Instructional and Technical Frameworks for Online Distance Learning

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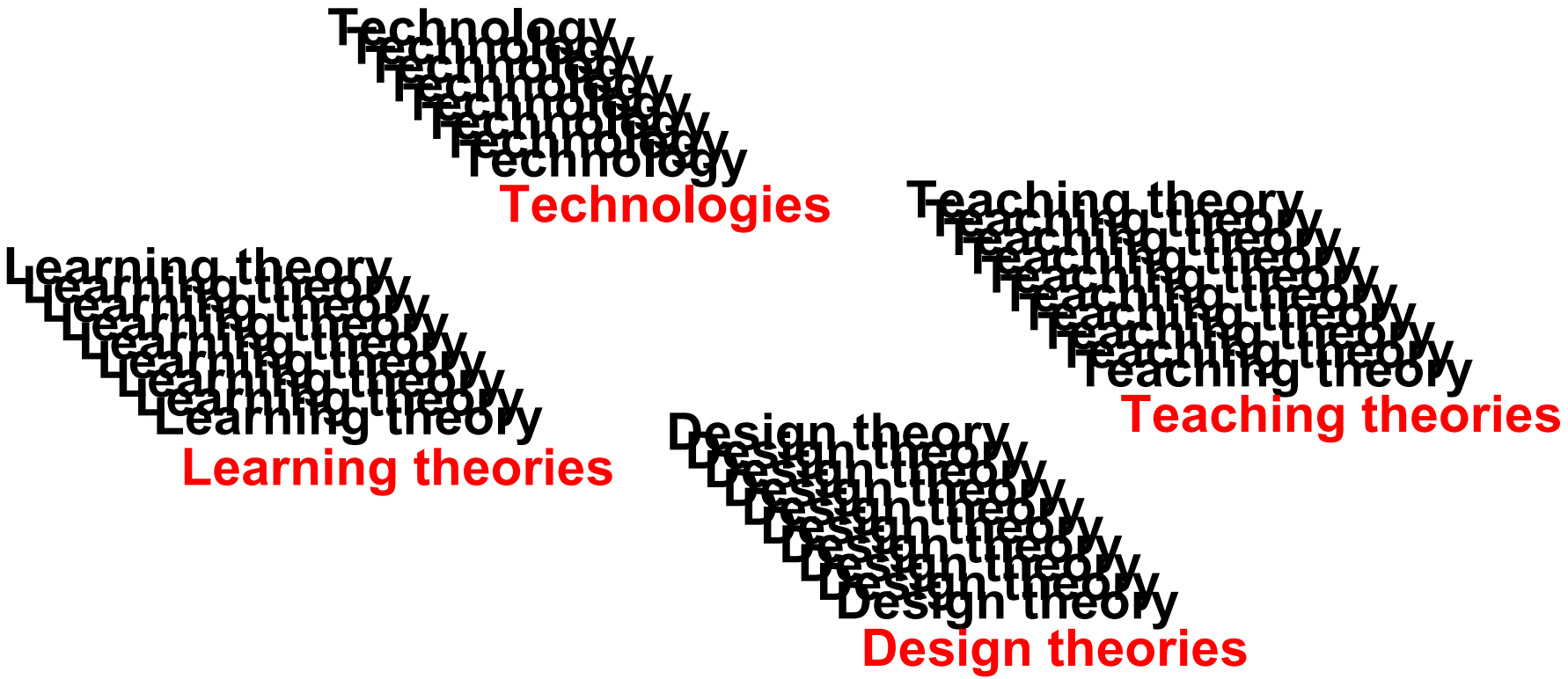
Code: mau05

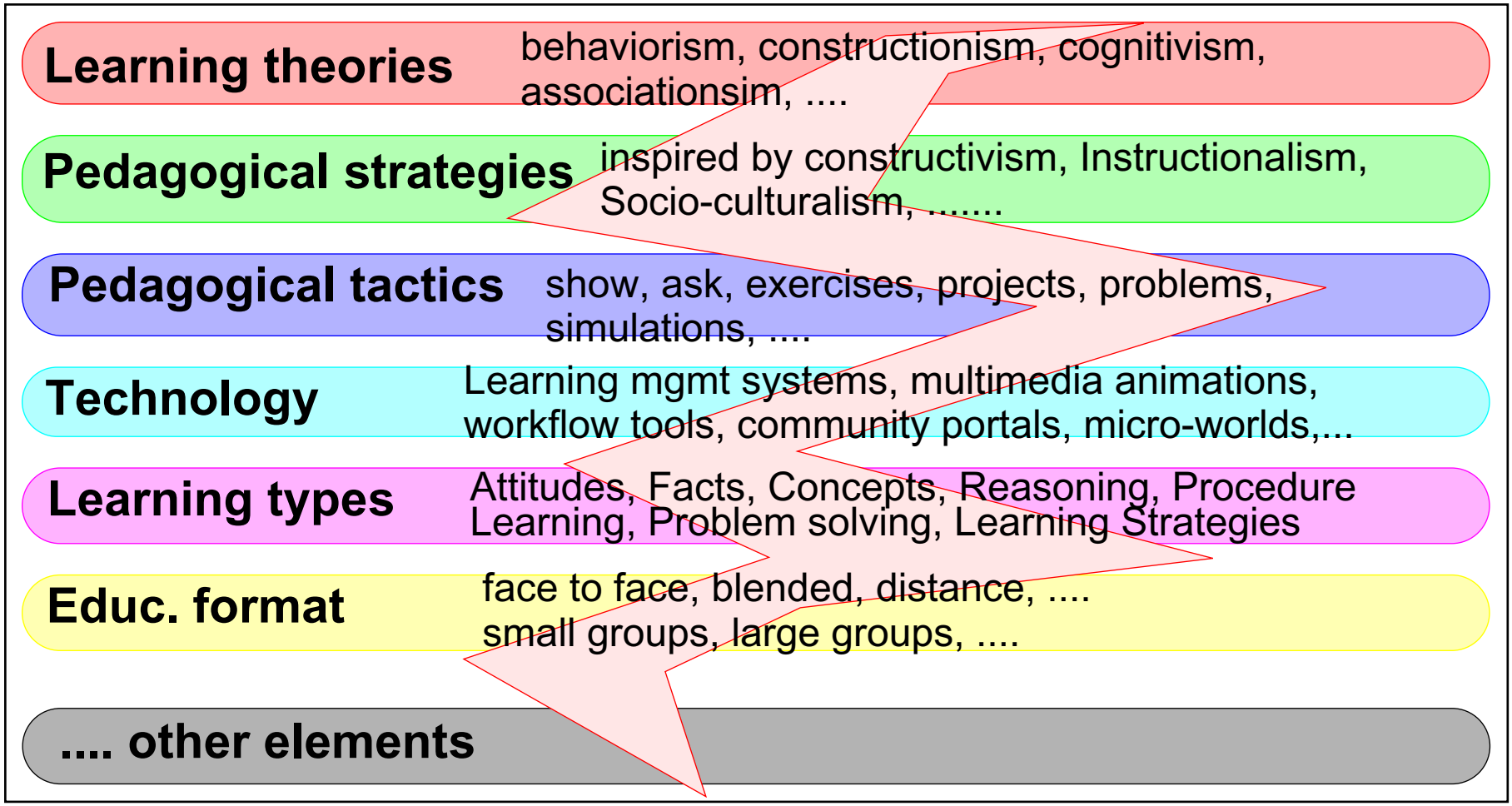
Menu of the talk

I Why you should worry



1. The problem space

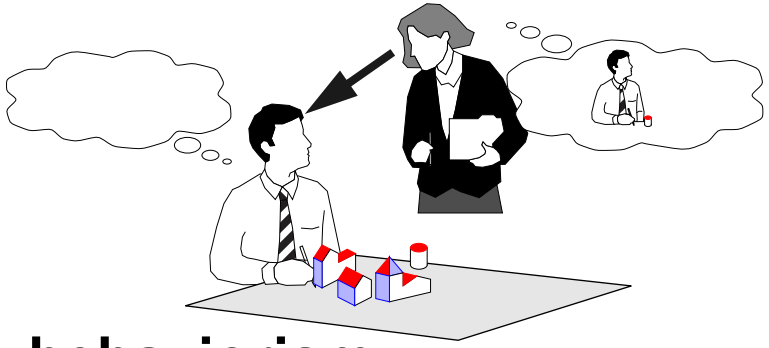
1.1 Learning & teaching: many dimensions & combinations !!



A very complex affair, the next few slides just address a few issues .... !

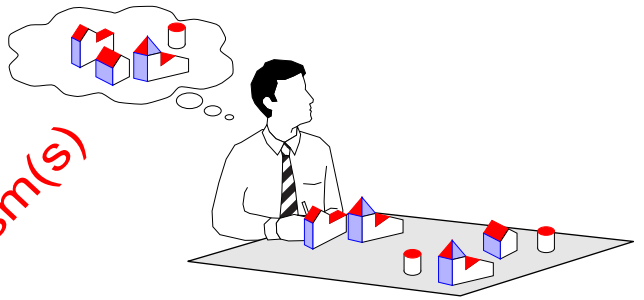
1.2.Leaning theories ?

Some major schools of thought that will lead to different designs

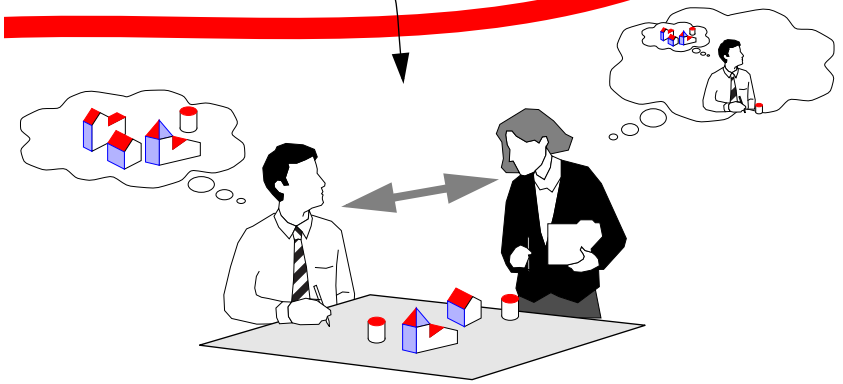


behaviorism
(reach knowledge objectives feedback, etc.)

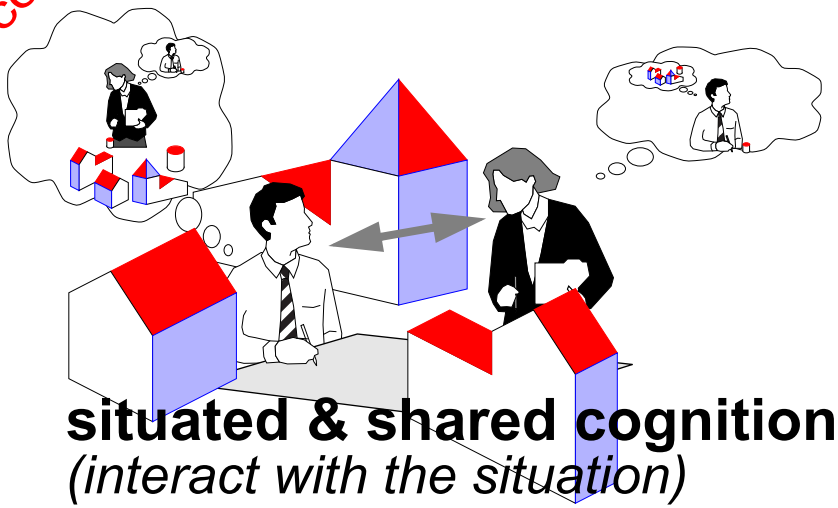
socio-constructivism(s)



constructivism
(construct)

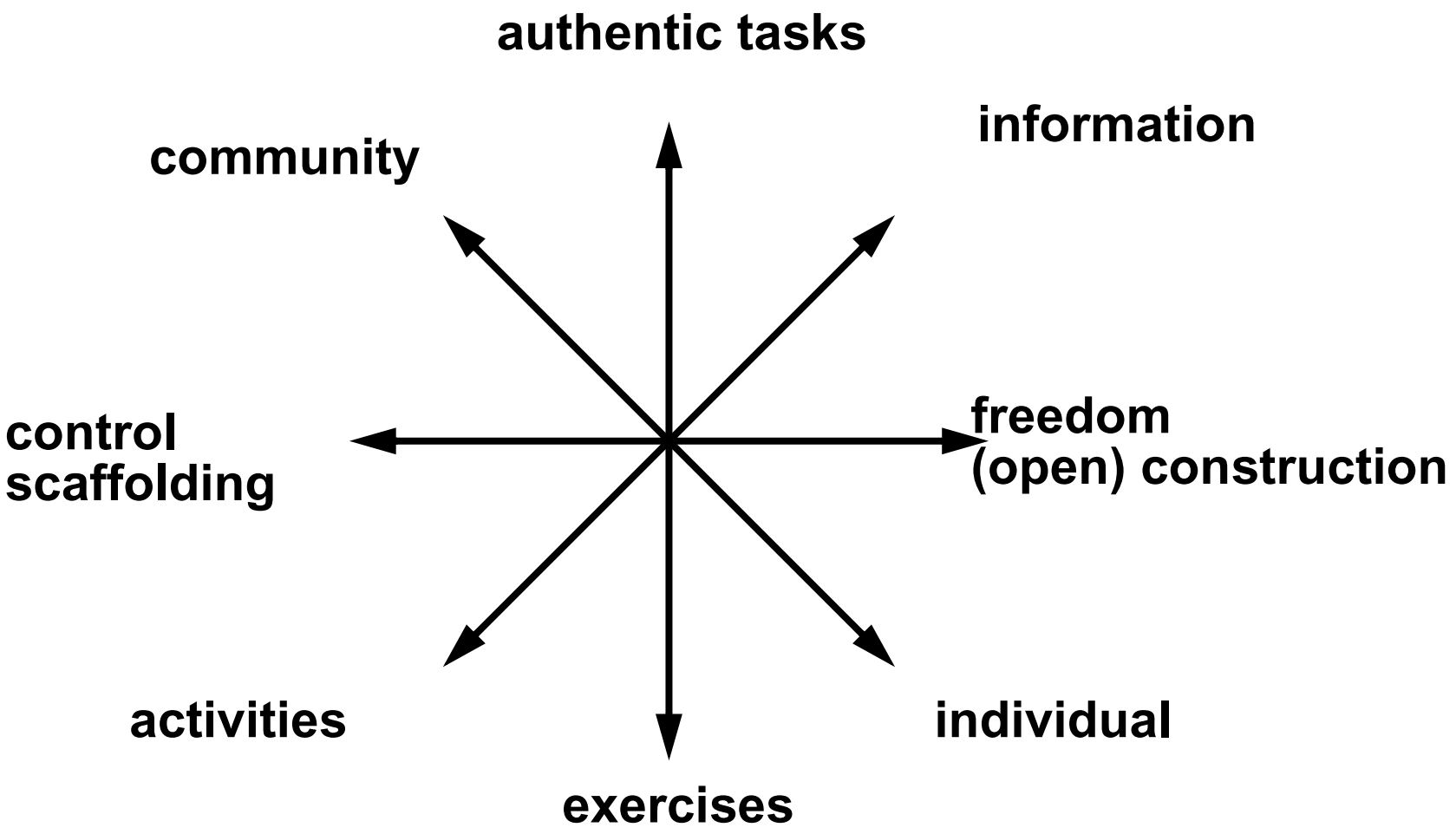


social cognition
(interact with others)



situated & shared cognition
(interact with the situation)

A few issues on which we could focus



not that much operational .....

1.3.Major pedagogical approaches (strategies)

(**Baumgartner & Kalz**), there are many other typologies ...

Transfer	*Tutor*	*Coach*
Factual knowledge, "know-that"	Procedural knowledge, "know-how"	Social practise, "knowing in action"
Transfer of propositional knowledge	Presentation of predetermined problems	Action in (complex and social) situations
to know, to remember	to do, to practise	to cope, to master
Production of correct answers	Selection of correct methods and its use	Realization of adequate action strategies
Verbal knowledge, Memorization	Skill, Ability	Social Responsibility
to teach, to explain	to observe, to help, to demonstrate	to cooperate, to support
Teaching I	*Teaching II*	*Teaching III*

Things (learning types, learning level, teaching, etc.)come clustered !

1.4.Types of Learning (Kearsley's http://tip.psychology.org/) ?

1. **Attitudes**:
   - Disposition or tendency to respond positively or negatively ....
2. **Factual Information** (Memorization):
   - Processing of factual information and remembering .....
3. **Concepts** (Discrimination):
   - ... how to discriminate and categorize things. It is not related to simple recall and must be constructed.
4. **Reasoning** (Inference, Deduction):
   - thinking activities that involve making or testing inferences
5. **Procedure** Learning:
   - .... being able to solve a certain task by applying a procedure.
6. **Problem solving**:
   - identification of subgoals, use of methods to satisfy subgoals.
7. **Learning Strategies**:
   - can hardly be taught and only be learned and to some extent only !

1.5.Pedagogical strategies and methods?

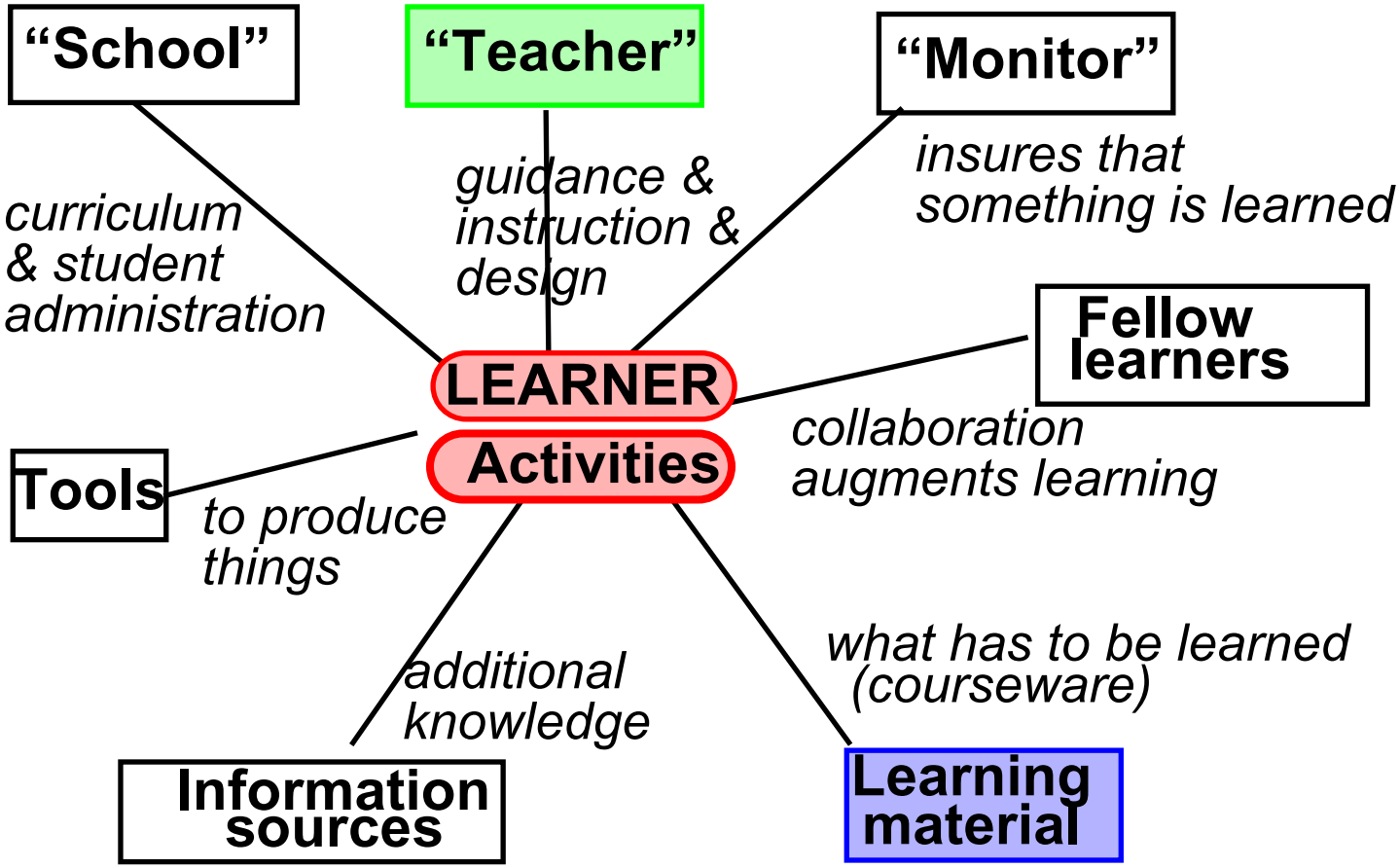
E.g. Khan's (2000) list of Methods and Strategies

Presentation	Exhibits
Demonstration	Drill and Practice
Tutorials	Games
Story Telling	Simulations
Role-playing	Discussion
Interaction	Modeling
Facilitation	Collaboration
Debate	Field Trips
Apprenticeship	Case Studies
Generative Development	Motivation

So we have more to worry:

What strategies work better for what types of learning ?

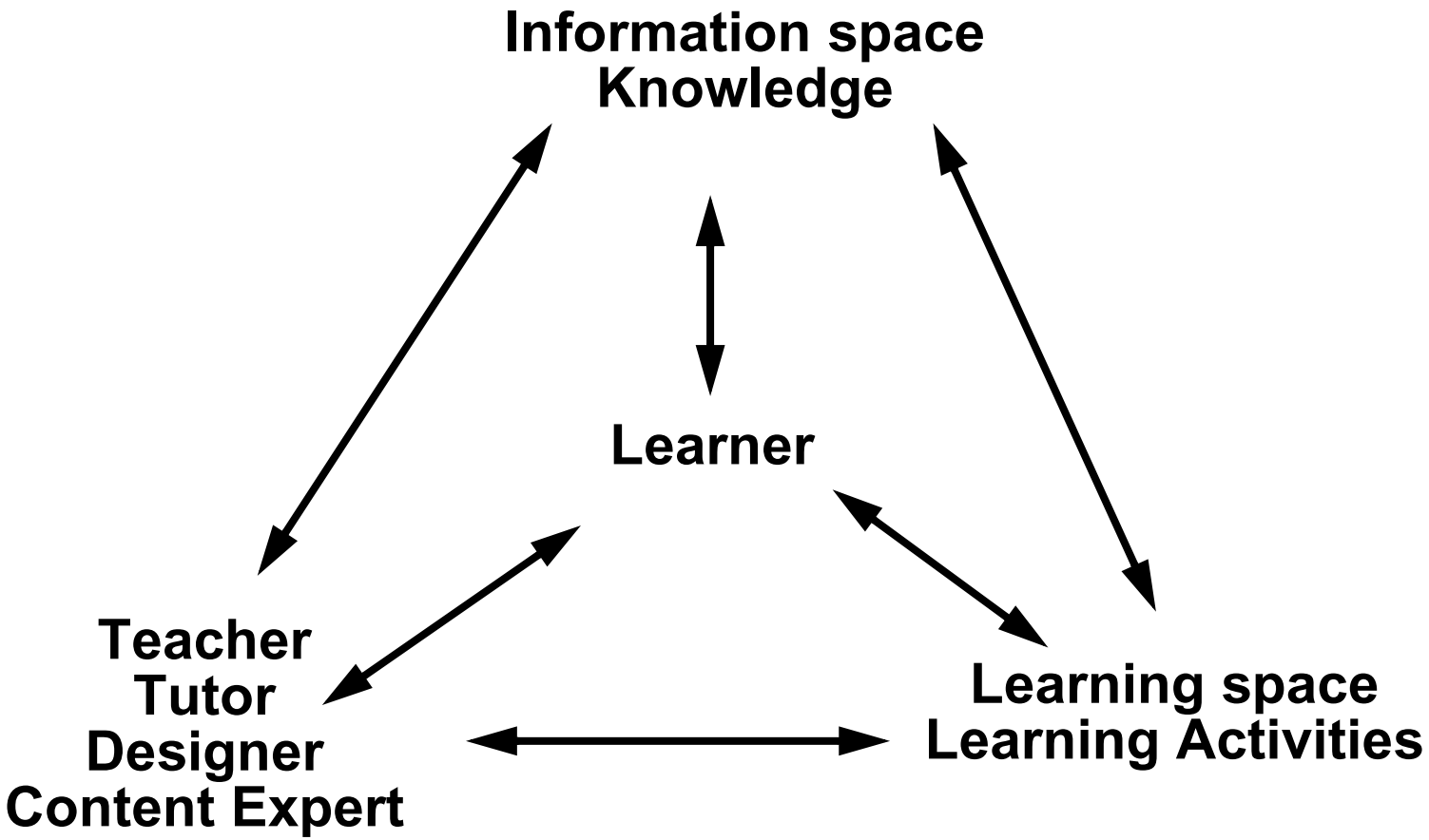
1.6.Functions of a learning environment: Where do we focus ?



modified from Sandberg

- **E.g. teacher role is central in activity-based designs**
- **E.g. Learning material is important for mass-education**

A simplified version ....



How should we define roles, structures and relations ?

1.7.Motivation: learn from computer games or flow theory ?

- **Motivation is key element (particularly in distance teaching)**

Intrinsically motivating elements of gaming: a curious blend ...

(Frete 2002, Master thesis)

Element	
fantasy	• imagination and freedom (make believe + voluntary activity)
challenge & curiosity	• a level of difficulty that triggers curiosity • presence of goals • uncertainty (surprise)
feedback	• immediate • clear
self-esteem	• adapted tasks • encouragement to learn & augment scores
control	• levels to play, user selection of goals, strategies & tactics

Csikszentmihalyi's elements of "optimal experience" (flow) applied to programming and gaming activities:

element	games	programming		learning designs
		good	bad	
1. optimal challenge	xx	x	no	improvable
2. immersion	xx	x	no	improvable
3. clear goals	xx	x	no	improvable
4. immediate feedback	xx	x	x	improvable
5. concentration	xx	x	no	?
6. sense of control	xx	?	no	improvable
7. disappearing self	xx	x	no	?
8. altered sense of time	xx	x	no	?

... take advice from "skilled programming" and gaming ?

2. Instructional design

2.1 The instructionalist voice ?

A. The executive summary:

- **Reading is NOT learning**
  => One must "do" to learn
- **Most learning material (e.g. Internet) is NOT interactive (per se)**
  => Skills and concepts can only be learned through activity (triggered by the system and/or by the task)
- **Passing an exam or a MCQ does NOT guarantee much**
  => One must do "real" tasks to insure transfer
- **Most people need guidance to achieve instructional goals**
  => External conditioning (teaching, monitoring)

Now that is quite understandable, however, let's look at some more detailed principles ....

B. Example: Merril's criteria for 5 Star Instructional Design's

Not applicable to transmissive ("spray-and-pray" / or exploratory designs ("sink-or swim").

1. Does the courseware relate to real world problems?

a.... show learners the task or the problem they will be able to do/solve ?

b.are students engaged at problem or task level not just operation or action levels?

c.... involve a progression of problems rather than a single problem?

2. Does the courseware activate prior knowledge or experience?

a. do learners have to recall, relate, describe, or apply knowledge from past experience (as a foundation for new knowledge) ?

b. does the same apply to the present courseware ?

c. is there an opportunity to demonstrate previously acquired knowledge or skill ?

3. Does the courseware demonstrate what is to be learned ?

a. Are examples consistent with the content being taught? E.g. examples and non-examples for concepts, demonstrations for procedures, visualizations for processes, modeling for behavior?

b. Are learner guidance techniques employed? (1) Learners are directed to relevant information?, (2) Multiple representations are used for the demonstrations?, (3) Multiple demonstrations are explicitly compared?

c. Is media relevant to the content and used to enhance learning?

4. Can learners practice and apply acquired knowledge or skill?

a. Are the application (practice) and the post test consistent with the stated or implied objectives? (1) Information-about practice requires learners to recall or recognize information. (2) Parts-of practice requires the learners to locate, name, and/or describe each part. (3) Kinds-of practice requires learners to identify new examples of each kind. (4) How-to practice requires learners to do the procedure. (5) What-happens practice requires learners to predict a consequence of a process given conditions, or to find faulted conditions given an unexpected consequence.

b. Does the courseware require learners to use new knowledge or skill to solve a varied sequence of problems and do learners receive corrective feedback on their performance?

c. In most application or practice activities, are learners able to access context sensitive help or guidance when having difficulty with the instructional materials? Is this coaching gradually diminished as the instruction progresses?

5. Are learners encouraged to integrate (transfer) the new knowledge or skill into their everyday life?

a. Is there an opportunity to publicly demonstrate their new knowledge or skill?

b. Is there an opportunity to reflect-on, discuss, and defend new knowledge or skill?

c. Is there an opportunity to create, invent, or explore new and personal ways to use new knowledge or skill?

=> This is rather a list of evaluation criteria

2.2.The socio-constructivist voice ?

Socio-constructivist features of on-line teaching (Taylor and Maor

1. Relevance : How relevant is on-line learning to students' professional practices?

2. Reflection : Does on-line learning stimulate students' critical reflective thinking?

3. Interactivity : To what extent do students engage on-line in rich educative dialogue?

4. Tutor Support : How well do tutors enable students to participate in on-line learning?

5. Peer Support : Is sensitive and encouraging support provided on-line by fellow students?

6. Interpretation : Do students and tutors make good sense of each other's on-line communications?

2.3.So how shall we proceed ?

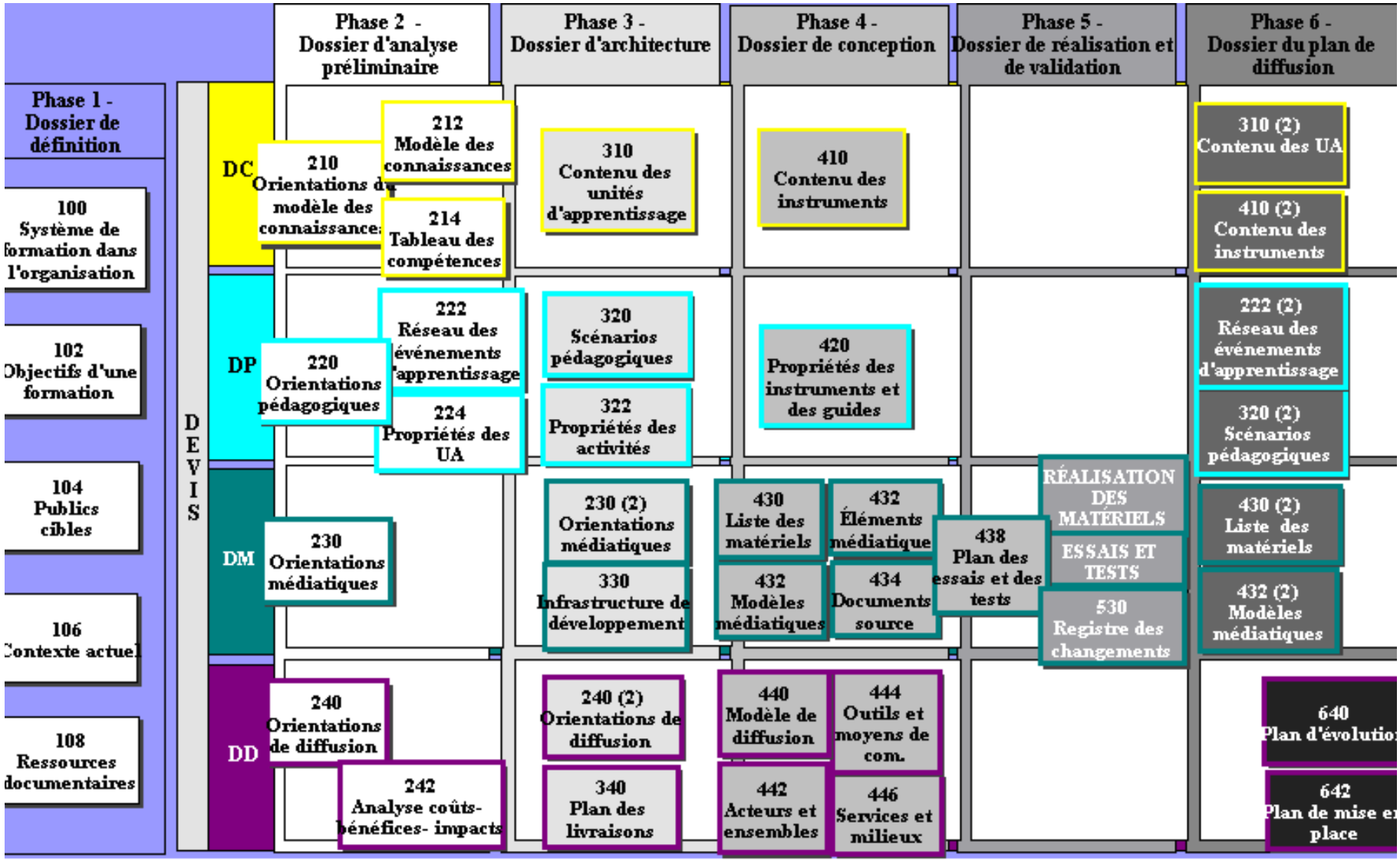
E.g. MISA/MOT/ADISA: Course designer works on "4 models"

1. **Knowledge and Skill Representation**
   DC: Design of Content (know-that and know-how)
2. **Application of Teaching Methods and Approaches**
   DP: Design of Pedagogical specifications
3. **Specification of Learning Materials**
   DM: Design of Materials
4. **Delivery Planning**
   DD: Design of Delivery

Using such a method (see next slide) is worth the effort:

- **if you plan do it right (e.g. buy the MOT editor)**
- **if you focus on a whole course instead of difficult problems**
- **if you plan to train yourself in instructional design**

url: http://www.cogigraph.com



Too much for you ? Let's rather look at "natural types"

II Natural types

The Internet Model: how it (re)started

Main stream "e-learning"

Structured activity-based project-oriented learning

Learning within a community

Microworlds, simulations, rich exercising machines

Teleteaching

CSCL (Computer supported collaborative learning)

Content & Document Management Systems

Weblogs

The Wiki way

Groupware and CSCW

The "help desk model" for life-long learning

3. What's out there ? What do people really use ?

3.1 Rationale and plan for the rest of the talk ...

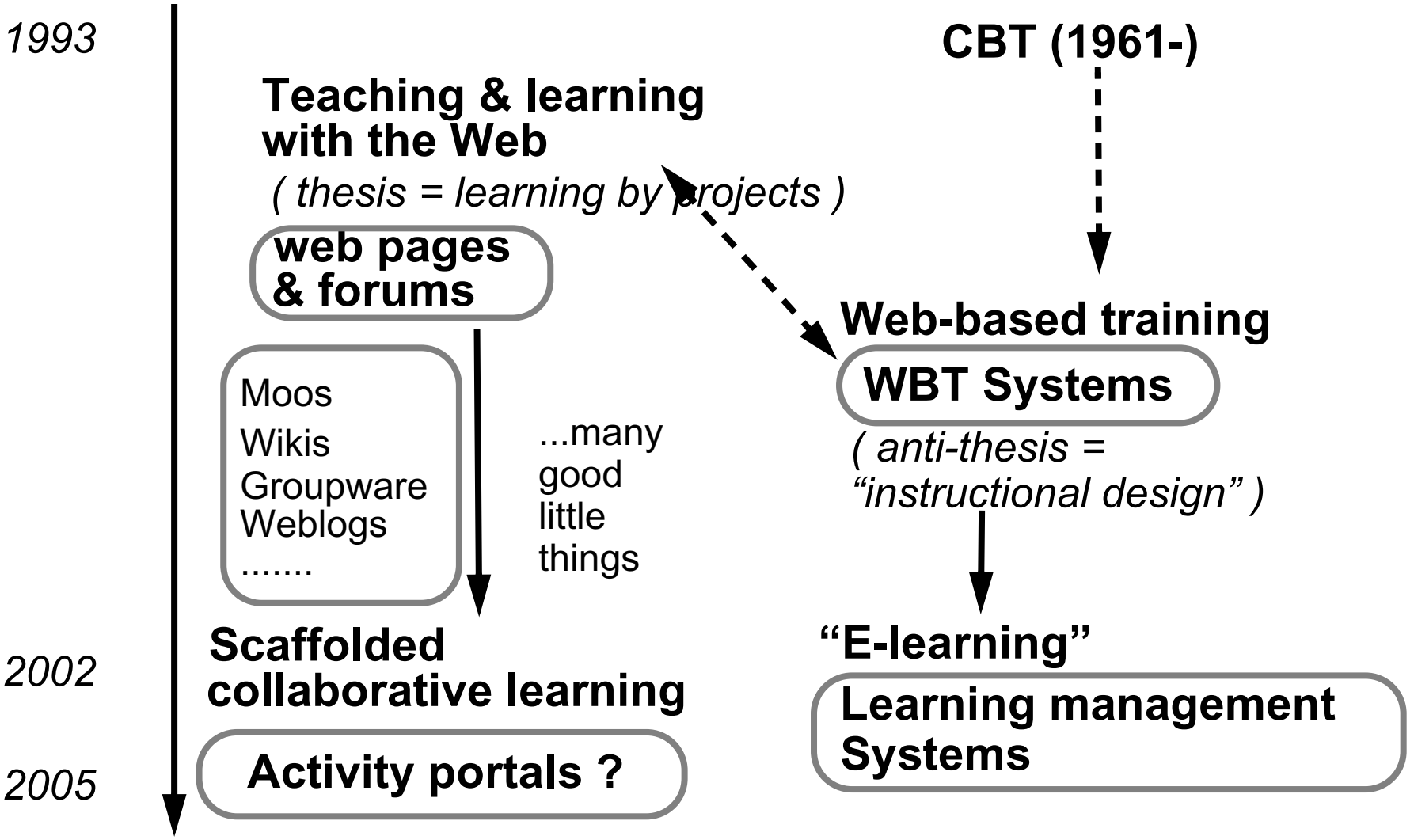
A few remarks:

- There is a HUGE amount of designs and technology
- What is currently marketed (e-learning/Learning Management systems) does not necessarily represent what people really use
- Distance teaching universities are just moving in. They know what DT means and don't want to compromise
- Most sustainable designs are developed within "blended formats" by "ordinary" but creative university teachers
- Research produces interesting but costly designs

Plan

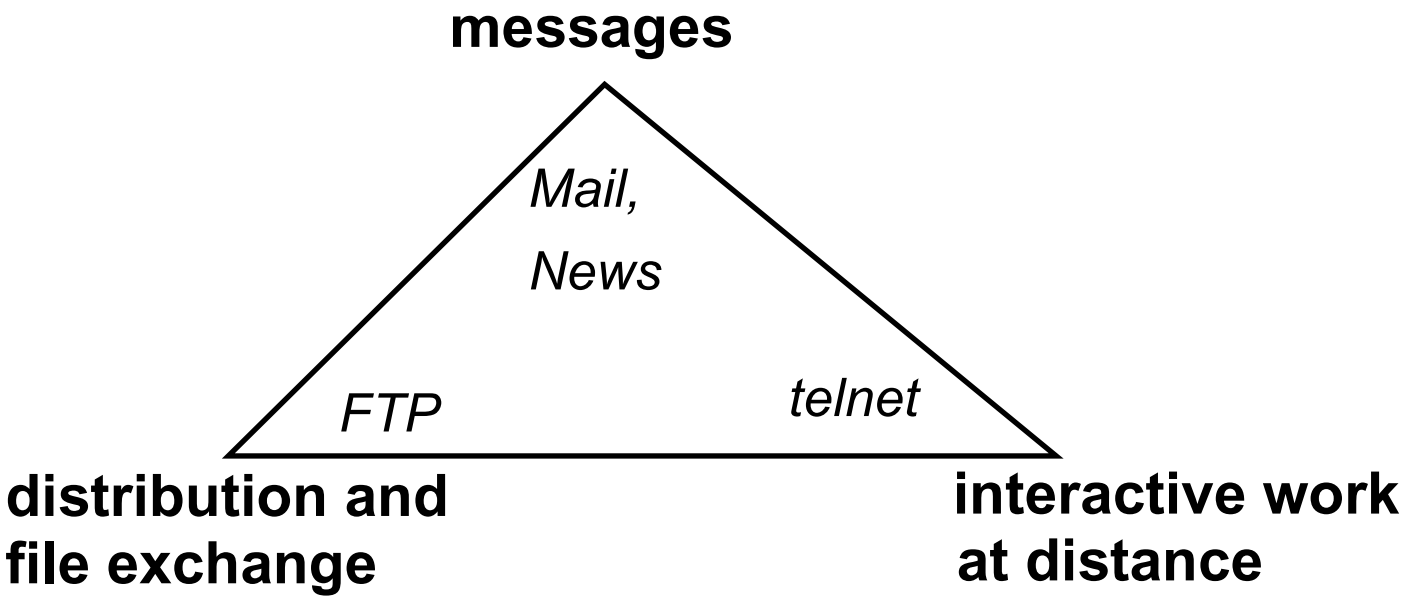
- Show a relevant subset of existing designs (biased of course !)
- Focus on (1) "Internet Model" (2) simple e-learning (3) Project-based learning with portals.
- Missing: ROI (there only 2 reasons why you should engage in e-learning, and a lot against)

3.2.A condensed historical view



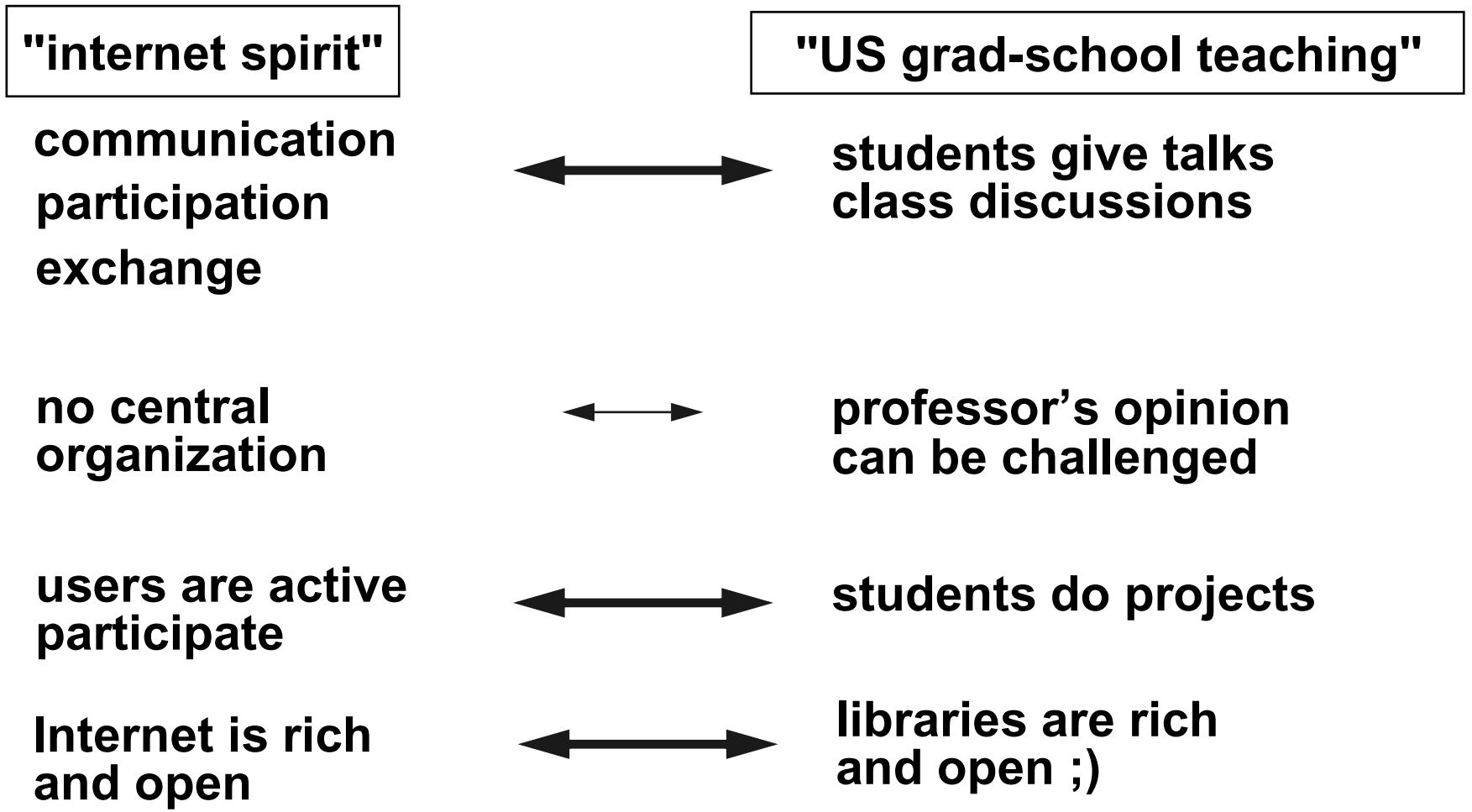
4. The Internet Model: how it (re)started

Internet : services et "spirit" 1980-1993



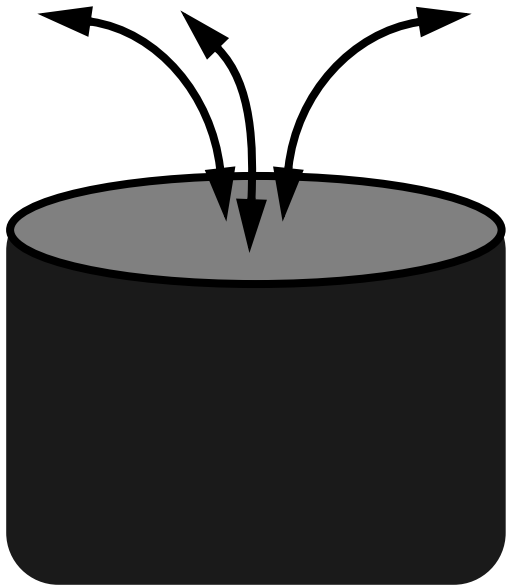
exchange - communication - collaboration
everyone can participate

4.1.Structural similarities ...



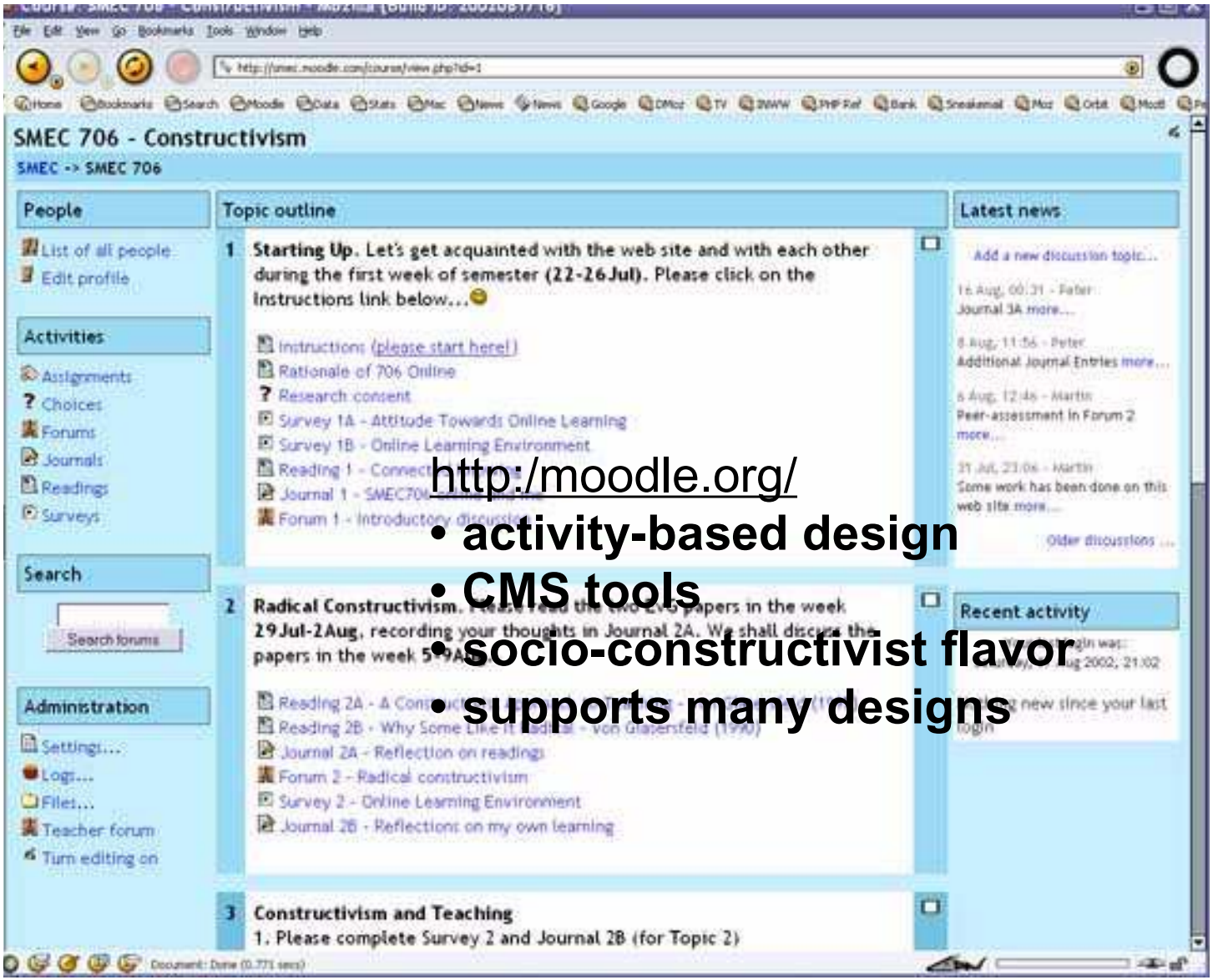
4.2.The traditional technical infrastructure & its use

1. **WWW (hypertext), e.g. for:**
   a. planning, curricula, agendas, assignments
   b. texts, manuals, resources and pointers
   c. assignments (student productions)
   d. collaboration within group projects
2. **Email, e.g. for:**
   a. agenda planning (teacher)
   b. search for information (student)
   c. information about updates (student, teacher)
   d. short comments (teacher)
3. **Discussion Forums, e.g. for:**
   a. debates (about articles or themes)
   b. technical Q/A
   c. student-student help (!)
4. **Some chat or similar (text or audio/video)**
   a. urgent things
   b. co-presence (common virtual space, radio channels)
   c. virtual meetings for simple discussions



The simple "Internet soup"

4.3.Moodle - like systems are based on this tradition



http:/moodle.org/

- **activity-based design**
- **CMS tools**
- **socio-constructivist flavor**
- **supports many designs**

5. Main stream "e-learning"

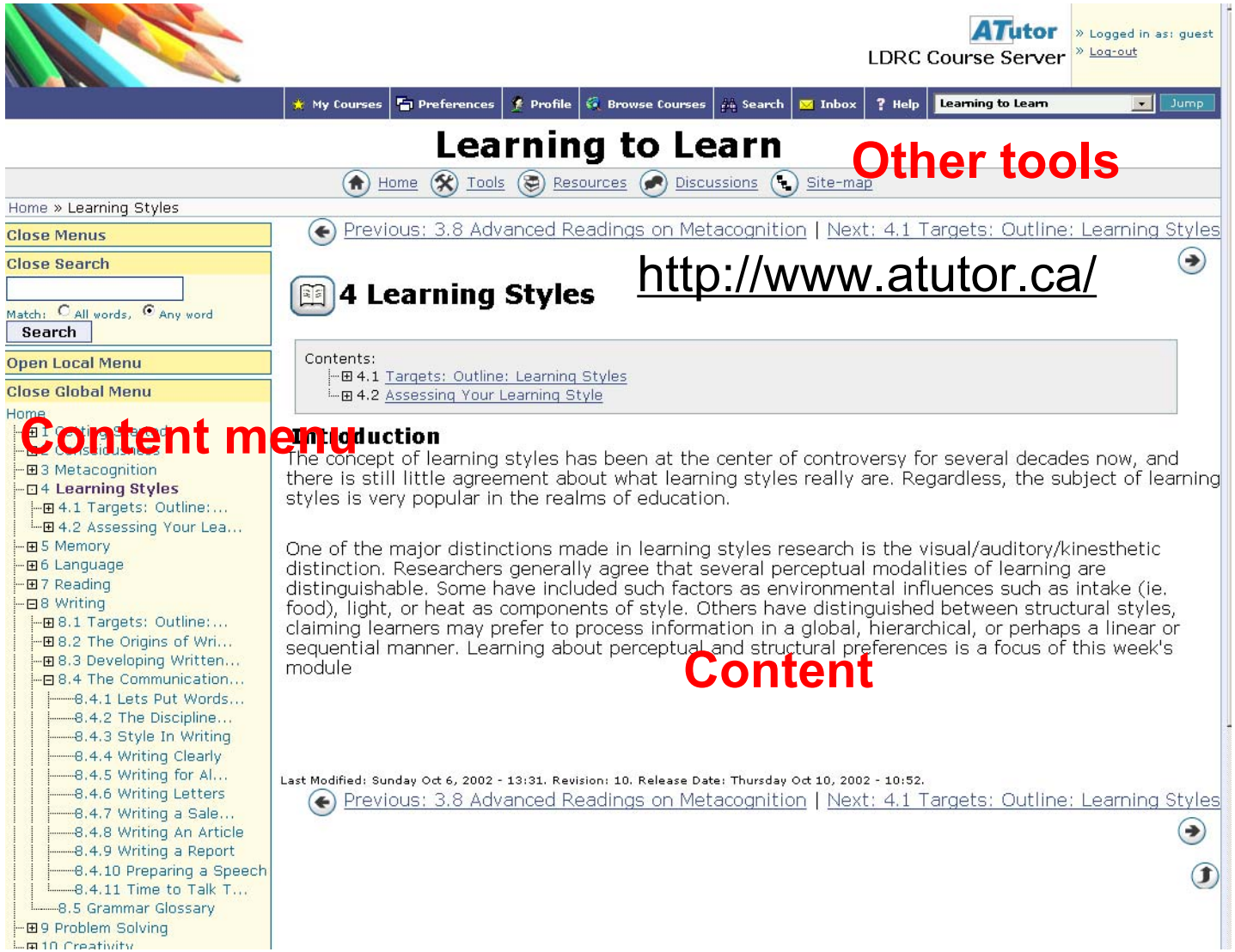
5.1 Purpose and features

- Based on CBT ("Computer-based training"), 1961,->
- Mostly "tell & ask" (learning I), inclusion of learning II possible
- Dozens of commercial and open source systems

Common main features of Learning Management Systems:

- Closed circuit platforms (logins, restricted access to classes)
- Asynchronous Communication: email, forums
- Synchronous Communication: chat, whiteboard, teleconferencing,
- Student tools: home page, self tests, bookmarks, progress tracking, ...
- Student Mgmt Tools: progress tracking, on-line grading, ...
- Lessons tools: authoring (structured XML or HTML), testing (e.g. Java Script generators)

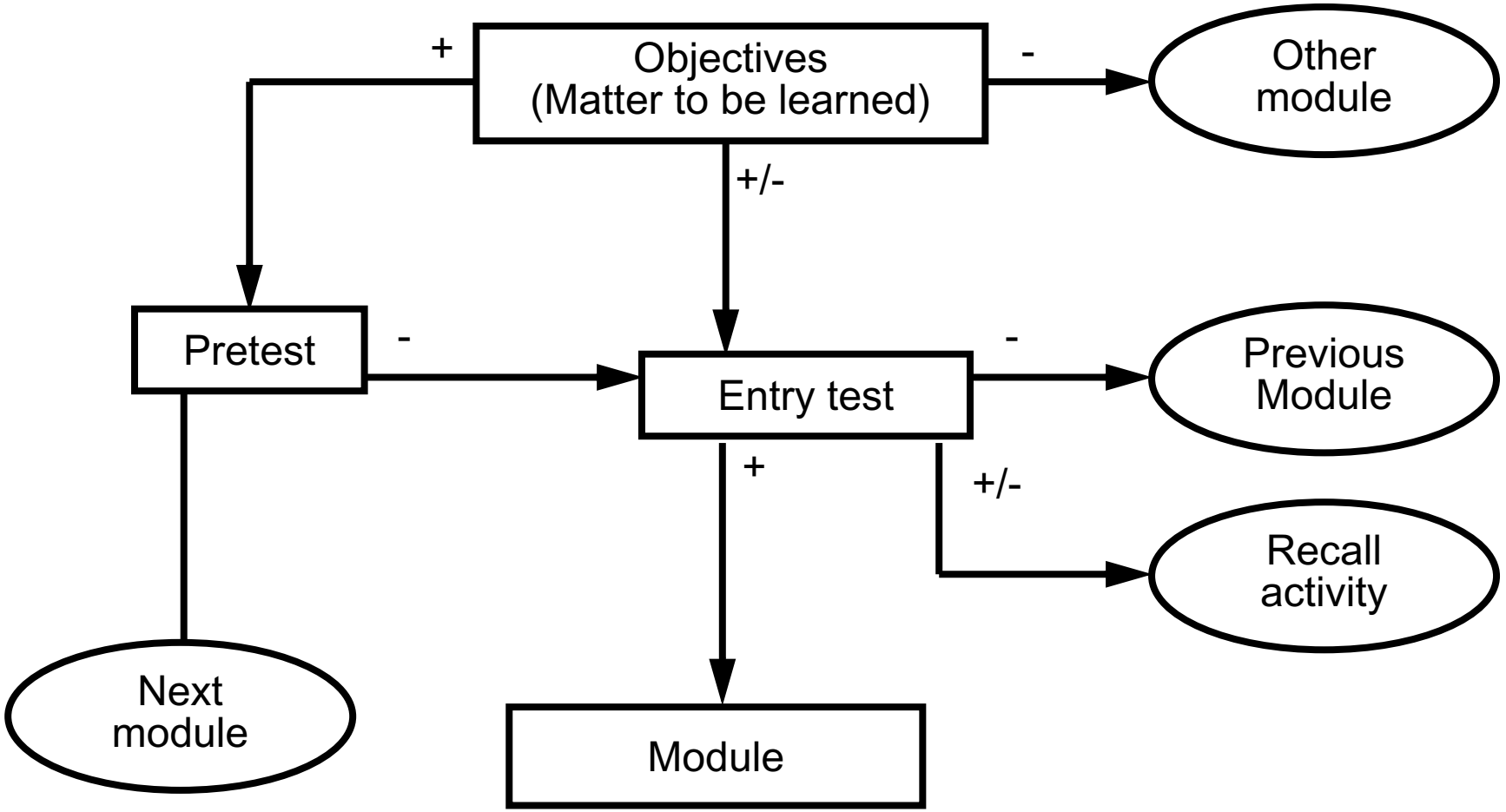
5.2.Screenshot from ATutor



Interactive JS or Java code can also be included

5.3.Overall course design: the module principle

The module architecture



5.4.Architecture of a module (lesson, topic)

- **Should follow (some) sound instructional design principles, e.g. Gagné's 9 steps of instruction for learning I + II**

a. **Gain attention** e.g. present a good problem, a new situation, use a multimedia advertisement.

b. **Describe the goal**: e.g. state what students will be able to accomplish and how they will be able to use the knowledge, give a demonstration if appropriate.

c. Stimulate **recall of prior knowledge** e.g. remind the student of prior knowledge relevant to the current lesson (facts, rules, procedures or skills). Show how knowledge is connected, provide the student with a framework that helps learning and remembering. Tests can be included.

d. **Present the material** to be learned e.g. text, graphics, simulations, figures, pictures, sound, etc. Chunk information (avoid memory overload, recall information).

e. Provide **guidance for learning** e.g. presentation of content is different from instructions on how to learn. Use of different channel (e.g. side-boxes)

f. Elicit **performance "practice",** let the learner do something with the newly acquired behavior, practice skills or apply knowledge. At least use MCQ's.

g. Provide **informative feedback**, show correctness of the trainee's response, analyze learner's behavior, maybe present a good (step-by-step) solution of the problem

h. **Assess** performance test, if the lesson has been learned. Also give sometimes general progress information

i. Enhance retention and **transfer**: inform the learner about similar problem situations, provide additional practice. Put the learner in a transfer situation. Maybe let the learner review the lesson.

5.5.Standards

Implemented standards mostly focus on (modular) content:

- **Describe CBT contents as data**
  - **sequential content, quizzing, packaging, meta-data, etc.**

  (Unclear instructional standards: page-turning “shovelware” only ?)
- **Modularity**
  - **Allows for *modular management* of reusable learning contents**

  (But: how easily can contents be hacked à part and repurposed ?)
- **New: Learning Design (LD) educational markup language**
  - **engines are under way (e.g. a MOT extension)**
  - **difficult !**

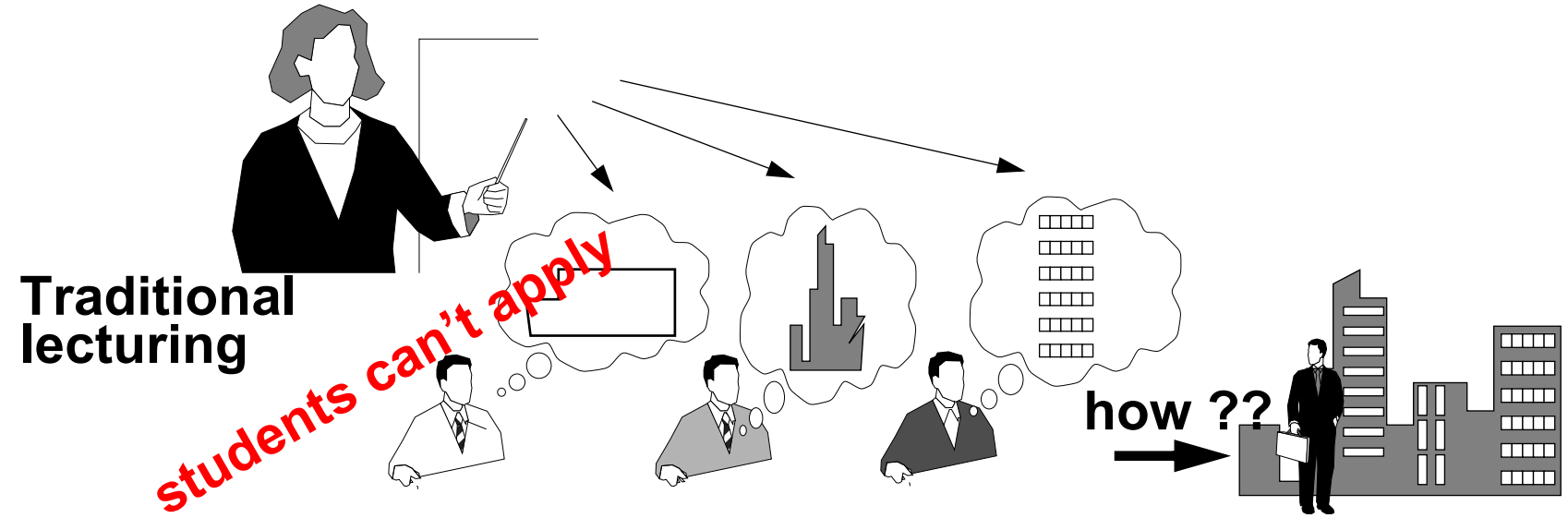
  (yet unclear how it could support socio-constructivist pedagogies)
- **Summary:**
  - **Good standards for so far (!) simple instructionalist pedagogies**
  - **Compliant Learning Content & Management Systems exist**

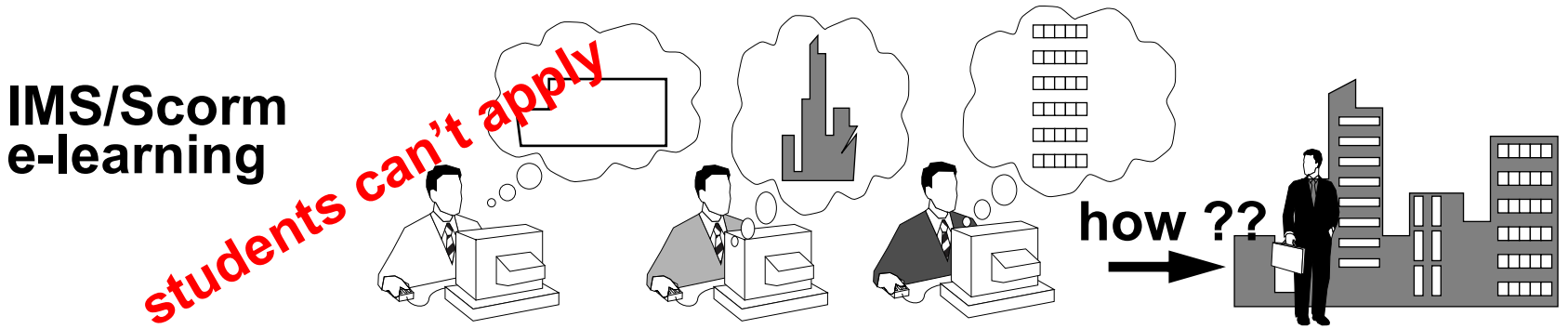
Major standard bodies

- **IMS and Scorm (mostly an IMS-based operational subset)**

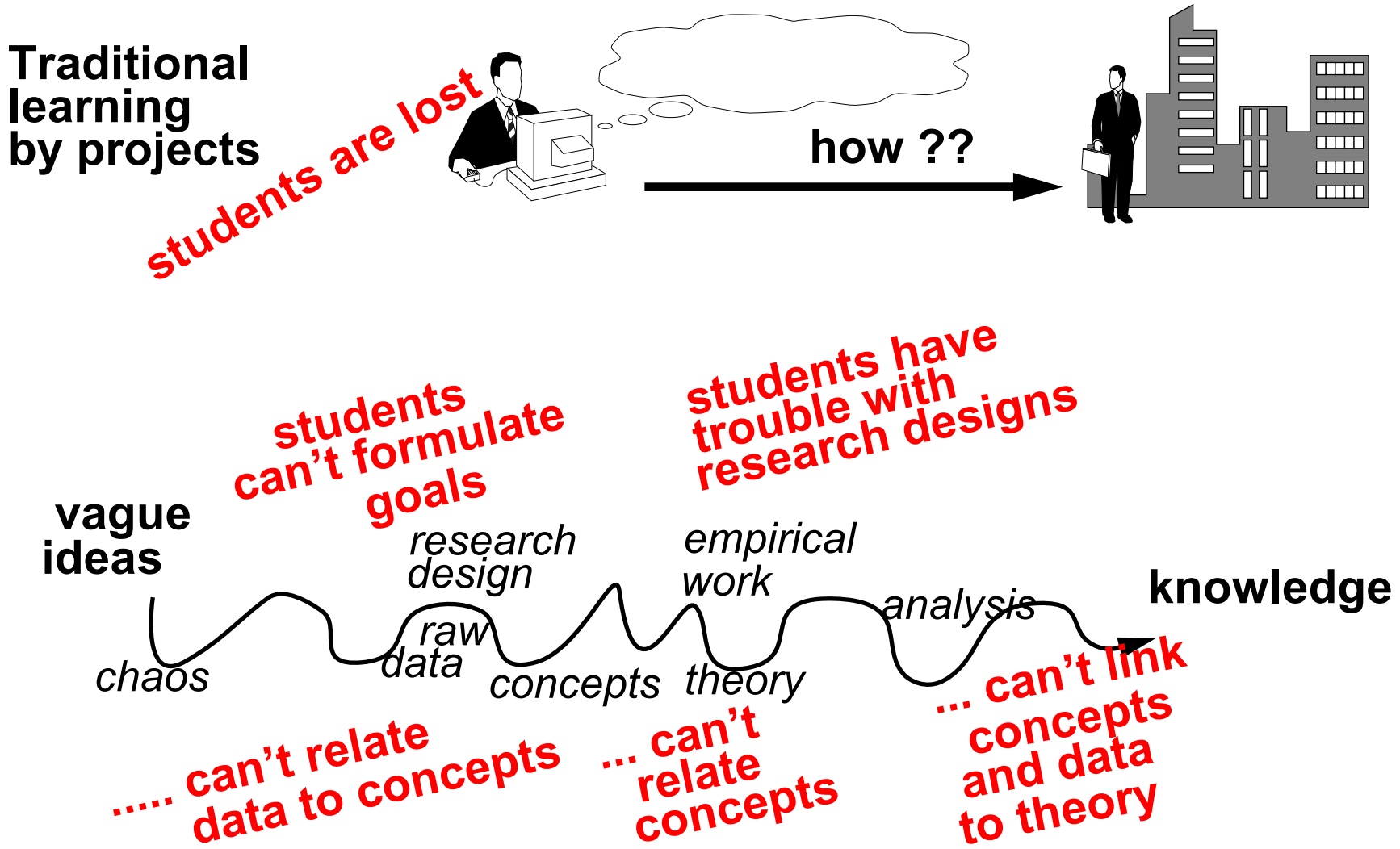
6. Structured activity-based project-oriented learning

6.1 Motivation: the problem with reproductive tell & ask learning

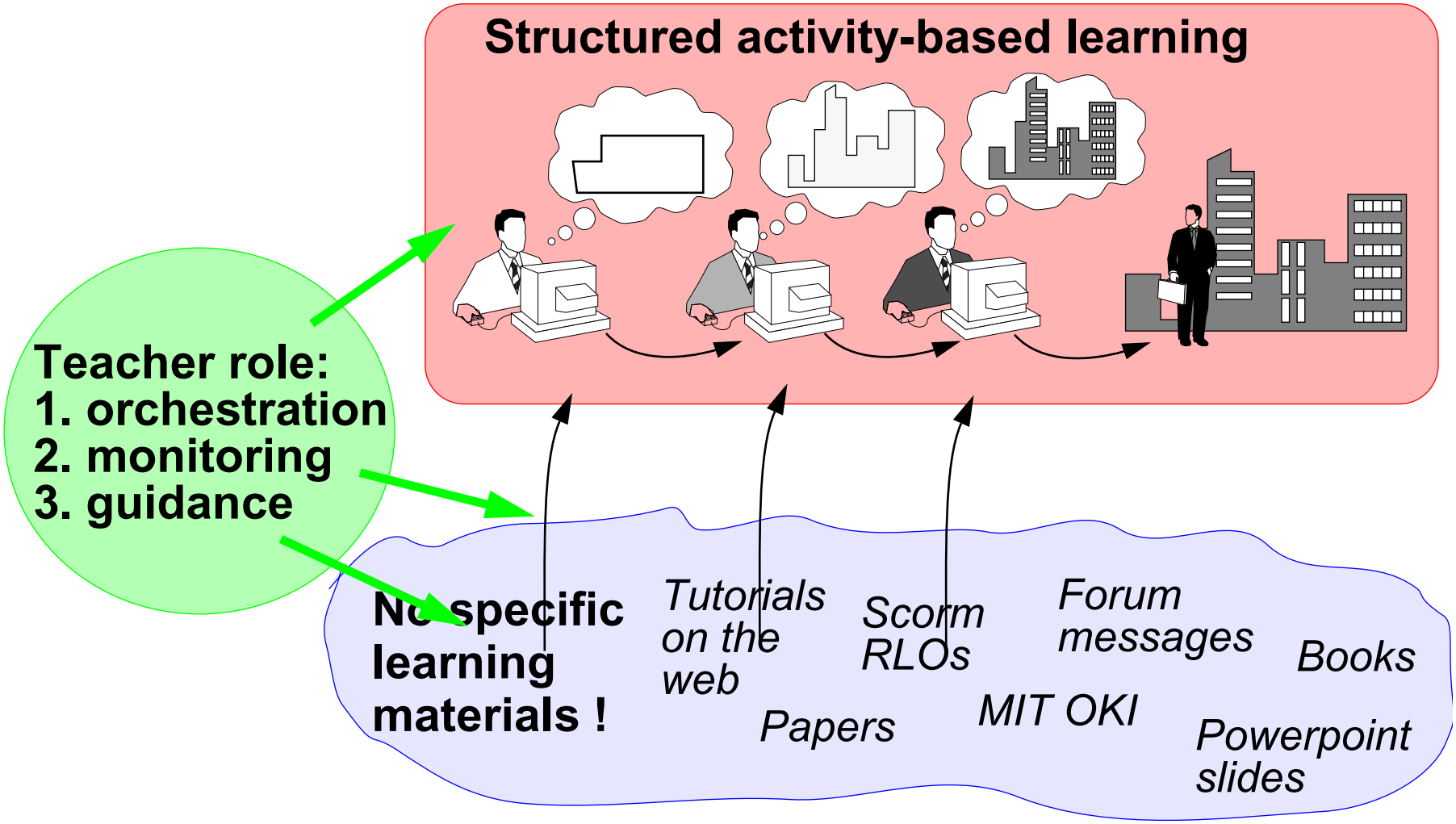




6.2.The problem with "let's do projects" answer



6.3.A possible solution

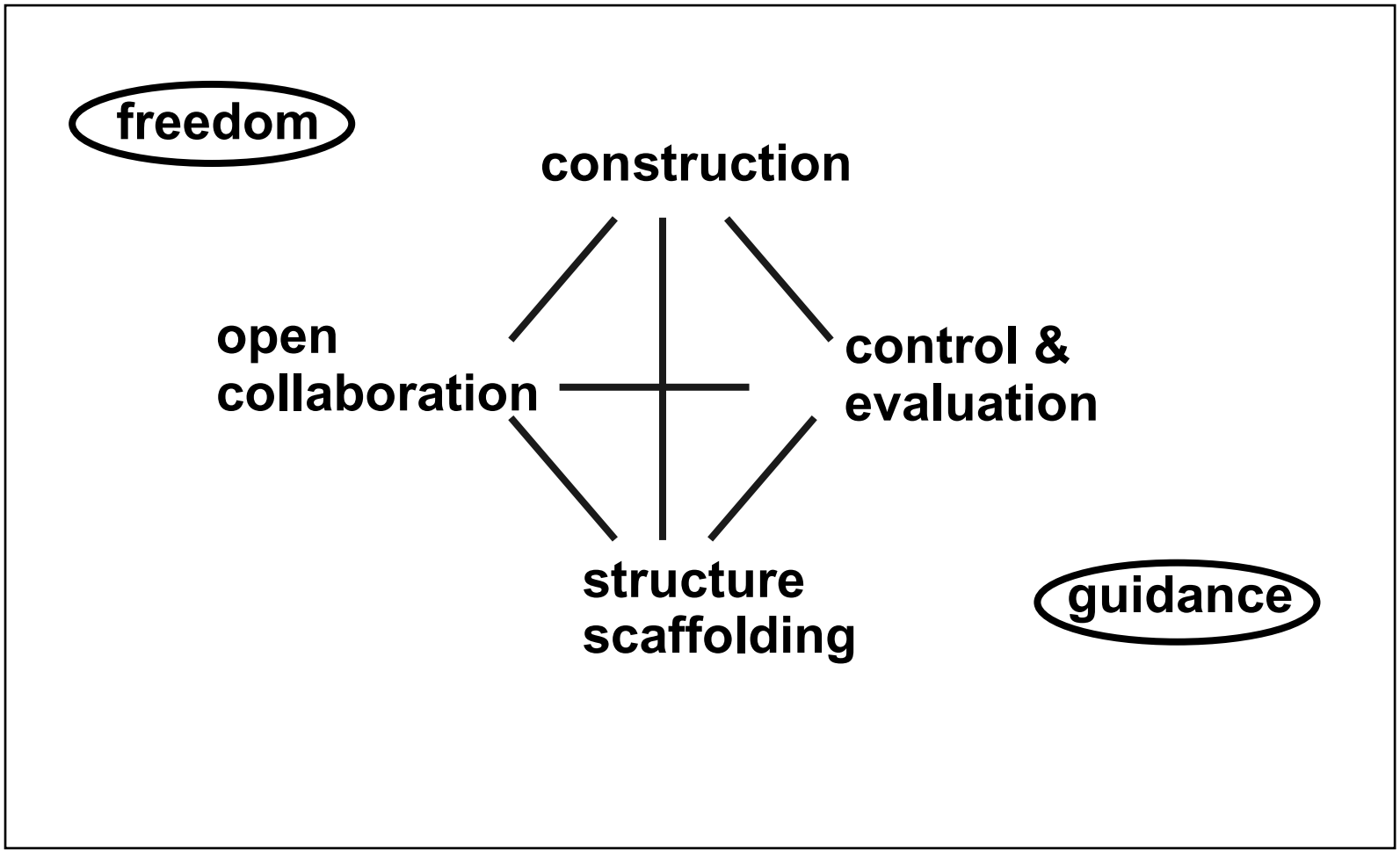


url: **http://tecfaseed.unige.ch/door/**

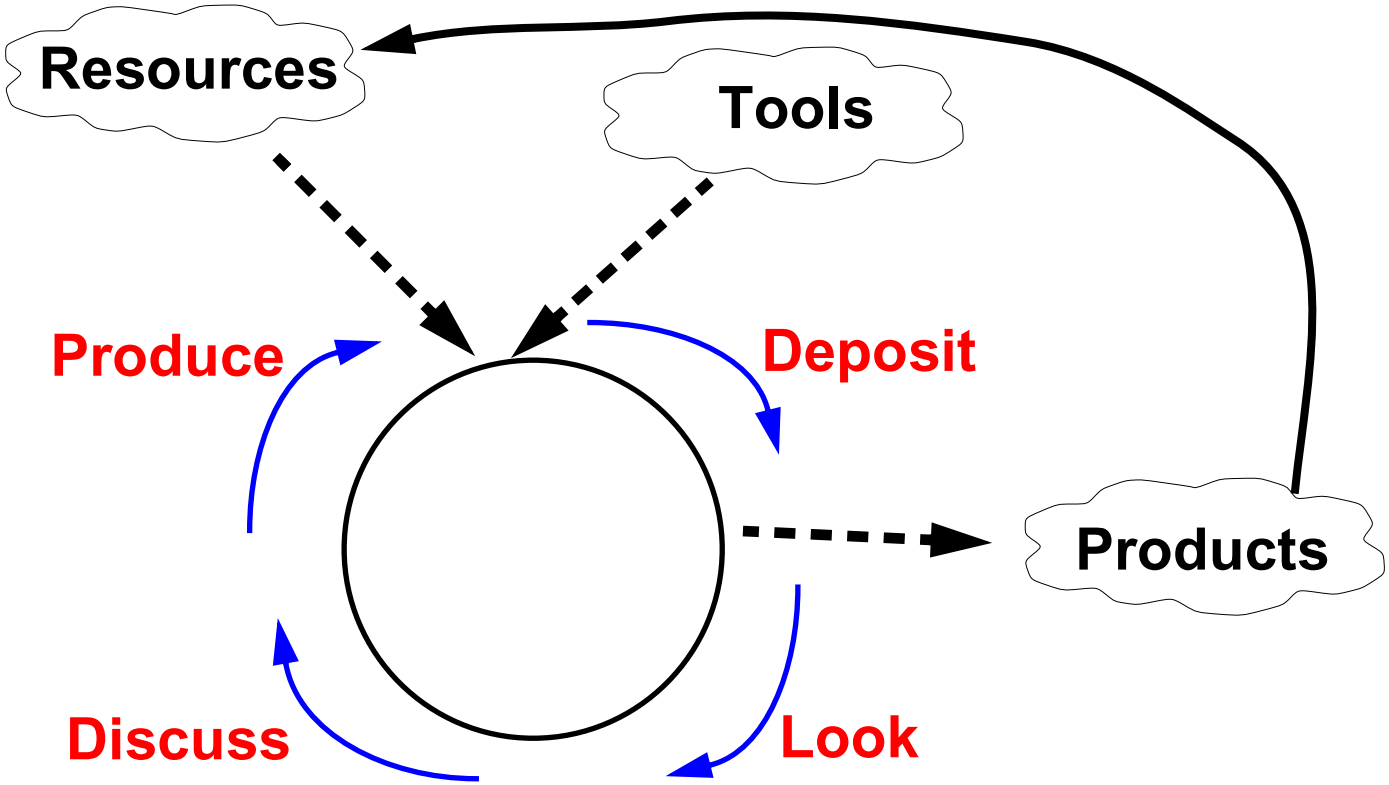
url: **http://tecfa.unige.ch/proj/seed/catalog/**

6.4 Structured socio-constructivist pedagogical scenarios

- **Open ended & "rich" socio-constructivist designs are more effective if individuals and groups have to evolve within *somewhat* specified scenarios**



- **Scenarios are sequences of activity phases within which group members do tasks and play specific roles**
- **This *orchestration* implies organizing workflow loops**

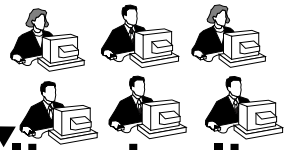


... this is just the “ur-loop” ... other variants !

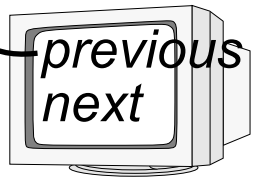
6.5.LMS (learning I) vs. knowledge engines (learning III)!

t

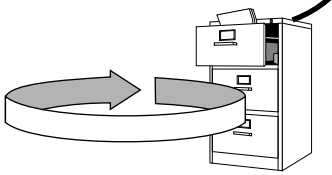
Transmissive pedagogies



line by line...



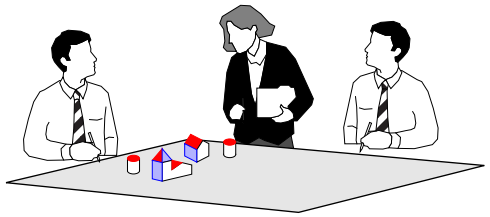
repetition



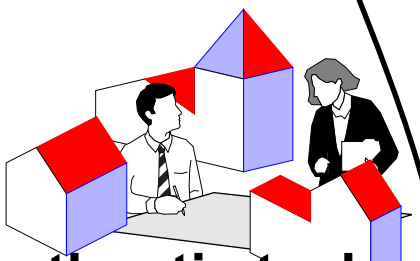
circular files

- the computer as **facilitating structure**, as thinking, working & communicati on tool
- Support of student and teacher **activities** leading to **new "contents"**

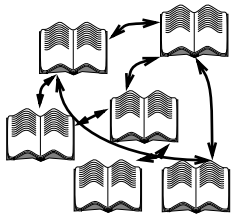
Activity-based pedagogics



collaboration



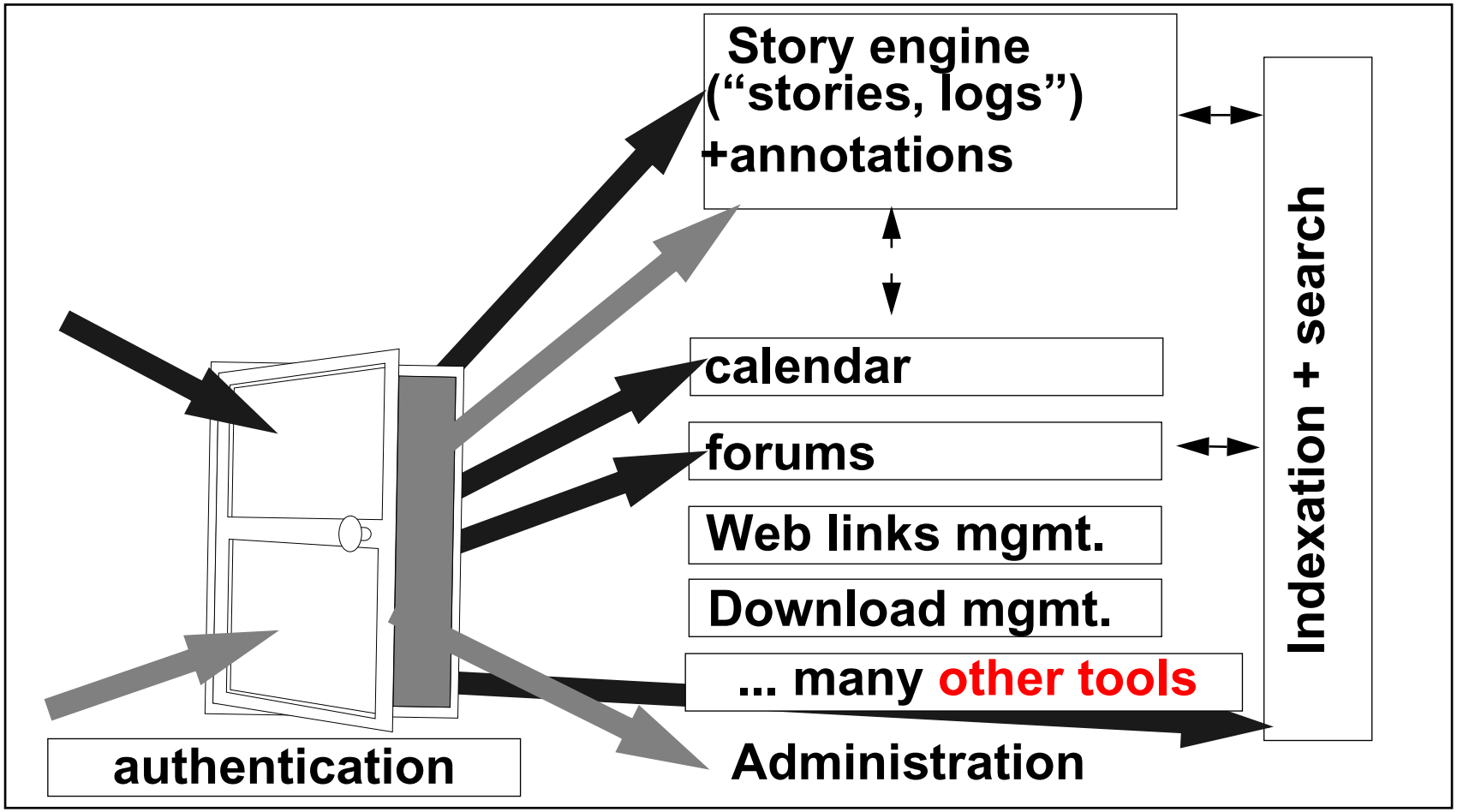
authentic tasks



living documents

6.6.C3MS Portals for Learning III support!

Community, Content, & Collaboration Management Systems

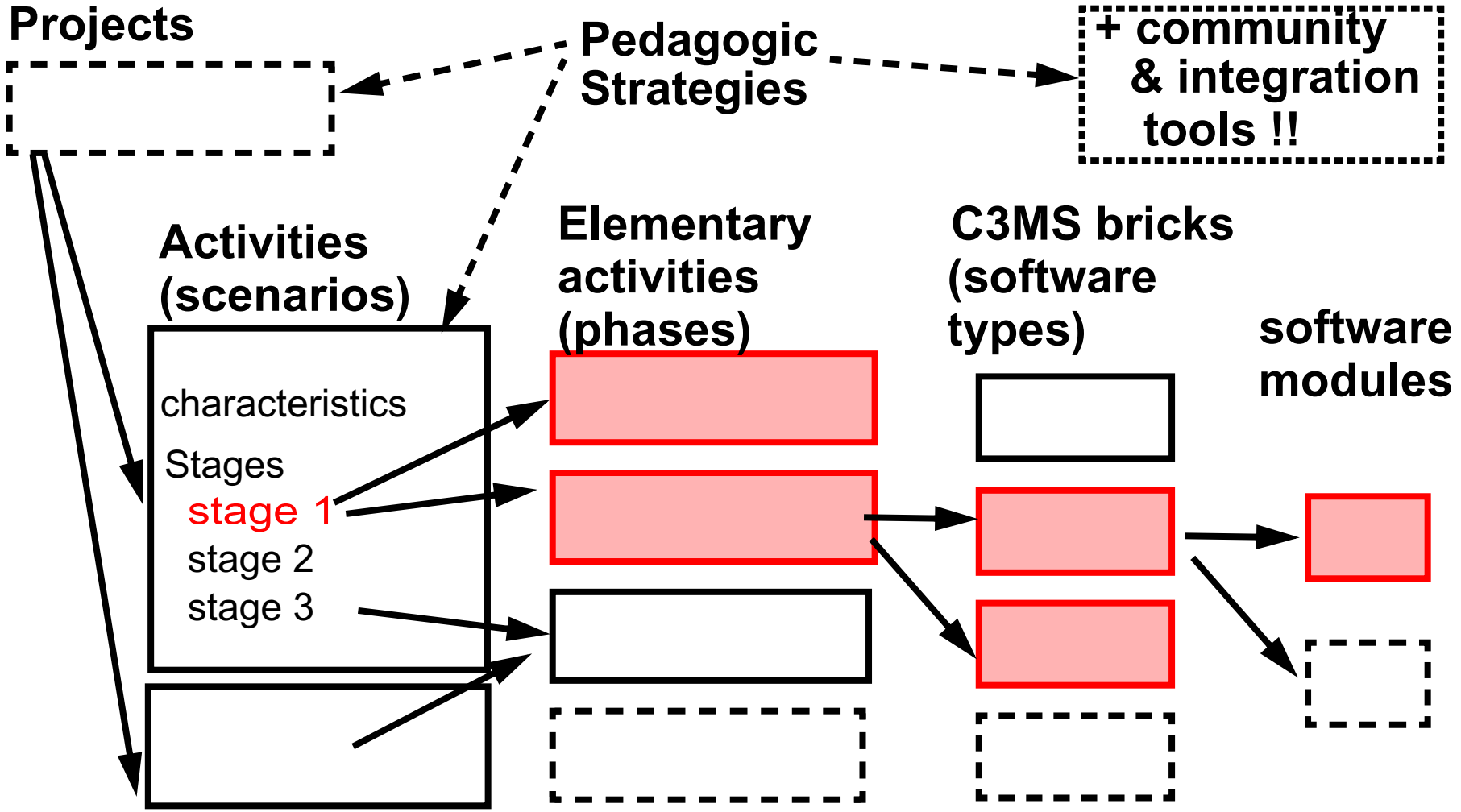


- *Integration* of most applications (authentication, interfaces,...)
- *Plug-in architecture* ! (YOUR organization can write modules)

6.7.A good start: available C3MS bricks

Function	*C3MS modules (tools of the portal)*
Content management	News engine (including a organization by topics and an annotation mechanism) - Content Management Systems (CMS) Collaborative hypertexts (Wikis) - Image albums (photos, drawings, etc.) - Glossary tool or similar - Individual weblogs (diaries)
Knowledge exchange	News syndication (headlines from other portals) File sharing (all CMS tools above)
Exchange of arguments	Forums and/or new engine Chats, ...
Project support	Project management modules, Calendars, ...
Knowledge management	FAQ manager - Links Manager (“Yahoo-like”) Search by keywords for all contents “top 10” box, rating systems for comments “What’s new” (forum messages, downloads, etc.), ...
Community management	Presence, profile and identification of members Shoutbox (mini-chat integrated into the portal page) Reputation system Activity tracing for members Event calendar News engine, ...

6.8 C3MS portals & educational scenario scripting



6.9.Planning example: Study wildlife of Mauritius

PROJECT	
	Activities (scenarios)
1	Teach portal to students
2	Make a glossary
3	Find research subjects
4	Make a research plan
5	Field trip
6	.....

GLOSSARY *activity (scenario)*

	Stages	Simple activities
1	Participants think about terms	IntroWork, BrainStorm
2	An alphabetic list of terms is entered	EditGlossary or EditPage
3	Students search and share links	SearchWeb, EditLink
4	Work is synthesized and combined	CoEdit
5	Teacher moderates	CheckWork
6	Final definitions	CoEdit

Simple activity	Description	Available C3MS modules
CoEdit	make collaborative documents	Wiki (phpWiki portal module), CMS (EzCMS module)
BrainStorm	Generate Ideas	Wiki, News Engine, Forums, Bulletin Boards

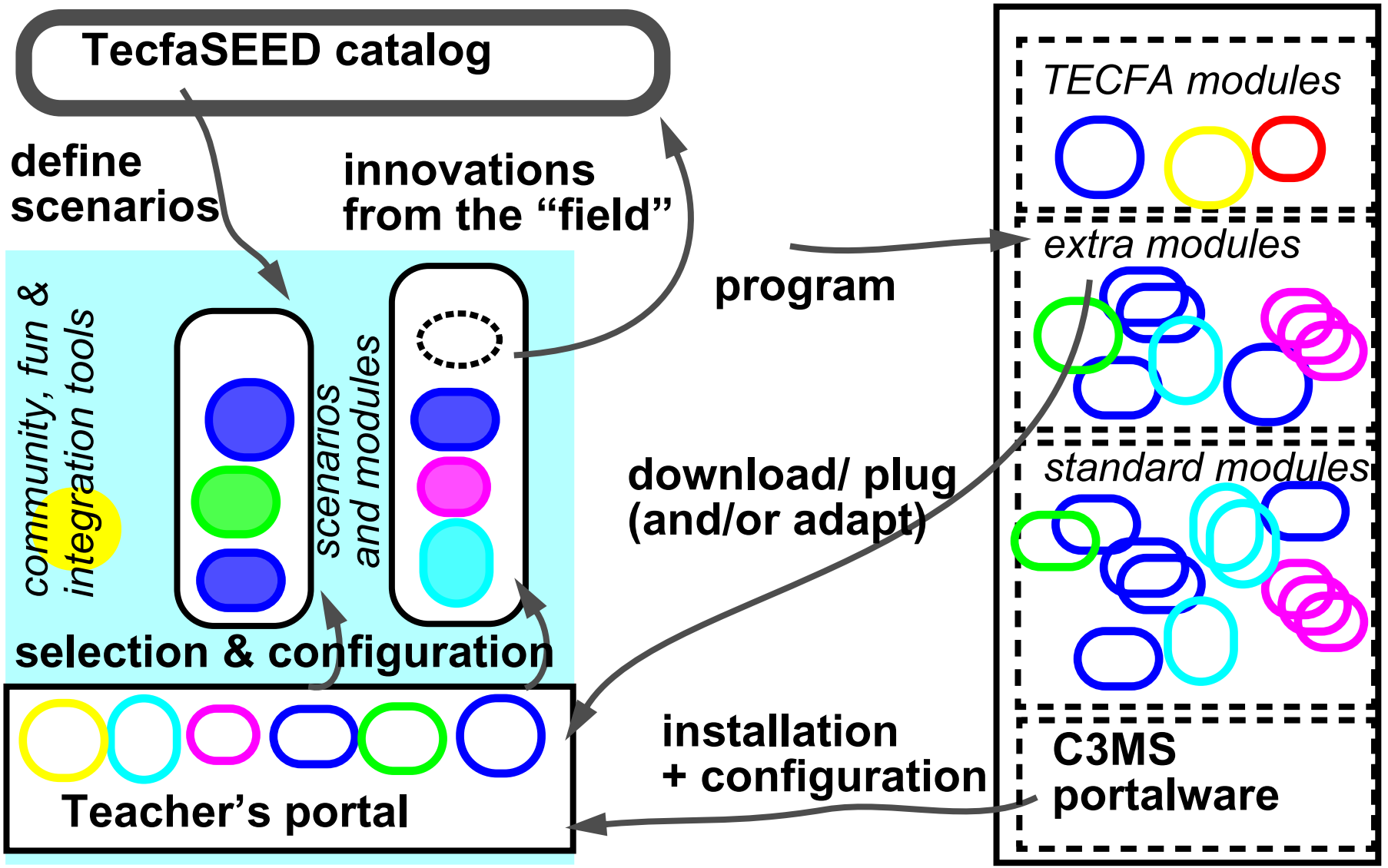
Implementation example of the Glossary activity

(previous step: learn portal)

Instantiated example "glossary" ***activity (activity 2)***			
Stages		***Tools***	***Instructions***
1	Suggest terms	Wiki (= coll. hypertext)	Each student must suggest 3 terms and enter them
2	Provisional list of terms	Wiki	Together in class we clean up the list
3	Search and sharing of results	Google, Links manager	Each student must provide 4 links and make comments to 2 other
4	Raw information is synthesized and combined	Wiki	Each student must enter 2 definitions, make links from "his" definitions to others and modify others
5	Teacher moderates	News engine	Teacher will give feedback in an article
6	Students produce final definitions	Wiki	Students can make final modifications

(next step: find research subjects)

6.10.Scenario configuration with C3MS bricks



6.11.Teacher roles in a C3MS approach

Teacher as orchestrator

designs the environment
designs the global project
designs flexible tasks

Teacher as monitor

makes audits
reads blogs
controls project plans
evaluates

Teacher as facilitator

gives feedback
answers questions
writes tutorials
makes examples
provides links

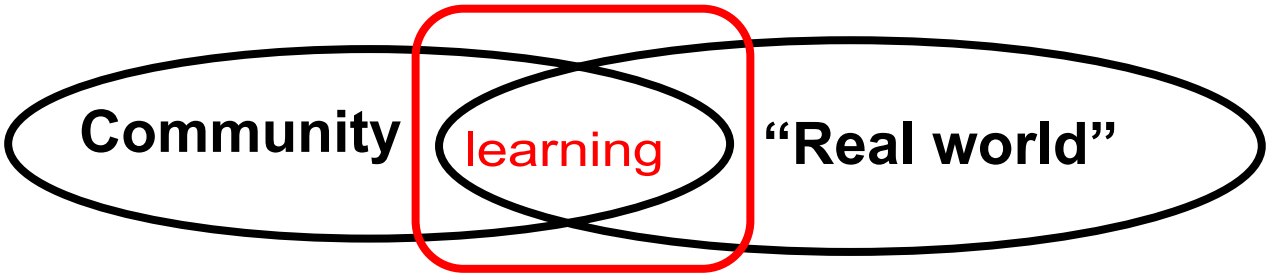
..... *(now try to do this without ICT!)*

- **More to come: C3MS also must be designed as virtual environments and support the learning community**

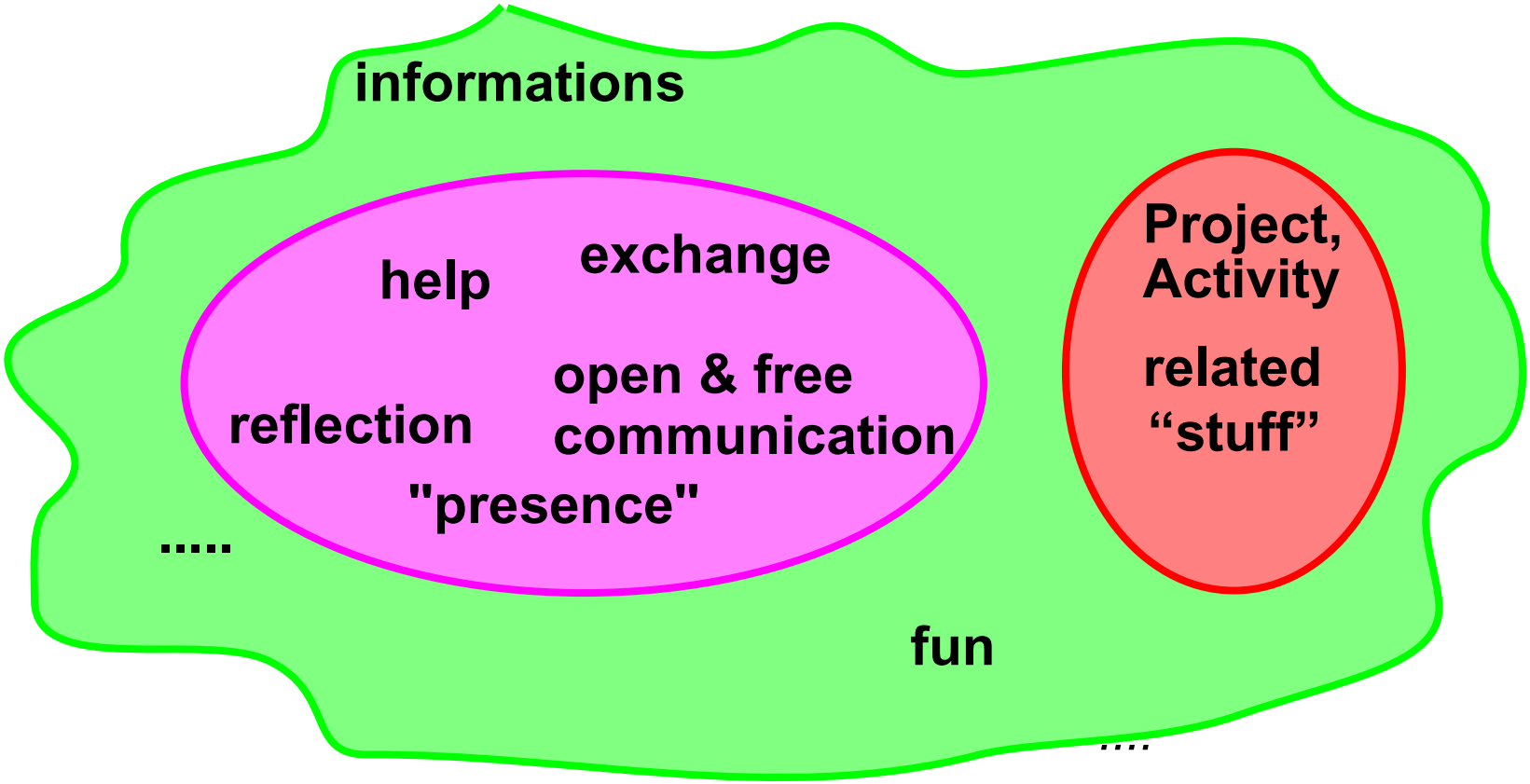
7. Learning within a community

A sampler of arguments:

- members of a community tend to make better progress (peer intellectual & emotional help and mutual stimulation)
- some goals can't be reached alone (distributed cognition)
- a group can develop special language and practice adapted to specific problems
- knowledge through enculturation (collective memory)
- cognition is tied to experience (grounded)
- communities can extend beyond formal groups of learners
- a lot of learning is informal
- good communities are knowledge management aware

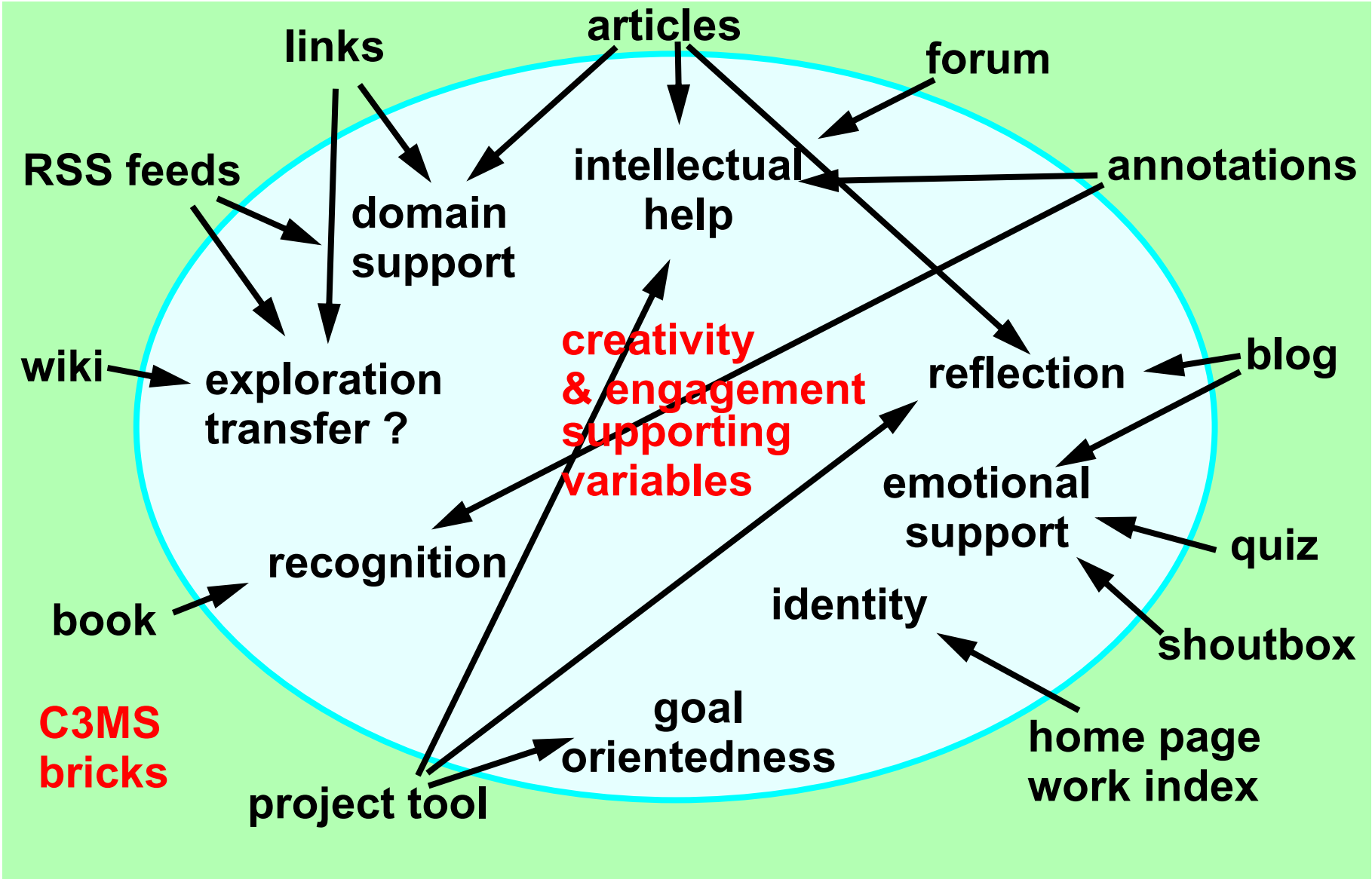


7.1 On-line virtual environments for communities

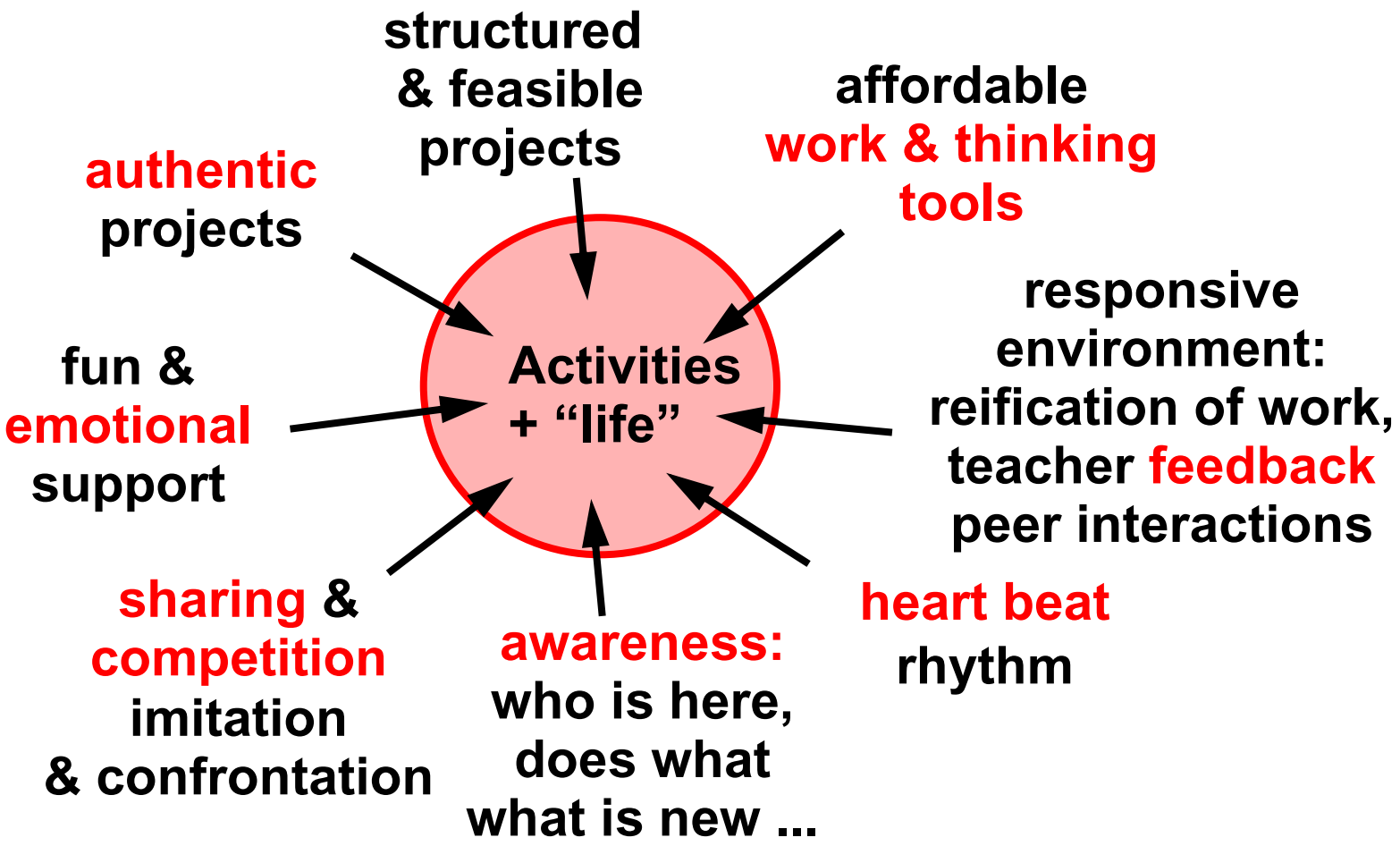


- A "**place to be**" ! (virtual environment implies social presence)
- Activity support
- .... many sorts of virtual environments

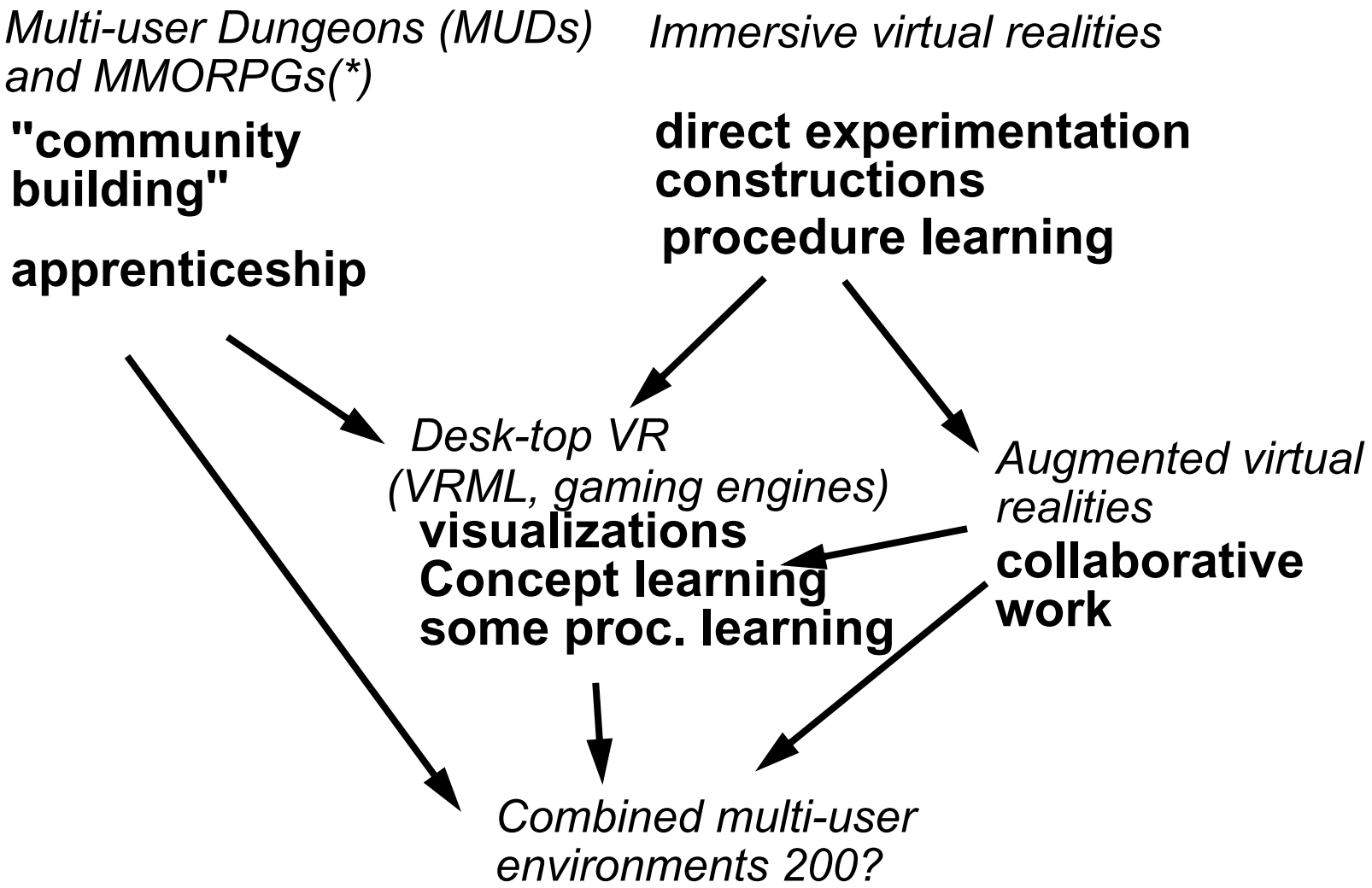
7.2.C3MS and support for creativity “elements”



7.3.LE design = landscaping & conditioning



7.4.Other alternatives to C3MS as virtual environments



(*)Massively multiplayer online role-playing games

8. Microworlds, simulations, rich exercising machines

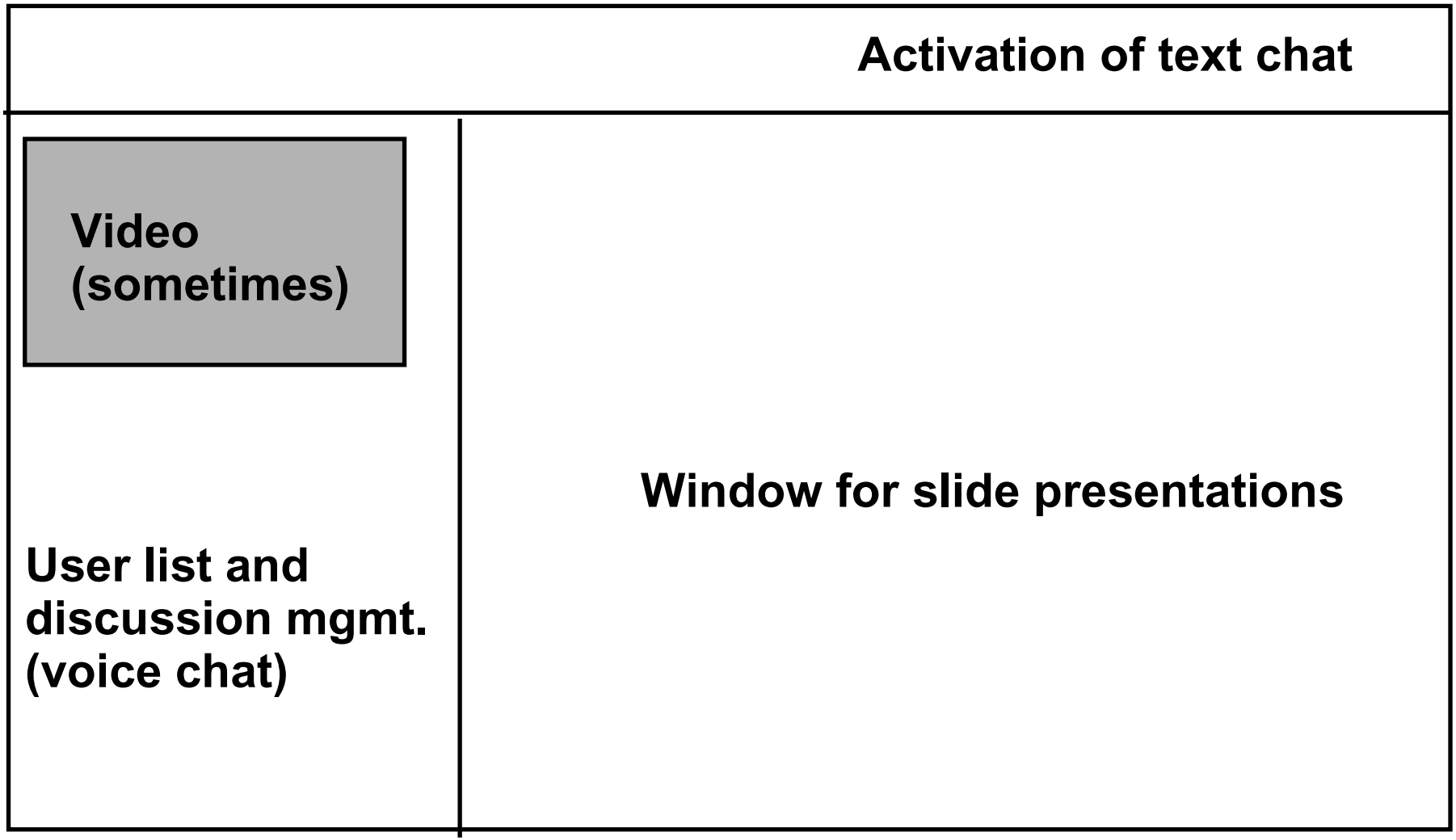
- **There is a rich variety**
- **Can sometimes be imported into a LMS or an other platform**
- **Frequently used in technical teaching**

Example: on-line syntax parser

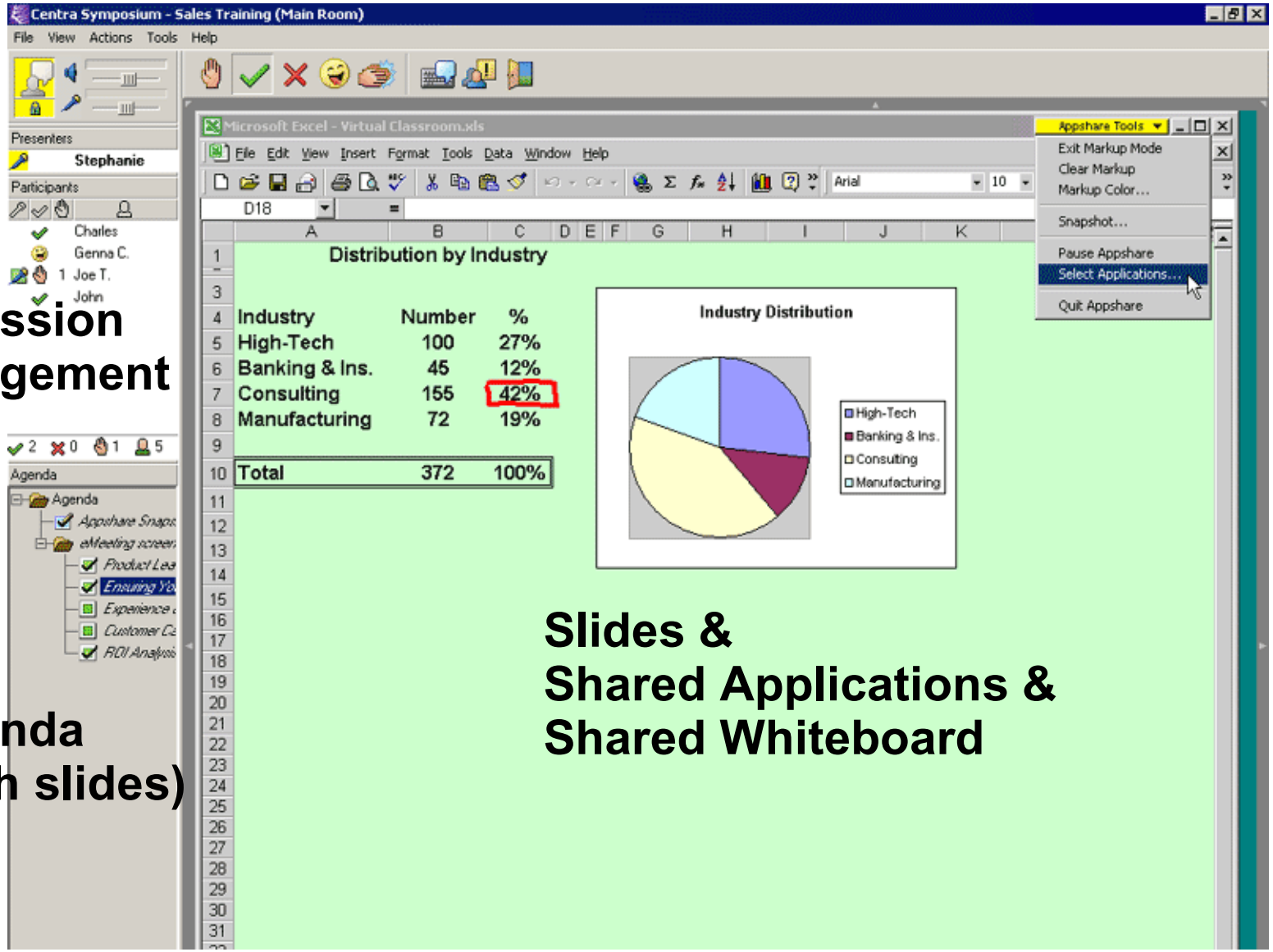
url: http://www.latl.unige.ch/

9. Teleteaching

9.1 Slides + voice applications



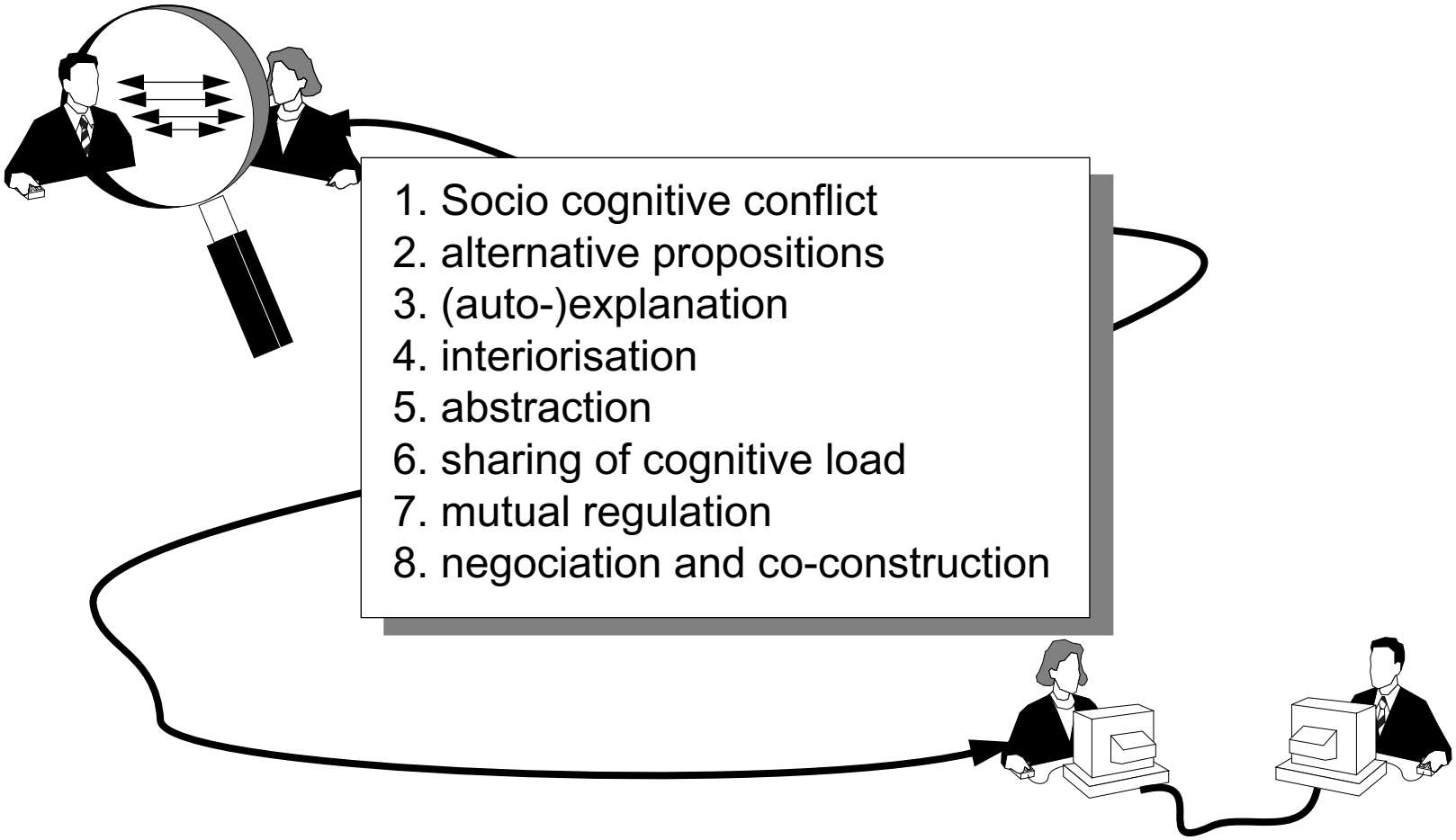
9.2 Centra "virtual class solution" (MS only)



9.3 Other alternatives

- Mass market text and voice/video chat
  - e.g. MS Messenger
- High-end video-conferencing systems
  - Video/voice quality adapted to client
  - Application sharing (Microsoft)
  - Slide presentation management
  - Document camera
  - Special video rooms with feedback cameras/screens
  - ....
- Peer-to-peer groupware
  - e.g. Groove

10.CSCL (Computer supported collaborative learning)



- **Collaborative learning can be very powerful**
- **needs scenario-building (story-boarding)**

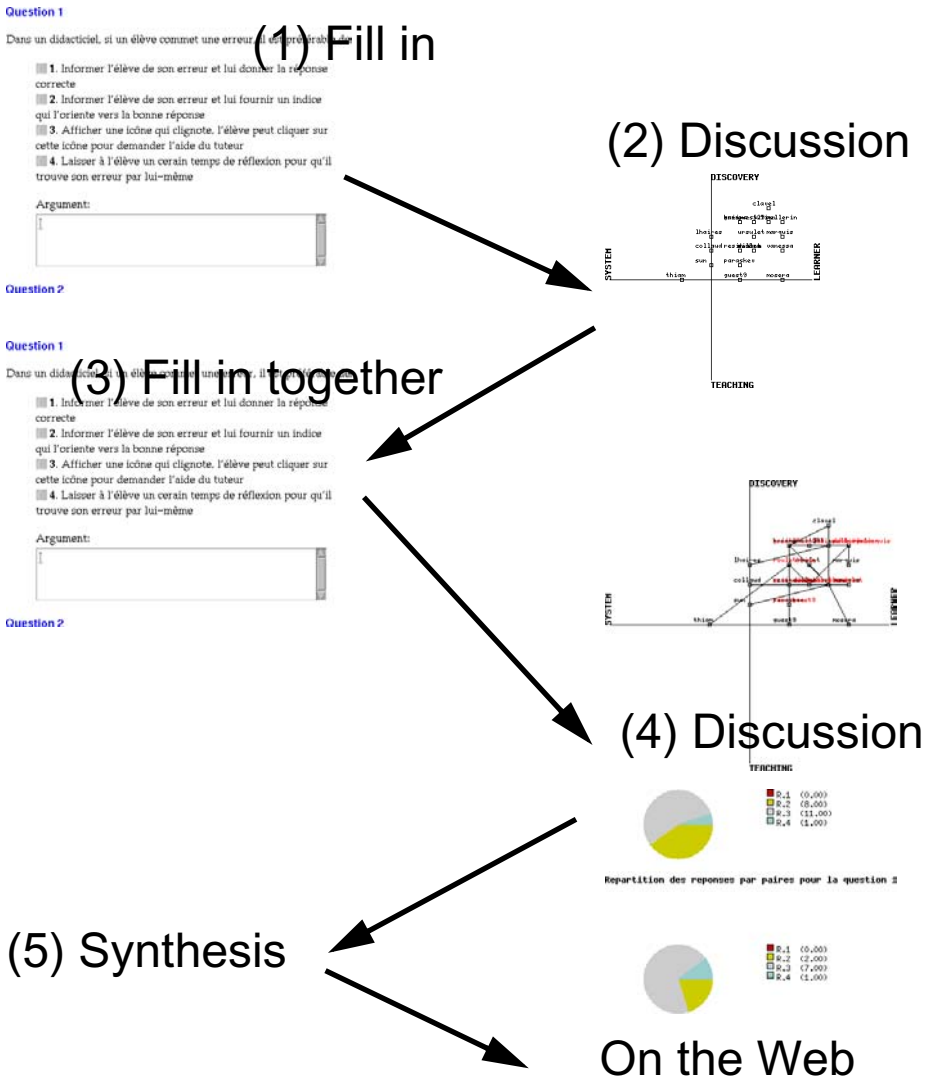
10.1.Locally made (at Tecfa)

The ArgueGraph scenario

- **Goal: Support conceptual learning**

Scenario:

1. **Students answer survey**
2. **Discussion on summary information**
3. **Collaborative fill in**
   - **Teacher selects opposite pairs**
   - **Pairs argue and answer survey again**
4. **Discussion**
5. **Synthesis (HomeWork)**
   - **Each student writes a text**

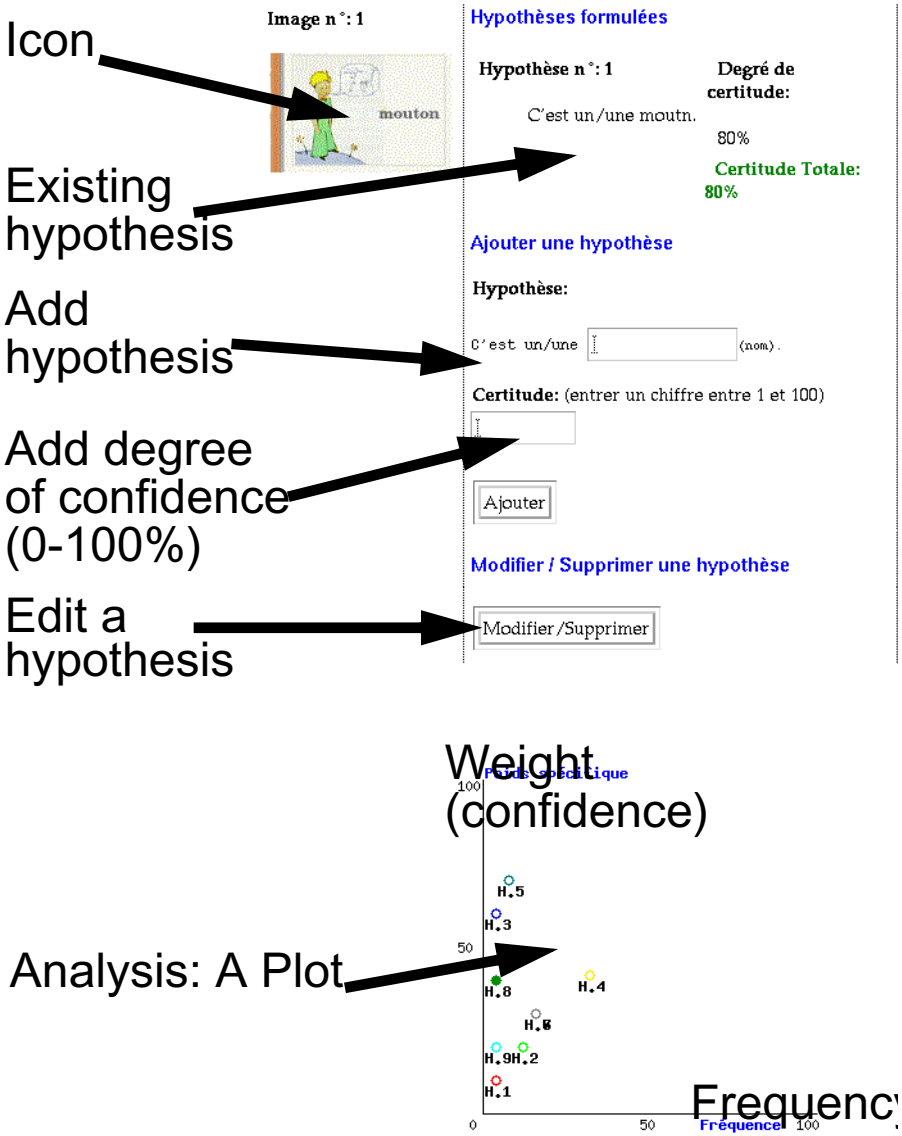


The Iconometer

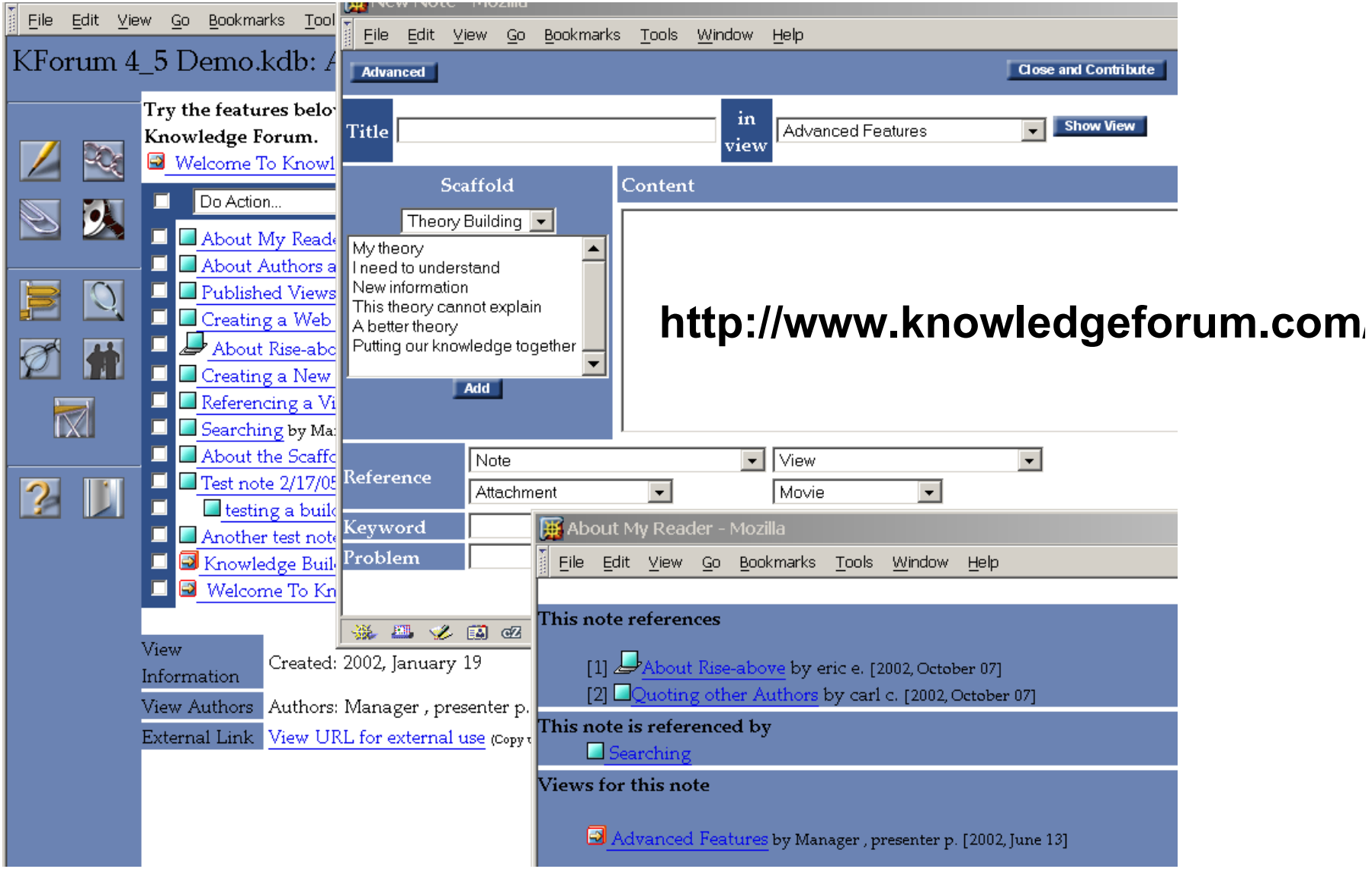
- Test icons used in web pages
- Learn about multiple meanings

Scenario

1. Look at an icon
2. Formulate hypothesis
   - one or several
   - each with a confidence factor
   - total must not exceed 100%
3. Look at results
   - Look at each hypothesis
   - Look at summary information
4. Discuss ....



10.2.Platform Example: "Knowledge Forum"



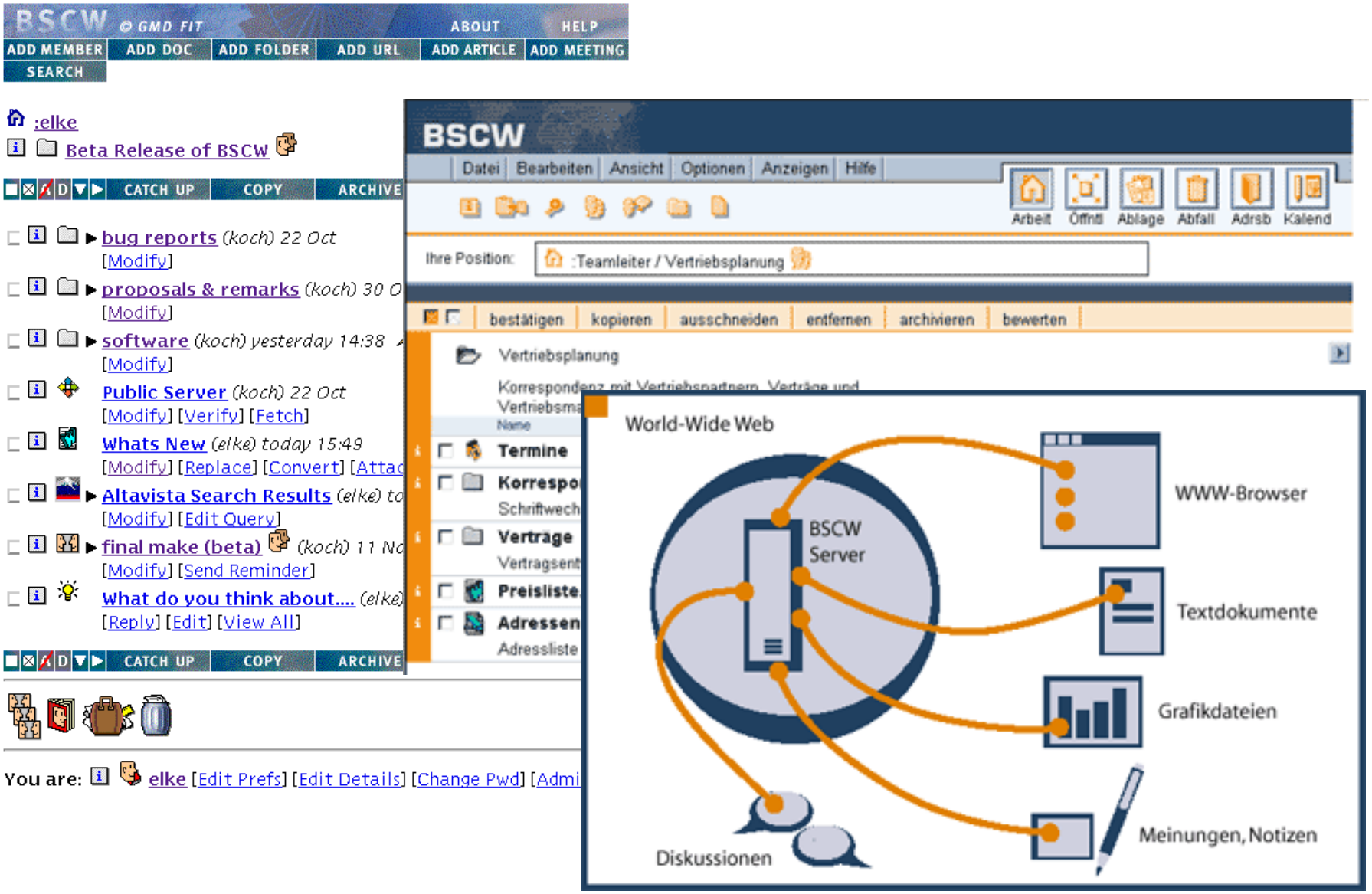
Open Source and Freeware examples: DREW, CoolModes, ...

11.Groupware and CSCW

11.1Overview

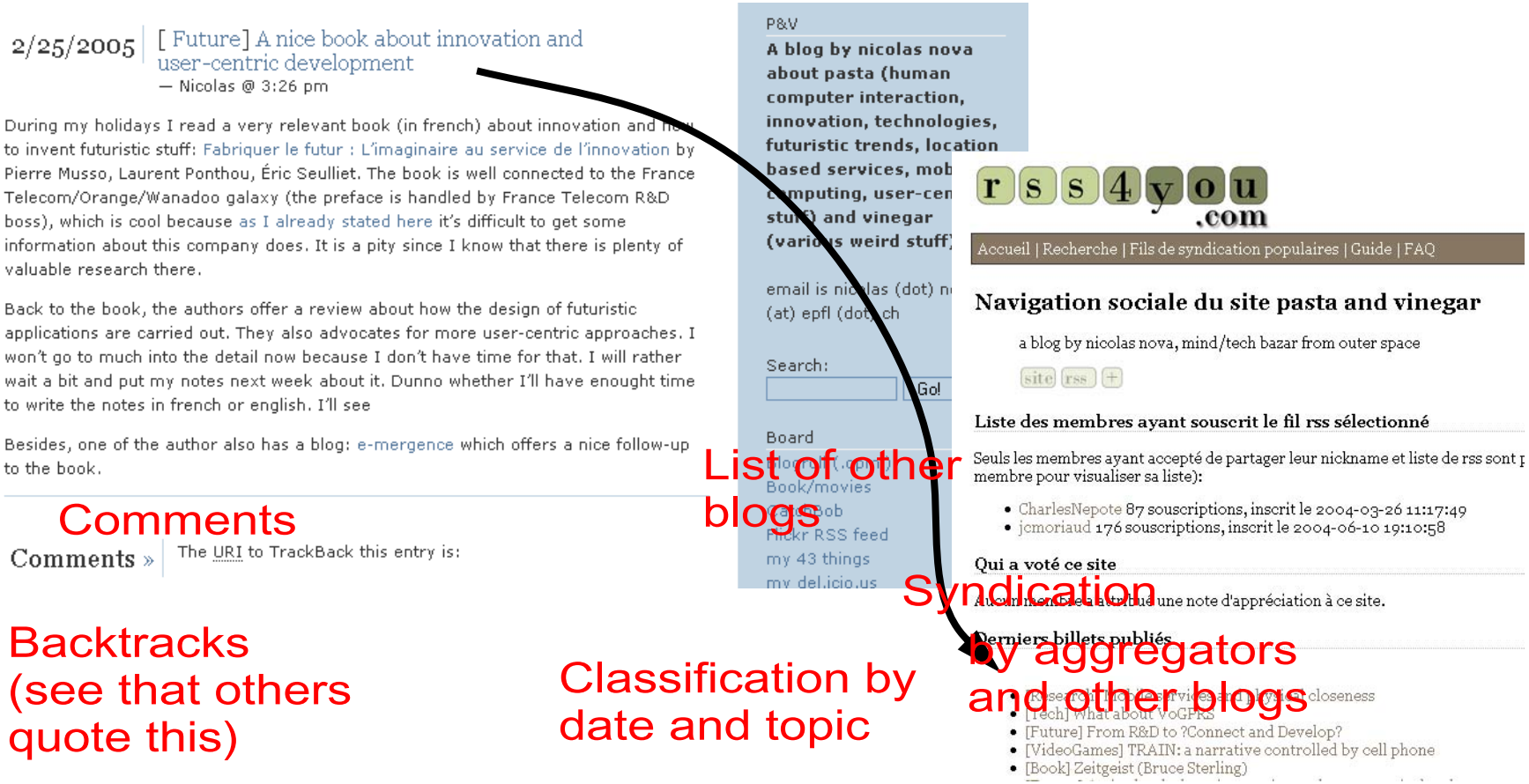
- Sometimes an alternative to the C3MS presented before
  - less focus on system supported production
  - less community building features
- Typical features
  - document management: file-exchange, file management
  - asynchronous communication tools (forums)
  - user management and access control
- Not so typical
  - (sometimes) application sharing
  - workflow support and roles definitions
  - less focus on system supported production

11.2.Typical example: BSCW - http://bscw.fit.fraunhofer.de/



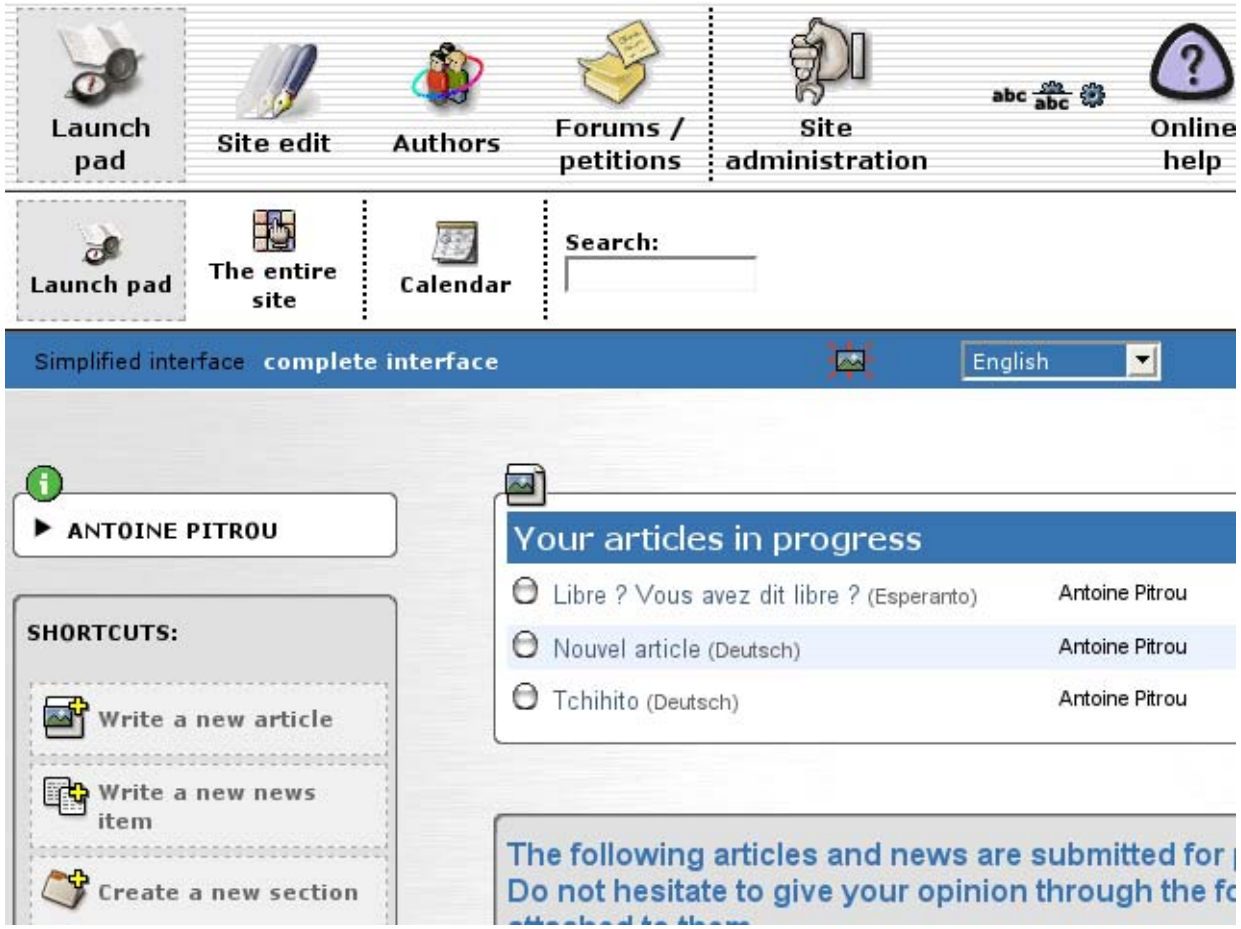
12.Weblogs

- **Diary for interesting information and ideas**
- **Propagation mechanisms of good ideas through "blogsphere"**
- **Learn by "look", write, exchange, confront, ...**



13.Content & Document Management Systems

- A CMS can be used to edit & organize contents through the web
- Note: most LMS have simple (IMS/Scorm) CMS functionality
- A CMS can also be used as write-to-learn tool for students



http://www.spip.net/

- open source CMS

14.The Wiki way

14.1Definition and usage forms

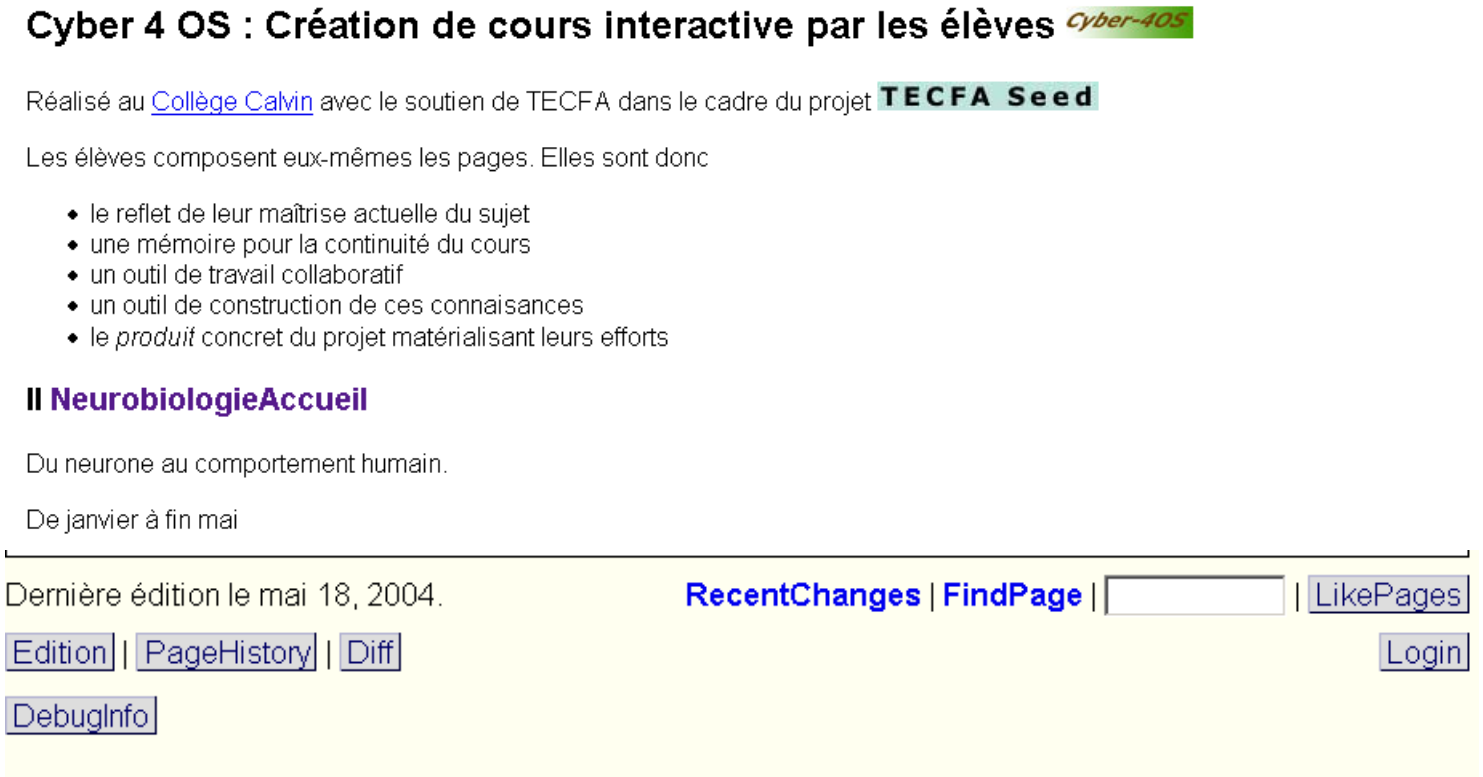
Features

- Through the Web editing with simple markup or Wysiwyg
- Autolinking of terms (each term that correspond to a page name)
- Versioning control and tracking

Some usage patterns

1. Collaborative documentation tool (e.g. programmers teams),
   - related to life-long and organizational learning
2. Students write (also: collaborate, discuss, confront, link)
   - Write-to-learn strategies
   - Support for exploratory, inquiry-based scenarios
3. Large collective encyclopedias
   - Useful for resource-based teaching scenarios
   - http://wikipedia.org/ has over 470'000 articles in English, many versions in other languages.

14.2Example: Biology teaching at High school level



Cyber 4 OS : Création de cours interactive par les élèves Cyber-4OS

Réalisé au Collège Calvin avec le soutien de TECFA dans le cadre du projet TECFA Seed

Les élèves composent eux-mêmes les pages. Elles sont donc

- le reflet de leur maîtrise actuelle du sujet
- une mémoire pour la continuité du cours
- un outil de travail collaboratif
- un outil de construction de ces connaisances
- le *produit* concret du projet matérialisant leurs efforts

II NeurobiologieAccueil

Du neurone au comportement humain.

De janvier à fin mai

Dernière édition le mai 18, 2004. RecentChanges | FindPage | | LikePages

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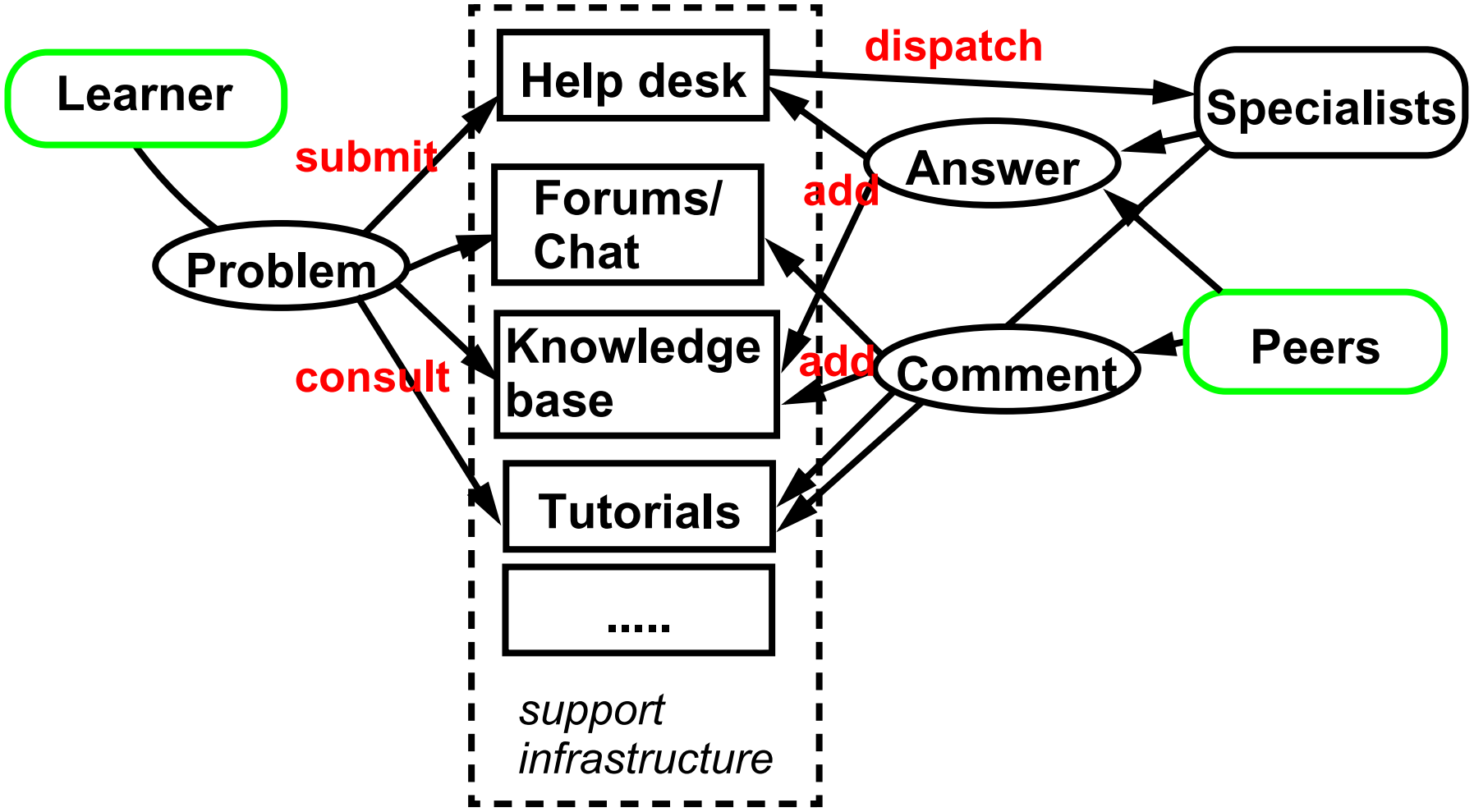
DebugInfo

- **Several long-term experiments: Ecology, Neurobiology, Anatonomy, Reproduction, ...**
- **Each course was "story-boarded": distribution of task, collaborative and collective activities included.**

15.The "help desk model" for life-long learning



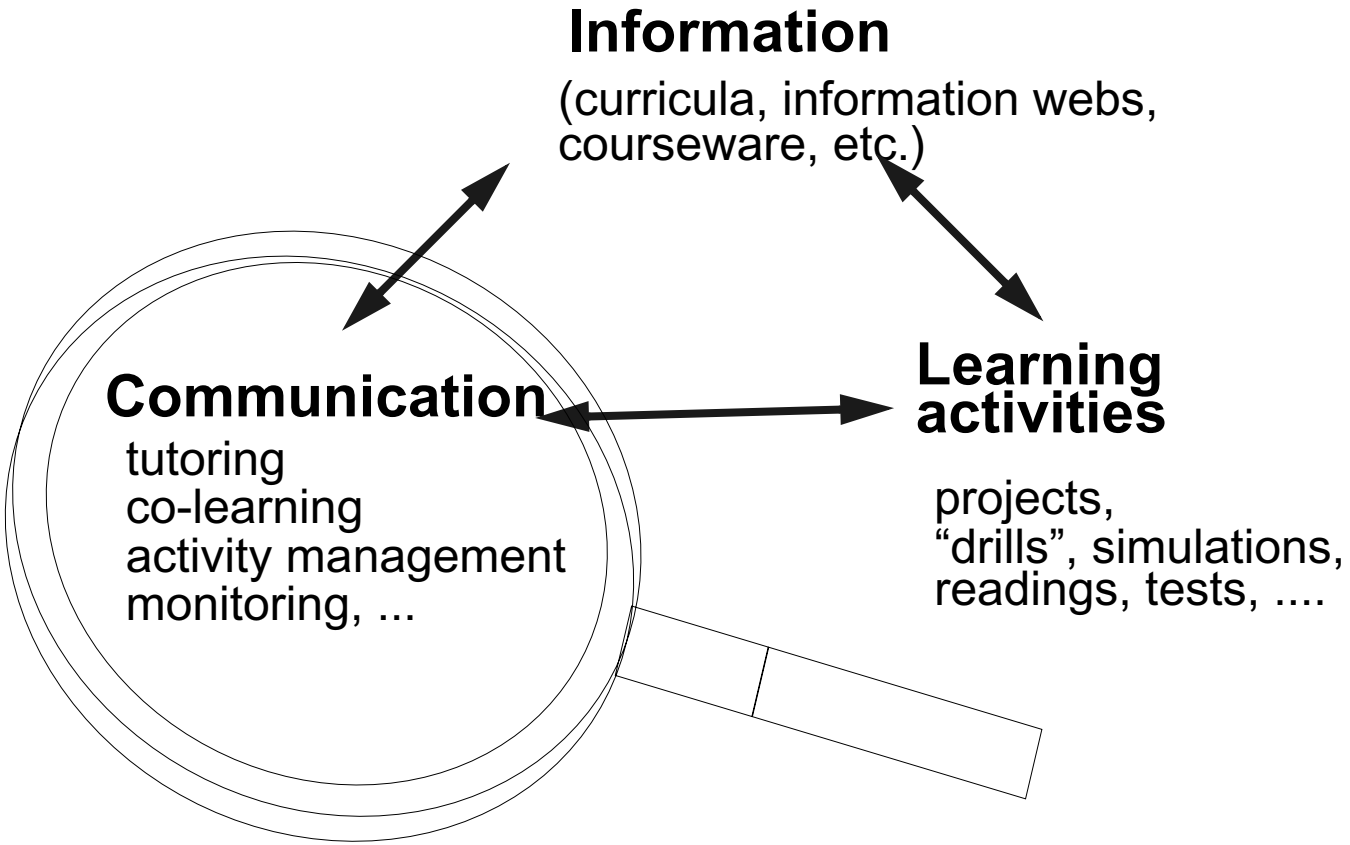
Systems used: either C3MS portals, Groupware, specialized helpdesk and knowledge management software.

III Conclusions

Think !

Make scenarios
(story boarding)

16.Three key elements



Focus on communication when you start delivery planning (costs are NOT constant)

17.Make sure that technology fits your needs

Technology (is not innocent !!)	*Teaching I "know-that"*	*Teaching II "know-how"*	*Teaching III "knowing-in-action"*
E-learning Systems	***	*	
Hypertext, Wikis, CMS (exploring, reading)	***	*	
Groupware (help desk, discussion)	*	***	**
Microworlds (exercising, simulating)		***	*
Hypertext, Wikis, CMS (producing, collaborating)	**	*	***
C3MS	*	*	***
CSCL	*	***	*

Technical standards

	behaviorist instructionalist	*socio-constructivist activity-based*
Data	metadata, quizzing, packaging, simple sequencing learning design (new) learning objectives	metadata structured text (XML) Internet formats (activity-design is under preparationS !)
Systems	IMS compliant Learning Content & Management Systems, Teleteaching	portals, web services, (API's for portal bricks), User CMS & wikis, isolated groupware, CSCW Systems, CSCL Systems, ...