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Roles in Learning Management Systems Development

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ABSTRACT

Learning management systems (LMS) enhances education and training possibilities and provides distance access to the learning content. LMS development is a co-operation between various professionals. This paper reports recognized emerging roles in LMS development. In general, emerging roles involve different responsibilities depending on the phases of the systems development. Especially in the systems requirements phase, requirements are gathered together in a co-operation with the users. In a web-survey conducted the respondents described their work concerning LMS development mostly within roles of content producers, developers and designers, but least as users. An organization setting up project teams should know the roles and their responsibilities and tasks of a successful LMS project.

1 INTRODUCTION

Robertson and Robertson use the term *adjacent system* to describe a system (person, organization, computer system) that provides information (Capurro, 2003; Mingers, 1995; Boland, 1987) to, or receives information from the work under study. Generally, all IS can be described as a model with an input, a process, and an output_(Nunamaker, 1992, Checkland, 1981). In the past information systems (IS) professionals concluded that information system development (ISD) needed to became an engineering-like discipline. Common methods, techniques, and tools had to be developed to create a disciplined approach for ISD. The benefits were well-understandable: easier to train programmers and analysts and systems would be more maintainable if the common techniques were recognized. Today ISD involves many stakeholders and IS are used managing, controlling and auditing e.g. the financial and human resources of the organization. Despite unsuccessful ISD projects and development challenges towards natural IS, the ISD is not wasting resources because for example learning management systems (LMS such as Blackboard, Moodle and Sakai) in education and training provide students, teachers, managers etc. an access to the online discussions, learning services and digital learning material from the workplace and from the home (Avgeriou, 2003; Paulsen, 2002). LMS development (LMSD) can be described as development of a delivery system to meet the needs of instructional design (e.g. Gagné et al., 1988), as instructional design is the systematic approach to analyze, design, develop, implement, and evaluate learning materials and activities according to the recognized learning needs. The ISD phases, activities and task are identified in LMSD (e.g Baloian et al, 2001; White, 2000). Thus, LMSD is a special ISD to support learning.

In this paper, systems development approaches and the importance of the requirements in systems development are introduced. Next, traditional roles of systems development and emerging roles concerning LMSD are presented. After describing research methodology, data collection and results, discussion section ends this paper.

2 REQUIREMENTS AND SYSTEMS DEVELOPMENT

Design can be described as a process of converting information originally presented in the form of requirements into the form of specifications (Hubka & Eder, 1982) or as a task to fit a technological solution with the requirements, within the constraints (Robertson & Robertson, 1999). Design and development bring up the goal-setting and constructive aspects distinctive to a human mind (Eteläpelto, 1998). Thus, for example when a need for a new IS is recognized, the designer's job is to identify the requirements for the new IS and to create something to satisfy these emerging requirements.

Despite many options to obtain new IS (building, buying, outsourcing development or let the users build their own custom systems), Jessup and Valacich (1999) argue that it is important for all in organization to understand systems development and its activities, for example in order to understand how the new systems will change the organization. Several approaches exist for systems development, such as prototyping, rapid application development and object-oriented analysis and design. All these approaches need requirements. The methods for structuring systems requirements include e.g. Critical Success Factors methodology (Rockart's (1979) and Joint Application Requirements/Joint Application Design (JAD). For example JAD involves the client in the development of an application, through a succession of collaborative workshops called JAD sessions.

All in all, gathering requirements can be aided with appropriate methods and tools. However, requirements vary and some can be global (constraints) restricting the production for instance the development budget restricts the number and sophistication of the features implemented (Robertson & Robertson, 1999). Furthermore, the designers often set themselves original goals and adopt novel ideas as guides for the future; in doing so they engage in an intentional activity which can affect the users' environmental and social conditions. This implies that they have to integrate a normative component into their activity (Eteläpelto, 1998) either by themselves or in co-operation with the other roles in systems development.

3 ROLES IN SYSTEMS DEVELOPMENT

In this paper there is no purpose to give a list of all the possible different roles in systems development or in LMSD. Instead this paper is to emphasize the importance of the different roles and co-operation with the user in systems development. People involved in systems development are called here as a stakeholder. Precisely, a stakeholder is a person with an interest towards system (Robertson & Robertson, 1999), for example a client who pays for the development or a user using the system. Some stakeholders are remote, like an auditor, a safety inspector, a company lawyer etc. Sometimes the possible stakeholder in ISD can be identified, because of familiar and specific role (Päivärinta et al, 2001). For organization, it is beneficial to know the different roles and responsibilities and task related to LMSD for gathering suitable teams to work in specific projects. For example, a systems analyst becomes adept at decomposing large, complex problems into many small and simple problems. The goal of the systems analyst is to build the final system by piecing together the many small programs, which can solve those small problems, whereat a large and very complex IS can be build. On the other hand, a requirements analyst is considered as a kind of systems analyst who has responsibility for producing the requirement specification document. The specification defines the product, and may be used as a contract annex for build the product. As people have a limited capacity for dealing with complexity and keeping track of information, the requirements analyst does not do all of the requirements elicitation but does have responsibility for coordinating the requirements effort.

Let's next consider the broad field of systems engineering. Among twelve roles constituting the practice of systems engineering, Sheard (1996) categorized five probably the most basics SE roles: requirements owner, systems designer, systems analyst, validation or verification engineer and logistics or ops engineer. She found that no person performs all mentioned twelve roles at once and many engineers will never perform all the roles even over the course of an entire career. When systems engineering is performed on a large program, parts of the entire task are usually allocated to individual engineers. Each person identified as a systems engineer might, e.g., be assigned a subsystem or a software component to oversee. In addition, each might be asked to coordinate the development of something that crosses subsystem boundaries, such as an operational concept document, a risk identification document, or a performance budget. In a similar manner, the twelve roles are usually allocated among people or groups e.g. a performance analysis group might be established that owns specific analyses from the set listed under the systems analyst role. Because priorities vary between projects, resources for accomplishing the roles will vary. For example, high risk systems will require more systems analysis and systems with, very involved, technical customers will need to devote more resources to customer interface. The interactions among the roles mentioned will also need to be taken into account when planning the systems engineering effort.

For LMSD, a framework is available to help designers to think through every aspect of their tasks (Khan, 2001) and some roles in LMS and development of web-bases learning are also earlier identified (Khan, 2005): director, project manager, business developer, consultant/advisor, research and design coordinator, content or subject matter expert, instructional designer, interface designer, copyright coordinator, evaluation specialist, production coordinator, course integrator, programmer, editor, graphic artist, multimedia developer, photographer or videographer, learning object specialist, quality assurance, pilot subjects, delivery coordinator, systems administrator, server/database programmer, online course coordinator, instructor, instructor assistant, tutor, discussion facilitator or moderator, customer service, technical support specialist, library services, administrative services, registration services and marketing. Each role has corresponding responsibilities e.g. a business developer develops business plan whereas content expert writes course contents and reviews existing course materials. As noted, based on the size and scope of the project, the numbers of individuals involved vary and some roles and responsibilities may overlap. Recognizing the difference between various roles helps organization to evaluate which roles (further tasks), LMSD projects size and resources are needed for successful LMSD results.

4 RESEARCH METHOD, DATA & RESULTS

The form of research method (Järvinen, 2004) applied in this work used a web-survey for data collection, because of its availability, affordability and easy of access by the respondents. However, the use of a web-survey for a data collection has been criticized due to lower response rates than paper and pencil surveys (Andrews et al. 2003; Yun & Trumbo, 2000). Research target population was national companies (153) and institutes (18) involved in learning business (softwares, services, content) or research concerning various LMS (Mikkelä et al, 2004; IT-Peda, 2004). After contacting the companies and institutions representatives, 102 people were send requests by e-mail to answer a web-survey between July, 2004 and April, 2005. Most people answered after first e-mail request, but by sending one to five reminding e-mails, the respond rate was increased. Although widely considered sufficient respond rate is 75-90% (Ary et al. 1996), only 50 people gave answers to the questions resulting to the final respond rate of 49%. Because respondents could respond to the web-survey late after the first e-mail, the real reason for answering may not be the reminding e-mails.

Gathered data about roles in LMSD was evaluated with background variables (age, gender, working title, educational background, experience of teaching, training and LMS). A typical respondent was a 37 year old (69.4 % under 40, M = 37.33+/-1.43) man (62%) with experience of teaching and training over 10 years (44%) and 5-10 years of experience of LMS (38.8 %). Respondents were given opportunity to choose from a set of different roles: content producer, material producer, administrator, manager, trainer, teacher, developer, designer, user and student. Respondent could choose which of these roles would best (first role, f_1) and second best (second role, f_2) describe their working with LMS. The roles given were actually alike five pairs of similar roles, because the variety of terms describing certain role can be overlapping as previously noted. The purpose was to give a more possibilities to choose, but to limit the set into ten alternatives. Respondent could also explain with open answer their current work in order to ground their role selection. Frequencies (f_1,f_2) and percents ($\%_1$,$\%_2$) from role selections are presented in table 1.

Among available roles most of the respondents first identified themselves as content producers (26%) and as developers (24%). Second chosen role was designer (24%) and developer (22%). Thus, respondents considered most their working with LMSD within roles of content producers, developers and designers, but not considering themselves first or second as users. This was quite clear, because professionals don't choose working roles too far from their area of expertise. However, some respondents showed background of the user role because of their earlier working experience or work related tasks.

"…I have been with in design and development of two national LMS from the user and the student perspective and also from the content producer and the administrator of learning process perspective..."

"…I'm in LMSD mostly by giving comments as an active user and mediating feedback given by the students to the developers…"

5 DISCUSSION

IS are developed to assist human information processing and decision actions (Simon, 1978). While professionals transform their information, thoughts and ideas into a computable form, the richness of original information decreases. But by co-operation with other professionals supported with a number of different systems, it may increase. The knowledge dependent role definitions give the professionals a hint of who might help increasing information richness. In LMSD, professionals choose roles most evident and close to their actual work. In systems development requirements gathering phase, systems analyst and user working relationship can have a considerable impact on the progress of the project (Urquhart, 2000). Studies suggest (Isomäki, 2002) that the social problems associated with the implementation of IS are due to the inadequate view of users hold by the systems designers. Despite the designers know their level of knowledge (Wahlstedt, 2004) and the systems development requirements collection and analysis phase is for to understand the context, valued users are keys for systems development success and interest in relationships between user and other roles is concern. Thus, as we have workplace roles, we should also paid attention onto those roles not present in working environment. We think that the knowledge about active stakeholders in the LMSD can improve the usability of the LMS and get us closer to adjacent systems.

Table 1. Respondents' choice of suitable role

Role option	f_1	f_2	$\%_1$	$\%_2$
Administrator	2	2	4,0	4,0
Manager	2	2	4,0	4,0
Material producer	3	2	6,0	4,0
Content producer	13	9	26,0	18,0
Developer	12	11	24,0	22,0
Designer	9	12	18,0	24,0
Trainer	3	10	6,0	20,0
Teacher	6	1	12,0	2,0
Student	0	1	0	2,0
User	0	0	0	0
Total	**50**	**50**	**100,0**	**100,0**

However, despite user involvement throughout the development process like in JAD, global requirements may restrict how a product can be produced.

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