

# “I’d Be Overwhelmed, But It’s Just One More Thing to Do:” Availability and Interruption in Research Management

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## ABSTRACT

Many CSCW projects dealing with individual availability and interruption filtering achieve only limited success. Perhaps this is because designers of such systems have limited evidence to draw upon; most data on interruption management is at least a decade old. This study uses an empirical sampling method and qualitative interviews to examine attitudes toward availability and interruption. Specifically, we analyze how corporate research managers spend their time and look at how their attitudes toward interruption relate to their various activities. Attitudes toward interruption are marked by a complex tension between wanting to avoid interruption and appreciating its usefulness. We conclude by discussing the implications of these findings for design, suggesting that the notion of socially translucent systems may be a fruitful approach.

## Keywords

CSCW, availability, interruption, time management, attention economy, managers, social translucence

## INTRODUCTION

In recent years, there has been increased discussion of the “attention economy” and “information overload.” Essentially, these discussions suggest that the important commodity in the current economy is no longer money or other physical resources. Rather, it is an individual’s time and attention. Due to limited time, attention is a limited resource. Those who succeed will be those who best gain others’ attention, or who most effectively deploy and manage their own [7]. While these ideas are certainly not new (e.g., [8]), technology seems to have exacerbated the problem. Technology has allowed more and more information and people to reach us than ever before. More and more, individuals feel overwhelmed.

If technology is one of the leading causes of this problem, it

makes sense that technology could also be a solution. While researchers have explored some approaches to ameliorating the attentional demands of communication technologies, however, they have met with limited success. For example, Rodenstein, Abowd, and Catrambone [19] designed a system prototype that allowed an individual to filter interruptions in a lightweight fashion. Studies of this prototype, however, revealed no significant performance gains for those using the system. This is consistent with later research showing that notification of an incoming message, even when the message is ignored, is disruptive to task performance [6]. In a somewhat more complex approach, Milewski and Smith [15] built a telephone system that allowed a caller to preview a callee’s self-declared state before placing a call. Unfortunately, Milewski and Smith weren’t able to test the usefulness of their availability states. Instead, they discovered that users of the system never seemed to remember to change their availability state, rendering the preview ineffective.

One conclusion that might be drawn from this previous work is that the strategy of requiring an overloaded, attention-limited person to devote time to managing these demands may not be the best approach. What is the alternative? Instead of placing the burden on the overloaded individual, the system could take on the management of incoming demands for attention. Perhaps a system could automatically filter interruptions for users; or, perhaps, it could reveal the callee’s state to a potential caller without requiring the callee to declare this information.

Regardless of the strategy pursued, it seems clear to us that more information is needed. While there is a considerable literature in this area, it is rather surprising to note that most of the work is at least a decade old, and, clearly, the technological terrain has changed quite significantly in that time. Thus, in this study, we take a strongly empirical approach and begin asking how it is that people really spend their time, and how they view demands upon it.

Our study examines a group of managers in a corporate research laboratory. While, in some regards, this group does not fit typical management demographics (e.g., the majority have doctorates), they still have the demands on their attention and the frequent interruptions that characterize management more generally. Thus, as we

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CHI 2002, April 20-25, 2002, Minneapolis, Minnesota, USA.  
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<p><b>1. Right now, I am:</b>                  By Myself                  Engaged with 1 other person...                      This is a planned event.                      This is an unplanned event.                  Engaged with 2 or 3 others...                      This is a planned event.                      This is an unplanned event.                  Engaged with many others...                      This is a planned event.                      This is an unplanned event.</p>	<p><b>2. I was engaged in:</b>                  Deep concentration                  Reading / Writing                  Watching / Listening                  Interaction / Communication...                      Face-to-face                      Telephone                      Email                      Chat / I.M.                      Other...                  Eating                  Traveling                  Other...</p>	<p><b>3. This activity is:</b>                  Business                  Personal                  Other</p> <p><b>4. How much time would you have for an interruption?</b>                  It would be awkward to be interrupted.                  I would prefer not to be interrupted.                  I could be available for a few seconds to a minute.                  I could be available for minutes or longer.</p>
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**Table 1.** Questions 1 through 4 of our survey illustrate how it was designed to provide detailed information about a manager’s state and attitudes.

there was no response to a probe, it would time out after five minutes and the survey would be replaced with a question that asked why the subject did not respond. Because of these missed probes, the number of data points for each individual varies. Subjects completed the survey 71% of the time overall and 80% of the probes during business hours. In total, this provided 295 completed surveys, 190 (64%) of which occurred when the subject was engaged in a business activity. Of the missed probes during business hours, slightly over half were because the subject was too busy to respond. For the remaining missed probes either the subjects did not have the paging device with them or they did not notice the probe.

**SUBJECTS**

At IBM Research, there are three levels of management between standard employees and the corporate vice president (first-line, second-line, and third-line managers, respectively). We solicited participants from all levels, resulting in seven first-line managers, four second-line managers, and one third-line manager. Two potential subjects declined to participate because they did not want to wear a pager or be interrupted.

With the exception of one first-line manager, all subjects were male. Two managers (one first-line and one second-line) were of European background. The remaining subjects were of North American background. While there are some suggestions that communication patterns vary along gender [21, 23] and cultural lines [22], these issues could not be examined here without broader participant demographics.

**RESULTS AND DISCUSSION**

Our results generally replicated earlier results in the amount of time managers spend alone (42% in our data) and in how much time they spent in communication with others (46%). However, the combination of ESM and interview data also revealed new results, particularly for the understanding of managers’ attitudes towards interruption. We found a fundamental tension between the disruptiveness of interruption and its potential benefits. Also prominent in our data was the importance to managers of maintaining a sense of control over interruptions. The data also revealed relatively consistent daily rhythms in attitudes toward

interruption. In this section, we explore these findings in more detail.

**Time Distribution**

Of 190 probes in which the subject said that the current activity was business-related, 43% of the time the subjects were alone. The next largest activity was spontaneous, unplanned dyadic meetings. This category accounted for 14% of the reported activities. In order of frequency, the remaining activities were large planned meetings (12%), planned meetings with 2 or 3 other people (9%), planned meetings with one person (6%), and spontaneous meetings with 2 or 3 people (4%).

Meetings that can occur through serendipitous encounters seem to do so. As greater numbers of people are involved, there appears to be a steep drop off in how easily an unplanned meeting can occur. In these cases, it becomes necessary to plan meetings in order to ensure that all can be present. Therefore, dyadic communication favors spontaneity while larger meetings require planning.

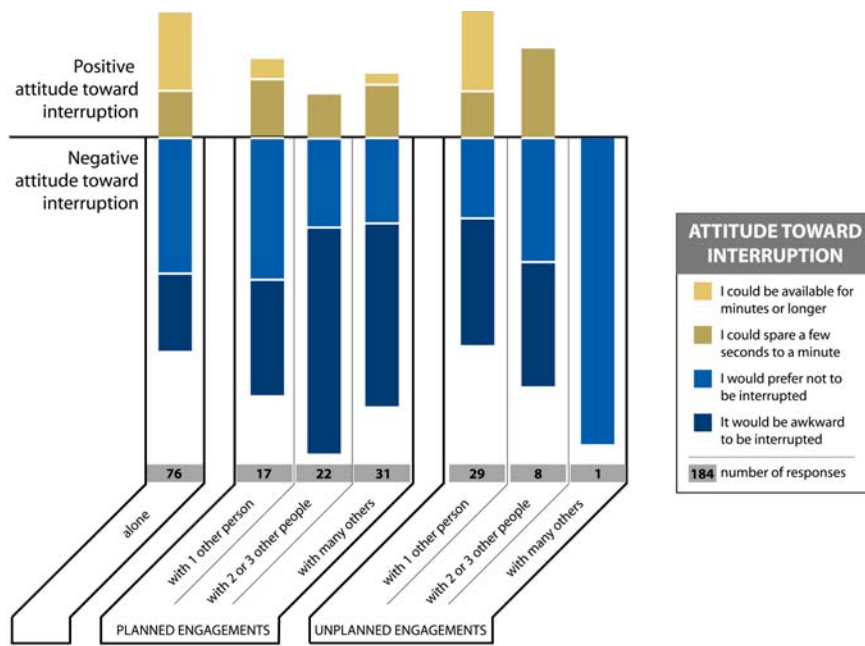
When managers are alone, most of the time is spent reading and writing. Of 73 responses in this category, 68% of the time the manager was involved in either reading or writing<sup>1</sup>. “Deep concentration” (our term) was another important activity, taking 45% of the manager’s alone time. (Managers indicated being involved in both deep concentration and reading/writing 34% of the time.) Other important activities included traveling (10%), doing email (10%), and organizing (3%). While these numbers suggest a surprisingly small amount of time devoted to email, it is likely that some email activity was reported as “reading/writing.”

The type of communication channel(s) used for meetings varied as a function of number of participants and whether the meeting was planned or spontaneous. For two people, all planned meetings were face-to-face, whereas impromptu meetings took place via telephone 14% of the time. Research has suggested (e.g., [17]) that physical proximity is an important factor in successful collaboration. As

<sup>1</sup> The survey allowed multiple answers to this question. Therefore, the percentages do not sum to one hundred percent.







**Figure 5.** Attitudes toward interruption vary based on the activity in which managers are engaged. Each bar indicates proportions of responses for each state. Bars represent 100% of the responses rather than absolute numbers. Note that there was only one recorded occurrence of an unplanned large group meeting (far right).

At least within IBM Research, managers tend to arrive at work between 8:00AM and 9:00AM and leave between 5:00PM and 6:00PM. In the morning, until about 10:30AM or 11:00AM, it is typically awkward to deal with interruption. Then, there is a lull during which the manager could be available for minutes or longer that lasts until about 1:00PM. Between 1:00PM and 2:00PM, managers prefer not to be interrupted. From 2:00PM to 4:00PM, managers once more become available for interruption. Between 4:00PM and 5:30PM, managers again prefer not to be interrupted. After 5:30PM, attitudes vary, but tend toward availability if the manager reports still being engaged in business activities.

**Relation between Activity and Availability**

While attitudes toward availability vary throughout the day, some general patterns are also visible based on the activity in which the manager is engaged. Figure 5 shows a consolidated view of managers’ attitudes towards availability in various states. If an event is planned, interruption is generally more awkward than if it is unplanned. The data suggest a correlation between the size of the meeting and attitude, but larger meetings were too rare to determine significance. While there is not much difference between meetings with two or three other people and meetings with more people in the awkwardness of interruption, there were a few cases in the larger meetings in which managers reported being available for minutes or longer.

**Interruption Driven**

Despite what seems to be a general aversion to interruption, managers commonly spoke of themselves as being

“interruption driven.” One manager described himself as needing interruption:

I have sort of come to rely on interrupts. If I’m not being interrupted, I don’t know what to do. I have to generate an internal interrupt of some sort to get me going.

While this manager might be an extreme case, many others echoed a more conservative version of the same theme. For example, one manager claimed interruption as a memory aid:

One [benefit of interruption] is so that I don’t have such a short-term memory load. I can deal with something now and not have to deal with it later.

More importantly, however, managers view interruption as part of their job description. As one manager said, “I guess I see handling interrupts as part of what I do.” While managers do talk of learning to deal with interruptions, they have uniformly come to see them as an important part of what they do. All managers viewed interruption as a necessary part of their job. Beyond simply being part of the job description, however, managers often reported deriving benefits from interruptions.

In the interviews, managers suggested that benefits from interruption arise in two ways. First, openness to interruption allows the manager to deal flexibly with problems before they become overwhelming. One manager summarized this saying:

Being flexible enough to respond and respond quickly to certain kinds of interruption, I find to be useful in getting things done.



example, when work begins to encroach on home life, they prefer to choose when to fit it in rather than automatically accepting an interruption.

In response to the probe study, most individuals indicated that on personal time, business interruptions should be either critical to the manager or critical to the interrupter. The interviews, however, told a different story. A number of individuals stated that they try to remain flexible. As one manager put it, “I guess I would want to be seen as reachable.” Several managers, even those who draw a hard line between work and home life, echoed the theme of difficulties that arise when others cannot reach them:

I guess I would hate to think that there is work that isn't being done because people can't reach me or they feel stuck or in a quandary or upset or whatever because they can't reach me. ... I guess it would be good if I were more easily reached for that time that I'm not sitting by my work computer.

During personal time, managers want to be accessible to those who need their attention. At the same time, however, they wish to maintain control over these interruptions. They do not mind doing work at home, but they want it to fit into the holes in their personal schedule rather than disrupting it. One manager summarized this feeling by discussing the type of connection that he would like to have to his professional activities:

I would not mind being connected all the time, but more on the email side than on the phone mail side. ... It's probably more in a pull-mode connected than in a push-mode connected. I would be perfectly happy to have web access all the time and no incoming inbox.

### IMPLICATIONS FOR CSCW SYSTEMS

Many computer systems designed to alleviate the problems of interruption and limited availability fail because the intuitive notions of designers may not match the realities of the problem. While the word *interruption* typically carries negative connotations, we have seen that managers experience an internal tension in their attitude toward interruption. On one hand, there is little doubt that interruption can be disruptive to the task currently occupying the manager's attention. On the other hand, the interruption may bring news related to something else that the manager views as important. Managers need uninterrupted time to accomplish certain tasks, but view interruptions as important to accomplishing certain higher level goals. As one manager put it:

I'm not sure that having fewer interruptions would really achieve a lot because part of being a senior manager is dealing with all of the stuff that doesn't work as planned. It's just a matter of life. It's part of my job to deal with large amounts of interruption. ... If it could be planned, then it would just work [out].

Therefore, managers struggle with finding the balance between entertaining useful interruptions and avoiding distracting ones. Achieving such a balance is inherently problematic.

CSCW software has traditionally supported a binary notion of availability rather than the continuum in which managers typically work. Users of these CSCW systems must declare their attitudes toward interruption in advance. These settings are then used to filter potential interruptions. While this method can produce uninterrupted time, it does a poor job of supporting the potential benefits of being interrupted. Our findings suggest that designers of CSCW systems should focus on making interruptions more effective rather than on decreasing them.

How to make interruptions more effective, however, is a challenge. This study offers a number of suggestions for how CSCW systems can be designed to do this. First, there is rarely a state during which an interruption would be ideal. By their nature, interruptions will disrupt something. This implies that systems should not be designed to queue possible interruptions until the ideal time. Rather, interruption should occur at the best relative time. As this study suggests, there are periods of lull during the day and certain states during which interruption is better received than other times or states. While the details of this study cannot be applied to all populations, the suggestion of regular patterns of acceptable interruption times should be explored for other CSCW audiences.

Another interesting implication of this study is that technology has not significantly changed a manager's daily life. The discourse surrounding the concept of information overload suggests that technology is exacerbating the problem. This study, however, suggests that managers still follow the same communication patterns that were documented ten [18], twenty [20], or even thirty years ago [5]. While changing technology certainly has effects on society, it is not clear that technology is causing all of the challenges that critics predict.

The complexities surrounding availability imply that the acceptability of interruption is a socially constructed phenomenon. Because of this tension between benefits and disruptiveness, certain interruptions receive a higher priority than other ones. More importantly, the priority of an interruption relative to the current task varies. Regardless of state or time, availability is handled differently depending on the nature of the interruption.

Technological systems are rarely able to independently deal with this sort of social construction [1]. Therefore, social processes need to be designed into any system designed to ease the challenge of limited attention. We believe the notion of socially translucent systems [9] can provide one way to approach this challenge. Creating awareness and accountability through making behavior more visible – the definition of a socially translucent system – can allow social mechanisms to play more effective roles in technology-mediated interruptions. For example, by

