Acceptance of a Remote Desktop Access System to Increase Workspace Awareness

By

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I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Awareness systems are being designed and implemented to improve employee connections. This study examines the variables that affect the acceptance of an awareness system. The awareness system that was used for this research was a remote desktop access system. The independent variables investigated were the degree of detail that can be viewed on a desktop, whether the users can control who can access their desktops, whether the users can control when others have access to their desktops, the equality of access to others' desktops, and task-technology fit. In determining the effect of the independent variables on acceptance, the dependent variable, the mediating variables of privacy and fairness were taken into account. There was a preliminary survey conducted to determine appropriate situations to be used in the scenario descriptions for the survey for the main study. The methodology of policy-capturing surveys was utilized to conduct the survey for the main study in order to investigate the model developed in this study. The policy-capturing survey was pre-tested on University of Waterloo students. The main study was conducted in two different organizations, the subjects for the first study were employees from the Information Systems and Technology Department at the University of Waterloo and the subjects for the second study were employees from Ciber Incorporated. Results indicate that perceptions of privacy and perceptions of fairness have significant effects on acceptance. Also, perceptions of privacy and fairness are related to details in the design of the remote desktop access system. This research may be a contribution to this field since little research has been conducted in this area and implications can be drawn for future research on acceptance of awareness systems.

Acknowledgements

Doing what you want is freedom.
Liking what you do is happiness.

Author unknown

I would like to thank my friends and family for all their support and the memories that I will always cherish.

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Chapter 1

Introduction

With the increase in the number of distributed teams in organizations, and the growing quantity of temporary and virtual organizations (Hardwick & Bolton, 1997; Jarvenpaa, Knoll, & Leidner, 1998; Turoff, Hiltz, Bahgat, & Rana, 1993), awareness systems are being designed and implemented to improve employee connections. Awareness has been conceptually generalized in human-computer interaction literature as the chance that the actions of one individual will be noticed by another individual (Rodden, 1996). This chapter draws from the studies of many researchers including the research by McKnight and Webster (in press).

Media spaces, which are systems that use various media technologies to support collaboration, can be used as awareness sytems (Ackerman, Hindus, Mainwaring, & Starr, 1997). Awareness systems, most often electronic, provide information on distant colleagues' availability or actions (Webster, 1999). For instance, they may provide the user with some indication of the activities of users of a shared information base (Mariani, 1997). Awareness systems may monitor information in many different ways, such as an employee's keyboard, mouse, and chair for activities (Honda, Tomioka, & Kimura, 1997), movements in a work area by motion detectors (Kuzuoka & Greenberg, 1999), and muffled speech in an employee's work area (Hudson & Smith, 1996).

These awareness systems are thought to be very beneficial since it is much more difficult to maintain awareness in a distributed workspace than in a traditional workspace. The awareness of others is an important factor that may influence the fluidity and

naturalness of collaboration (Gutwin & Greenberg, 1998). Thus, awareness is viewed as a key design factor for collaborative applications by human-computer interaction researchers (Johnson & Greenberg, 1999; Lee, Schlueter, & Girgensohn, 1997; Marianni, 1997; Palfreyman & Rodden, 1996; Simone & Bandini, 1997; Tollmar, Sandor, & Schomer, 1996). Palfreyman and Rodden (1996) stated that importance of awareness is demonstrated in ample literature including work on media spaces (Bly, Harrison, & Irwin, 1993), the development of interaction models (Benford & Fahlen, 1993), and social studies of work (Heath & Luff, 1991).

Gutwin and Greenberg (1998) stated that having knowledge of who is in the workspace, where they are working, and what they are doing is awareness. This may be used to manage activity, simplify verbal communication, supply suitable assistance, and co-ordinate movement between individual and shared work. They believe that maintaining workspace awareness is necessary for natural and trouble-free collaboration and that co-ordinating activities with others in a shared workspace is much easier when the individuals are aware of what others are doing. For example, periodic video snapshots of the colleague's work area may enable a user to determine whether a distant colleague is available (Whittaker, 1995). Another example is the advantage of being able to view the state of tasks on a distant colleague's computer to decipher when merging independently-developed software components is possible (Simone & Bandini, 1997).

With the goal of improving collaborative connections, awareness systems have been designed, tested, and implemented in some organizations. For example, organizations such as NYNEX and Xerox have implemented awareness systems (Lee,

Girgensohn, & Schlueter, 1997) in order to improve connections between employees doing collaborative work.

There are many different kinds of awareness systems. The two major genres of awareness systems are peripheral awareness systems and activity-based awareness systems, the latter is the focus of this study. Peripheral awareness systems are also known as passive, pre-attentive, presence, or background awareness systems. Activity-based awareness systems have also been called detailed task, shared workspace, shared document, or synchronous groupware awareness systems (McKnight & Webster, in press). Development of systems in both of these genres continues to expand.

Peripheral awareness systems may provide information that is known about one's presence in a distant location (Zhao & Stasko, 1998). Researchers have argued that peripheral awareness systems are advantageous because users are provided with the ability to initiate opportunistic connections (Whittaker, 1995). Opportunistic connections are interactions and/or interrelations that occur because the opportunity presents itself. Studies of workplace communication emphasize the importance of opportunistic connections compared to arranged meetings (Kraut, Fish, Root, & Chalfonte, 1993; Whittaker, Frohlich, & Daly-Jones, 1994). Peripheral awareness systems may be beneficial since they provide the opportunity for interacting with others, therefore increasing communication. Peripheral awareness systems are frequently audio or video connections between locations (Zhao & Stasko, 1998). An example of a peripheral awareness system can be part of a desktop videoconferencing system that enables audio and video communication between multiple locations through users' personal computers (Webster, 1998). According to Adler and Henderson (1994) peripheral awareness

enables users to determine when colleagues are available, save time in travelling to their colleagues' work areas, and cultivate closer working relationships.

Activity-based systems increase awareness of colleagues by providing information on colleagues' computer desktop activities (McKnight & Webster, in press). Activity-based awareness systems might enable a user to monitor the state of computer-based tasks of a colleague (Mariani, 1997), to provide access to a shared information repository (Simone & Bandini, 1997), or collaborate with other users in the writing of a document through a shared text editor (Rodden, 1996). Remote desktop access systems are one type of activity-based awareness systems that are currently being developed and implemented. For example, some remote desktop access systems enable the user to view a computing desktop environment of a machine from anywhere on the network or Internet, which will result in increased awareness of the colleague's activities. Remote desktop access systems will be investigated in this study since little research has been conducted in this area, and as described in the next paragraph, they can be very useful for increasing awareness. A further description of remote desktop access systems is given in Appendix A, as well as some examples of various uses for these systems.

Collaborating on a project with another user remotely is one benefit of remote desktop access systems (Symantec Corp., 1996). An example would be when software developers are working together to write a piece of code, it may be advantageous for one software developer to observe how a colleague dealt with or is dealing with a certain detail in the code. Another benefit of some remote desktop access systems is that a computing desktop on one platform can be viewed by a desktop on a different platform.

This capability enables users to get past the MacIntosh versus Personal Computers (PC) barrier, the obstacle of Unix versus Windows, and many more.

For a technology such as awareness systems to be successful, user acceptance must occur. However, little research has been conducted on the acceptance of electronic awareness systems (McKnight & Webster, in press; Webster, 1999). The research that has focused on employee reactions has highlighted employee issues pertaining to privacy, similar to those found for electronic performance monitoring systems (Webster, 1998; Zhao & Stasko, 1998). In contrast to examining employee reactions, most research has focused on technical issues about providing awareness to distant employees (e.g., Johnson & Greenberg, 1999). Even though some researchers have developed models of collaborative awareness (e.g., Rodden, 1996), these models are technical, addressing the design of awareness systems instead of behavioural models of employee reactions (McKnight & Webster, in press). Thus, further research of the acceptance of awareness systems would be valuable such as the acceptance of a remote desktop access system for the purpose of increasing awareness would be beneficial.

This study examines variables that affect the acceptance (attitudes towards use and intentions to use) of a remote desktop access system through studying the underlying factors of privacy, fairness, and task-technology fit. To do so, it draws on theories of electronic performance monitoring systems, task-technological fit and areas of organizational justice such as procedural and distributive justice. Individuals from the information technology area and human resource departments of organizations as well as researchers concerned with privacy and fairness issues in organizations may be interested in the outcomes of this study.

In Chapter 2, the development of the research model along with the related literature is discussed. Chapter 3 begins with the rationale for using policy-capturing methodology as the research approach and method of inquiry, followed by explanations for the measures, procedures and analysis. The results are presented in Chapter 4 followed by the implications and conclusions of the findings as well as a discussion on areas for future research in Chapter 5.

Chapter 2

Development of Research Model

Examining the variables that affect the acceptance of a remote desktop access system as an awareness system is the objective of this study. The meaning of acceptance may be interpreted in different ways, hence the interpretation used in this study must be clarified. Rice and Webster (1999) mention that within organizations a new technology may be acquired yet only sparsely used, resulting in what Fichman (1995) termed the assimilation gap, or what Hiltz and Johnson (1989) distinguish as usage versus acceptance. Whereas, some researchers use "acceptance" and "usage" interchangeably (e.g., Davis, Bagozzi, & Warshaw, 1989), Saga and Zmud (1994) noted that attitudes toward use, intentions to use, and frequency of use are indications of acceptance. The focus on acceptance will be on attitudes towards use and intentions to use in this study.

2.1 Research Questions/Hypotheses

Chapter 1 explains awareness systems in general and establishes that acceptance of these awareness systems is important in their success. Awareness systems present many potential advantages to organizations and the employees who utilize them. However, it is proposed that a few key influences, privacy, fairness and task-technology fit, which are affected by the independent variables described below, will have an effect on the acceptance of remote desktop access systems as awareness systems.

2.1.1 Privacy

Privacy has been recognized as an important issue for media spaces (Hudson & Smith, 1996). Many disciplines have given a significant amount of attention to the concept of privacy including psychology (Altman, 1975; Margulis, 1977), anthropology (Mead, 1949), sociology (Simmel, 1950), law (Jourard, 1966; Shils, 1966; Warren & Brandeis, 1890), and organizational behaviour and human resource management (Bies, 1993; Schein, 1977; Stone & Stone, 1990). Privacy research has experienced a multitude of diverse conceptions because of the diversity in its treatment (Alge, 1999). For example, an agreement does not exist about whether privacy reflects an individual state or condition, a characteristic of place, a goal, a process, an attitude, or an observable behaviour (Newell, 1995).

A common element in many definitions of privacy is the concept of control (Altman, 1975; Kelvin, 1973; Shils, 1966; Stone & Stone, 1990; Westin, 1967). As stated by Stone & Stone (1990, p. 358), the definition of privacy is as follows:

> A state or condition in which the individual has the capacity to (a) control the release and possible subsequent dissemination of information about him or herself, (b) regulate both the amount and nature of social interaction, (c) exclude or isolate him or herself from unwanted (auditory, visula, electronic, etc.) stimuli in an environment, and as a consequence, can (d) behave autonomously (i.e. free from control of others).

In accordance, Altman (1967, p.18) defined privacy as the "selective control of access to one's self or group". Westin (1967, p.7) defined privacy as "the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent

information about them is communicated to others", this definition will be adopted in this study.

An invasion of privacy results when the privacy control that one desires has not been achieved (Alge, 1999). The few studies that examined employee reactions to awareness systems have determined that some of the same concerns employees had about privacy with respect to electronic performance monitoring systems have been found for awareness systems (Webster, 1998; Zhao & Stasko, 1998). These findings suggest that although awareness features are intended to improve working relationships they may actually lower system acceptance since privacy has become a very prominent issue for them (Webster, 1998). Privacy should be an important issue since users obviously do not want to feel as though their privacy is being threatened. Thus, perception of privacy may be an influence on the acceptance of an awareness system.

Invasion into someone's privacy might make the person feel ill at ease. Relations between individuals may change towards a more vulnerable association, which may not necessarily be desirable:

> Simply stated, the more information about oneself that leaves your work area, the more potential for awareness of you exists for your colleagues. Unfortunately, this also represents the greatest potential for intrusion on your privacy. Similarly, the more information that is received about the activities of colleagues, the more potential awareness we have of them (Hudson & Smith, 1996, p. 248).

Privacy may be directly related to acceptance, which leads to the first hypothesis.

H1: *Acceptance of remote desktop access awareness systems is more likely with a higher perception of privacy.*

Four independent variables, degree of detail, control over who can access, control over when others can access, and equality of access, are proposed to affect privacy. First, the degree of detail will be discussed. What others can view on a user's desktop entails whether a colleague can view everything on the desktop or if the colleague can only view certain applications. It is assumed that the degree of detail that is available is a feature that is pre-determined with the remote desktop access system. Control over the level of detail is not an issue since all the users will have the same amount of detail available. If all the details of the user's desktop are available then that individual may have a low perception of privacy since nothing on that user's desktop would be private. However, if some items or applications on the user's desktop were not accessible to other users, then there may be a perception of some privacy. For example, if all the details of a user's email messages were available then those messages would not be perceived as private and the user may feel a lack of privacy since their email messages may be highly personal. Whereas, if the details of the user's email messages were not available including who the user was corresponding with and what the subject titles were then that user would have a higher feeling of privacy.

The relations between individuals may change with having the ability to access each other's desktop. As McKnight and Webster (in press) stated, "...the use of an awareness system is, in a sense, an act of self-disclosure, a willingness to share information about oneself". The ability to see what the individual is working on or accomplished may lower the individual's sense of personal privacy and perhaps even result in feelings of vulnerability. Hence, the degree of detail that is available about a user's desktop will be directly related to the amount of privacy that is perceived.

H2: *The less detail about a user's desktop that is available, the higher is that user's perception of privacy.*

A major issue that affects users' perceptions of privacy is the extent to which users have personal control over their desktops. Alge (1999) argued that control is a central concept in privacy theory. This is in accordance with the earlier discussion about control being a theme that frequently runs throughout various definitions of privacy (Altman, 1975; Kelvin, 1973; Shils, 1966; Stone & Stone, 1990; Westin, 1967), including the definition of privacy that has been adopted for this study. Thus, as described in the next two hypotheses, it is proposed that perception of privacy will be increased when users can control when and who has access to their desktops. If all the other users can access the user's desktop then the user may have a low perception of privacy. However, if the users can choose which individuals are allowed access to their desktops then the users may feel more of a sense of privacy. Therefore, the users' control over who can access their desktops will be related to feelings of privacy.

H3: *If users can control who can access their desktops, they will experience higher perceptions of privacy.*

If users can control when others have access to their desktops, then they may have a greater sense of privacy. For example, suppose the remote desktop access system was set up to allow others to be able to view documents in a word processor. If the individual wanted to write a personal letter then that individual might not want his/her colleagues to

be able to read it. If access to that user's desktop could be temporarily denied, the individual would be able to write the letter with no concerns. A greater feeling of privacy would then be perceived, and therefore the perceived degree of privacy will be related to the users having control over when others can access their desktops.

H4: *If users can control when others can access their desktops, they will experience higher perceptions of privacy.*

Equality of access is whether users can view all the desktops of colleagues who can view theirs. As stated, the purpose of an awareness system is to provide information about distant colleagues' availability and actions (Webster, 1999). If information pertaining to availability or actions is being transferred in only one direction then the system is not necessarily an awareness system. Relaying information about an individual's activities in only one direction is similar to a system used for performance monitoring. The intent of a monitoring system is the distinguishing factor between performance and awareness monitoring systems since the underlying technologies may be the same (McKnight & Webster, in press). Therefore, information must be flowing in both directions for users to perceive equality of access.

Another issue pertaining to equality of awareness is control. If a colleague can view a user's desktop but the user can not view that colleague's then the user may feel a lack of control. Control is a major issue in the definition of privacy; as a result the amount of control an individual has may affect their perception of privacy. Thus,

equality of access (equality in the transfer of information) may affect a user's perception of privacy.

H5: *Users will have a greater perception of privacy if they can view all the desktops of colleagues who can view theirs.*

2.1.2 Fairness

Another issue that could affect the acceptance of a remote desktop access system is the perceived fairness of the system. The importance of fairness, as an issue, in organizations is receiving widespread attention (Greenberg, 1990). For clarification, fairness and justice may be used interchangeably (e.g., Alge, 1999). Fairness may also be clarified by the synonym, unbiased.

There is increasing evidence that fairness is a significant component affecting employee behaviour within organizations (Masterson, Lewis-McClear, Goldman, & Taylor, in press). An example of this is the general finding that fairness of decision outcomes results in increased positive attitudes and behaviours (Alge, 1999; Ambrose & Alder, 2000; Greenberg, 1982; Walster, Walster, & Berscheid, 1978). Many studies have concluded that there are positive employee attitudes and behaviours associated with fairness in organizations, including job satisfaction, organization citizenship behaviour, organizational commitment, performance, and satisfaction with the leader (Masterson, Lewis-McClear, Goldman, & Taylor, in press). Hence, fairness is a very important aspect that should be present for a system to be accepted. If the system is perceived to be

unfair then negative employee attitudes and behaviours may affect the acceptance of the system, thus making it more probable that the system will be rejected.

H6: *Acceptance of remote desktop access awareness systems is more likely with a higher perception of fairness.*

Perceptions of fairness may be explained in terms of justice theories. More specifically, a significant influence on individual attitudes and behaviours can come from perceptions of procedural justice, which are feelings about the fairness of the decision-making process (Leventhal, 1980).

The fairness of the decision-making process is the fundamental building block of procedural justice theory (Lind & Tyler, 1988). In awareness systems, the decision-making process may be represented in the decisions that were made concerning the design of the system. If the users perceive that the decisions made concerning the design of the awareness system were fair then the perception of fairness in general may be greater.

There are studies that implicate that some variables have a similar effect on both perceptions of privacy and perceptions of fairness. For example, Eddy et al. (1999) argue that theories of procedural fairness support the findings from privacy literature. They demonstrate that the impact of some variables on perceptions of privacy are similar to the impact of these variables on perceptions of fairness. In accordance with this theoretical rationale, many concepts used to support hypotheses relevant to perceptions of privacy can be used in support of hypotheses pertaining to perceptions of fairness. Thus, the

following four hypotheses concerning degree of detail, control over who can access, control over when others can access, and equality of access are supported with similar concepts to those that were employed for hypotheses two through five.

As described earlier, the degree to which others can view another user's desktop entails whether a colleague can view everything on the desktop or only certain applications. As discussed, the degree of detail of a user's desktop that is available is an issue when it comes to perceptions of privacy, however it is also an issue with perceptions of fairness. Using the example previously discussed, if everything on the user's desktop could be viewed including the details of their email messages, the user may not have a very good perception of fairness. An issue that will be further discussed in the support of the next hypothesis is the role that control plays in procedural justice. Thibaut, Walker, and their colleagues (Lind, Kurtz, Musante, Walker & Thibaut, 1980) determined that control positively affects perceptions of procedural fairness and outcome satisfaction. Thus, the individual having no choice or control over the amount of detail that is available to other colleagues affects the individual's perception of fairness. If the details of the user's email messages were not available including who the user was corresponding with and what the subject titles were then that user may perceive more of a feeling of fairness.

H7: *The less detail about a user's desktop that is available, the higher is that user's perception of fairness.*

An underlying core element of procedural justice (feelings about the fairness of the decision-making process) is the perceived degree of control (Lind, Kanfer, & Earley, 1990). One form of decision control is choice (Houlden et al., 1978). Choice allows the user the opportunity to choose a subset of outcomes from a set of alternatives (Early & Lind, 1987). Choice is part of the control-oriented perspective of procedural justice (Hunton, 1996). Thibaut, Walker, and their colleagues (Lind, Kurtz, Musante, Walker & Thibaut, 1980) determined that control positively affects perceptions of procedural fairness and outcome satisfaction. Therefore, the more control the user has over the awareness system, the greater the perceptions of fairness resulting in an increased chance for acceptance.

Whether the users have control over who can access their desktops affects the users' perception of fairness. In other words, if the design of the awareness system allows the users an aspect of control then their feelings of fairness may be affected. The decision-making process being the decisions made concerning who can access the decision-maker's desktop. A higher perceived degree of control may result when the users are able to control who can access their desktops. As mentioned earlier, the perceived degree of control is an underlying component of procedural justice (Lind, Kanfer, & Earley, 1990). Since perceptions of procedural justice are feelings in regards to fairness (Leventhal, 1980), the perception of fairness may be related to the users controlling who can access their desktops. Therefore, having more control increases perceptions of fairness, which leads to the next hypothesis.

H8: *If users can control who has access to their desktop, they will experience greater perceptions of fairness.*

Using a similar argument as the previous hypothesis, if the users can control when others have access to their desktops then the users will have a greater feeling of control. This higher degree of control leads to a greater feeling of procedural justice resulting in a greater perception of fairness. Revisiting the example presented earlier, if a user wanted to write a personal letter then that user may not want his/her colleagues to able to read it. If access to that user's desktop could be temporarily denied, the individual would be able to write the letter with no concerns. Thus, a greater feeling of control would be perceived as well as fairness. Therefore, the perceived degree of fairness is related to the users having control over when others can access their desktops.

H9: *If users can control when others have access to their desktops, they will experience greater perceptions of fairness.*

Studies have shown that interpersonal (or social) comparisons are important in potentially eliciting feelings of fairness (Crosby, 1976; 1984; Martin, 1981). "The perceived proportion of individuals' inputs into and outcomes derived from the relationship in comparison to the inputs and outcomes of relevant others" is a definition of distributive justice given by Brochner and Wiesenfeld (in press). Another area of organizational justice is distributive justice. The concept that individuals' perceptions of the fairness of an outcome affects their attitudes and behaviours has been determined by research on distributive justice (Ambrose & Alder, 2000). The principle of distributive

justice is to assess the fairness of outcomes and consequences of organizational processes and decisions as well as the resulting response of organizational members (Greenberg, 1987; Greenberg, 1990). Theories of distributive justice state that individuals evaluate outcomes based on some distribution rule (Ambrose & Alder, 2000). Three allocation rules determined by Leventhal form a bases for judgements of distributive fairness: equity, equality, and need (Leventhal, Karuza, & Fry, 1980). It is the principle of equality that is one of the issues addressed in this study. As previously mentioned, information must be flowing in both directions for users to perceive equality of access. The users may have a greater sense of fairness when equality in information transfer is achieved. Therefore, equality in the transfer of information is related to fairness.

H10: *Users will have a greater perception of fairness if they can access the desktops of everyone who can access theirs.*

"Task-technology fit is the degree to which a technology assists an individual in performing his or her portfolio of tasks" (Goodhue & Thompson, 1995, p. 216). Thus, task-technology fit may be an important issue to users since a better task-technology fit may result in increased assistance for accomplishing their tasks. Increased assistance with their tasks may encourage users to utilize technology that is appropriate for their tasks. Floyd (1986; 1988) stated that a "system/work fit" construct has been found to be a strong predictor of system use. Hence, a system is more likely to be employed if the users feel that the system is appropriate (fits) for the task at hand. For example, consider two individuals collaborating on a project where one person needs to ask the other a question that is not urgent. Would that person be more likely to pick up the telephone or

email the other person or would he/she access the remote desktop access system to see what the other person was doing in order to contact the other person? Most likely the person would not want to bother accessing a remote desktop access system when he/she could quickly email or telephone the other person. Thus, for a task such as this, the technology of a remote desktop access system is not likely to be used and does not have a very high task-technology fit. Therefore, task-technology fit may have an influence on intentions to use, which in turn is acceptance.

H11: *Acceptance of remote desktop access system awareness systems is more likely with higher task-technology fit.*

The eleven hypotheses that were discussed are portrayed in the model in Figure 1. In the model, privacy and fairness are mediating variables because they are intervening variables that directly influence the relationship between the dependent variable, acceptance, and four of the independent variables. Eddy et al.'s (1999) argument that some variables have a similar impact on both perceptions of privacy and perceptions of fairness reinforces the fact that four of the independent variables are being mediated by both perceptions of privacy and perceptions of fairness.

The objective of this study is to examine the factors that effect the acceptance of remote desktop access systems as awareness systems through the underlying factors of privacy, fairness and task-technology fit. There are other factors that may contribute to the acceptance of an awareness system but were not included in this model because of its focus on the design of the system. Some of these factors, such as users' input into the

design of the system, organizational climate, perceived ease of use, and perceived usefulness, are proposed as areas for future research in Chapter 5.

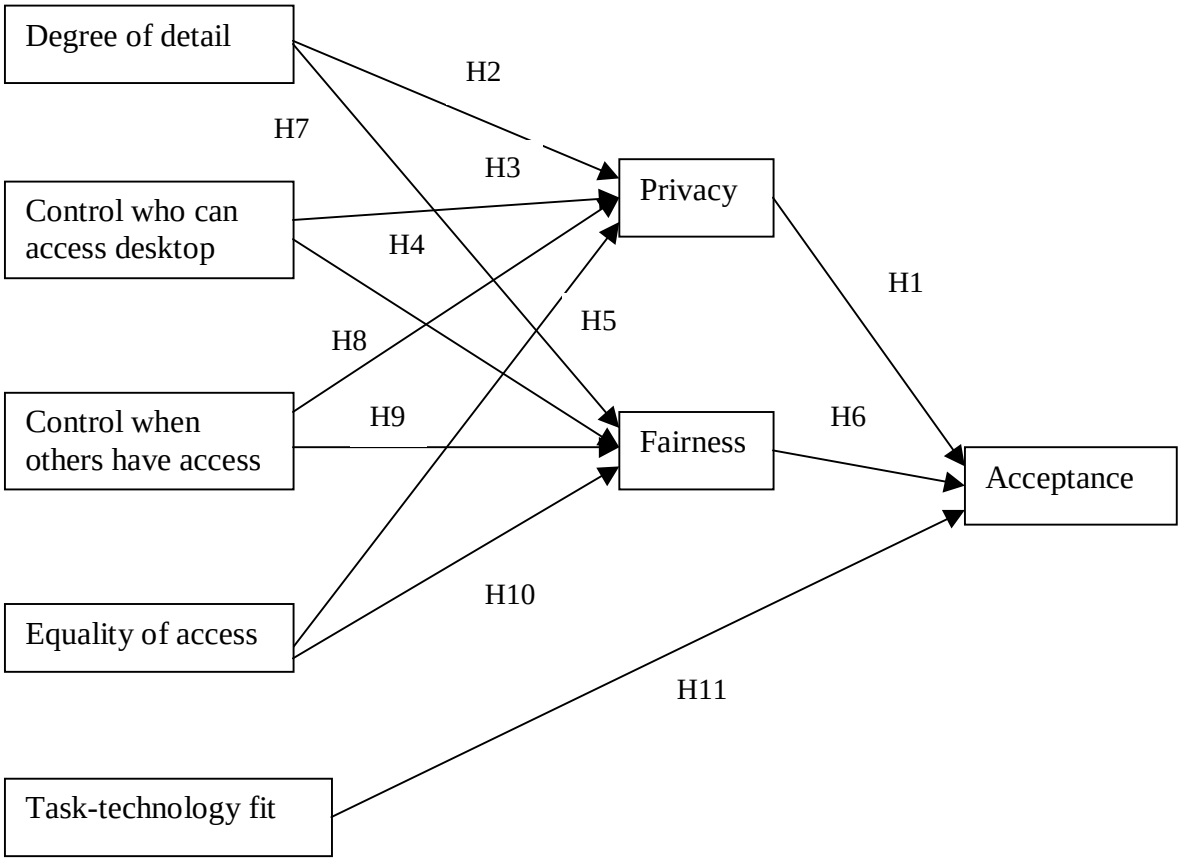


Figure 1 - Model

Chapter 3

Research Approach

The research approach was policy-capturing which is a within-subject method. Policy-capturing was chosen because it is considered more of an objective approach than the traditional survey approach (Webster & Trevino, 1995). Policy-capturing has been used widely in various areas of management such as marketing (e.g., Batsell & Lodish, 1981), finance (e.g., Slovic, 1972), personnel (e.g., Klaas & Wheeler, 1990), organizational behaviour (e.g., Martocchio & Judge, 1994), strategic decision-making (Hitt & Tyler, 1991), and communication (Webster & Trevino, 1995). However, traditional survey data was also collected so that variables could be included that could not be manipulated through policy-capturing such as individuals' characteristics, for example age and work experience (see Appendix C).

Policy-capturing, or the "factorial survey" (Rossi & Nock, 1982), demonstrates the importance of different decision variables, or "factors", to employees' choices (Zedeck, 1977). The variables of interest to the researcher are varied to form multiple scenarios. These scenarios are presented to the subjects and the choices that the subjects make are recorded (Webster & Trevino, 1995). Traditional survey research rates or ranks factors, whereas policy-capturing determines the significance of factors from individuals' actual choices (Zedeck, 1977).

Approval has increased for policy-capturing since studies have demonstrated that the importance of minor factors are often overestimated in direct ratings from surveys (Zedeck, 1977). Overestimation sometimes occurs in surveys because individuals do not hold insights into their own decision-making (Valenzi & Andrews, 1973). In other cases

of traditional survey approaches, responses are not necessarily correct because individuals choose socially desirable answers (Arnold & Feldman, 1981; Brookhouse, Guion, & Doherty, 1986). Webster and Trevino (1995) give the example of responses received concerning job choice. In a survey, respondents are more likely to rank pay low and job fulfilment high, whereas in policy-capturing they are actually choosing among different job descriptions and may be more likely to choose the job with higher pay. Thus, in order to avoid a phenomenon similar to that of the job choice survey, policy-capturing was chosen for this research. Policy-capturing was also chosen instead of a lab exercise since the particular independent variables for this study would be difficult to manipulate in a lab setting.

The main study was conducted in two different organizations, the subjects for the first study were employees from the Information Systems and Technology Department at the University of Waterloo and the subjects for the second study were employees from Ciber Inc..

3.1 Study 1

Following the Zedeck methodology, a series of descriptions were created to represent scenarios. An example scenario is provided in Appendix C. Within each description there are five sentences, one for each independent variable indicating the state of that variable. The independent variables are dichotomous, thus each independent variable can either be present or absent as shown in the next section. With the five independent variables and the fact that they are all binary, employing the factorial design resulted in 32 (2^5) combinations. Each combination is represented by a description, thus

the questionnaire had 32 different descriptions. Using the within subject methodology each participant will respond to all of the 32 descriptions.

Consistent with Arnold and Feldman (1981), the order of the independent variables in the descriptions was held constant: degree of detail, being able to control who has access, being able to control when others have access, equality of access, and task-technology fit. Two versions of the order of the 32 scenarios were randomly distributed to control for potential order effects (Hitt & Tyler, 1991). Once the data was received, it was tested and there was no significant effect from the order of the scenarios.

3.1.1 Measures

There were traditional survey questions as shown in Appendix C. The purpose of these questions was to obtain demographic information about the participants.

In each scenario, each of the first four independent variables was described by the following sentences either being present or absent; an example of this is displayed Appendix C.

Variable 1: Degree of detail.

Present:	Only the applications that you use for collaborating with your colleagues are available to them.
Absent:	All the details of your desktop are available to your colleagues.

Variable 2: Being able to control who can access your desktop.

Present:	You can control who can access your desktop.
Absent:	All your colleagues can access your desktop.

Variable 3: Being able to control when other colleagues can access your desktop.

Present:	You can control when others have access to your desktop.
Absent:	You cannot control when others have access to your desktop; i.e., those who have access always have access.

Variable 4: Equality of access.

Present:	You have the same access to colleagues' desktops as they have to yours.
Absent:	You do not have access to the desktops of some of the people that have access to yours.

The fifth variable captures different situations to represent whether the task-technology fit was high or low. As it was not known previously which situations would be viewed as high or low in task-technology fit by software developers, a preliminary study was conducted to determine this. A list of situations in which a remote desktop access system might be employed as an awareness system for developers was developed, as shown in Appendix B. The remote desktop access system description from Appendix A as well as the list of situations and background questionnaire from Appendix B were given to 12 undergraduate students from the University of Waterloo. The 12 undergraduate students were all males under 25, a couple were mathematics students while the rest were engineering students. There was an average of 22 months work

experience with all having worked at least 19 months, 11 had held positions as software developers while the other had systems analyst experience, some also had experience in both positions as well as other computer-related positions. Five did not have any experience with remote desktop access systems while the other seven had an average of over 4 months experience. The experience that they had with remote desktop access systems was from a broad range of uses including: accessing their work desktop from home, remote access to centralized data, remote access to a centralized desktop, remote access to someone's desktop for support purposes, access to office computer from lab, and demoing functionality for a computer conference.

The students rated the extent of task-technology fit for each situation. The results are shown in Appendix F. From the results, two situations were used to represent high task-technology fit and two other situations were used to represent low task-technology fit, as shown below. In the scenarios, the situations with high task-technology fit were used when the variable was considered "present" and low task-technology fit was used for "absent". Two situations were used for each in order to add some variety to the scenarios for the participants of the policy-capturing survey.

Variable 5: Task-technology fit.

Present:	Situation 1: You and your co-workers need to conduct a code review. Situation 2: You are working on a module and you encounter an issue that would be reoccurring throughout other programmers' modules. It would be helpful to know how a co-worker dealt with the issue.
Absent:	Situation 1: You and your co-workers are working on different programs. Situation 2: You are converting an existing program to another language.

The mediating and dependent variables were captured with one-item measures, consistent with other policy-capturing research (e.g., Rossi & Anderson, 1982), see Appendix C. As described earlier, acceptance was operationalized as intentions to use and attitudes towards use (Saga & Zmud, 1994). Intentions to use was measured with an item similar to the one used by Arnold and Feldman (1981), and captured the subjects willingness to use the desktop access system. Attitudes towards use was captured by one item similar to Osgood et al.'s (1957) focus on affect. Perceptions of fairness and privacy were measured with items adapted from Alge (1999).

3.1.2 Procedure

Potential subjects were informed that it would take approximately half an hour to complete the survey and asked to volunteer to participate in this study. The individuals, who decided to participate received an Information Letter describing the study and procedure, see Appendix D. They were also given a description of a remote desktop access system including screen shots of this software, see Appendix A. Then the participants were presented with the 32 scenarios, each of which contained the four mediating and dependent measures. After all the surveys had been returned, a feedback page was given to all the participants; see Appendix E.

3.1.3 Sample

This cross-sectional research was conducted on a sample that consisted of twelve employees from the Information Systems and Technology Department at the University of Waterloo. The employees chosen all had computer-related positions including:

analyst, project manager, systems manager, systems support specialist, and administrator/consultant. These participants were chosen because a remote desktop access system may be very useful in their line of work. Individuals in such positions will often collaborate on a project and many organizations these days. For example, Newbridge Networks Corporation has employees in many different locations around the world that collaborate on projects.

The sample population was made up of employees that had voluntarily agreed to participate in the study. As discussed earlier, policy-capturing is a within-subject method (Webster & Trevino, 1995), thus the sample size was not calculated using the general rules of thumb. In policy-capturing, the sample size is the number of scenarios presented to participants, hence for this case, the size was 32. Because previous studies have shown that five to fifteen subjects are adequate for indicating patterns in the model (Rynes & Lawler, 1983), twelve subjects appeared to be adequate. However, one participant voiced her concern about the accuracy of her responses since she mentioned that she was continually interrupted while completing the survey; thus her data were not used. Eleven subjects was still in the five to fifteen range, hence it appeared sufficient to use the data from the other eleven participants.

From the background questions, the range in age was found to be 22 to 45+ years old with four participants between 22 to 32 years old, six between 33 to 45 years old, and one in the 45+ years old category. Eight were male and three were female. One had a masters degree, seven had bachelor degrees, one had high school, and the remaining two had college diplomas. The range of working experience was under 1 year to 16+ years, with one participant having under a year, two having 1 to 5 years, one having 6 to 10,

four having 11 to 15 years, and three having 16+ years. In the sample, three participants did not have any experience with remote desktop access systems previously. Of the eight that did, three had less than one year experience, four had 1 to 5 years experience, and the other one had 6 to 10 years experience. All the purposes for which the participants had used remote desktop access systems were listed on the background survey, Appendix C. None of the purposes were related to using a remote desktop access system for awareness. These purposes along with the percentage of participants that had used them for that reason are: accessing your work desktop from home (54.5%), accessing your home desktop from work (9%), remotely accessing centralized data (27.3%), remotely accessing a centralized desktop (36.4%), and remotely accessing someone's desktop for support purposes (54.5%).

3.2 Study 2

A second study was conducted at Ciber Inc., a consulting company located in Waterloo. Ciber Inc. expressed interest in the study since collaborative work is very common within a consulting company. However, because the majority of the participants of the survey were consultants, the survey was slightly altered from the survey that was used in Study 1. The independent variable, task-technology fit, was removed. The tasks depicted were not appropriate for individuals in consultant positions as well as the fact that in Study 1, task-technology fit did not demonstrate significance, as is shown below in the Results section. Thus, without task-technology fit there were only four independent variables resulting in 16 scenarios. An example of the scenario that was employed in Study 2 is shown in Appendix G. To increase generalizability, the scenarios were

presented in a different order from Study 1. More questions for each scenario were added, however only the analysis from the four questions that were used in Study 1 will be discussed in this paper so that the two studies can be compared. Thus, the four questions that were identical in both studies were in a different order in each study.

Again, the sample population consisted of employees that voluntarily agreed to participate in the study. Similar to Study 1, there was no calculation of sample size because policy-capturing is a within-subject method. The sample size in policy-capturing is the number of scenarios. Therefore, for Study 2 the sample size was 16.

3.2.1 Measures

There were traditional survey questions in order to obtain demographic information about the participants, as shown in Appendix G.

Similar to Study 1, in each scenario, each of the first four independent variables was described by the sentences either being present or absent; an example of this is displayed Appendix G. Again, the mediating and dependent variables were captured with the same one-item measures as in Study 1.

3.2.2 Procedure

Potential subjects were informed that it would take approximately half an hour to complete the survey and asked by a contact in the organization to volunteer to participate in this study. The individuals received an email with a an attachment containing an Information Letter describing the study and procedure (Appendix D), a description of a

remote desktop access system including screen shots of this software (Appendix A), and the survey (Appendix G). Once the participants had completed the survey they returned it either through email as an attachment or sent it through regular post mail.

3.2.3 Sample

Twelve employees from Ciber Inc. volunteered to participate in the study by returning the completed survey. Eight on the participants have positions as consultants while the other four were managers with two of the four being upper level management. The background questions were slightly altered to accommodate the difference in potential participants from Ciber Inc.; the background questions that were employed for Study 2 are shown in Appendix G. From the background questions, the range in age was found to be 22 to 45+ years old with two participants between 22 to 32 years old, six between 33 to 45 years old, and four that were 45+ years old. Eight were male and four were female. All but one of the participants had at least some college or university, which included six that had competed university undergraduate degrees and three with post-graduate degrees. The range of work experience was under 1 year to 11+ years, one participant had under a year of experience, one had between 1 and 5 years experience, another one had between 6 and 10 years experience and the rest all had 11 years experience or more. Four participants did not have any experience with remote desktop access systems, while the other eight had worked with them before. Three participants had under a year's experience with remote desktop access systems while the other five had between 1 and 5 years experience. None of the participants had used a remote desktop access system for awareness. The purposes for which participants had used the

remote desktop access systems for along with the percentage of participants that had used them for that reason are: accessing your work desktop from home (25%), accessing your home desktop from work (16.7%), remotely accessing centralized data (33.3%), remotely accessing a centralized desktop (33.3%), and remotely accessing someone's desktop for support purposes (16.7%). One participant had also used remote desktop access systems to do network administration work.

3.3 Analyses

The policy-capturing method "captures" the process an individual uses to combine information to come to a decision by using mathematical calculations such as a regression equation (Zedeck, 1977). The regression equation gives a description of the decision-maker's procedures for combining and weighing information (Zedeck, 1977).

In the traditional application of regression, one regression equation is estimated for the entire sample (Webster & Trevino, 1995). This differs from policy-capturing where the focus is on the individual since it is a within-subject method, and analyses are performed for a single decision-maker since it is a within-subject approach (Zedeck, 1977). In policy-capturing, the principal analytic model used to date has been a single linear additive equation estimated using ordinary least squares (Rossi & Anderson, 1982). In accordance with Zedeck's technique, the responses of each individual subject were analyzed by multiple regression. This approach for within-subject analysis is consistent with earlier (e.g., Naylor & Wherry, 1965; Velenzi & Andrews, 1973) and more recent (e.g., Klaas & Wheeler, 1990; Martocchio & Judge, 1994; Webster & Trevino, 1995) organizational studies where policy-capturing was employed.

Similar to the methodology used by Arnold and Feldman (1981), for each particular description the independent variables were coded 1 or 0 to represent whether the variables were present or absent, respectively. This was done for each of the five independent variables. In policy-capturing, the choice of the decision-maker is the dependent variable. In this study, two mediators (perceptions of privacy and fairness) and two operationalizations of the dependent variable, acceptance (attitudes towards use and intentions to use), represent the "choices" of the decision-maker.

Although a mediating model is presented in Figure 1 and an analytical method such as path analysis would be the typical statistical tool used, this was not possible with only 32 observations in Study 1 and 16 observations in Study 2. Thus, following Baron and Kenny's (1986) suggestions for testing mediating models, a set of regression analyses was used to test the model. Their recommendations were first to regress the mediators on the independent variables, second to regress the dependent variable on the independent variables, and third to regress the dependent variable on both the independent and mediating variables. However, as previously discussed, research has shown that there is a correlation between perceptions of privacy and perceptions of fairness. Eddy et al. (1999) imply that factors that invade privacy will be perceived as unfair which in turn results in concerns for privacy being inter-related with feelings of fairness. This idea holds true for the results of this study since feelings of privacy and fairness are shown to be highly correlated. Thus, only one construct will be used to represent the effects of both perceptions of privacy and perceptions of fairness on the other variables in the model.

It was proposed that four of the independent variables would be mediated by perceptions of fairness and privacy, while task-technology fit affects acceptance directly. Thus, the mediator, perceptions of privacy, was regressed on the four independent variables and the operationalizations of the dependent variable were regressed on the independent variables. Next, consistent with Alge (1999), hierarchical regressions were used to regress each of the operationalizations of the dependent variable on task-technology fit and the mediator variable in step 1 and the remaining four independent variables in step 2.

To demonstrate an example from Study 1, the results from one participant are shown in the following tables.

		Independent Variables				
		Degree of detail	Who can access	When others can access	Equality of access	Task-technology fit
Dependent Variable	Attitudes towards use	0.389**	0.269*	0.329*	0.389**	0.09
	Intentions to use	0.354*	0.295*	0.354*	0.354*	0.118
Mediating Variable	Perceptions of Privacy	-0.358*	-0.262*	-0.310*	-0.358*	

*p = 0.05 or less
**p = 0.01 or less

Table 3-1: Example Regression Results for a Study 1 Participant

The correlation between perceptions of privacy and perceptions of fairness was -0.807 with a significance level of 0.01. Table 3-1 displays the standardized regression

coefficients (ß) for the regressions of the operationalizations of the dependent on the independent variables as well as the regressions of the mediator on the four independent variables. Note that the data pertaining to perceptions of privacy is negative, this is expected since the survey question relating to perceptions of privacy was opposite in direction to the other variables.

	Attitudes Towards Use				**Intentions To Use**		
	R^2	R^2 change	ß		R^2	R^2 change	ß
Step 1:	0.764**				0.785**		
Task-technology fit			0.028				0.000
Perceptions of privacy			-0.985**				-0.992**
Step 2:	0.77**	0.006			0.789**	0.004	
Task-technology fit			0.020				0.005
Perceptions of privacy			-0.921*				-0.951**
Degree of detail			0.059				0.014
Who can access			0.028				0.046
When others can access			0.043				0.059
Equality of access			0.059				0.014

*p = 0.05 or less
**p = 0.01 or less
Table 3-2: Example Hierarchical Regression Results for a Study 1 Participant

Table 3-2 demonstrates the hierarchical regressions of the operationalizations of the dependent variables on the mediator and independent variables for the same participant.

The square of the multiple correlation coefficient, R^2, indicates to what extent the regression explains the variability in the dependent variable. Thus, the higher R^2, the better is the fit of the model. The R^2-values from each of the steps in the hierarchical regression are presented in Table 3-2. This example demonstrates that the four independent variables are fully mediated by perceptions of privacy since the independent variables are not significant and the change in R^2 in step 2 is insignificant as well.

In policy-capturing, results are summarized across subjects in several ways, such as presenting frequencies of significant results (e.g., Webster & Trevino, 1995) or averaging results (e.g. Rossi & Anderson, 1982). The latter will be employed for the analysis of this study, while individual analyses for Study 1 and Study 2 participants can be seen in Appendix H. From a statistical methodology standpoint aggregating responses may result in inflated estimates (James, 1982), thus the individual analyses presented in Appendix H, however individual analyses were not used since they were difficult to generalize, interpret and to be able to draw conclusions.

3.4 Pilot Study

A pilot study was conducted to assess the policy-capturing survey. Six subjects were surveyed since previous studies have shown that a variety of patterns of the model usually emerge with as few as five to fifteen subjects (Rynes & Lawler, 1983). The subjects were students at the University of Waterloo, four were graduate students and the

other two were fourth-year undergraduate students. These students were chosen because of their similarity to the subjects in the study, since they all had at least one year of work experience in a computer-related (development) position. As a result of the pilot study, the wording of one of the variables was slightly modified. The individual results are shown in Appendix H. The results from the averaged responses of the pilot study are shown in Tables 3-3 and 3-4.

		Independent Variables				
		Degree of detail	Who can access	When others can access	Equality of access	Task-technology fit
Dependent Variable	Attitudes towards use	0.433**	0.289**	0.469**	0.493**	0.277**
	Intentions to use	0.430**	0.310**	0.441**	0.453**	0.346**
Mediating Variable	Perceptions of Privacy	-0.499**	-0.266*	-0.466**	-0.344**	

*p = 0.05 or less
**p = 0.01 or less

Table 3-3: Pilot Study Regression Results

The correlation between perceptions of privacy and perceptions of fairness for the averaged responses was –0.898 with a significance level of 0.01. Only one mediator was used to test for mediation effects in the hierarchical regression. The results of the hierarchical regression with perceptions of privacy as the only mediator are shown in Table 3-4.

Task-technology fit is significant in the regression as oppose to the hierarchical regression. This occurs because from a mathematical standpoint in the hierarchical regression perceptions of privacy is in the model to account for the majority of variability, whereas in the regression, perceptions of privacy is not present thus the other variables will account for more variability than they should.

Equality of access indicates some significance in the hierarchical regression, however as will be seen in the Results sections for both Studies 1 and 2, once the sample size increases equality of access is not significant.

	Attitudes Towards Use				**Intentions To Use**		
	R^2	R^2 change	ß		R^2	R^2 change	ß
Step 1:	0.821**				0.845**		
Task-technology fit			0.059				0.132
Perceptions of privacy			-0.890**				-0.878**
Step 2:	0.895**	0.074			0.899*	0.054	
Task-technology fit			0.143				0.203*
Perceptions of privacy			-0.547**				-0.586**
Degree of detail			0.160				0.137
Who can access			0.143				0.154
When others can access			0.214				0.169
Equality of access			0.305*				0.252*

*p = 0.05 or less
**p = 0.01 or less
Table 3-4: Pilot Study Hierarchical Regression Results

Chapter 4

Results and Discussion

4.1 Results from Study 1

Using methods presented by Berk and Rossi (1982), the responses of the participants were averaged for each question of each scenario. Regression analyses were then performed on these averaged responses. The coefficients from these regression analyses are displayed in Table 4-1 along with their significance levels.

As discussed in the Analysis section, the analysis was conducted using one mediator, perceptions of privacy, since there was a high correlation of –0.91 between perceptions of privacy and perceptions of fairness. Again, note that the data pertaining to perceptions of privacy are negative; this is expected since the survey question relating to perceptions of privacy was opposite in direction to the other variables.

The regression coefficients presented in Table 4-1 represent the extent to which the participants' judgements were affected by the presence of the respective variable. For example, the first regression coefficient in Table 4-1 indicates that when only the applications that individuals use for collaborating with their colleagues are available to them then attitudes towards use is on average greater by 0.516 than a reference situation which is the conjunction of all the omitted variables. The fact that all the regression coefficients for attitudes towards use are positive indicates that each of the independent variables affects attitudes towards use in a positive manner; in other words, that on average attitudes towards use is increased by the presence of these variables. However, as demonstrated in the hierarchical regression, these effects are fully mediated by perceptions of privacy. Similar conclusions can be made about intentions to use and

perceptions of privacy (that these variables are increased by the presence of the independent variables).

		Independent Variables				
		Degree of detail	Who can access	When others can access	Equality of access	Task-technology fit
Dependent Variable	Attitudes towards use	0.516**	0.249**	0.695**	0.23**	0.163*
	Intentions to use	0.47**	0.272**	0.738**	0.215**	0.152*
Mediating Variable	Perceptions of Privacy	-0.545**	-0.279**	-0.715**	-0.127*	

*p = 0.05 or less
**p = 0.01 or less

Table 4-1: Regression Results for Averaged Responses for Study 1

The square of the multiple correlation coefficient, R^2, was 0.891 for attitudes towards use, 0.909 for intentions to use, and 0.902 for perceptions for privacy. These values suggest that the variables in model explain most of the variability, thus indicating a good fit.

It can also be observed in Table 4-1 that all of the regression coefficients are statistically significant to some degree. This supports the hypotheses that suggested that a user's perceptions of privacy (fairness) are increased by having less detail of their desktop available to others, being able to control who can access their desktop, being able to control when others can access their desktop, and being able to view the desktops of all their colleagues that can view theirs. The first three variables are very significant for all

of the dependent and mediating variables, which correlates with the fact that those variables had the most subjects find them significant. The fourth variable, equality of access, is also fairly significant. The fifth variable, task-technology fit, although statistically significant is practically insignificant. Examining the regression coefficients for task-technology fit, it can be observed that all of the regression coefficients are smaller than the other independent variables' regression coefficients, indicating that this variable has a lesser effect on the operationalizations of the dependent variable. In accordance, the regression coefficients are so small that they can be considered to have practically no effect, especially considering that the sample size is small (with only thirty-two observations).

The results from a hierarchical regression that was performed on these averaged responses are displayed in Table 4-2. The results demonstrate significant effects of perceptions of privacy (fairness) on acceptance, supporting hypotheses 1 (acceptance of remote desktop access awareness systems is more likely with a higher perception of privacy) and 6 (acceptance of remote desktop access awareness systems is more likely with a higher perception of fairness). Results also indicate that perceptions of privacy (fairness) had mediating effects on the averaged responses which coincides with the model.

Task-technology fit shows some degree of significance in the regression as oppose to the hierarchical regression. This occurs because from a mathematical standpoint in the hierarchical regression perceptions of privacy is in the model to account for the majority of variability, whereas in the regression, perceptions of privacy is not present thus the other variables will account for more variability than they should.

	Attitudes Towards Use				Intentions To Use		
	R^2	R^2 change	ß		R^2	R^2 change	ß
Step 1:	0.920**				0.928**		
Task-technology fit			0.042				0.03
Perceptions of privacy			-0.953**				-0.959**
Step 2:	0.936**	0.016			0.948**	0.02	
Task-technology fit			0.068				0.064
Perceptions of privacy			-0.744**				-0.691*
Degree of detail			0.110				0.093
Who can access			0.042				0.079
When others can access			0.164				0.244
Equality of access			0.135				0.128

*p = .05 or less
**p = .01 or less
Table 4-2: Hierarchical Regression Results from Study 1

Since degree of detail, who can access the desktop, when the desktop can be accessed, and equality of access were not significant in step 2, this indicates that these variables did not have a direct effect on acceptance but their effect was accounted for by the mediating variables. This supports the mediating model and the ten following hypotheses:

1. Acceptance of a remote desktop access awareness system is more likely with a higher perception of privacy.

2. The less detail about a user's desktop that is available, the higher is that user's perception of privacy.

3. If users can control who can access their desktops, they will experience higher perceptions of privacy.

4. If users can control when others can access their desktops, they will experience higher perceptions of privacy.

5. Users will have a greater perception of privacy if they can view all the desktops of colleagues who can view theirs.

6. Acceptance of a remote desktop access awareness system is more likely with a higher perception of fairness.

7. The less detail about a user's desktop that is available, the higher is that user's perception of fairness.

8. If users can control who has access to their desktop, they will experience greater perceptions of fairness.

9. If users can control when others have access to their desktops, they will experience greater perceptions of fairness.

10. Users will have a greater perception of fairness if they can access the desktops of everyone who can access theirs.

However, hypothesis 11 (acceptance of a remote desktop access awareness system is more likely with a higher task-technology fit) was not supported since task-technology fit did not significantly affect either of the operationalizations (attitudes towards use and intentions to use) of the dependent variable, acceptance.

4.2 Results from Study 2

Since task-technology fit was found to not be significant in Study 1, it was removed from the survey before conducting Study 2. The survey that was distributed for Study 2 is shown in Appendix G.

Again, following Berk and Rossi (1982), the responses of the participants were averaged for each question of each scenario. Regression and hierarchical regression analyses were performed on these averaged responses. The coefficients from the regression analyses are shown in Table 4-3 along with their significance levels.

In accordance with Study 1, the analysis was conducted using one mediator, perceptions of privacy, since there is a correlation in the effect of perceptions of privacy and perceptions of fairness. The correlation was 0.806** between perceptions of privacy and perceptions of fairness. Note that the data pertaining to perceptions of privacy are not negative for Study 2 as oppose to Study1 since the survey question relating to perceptions of privacy was not opposite in direction to the other variables in Study 2.

		Independent Variables			
		Degree of detail	Who can access	When others can access	Equality of access
Dependent Variable	Attitudes towards use	0.672**	0.504**	0.367**	0.275**
	Intentions to use	0.653**	0.497**	0.389**	0.311**
Mediating Variable	Perceptions of Privacy	0.540**	0.461**	0.316**	0.579**

*p = 0.05 or less
**p = 0.01 or less

Table 4-3: Regression Results for Averaged Responses for Study 2

Similar to Study 1, the regression coefficients presented in Table 4-3 represent the extent to which the participants' judgements were affected by the presence of the

respective variable. The fact that all the regression coefficients for attitudes towards use are positive indicates that each of the independent variables affects attitudes towards use in a positive manner. However, as demonstrated in the hierarchical regression in Table 4-4, these effects are fully mediated by perceptions of privacy. Similar conclusions about the positive effect can be made about intentions to use and perceptions of privacy (that these variables are increased by the presence of the independent variables).

It can also be observed in Table 4-3 that all of the regression coefficients are statistically significant. This supports the hypotheses that suggested that a user's acceptance and perceptions of privacy (fairness) are increased by having less detail of their desktop available to others, being able to control who can access their desktop, being able to control when others can access their desktop, and being able to view the desktops of all their colleagues that can view theirs.

The results from a hierarchical regression that was performed on these averaged responses are shown in Table 4-4. In accordance to Study 1, the results from Study 2 demonstrate significant effects of perceptions of privacy (fairness) on acceptance, supporting hypotheses 1 (acceptance of remote desktop access awareness systems is more likely with a higher perception of privacy) and 6 (acceptance of remote desktop access awareness systems is more likely with a higher perception of fairness). The findings also show that perceptions of privacy (fairness) had mediating effects on the averaged responses which coincides with the model.

Since degree of detail, who can access the desktop, when the desktop can be accessed, and equality of access were not significant in step 2, this indicates that these variables did not have a direct effect on acceptance but their effect was accounted for by

the mediating variables. This supports the mediating model and the ten hypotheses that were supported in Study 1.

	Attitudes Towards Use				**Intentions To Use**		
	R^2	R^2 change	ß		R^2	R^2 change	ß
Step 1:	0.847**				0.873**		
Perceptions of privacy			0.920**				0.934**
Step 2:	0.957**	0.110			0.962*	0.089	
Perceptions of privacy			0.821*				0.825**
Degree of detail			0.229				0.207
Who can access			0.126				0.117
When others can access			0.107				0.128
Equality of access			-0.201				-0.167

*p = .05 or less
**p = .01 or less
Table 4-4: Hierarchical Regression Results for Study 2

Chapter 5

Implications and Conclusions

This research examined factors that affect the acceptance of an awareness system. The findings support most of the hypotheses presented earlier. The results indicate that four of the five independent variables investigated play a role in increasing acceptance of a remote desktop access system as an awareness system. The independent variables that had an effect are: the degree of detail that can be viewed on a desktop, whether the users can control who can access their desktops, whether the users can control when others have access to their desktops, and the equality of access to others' desktops. The fifth independent variable, task-technology fit, was found to have an insignificant effect on acceptance ($p > 0.05$) in the hierarchical regression. It was also determined that, on average, the first four variables contribute to increased perceptions of privacy, as expected. Similarly, those four variables, on average, augment the perceptions of fairness when they are present as was also expected. Moreover, perceptions of privacy and fairness fully mediated the relationship between the four independent variables and acceptance.

5.1 Implications, Limitations, and Future Research

The results of this research indicate that privacy and fairness are significant issues pertaining to the acceptance of awareness systems. This is important to note since these factors may make or break the success of an awareness system. Future development of remote desktop access systems should take into account the independent variables

discussed in this study when designing the system. For example, remote desktop access systems that will be developed in the future should allow the user control over who he/she wishes to permit access. This research may indicate to management of organizations what details of remote desktop access systems will affect their employees' acceptance of the system. Thus, management will have a better chance at implementing a system that will be successful.

Similar to most studies, this research has limitations. There is some evidence that the conclusions may be generalized since the study was conducted in two different organizations with full time employees as well as the pilot study was carried out with a different set of individuals that are students and similar results were found in all three. The external validity should be fairly good however, external validity can never be a hundred percent. One limitation is that the study only used participants with software development/support and consulting related positions, which may affect the generalizability of the results to other professions. For Study 1, the list of tasks was narrowed to two situations with high task-technology fit and two situations with low task-technology fit; limiting the situations to these four examples may also affect the generalizability of the findings.

Another drawback of this research may be that the users had not actually used a remote desktop access system as an awareness system similar to those found in the scenarios. Thus, the participants were merely projecting what they perceived they would feel about the different aspects of the systems and not necessarily responding with hands-on experience.

The effects of other influences on the acceptance of awareness systems, such as individual characteristics, users' input, organizational climate, ease of use, and perceived usefulness, were not examined and represent interesting areas for further research. These variables were not investigated in this study because the focus pertained more to the details of the design of remote desktop access systems. More specifically, many of these variables were held constant in this study. First, no indication of users' input into the design of the remote desktop access systems was mentioned in the scenarios. Second, the variable of a trusting climate was controlled in this study since the survey was conducted in only one organization. Third, ease of use was held constant, thus controlling for the effect of this variable. Finally, perceived usefulness was expected to be consistent between the participants since they held similar job titles within the same organization. However, these different influences on awareness system acceptance may be interesting areas for future research, and are further discussed next.

5.1.1 Individual Characteristics

As reported earlier, most of the participants had one of the mediators (perceptions of privacy or perceptions of fairness) dominating in significance. It is interesting to note that participants generally found one mediator or the other to be more significant and that the number of participants that found each of the mediators to be significant was approximately evenly distributed. Neither of the mediating variables seemed to dominate the majority of participants. This indicates that there may consistently be differences between individuals. Perhaps personality or other individual characteristics are responsible for these differences. Some people may find privacy more of an important

issue to them than fairness and vice versa. This may be a result of past experiences, their upbringing, or morals. This area is definitely something that should be investigated further in relation to awareness systems in the future.

5.1.2 Users' Input

User participation is an integral factor in the successful implementation and performance of information systems (Cushing, 1990). Hunton and Beeler (1997) proposed that participation by mandatory users may be an important factor in the ultimate success of information systems. Thus, examining the effect of users' input on the acceptance of awareness systems such as remote desktop access systems would be an interesting area for furture research.

5.1.3 Organizational Climate

An awareness system is a tool that enhances knowledge of individuals' activities and the sharing of information. Many researchers have determined that trust enables information sharing (e.g., Bromiley & Cummings, 1995; Lewis & Weigert, 1985; McGregor, 1967; O'Reilly, 1978; Sherif, 1966; Zand, 1972) and self-disclosure (e.g., Altman & Taylor, 1973; Wheeless, 1978). McKnight and Webster's (in press) research underscores the importance of a trusting climate for information sharing about oneself, and proposed that a trusting climate is a key variable in the acceptance of awareness systems. This would also be an area that may benefit from further research pertaining to the effects of organizational culture on the acceptance of awareness systems, in particular on remote desktop access systems.

5.1.4 Perceived Ease of Use

The Technology Acceptance Model demonstrates that ease of use and usefulness predict attitudes towards information systems, which in turn predicts usage (Lederer, Maupin, Sena, & Zhuang, 1998). Perceived ease of use, which refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320), follows from the definition of ease which is "freedom from difficulty or great effort" (Webster's dictionary). Effort is defined as a finite resource that a person may distribute to the various activities for which they are responsible (Davis, 1989; Radner & Rothschild, 1975).

Convenience, which refers to "something conducive to comfort or ease" (Webster's dictionary) of an awareness system will affect the likelihood of the amount of use that the system receives. If an application has to be loaded up every time the user would like to be aware of a colleague's activities then feelings of wasted time may be associated with the particular application. For instance, one user in Tollmar, Sandor, and Schomer's (1996) study remarked that to get information about a colleague it seemed natural to use an application that is open on his/her own desktop all the time. Thus, an application that is quick and simple seems to be more attractive than one that would require too much of the user's time, especially since an awareness system is supposed to enhance the work environment and not add to the workload. Even if users believe that the system is useful, they may believe that the system is too hard to use and that benefits from usage are outweighed by the effort required to use the system (Davis, 1989). Ease of use was held constant in this study but would be an interesting factor to investigate in future research.

5.1.5 Perceived Usefulness

Many arguments concerning perceived ease of use are related to perceived usefulness. As previously discussed, Lederer, Maupin, Sena, and Zhuang (1998) argued that the Technology Acceptance Model demonstrates that usefulness predicts attitudes towards information systems, hence predicting usage. They defined perceived usefulness as the degree to which an individual believes that a particular system would enhance his or her job performance. This was constant in the study since the participants were all from the same job in the same organization but this might also be a significant area for future research.

5.1.6 Measures Discussion

As previously discussed, in each scenario, each of the first four independent variables was described by the following sentences either being present or absent; an example of this is displayed Appendix C.

Variable 1: Degree of detail.

Present:	Only the applications that you use for collaborating with your colleagues are available to them.
Absent:	All the details of your desktop are available to your colleagues.

Variable 2: Being able to control who can access your desktop.

Present:	You can control who can access your desktop.
Absent:	All your colleagues can access your desktop.

Variable 3: Being able to control when other colleagues can access your desktop.

Present:	You can control when others have access to your desktop.
Absent:	You cannot control when others have access to your desktop; i.e., those who have access always have access.

Variable 4: Equality of access.

Present:	You have the same access to colleagues' desktops as they have to yours.
Absent:	You do not have access to the desktops of some of the people that have access to yours.

As explained in Chapter 3, the two mediators and two operationalizations of the dependent variable were measured by four questions presented at the end of each scenario. Intentions to use was measured with an item similar to the one used by Arnold and Feldman (1981), and captured the subjects willingness to use the desktop access system. Attitudes towards use was captured by one item similar to Osgood et al.'s (1957) focus on affect. Perceptions of fairness and privacy were measured with items adapted from Alge (1999).

Since there is strong support for the hypotheses between the first four independent variables, the two mediators and the dependent variable, it is a possibility that each of the four questions may not be measuring different variables. One reason for this occurrence is that the participant could obtain an impression of the scenario and then answer all the questions similarly, reflecting the impression that they got from the scenario. The phenomenon might have also occurred due to the participants' perspectives of the questions involved. The four questions that were suppose to measure attitudes towards

use, intentions to use, perceptions of privacy and perceptions of fairness may have been interpreted differently by the participants than was intended by the researchers. Not to mention that individual participants may have interpreted the questions in a different manner from other participants due to personality factors and other individualistic qualities and experiences. Another consequence of the participants' perspectives that may have contributed is the frame of mind of the participants when they respond to the questions. Someone in a positive frame of mind may tend to respond positively to the questions resulting in consistency across all questions. A similar phenomenon may occur with an individual in a negative mind set. In addition to the different perspectives affecting whether the four questions measured what was intended, another consequence is whether the four questions measured the variables as they are defined. It is very difficult to accomplish measuring variables as complex and widely defined as perceptions of privacy, perceptions of fairness, and acceptance. Not only it is a concern of the participants' perspectives but various researchers have different definitions and interpretations of these variables as well. Thus, even though the measures that were employed in this study followed from published research, it may be a limitation since the measures may not capture the measurement of the variables as defined in this study very well.

The definition of privacy adopted for this study follows from Westin (1967, p.7) who defined privacy as "the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others". Fairness may be used interchangeably with justice (e.g. Alge, 1999). Initially in this study, perceptions of privacy and perceptions of fairness were treated as different and

completely mutually exclusive variables. There is a vast array of literature that examines either perceptions of privacy or perceptions of fairness. However at the same time, some researchers have found a high correlation between perceptions of privacy and fairness and believe that they are often linked. In accordance with this theory, a correlation between perceptions of privacy and perceptions of fairness was found in the results of this study, which is why only one of the mediating variables was used in the analyses. It is the belief of this researcher that the relationship between perceptions of privacy and perceptions of fairness depends on the situation and perhaps even the individual. Since the intervening variables had a correlation with acceptance as well, it can be suggested that possibly the intervening variables not only mediated but also did not differ from acceptance, the dependent variable. Acceptance is defined as attitudes towards use, intentions to use, and frequency of use, which follows from Saga and Zmud (1994). However, if acceptance should be combined with perceptions of privacy and then the results of this study would indicate that the four independent variables that had an effect directly on perceptions of privacy and fairness would also have a direct effect on acceptance. Thus, these independent variables would directly effect this one dependent variable which would encompass perceptions of privacy, fairness and acceptance. Figure 2 demonstrates how the model would appear with acceptance being combined with perceptions of privacy and fairness.

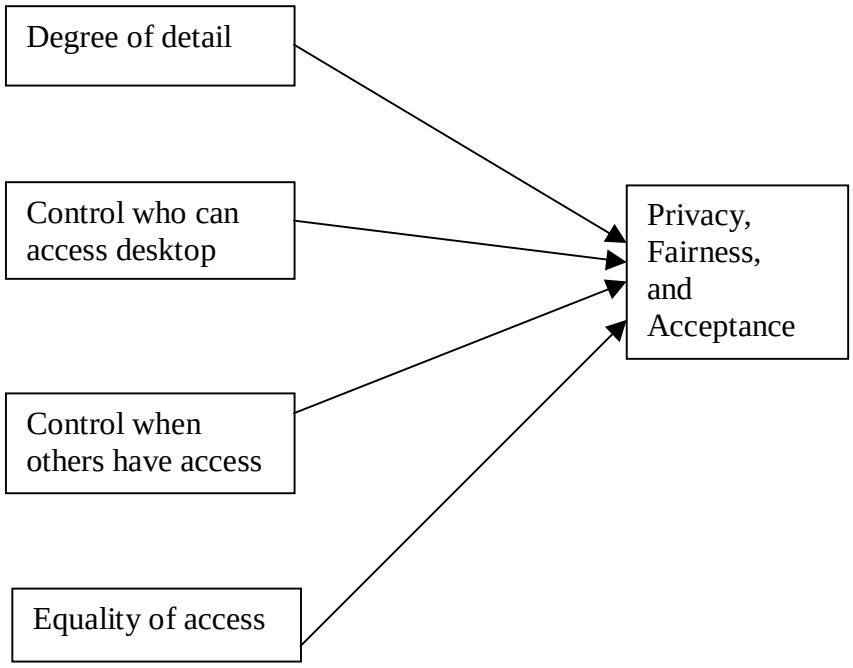


Figure 2

Note that the task-technology fit variable has not been included since it was shown to not have a significant relationship with either perceptions of privacy, perceptions of fairness or acceptance. The four hypotheses in the model would be supported by the findings of these studies even if research indicates that perceptions of privacy, perceptions of fairness, and acceptance should be combined into one dependent variable since the results already support the relationship between the four independent variables and perceptions of privacy and fairness. Thus, the implications of this new model are that the independent variables would still affect perceptions of privacy, perceptions of fairness and acceptance as well as the fact that perceptions of privacy,

perceptions of fairness and acceptance are to be considered as one variable which is the dependent variable.

Some of the literature presented dealt with perceptions of privacy and fairness having an effect on acceptance. For example, the findings by Webster (1998) determined that concerns employees have about privacy may have an effect on acceptance. And pertaining to fairness, many researchers have concluded that fairness of decision outcomes results in increased positive attitudes and behaviours (Alge, 1999; Ambrose & Alder, 2000; Greenberg, 1982; Walster, Walster, & Berscheid, 1978). Thus, these concepts led to the development of the original model with hypotheses representing the relationship between acceptance and perceptions of privacy and perceptions of fairness. If acceptance was grouped with perceptions of privacy and fairness this would obviously enforce arguments made by the researchers cited about there being a relationship between acceptance and perceptions of privacy and fairness. However, further literature would have to be included discussing not only that there is a relationship between perceptions of privacy and fairness and acceptance but that the three variables can be encompassed into one variable.

Another issue to discuss is that policy-capturing was employed. Since a sample of only five to fifteen subjects is considered adequate in policy-capturing to indicate patterns, the number of participants used in Studies 1 and 2 fell within that range. However, this is still a small number of participants for a study. If more participants were used then there is more of a chance of receiving accurate results perhaps giving findings with different variability and correlations. An additional factor is the fact that with policy-capturing the sample size is determined by the number of scenarios. This

restricted sample size may affect the results since with a smaller sample size each response has more of an effect. Thus, if the number of scenarios was larger perhaps different variability and correlations would result.

5.2 Conclusions

Ten of the eleven hypotheses in the model developed in this research were supported by the findings in Study 1. Thus, only those ten were tested further and supported in Study 2. Hypotheses that were supported suggested that a user's perceptions of privacy and fairness are increased by having less detail of their desktop available to others, being able to control who can access their desktop, being able to control when others can access their desktop, and being able to view the desktops of all their colleagues that can view theirs. It was also supported that acceptance is more likely when perceptions of privacy and fairness are higher. Thus, the results indicate that four of the independent variables (the degree of detail that can be viewed on a desktop, whether the users can control who can access their desktops, whether the users can control when others have access to their desktops, and the equality of access to others' desktops) can influence acceptance through their effects on perceptions of privacy and fairness.

These results are important because the success of systems may influence user acceptance. Poor acceptance of technologies such as awareness systems can limit the potential for technology to facilitate the formation of virtual work communities (Lee, Girgensohn, Schlueter, 1997). Most research in this area has focused on the technical design details pertaining to providing awareness to distant employees. Meanwhile, little research has been conducted on investigating the acceptance of electronic awareness

system (Webster, 1999). This study is a contribution because of the lack of research in this area. Not only is this research valuable because it investigates technology further but it also reveals some of the many areas for future research.

References

Ackerman, M. S., Hindus, D., Mainwaring, S. D., and Starr, B. "Hanging on the 'Wire: A Field Study of an Audio-Only Media Space," *Association for Computing Machinery*, 4, 1, 1997, 39-66.

Alder, A. and Henderson, A. A. "Room of our Own: Eperiences from a Direct Office Share," *In B. Adelson, S. Dumais, 7 J. Olson (Eds.), Proceedings of the CHI '94 Conference on Human Factors in Computing Systems*, Boston, MA: Association for Computing Machinery, 1994, 138-144.

Alge, B. J. "The Role of Fairness and Privacy in Electronic Performance Monitoring and Control Systems: Some Preliminary Findings," *Presented at the 1999 Annual Meetings of the Academy of Management*, Chicago, IL, 1999.

Altman, I. "The Environment and Social Behaviour: Privacy, Personal Space, Territory, Crowding," Monterey, California, USA: Brooks/Cole Publishing, 1975.

Altman, I. and Taylor, D. A. "Social Penetration: The Development of Interpersonal Relationships," New York, Holt, Rinehart, and Winston, 1973.

Ambrose, M. L. and Alder, G. S. "Designing, Implementing, and Utilizing Computer Performance Monitoring: Enhancing Organizational Justice," *In G. R. Ferris (Ed.), Research in Personnel and Human Resource Management*, 18, (in press), Greenwich, CN: JAI Press, 2000.

Arnold, H. J. and Feldman, D. C. "Social Desirability Response Bias in Self-Report Choice Situations," *Academy of Management Journal*, 24, June 1981, 377-385.

Baron, R. M. and Kenny, D. A. "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations," *Journal of Personality and Social Psychology*, 51, 6, 1986, 1173-1182.

Batsell, R. R. and Lodish, L. M. "A Model and Measurement Methodology for Predicting Individual Consumer Choice," *Journal of Marketing Research*, 18, 1981, 1-12.

Benford, S., and Fahlen, L. "A Spatial Model of Interaction in Large Virtual Environments," *Proceedings from ECSCW'93*, Milano, Italy, Sept. 13-17, 1993.

Berk, R. A. and Rossi, P. H. "Prison Reform and State Elites," in P. H. Rossi & S. L. Nock (Eds), *Measuring Social Judgements*, Beverly Hills, CA, 1982, 145-175.

Bies, R. J. "Privacy and Procedural Justice in Organizations," *Social Justice in Research*, 6, 1993, 69-86.

Bly, S., Harrison, S. And Irwin, S. "MediaSpaces: Bringing People Together in a Video, Audio, and Computing Environment," *Communications of the Academy of Computing Machinery*, 36, 1, 1993.

Brockner, J. and Wiesenfeld, B. M. "An Integrative Framework for Explaining Reactions to Decisions: The Interactive Effects of Outsomes and Procedures," *Psychological Bulletin*, 120, 2, 1996, 189-208.

Bromiley, P. and Cummings, L. L. "Transaction Costs in Organizations with Trust," *In Bies, R., Lewicki, R., & Sheppard, B. (Eds.), Research on Negotiation in Organizations*, 5, Greenwich, CN: JAI Press, 1995, 219-247.

Brookhouse, J. K., Guion, R. M., and Doherty, M. E. "Social Desirability Response Bias as One Source of the Discrepancy between Subjective Weights and Regression Weights," *Organizational Behaviour and Human Decision Processes*, 37, 1986, 316-328.

Crosby, F. "A Model of Egoistical Relative Deprivation," *Psychological Review*, 83, 1976, 85-113.

Crosby, F. "Relative Deprivation in Organizational Settings," in B. M. Staw & L. L. Cummings (Eds.), *Research in Organizational Behaviour*, 6, 1984, 51-91.

Cushing, B. E. "Frameworks, Paradigms, and Scientific Research in Management Information Systems," *Journal of Information Systems*, 4, 1990, 38-59.

Davis, F. D. "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *Management of Information Systems Quarterly*, Sept. 1989, 319-339.

Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," *Management Science*, 35, 8, 1989, 982-1003.

Earley, P. C. and Lind, A. E. "Procedural Justice and Participation in Task Selection: The Role of Control in Mediating Justice Judgements," *Journal of Personality and Social Psychology*, 52, 1987, 148-1160.

Eddy, E. R., Stone, D. L., and Stone-Romero, E. F. "The Effects of Information Management Policies on Reactions to Human Resource Information Systems: An Integration of Privacy and Procedural Justice Perspectives," *Personnel Psychology*, 52, 1999, 335-358.

Ehlen, C. R., Magner, N. R., and Welker, R. B. "Testing the Interactive Effects of Procedural Fairness and Outcome Favourability on Current- and Future-Oriented

Reactions of Members of a Voluntary Professional Organization," *presented at the annual Academy of Management Meetings, 1996,* Cincinnati, Ohio.

Fichman, R. G. "The Illusory Diffusion of Innovation: An Examination of Assimilation Gaps," Unpublished paper. Cambridge, MA: MIT Sloan School of Management, 1995.

Floyd, S. W. "A Causal Model of Managerial Electronic Workstation Use," unpublished doctoral dissertation, University of Colorado at Boulder, Boulder, CO, 1986.

Floyd, S. W. "A Micro Level Model of Information Technology Use by Managers," in *Studies in Technological Innovation and Human Resources (Vol. 1) Managing Technological Development*, U. E. Gattiker (Ed.), Walter de Gruyter, Berlin & New York, 1988, 123-142.

Goodhue, D. L. and Thompson, R. L. "Task-Technology Fit and Individual Performance," *Management Information Systems Quarterly*, June 1995, 19, 2, 213-236.

Greenberg, J. "Approaching Equity and Avoiding Inequity in Groups and Organizations," in J. Greenberg & R. L. Cohen (Eds.), *Equity and Justice in Social Behaviour*, 1982, 389-435.

Greenberg, J. "A Taxonomy of Organizational Justice Theories," *Academy of Management Review,* 12, 1987, 9-22.

Greenberg, J. "Looking Fair vs. Being Fair: Managing Impressions of Organizational Fairness," in B. M. Staw and L. L. Cummings (Eds.), *Research in Organizational Behaviour*, 12, 1990, 43-55.

Greenberg, J. "Organizational Justice: Yesterday, Today, and Tomorrow," *Journal of Management*, 16, 2, 1990, 399-432.

Gutwin, C. and Greenberg, S. "The Effects of Workspace Awareness Support on the Usability of Real-Time Distributed Groupware," Research Report 98-632-23, Department of Computer Science, University of Calgary, Calgary, Alberta, Canada, 1998.

Hardwick, M. and Bolton, R. "The Industrial Virtual Enterprise," *Communications of the Association for Computing Machinery*, 40, 9, Sept. 1997, 59-60.

Heath, C. C. and Luff, P. "Collaboration and Control: Crisis Management and Multimedia Technology in the London Underground Line Control Rooms," *Computer Supported Cooperative Work Journal 1*, (1-2), 1991, 193-216.

Hiltz, S. R. and Johnson, K. "Measuring Acceptance of Computer-Mediated Communication Systems," *Journal of the American Society for Information Science*, 40, 6, 1989, 386-397.

Hitt, M. A. and Tyler, B. B. "Strategic Decision Models: Integrating Different Perspectives," *Strategic Management Journal*, 12, 1991, 327-351.

Honda, S., Tomioka, H., and Kimura, T. "Valentine: An Environment for Home Office Worker Providing Informal Communication and Personal Space," in *Proceedings of the International ACM SIGGROUP Conference on Supporting Group Work*, GROUP 97, ACM Press, Phoenix, Arizona, USA, 1997, 368-375.

Houlden, P., LaTour, S., Walker, L. and Thibaut, J. "Preferences for Models of Dispute Resolution as a Function of Process and Decision Control," *Journal of Experimental Social Psychology*, 14, 1978, 13-30.

Hudson, S. E. and Smith, I. "Techniques for Addressing Fundamental Privacy and Disruption Tradeoffs in Awareness Support Systems," in M. S. Ackerman (Ed.), *Proceedings of the ACM 1996 Conference on Computer Supported Cooperative Work*, ACM Press, 1996, 248-257.

Hunton, J. E. "Involving Information System Users in Defining System Requirements: The Influence of Procedural Justice Perceptions on User Attitudes and Performance," *Decision Sciences*, 1996, 27, 4, 647-669.

Hunton, J. E. and Beeler, J. D. "Effects of User Participation in Systems Development: A Longitudinal Field Experiment," *Management of Information Systems Quarterly*, Dec. 1997, 359-383.

James, L. R. "Aggregation bias in estimates of perpetual agreement," *Journal of Applied Psychology*, 67, 1982, 219-229.

Jarvenpaa, S. L., & Knoll, K., and Leidner, D. E. "Is Anybody Out There? Antecedents of Trust in Global Virtual Teams," *Journal of Management Information Systems*, 14, 1998, 29-64

Johnson, B., and Greenberg, S. "Judging People's Availability for Interaction from Video Snapshots," *Proceedings of the Thirty-Second Hawaii International Conference on System Sciences*, IEEE Computer Society Press, Los Alamitos, California, USA, 1999.

Jourard, S. M. "Some Psychological Aspects of Privacy," *Law and Contemporary Society*, 31, 1966, 307-318.

Kelvin, P. "A Social Psychological Examination of Privacy," *British Journal of Social and Clinic Psychology*, 12, 1973, 248-261.

Klaas, B. S. and Wheeler, H. N. "Managerial Decision Making about Employee Discipline: A Policy-Capturing Study," *Personnel Psychology*, 43, 1990, 117-133.

Kraut, R., Fish, R., Root, B. and Chalfonte, B. "Informal Communication in Organizations," *In R. Baecker (Ed.) Groupware and Computer Supported Cooperative Work*, San Mateo, California, USA, 1993.

Kuzuoka, H. and Greenberg, S. "Mediating Awareness and Communication through Digital but Physical Surrogates," *Association for Computing Machinery CHI 99 Video Proceedings and Proceedings of the ACM SIGCHI'99 Conference Extended Abstracts*, February 1999, 11-12.

Lee, A., Girgensohn, A., and Schlueter, K. "NYNEX Portholes: Initial User Reactions and Redesign Implications," in *S. C. Hayne & W. Prinz (Eds.), Proceedings of the International ACM SIGGROUP Conference on Supporting Group Work,* GROUP 97, Phoenix, Arizona: ACM Press, Nov. 16-19, 1997, 385-394.

Lee, A., Schlueter, K., and Girgensohn, A. "Sensing Activity in Video Images," *CHI 97 Extended Abstracts*, 1997, 319-320.

Ledere, A. L., Maupin, D. J., Sena, M. P. and Zhuang, Y. "The Role of Ease of Use Usefulness and Attitude In The Prediction Of World Wide Web Usage," CPR 98, Boston, MA, USA, 1998, 195-204.

Leventhal, G. S. "What Should Be Done with Equity Theory? New Approaches to the Study of Fairness in Social Relationships," in *K. Gergen, M. Greenberg and R. Willis (Eds.), Social exchange: Advances in Theory and Research*, New York, Plenum Press, 1980, 27-55.

Leventhal, G. S., Karuza, J. and Fry. "Beyond Fairness: A Theory of Allocation Preferences," in G. Mikula (Ed.), Justice and Social Interaction, New York, Springer-Verlag, 1980, 121-145.

Lewis, J. D. And Weigert, A. J. "Trust as a Social Reality," *Social Forces*, 63, 967-985.

Lind, E. A., Kanfer, R., and Earley, P. C. "Voice, Control and Procedural Justice: Instrumental and Noninstrumental Concerns in Fairness Judgements," *Journal of Personality and Social Psychology*, 59, November 1990, 952-959.

Lind, E. A., Kurtz, S., Musante, L., Walker, L., and Thibaut, J. "Procedure and Outcome Effects on Reactions to Adjudicated Resolutions of Conflicts of Interest," *Journal of Personality and Social Psychology*, 39, 1980, 643-653.

Lind, E. A. and Tyler, T. R. "The Social Psychology of Procedural Justice," New York, Plenum Press, 1988.

Margulis, S. T. "Conceptions of Privacy: Current Status and Next Steps," *Journal of Social Issues*, 33, 1977, 5-21.

Martin, J. "Relative Deprivation: A Theory of Distributive Injustice for an Era of Shrinking Resources," in B. M. Staw & L. L. Cummings (Eds.) *Research in Organizational Behaviour*, 3 1981, 53-107.

Martocchio, J., and Judge, T. A. "A Policy-Capturing Approach to Individuals' Decisions to be Absent," *Organizational Behaviour and Human Decision Processes*, 57, 1994, 358-386.

Masterson, S. S., Lewis-McClear, K., Goldman, B. M., and Taylor, M. S. "Integrating Justice and Social Exchange: The Differing Effects of Fair Procedures and Treatment on Work Relationships," *Academy of Management Journal*, in press.

Mariani, J. A. "Sisco: Providing a Cooperation Filter for a Shared Information Space," in *Proceedings of the International ACM SIGGROUP Conference on Supporting Group Work*, GROUP 97, ACM Press, Phoenix, Arizona, USA, 1997, 376-384.

Mead, M. "Coming of Age in Samoa," New York, 1949.

McGregor, D. "The Professional Manager," New York, McGraw-Hill, 1967.

McKnight, H. and Webster, J. "Collaborative Insight or Privacy Invasion? Trust Climate as a Lens for Understanding Acceptance of Awareness Systems," in C. Cooper and C. Earley (Eds.), *Handbook of Organizational Culture and Climate*, in press.

Naylor, J. C., and Wherry, R. J., Jr. "The Use of Simulated Stimuli and the "Jan" Technique to Capture and Cluster the Policies of Raters," *Educational and Psychological Measurement*, 25, 1965, 969-986.

Newell, P. B. "Perspectives on Privacy," *Journal of Environmental Psychology*, 15, 1995, 87-104.

O'Reilly, C. A. "The Intentional Distortion of Information in Organizational Communication: A Laboratory and Field Investigation," *Human Relations*, 31, 2, 1978, 173-193.

Palfreyman, K. & Rodden, T. "A Protocol for User Awareness on the World Wide Web," in M. S. Ackerman (Ed.), *Proceedings of the ACM 1996 Conference on Computer Supported Cooperative Work*, NY, NY, 1996, 130-139.

Radner, R. and Rothschild, M. "On the Allocation of Effort," *Journal of Economic Theory*, 10, 1975, 358-376.

Rice, R. E. and Webster, J. "Adoption, Diffusion and Use of New Media in Organizational Settings," *Communication Technology and Society: Audience Adoption and Use of New Media*, Cresskill, NJ, in press.

Rodden, T. "Populating the Application: A Model of Awareness for Cooperative Applications," in M. S. Ackerman (Ed.), *Proceedings of the ACM 1996 Conference on Computer Supported Cooperative Work*, NY, NY, 87-96.

Rossi, P. H., and Anderson, A. B. "The factorial survey approach," in P. H. Rossi & S. L. Nock (Eds), *Measuring Social Judgements*, Beverly Hills, CA, 1982, 15-67.

Rynes, S. and Lawler, J. "A Policy-Capturing Investigation of the Role of Expectancies in Decisions to Pursue Job Alternatives," *Journal of Applied Psychology*, 68, 4, 1983, 620-631.

Saga, V. L. and Zmud, R. W. "The Nature and Determinants of IT Acceptance, Routinization, and Infusion," in L. Levine (Ed.), *Diffusion, Transfer and Implementation of Information Technology*, Elsevier Science (North Holland), Amsterdam, 1994, 67-86.

Schein, V. E. "Individual Privacy and Personnel Psychology: The Need for a Broader Perspective," *Journal of Social Issues*, 33, 1977, 154-167.

Sherif, M. "In Common Predicament: Social Psychology of Intergroup Conflict and Cooperation," Boston, Houghten Mifflin, 1966.

Shils, E. "Privacy: Its Constitution and Vicissitudes," *Law and Contemporary Society*, 31, 1966, 281-306.

Simmel, G. "The Sociology of George Simmel," K. H. Wolff, trans., New York: The Free Press, 1950.

Simone, C. and Bandini, S. "Compositional Features for Promoting Awareness within and across Cooperative Applications," in *Proceedings of the International ACM SIGGROUP Conference on Supporting Group Work*, GROUP 97, ACM Press, 1997, 385-394.

Slovic, P. "Psychological Study of Human Judgement: Implications for Investment Decision-Making," *Journal of Finance*, 27, 1972, 779-799.

Stone, E. F. and Stone, D. L. "Privacy in Organizations: Theoretical Issues, Research Findings, and Protection Mechanisms," *Research in Personnel and Human Resource Management*, 8, 1990, 349-411.

Symantec Corporation, "pcAnywhere32 User's Guide", Cupertino, CA, USA, 1996.

Thibaut, J. and Walker, L. "Procedural Justice: A Psychological Analysis Lawrence Erlbaum", Hillsdale, New Jersey, USA, 1975.

Tollmar, K., Sandor, O. and Schomer, A. "Supporting Social Awareness @Work Design and Experience," *Computer Supported Cooperative Work '96*, ACM Press, 1996, 298-307.

Turoff, M., Hiltz, S. R., Bahgat, A. N. F. and Rana, A. R. "Distributed Group Support Systems," *Management of Information Systems Quarterly*, 17, 1993, 101-125.

Valenzi, E. and Andrews, I. R. "Individual Differences in the Decision Process of Employment Interviews," *Journal of Applied Psychology*, 58, 1973, 49-53.

Walster, E., Walster, G. W., and Berscheid, E. "Equity: Theory and Research," 1978, Boston: Allyn & Bacon.

Warren, S. and Brandeis, L. D. "The Right to Privacy," *Harvard Law Review*, 4, 1890, 193-220.

Webster, J. "Desktop Videoconferencing: Experiences of Complete Users, Wary Users, and Non-Users,' *Management of Information Systems Quarterly*, September 1998, 257-286.

Webster, J. "Influences on Employee Acceptance of Electronic Awareness Monitoring Systems," *SSHRC Research Grant*, #410-99-0472, 1999.

Webster, J. and Trevino, L. K. "Rational and Social Theories as Complementary Explanations of Communication Media Choices: Two Policy-Capturing Studies," *Academy of Management Journal*, 38, 6, 1995, 1544-1572.

Westin, A. F. "Privacy and Freedom," New York: Atheneum, 1967.

Wheeless, L. R. "A Follow-Up Study of the Relationships among Trust, Disclosure, and Interpersonal Solidarity," *Human Communication Research*, 4, 2, 1978, 143-157.

Whittaker, S. "Rethinking Video as a Technology for Interpersonal Communications," *International Journal of Human-Computer Studies*, 42, 1995, 501-529.

Whittaker, S., Frohlich, and Daly-Jones, O. "Informal Workplace Communication: What is it like and how might we support it?" *Proceedings of CHI '94 Human Factors in Computing Systems*, ACM Press, 1994, 130-137.

Zand, D. E. "Trust and Managerial Problem Solving," *Administrative Science Quarterly*, 17, 1972, 229-239.

Zedeck S. "An Information Processing Model and Approach to the Study of Motivation," *Organization Behaviour and Human Performance*, 18, 1977, 47-77.

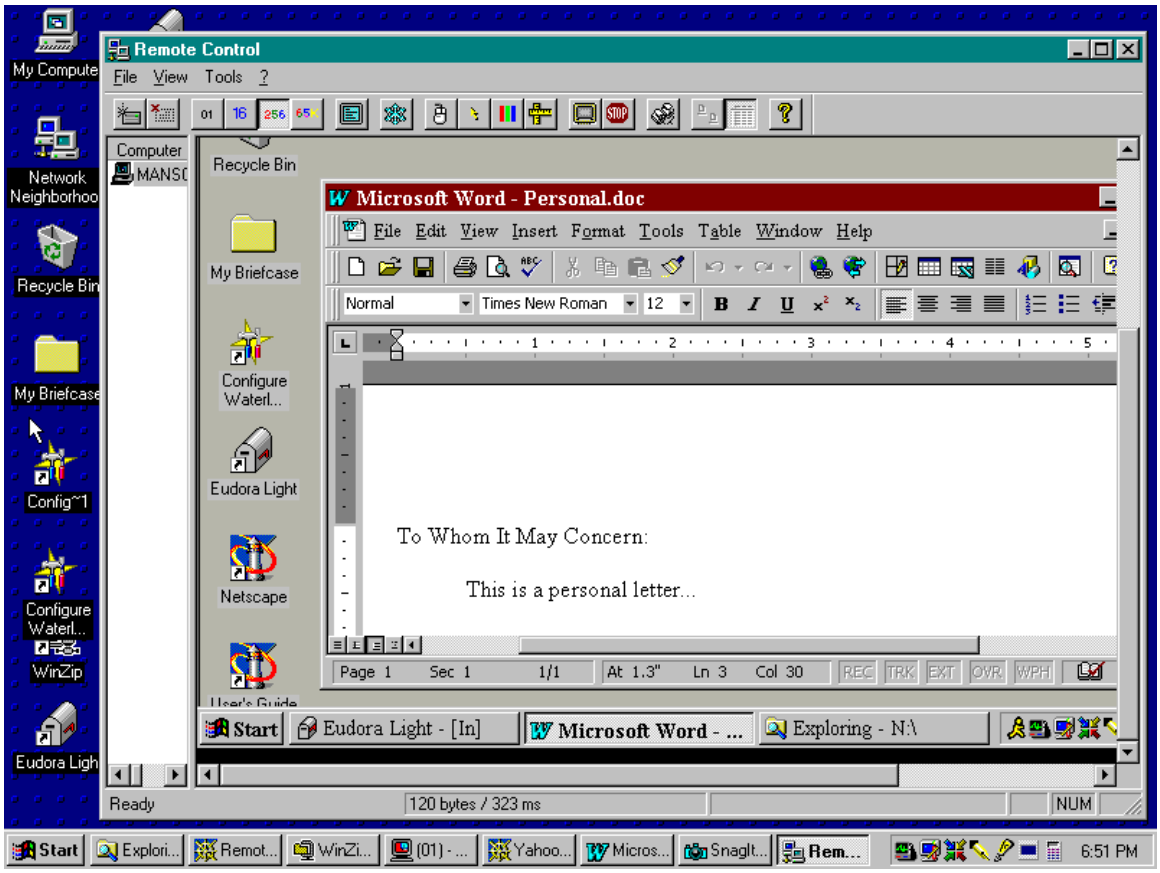
Zhao, Q. A., and Stasko, J. T. "Evaluating Image Filtering Based Techniques in Media Space Applications," *Proceedings of the Conference on Computer-Supported Cooperative, Association for Computing Machinery*, Seattle, Washington, USA. Nov. 14-18, 1998.

Appendix A: Description of a Remote Desktop Access System

A remote desktop access system may be used for various purposes, some of which may be familiar to you. With some applications of remote desktop access systems, an individual may access his/her computer desktop at work from home. This use of remote desktop access systems is used by i-Stat Canada Ltd. Similarly, if an employee travels frequently, then a remote desktop access system may be a convenient way to access his/her office desktop from a remote location. Several people remotely accessing centralized data and resources from the same computer represents another use of remote desktop access systems. For instance, in the Information Technology Department at Newbridge Networks, a remote desktop access system is used on their Web servers so that Webmasters may access Web server files from remote locations. A further use for remote desktop access systems, employed at the University of Waterloo, allows technical support personnel to access users', staff, and faculty desktops. This enables technical support personnel to remotely determine what problem the user may be having and to remotely install or upgrade an application.

None of the discussed applications of remote desktop access systems are being examined in this study. Rather, the utilization of remote desktop access systems as an awareness system is being examined in this study. That is, employees may use a remote desktop access system to help them collaborate remotely on projects with other employees.

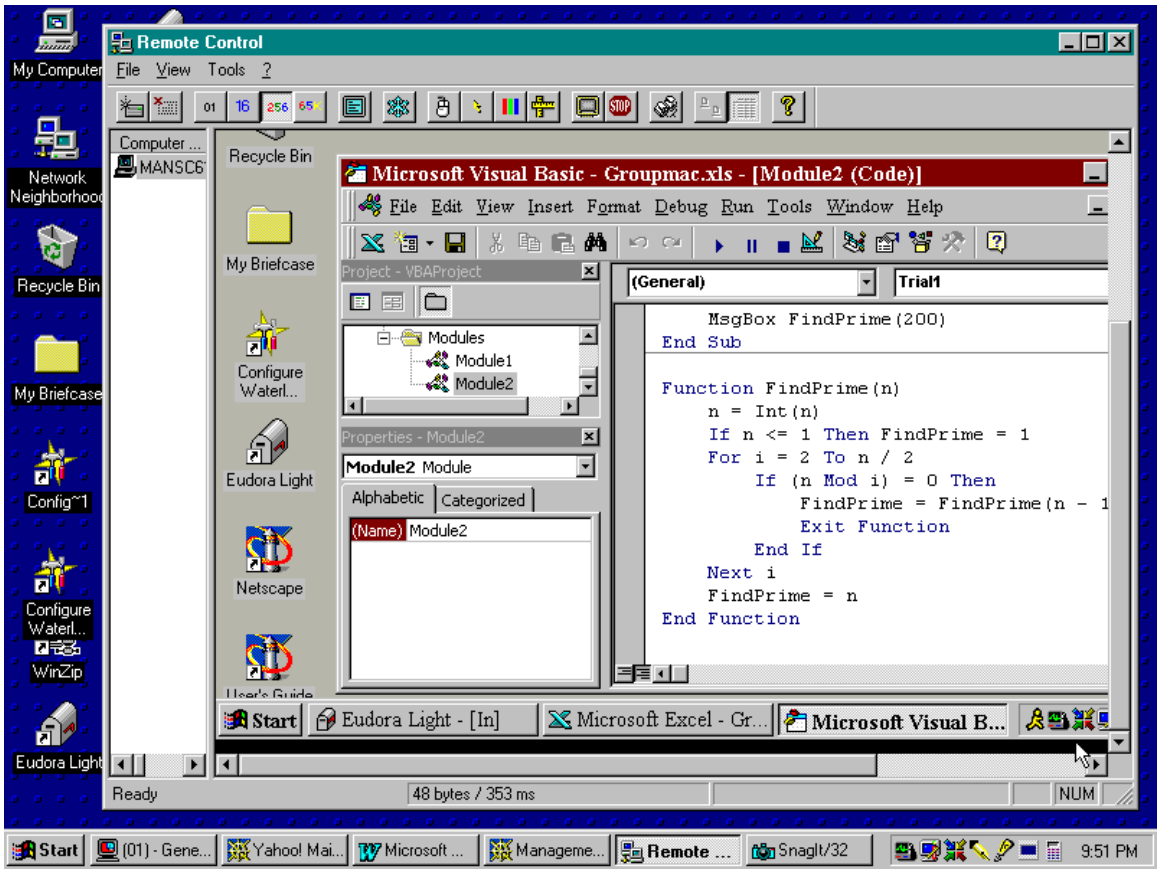
A couple of examples of the appearance of a remote desktop access system as an awareness system are shown here:



Example of a remote desktop access system when user is using Word

These examples are screen snapshots of an employee's desktop (dark background) that is logged into a second employee's desktop (light background). The desktop with the light background that has been logged into is considered the host machine.

In the first picture on the desktop of the host machine, the first employee can view what the second employee is writing in Word. The first employee that has logged in may also browse or copy files from the host machine.



Example of a remote desktop access system when user is using Visual Basic

A remote desktop access system such as the one shown in the second picture may be used as an awareness system for developers. In particular, developers may benefit from a system such as this when collaborating on a programming project. For example, a developer may log into another developer's desktop in order to view how the programming code was dealt with in a particular situation, without having to bother the other developer. Or, if different individuals are programming different modules, then the ability to access other developers' desktops to ensure that variable naming is concurrent may simplify the process of combining the modules. Another example would be if you made changes to a module in the program then you could look at others' modules to see how the changes you made affect their modules. Also, if other developers knew that you

had made changes, they could look at your module to see how the changes may affect theirs.

Appendix B: Task-Technology Fit Questionnaire for the Preliminary Study

i. Task-Technology Fit Questionnaire

Task-technology fit represents the degree to which a technology assists an individual in performing his or her portfolio of tasks.

Assume that you are working on a development (programming) project with other(s) who are remotely located. You can use a remote desktop access system as an awareness system to help accomplish each of the various tasks listed below.

Please rate the extent to which an awareness system would assist you in performing each of the tasks listed below, that is, put an "x" in the brackets to indicate whether the task-technology fit is higher or lower:

Very Low Task-Technology Fit			Moderate Task-Technology Fit			Very High Task-Technology Fit	
1	2	3	4	5	6	7	
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You and your co-workers are working on different modules and need your variable names to coincide.
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You and your co-workers are working on different programs.
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You are working on a small procedure within a larger section of code. You need to know what conditions have to be met for your procedure to be reached (e.g. if your procedure is nested).
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You are updating existing code.
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You are teaching a new employee the procedures and coding standards for your organization.
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You are working on a module and you encounter an issue that would be reoccurring throughout other programmers' modules. It would be helpful to know how a co-worker dealt with the issue.

[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You are converting an existing program to another language.
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You and your co-workers are working on different sections of the code. The code must meet the formatting standards of your company.
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You and your co-workers need to conduct a code review.
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You are performing user tests with employees located in your office.
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You are adding documentation to a program.
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You need to look at the effects that changes to a module (that you are working on) has on other modules in the program.
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	You are trouble shooting an entire program.

ii. Task-Technology Fit Questionnaire Background

BACKGROUND QUESTIONS

1. Into which age category do you fall?

Under 20	[ ]	26-35	[ ]
20-25	[ ]	35+	[ ]

2. Which gender are you?

Female	[ ]	Male	[ ]

3. What is your major?

Engineering	[ ]	Arts	[ ]	Science	[ ]
Computer Science	[ ]	Math	[ ]	Other	[ ]

4. Have you had a co-op/job title with the following title?

Software developer/programmer	[ ]
Systems Analyst	[ ]
Other computer-related position	[ ]

5. How many months of work experience do you have?

_____ months

6. Do you have any experience with remote desktop access systems?

Yes	[ ]	No	[ ]

If yes, how many months experience do you have with them?

_____ months

If yes, for what purpose were you using remote desktop access systems?

Access your work desktop from home	[ ]
Access your home desktop from work	[ ]
Remotely access centralized data	[ ]
Remotely access a centralized desktop (e.g. Web server)	[ ]
Remotely access someone's desktop for support purposes	[ ]
Other (please indicate): _____	[ ]

iii. Information Letter for Task-Technology Fit Study

Information Letter for an Awareness System Study

This study is being conducted by Jennifer Williams under the supervision of Jane Webster in the Management Sciences Department of the Faculty of Engineering at the University of Waterloo.

I am conducting a research study about the use of remote desktop access systems as for collaboration in software development. In particular, the overall scope of this study is to examine several variations of the details of the design of a remote desktop access system.

Remote desktop access systems are one type of collaborative awareness systems. With the increase in the number of distributed teams in organizations, and the growing quantity of temporary and virtual organizations, awareness systems are being designed and implemented to improve employee connections. Awareness systems, most often electronic, provide information on distant colleagues' availability or actions. For instance, they may provide the user with some indication of the activities of users of a shared information base. Designers of these systems argue that electronic awareness systems can help improve communication and that employees who are physically separated do not have the same opportunities as colleagues located in the same area for informal interactions. The purpose of this study is to investigate what details of the design effect the acceptance of such a system.

Your opinions are important because you will be exposed to some examples of tasks for which remote desktop access systems may be used. The results from the questionnaire that you will be given will be used to construct the survey that will be used for the main scope of this study. My supervisor and I intend to write a research article based on the findings from this study; however, all results will be reported in a summarized form, and no individual could be identified from these summarized results.

If you decide to volunteer, the procedure for this study is as follows. Read the description that is provided in this file. Then there will be a questionnaire with a list of situations following the description where you may indicate with an "x" which rating you would like to give the situation. The questionnaire will be followed by a brief background questionnaire so that demographics may be measured. You can indicate you responses to the background questionnaire by indicating with an "x" in the brackets. Then save the changes that you have made to the file and send it back to me. The questionnaire should take approximately 5-10 minutes to complete.

Participation in this study is voluntary, you may decline to answer any questions that you do not wish to answer, and you can withdraw your consent without penalty at any time. Declining to answer or withdrawing your consent will not impact you in any way. All information you provide will be confidential and you do not need to identify yourself by

name on any materials. The data collected from this study will be electronically archived after the completion of the study for two years. There are no known or anticipated risks from participating in this study.

This study has received ethics clearance through the Office of Research Ethics at the University of Waterloo. If you have any initial questions or concerns, or ones resulting from your participation in this study, please feel free to contact me at (519) 888-4567 x3422, by email j4willia@uwaterloo.ca, Dr. Jane Webster, my supervisor, at (519) 888-4567 x5683 (email: jwebster@uwaterloo.ca), or Dr. Susan Sykes, Director, Office of Research Ethics at (519) 888-4567 x6005 (email: ssykes@uwaterloo.ca).

Thank you,

Jennifer Williams
Faculty of Engineering
University of Waterloo

Appendix C: Example Survey for Study 1

i. Example Scenario

Suppose that you are a developer working on a program with other co-workers, some of whom are remotely located. Available to you is a remote desktop access system with the following features:

- All the details of your desktop are available to your colleagues.
- You can control who can access your desktop.
- You can control when others have access to your desktop.
- You have the same access to colleagues' desktops as they have to yours.
- You and your co-workers need to conduct a code review.

What would be your attitude towards the use of this remote desktop access system?

Extremely Negative						Extremely Positive
1	2	3	4	5	6	7

How willing would you be to use this remote desktop access system?

Extremely Unwilling						Extremely Willing
1	2	3	4	5	6	7

To what extent do you feel that this remote desktop access system would result in an invasion of your privacy?

Definitely Not An Invasion						Definitely An Invasion
1	2	3	4	5	6	7

To what extent do you feel that this remote desktop access system would be fair?

Definitely Not Fair						Definitely Fair
1	2	3	4	5	6	7

ii. Traditional Survey Questions

BACKGROUND QUESTIONS

1. Into which age category do you fall?

   [ ] Under 22 [ ] 33-45
   [ ] 22-32 [ ] 45+

2. Which gender are you?

   [ ] Female [ ] Male

3. What is the highest level of education you have completed?

   [ ] High School [ ] Bachelors [ ] PhD
   [ ] College Diploma [ ] Masters

4. What is your job title?

   [ ] Software developer [ ] Other
   [ ] Analyst (please indicate) _____

5. How many years of work experience do you have?

   [ ] Under 1 year [ ] 11-15 years
   [ ] 1-5 years [ ] 16+ years
   [ ] 6-10 years

6. Do you have any experience with remote desktop access systems?

   [ ] Yes [ ] No

   If yes, how many years experience do you have with them?

   [ ] Under 1 year [ ] 6-10 years
   [ ] 1-5 years [ ] 11+ years

   If yes, for what purpose were you using remote desktop access systems?

   [ ] Access your work desktop from home
   [ ] Access your home desktop from work
   [ ] Remotely access centralized data
   [ ] Remotely access a centralized desktop (e.g. Web server)
   [ ] Remotely access someone's desktop for support purposes
   [ ] Other (please indicate) _____

Appendix D: Information Letter for Participants of Studies 1 and 2

--University letterhead--

Information Letter for an Awareness System Study

This study is being conducted by Jennifer Williams under the supervision of Jane Webster in the Management Science Department of the Faculty of Engineering at the University of Waterloo.

I am conducting a research study about the use of remote desktop access systems for collaboration in software development. In particular, you will see several variations of the details of the design of a remote desktop access system and will have the opportunity to give your reactions to these various designs.

Remote desktop access systems are one type of collaborative awareness systems. With the increase in the number of distributed teams in organizations, and the growing quantity of temporary and virtual organizations, awareness systems are being designed and implemented to improve employee connections. Awareness systems, most often electronic, provide information on distant colleagues' availability or actions. For instance, they may provide the user with some indication of the activities of users of a shared information base. Designers of these systems argue that electronic awareness systems can help improve communication and that employees who are physically separated do not have the same opportunities as colleagues located in the same area for informal interactions. The purpose of this study is to investigate what details of the design effect the acceptance of such a system.

Your opinions are important because you will be exposed to some details of designs for remote desktop access systems and your reactions to these systems could affect their design in the future. My supervisor and I intend to write a research article based on the findings from this study; however, all results will be reported in a summarized form, and no individual could be identified from these summarized results.

If you decide to volunteer, the procedure for this study is as follows. You will be presented with scenarios describing aspects of a remote desktop access system along with four questions pertaining to each scenario. For example, you may be asked to rate your willingness to use a system that has been described in the scenario. You may complete the survey by circling the number that best indicates your chosen rating for each question. There are 32 scenarios, which are followed by some questions for background information. When you had reached the end of the questions your will be presented with a feedback letter. The survey should take approximately 30 minutes to complete.

Participation in this study is voluntary, you may decline to answer any questions that you do not wish to answer, and you can withdraw your consent without penalty at any time.

Declining to answer or withdrawing your consent will not impact you in any way, including your employment. All information you provide will be confidential and you do not need to identify yourself by name on any materials. The data collected from this study will be electronically archived after the completion of the study and maintained for two years after the thesis has been completed and any submissions to journals have been completed. There are no known or anticipated risks from participating in this study.

This study has received ethics clearance through the Office of Research Ethics at the University of Waterloo. If you have any initial questions or concerns, or ones resulting from your participation in this study, please feel free to contact me at (519) 888-4567 x3422, by email j4willia@uwaterloo.ca, Dr. Jane Webster, my supervisor, at (519) 888-4567 x5683 (email: jwebster@uwaterloo.ca), or Dr. Susan Sykes, Director, Office of Research Ethics at (519) 888-4567 x6005 (email: ssykes@uwaterloo.ca).

Thank you,

Jennifer Williams
Graduate Student
Faculty of Engineering
University of Waterloo

Appendix E: Feedback Letter for Participants

--University letterhead--

Feedback to Participants

Thank you for participating in this study about the use of remote desktop access systems as awareness systems. In this study, you were able to see several variations of the details of the design of a remote desktop access system and had the opportunity to give your reactions to these various designs.

Although most electronic monitoring systems are implemented for reasons of performance monitoring, awareness systems have been designed to improve connections between employees in distant locations and in virtual organizations, rather than to monitor performance. Researchers have argued that electronic awareness systems can help improve communication and that employees who are physically separated do not have the same opportunities as co-located colleagues for informal interactions. They propose that awareness systems can be advantageous because they provide users with the ability to initiate opportunistic connections or what is sometimes referred to as "benign surveillance".

The few studies that have addressed employee reactions to awareness systems point to some of the same employee concerns about privacy that have been found for electronic performance monitoring. That is, awareness features (designed into systems to improve working relationships) may actually have the unintended consequence of making privacy more salient to these users, resulting in lower system acceptance.

Another factor that is considered to affect employees' acceptance of a system is the perception of fairness. I propose that an employee will be less willing to accept an awareness system if that individual does not feel as though they are being treated fairly.

This is why your opinions are important. You were able to assess some designs for remote desktop access systems to be used as an awareness system and your reactions to these systems could influence their design in the future. I intend to publish the results of this research in order to affect future designs.

If you would like to receive a copy of any research reports written from this study, please feel free to contact me at (519) 888-4567 x3422, by email j4willia@uwaterloo.ca, or at the above address.

If you have any questions or concerns resulting from your participation in this study, please contact either myself, Dr. Jane Webster, my supervisor, at (519) 888-4567 x5683

(email jwebster@uwaterloo.ca), or Dr. Susan Sykes, Director, Office of Research Ethics at (519) 888-4567 x6005 (email: ssykes@uwaterloo.ca).

Thank you,

Jennifer Williams
Graduate Student
Faculty of Engineering
University of Waterloo

Appendix F: Results from Task-Technology Fit Test

The percentage of individuals that chose the level for each of the situations is shown in brackets and the situations that were chosen for the policy-capturing survey are indicated in bold.

Very Low Task-Technology Fit			Moderate Task-Technology Fit			Very High Task-Technology Fit	
1	2	3	4	5	6	7	
[ ]	[ ]	[16.6]	[8.3]	[33.3]	[25]	[16.6]	You and your co-workers are working on different modules and need your variable names to coincide.
[33.3]	[50]	[16.6]	[ ]	[ ]	[ ]	[ ]	**You and your co-workers are working on different programs.**
[ ]	[8.3]	[16.6]	[25]	[ ]	[25]	[25]	You are working on a small procedure within a larger section of code. You need to know what conditions have to be met for your procedure to be reached (e.g. if your procedure is nested).
[16.6]	[16.6]	[25]	[25]	[8.3]	[ ]	[8.3]	You are updating existing code.
[16.6]	[ ]	[8.3]	[8.3]	[8.3]	[25]	[33.3]	You are teaching a new employee the procedures and coding standards for your organization.
[ ]	[ ]	[ ]	[ ]	[41.6]	[33.3]	[25]	**You are working on a module and you encounter an issue that would be reoccurring throughout other programmers' modules. It would be helpful to know how a co-worker dealt with the issue.**
[41.6]	[50]	[8.3]	[ ]	[ ]	[ ]	[ ]	**You are converting an existing program to another language.**

[25]	[25]	[8.3]	[25]	[8.3]	[8.3]	[ ]	You and your co-workers are working on different sections of the code. The code must meet the formatting standards of your company.
[ ]	[ ]	[ ]	[ ]	[16.6]	[50]	[33.3]	**You and your co-workers need to conduct a code review.**
[ ]	[16.6]	[8.3]	[16.6]	[16.6]	[ ]	[41.6]	You are performing user tests with employees located in your office.
[16.6]	[41.6]	[16.6]	[8.3]	[ ]	[8.3]	[8.3]	You are adding documentation to a program.
[8.3]	[16.6]	[16.6]	[16.6]	[16.6]	[16.6]	[8.3]	You need to look at the effects that changes to a module (that you are working on) has on other modules in the program.
[8.3]	[16.6]	[16.6]	[25]	[16.6]	[8.3]	[8.3]	You are trouble shooting an entire program.

Appendix G: Example Survey for Study 2

i. Example Scenario

Suppose that you are a consultant working on a project with other co-workers, some of whom are remotely located. Available to you is a remote desktop access system with the following features:

- **All the details of your desktop are available to your colleagues.**
- **All your colleagues can access your desktop.**
- **You can control when others have access to your desktop.**
- **You have the same access to colleagues' desktops as they have to yours.**

Please answer the following questions:

1. To what extent do you feel that this remote desktop access system would be fair?	Definitely Not Fair	1	2	3	4	5	6	7 Definitely Fair
2. To what extent do you feel that the this remote desktop access system would result in an invasion of your privacy?	Definitely an Invasion	1	2	3	4	5	6	7 Definitely Not an Invasion
3. To what extent do you feel that this remote desktop access system would preserve your dignity and respect?	Not at all	1	2	3	4	5	6	7 A Great Deal
4. Do you feel that this remote desktop access system would be useful in aiding collaboration?	Definitely Not Useful	1	2	3	4	5	6	7 Definitely Useful
5. What would be your attitude towards the use of this remote desktop access system?	Extremely Negative	1	2	3	4	5	6	7 Extremely Positive
6. How willing would you be to use this remote desktop access system?	Extremely Unwilling	1	2	3	4	5	6	7 Extremely Willing
7. To what extent do you feel that you would have an opportunity to determine who has access to your remote desktop system?	No Opportunity	1	2	3	4	5	6	7 Full Opportunity
8. To what extent do you feel that you would have an opportunity to determine when others have access to your remote desktop system?	No Opportunity	1	2	3	4	5	6	7 Full Opportunity
9. Do you think that the remote desktop access system would be used in an ethical manner?	Not at all Ethical	1	2	3	4	5	6	7 Extremely Ethical

ii. Traditional Survey Questions

Please provide the following CONFIDENTIAL biographical information. This information will be used only to describe the group of respondents.

AGE: Into which age category do you fall? [ ] Under 22 [ ] 22-32 [ ] 33-45 [ ] 45+

GENDER: [ ] Male [ ] Female

EDUCATION: Please indicate the *highest level* of education that you have completed.

[ ] Elementary School [ ] High School [ ] Some College or University
[ ] University Degree [ ] Professional or Post-Graduate Degree [ ] Other: _____

CURRENT EMPLOYMENT:

[ ] Full-time permanent [ ] Part-time permanent [ ] Full-time temporary

JOB INFORMATION:

Are you in a management position? [ ] Yes [ ] No

If yes, at what level? [ ] Entry [ ] Middle [ ] Upper

Please indicate which job title *best* describes your position:

[ ] Manager
[ ] Marketing/Sales
[ ] Consultant
[ ] Computer Programmer or Systems Analyst
[ ] Research and Development
[ ] Other, please specify:_____

How many years of work experience do you have?
[ ] Under 1 year [ ] 1-5 years [ ] 6-10 years [ ] 11+ years

Do you have any experience with remote desktop access systems? [ ] Yes [ ] No

If yes, how many years experience do you have with them?

[ ] Under 1 year [ ] 1-5 years [ ] 6-10 years [ ] 11+ years

If yes, for what purpose were you using remote desktop access systems?

[ ] Access your work desktop from home
[ ] Access your home desktop from work
[ ] Remotely access centralized data
[ ] Remotely access a centralized desktop (e.g., Web server)
[ ] Remotely access someone's desktop for support purposes
[ ] Other (please indicate) _____

iii. Instructions for completing the questionnaire

Instructions for completing the questionnaire

If you are responding by e-mail, please place an "X" beside the number on the scale which corresponds to your response. As an example, for the following question, if you strongly agree that the weather today is very nice, you would place an "X" by the number 7:

I believe that the weather today is very nice.	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7X

On the following pages, you will see descriptions of the features of a number of remote access systems. Please read through the features of each system carefully as each one is different. Each description is followed by a series of questions.

Appendix H: Individual Results for Study 1

i. Frequency Results for Study 1

With the independent variables being expressed as binary (dummy) variables, multiple regressions were calculated for each participant, one for each of intentions to use, attitudes towards use, perceptions of privacy and perceptions of fairness.

The regressions demonstrate that different variables are significant for different individuals. However, an independent variable that is significant is generally significant for most of the dependent/mediating variables (attitudes towards use, intentions to use, privacy, and fairness). Table H-1 shows the number of subjects for which there was a significant relationship between the variables ($p < 0.05$).

		Independent Variables				
		Degree of Detail	Who can access	When others can access	Equality of access	Task-technology fit
Dependent Variable	Attitudes towards use	6	6	8	5	2
	Intentions to use	7	6	9	3	2
Mediating Variables	Perceptions of Privacy	7	6	9	3	
	Perceptions of Fairness	6	5	9	5	
	All	6 (55%)	5 (45%)	8 (73%)	2 (18%)	

Table H-1: Frequency of Significant Betas for Study 1

The "All" category indicates how many subjects (percentage) found that particular independent variable significant for all the dependent/mediating variables.

From examining this row in Table H-1, it can be observed that individuals who found a significant relationship with some of attitudes towards use, intentions to use, perceptions of privacy, and perceptions of fairness, found all of these variables to have a significant relationship. Out of all the independent variables, whether the users can control when others have access to their desktops had a significant effect on the most subjects as well as was significant for all of the dependent and mediating variables for almost all of those subjects. The degree of detail that can be viewed on a desktop and whether the users can control who can access their desktops also had a high ratio of subjects that found those variables significant for some of the dependent variables compared to all of the dependent variables. Thus, the first three variables demonstrated consistent effects. The consensus was not so unanimous for equality of access to others' desktops since there was more variability among the number of subjects that found it significant for each of the dependent variables. Task-technology fit demonstrated consistent effects across the operationalizations for acceptance, although only two subjects found it to have a significant effect.

The variables that were significant in step 2 of the hierarchical regression for each participant in Study 1 are shown in Table H-2.

As noted earlier, the results from the individual analyses may differ from those of the averaged responses because as James (1982) indicated, averaged responses may result in an overestimation of the relation between variables.

Participant		Degree of detail	Who can access	When others can access	Equal. of access	Task-Tech. Fit	Percep. of Privacy
One:	Attitudes towards use						X
	Intentions to use						X
Two:	Attitudes towards use			X			X
	Intentions to use			X			X
Three:	Attitudes towards use						X
	Intentions to use						X
Four:	Attitudes towards use						X
	Intentions to use						X
Five:	Attitudes towards use						X
	Intentions to use						X
Six:	Attitudes towards use						X
	Intentions to use						X
Seven:	Attitudes towards use						X
	Intentions to use						X
Eight:	Attitudes towards use			X			X
	Intentions to use			X			X
Nine:	Attitudes towards use	X					
	Intentions to use	X					
Ten:	Attitudes towards use						X
	Intentions to use						X
Eleven:	Attitudes towards use						X
	Intentions to use						X

Table H-2: Significant Variables for Each Participant for Study 1

ii. Frequency Results for Study 2

Again, multiple regressions were calculated for each participant, one for each of intentions to use, attitudes towards use, perceptions of privacy and perceptions of fairness. The number of individuals from Study 2 that found each of the independent variables significant is shown in Table H-3. The regressions demonstrate that different variables are significant for different individuals. However, an independent variable that is significant is generally significant for most of the dependent/mediating variables (attitudes towards use, intentions to use, privacy, and fairness). Table H-3 shows the number of subjects for which there was a significant relationship between the variables ($p < 0.05$).

		Independent Variables			
		Degree of Detail	Who can access	When others can access	Equality of access
Dependent Variable	Attitudes towards use	8	5	4	4
	Intentions to use	8	5	5	4
Mediating Variables	Perceptions of Privacy	8	4	4	3
	Perceptions of Fairness	7	5	6	7
	All	7 (58%)	4 (33%)	4 (33%)	3 (25%)

Table H-3: Frequency of Significant Betas for Study 2

The "All" category indicates how many subjects (percentage) found that particular independent variable significant for all the dependent/mediating variables. It can be observed that individuals who found a significant relationship with some of

attitudes towards use, intentions to use, perceptions of privacy, and perceptions of fairness, found all of these variables to have a significant relationship. Out of all the independent variables, the degree of detail that can be viewed on a desktop had a significant effect on the most subjects as well as was significant for all of the dependent and mediating variables for almost all of those subjects. The other three variables were significant to approximately the same number of participants.

A hierarchical regression analysis was also done on each individual in Study 2, as shown in Table H-4. The variables that were significant in step 2 of the hierarchical regression for each participant in Study 2 are displayed.

As explained above, the results from the individual analyses may differ from those of the averaged responses.

Participant		Degree of detail	Who can access	When others can access	Equal. of access	Percep. of Privacy
One:	Attitudes towards use					
	Intentions to use					
Two:	Attitudes towards use					
	Intentions to use					x
Three:	Attitudes towards use					x
	Intentions to use					x
Four:	Attitudes towards use					
	Intentions to use					
Five:	Attitudes towards use				x	x
	Intentions to use				x	x
Six:	Attitudes towards use					x
	Intentions to use		x			x
Seven:	Attitudes towards use					x
	Intentions to use					x
Eight:	Attitudes towards use					x
	Intentions to use					x
Nine:	Attitudes towards use					x
	Intentions to use					x
Ten:	Attitudes towards use					
	Intentions to use					
Eleven:	Attitudes towards use	x				x
	Intentions to use	x				x
Twelve	Attitudes towards use		x	x	x	
	Intentions to use					

Table H-4: Significant Variables for Each Participant for Study 2

iii. Frequency Results for the Pilot Study

Multiple regressions were calculated for each participant, one for each of intentions to use, attitudes towards use, perceptions of privacy and perceptions of fairness. The number of individuals from the Pilot Study that found each of the independent variables significant is shown in Table H-5. The regressions demonstrate that different variables are significant for different individuals. However, an independent variable that is significant is generally significant for most of the dependent/mediating variables (attitudes towards use, intentions to use, privacy, and fairness). Table H-5 shows the number of subjects for which there was a significant relationship between the variables ($p < 0.05$).

		Independent Variables				
		Degree of Detail	Who can access	When others can access	Equality of access	Task-technology fit
Dependent Variable	Attitudes towards use	2	1	3	4	1
	Intentions to use	2	2	4	3	1
Mediating Variables	Perceptions of Privacy	4	2	5	3	
	Perceptions of Fairness	2	1	3	5	
	All	2 (33%)	1 (17%)	3 (50%)	2 (33%)	

Table H-5: Frequency of Significant Betas for the Pilot Study

The "All" category indicates how many subjects (percentage) found that particular independent variable significant for all the dependent/mediating variables. It can be observed that individuals who found a significant relationship with some of

attitudes towards use, intentions to use, perceptions of privacy, and perceptions of fairness, found all of these variables to have a significant relationship. Out of all the independent variables, whether the user can control when others have access to their desktops had a significant effect on the most subjects as well as was significant for all of the dependent and mediating variables for almost all of those subjects. The degree of detail and equality of access were significant for all the variables for a couple participants. Having control over who can access and task-technology fit were significant for one participant out of the six that completed the pilot study.

A hierarchical regression analysis was also done on each individual in the Pilot Study, as shown in Table H-6. The variables that were significant in step 2 of the hierarchical regression for each participant in the Pilot Study are displayed.

Participant		Degree of detail	Who can access	When others can access	Equal. of access	Task-Tech. Fit	Percep. of Privacy
One:	Attitudes towards use						X
	Intentions to use						X
Two:	Attitudes towards use						X
	Intentions to use						X
Three:	Attitudes towards use						X
	Intentions to use						X
Four:	Attitudes towards use			X			X
	Intentions to use			X			X
Five:	Attitudes towards use						X
	Intentions to use					X	X
Six:	Attitudes towards use	X					
	Intentions to use	X					

Table H-6: Significant Variables for Each Participant for the Pilot Study