Rehabilitation Therapists as Software Creators? Introducing End-User Development in a Healthcare Setting

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ABSTRACT

The authors discuss the feasibility of End-User Development (EUD) for non-information workers in the context of neurorehabilitation. The authors present a three-week long field deployment of TagTrainer, a system that enables therapists to create, share, and use exercises for arm-hand training with a tangible interactive tabletop application. The experiences suggest that therapists are capable and motivated to create content that is tailored to the training needs of their patients. Three key challenges are identified for enabling EUD practices in a clinical setting, which appear to have a broader relevance outside the specific domain of neurorehabilitation: more support for retrieval and sharing of existing solutions developed by end users, guiding end-user developers to ensure usability and software quality for their creations, and aligning with the revenue model of the organization.

INTRODUCTION

End-user development (EUD) is the creation of software by end-users primarily for their own use, modifying or extending the capabilities and functionality of an extant system (Lieberman, Paternò, & Wulf, 2006). EUD can potentially overcome a major challenge facing software designers and developers: anticipating on the immense variety of contexts in which systems are used, the unexpected purposes, priorities, and usage characteristics that often become known only during actual use. EUD seems particularly promising for domains where there is a need for customized solutions, where domain expertise can provide a very high added value through customisation, and where the

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latter transcends parameter setting, a task that is easily left to end-users, extending to tasks that are typically the responsibility of software engineers. Especially where professionals cannot be assumed to have expertise in software development, this goal is very challenging but the potential rewards very high.

Early research on EUD focused on programming language design and the tools that may support EUD practices (e.g., see (Lieberman et al., 2006; Nardi, 1993; Pane, Ratnamahatana, & Myers, 2001)). Less understood is how well such solutions fare in actual use in a professional context. There have been calls for this community to pay more attention to organizational (Mehandjiev, Sutcliffe, & Lee, 2006), and sociotechnical (Fischer, 2011) factors pertaining to EUD adoption. Questions that emerge, and that we set out to answer with our research are: What are the factors that support or hinder the acceptance of EUD? What is the impact of EUD upon users and their work?

One might expect the answers to such questions to be context dependent. Here we focus on healthcare and specifically technology-supported rehabilitation. Healthcare has been suggested as one of the most promising application domains for EUD, e.g., see (Costabile, Maria Francesca, Lanzilotti, Rosa, & Piccinno, Antonio, 2003; Fischer, 2011). One of the factors that make this domain so particularly suitable for EUD is the immense diversity in patients and their corresponding treatment needs. With EUD, healthcare professionals could be empowered to tailor healthcare technology to the needs of their individual patients. For example, MAPS (Carmien & Fischer, 2008) allows caretakers to create prompting scripts for persons with cognitive disabilities. Their rationale is that caretakers, having the most intimate knowledge of patients, can become end-user developers of assistive technology tools. Their ethnographic evaluation study supports the feasibility of EUD in the healthcare domain, but there is little yet known about what factors enable or hinder the creation, use and reuse of software that they create and how EUD is embedded in clinical practice.

Interactive technologies have been making a gradual entry in upper extremity rehabilitation, e.g., after stroke, spinal cord injury (SCI), or for patients with multiple sclerosis or cerebral palsy. Whether as games (Dhillon, Goulati, Politis, Raczewska, & Markopoulos, 2011), rehabilitation robotics (Gelderblom, De Wilt, Cremers, & Rensma, 2009), or otherwise, interactive technologies are seen as a way to reduce healthcare costs, while extending the quantity and quality of the care provided (Jones, Mueller, & Morris, 2010). Despite this prospect and growing research interest, overall one cannot ignore that physiotherapists and occupational therapists are not information workers; they do not rely on ICT for delivering treatment to patients, and are usually not familiar with software development. They spend little time, if any, behind computer screens and the tasks they perform with computers are secondary to their main tasks. In short, therapists are very different from professionals traditionally targeted in EUD research such as accountants, office workers, and software developers, so different challenges and solutions need to be considered.

In the next section we discuss related work. Then we describe TagTrainer, a platform supporting training of upper extremities with tangible interaction, and report on a three-week long case study in which rehabilitation therapists used this platform in actual clinical practice. Finally, three key challenges are identified for enabling EUD practices in a clinical setting, which appear to have a broader relevance outside the specific domain of neurorehabilitation.

RELATED WORK

Sociotechnical Aspects of EUD

There is little prior art regarding the challenges of introducing EUD in the workplace and how to overcome them. One of the few studies that have taken a broader organizational perspective on EUD (Mehandjiev et al., 2006), reports on a survey among researchers and software developers that studied the antecedents of adoption for EUD. They point out the challenges
Sporting Safe in the Liminal Sphere: “Tactics” and Facebook
www.igi-global.com/chapter/sporting-safe-in-the-liminal-sphere/96062?camid=4v1a

A E-Business Case of Study: Modelling the Quality of the Wine using its Physicochemical and Qualitative Properties
www.igi-global.com/article/a-e-business-case-of-study/183678?camid=4v1a