

Chapter 1

Multitasking Bar: Prototype and Evaluation of Introducing the Task Concept into a Browser

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ABSTRACT

This chapter clarifies two common patterns of multitasking on the Web, namely Multiple Tasks (MT) and Multiple Session Task (MST). Multi-Tasks (MT) is defined as executing a set of tasks simultaneously where the execution often depends on bundles of Web pages. Multi-Session Task (MST), on the other hand, is defined as executing a single task spanning multiple Web sessions. To support both of these, the task concept needs to be introduced into a browser. An online pilot survey has revealed which attributes of the task concept are most significant to Web users, and as a result, a simple prototype, the Multitasking Bar (MB), has been proposed based on these findings. The MB copes with the multitasking needs of both MT and MST in the browser by providing functions for task related Web page management and task schedule management. A two-session controlled experiment has been conducted to evaluate the MB and to compare user performance and experience when multitasking on the Web with and without support for MT and MST. Results show that support for both MST and MT significantly improves user task performance efficiency and greatly enhances the user experience when multitasking on the Web.

INTRODUCTION

Currently with the ubiquity of the Internet, we are doing more and more of our jobs online (UCLA, 2003; USC, 2009; GVVU, 1998), with the most important workplace for these jobs be-

ing the browser. On the other hand, humans are naturally multitasking beings, often either doing several tasks simultaneously and alternatively, or executing a single task through several working sessions. For instance, there are several reports in the literature that a great many managerial tasks can be characterized by their brevity, variety, and fragmentation (González & Mark, 2004; Mintz-

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berg, 1970, 1980). This leads to simultaneously executed activities, interruptions and resumption of tasks both on and off the Web (Mayer, 2007, p. 173-278). Meanwhile, a diary study of knowledge workers has identified an average of 50 task shifts per person during a typical working week (Czerwinski, Horvitz, & Wilhite, 2004, p. 175-182), and a log study has identified an average of 3.74 e-mail or IM-driven task shifts per hour, taking between 8 and 10 minutes on average for the person to return to the interrupted task (Iqbal & Horvitz, 2007, p. 677-686).

Cognitive psychologists have studied many aspects of multitasking or task switching, providing several definitions of multitasking (Carlson & Sohn, 2000; Miyata & Norman, 1986, p. 265-284). Just et al. (2001) and Rubinstein et al. (2001) stated that multitasking is the ability of humans to handle simultaneously the demands of multiple tasks through task switching, and that it allows people to cope with ever increasing complex environments by handling multiple tasks through task switching (Burgess, 2000, p. 465-472; Lee & Taatgen, 2002, p. 572-577). We follow these definitions in this chapter and concentrate especially on tasks that depend on Web resources, typically Web pages. When users multitask while working on the Web, they switch among several tasks running simultaneously, often suspending and then resuming their task(s). In doing so, they tend to follow one of two common patterns, which we define as Multi-Tasks (MT) and Multi-Session-Task (MST). In this chapter, Multi-Tasks (MT) is defined as the pattern of executing a set of tasks simultaneously, where the execution often depends on bundles of Web pages. MST on the other hand, is the pattern of executing a single task spanning multiple Web sessions (as in MacKay's [2008] definition). For example, whilst shopping on an e-commerce web site, and doing other task(s) on the Web at the same time, i.e., planning the itinerary of a vacation, constitutes MT. Furthermore, the shopping task is classed as an MST if it spans more than one Web session; in other words, if at

some point the browser is closed and the shopping task temporarily suspended, and then later resumed in a new instance of the browser.

These patterns of MT and MST in Web use are very common, and have frequently been reported in the literature. Spink et al. (2002) found that multitasking information seeking and searching is common human behavior as many IR system users conduct information seeking and searching on related or unrelated topics. The study by Sellen et al. (2002) of knowledge workers' Web use reported that 40% of the "information gathering" activities they observed were not completed in a single sitting, often due to external interruptions. MacKay and Watters (2008) found that users with tabbed browsing typically worked on several tasks during a single web session. Morris et al. (2008) presented evidence that users often conduct multi-session tasks, such as Web investigations, and they also found that "such tasks are not adequately supported by current tools."

In summary, there is significant evidence that both MT and MST are typical patterns of Web use, and should be well supported by browsers. This means that there should be some effective functions within the browser to help users manage tasks whilst multitasking on the Web, including functions for managing bunches of Web pages for corresponding tasks both simultaneously and across Web sessions, and functions for managing a task's status and schedule. For example, in the aforementioned shopping example, while shopping online a user may browse several related web pages simultaneously. Some pages may be commodity pages from the actual e-commerce site, while others may be web pages from other sites about these commodities, such as user comments, background information, and reviews. In this situation, all these web pages comprise a bundle of resources forming the context for the user's shopping task. Consequently, this resource bundle should be able to be saved, found, and restored as a whole whenever needed. Furthermore, when work is done on more than one task, the browser should

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