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Research Article

Overcoming the Mum Effect in IT Project Reporting: Impacts of Fault Responsibility and Time Urgency *

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Abstract

The mum effect – a project member's reluctance to report bad news about a troubled project – has been recognized as an important contributor to project failure. While there are many potential factors that can influence the mum effect, in this study we focus on two factors that are particularly important in today's software development environment: (1) the issue of fault responsibility that arises in the context of outsourced IT projects that involve an external vendor, and (2) the issue of time urgency, which has become more important as firms seek to compete on "Internet time," developing and delivering applications with greater speed than ever before. We draw upon the basic whistle-blowing model adapted from Dozier and Miceli (1985) to examine how fault responsibility and time urgency ultimately affect a project member's IT project reporting decision. Based on the results of a controlled laboratory experiment, we confirmed that the basic whistle-blowing model holds in an IT project context and found that both fault responsibility and time urgency can have significant effects on an individual's willingness to report bad news. Fault responsibility exerts both direct and indirect influence on willingness to report bad news, while time urgency was found only to exert an indirect influence on willingness to report bad news. One implication of our study is that when fault responsibility rests with an outside vendor, this can actually increase the probability that a client employee will report the bad news to his or her management, provided that the vendor is not able to hide the problem entirely from the client organization. With respect to time urgency, our results suggest that managers may be able to increase individuals' willingness to report by emphasizing that there is a narrow window of time to correct defects before a project is delivered and the impacts of defects start to be felt. Contributions and directions for future research are discussed.

Keywords: *Project management, whistle-blowing, mum effect, fault responsibility, time urgency*

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Overcoming the Mum Effect in IT Project Reporting: Impacts of Fault Responsibility and Time Urgency

1. Introduction

Project failure is a serious problem in the information systems field. The mum effect (O'Neal et al., 1979)—or the reluctance of people to report unpleasant messages—has been recognized as an important contributor to software project failure (Tan et al., 2003). If bad news about a project's status is withheld from senior management, troubled projects can escalate and become runaway software projects. Conversely, if the status of a troubled project is reported to senior management, there is a chance that corrective actions can be taken while there is still time to successfully turn the project around and before further resources are squandered.

Prior research suggests that evidence of impending failure may be apparent to those who are closely involved in a software project, yet this information sometimes fails to be communicated up the hierarchy (Keil and Robey, 1999) or, if communicated, is substantially distorted in the process (Snow and Keil, 2002). Keil and Robey (2001) reported that even information systems auditors—who are role prescribed to serve as watchdogs—are often reluctant to report bad news about project status due to personal and organizational factors. One internal information systems (IS) auditor in their study observed that reporting bad news to senior management was like career suicide, especially when senior management was perceived as having supported the project:

> Me as a little staff auditor? … I sure wouldn't want to march into this guy's office and tell him the project that he had been championing for all these years should be put to death (Keil and Robey, 2001).

To date, bad news reporting has received only limited attention from IS researchers and has focused on a relatively small number of factors. As the information technology (IT) landscape continues to shift toward an environment in which firms are relying on vendors to a greater degree and seeking to implement systems more quickly, it is important to focus on those factors that are most characteristic of this context and likely to influence bad news reporting. In this paper, we focus on two factors that may influence the willingness to report bad news about project status, but have not been previously investigated: (1) fault responsibility, and (2) time urgency. Fault responsibility is defined as the degree to which responsibility can be attributed to an actor for the negative outcomes of a project in which he or she was involved (Robbennolt, 2000). Time urgency is defined as the degree to which stakeholder claims call for immediate attention (Mitchell et al., 1997).

Both fault responsibility and time urgency have become particularly relevant in today's software development environment. First, companies are increasingly relying on external vendors (e.g., outsourcing partners) to create key software components (or entire systems) rather than developing them in-house (Zwieg et al., 2006). When such projects go awry, the vendor is often responsible for the fault and becomes a ready target for blame (Bulkeley, 1996; Stein, 1998). Thus, the issue of fault responsibility becomes more critical in today's software development outsourcing context. Results from a recent study by Keil, Im, and Mahring (2007) suggest that the presence of a blame shifting opportunity can affect bad news reporting. While this implies that fault responsibility may be an important factor in shaping an individual's willingness to report, this construct has never been measured in the IT project reporting context. Second, companies are increasingly competing on "Internet time" (Cusumano and Yoffie, 1998) and are thus engaged in rapid application development, which means performing knowledge-intensive tasks in a tighter time than ever before to deliver a software product. This shift has brought about a greater sense of time urgency in the software development environment, which will influence behaviors including decision making (Waller et al., 2001). Time urgency is closely related to the notion of time pressure, which is one of four salient factors identified by Smith and Keil (2003) that may affect an individual's reporting decision. Unlike the other factors, the effect of time urgency is not known because it has never been subjected to an empirical test in the context of the IT project environment.

In this research, we directly manipulate both fault responsibility and time urgency, which appear as salient factors in today's software development environment, so that we can examine their effects on

IT project reporting. This study represents the first time that these two factors have been empirically investigated using a theoretically grounded model. The remainder of the paper is organized into six sections. First, we briefly review the relevant literature, focusing on the reporting decision and the two factors of interest: fault responsibility and time urgency. Next, we introduce our research model and hypotheses. Then, we briefly describe our research method and present the results of an experiment designed to test our research model. We then discuss limitations and implications and conclude the paper with a brief discussion of contributions and future research directions.

2. Theoretical Background

This study is grounded in whistle-blowing theory (Miceli and Near, 1992), which holds that individuals undertake a predictable series of assessments in deciding whether or not to report. Drawing on Latane and Darley's (1970) work on bystander intervention, Dozier and Miceli (1985) conceptualized a whistle-blowing model that focuses on an individual's whistle-blowing decision steps (see Figure 1). They argued that once an individual is aware of a problem, he or she first decides whether or not the bad news ought to be reported, then considers whether he or she is personally responsible for taking action, which, in turn, influences his or her willingness to report. The three steps from the whistle-blowing literature provide a theoretically grounded approach to understanding bad news reporting in the IT project context, and the model has been adopted by IS researchers investigating this phenomenon (Keil et al., 2004; Smith and Keil, 2003; Smith et al., 2001). Therefore, we adopt the basic whistle-blowing model as a building block for developing an expanded model of bad news reporting.

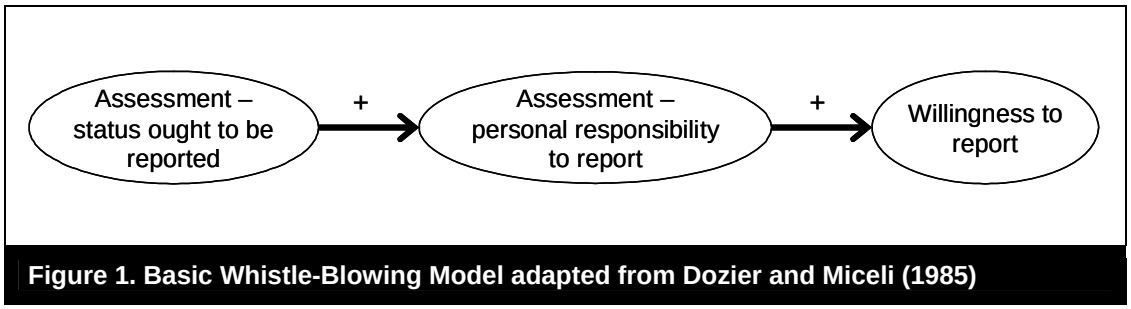

Figure 1. Basic Whistle-Blowing Model adapted from Dozier and Miceli (1985)

2.1. Fault Responsibility and Behavior

To understand fault responsibility, we need to examine how people attribute the responsibility for problems to their causes. An attribution is an expression of the way people think about the relationship between a cause and an outcome (Munton et al., 1999). People make attributions about their own and others' behaviors, about incidents, and about anything that requires a causal explanation. Attribution theory, which is about how people make causal explanations, introduces two types of attribution: internal and external (Munton et al., 1999). While an external attribution assigns causality to situational factors or outside agents, an internal attribution assigns causality to factors within the person.

Relationships between attributions and individual behaviors have been discussed in the attribution literature (Eiser, 1983). For example, Fincham (1983) has applied attribution theory to clinical psychology and suggested from the analysis of multiple clinical cases that attributions affect individual behavior. Attribution theory has also been used to explain the effects of attributions on individuals' behaviors in a variety of other contexts such as health (King, 1983), job search, and relationship marketing (Munton et al., 1999). Shultz and Schleifer (1983) suggest that responsibility (i.e., who is likely to be held responsible for the problem) is a central factor in the attribution process. Since attributions affect behavior, fault responsibility as a factor in the attribution process may affect an individual's reporting behavior.

2.2. Time and Behavior

Urgency comes from the Latin word, *urgentia*, meaning pressure (Price, 1982). Time pressure is regarded as externally imposed urgency to accomplish a task (Staudenmayer et al., 2002).

A time constraint exists when there is a time deadline. Time urgency indicates that the time constraint induces some feeling of stress and creates a need to act within the limited time frame (Ordonez and Benson, 1997). Time urgency has been shown to be a factor that can influence an individual's decision making (Bronner, 1982). Waller and her colleagues (2001) propose that individual perceptions of a time-urgent situation affect individual behaviors. In addition, while Smith and Keil (2003) theoretically suggest that time urgency may affect an individual's reporting behavior in the software project context, it has not been empirically investigated.

In this paper, we use the basic whistle-blowing model as a foundation upon which to build a richer model that incorporates fault responsibility and time urgency. In the next section, we describe our research model and hypotheses and follow with a discussion of our methodology and results.

3. Research Model

Numerous factors have been identified in the literature as having the potential to affect an individual's willingness to report bad news about a troubled software project (Smith and Keil, 2003). In this study, we focus on two such factors that we believe to be important, but which have yet to be empirically tested in the context of the IT project environment. We explicitly state six hypotheses corresponding to the six paths in the research model, as depicted in Figure 2.

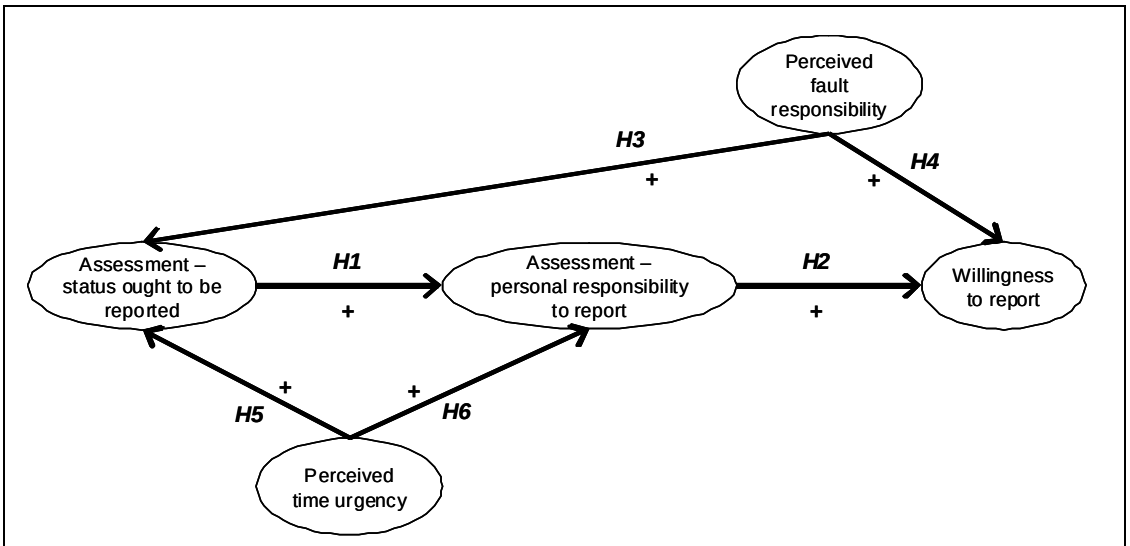

Figure 2. Research Model

3.1. Central Decision-Making Model

The middle row of Figure 2 represents the central decision-making model based on whistle-blowing theory. While Dozier and Miceli (1985) conceptualize the central decision-making model as a means of understanding an individual's response to wrongdoing, the model has been shown to be applicable to a broader range of reporting contexts that do not necessarily involve wrongdoing per se. This is because whistle-blowing is defined as being applicable to situations in which behavior is observed that is illegitimate, illegal, or immoral (Near and Miceli, 1985, p.6). Smith and Keil (2003, p. 72) contend that the whistle-blowing model is applicable to the IT project context because continuing to pour resources into a failing project (i.e., one that is not delivering what was intended when the

resources were allocated) is an illegitimate use of limited resources. Seen in this context, whistle-blowing is not limited to wrongdoing, but includes an organization member's disclosure of information about dysfunctional organizational activities. Thus, we believe that the three steps for reporting specified in the central decision-making model are applicable to a wide range of reporting situations including bad news reporting on IT projects. To date, however, the central decision-making model has only been empirically tested on two occasions (Keil et al., 2004; Smith et al., 2001). In both instances, support was found for the model, but to varying degrees.[1] Given that the central model has only received limited testing and the fact that there are subtle variations (e.g., assumed role and project context) in the experimental scenarios used previously and the one used here (to be described later), we elected to retest the central decision-making model in this study. One benefit of this approach is that if support is found for the central model, this would suggest that the relationships specified have some generalizability.

A key feature of the central decision-making model is that the individual will make two distinct assessments: whether the bad news *ought to be reported* and whether he or she has the *personal responsibility to report* the bad news (Dozier and Miceli, 1985). Other things being equal, an individual's stronger assessment that status information ought to be reported will be reflected in a stronger feeling of personal responsibility for reporting. Hence, we state the following hypothesis:

H1: A stronger assessment that information ought to be communicated will be associated with a stronger assessment of personal responsibility for reporting.

Following the line of argument from the whistle-blowing literature (Miceli and Near, 1992) and some empirical support from the IS literature (Keil et al., 2004; Smith et al., 2001), there should be a direct effect between personal responsibility and willingness to report bad news. Hence, we state the following hypothesis:

H2: A stronger assessment of personal responsibility will be associated with greater willingness to report bad news.

We now turn to the two additional factors that influence the central model.

3.2. Influencing Factors

Prior research has noted that the inclusion of other factors could improve our ability to explain the variance in reporting behavior (Tan et al., 2003). Thus, it is necessary for researchers to identify and test other factors that may influence bad news reporting. In this research, we have identified two such factors that have become increasingly important in today's software development environment: fault responsibility and time urgency. While these two factors have been proposed in the literature, they have not been empirically tested to determine their respective impacts on bad news reporting. In the sections below, we develop specific hypotheses associated with the two factors based on the attribution and risk literature (Hypotheses 3 and 4) and the time urgency literature (Hypotheses 5 and 6).

Fault Responsibility

In establishing the theoretical linkage between fault responsibility and the decision about whether something ought to be reported, we first draw upon the risk literature, which suggests that perceived risk is inversely related to the level of control one has in a given situation (Koonce et al., 2005; March and Shapira, 1987). The perceived risk that we focus on here is the risk that a project will fail. We then apply attribution theory to associate perceived risk with the decision about whether the problem ought to be reported.

[1] Smith et al. (2001) reported path coefficients of 0.49 and -0.43 respectively for the paths from "ought" to "responsibility" and from "responsibility" to "reluctance to report." Keil et al. (2004) reported larger path coefficients of 0.70 and -0.62 respectively for the paths from "ought" to "responsibility" and from "responsibility" to "reluctance to report." All t-values were reported to be significant at the $p < 0.01$ level (one-tailed).

In a troubled software project, individuals in the client organization will feel less control over the project when one or more core modules are being developed by an external vendor, as opposed to being developed internally. Feelings of decreased control can be ascribed to restricted opportunities to assess the true status of the troubled project, limited ability to gauge the probability that discovered problems can be remedied, and limited ability to propose and implement solutions involving modules that are not managed internally. In effect, reduced control means there is less of an opportunity to stop risks from materializing, which gives rise to a higher level of perceived risk. With a heightened perception of risk and fewer options to control it, individuals are more likely to feel that the current situation ought to be reported.

Moreover, since the problems that give rise to the risk can be attributed to an external vendor, individuals are less likely to be held responsible and have little to lose in reporting. Under such circumstances, individuals may be more inclined to perceive that the situation ought to be reported than when the cause of the problem can be attributed internally. In this research, we seek to examine whether fault responsibility affects an individual's assessment that the status ought to be reported within the rubric of the basic whistle-blowing model derived from Dozier and Miceli (1985). Given the above arguments, we state the following hypothesis:

H3: When fault responsibility can be placed on an external vendor, individuals are more likely to assess that negative information ought to be reported.

In order to understand the effect of fault responsibility on an individual's reporting behavior, we draw on attribution theory, which suggests that individuals are likely to engage in causal attribution processing when an event is associated with negative, unexpected, or important consequences (Weiner, 1986). People often go beyond causal attribution, make judgments regarding who should be held accountable for an event, and assign responsibility to a blamed target (Fincham and Jaspars, 1980; Jaspars et al., 1983). In a troubled software project involving an "at fault" vendor, responsibility for the problem is likely to be attributed to the vendor because there is a perception that the vendor should have been able to anticipate and correct the problem. For that reason, when fault responsibility rests with the vendor, the individual will be more likely to report the problem. Without an "at fault" external vendor, individuals may be reluctant to report bad news because they fear being held responsible for having caused the problem and the bad consequences that would likely occur. Thus, the presence of an "at fault" external vendor is hypothesized to affect bad news reporting because it provides a mechanism for causal attribution.

The negative impact of fear of being held responsible (i.e., no opportunity to attribute to others) on an individual's willingness to report bad news is also well recognized in the whistle-blowing literature (Dozier and Miceli, 1985). Therefore, when fault responsibility rests with the vendor, this should remove one of the major factors that inhibit bad news reporting. In such circumstances, individuals can freely report bad news without necessarily exposing themselves to the costs that would normally be associated with blowing the whistle, as they are unlikely to be held responsible for project failure or delay.
Given the above arguments, we state the following hypothesis:

H4: When fault responsibility can be placed on an external vendor, individuals will be more willing to report bad news.

Overall, we have hypothesized that perceived fault responsibility affects the decision about whether or not the bad news ought to be reported and individuals' willingness to report. Unless an individual is specifically in charge of the project (i.e., a project leader), we would not expect him/her to perceive much, if any, personal responsibility to report, regardless of fault responsibility. Since we elected not to focus on project leaders in this particular study, we have not theorized a link between fault responsibility and personal responsibility to report.

Time Urgency

Smith and Keil (2003) have theoretically expanded the basic whistle-blowing model by specifying how

the perception of time urgency can affect the bad news reporting decision. In their theoretical work, they argue that when time urgency is perceived to be high, individuals may be more willing to report bad news than when time urgency is perceived to be low. In addition, the time urgency literature supports their theoretical argument. For example, Billings, Milburn, and Schaalman (1980, p. 305) suggest that without a sense of time urgency, "a problem will be left to the future" and that "the more distant a future negative consequence, the less negative it will seem. The full adverse impact of a negative outcome…is not perceived when it is believed to be far away." Thus, it is reasonable to expect that an individual is more likely to perceive that something ought to be reported in a situation that involves time urgency.

While prior research in the whistle-blowing and time urgency literature suggests theoretically that time urgency is directly associated with the assessment of whether the project status ought to be reported, there has been no empirical research to substantiate this. Thus, we propose to test the following hypothesis:

H5: When higher levels of time urgency are perceived, individuals are more likely to assess that the project status ought to be reported.

According to the time urgency literature, a time-urgent situation may encourage an individual to engage in a Type A behavior pattern, which is characterized by extreme competitiveness, easily aroused hostility, and hypervigilance (Friedman and Rosenman, 1974; Price, 1982). In addition, Furnham, Hillard, and Brewin (1985) find that individuals exhibiting a Type A behavior pattern will assume greater responsibility in uncontrollable situations. Based on these findings, it is plausible that time urgency may exert a direct effect on feelings of personal responsibility.

Taking the above discussions together, we propose that when individuals find themselves in an uncontrollable situation such as a troubled software project, they will perceive higher levels of time urgency and, therefore, will be more likely to feel personally responsible for reporting the project's status. This is especially likely to be the case if they feel that it might help get the project back on schedule or avoid any negative outcomes. Thus, we state the following hypothesis.

H6: When higher levels of time urgency are perceived, individuals are more likely to perceive themselves as having a personal responsibility to report the project's status.

In summary, while prior literature has suggested that both fault responsibility and time urgency may affect bad news reporting behavior, the full nature of the relationships between these variables and the basic whistle-blowing model has not been empirically studied. In this study, we examine empirically the effects of fault responsibility and time urgency on bad news reporting behavior by investigating how these variables exert their influence on the central decision model from whistle-blowing theory shown in Figure 2.

4. Research Methodology

We conducted an experiment to test the causal relationships between constructs in the research model. The experiment involved a two-factor, four-cell design with two exogenous variables (fault responsibility and time urgency) that are manipulated independently at two levels. We developed four treatment scenarios for the four cells as well as the measurement items for assessing those constructs for which we were unable to identify reliable and valid measures. We conducted an iterative series of pilot tests to refine the treatment scenarios and validate the measures. College students at a large university in the southeastern U.S. served as subjects in this process.

4.1. Scenario

Each subject was asked to read a short scenario about a troubled software project called CAPS and to assume the role of a project team member (see Appendix A). Subjects were informed that the CAPS project consisted of two core software modules and that a serious problem had been identified in one of the two modules. The subject's company had promised that the CAPS project would be

installed and fully operational for a key customer within a specified time frame. Fault responsibility and time urgency were manipulated independently to yield four treatment conditions.

For the low fault responsibility manipulation, an external vendor was introduced, and the subject was informed that the faulty module was one that the external vendor was responsible for developing and that he or she would not be responsible for the problematic module. For the high fault responsibility manipulation, there was no external vendor involved, and the subject was informed that both modules were being developed internally and that he or she was responsible for the problematic module. Thus, fault responsibility was manipulated by the presence or absence of an external vendor who could legitimately be assigned responsibility for the faulty module. It is worth noting that whether or not the vendor is portrayed as being "at fault," the subject still had to go through an attribution process to decide if anyone was at fault and if so, whom. This was because the subject's company would be responsible for integrating and delivering the modules even though the defects were in the vendor's module. That is, the subject and his or her company could not be completely free from the responsibility for the defect. In addition, it should be noted that fault responsibility lies along a continuum (e.g., from work one has done personally, to work done by employees working under one's direction, to work done in collaboration with other departments but not under one's direction, and to work outsourced to a vendor), and there are other situations along that continuum that we could have tested. In this study, we chose to test the more extreme positions along this continuum in order to maximize variance, since the effect size would likely be smaller as we move away from the extremes.

We manipulated time urgency by varying the amount of time left between problem identification and project delivery. For the high time urgency manipulation, subjects were informed that the project was to be delivered within one month and that it was urgent that the code defects be resolved soon, or delivery of the project would be delayed. For the low time urgency manipulation, subjects were informed that the project was to be delivered within 12 months and that there was no particular urgency that the code defects be resolved soon, nor much risk that the project would be delayed.

4.2. Procedure

Subjects were randomly assigned to one of the four treatment conditions. The experimental procedure consisted of two parts. In the first part, subjects received a copy of the scenario corresponding to their respective treatment conditions and were asked to read the scenario. In the second part, subjects were asked to complete a questionnaire that measured their willingness to report bad news, their perception of fault responsibility and time urgency, their assessment of whether the information concerning the project ought to be reported, and their assessment of whether they had a personal responsibility to report the information. The questionnaire also included a single item that served as a simple test to determine if a subject had read and comprehended the scenario. Subjects were also asked to provide some basic demographic information.

In order to minimize evaluation apprehension that may result in common method bias, we took the following two steps. First, subjects' answers were made anonymous. Second, subjects were assured that there were no right or wrong answers. This procedural remedy may help make subjects less likely to edit their responses to be socially desirable and consistent with their perception of how the researcher wanted them to respond. In addition, we adopted items that had been previously validated in the literature, and strove to avoid vague or ambiguous terms. Both the treatment scenarios and the questionnaire were designed to have an easy-to-moderate readability level that a tenth grader would understand. We also included both positively and negatively worded items.

4.3. Subjects

A total of 192 undergraduate students enrolled in an introductory information systems course at a large urban university in the southeastern United States were recruited for the study. Thirty-three subjects were dropped from the subject pool because they could not answer a question that was designed to check if subjects had actually read the scenario or not. In two of these cases, the

subjects would have been dropped anyway because they had failed to complete the questionnaire.[2] The mean age of the remaining 159 subjects was 22.8 years, and the mean work experience was 2.6 years. Approximately 60 percent of the subjects had at least one year of work experience. Forty-five percent of the subjects were male, and 55 percent were female.

While the use of student subjects can limit the generalizability of results, students are commonly used in experiments that probe human decision-making (Harrison and Harrell, 1993; Sitkin and Weingart, 1995). Moreover, there is some support in the literature for using student subjects as surrogates for organizational decision makers (DeSanctis, 1989; Remus, 1986), especially when the decision-making task does not require highly specialized domain knowledge. In this study, the subjects were asked to adopt the role of a team member in a software project, not of a leader or a manager. The role of a team member in a software development project was discussed in the software development life cycle (SDLC) topic of their information systems course, and the subjects had an average of 1.7 years work experience as a member of a software development team. Thus, we believe that the subjects were able to appreciate the context of the scenario and could imagine themselves in the role of a software project team member for the purposes of the experiment.

4.4. Measures

Multi-item measures for willingness to report bad news, perceived fault responsibility, and perceived time urgency were developed for this study. We also adopted existing multi-item measures for assessments of whether the project status ought to be reported and personal responsibility to report (Smith et al., 2001). We validated all measurement scales through extensive pilot testing of the experimental materials involving six rounds of experimentation aimed at fine-tuning the scenario, the manipulations, and the instrumentation.

We manipulated the willingness to report bad news using three items that were anchored on a seven-point Likert scale ranging from “very unlikely” (1) to “very likely” (7). All of the other multi-item measures were assessed on a seven-point Likert scale ranging from “strongly disagree” (1) to “strongly agree” (7).

5. Results

5.1. Manipulation Checks

We performed manipulation checks to verify that the fault responsibility and time urgency manipulations were effective, following the procedure used in the literature (Keil et al., 2004; Smith et al., 2001). We created composite measures for perceived fault responsibility and perceived time urgency by averaging the two items for each (see Appendix B). The Cronbach’s alphas (0.75 and 0.95) were deemed adequate for both. Figure 3 shows the mean values for perceived time urgency (1 = low time urgency; 7 = high time urgency) and perceived fault responsibility (1 = low fault responsibility; 7 = high fault responsibility) across the four treatment groups.

As Figure 3 shows, the means move in the expected direction from cell to cell, indicating that the manipulations are effective. We performed a 2x2 multiple analysis of variance (MANOVA) with perceived fault responsibility and perceived time urgency as the dependent variables and the treatment conditions as the independent variables (Table 1).

[2] In order to test the robustness of our results, we re-ran the analysis including those subjects who failed the reading comprehension question. We found that the pattern of results was fully consistent with the results that were obtained when these subjects were dropped from the analysis.

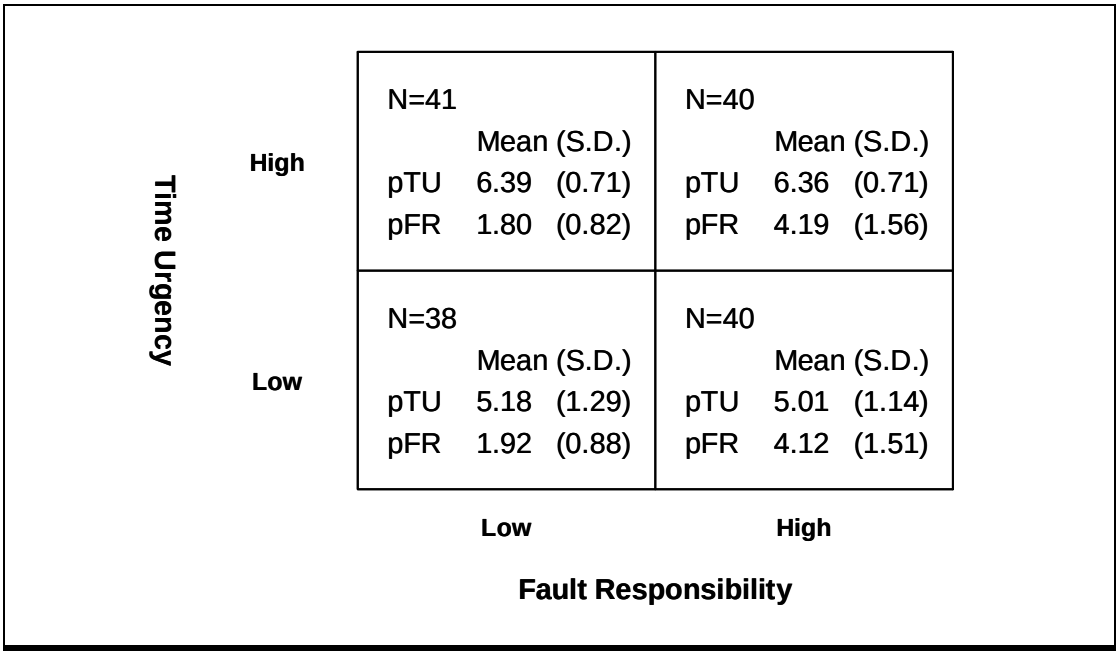

Figure 3. Perceived Fault Responsibility (pFR) and Perceived Time Urgency (pTU) by Treatment Condition

Table 1: Results of 2×2 MANOVA

Dependent Variables / Independent Variables	Perceived Time Urgency		Perceived Fault Responsibility	
	Sum of Squares	F-value (Sig.)	Sum of Squares	F-value (Sig.)
Direct effect: (1) time urgency manipulation	64.287	65.484 (0.000)	0.024	0.015 (0.902)
Direct effect: (2) fault responsibility manipulation	0.407	0.414 (0.521)	208.005	134.941 (0.000)
Interaction effect: (1) × (2)	0.195	0.198 (0.657)	0.332	0.215 (0.643)

It was expected that the main effects of each manipulated variable would be strongly significant on its respective dependent variable (i.e., time urgency manipulation on perceived time urgency and fault responsibility manipulation on perceived fault responsibility), but have no significant relationship with the other dependent variable. As seen in the first and second data rows of Table 1, this was indeed the case. The third row shows that there are no interaction effects. Thus, each manipulation produced the intended effect.

5.2. Partial Least Squares Analysis

We used Partial Least Squares (PLS) analysis (with PLS Graph version 3.0) for measurement validation and for testing the paths hypothesized in the research model shown earlier in Figure 2. We considered PLS analysis appropriate for this study because it places minimal demands on measurement scales and distributional assumptions (Chin, 1998; Fornell and Bookstein, 1982). In

addition, the use of PLS helps us easily compare the results of this study with those of previous bad news reporting studies (Keil et al., 2004; Smith et al., 2001). Before testing the structural model, the measurement model must be established by examining the psychometric properties of the measures. A measurement model connects each construct with a set of indicators measuring that construct, while a structural model represents a network of causal relationships among multiple constructs in the research model.

5.3. Measurement Model

Convergent Validity

To evaluate convergent validity of each factor model, we first examined standardized loadings. The standardized loadings should be greater than 0.707 for the shared variance between each item and its associated construct to exceed the error variance. Table 2 shows that all the loadings exceed this threshold. We also examined Cronbach's alpha, composite reliability, and average variance extracted (AVE). Composite reliability and average variance extracted for each construct were calculated according to the procedure outlined in the literature (Gerbing and Anderson, 1988). The acceptable levels for composite reliability and average variance extracted are 0.7 or higher (Yi and Davis, 2003) and 0.5 or higher (Fornell and Larcker, 1981), respectively. Table 2 shows that these thresholds were exceeded for each construct.

Table 2: Item Loadings and Construct Measurement Properties

Construct	Item	Standardized Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Perceived Time Urgency (pTU)	pTU1	0.923	0.750	0.899	0.817
	pTU2	0.887			
Perceived Fault Responsibility (pFR)	pFR1	0.977	0.948	0.975	0.951
	pFR2	0.973			
Assessment - Status Ought to Be Reported (OTR)	OTR1	0.901	0.777	0.880	0.710
	OTR2	0.853			
	OTR3	0.768			
Assessment - Personal Responsibility to Report (RTR)	RTR1	0.906	0.752	0.862	0.678
	RTR2	0.718			
	RTR3	0.836			
Willingness to Report (WTR)	WTR1	0.956	0.927	0.955	0.875
	WTR2	0.948			
	WTR3	0.902			

Discriminant Validity

We conducted two tests for discriminant validity. First, we calculated each indicator's loading on its own construct and its cross-loading on all other constructs. Table 3 shows that the loadings for the intended indicators for each construct are higher than the cross-loadings for indicators from other constructs. Moreover, each indicator has a higher loading with its intended construct than a cross-loading with any other construct.

Table 3: Loadings and Cross-Loadings

Construct	Item	1	2	3	4	5
1. Perceived Time Urgency (pTU)	pTU1	**.927**	.244	.308	.298	.251
	pTU2	**.882**	.151	.228	.252	.143
2. Perceived Fault Responsibility (pFR)	pFR1	.248	**.977**	.412	.276	.303
	pFR2	.184	**.973**	.375	.258	.275
3. Assessment - Status Ought to Be Reported (OTR)	OTR1	.239	.435	**.901**	.582	.656
	OTR2	.299	.280	**.853**	.596	.499
	OTR3	.221	.300	**.770**	.443	.511
4. Assessment - Personal Responsibility to Report (RTR)	RTR1	.265	.295	.645	**.906**	.545
	RTR2	.221	.109	.427	**.718**	.261
	RTR3	.269	.236	.494	**.836**	.470
5. Willingness to Report (WTR)	WTR1	.150	.193	.479	.394	**.956**
	WTR2	.118	.202	.446	.377	**.949**
	WTR3	.155	.186	.455	.338	**.902**

Second, we compared average variance extracted for each construct with the shared variance between all possible pairs of constructs (Fornell and Larcker, 1981). Table 4 shows that average variance extracted for each construct is higher than the squared correlation between the construct pairs, which indicates that more variance is shared between the latent construct and its block of indicators than with another construct representing a different block of indicators. Thus, it also establishes discriminant validity.

Table 4: AVEs versus Squares of Correlations between Constructs

Construct	Average Variance Extracted	pTU	pFR	OTR	RTR	WTR
pTU	0.82	-				
pFR	0.95	0.05	-			
OTR	0.71	0.09	0.16	-		
RTR	0.68	0.09	0.08	0.42	-	
WTR	0.88	0.05	0.09	0.44	0.29	-

5.4. Structural Model

We assessed the structural model by examining path coefficients and their significance levels. The explanatory power of a structural model can be evaluated by examining the R^2 value of the final dependent construct. The final dependent construct, willingness to report bad news, had an R^2 value of 0.32, indicating that the research model accounts for 32 percent of the variance in the dependent variable. It is also instructive to examine the R^2 values for the intermediate variables in the structural

model. The R^2 value for "personal responsibility to report" and "status ought to be reported" were 0.43 and 0.22, respectively. It is apparent that the R^2 values are sufficiently high to make interpretation of the path coefficients meaningful. In particular, 32 percent of the variance explained in the final dependent variable stands as compelling evidence of the research model's explanatory power, and is comparable to results obtained in prior studies that have examined other factors that influence bad news reporting (Keil et al., 2004; Smith et al., 2001). In particular, Smith et al. (2001) reported an R^2 of 24 percent for a model that investigated the effects of perceived wrongdoing and perceived impact, and Keil et al. (2004) reported an R^2 of 38 percent for a model that investigated the effects of perceived information asymmetry and perceived organizational climate.

We computed path coefficients in the structural model with the entire sample, and employed the bootstrapping method (with 500 resamples) to obtain the t-values corresponding to each path (see Figure 4). The acceptable t-values for two-tailed tests are 1.96 and 2.58 at the significance levels of 0.05 and 0.01. The assessment of whether the status ought to be reported had a direct positive effect on the assessment of personal responsibility to report, supporting H1 (β = 0.61, p < 0.01). The assessment of personal responsibility to report had a direct positive effect on the willingness to report bad news, which means that subjects were more willing to report when they perceived themselves to be personally responsible for reporting the bad news. Thus, H2 is supported (β = 0.49, p < 0.01). Perceived fault responsibility had an indirect positive effect through the assessment of whether the status ought to be reported (β = 0.35, p < 0.01) as well as a direct positive effect on the willingness to report bad news (β = 0.16, p < 0.05), thus supporting both H3 and H4. Perceived time urgency had a positive effect on the assessment of whether the status ought to be reported (β = 0.22, p < 0.01) and on the assessment of personal responsibility to report (β = 0.12, p < 0.05), thus supporting both H5 and H6.

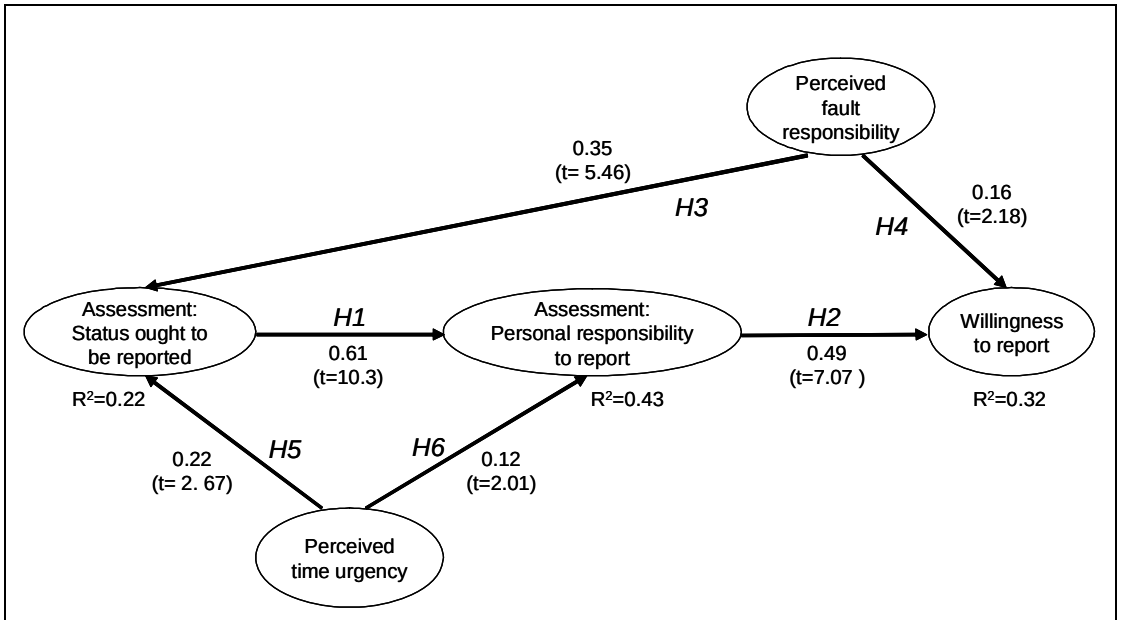

Figure 4. Structural Model

5.5. Assessing Common Method Bias

In order to examine the existence of common method bias, we conducted a latent variable approach of adding a first-order factor with all of the measures in the theoretical model as indicators (Podsakoff et al., 2003). A common method factor was, therefore, added in the research model (Liang et al., 2007), and the results demonstrate that the average substantively explained variance of the indicators

is 0.786, whereas the average method-based variance is 0.017. The ratio of substantive variance to method variance is 46:1. Thus, common method bias is unlikely to be a serious concern in this study.

6. Discussion and Implications

Before discussing the implications of our study, we note that all studies have limitations, and ours is no exception. While the experimental approach provides a highly controlled environment for hypothesis testing, it does have limitations. First, our experiment is based on role playing scenarios. In crafting the scenario, we tried to be as realistic as possible while controlling extraneous sources of variance and providing only the essential information needed for role playing and decision making. Clearly, there are many organizational and political factors that may also influence an individual's willingness to report bad news. Second, the decision choice presented to the subjects in our experiment represents a necessarily narrow and simplified view of the options available to one who is faced with the decision of whether and how to report a troubled project's status. In this study, we framed this situation as a binary choice of whether or not to report the project status to his or her boss. Clearly, the team member can make other choices in response to such a situation, such as working overtime to solve the code defects, enlisting the aid of other team members, trying to solve the problem together with the vendor, or deciding to report through some other channel. Third, we have measured subjects' self-reported behavioral intentions rather than actual behaviors. There is no guarantee that subjects would actually behave as they have indicated. Finally, using student subjects can be seen as a limitation. While there is some support in the literature for using student subjects as surrogates for employees in the organizational decision-making setting, one must do so with caution. In this study, we conducted a post-hoc test to check the reporting decision difference between two groups: those with work experience as a member of a software development project team (n = 50) and those with no experience (n = 109). The mean willingness to report for those in the "with experience" group was 5.32 (S.D. = 1.44), while the mean willingness to report for those in the "no experience" group was 5.13 (S.D. = 1.63). A one-way ANOVA indicated that this difference was not significant (p = 0.49).

Despite these limitations, the strong relationships among the constructs in our model and its explanatory power shed new light on some important factors that can influence the willingness to report bad news. Thus, we believe that the study represents a significant contribution to our understanding of this phenomenon.

6.1. Implications for Research

This study demonstrates that perceived fault responsibility and perceived time urgency can both have significant effects on an individual's willingness to transmit bad news. Fault responsibility has both a direct effect on an individual's willingness to report and an indirect effect through the assessment of whether the status ought to be reported. In our experiment, we tested the extreme conditions of fault responsibility, and we used the rubric of an outside vendor in order to test one end of the fault responsibility continuum. It is our speculation that the differences we observed between the outside vendor scenario and the one involving the subject being responsible for the code defects might have been reduced if the comparison had been between another department responsible for development (internal to the organization) and an external vendor.

Time urgency affects both an individual's assessment of whether the project status ought to be reported and an individual's assessment of whether he or she has personal responsibility to report. Thus, time urgency influences behavior in an indirect fashion by affecting an individual's perception of his or her situation (Hambrick and Mason, 1984; Thomas et al., 1993). Waller et al. (2001) develop theoretically derived propositions describing how individuals' deadline perceptions affect their deadline-oriented behaviors under deadlines with different time horizons. Our results are consistent with the findings of Waller at al. (2001) and suggest that time urgency affects an individual's decision-making in two ways: through his or her assessments of (1) whether the status ought to be reported, and (2) whether there is personal responsibility to report.

There has been some controversy over the existence of a direct linkage between time urgency and

willingness to report. Many studies in the decision-making literature suggest that an individual's sense of time urgency significantly affects decision-making processes. Some of them show that people may change information-processing strategies to cope with the situation as their sense of time urgency increases (Christensen-Szalanski, 1980; Smith et al., 1982; Zakay, 1985). For example, in a time-urgent situation, a decision maker may speed up information processing (Ben Zur and Breznitz, 1981; Payne et al., 1988), or reduce the amount of information to be processed (Wright, 1974). However, the effect of these changes in information processing may or may not have direct influence over an individual's willingness to report bad news. For some individuals, the increased time urgency may result in a more focused search for a solution to the problem and a delay in reporting the bad news (under the hope that the problem can be resolved). For other individuals, the increased time urgency may cause them to perceive the situation as hopeless, causing them to give up trying to solve the problem (Durham et al., 2000) and accelerating their willingness to report the bad news. For this reason, we did not posit a direct linkage between time urgency and willingness to report. We did, however, perform a post-hoc test to determine if there was such a linkage, but did not find it to be statistically significant.

Finally, this study provides further validation of the central decision-making model in a different context. Thus, researchers can safely build upon this model as a foundation for future work in the area of bad news reporting.

6.2. Implications for Practice

The significance of both fault responsibility and time urgency hold important implications for practice. Our study suggests that when fault responsibility rests with an outside vendor, this raises an individual's perception that information ought to be communicated and also directly influences one's willingness to report bad news. Thus, when project status information is free-flowing between clients and vendors, managers in the client firm can expect that their employees will be more willing to report bad news because there is an opportunity to assign responsibility to an outside vendor. Given the growth in outsourced projects, this suggests that with adequate monitoring of vendors, client firm employees will find it easier than ever before to report problems. While managers may be in a position to use this in a way that promotes bad news reporting, they should do so with caution, as it is usually more productive to identify and correct problems than it is to assign blame. Improperly handled, such bad news reports can adversely influence the relationship between client and vendor.

It is important to keep in mind that the results obtained in this study are based on a hypothetical project setting in which an employee in the client organization has already discovered glitches in the vendor's module. This may not be characteristic of the typical vender-client relationship due to information asymmetry. When the vendor is able to conceal information regarding the true status of the project and does not fully share this with the client, we have a condition of information asymmetry. In these situations, the client will be less likely to detect problems with the vendor's software, and we would not expect to observe the effects seen in this study.

From the client's perspective, it can be challenging to identify the true status of a troubled project when the vendor is withholding private information concerning the project. In our hypothetical scenario, the client became aware of the problem through software testing. While testing is one approach to dealing with information asymmetry, another avenue is to better manage the contract by employing relational contracting (Milgrom and Roberts, 1992), which has been recognized as an important element in successful outsourcing initiatives (Kumar and Palvia, 2002; Richmond and Seidmann, 1993). In relational contracting, the parties involved "do not agree on detailed plans of action but on goals and objectives, on general provisions that are broadly applicable, on the criteria to be used in deciding what to do when unforeseen contingencies arise, on who has what power to act and the bounds limiting the range of actions that can be taken, and on dispute resolution mechanisms to be used if disagreements do occur" (Milgrom and Roberts, 1992, p. 131).

In terms of time urgency, the results of our study indicate that this affects both an individual's assessment of whether the project status ought to be reported and whether he or she has a personal

responsibility to report. Thus, time urgency has an indirect effect on an employee's willingness to report bad news. This is important in the organizational context because it suggests that managers can increase individuals' willingness to report by emphasizing the time urgency associated with a given project. The time urgency that was manipulated in this study had to do with the narrow span of time before the negative impacts associated with a project failure would be experienced by the customer. It is possible, therefore, that managers can promote bad news reporting from their employees simply by pointing out that there is a narrow window of time to correct defects before the project is delivered and that the company's reputation rests on a positive customer experience. It is unclear, however, whether time urgency that is created through deadlines and associated pressures to complete work on time would have the same result.

In addition to the factors that were manipulated in this study, there are a number of things that managers can do that may encourage bad news reporting. These include creating communication channels for employees to air concerns with their supervisors (Morrison and Milliken, 2000), fostering trust within supervisor-subordinate relationships, being responsive to employee concerns that are expressed, and creating an organizational climate that encourages rather than punishes bad news reporting.

7. Contributions and Directions for Future Research

Smith and Keil (2003) argue that an individual's assessment of whether or not the status ought to be reported is likely to be associated with the individual's perceptions of the project situation. They expand the basic whistle-blowing model theoretically by suggesting additional constructs that may affect perceptions of a project situation, such as risk, time pressure, level of behavioral immorality, and information asymmetry. Some IS research has empirically tested these additional constructs' effects on the central decision-making model. For example, Smith et al. (2001) empirically examine the level of behavioral immorality and risk, and Keil et al. (2004) test information asymmetry. These studies confirm the importance of these three factors on the individual's assessment of whether or not the status ought to be reported, which lends support for Smith and Keil's (2003) theoretical model. Our study empirically examines the effect of time urgency as a surrogate for time pressure, which is the one factor that had not been previously tested among the four factors in their theoretical model. Our results provide evidence that time urgency does affect an individual's assessment of whether or not the status ought to be reported. Thus, one major contribution of our study is to complete the empirical testing of Smith and Keil's (2003) theoretical model.

To date, there has been comparatively little research on the role or impact of time in the IS context. Thus, another contribution of our study is in advancing research on time within the IS community. Time, which has different aspects including time urgency, has been studied in the psychology discipline as a well-known factor that can influence human behavior. In addition, time has recently received much research attention in the IS field (Saunders and Kim, 2007) as well as in the management field (Fried and Slowik, 2004; Waller, 2004; Wright, 2002). While we focus on only one aspect of time, namely time urgency, our study provides insight on how an individual's time perception affects his or her IT project reporting. Given the increasing emphasis on the speed of software development, time urgency is likely to play a greater role in bad news reporting.

This study also demonstrates the effect of fault responsibility on the willingness to report bad news and clearly establishes that fault responsibility has both a direct and indirect influence on willingness to report. Given the increasing use of outside vendors in IT projects, fault responsibility can also be expected to play an increasing role in bad news reporting.

We believe that this research can contribute to the body of knowledge on IT project failure. This study provides strong evidence that fault responsibility and time urgency can be influential factors in the decision about whether or not to report bad news. If managers can make use of these results by creating an environment that encourages bad news reporting (by keeping fault responsibility low and maintaining a sense of time urgency), they may be able to reduce the incidence of project failure.

While our study supports the effect of time urgency proposed by Smith and Keil (2003) and also shows how fault responsibility fits into the rubric of the basic whistle-blowing model derived from Dozier and Miceli (1985), there may be other factors (e.g., severity of the problems facing a project or the impacts that a failure might have) that can also affect perceptions of the project situation. These, too, may influence willingness to report bad news in a troubled software project. Theoretically identifying and empirically testing these factors are worthwhile goals for future research and may allow further extension of the basic whistle-blowing model in the context of IT project management.

The scenarios for this study were crafted around an IT project context in which the level of perceived fault responsibility was manipulated by the presence or absence of a vendor. For purposes of experimentation, we have examined extreme conditions in order to maximize variance. As noted earlier, fault responsibility lies along a continuum, and in future studies it may be fruitful to examine other situations along this continuum (e.g., the case of an internal department other than an outside vendor that bears some responsibility).

Finally, while time urgency is a situational variable, an individual's perception of time urgency is likely to be affected by the individual's personal characteristics such as sensitivity to time. In this study, we did not measure the subjects' personal characteristics and assumed that subjects had a similar level of sensitivity to time urgency. Future research may be able to address this individual-difference issue of time urgency. A more nuanced approach to the study of time urgency that takes into account such individual differences in time sensitivity may allow us to better understand why and how time urgency affects individuals' decision making in the context of reporting bad news.

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Appendix A. Experimental Scenarios and Instructions

INSTRUCTIONS: The business case that follows is part of a study that examines business decision-making. Please take a few minutes to read over the case and to answer the questionnaire that follows. There are no right or wrong answers.

Software Solutions Corporation

You work for Software Solutions Corporation (SSC), a U.S. computer software company that specializes in software solutions designed to meet specific customer needs.

You are working on a project called CAPS which consists of 2 core modules. SSC has promised a customer that **the CAPS system will be installed and fully operational 1 month from now.**

Before you joined the project, SSC had already contracted with an external software company called IN-TECH to develop and supply one of the core modules. This is the first time that SSC has ever used IN-TECH as a supplier and **the contract clearly specifies that IN-TECH is responsible for any project delays resulting from code defects in their module. In other words, you will not be blamed for any project delays that can be traced to IN-TECH's module.** Last week, you began working to integrate the 2 core modules. However, **you discovered major code defects in IN-TECH's module**.

Since the CAPS system will be installed in **1 month,** it is **urgent** that the code defects be resolved soon, or delivery of the project will be delayed.

At this point, you are now wondering whether or not you should **immediately** report the bad news to your boss. If you report the bad news and the project is delayed, you could lose your job **if you are found to be responsible for the delay**.

The above scenario represents the treatment used to manipulate high time urgency and low fault responsibility. The treatment for high time urgency and high fault responsibility is identical except for the third paragraph, which the following paragraph is substitute for:

Last week, you began working to integrate the 2 core modules. However, **you discovered major code defects in one of the modules that was YOUR responsibility**.

The treatments for low time urgency are identical to the above scenarios except that the second and fourth paragraphs of the scenarios are replaced with the following paragraphs:

You are working on a project called CAPS which consists of 2 core modules. SSC has promised a customer that **the CAPS system will be installed and fully operational 12 months from now.**

Since the CAPS system will not be installed for another **12 months**, there is **no particular urgency** that the code defects be resolved soon, nor is there much risk that the project will be delayed.

Appendix B. Constructs and Measures

Willingness to Report Bad News

Variable	Mean	S.D.	Item Wording (1 = very unlikely; 7 = very likely)
WTR1	5.31	1.66	Please indicate your willingness to **IMMEDIATELY** (i.e., RIGHT NOW) report the bad news to your boss.
WTR2	5.14	1.61	At this time, how likely are you to go directly to your boss by yourself to report the bad news concerning the project's status?
WTR3 (reversed)	2.87	1.80	Please indicate how likely it is that you would avoid telling your boss the bad news.

Assessment of Responsibility to Report

Variable	Mean	S.D.	Item Wording (1 = strongly disagree; 7 = strongly agree)
RTR1	5.64	1.20	I believe that I have a personal responsibility to make more information about the status of the CAPS project known to my boss.
RTR2 (reversed)	2.63	1.50	I believe that it is not my responsibility to make more information about the status of the CAPS project known to my boss.
RTR3	5.44	1.25	I believe that it is my personal duty to tell my boss about the project's status.

Assessment of Whether Something Ought to Be Reported

Variable	Mean	S.D.	Item Wording (1 = strongly disagree; 7 = strongly agree)
OTR1	5.73	1.14	I believe that something should be done to make more information about the status of the CAPS project known to my boss.
OTR2 (reversed)	2.41	1.32	I don't believe that it really matters whether more information about the status of the CAPS project is made known to my boss.
OTR3	5.43	1.62	Even if it is not me, I believe someone should tell my boss about the status of the CAPS project.

Perceived Time Urgency

Variable	Mean	S.D.	Item Wording (1 = strongly disagree; 7 = strongly agree)
pTU1	5.43	1.53	I believe that this matter is of considerable time urgency given the schedule under which CAPS is to be installed.
pTU2	6.06	1.05	I believe that the problems must be solved quickly because of the CAPS installation schedule.

Perceived Fault Responsibility

Variable	Mean	S.D.	Item Wording (1 = strongly disagree; 7 = strongly agree)
pFR1 (reversed)	3.03	1.74	If I reported the problem to my boss, I could show that the problem was not caused by me.
pFR2 (reversed)	2.99	1.72	If I reported the problem to my boss, I could show that the code defects were not my fault.

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