Supporting Behavioral Differences and Changes in Personal Task Management

Mona Haraty

University of British Columbia

201-2366, Main Mall,

Vancouver, British Columbia, Canada

haraty@cs.ubc.ca

Abstract

Research on personalization has mostly focused on improving low-level aspect of user's performance (e.g. time to access a command) or automating tasks for accommodating the different needs of individuals. Thus, the results of that research has often led to the design of personalization facilities that allow users to accomplish their goals *faster.* While this is a valuable outcome, personalization research has given little attention to supporting individual differences beyond those related to user's performance.

For my PhD research, I explore 1) behavioral differences in the context of personal task management, and 2) the design of personalization facilities that can accommodate such differences.

Author Keywords

Personalization; customization; change in behavior; individual differences; personal task management.

ACM Classification Keywords

H.5.2 [Information Interfaces and Presentation]: User Interface.

Introduction

People have different needs and preferences when using software tools to perform their daily activities such as managing tasks. Moreover, people's behaviors change over time, both due to their changing needs and desire to improve (e.g., their effectiveness). Thus, it is important for the tools that are increasingly becoming part of peoples' daily lives to accommodate these individual differences and behavior changes over time. Otherwise, people will be forced to live a '*default life*' dictated by their tools.

Individual differences and the importance of designing user interfaces that are capable of catering to a wide range of users have been discussed in the HCI literature [6]. The focus of most of that work has been on general differences such as differences in cognitive abilities (e.g., visual working memory); their goal is often to understand the mapping between individuals' abilities and their performance in using different types of interfaces (e.g., [8,12]). Such mapping informs the design of adaptive interfaces that can accommodate individual differences, for example by adapting the interface based on performance scores.
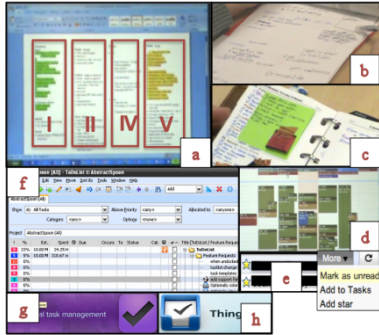
Figure 1: Selection of PTM tools of participants who participated in the field study and focus group. (a) P1's "Matrix To-do" list in a Word document comprised of 4 columns: (I) personal tasks, high priority ones highlighted in green, (V) work-related tasks, high priority ones in yellow, (II+IV) low+medium priority work-related tasks, (b) P2's task list on a paper, (c) P3's paper planner, (d) Google Calendar, (e) Email, using star or "mark as unread" to record tasks, (f) AbstractSpoon, (g) OmniFocus, (h) Things.

There are, however, individual differences that are beyond those related to user performance; we refer to them as behavioral differences. For example, studies of PIM have often reported behavioral differences in the PIM context (e.g., different strategies among individuals in managing email). Many of these studies have pointed to the need for personalized PIM tools (see [9] for a review). However, the design of such tools for accommodating behavioral differences is largely unexplored. This reveals a gap in personalization research, which has focused mostly on improving low-level aspects of user performance (e.g., the time to access a command) [1,4], and less on accommodating behavioral differences or supporting changes in behavior over time.

In my PhD, I aim to fill this gap in the domain of personal task management (PTM), which has been relatively less studied compared to PIM. In the few existing PTM studies (e.g., [2,3]), behavioral differences are often not systematically analyzed.

Keeping track of things we need to do is a common human activity, and the plethora of existing e-PTM tools reflects the need for supporting tools. However, previous research has reported low adoption rate of these tools [3]. We hypothesized that this low adoption could be due to individual differences in how people manage their tasks and that the existing e-PTM systems do not adequately accommodate those differences. Although open source PTM tools (e.g. Taskfreak) are user extensible and personalizable, they require their users to have some knowledge of programming to do so. Thus, the next phases of my research involve exploring the design of personalization facilities and end user programming environments for providing an appropriate level of flexibility needed for accommodating behavioral differences in PTM. End user programming research has proposed several approaches such as visual programming languages and programming by example to remove the need to program, which can inform this phase of my work. Design of such facilities and environments needs to be informed by studies of behavioral differences and changes in PTM which constitute part of the research that I have conducted so far [11].

Research Goals and Methods

My primary PhD research question is how to accommodate *behavioral* differences and changes in idiosyncratic human behaviors such as PTM. I have the following goals which are partially completed.

Goal-1: *Understanding behavioral differences in how people manage their tasks.* [Completed, GI'12]
To accomplish this goal, we conducted a focus group (7 participants) and a field study (12 participants) in an academic setting [11], Figure 1. The data from this study was analyzed using a grounded theory approach. We identified three types of users based on two criteria: (1) whether or not their primary PTM tool was a dedicated e-PTM tool, and (2) whether or not they personalized their primary tools. The three types of users were: adopters (using dedicated e-PTM tools), do-it-yourselfers (DIYers) (using general tools and personalizing them), and make-doers (using general tools without personalizing them), Figure 2. Among other things, we were surprised to learn that the majority of participants were DIYers (11/19), half of whom had already tried dedicated PTM tools before settling as DIYers. This implies a mismatch between the needs of the majority of people and existing dedicated PTM tools, offering a possible explanation for the low adoption of these tools.

Figure 2: Three approaches to PTM. The number of participants in each group is illustrated (*N*=19).The examples of dedicated e-PTM tools used were OmniFocu, AbstractSpoon, Google Tasks. Non-dedicated PTM tools were paper and pen, word document, or text file.

Goal-2: *Understanding PTM changes and the reasons behind them.* [Completed, under submission]
How PTM behavior changes over time is one aspect of individual differences that we did not explore in our field study. As a follow up, we used a survey (178 respondents) to elicit PTM changes and their reasons. Another goal of the survey was to assess the generalizability of our findings of the field study with a broader sample that included people with various occupations.

In the analysis of PTM changes in our survey, we identified different types of changes that occur in PTM behaviors: within-tool, between-tool, and strategy changes. We characterized four types of triggers that prompt people to make changes in their PTM behaviors, and the interplay between those triggers, PTM needs, and PTM systems. The triggers were 1) mismatches between PTM needs and a PTM system, 2) negative feelings caused by a mismatch, 3) poor PTM performance also caused by a mismatch, and 4) opportunities for enhancement to a PTM system.

Goal-3: *Exploring the design of personalization facilities that can accommodate behavioral differences in PTM as well as PTM changes* [In Progress]. The design explorations will be based on the design implications that emerged from my previous studies as well as prior PTM work. I aim to apply Meta-design principles [7] at this stage to design an open system for giving enough flexibility to users who would like to design their own tool (DIYers), while users who are not willing to invest any time in personalizing (Make-doers) will still benefit from it.

Based on the triggers to change that we identified in our survey study, we propose a multi-stage approach

whereby the tool works with the user in a mixed-initiative way: I) to diagnose the underlying mismatch that is prompting the user to make a change, and II) to provide solutions to that mismatch, relying on a social infrastructure. Currently, I am exploring the design of different components of such mixed-initiative PTM system: a diagnosis component, a help component, and the integration of a social infrastructure within the system. The diagnosis component is aimed at helping users to find the underlying mismatch between their needs and their system. One aspect of this component is to encourage users to reflect on the effect of such mismatch on their feelings and their performance. Our hypothesis is that reflecting on one's behavior cause users to customize their tools, see [10] for our more detailed argument on reflection and customization.

The help component is aimed at helping users to make their desired changes. As mentioned earlier, this type of personalization is largely unexplored and thus, the design of help systems for such personalizable tools is also unexplored. Help systems research can inform this aspect of our work (e.g., [5]).

Finally, I will explore the integrating of a social infrastructure (e.g. a forum) within personalizable e-PTM tools. We suggested that a tight integration would enable the tools to provide users with PTM strategies and customized artifacts (e.g., a customized task list layout), which are shared by others.

Goal-4: *Assessing the effectiveness of the proposed personalization facilities in 1) accommodating behavioral differences, and 2) accommodating changes in PTM* [Next step]. To achieve this goal I will first assess some of the design decisions such as decisions around user-initiation of the mixed initiative approach,

when exploring the design of the diagnosis component, by conducting experiments in ecologically valid settings. Then, I will conduct a longitudinal study of the designed personalizable PTM tool to assess how well it accommodates behavioral differences in PTM and how well it supports users through changes in their PTM behaviors. The effectiveness of our tool will be assessed by the variety of uses of the tool by different users and the extent to which users can adapt their tool to their own way of managing their tasks.

Expected Contributions
- Characterization of behavioral differences in PTM
- Characterization of changes in PTM over time
- Design and evaluation of personalization facilities for accommodating behavioral differences and changes in PTM

Research Situation
I am in the middle of my PhD, in Computer Science Department at UBC. I have almost two years ahead before my graduation. Currently, I am at the stage of writing my thesis proposal, which I plan to defend in February 2012.

Acknowledgement

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