

## ABSTRACT

User requirements serve as a fundamental cornerstone in the design of electronic Health Information Systems (eHIS). These requirements are vital for ensuring that eHIS systems are not only efficient and effective, but also finely-tuned to align with the specific needs of their users. To elevate the quality and relevance of eHIS, it is imperative for system developers to actively involve users, particularly during the critical phases of requirements elicitation and analysis of the *User Centered Design* (UCD) approach. However, these two vital phases often encounter the challenge of limited user involvement during the eHIS development process. This challenge arises because the UCD approach majorly emphasises 'what' should be done in executing these tasks, but does not prescribe 'how' user groups or teams should execute such tasks to collectively achieve a common goal. This has led to various limitations, including; difficulty in effectively incorporating and reflecting user needs in the design, reduction of user role to that of a mere participant other than a co-designer, application of varying methods that trigger incorrect interpretations of real user needs, among others weaknesses. Worse still, while UCD theories are critical for improving design efficacy, they often lack specific guidance on *how* to apply them to enhance end-user involvement throughout the requirements elicitation and analysis phases.

To address the UCD limitations, the study sought to integrate another collaborative design approach known as “*Collaboration Engineering*” (CE) to the UCD approach. The CE approach follows design principles that are similar to UCD principles; and thus, we claim that the two approaches if combined would reinforce user involvement. That is, integrating the CE and UCD design principles to enrich the UCD 'what' with the CE 'how' aspects, thereby reinforcing user involvement during the requirements elicitation and analysis phases of eHIS development. Moreover, we argue that integrating the “*Activity Theory*” with the “*Theory W with an easy win-win approach*”, would help to bridge the theoretical gap in UCD theories; that is, provide guidance on *how* to reinforce user involvement during the two initial development tasks.

The Pragmatism philosophy was adopted in this study, to facilitate the discovery of practical solutions to the research problem. The study followed a combined method, that is *Design Science* and *Action research*, given the nature of the research questions; which required both interaction with the users to understand their needs, later on designing environments that would support enhanced involvement in the development process of electronic health information systems.

The UCD-CE design process underwent rigorous validation in three iterations. Empirical results highlight the UCD-CE process strengths, particularly, its efficiency regarding task completion in time, low cognition load and efforts to arrive to a common goal (user requirements), high user satisfaction, high creativity and productivity, ease-of-use, learnability and completeness of the deliverable(s) in the tasks in requirements elicitation and analysis tasks during development process. Looking ahead, the research will focus on assessing the practicality of the UCD-CE design process in enhancing user involvement in the UCD design phase.