Task Constraints as Determinants of E-Collaboration Technology Usefulness

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INTRODUCTION

As anyone who looks at the history of research on e-collaboration technologies can attest, much is yet unknown about the impacts of those technologies on people (Kock, 2005; Kock & D'Arcy, 2002; Kock, Davison, Ocker, & Wazlawick, 2001). The development and test of pioneering theoretical models from the 1970s and 1980s, such as the social presence and media richness theories (Daft & Lengel, 1986; Short, Williams, & Christie, 1976), has led to the realization that e-collaboration is a complex phenomenon. This perception of complexity has been met by the development of taxonomies, or classifications, of e-collaboration scenarios.

Since e-collaboration technologies have normally been used to accomplish tasks, hopefully with some advantages over plain face-to-face interaction, taxonomies of both e-collaboration technologies and tasks have emerged (Kock, 2005). The following natural step was the development of theories that proposed that certain types of e-collaboration technologies are better matched with certain types of tasks. Some of those theories hypothesized their e-collaboration technology-task fit links explicitly, which make them easier to test and refine, whereas others have not.

This article provides a brief review of one e-collaboration technology-task fit theory, and argues that it focuses (like most technology-task fit theories) on what can be accomplished through tasks, as opposed to what cannot—that is, the tasks' constraints. The article also argues that task constraints are important explanatory and predictive elements, illustrating that point through an example of a car racing team that employs text-based instant messaging for communication between pilots and support team during races.

BACKGROUND

Zigurs and Buckland's (1998) theory stands out among the task-technology fit theories that can explain and predict human behavior toward e-collaboration tools. The reason is the theory's clarity and parsimony, which are desirable components of any theory that aims to be testable. And, as Popper (1992) pointed out in one of his main contributions to the philosophy of science, a theory that is not testable is not very useful either.

The theory proposed by Zigurs and Buckland (1998) classifies tasks into five main types: simple tasks, problem tasks, decision tasks, judgment tasks, and fuzzy tasks. E-collaboration technologies are differentiated from each other based on three key dimensions, which can be measured in terms of the degree to which each dimension is present in a certain e-collaboration tool. The three dimensions are communication support, process structuring, and information processing. For example, an instant messaging system would provide a higher degree of communication support than a Web-based workflow control system, and a lower degree of process structuring. A group decision support system would generally provide a higher degree of information processing (the compilation, aggregation, presentation, etc., of complex information) than e-mail.

The theory proposed by Zigurs and Buckland (1998) is one of the best developed and, as mentioned before, testable theories of task-technology fit applied to e-collaboration. It highlights e-collaboration technology types and support dimensions that are arguably important in the decision to use this or that type of e-collaboration system (or this or that brand and model of e-collaboration system). The theory places emphasis on what e-collaboration technologies can offer to accomplish certain tasks.

One could argue, however, that the taxonomy of tasks proposed by the theory is missing one key element, which under some circumstances may be the most important in informing decisions to adopt a particular e-collaboration technology. That key element is, essentially, what the process by which the task is accomplished "does not allow"—that is, a task constraint.

GOLDRATT'S THEORY OF CONSTRAINTS

Goldratt's (1999) theory of constraints is perhaps the most popular theoretical model addressing the issue of task constraints, in the sense outlined above. Perhaps its popularity is due to the fact that it was first presented as a best-selling novel titled "The Goal" (Goldratt & Cox, 1986), where a business process improvement consultant helps a manufacturing plant manager deal with a number of professional and personal problems.

The underlying theme of Goldratt's (1999) theory of constraints is that the productivity and quality of the outcomes of a process, by which a task is accomplished (e.g., the process of assembling a car), are strongly determined by the process' constraints. For example, the speed through which cars will be produced by an assembly line is much more strongly defined by the speed of the slowest and more laborious step in the car assembly process than by the faster and simpler steps. In other words, if fitting the windshields is more problematic and takes longer than fitting the doors to the car's main body, then someone looking at improving the process ought to look at the windshield-fitting step more carefully than at the doors-fitting step. This is a very simple idea, but with key implications for decisions related to what e-collaboration tools to use to support one task or another.

A CONSTRAINTS-BASED VIEW OF TECHNOLOGY USEFULNESS

The idea of looking at collaborative tasks from a constraints perspective is not new. For example, Trevino, Daft, and Lengel (1990) already pointed out as part of their symbolic interactionist view of communication media selection and use that a key collaborative task constraint, namely the geographic distribution of the collaborators, strongly influences the decision to which e-collaboration technology to adopt, and how the collaborators view and use the technology.

What is not present in much of the e-collaboration research is a concern with low-level constraints (e.g., task-specific, rather than task-type specific) posed by collaborative tasks. This may be one of the reasons why low-level technology attributes (e.g., system-specific, rather than technology type-specific), are not usually addressed in e-collaboration research. (See, e.g., Markus, 2005, for a more elaborate discussion on this, from a slightly different angle). Low-level collaborative task constraints can influence much more strongly the decision of which e-collaboration technology to use to support the task, as well as the expectations of the technology users and their success in accomplishing the task.

AN ILLUSTRATION: CAR RACING AND INSTANT MESSAGING

Instant messaging is an e-collaboration technology that has been steadily gaining ground in business circles, although its use is still far less widespread than that of e-mail. Instant messaging allows for synchronous communication in a chat-like manner, with a much higher level of interactivity than e-mail (which is primarily used for asynchronous, or time-disconnected, interaction).

Arguably, one of the reasons why instant messaging is not more widely used is that there is another technology that enables synchronous communication and that seems to be better adapted to the design of our biological communication apparatus (Kock, 2004). That other technology is the telephone. We human beings seem to be able to communicate much more easily in an oral fashion than by typing and reading text through computers, which makes text-based instant messaging a somewhat cumbersome alternative to the telephone. Even desktop conferencing using audio only, or audio and video, is likely to be perceived as more natural than instant messaging by the vast majority of us.

But certain task constraints can significantly tip the balance in favor of instant messaging. Take for example the case of the Chip Ganassi Racing team, described by Betts (2004) in a *Computerworld* magazine article. Members of the Chip Ganassi Racing team, which competes in the NASCAR and Indy Racing League, were looking for an alternative to voice communication with the racing car drivers.

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