

# E-Learning 2.0

## *IN DEVELOPMENT*

Stephen Downes  
September 25, 2007



# Overview

1. E-Learning in Development
2. The (Traditional) AI Approach
3. The Connectivist Alternative
4. Network Semantics
5. Web 2.0 - Core Technologies
6. E-learning 2.0
7. The Personal Learning Environment

# 1. E-Learning in Development



# Online Learning

- Has been around since 1995 or so
- Really grew with the World Wide Web
- Has advanced tremendously

Many positive developments in the last few years worth sharing...

# Open Source Applications

- **Learning Management Systems**  
such as Moodle, Sakai, Bodington, ATutor
- **Development and Community Tools**  
such as LAMS, Connexions, ELGG, Drupal, WordPress
- **Supporting Software**  
such as Firefox, Thunderbird, OpenOffice, Audacity



# Open Educational Resources

- MIT's **OpenCourseWare** project  
and the OpenCourseWare Consortium
- Open University's **Open Courses**
- **OER** initiatives  
Hewlett, Wellcome, OECD, UNESCO
- **Creative Commons** and CC materials  
in Flickr, Yahoo, Google, **Wikipedia**, Wikiversity, etc.





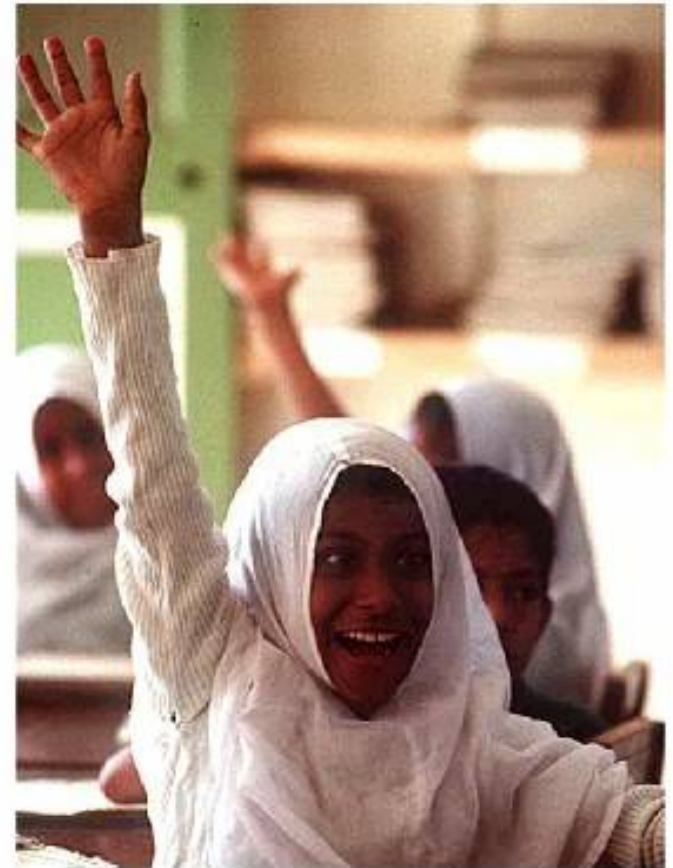
# New Environments

- **Multimedia explosion**  
podcasts, vodcasts, YouTube, Slideshare, more
- **Mobile computing**  
mobile phones, PDAs, etc.
- **The 3D web**  
Second Life is a start, we will see more of this



# Access...

- *One-to-one computing*  
such as the Maine laptop project,  
now spreading rapidly
- *One Laptop per Child*  
has launched –  
computers in Nigeria
- *Wireless access*  
3G networks, WLAN...





## 2. The Traditional (AI) Approach



# Expert Systems

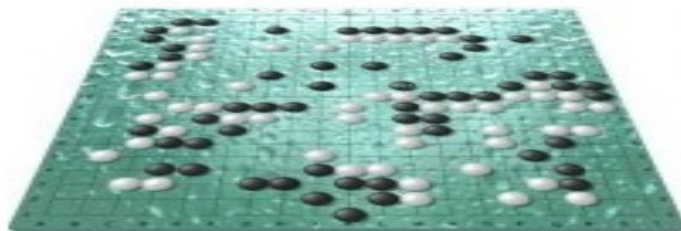
- Two major aspects:
  - Representation
  - Inference engine
- Analogy: the wizard



[http://en.wikipedia.org/wiki/Expert\\_system](http://en.wikipedia.org/wiki/Expert_system)

[http://www.atariarchives.org/deli/expert\\_systems.php](http://www.atariarchives.org/deli/expert_systems.php)

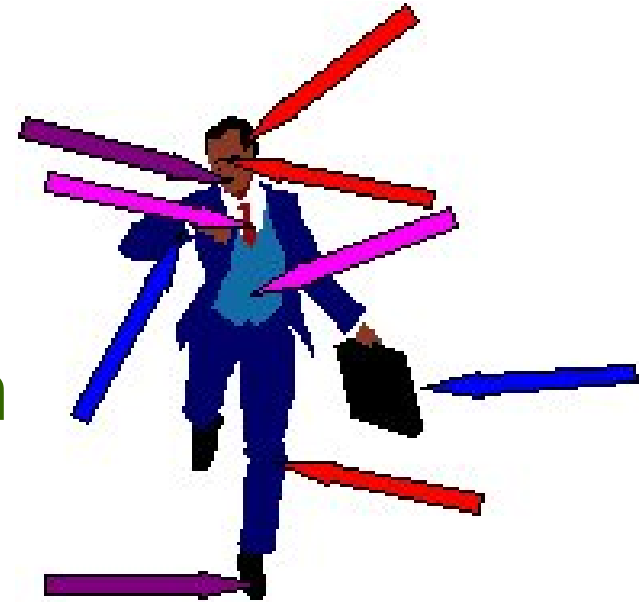
# Properties of Expert Systems



- Expert systems are goal oriented
- Good expert systems are efficient
- Expert systems should be adaptive

# AI Requires...

- Knowledge Acquisition
  - Subject matter expert
- Knowledge Representation
  - Eg. creation of resources
- Knowledge Encoding
  - Eg. creation of if-then structures



# Learning Design

- to automatically “run” the sequence of student activities (facilitated by the educator via computers
  - James Dalziel

<http://blog.worldcampus.psu.edu/index.php/2007/05/16/learning-design-and-open-source-teaching/>

[http://zope.cetis.ac.uk/lib/media/WhatIsLD\\_web.pdf](http://zope.cetis.ac.uk/lib/media/WhatIsLD_web.pdf)

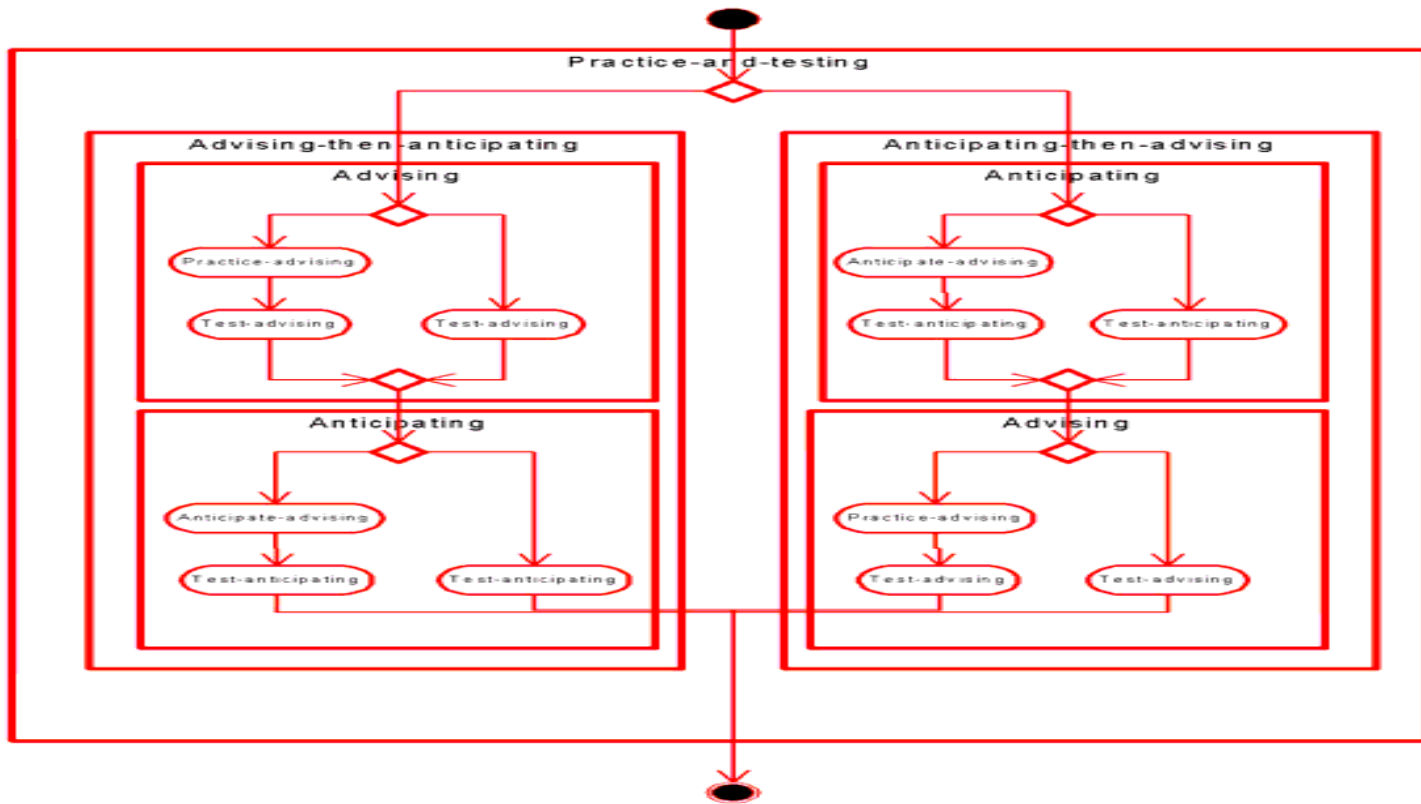
# IMS Learning Design

- Based on Education Modelling Language (Rob Koper)
- Examples...
  - Programmed instruction
  - Role play
  - Competency-based learning
- Idea that LDs are “pedagogically neutral”

[http://www.imsglobal.org/learningdesign/ldv1p0/imsld\\_bestv1p0.html](http://www.imsglobal.org/learningdesign/ldv1p0/imsld_bestv1p0.html)



# Competency-Based Learning

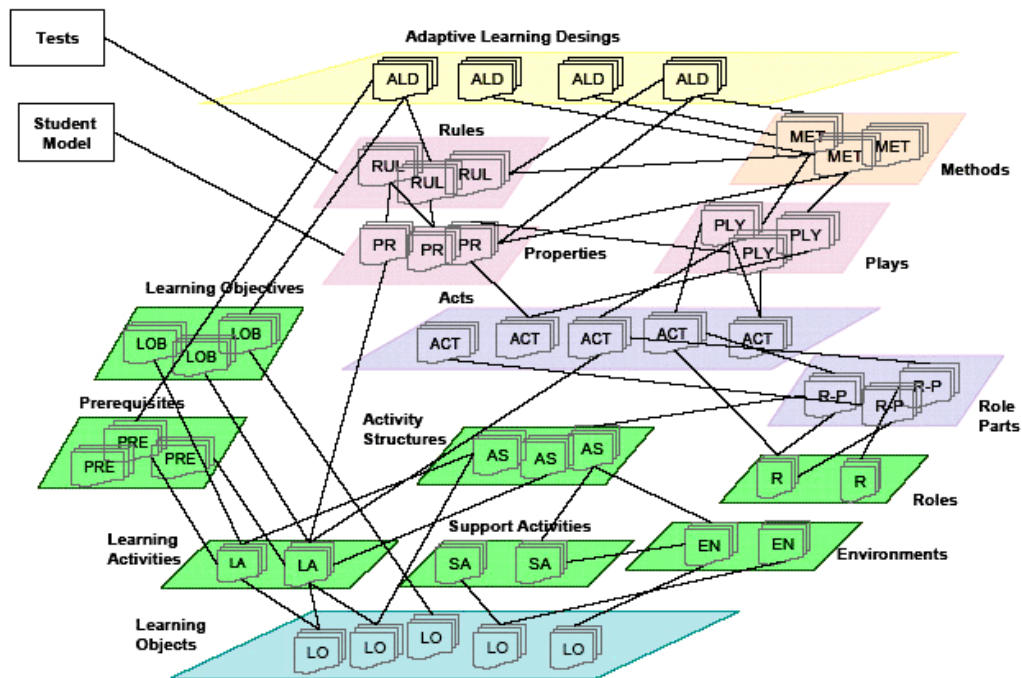


# LD Tools

| Nr. | <i>Tool Name</i>        | <i>Link</i>  | <i>Author</i>          | <i>Levels</i> |
|-----|-------------------------|--|------------------------|---------------|
| 1   | <b>CopperAuthor</b>     | <a href="http://www.copperauthor.org">www.copperauthor.org</a>   | OUNL                   | A             |
| 2   | <b>Reload LD Editor</b> | <a href="http://www.reload.ac.uk/ldeditor.html">www.reload.ac.uk/ldeditor.html</a>   | Reload                 | A,B,C         |
| 3   | <b>ASK LDT</b>          | <a href="http://www.ask.iti.gr">www.ask.iti.gr</a>   | University of Piraeus  | A,B           |
| 4   | <b>Mot+</b>             | <a href="http://www.licef.teluq.quebec.ca/gp/eng/productions/mot.htm">www.licef.teluq.quebec.ca/gp/eng/productions/mot.htm</a>   | University of Quebec   | A             |
| 5   | <b>Cosmos</b>           | <a href="http://www.unfold-project.net:8085/UNFOLD/general_resources_folder/cosmos_tool.zip">www.unfold-project.net:8085/UNFOLD/general_resources_folder/cosmos_tool.zip</a> | University of Duisburg | A,B           |

Berggren et.al. <http://jime.open.ac.uk/2005/02/>

# The Lego Metaphor



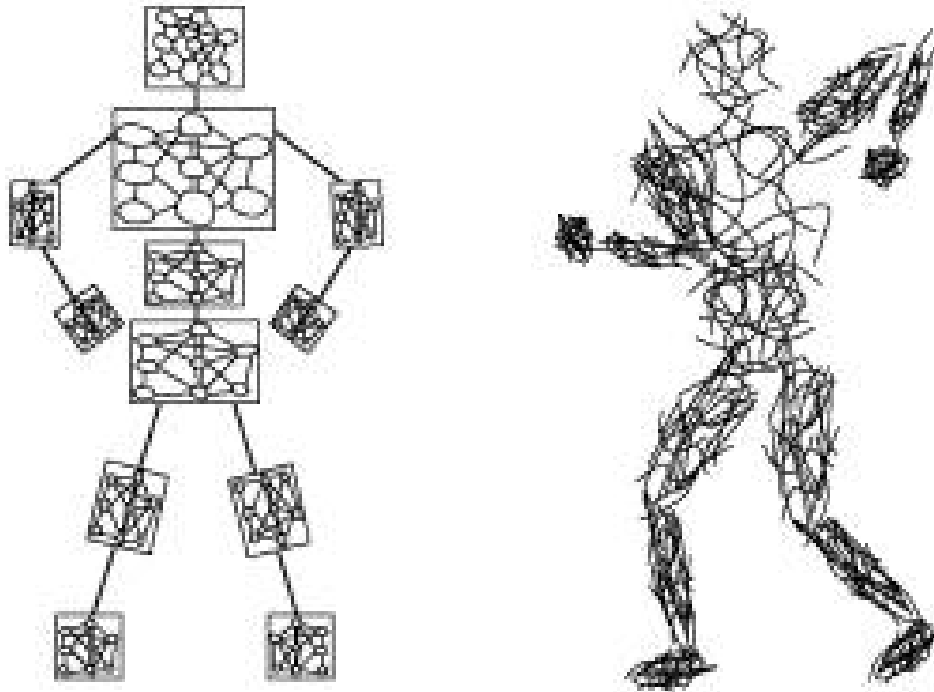
# The Learning Refinery

- LD but one element of a larger picture
- Includes Learning Objects, repositories, etc
- “LDs by themselves are of limited value without a bundle of surrounding documentation, metadata, and taxonomies”

# 3. The Connectivist Alternative



# Connectionism



Minsky: Symbolic vs. Analogical Man: Top-Down vs. Bottom Up

<http://web.media.mit.edu/~minsky/papers/SymbolicVs.Connectionist.html>



# Un...

As in, unorganized  
As in *not* managed  
Unconference



# Messy vs. Neat

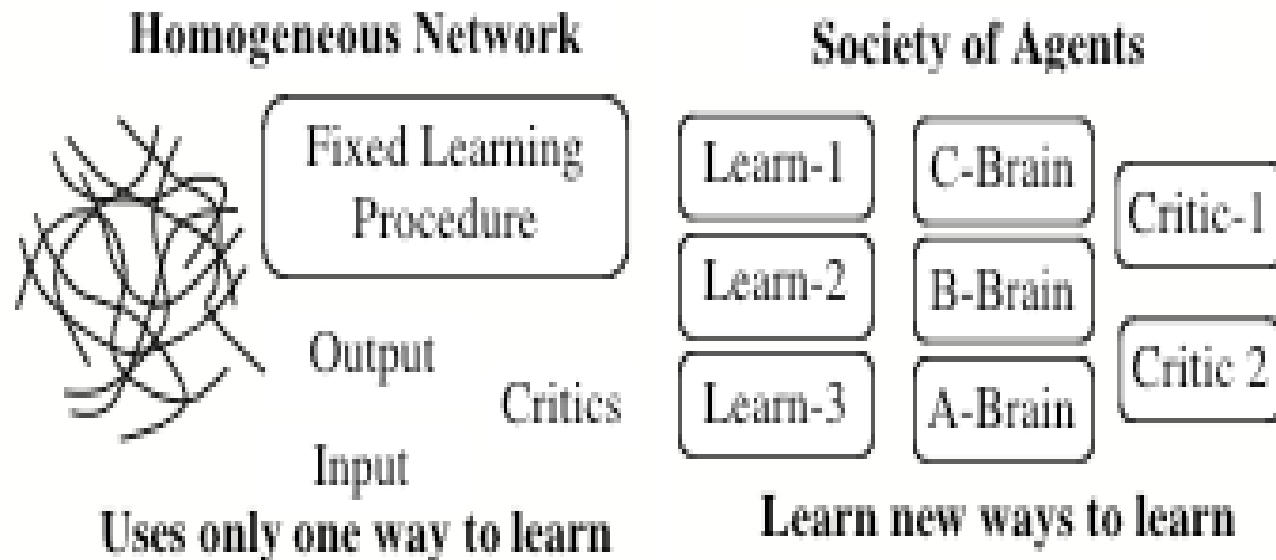
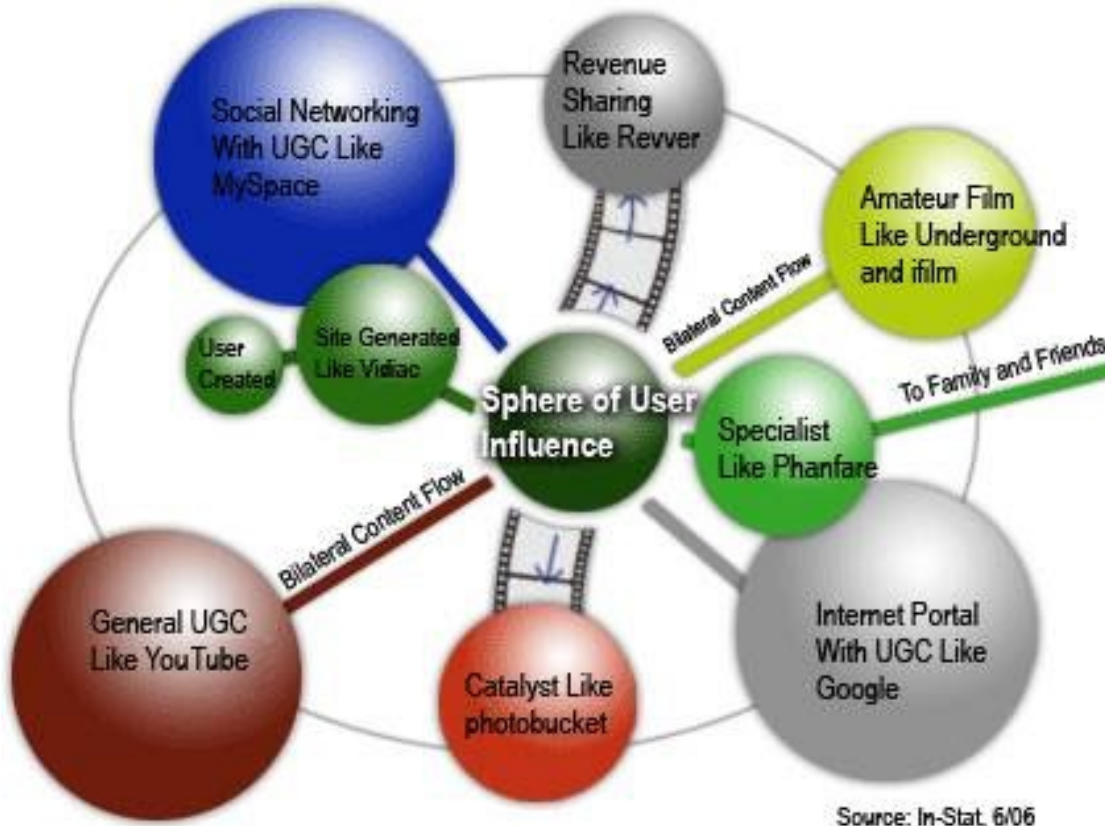


Figure. 7: Messy vs. Neat: Homostructural vs. Heterostructural

# User-Generated Content



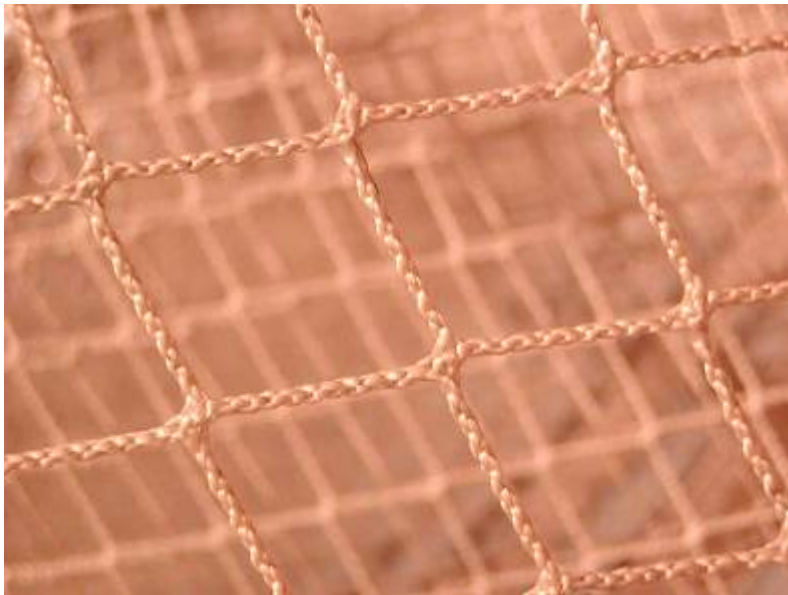
<http://www.linuxelectrons.com/news/general/user-generated-web-content-will-grow-rapidly-through-2010>

# Flow

- IM and SMS expanded – Twitter
- Facebook ‘status’ updates – the now
- RSS, podcasting and other content feeds
- Mode – the idea of flow – how do you survive in a world of constant change?  
Stop thinking of things as static
-

# Resources are like Patterns in the Mesh

the knowledge is in the network



**Old: universals**

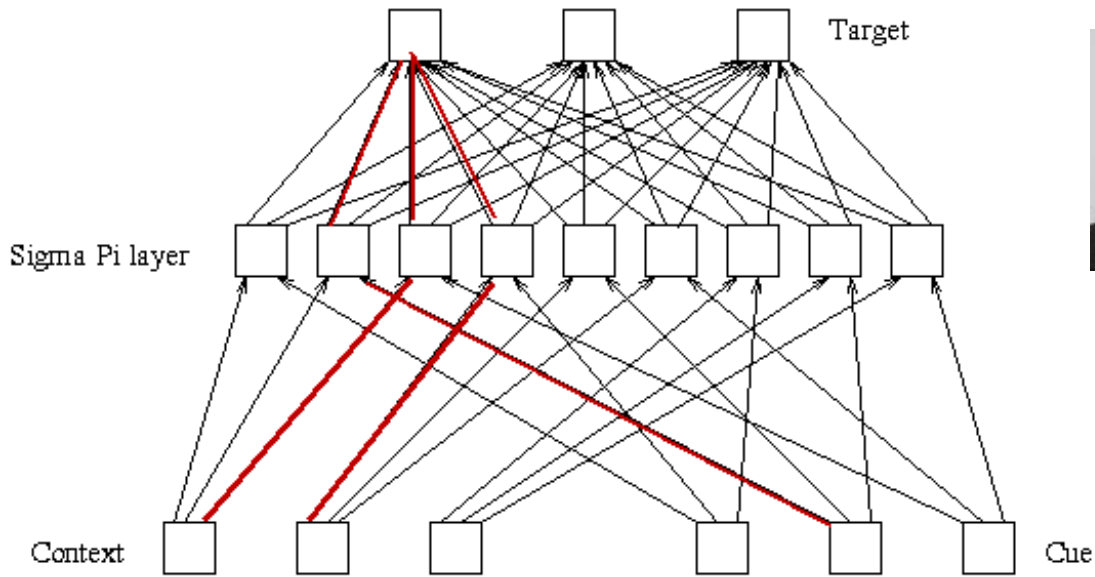
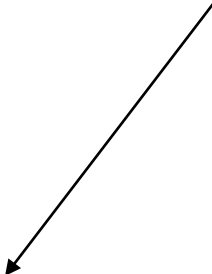
- rules
- categories

**New: patterns**

- patterns
- similarities

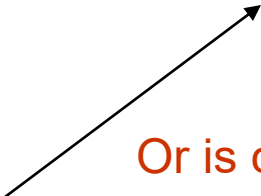
the knowledge *is* the network

stands for?



Hopfield

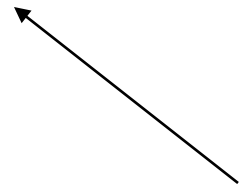
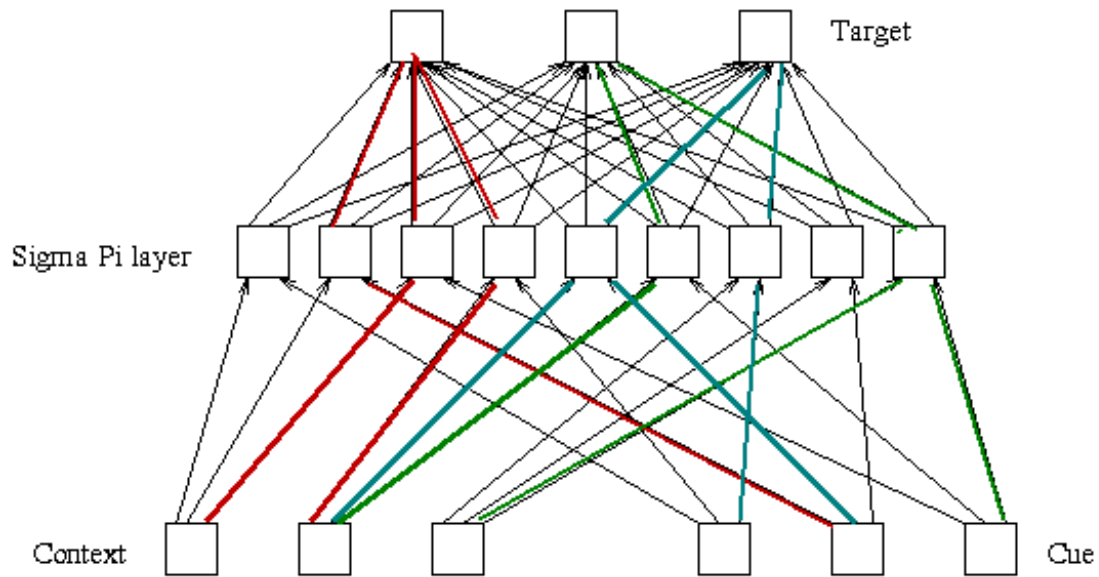
Or is caused by?



# Distributed Representation

= a pattern of connectivity

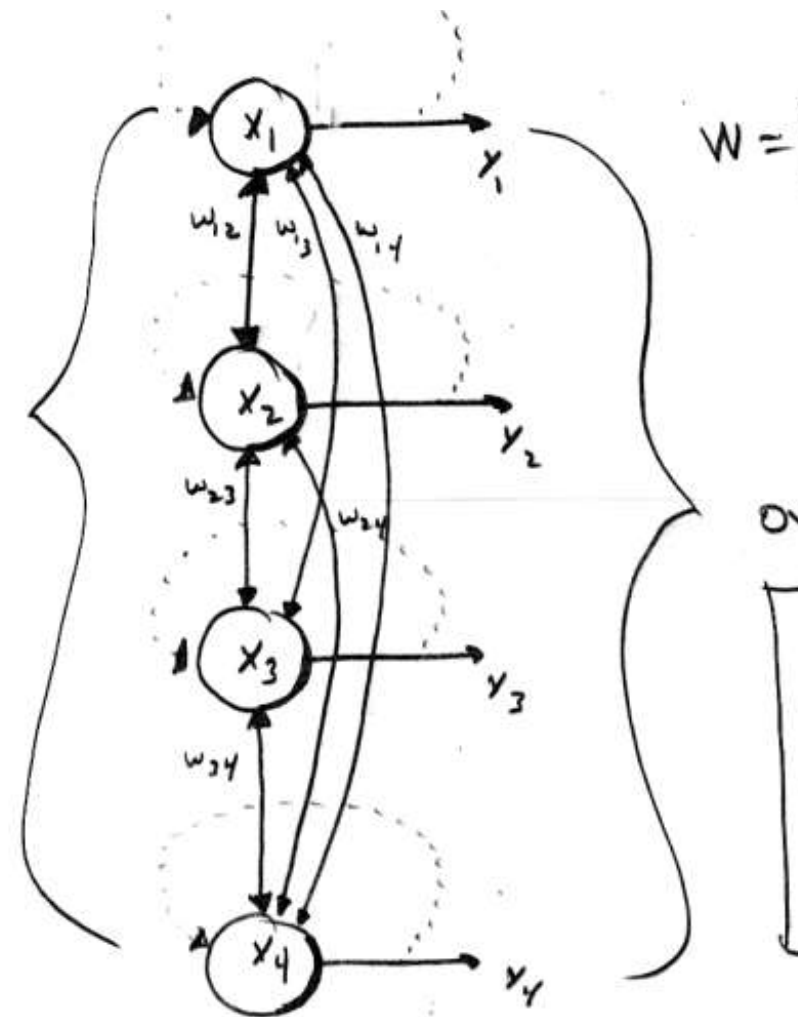




# This...

## Network Learning *Inputs*

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



- Single Layer
- Inputs  $X_i$  act as outputs  $Y_i$

# 4. Network Semantics



# Groups vs. Networks

- *A group* is a collection of entities or members according to their nature; what defines a group is the quality members possess and number
- *A network* is an association of entities or members via a set of connections; what defines a network is the extent and nature of this connectivity

# Rethinking Learning



[http://static.flickr.com/109/252157734\\_9e6c29433b\\_b.jpg](http://static.flickr.com/109/252157734_9e6c29433b_b.jpg)

<http://video.google.com/videoplay?docid=-4126240905912531540&hl=en>

# Groups, Schools, Classes

- A group, in other words, is a ***school*** (of thought, of fish...) or a ***class*** of some sort.
- Or: classes and schools are just groups. They are *defined* as groups.
- Can we even think of schools – and of learning – without thinking at the same time of the attributes of groups?

# A Group...

- A group is **elemental**, defined by mass and sameness – like an ingot of metal (Aside: democracy is a group phenomenon)



# A Network...

- A network is diverse and changing, defined by interactions – like an **ecosystem**

Can we achieve order, responsibility, identity in an ecosystem? Do we need the iron hand? (Aside: Solon, learning, justice)



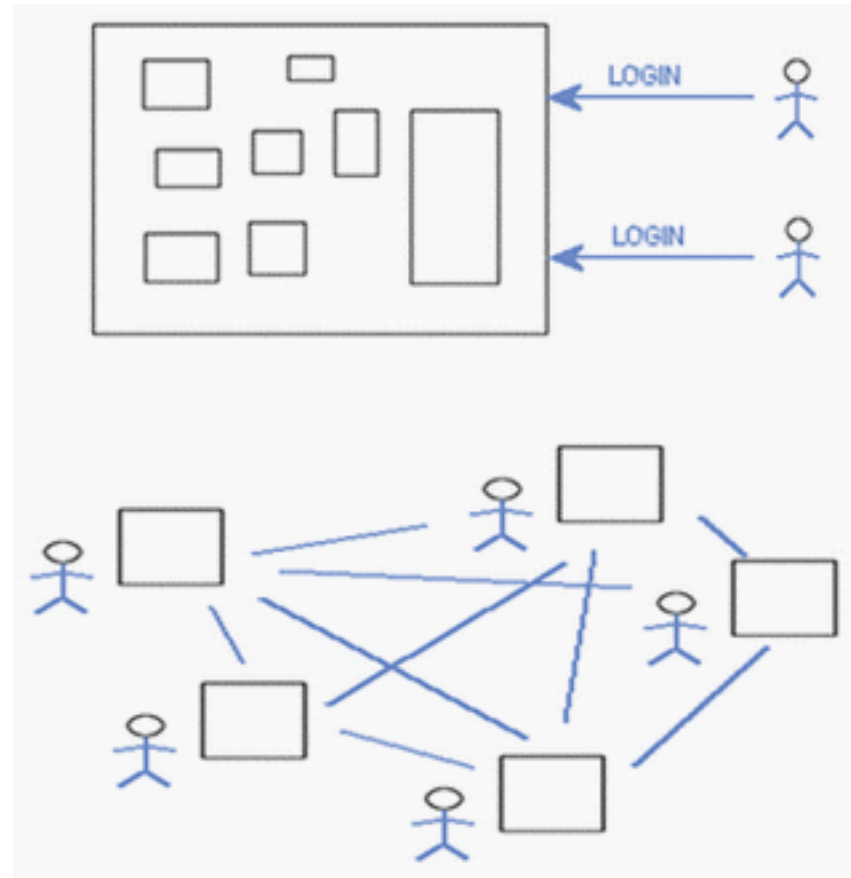
# The Semantic Principle

- Groups require unity, networks require diversity
- Groups require coherence, networks require autonomy
- Groups require privacy or segregation, networks require openness
- Groups require focus of voice, networks require interaction

<http://www.downes.ca/cgi-bin/page.cgi?post=35839>

# Networks Connective

Peer-to-peer  
Conversation  
Distributive  
Emergent



# Why Networks?

- **Nature of the knower:** humans are more like networks
- **Quality of the knowledge:** groups are limited by the capacity of the leader
- **Nature of the knowledge:** group knowledge is *transmitted* and *simple* (cause-effect, yes-no, etc) while network knowledge is *emergent* and *complex*

# 5. Web 2.0 - Core Technologies





# Tagging

## Tagging

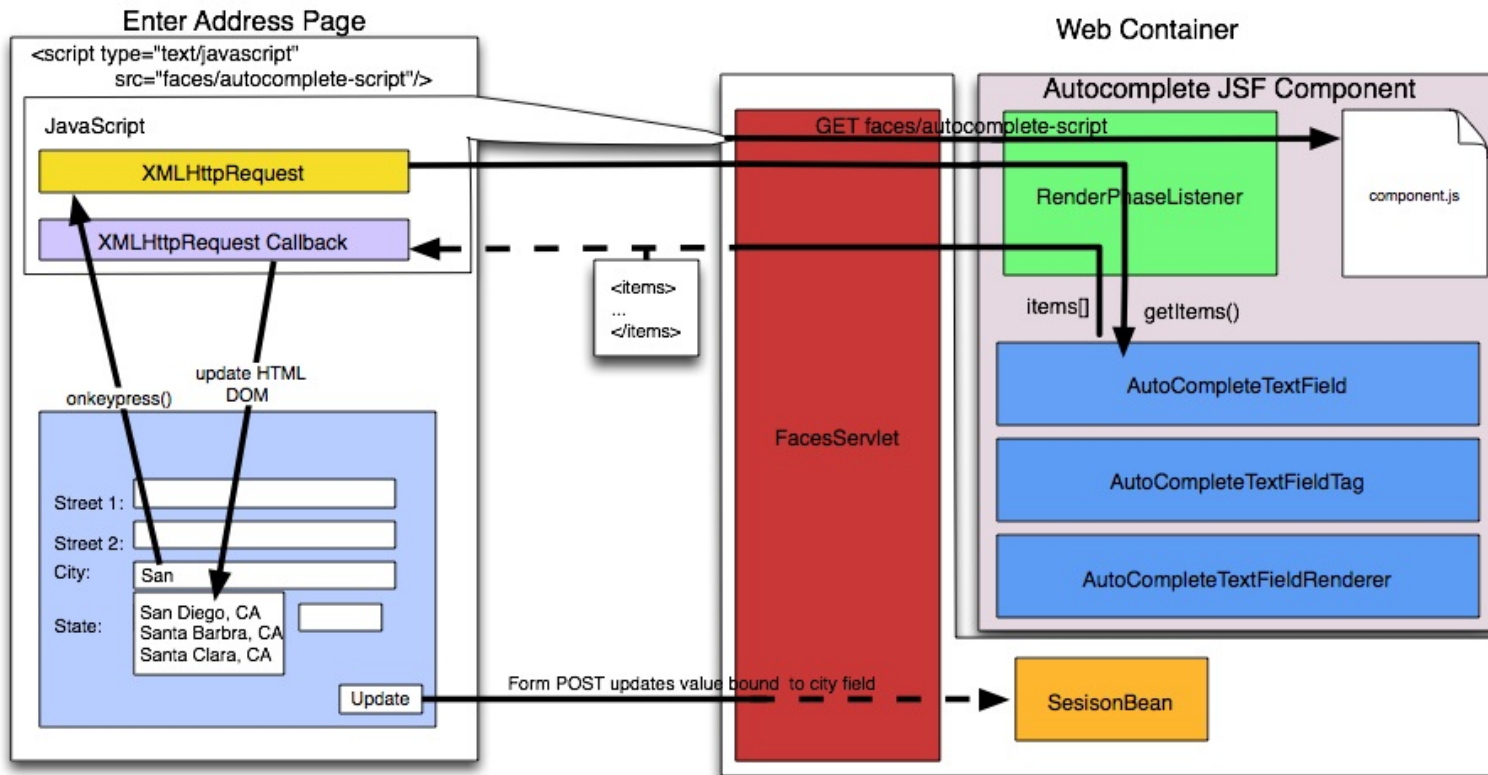
entrepreneurship publishing technology **design** medium b  
environment games **wireframe** sitemap user experience  
process flow **tagging** card sort **iasummit07** design  
on the box **information architecture** swimlanes rapid f  
**UX methods** digital ethnography analytics alignment m  
**interaction design** kano analysis **tagging** experience  
**faceted browse** page description diagram **facets links**  
miscellaneous **web 2.0** movies **adoption** emergence m

UX METHODS TRADING CARDS

13

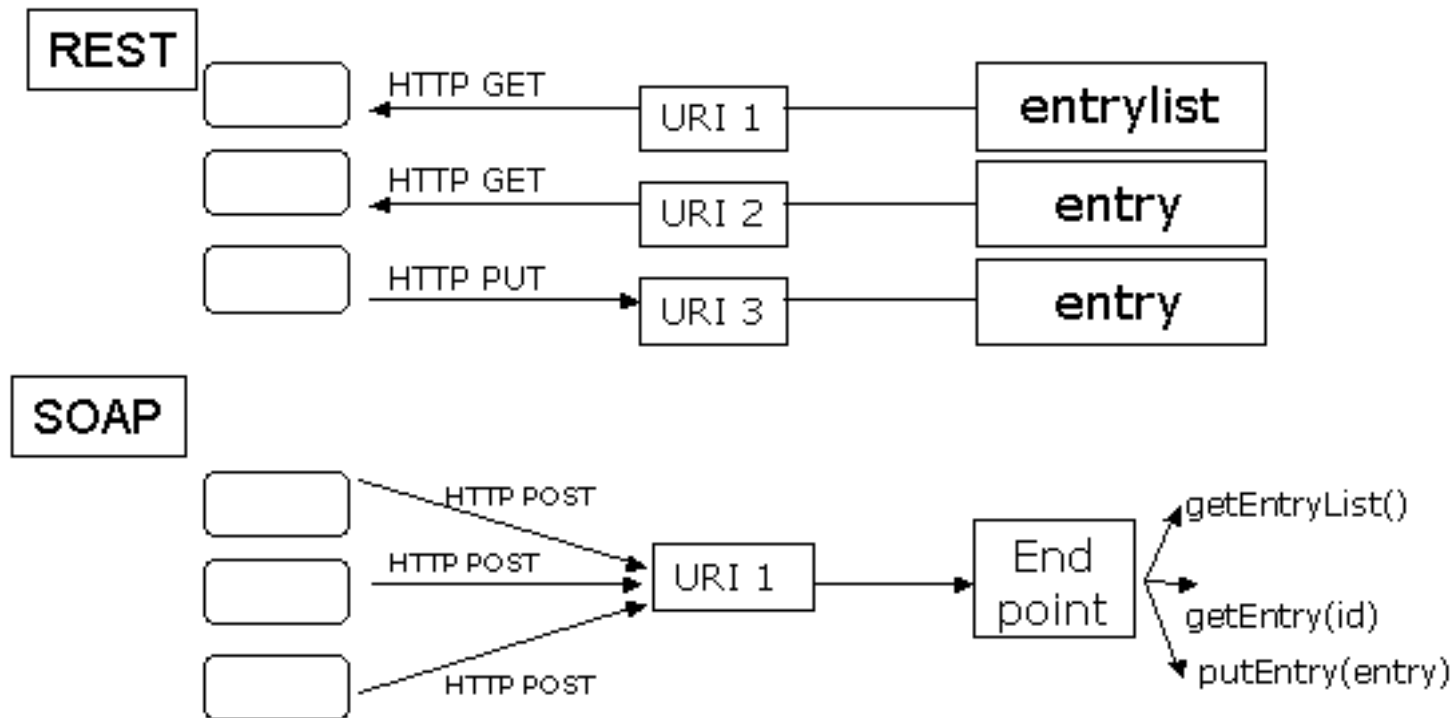
# Asynchronous Javascript and XML (AJAX)

Jesse James Garrett in February 2005.



<https://bpcatalog.dev.java.net/ajax/textfield-jsf/design.html>

# Representational State Transfer (REST)

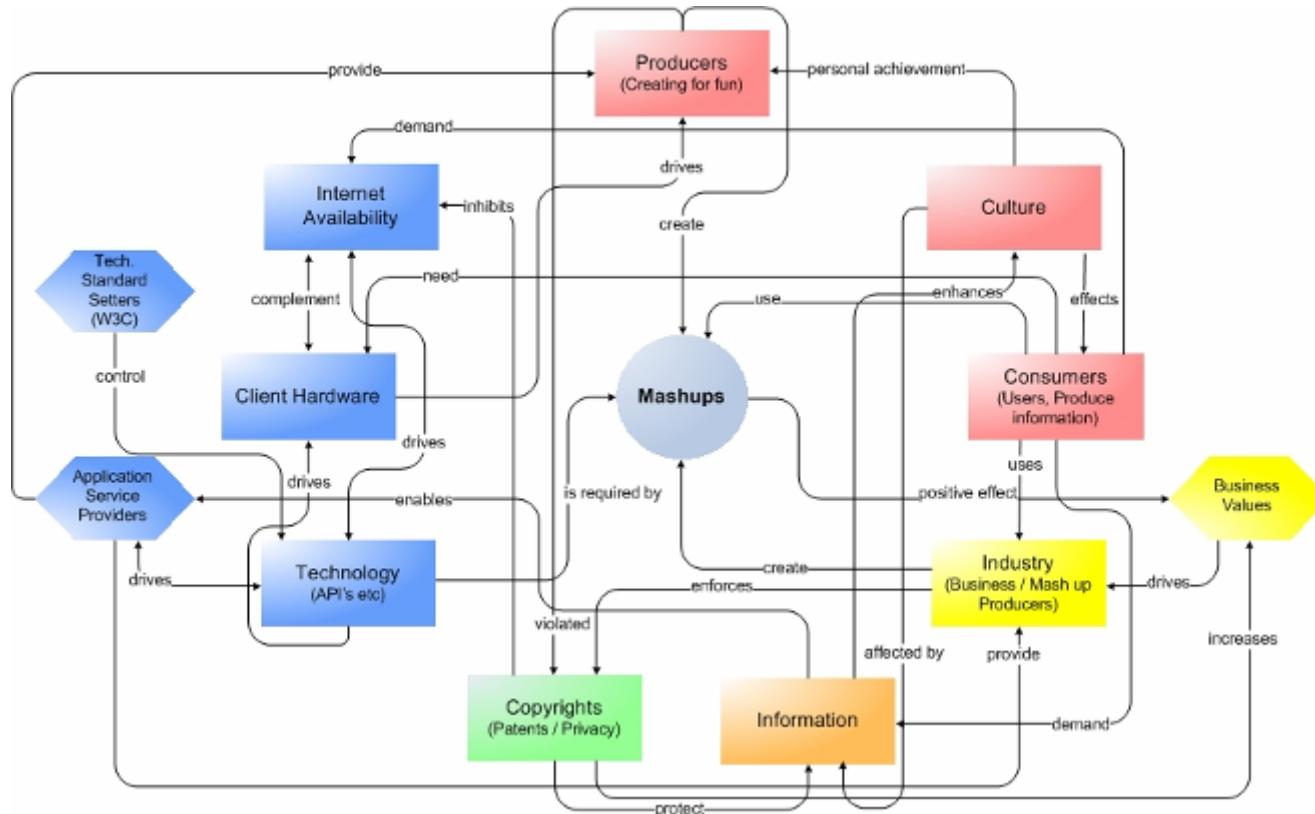


- principles that outline how resources are defined and addressed
- looser sense: domain-specific data over HTTP

[http://en.wikipedia.org/wiki/Representational\\_State\\_Transfer](http://en.wikipedia.org/wiki/Representational_State_Transfer)  
<http://itpro.nikkeibp.co.jp/article/Watcher/20060315/232492/>

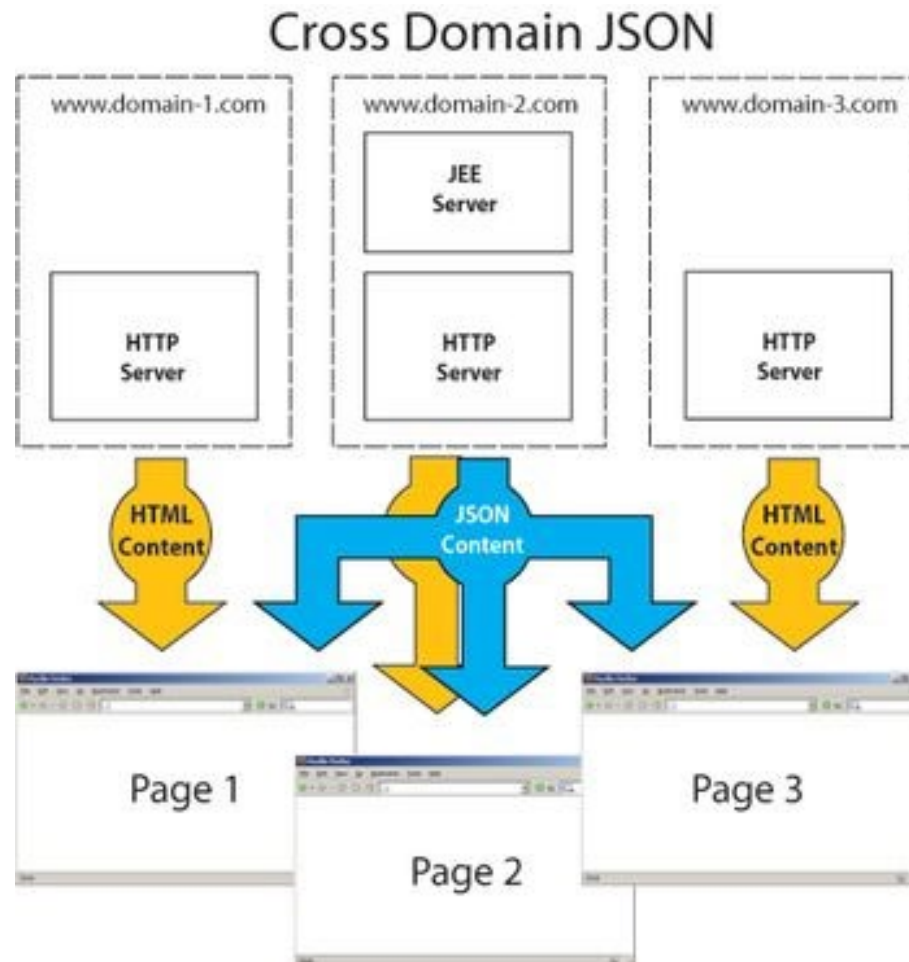


# Application Program Interface (API) and Mash-Ups

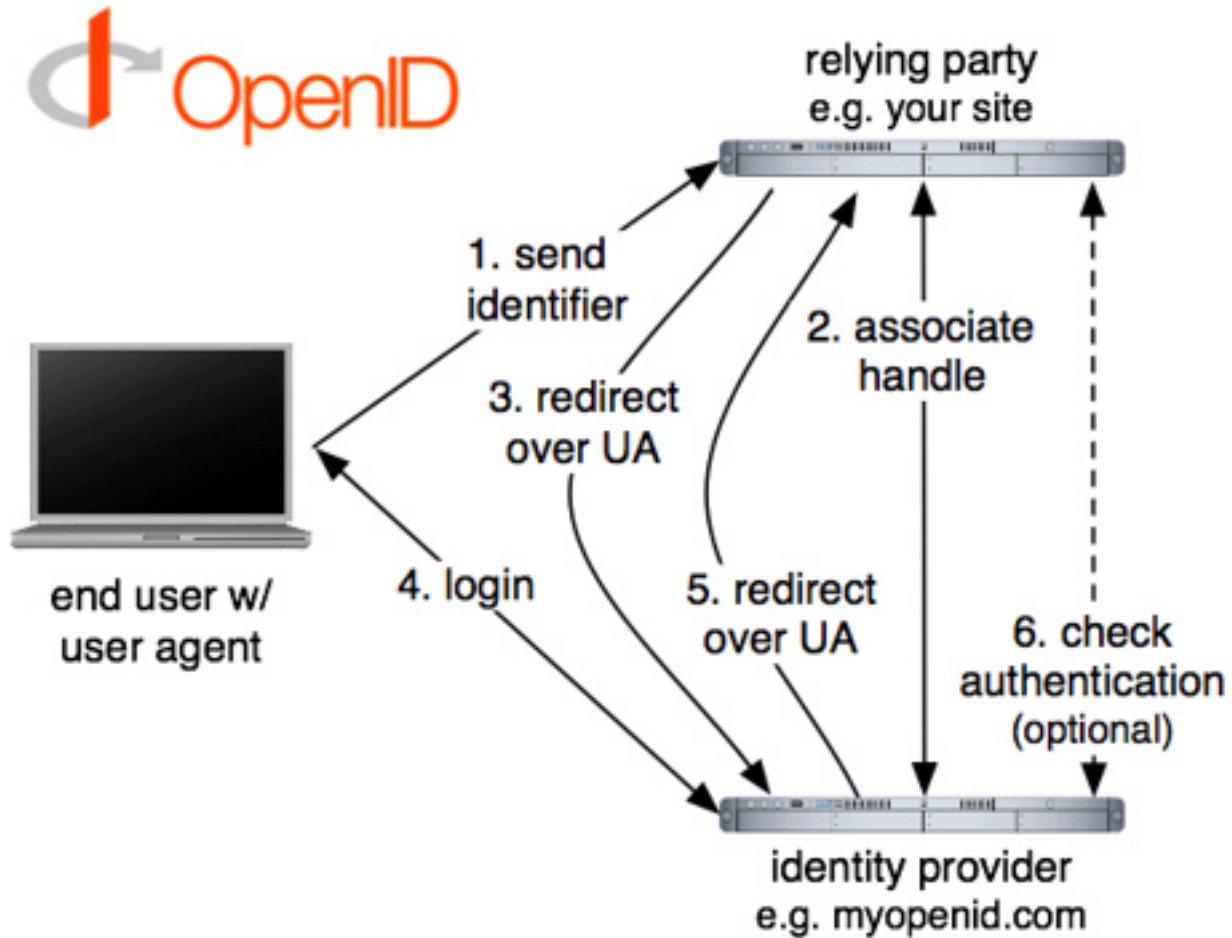


<http://scenariothinking.org/wiki/images/b/b6/MashUpSysDiagramV6.0.jpg>

# Javascript Object Notation (JSON)



- OpenID



# Identity

- The idea: identity as personal, not institutional
- You own your data
- Identity 2.0 – Dick Hardt  
[http://talk.talis.com/archives/2005/10/dick\\_hardt\\_on\\_i.html](http://talk.talis.com/archives/2005/10/dick_hardt_on_i.html)  
<http://identity20.com/media/OSCON2005/>
- OpenID <http://openid.net/>

# No More Walled Gardens

- Social and content networks distributed across services
- But also... importantly... the walls or institutions and corporations are also less important

## 6. E-Learning 2.0



# E-Learning 2.0

The idea is that learning is *not* based on *objects* and *contents* that are stored, as though in a library

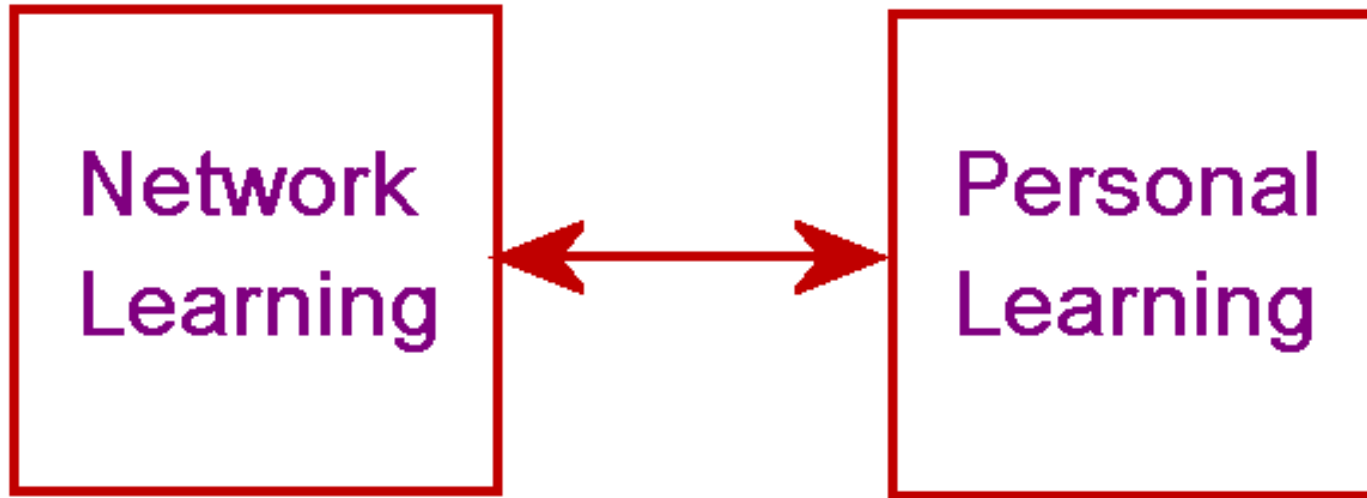


Rather, the idea is that learning is like a utility - like water or electricity - that flows in a network or a grip, that we tap into when we want





The way networks learn is the way people learn...



- they are both complex systems
- the organization of each depends on connections

Connectivism (George Siemens)

# The Concept

- Learner centered

Learning is centered around the interests of the learner

Learning is *owned* by the learner

This implies learner choice of subjects, materials, learning styles

- Immersive learning

This learning is  
immersive –  
learning by doing

- **Connected Learning**

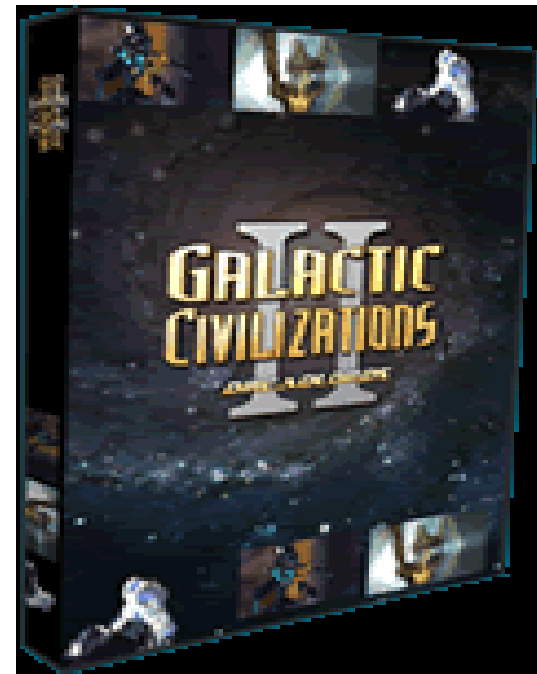
The computer connects the student to the rest of the world

Learning occurs through connections with other learners

Learning is based on conversation and interaction

# Examples

- Game-based learning

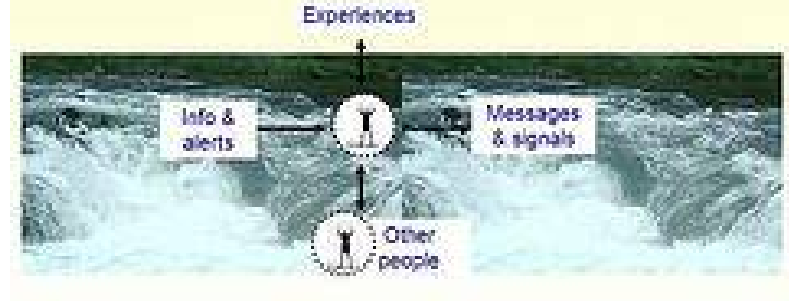
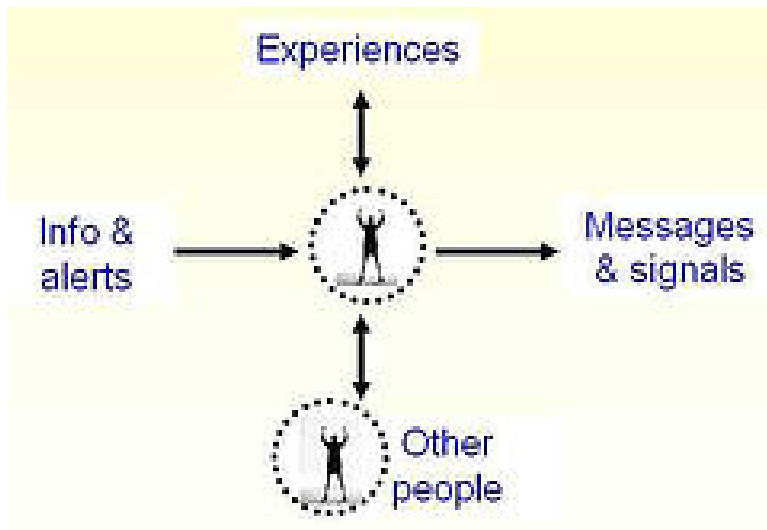


Types:

Branching, Spreadsheet, Quiz Game, Simulation Lab...

<http://www.downes.ca/post/11>

- Workflow (Informal) Learning



Types: EPSS, Community of Practice, Environment, Visualization...

<http://metatime.blogspot.com/>

- Mobile Learning



Examples:

Co-op learning, drill and flash-card,  
instant messaging, field trips,  
resource capture (like this talk!)

## Mobile Living

## Easy Living

Make the convenient people's livelihood, build up high-quality national life.

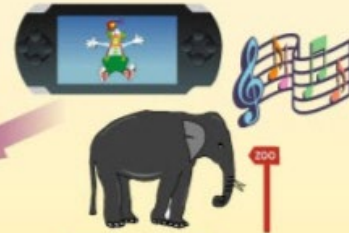
### M-the people's livelihood

- Live information
- Convenience store
- Food court
- Buy ticket...



### M-amusement

- Game
- Cartoon
- Music
- Food & Drink...



### M-community

- Wireless internet access
- House monitor
- Community safety
- ...



### M-care

- An exclusive SARS hospital
- Take care of old man live alone
- Family violence protection



Mobile Rescuer

Industry  
to encourage business united  
Application  
to build working mode  
Technology  
to promote dual LAN integration

<http://www.pwlan.org.tw/ct.asp?xItem=200&CtNode=501&mp=5>



# Online Learning at the Crossroads

- On the one hand – we have developed tools and systems intended to support traditional classroom based learning
- On the other hand – we *could* (should?) be developing tools and systems to support immersive learning. **We should be developing for dynamic, immersive, *living* systems...**

# First Iteration: User-Produced Media

- Blogs and Blogging
- Podcasting and Vodcasting
- Game mods and other multimedia



# Web 2.0: The Learning Network

- The intersection between the worlds for education, work, and home
- Key requirement is easy-to-use tools and hosting services\*
- \*E.g. the “e-Portfolio-as-blog” approach

<http://www.cetis.ac.uk/members/scott/entries/20050523083528>

# 7. Personal Learning Environment



Warrierz....c'mout an' playayyy...



## Content as Vocabulary

<http://icanhascheezburger.com/>

# Content as Creation

Aggregate

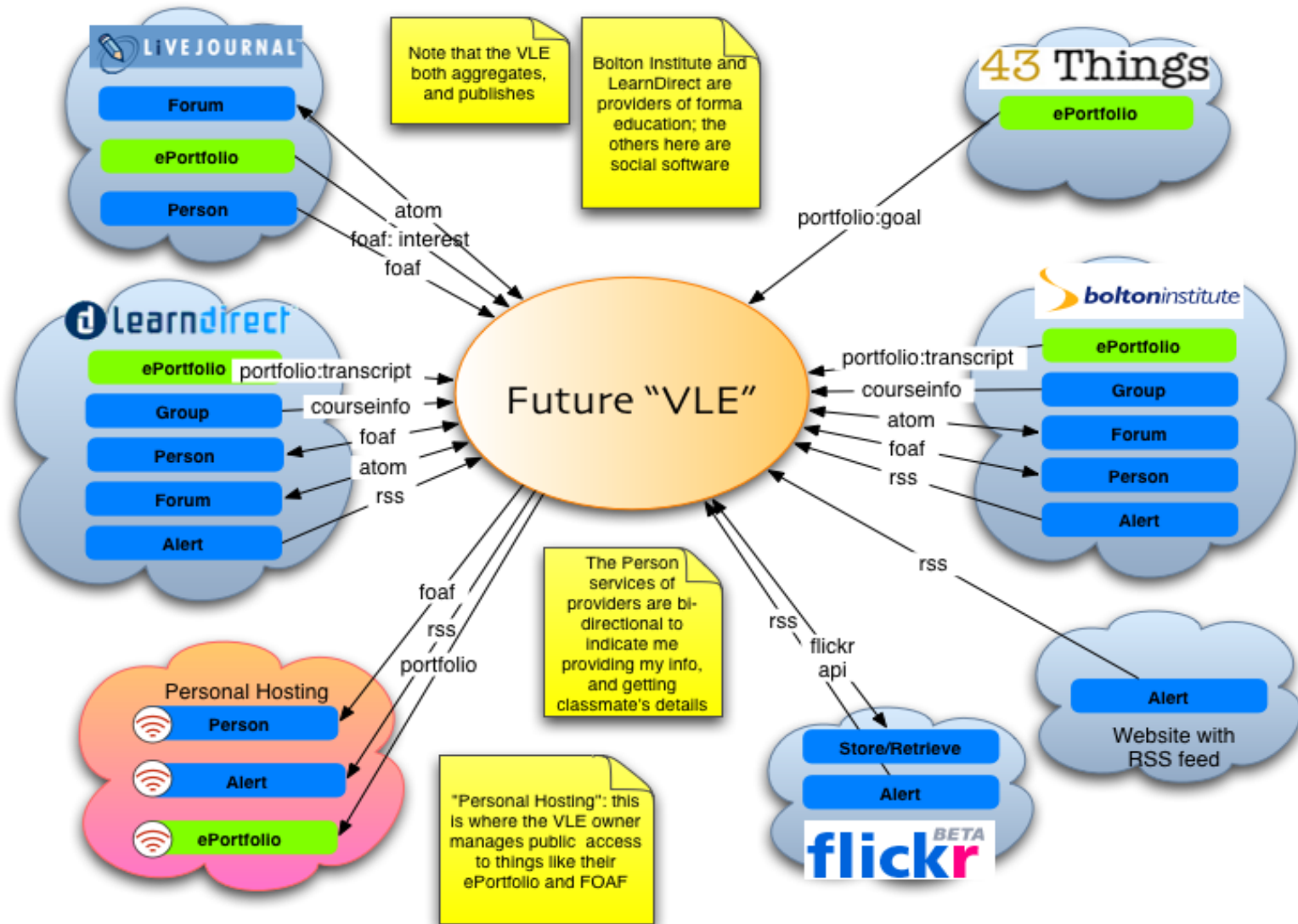
Remix

Repurpose

Feed Forward



# The Idea of the PLE...





# Plex Personal Learning Environment Example

The screenshot displays the Plex Personal Learning Environment interface. The main window is titled "Plex" and contains several panes:

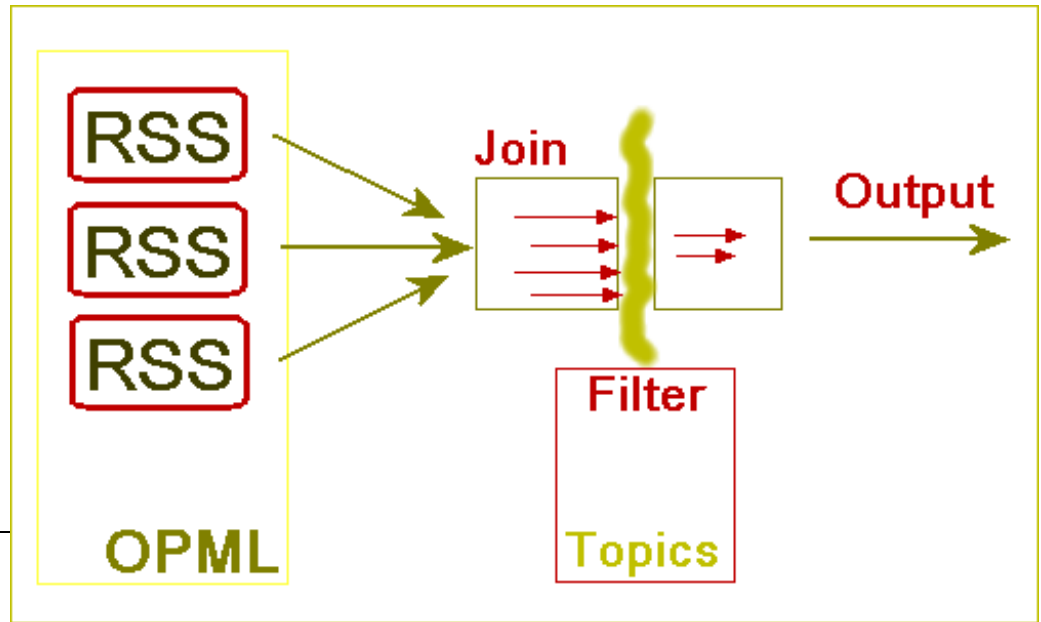
- Opportunities Explorer:** Shows a tree view with "Free" and "Match" categories. The "Match" category is expanded, showing "learn three chord rock guitar".
- Opportunity Viewer:** Displays details for the selected opportunity:
  - Title: learn three chord rock guitar
  - Number of registered people: 1
  - Provider: 43 Things
  - Location: <http://www.43things.com/thing/>
- Search Results:** Shows a list of search results for "learn three chord rock guitar". The results are filtered by "43 Things" and include a "Find It!" button and a "Filter results by:" field. The results table is as follows:

| Title   | Provider  | Location  |
|---|-----------|---|
| Leran to play the guitar like no one has ev...  | 43 Things | <a href="http://www.43things.com/thing/">http://www.43things.com/thing/</a> |
| learn to play acoustic guitar, also get a gu... | 43 Things | <a href="http://www.43things.com/thing/">http://www.43things.com/thing/</a> |
| Learn to play the guitar guitar properly an...  | 43 Things | <a href="http://www.43things.com/thing/">http://www.43things.com/thing/</a> |
| meet Mcfly and just chill out with them an...   | 43 Things | <a href="http://www.43things.com/thing/">http://www.43things.com/thing/</a> |
| Create a music room downstairs, with a dr...    | 43 Things | <a href="http://www.43things.com/thing/">http://www.43things.com/thing/</a> |
| i want to keep playing guitar and play infr...  | 43 Things | <a href="http://www.43things.com/thing/">http://www.43things.com/thing/</a> |
| i want to learn to play the guitar and then...  | 43 Things | <a href="http://www.43things.com/thing/">http://www.43things.com/thing/</a> |
| Sing and play bass guitar at the same tim...    | 43 Things | <a href="http://www.43things.com/thing/">http://www.43things.com/thing/</a> |
- Web Browser:** Shows the details page for the selected opportunity on the 43 Things website. The address bar contains <http://www.43things.com/things/view/161919>. The page content includes a search bar and the text "1 person wants to do this..."



# Collecting and Filtering RSS

<http://www.downes.ca/mygluframe.htm>



## MyGlu

By Stephen Downes

[About](#)

Force: 1

Harvesting <http://del.icio.us/rss/Downes>

Feedfile is: myglu/feedcache/del.icio.us\_rss\_Downes

No content. Harvesting from source.

URL: <http://del.icio.us/rss/Downes>

Parsing Feed=HASH(0x9f0f10c)

Harvesting <http://www.downes.ca/news/OLDaily.xml>

Feedfile is: myglu/feedcache/www.downes.ca\_news\_OLDaily.xml

No content. Harvesting from source.

URL: <http://www.downes.ca/news/OLDaily.xml>

Parsing Feed=HASH(0x9f0ef8c)

# RSS Writr

The screenshot shows the RSS Writr web editor interface. At the top left, there is a search bar with a "Start Search" button. Below it are navigation links: [Change Theme], Stephen's Web, [OLDaily], [Archives], [Threads], [Best Of], [Search], and [Options]. The main content area on the left features a large heading "Welcome to RSS Writr" and three paragraphs of instructional text. The right side of the interface contains a "Title:" input field, a rich text editor toolbar with icons for bold, underline, italic, bulleted list, numbered list, decrease indent, increase indent, link, and unlink, and a text area containing the word "Hello". Below the editor is a "Content Sources" section with a dropdown menu currently showing "Stephen's MyGlu Test".

Start Search

[Change Theme]  
Stephen's Web  
[OLDaily] [Archives] [Threads] [Best Of] [Search] [Options]

## Welcome to RSS Writr

Select a content source from the list (see the panel at the lower right hand side of the page).

When you see an item that interests you, drag it into the editing area (at right). You can drag multiple items into the editor.

When you have finished editing, save your new post to your blog.

Title:

**B** U *I* Shift+Enter for single line space

Hello

## Content Sources

Stephen's MyGlu Test

<http://www.downes.ca/editor/writr.htm>

# Edu\_RSS Viewer



## Stephen's Web

---

[START SEARCH](#)

[\[NEWS\]](#) [\[DISCUSS\]](#) [\[SEARCH\]](#) [\[ABOUT\]](#) [\[ARCHIVES\]](#) [\[OPTIONS\]](#)

---

 **EDU-RSS RECENT** 

You are logged in as Stephen Downes

[\[Logout\]](#)

*Formation and professional certification open and remote on the free software \*\*\**

Tally of the general project, history, objectives, concepts  
[From: [Thot](#), April 10, 2007] [Tags: [Project Based Learning](#)]  
<http://thot.cursus.edu/rubrique.asp?no=25673>

[Blog This!](#)

1 of 1594

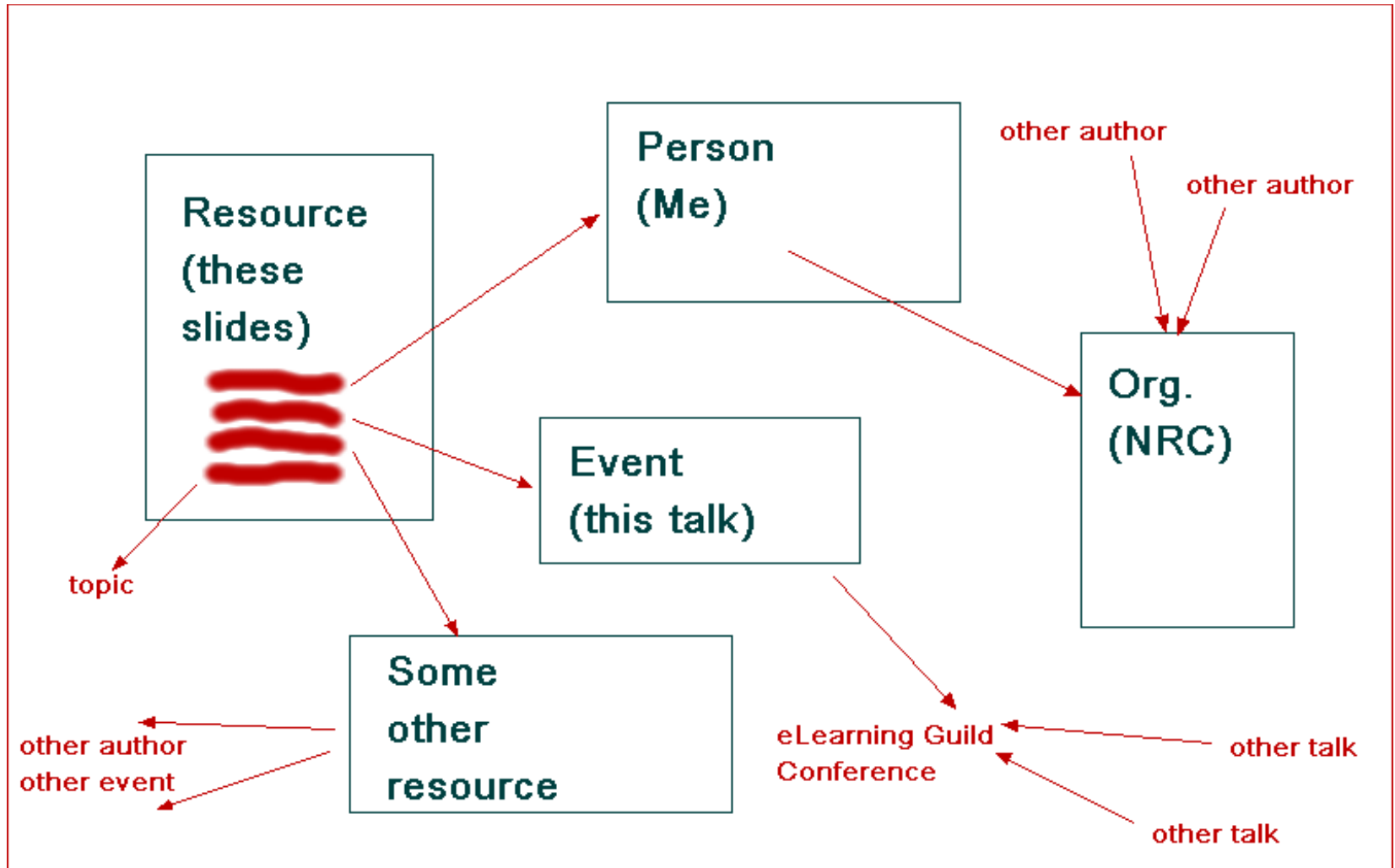
---

SOME RIGHTS RESERVED THIS WORK IS LICENSED UNDER A [Creative Commons License](#)

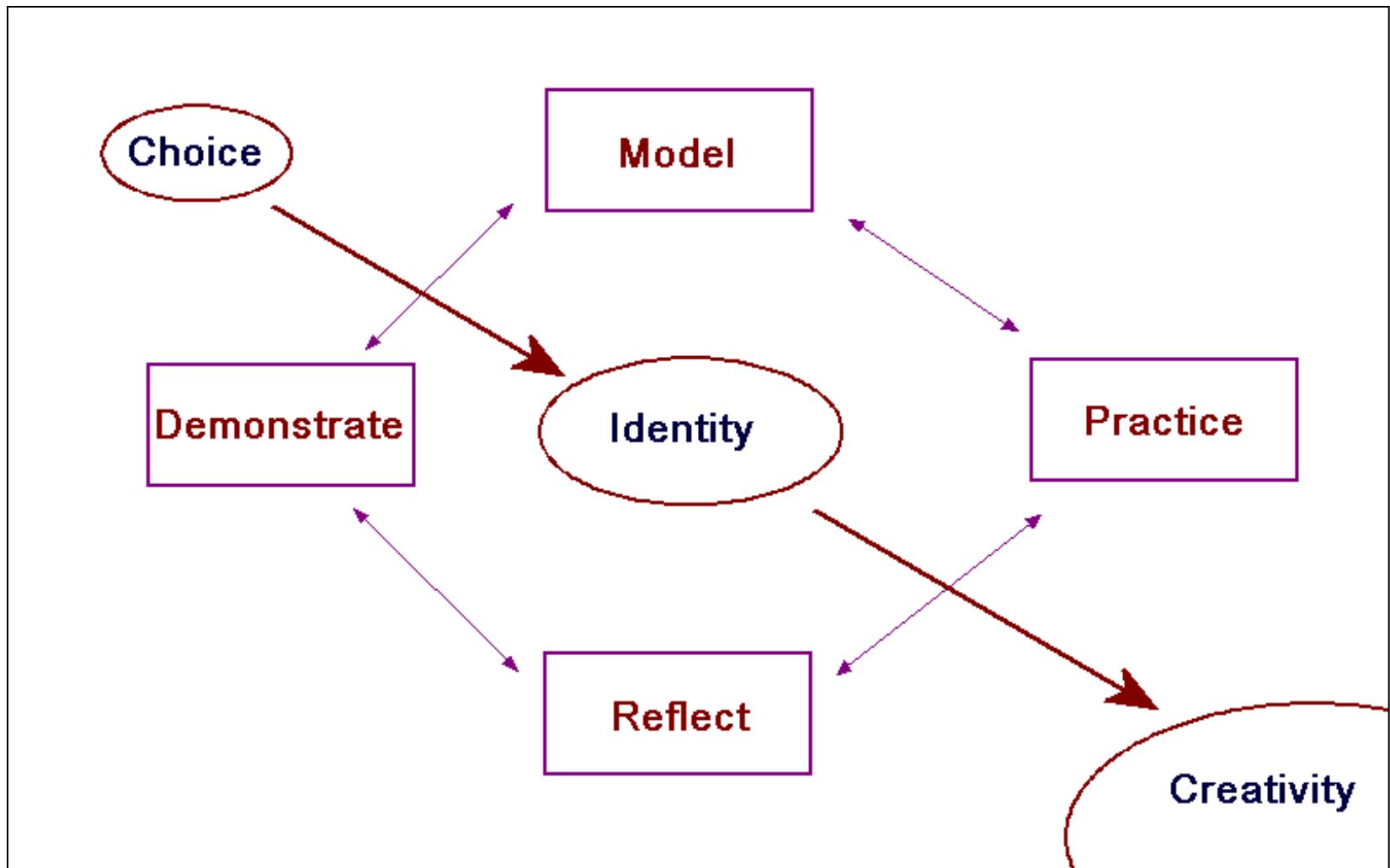
COPYRIGHT 2007 STEPHEN DOWNES  
CONTACT: [STEPHEN@DOWNES.CA](mailto:STEPHEN@DOWNES.CA)

<http://www.downes.ca/cgi-bin/page.cgi?action=viewer>

# Relations between Entities...



# What is the PLE?



We can get an idea of what the PLE looks like by drilling down into the pieces...

## Model

- conceptual frameworks
  - wiki (wiki API, RSS)
  - concept maps (SVG, mapping format)
  - gliffy (SVG?)
- reference frameworks
  - Wikipedia
  - video / 2L 3D representation – embedded spaces

The question is – how to transport and represent models that are actually used?

# Demonstrate

- reference examples

- code library
- image samples

- thought processes

- show experts at work (Chaos Manor)

- application

- case studies
- stories

The question is, how can we connect the learner with the community at work?

# Practice

- scaffolded practice
  - game interfaces
  - sandboxes
- job aids
  - flash cards
  - cheat sheets
- games and simulations
  - mod kits
  - mmorpgs

The question is, how can we enable access to multiple environments that support various activities?



The question is, how can we assist people to see themselves, their practice, in a mirror?

## Reflection

- guided reflection
  - forms-based input
  - presentations and seminars
- journaling
  - blogs, wikis
- communities
  - discussion, sharing

People talk about 'motivation'  
– but the real issue here is  
*ownership*

## Choice – Identity - Creativity

- simulated or actual environments that present tasks or problems
- OpenID, authentication, feature or profile development
- Portfolios & creative libraries



Stephen Downes

<http://www.downes.ca>