

Development of Web Based Publishing When User Involves

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Abstract-

The theme of this paper is development of Web applications used by an organization to publish information to groups of users outside the organization. The paper focus on the challenge for the Web development organizations to help organizations finding and characterizing target groups for web sites and to create Web applications that can be used to communicate certain information and values to these specific target groups. The paper reports from a field study of a project developing a Web application to be used for information publishing to a number of target groups. The field study showed that such a project is different from other types of software development with respect to the point in time the different groups of users are identified and to what extend these groups are involved in the development process. The conclusion is that development of Web based information publishing is characterized by the importance of branding instead of selling products, a characterization of the user of the information system instead of involvement in the development process, that there is no work to be supported by the Web application, and finally that the task of "branding" includes more than usability issues.

Keywords- Web development, software development paradigms, user involvement

I. INTRODUCTION

The use of information systems has changed within the last decades. In the 1980s the Personal Computer was introduced and the computer was primarily perceived as a tool used for work related tasks. Today with the wide spread use of the World Wide Web, information systems are also used for information publishing, eCommerce, and other services (Braa, K., C. Sørensen & B. Dahlbom 2000). According to Turoff (1998) a Web based information system is a new medium for human communication. In order to develop this type of systems, expertise in information architecture and graphical design are required in the development projects (Burdman 1999; Carstensen & Vogelsang 2001; Murugesan & Deshpande 1999). With the introduction of the Personal Computer ease of use became important so the average user could use the systems as intended (Grudin 1991). Today the World Wide Web has become widely used for communication purposes. In recent years Web applications have become business critical to many organizations. Web applications are used for e-commerce, information publishing, communication, and for other purposes that includes involvement of users that are outside the organization that owns and run Web applications. Today it is critical for organizations to have their web sites up and running all the time so people do not think that the organization is out of business or just not competent enough to maintain a web site. This was not the case just a few years ago when web sites were taken less serious and web sites that were down for a period of time were considered part of being on the Internet. Another typical problem for organization's web sites is when it is difficult for the users to search for information and navigate on the web site. Creating a web site with the appropriate information and making this information easy to navigate and search are not only a technical challenge. An understanding of the intended users of the web site is needed. Understanding the users of a web site to such an extent that the content on the web site can be structured and navigation created is a big challenge for the development organization. Today web development organizations must be able not only to ensure the Web applications for technical problems, but also have to provide a usable information architecture making users feel comfortable and create a "look and feel" that communicates the values of the organization that buys the Web application. An information architecture is the organization of the information on the web site and the functionality to navigate on the web site that enables users to get find information and answer their questions (Rosenfeld & Morville 1998). This paper concentrates on the development of Web applications used for information publishing from an organization to potential external groups of users. This specific type of development is important because a significant number of Web applications are used for publishing information to users outside the organization that owns the system. In order to characterize this specific type of development a field study has been undertaken. In the field study the development of a major web site in an organization that develops Web applications was followed. The paper describes some of the characteristics in the development of Web applications used for information publishing. The next section describes the approach taken in the field study followed by section that describes the studied project and its setting. After that section the involvement of users in the studied project is analyzed and compared to the software development paradigms described by Grudin (1991). Then some characteristics of this specific type of web development are presented. Finally it is concluded that in order to understand this specific type of software development and characterize the user involvement we should think about users as external and internal users. It is furthermore concluded that the involvement of external users seems to be quite limited in this type of projects because it is sufficient to characterize the user without involving them.

II. APPROACH

The research described in this paper is based on a field study conducted in a software development company that develops Web applications. The objective was to obtain an in-depth understanding of the development of Web applications used for information publishing. More precisely the implication caused by the shift from developing information systems for internal business processes to information systems used for communication and information publishing to people outside the organization was studied. The study had an emphasis on the context of the project, activities in the project, involved expertise, and the use of software methodologies, techniques, and tools. The field study was based on qualitative data collection techniques. The main methods for data collection were semi-structured qualitative interviews, document analysis, and observation of project meetings (Lofland & Lofland 1995; Yin 1989). Four interviews were conducted at the outset of the project in order to understand the initial ideas with the project and the company the project was conducted in. At the outset of the project a project manager, an information architect, a developer, and a hardware architect were interviewed. After the web site was launched and the project was finished a new set of interviews with a graphical designer, the same information architect, developer, and project manager were interviewed in order to follow up on their experiences of the project. In total eight semi-structured interviews was conducted. Each interview lasted from one to two hours and was all tape-recorded and transcribed. The study included observation of approximately twenty project meetings. The observations were mainly used to validate the researchers' interpretation of the data from the interviews. Furthermore documents used in the projects were analyzed for instance the tender material, diagrams used for creating the information architecture, Use Cases, descriptions of the software method used in the project, minutes from meetings, and material about the customer (brochures, web sites, news papers, etc.). After these activities a working paper was produced describing findings from the study. This working paper has been discussed and validated by actors in the project and discussed with a large group of researchers who have made similar studies of web development (see DIWA, 2002 for further details).

III. THE CASE

The study took place in a software development company (hereafter called the Company) that develops software for one of the larger Danish pharmaceutical companies. The Company is part of the same holding company as the pharmaceutical company. The Company develops business systems, production systems, web based systems, and they support and maintain the IT-systems they build. The study took place in the Company's web development department (hereafter called WebSystems). WebSystems had existed for 5 years and there were approximately 70 persons in the department when the study took place.

3.1 THE ZYME PROJECT

The project studied is called the Zyme project (a pseudonym). The purpose of the Zyme project was to develop a web site for a company called ZymeCorp (a pseudonym), which is a company in the same holding company as the Company. The web site that was developed consisted of a main web site with a number of sub-sites and a web based content management system for the web site. The sub-sites address different groups of users or target groups, such as investors, the press, students, and customers. WebSystems was responsible for preparing a call for tender during a two months period. Based on the tender material WebSystems made Use Cases, an information architecture, and a specification for the technical equipment. Three companies made a bid on the project and WebSystems won the project. WebSystems had responsibility for the design and the development of all aspects of the web site, i.e. the information architecture, the user interface, the technical infrastructure, programming, testing, etc. The whole project including the call and creation of the tender material lasted ten months. The web site was launched on time and the Zyme project was considered a success by WebSystems, although some features were not implemented due to delay in the design process and the project as such. Today, two years after the web site was launched, ZymeCorp has added the possibility to sell its products to the web site and is now selling one third of its products through the web site. The "branding" on the web site has not been changed significantly since the web site was launched and is another indication of a successful project.

3.2 GROUPS, TOOLS, AND TECHNIQUES IN THE ZYME PROJECT

The project lasted ten months and 8-18 people were allocated to the project. Most of them worked full-time. The project had two project managers, one from WebSystems and one representing ZymeCorp. The rest were organized in the following four groups: Information Architects, Graphical Designers, Developers, and Hardware Architects (see table 1). Each group consisted of 3-5 persons and was formed after WebSystems was awarded the project. The people in the groups had quite different educational backgrounds. The Information Architects typically had a background in the humanities and some training in the basic web technology (i.e. HTML). The Graphical Designers had backgrounds like psychology and graphical design. The developers and hardware architects all had a technical background in computer science or engineering. The information architects created the structure of the web site. They did this by dividing the users of the web site into target groups, finding and categorizing the content for each of the target groups, and creating sketches for the navigation through the content. The structure of the web site was created in cooperation with some of the employees from ZymeCorp and ZymeCorp's project manager in the project. The Developers and hardware architects implemented the technical part of the web site, i.e., programmed and configured the software and hardware for the system. The Graphical Designers made guidelines for the web site, i.e. colors, fonts, form of images etc. and the exact placement of the elements on the web pages. The Graphical Designers made the guidelines in cooperation with the

ZymeCorp project manager. There was no guideline the Graphical Designers could base their work upon because ZymeCorp became an independent company the day the web site was launched. Therefore did ZymeCorp need a new "look and feel" for the web-site to present ZymeCorp. The new "look and feel" had to be made almost from scratch.

Table 1. Groups involved in the Zyme project.

Group	Main activity	Tools used	Educational background
Information Architects	Gathering and structuring of information	Developed their own diagramming technique	The Humanities
Graphical Designers	Creation of the graphical design	Screen dumps, Graphical Program	Graphical Design, Psychology
Developers	Technical implementation	Application platform	Computer Science, Engineering
Hardware Architects	Decide server type and architecture		Engineering

Due to the different expertise involved in the project a number of different tools and techniques were used. The Information architects created their own type of diagrams to describe the structure of the web site. The diagramming technique was simple but sufficient for the information architects to express the relation between the web pages on the web site. The information architects used their diagrams and created some sketches of the interface, which included the rough location of elements on the screen and short descriptions of the functionality in order to communicate the structure of the web site to the graphical designers, so the graphical designers would be able to create the graphical appearance of the web site. The graphical designers used this information to create the visual appearance, which was created in a graphical program and the result was a number of bitmap-files showing location of pictures, colors, and location of elements like buttons, navigation panels, etc. The developers used the information architects' diagrams and sketches, the graphical designers' bitmap-files, and the Use Cases from the tender material as information sources to build the system.

IV. OBSERVATIONS FROM THE ZYME PROJECT

In this section the Zyme project is compared to the three paradigms of software development described by Grudin (1991). The paradigms provide a vocabulary that is useful to characterize an important part of this specific type of web development: The involvement of users. But first a brief description of Grudin's three paradigms.

4.1 SOFTWARE DEVELOPMENT PARADIGMS

Grudin (1991) identifies three typical paradigms in software development; contract-, product-, and in-house development. He distinguishes each paradigm by the time at which developers and users are identified in the software development project. The developers and users are either identified at the outset of the project or later in the project (see table 2). In Grudin's terminology the users are the people who are directly engaged with the system and the developers are the active members of the development project [ibid]. The three paradigms are ideal types of software development projects and are not intended to clarify the fundamental assumptions as it is in other descriptions of software development paradigms (e.g. Hirschheim & Klein 1989, Dahlbom & Mathiassen 1993)

Table 2. Development Paradigms. Adapted from (Grudin 1991).

Paradigm	User identified	Developers identified
Contract development	At the outset of the project	After a contract is awarded
Product development	When product is bought by customers	At the outset of the project
In-house development	At the outset of the project	At the outset of the project

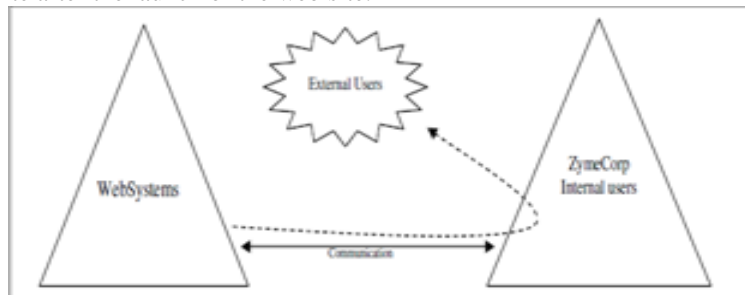
Grudin (1991) defines contract development as the type of development where the user organization is identified from the outset of the project and the development organization is identified after a contract is awarded. Grudin states that the main focus in contract development is software methodologies (especially the waterfall model) in order to control that the developed product meets the contract. In product development the developers are identified from the outset while the actual users are not identified until the product is marketed, although there is some notion of the users throughout the development of the product usually in terms of a potential market to sell the product.

The focus in product development is ease of use and to some extent "look and feel" to make sure the product can be sold. In in-house development the developers and the users are both identified from the outset [ibid] and the focus is on user participation and user acceptance. A software development project can have aspects of more than the one paradigm and does not necessarily conform to one specific paradigm. Despite this, it is still useful to characterize the user involvement

in web development in order to characterize aspects of the user involvement in development of web applications for information publishing. This paper uses the time of identification of users to characterize the development and acknowledge that there are other aspects that influences the Zyme project.

4.2. USER GROUPS IDENTIFIED AT DIFFERENT TIMES

The main task for WebSystems in the Zyme project was to develop a major web site intended to be used by students, the press, researchers, customers etc. and to create a content management system for the web site to be used by ZymeCorp. WebSystems helped ZymeCorp to find and structure the information to be published on the web site by ZymeCorp. This was necessary in order to create the structure of the web site and the functionality (primarily navigation and search functions). WebSystems had to understand two different groups of users; the internal users of the web site in ZymeCorp and the external users of the web site i.e. the target groups of the web site. WebSystems had to have a notion of the external users of the web site to create a useful information architecture that would enable the external users of the web site to find the information they needed and could be interested in. WebSystems also had to understand the internal user, i.e. the users of the web site and the content management system in ZymeCorp. This was necessary in order to create an information architecture that would enable the internal users to publish additional information on the web site after the launch of the web site.



The groups involved in the Zyme project

Besides being the information publisher and the information consumer the two groups of users were distinct in respect to the time at which they were identified in the project. WebSystems could identify the internal users in ZymeCorp at the outset of the project because ZymeCorp was the customer and were able to point WebSystems to the future users in ZymeCorp. The external users were more difficult to identify. WebSystems had only a weak notion of the external users because ZymeCorp only had a notion about what the target group the web site should have and ZymeCorp had not decided all the target groups the web site should be aimed at and what information to be published to the target groups. It was WebSystems task to cooperate and help the project manager

from ZymeCorp to find the target groups and the information to publish to the target groups. This cooperation was a challenge for WebSystems because they had to make detailed decisions about the information that should be on the web site almost throughout the whole project. On some occasions the decisions demanded new functionality that made it hard to settle the requirements for the web site, which the Developers occasionally could base their work upon. The problem for WebSystems was that a part of the project was to help the project manager from ZymeCorp to make the information architecture. This took months before the information architecture was developed sufficiently to enable the ZymeCorp project manager to accept the information architecture. One of the problems was that the information architects only had a limited understanding of the information that was going to be published on the web site. In one of the interviews an information architects said that she only had brochures from ZymeCorp and some materials about enzymes (the product produced by ZymeCorp) as information source for the information architecture and found it difficult to understand what the products were and consequently what information that should be on the web site. WebSystems

V. CHARACTERIZING THE PARADIGM FOR THE ZYME PROJECT

In each of Grudin's paradigms the users are perceived as a more or less homogeneous group in respect to the time at which they are involved in the development project (while the group of users can be heterogeneous in respect to issues such as computer literacy, tasks to support, etc.). But the Zyme project did not have a single homogenous group of users identified at specific time in the project, but two distinct user groups identified at the outset of the project (internal users) and later in the project (external users) respectively. If the focus is on the internal group of users in ZymeCorp the development paradigm of the Zyme project is contract development or in-house development because the ZymeCorp users are identified from the outset of the project. Focusing instead on the external users the development paradigm is product development because this group of users is not identified at the outset of the project. Thus, the paradigm of the Zyme project is depending on the group of users in focus and therefore it is not a pure instance of any of the three software development paradigms. Grudin uses the identification of developers to distinguish between contract development on the one hand and product and in-house development on the other. It is not clear whether the Zyme project was in-house or contract development because WebSystems made the tender material themselves and afterwards won the contract (contract development) and at the same time is a company in the same group of companies as ZymeCorp (in-house development). This aspect will not be further elaborated in this paper because the process and awarding of a contract in this case has little relevance for the involvement of users in the development process.

VI. CHARACTERISTICS OF DEVELOPMENT OF WEB BASED INFORMATION PUBLISHING

This section describes some characteristics of development of web based information publishing based on the Zyme project.

6.1. BRANDING INSTEAD OF SELLING

It is assumed by Grudin (1991) in his characterization of product development that there are a number of user organizations to which the developed product or software package can be sold after the product is released. In many cases user organizations are identified before the development of the product is initiated to ensure that the product can be sold. This makes it possible for the development organization to find potential users although it is sometime difficult to reach them due to competition and lack of time (Grudin 1991). But it is possible for the development organizations to make interviews, observations, workshops, and so forth to gain knowledge about the work the product is supposed to support. In the Zyme project there was no product or software package to be sold. Instead the purpose was to publish information to the target groups. The goal for ZymeCorp and thereby WebSystems was not to make money on selling the web site as such, but to "brand" ZymeCorp. Obviously ZymeCorp had a notion about how the web site could improve their business for instance by selling products through the web site, but it was not the intention to create income from the web site as such. In an action research project, Vidgen (2002) found that it is essential to have an external orientation in an eCommerce project, because the aim is to sell products and services to customers. In the Zyme Project there was also an external orientation although there were no products or services to be sold. The orientation in the Zyme Project was primarily towards the user organization and its representatives (the ZymeCorp project manager).

6.2. CHARACTERIZING INSTEAD OF INVOLVING EXTERNAL USERS

In the eyes of the information architects their main task was to see the web site from the users' perspective (in contrast to the developers' technical perspective) and try to figure out what the different target groups could be interested in reading and searching for on the web site. In order to do this, the information architects needed some notion of the external users. Therefore the information architects described a number of relevant characteristics of potential external users such as employment, age, gender, education, and so forth. The information architects did not involve any potential external users in the project. One explanation for the lack of user involvement is that the web site should not support specific work and consequently the notion of the tasks to support through the web site was vague and unspecific. Some very general tasks like search and e-mail notification were described in Use Cases, but were not targeted towards specific target groups on the web site. The information architects had to determine which Use Cases (i.e. functionality) that should be included on each sub site. In order to do this WebSystems found it necessary to characterize the external users to such an extent that they could help ZymeCorp to determine which information to publish, in what form (for instance the visual appearance, fonts, etc.), and with what functionality. Another reason for not involving external users was that WebSystems had to involve internal users from ZymeCorp in the process and did not have the sufficient resources for involving external users. As stated earlier the Zyme Project has similarities to product development if the cooperation between ZymeCorp and Web Systems is seen as one company developing a product. ZymeCorp and Web Systems had the same possibilities for involving users in respect to involvement of users although some potential customers sometimes are identified in product development, which makes user involvement more feasible and practical. The work made by the information architect and the ZymeCorp project manager is quite similar to the work advertising companies do in their work with target groups. Advertising companies do not necessarily involve people from the target groups. It seems that it is not necessary, in the development of web applications for information publishing, to have users involved in the project to the same extent as it is in contract and in-house development, where the users often are more involved in the projects because specific work has to be supported. This is in contradiction to the requirements put forward to methodologies for developing web application (e.g. Howcroft, D. & J. Carrol 2000; Standing 2001). The external users can be involved indirectly through their use of the web site that can be analyzed through web logs that can be a foundation for further improvements of the site. The web application build in the Zyme project was the first version, so no data like web logs existed for analysis.

6.3. BRANDING IS MORE THAN USABILITY

In product development the software is developed in order to be sold and used for specific work related activities that usually can be studied and the product to be sold has competition from other similar products. Therefore product development is concerned with "look and feel" and usability to make the product "look and feel" good and make it easy to use. Grudin states that "...attention to "look and feel" reflects attention to usability" (Grudin 1991, pp. 65). In the Zyme project attention to "look and feel" was much broader than creating a usable web site. Obviously it was important to create a web site that would be easy to use. But the purpose of the Zyme project was not just to publish information that would be easy to find and presented in a "good looking" way. The purpose was also to "brand" ZymeCorp. That is to communicate values and an impression of ZymeCorp to external users. Thus the "look and feel" did not only mean "looking good" but should also communicate a specific impression or image of ZymeCorp. In the ZymeCorp case the general values that should be communicated were serious, ethical, and trustable and varied a bit for each of the target groups. These values should be expressed through the colors, images, fonts, and the text on the web site and were found by the graphical designers in the Zyme project. The information architects and the graphical designers spend a significant time (months) on finding information for the web site and creating the "look and feel" in order to communicate values. These type of activity are almost absent in other types of software development. It indicates that

development of web application for information publishing to external users includes activities and tasks that are not present in other types of software development. Despite this, a range of classical software development tasks like creating a software architecture, programming, testing, and configuration management still exist in development of web applications used for web publishing.

VII. CONCLUSION

An increasing number of organizations use web sites to publish information to specific target groups outside the organization. It is important for such organizations that their web sites are designed to give external users a certain impression of the organizations. The field study showed that the development organization is heavily involved in the task of designing the web application so it will communicate the values intended by the organization that owns the web application. The paper puts forward the following three conclusions: There seems to be two distinct groups of users in development of web applications for information publishing, the internal and external users. Applying Grudin's (1991) paradigms of software development to the Zyme project, the development can be described as product development when the focus is only on the external users and in-house or contract development when the focus is on the internal users. Consequently the Zyme project is not a pure instance of one of the three software paradigms described by Grudin (1991), but has aspects of all three paradigms. This is a general conclusion for developments of web based information publishing targeted to groups outside a user organization, because there will be different types of relations to both internal and external groups of users. It seems that user involvement is as important in development of web applications for information publishing as it is in other types of development. In the development of the ZymeCorp web site no external users were involved. It seemed that a characterization of the target groups was sufficient to decide what information to include on the web site and how this information should be communicated. The task for WebSystems to understand the external users has similarities to the work in advertising agencies. In order to "brand" the user organization the development organization has to understand the values the organization would like to communicate, the information to communicate, and the external user that the organization wants to communicate to. This demands that the development organization has some domain specific knowledge about the information to structure. This can be a problem for the development organization because the information to be published on the web site can be very specialized and demand years of training in order to understand it.

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