TAKING PRESSURE OFF KNOWLEDGE WORKERS WITH THE HELP OF SITUATIONAL APPLICATIONS

Improving Time-to-proficiency in Knowledge Work Settings

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Abstract: Knowledge work is weakly structured, highly diverse and fast changing and thus needs flexible, personalised support by software. Situational applications are a new breed of software that is assumed to fit to the types of tasks and contextual requirements encountered in knowledge work settings. Furthermore, their application is supposed to result in shorter time-to-proficiency. The main goal of this paper is to discuss these assumptions taking the constructs of the task-technology fit model as well as the relationships among them into account. Based on the model, three propositions are developed and discussed.

1 INTRODUCTION

Profound transformations of organisations backed by information technology (IT) and the shift from traditional work to knowledge work (KW) (Kelloway et al., 2000) have substantially changed workplaces for many employees. From an IT perspective, increasingly complex data need to be handled in weakly-structured, highly diverse and fast-changing working environments. Software, designed to support traditional work, cannot entirely cope with the requirements of KW. Furthermore, traditional software development is slow and often delivering only a subset of or an approximation to the potentially useful and required functions.

Cherbakov et al. (2007, p. 2) describe end-user development of situational applications (SAs) as a trend promising to better meet the requirements of KW settings. A recent IBM survey shows that 12% of business employees and 42% to 68% of IT employees have already created applications to automate business functions outside official IT projects (Cherbakov et al., 2007, p. 3). Enabling the development and utilisation of SAs in a governed and secure environment is a promising approach to provide knowledge workers access to the software support they need while avoiding the negative effects of shadow IT.

The increasing presence of KW (Wolff, 2005, p. 37-42) and grassroots approaches in software development suggests rethinking existing models explaining the utilisation of software. In this work, we use the task-technology fit (TTF) model (Goodhue, 1995; Goodhue et al., 1995) as a conceptual basis for the analysis of the fit between SAs and tasks of KW. The applicability of SAs in KW settings will be discussed with a focus on the time needed to become proficient in a new position where most tasks can be characterised as KW.

Time-to-proficiency (TTP) is defined as the amount of time an individual spends in a new job environment before it is able to fulfil most tasks without help from colleagues or supervisors (Williams et al., 2004). Although numerous factors influence TTP (Morrison et al., 1992, p. 930ff), changes in routines and differences between positions are the most significant ones (Pinder et al., 1987, p. 348). Studies on potential savings resulting from reduced TTP have already been conducted in fields such as health care (Sullivan et al., 2003). The potential of reducing TTP by means of innovative IT has not yet been in the focus of research.

The goals of this paper are to discuss the applicability of SAs in KW settings as well as to construct propositions based on the TTF model. Section 2 explains the TTF model and its constructs focusing on the utilisation of SAs for KW. Section 3 presents three propositions based on the TTF model and section 4 concludes with proposals for evaluating the propositions.

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2 TASK-TECHNOLOGY FIT

The TTF model explains how technology leads to performance impacts (Goodhue et al., 1995, p. 215). The central dependent construct of the model is the individual's interpretation of the fit between a task and a technology. This fit is not only affected by the task and the technology themselves, but also by characteristics of the individual and, as it is not directly measurable, the user's evaluation of the fit is taken as a surrogate. It is assumed that a better fit leads to higher performance.

Within the scope of this work, the *task* is characterised as KW, the *technology* as either a traditional or a situational application and the *individual* as a digital native. Below, the TTF constructs and their operationalisation for this work are explained in detail. TTP is used as performance indicator.

Task. Tasks are actions performed by individuals to transform certain inputs into outputs (Goodhue et al., 1995, p. 216). They are characterised by their variety and difficulty (routine versus non-routine), interdependence (number of other systems to be integrated) and degree of hands-on character (flexibility to meet data needs and access routines) (Goodhue, 1995, p. 1833).

According to Schulze (2004, p. 46), knowledge workers distinguish themselves from non-knowledge workers along two dimensions: (1) they possess mostly abstract knowledge requiring high levels of formal education and (2) they produce new knowledge rather than merely manipulate knowledge. Maier (2007, p. 46f) describes KW as creative work, addressing ill-structured problems in complex domains with a high degree of variety using intellectual abilities and specialised knowledge, organised decentrally and requiring flexible, personalised IT support. Concerning IT support for KW, new challenges are complex synchronisation needs of mobile workspaces, information sharing within and across organisational boundaries as well as finding documents and messaging objects using heterogeneous formats and residing in a variety of distributed data sources.

Knowledge workers have to orient themselves in a dynamic and unpredictable environment requiring decisions driven by unexpected events and exceptions to documented processes. In summary, they face tasks which can be characterised not only as particularly non-routine and interdependent but also as exhibiting a high degree of hands-on character. Thus, following the line of Goodhue's (1995, p. 1833) argumentation, we can assume that knowledge workers find traditional applications less able to meet their needs than non-knowledge workers.

Technology. Technologies are tools used by individuals to carry out tasks. They are either computer systems or user support services (Goodhue et al., 1995, p. 216). We focus on software as technology for KW and distinguish between two types of applications: traditional and situational applications. Traditional applications usually address anticipated situations requiring planned responses. KW, however, is characterised by unanticipated situations which make unplanned responses necessary.

While developing and maintaining applications that meet the requirements of KW is expensive, the number of potential users per application typically is rather low. Thus, applications supporting KW usually have low priority for IT departments and knowledge workers often have no choice but to rely on shadow IT.

The approach to develop SAs diverges significantly from traditional methods (Cherbakov et al., 2007), allowing solutions that are far more flexible and dynamic than the ones available today. SAs are highly context-specific sets of functionalities, arranged and put into use by an end-user to perform certain tasks.

In traditional software development, development phases are well defined and follow an agreed procedure. Nevertheless, schedule overruns are frequent. With respect to SAs, there are no defined phases, milestones or schedules. The focus typically lies on good-enough solutions that address immediate needs. Developers of SAs usually expect short time-to-value from identifying needs to productive application use.

Functional requirements of traditional software are usually defined by a limited number of users. Developers need to finalise requirements specifications in order to move to design and implementation. Thus, changing business needs often lead to scope creep. SAs usually accommodate requirement changes caused by business changes. While resources are allocated to address concerns such as scalability and maintainability in traditional software development, there is little focus on non-functional requirements in the context of SAs. Thus, traditional applications are often more robust.

The characteristics of SAs make them particularly interesting for the needs of KW. SAs allow giving form-fit to solutions with a particular task in mind. DeSanctis et al. (1994, p. 125ff) differentiate between the spirit of software (i.e., the developers' intention) and the expectations of actual end-users. The union of software developer and software user

seems to be a particularly promising approach in the context of KW as the knowledge worker's world is not easily accessible to outsiders such as members of IT departments or external service providers.

Individual. Individuals, in the context of the TTF model, are the persons utilising technologies to assist them in performing tasks. They are characterised by their training status, computer experience and motivation (Goodhue et al., 1995, p. 215).

Members of the generation that grew up with the presence of the Internet are considered digital natives. They are currently joining the workforce and are supposed to have an unconventional attitude toward work (Cherbakov et al., 2007, p. 2). They (1) have different learning preferences than previous generations, (2) use a broad bandwidth of communication channels to enter social networks and access digital resources, (3) see themselves as providers of digital resources, not only as consumers, and (4) demand customised instead of one-size-fits-all solutions (Oblinger et al., 2005; Prensky, 2001).

Digital natives feel comfortable doing KW. They are used to join decentrally organised groups using flexible IT, proactively provide rather than only consume knowledge and are able to deal with problems with a high degree of variety. This enables them to better retain and use IT in creative and meaningful ways (Oblinger et al., 2005, p. 2.6).

The concept of the digital native has been criticised because of limited empirical evidence. It is argued that most of the characteristics can neither be seen as static, nor as generalisable throughout the population (Bennett et al., 2008, p. 780). Nevertheless, for this work, the concept is perceived to be a useful proxy for the *future employee* who might have an unconventional approach toward work.

3 PROPOSITIONS

The three propositions described below are based on the TTF model. The first proposition focuses on the adaptability of traditional applications and SAs as this attribute is assumed to be particularly important in the context of KW. With the second proposition comparing the fit between applications and KW in general, we go one step further and consider additional requirements of applications supporting KW. The third proposition focuses on TTP as a specific and relevant performance indicator.

Proposition 1: Situational applications better adapt to variations in tasks than traditional applications.

As mentioned above, KW is characterised by a dynamic and unpredictable environment, and a low level of standardisation. It addresses ill-structured problems in complex domains and requires flexible, personalised IT support.

In traditional software development projects, changing business needs often lead to scope creep. This typically results in overrunning the original project budget and schedule. SAs, however, can be adapted to changing business needs, not only in the stage of development, but also afterwards. SAs can be changed or reused as patterns for the developpment of new SAs. Additionally, the complexity of traditional applications makes it unlikely that developers and end-users have the same understanding of the intended purpose of an application. The union of developer and end-user in the case of SAs avoids the risk of misunderstandings between the two. This is not only important in the development phase, but also when applications are adapted to variations in tasks.

Knowledge workers in organisations where an ecosystem for SAs is in place have a clear advantage. Such ecosystems typically provide interfaces to internal information sources and facilitate sharing and reusing SAs.

Proposition 2: Situational applications better fit to knowledge work than traditional applications.

According to the TTF model, the task construct is characterised by the attributes routineness, interdependence and degree of hands-on character. Knowledge workers typically deal with a great variety of issues, non-routine, ad-hoc situations and are engaged in tasks that are interdependent with respect to other organisational units. SAs facilitate the access to as well as the integration of data from various sources. This is useful to accommodate interdependence in decentrally organised environments. KW also exhibits a particularly high degree of hands-on character as a considerable share of data that needs to be accessed is not available in a preprogrammed way.

Tasks exhibiting high interdependence as well as a high degree of hand-on character are better supported by SAs than by traditional applications. Knowledge workers often have to integrate data from several information sources within and beyond the organisation. Software reflecting the specific requirements and being flexible enough to exchange data with various other information systems is needed.

Traditional applications hardly offer the required features and interfaces. Additionally, SAs fit well to

the characteristics of digital natives who are appreciating flexibility and creativity.

Proposition 3: Situational applications result in shorter time-to-proficiency than traditional applications.

The focus on the most relevant features reduces the complexity of SAs and also contributes to improved time-to-value. Both result in shorter TTP, the former by constraining learning efforts and the latter by reducing the time to productive application use. While schedule overruns are an issue known from traditional software development, developers of SAs consider themselves satisfied once the application is good-enough to address an immediate need. Particularly digital natives appreciate flexibility and reduced TTP.

Short TTP is critical for knowledge workers in many respects. Becoming proficient quickly after joining a new organisation or after variations in tasks is a major challenge for knowledge workers. The reuse of SAs either with or without adjustments as well as the availability of a well-documented collection of electronically accessible information sources result in improved TTP. Because changes in routines and differences between positions are the most significant factors influencing TTP, giving employees the chance to reuse applications is likely to affects TTP positively.

4 CONCLUSIONS

In this paper, we discussed the applicability of SAs in KW settings. The discussion resulted in three propositions based on the TTF model. These propositions describe how the constructs task, technology and individual influence the user evaluation of the fit between tasks of KW and a traditional as well as situational applications. TTP was used as performance indicator.

In order to evaluate the propositions constructed within the scope of this work, we propose conducting (1) semi-structured interviews with human resource experts for a better understanding of TTP, (2) an experiment contrasting two groups of digital natives supported by SAs and traditional applications, respectively, using observations and questionnaires for data collection and (3) a field study observing employees taking up new positions in organisations providing an ecosystem suitable for the development and utilisation of SAs. This may result in new theories explaining in what respect and under what circumstances SAs can benefit organizations, not only with respect to TTP. To us, the TTF model seemed to be a good starting point.

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