E-learning for OpenMI-Enabled Integrated Modelling

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Context

- As understanding of environmental system complexity progresses, the need for more integrated analysis and modelling of these systems and their interactions increases.
- Current interest on interfaces and cross-sectoral and cross-system implications of policies and interventions, results in a growing need for reliable and seamless integration of models and tools
- These tools have been developed for different parts of the integrated system, by different parties.

Challenge

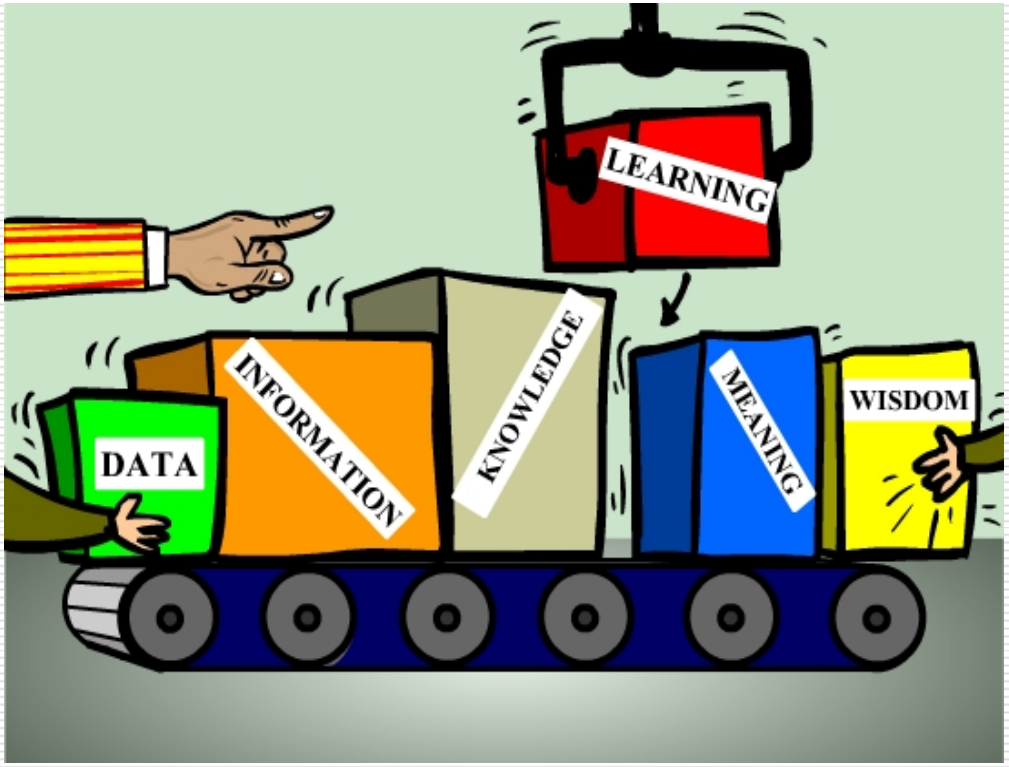
- Making the use of these integrating environments intuitive and user friendly
- Embed them within the education process and use the possibilities they offer to promote and teach integrated modelling

Environmental education in context

- The educational system in the European Union, has attempted to address the need for highly trained environmental professionals balancing specific domain knowledge and an understanding of cross-disciplinary issues, through the establishment of environmental courses at undergraduate and post-graduate levels.
- The graduates of these courses have actively assisted in changing the Union's environmental policy and practice which is now rightfully considered the most advanced in the world

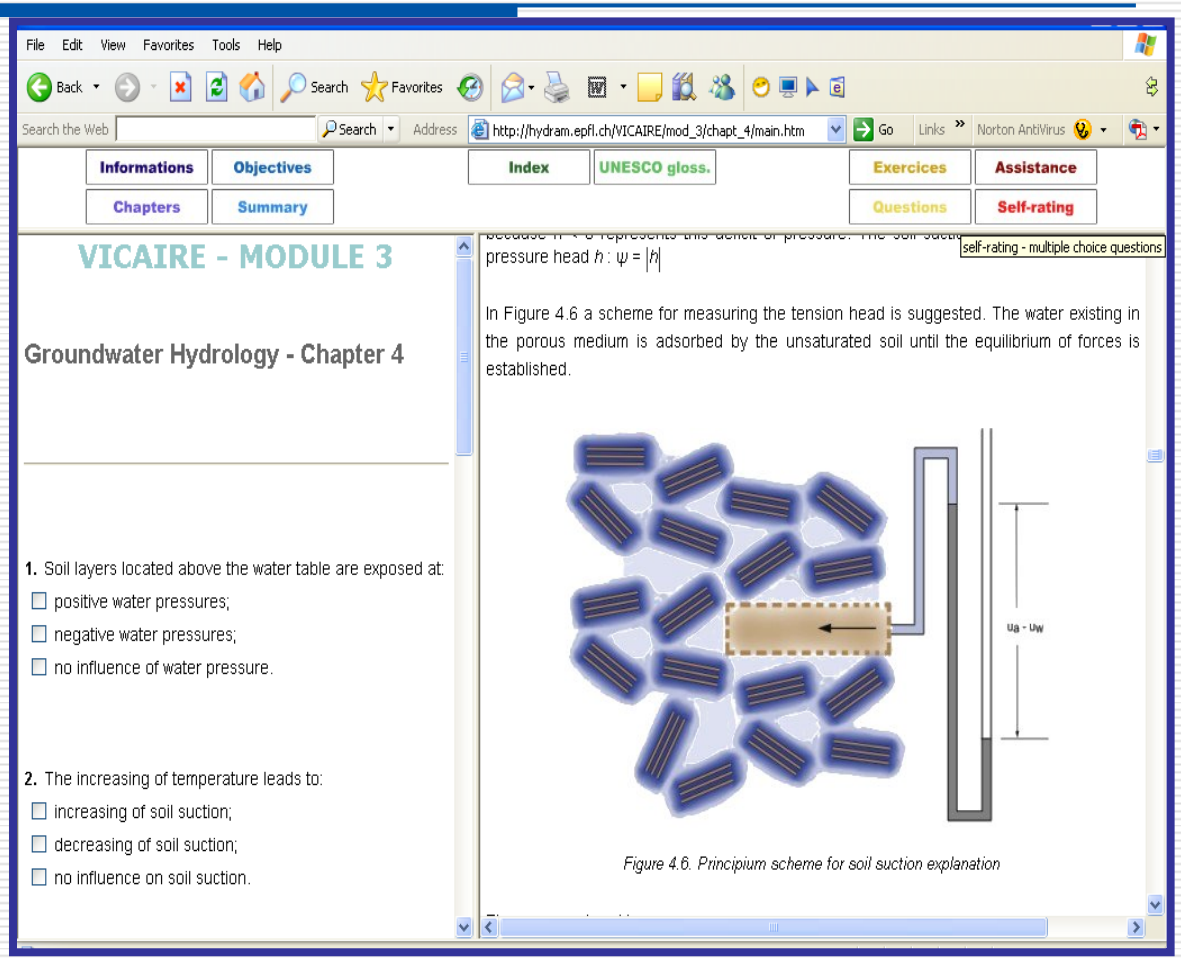
E-learning concept

- A dynamically changing environment (tech + natural)
- Data-Information-Knowledge flow (and change)
- Learning has to keep up!!
- To allow for progressing to the quest for meaning…



E-learning

- Digital literacy
- Virtual Campuses
- Emerging issue in the EU (knowledge based society)
- Anytime-Anyplace



http://www.elearningeuropa.info

Universities should:	Suggested Response:
Provide (affordable) education, customised to meet current and future needs	Relevant/Current PG Course Topic & E- learning delivery
Provide the link between data-information-knowledge and learning	Quick transfer between Research and Teaching Updatable material
Provide training on mechanisms of learning per se	Hands-on approach (web/digital literacy: new learning paradigm)
Provide a platform for communication, exchange of ideas and collaboration	International Team and Audience Link with USA initiatives (CUAHSI)
Provide tools and data to apply the theory: online and free	Link to HO Infrastructure, the CUAHSI Network and Software Companies)

Partners

A kick-off within the OpenMI LIFE project:

- Natural Environment Research Council (UK)
- DHI - Water and Environment (DK)
- Wallingford Software Limited (UK)
- National Technical University of Athens (EL)
- University of Thessaly (EL)
- Aquafin (BE)
- VMM (BE)
- Université de Liège (BE)

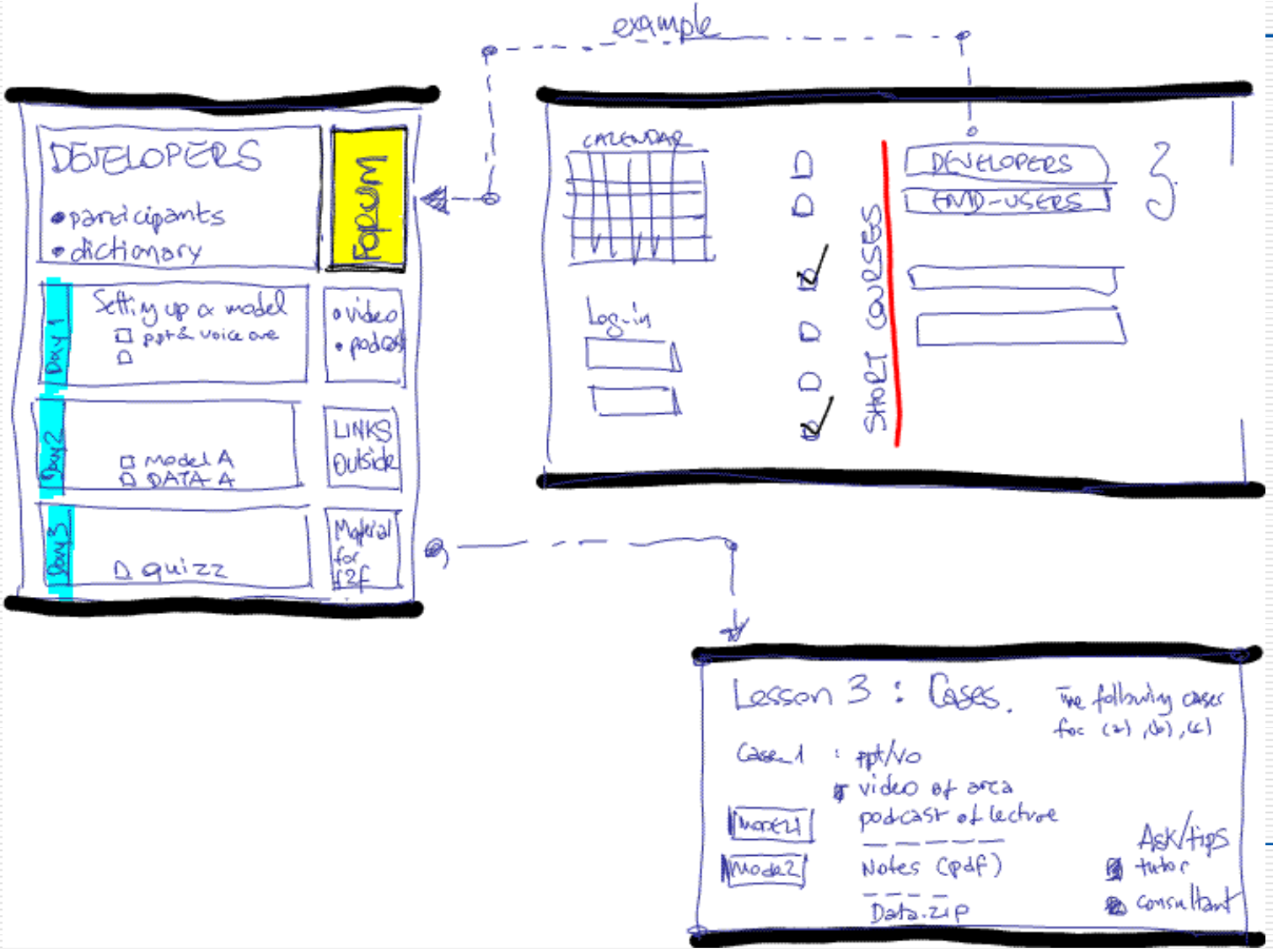
With the help of OpenMI Association members:

- IHE Delft (NL)
- Alterra (NL)
- CUAHSI contacts and input

Overview of Actions

- Organisation of a Virtual Network of Higher Education Institutions for Integrated Modelling facilitated by OpenMI
- Development of an e-learning platform for the delivery of courses
- Development of Educational Material for:
  - Introduction to OpenMI
    - Users (1 module)
    - Developers (1 module)
  - Subject specific courses [to be added in over the longer term]
- Delivery of a pilot course for selected users (volunteers?)

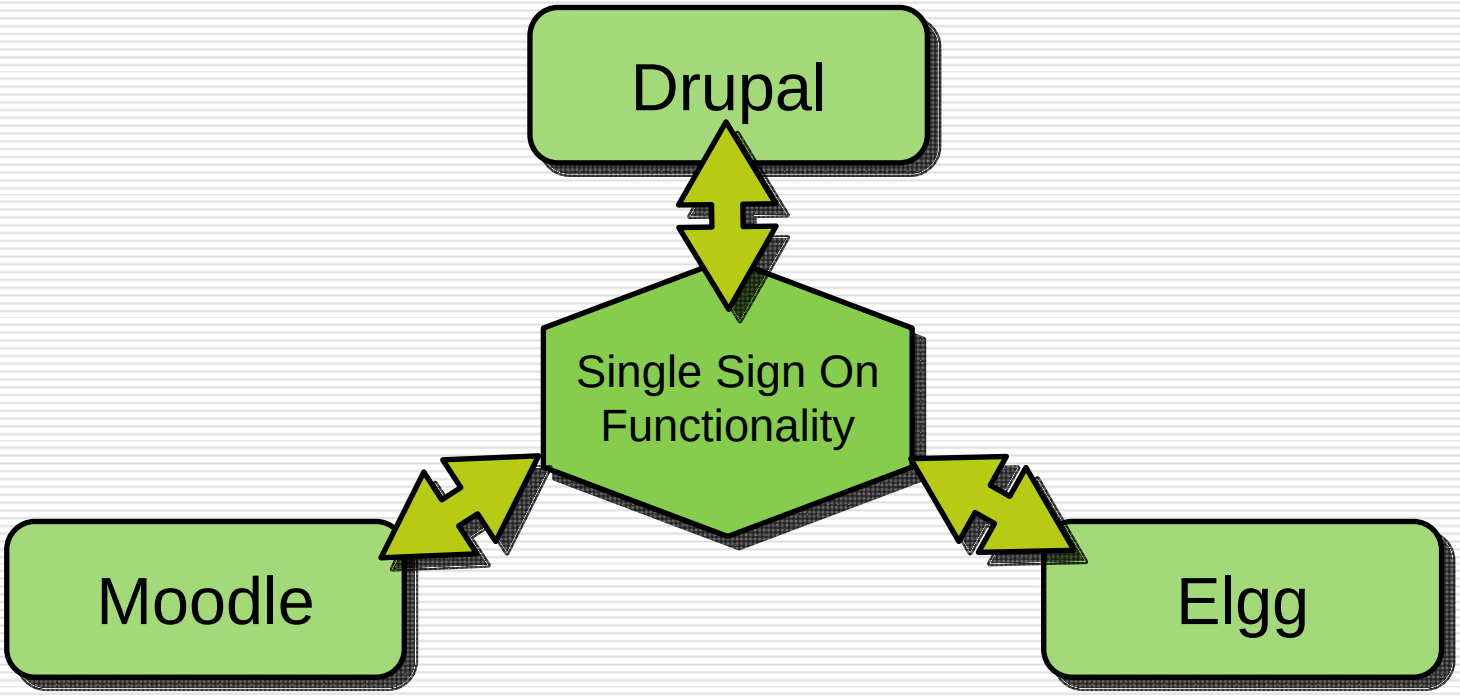
An (early) concept diagram



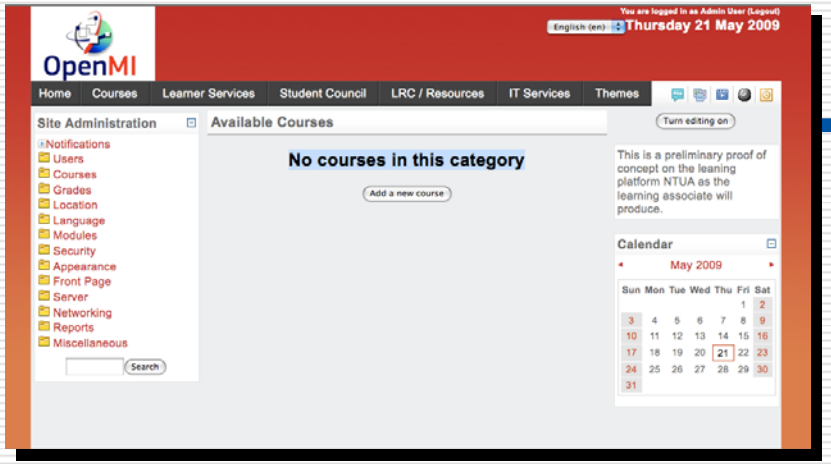
Implementation Software

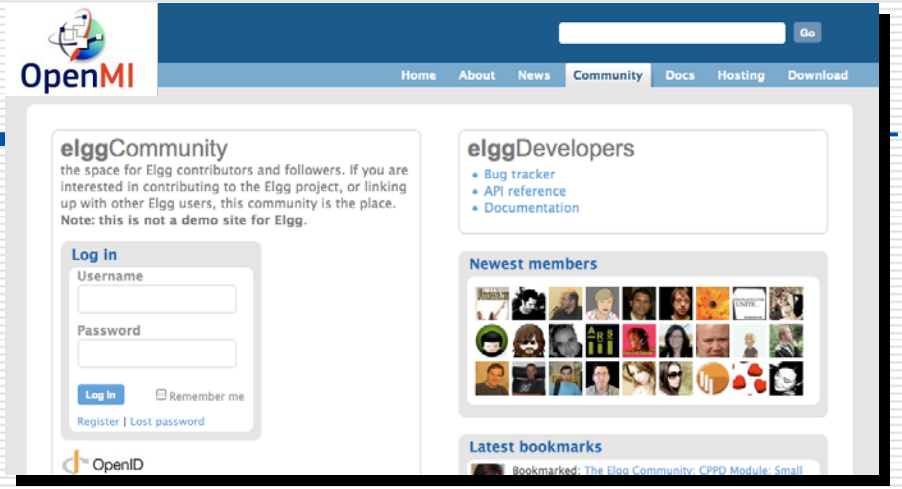
- **Moodle** state of the art open source e-learning platform.
- **Drupal** #1 CMS the last 3 years. Advanced ontology and community management capabilities.
- **Elgg**. The most active and emerging open source, social networking platform (“educational-facebook: migrate existing communities”).

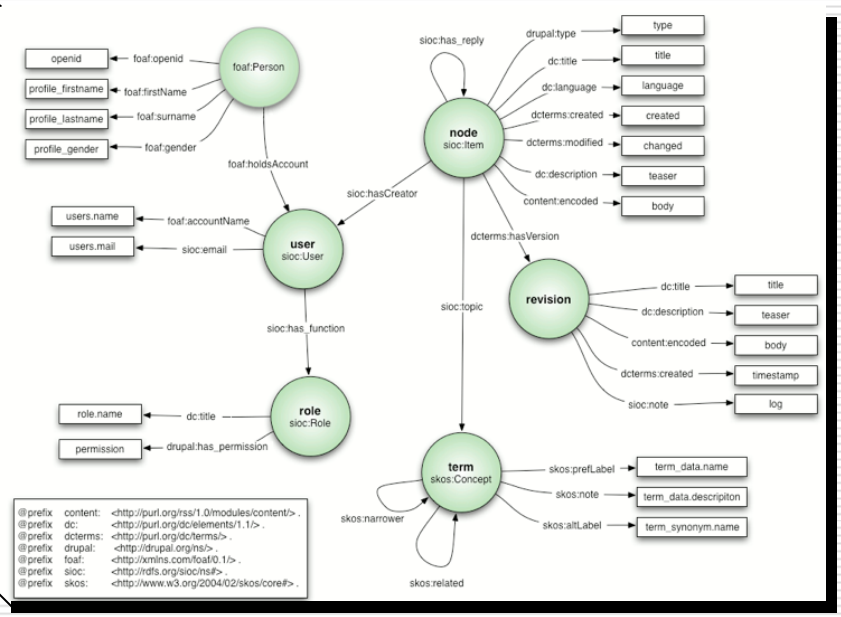
Deployment Diagram



Systems Integration







Drupal: Semantic Web Functionalities

Learning Methodologies

- Project based learning.
- Self Evaluation, automated feedback.
- On line Class feature (real time course broadcasting and offline search)
- Learning Communities.
- Collaborative learning.
- Twitter live feedback.
- Advanced Taxonomies for content search.
- Cross knowledge domain linking. Advanced Ontologies.
- Multilingual content.
- Mobile thematic.
- Customizable UI

User roles in the educational procedure

- Guest
  - Access to public information
- Student
  - Participation in modules (access to educational material, participation in module activities)
  - Communication with teachers and students
- Teacher
  - Module content management
  - Module activities management
  - Responsible for the ongoing educational procedure
- Administrator
  - User management
  - Membership management
  - Course structure management
  - Module administration

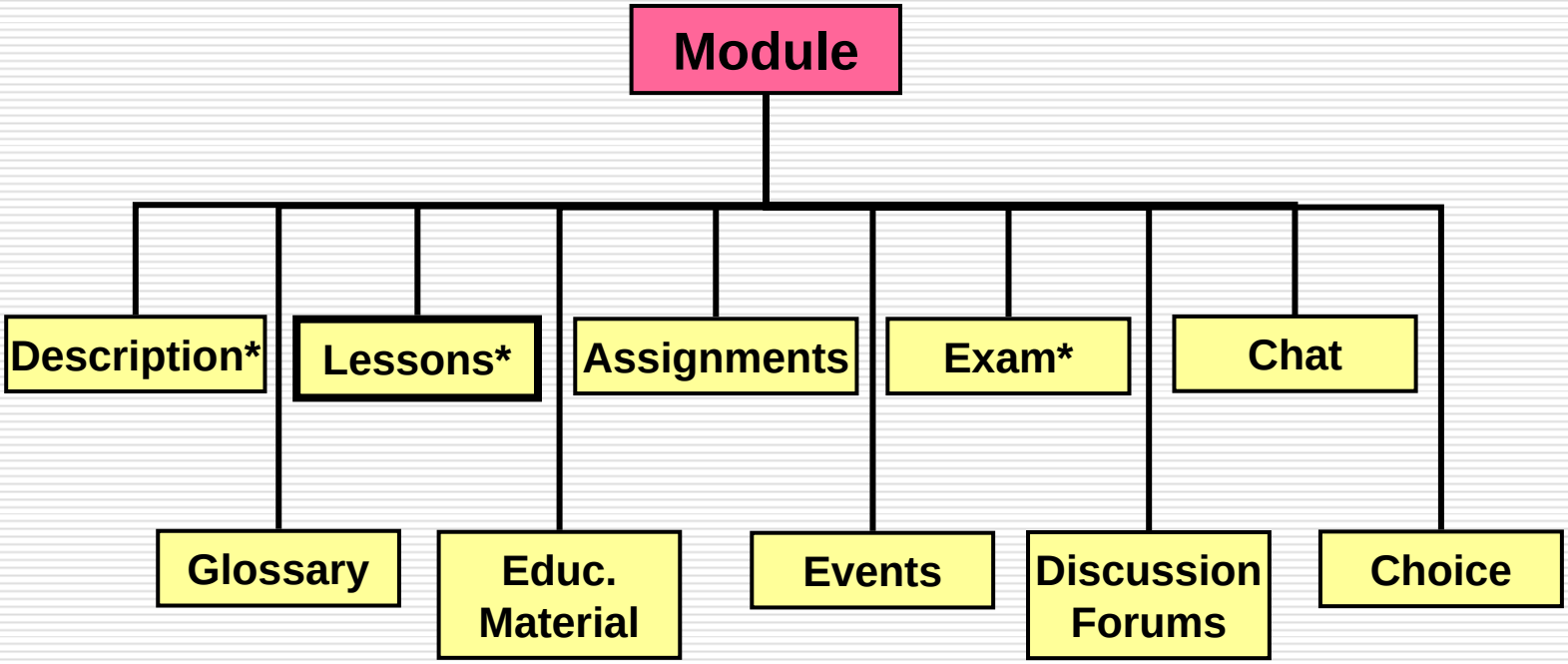
Module functionalities

1. Teaching mechanisms
   a) Teaching material
   b) Activities
2. Evaluation
   a) Self-assessment
   b) Evaluation by the instructor
   c) Module evaluation
3. Grading and Reporting
4. Information and Communication mechanisms
   a) One way
      - Static information
      - Inform – Notify – Feedback
      - Time related (Events, Calendar)
   b) Two-ways: Synchronous and Asynchronous

Forms of communication supported by the e-learning platform

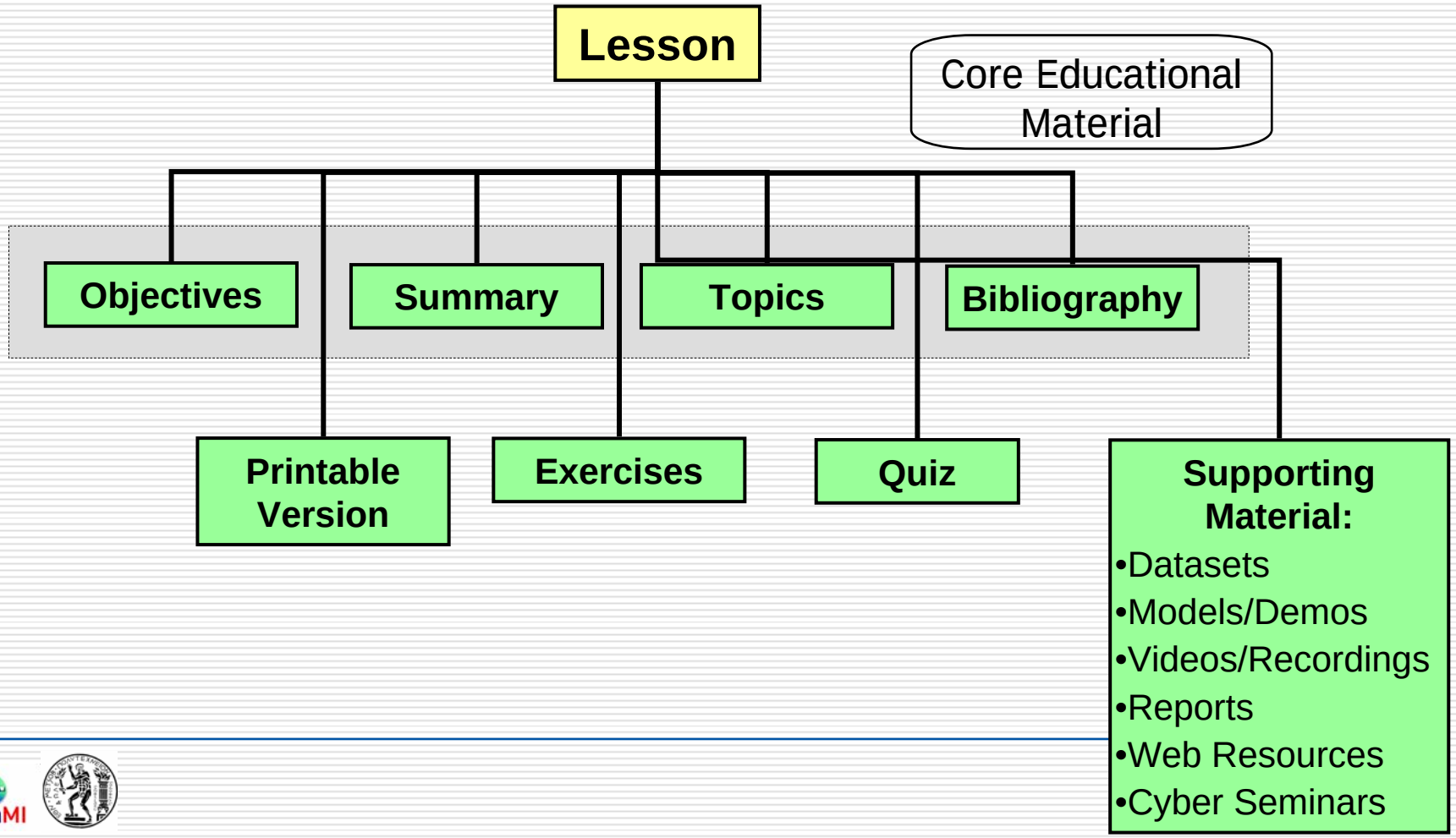
	Mode	Level	Participants
Chat	Synchronous	Module	Teachers and Students (many to many)
Dialogs	Synchronous	Platform	Teachers and Students (one to one)
Email	Asynchronous	Platform	Teachers and Students (one to one, one to many)
Messages	Asynchronous	Platform	Teachers and Students (one to one, one to many)
Discussion Forums	Asynchronous	Platform Module	Teachers and Students (many to many)
Choice	Asynchronous	Module	Students

Module components



* Required

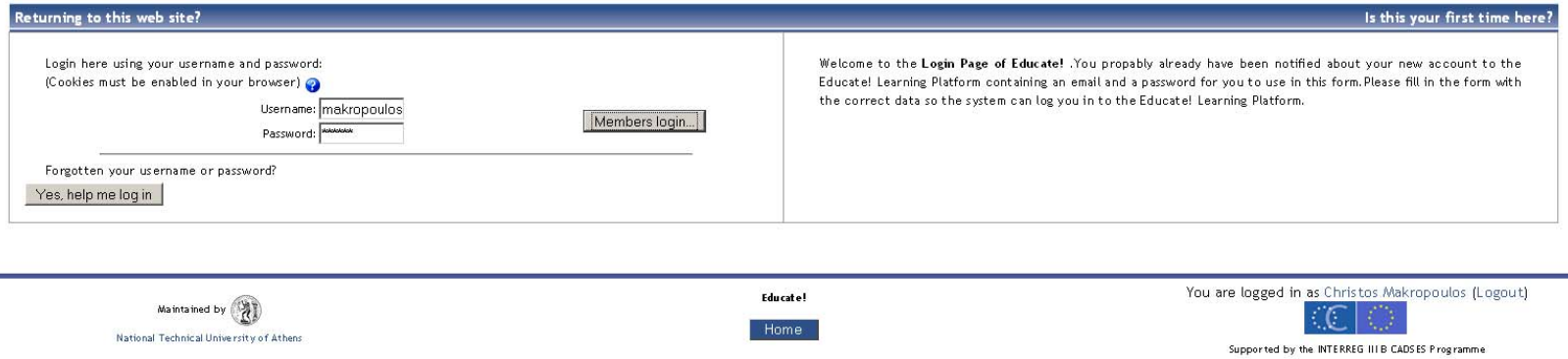
Lesson components



Lesson components

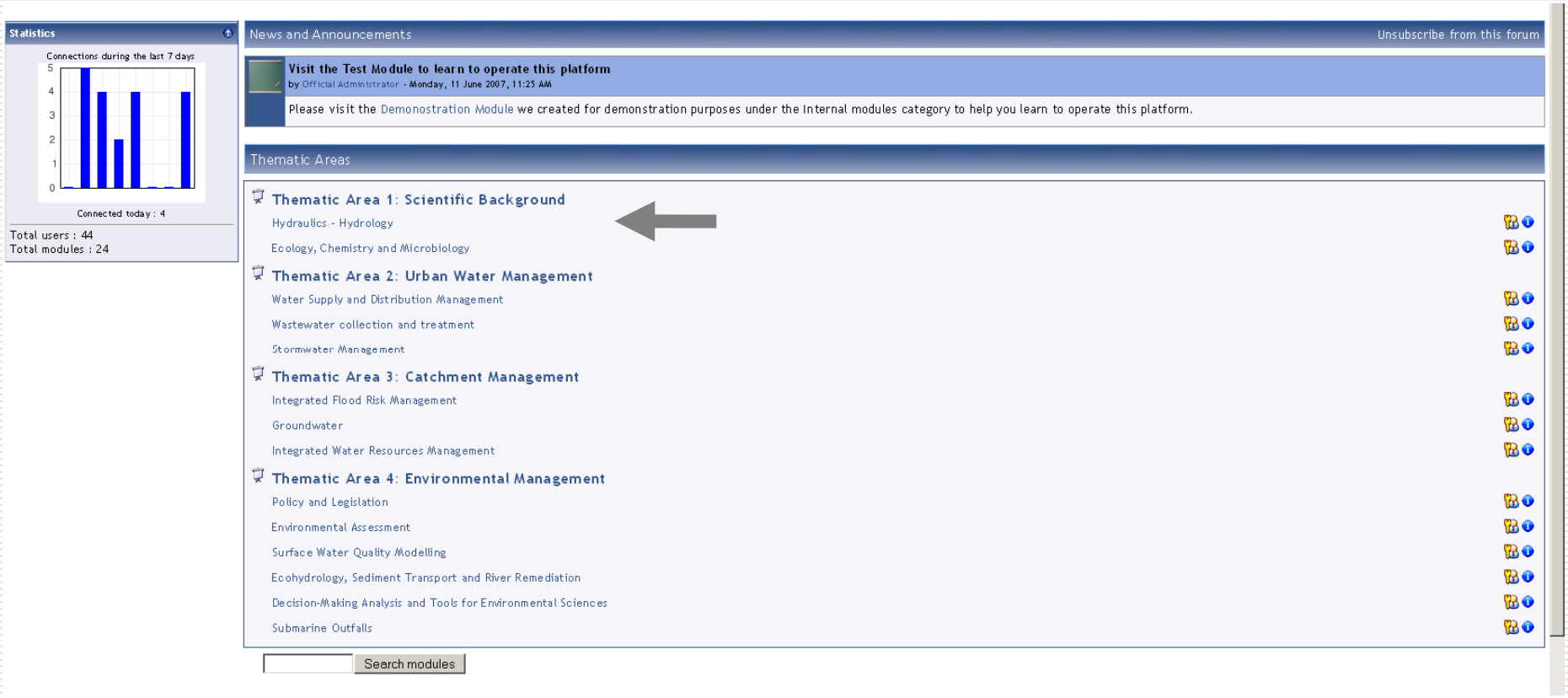
- **Topics** (a) hypertext (lecture notes, case studies), (b) animated presentations w/voiceover (c) multimedia (video, animations, graphics)
- **Quiz (**Knowledge stabilization units/*Formative* Assessment**)** (not to be evaluated): (a) solved problems, (b) questions and answers, (c) multiple choices
- **Exercises** (to be evaluate/*Summative* Assessment): (a) reports, (b) software applications (GIS, models, commercial software)
- **Bibliographical material:** (a) digital library (papers, studies, books, manuals), (b) theses catalogue (c) links to URLs, (d) dictionary of terms

Logging In: A closer look



Examples from the Educate! E-Learning course at NTUA
http://www.water-msc.org/

Available Modules…



Module interface

A discussion forum

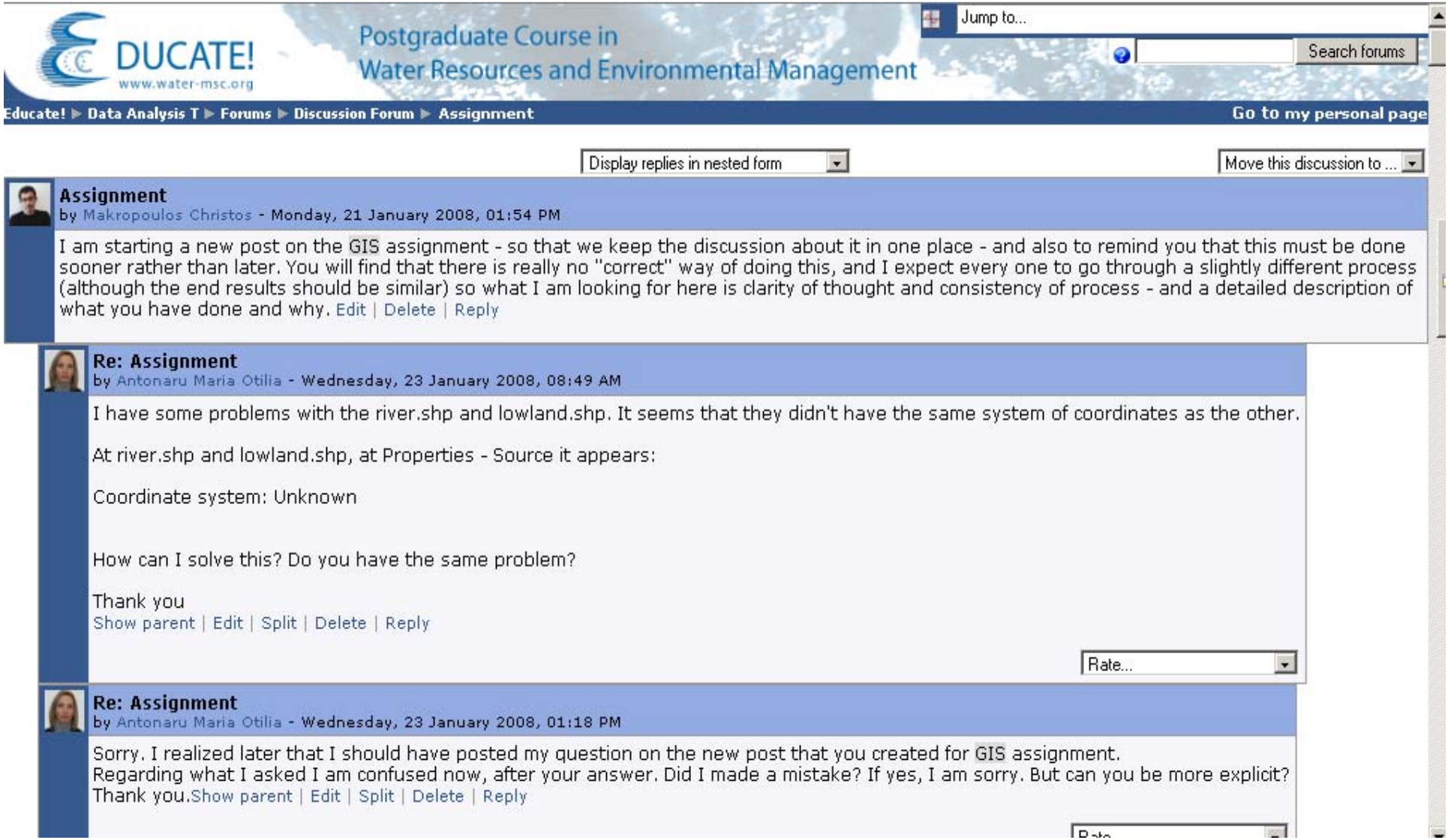
Show/edit current subscribers
Unsubscribe from this forum
Track unread posts

This is a place for general discussion

Add a new discussion topic

Discussion	Started by	Replies	Unread	Last post
Statistics Assignment	Frangos Andreas	6	0	Koutsoyiannis Demetris Sun, 20 Apr 2008, 07:27 PM
Questions 5	Chagios Fotios	1	0	Koutsoyiannis Demetris Wed, 2 Apr 2008, 07:29 PM
Exams	Koutiva Ifigenia	5	0	Makropoulos Christos Sun, 30 Mar 2008, 09:17 PM
Questions 4	Koutiva Ifigenia	3	0	Koutsoyiannis Demetris Sat, 29 Mar 2008, 02:22 PM
access problems	Minasidou Kassiani	5	0	Koutsoyiannis Demetris Fri, 28 Mar 2008, 09:40 AM
Questions 3	Chagios Fotios	1	0	Koutsoyiannis Demetris Fri, 28 Mar 2008, 09:20 AM
Grades	Horvat Anja	1	0	Koutsoyiannis Demetris Tue, 25 Mar 2008, 09:51 AM
Qustions 2	Chagios Fotios	5	0	Koutsoyiannis Demetris Thu, 20 Mar 2008, 08:25 AM
Quizz 4 (numerical) on basic conceps of probability	Vojt Predrag	3	0	Koutsoyiannis Demetris Tue, 18 Mar 2008, 11:06 PM
Problem with Internet platform	Isakovic Dusko	1	0	Koutsoyiannis Demetris Tue, 18 Mar 2008, 10:52 PM
theoretical quiz 2	Moniodi Maria	11	0	Kordopati Dionysia Tue, 4 Mar 2008, 09:28 PM
Errata	Koutsoyiannis Demetris	11	0	Koutsoyiannis Demetris Sun, 2 Mar 2008, 06:10 PM

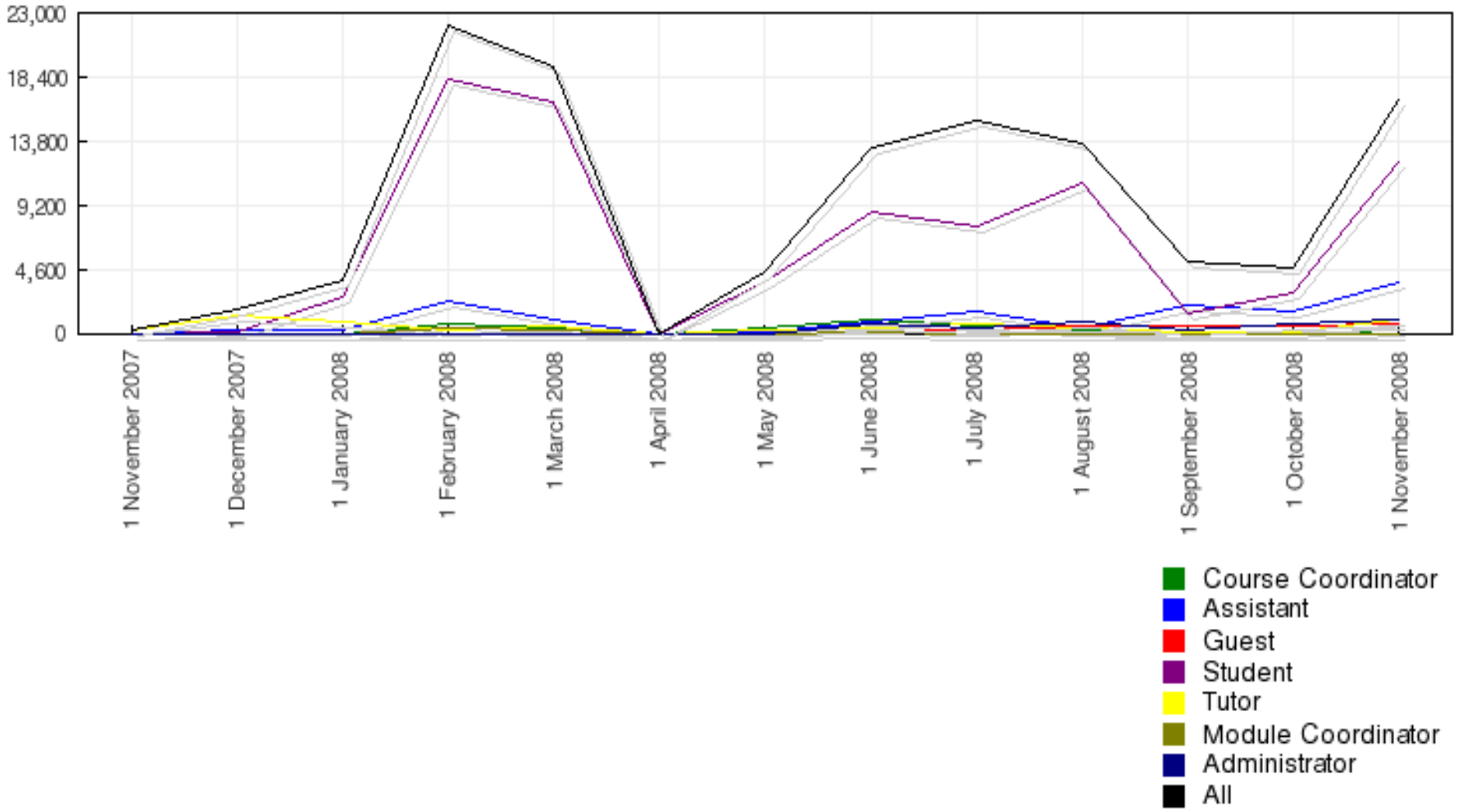
Inside a discussion forum…



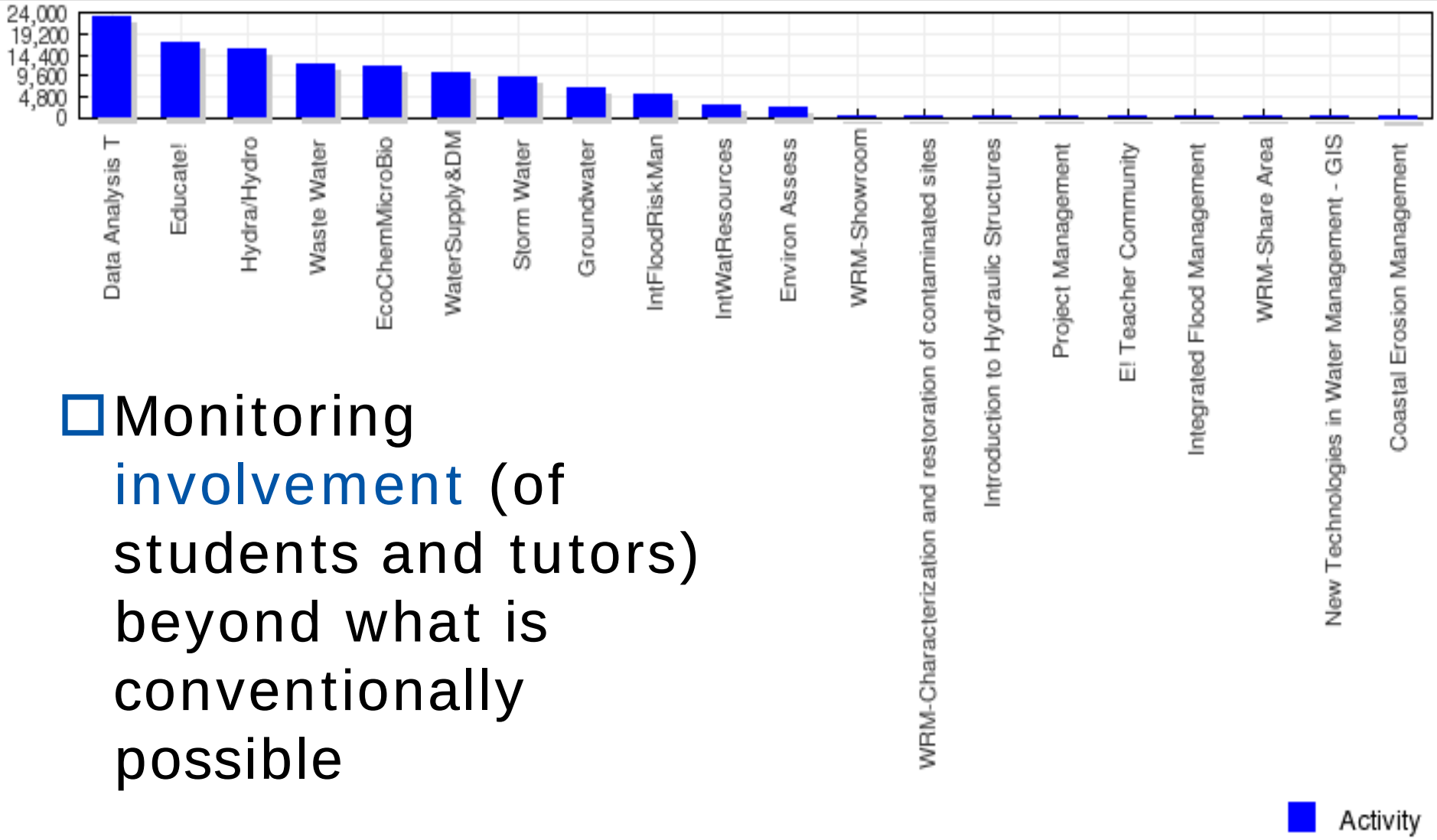
The platform

- Can be used to support both distance and blended learning (short courses).
- An excellent monitoring tool of the activities of the course and resulting engagement (much better than traditional courses!)

Activity

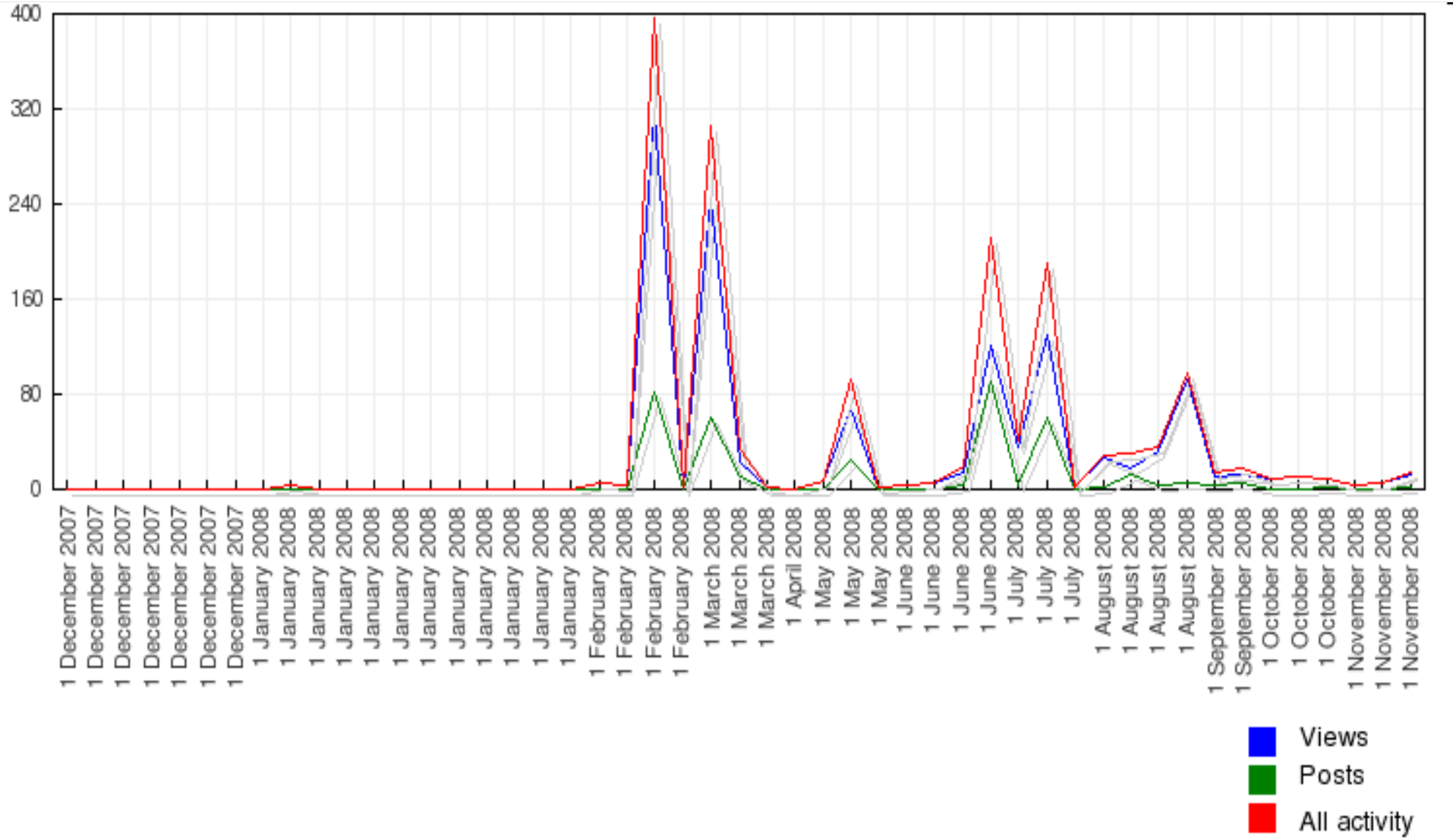

23,000
18,400
13,800
9,200
4,600
0
1 November 2007
1 December 2007
1 January 2008
1 February 2008
1 March 2008
1 April 2008
1 May 2008
1 June 2008
1 July 2008
1 August 2008
1 September 2008
1 October 2008
1 November 2008
Course Coordinator
Assistant
Guest
Student
Tutor
Module Coordinator
Administrator
All

Activity of Modules

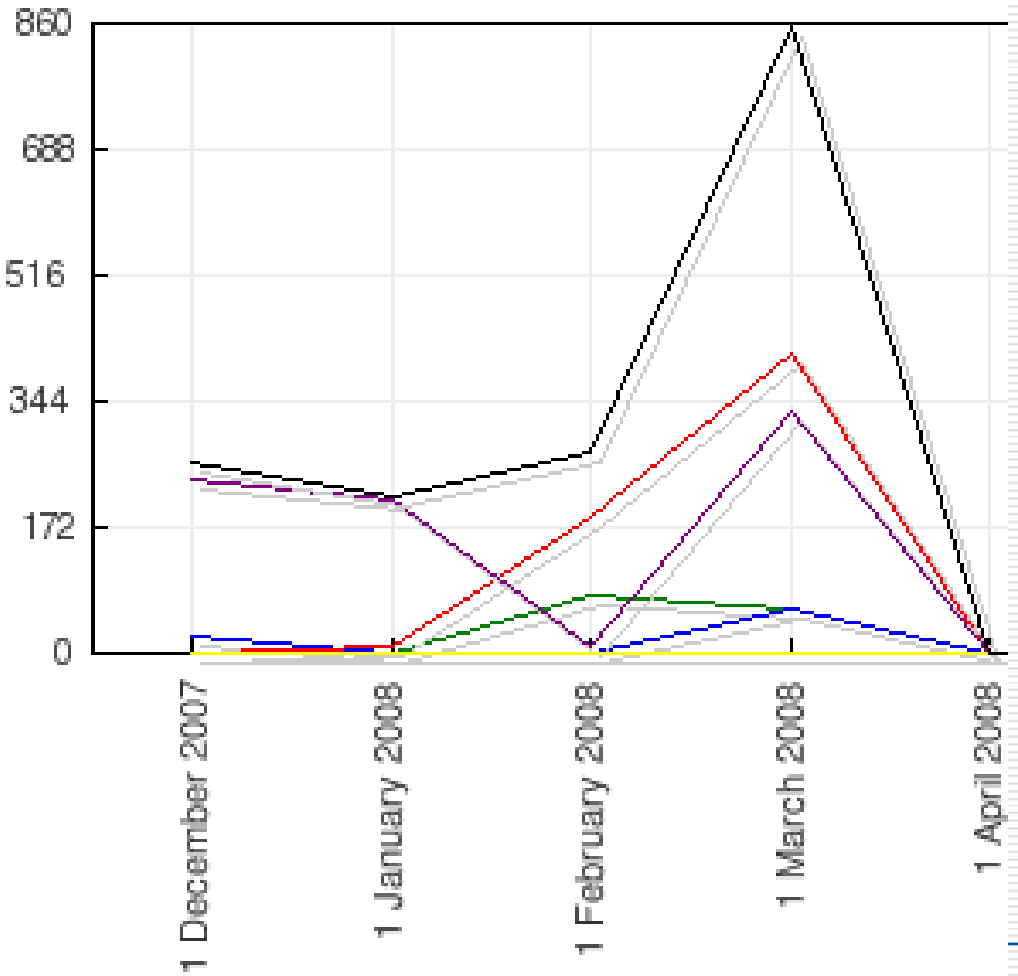


- Monitoring involvement (of students and tutors) beyond what is conventionally possible

e.g. Tutor activity…



Posts in the discussion forum



- Collaboration between students-tutors and among students
- Posts anyplace all-the-time – replies anytime – all-the-place…

Monitor and record feedback

- Discussions, suggestions and arguments are recorded.
- Questionnaires allow continuous feedback.
- Co-development of course: relevance and engagement
  - Area for students to upload and share useful material
  - Actual transnational collaboration in practice – at all levels

Questionnaires

Please comment on the following issues by assigning an appropriate score to each question

	Average rank	
	Strongly disagree / Disagree / Neither / Agree / Strongly agree	
I was satisfied with teaching the module		4.2
The experience was enjoyable		4.2
I strongly encouraged the interaction between students through the use of technology		4.4

2. What is your overall evaluation of the organization of the course?

Response	Average	Total
Very good	88%	7
Excellent	12%	1
Total	100%	8/8

Impressions from participants: past experience

- Students very satisfied with the approach:
- Part-time attendance of such high-level course, made possible a radical change on what LLL means (improving its true potential).

12. What was the most satisfying part of the course?

#	Response
1	Ability to use some other means of presenting the teaching material. The Moodle system itself.
1	Being able to develop the lecture anytime anywhere, and allow it to grow gradually Being able to respond to students questions anytime anywhere which is compatible to my research work schedule.
1	Final presentation of Mini theses
1	The direct communication with the students
1	The introductory week in Belgrade
1	water treatment technoogies.

Assessment of methods and tools

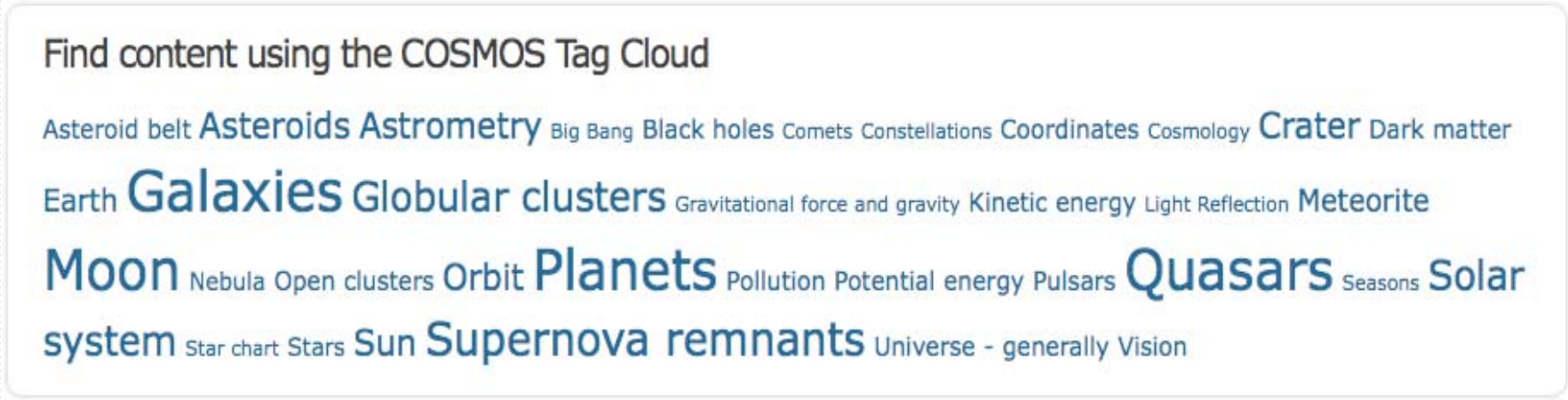
The following on line tools are easy to use:

	Average rank	
	not at all ... very much so	
Chat		3.3
Forum		4.6
Private Messages System		3.8
Reading Material (in Web Pages Format)		3.6
Reading Material (in PDF Format)		4.8
Assignments		4.7
Quizzes		4.6
Glossaries		4.1
Calendar		4.2
Choices		4.1
Grades		4.2
Skype		4.2

Learning 2.0

- Tweets captured during the lesson.
- Social media smart device applications. iphone, android, web smart phone client.
- Quizzes answered in real time (over the mobile) with data transferred to the system/tutor.
- Content and article sharing, inside the same workgroup.

Taxonomies Content



Advanced Taxonomies for Learning Metadata

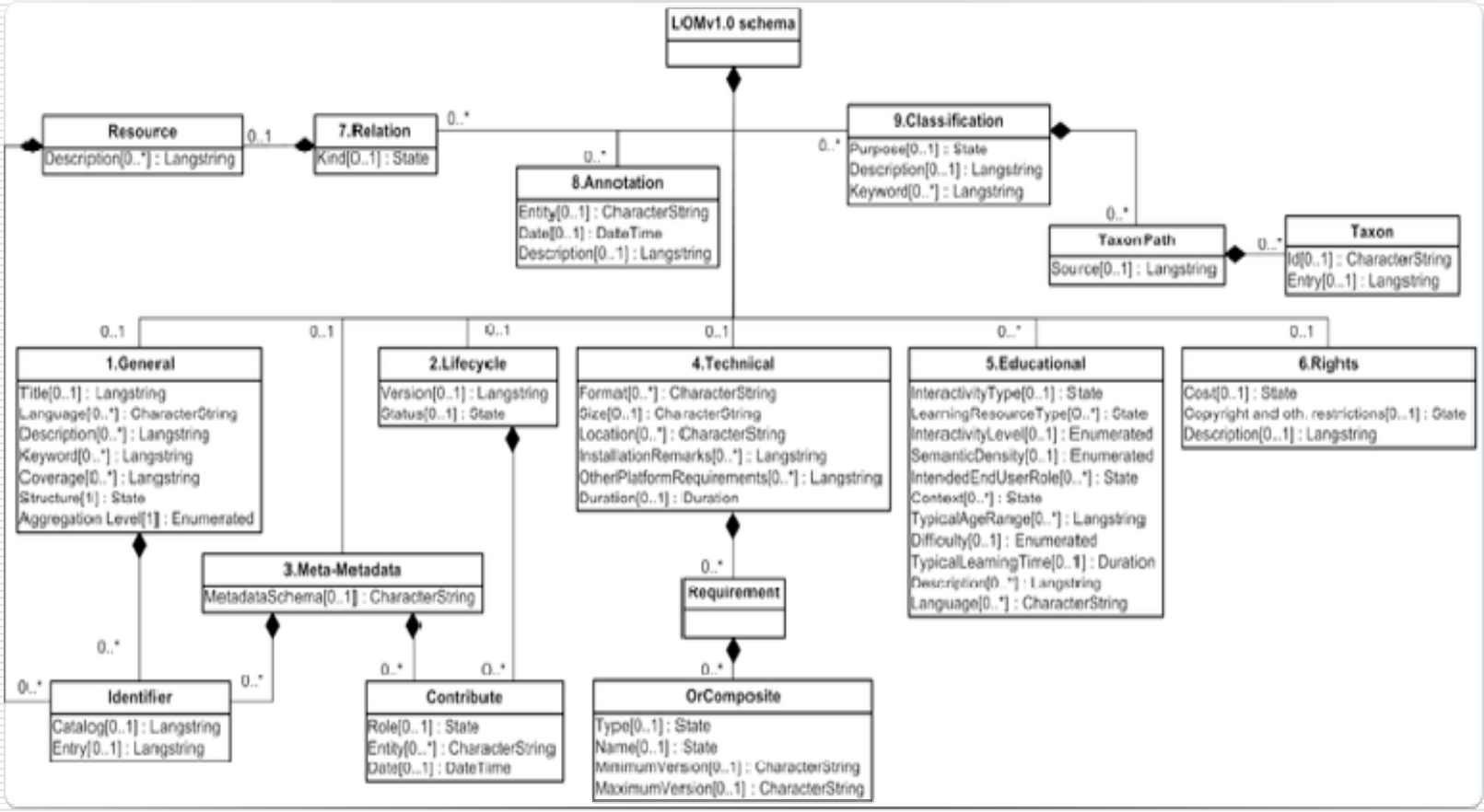
Nr	Name	Explanation	Size	Order	Value space	Datatype	Example
1	General	This category groups the general information that describes this learning object as a whole.	1	unspecified	-	-	-
1.1	Identifier	A globally unique label that identifies this learning object.	smallest permitted maximum: 10 items	unspecified	-	-	-
1.1.1	Catalog	The name or designator of the identification or cataloging scheme for this entry. A namespace scheme.	1	unspecified	Repertoire of ISO/IEC 10646-1:2000	CharacterString (smallest permitted maximum: 1000 char)	"ISBN", "ARIADNE", "URI"
1.1.2	Entry	The value of the identifier within the identification or cataloging scheme that designates or identifies this learning object. A namespace specific string.	1	unspecified	Repertoire of ISO/IEC 10646-1:2000	CharacterString (smallest permitted	"2-7342-0318", "LEAO875", "http://www.ieee.org/documents/1234"
1.2	Title	Name given to this learning object.	1	unspecified	-		

Nr	Name	Explanation	Size	Order	Value space	Datatype	Example
1.5	Keyword	A keyword or phrase describing the topic of this learning object. This data element should not be used for characteristics that can be described by other data elements.	smallest permitted maximum: 10 items	unordered	-	LangString (smallest permitted maximum: 1000 char)	("en", "Mona Lisa")
1.6	Coverage	The time, culture, geography or region to which this learning object applies. The extent or scope of the content of the learning object. Coverage will typically include spatial location (a place name or geographic coordinates), temporal period (a period label, date, or date range) or jurisdiction (such as a named administrative entity). Recommended best practice is to select a value from a controlled vocabulary (for example, the Thesaurus of Geographic Names [TGN]) and that, where appropriate, named places or time periods be used in preference to numeric identifiers such as sets of coordinates or date ranges. NOTE 1:--This is the definition from the Dublin Core Metadata Element Set, version 1.1[4].	smallest permitted maximum: 10 items	unordered	-	LangString (smallest permitted maximum: 1000 char)	("en", "16th century France") NOTE 2:--A learning object could be about farming in 16th century France: in that case, its subject can be described with 1.5:General.Keyword=("en","farming") and its 1.6:General.Coverage can be ("en","16th century France").

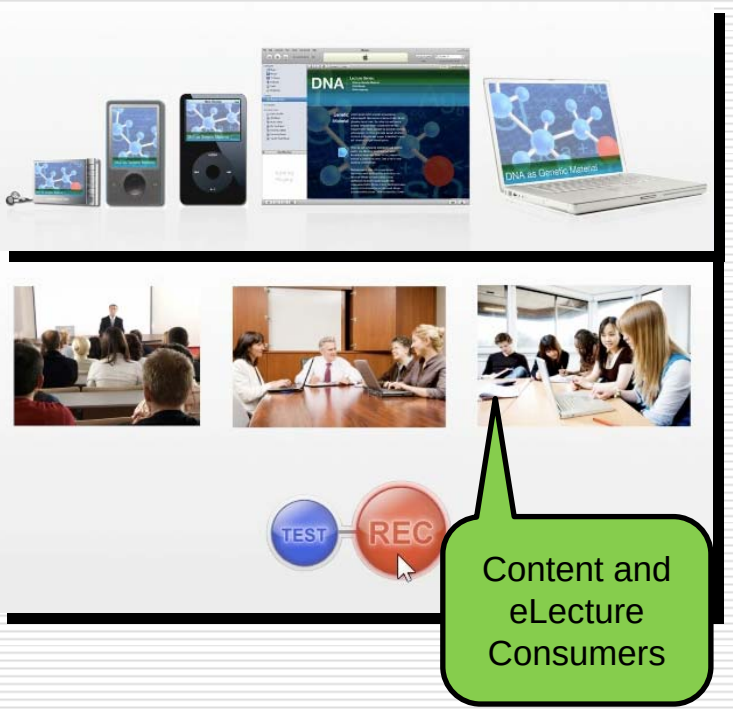
5	Educational	This category describes the key educational or pedagogic characteristics of this learning object. NOTE:--This is the pedagogical information essential to those involved in achieving a quality learning experience. The audience for this metadata includes teachers, managers, authors, and learners.	smallest permitted maximum: 100 items	unspecified	-	-	-

OpenMI

LOM Schema Definition



Video Lectures



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About Cyberseminars

A cyberseminar is a PowerPoint presentation shown over the Web in conjunction with a conference call for narration by the presenter. CUAHSI pays on a connection basis so minimizing the number of connections on each campus is preferable. If time allows, a question and answer period may follow.

PDF versions of the cyberseminars are available for all the talks. Some presentations are available in integrated audio/video format. To view: dowload and install atplay.exe then download and view the .wrf file.

Fall 2008 Schedule

October 10, 2008; 3:00pm ET

- **Scott Collins**, University of New Mexico and Sevilleta LTER
  Title: Integrated Science for Society and the Environment: an integrated research plan
  - WebEx Meeting Number: **595 122 034**
  - Presentation Slides (2.2MB, 45 pages; PDF)
  - Recorded Presentation (WRF file requires plug-in)
  - New! Video Presentation on SciVee

October 17, 2008; 3:00pm ET

- **Cecelia DeLuca**, Head, Earth System Modeling Infrastructure Section National Center for Atmospheric Research
  Title: ESMF and Earth System Curator: Integrated modeling infrastructure for virtual communities
  - WebEx Meeting Number: **598 994 166**
  - Presentation Slides (600KB, 34 pages; PDF)
  - Recorded Presentation (WRF file requires plug-in)
  - New! Video Presentation on SciVee

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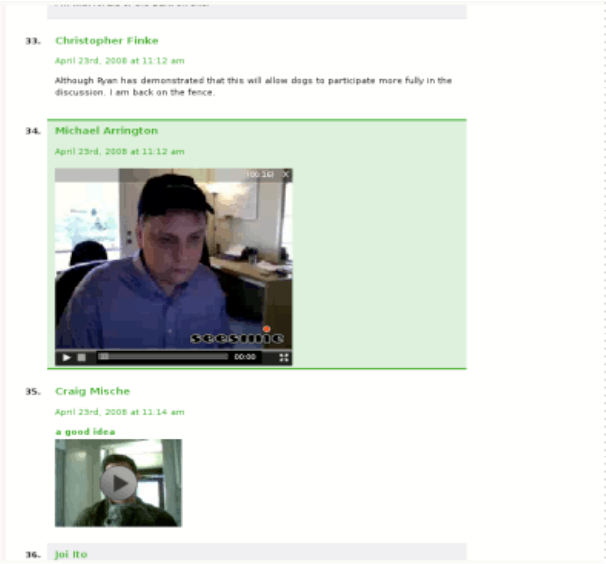
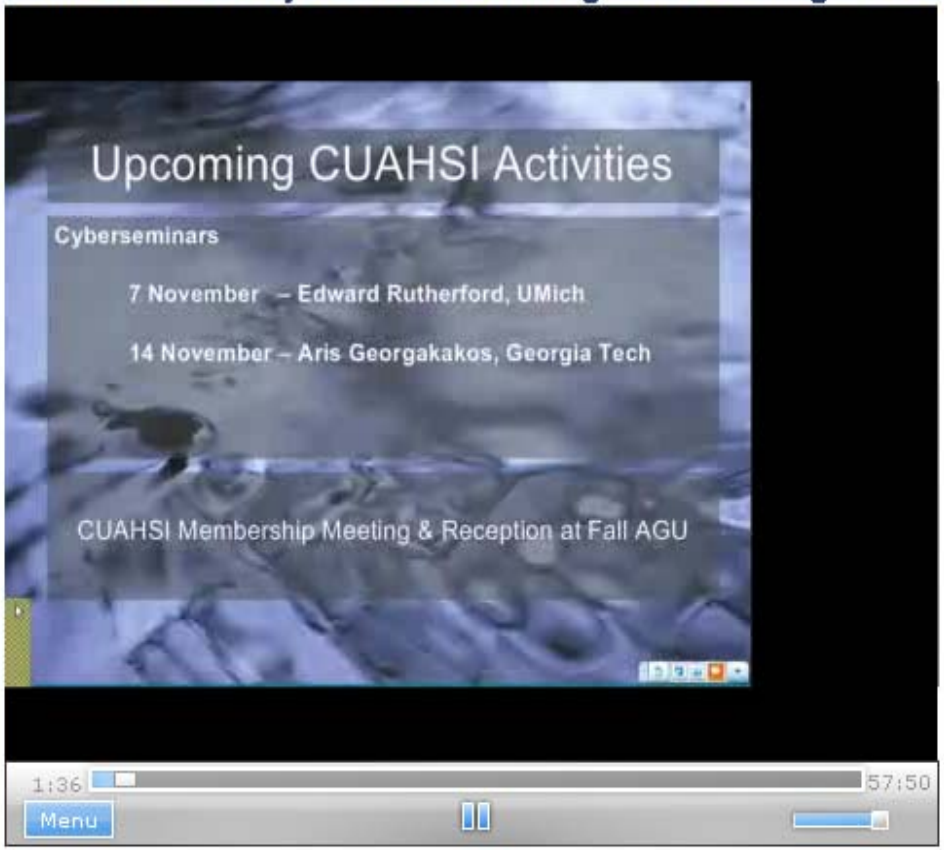


OpenMI

ESMF and Earth System Curator: Integrated modeling infrastructure for virtual communities - Cecelia DeLuca, NCAR



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DOI: 10.4016/9905.01
Description: presented 17 October 2008
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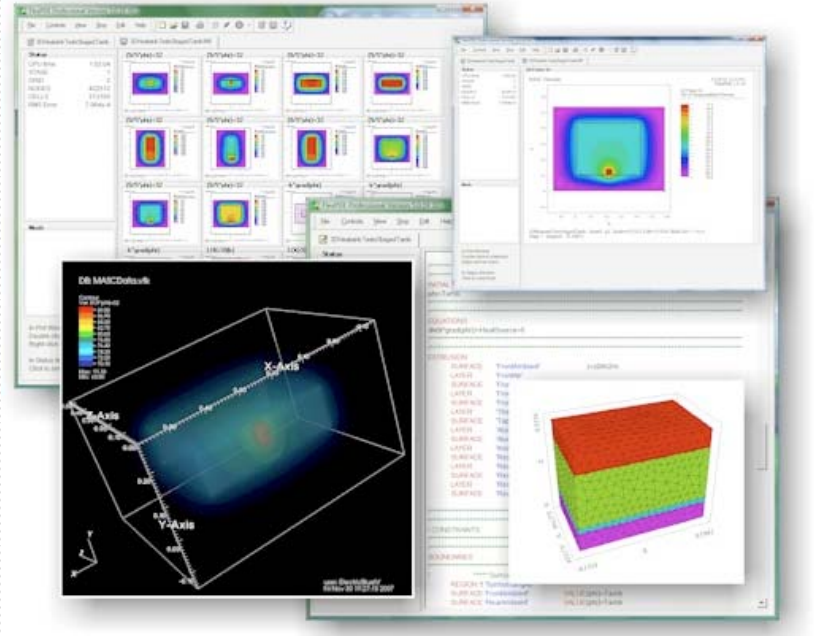
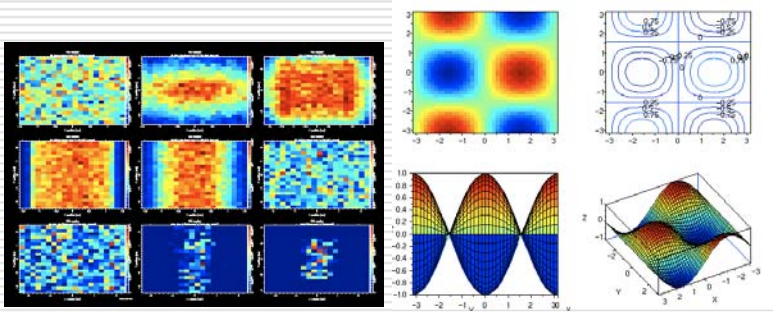
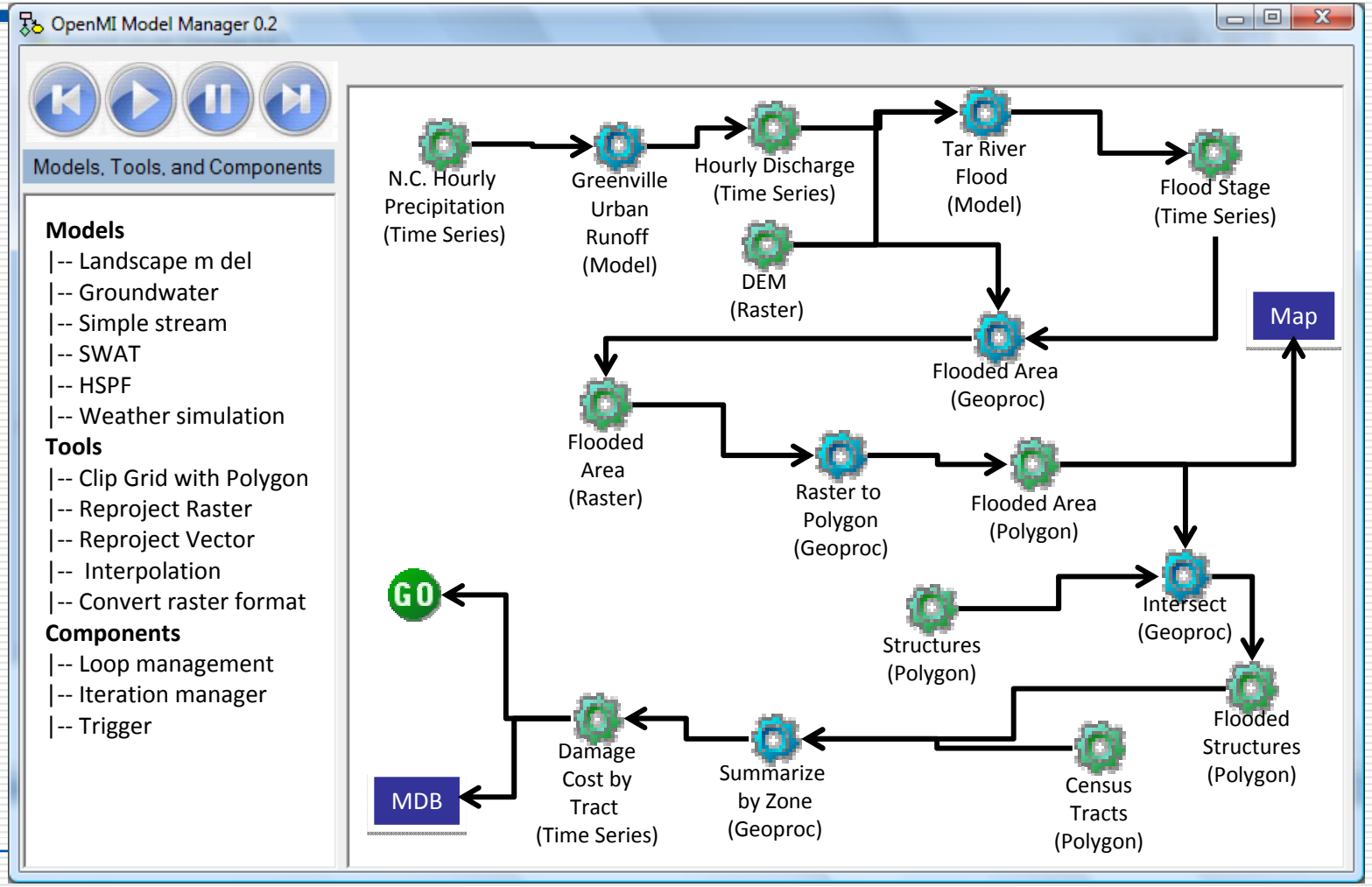
Simulation Environment



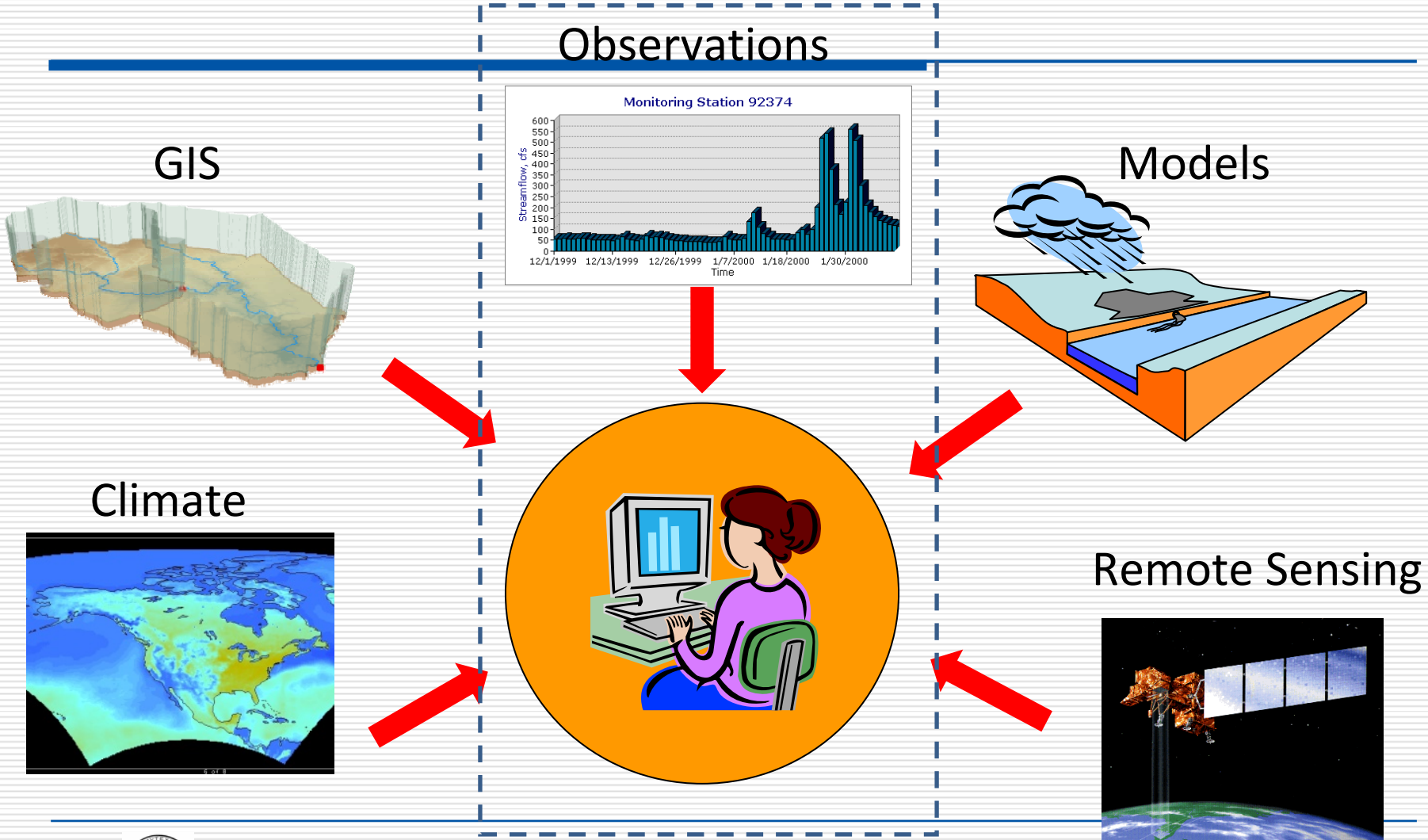


OpenMI

Simulation Environment:
Time Series Modeling + GIS Scenario



Consistent with “Harvesting data from web services” approach



A vision for the longer term

- Transnational environmental problem resolution – which is of major concern in the EU - will be greatly facilitated by building bridges.
- Courses attended by students from multiple countries will contribute in building these bridges by allowing the participants to discuss problems and co-evolve perspectives, in the informal, collaborative space of the (virtual) classroom.

Bridges for the students and the professionals

- Senior professionals within the age group 35+ who are in charge of units, institutions and government departments responsible for environmental and water issues, often do not have adequate formal education on the subject.
- Keeping education up to date is a challenge for the EU
- The situation calls for new methodological approaches and tools designed to address the classic education needs as well as those of life-long learning.
- It is especially important to allow practicing professionals to update their knowledge without leaving their work, and hence speed up the uptake of new knowledge by decision-makers.

Future Needs

- More common action and mobility (real and virtual) in HE and training: a change in perspective for new scientists and engineers
- More common action in continuous education and professional training: A change in perspective on the balance between knowledge obtained as an undergraduate and as a professional!
- More collaboration (and feedback) between knowledge providers and knowledge consumers: A change of perspective for practitioners and academics!
- A wider knowledge base for individuals and organisations (engineering, planning, legal, social science: disciplinary barriers crossing – without falling into journalistic approaches…): Re-design and re-thinking of curricula
- A wider (co-developed, common) evidence base on environmental problems, options, data etc accessible by all, to base education and training on: **OpenMI-Education and beyond…**

- **E-learning can be a powerful instrument towards these aims.**