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Interruption management and office norms: Technology adoption lessons from a product commercialization study

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ABSTRACT

This paper explores factors that influence technology adoption in an office environment, with an emphasis on technology aimed at managing focused and collaborative work by reducing unwelcome interruptions for its users. Based on surveys, focus groups, and usability studies, our findings suggest that workplace social norms play a pivotal role in the adoption and use of interruption management technologies. Our findings display a marked lag of social norms behind the importance placed on uninterrupted time by individuals; even when individuals see the efficacy of the technology, they often misjudge their peers' attitudes, underestimating their colleagues' similar needs. In spite of high levels of perceived usefulness reported by our participants, need and ease of use alone were insufficient to predict uptake; when technology has implications for the office behavioral environment, it must be supported by social norms encouraging adoption. Our results further suggest that feedback, which actively engages a product's user, could be crucial to encouraging prolonged use and enhancing the user experience. Although the findings are drawn from a pre-commercialization study of an interruption management technology, they are broadly relevant to technology adoption cases, with special salience for those within the office context.

1. Introduction

Interruptions are becoming a pervasive element within the contemporary workplace context. Haynes (2007b, 2008a) identifies the office behavioral environment as the most important factor in enhancing/hindering office productivity[1] and demonstrates that the dynamic elements of the office environment (i.e., interaction and distraction) have the largest positive and negative influences on office productivity. In office settings, studies show that employees can be interrupted frequently and for relatively long durations (O'Connell, 2008). O'Conaill and Frohlich (1995) report an average of four (4) interruptions per hour, with approximately 10 min an hour spent engaged in an interruption. In an 8-h work day, Sykes (2011) observed an average of 121 interruptions experienced by technical leaders, which took up 5.7 h of their working time. Sykes (2011) observed other staff to get interrupted less frequently but still at a significant rate: on the average, 24 interruptions and 73 min total interruption time in an 8-h work day. Further, Czerwinski, Horvitz, and Wilhite (2004) report that office workers experience multiple interruptions while they perform a single task.

Interruptions have become a larger concern in the recent years with increased reliance on a variety of electronic communication tools that result in heightened availability and an expectation of rapid response time. These technology mediated interpersonal interruptions appear to have increased at a rapid rate in the recent years and although they constitute new realities of the contemporary workspace, these disruptions are becoming so frequent as to decrease, rather than increase, workplace productivity (Karr-Wisniewski & Lu, 2010). Face-to-face interruptions are also still of concern given the rise in popularity of open concept office design, which aims to encourage collaboration.

It should be noted that collaboration is important for businesses to remain successful (Innes & Booher, 1999) and is a crucial aspect of modern workplaces (Sykes, 2011). One of the most difficult challenges faced in managing interruptions is navigating the balance between collaboration and interruption (Haynes, 2008a, 2008b). For example, Perlow (1999) observed that her subjects, namely software engineers, considered 96% of their interactive activities

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[1] By enhancement of office productivity we mean enhancing the long-term quality of a firm's products and services as perceived by its clients and the amount of economic activity performed during specified and comparable periods of time, e.g., quarters (Haynes, 2008b).

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to be helpful. However, her subjects also considered only 10% of these activities to be urgent, suggesting that the majority could be scheduled for a later time without negative repercussions for anyone involved. Despite this possibility, 95% of the interactive activities in this study occurred spontaneously, fragmenting the engineers' day and giving them no control over their schedules. Interruptions can carry important content, which can benefit the recipient (O'Conaill & Frohlich, 1995), and are in fact often welcomed depending on the nature of work (e.g., interdependencies of activities, pressure to respond to crisis) and the work culture (e.g., reward system based on individual heroics) (Hudson, Christensen, Kellogg, & Erickson, 2002; Perlow, 1999). However, if interruptions take over control of their schedule away from the workers, they may disrupt focused work and deteriorate productivity. Further, if they happen at inopportune times, they can also be quite detrimental to performance.

The negative effects of interruptions on task performance are well documented in the literature. Interruptions can cause errors and reduce people's efficiency. For a comprehensive review, see Trafton and Monk (2007). Interruptions also reduce the quality of work (Foroughi, Werner, Nelson, & Boehm-Davis, in press). One mechanism that contributes to the role of interruptions in performance degradation is their interference with prospective memory (Brandimonte, Einstein, & McDaniel, 1996). Diary and observational studies suggest that 41% of tasks are not resumed immediately after an interruption (O'Conaill & Frohlich, 1995) and 23% are not resumed at all within that day (Mark, Gonzalez, & Harris, 2005). Even if the resumption occurs, individuals may experience source confusion and neglect to complete certain components of a task, thinking that they were completed before the interruption took place (Trafton & Monk, 2007). Unpredictable and uncontrollable interruptions can also induce personal stress, which can in turn negatively impact performance (Cohen, 1980), and ultimately an individual's well-being. There is increasing recognition that lack of personal control on workplace demands can lead to increased ill health and in particular chronic conditions (Ganster, Fox, & Dwyer, 2001).

Emerging amidst the shifting workplace landscape, Covey (1989) developed a matrix that identifies typical tasks as urgent or non-urgent, and important or non-important. The popularity of email-enabled mobile devices, push notifications, and instant messaging has allowed the urgent items within this matrix to become increasingly visible, detracting attention away from important but non-urgent tasks. In this scenario, important tasks, such as strategic planning, product design, and detailed analysis, can be set aside to address interrupting instant messages. In fact, Czerwinski et al. (2004) found that information workers were interrupted the most while performing high-priority and complex tasks involving information management. Further, they found that it was difficult to return to these complex tasks and that interruptions had the worst effect on these types of tasks. The dominance of urgent over important has further implications given the nature of the mindset required to complete these complex tasks, which often require high concentration (Perlow, 1999). The cost of interruption can be very high for such high cognitive load tasks (Iqbal & Horvitz, 2007).

This study was developed in response to these personal, professional, and health considerations relating to interruption management. The research team embarked on a program to test and evaluate a product in its pre-commercialization phase, designed to publicly distinguish between time dedicated to collaboration or to individual concentration requiring focused periods with no interruptions. The product was designed to mitigate face-to-face as well as technology mediated interpersonal interruptions, in both traditional and open concept office layouts. Through a series of research components that tested the product's software and hardware, we examined the prevalence of different workplace interruptions, perceived need for focused work, as well as the relationship among usability features, social norms, and predicted adoption uptake. We also explored the importance of social norms in an office environment as drivers in the adoption of this new technology and identified further product development suggestions. As will be discussed in later sections, the successful uptake of this product can be defined not only by the individuals' use but also by their colleagues adjusting their behavior based on the status of an individual communicated to them through the product. Thus, the results of this research bear on technology adoption in general, especially in office environments, and point to new research directions exploring the interaction between individual and group attitudes toward productivity enhancement in the office context.

2. Theory

2.1. Technology adoption and diffusion

The theory, the process, and the necessary preconditions for the adoption of new technology formed the underlying basis of this study. The literature on technology diffusion has traditionally focused on two crucial elements that have been assumed to be essential drivers: apparent need, and the ease of use of a new technology (Davis, 1989; Rogers, 1995). Davis (1989) proposed the Technology Acceptance Model primarily based on these two determinants. The first of these describes the requirement for a new product to address a specific need that has been identified within the target population. Often, new product design occurs as a direct result of this explicit demand or need. The second factor is heavily dictated by product design, and suggests that if a new technology is easy to use, it can reduce the barriers that an individual faces before adopting it. Intuitive product design is one strategy to ensure ease of use. This approach often relies on the creation of a new product that has an analogous design to pre-existing products with which the target audience has prior experience (Blackler, Popovic, & Mahar, 2006; O'Brien, Rogers, & Fisk, 2008). While both an identified need and easily understood products are necessary factors, nuanced views of the process indicate that these elements may not be sufficient to predict the uptake of new technology.

2.2. Social norms and behavior change

Analyzing several theories related to social norms and behavior change, Straub (2009) suggests that social influence is a further crucial factor in technology adoption by individuals. The lens of social psychology can be applied to deepen our understanding of the interaction between social norms and adoption behaviors and to understand the complexities of individual behavior change in the broader context of social norms. To accomplish this, the Theory of Planned Behavior offers insights into the antecedent causes of behavioral change. Within this typology, attitudes, perceived control, and social norms are all precursors to the intention that leads to behavioral change (Ajzen, 1991). This sentiment is emphasized in the Theory of Reasoned Action, which suggests a positive correlation between the strength of a social norm and the intention to act (Ajzen & Fishbein, 1980). These theories have received support from subsequent technology adoption studies that have found that social context and norms provide support for the adoption of new communication technologies (Green, 1998; Schmitz & Fulk, 1991).

A factor that appears to interact with social norms is the voluntariness of technology adoption. Venkatesh and Davis (2000) extended the original Technology Acceptance Model proposed by Davis (1989) to suggest that social norms will play a role in intention to use if the product use is organizationally mandated. However, they also suggested that regardless of voluntariness,