From Top to Bottom: End User Development, Motivation, Creativity and Organisational Support

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Abstract. This paper examines the socio-technical and organisational factors that influence the adoption of End User Development (EUD) technology and practices at the workplace. This research focuses on the rehabilitation industry, where a 64-item paper-based survey was completed by 52 therapists working at two rehabilitation clinics in the Netherlands. Results suggest that therapists need to be motivated to act as creators of technological innovations in rehabilitation as this is not part of their current work culture and current rewards for such innovations are perceived as small. Most likely incentives for therapists are (1) time allocated for end user development practices (2) monetary compensation for overtime required for this work (3) and intellectual ownership of the innovation.

Keywords: organizational studies, intrinsic motivation, extrinsic motivation, therapy, technology acceptance, creativity, end-user development.

1 Introduction

Theoretical and empirical works in the field of End User Development have often examined the cognitive aspects of programming. Comparatively, much less attention has been placed on the motivational, socio-technical, and organisation factors that influence an individual's and especially an employee's willingness to successfully engage in EUD. A question that is critical to answer for the eventual feasibility of EUD as a software creation approach pertains to what are the social and organizational conditions that will enable the adoption and success of EUD.

Little is known on how an organisation can best foster and support the employee's acceptance and use of EUD technology. The research described here is part of an investigation processes for introducing novel technologies in rehabilitation. Specifically, it aims to provide EUD technologies for therapists so that they can create their own tangible and robotic interaction solutions for supporting patient therapy. EUD can potentially overcome the difficulty for technology developers to access highly specialized domain expertise and to tailor patient specific requirements – something that is arguably better done post deployment by therapists. The paper reports on a survey conducted among therapists in a rehabilitation clinic aiming to understand end

user (therapist) perceptions, background experience with software technology, perceptions about risks and benefits, factors that determine their willingness to apply EUD and perceptions on the organizational support in performing these tasks.

2   Literature Review

In one of the few studies that have taken a broader organizational perspective on EUD, Sutcliffe et al [8] analysed the importance of connecting user motivation to the perceived rewards of using an EUD tool. He concluded that motivation will depend critically on perceived utility and then the actual utility payoff. Mehandjiev et al [5] concluded that participants saw EUD as adding corporate value in terms of better support for agile working practices at an affordable price. However, attitudes to EUD are shaped to a large extent by the culture of the organization and by the benefits. Deci et al. [3] suggests that external intervention via monetary incentives and punishment may undermine intrinsic motivation.

3   Method

A set of open-ended interview sessions with therapists and healthcare researchers were held with the aim of gaining a better understanding of therapists, their experience with technology, work environment, motivation, and creativity skills. Three core themes were identified as critical for enabling EUD practices to take place in the rehabilitation domain:

- Creativity: Do therapists have the creativity required for creating novel technology based solutions and are they motivated to do so?
- Organisation: Support and incentives to nurture a culture of EUD at the workplace.
- Technology: Willingness to work and adopt technology as well as understand software programming concepts i.e. abstract manipulation.

Based on these interviews and a literature survey of related works on organizational perspectives regarding end-user development practice, e.g., see [5], we designed a survey study aiming to evaluate the attitude of therapists regarding these topics.

3.1   Participants

A total of 140 questionnaires were distributed with the support of the management in two rehabilitation clinics; 52 therapists (15 male, 37 female) returned these questionnaires resulting in 37 % overall response rate. Participants were selected based on their knowledge and work with new rehabilitation methods at two research driven rehabilitation clinics in the Netherlands.

The ages of participants ranged from 24 to 62 years with an average of 39.58 years. Twenty one (21) of the participants were occupational therapists; 25, physiotherapists; and 3, speech therapists. The subjects used in this study were identified by their questionnaires as either educated at bachelor level (37%) or have masters degrees (12%).

3.2 Procedure

The questionnaires were distributed in paper form during the summer and autumn of 2010. Subjects were informed that the survey was anonymous, and the statistics gathered would be used for summary purposes only. Participation was voluntary. The questionnaires were followed by a brief interview at a later stage to gather feedback.

3.3 Materials

The questionnaire was designed to investigate therapists' backgrounds as potential End-User Developers, their willingness to create, share, and extend therapy, and their perception of the organisational support available to develop and motivate the creation of new therapies. The final version of the questionnaire consisted of 64 questions. Most questions were presented as a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree) – in some cases, 6-point Likert scales were used addressing feedback from pilot runs of the questionnaire.

4 Results

The following summarises the result of the survey.

- Therapists consider themselves *personally creative*. They report being more creative during working hours and when collaborating with others.
- Therapists learn new approaches to therapies mostly from direct interaction with peers rather than from publications or websites, and receive a lot of peer support.
- Therapists are mostly unaware of opportunities to fund new therapy development and rate financial incentive provided as low.
- The result of the survey reveals that therapists are driven by their desire to assist patients rather than to develop technologies. They spend little time on technology development but spend time and effort in developing new therapies.
- Respondents named the following organizational factors that might motivate them to explore new rehabilitation technologies, ranked according to importance: peer recognition (1) more time (2) monetary compensation for extra hours (3) and intellectual ownership of the innovation.
- Therapists are familiar with digital technology but are largely unfamiliar and averse to software programming.
- Therapist attitude is positive towards new technologies if they can improve therapy and are confident that they would bring no risks to patients.

5 Discussion

The results indicate that therapists think that they are slightly more creative when collaborating with other people. We were interested in the possibility of online collaborative applications supporting the dissemination of new therapy approaches supported by technology. Our respondents felt that they understand new things best when learning together with other people in a group setting. The respondents' responses are

consistent with the social facilitation theory, which posits that people often perform better in the presence of others than alone [2]. Group learning with peer input is thought to significantly increase learning perceptions, problem solving skills, and help achieve a higher level of learning than individual learning alone [4]. This knowledge allows for the development of competencies and incremental or transformational change and the strong peer support learning.

Regarding technology adoption, respondents felt that they should be given time to learn new tools and attend training sessions. Contribution to training for these users would be funds well invested in keeping those workers motivated by their jobs. It has been cited as a strategy that will increase the likelihood of innovation in end user application [1]. The more positive the perception of organizational support, the greater is the degree of motivation and system utilization [6].

The result of the survey reveals that therapists are driven by their desire to assist patients; adoption of technology thus needs to be related to providing tangible benefits to patients rather than other types of savings of financial benefits. In the Netherlands (and probably also in other countries with similarly organized national health systems), health workers are normally not exposed to extrinsic rewards for creating innovative solutions. Health workers are driven by a high level of moral commitment and intrinsic motivation. The most common form of reward is praise, which can boost an individual's perception of competence and ability. This can inspire a person to continue achieving his goal – thus increasing intrinsic motivation.

The observation of insufficient time as the predominant barrier deserves note. Based on the respondents' response, it would seem that external incentives such as *more time* to develop new therapies and financial rewards could increase the intrinsic motivation. Awards can be seen as a device that, like intrinsic motivation, motivates individuals to exert an effort. Awards are typically perceived as a gesture of support and are likely to have a positive effect on performance [8].

Some conclusions can be drawn from the data with regards to the feasibility of EUD by therapists: in the current situation therapists are not motivated to become software developers of therapeutic applications. The analysis above identifies factors that could enhance the motivation of therapists to do so (improving treatment, recognition) and remove perceived barriers (allocation of time).

6   Limitation of the Study

This study considers only therapists drawn from two clinics in the Netherlands. Organizational culture and the level of support may vary from country to country and even within. The quantitative nature of these results emphasizes the prevalent attitudes and ignores the possibility that in each organization there will be one or two individuals who take the role of the innovator and who are differentially motivated than the average employee to create, innovate and share their knowledge. To understand how to support these individuals and increase their impact in therapy a more qualitative research approach is needed that will examine motivations, incentives, and barriers these innovators face and how end-user development practices could be enabled through supporting them.

7 Conclusion

Software applications developed by therapists can contribute to major innovations and improvements in health care. The study reported on this paper investigated the ability and motivation of therapists to act as end-user developers, as well as their perception of their organizational support for doing so.

This research examined therapists who have highly specialized expertise and training, but not much exposure or interest in software technology. In contrast to professionals in the creative industries, the therapists 'primary goal is to treat patients, which has to be done within working hours as patients' treatment is confined to working hours. They also do a lot of work outside their regular working hours (e.g. giving courses, workshops etc.). This leaves little room for creativity and therapists are not motivated to create, innovate and share new therapeutic software using new technology; *this is not inherent in their job, their culture or their training*. Therapists were driven by their primary motivation to assist patients in the rehabilitative clinics and the use of IT technology was not considered the primary management tool to achieve their tasks, unlike the subjects of earlier studies employed in industries where IT is central to the business development. Moreover, majority of our respondents did not posses software development skills unlike respondents of previous studies. Perception and attitude towards EUD thus vary according to the job task and the nature of the organization and their computer skills.

The domain of therapy presents some distinct characteristics. This study surprisingly found that although therapists are driven by their moral commitment to help patients, they lack the motivation to explore new opportunities to further their understanding and knowledge regarding software technology. Praise (in its current form) was not sufficient to motivate them to develop new technology-based tools. This finding is in contrast to earlier studies which found that EUDers in other sectors consider peer recognition, training and management recognition of the time spent by EUDers for learning especially outside work hours, sufficient to motivate them to engage or extend the scope of EUD.

This study charts into new territory by providing new insights into the role and significance of gender differences. Male therapists have greater motivation to explore and share new innovative rehabilitative tools than female therapists.

Efforts to introduce EUD in therapy will have implications for the development of interventions and rehabilitation therapy. EUD will encourage therapists to share valuable information necessary in achieving high quality therapy services and optimal patient outcomes. A clinical culture that does not value the importance of implementing EUD and understanding the needs of end user developers will fall short of these goals.

The present study yield valuable insights about the role of rewards and motivation in end-user development. Research to date on EUD has focused on task performance, computer skills, job satisfaction, and technological aspect and implementation barriers of EUD. However, it is difficult to address the issues of growth, barriers and management without in-depth understanding of the EUDers creativity experiences and motivation to address questions arising from implementation of EUD. This study fills this lacuna and provides valuable insights in identifying the EUDers 'attitude towards organizational resources and supportive culture.

This study could be expanded to include a more in-depth study on what motivation techniques would drive the therapists to achieve the goal of new therapeutic technology-based tools and sharing.

Acknowledgement

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