

# **Can You Handle It?**

## **Individual Management of Incoming Information in the Workplace**

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February 6, 2002

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## **Executive Summary**

The purpose of this study is to identify whether or not individuals in the workplace feel overloaded with incoming information. We look at the amount of information people take in, their sources of information, and some strategies they use to handle that information. In doing so, we hope to ascertain whether information overload should be a concern in the workplace, recognize some causes of information overload, and to understand how businesses can aid employees in managing their information.

We used an online survey clearinghouse to gather 165 responses to a 27 question survey from October 16<sup>th</sup>, 2001 thru October 20<sup>th</sup>, 2001. The survey was designed to answer the following questions:

1. How frequently do individuals feel overloaded with information in the workplace?
2. What information sources are used the most? Are the most important? Are the most interruptive?
3. How do different information sources relate to feelings overload?
4. What characterizes those individuals who feel most overloaded?

We found that feelings of information overload do not dominate in the workplace. The majority of individuals experience feelings of overload, but not all of the time. In general, people feel that they are on top of the information they are required to take in for their job, and that they are provided with this information most of the time. Most people are satisfied with their company's involvement in managing information, as well as with their own strategies for handling incoming information.

Feelings of information overload are not simply caused by large quantities of information. In fact, the less people feel they are provided with necessary information, the more overloaded they tend to feel. Particular information sources, their importance and interruption frequency, are more or less stressful to certain groups of people. Specifically, the frequent use of e-mail, the telephone, and/or voicemail correlate to stronger feelings of overload. However, the total number of email or voicemail messages do not correlate with feelings of overload. Rather, certain types of messages and behaviors for handling information seem to be more related, such as frequently checking e-mail, voicemail, or the Internet. The findings in this study collectively support the idea that quality and appropriateness of information received, and not just quantity of information received, are linked to feelings of overload.

Our findings do not give a crystal clear picture of what characterizes individuals who feel overloaded with incoming information at the workplace. We did find a small positive correlation between working outside of the office and feelings of information overload, and that women report feeling overloaded more frequently than men. However, information overload is not simply a quantitative or demographic relationship. Rather, it is a complex and difficult to characterize combination of the quality of received and provided information, the medium and context in which it arrives, and personal work habits.

## 1. Introduction

According to a 2000 Reuters study, 49% of managers feel that they are quite often or very frequently unable to handle the volume of information they receive. They also report that the amount of information required to execute their jobs effectively is large and growing, and they feel that much of the information they do receive is not important or unsolicited. In addition, 41% of managers agree that their working environment is extremely stressful on a day-to-day business [3].

How much are stress and overload related to the information one receives at work? Does being inundated with large amounts of data, useful or not, lead to a sense of overload? There is a growing concern in the literature [4,5] and in the workplace about this sense of overload, whether or not it exists, where it comes from, and how to deal with it. A first step in answering these questions is to identify the types and amount of information people deal with, how they receive and gather that information, and what they do to manage it.

## 2. Method

### Pilot Study

Using online survey software from [www.surveymonkey.com](http://www.surveymonkey.com) [8], we distributed two 43 question surveys consisting of a mix of quantitative, categorical and short answer, open-ended responses. Six of the 43 questions were open-ended questions about the survey itself, asking for feedback on the wording, confusing questions, etc. We had 10 trial participants return valid responses, each taking approximately 20 minutes to fill it out.

For the final survey, we switched from [surveymonkey.com](http://surveymonkey.com) to an online survey clearinghouse, [Zoomerang](http://Zoomerang.com) [7], which could gather an appropriate sample population and distribute our survey via e-mail. The final survey consisted of 27 questions, requiring responses to quantitative, categorical and short answer, open-ended questions and requiring approximately 20 minutes to complete.

### Survey Design

In designing our survey, we attempted to ascertain how much information overload professionals in the workplace feel, and to identify characteristics of the most overloaded individuals. Toward this end, we asked questions in the following areas:

- 1. Use, importance, and interruption of information sources.** Based on a list of 13 different sources of information, we asked the respondents to identify those sources they used most often, to rate the sources by level of importance in their work, and to rate the sources by the frequency with which they interrupted their work.
- 2. Load, work habits, and organization strategies for specific sources.** We then asked for more detail regarding the respondents' use of specific sources (e-mail, voicemail, Internet, company intranets, and instant messaging) in terms of frequency of use, number of messages (total and in various categories for e-mail and voicemail) and, in the case of e-mail, strategies used to organize their messages. We chose to look more closely at e-mail, voice-mail, the Internet, and company intranets as sources whose popularity and use has changed significantly in the past few years. We chose to look at IM as a relatively new information source and technology we felt may be heavily used in the future [6].
- 3. Work outside the office.** We then asked our respondents questions intended to identify how often they found themselves taking work-related information outside of the office

and the normal working day. We also asked how often they telecommuted, in order to be able to contrast the work habits, frequency of work outside the normal work day, and information overload of telecommuters versus non-telecommuters.

4. **Information overload and information reception.** We asked our respondents how often they felt overloaded with information. Additionally, we asked them how often they felt they were provided with all the information the needed to do their job
5. **Demographics.** We gathered typical demographic information such as age, gender, education level, and job category. We also asked participants to include their job title. Using the education, job category and job title, we classified each individual as knowledge workers or not. We loosely define knowledge workers as any one who works for a living developing or using knowledge.

### Participants & Deployment

The survey that ran for 5 days from October 16<sup>th</sup> to October 20<sup>th</sup>, 2001. In this time period, we received 165 valid responses from Zoomerang [7]. Zoomerang's sample was randomly selected from individuals that had some form of Internet connection and access to e-mail.

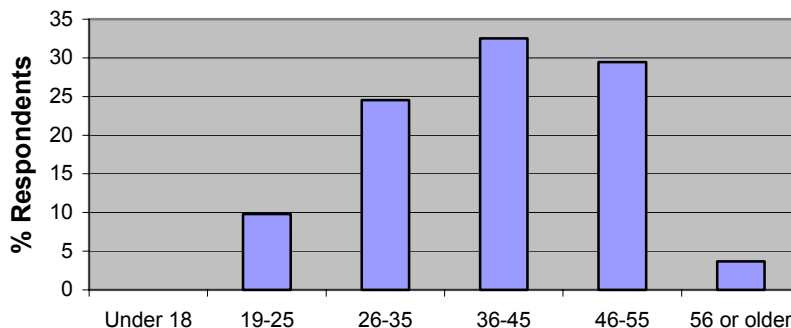
### 3. Results

Unless otherwise indicated, all significance results are reported at the two-tailed 0.05 level. All means are reported with standard deviations. Percentages are reported with respect to the total valid responses received for that question.

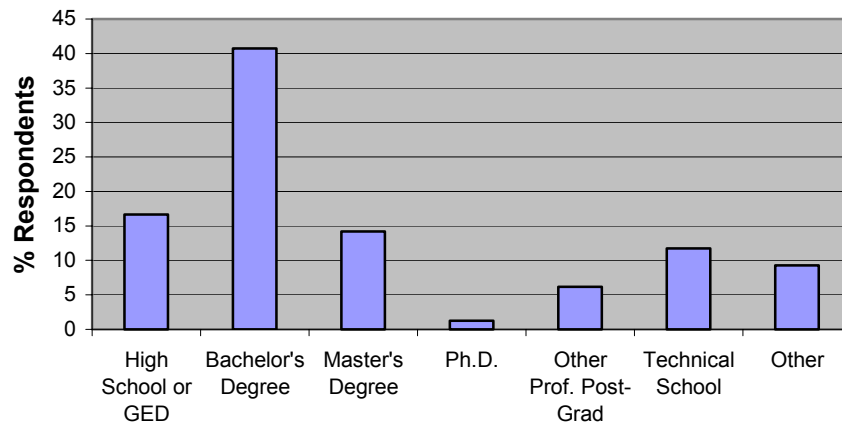
#### Demographics

Our sample population was nearly evenly split across gender, with 48% of the respondents female and 52% male. The age of the respondents was fairly normally distributed across the categories (Figure 1). Education levels of our respondents indicate most had a Bachelor's degree (Figure 2), and our respondents covered a broad range of job categories (Figure 3). We asked participants to indicate their job title, which we used to categorize them as knowledge workers or not. The sample was split fairly evenly, with 44% classified as knowledge workers, 47% not, and the remaining we were unable to classify.

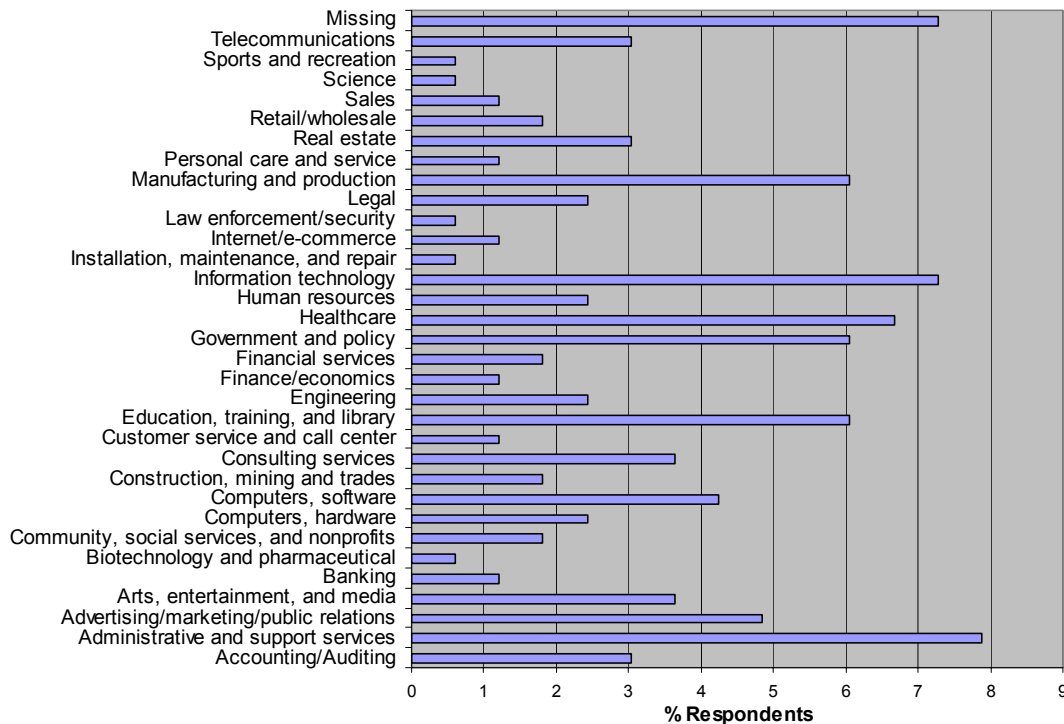
Figure 1: Age.



**Figure 2: Education Level.**



**Figure 3: Job Category.**

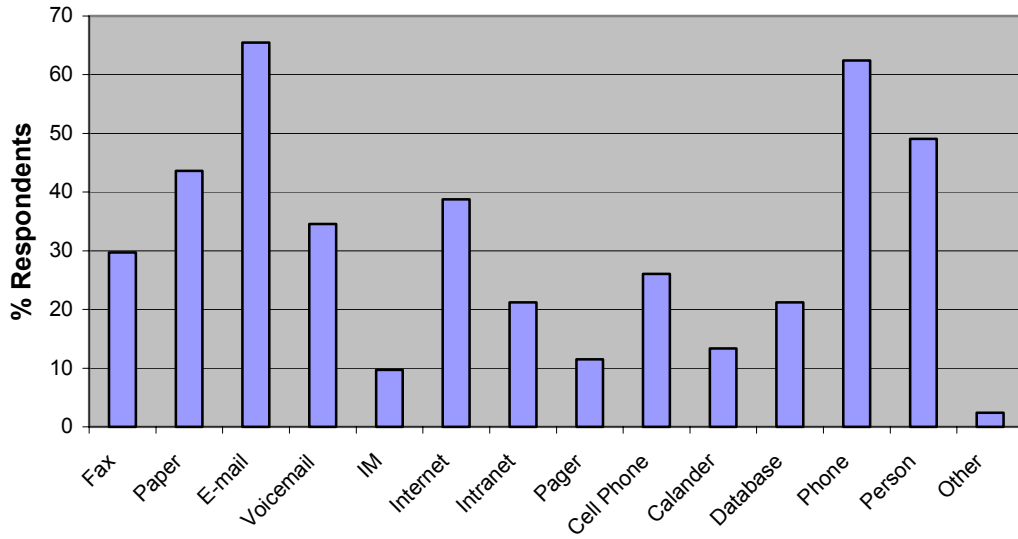


**Source Use, Importance, & Interruptions**

In order to begin understanding how the different information sources people use at their job relate to overload, we looked at (1) the frequency of the source use, (2) the level of importance of each source, and (3) the frequency in which a source interrupted somebody during their work day.

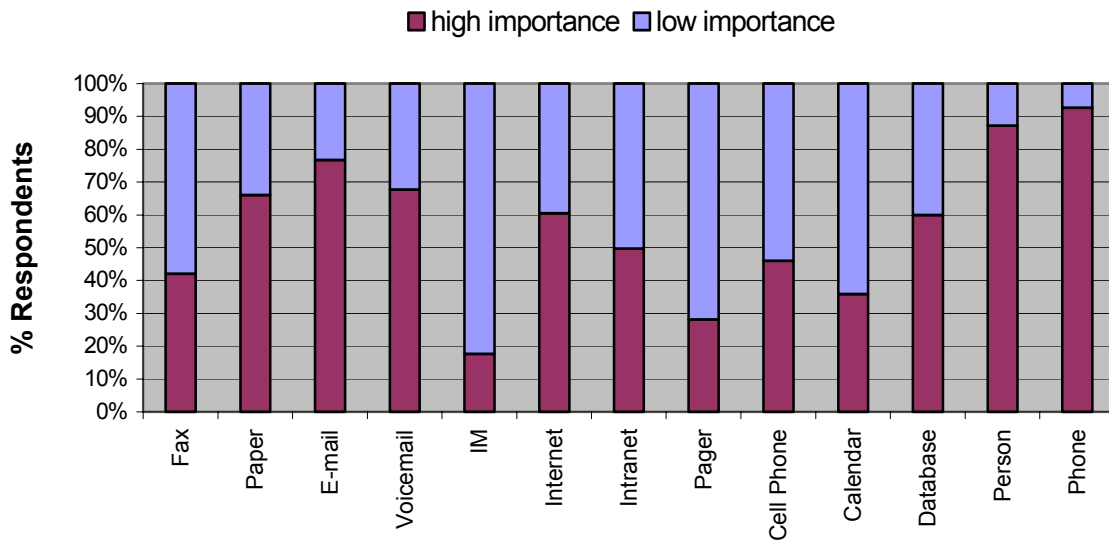
The first question of the survey asked the respondent to indicate the information source they typically use the most. Figure 4 shows that e-mail and the phone are used the most out of all 13 sources we offered as selections in our study. Respondents could select more than one source, though one third indicated only one source.

**Figure 4:** Of the following information sources, which do you use the most for your job?



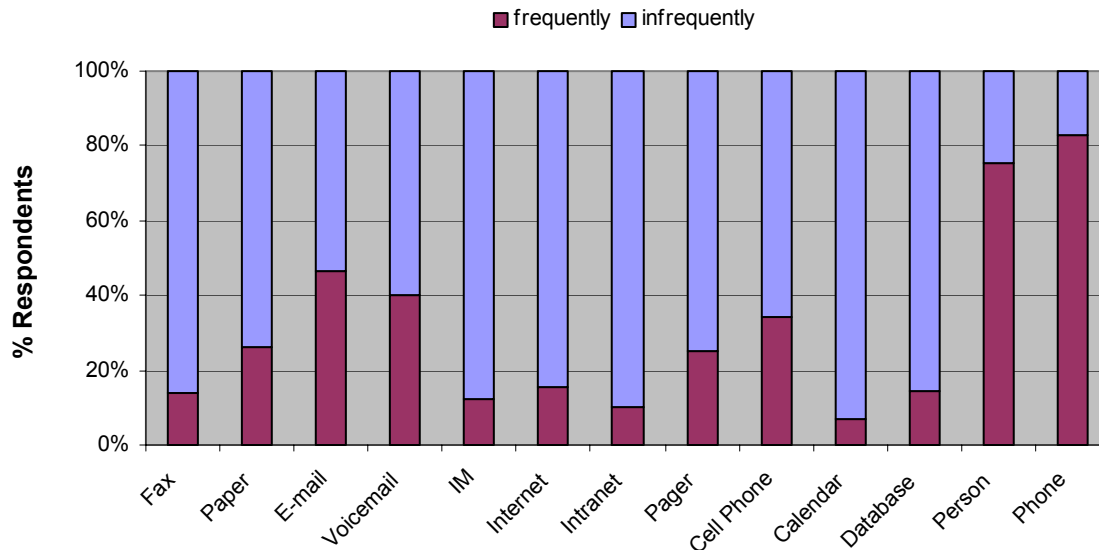
Respondents were asked to rank the importance of each 13 information source for getting their daily work done. The five point Likert scale options were *not important (1)*, *somewhat important*, *important*, *very important*, and *critical (5)*. An *n/a* option was available as well. Figure 5 shows the percentage of responses for each source, grouping the responses for *n/a*, *not important* and *somewhat important* in the low importance group, and the *important*, *very important*, and *critical* responses in the high importance group.

**Figure 5:** Information Source Importance



We were also interested in how frequently people were distracted from their work by the information sources. Figure 6 shows how frequently people felt the information sources interrupted their work. The five point Likert scale used here was *never (1)*, *rarely*, *sometimes*, *often*, and *always (5)*. The *never* and *rarely* responses are grouped as infrequently interruptive, and the *sometimes*, *often*, and *always* responses are grouped as frequently interruptive.

**Figure 6:** Source Interruption Frequency.



In order to create a more general measure of use, importance and interruption frequency, we created indices for each of these three questions. The Use index is simply the total number of sources each respondent indicated using in their typical day. The Importance and Interruption indices are summations of the Likert values attributed to each source. All three indices have a strong, positive correlation with one another:

- Use—Importance:  $r(161) = 0.21, p < 0.01$
- Use—Interruption:  $r(161) = 0.27, p < 0.01$
- Interruption—Importance:  $r(161) = 0.57, p < 0.01$

In general, these correlations indicate that if you use an information source frequently, you find it important and frequently distracting. If you find an information source important, you frequently use it and find it distracting. Lastly, if you find an information source distracting, you probably use it a lot and it is important to you.

While the indices give a general feel for the how these three aspects relate to one another, taking a closer look at the correlations of individual sources amongst the three categories reveals more interesting relationships. Correlating each source against itself for use, importance, and interruption followed the same trend as described for the indices – all three attributes for each source correlate very strongly and positively with each other. This means that for no source listed, was it frequently used and not distracting. Nor do people frequently use information sources that they do not find useful.

Many of the sources also have a positive and significant correlation with other sources in expected fashions, e.g. if you use the Internet a lot and find it important, you use e-mail a lot and

find it important as well. The interesting correlations here, however, are the negative ones. The importance of paper correlates negatively with e-mail [ $r(151) = -0.26, p < 0.01$ ] and with instant messaging [ $r(124) = -0.20, p < 0.05$ ]. People who find paper-based information sources important, do not find e-mail or instant messaging important, and vice versa. The use of e-mail [ $r(163) = 0.05, p = n.s.$ ] or instant messaging [ $r(163) = 0.12, p = n.s.$ ] do not correlate to use of paper sources significantly. However, the use of e-mail correlates negatively with finding paper sources important [ $r(160) = -0.17, p < 0.05$ ] as well as the converse of that: the use of paper sources correlates negatively with finding e-mail important [ $r(154) = -0.16, p < 0.05$ ]. These findings support the intuition that e-mail has replaced paper for a number of workers.

No significant interactions were found between the frequency of interruption and use of paper, instant messaging, and e-mail. The use of paper does not correlate to finding instant messaging [ $r(158) = -0.06, p = n.s.$ ] or e-mail [ $r(161) = -0.02, p = n.s.$ ] distracting. Nor does the use of e-mail [ $r(161) = 0.07, p = n.s.$ ] or instant messaging [ $r(161) = -0.09, p = n.s.$ ] correlate to finding paper distracting.

### *Identifying Groups*

Analysis of the relationships described by these correlations provide a framework in which to identify groups of people based on the information sources they find important. Using a factor analysis on the responses for importance, two distinct groups were identified that explain 43% of the variance for the question. The first distinct group identifies people whose work is heavily computer-based, such as technical support specialists, software developers, and accountants. These people find e-mail, instant messaging, the Internet, their company intranet, and voicemail very important. Averaging the importance ratings for these five information sources, 40% of the total respondents score higher than a 3 on a scale of 0 to 5. Throughout the rest of this paper we will refer to this group of people relying mainly on “computer-based” sources for their information.

The second distinct group found in the analysis identifies people that find pagers, telephones and cellular phones, group calendars, and personal interaction very important to their job. Examples of people in our survey that fall into this category include a corporate vice-president, physicians, real estate agents, and a police officer. Averaging the importance ratings for these five information sources, 39% of the respondents score higher than a 3 on a scale of 0-5. Throughout the rest of this paper we will refer to this group of people as relying on “direct interaction” as their main sources of information.

These two groups are not mutually exclusive. In fact, 23% of the respondents score high in both categories. Examples of these computer-based and direct interaction people in our survey include a deputy press secretary and a number of project managers. 44% of the respondents do not fall into either of these two groups, and include people such as personal coaches, hardware technicians, and a USPS carrier. Figure 7 shows the percentages of the respondents that fall into one of the following four categories: neither of these groups, mainly direct interaction, mainly computer-based, or both groups. No significant demographic differences exist between these four groups.

**Figure 7:** Information Source Importance Groupings.

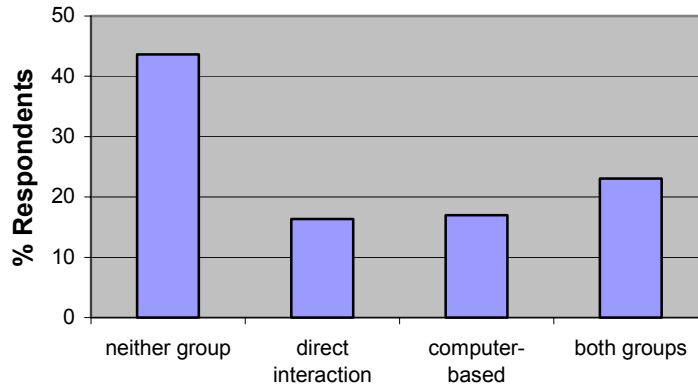
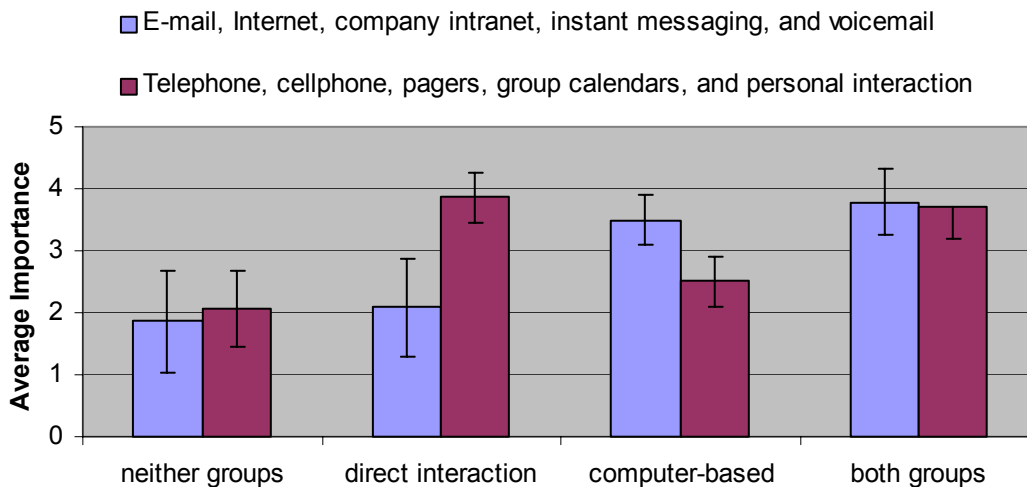


Figure 8 shows average importance of the two groups of information sources for each of the four groups.

**Figure 8:** Average importance of information sources for groups.



### Information Load & Reception

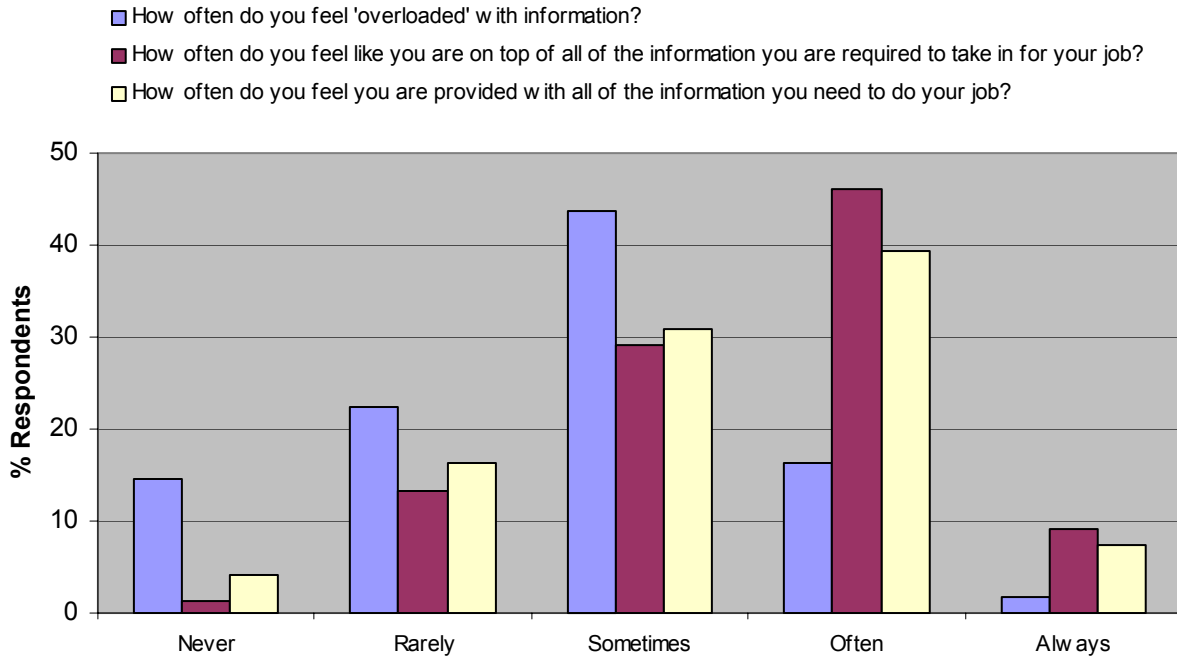
Quantifying feelings of information overload is difficult with a survey, particularly because the term “information overload” is complex, ambiguous and may mean different things to different people. The questions in our survey were designed to gauge the presence of these feelings and their frequency. Because we are concerned with incoming information and sources, we are interested in an understanding not only of the information people do receive, but also their feelings on the quality of that information, or the need for more information.

#### Measures

We asked our respondents to use a 5-point Likert scale (*never (1), rarely, sometimes, often, and always(5)*) to rate how often they felt overloaded with information. Using the same scale, we also had them rate how frequently they felt they were on top of all the information they were required to take in for their job. These two questions were used to gauge feelings about the

information they receive. Additionally, using the same five-point scale, we asked the respondents to indicate how often they felt they were provided with all the information they needed to do their job. This question was intended to assess feelings of not receiving enough information, or not receiving information of appropriate quality. This question also suggests the need for workers to seek out more information. The responses are displayed in Figure 9.

**Figure 9:** Measures of Information Overload and Reception.



In general feelings of information overload in the workplace exist, but do not dominate. 38% of the respondents felt overloaded *rarely* or *never*, and 56% feel as though they are *often* or *always* on top of the required information for their job. Additionally, 47% feel that they are being provided with all of the information either *often* or *always*. These summary responses indicate that, on the whole, people are fairly comfortable with the amount of information they receive and their ability to handle it. However, the number of respondents experiencing feelings of overload is not insignificant, with 18% feeling overloaded either *often* or *always*, and 44% *sometimes*.

As expected, a negative correlation exists between the frequency of feelings of overload with being on top of required information,  $r(161) = -0.30, p < 0.01$ . Additionally, a negative correlation exists between the frequency of feeling overloaded with being provided with information,  $r(160) = -0.16, p < 0.05$ . People who are on top of the information for their job and are provided with the information they need do not have feelings of information overload. These figures also indicate that people who are not provided with information feel overloaded, suggesting that overload is related to the information that an individual must seek out as part of their job as well as the quality of the information given to them. In the following few sections, we look more closely at different groups of people, trying to identify what causes feelings of overload, and which groups are feeling more overloaded than others.

### *Demographic Factors, Between Groups*

We first looked at how feelings of information overload were distributed by various demographic measures, including gender, age, job category, level of education attained, and whether or not the respondents were knowledge workers. Overall, we found no significant differences, except between the genders. Women [ $M=2.85$ ,  $N=78$ ,  $SD=0.97$ ] reported feeling overloaded by information at a slightly higher rate than men [ $M=2.52$ ,  $N=84$ ,  $SD=0.98$ ],  $t(160) = 2.11$ ,  $p<0.05$ . Additionally, more so than women [ $M=3.35$ ,  $N=78$ ,  $SD=0.92$ ], men [ $M=3.62$ ,  $N=84$ ,  $SD=0.83$ ] felt that they were on top of all of the information they required to do their job,  $t(160) = -1.97$ ,  $p<0.05$ .

Among the four categories of people identified earlier – the computer-based group, the direct interaction group, people in neither group, and people in both groups, there were no discernable differences in information overload. No group felt significantly more or less overloaded [ $F(3) = 0.38$ ,  $p=n.s.$ ], on top of their required information [ $F(3) = 0.53$ ,  $p=n.s.$ ], or provided with information [ $F(3) = 0.89$ ,  $p=n.s.$ ], than another group.

### *Information Sources*

In order to understand how different information sources related to feelings of overload in general, we first looked at the overall usage, importance, and interruption indices. The usage [ $r(161) = 0.17$ ,  $p<0.05$ ] and interruption [ $r(159) = 0.19$ ,  $p<0.05$ ] indices correlated with information overload, while the importance index [ $r(161) = 0.12$ ,  $p=n.s.$ ] did not. This indicates that feelings of information overload are sensitive to the number of information sources a person uses and how frequently interrupted they are, but not to the general feeling of having a lot of important information sources.

We next investigated the relationship between the individual information sources and feelings of overload, to see if particular sources were associated with feelings of information overload. We found that across all respondents, only three specific information sources, e-mail, voice-mail, and the telephone, correlated to information overload in terms of use, importance, or frequency of interruption. See Appendix B: Table 1. Telephone, voice-mail, and e-mail are the main information sources contributing to feelings of information overload. In fact, people who e-mail [ $M=2.81$ ,  $N=107$ ,  $SD=0.92$ ] are significantly more overloaded than those that do not [ $M=2.43$ ,  $N=56$ ,  $SD=1.04$ ];  $t(101) = -2.33$ ,  $p<0.05$ . People that use the phone [ $M=2.80$ ,  $N=102$ ,  $SD=0.93$ ] are also significantly more overloaded than those that do not, [ $M=2.48$ ,  $N=61$ ,  $SD=1.03$ ];  $t(161) = -2.09$ ,  $p<0.05$ . People that use voicemail [ $M=2.79$ ,  $N=56$ ,  $SD=0.93$ ], however, are not significantly more overloaded than those that do not, [ $M=2.63$ ,  $N=107$ ,  $SD=1.00$ ];  $t(161) = -0.98$ ,  $p=n.s.$

Taking a closer look at the groups of respondents individually, there are some interesting relationships with specific sources. Correlation statistics can be found in Appendix B: Tables 2-5. For people that do not heavily rely on either computer-based or direct interaction information sources, the importance of e-mail and the telephone correlate with overload, however they also correlate positively with feeling of being provided with the information necessary for their job. This indicates that the more important e-mail and the telephone become to this group, the more they feel they are provided with good information, but they also feel more overloaded. Telephone interruptions also make these people feel overloaded, but at the same time, they also make them feel as if they are being provided with necessary information.

For people that rely heavily on computer-based information sources, the use of e-mail actually correlates negatively with feelings of information overload, meaning the more they use

e-mail, the less overloaded they feel. These people do not feel interrupted by e-mail either. However, interruptions with the Internet make them feel overloaded, and the more interruptions from the telephone and people, the less they feel they are being provided with necessary information.

People that rely on more direct interaction for information tend to feel more overloaded the more important face to face contacts are. E-mail, voicemail, and the telephone cause no feelings of overload for these people, but interruptions from e-mail and the Internet cause feelings of not being provided with necessary information.

For the group of people that rely heavily on both computer-based sources and direct interaction for their information, e-mail has no significant effects on their feelings of overload or on their feelings of being provided with necessary information. However, the more they have to use the Internet, the more they feel they are not provided with necessary information, and the more important the Internet becomes, the more overloaded these men and women feel. The more they have to use the telephone or are interrupted by the telephone, the less they feel they are on top of all of the information required for their job. Additionally, the telephone and face to face interactions leave these people feeling as if they are not provided with necessary information.

Generally, the use of sources that are not “typical” for a person seem to cause feelings of overload. These findings can help us understand the relationships between people and their feelings towards the contexts of incoming information and medium which it arrives. In the following sections, we take a closer look at e-mail, voice-mail, the Internet, company intranets, and instant messaging. Unfortunately, our survey did not cover the use of the telephone in more detail.

## **E-mail**

In general, we found no relationship between the total number of e-mails received in a day and information overload. However, we asked the respondents to include information on the number of various types of e-mail messages they received: the number pertinent to their job, the number requiring an action or response, the number internal to their company, the number of company broadcasts, the number left unread, the number containing duplicate information, and the number of spam messages. For all respondents, we found a positive correlation between the number of internal e-mails received and frequency of feelings of overload [ $r(153)=0.20, p<0.05$ ]. This could indicate that intra-company communication by e-mail is more of a factor than inter-company communication in causing feelings of information overload. In addition, for those people that rely on computer-based information sources, the number of unread e-mails contributes to feelings of overload [ $r(60) = 0.32, p<0.05$ ]. For those that do not rely on computer based sources, the number of pertinent e-mails [ $r(92) = 0.30, p<0.01$ ] and broadcast e-mails, [ $r(91)=0.25, p<0.01$ ] are significantly related to feelings of overload.

E-mail organizational schemes also seem to contribute to feelings of overload. In particular, the use of filters correlates strongly to people feeling they are not on top of the required information for their job [ $r(161) = -0.24, p<0.01$ ], especially for those people who rely on computer-based sources [ $r(25) = -0.61, p<0.01$ ]. It seems that the filtering strategy affects people’s perceptions of the information they receive. Possible explanations for this finding is that imperfect e-mail filtering algorithms are discarding or misfiling e-mails in such a way that users are not able to locate and read all the ones that contain needed information, or that people are not sure to where important e-mail is being filtered.

The frequency of which people check their e-mail can also correlate to feelings of information overload. For those who check their e-mail multiple times in an hour or constantly [ $M=2.88$ ,  $N=74$ ,  $SD=0.88$ ], they tend to feel more overloaded than those who check it hourly or less [ $M=2.52$ ,  $N=89$ ,  $SD=1.03$ ],  $t(161)=-2.42$ ,  $p<0.05$ .

### **Voice-mail**

Similar to e-mail, we had respondents indicate not only their total voice-mail messages, but also information on the number of various types of voicemail messages they received: the number pertinent to their job, the number requiring an action or response, the number internal to their company, the number deleted without listening to, the number saved for later, and the number of duplicate messages. For all respondents, redundant voice-mails correlated with feelings of not being provided with enough information [ $r(149) = -0.20$ ,  $p<0.05$ ]. For those that indicated voice-mail is very important or critical to their work, the number of pertinent voice-mails [ $r(71) = -0.26$ ,  $p<0.05$ ] and the number of internal voice-mails [ $r(67) = -0.28$ ,  $p<0.05$ ] correlate with a sense of not being provided with enough information. One possible explanation for this relationship is that these internal and relevant voice-mails are not reaching these people at the right times, or the information they contain is not complete or in a format that they expect it.

The frequency of checking voice-mail also correlates with feelings of overload, with those checking multiple times in an hour or constantly tending to feel more overloaded [ $r(159) = 0.16$ ,  $p<0.05$ ].

### **Internet, Intranet and Instant Messaging**

We also looked at the frequency with which people reported using the Internet, their company intranet, and instant messaging. In general, use of the Internet correlates with feelings of information overload [ $r(159) = 0.17$ ,  $p<0.05$ ]. This trend is stronger for those people who do not use the Internet frequently [ $r(126) = 0.26$ ,  $p<0.01$ ].

For people who find their company intranet important to their job, frequently using it correlates with a sense that they do get the information required for their job [ $r(51) = 0.32$ ,  $p<0.05$ ], as well as to feeling as if they are provided with the information to perform their job, [ $r(50) = 0.31$ ,  $p<0.05$ ]. Interestingly, for those people that rely on computer-based information sources, the more frequently they use their company intranet the less overloaded they feel [ $r(25) = -0.43$ ,  $p<0.05$ ].

For instant messaging, no interesting correlations or relationships were found.

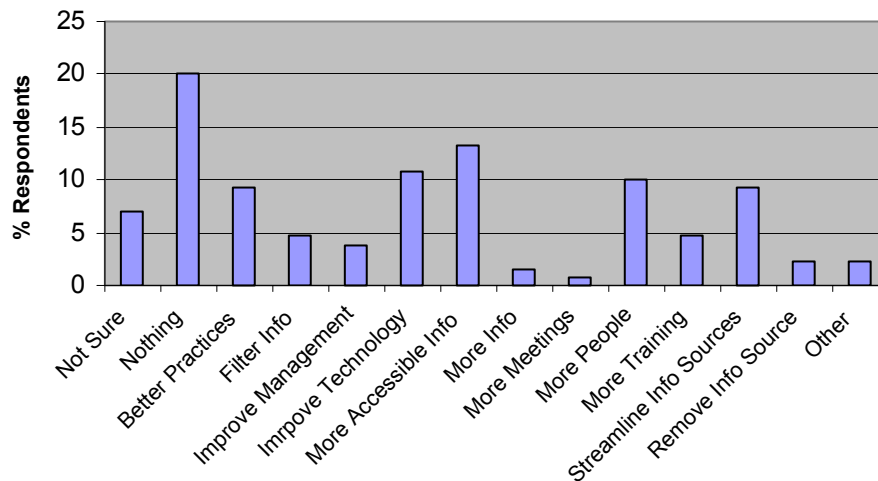
### ***Work outside of work***

In terms of work outside the traditional office and office hours, we found that information overload positively correlated with both the amount of time people spent on work outside the office or normal workday [ $r(161) = 0.16$ ,  $p<0.05$ ], as well as with the number of days a week they spent telecommuting [ $r(161)=0.16$ ,  $p<0.05$ ]. When we looked at telecommuters (those who reported telecommuting one or more days a week) and non-telecommuters separately, however, both correlations disappeared for each group. This suggests the possibility that most of the increase in information overload was associated with the some difference between telecommuters and non-telecommuters not addressed by this survey.

### Making Changes

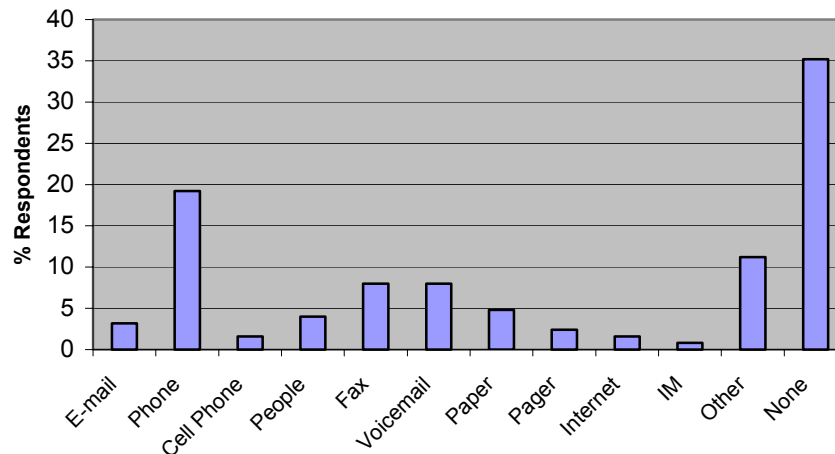
We asked each participant to indicate what their company could do to help them better manage their information. Of the people indicating a response, the resulting categories and percentages can be seen in Figure 10. 22% of the respondents left this field blank. These figures indicate that, on the whole, companies are doing a decent job helping individuals manage information.

**Figure 10:** If your company could do one thing to help you manage your information, what would it be?



Lastly, we asked participants which, if any, information source they most wished to remove from their workday. 24% of the respondents did not reply to this question, but the remaining responses and percentages can be seen in Figure 11. A very large percentage, 35%, indicated they would not remove any of their information sources. 19%, however, would remove their telephone.

**Figure 11:** If you could remove one information source from your workday, what would it be?



## 4. Discussion

### Source Use, Importance, Interruptions

Our preliminary findings on information source use, importance, and interruptivity show that these three factors are very closely related to each other, not only in terms of each specific information source, but across sources as well. Individuals who use, find important, and are frequently interrupted by one source are likely to use, find important, and be frequently interrupted by related sources. Interesting interactions exist for paper-based information sources; the negative correlations between these three factors for paper versus e-mail, voicemail, and instant messaging could indicate either that paper is being replaced with these sources in some situations, or that high-paper use individuals simply work differently than low-paper use individuals.

Source importance can be factored into two descriptive categories, those people that find computer-based information sources important, and those that find direct interaction as a source of information important. These factors are not mutually exclusive. In fact, a large number of individuals fall into both categories, and a large number of individuals do not fall into either of these categories as well.

#### Computer-based Sources

E-mail  
Internet  
Intranet  
Voicemail  
Instant Messaging

#### Direct Interaction Sources

Telephone  
Cellular Phone  
Pager  
Group Calendar  
Face-to-face

The sources used by these two distinct groups in our analysis have interesting comparisons that warrant further study. One could characterize the sources for computer-based workers as stationary, more asynchronous, and persistent. The sources for direct interaction are more mobile, synchronous, and transitory. These characteristics help to understand the difference in information these people rely on, and how they expect to interact and handle incoming information.

### Overload

We found that the majority of individuals in the workplace experience feelings of information overload. These feelings do not dominate, but they exist. People also feel they are provided with some or most of the information they need to do their jobs. Most are satisfied with their company's involvement in managing information, as well as with their handling of incoming information sources. Feelings of information overload correlate negatively with feelings of being provided with information necessary for their job, meaning the less people feel they are provided with the information they need, the more overloaded they feel. A small correlation exists between working outside of the home and feelings of information overload.

Frequent use of e-mail, voicemail and/or the telephone, correlates positively with feelings of information overload. Sources infrequently used, or are not typical or expected during the workday, can also increase feelings of overload. People that frequently check their e-mail, voicemail, or the Internet experience more frequent feelings of information overload. Additionally, women report feeling overloaded more frequently than men.

By and large, the total number of e-mail or voicemail messages does not correlate with feelings of overload. Rather, certain types of messages and behaviors for handling information seem to be more related. The lack of some expected correlations was particularly interesting. In

general, the number of e-mails received and voice-mails received, total or in any category, did not relate significantly to overload, except for broadcast, redundant, and/or internal messages. Probing more deeply into the relationship between a company's internal information exchange and overload could provide some interesting results. Because the frequency with which individuals checked their e-mail, voicemail and used the Internet relate to overload, it may be that individual work habits are more of a factor than the actual quantity of information received. On the other hand, at least for e-mail use, the various methods used to organize information flow did not seem to be a factor, except for filtering. These issues need to be teased apart in future studies.

Running our survey online limited our study to people that use the Internet and e-mail, which means we do not represent the greater working population. Additionally, we intentionally limited our information sources to a list of thirteen. Other sources, such as television and radio were not included, both of which are used frequently in certain professions. Our focus on probing deeper into some specific sources and not others offered us only a glimpse at some important sources, such as paper and face-to-face interactions. A more detailed study of these sources would be beneficial as well. A number of other possible important factors were not possible to include in this survey, such as job satisfaction, stress factors and levels within and outside of work, and total hours worked.

These findings do not give us a clear picture of what characterizes individuals who feel overloaded with information at the workplace. They do, however, begin to show us that the quality of information received, the context in which it is received, the medium by which it arrives, and general work habits may prove more indicative of overload than sheer quantity of information received. In addition, they also reveal how difficult it is to characterize and quantify information overload.

For a copy of the survey data or further information, please contact Sarah Waterson via email at [waterson@cs.berkeley.edu](mailto:waterson@cs.berkeley.edu).

## 5. About the Authors

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This survey was sponsored and funded by BackWeb Technologies ([www.backweb.com](http://www.backweb.com)).

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## Appendix A: Survey

(27 Questions)

1. Of the following information sources or device, which do you typically use the most for your job?

*Checklist of the following sources – multiple selection possible*

*Fax*

*Paper*

*E-mail*

*Voice-mail*

*Instant messaging/Chat*

*Internet*

*Intranet*

*Beeper/pager*

*Cellular phone*

*Group calendar*

*Shared database*

*Telephone*

*Face to Face (including meetings)*

*Other, please specify*

2. On a typical work day, how important are the following information sources for getting your work done?

*Matrix of drop down menus. For each of the following 13 sources listed in Question 1, the respondent could select:*

*not important*

*somewhat important*

*important*

*very important*

*critical*

*n/a*

3. If you have more than one of any of the above information sources/devices, please let us know how many you have and briefly describe how you use them at your job. For example, you might have two phone lines: and individual line and a general office line.

*Freeform response.*

4. Imagine you are hard at work, in the middle of a task or project. How frequently do you find the following information sources to break your concentration or distract you?

*Matrix of drop down menus. For each of the following 13 sources listed in Question 1, the respondent could select:*

*never*

*rarely*

*sometimes*

*often*

*always*

5. In the past day, how many e-mails...  
did you receive?  
were pertinent to your primary work function?  
required an action or response?  
were internal to your company?  
were company broadcasts?

did you leave unread?  
contained duplicate or redundant information?  
would you consider SPAM?

*Each sub-question had text boxes for a numerical response.*

6. Please briefly describe how you organize your e-mail, including the use of any tools, automatic filters, or rules.

*Freeform response.*

7. How often do you check your e-mail during the day?

*Radio button selection of one of the following:*

*Multiple*  
*less than once a day*  
*1-2 times a day*  
*hourly or so*  
*multiple times in an hour*  
*constantly*  
*n/a*

8. In the past day, how many voice-mails...  
did you receive?  
were pertinent to your primary work function?  
required an action or a response?  
were internal to your company?  
did you delete without listening to?  
did you save to listen to later?  
were duplicates or contained redundant information?

*Each sub-question had text boxes for a numerical response.*

9. How many times do you check your voice-mail during the day?

*Radio button selection of one of the following:*

*less than once a day*  
*1-2 times a day*  
*hourly or so*  
*multiple times in an hour*  
*constantly*  
*n/a*

10. Do you always answer your phone when you receive a call?

*Radio button selection of one of the following:*

*yes*  
*no*  
*n/a*

11. How often do you use your company's Intranet?

*Radio button selection of one of the following:*

*less than once a day*  
*1-2 times a day*  
*hourly or so*

*multiple times in an hour*  
*constantly*  
*n/a*

12. What are the main activities you use your company's Intranet for?

*Freeform response.*

13. How often do you use the Internet for job-related purposes?

*Radio button selection of one of the following:*  
*less than once a day*  
*1-2 times a day*  
*hourly or so*  
*multiple times in an hour*  
*constantly*  
*n/a*

14. What are the main job-related activities you use the Internet for?

*Freeform response.*

15. How often do you chat online or use instant messaging for job-related activities?

*Radio button selection of one of the following:*  
*less than once a day*  
*1-2 times a day*  
*hourly or so*  
*multiple times in an hour*  
*constantly*  
*n/a*

16. Briefly describe how you use online chatting or instant messaging for job-related activities?

*Freeform response.*

17. Think of the last couple of times you received useful job-related information in the following categories. How did you get that information? If possible, please respond with one of the following information sources: Fax, Paper, E-mail, Voice-mail, Instant messaging/Chat, Internet, Intranet, Beeper/pager, Cellular phone, Group calendar, Shared database, Telephone, Face to Face.

Human resources or company forms?  
Company announcements or financial status?  
Scheduling and meeting planning?  
Information specific to your primary work function?  
Company directory or contact information?  
Competitor information?  
Social events?

*For each sub-questions a text box for a freeform response.*

18. In the past week, during how many days did you...  
telecommute?  
take work home, or work outside of your normal work day?  
read your work e-mail outside of your normal work day?  
check your voice-mail outside of your normal work day?

access your company's Intranet outside of your normal work day?

*Radio button selection of one of the following:*

- 0
- 1-2
- 3-4
- 5-6
- 7

19. How often do you...

feel 'overloaded' with information?

feel like you are on top of all of the information you are required to take in for your job?

feel like you are on top of all of the information you would ideally like to take in for your job?

feel you are provided with all of the information you need to do your job?

*For each sub-questions, a choice of radio button selections of one of the following:*

- never*
- rarely*
- sometimes*
- often*
- always*

20. If your company could do one thing to help you manage your information, what would it be? Why?

*Freeform response.*

21. If you could remove one source from your working day, what would it be? Why?

*Freeform response.*

22. How old are you?

*Radio button selection of one of the following:*

- under 18*
- 19-25*
- 26-35*
- 36-45*
- 36-55*
- 56 +*

23. Gender?

*Radio button selection of one of the following:*

- Male*
- Female*

24. Highest level of education attained?

*Radio button selection of one of the following:*

- High school or GED*
- Bachelors degree*
- Masters degree*
- PhD*
- Other professional post graduate degree*
- Technical school*

*Other, please specify*

25. Job title?

*Freeform response.*

26. Job category?

*Drop-down menu of the following:*

*Accounting/auditing  
Administrative and support services  
Advertising/marketing/public relations  
Agriculture, forestry, & fishing  
Architectural services  
Arts, entertainment, and media  
Banking  
Biotechnology and pharmaceutical  
Community, social services, and nonprofits  
Computers, hardware  
Computers, software  
Construction, mining and trades  
Consulting services  
Customer service and call center  
Education, training, and library  
Employment placement agencies  
Engineering  
Finance/economics  
Government and policy  
Healthcare  
Hospitality/tourism  
Human resources  
Information technology  
Installation, maintenance, and repair  
Insurance  
Internet/e-commerce  
Law enforcement/security  
Legal  
Manufacturing and production  
Military  
Personal care and service  
Real estate  
Restaurant and food service  
Retail/wholesale  
Sales  
Science  
Sports and recreation  
Telecommunications  
Transportation and warehousing*

27. Please feel free to provide any comments or feedback.

*Freeform response.*

## Appendix B: Correlations

**Table 1:** Correlations with information overload

|                  | Use                    | Importance             | Interruption           |
|------------------|------------------------|------------------------|------------------------|
| <b>E-mail</b>    | $r(161)=0.161, p<0.05$ | $r(152)=0.243, p<0.01$ | $r(159)=0.236, p<0.01$ |
| <b>Voicemail</b> | $r(161)=0.085, p=n.s.$ | $r(144)=0.170, p<0.05$ | $r(158)=0.211, p<0.01$ |
| <b>Telephone</b> | $r(161)=0.163, p<0.05$ | $r(159)=0.187, p<0.05$ | $r(159)=0.186, p<0.05$ |

**Table 2:** Correlations for people who do not rely on computer-based or direct interaction information sources

| Measure      | Source    | Correlation to          | Statistic               |
|--------------|-----------|-------------------------|-------------------------|
| Use          | E-mail    | Overload                | $r(70) = 0.325, p<0.01$ |
| Use          | Fax       | On Top of Required Info | $r(70) = 0.238, p<0.05$ |
| Importance   | E-mail    | Overload                | $r(69) = 0.347, p<0.01$ |
| Importance   | E-mail    | Provided Info           | $r(69) = 0.235, p<0.05$ |
| Importance   | Telephone | Overload                | $r(69) = 0.251, p<0.05$ |
| Importance   | Telephone | Provided Info           | $r(69) = 0.332, p<0.01$ |
| Interruption | E-mail    | Overload                | $r(69) = 0.429, p<0.01$ |
| Interruption | Voicemail | Overload                | $r(68) = 0.319, p<0.01$ |

**Table 3:** Correlations for people that rely on computer-based information sources

| Measure      | Source    | Correlation to | Statistic                |
|--------------|-----------|----------------|--------------------------|
| Use          | E-mail    | Overload       | $r(25) = -0.447, p<0.05$ |
| Interruption | Fax       | Provided Info  | $r(25) = 0.453, p<0.05$  |
| Interruption | Internet  | Overload       | $r(25) = 0.560, p<0.01$  |
| Interruption | Telephone | Provided       | $r(25) = -0.409, p<0.05$ |
| Interruption | Person    | Provided       | $r(25) = -0.444, p<0.05$ |

**Table 4:** Correlations for people that rely on direct interaction for information

| Measure      | Source   | Correlation to | Statistic                |
|--------------|----------|----------------|--------------------------|
| Importance   | Person   | Overload       | $r(25) = 0.427, p<0.05$  |
| Interruption | E-mail   | Provided Info  | $r(25) = -0.434, p<0.05$ |
| Interruption | Internet | Provided Info  | $r(23) = -0.470, p<0.05$ |

**Table 5:** Correlations for people that rely on both computer-based sources as well as direct interaction

| Measure      | Source    | Correlation to          | Statistic                |
|--------------|-----------|-------------------------|--------------------------|
| Use          | Internet  | Provided Info           | $r(34) = -0.370, p<0.05$ |
| Use          | Pager     | Overload                | $r(35) = 0.358, p<0.05$  |
| Use          | Telephone | On Top of Required Info | $r(35) = -0.328, p<0.05$ |
| Use          | Telephone | Provided Info           | $r(34) = -0.371, p<0.05$ |
| Use          | Person    | Provided Info           | $r(34) = -0.412, p<0.05$ |
| Use          | Person    | Overload                | $r(35) = 0.378, p<0.05$  |
| Importance   | Intranet  | Overload                | $r(35) = 0.358, p<0.05$  |
| Interruption | Person    | On Top of Required      | $r(34) = -0.408, p<0.05$ |

## **Appendix C: Some Interesting Comments**

*If you could remove one information source from your working day, what would it be?*

“My supervisor. Why? Obviously, you've never dealt with him.”

“bosses.”

“assistant supervisor.”

“too many chiefs.”

*If your company could do one thing to help you manage your information, what would it be?*

“Clone me...” (2)

“Provide matches to burn all the unwanted magazines! Otherwise, nothing.”

“Give me more of it.”

“leave me alone. Because non techs ask a lot of dumb questions”

“honesty. It makes things quicker, easier, more beneficial to work and wellness of workers”

“I don't know. I'm the President. Tough question.”

“put a woman in charge :)”

“Put in my hand directly rather than let it die a slow death going through the proper channels”

“Get off my back because I know my job better than the bosses do.”

“strap on an extra brain to my head”