An Approach to Information Requirement Engineering

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An Approach to Information Requirement Engineering

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***Abstract*—Requirement engineering is a crucial activity, which can affect the entire life cycle of software development project. The main objective of requirement engineering is to collect requirements from different viewpoints such as business requirements, customer requirements, user requirements, constraints, security requirements etc. Information is also one of the important requirements of requirement engineering process to develop quality and updated software. Typically, the specification of information requirements commences with observing and interviewing people at different levels. The collected information flows across the management spectrum in decision making for project development. In this paper, we discuss a noble approach for Information Requirement Engineering (IRE) that can assist to collect proper and valuable information for software development. Also, we examine the process of analyzing the obtained information at different level of management spectrum, which may lead to positive changes in an organisation.**

Keywords- Information requirement engineering, IRE Process, Requirement engineering, Software development, Software organisations.

I. INTRODUCTION

Requirement engineering is the most effective phase of software development process. It aims to collect quality requirements from various stakeholders using appropriate methods [1]. Requirement engineering helps to collect quality information from various sources for entire software development process. Regardless of the specific technique used; an information requirements analysis is performed by information and system designers as it is the initial activity in any design, development, and delivery process [5, 6]. It is intended to clearly identify the training and documentation needs for a project group or organization. For organizations or companies, the information requirements analysis typically focuses on documentation and/or training, documentation process, its uses and improvement [2]. For projects and products, the requirements analysis ensures that the proper documentation and training of information is developed by using proper tools and in the most effective formats, and it has to be according to users' needs [7, 8].

Traditional methods of information analysis methodology that span both documentation and training fields have typically involved certain high-level phases such as discovery of required information, analysis of information, identification of possible solutions, and production of proper information and delivery of findings to the requesters [9, 10, 11]. Traditional methods of data collection and analysis include at least one of these phases and often include face to face interviewing or structured group facilitation techniques. Information analysts can modify obtained information to achieve the required level of users' needs. The resulted information covers organizational or product analysis, task or workflow analysis, and audience or people analysis [3, 4]. It is necessary to understand the value of information to develop quality information.

There have been various techniques introduced by large companies and experts in the field of computer documentation, which are most widely used in the current scenario [12]. The contextual inquiry is one of the useful techniques for information requirement analysis, which was developed at Digital Equipment Corporation as an interpretive field research technique to collect and analyze in-depth user requirements for product and service design. Further, it has been modified by usability engineers, trainers and technical communicators to gather and analyze requirements for process re-engineering, training and documentation design as well as product user interface design. The approach is based on careful observation and discussion with selected project stakeholders and potential audience members. The actual process (interview technique) will differ depending on the desired outcome and data. End user needs are gathered through observation and conversation with experts, managers as they are actually involved in their day-to-day activities. The collected data from interviews occurs within the context of the audience's work. A particularly powerful and effective contextual enquiry technique is often

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used for information and training requirements analysis. It is best performed when customers are interested in looking at a process or organization that requires some form of documentation or training, and typically involves the work of several people or a team. The artifacts refer to any existing documents, training or job aids, memos, reports or other types of communication that will help analysts to understand the current work and/or communications flow within an organization or process.

Information mapping is another way of information analysis that involves strategies and techniques to create information even when the audience is diverse and difficult to identify. It is an easy approach to learn, which is intended to help designers to analyze, organize, and present information and training materials in a usable, modular format. Software developers will need to understand the basic principles, information types, and information blocks and maps before they can use the particular method for requirements analysis. Edmund Weiss offers structured approach for analyzing the information needs to support a product, service, or organization [2]. If it is performed correctly then it will be public, rule-abiding, and explicit. Starting with the biggest picture possible, it allows a designer to add overlays of details in successive stages. Weiss presents a model for structured analysis and design, which includes activities such as forming the program team, and listing the features and topics. The analysis of the audience, forming a topic and audience matrix and determining the format parameters is also integrated in this model [2].

The main objective of IRE is to collect the quality information from various sources that can update the software system throughout its lifecycle. The paper is organized as follows. The Section 2 introduces the information requirement engineering approach with its detailed subsections. The role of IRE in organizational change is presented in Section 3. We have discussed the proposed approach with various other techniques in Section 4. The concluding remarks are described in Section 5.

II. IRE APPROACH

Developing a new information system for software development is an exhaustive exercise. Information system helps management in decision making related to software development. As an organisation always has many projects to develop, the management must decide the actions in making the priority of system development in order to streamline the business. Therefore, the information plays an important role in decision making. Information requirement engineering is a method for evaluating and modifying the information, information development and delivery of information. IRE is also capable of understanding and analyzing business requirements, understanding a current process of information requirement engineering and assessing its effectiveness. IRE envisions an improved information engineering process that meets business objectives and suggesting solutions (information and/or training) [1].

We have proposed a noble approach for information requirement engineering, which is shown in Figure 1. The proposed IRE approach incorporates some perception such as sources of information, information processing actors and their responsibilities. The resources of information may be repositories of facts that can be used by the information processing actors. The actors are responsible user of organisation having some organisational responsibilities. These actors are responsible for information processing and decision making. The details of our proposed framework are discussed in following subsections. It can process and analyze information according to the requirements of management and different users groups. The requirement of analyzed information is an important pre-requisite for software development. The management constantly decide to develop the system on the basis of analyzed information. The management must ensure that the most important system is developed first and then the less important subsystems.

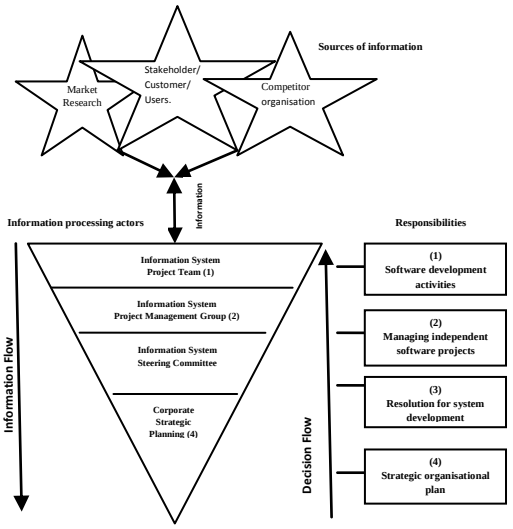

Figure 1. Information Requirement Engineering (IRE)

A. *Source of information*

The main job of software developers is to collect information in right manner from various sources. We identify available sources of information from various people such as users, stakeholders and from market research. Information on customer interest can be identified using market research approach. The competitor's organisations may also be source of information, which can provide valuable information that facilitates our organisation performance. Users and stakeholders provide detailed information regarding product, project, and process.

B. *Information processing actors*

The management spectrum for information engineering comprising of various information processing actors such as project team, project management group, steering committee and strategic planning group. These actors assist software developers to take decisions for software development process to fulfil user's requirement. The project team is responsible for most of the development activity of software development process. It comprises of mainly system analyst and programmers. The main objective is to collect information from various sources and allocate it to the next level information system designers. Information system project management group is responsible for managing independent projects. They use received information and implement them in minor projects to test whether the refined information from primary level will be applicable in decision making or not.

The information system steering committee of senior management is mainly responsible for system development. The major functions of the committee are to review the information, analysis of information, make system plan and

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approve/ disapprove them. They integrate the system that shares input data, provide alternative to the project and transfer the information to the top level. The key actor of our framework is corporate strategic planning group, who design strategic plans and make decisions. They provide overall strategic direction to project team and explain the importance of information system to project stakeholders.

In IRE, designers start at the very top, examining the relationships among business objectives, business processes, information flows, and information systems. From this information, specific training and information needs can be pinpointed, discussed, and validated with clients during data collection and analysis. The first stage in this method involves conducting a business needs analysis that allows software developers to work with clients to identify specific business objectives of an organization, product or service. As software developers proceed with the analysis, designers learn about the current ways in which tasks are accomplished, products are produced, and information and work flows through the organization or process. The next stage involves stepping their clients through a visioning exercise, where participants are asked to help to produce a visual representation for organizational working for a project development.

III. ROLE OF IRE IN ORGANISATIONAL CHANGE

IRE plays an important role in strengthen the organisation structure. IRE helps to make positive changes and ensure the successful working of an organisation. The priority of system development is also decided on the basis of the IRE. Applying the Information requirement engineering in software organisation brings many positive changes such as paradigm shift, business re-engineering, and automation of entire organisation process and rationalization of procedures which is shown in Figure 2.

IRE brings automation in the organisation Automation is an important change in organisation. Automation speeds up the performance of various activities in software development. The system that brings automation in one particular phase is given less priority than that system which brings automation in almost all phases of system development. Next, positive change in organisation is rationalisation of procedure that refers to the streamlining of standard operating procedures by eliminating obvious bottlenecks for bringing efficiency in the operations. The system that streamlines the standard operating procedures must be given higher priority than that system which brings just automation. Business reengineering is the radical redesign of business process that eliminates repetitive paper –intensive task and hence improves cost, quality, and services is called business reengineering. The system that brings business reengineering in the organisation is given higher priority than system which rationalisation of procedures and finally changes in organisation is paradigm shift. It refers to the re-conceptualisation of the natures of business and organisation. For instance, an organisation may decide to make other changes besides the above three in order to streamline the business process. A paradigm shift is the more radical form of organisation change and is given the highest priority. Although, paradigm shift carry highest risk, they provide maximum benefits.

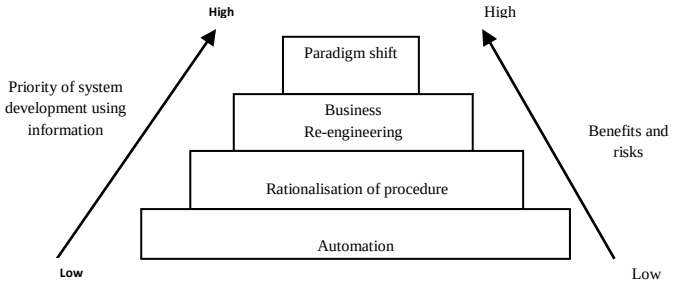

Figure 2. IRE in organisational changes.

The information requirement engineering allows organisation to take the information in appropriate form from appropriate source. Also, it can change the organisational structure by different ways. Some of these changes are discussed in this section. This changes leads to the organisation to achieve their desire goals. IRE is an effective tool that helps information engineer to renovate the information into decisions. Therefore, it should be mandatory to adopt IRE practices and techniques in every software industries and organisations.

IV. DISCUSSION

It is clear that our approach emphasizes on top-down method for gathering right information. When it is performed at the start of information design and development process, requirements analysis allows information and software designers to gather different types of information. These information may be work flow and tasks, work opportunities and problems currently encountered, tool opportunities and problems, design ideas and validations and audience's work context, ideas, and future needs. From this information, it is possible to outline and present a set of high-quality recommendations and/or suggested solutions to meet the training and/or documentation needs of an organization or product.

Traditional methods are unable to examine information and training needs from a business perspective, i.e., these approaches doesn't have to provide a systematic approach to tie with the business objectives of a software organization or product to the proposed training and/or information solutions [2]. Our approach incorporates data collection and analysis methods, which can be collected from various information sources and thereafter, it is provided to technical communicators and software designers with powerful new techniques for conducting information requirements analyses at a higher level. It allows designers to capture a more complete picture of end users' information and training needs.

V. CONCLUSION

The information requirement engineering process deserves a stronger attention in the industrial practices. In this paper, we have discussed information requirement engineering approach and its various dimensions. It can be used to provide quality information for throughout software development processes to produce high quality software product. Also, we have discussed various positive changes in organizations due to IRE, which can help to management in strengthening the organisation. IRE is useful approach to elicit the information in entire software development process. IRE can be conducted as early as possible in the lifecycle of software development, preferably before any other software development activity is actually started.

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