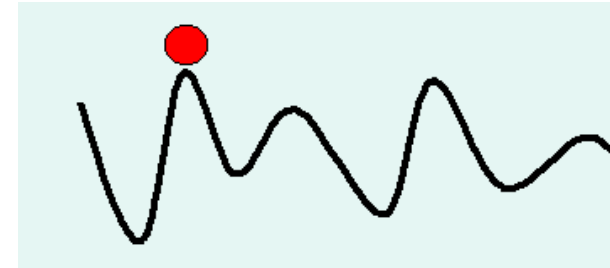


But what *kind* of network do we want to model for our students?

For that matter, what kind of network do we want for *ourselves*?

To maximize knowledge?

To little connection and information never propagates



Too much connection and information propagates too quickly



Varela

The internet itself illustrates a sound set of principles, grounded by two major characteristics: simple services with realistic scope.



Cerf

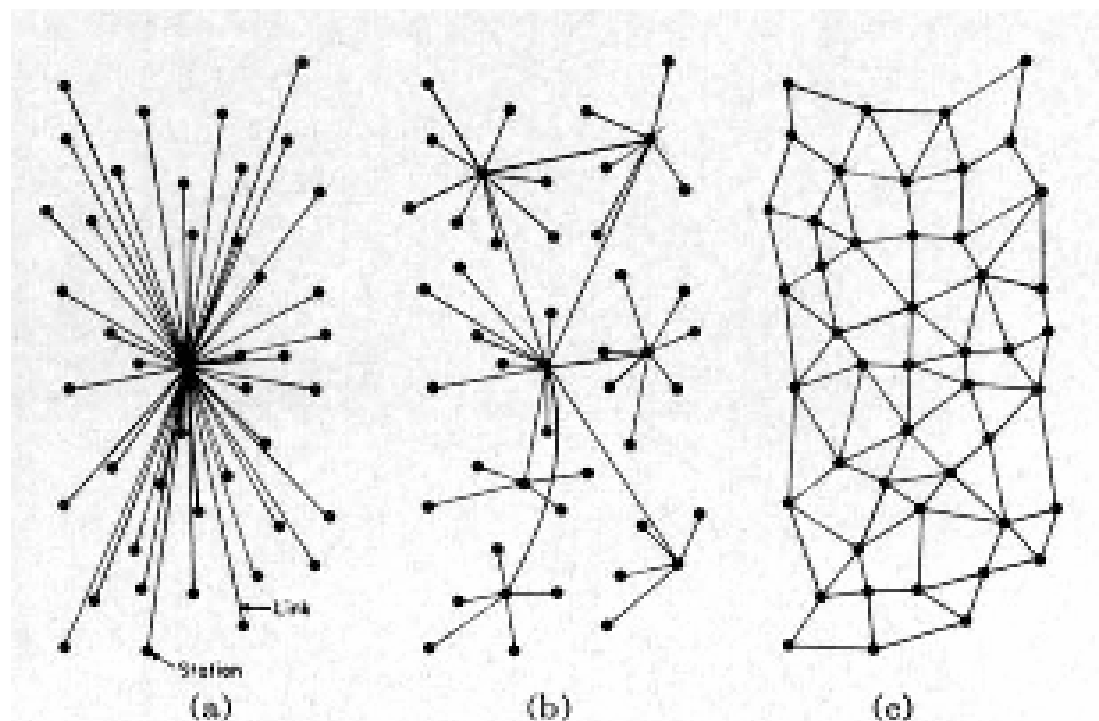


Fig. 1—(a) Centralized. (b) Decentralized. (c) Distributed networks.

Effective networks are...

Decentralized



Disaggregated



Distributed



Disintermediated

Dis-Integrated

Dynamic



Desegregated

Democrati



Democratic =

The Semantic Condition

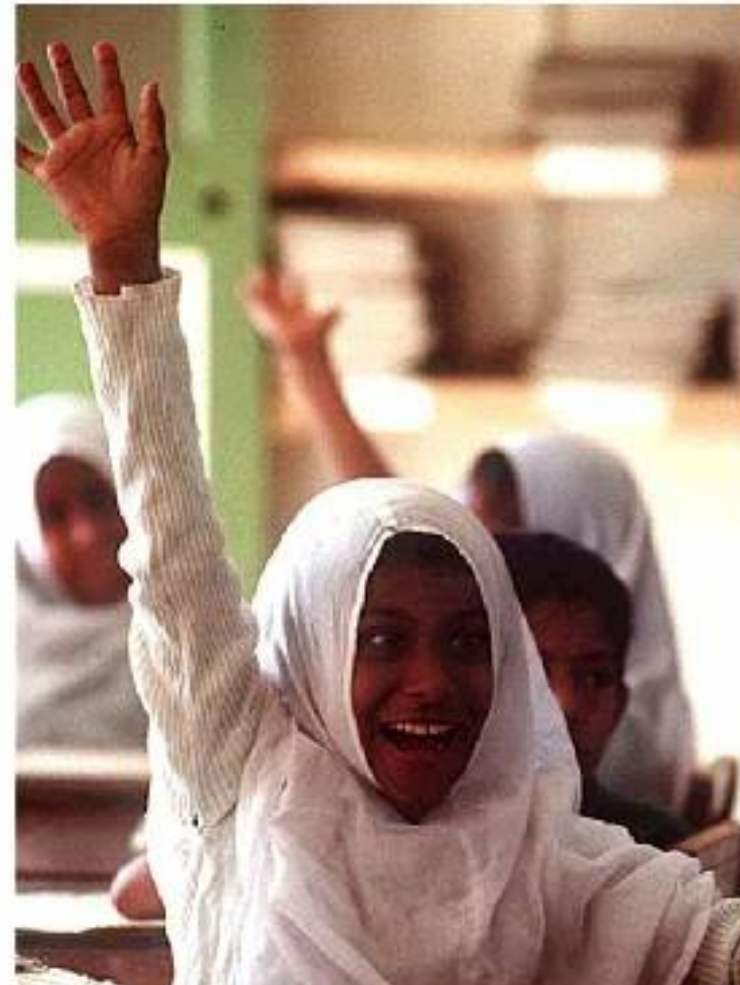
Reliable networks support...

- *Autonomy*
- *Diversity*
- *Openness*
- *Connectivity*



Mill

<http://www.downes.ca/post/33034>





Downes

<http://www.downes.ca>