PSYCHOLOGICAL REACTANCE AND USER WORKAROUNDS. 
A STUDY IN THE CONTEXT OF ELECTRONIC MEDICAL RECORDS IMPLEMENTATIONS. 

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Abstract 
User workarounds are a growing problem in many complex system implementations including healthcare settings. Anecdotal evidence from the healthcare informatics as well as the information systems (IS) fields suggest that many system users are employing workarounds in order to bypass the system’s functionality. Yet, little theory exists on the topic. This study proposes a theoretical model to investigate why user workarounds occur based on psychological reactance, protection motivation and technology threat avoidance theories. We view user workarounds as a response to situational reactance and coping appraisals with respect to electronic medical record systems (EMR). Situational reactance is based on EMR system appraisals, perceived EMR threat to freedom, threat appraisal, trait reactance and job time constraints. Together, these elements form the nomological net surrounding the important phenomenon of user workarounds. We propose to test our model using a multi-method approach. Implications for theory and practice are discussed. 

Keywords: Workarounds, technology avoidance, protection motivation, reactance, EMR, healthcare.
INTRODUCTION

Users’ behaviors such as acceptance of new systems (Venkatesh et al., 2003) or resistance to IS implementations (LaPointe & Rivard, 2005) have been a mainstream topic of interest to IS researchers for decades. One fairly overlooked phenomenon is user workarounds. Workarounds are “informal temporary practices for handling exceptions to workflow” (Kobayashi et al. 2005, p.1561). They are non-compliant user behaviors vis-a-vis the intended system design which may go as far as to bypass the formal systems entirely (Koopman & Hoffman, 2003). In certain contexts such as healthcare, such behaviors can have serious “unintended consequences” (Campbell et al. 2006) such as the wrong medication dose being administered to a patient, the wrong patient being treated or, medications not being administered at the right time (Koppel et al. 2008). Currently, most medical informatics (and IS) literature on this topic is rather descriptive and it is not based on theory. For instance, the medical informatics literature documents a variety of user workarounds such as (a) clinical users tend to omit important process steps (e.g. users do not review the electronic medical administration record – EMAR to verify current medications), (b) steps are performed out of sequence (e.g. users document medication administration before medication is administered) and (c) users perform unauthorized process steps (e.g. patient ID bar code placed on another object –not on patient—and user scans it) but it does not theoretically explain the reasons why workarounds occur. Such behaviors can lead to “new types of errors” (Campbell et al. 2006). For instance, system users may enter clinical data “where it might fit” or in the ”miscellaneous” section of the electronic chart as opposed to the correct data entry location (Campbell et al. 2006, p. 552). Thus, a paradox arises: the goal of EMR is to reduce medical errors (as proposed by the Institute of Medicine in a 2001 report); however, new types of errors may arise when users misuse EMR and engage in workarounds.

Under these circumstances, it is important to address the following research question: “What factors can theoretically explain user workaround behaviors with respect to complex systems such as EMR?” Answering this question will allow researchers to develop theory around this relatively new phenomenon. Our goal is to propose a theoretical model of user workarounds based on elements from the psychological reactance theory (Brehm, 1966,1989; Shen & Dillard, 2005) and protection motivation and threat avoidance theories (Rogers, 1975, 1983; Liang & Xue, 2009). This study is organized as follows: we first present the three theoretical bases used in our study, then we present our research model and hypotheses followed by a brief description of the proposed methodology. The paper concludes with potential contributions of this work to both theory and practice.

2 Theoretical Bases

2.1 Psychological Reactance Theory

The psychological reactance theory has been originally proposed by Brehm (1966) to explain why individuals respond negatively to any force that restricts their freedom (e.g. introduction of a new complex system). The theory poses that individuals become motivationally aroused by a threat to or elimination of a behavioral freedom and thus experience psychological reactance (Brehm, 1989). Psychological reactance was defined as “a motivational state directed toward the re-establishment of the threatened or eliminated freedom” (Brehm, 1966 p.15-16). The magnitude of reactance is determined by (a) the importance of the threatened (or eliminated) behavioral freedom to the individual and (b) the magnitude of the exercised influence (Brehm, 1966). Further, Brehm (1966; 1989) postulates two manifestations of reactance namely (a) actual attempts to restore the lost or threatened freedom and (b) a stronger individual attractiveness towards the restricted alternative. Thus, the reactance theory deals with opposing individual behavior in face of threatened behavioral freedoms. Originally, Brehm (1966, 1989) described reactance as a psychological state produced in response to a situation. Currently, the literature on psychological reactance draws distinction between “situational reactance” (also called “state reactance”) which is situation-specific and enduring for a relatively short period of time and “trait reactance” which is a stable personality trait that captures
one’s general disposition to reactance (Miller et al., 2007). Reactance theory has primarily been applied in marketing and advertising to explain reactance against promotional influence (e.g. Wendlandt & Schrader, 2007) as well as health communication and interpersonal communication (e.g. Dillard & Shen, 2005; Miller et al., 2007) to explain how individuals are likely to respond negatively (e.g. the opposite way) when their perceived freedoms are threatened by persuasive health messages.

### 2.2 Protection Motivation and Technology Threat Avoidance Theories

Originally, protection motivation theory (Rogers, 1975) postulated that the combination of two cognitive processes namely threat appraisal and coping appraisal elicits a person’s protective motivation, resulting in the applicable compliant adaptive responses such as behavioral intentions to engage in a behavior (e.g. a health message such as “don’t smoke, it will kill you” would elicit a behavioral intention not to smoke). In the context of IS, this theory has been used to conceptually explain non-compliant user behaviors such as technology avoidance (Liang & Xue, 2009). These authors have proposed the “technology threat avoidance theory.” The core of both protection motivation theory (PMT) and technology threat avoidance theory (TTAT) is that the combination of two cognitive processes namely threat appraisal and coping appraisal elicits a person’s adaptive protective behaviors. Perceived threat appraisal, refers to the extent to which an individual perceives an IS as dangerous to him/her (Liang & Xue, 2009) and it’s shaped by the perceived vulnerability (or susceptibility) to the threat and perceived severity of the threat. The coping appraisal process involves an individual’s assessment of his/her ability to cope with and avoid the perceived threat (Liang & Xue, 2009). In line with PMT and TTAT, self-efficacy, response-efficacy and response cost are three mechanisms for coping appraisals. We adapt these three constructs to our context of study, namely user workarounds as the coping mechanism. Thus, we refer to workaround self-efficacy, workaround response-efficacy and workaround response-cost. Workaround self-efficacy refers to an individual’s subjective belief that he or she is (or is not) capable of performing the workaround behavior (Bandura, 1977). Workaround response-efficacy reflects an individual’s subjective assessment that the workaround coping strategy used to safeguard against an IS threat can effectively work to avoid the threat of a new IS (Liang & Xue, 2009). Workaround response-cost involve an individual’s physical and cognitive efforts such as time, money, inconvenience and comprehension (Weinstein, 1993) used to apply the adaptive coping strategy (engage in workarounds). In IS, PMT has been used in various contexts including healthcare (Chen & Lee, 2008) to explain adoption of computerized physician order systems (CPOE) at an organizational level. However, both PMT and TTAT have not been widely used to explain the growing and important phenomenon of workaround behaviors.

### 3 Research Model and Hypotheses

Based on the three theories presented above, we formulate our research model (see Figure 1 at the end of this section). Our theoretical model aims to account for various factors that could potentially explain why users fail to conform to the “prescribed rules of engagement” with a system (Kobayashi et al. 2005). In the following paragraphs, we propose hypotheses related to various direct and indirect influences on technology avoidance or EMR workarounds.

One first important determinant of EMR situational reactance is EMR users’ system appraisal. When interacting with an EMR system, clinicians may form two important perceptions related to the system itself: its ease of use and usefulness to the clinical work (Venkatesh et al., 2003). To the extent EMR are perceived as being easy to use and useful to the clinical task at hand, EMR users should experience less EMR situational reactance (e.g. less anger and negative cognitions with respect to EMR (Dillards & Shen, 2005). Wendlandt & Schrader (2007) also found that the higher the perceived utility of a consumer loyalty program, the lower the reactance against it. In the same vein, we propose:

**H1: System appraisal as manifested by its perceived usefulness and ease of use will be negatively related to EMR situational reactance**
**H1a:** System ease of use appraisal will be negatively related to EMR situational reactance proneness.

**H1b:** System usefulness appraisal will be negatively related to EMR situational reactance proneness.

One major postulate of the psychological reactance theory is that when confronted with a threat to reduce or eliminate their freedom, individuals will develop reactance (Brehm 1966, 1989). EMR systems constitute disruptive innovations; research in medical informatics showed that physicians reported loss of professional autonomy when “CPOE systems prevented them from ordering the types of tests or medications they preferred, or forced them to comply with clinical guidelines they did not embrace, or limited their narrative flexibility through structured rather than free-text clinical documentation” (Campbell et al., 2006, p.552). Under these circumstances, EMR may constitute a threat to clinicians’ freedom to document or retrieve clinical data the desired way. The perceived threat to freedom is the immediate presumed cause of situational reactance (Brehm & Brehm, 1981). Various studies found support for this claim (Shen & Dillard, 2005; Quick & Stephenson, 2007). Thus, we hypothesize the following:

**H2:** EMR’s threat to freedom will be positively related to EMR situational reactance.

PMT and TTAT (Rogers, 1983; Liang & Xue, 2009) posit that threat appraisals prompt a person to take protective measures. Thus, once an individual becomes aware of a threat (e.g. EMR), he or she will form beliefs as to the probability of a threat occurring (perceived threat susceptibility) as well as the seriousness of the threat (perceived threat severity). Based on psychological reactance theory, we know that threats may not directly trigger adaptive behaviors but in turn, may cause reactance (Dillard & Shen, 2005; Quick & Stephenson, 2009). As previously noted, situational reactance is a direct response to a threat (Brehm, 1989). Thus, if a clinician makes a subjective probabilistic assessment that he or she is likely to be exposed to the unfavorable threat (e.g. EMR) and the potential EMR consequences are severe (e.g., taking longer to complete a round of patient check-ups), the clinician will present stronger situational reactance. Various authors (e.g. LaPointe & Rivard, 2005) show that clinicians may respond to EMR mandates with resistance. Thus, we propose the following hypotheses:

**H3:** EMR’s threat appraisal will be positively related to EMR situational reactance.

**H3a:** Perceived susceptibility of the EMR threat will be positively related to EMR situational reactance.

**H3b:** Perceived severity of the EMR threat will be positively related to EMR situational reactance.

Trait reactance is a unique individual attribute that refers to the reactance proneness people exhibit across situations (Miller et al., 2007). This general reactance proneness can exacerbate people’s reactance across situations; presumably also in the situation where clinicians’ freedoms are threatened by a new EMR system. According to this view, in the context of EMR implementation, a clinician with high trait reactance will develop higher EMR situational reactance given the stronger predisposition. This view had received support in reference disciplines. For example, recent research in the field of persuasive communication and marketing also shows that trait reactance influences situational-specific reactance (Dillards & Shen, 2005; Wendlandt & Schrader, 2007). Based on the above, we propose H4:

**H4:** Trait reactance will be positively related to EMR situational reactance.

Several authors (e.g. Chiasson & Davidson, 2005) urged IS researchers to take the industry seriously in IS research. To this extent, we focus on time pressures as an important job characteristic in healthcare settings. In typical healthcare environments, clinical staff works under severe time constraints and conflicting work demands. In fact, time is one of the most precious resources a clinician has (Ilie et al., 2007). Interacting with EMR may add additional time to a clinician’s already busy schedule, by forcing him or her to respond to excessive system alerts or and to enter new information not previously required (Campbell et al., 2006). Thus, to the extent a clinician is faced with increased time constraints, he or she may experience higher EMR situational reactance. H5 reflects this logic:

**H5:** Job time constraints will be positively related to EMR situational reactance.
PMT and TTAT (Rogers, 1975; Liang & Xue, 2009) posit that coping appraisal mechanisms are needed in order to elicit a person’s protective response such as technology avoidance behavior. In order to engage in workaround behaviors, clinical users need to feel capable of performing the workaround behavior (workaround self-efficacy). They also need to be able to subjectively assess whether the selected workaround strategy would effectively work in their context (workaround response-efficacy) as well as evaluate any costs such as time, money, inconvenience and comprehension (Weinstein, 1993) related to engaging in the adaptive coping strategy. To the extent clinical users exhibit higher levels of workaround self-efficacy and response-efficacy, they would be more likely to engage in coping strategies (such as workarounds). In addition, to the extent clinical users believe that employing a workaround strategy would be costly in terms of various tangible and intangible resources, they would be less likely to engage in coping strategies. This idea is supported across various studies (Chen & Lee, 2008; Liang & Xue, 2009). We then propose:

**H6:** EMR coping appraisals will be associated with EMR workaround behaviors.
- **H6a:** Workaround self-efficacy will be positively related to EMR workaround behaviors.
- **H6b:** Workaround response-efficacy will be positively related to EMR workaround behaviors.
- **H6c:** Workaround response-cost will be negatively related to EMR workaround behaviors.

Psychological reactance theory deems that one possible outcome of reactance is individuals’ active attempts to restore the lost or threatened freedom (Brehm, 1989). Workarounds could constitute one way for clinicians to attempt to restore their freedom with respect to EMR (i.e., cope with the situation). Trying to bypass the system or change the way one interacts with EMR by deviating from prescribed interactions may potentially be the only viable coping responses of physicians. More severe measures, such as full rejection and refusal to use the system may be impossible to perform (especially if EMR use is formally mandated) and carry severe consequences (e.g., inability to practice at the respective hospital). Thus, we propose our last hypothesis:

**H7:** EMR situational reactance will be positively related to EMR workaround behaviors.

Figure 1 below summarizes our hypotheses formulation and shows the proposed theoretical model.

**Figure 1:** Psychological Reactance and User Workarounds in Complex EMR Implementations.
4 Method

In order to test the research model and hypotheses, we will use a mixed method approach in two stages (1) conduct qualitative interviews and (2) empirically test the proposed model using a field survey approach. In stage 1 of the research, we conducted interviews with 17 physicians and 15 nurses practicing in two large hospitals in the Midwest U.S. They were asked two main questions regarding (a) whether they employed any methods to bypass the current EMR system and (b) what were the reasons for such behaviors. Stage 1 of this research is complete and data is currently being analyzed. In stage 2 of this research, we will administer an anonymous survey to clinicians practicing in a large hospital on the East Coast U.S. Negotiations are currently in progress with the site. The survey instrument has been developed and the survey will be administered on-line. A power analysis will be performed according to procedures recommended by Cohen (1988) in order to estimate the minimum sample size. Emails will be sent with a link to the survey to all practicing physicians and nurses. Three reminders to complete the survey will be provided in order to increase response rate. In all correspondence, we will point out that individual responses are confidential and will not be shared. Data will be analyzed using SmartPLS 2.0 (Ringle et al. 2005). Results from this research will be discussed in a full research paper by blending results from study 1 and study 2.

5 Theoretical and Practical Contributions

Our main theoretical contribution is development of a solid model that explains why organizational users work around complex enterprise systems in the healthcare field. Based on our model, workarounds occur when system users experience situational reactance and at the same time, they believe they are capable in engaging in workaround behaviors at a minimum cost. Our model also includes likely antecedents of situational reactance based on system appraisal, threat to freedom, threat appraisal, trait reactance and job time constraints. Together, these elements form the nomological net surrounding the important phenomenon of user workarounds. Practically, by accounting for various factors in our model, managers can realize that during complex system implementations, they need not only to manage the system itself but also the inherent human trait reactance. Ultimately, managing user workarounds is a necessary endeavor in organizations in order to realize benefits from EMR investments and prevent new types of errors that may arise when individuals misuse the technology (Campbell et al., 2006).

6 Conclusion

Complex EMR implementations projects are currently underway throughout the entire American healthcare system as well as globally with the goal to reduce dangerous medical errors. Paradoxically, new types of errors may arise from misuse of such systems. Our research makes theoretical predictions of user workarounds in healthcare settings while at the same time, it helps managers understand this phenomenon such that to better handle system implementations.

7 References


