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Knowledge Worker Adoption of Time Management Tools: Satisfaction and Perceived Effectiveness

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ABSTRACT

The knowledge worker of today is faced with increasing complex scheduling demands. Employees are put on multiple teams working on a variety of different projects, which have various tight and important deadlines. In addition, they are called into regular and ad hoc meetings with management and colleagues. Many of the meetings are in distant locations and individuals are constantly on the move and connected primarily via mobile devices. How does a person manage their time in this complex environment? What tools do they select to carry out this time management and how effective are these tools? This research work presents an exploratory study using semi-structured interviews to investigate these questions. The key purpose of the study was to obtain requirements for developing better electronic time management tools.

Keywords


INTRODUCTION

In today’s world, knowledge workers are taxed with handling multiple meetings and deadlines, which dominate a large percentage of their work time. Faculty members, for example, are faced with managing time to write grant proposals and research papers while serving students’ needs. Academic administrators struggle with various tight and ever changing deadlines. Meanwhile, the majority of their time is allocated to attending functions and administration meetings. Therefore, scheduling ends up being a complex task with good time management being a critical factor for a successful professional life. To manage their time, knowledge workers have adopted various time management tools. Paper calendars have served as an important aid in people’s professional lives (Kincaid, Dupont and Kaye, 1985), but people are switching to electronic forms. The sale of personal data assistants is booming and more offices are moving to collaborative calendars.

The existing research literature does not provide evidence on how people manage their time with the new electronic tools. Do people change their time management strategies because of the new tools? What are the problems with converting to the new tools? Do they prefer the new tools to the paper-based ones? In addition, how satisfied are people with the tools and how effective do they perceive them to be? This research investigates these questions via an exploratory study intended to give us an understanding of current tool usage and problems. A key reason for this study is to uncover the functionality needed for next-generation time management tools. Semi-structured interviews were conducted on twenty busy professionals at an East Coast technical university. All were asked questions about their time management tools, problems they had with their tools, and their reasons for choosing their time management tools. We report the results of this exploration in this paper. First, we survey other recent studies on time management and calendar usage to build a framework for what we already know about time management tools. This is followed by a description of the interview study. A large section of the paper presents insights drawn from the interview data. In the conclusion, we provide a discussion of what has been uncovered.

RELATED WORK

Morgenstern defines time management to be “about identifying what’s important to you and giving those activities a place in your schedule based on your unique personality needs and goals” (Morgenstern, 2000, p. 12). Hence, people’s scheduling behavior reflects how they manage their time. In practice, people’s time management is achieved by interacting with their
schedules through their time management tools. Almost all current electronic time management tools, including Personal Data Assistants (PDAs), cell phones and desktop computer calendars provide a variety of time management capabilities, e.g., calendars, to-do lists, reminders, planners etc.

In the 1980s, early electronic calendars were not adopted because they lacked flexibility and functionality in comparison to paper-based calendars (Kelley and Chapenis, 1982; Kincaid, Dupont and Kaye, 1985). Kincaid, Dupont and Kaye found that an automatic scheduling feature was not widely used because people felt they could not assess others’ availability. Payne (1993) conducted interviews with 20 staff members from the IBM T.J. Watson Research Center. He found that although a computerized group calendar system was available, people still used a mix of calendars, primarily relying on paper-based calendars. Is his conclusion still true after a decade? Our study updates Payne’s study in certain ways. We conducted our semi-structured interviews in a university, where people have a larger mixture of duties and interactions with others. In addition, Payne’s study was done in an organization that encouraged using a uniform calendar system, while individuals in our study had complete discretion in picking their time management tools.

Palen (1999) studied the use of collaborative calendar systems by 40 office-workers in a large computer company. She reported that users kept additional individual calendars and that they used both systems for such tasks as scheduling, tracking, reminding, note recording/archiving and retrieval/recall. A key difference between our study and hers is its focus on individual time management rather than collaborative time management. Our focus is also on the choices and the effectiveness of the choices that people make in their time management tool selection.

Overall, most existing calendar studies are either focused on the calendar interface design issues (Egger and Wagner, 1992; Kelley and Chapenis, 1982; Kincaid, Dupont and Kaye, 1985), on collaborative calendar systems (Crabtree, Hemmings, and Rodden, 2003; Palen, 1999), or on calendar usage patterns (Bluedorn, Kaufman and Lane 1992). Few studies measure what types of time management tools people use, why people made their tool choice and how effective they feel their choice has been.

A DESCRIPTION OF THE STUDY CONDUCTED

Twenty representative knowledge workers who spanned a wide range of job activities were interviewed. All twenty came from a medium-sized East Coast University. A key reason for using these individuals over personnel in the corporate world was the focus on technology usage at the university, which gave everyone of the interviewees an opportunity to own personal data assistants and to use electronic calendars. Thus, we were able to access not only senior level administrators but also secretaries and receptionists who used electronic calendaring. No attempt was made to randomize the individuals chosen for the interviews. Two individuals from each university personnel category were selected for the interviews. Structured interviews were chosen over other methods because the study was exploratory in nature making questionnaire administration too restrictive a method. Ethnographic methods could not be used because calendar tools of today imply mobility and usage not only in the workplace but while traveling and at home. The office was chosen as the best place for the interview since much of the time management needs for this class of interviewees arose from their employment. Thus, interviewees would have their calendaring tools at hand, helping them to remember usage patterns.

The following set of interview questions guided the semi-structured interview. For each question, the interviewer probed the interviewee for additional information on the topic. Each interview lasted approximately 30 or 40 minutes.

- What types of time management tools do you use?
- How do you do your time management with these tools?
- What are the problems you have using these tools?
- How would you evaluate your satisfaction of doing your time management on your tools?
- How effective would you rate your time management tools for organizing your time?
- Why did you choose the tools you are using?
Among the interviewees, there were six females and fourteen males. All interviewees were professionals, e.g., all levels of professors, senior and junior administrators, lecturers, secretaries and part-time Ph. D. students with full-time jobs. When the interviewees were asked how many hours they work each week, 5% replied forty hours, 15% answered 40-50 hours, 25% worked 50-60 hours, 20% spent between 60-70 hours, and 35% dedicated over 70 hours. Thus, over 95 percent of those interviewed worked more than 40 hours per week. Because the university is located in what is known as a blighted urban center, all of the people interviewed took between 30 minutes and 2 hours to travel to work adding to their tight schedules. All of the individuals interviewed had multiple job responsibilities. The receptionist not only answered the phone and spoke to people entering the office complex but also ordered food, reserved rooms and handled reimbursement requests for the faculty. The secretary handled such diverse items as H1 visa applications, ordering physical plant maintenance and managing the department’s books. Deans mixed their daily activities with fund raising, serving as directors of degree programs and meeting with other units on campus. Overall, no single person had a single role or a single person to report to leading to a need to effectively schedule tasks and set priorities.

PRELIMINARY RESULTS FROM SEMI-STRUCTURED INTERVIEWS

This section describes the tool usage results from the semi-structured interviews. It begins by describing the time management tools that were used and then characterizes users’ satisfaction with the tools and a sense of how effective the tools were at supporting time management tasks. The section closes with a presentation of the reasons given by the interviewees for choosing the various tools.

1. What time management tools are being used?

Seventy-five percent of our interviewees had switched from paper to electronic calendars. We explore the reasons for the choices and for not switching below.

1.1 Paper-based time management tools

Five of our interviewees used a paper-based calendar as their time management tool (see Figure 1). Two major types are being used, a pocket-sized notebook (3 users), and a large wall calendar (1 user). Paper-based systems were used because of their portability and ease of use. The wall calendar was used for collaboration among multiple users, e.g., for coordinating family schedules. One of our paper-based users commented:

X: Why do I use a paper-based calendar? Because it never fails and it is convenient to carry with me and use.

1.2 Computer-based time management tools

Figure 2-4 illustrate the range of time management tools used by our interviewees. Table 1 shows the distribution of this usage. Not only are mobile devices used, but also desktop tools, such as Outlook™, the Microsoft Exchange™ Calendar and
Apple iCal™. For mobile devices, interviewees owned a Pocket PC, different versions of the Palm™ PDA, and PDA-cell phone combinations.

Six respondents relied solely on a single computer tool, while the rest used a mixture. For younger professionals with less complex schedules, and who could still carry their schedules in their memory, a single time management tool was usually selected. Users with more complex scheduling issues synchronized their mobile devices with desktop or paper-based time management systems. For example, one participant uses the Microsoft Outlook™ application on his laptop, and synchronizes the appointment data in this calendar to his PDA-cell phone combination. For scheduling meetings, one interviewee makes her Yahoo™ online calendar public and tells others to look at the calendar to select viable meeting times. She feels that this dramatically decreases meeting negotiations. Meanwhile, she is managing her personal time on a PDA, which is synchronized with her online calendar. Another interviewee not only uses his Palm™ for scheduling, but also a large white board on his office wall as a reminder. One secretary uses the Microsoft Outlook™ application to manage her work time in the office, while using her PDA-cell phone to organize her personal time.

![Figure 2. PDAs using the Palm™ Operating System](image1)

![Figure 3. A PDA with a cell phone embedded (left) and a iPAQ pocket PC (right)](image2)
Nine of the twenty people in our study used a mixture of time management tools (see Table 1) to support their scheduling, reminding, and time planning tasks. Several reasons were given for using a mixture of tools. (1) The tools were used collaboratively so that one had to be maintained on a desktop computer. (2) The desktop tool was more convenient but the PDA was provided scheduling information when away from the office. (3) The tools were used to maintain different schedules, one for home and one for work. (4) Private information was kept on the PDA, which could not be kept on the public desktop calendar. For example, two of our interviewees stated:

P: Yeah. You know, I use my cell phone to manage my time, which is also a PDA. Outlook has a calendar. I have it in my computer. They both hold the same information. My cell phone is much more convenient to use when I travel.

M: I only have an electronic calendar (user only has a PDA)...I also use the white board on the wall as my reminder of important things.

2. Perceived satisfaction and effectiveness of various time management tools

In addition to asking respondents what they used for time management, we also asked them about their satisfaction with each time management tool. Interviewees responded to the question “how would you evaluate your satisfaction of doing your time management on your tools?” on a Likert scale ranging from (1=least satisfied) to (5=very satisfied). In addition, we asked them to give us an assessment of how effective they felt each of the tools they used was in supporting their time management needs. For the question, “how effective would you rate your time management tools for organizing your time?” users responded on a Likert scale ranging from (1=least effective) to (5=very effective). We then asked each respondent to give the underlying reason for their responses. Table 1 shows the types of time management usage and the summarized results from the two Likert-scale questions. Although our interviewee population is too small to draw any conclusions from the answers, the answer trends suggest what interviewees reported, that paper calendar tools had key limitations that were only solved by having multiple electronic tools.

2.1 Paper-based time management tools

Only one person of the five using paper-based tools is very satisfied with his current paper-based tool (a large wall calendar) primarily because of its use as a family communication medium. People were unhappy with the effort it took to make backups and with the difficulties in making updates especially for repeating events. Because a calendar was so important in their life, they expressed concern over losing the paper calendar accidentally or even, of having it stolen. Another concern they reported was the difficulty of having consistent time records among several paper-based tools. One respondent said:
**D:** I haven't recently found anything to be better, but I am not satisfied...The main problem is...as I said some of these things are at home...There are calendar tools, and I can sit and make the second copy, but that is too much work. The tradeoff is that I just hope nobody steals it.

<table>
<thead>
<tr>
<th>Time Management Tools</th>
<th>Number of Users</th>
<th>Perceived Satisfaction*</th>
<th>Perceived Effectiveness**</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paper-based tools</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pocket-sized</td>
<td>4</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Wall-sized</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>Computer-based tools</strong></td>
<td></td>
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<tr>
<td><strong>Single Tool</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Private Desktop Calendar</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>PDA</td>
<td>3</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>PDA (mainly relying on memory)</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Mixed Tools</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Desktop Calendar + PDA/ PDA Cell phone combo</td>
<td>7</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Public Online Calendar + PDA</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>PDA + White board</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>


** Perceived effectiveness: Least effective: 1: 2: 3: 4: 5: Very effective

Table 1. Perceived Satisfaction and Effectiveness of Various Time Management Tools

2.2 Computer-based time management tools

Of the large percentage of respondents in our study who use computer-based time management tools, six use a single tool on either a desktop or a PDA. Nine of our respondents use a mixture of time management tools. Many use a desktop time management application that synchronizes with a PDA. One user employs a PDA and a whiteboard. In general, one tool was unable to meet all time management purposes. Respondents who used a mixture of tools reported higher satisfaction and effectiveness, but many users complained about inadequate integration between the tools. Users with an online calendar shared with a secretary reported constant problems with schedule synchronizations. Many users wanted to keep different data on their PDA than on their online calendar, that is, they wanted to indicate which data should be synchronized and which should not be. Finally, users reported problems with tool differences between the PDA and online calendars. For example, the online calendar allowed a repeated appointment to have an annotation for a single instance of the repeat, but the PDA converted this to an annotation for all the appointments.
2.2.1 Private desktop time management tool

✓ Outlook™

The user of the desktop version of Microsoft Outlook™ rated his satisfaction with the system as a 3 (neutral) although he felt that the system supported him effectively with its other functionalities (e.g., email, to do list management, etc.). His key concern was that Outlook™ lacked support for developing time management strategies. He was therefore forced to use other tools and stated in his interview:

C: Yeah. It tells what time I have something to do, it tells me what my current tasks are. I mean I use it for my daily tasks, but I also use visual charts or word documents, but that is time management for a project, not for my overall life…

✓ Microsoft Exchange Calendar™

One senior administrator uses Microsoft Exchange™ as his time management tool. He is not happy with this tool (see his comments below), because it is not easy for him to coordinate scheduling with his secretary:

S: No, actually I would like to transmit it (schedule) to PDA. In this way that I can synchronize things. While the office is doing the schedule for me...I am not sure how it could keep synchronizing my calendar. But I will try. (he rated his satisfaction with the current time management system as 3 – neutral) I am fine with it. I am not extremely satisfied and not extremely disappointed, please.

✓ Palm™

Three people use a Palm™ for time management. They expressed only mild satisfaction with their Palm™ for the following reasons:

- The Palm™ they own is old and does not support some of the functionality that is now available.
- They only schedule a few meetings and several university events on the Palm™ and thus do not use the device’s full time management capabilities.
- They do not know many of the support functions available on the PDA, e.g., one respondent did not know there was a repeat function for scheduling recurring events.

One of our respondents stated:

K: How do I rate my time management tool? I think the version is not (what) I would like to have yet, but I don’t have to do that investment. I like the newer Palm that incorporates the phone and wireless connection, but I haven’t bought it yet.

✓ PDA ( but mainly relies on memory)

One interviewee also has a Palm but has a relatively uncomplicated schedule and relies mainly on memory using the PDA as a backup. Ironically, she often forgets to charge her PDA, in part. Thus, her PDA received a neutral rating both in terms of satisfaction and perceived effectiveness. This class of Palm users were younger individuals with less complex schedules and need for time management. Thus, their tool was less useful for their needs.
2.2.2 A mixture of computer time management tools

Respondents who used a mixture of computerized time management tools tended to be in upper management. They also were more satisfied with using the mixture of tools. A key advantage they mentioned for having a mobile tool was that they could access it anytime and anywhere. They also liked a desktop tool because the larger screen allowed them to see more of their schedule and make strategic decisions that involved multiple weeks or months of time scheduling. Some of our interviewees used the integration capabilities of the PDA and desktop system. For example, seven people used Microsoft Outlook™ which allowed them to synchronize their desktop calendar with their PDA. One interviewee used her desktop Microsoft Outlook™ calendar to manage her work time and her cell phone to coordinate her family schedule. Another respondent indicated that although her secretary maintained her desktop calendar, she could not effectively synchronize the two calendars because she also maintained her husband’s calendar on her PDA. Because of this, her assistant also uses a PDA and “beams” new appointments to her manager’s PDA after she downloads the calendar on her PDA. However, life became complicated when her assistant inadvertently synchronized her PDA with her manager’s desktop calendar and added her personal home schedule to the calendar.

One senior administrator is using a Yahoo online calendar to manage time. By posting her calendar, others can see when it is possible to make appointments rather than sending multiple emails to negotiate a workable appointment time. The calendar is also used as a communication device and individuals who have regular meetings with her use the calendar to verify their meeting time. In addition, if a meeting has to be moved, the calendar email facility is used to notify meeting attendees of the change. She also uses her PDA calendar extensively and records much more than appointments in a time slot. For example, she also adds cell phone numbers for the person she is meeting with in case traffic has made her late or puts in the names of all members of a household in case she is attending a dinner party. In one case, she had even noted the name of the family dog. Because of her extensive use of her PDA and her online calendar, she rates her time management tools very highly.

The following is a sample comment giving one user’s perception of the mixed time management tools.

✓ Apple iCal™+ Palm™

E: I can have it (Palm) with me. It is just I don’t have to do a lot of redundant information. One problem with paper calendar is that you cannot delete something that is probably over…But using a computer-based calendar, it is easy to erase things…and the paper calendar is really a mess in this case. I don’t need to copy everything again and again in an electronic calendar. I don’t need to do so much entry in the computer-based calendar. My computer is big, and it is easy to see. On screen it is easy to see what happens in the whole week. I found it is easy to enter information on the Palm, but if I want to get an overview, it is easier on my big computer.

3. Comparing time management tool choices

Our interviews showed that both paper-based and computer-based time management tools were used for scheduling meetings, reminding users of meetings, keeping track of deadlines, recording notes and helping users to remember things that happened in the past. In short, the usage patterns we uncovered were similar to Palen’s results. However, different tools were more or less effective for supporting these tasks. For example, a paper-based calendar is not as good a reminder as an email or a beeping tone coming from a PDA. We therefore asked users why they were using the tool they had chosen for time management.
3.1 Reasons for selecting a mobile device over a paper-based tool?

When we asked respondents why they chose a mobile device over a paper calendar, they stated that a paper calendar was inconvenient because of its lack of a “repeat” function and its inflexibility. They liked the small size and light weight of the mobile devices and the ability to easily make backups of all their records. Users who reported functionality as a key reason for choosing a PDA tended to be in upper management positions. Users with less time demands emphasized how “cool” it was to have a cutting-edge mobile device. In fact, “coolness” seemed to be the key reason for having an electronic calendar if one’s complex life did not depend on it. One of these users commented:

\[ \text{G:} \ \text{Firstly, I am really scared that the PDA will not be as good as the paper-based calendar. But actually I like it more... It is small and it is easier to carry around than my calendar. And I can write notes in my handwriting, which I didn't know I can be able to do that. But I can. I also like the fact that it has a little alarm, which can remind me ahead of a meeting.} \]

3.2 Reasons for choosing a paper-based tool over a mobile device?

Two paper-calendar users complained that they could not read a mobile devices’ small screen display nor use the stylus to enter information. Eyesight and advancing age limited their tool choices. In addition, one interviewee thought that a PDA would not fit into her handbag. A comment from one of the users is shown below.

\[ \text{D:} \ \text{Now I personally have trouble trying to use the little tiny keyboard on the PDA. I noticed there are some time management tools on the PDA, but I cannot use these little styluses. I need a keyboard or this (pointing to her paper-based calendar). I actually tried to type in (appointments on) my (desktop) computer, and I found I was much less satisfied. This (her paper-based calendar) is actually portable. (Laughter)} \]

Other electronic calendar users also commented on the extreme lack of usability of the devices. In particular, they found that the number of selections that needed to be made for each entry was socially awkward. They also found that lighting conditions plus numerous stylus errors limited the PDA’s usefulness. In addition, there were numerous complaints about making wrong selections, receiving SPAM type email reminders of appointments and misreading small font times and locations on the PDA.

CONCLUSION AND DISCUSSION

In our study, a variety of time management tools and usage patterns are identified. Users use multiple tools because a single tool does not meet their time management needs. A desktop tool is used to view time usage in a larger scale and a small handheld device is used for its mobility and constant presence. The mobile tool is also used for reminding. Only two examples of using time management tools collaboratively were observed.

Paper-based calendar users were not satisfied with their systems nor did they view them as very effective for time management. They explained that they would like the functionality provided by the electronic systems but were unwilling to adopt them because of key user interface issues. They could, of course, still use a desktop time management system, but then they would not have the portability provided by their paper-based system. Thus, the user interface issues were keeping them from adopting the electronic methods of time management.

Overall, four basic needs of time management tools were uncovered in this study. They are:

- Portability
- Ability to gain an overview
• Ability to better coordinate between multiple tools
• Collaborative Scheduling

Only the first two of the needs were being met, and this was with a combination of a desktop and a portable electronic calendar or with a paper-based calendar. Some of the users interviewed were even willing to eschew advantages gained by using an electronic calendar to ensure the first two needs. None of the tools truly supported the strategic form of time management, but only served as an external memory device for this type of planning.

Most of the users selected their time management method through random choice rather than assessing their time management needs. They then adapted the tool or combination of tools to their needs without much judgment on how effectively their needs were met. Our interviews found that most of the features provided by the electronic tools were not used and that, even when integration between desktop and PDA time management tools existed, the integration was not always exploited. Or, if it was, did not work conveniently, because each tool was used differently. Overall, although adoption of electronic time management is proceeding at a healthy pace, effective and efficient use of the functions provided is limited and today’s busy professional needs more support.

REFERENCES