Web-based Citizens Education for a Healthy Life-Style

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Abstract: - All over the world the health sector has to face serious challenges: aging population, increase of the care costs, new diseases, and increase incidence of chronic diseases, being the most important. There are new treatments, new medical technologies that can answer to some of these challenges, but often access to them is prohibited by the costs associated. An old proverb, attributed to Erasmus of Rotterdam says that "Prevention is better than cure". In our paper we are presenting a health portal – PRO VITA - designed to support education for a healthy life-style of the citizens of the district of Sibiu. In designing the portal we had considered, from the medical point of view, the fact that primary prevention starts with reduction of risk factors. From the technical point of view we took advantage of the opportunities offered by Web 2.0 services and technologies (web-based communities, wikis, blogs, social networks, RSS, LPWS- lifetime personal Web space, podcasts, Second Life, etc.), combined with the multi-agent paradigm.

Key-Words: - Health portal, Prevention, Life-style, Web services, Multi-agent system, User centered design

1   Introduction

The health sector has to face serious challenges: aging population, increase of the care costs, new diseases, and increase incidence of chronic diseases, being the most important. There are new treatments, new medical technologies that can answer to some of these challenges, but often access to them is prohibited by the costs associated. An old proverb, attributed to Erasmus of Rotterdam says that "Prevention is better than cure". Having in mind this idea we have started a project to develop the existing Health Portal of the County Centre for Public Health in order to offer all needed information to support education for a healthy life-style of the citizens of the district of Sibiu. The existing portal was launched a couple of years before and though it offers valuable information, (fig.1) it … and static. Our idea was to start "to sell" educational products for a healthy life-style, i.e. to use marketing strategies to make them more attractive. The Health Portal has to be dynamic, user-centered. In order to achieve these requests we took advantage of the opportunities offered by Web 2.0 services and technologies (web-based communities, wikis, blogs, social networks, RSS, LPWS- lifetime personal Web space, podcasts, Second Life, etc.).
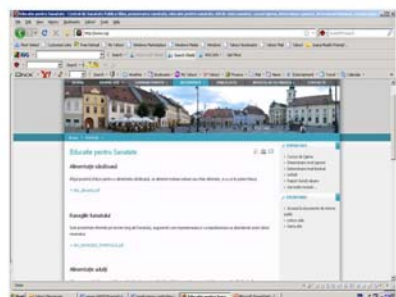

Fig. 1.

2   Design considerations

In designing the new health portal – PRO VITA we have used a hybrid user-centred design methodology that is blending different kinds of user-centred designs with interaction (social interaction, affective interaction) and participatory design and takes into account health education objectives and users' age and preferences.

The design research phase had two steps. Firstly the need of web-based educational products, the interest of the users towards computers and Internet, the level of satisfaction concerning other computer-

based and web-based educational products, what characteristics of human-computer interaction they prefer (sounds, colours, mediating agents) and the general level of computer literacy were identified. We have also asked the users to give information about their access to internet, how often they are accessing the Web, what kind of information are they looking for, where are they accessing the net, and about their general level of knowledge as web users. We have also investigated users' behaviour towards the educational software market (are they buying educational software, if so, on what subjects, who is the buyer, how often are they subscribing to web sites that deliver free training and if so on what subjects, etc.).These data have been obtained by applying Questionnaire no. 1.

The second step aimed to investigate users' behaviour towards healthcare aspects (how interested they are, did they used other educational software on these topics, are they attending training programs on life-styles, when, how often, etc). This information has been obtained by applying Questionnaire no. 2.

Both questionnaires are applied when the user is visiting the portal for the first time, during the registration session. The data are stored in a User data base and updated once a year. During the registration session (fig. 3) every user will receive a user ID and a password. In general, the user ID is the e-mail address.

the one that will have the maximum impact. Scenarios are linked to health topics, as explaining what a virus is, or why we need to respect hygiene rules and why we must wash our hands before eating, what are vaccines, how we are protecting our selves against diseases, why we need to make exercise, the danger of obesity etc.

Fig. 3. Registration form

The new look of the main page is presented in figure 4.

Fig. 4.New looks of the main page of PRO VITA

If you are only a visitor (non registered user) you have limited access. In order to benefit from all the facilities of the system you must register and answer to the two questionnaires, so that the system will record an initial user profile. Information can be obtained in two ways: by clicking a button or a picture, when the user is linked to the web pages that contains the required information (figure 4 – main page with data on pharmacology and pharmacies), or by formulating a query. In this case the query is passed to a Query application that will provide the user with the answers. In communicating with the system, the user is assisted by an interface agent. This agent is learning the user's profile and answers to her/his requests.
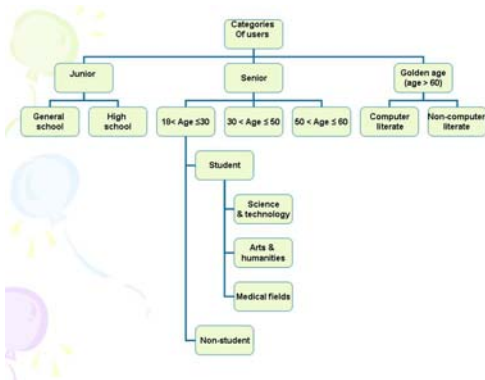

Fig. 2. Categories of users

The way the information is presented is specific to each category of users. For example, for the juniors there will be musical hits and games accompanying the health advices. The information will be essentially visual and multimedia. Some of the applications are developed together with children in the first years of school. They take part in the design process and choose how topics are presented. We are presenting them with scenarios and they decide

Fig. 4. Main web page on topic: *Pharmacology and pharmacies*

In the case of junior users, for example, the interface agent is an avatar. In fact the user can chose the look of the agent. The interface agent can update the user profile. Users' profiles are kept in a special data base.

For the moment there are 6 major topics: *Life Styles*, *Important Diseases*, *Pharmacology and Pharmacies*, *More about risk factors*, *Ask the doctor*, *e-library*, but in the future we can add more. There is a chat room, a forum and each user can have her/his blog. Some of the topics have quizzes and virtual awards can be obtained.

3 Implementation Aspects

The implementation solution is one used in several e-commerce applications. The system is using Web services and multi-agent technologies (JADE) [6]. The PRO VITA portal has two main components: a classical dynamic web site and a Query application. The general architecture of the Query system is presented in figure 5. The basic idea is that the Query application (developed in JBE) is running on a server and exchanges messages with the user in order to make a transaction. The user is asking for a certain product, i.e. a piece of information about some health aspects. The application is looking in the server data base, queries the server directory and obtains the addresses of servers running similar applications. These servers are also asked about the specific product. After obtaining the results, these will be presented to the user sorted by certain criteria that match the user's query or the user's profile. We have implemented also a negotiation algorithm. The interface agent is collecting from the user data on the quality of the answers (user's satisfaction concerning the relevance of the information provided, web site usability).

All data bases are My SQL. Each server of the Query application has a data base that contains data on users, queries and negotiations.
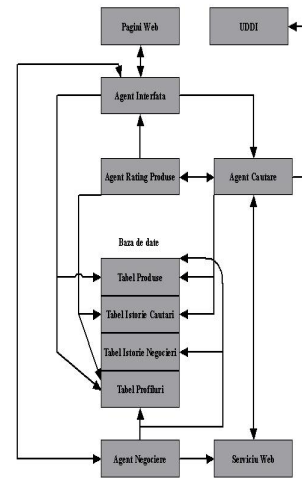

Fig.5. General Architecture of the Query Application

The negotiation agent is a simple one. Negotiation is the process by which two or more parties take together a decision [5]. The core idea in negotiation is reaching the consensus. There is one Interface agent that creates for each user, a User agent. Based on the information received from the Interface agent, the User agent is attempting to provide the user with the best results by negotiating the query with the Expert agents. The negotiation schema is presented in figure 6.
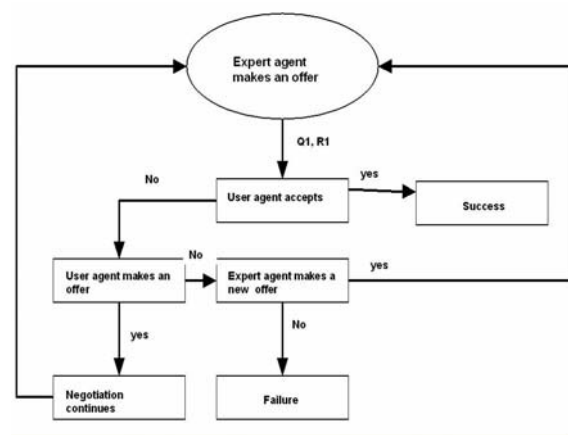

Fig.6. Negotiation schema

For example, a negotiation can take place when the user is asking for a certain diet. The Expert agent is

proposing diet D1. The User agent is rejecting the proposal after checking with the user profile and asks for a new proposal. The Expert agent is adjusting his first offer and proposes diet D2. This offer is accepted by the User agent and the process is closed. In the situation when the negotiation fails the Interface agent is starting a dialogue with the user and tries to update the user's profile. If this is not possible, the user is connected with a human operator.

The Search agent is the one responsible with analyzing the user query and if necessary adding data from the user's profile. He is searching the server data base, sends the request to web services from other servers, collects the answers, and after formatting them in a XML documents, sends them to the Rating agent. The Search agent is responsible also with analyzing and updating the query historical data base. The Rating agent analysis the XML document, sorts the results by several criteria, and forms a new XML document that is sent to the Interface agent to be presented to the user. The role of the Rating agent is very important and we are testing several sorting scenarios.

4   Conclusion

The PRO VITA portal presented in our paper is a web application quite frequent today. We have designed it using a hybrid methodology that combines user-centered design with social interaction, multi-agent technology, web services, based on a Java environment. The main advantage of PRO VITA is its specificity. At present we are running several assessing sessions. The first results show that PRO VITA is accepted very well by the end users and has obtained a very satisfactory score on usability. The user-group was very satisfied with the interface and the categories of information offered by the portal. The portal restricted to the geographical area proved also easier to maintain and

administrate. A need of developing versions in other co-national languages (German, Hungarian) has been noted. The first evaluation shows also that in spite of apparently good results, the algorithm for identifying relevant information is not sufficiently refined.

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