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Designing Support for Customers on the Web – A Methodology and A Case Study

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Abstract

Firms have to use the Web to support a customer's decision-making process, if they are to leverage this reach for competitive advantage. This paper attempts to look at how many well established DSS methodology issues can be applied, with modification, to firms building Web-based DSS, and illustrates some of the practical limitations and challenges by using a case study (i.e. developing a DSS for a "consulting" organization).

Introduction

In the 70's and early 80's, most firms used computers to reduce operational costs or provide information for monitoring/control. To address the needs of management in decision making, firms started to look at the development of systems that support, what Simon [1965] calls, the three basic phases of decision making: intelligence (gathering), design (of the decision problem), and choice (of an option), prior to taking an action. These are often referred to as decision support systems and due to the broader definition of support, the scope of these systems varied significantly both in terms of what the user is able to model [Sprague, 1980]. The scope of coverage of these systems broadened even further with some of them supporting qualitative decision making (i.e. knowledge/expert system support) and others simply providing intelligence gathering and synthesis (executive support) [King, 1992; Turban, 1993].

As the scope of developing these systems changed, so is the methodology used to build these systems. When the focus is on choice support, much of the emphasis of DSS development is on the user-interface. When the focus is on model/input variation through what-if analysis, the emphasis of DSS development is on the flexibility with which models are constructed and manipulated. When the focus is on information synthesis as in executive support, the emphasis is on the drill-down capabilities of stored data, and external and internal data integration. In all these cases, the general assumption is that the DSS is built for a single major user or user group within an organization, thus facilitating iterative development and some degree of customization.

However, today many firms are using WWW to develop systems that provide information to support external customers and are extending its role from operational support (e.g. process orders) to decision support (e.g. support the design and choice phases of a customer's decision process). As the firms move to build DSS to support customers, the development process becomes somewhat challenging. First, the system has to support the decisions of multiple, non-homogenous users, and their decision process is not exactly constrained by a single organizational context (i.e. the rationale for the purchasing decision can vary significantly from one user to another). So, the research question is: how do we develop a web-based decision support to an external customer?

The literature in DSS talks about DSS tools, which are provided by many software vendors (e.g. Microsoft's Excel), which can be used by several non-homogeneous users to build their own systems. As the Internet market matures, there may be vendors who will be able to provide software tools to support several activities of a customer within an electronic commerce environment (e.g. search, compare, etc.). Even if such tools are available today, simply providing tools with no cognitive support for navigation may not keep the customer at the web site for long. One strategy is to categorize the customers into groups and support the decision process of each customer in a group using "situation specific models" that are particularly relevant to their decision context.

The *objective of this paper* is to discuss a methodology that is used to build a Web based DSS to help support a set of clients by first categorizing them as members of a predefined group and then supporting them with appropriate tools and navigation support.

Case Study: Applied Technology in Business

The case used is an organization, called *Applied Technology in Business*, which serves multiple clients: sponsors, students, professors, prospective students and sponsors, parents, etc. Current students in the program use the web page to track their projects, retrieve project sponsor contact as well technology related information

that is used to complete the project. Prospective students to the program want to know the benefits of such a program (so they can apply), requirements, where are some of the ATiB alumni went after they graduated. The corporate sponsors and faculty of the program, who assign various student teams to projects would like to know the status of a project, who is doing what and what are the deliverables at various points in time. While all of this information can be provided on a single web-page with appropriate links, it makes sense to change the page and the associated links based on the client's interest when they visit the web-site. *See Figure 1 for a prototype ATiB Portal that is being developed. By knowing that the individual interacting is a student, the system will display a set of options that are relevant only to the students.*

To make the web interface context specific, a user profile is first used to steer the client in a particular direction. For example, when some one signs on the web-site, depending on who it is (student, faculty, sponsor, etc.) and their status (current, alumni, new for a student), the web-site may provide different sets of information. For example, a current student signing on to the system in the middle of the semester generally focus on project activity, while the same student signing on to the system towards their senior year may also be looking for potential employment opportunities. So, the order in which relevant information is displayed may be determined by the context. Prior literature on DSS/EIS development and help systems has discussed the use of "customer profiles" (e.g. novice users, experienced users; finance mangers as opposed to marketing managers) for tailoring system support to individual users [Houdeshel and Watson, 1987; Sprague and Watson, 1996]].

To support the decision processes of each group, the overall knowledge is modularized into "knowledge chunks" and organized in a way that it can be manipulated and presented as needed. For example, much of the information on projects can be stored in a single database and accessed using ASP (active server pages) for access by sponsors and students via Web. However, if sponsors need certain type of information and students need other types of information, it may make sense to develop ASP pages that will access different sets of data, possibly from the same or different data bases, rather than have all the data read in by a single ASP page and customize it for the purposes of visualization for different clients. This may help better protect the data as well as reduce volume of data accessed for adhoc transaction requests.

Problems of this type were studied extensively in the early days of system design when on-line storage is at a premium and access times are critical for customer satisfaction. However, in the last decade, with storage becoming cheaper and processing speed increasing, these were not viewed as major concerns. However, with the way these corporate databases are being accessed by remote clients and with growing expectation that such systems should provide information at Internet speed over longer distances, the old logical Vs physical design issues in the application and file segmentation may have to be revisited.

If the clients decision process moves beyond known information access to decision support, such as how should I select a project (by a student), who should I assign to a project (by a faculty member), when should I alter the project scope (by a corporate sponsor), then we may have to move from partitioning the files and applications, to providing better tools in support of any analysis a user might engage in using the data bases. This is similar to the way the underlying models of an expert are understood in the development of "deep" expert systems [Benaroch and Tanniru, 1996]. The goal there is to organize the underlying knowledge used by an expert in a way that it can be accessed and synthesized to meet multiple objectives of different clients. In support of such an analysis, the system may provide a set of tools and navigation strategies for a client.

While the initial development of such a system may be an approximation of what is needed (determined based on some qualitative data gathering), tracking those who visit a site may help better understand the robustness of both the client classification and tool and navigation support. Such tracking of user inquiries has been used and discussed both in the database literature under query optimization as well as in managing data in data warehousing environment [Babad and Saharia, 1997]. We hope to develop mechanisms in this research for tracking client process and explore ways to use this "intelligently" for future support.

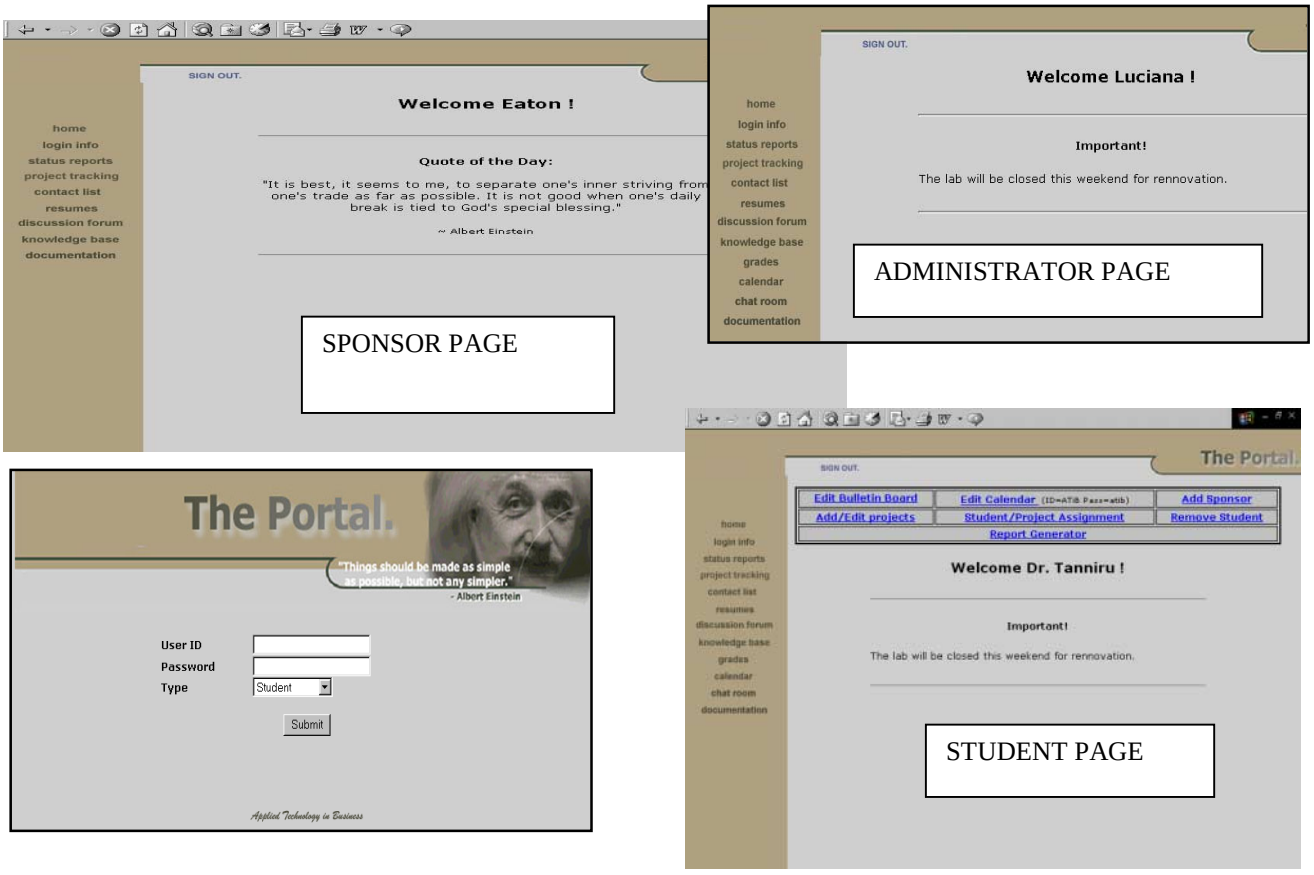
Methodology

The project is currently underway and many of the features discussed above are being implemented. We hope to present the working system at the time of the conference.

Conclusions and Implications

Given the understanding we had in developing systems to support users involved in different decision making contexts, it seems appropriate that we use some of this knowledge to support the decision processes of external users (i.e. customers) that access the firm via a web page. The implications of such support is significant as it can make a person visit a site not only to engage in a business transaction, but also obtain some pre- and post purchase decision support.

Figure 1. Applied Technology in business Portal (developed by Ms. Luciana Madeira and Mike Edwards, two ATiB students in consultation with the authors)



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