Implication of Requirements Engineering in ICT4D Project Development

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ABSTRACT

The idea of Information and Communication Technology for development (ICT4D) has been gathering momentum since last decade. It contributes to the development of social, political, and economic growth of the underprivileged group of populations especially in the context of developing countries. Requirements Engineering (RE) is the most sensitive from all other activities involved in the ICT4D project development. This paper reports on a literature review of published ICT4D research and provides an analysis of the requirements design issues in ICT4D project development in terms of functional requirements, non-functional requirements, and user requirements. The analysis of this paper can serve the ICT4D researchers and practitioners as a means of understanding the requirements design issues in ICT4D project development.

Keywords: Design Requirements, ICT4D, Information and Communication Technology for Development, Literature Review, Requirement Analysis, Requirement Engineering

INTRODUCTION

Information and Communication Technology for Development (ICT4D) is a general term refers to the application of ICTs to assist in reducing disparities of socioeconomically disadvantaged group of populations within the vision of social development and poverty alleviation. In ICT4D applications, ICTs can be applied either directly benefit the disadvantage group of populations or indirectly assist governments, non-governmental organizations, aid organizations and business organizations to improve socio-economic conditions of disadvantage group of populations (Miller et al., 2009).

The use of computer and mobile based electronic applications are rapidly increasing in the ICT4D project development within the vision to extend the existing functionalities. Hence, complexities and difficulties have been rising to develop these varieties of electronic applications which have to fulfill all requirements of a vast range of computer and mobile users with their different abilities, services and expectations (Gunda, 2008). ICT based project developments have been facing difficulties since its birth, which is now recognized as ‘problem of development’. The development problems not only led many ICT4D projects to be delayed and over budget,
but also caused user’s dissatisfaction. Years of investigations determine the most significant and crucial factor that contributes to the problems is the deficiency of understanding requirements engineering in ICT based project development (Gunda, 2008; Thayer & Drafman, 1997).

Requirements Engineering (RE) is a process that defines the prospective system where requirements act as a guideline for the system development team. The aim of RE is to provide an unambiguous, complete and consistent set of requirements to steer a successful project development. Without get the right requirements any project development would be eventually failed, no matter how well the rest of the project development is executed (More et al., 2011). A number of studies review the published ICT4D literatures. The study of Gomez et al. (2012) reports the trends and directions of ICT4D research. Raiti (2006) reports the shortcomings of ICT4D research. Chepken et al. (2012) categorizes ICT4D research into seven directions, i.e. domain area, discipline, region, target group, telecommunication, terminal device and research methods. However, no review process focuses on the issues of requirements engineering in ICT4D project development.

The aim of this paper is to investigate and analyze previous ICT4D research to provide an overview of understanding requirements engineering in ICT4D research and project development. And, identify the implications of requirements engineering in successful ICT4D project development with the particular research question: What is the implication of requirement engineering in ICT4D project development? The results and analysis of this paper can serve the ICT4D researches and practitioners as a means of understanding the issues of requirements design in ICT4D project development. In order to operationalize the research question the objective of this paper is to investigate and examine the type of requirements addressed in the literature and its implication to the ICT4D project development. Maiden (2008) defines there are mainly two types of requirements in the system development, i.e. user requirements and system requirements.

User requirements in a system development are given by the users of the system on what purpose they use the system for (Maiden, 2008; Hazer & Karstens, 2009). System requirements identify the system capabilities and functionalities in what, how well and under what conditions the system will operate to satisfy the users with their various needs and expectations (Sage & Rouse, 2009). System requirement is also classified into two sub-categories, i.e. functional requirements (FR) and non-functional requirements (NFR). Functional requirement is the required functionality of a system (Robertson & Robertson, 2012). It captures the intended behavior, e.g. service, task or function of a system required to be performed (Malan & Bredemeyer, 2001). In contrast with functional requirements which define specific functions of a system, non-functional requirements or quality requirements define the criteria that can be used to judge the operation of a system (Crespo & Peiro, 2011). For example, functional requirements describe the functions of a system that what a system supposed to do while non-functional requirements describe how a system supposed to be (Ataie et al., 2011).

This paper is organized as follows. First, the research methodology is defined and described the strategic operations of methodology. Second, the selected papers are categorized and discussed according to their relevance to the categories of requirements engineering. Third, an analysis of the results is provided to answer the research question. Finally, the paper concludes with reflections and suggestions for future research.

**METHODOLOGY**

This paper is based on a literature review of earlier published literature in field of ICT4D to identify the implication of requirements engineering in ICT4D project development. In order
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