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Proposing an Integrated Process Model for Designing Clinical Decision Support Tools

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Abstract. We propose a Human Factors Engineering process model for designing clinical decision support tools (CDST) that integrates Design Study Methodology, User-Centered Design, and Decision-Centered Design. It addresses domain-specific needs, cognitive demands, and decision-making processes. We hypothesize our approach will improve CDST usability and acceptance, while enhancing decision-making and reducing cognitive workload.

Keywords. Human factors engineering; problem-driven research, user-centered design, decision-centered design

1. Introduction

Human Factors Engineering (HFE) is key to the design of usable and effective clinical decision support tools (CDST) [1]. Effective CDST require efficient workflow integration, consistency, intuitive design, and meaningful alerts [1,2]. To meet these needs, design must address domain and user requirements, cognitive demands, decision-making processes, and data visualization. Three iterative, human-centered HFE approaches can provide guidance: design study methodology (DSM), user-centered design (UCD), and decision-centered design (DCD). DSM is a problem-driven research paradigm focused on creating innovative visualization solutions through domain expert collaboration [3]. UCD emphasizes understanding user tasks, goals, and needs, which informs user requirements [4]. DCD aims to enhance human decision-making by identifying key cognitive demands and translating them into decision requirements [5].

2. Methods and Results

We propose an HFE process model for designing CDST, integrating DSM, UCD, and DCD, where domain experts are engaged from the start (see Figure 1). According to problem-driven research, the domain is comprehensively analyzed. This informs design

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requirements that guide conceptual design and prototypical implementation. Iterative design-feedback loops ensure usability and domain-specific functionality. The prototype is tested to validate usability and support for decision-making. The final phase reflects on the overall results, deriving guidelines for future CDS design.

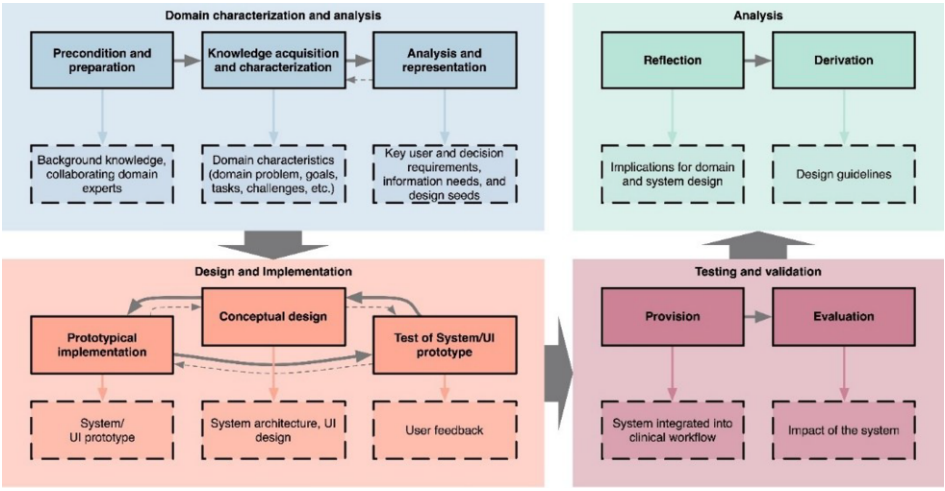

Figure 1. Process model including four successive phases and ten iterative steps.

3. Discussion and Conclusions

We hypothesize our approach will improve CDST usability and acceptance, while enhancing decision-making and reducing cognitive workload. It is applied to develop a CDST for physiotherapists diagnosing and treating musculoskeletal problems in musicians. It aims to improve diagnostic accuracy, treatment efficacy, and patient outcomes. So far, design requirements were identified during the initial phase [6].

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