

# Toward Designing Personalized Task Management Tools

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## ABSTRACT

A plethora of electronic personal task management (e-PTM) tools have been designed to help individuals manage their tasks. There is a lack of evidence, however, on the extent to which these tools actually help. In addition, previous research has reported that e-PTM tools have low adoption rates. To understand the reasons for such poor adoption and to gain insight into individual differences in PTM, we conducted a focus group with 7 participants followed by a field study with 12 participants, both in an academic setting. This paper describes different behaviors involved in managing everyday tasks. Based on the similarities and differences in individuals' PTM behaviors, we identify three types of users: adopters, make-doers, and do-it-yourselfers. Grounded in our findings, we offer design guidelines for personalized PTM tools, which can serve the different types of users and their behaviors.

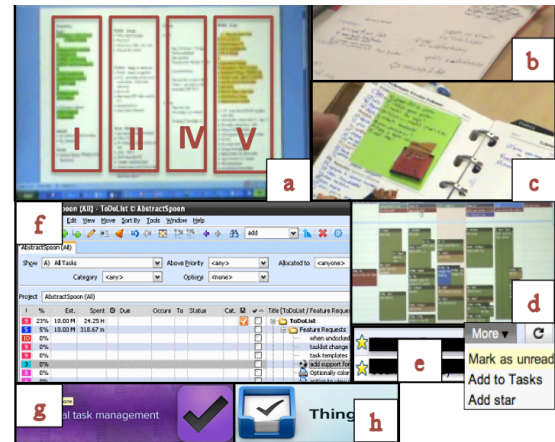
## Author Keywords

Personal task management, personal information management (PIM), individual differences, personalization, grounded theory, field study, contextual interviews

## INTRODUCTION

Keeping track of the things we need to do is a common human activity. Although a plethora of electronic personal task management (e-PTM) systems such as Things (task management on Mac), RTM (<http://www.rememberthemilk.com>), and Google Tasks have been developed to support this activity, there seems to be little convergence in the market. Blandford et al. documented in 2001 that most users adopt general-purpose tools such as bits of paper and use mobile phones for their prospective remembering tasks [2]. Now ten years later, based on our own casual observation, the adoption of e-PTM systems does not appear to be any higher. We suspect that existing e-PTM systems do not adequately accommodate the needs of a broad range of people. This points to a need to understand individual differences in PTM, and to the opportunity to design a personalized PTM system that is more appropriate for a wide range of users.

There has been previous research on how people manage their



**Figure 1: Selection of participants' tools for PTM. (a) Kirsten'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) John's task list on a paper, (c) Mary's paper planner, (d) Google Calendar, (e) Email, using star or "mark as unread" to record tasks, (f) AbstractSpoon, (g) OmniFocus, (h) Things.**

tasks. For example, Bellotti et al. studied how busy professionals manage their tasks [1]. Our study is similar to their study but with a different population; however, our analytic approach differs in that the primary lens through which we viewed the data was that of individual differences. The goal was to understand the similarities and differences in individuals' PTM behaviors with a longer-term goal of designing personalized PTM systems.

To accomplish our goal, we conducted a focus group and a field study, which relied primarily on contextual interviews.

In this paper, we present some of the findings of these studies. First, we report the three types of users that we identified based on their approach to PTM. Second, we report on one of the PTM behaviors, making task list, which is part of a larger group of behaviors, namely, recording tasks. Finally, grounded in our findings, we offer design guidelines for personalized PTM systems, which can serve the different types of users and their respective behaviors.

## STUDY METHODOLOGY

In the field study, data collection was done through semi-structured contextual interviews. These interviews were conducted in the place where participants do most of their PTM activities such as their offices.

We asked participants to show us their PTM tools, to talk about how they used them, and to describe how they liked and/or disliked them. The length of each interview was between 30 minutes to 1 hour. All the interviews were audio-recorded. We used grounded theory, a systematic approach to analyzing qualitative data, for data analysis. All 19 participants from the focus group study and the field study were included in the analysis.

Table 1 summarizes the participants from both the focus group and the field study.

## FINDINGS

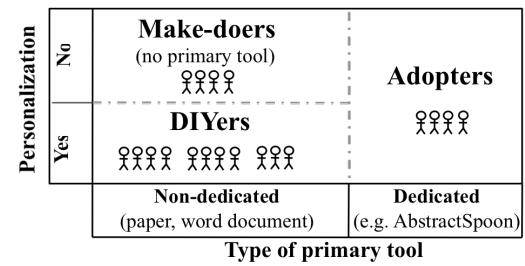
In this section, first we describe the three types of users that we identified. Second, we present the PTM behaviors we observed and discuss one of them in detail.

### Approaches to Personal task management

We asked participants about what they used for managing their tasks. Participants often used multiple tools in combination, as shown in Table 1, to satisfy their collective PTM needs. The tools used for PTM ranged from highly general tools, both

P	Degree	Sex	Tools used for PTM	PTM Approach
Mary	Ugrad	F	<b>Paper planner</b>	DIYer
John	Ugrad	M	<b>Pieces of paper, Notepad, iCal, email</b>	DIYer
Alex	Ugrad	M	<b>Paper, email, alarm</b>	DIYer
Melony	PhD	F	<b>Word document, Notebook, Google Calendar, cellphone, alarm</b>	DIYer
Ryan	PhD	M	<b>OneNote, Microsoft Outlook</b>	DIYer
Julia	PhD	F	<b>Paper</b>	DIYer
Kirsten	Faculty	F	<b>Word document, Google Calendar</b>	DIYer
Chad	MD	M	<b>Microsoft Excel, Word, Google Calendar and Tasks, iPhone calendar</b>	DIYer
*Aaron	PostDoc	M	<b>Paper, calendars</b>	DIYer
*Nathan	MSc	M	<b>Wiki, Paper notebook, Mendeley</b>	DIYer
*Vicki	MSc	F	<b>Word document, Paper notebook, sticky notes</b>	DIYer
Henry	MSc	M	<b>AbstractSpoon, Email (Gmail), Google Calendar, Smartphone (Calendar)</b>	Adopter
*Andrew	PostDoc	M	<b>Things (on Mac), Google Calendar</b>	Adopter
*Mike	MSc	M	<b>Google Tasks, Email, Google Calendar, Whiteboard, wiki</b>	Adopter
*Kevin	MSc	M	<b>OmniFocus (on Mac &amp; iPhone), Email for collaborative PTM</b>	Adopter
Bill	Ugrad	M	Paper notepad, iPod Touch (Calendar, Notepad, ListPro)	Make-doer
Tanya	MSc	F	Email, Google Calendar	Make-doer
Alice	PostDoc	F	Calendar (Google, iphone), Post-it notes, notebook	Make-doer
*Brian	PhD	M	Google Calendar, Firefox Tabs, text files	Make-doer

**Table 1: Field study participants and focus group participants (distinguished by\*), their degree levels, the tools they used for PTM, and their identified approach to PTM—Participants' names are fabricated—Participants' primary tools are in bold.**



**Figure 2: Three approaches to PTM. The number of participants in each group is illustrated (N=19).**

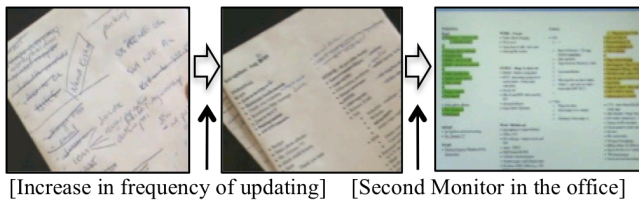
traditional (e.g. paper & pen) and electronic (e.g. Word document), to tools that provide some PTM support (e.g. email), to tools that are dedicated to PTM (e.g. AbstractSpoon). On a different dimension, we found that participants who were using general tools for PTM (e.g. paper & pen) differed from one another with respect to their investment in personalizing those tools. Given the similarities and differences we found among the participants, three types of users emerged, 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 are: 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). The majority of our participants were DIYers (11), with the remaining divided evenly between adopters (4) and make-doers (4). Figure 2 illustrates these three groups of users. Each group is described below.

### Adopters

The primary tools of adopters were dedicated e-PTM tools (e.g., AbstractSpoon), which are generally not very flexible in terms of supporting personalization. Adopters differed with respect to the level of their investment in choosing their tools. For example, Henry chose his PTM tool by trying a number of different PTM applications in a single session: *“there was one time that I downloaded tons of task lists software and then tried all of them out and this [AbstractSpoon] was one of them and this was the best that I liked”*. Mike, on the other hand, had tried approximately twenty PTM applications over a course of five years before finally deciding to use Google Tasks. When asked what he disliked about all these tools, he pointed out that they were not integrated with other tools that he had been using for PTM (e.g. email, calendar) and he disliked their inflexibility, which had forced him to adapt his PTM behavior to the way the tool required.

### Do-it-yourselfers (DIYers)

The primary tools of DIYers were general-purpose tools either paper-based such as traditional pen & paper and paper planners, or electronic such as Word and Notepad documents. They designed their own PTM system by personalizing these tools based on their own personal rules for recording and remembering their tasks as well as maintaining and organizing their task list. Five out of 11 DIYers settled as DIYers after trying to adopt a number of dedicated PTM applications. For example, Kirsten said about her PTM system, which was a Word document illustrated in Figure 1-a: *“this is the best system that I’ve had to-date, after trying a number of different*



**Figure 3: Changes in PTM behaviors**

systems [...], it works for me". Similarly, Mary who used a paper planner says: "[...] on my phone, I tried a whole bunch of to-do list apps, there was like Wunderlist: that one has a desktop app too so I tried both of them. But [...] 'cause there was a whole bunch of to-do list apps, and none of them is quite what I need. And it's kind of confusing to have to relearn stuff, so I was just like "forget it!" Paper is so easy! 'cause I can configure it to however I want to do it".

Mary designed her own PTM system using a paper planner and Post-it notes (Figure 1-c). She essentially personalized her paper planner. For example, due to the limited space in her paper planner for each day, she added Post-it notes to relevant days for additional tasks that did not fit in the space provided by the planner. To overcome the added effort of manually entering recurring tasks every week or month, she put these tasks on a Post-it note so that they could be easily moved to another week or month. Also, since paper planners naturally enforce every task to be associated with a date, she used Post-it notes for time-independent tasks, so that she could also easily move them around without having to rewrite them.

DIYers personalized their tools, therefore they were able to make changes to their tools to better accommodate changes in their PTM needs. We found that external factors such as changes in one's job and having a second monitor were two possible factors that could alter PTM needs. Kirsten, for example, transitioned gradually from a manual weekly to-do list to creating and printing lists from a word processor, because her lists changed so frequently and manual edits became too time-consuming. Although she made a digital list, she kept on printing until she got a second monitor: "so without the screen, I wanted my to-do list to sit here 'cause I wanted to be able to say: what should I be doing now? What am I supposed to be working on now?" Once she had her second monitor, she stopped printing the list because she could view it while working on other things on her primary monitor (Figure 3).

#### **Make-doers**

Make-doers did not use any dedicated PTM tools. The tools they did use were similar to DIYers'; they used email, calendar, and other general tools such as paper & pen and text files. However, unlike DIYers, they used such tools without personalizing or making any changes to them. For example, when using electronic calendars, which provide a reminding mechanism, none had even changed the default settings of the reminders for any of their tasks. Despite this, 2 out of 4 complained that the default reminder was set to *only* ten minutes ahead of a scheduled task.

Two out of 4 make-doers settled as make-doers after trying Google Tasks, a dedicated PTM system, which they had both

stopped using after a while. When asked for a reason, Brian, who had tried to use Google Tasks only because it was integrated into his email, said: "*part of it was that it wasn't easy to have a clean integration with calendar... another part was that it was in my gmail and at some point I didn't want it to be always visible because of visual clutter...and then I totally forgot about the tasks that were there. I used Google Tasks for the tasks that did not have a specific time, most of my urgent tasks were in the calendar. But, ultimately, I wanted to have all tasks in both [Google Tasks and Calendar] in some form*".

#### **Personal Task management behaviors**

We observed a set of common PTM behaviors among our participants, which we categorized into three groups: 1) recording tasks, 2) remembering tasks, and 3) maintaining and organizing task lists. The behaviors relevant to recording tasks include making task lists, distributing tasks across multiple tools, and estimating task completion time. In this paper, we only describe one of these behaviors, making task lists, and compare and contrast it among the three types of users.

##### **Recording tasks: Making task lists**

Making task lists was a prevalent PTM behavior among adopters and DIYers. Dedicated PTM tools imposed the format of adopters' task lists, giving them limited formatting flexibility. However, we found a variety of formats among DIYers' lists that reflected the influence of factors unique to each individual. Although making task lists was not a dominant behavior among make-doers, if they happened to do so, they would choose the most readily available tool which was likely paper, digital document, or email and there would be no rules as to where and in what order to put tasks in their lists. When we asked the participants how often they made to-do lists, responses varied from daily, weekly, monthly, to "*whenever an overwhelming amount of details exists to remember*". We found that the frequency of making lists was highly influenced by the level of busyness in a particular period, and the medium of their tool, whether it was digital or paper-based. In our analysis, we extracted several aspects pertinent to making lists such as the level of task details, use of colour, and use of space. In the following, we report on the use of space.

>>*Use of space:* Whenever a tool allowed, DIYers exhibited a variety of uses of space in making their task lists. For example, we found various uses of space in a piece of blank paper or a plain Word document. One common use was differentiating tasks from notes, which we observed through two distinct examples: 1) adding some notes to a paper list by creating a box in the corner of the paper (Bill), and 2) dividing a paper in half such that the left side includes the days of the week and their corresponding tasks, and the right includes any kind of notes, either relevant or irrelevant to the tasks on the left (Figure 1-b). Two other common patterns were 1) dividing a list into multiple columns, each representing a different category of tasks, and 2) placing high priority items at the top and low priority ones at the bottom. This division of tasks into different regions of a page with respect to various criteria such as viewing frequency or priority was an attempt to make optimal use of available space [4] and attention. However, participants' behavior with respect to use of space was not

always persistent. Running out of space and the difficulty to place every task legibly in one view were two reasons for non-persistent behavior in the use of space.

## DISCUSSION AND DESIGN IMPLICATIONS

One finding that stands out strongly is that, despite the plethora of tools now available, dedicated e-PTM tools have missed the majority of potential users among those in an academic setting who have become DIYers or make-doers. Only one fifth of our sample (4/19) were using a dedicated e-PTM tool at the time of the study (Table 1), despite most of our participants having tried multiple ones in the past. We offer several implications for the design of e-PTM tools that could lead to greater tool adoption among users who share characteristics with the population we studied.

*Evolve with users' changing needs through add-on functionality.* User needs evolve and we saw that a tools' failure to accommodate the new needs often caused our participants to change their tools. For example, as reported in the results section, an increase in the level of Kirsten's busyness caused her transition from using paper for making manual to do lists to using Word processor for making digital lists, since manual edits were too time-consuming. Another example of an evolving need was Mike's need for his PTM tool to integrate with Google's products, since he had found himself using Gmail and Google Calendar for his PTM. One possible way for PTM tools to accommodate evolving needs is through an add-on approach: to provide a repository of functions and allow users to add functions from that repository, as they need them. This approach is similar to a multiple interfaces approach, in which the user starts with a small personalized interface and can add features from a full set of functions, as needed [5].

*Meta-design for DIYers.* Meta-design is "designing for designers" [3]; it is based on the basic assumption that users will find mismatches between their needs and the support provided by a system at use time, so considerable flexibility must be built into the system at design time so that users can construct their desired functionality. The high proportion of DIYers (11/19) in our sample suggests that many people are interested in using flexible tools such as paper and digital documents so that they can do PTM their own way, applying their own rules as to where to write their tasks, what details to write, and how to write them. However, since existing e-PTM tools do not provide such flexibility, some people resort to paper and digital documents. Meta-designed PTM tools would provide this flexibility, and DIYers are likely to invest the time necessary for set up, just as they are willing to invest time in personalizing their current PTM tools. Meta-designed tools could provide a basic infrastructure for supporting PTM behaviors such as setting task notifications.

*Utilize affordances of everyday tools in support of PTM.* PTM tools support PTM behaviors differently, most notably in the

effort that they require. For example, recording a task can be performed by writing on paper, typing into a digital document, marking an email, leaving a web-page open, or entering a new task into a dedicated PTM tool. Recording a task received by email requires only marking the email message (a single click) to record it within the email client, whereas to transfer it to a paper to-do list requires more effort. Many of our participants, especially the make-doers, chose their PTM behaviors based on the ease of the required action. We encourage designers to consider existing tools' affordances and utilize them to support the PTM behaviors with minimal effort.

## CONCLUSIONS AND FUTURE WORK

We presented the findings of a focus group and a field study aimed at investigating individual differences in PTM behaviors. 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 (using general tools and personalizing them), and make-doers (using general tools without personalizing them). One of the interesting findings of this study is 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. The results of this research yield insight into the design of personalized PTM tools for accommodating the needs of a wide range of users. To test the generalizability of our findings beyond people in academic setting, we are conducting a survey with a broad sample, which will include people in various occupations.

## ACKNOWLEDGEMENT

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