EDITORIAL PREFACE

Car Racing and Instant Messaging:
Task Constraints as Determinants of e-Collaboration Technology Usefulness

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ABSTRACT

Pioneering theoretical work conducted in the 1970s and 1980s led to key testable theories of e-collaboration. Many empirical tests followed, serving to establish e-collaboration as a distinct field of research. Those theoretical tests led to the generalized perception that e-collaboration phenomena were more complex than originally predicted and to the search for new theoretical frameworks. Task-technology fit theories emerged, which focused more on what could be accomplished through tasks than what could not (i.e., task constraints). Here, task constraints are presented as strong determinants of the identification of best fit between e-collaboration technologies and tasks. An illustrative example is provided of a NASCAR and Indy car racing team's use of instant messaging over a wireless network during races. This article explores some ideas that could lead to the development of theories that place emphasis on the surfacing of task constraints as a basis for the selection and use of supporting e-collaboration technologies.

Keywords: *e-collaboration; organizational communication; physical constraints; task-technology fit; theory of constraints*

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. 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 et al., 1976), have 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 normally are used to accomplish tasks, hopefully with some advantages over plain face-to-face interaction, soon taxonomies of both e-collaboration technologies and tasks emerged. 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.

A TASK-TECHNOLOGY THEORY OF E-COLLABORATION

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 that the theory's clarity and parsimony are desirable components of any theory that aims to be testable. 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 generally would provide a higher degree of information processing (the compilation, aggregation, presentation, and so forth 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 previously. Perhaps its popularity is due to the fact that it first was 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 determined strongly by the process' constraints. For example, the speed by which cars will be produced on an assembly line is defined much more strongly by the speed of the slowest and more laborious step in the car assembly process than by the fastest and simpler step. In other words, if fitting the windshield 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, et al. (1990) already pointed out as part of their symbolic interactionist view of communication media selection and use that a key collaborative task constraint (i.e., the geographic distribution of the collaborators) strongly influences the decision of 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) usually are not addressed in e-collaboration research (see 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 steadily has been 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 instant messaging is not used more widely 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 tele-

phone. 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.

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.

Voice communication through radio was problematic, not only because it was difficult to find a usable radio channel but also because of the background noise coming from the driver's car as well as other cars. These are two key constraints that are inherent in the car-racing task. The solution was instant messaging communication between the crew and the drivers, using an encrypted wireless LAN.

In this example, the task constraints (i.e., difficulty finding a usable radio channel and the background noise coming from the driver's car as well as other cars) were stronger determinants of the choice of e-collaboration technology used than other elements (e.g., perceive communication medium naturalness). Moreover, the task constraints seem to have been more decisive in the choice of technology to be used than the general type of the task.

CONCLUSION

This article looks at attempts at task-technology fit theorizing targeted at understanding and predicting e-collaboration phenomena. Those attempts have led to theories that proposed that certain types of e-collaboration technologies are more appropriate for certain types of tasks than other e-collaboration technologies. Among those theoretical efforts, Zigurs and Buckland's (1998) stands out for its resulting theoretical model's clarity, parsimony, and testability.

This article calls for a careful look at task constraints when identifying the best fit between an e-collaboration technology and a task. This perspective seems to be missing in Zigurs and Buckland's (1998) as well as other task-technology fit theories addressing e-collaboration phenomena. In fact, rarely does one see theoretical frameworks that address task constraint issues as determinants of e-collaboration technologies selection and use.

The goal of this article is not to develop a new theory of e-collaboration based on task constraints, something that would require significantly more space than available here. The main goal here is to point out that such a theory (or theories) can be developed and to explore some ideas that could lead to the development of such a theory (or theories). As pointed out by Markus (2005), "[T]echnologies pose problems for users who want to use them to accomplish particular goals; the solutions users create for those problems during recurrent use may exhibit certain regularities across different contexts" (p. 1). Hypothesizing about such regularities in the context of certain types of task constraints arguably will be the main outcome of related theoretical pursuits.

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