

MUTATE (MULTimedia Tools for Advanced gis Training in Europe) teaching advanced GIS in planning, tourism and emergency management.

Mauro Salvemini, Massimo Davi

Università di Roma La Sapienza ,LABSITA(Laboratorio di Sistemi Informativi Territoriali e Ambientali), Piazza Borghese 9, 00186 Roma Italy
tel.0039-6-49918830, telefax 0039-6-49918873, salvemini@axrma.uniroma1.it

ABSTRACT

MUTATE, Multimedia Tools for Advanced GIS Training in Europe, a R&D Project funded by the Educational Multimedia Task Force of the European Union, emerged from the practical experience of a multi-national team of SME's and universities. Having started in January 1998, MUTATE has a two year lifetime. Its ultimate goal has been the creation of a set of tools, designated MUTATE Bundle, which will allow the development of Web Based Advanced GIS Training and Education, thus opening the door for Universities to introduce a new type of educational service, multimedia, Internet based, which can be offered world-wide, making the most of the European know-how and, through the implementation of real cases demonstrate the validity of the concept. In the Consortium the University of Rome was in charge of developing the interface with the learner, of developing three educational modules, one of which on GIS and tourism planning is discussed in the paper, and of test the system in Italy with public authorities.



<http://mutate.chiron.pt> or <http://romulus.arc.uniroma1.it/mutate>

The idea

MUTATE is a R&D Project funded by the Educational Multimedia Task Force of the European Union, whose ultimate goal is the creation of the new tools for Web Based Advanced GIS Training and Education. The main steps in the project have been :

- development of the MUTATE Bundle;

- use the developed tools to implement different GIS courses such as environmental analysis and geostatistics , GIS and decision making course, GIS and planning course
- establish the European Internet Open GIS Course, based at the University of Utrecht and directed by Professor Peter Burrough, as an example of the new type of course.

The third-one is still under development.

A new pedagogical approach

MUTATE proposes an innovative pedagogical approach, ultimately aiming at finding out new means of conveying knowledge from experts and a pool of knowledge to students. This approach is based on the following principles:

- principle of interaction: by dynamically interacting with a Web Site the student can customise the sequence of the teaching materials to meet his or her specific needs;
- principle of complementarity, no matter how sophisticated the computer tools are, human intervention is always required. The human dimension is assured by assigning a tutor to each registered student as part of the service provided; this may be extended to include capabilities like net-conferencing with the tutor;
- principle of empiricism, learn by trying, rather than by reading about other people's experiences. By providing a modern GIS environment and complex simulation models on the web site MUTATE gives students the possibility to carry out studies as if they were laboratory experiments. By using interactive simulation as the major learning method, this approach will enhance the understanding of fundamental processes, leading to the possibilities to create "what-if" scenario analyses and to the exploration of far-reaching solutions.
- principle of learning by peer discussion, learn by discussing with your own group. Since the ancient greek times discussion is the basis for continuous learning. By creating discussion forums associated to each course, MUTATE motivates discussion as an essential part of the course.
- principle of fair evaluation, besides exercises that will automatically be evaluated by the system, and projects which will be evaluated by the tutor, attendance at a live examination will be mandatory if the student wants a final certificate. This examination will be conducted at an affiliated university.

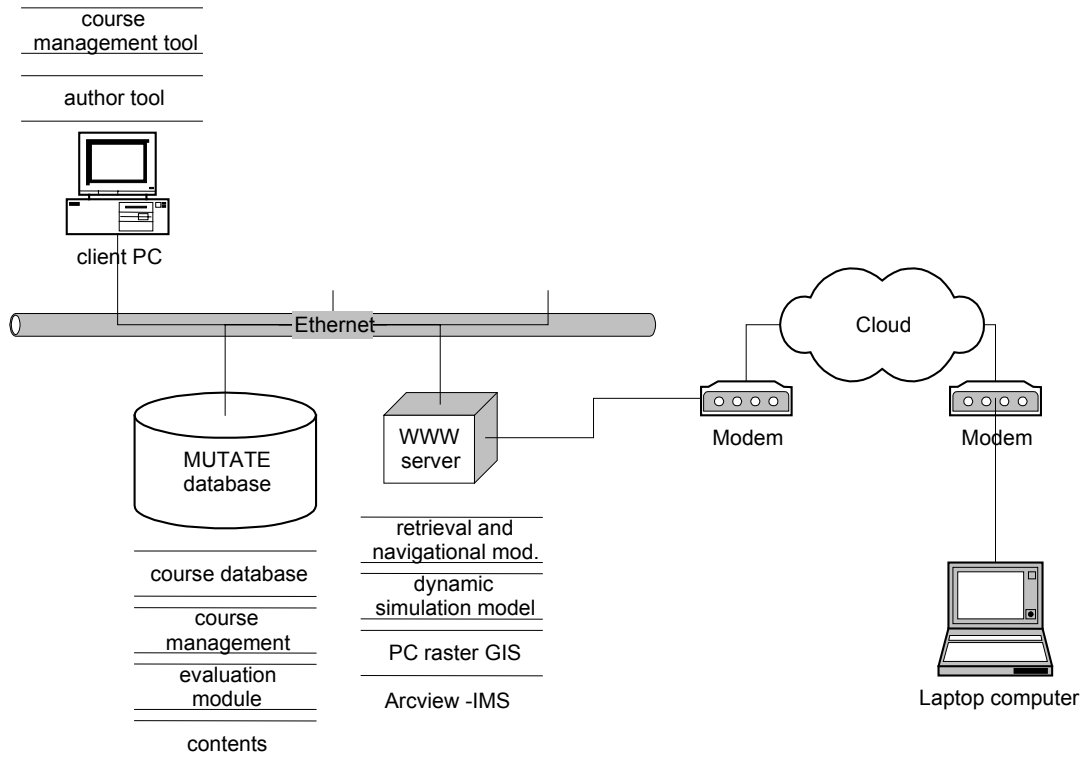
The products

The MUTATE Bundle includes several modules:

- course management module;
- course evaluation module, for tracking student performance and to perform student evaluation, based on the interaction between the student and the Course Web Site and his/her Tutor;
- content database management system;
- content database retrieval and navigational module, capable of dynamically generating multi-media content through the client-server integration of dynamic simulation models, optimisation models, and spatial expert system;

- dynamic content generation, customisation, editing and rendering tools;
- dynamic simulation models.

The figure below is depicting the general architecture of the system.



MUTATE Bundle is installed in a Server machine, integrating an ORACLE database server and a WebServer. The structure of the MUTATE based courses is such that different parts can be run by different computers, for instance dynamic simulation models may be run in super-computers anywhere in Europe and the IMS (Internet Map Server) GIS may run on the same computer or any remote one. Management and development modules are client server programs; Student tools are accessed through the WebServer, and includes HTML contents, XML contents, ActiveX controls and JAVA applets.

The services

MUTATE is providing two types of services: Web Based Training Services and Content Development Services. The characteristics of the MUTATE Web Based Training Services are mainly related to highly flexibility in terms of schedule, to the minimum amount of travelling by students, to freedom of choice with tutor direction to insure the learning process, inviting the student to define his/her own schedule within a set of rules from the course, to give access to powerful tools from the home or office micro-computer.

MUTATE Content Development Services include creating or organising contents for specific courses, other than the Open GIS Course. The Editor is enabling the content developer to insert text and iconographic material into the data base. The course contents are automatically translated and stored in XML format following a previously defined DTD (Data Type Definition). This approach is giving high level of flexibility to the author and to the tutor .

MUTATE is also furnished of a very complex and powerful Backoffice system that is used by administrators and tutor to manage the course and to perform assistance to the students which are tracked continuously by the DB which is recording everything the user is doing.

The approach to develop an educational module. The example of the " GIS for tourism planning"

The teaching material is organised in *lectures*. A lecture is a set of material that covers a certain amount of time (about 120 minutes), including the questions and exercises. Lectures are organised in Chapters and several of them constitute a course module.

The learner is supposed to spend almost fifty hours in attending to the course and some extra time for studying and for related readings which are generally enclosed in the educational package.

A series of practical, easily executed exercises always follow and/or are embedded in the theoretical arguments, and they allow to perform small applications based on the theoretical principles discussed in the module.

Some complex exercises which have to be performed through the use of a GIS SW usable by the web (Arcview IMS in the case of this module) are contained in several chapters. For using the GIS sw the student have not to be skilled in the specific sw , such as Arcview, but he/she is driven by the comments and the indications contained in the lecture to exercise his/her knowledge of analysis tools.

The module "*GIS for tourism planning*" aims to teach the matter to use geographical information systems for tourism planning and management.

The tourism sector is an extremely complex and intricate system, due, on the one hand, to the particularly segmented nature of the tourism demand and, on the other, to the fact that numerous public and private bodies operate in that field.

Furthermore, the complexity of the territory and environment in which tourist activity takes place means that it is necessary to use an approach that has as its primary aim minimum impact combined with maximum benefit for users.

In order to use the GIS to its full potential it is necessary to possess in-depth knowledge of the tourism resources in the area in question, the elements that characterise the system and the relationship between tourist activity and the surrounding territory.

The module is structured in five topics. The first and second one regard the basic concepts of the tourism industry, while the last examine carefully the components of the GIS project and system for tourism.

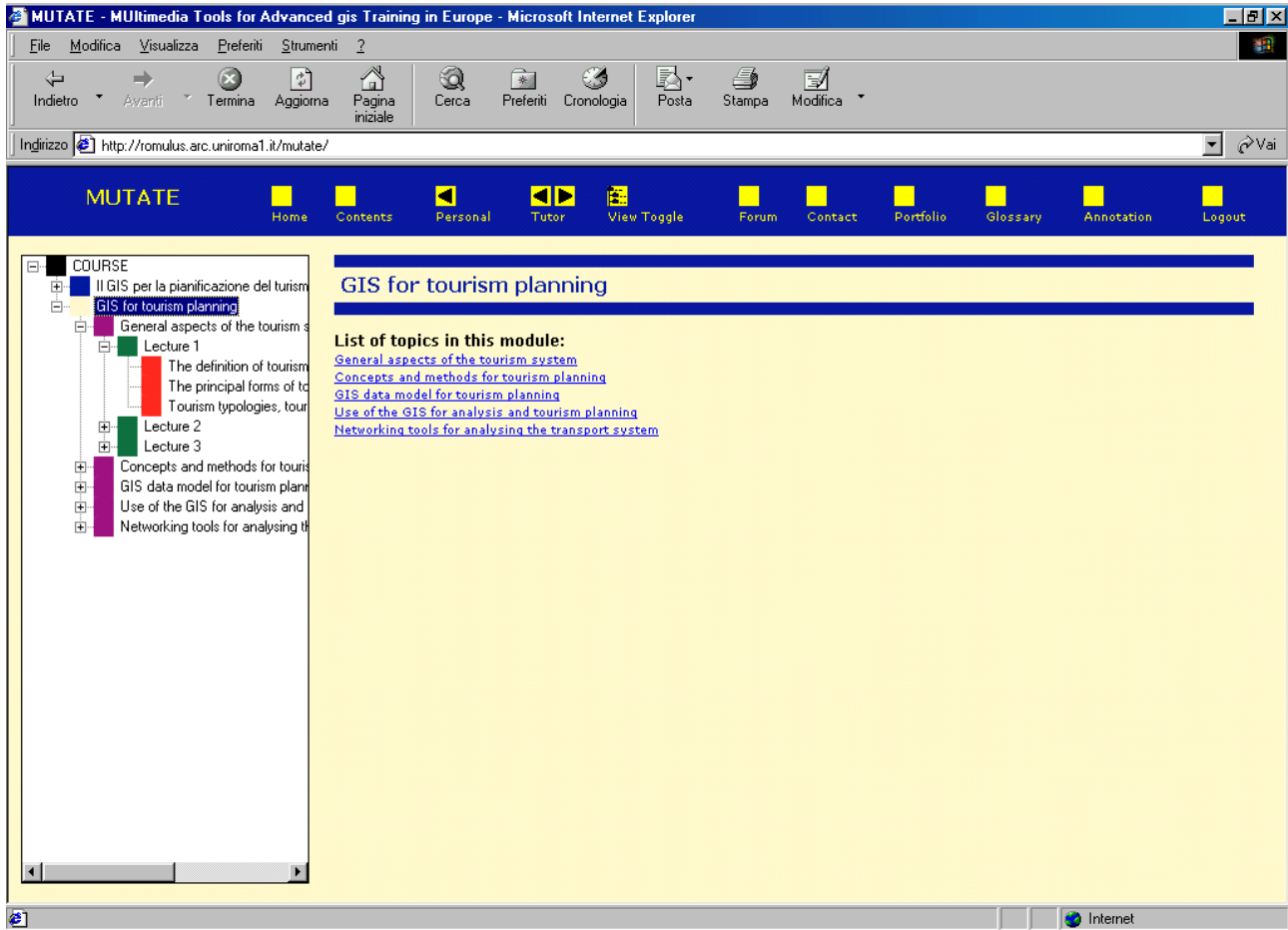
Particularly the topics regarding the following arguments:

- the chapter one provides a general analysis of the most important aspects of the different bodies operating in the tourism industry and provides methodological input on the organisation of operators, information and data within a geographical information system;
- the chapter two deals with the methodological aspects of the planning process, from the determination of objectives, through to analysis and the identification of the interventions necessary in the area;
- the chapter three reviews the main components of a tourism system by analysing them from the viewpoint of GIS applications and data model.

In the chapter four the purpose is to emphasise the types and characteristics of statistical data to be used in the planning process, thereby also accentuating the differences and implications derived from monitoring at different stages.

Methods of analysis refer to the use of both simple and complex indicators to describe principle territorial and socio-economic phenomena by means of statistical data, and to effect complex analyses with precise objectives in mind.

The chapter five discusses the main types of GIS analysis and techniques used to examine the problems connected with tourism planning and transportation.



GIS training

GIS training concerns a variety of agents in private or public organisations dealing with the management of spatially distributed activities. As a first taxonomy it may be considered the following classification:

- International agencies (typically a "UN or EU organisation");
- Governmental agencies and public administration (typically an "Environmental protection agency", general directorates and municipalities);
- Public or private firms with a spatially distributed activity (typically a Power Utility or distribution companies);
- SME's (typically a Consultant Office);
- Non-governmental organisations.

These agents have a background in different areas of knowledge, including Sciences, Social Sciences or Information Processing and Decision. Depending on the task they have to perform in their respective organisations these different agents will require different training offers. However a common structure may be defined, along three main topics: Understanding GIS, Performing geographic analysis and Analyse decisions on the basis of a GIS.

MUTATE Consortium

The MUTATE consortium was conceived in order to get the proper mix of academic entities, with the scientific and pedagogic competence to support such an initiative, and private companies with a reputation for the development of innovative software products, guarantying that the final tools developed have support in the future and that they will be exploited commercially. The consortium includes seven partners, under the co-ordination of Chiron(www.chiron.pt), ESS (www.ess.co.at); University of Utrecht(www.frw.ruu.nl); University of Rome La Sapienza (www.uniroma1.it/DICEA/GIS_LAB.HTM) ; University of Ferrara; Royal Institute of Stockholm(www.kth.se) University of Geneva(<http://ecolu-info.unige.ch/cueh/AboutTheCenter>)