Cross-border collaboration between greece and bulgaria: the use of ict in improving social medicine education arrangements

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CROSS-BORDER COLLABORATION BETWEEN GREECE AND BULGARIA: THE USE OF ICT IN IMPROVING SOCIAL MEDICINE EDUCATION

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Cross-country-border collaboration exists in various fields as regions are facing similar social and economic challenges. Many countries of South-East Europe experience a lack of knowledge, especially in topics of social medicine. Improved collaboration across the borders can develop the appropriate conditions for enhanced knowledge sharing and ICT can effectively contribute to this aim. The system proposed in this paper is the combination of a database and a Geographic Information System that accepts inputs from different sources and produces outputs for different uses. It was developed in the framework of an INTERREG IIIA Greece-Bulgaria collaborative project named "CrossBorderHealth", and was aiming to improve education in social medicine bilaterally.

Keywords: Social Medicine Education; Geographic Information System; learning management environment; South East European collaboration; e-learning standards; public health

1 INTRODUCTION

Some European countries are facing similar social and financial challenges today and will probably seek for the same kind of achievements in the future as well. Cross-border collaboration between countries exists in various fields, but very limited collaboration has been reported regarding medical issues across the borders.

Newborn European countries and more specifically South-East European countries experience a lack of knowledge, especially in topics of social medicine. The actual knowledge improvement and knowledge sharing has been so far focused on non-IT based solutions, mainly through seminars, conferences etc. There exist numerous software tools that allow

collaboration and education, independent statistical tools that could be used to support decision making, as well as, other student-teacher or doctor-patient collaboration environments, online courses and exams that have been exploited to support the educational process.

The question that arises is whether the collaboration across countries can cultivate the appropriate conditions for enhancing knowledge sharing and whether Information Technology can effectively contribute towards this aim.

The aim of this paper is to show how Information Technology and its different tools can contribute to the improvement of education and how it can be used to improve social medicine education and (ultimately) practice across borders. The solution proposed consists of an integration of software tools that accept inputs from different sources, and produce outputs that may be utilized in different ways. The system was developed in the framework of an INTERREG IIIA Greece-Bulgaria cross-border collaboration project, named "CrossBorderHealth".

The rest of this paper is structured as follows: Section 2 contains background information, presenting the usefulness of web collaboration and its effects on knowledge sharing and education. The following section illustrates the educational needs for such an endeavour. In Section 4 the detailed technical aims and objectives are presented, while in Section 5 the proposed solution and its architecture is described, followed by some (technical) development aspects in Section 6, and a discussion on the advantages of the proposed idea/system and some suggestions for future work**.**

2 BACKGROUND

Knowledge sharing is the behaviour of disseminating one's acquired knowledge with that of other members within one's organization. The focus of knowledge management is on how to share knowledge in order to create value-added benefits to the organization (Liebowitz, 2001). Physicians are forming the most knowledge-intensive and principal professional group in hospitals. Their theoretical and practical knowledge is vital for the care of patients, and the quality of their clinical practices is a major determinant for patients' use of medical services. Knowledge sharing in this sense becomes even more important for physicians in tertiary hospitals, because they are required to be research-oriented, evidence based, creative in medical care, and ready to receive new medical knowledge opportunities that can be acquired through various organizational learning mechanisms (Lipshitz & Popper, 2000).

However, knowledge is created out of information extracted from processed data and fused with experience, so as to add value to a specific activity. In this context, ICT systems extracting knowledge may facilitate different human activities. For example, Geographic Information Systems (GIS) have the ability to gather general and specific information about the real world and deliver useful solutions on social issues (Ian P, 2006). GIS handles a wide range of information and knowledge based on scientific rules, sophisticated materials and specific values of land information, to present the appropriate solutions with respect to the defined objectives.

The combination of GIS technology with other information systems and the merging of data that could be represented in the same manner can be very effective. England's Strategic Health Authorities have created a map to represent the region's health units by using Google Maps API, Google Earth KML, and MSN Virtual Earth Map Control (England SHA Locator, 2005).

What is more, collaboration that is supported by proper collaborative tools and work environments may increase knowledge sharing among working teams and may assist them in accomplishing mutual goals; much of this may currently occur over the web. Web collaboration environments are applied in medicine as well. A lot of web medical systems have been introduced and created through web collaboration tools, offering doctors and medical stuff collaborative environments for improving knowledge and skills.

Contemporary web collaboration may be accomplished via the Internet in real time. It consists of a package of mostly Web-based tools within Web sites. Collaborative tools are software applications that enable working teams to collectively author and archive their work, to be notified for events on a group calendar, and to collaborate with vendors and partners on a secure web server. These collaborative tools can be hosted or non-hosted, and may take the form of synchronous (real-time, conferencing and instant messaging) or asynchronous modes (calendars, schedules, and discussion forums).

Finally, a growing interest has been noticed for the last generation of Web-based collaboration ware (also known as Web 2.0 tools), namely wikis, blogs and podcasts; these are highly adopted for health-related professional and educational services online (Boulos et al, 2006).

3 RATIONAL AND REQUIREMENTS

In our new era of rapid changes due to the expansion of technologies and the globalization, countries and societies are forced to develop alternative forms of education. Since the beginning of human societies education has always been a priority, and the emphasis now is put on the way technology, which is involved in e-learning, in knowledge sharing, in collaboration between distant locations, can improve medical education. Many methods exist for teaching and learning social medicine. Nevertheless, there exists a debate about the effectiveness of various social medicine teaching and learning activities, resulting in a lack of consensus, what methods constitute the best educational practice.

There is a need for a clear hierarchy of educational activities that can effectively lead to the acquirement of competence in social medicine skills (Khan and Coomarasamy, 2006). All health care professionals need to understand and implement the principles of social medicine to achieve improved health care of their patients. Interactive and clinically integrated teaching and learning activities provide the basis for the best educational practice in this field. Web-based learning, online learning, distributed learning, computer-assisted instruction, or Internet-based learning are very important in improving social medicine education because today's medical educators are facing different challenges from their predecessors. The integration of ICT into existing medical curricula should be the result of a well-devised plan that begins with a needs assessment and concludes with the decision to use ICT. In undergraduate medical education, ICT offers material to the learners for self-

instruction and collaborative learning. In graduate medical education, the Accreditation Council for Graduate Medical Education has established six core competencies towards which ICT can be applied (Ruiz et al, 2006). The use of such technologies to encourage learners' deeper engagement with learning materials, and the maintenance of shared working spaces to improve collaboration between learners, are desirable outcomes.

It is acknowledged by many educators that students of all ages learn best when immersed within a culturally and socially rich environment in which scaffolding of learning can be achieved (Boulos et al, 2006). In the case of social medicine, such an environment should entail enough public health information. For instance, information on population/inhabitants and their needs, their health problems, and other appropriate statistics regarding the health care services as such. Furthermore, there is a clear demand for a dynamic provision of such information, as any variations and changes done in the society must be appropriately reflected and specified by updating and modifying those statistics and databases. If ICT can provide the means to merge e-learning environments with suitable controlling and fusing such information, then an obvious improvement of social medicine education may be envisaged.

4 AIMS AND TECHNICAL OBJECTIVES

As mentioned already, the aim of the work described in this paper is the development of a concept that would integrate different solutions for improving social medicine education. Technically speaking, the paper's objectives are as follows.

The first objective is the demonstration of geographically localized information (GLI) comprising medical issues, or the medical GLI, in a user friendly way. The second objective is the establishment of a SCORM-compliant e-learning environment for social medicine education (SCORM stands for Sharable Content Object Reference Model) (ADL, 2007). The third objective is the setting up of a web collaboration environment for collaboration between health professionals. The ultimate condition encompassing all the above requirements is the integration of international standards such as SCORM, LOM (Learning Object Metadata), Healthcare SCORM (Smothers, 2007) etc. within our framework.

A starting point to meet the project objectives is the collection of statistical information for the regions involved. The selection of useful statistical data can lead to the design and creation of a database where this information and data will be stored. Further requirements are the creation of predefined data sets that will be given as final output, and finding of the appropriate Geographic Information System (GIS) that allows external connection to database and demonstrate the results. The framework component has to meet the latest technologies standards as well as SCORM for e-learning compatibility.

5 SOLUTION

In this paper, we propose as a solution a concept using different modules to create a useful visualization tool that will help health professionals improve their social medicine education. We created this system as a tool within the cross-border collaboration INTEREG IIIA project "CrossBorderHealth" (CrossBorderHealth, 2007), but it can be used as a tool in

e-learning processes under any SCORM compatible collaboration platform or moreover under any e-learning platform.

In the framework of the INTERREG project between Greece and Bulgaria, one of the requirements has been the development of a dynamic tool that would accept inputs from different sources and show useful results to the end users. That information includes general statistics for the region as well as existing health units, their availability, capacity and some general health statistics such as the number of specialized doctors per field etc. The concept is built upon the combination of a database and a Geographic Information System that provides a tool that could be useful from many different aspects.

In addition, this concept can be broadened and also used to demonstrate other information that are of significant importance such as demographic statistical overviews, medical statistical information of epidemiological type or any other useful information.

6 ARCHITECTURE

The systems itself contains several components: the external database provided from Google that contains the tile images used to offer the map flexibility of panning and zooming, the database that contains all the statistical data, and a user interface that has two parts – the user interface for browsing and the user interface for inputting data. The first is used for anyone that is interested to see the results, while the second is used only by contributors and needs special access. The last component is the LOM Object that complies with SCORM standards and it is used to combine the user pages within an e-learning module.

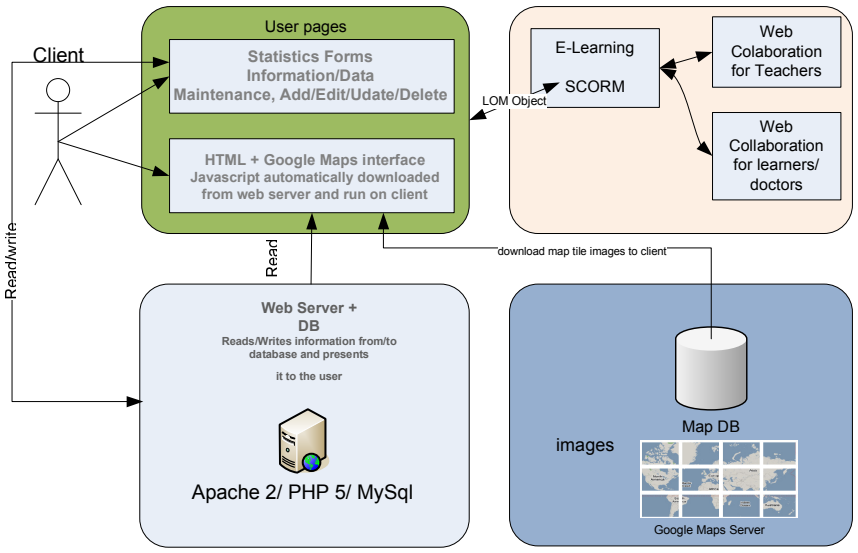

FIGURE 1. A component diagram of the system concept

The Database has been created to fit the statistics needs, the gathered statistics and information about the border region.

The Google Maps API allows us to embed Google Maps in our application for our own purposes with JavaScript. The maps have been used to give the visualisation of the specific region and, furthermore, to present, with some adjustments, the gathered information in a dynamic form. With the usage of the Java Scripting Language we have been allowed to geocode locations of interest showing the statistics gathered and provide information accordingly.

As we have already mentioned there are two user interfaces for data manipulation. The first interface is accessible to any user that is interested in browsing in the border area between Greece and Bulgaria and finding the desired information to be used for specific purposes or even just for increasing his/her knowledge on social medicine issues only by looking at the results. The second part is restricted only to specific members, those who have the permission to add or modify the data. The page allows the user to modify the existing tables in the database, which can be updated later on the browsing page or can be removed for various purposes.

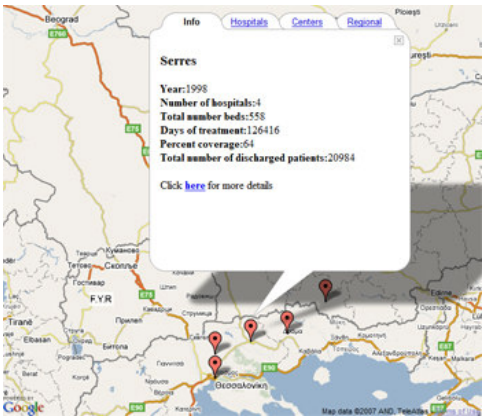

FIGURE 2. GLI visualisation result. nodes (light-bulb looking bubbles) indicate health care service provision points, while extended dialog bubbles provide detailed specific information

7 DEVELOPMENT

The system has been developed to be working within the web site of the project. Thus, PHP on a Linux server has been used as the developing language by having MySQL as a database. As a Geographic Information System Google MAPS and its API 2.0 has been used, which allows manipulation on existing elements tuned for our own purposes or moreover for showing the statistics gathered in a dynamic environment enriched with PHP and HTML.

The whole web portal is organized in three main parts, the first is the web portal on its own and the links for browsing the entire web site; the second part is where a dynamic map is shown having all needed elements for medical statistic visualization and the third, is the

"insertion section" where the administrator or a responsible person can add/edit/update statistical data on the existing database. Figure 3 shows how the structure of the portal may be integrated through the existing e-learning platform, following the concept described above.

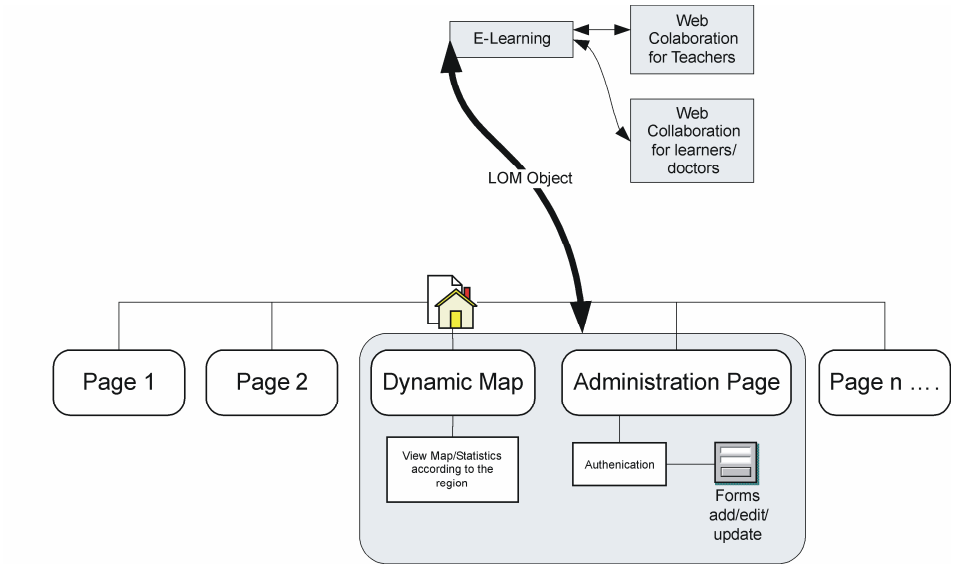

FIGURE 3. The portal (web page) structure diagram integrated with the e-learning management system and with the provision to be utilised for social medicine education

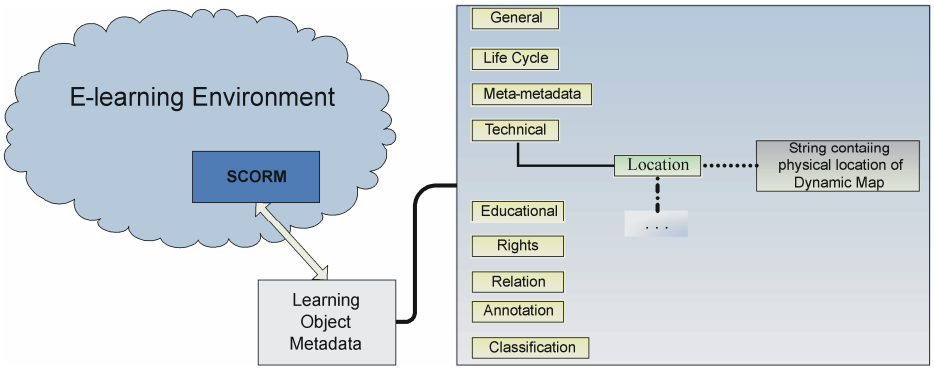

FIGURE 4. A detailed description of connecting the "SCORM compliant" LMS with the geographical information system as a resource for social medicine education

To achieve the above, we have considered the following. As known, the SCORM package can be described by the Learning Object Metadata (LOM), which consists of 9 categories as illustrated in the Figure 4. One of the latter is the "Technical category", which is composed by elements such as "Size", "Location", "Requirements" etc. "Location" is a string and may be used to access the learning object; it usually represents its physical address (Figure 5). Therefore the connection between the e-learning environment and the user's pages could be easily customised through that connection.

Furthermore, this kind of Metadata can be associated with Assets providing suitable information about the Assets independently of learning content including the information of title, description, etc. The Asset Metadata can be applied both to <resource> elements (Asset resource) and to the <file> element which can be met as child element of <resource> within a Sharable Content Object (SCO).

```
<lom xmlns="http://ltsc.ieee.org/xsd/LOM">
        .
        .
        .
        <technical>
                <format>text/html</format>
                <size>1024</size>
                <location>/crossborderhealth/map/map.html</location>
                <requirement>
                        <orComposite>
                                <type>
                                        <source>LOMv1.0</source>
                                        <value>browser</value>
                                </type>
                                <name>
                                        <source>LOMv1.0</source>
                                        <value>mozilla</value>
                                </name>
                                <minimumVersion>4.2</minimumVersion>
                                <maximumVersion>5.0</maximumVersion>
                        </orComposite>
                </requirement>
                .
                .
                .
 </technical>
        .
        .
        .
</lom>
```

FIGURE 5. An XML extract of the connection between the "SCORM compliant" LMS and the geographical information system as a resource for social medicine education

8 DISCUSSION AND FUTURE WORK

The concept presented herewith enables the users to access a different way of gathering desired information or just informing themselves with the current cross-border situation in public health or health service provision. Learning or more specifically e-learning, has been designed using tools that involve the adequate educational strategies and methods, which, combined with this concept will provide a wide range of accessing and learning information in a more elegant, easy and visual way. The possibility for this system to be adjusted to any SCORM-compliant e-learning platform would allow existing e-learners to become part of it or new users to become members of the community.

As the title of the paper denotes, the whole development aims to enhance the cross-border collaboration between Greece and Bulgaria. Although not sufficiently evident at the moment, the system demands the collaboration of Greek and Bulgarian scientists at two levels. First, the input of statistical and health care data in the database is based upon mutual communication and collaboration at a database and policy level. Moreover, once the system is full of data, academics from both countries may utilise a web collaboration environment to collaborate on setting academic attributes such as the "aims and objectives", the "teaching strategies", the "cases" etc, in order to mutually enhance their teaching modules, or select teaching cases from a pool of already existing components developed by the other partner (this part has also been developed but it is not described here due to space limitations).

As an extension on what we have done by now, an additional component could be developed. The new component can be a third main page for the special users, allowing geocoding on new locations that are of special interest and include other vital information on that area. Google Maps API has a big contribution to the whole custom made development of such projects.

To conclude, this paper showed how ICT and its different tools can contribute to the improvement of education by empowering the learner with updated, dynamic context information. We have integrated different technologies and standards, in an effort/intention to enrich social medicine education and (ultimately) improve its practice across borders. Obviously, the overall success of the project endeavours is going to be judged by an actual evaluation study on the users of the system, which is something that has not been undertaken so far. However, the significance of the project's envisaged aims and objectives in the context of cross-border collaboration in South East Europe, as presented in this paper, cannot be simply overlooked.

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