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Understanding User Resistance to Information Technology: Toward A Comprehensive Model in Health Information Technology

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UNDERSTANDING USER RESISTANCE TO INFORMATION TECHNOLOGY: TOWARD A COMPREHENSIVE MODEL IN HEALTH INFORMATION TECHNOLOGY

A Dissertation

by

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ABSTRACT

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The successful implementation of health information systems is expected to increase legibility, reduce medical errors, boost the quality of healthcare and shrink costs. Yet, evidence points to the fact that healthcare professionals resist the full use of these systems. Physicians and nurses have been reported to resist the system. Even though resistance to technology has always been identified as key issue in the successful implementation of information technology, the subject remains largely under-theorized and deficient of empirical testing. Only two proposed model have been tested so far. Hence, though user resistance is clearly identified and defined in literature, not very much is known about its antecedents; and about *how* and *why* it comes about.

This study seeks therefore, to fill this gap. If organizational change managers must go past the hurdle of under-utilized systems, low productivity and the high implementation costs associated with them, a clear understanding of the very nature of resistance is important. The following questions are investigated: (1) why do healthcare personnel resist health information technology? (2) What are the antecedents of *perceived threats* to health information technology? And, (3) does user resistance vary across healthcare professions?

The study utilizes the theory of psychological reactance, the cognitive dissonance theory, the extended technology acceptance model and other relevant theories to build on the Lapointe

and Rivard (2005) resistance framework. The resulting theoretical model is further tested empirically using primary data. Partial Least Squares technique will be used to analyze data and findings would be discussed. This work is expected to contribute to both our understanding of the resistance theory—through the extension of current theory—as well as provide useful tools for change practitioners to mitigate the phenomenon and improve electronic health records implementation outcomes.

DEDICATION

I dedicate this entire work, first and foremost, to God Almighty who led me to, and guided me through my doctoral studies. Thank you for the strength, wisdom and guidance that You provided me. Your presence inspired and encouraged me to believe for infinite possibilities. You are my rock.

Second, I dedicate this piece to my wife and our three lovely children. Claudia Ngafeeson, my ever-loving wife, you prayed for me, believed in me, encouraged me, and endured me through the frustrating moments. I could never thank you enough! Triumph, my daughter, you never seized to be concerned that I finish my work on time. Lamb and Madison, my loving sons, thank you for the encouraging smiles you gave me in those tiring moments. You all made me feel supported. I am equally thankful to my parents, Ms. Miriam Ngafeeson and Mr. Kevin Ngala, as well as my mother-in-law, Mrs. Rose Siben. You all were such a great support.

Last, but certainly not least, I dedicate this research to my loving pastors: Eliud and Cathy Garcia. Words would not be enough to express my deepest gratitude and respect for your love and support. Thank you for providing the right spiritual environment under which I could easily thrive. Thank you.

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CHAPTER I

INTRODUCTION

Overview

The successful implementation of health information systems is expected to increase legibility, reduce medical errors, boost the quality of healthcare and shrink costs (Jha *et al.* 2009; Blumenthal and Tavenner, 2010). Yet, evidence points to the fact that healthcare professionals resist the full use of these systems. Physicians, nurses, staff, and even administration have been reported to resist the system (Bates, 2005; Bhattacherjee and Hikmet, 2007; Thede, 2009; Timmons, 2003).

Resistance to technology has long been identified as key issue in the failure to the successful implementation of information technology (Lin, 1994; Vrhovec & Rupnik, 2011). Nevertheless, the subject remains largely under-theorized and deficient of quantitative empirical testing (Kim and Kankanhalli, 2009). For example, a review of literature by the author revealed only two studies (Bhattacherjee and Hikmet, 2007; Kim and Kankanhalli, 2009) in which user resistance is empirically tested. Other studies have conceptualized the phenomenon but leave it at that level (see Table 4, pp. 43-44). Consequently, though user resistance to information technology is clearly identified and defined in literature, very little is known about its antecedents. Additionally, there is no overarching and generally agreed-upon paradigm that clearly explains why people resist technology and how the effectively achieve this. Eight models have been proposed to explain why and how user resistance happens in information technology

implementation (Markus, 1983; Joshi, 1991; Martinko et al., 1996; Marakas and Hornik, 1996; Hirschheim and Newman, 1998; Lapointe and Rivard, 2005; Ferneley and Sobreperez, 2006; Kim and Kankanhalli, 2009) with one more study (Bhattacherjee and Hikmet, 2007) carried out within the healthcare environment. Apart from Kim and Kankanhalli (2009), and Bhattacherjee and Hickmet (2007) these models have not been empirically tested.

This study, therefore, seeks to fill this gap. Through the study, organizational change managers can gain the knowledge of how and why resistance occurs, and thus be able to navigate the hurdle of high implementation costs and under-utilized systems. Previous conceptualizations hypothesized that resistance is caused by *perceived threats* (Lapointe & Rivard, 2005; Bhattacherjee and Hickmet, 2007). In this study, perceived threats is split into two independent constructs (*perceived helplessness over process* and *perceived dissatisfaction with outcomes*) that give us a greater understanding of how resistance comes about. Bhattacherjee and Hickmet (2007) have suggested that an understanding about the very nature of resistance is essential in increasing the adoption of information systems and have even argued that user resistance is an important antecedent of adoption intentions.

This study also answers key questions like: how and why do healthcare personnel resist health information technology? Consequently, user resistance to health IT is discussed. Lastly, the study investigates whether user resistance varies across various healthcare professions. To achieve these objectives, the study utilizes the theory of psychological reactance, the cognitive dissonance theory, and other relevant theories to build on the Lapointe and Rivard (2005) resistance to information technology (IT) framework. The resulting theoretical model is tested empirically using primary data. This study's contribution to theory and practice is discussed in a later section.

For the remainder of the study, *user resistance to IT* is simply stated as *user resistance*, or *user resistance to health information technology,* when it is used to denote resistance to health information technology. Hence, except when used in the general context, as in the literature review in Chapter 2, user resistance is same as user resistance to IT or heath IT.

A Background of Study

Researchers of information technology implementation had long recognized *user resistance* as an important concept in information systems (IS) literature (Keen, 1981; Lapointe and Rivard, 2005). Investigators have generally taken a two-pronged view of the concept of resistance. While some have viewed it as negative (i.e. as a hindrance to IS implementation), others have considered it to be positive—a feedback mechanism—by which the users' voice can be heard by system implementers or developers (Rivard & Lapointe, 2012). Resistance is viewed as negative when the perception is that it hinders intended system outcomes. When resistance provides information that could be used by managers to modify implementation efforts and improve outcomes, it is deemed to be a positive step. Nevertheless, no matter how user resistance has been conceptualized, it is clearly seen as an important reason for the failure of new systems (Kim, 2011).

In-depth study of IT literature reveals that there are nine key models that have been proposed. Only two out of the nine studies, have undergone empirical testing. The empirically tested studies are yet to be validated through replication studies. However, there is evidence that user resistance research is on the rise. Research in the past 30 years seems to suggest a growing attention by the number of user resistance research (see Table 4, pp. 43-44).

Researchers have asked questions as to why people may resist change that challenge the validity of their long-held beliefs, even in the face of evidence that dictates the need for this

change (Sherman & Cohen, 2002). Resistance to information systems in organizations continue to be of great concern: for one thing, information systems implementation is very costly and has persisted with relatively low success rates (Dalchar & Genus, 2003; Legris, Ingram & Collerette, 2003). Earlier research, from 1960-1979 had concentrated on identifying factors that facilitated IS adoption and use. This gave rise to a long list of items that directly or indirectly affected adoption and use, but with very little practical use (Legris, Ingram & Collerette, 2003). In the late 1980s, Davis (1989) proposed a more practical model that predicted acceptance and use of information systems (see Davis, 1989). It was from 1989 that other researchers, notably: Markus (1983) and Martinko, Henry and Zmud (1996) began to consider the reason why some intended users of a system would actually resist the same. This stream of research continues to date as researchers continue to propose models that can potentially improve implementation outcomes.

In general, IS implementation can be triggered by either the individual industry goals (internal factors) and/or regulatory/governmental policies (external factors). In the U.S. for instance, the U.S. government, in July, 2010, introduced a policy framework known as the Meaningful Use policy intended to mandate the use of certified technology to improve healthcare outcomes. According to this policy by the Department of Health and Human Services (DHHS), the U.S. healthcare sector is expected to migrate from paper to electronic health records (EHR) by 2015 (*DHHS*, 2010a). EHR refers to a repository of patient data in digital form, stored and exchanged securely, and accessible by multiple authorized users. It contains retrospective, concurrent, and prospective information and its primary purpose is to support continuing, efficient and quality integrated health care (Hayrinen, Saranto & Nykanen, 2008). Despite the benefits of EHRs, full adoption continues to be challenged through resistant behaviors; and extant studies lack a careful regard to the role of policy.

This reform has triggered a huge and difficult transition in the U.S. health sector (Blumenthal and Tavenner, 2010). The Meaningful Use mandate of the Department of Health and Human Services (DHHS) expects healthcare organizations to adopt and use EHR within certain government-specified guidelines. From 2011, when this mandate was implemented, early reports show that the benefits are visible (Blumenthal and Tavenner, 2010), but changing to a new system is still a challenge. Physicians, nurses and other practitioners are resisting this change (Buntin, Burke, Hoaglin and Blumenthal, 2011).

It is not clear whether different health professionals resist health information technology to the same extent has not been investigated. There is however reason to believe that differences may exist based on the level of autonomy of practice. For instance, professionals with prescriptive authority (e.g. physicians, physician assistants and nurse practitioners) may view the introduction of a health IT system differently from professionals with non-prescriptive authority (e.g. registered nurses, pharmacists and licensed vocational nurses). Typically, professionals with prescriptive authority decide of treatment plans for patients while those with non-prescriptive authority follow through with these plans. Prescriptive authority is naturally characterized by independence of practice, access to patients and the development of treatment plans (Mundinger, 2002), while non-prescriptive roles are not. Advanced practice nurses (with prescriptive authority) are expected to demonstrate practice processes and outcomes that are indistinguishable from those of physicians.

Mundinger (2002) has noted that advanced nursing practice like physician practice, is based on the notion of *sameness* of practice. These prescriptive roles therefore carry with them both the privilege of autonomy as well as the duty of accountability. A study by Mahoney (1992) showed that professionals with prescriptive roles tended to have characteristics that were

consistent with their prescriptive status than those with non-prescriptive status. Because prescriptive authority comes with a level of autonomy and independence, the introduction of information systems that that may alter practice processes and/or outcomes are likely to be received with more scrutiny and possible resistance by prescriptive than non-prescriptive professionals. A possible mechanism by which this may be possible is that technology-induced change is more likely to be viewed as a threat to professional autonomy of process and outcomes for prescriptive professionals than for their non-prescriptive peers. It is this threat to professional freedoms that could result to a difference in user resistance to information technology such that prescriptive professionals are expected to be more resistant than non-prescriptive professionals. Mechanic (1976) has argued: "Physicians who work in bureaucratic settings usually continue to regard themselves as autonomous professionals and they resist many of the demands that would alter their role as agent of the patient." (p. 50)

Many theories have been proposed to explain user resistance to technology over the years. Leading theories include: the interaction theory (Markus, 1983), the equity implementation theory (Joshi, 1981), the attributional model of reactions to information technology (Martinkho *et al.*, 1996), the status quo bias theory (Kim & Kankanhalli, 2009), the IT conflict-resistance theory (Meissonier & Houzé, 2010**)**, and the cynicism theory (Selander & Henfridsson, 2012**)**. It would be fitting to also mention that alternative theories that have been used to either explain resistance or that have not been leveraged in IS research also exist. Some of these include: the technology acceptance model, the psychological reactance theory, and the cognitive dissonance theory. These theories shall be discussed in greater detail later.

Statement of the Problem

The introduction of a new information system into the workplace can bring about huge financial losses to many organizations due to implementation failures (Kachalia et al., 2012; Martinko *et al.*, 1996). Resistance has been cited as one of the key reasons for these failures (Vrhovec & Rupnik, 2011). Understanding and managing resistance, especially in the context of an industry-wide organizational change is therefore critical, if IS must support business in achieving its outcomes (Kim and Kankanhalli, 2009; Coetsee, 1999).

Successful information technology implementation is associated with greater productivity and organizational competitiveness (Eastaugh, 2012). By the same token, health information technology (HIT) is being hailed for its potential to increase legibility, reduce medical errors, boost the quality of healthcare and shrink costs (Blumenthal and Tavenner, 2010; Jha *et al.* 2009). The Institute of Medicine (2006) report reveals evidence of a yearly rise in medical errors. This report claims that a total of at least 1.5 million adverse drug events occur in the US yearly, due to preventable medical errors. It also lists the implementation of health information technologies like e-prescription as a key solution. Evidently, link between successful HIT implementation and increased healthcare outcomes (Blumenthal and Tavenner, 2010).

While some theoretical models have been proposed so far (see Joshi 1991; Markus 1983; Martinko *et al.* 1996; Piderit 2000) to explain the concept of user resistance, there is still a dearth of theory-based explanations of resistance (Kim, 2011). With the exception of Bhattacherjee and Hikmet (2007) and Kim and Kankanhalli (2009), there is a deficiency of empirically tested frameworks. Most of the investigative studies in *user resistance of technology* reveal an overwhelming dominance of case studies, a clear lack of quantitative validation, and just a few theoretical explanations (see Table 4, pp. 43-44). Lastly, though physicians, nurses, staff, and

even administration have been reported to resist the system (Bates, 2005; Bhattacherjee & Hikmet, 2007; Thede, 2009; Timmons, 2003), the question as to whether resistance may differ across healthcare professionals has not been examined closely.

Purpose of Study and Research Questions

The purpose of this study is to propose a comprehensive framework that makes use of extant theories of resistance to build on the Lapointe and Rivard (2005) framework. Secondly, the study further tests the proposed model empirically. The use of extant theories assures that while attempting to add new perspectives, what is already known on the subject is not lost. The use of a comprehensive approach to user resistance is consistent with the belief of resistance theorists that better theories would lead to better models of user resistance and consequently, successful outcomes in IT implementation in general (Joshi, 1991; Markus, 1983).

The proposed model is similar to extant models in that: (1.) it builds on an established framework—the Lapointe and Rivard (2005) model, (2.) it considers resistance as an outcome of certain beliefs and attitudes, (3.) it examines individual resistance to IT, (4.) it regards user resistance as a neutral concept[1] (neither negative nor positive), and (5.) it focuses on a post-implementation perspective. Nevertheless, this model is distinct from existing frameworks in that: (1.) it is a comprehensive model since being based on a wide-range of socio-psychological, behavioral and information system theories (these are discussed in greater detail later), (2.) it both proposes and tests this theory-based model, (3.) it clearly conceptualizes *perceived threats*[2]

[1] A neutral perspective means that user resistance in not necessarily a bad or a good thing. Literature acknowledges that user resistance can be functional or dysfunctional (Rivard & Lapointe, 2012) however the sense-making is left to the managers of change.

[2] Perceived threats are hypothesized to be the main antecedent of user resistance to IT (Lapointe & Rivard, 2005)

as two related but distinct constructs, and (4.) it introduces a policy construct that has not been considered to this point.

The proposed model (See Figure 1) suggests that resistance is predicted by *perceived threats* (or the uncomfortable emotional feeling that results people's freedoms are violated when they encounter a new technology). *Perceived threats* are further predicted by a set of techno-centric, people-centric, and policy centric factor variables. By techno-centric factors, is meant factors that arise from the technology itself. People-centric factors, on the other hand, deal with elements that originate from individuals while policy-centric factors consist of elements that ensue from reform or policy.

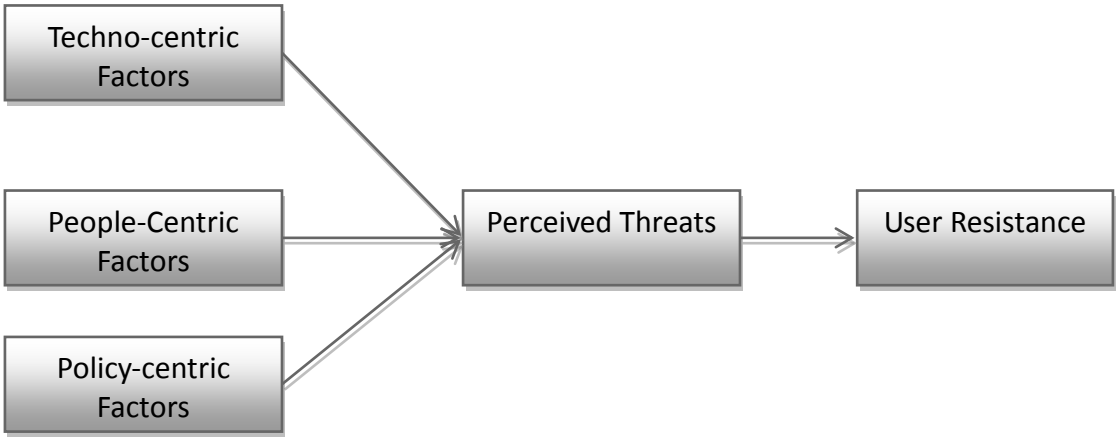


Figure 1: A generic framework for user resistance of information technology

In this study, we attempt to develop a comprehensive model. We make use of theories such as the theory of psychological reactance, the theory of cognitive dissonance, the technology acceptance model, the equity implementation model, and the social identity theory, to build on the Lapointe and Rivard (2005) framework. Furthermore, like Joshi (1981) asserts, MIS researchers do recognize that better developed theories or models of user resistance could lead to better implementation strategies and desired implementation outcomes.

This study seeks to answer the following three research questions:

(1) Why do healthcare personnel resist health information technology? This question is explored by proposing and empirically testing a theoretically grounded model. The model builds on the theories of resistance, especially those that have, so far, not been leveraged with IT user resistance, to find alternative explanations for the phenomenon.

(2) What are the antecedents of *perceived threats* to health information technology? Again, from the existing theories, the study draws concepts that explain resistance and the relationships that exist between these antecedents.

(3) Does user resistance vary across various healthcare professions? Here, a comparison is made between two major groups of health professionals in the study to observe for any potential differences in resistance behaviors.

Contributions of the Study

An understanding of *how* and *why* resistance takes place within the HIT context is both important to IS researchers, organizational scientists and change managers. Hence, this study has two main contributions: theoretical and practical contributions. Theoretically, it expands and extends our knowledge of resistance to IT within a healthcare context. From a more practical standpoint, a shared understanding should decrease individual resistance to- and increase acceptance of technology (Martinko *et al.* 1996). If organizational change managers must mitigate resistance, and promote the adoption and full use of information technologies to achieve productivity and efficiency, a clear understanding of the very nature of resistance is important.

Contributions to Theory

The proposed model is a comprehensive model that views resistance as a complex interplay of psychosocial determinants spanning the cognitive, the affective and the behavioral

realms. Not only does it build on a well-known resistance framework (i.e. the Lapointe and Rivard model), it uses time-honored theories of resistance that have heretofore not been significantly integrated into IS resistance frameworks. It integrates five relevant theories to explain the relationships between user resistance to technology and its antecedents. These theories are: the psychological reactance theory, the equity implementation model, cognitive dissonance theory, the unified theory of acceptance and use of technology, and social identity theory.

The proposed model also introduces a policy component. This integration of a policy constituent is clearly important given the fact that HIT implementation is a *policy-driven* organizational change. Hence, this study extends the equity implementation model by introducing a new evaluative dimension—the government—to which HIT users make equity comparisons to, in order to determine behavioral decision-making.

The study also 'opens up' the *perceived threats* construct. So far, the construct – *perceived threats*—has been considered as a single construct. In the current study, it is conceptualized as two independent, but complimentary constructs—*Perceived Helplessness over Process* and *Perceived dissatisfaction with outcomes*—for enhanced understanding. First, by splitting *perceived threats*, not only were the two distinct types of threats segregated, but also were the unique factors that lead these threats. Distinguishing between these two types of threats is paramount because as Oreg (2006) has contended that the literature on resistance to change must differentiate between "reactions to change outcomes and reactions to the change process" (p. 78). *Perceived Helplessness over Process* in this research is conceptualized to be consistent with the reaction to the change process while *perceived dissatisfaction with outcomes* depicts a reaction to change outcomes in particular.

Second, a new normative construct relevant to workplace inter-relationships called *social enabling effect* is defined. The social enabling effect is a new construct that describes an individual's belief that his/her beliefs are consistent with those of referent others around them. It is clearly distinct from other normative constructs, such as social influence or subjective norms. Hence, it contributes to the normative theory in that while the constructs used so far only describe peer and supervisor "pressure" on the individual carrying out a behavior, *social enabling effect* is defined as a "self-imposed pressure" due to one's own expectation of themselves vis-à-vis their peers' possible course action.

Third, a new classification of resistance is introduced. Coetsee (1999) classified resistance into apathy, passive, active, or aggressive resistance based on how overt or covert the resistance is manifested. The Knowles and Linn (2004) classification of resistance, based on emotional intensity, is introduced here. This classification, is relatively new in IS literature. These four categories of resistance namely: reactance, distrust, scrutiny and inertia each depict a practical manifestation of resistance. Through our understanding of these types of resistance attitudes, a strategy of how to mitigate resistance can be developed. One relevant set of strategies is to target system users with specific persuasion messages. This study provides managers with the elements that these persuasion messages should carry.

Finally, the proposed model is empirically tested for the explanatory and predictive power. Only two of six proposed models to date attempted an empirical validation (c.f. Bhattacherjee and Hikmet, 2007; Kim and Kankanhalli 2009); the current research, therefore, contributes to the general lack of testable frameworks of IT user resistance. More specifically, Bhattacherjee and Hikmet's model only used one antecedent—perceived threats—to predict resistance. This is clearly insufficient given our knowledge of the sources and causes of

resistance as evidenced from literature: namely that perceived threats may originate from the change outcomes or the change process itself (Oreg, 2006). On the other hand, Kim and Kankanhalli's model—which consisted of more determinants of user resistance—did so, only from a single paradigm (the *status quo* bias perspective). The current study tests two antecedents of user resistance: *Perceived Helplessness over Process* and *perceived dissatisfaction with outcomes* (the two sub-constructs of perceived threats), using multiple paradigms. It can be expected, therefore, that it should yield better results.

Contributions to Practice

This study also contributes to practice by offering a clearer understanding of the nature of resistance. For instance, one way employers try to resolve resistance, is to design and implement user awareness of, and compliance to programs that encourage optimal system usage. This study suggests that employee awareness and compliance training programs should target areas of employee *perceived helplessness over process* and *perceived dissatisfaction with outcomes* attitudes about the new system. This is significant because the model shows that most *initial conditions* that lead to resistance are mediated through *Perceived Helplessness over Process* and *perceived dissatisfaction with outcomes* constructs. As was mentioned earlier, *perceived helplessness over process* and *perceived dissatisfaction with outcomes* address two key reactions of change that is worth distinguishing namely: reactions to the change process and reactions to the change outcomes. These two sets of variables would necessitate two different kinds of persuasive strategies by organizational change managers. The greater our understanding of the constructs, the better the chance to design and fine-tune persuasive messages that stand a chance of mitigating resistance.

Furthermore, the study provides a kind of feedback to system designers. It is obvious that the greater the fit between system design and user requirements, the lesser the anticipated resistance would be. For instance, health professionals often complain that technology cannot code certain data that is necessary to document in medical practice. One case in point is the health professional's interaction with the patient. An understanding about how and what data should be captured during this interaction, so as to correctly apply professional judgment in diagnosing and treating the patient is necessary. Hence, a clearer understanding of why these professionals resist the use of the system is likely to lead to a lower resistance when appropriate feedback from the user's perspective is incorporated into system design.

Lastly, the model offers information that can improve persuasion messages by change managers. According to the Knowles and Linn (2004) categorization of resistance—i.e. *reactance, scrutiny, distrust and inertia*—based on emotional intensity, strategies for persuasion can be formulated. This categorization makes ensures that different types of resistance attitudes and behaviors can be targeted using different types of persuasion strategies. By adjusting and fine-tuning their messages, as informed by the proposed model, change managers are likely to get lower resistance outcomes.

Definition of Terms

There are several terms that are important to the development and understanding of this study. The following definitions are offered as a means of establishing a uniform understanding:

Contingent Pragmatism

It refers to the belief by an individual with oppositional orientations to reforms or policies, whereby, enforced reactions to policy change take on form of a last resort or 'something of the function of a survival strategy' (Moore et al., 2002).

Equity Implementation Model (EIM)

The EIM suggests that users assess the equity, or fairness, of a new system at three different levels (Joshi, 1991).

Facilitating Conditions

Facilitating conditions refer to the degree to which an individual believes that organizational and technical infrastructure exists to support the use of a system (Venkatesh *et al.,* 2003).

Health Information Technology (HIT) Self-Efficacy

HIT self-efficacy refers to an individual's beliefs that he or she has the ability to perform specific tasks/jobs using a health information technology.

Perceived Dissatisfaction with Outcomes

Perceived dissatisfaction with outcomes denotes an individual's belief that carrying out a particular behavior will lead to unfavorable result.

Perceived Helplessness over Process

Perceived helplessness over process refers to an individual's belief that carrying out a new behavior diminishes their ability to maintain control over their current routine.

Performance Expectancy

Performance expectancy is the degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh *et al.,* 2003).

Principled Pragmatism

It refers to the positive belief by an individual that a set of reforms or policies will strengthen and affirm his or her professional identity by drawing eclectically on a range of professional practices and traditions (Moore *et al.*, 2002).

Social Enabling Effect

The social enabling effect is defined as the belief by an individual that his or her beliefs are consistent with those of referent others around him.

Social Influence

Social influence refers to the degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh *et al*., 2003).

User Resistance to HIT

It refers to covert or overt behaviors that oppose change towards the use of- or avoidance of an information system manifested as reactance, *distrust, distrust, scrutiny or inertia*.

Expected Limitations

The results of this research must be interpreted in terms of the limitations inherent in the study itself. First, the researcher, for the purpose of making the study manageable, delimited the scope of the study. The delimitations subsequently limit the generalizations of the findings of the data. The first limitation might be the sample drawing. The sample will be predominantly healthcare professionals from South Texas who volunteer to take part in the study. Since the sample is drawn from one region predominantly, the results must be interpreted as such.

Additionally, the study is a primary research initiative that relies on a questionnaire with developed measures. The measures may not be perfect, and hence, need fine-tuning and validation in different settings. Also, these measures are self-reported: meaning that the final results depend on the accuracy of these subjective assessments. Common method bias, resulting from the use of a singular method may therefore arise. The study is also a cross-sectional in nature. This design limits causal inference.

Lastly, the research is being carried out in a post-implementation setting in which the system is no longer very new to participants. It is possible that participants may have begun to adjust to the new system in significant ways that may make it difficult to capture the strong perceptions that existed when the system was just newly implanted.

Nevertheless, these limitations are addressed in the methodically. First, we look at the sample. Though the sample is taken from a single region of the United States, all the healthcare professions represented are identical to that of the rest of the population. Second, since we base our measures on established theory and instruments, we expect that though we use only a survey instrument as our data collection method, valid results will still be obtained. Lastly, because the research is being carried in a post-implementation perspective, the instrument has been designed in such a way as to be retrospective in nature. We expect therefore, that these methods will make sure that results are tenable and reliable.

Study Outline

In this chapter, we have presented an overview the study of resistance to information systems; we have examined the purpose of the study, stated the research problem, enumerated the research questions, highlighted the research contributions, defined the terms, and presented the limitations of the study.

Chapter Two will focus on the review the literature on user resistance to information technology. Specifically, it will explore germane theories and models of user resistance, while summarizing, analyzing and critiquing the methods, results and conclusions. We precede this discussion by first presenting a background view of the U.S. healthcare policy change and its implications on healthcare technology implementation.

Chapter Three will present a logical derivation of the model, the constructs and the research hypotheses. Specifically, the model hypothesizes that resistance is predicted by perceived loss control and *perceived dissatisfaction with outcomes*. These two main constructs are then further predicted by a set of techno-centric, people-centric and policy centric factor variables.

Chapter Four details how the proposed research model will be tested. It will discuss the sample, study setting, measures, and data collection and analysis methods.

In chapter 5, the researcher will evaluate the findings, discuss limitations and provide a personal insight and interpretation of the study's results.

CHAPTER II

REVIEW OF LITERATURE

Introduction

To better delimit the scope of this research, and to synthesize and analyze extant literature, Cooper's (1988) taxonomy of literature of reviews is used. According to this strategy, the focus, goal, perspective, coverage, organization, and audience of the literature are first determined. Given the nature of the study, this review focuses on user resistance theories and models, research methods and outcomes. The review covers a wide range of literature that is both relevant and pivotal to the discussion of user resistance to information technology. But first, background literature on the healthcare reform that has triggered nation-wide organizational change is discussed.

The Meaningful Use Reform and Change

On July 13, 2010, the United States administration rolled out a five-year transition plan for the U.S. healthcare industry to move from paper health records system to electronic health records. Over a ten-year period, the U.S. government plans to invest about $70 billion to help the healthcare sector in this transition process (DHHS Press Release, 2010). This governmental mandate has been named, the *Meaningful Use* policy. It is arguably the greatest organizational change trigger in the U.S. healthcare system so far. Summarily, this reform program affects three areas of concern in the healthcare industry. First, it offers a definition of many health information technology concepts that heretofore had been ideologically inconsistent. Second, it offers

guidelines on adoption and implementation. Lastly, it stipulates standardization and certification requirements for healthcare technology. These three are discussed in greater detail in the following three subsections.

Definitional Dimension of Policy

Generally, two sets of definitions were affected by the policy namely: technology-related definitions and user-related definitions. Technology-related definitions here refer to the meaning of terms used to describe health information technologies. The second set of terms—user-related definitions—unifies the meaning as to what constitutes *meaningful use* is and who a meaningful user is. In Table 1, a summary of the key terms are presented.

Table 1: Review of important Meaningful Use terminology

Technology-related definitions	
EHR term	Definition
Qualified EHR	An electronic record of health-related information on an individual that: (A) Includes patient demographic and clinical health information, such as medical history and problem lists; and (B) has the capacity: (i) To provide clinical decision support; (ii) to support physician order entry; (iii) to capture and query information relevant to health care quality; and (iv) to exchange electronic health information with, and integrate such information from other sources.
EHR Module	Any service, component, or combination thereof that can meet the requirements of at least one certification criterion adopted by the Secretary[1]. Examples of EHR modules include, but are not limited to, the following: • An interface or other software program that provides the capability to exchange electronic health information; • An open source software program that enables individuals' online access to certain health information maintained by EHR technology; • A clinical decision support rules engine; • A software program used to submit public health information to public health authorities; and • A quality measure reporting service or software program.
Complete EHR	Encompasses EHR technology that can perform all of the applicable capabilities required by certification criteria adopted by the Secretary[1] and

	distinguish it from EHR technology that cannot perform those capabilities. Complete EHRs are expected to have capabilities beyond those addressed by certification criteria adopted by the Secretary[1].
Certified EHR technology	A Complete EHR or a combination of EHR Modules, each of which: (1) Meets the requirements included in the definition of a Qualified EHR; and (2) has been tested and certified in accordance with the certification program established by the National Coordinator as having met all applicable certification criteria adopted by the Secretary[1].
	User-related definitions
Meaningful Use	The use of certified EHR technology in health practice to achieve the goals of improved health care quality, efficiency and patient safety
Meaningful user	A qualified health practitioner using certified EHR technology to achieve health care that is patient centered, evidence-based, prevention-oriented, efficient, and equitable.

1. U. S. Department of Health and Human Services

Adoption and Implementation Dimension

Under the adoption and implementation rule of EHR technology, providers who meet stipulated standards in the first year of implementation are financially compensated. In subsequent years of participation, they are then expected to demonstrate ‘‘meaningful use” of the certified technology (DHHS, 2010 a, b). Hence, while the first year (i.e.2010-2011) targeted efforts towards adoption, the subsequent years focus actual implementation.

Implementation is defined here as adopting, executing, or upgrading certified EHR technology. It includes the process by which providers install and utilize certified EHR technology or expand the available functionality of certified EHR technology already in use. The DHHS further stipulates deliverables that institutions would have to show from year to year to demonstrate continual eligibility.

Standardization/Certification Dimension

A third and important aspect of the *meaningful use* requirement has to do with standards and certifications. Here, attempts were made to standardize the various component subsystems that integrate into the bigger system. It is worth mentioning that these standards have been

defined to fit three phases of the policy implementation generically denoted as *Stage 1, Stage 2* and *Stage 3* phases.

Stage 1 of the *meaningful use* of EHR mainly focuses on data capture, storage, and retrieval. It also involves reports generation from multiple departments within the health institution and is achieved through the Computerized Patient Order Entry (CPOE) system. Stage 2, on the other hand builds on Stage 1. It defines the standards for the exchange of patient care summaries to support transitions across unaffiliated providers, settings, and other EHR systems. Finally, Stage 3 standards center on for decision support capabilities that support national high priority conditions and improving population health. It includes standards for patient access to self-management tools and comprehensive patient data through robust information exchange.

Summarily, the three dimensions of the meaningful health policy summarized above all call for a robust, large-scale, and an across-the-board organizational change. The change does not only take huge costs in organizational finances, but also necessitates significant changes in workflows and assignment of roles. For instance the government support to implement the Meaningful Use policy is expected to cost about $70 billion over a ten-year period (2010-2020) (DHHS Press Release, 2010). Above all, the implementers of this change at all levels must be willing to support it.

Organizational Change and Resistance

Organizations need to grow. Growth implies change. When change is challenged resistance results. Earlier views on resistance give the notion that resistance in an organizational setting happens as the natural reaction to change (Wadell & Sohal, 1998). However, this view has also too often been linked to negative employee attitudes with counter-productive behaviors (Waddell and Sohal, 1998). Many organizational theorists view resistance from a neutral perspective rather

than from the viewpoint that it is essentially a negative behavior (see Waddell and Sohal, 1998; Ford, Ford & d'Amelio, 2008). Ford *et al*., (2008) have argued that resistance should not only be looked upon as a negative force, but also a clearly important and beneficial phenomenon in the change process.

Consequently, Ford *et al.* suggested three different roles of resistance. First, that resistance can help *change agents* make sense of change, e.g. "why are people resisting?" Second, that resistance can reflect quality of relationship between *change agents* and *change recipients*. For example, is the resistance coming from the inability for change agents to communicate with change recipients, or is there a characteristic of change recipients that his hindering changes. Lastly, that resistance could well serve as a resource, rather than a liability to successful positive change. When resistance data is used feedback data from the user's perspective, meaningful adjustments can be made in the current or future implementation endeavors. Hence, resistance could and should be viewed from not only the negative role it plays, but also the potential beneficial roles as has been suggested by some researchers (c.f. Ford, Ford & d'Amelio, 2008).

Coetsee (1999) classified resistance into four categories namely: apathy, passive, active and aggressive categories. Apathy or indifference is defined as a first level of resistance or a transition phase between resistance and acceptance. Active resistance, on the other hand is said to be exemplified by strong—but not destructive—opposing behavior such as blocking or impeding change by voicing strong opposing views and attitudes, working to rule, slowing activities down, protests, and personal withdrawal. Passive resistance refers to the exhibition of mild or weak forms of opposition to change, demonstrated by the existence of negative perceptions and attitudes expressed by voicing opposing views, regressive behavior such as

threats to quit or voicing other indications of the rejection of change. Finally, aggressive resistance is defined to encompass destructive behavior such as purposefully committing errors and spoilage, subversion, sabotage, terrorism, and outright destruction.

It has been proposed that resistance could be triggered from an individual's personality, environment, or social system around the individual (Oreg, 2003). Some researchers have described this as the dispositional/situational view of individual resistance (Oreg, 2006). On the personality side, Watson (1971) suggests that resistance results from the desire to maintain a state of equilibrium called *homeostasis*. Homeostasis here refers to a state of balance where an individual is comfortable with their beliefs and attitudes. However, if something new was suggested that seemed contradictory to their held beliefs or attitudes, they would be more likely to want to resist. On the social systems side, Watson (1971) maintained that resistance depended on both norms and environmental factors. Society has always had a sense of what is right or wrong to do. Hence, depending on whether the particular resistant behavior is considered by a given society to be right or wrong, resistance in one context may not actually be resistance in another.

Resistance to change within organization has been associated with individuals within the organization. More specifically, organizational change is considered to be the change of the individuals within the organization. Hence, resistance to change within an organization can be thought of as the sum total of the resistance of the individuals within the organization (Bovey & Hede, 2001). In fact, the failure in corporate employee change programs has been attributed to employee resistance attitudes (Maurer, 1997; Martin, 1975; Bovey & Hede, 2001; Piderit, 2000). Employee resistance is generally thought of to be characteristically consistent with general attitudes. Attitudes are manifested as: cognitions, affect, and behaviors (Ajzen, 1984). This view

of individual attitudes offers a three-dimensional explanation of the resistance: i.e. examining resistance as cognition, affect or behavior, or the interplay of the different dimensions. By cognition we mean individual's beliefs about the object of the attitude. The affective or emotional dimension refers to an individual's feelings in response to the attitude object. Lastly, the behavioral dimension is thought to be composed of past actions or future intentions. The study of individual resistance from this multidimensional attitudinal perspective, therefore, has been highly lauded in literature (Oreg, 2006).

Health Information Technology and Organizational Change

The introduction of HIT into the healthcare industry has been associated with distinctive changes. Lorenzi *et al.* (2000) describes possible changes that typify healthcare organizational change namely:

- *Operational changes.* These affect the way the ongoing operations of the business are carried out, such as the automation of a particular area.
- *Strategic changes.* These changes occur in the strategic business direction, e.g., moving from an inpatient to outpatient focus.
- *Cultural changes.* These affect the basic organizational philosophies by which the business is conducted, e.g. implementing continuous quality improvement system in a clinical environment.
- *Political changes.* Changes in staffing that occur primarily for political reasons of various types, e.g. those that occur at top patronage job levels in government agencies.

There are generally two major triggers of organizational change in the healthcare industry vis-à-vis information systems. Internally, stakeholders may want to leverage information systems for competitive advantage and strategic growth (Chen & Popovich, 2003; Porter, 1987). Externally, change could be a reaction to the obligations introduced by the mandates of industry regulatory policies and governmental reform.

A concrete example of policy-driven organizational change can be evidenced from the recent reform in the U.S. healthcare system. Government policy shifts like this bring with them implications in the professional practice within the industry. Organization-wide operational, strategic, cultural and political changes like those proposed by Lorenzi et al. (2000) above become necessary and without a doubt affect the professionals in the industry. These changes, resulting from the introduction of health information systems in the healthcare workplace, are then likely to cause resistance from organizational employees who are expected to use the systems.

Previous research in the domain of HIT implementation in the healthcare reveals that organization change is not nearly a smooth process. In a study of three hospitals in which new HIT was introduced, Lapointe and Rivard (2005) found out that physicians, nurses, and other professionals resisted the new system in varying ways. The reactions of these professionals ranged from apathy to a more overt and aggressive resistance of the systems. In yet another study by Bhatterjee and Hikmet (2007), it was found that the intention to use a newly introduced computerized physician order entry system (CPOE) was impacted and predicted—in part—by physician resistance to change. Lauer, Joshi and Browdy (2000) also affirm the impact of system-triggered change on the organization, and suggest that these well-intended changes may be rejected. Evidently, new technology in the healthcare industry impacts work patterns, routines and new role distributions. As these changes affect employees' jobs in significant ways, and become standard practice in the day-to-day operations of the organization, they may be welcomed with mix feelings by certain employees.

What is User Resistance to Information Technology?

User resistance to information technology is defined as a user's insistence to not use new IT. It is seen as a user's attempt to minimize his or her outputs while attempting to maximize and increase others' inputs (Joshi, 1991). This resistance, according to Markus, (1983) may range from more subtle manifestations of resistance as passivity, misuse, low levels of use, and lack of use to harmful use (Marakas & Hornik, 1996; Martinko *et al.*, 1996; Selander & Henfridsson, 2012). Marakas and Hornik (1996) discuss a form of resistance in which behaviors take "the form of overt cooperation and acceptance of the proposed system combined with covert resistance and likely sabotage of the implementation effort" (p. 208). Lapointe and Rivard (2005), on the other hand, mention the more overt side of resistance with scenarios where users "delivered an ultimatum, demanding that the system be withdrawn" (p. 477). In this study, resistance refers to covert or overt behaviors that oppose change towards the use of- or avoidance of an information system manifested as *reactance, distrust, scrutiny or inertia*

Theories and Conceptualizations of Resistance to IT in Research

The Interaction Theory

Markus (1983) pioneering research in user resistance to information systems (IS) is arguably the departure point for most IS resistance research. Her seminal work basically responded to the question as to why people resist IS. Three types of theories are proposed: first, people are said to resist technology because of internal factors inherent in those who resist or their organizations. Second, resistance stems from external factors emerging from the introduced system. Lastly, resistance may also stem from the interaction of both internal and external factors. Markus termed the latter, the "interaction theory." While the theory of the interaction

between the subject of resistance and the object of resistance was not entirely new, Markus was discusses this theory within an IT context.

Arguing from a group level and organizational level perspective, Markus (1983) demonstrates the importance of the interaction theory in understanding user resistance to information technology. Markus established a model that demonstrated the interplay of power dynamics within the organization and the implementation of a new system. According to Markus, the interaction of an individual's characteristics with the specific system design features and the organizational context will determine user resistance. Markus then describes and evaluates these sets theories based on the underlying assumptions and tests them with data from a case study. Results showed that the interaction theory was a superior theory for explaining resistance for implementers than just from the technology or from the individual/organizational perspectives.

Markus argues that the interaction theory is important in analyzing, diagnosing and finding solutions to organizational resistance to change introduced by information technology. This conceptualization, however, is limited in two significant ways: it views resistance from purely a political sense, and is likely to be more applicable for systems that are implemented across departments (Joshi, 1991).

The Equity Implementation Model (EIM)

Another significant theoretical model, the equity implementation model (EIM), was posited by Joshi (1991). Derived from the equity theory, the EIM attempted to explain resistance to change from a fairness perspective. The EIM proposed that individuals attempt to evaluate most changes. The changes considered as favorable are generally welcomed, while those considered as unfavorable are likely to be resisted. The equity theory suggests that in an

exchange relationship, individuals are constantly concerned about inputs, outputs and fairness of the given exchange. Hence, individuals are continuously comparing themselves with referent others and peer to assess if net gains are same (Adams, 1963). When these persons, therefore, experience a net loss in equity, the equity theory suggests that the people are likely to become distressed. This distress caused by inequity then causes the concerned individual to resist the change by lowering his or her inputs while trying to minimize the outputs of others. Building on the equity theory, Joshi (1991) proposed a three-level analysis of equity namely: a comparison of self with self, a comparison of self with employer, and a comparison of self with co-workers. According to the EIM, users will resist use, if inequity was perceived at any of these three levels, following the introduction of a new system.

The analysis levels in the EIM are summarized in Table 1, while the changes in user stresses and benefits because of implementation are summarized in Table 2. At level one equity evaluation, individuals compare their inputs with outputs and calculate their net gains. If the new system brings with it net gains in equity such as less tension and better working conditions, the individual is more likely to embrace the change. On the contrary, if the system brings the individual a net loss in equity such as loss of seniority or increased workload, then the individual is likely to oppose change. At the second level of equity evaluation, an individual compares equity net gains, in much the same way as at the first level: only this time, the individual compares their personal net gains to that of the organization. If the net gains are positive, change is welcome; but if the individual perceives that the organization's net gains are more than theirs, resistance is likely to result. A third level of analysis is also proposed in which an individual compares their net gains with those of their peers and referent others after the introduction of the new system. Here, the user asks questions like: "Does the new system treat each user equitably?

Or, does it increase others' equity while lowering those of others?" If the assessment is that personal equity is increased, change is received; otherwise, it is resisted.

Table 2. Three Levels of Analysis in the Equity Implementation Model

Level of Analysis	Focus	Criterion
Level 1	Change in equity status of the user (self)	Net change in equity status = change in benefits weighed against user stresses
Level 2	Comparison with the employer (organization)	Perceived outcome for the user compared with perceived outcome of employer
Level 3	Comparison with other users (co-workers)	Perceived outcome for the user compared with perceived outcomes for other users

Note: A perceived outcome indicates the net change in equity status.

Table 3. Possible Changes in User Stresses and Benefits because of Implementation

Benefits	Stresses
Possible increases:	
- More pleasant work environment	- More work to enter data
- Less tension, more job satisfaction	- More tension
- More opportunities for advancement	- Need to bring higher-level skills to the job
- Better service to customers	- More effort to learn new system
- More recognition, better visibility	- Assignment of additional tasks
- Salary increase, grade increase, or higher level title	- More effort to perform tasks
- Increase in power and influence	- Need to spend more time on tasks
- Learning a marketable skill	- Fear of the unknown, e.g. failure, and the resulting anxiety
- Reduced dependence on others	
- Increased usefulness of the system	
Possible decreases:	
- Reduced job satisfaction	- Ease of use
- Reduced power	- Less effort
- Reduced bargaining power relative to employer or others	- Less searching for solutions or information
	- Less manual effort
- Threat of loss of employment	- Less cognitive effort
- Loss of value of marketing skills	- Less rework, because of fewer errors
- Reduced importance or control	
- Increased monitoring	
- Reduced scope for advancement	
- More role conflict and ambiguity	
- Potential failure in learning and adopting the new system	

A possible critique for using the EIM as a stand-alone model for explaining resistance is that inputs and outputs are difficult to name and measure. This is especially so because these inputs and outputs could be tangible as well as intangible—the measure of which might be as challenging as impossible. As Joshi (1991), himself, states: "the nature of changes may also

make it difficult for users to make objective assessment." This suggests that, a need for a model that would be sensitive to other types of changes is a welcome necessity.

The Attributional Model of Reactions to IT (AMRIT)

Martinko, Henry and Zmud (1996) begin their theory-building process on the premise that, hitherto, there had not been any "well accepted theory or paradigm encompassing the full range of variables associated with an individual user's resistance of IT" (p. 313). Drawing from current research in social psychology and organizational behavior, Martinko *et al.* (1996) proposed an attributional model to explain IT resistance (AMRIT).

Based on previous literature that utilized the attribution theory and learned helplessness, Martinko and associates develop a model that they suggest could serve as a "basis for a more comprehensive theory" of worker resistance to the introduction of new technology in the workplace. According to the attribution theory, an individual's behaviors are a function of his or her beliefs about the possible outcomes. More specifically, it looks at the perceptions of what causes these outcomes. The AMRIT posits that individuals' attributions are informed by his or her experience with successes and failures. It suggests that individuals interpret their behaviors in terms of the causes (Kelley & Michela, 1980). Consequently, their behaviors in the future are constructed from the expectancy that comes from these attributions. In other words, success or failure with prior implementation of a technology may cause implementers to develop certain attributions to why this happened. These attributions then create certain expectations with regard to the technology's efficacy, leading to behaviors or feelings about the system that can be either negative or positive. Like many of the other models before this one, the Martinko *et al.*'s (1996) model shed more light on the nature of IS user resistance; however, this conceptualization ended at a purely conceptual level.

The AMRIT is presented in Figure 2. Factors that influence attributions are designated as external: e.g. co-worker behavior or management support; or internal: like prior experiences. The causal attributions for success or failure are classified into a two-dimensional matrix of describing two categories of the locus of causality and two categories of stability. The expectations formed are then translated into reactions which are either expressed as resistance or acceptance behaviors or affect. Based on the potential results, individuals then form their behavioral or affective reactions.

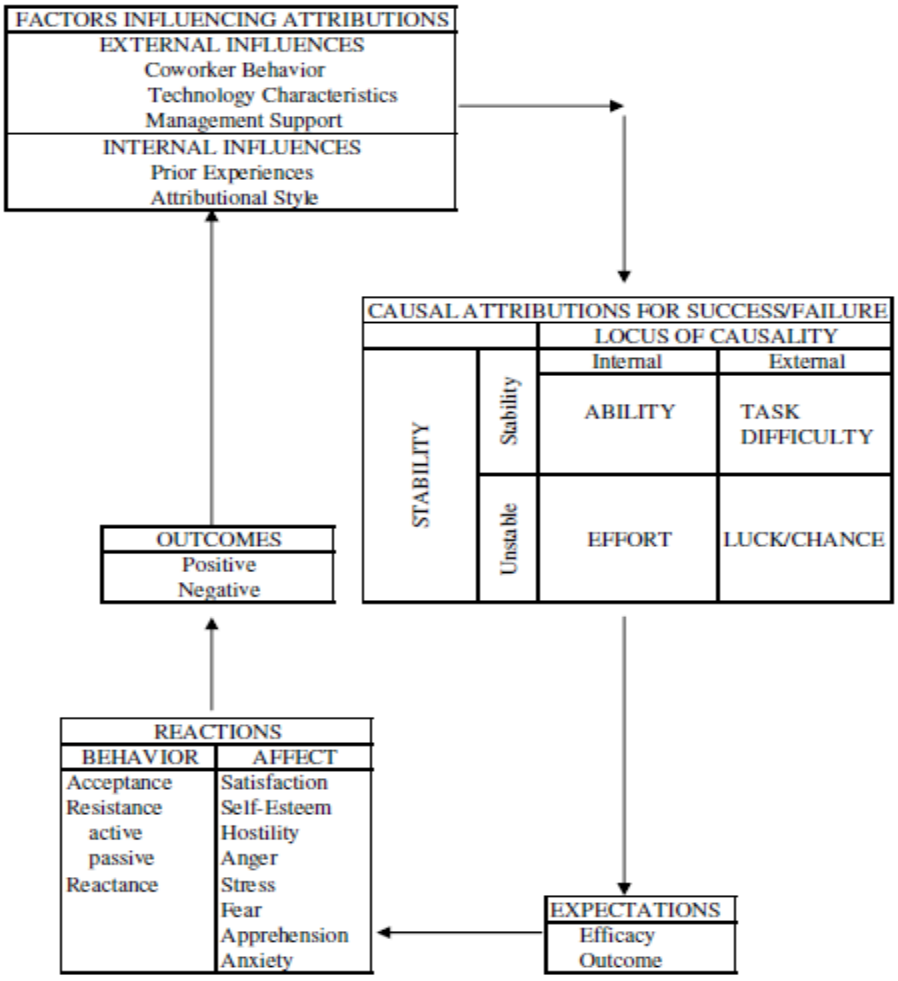


Figure 2. Attributional model of reactions to information technology

The Lapointe and Rivard (2005) Model (L-R)

Lapointe and Rivard (2005) examined group resistance dynamics at three levels namely: pre-implementation, during implementation, and post-implementation of an IS. The L-R model was developed to explain a multilevel dimension of resistance to IT implementation; arguing from the perspective that previous models had only looked at resistance at one level of the organization instead of examining different levels of the organization. Building on existing research, the L-R model, has proven to be an important model for a closer examination and extension. In summary, the L-R framework (see Figure 3) posited that resistance to an information system results from *perceived threats* which in turn evolve from a complex interplay of political and interpersonal/group factors resulting from people's interaction with an IS. Lapointe and Rivard (2005) termed these "interaction effects", *initial conditions*. Simply put, when an individual or an organization interact with a newly installed technology in the workplace, resistance targeting either the technology itself, the advocates of the technology or the significance of the technology. The L-R model also posited that resistance to information technology was mediated through *perceived threats*.

Selander and Henfridsson (2012) took advantage of L-R model foundation to propose an extension. However, Selander and Henfridsson (2012) did not explore the major antecedent of resistance, *perceived threats,* and only proposed one potential initial condition—*cynicism*.

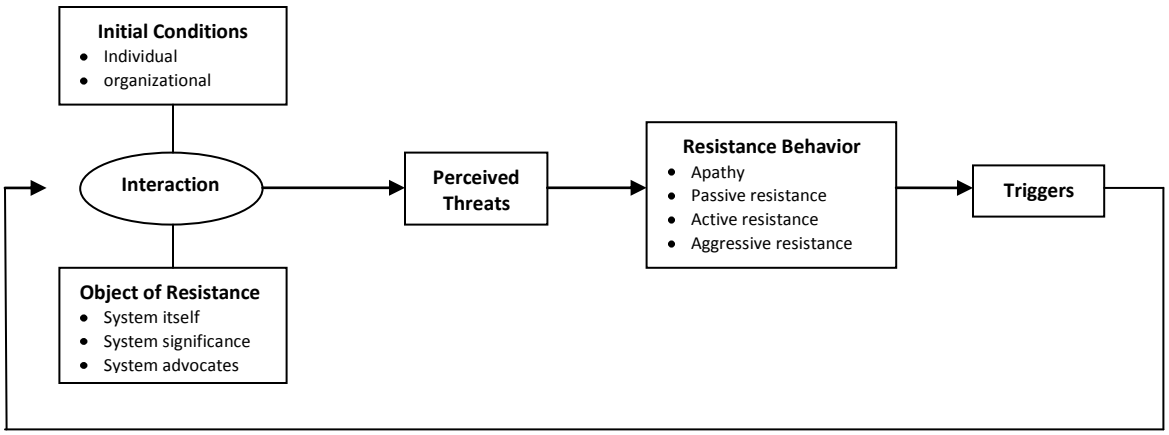


Figure 3. The Lapointe and Rivard (2005) model

The L-R model serves as a generic process model that provides a good departure point for more empirical investigation. For one thing, the L-R model incorporates previous frameworks and deals with user resistance form a multilevel and process perspective. Bhattacherjee and Hikmet (2007) draw from the L-R model and test a theoretical framework for HIT resistance, using *perceived threat* as a key antecedent of resistance. However, Bhattacherjee and Hikmet (2007) stopped short of examining the *initial conditions* proposed by Lapointe and Rivard (2005). Additionally, Bhattacherjee and Hikmet (2007) examined resistance as a mediator in determining technology acceptance and not as an outcome variable.

The *Status Quo* Bias Theory

The *status quo bias* perspective was proposed by Kim and Kankanhalli (2009). It is one of the few if not the only theoretical model of resistance to information technology that has been both proposed and tested. Kim and Kankanhalli (2009) contended that people resist an information system due to their desire to stay in their current state or *status quo*. In other words, people exhibit a bias towards maintaining their "old habits" when confronted with the choice of change.

In the context of technology-enabled change, therefore, the *status quo bias* perspective holds that people may resist the implementation of new technology, for the sole purpose that they are comfortable with the current state. Because of this desire to maintain the *status quo*, they judge the decision to change as a cost associated with this change, rather than the benefits thereof. By testing their model within the context of a new enterprise system, Kim and Kankanhalli (2009), found that the cost of switching to a new system from an old one caused user resistance. This attempt to empirically test user resistance of IS was probably the hallmark of Kim and Kankanhalli's (2009) work.

IT Conflict-Resistance Theory (IT-CRT)

Situating their research within a pre-implementation context, Meissonier and Houzé (2010) propose the *IT conflict-resistance theory* and use the framework as a basis for a two-year action research project. The research suggests that pre-implementation resistance to IT could be used as a gauge to assess possible post-implementation concerns. Resistance in this sense, therefore, is seen as positive tool for technology acceptance in the post-implementation phase.

IT conflict-resistance theory proposes that two sets of theories, viz. conflict theory and resistance theory as important theories through which to understand resistance. The theory is proposed in a pre-implementation context, and the theoretical system developed is used as a driver for a two-year action research project. Meissonier and Houzé (2010) found out that while conflicts towards IT implementation are often seen to have negative effects that requiring managerial action to resolve them, this research emerged with a contrary observation. They argue that by enhancing resistance in a pre-implementation phase, managers can anticipate and resolve latent conflicts that are directly or indirectly related to the project prior to actual implementation. The authors therefore propose the enhancement of resistance in IT pre-

implementation phases instead of maximizing user satisfaction as has been proposed in most prior research.

Like previous works, Meissonier and Houzé (2010) highlighted socio-political factors as well as task-oriented factors as salient determinants of conflict and resistance. However, being an action research in itself, the conceptual model proposed, suggests a more heuristic and practical approach to the topic than a testable concept.

Cynicism Theory

Selander and Henfridsson (2012) conceptualized cynicism as resistance. Building on the Lapointe and Rivard (2005) process framework, Selander and Henfridsson (2012) propose three dimensions of user cynicism as the precursors of resistance. They argue that cynicism is a remote form of resistance that is not mediated through *perceived threats*, but is rather manifested as a form of passive resistance. They also suggest that cynicism, being a passive resistance in itself, could escalate to other forms of resistance. The three dimensions of cynicism conceptualized are *cognitive distance*, *negative affect* and *seeing through espoused claims.* Cognitive distancing here refers to the way employees of an organization alienate themselves from the management's policies and stance. Negative affect on the other hand is defined to involve negative emotions towards managerial behavior including defeatism, betrayal, and disillusionment. *Seeing through espoused claims* supposes that the employee possesses knowledge of how things could better be done and is aware of managerial inconsistencies and repudiates these assertions.

In sum, Selander and Henfridsson (2012) contend that these three dimensions of user cynicism constitute a form of passive resistance. Using this framework, they built upon the Lapointe and Rivard (2005) framework. Their work however deferred from the Lapointe and Rivard model in that it completely ignored *perceived threats* as mediator between initial

conditions and resistance (see Figure 3). Like other models before it, it remained at a purely conceptual level: suggesting three antecedents of user resistance, but going no further.

Alternative Theories of Resistance

The following section discusses theories that either have been used to explain user resistance, but have not been leveraged in IS literature or inform our knowledge of user resistance, albeit not fully.

The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) has been used to predict user acceptance of technology in different IS studies (Venkatesh & Davis, 2000; Mathieson, 1991; Selim, 2002). The TAM is based in the Theory of Reasoned Action (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980) and is now widely regarded as the standard model for examining technology acceptance. Because of the failure by employees to accept and use technology, organizations as well as technology vendors see user acceptance of technology as crucial to organizational survival. The TAM in its simplest form suggested that *perceived usefulness* and *perceived ease of use* would predict user acceptance of an information technology. In other words, Davis (1989) posited that the acceptance or rejection of a technology is a function of how individuals perceived that the technology would be useful or how easy it could be to use it.

The TAM concept has been alternatively used to explain user resistance. For instance, Bhattacherjee and Hikmet (2007) hypothesized resistance as an antecedent of technology acceptance. However, since acceptance of information technology is not exactly the opposite of resistance to information technology, specific alternative theories are therefore needed to explain resistance. Hence, the TAM, though not a good predictor of resistance, still offers a great deal of insight.

The Psychological Reactance Theory (PRT)

Another alternative explanation of resistance is the PRT. Brehm's (1966) PRT is one of the most widely accepted resistance theories in social psychology. It has also been widely used to explain resistance and persuasion—its antithesis. PRT is built around the notion of "free behaviors" and "freedoms" It assumes a "conservative stance on people's desire for change" (Brehm and Brehm, 1981 p. 25). The PRT posits that individuals generally believe that they have specific behavioral freedoms. When these freedoms are threatened, individuals are aroused by the motivation to reassert their freedoms. The psychological reactance theory assumes that people's behaviors are motivated by the desire to protect their "freedom" to carry out a particular behavior in a particular context.

A "threat to freedom", according to the PRT, refers to the perception that an event has increased the difficulty of exercising a particular freedom. These threats could be external, as when an individual is subjected to social pressure; or internal, as when a choice alternative is taken away. *Threats to freedoms* have also been thought of to be social—emanating from social interactions or nonsocial—coming from the individual. Additionally, Brehm and Brehm (1981) also asserted that, "a freedom is important to a person when it has unique instrumental value of satisfaction of one or more important needs" (p. 55). Hence, the level of reactance is thought to be proportional to the relevance and number of threatened freedoms.

According to the PRT, resistance is a result of reactance, defined as the response to loosing freedom. The source of this resistance has been attributed to the person manifesting the behaviors as well as situation causing the resistance (Knowles and Linn, 2004, p. 6). Knowles and Linn (2004) have identified "four different but probably related faces" of resistance namely: *reactance, distrust, scrutiny and inertia* (pp. 7-8). *Reactance* is initiated when a person's choice

alternatives are threatened. This view of resistance has been found to be associated with the affective ("I don't like it!") and motivational ("I won't do it!) sides of resistance (p.7).

Distrust highlights the target of the change and general distrust of proposals. Here, the resisting entity questions the motive of proposal and whether the facts are indeed true. This face of resistance underlies the affective ("I don't like it!") and the cognitive ("I don't believe it!") reactions to influence.

Scrutiny refers to the face of resistance that results when people become aware of the fact that they are a target of an influence and therefore begin attend carefully and thoughtfully to every aspect of the proposal for change. Here, a thorough scrutiny is given to every proposal while each weakness is evaluated, exposed, and countered. This face emphasizes the cognitive ("I don't believe it!") element of resistance.

The last face, *inertia* is described as a "neutral" quality whereby an individual may not necessarily resist the change, but may focus more on rather staying put. To the extent that a "call for change" comes, the inertia personality and attitude frustrates the change through a drag of anchor than with a personal antagonism.

This classification of resistance according the theory of psychological reactance could be more informative than that proposed by Coetsee (1999) 1[1] discussed earlier. This could be so given that the PRT's resistance faces can be seen to present a continuum of resistance based on emotional intensity. This is such that as we go from *inertia* to *reactance*, the emotional intensity is seen to increase. The benefit of this type of classification is likely to inform our understanding about different forms of IT user resistance. For example, there is a possibility that certain types of initial conditions may lead to different types of resistant behaviors. Also, different phases of

[1] See section on Organizational Change and Resistance in Chapter 2

implementation are likely to be characterized by particular manifestations of resistance. Such an understanding would then be critical in the development of persuasion messages to mitigate user resistance.

The Cognitive Dissonance Theory (CDT)

The theory holds that "when an individual holds two or more elements of knowledge that are relevant to each other but inconsistent with one another, a state of discomfort is created" (Harmon-Jones *et al.,* 2010). The resulting discomforting state is called "dissonance." Because *dissonance* originates from the conflicting views or beliefs about one's self, the term cognitive dissonance is used to collectively describe the concept (Festinger, 1957; p. 9). According to the dissonance theory, this inconsistency or "lack-of-fit" of cognitions motivates the individual to be involved in a psychological effort to reduce the inconsistency between the cognitions.

Generally-speaking, there exist some consistency between what a person knows and what he does. For example, if an individual believes that getting an education is a good idea, they are likely to encourage their children to get an education. This example captures the idea of "consistency" in belief and action; and is generally a norm in life. However, there are exceptions to this rule. An individual may know that stealing is wrong and that it might constitute an offense against the law; and yet, be involved in theft. Hence, if an individual who holds the belief that stealing is wrong commits an act of theft, he is likely to experience dissonance.

Once this happens, the theory predicts that the individual is likely to do one of two things. He may either justify his action (e.g. "I only stole because I was hungry") or he could change his initial belief that stealing is wrong (e.g. "Stealing is not that bad, as long as it is a matter of survival"), to reduce dissonance. On the other hand, if his initial beliefs are strong enough, he may decide to hold on to his primary cognition and discontinue stealing—the dissonant behavior;

thereby reducing dissonance. Researchers often measure dissonance reduction as an *attitude to change* (Harmon-Jones et al., 2010). Hence, attitude change in response to a dissonant condition is expected to be in the direction of the cognition most resistant to change.

The questions as to why people experience dissonance and why they are motivated to reduce it have spun several streams of research in their own right. They have also given rise to a series of mini-theories in the area of cognitive dissonance. Among these, the most popular are: the self-consistency theory (Aronson, 1969); self-affirmation theory (Steele, 1988); self-standards model (Stone and Cooper, 2003); aversive consequences perspective (Cooper and Fazio, 1984) and the action-based model (Harmon-Jones *et al.*, 2010). The difference in these theories rests essentially in the attribution of the role of "self" in the cognitive dissonance process. However, the CDT has shortcomings: Harmon-Jones and Harmon-Jones (2002) have argued that Festinger's (1957) theory stopped short of explaining why individuals do not like to be in a state of cognitive inconsistency.

Consistent with the cognitive dissonance theory described above, user resistance is defined conceptualized as follows. When an individual's intention or action to reduce inconsistency is to rationalize or support his present state of cognition: such that a "new knowledge" is considered as dissonant or inconsistent with the individual's present cognition, the consequent behavior can be described as resistance. Simply put, resistance is an implicit or explicit intension that results to a behavior that opposes change towards a particular "new" attitude or behavior.

Conclusion

In summary, the investigator reviewed user resistance to information systems literature in the context of a wider literature of resistance to organizational change. Relevant extant theories

and models were specifically discussed. The common thread in the literature of resistance to information technology can be summarized as follows:

1. Resistance is a complex phenomenon: requiring different theorizations for a more comprehensive understanding.
2. Resistance attitudes should be studied from an unbiased perspective; that is, as neither positive nor negative.
3. Resistance attitudes may span through pre-implementation, during implementation, and post-implementation phases of an information system.
4. Resistance behaviors could originate from a single individual as well as groups of individuals.
5. Resistance is a result of the dynamic interaction between people, technology and the organizational environment.

In Table 3, a summary of the key literature is presented. First, it shows that there is a lack of an overarching paradigm of user resistance to information systems in spite of the burgeoning alternative theoretical explanations of user resistance to IT that have been proposed. Second, there is a noticeable lack of empirical investigations. Most of the research so far has been dominated by case studies, action research and other qualitative methodologies. As a consequence, many of the proposed models are yet to be validated. Third, not many studies have specifically looked into user resistance in the context of health information technology. Lastly, with the several theories and perspectives already proposed, there still is a lack of a comprehensive theoretical framework that can be tested.

Table 4. Summary of key research on IT resistance

	Theoretical Perspective/view	Sources of resistance	Type of study/ Technology type	Type of model
Markus (1983)	• Interaction theory • Power and politics dynamics • Neither good nor bad	• People-determined • System-determined • Interaction between people and system	• Case study/Group analysis • Financial information systems	• Theoretical • Untested
Hirschheim and Newman (1988)	• Resistance as aggression, projection, avoidance	• Innate conservatism • Lack of felt need • Uncertainty • Lack of involvement in the change • Redistribution of resources • Technological lack of fit • Poor technical quality • Designer personal characteristics	• Case study/ Group analysis • Insurance policy processing system	• Conceptual
Joshi (1991)	• Equity theory • Resistance as a result of gain or loss of equity status	• Perception of inequity arising from individual evaluation of fairness	• Case study/Individual level • Clinical laboratory system; banking system; fourth generation programming language	• Theoretical model • Untested
Martinko, Henry and Zmud (1996)	• Attribution theory • Learned helplessness	• Internal (within user e.g. past experiences) • External (outside the user)	• Literature review/ Individual level	• Conceptual • Untested
Lapointe and Rivard (2005)	• Combination of extant theories • Process model	• Interaction of between individual or group and system attributes	• Case study/ multi-level – group level • Electronic medical records	• Theoretical • Untested
Bhatterjee and Hikmet (2007)	• Dual factor model • Technology acceptance model	• Perceived threat	• Empirical study • Post-implementation of a clinical system	• Theoretical • Empirical test

Kim and Kankanhalli (2009)	• Integration of technology acceptance and status quo bias perspective	• Low perceived value • Lack of organizational support for change • Switching costs	• Empirical study • Pre-implementation of an IT enterprise system	• Theoretical • Empirical test
Meissonier and Houze (2010)	• IT conflict-resistance theory	• Task-oriented conflicts • Socio-political oriented conflict	• Action Research/ Individual and group levels • Pre-implementation of an ERP system	• Conceptual • Untested
Selander and Henfridsson (2012)	• Cynicism theory	• Cynicism (cognitive distance, negative effect, seeing through espoused claims)	• Case Study/ group	• Conceptual • Untested

CHAPTER III

RESEARCH MODEL

Introduction

The proposed model in Figure 4 builds on the Lapointe and Rivard (2005) framework (see Figure 3, page 34). The Lapointe and Rivard (L-R) model posited that resistance behaviors result from *perceived threats* that arise from the interaction between the *initial conditions* and the *object of resistance*. The model is presented as a cyclical process in which the consequences of the using a system are fed back into the *initial conditions* again as *triggers*, restarting the entire process all over again. Lapointe and Rivard viewed resistance from a longitudinal perspective of three phases namely: pre-implementation phase, implementation phase, and post-implementation phase. Regardless of the phase under consideration, the L-R model suggests that *initial conditions* interact with the *object of resistance* to produce resistance.

Model Development and Hypotheses

With the L-R model as a starting point, we discuss the proposed model from a matching perspective. First of all, the L-R model is summarized into three major parts namely: the *interaction of initial conditions* with the *object of resistance* (designated as *initial conditions* in the model diagram), *perceived threats* and *resistance*. The overarching theory that informs the proposed model is the *psychological reactance theory* (PRT), and is based on the following fundamental assertions as proposed by Brehm (1966) that:

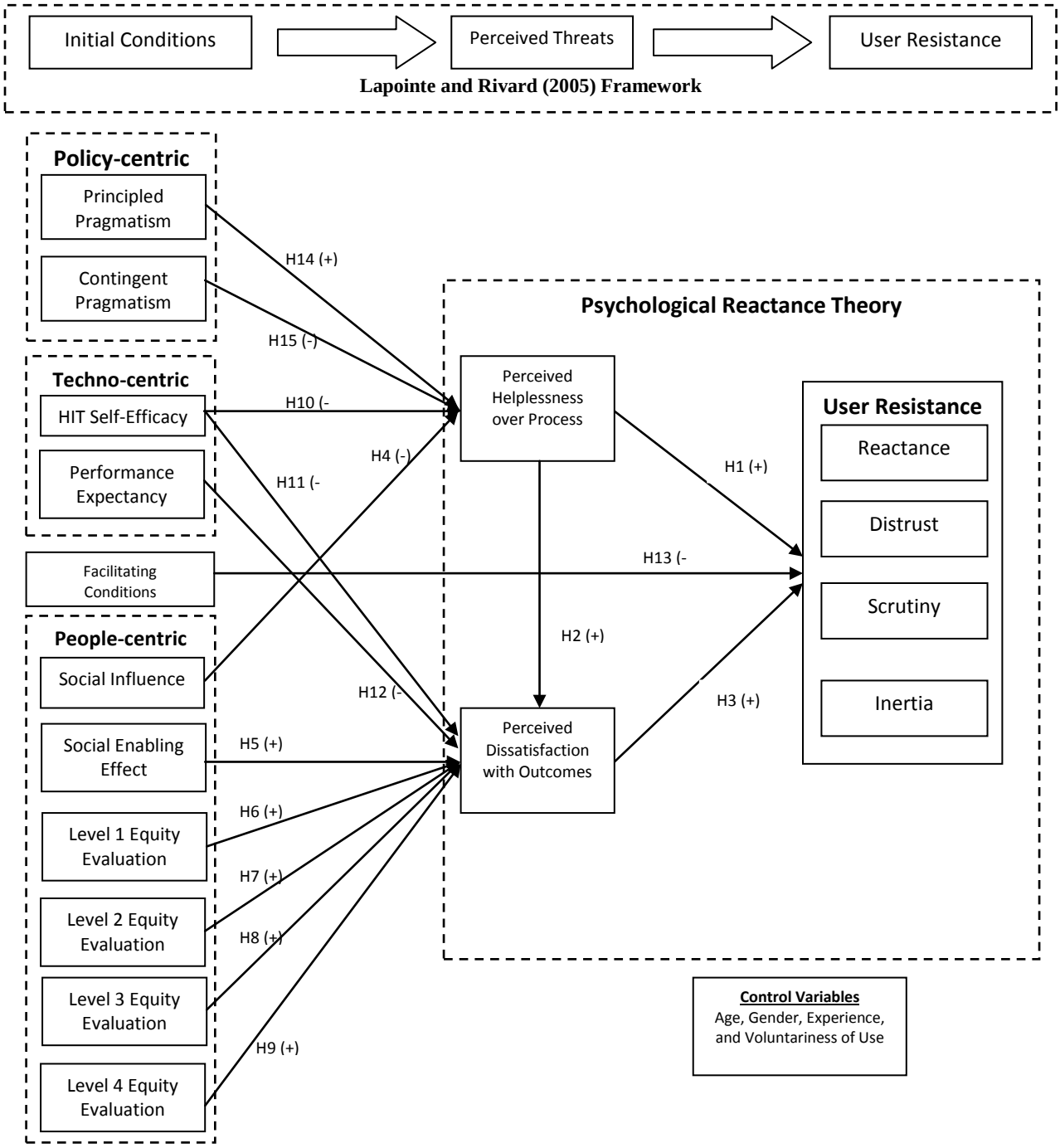


Figure 4. Research model

1. Human beings generally believe in "behavioral freedoms." That is, the freedom to perform certain behaviors: when they want it and how they want it.

2. When these freedoms are threatened, an uncomfortable motivational state known as reactance is created.
3. The decision to assert one's behavioral freedoms and to act in a way consistent these freedoms leads to resistance.

Given these assertions, we discuss the model in terms of the *initial conditions* that engender threats, the resulting *perceived threats,* and consequent *user resistance* within the context of a health information technology (HIT).

User Resistance

User resistance to information technology in this study refers to covert or overt behaviors that oppose change towards the use of- or avoidance of an information system manifested as *reactance, distrust, scrutiny or inertia*. Consistent with Piderit (2000) who suggested that user resistance should be viewed as a complex multi-dimensional construct, user resistance in this study is therefore treated in the light of the four faces (*reactance*, *distrust*, *scrutiny* and *inertia*) proposed by Knowles and Linn (2004). This study further builds on the view that a thorough conceptualization of resistance must cover cognitive, affective and behavioral realms as proposed by Lapointe and Rivard (2005) and Oreg (2006).

Perceived Threats

> "When a system is introduced, users in a group will first assess it in terms of the interplay between its features and individual and/or organizational-level initial conditions. They then make projections about the consequences of its use: if expected conditions are threatening, resistance behaviors will result." (Lapointe & Rivard, 2005; p. 461).

Threats may result from perceived inequity (Joshi, 1991), the fear of the potential loss of power (Markus, 1983), stress and fear (Marakas and Hornik, 1996), or from negative or undesirable outcome expectations (Martinko *et al.*, 1996). Previous studies have considered *perceived threats* as a single construct and an immediate antecedent of resistance. In this study, it is argued that *perceived threats* are manifested as two related, but distinct threats.

Justice literature had long postulated that people are constantly evaluating change through the lens of fairness (Konovsky, Folger & Cropanzano, 1987). If an individual believes that a particular change is not fair, a state of discomfort and dissatisfaction is created. Folger and Konovsky (1989) distinguished between two distinct types of justice in organizations namely: procedural and distributive justice. Procedural justice refers to the perceived fairness of the procedure while distributive justice focuses on the fairness of the outcomes. In the same way, Oreg (2006) has distinguished between two important elements of organizational change that are responsible for responsible for resistance. In his study, Oreg (2006) argued that two types of reactions to organizational change must be distinguished and examined separately namely: "reactions to the change process"—i.e. the procedural component, and "reactions to the outcomes"—i.e. the distributive component (p. 78). Furthermore, Lines (2005) had proposed a model of attitudes towards change based on fairness that argued for the differentiation between the "change process" and the "change content" (p. 12). Consistent with the forgone, it is argued here that *perceived threats* due to change would be a result of *threats from the process* as well as *threats from the outcomes* of the change in question. Again Lapointe and Rivard (2005) had pointed out that the introduction of technology in the workplace is likely to bring about change of routines, roles and even the significance of workplace interrelationships to bring about some

sense of threat. Based on the foregone, two types of threats are distinguished in this research namely: *perceived helplessness over process* and *perceived dissatisfaction with outcomes*.

When people appreciate the fairness of a change process, they become more likely to embrace the change outcomes. And though the outcome of a particular change may be perceived as a good one, people may still resist the change if the perceive that the change process itself is perceived as unfair. However, satisfaction with the process of change does not necessarily guarantee a satisfaction with the ultimate outcomes. A case in point is the airport security system deployed in airports across the United States after the 2011 terrorist attacks. Though many citizens want to have secured airports, they may not like the security screening processes that are in place and yet feel helpless about repeatedly being passed through the process. On the other hand, the deployment of security systems at airports does not in itself guarantee the outcome of greater security. In the information technology context, the implementation of new technology introduces new processes in the way things are done resulting in new outcomes.

Perceived helplessness over process is defined as an individual's belief that carrying out a new behavior diminishes their ability to maintain control over their current routine. According to the interaction theory (Markus, 1983), resistance can happen when an individual/organization interacts with technology in a given organizational context. The introduction of technology in the workplace is generally accompanied by new processes demanding the change of work routines and task dependencies between employees. These processes have the potential to cause power imbalances that may lead to *perceived helplessness over process.* The process of change due to the introduction an information system is therefore likely to be associated with reactions to *process of change.*

Perceived dissatisfaction with outcomes, on the other hand, denotes an individual's belief that carrying out a particular behavior will lead to unfavorable result. *Perceived dissatisfaction with outcomes* is generally linked to the discontentment with the espoused claims about the capability of the new system. Consequently, this perception is clearly linked to the outcome of change.

Perceived Helplessness over Process

Perceived helplessness over process, in this context, refers to an individual's belief that carrying out a new behavior diminishes their ability to maintain control over their current routine. Festinger (1957) suggests that people resist change because it is "painful", or may "involve loss." Furthermore, he asserts "the magnitude of this resistance to change will be determined by the extent of pain or loss which must be endured" (p. 25). Markus (1983) also suggested that during technology implementation, threats could arise from the dynamics of power and control. She therefore postulated that "power loss" for a group and consequently "power gain" for another will give rise to *perceived threats*. Perceived threats arise in this case due to the loss of autonomy brought about by these power imbalances. The perception of discontent with the process and loss of control over routine, results in a sense of discomfort described here as *perceived helplessness over process*. When an individual's sense of control over the process is threatened, the individual is likely to resist.

Shine (2002) notes that the shift from physician autonomy to greater team practice in the 21st century could also explain the physician's sense of frustration with certain processes that seem to threaten autonomy. Mrayyan (2004) also found out that nurses perceive autonomy to play an important role in their job contentment.

Warren *et al.* (1998) conducted a study in which they measured physician's perceptions of loss of control over work conditions and clinical autonomy. The results showed that loss of

control over work conditions and clinical autonomy, were all significantly and negatively correlated with physician satisfaction. Additionally, this study found out that one of the strongest challenges to physician satisfaction was the yielding their clinical judgment to non-physicians. In fact 44 percent of those who sometimes must yield their clinical judgment to non-physicians were dissatisfied, compared to only 18 percent of those who need not do so. The introduction of technology in the workplace clearly disrupts routines and task management; and threatens clinicians who feel as though they have surrendered their control over work conditions and professional judgment to non-clinicians—in this case, system developers. This threat to clinical control over work conditions and autonomy is likely to contribute to user resistance to information technology in the healthcare setting.

The sweeping process changes in the healthcare system due to the introduction of electronic health records are likely to generate resistance due to the loss of control in autonomy and power over processes. This loss of control is further exacerbated by the government procedural requirements placed on medical professionals (Warren *et al*. 1998). Since most of these imposed changes impact work routines and task assignments, physicians and other professionals are likely to resist such changes. Hence, it is hypothesized:

Hypothesis 1: Perceived helplessness over process of use of the system will positively affect user resistance.

Perceived Dissatisfaction with Outcomes

Perceived dissatisfaction with outcomes, on the other hand, denotes an individual's belief that carrying out a particular behavior will lead to unfavorable result. Relevant outcomes of an information system in healthcare include: increased productivity and efficiencies (due to the speed with which tasks are carried out), the boosting of skills and the ability to offer quality care.

Warren *et al.* (1998) have established a connection between loss of control over work conditions, clinical autonomy and lack of satisfaction. This study showed that both loss of control over work and reduced levels of clinical autonomy will both lead to greater dissatisfaction with outcomes. Hence, it is hypothesized:

Hypothesis 2: Perceived helplessness over process of use of the technology will positively affect perceived dissatisfaction with outcomes.

Poon et al. (2006) also observed that the introduction of certain HIT systems is likely to cause employee dissatisfaction due to the negative impact it has on workflows and productivity. Additionally, as the health-care providers' income is directly tied to their productivity (Poon *et al.* (2006), any changes that negatively affect this bottom-line are likely to result to dissatisfaction. Consequently, dissatisfaction with productivity and workflows due to implementation of new systems is likely to cause resistance to change.

Alter (1978) pointed to the positive relationship between user dissatisfaction and resistance (lack of compliance). Alter notes that the implementer's dilemma is: "How can I achieve compliance with minimal disruption and user dissatisfaction?" (p. 40). Doll and Torkzadeh (1989) had also stated that user feelings of greater control due to involvement in decision-making can lead to reduced resistance. Additionally, Martinko *et al.* (1996) observed that user dissatisfaction with the system is associated resistance towards the system. The introduction of a new system will affect productivity, at least in the beginning, since users must learn how to use the new system. The more users find ways to go around the system instead of actually using them, the more productivity is affected. This impact on productivity contributes to the dissatisfaction with system outcomes. Additionally, workflow interruptions can also affect dissatisfaction with outcomes such that the greater the number of disruptions, the more

dissatisfied the healthcare professional. There is an association between *perceived helplessness over process, perceived dissatisfaction with outcomes* and *user resistance*.

Dissatisfaction from the introduction of an information system in healthcare can result from threats to equity in reward systems, productivity and workflow. Regardless of the source of dissatisfaction, this generally leads to resistant behaviors. As Ford *et al.* (2008) have noted when employees cannot perceive a fair treatment during a change process in the work place, a loss of trust and satisfaction results. This means that the change process can affect can also affect the outcomes. For instance, if an older physician perceives that the outcome of the introduction of a system will inequitably favor a younger physician who has greater computing skills needed to work the system, they may become dissatisfied with the outcomes. This dissatisfaction is then manifested as resistant behaviors that including revenge, sabotage, theft or other aggressive behaviors (Ford *et al.*, 2008). Evidently when employee satisfaction is threatened, resistance is likely to ensue. It is therefore hypothesized:

Hypothesis 3: Perceived dissatisfaction with outcomes of use of the technology will positively affect user resistance.

Initial Conditions

Initial conditions are defined as defined by Lapointe and Rivard (2005) refer to work habits, routines, social values and workplace interrelationships including distribution of power. These conditions could be active or inactive. They are active when they play a role in the interaction with the object of resistance (e.g. a new system) or inactive, when they do not interfere with the object of resistance. Brehm and Brehm (1981) distinguished different initial conditions to the threat of reactance. Reactance here refers to a resisting emotional reaction

created by the introduction of a new or contradicting element of belief. Brehm and Brehm (1981) noted that these sources could be social versus non-social, or personal versus impersonal (p. 32).

For organizational and contextual reasons, these factors have been classified as *people-centric, techno-centric,* and *policy-centric* factors consistent with the main components of an information system as defined by Whitten and Bentley (2005). This classification of initial conditions into people, technology, and policies is consistent with other IS research which show that the interaction of these factors is responsible for implementation outcomes (c.f. Markus, 1983). Such classification helps us to discuss the complex interplay of people, technology, and policy within context of organizational transformation. Hence, it is argued that the interaction of these components will constitute the basic initial conditions that will generate threats that lead to reactant behaviors.

This categorization is therefore consistent with the Lapointe and Rivard's (2005) definition of *initial conditions* which includes work habits, routines, social values, and workplace interrelationships. Some researchers have looked at initial conditions from the standpoint of long held patterns in the political setting to which the system is introduced (Markus, 1983) and yet some have regarded it as an interplay of attributions of an individual through internal and external influences (Martinko *et al*., 1996). Additionally, they postulated that these initial conditions could interact with *object of resistance* to produce threats. In the following sub-sections below, the contributions of people-centric, techno-centric and policy-centric factors to perceived threat are discussed.

One of the *initial conditions* constructs in the model, *facilitating conditions,* was seen to cut across people, technology and policy frameworks. Facilitating *conditions* is therefore

discussed separately: i.e. neither as a people-centric, techno-centric or policy-centric factor, for this same reason.

People-centric Factors

People-centric factors refer to the aspects of *initial conditions* that originate principally from the people interacting with the new information system. Here, *perceived threats* set in due to the part that people play on the user experiencing a workplace system change. The main concept here is that people's reaction in the workplace is not solely dependent on them. As long as they are a part of the social system around them, their work experience will be affected by those around and important to them. In this regard, we draw from theories that explain social interaction. Generally, society affects us in three ways: directly (through laws and ethics), indirectly (through normative processes) (Rimal & Real, 2005), or by just providing a frame of reference to which we constantly evaluate and make individual judgments (Joshi, 1991). Based on these criteria, three people-centric sets of factors were found to critical for information technology use in the work place and are discussed here. These are: *social influence* (indirectly-normative dimension), *social enabling effect* (indirectly-normative dimension), and the *equity implementation* (comparative dimension) constructs. The third dimension, law and ethics, deals with policies and is treated separately in under policy in this study.

Social influence. Derived from the technology acceptance model (UTAUT), social influence refers to the degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh *et al.*, 2003). Similar to subjective norms in the theory of reasoned action (TRA), the technology acceptance model (TAM2), and the theory of planned behavior (TPB), social influence carries with it the explicit or implicit idea that an individual's

behavior is influenced by the way in which he/she believes others will view him/her vis-à-vis the use of a new technology (Venkatesh *et al.,* 2003).

Two types of social influences—injunctive norms and descriptive norms—have been described. Injunctive norms have been described as "a person's perception that most people who are important to him think that he should or should not perform the behavior in question'' (Fishbein & Ajzen 1975). The descriptive norm, on the other hand, refers to the social approval cues that we receive from the actions of referent others (see Cialdini, 2001, p. 100). For example, if one views a significant other (e.g. a colleague) performing a particular behavior, one may consider the behavior to be appropriate for him or her in similar circumstances.

Coleman *et al.* (1966) demonstrated that innovation within the medical community is adopted and integrated into medical practice through professional networks. They showed that doctors, who were connected to one another within their social system, were also influenced by one another, through these social ties. It can be reasonably expected that in an implementation initiative, healthcare personnel will be influenced by their significant others in the professional networks.

Social influence has impact through three mechanisms namely: compliance, internalization and identification (Venkatesh & Davis, 2000). Venkatesh *et al.* (2003) have stated that the compliance mechanism causes the individual to change his/her intentions due to social pressure while the internalization and identification mechanism operates by causing an individual to respond to social status gains. If a user therefore believes that others will view him/her positively if he/she uses a system, he/she could be pressured into using the technology. However, the pressure also comes at the cost of a loss of control over their preferred behaviors. For instance, in the transition from paper to electronic health records in the U.S., though system

users might change due to the expectations from the administration, they soon notice that they have lost control over such behaviors as unhindered face-to-face patient interaction. They may find themselves both listening to the patient while trying to make a few clicks on the computer system; a process which could be less intrusive if they just jotted notes on a piece of paper. For practitioners who find quality patient interaction as a key to proper quality care, social influence will likely to affect their loss of control in their preferred time-honored professional routines.

Additionally, research in technology acceptance also suggests that referent others who have the authority to determine the rewards or punishment for certain behaviors, generally have more social influence than those who have no such powers over other employees (Warshaw, 1980). This implies that to the extent this normative pressure comes from individuals who have the powers to decide an employee's reward system, the greater the influence to comply will be. The greater the social push to comply is, the lesser the control over the particular behavior in question.

According to the self-determination theory, outside influences such as social influences can be thought of as extrinsic motivators—since they originate from outside of the person. Such extrinsic motivators have been found to be associated with pressure, tension, and decreases in enjoyment (Chatzisarantis & Biddle, 1998). Since these behaviors are generally motivated for the attainment of an extrinsic outcome the performer of such behaviors may develop a negative affect due to their trying to comply with outside influence. To the extent that this outward compliance is not part of the performer of the behavior's preferred action, this may lead to lesser fulfillment due to lack of control.

However, if social influence takes the mechanism of internalization and identification, where an individual is motivated by a sense of desiring belongingness and therefore performs

behaviors consistent with those of referent others; social influence will have the role of lessening their sense of lessening their loss of control. Hence, social influence is likely to affect *perceived helplessness over process* such that the greater the motivation to comply with referent others, the lower the helplessness over process. Hence, it is hypothesized:

Hypothesis 4: Social Influence will negatively influence Perceived helplessness over process.

Social enabling effect. *Social enabling effect* refers to an individual's belief that his/her beliefs are consistent with those of referent others around them. Social enabling effect espouses a concept of "shared beliefs." However, in the context of this research, we focus on negative *shared beliefs*. The *social enabling effect* differs from the two types of social influences mentioned above. Unlike injunctive norms, *social enabling effect* does not exhibit a social pressure effect. This means that referent others may not necessarily be perceived as expecting certain behaviors from those under their influence. On the other hand, *social enabling effect* differs from descriptive norms in that social enabling effect is a perception of what a referent other would do (and not necessarily what the other actually does) and is not dependent on any actual cues or visible behaviors.

According to the social comparison theory, people make assessments about appropriate models of conduct by comparing themselves with others in their social midst (Festinger, 1954). In other words, people are always looking to affirm their behaviors from external sources. Unlike social influence, social enabling effect is not an external pressure. It is a self-imposed view by the system user that is trying to make judgments of the given situational outcome. For instance, when a policy change is first announced in a particular work-setting whose outcome may not particularly look pleasant, an employee may think to himself/herself: "I don't think anyone here believes this thing is going to work." Or the individual might also think, "Nobody here is going

to succumb to that type of way of doing things." And without necessary consulting with the others, hold the particular policy in disdain, because he/she thinks others will equally be dissatisfied with it.

Bankauskaite and Saarelma (2003) have cited dissatisfaction with healthcare reform as one of the organizational deficiencies of the healthcare system. In their study, the authors mention common reactions like: "Health care reform is bad" and, "Health care reform is pushing people to despair." If the prevailing belief in a healthcare facility is not in favor of a particular change, individuals within that community are likely to become dissatisfied with the announced change.

Lapointe and Rivard (2005), in their case study investigating user resistance in the implementation of HIT in three hospitals, noted that although individual reactions seemed to differ at the beginning of the implementation process, the general reaction of dissatisfaction was rather unanimous with different groups of physicians at the end of the process. They also express users' spread of the perception of dissatisfaction with implementation changes in their study as they noted: "the other physicians supported the surgeons by refusing to admit patients into surgery units" (p. 478). Clearly, an individual's perception of how others see change within a healthcare practice community to be negative, breeding dissatisfaction, will determine how they in turn view change. Hence, it is hypothesized:

Hypothesis 5: Social enabling effect will positively influence perceived dissatisfaction with outcomes such that if the attitude of referent others are perceived to be negative towards outcomes, the subject will be dissatisfied with the outcomes.

The equity implementation model variables. As discussed earlier, the Equity Implementation Model posits that users are always trying to assess and compare the fairness with

which they are being treated following the introduction of an IS. If people perceive that they are not treated equally with the introduction of a new system either by the fact that their work inputs increase at the expense of their benefits, they are likely to be dissatisfied. This comparison occurs at three different levels. At the basic level of comparison, users assess the net change in their own inputs and outcomes compared to the previous system. At the second level of analysis, users' net changes are assessed based on whether these benefits are shared equitably between the users and the organization. At the third level, users evaluate net gains by comparing their inputs and outputs with those of others (e.g. co-workers). See Hess and Hightower (2002) and Lauer, Joshi and Browdy (2000) for more discussion on this subject.

In this research, a fourth level of equity evaluation comparison is introduced. Here, a comparison in equity change is made between users of the system and the government. In the Joshi (1991) model, people evaluate equity by comparing themselves with their organization at the second level. However, as government policy and regulation steps in, the government becomes an important stakeholder in equity evaluations. Chiasson and Davidson (2004) argue that IT implementation in healthcare environments should be carried out in full cognizance of the sector's particular characteristics. One notable characteristic of healthcare IT implementation is that, unlike other industries where IS are introduced mostly from the implementing organization's perspective, it is also mandated by the State. Hence, the number of stakeholders goes beyond just the organization and its workers to include even the government. Hess and Hightower (2002) propose the relationship between the different evaluation levels and user satisfaction with a new system. This means that, to the extent that a user's net gains from using a new system is positive—compared to those of himself with a former system, his co-workers, his organization, or his government—the more likely he is to be satisfied with the new system. On

the contrary, if the users feel that the introduction of the new IS is giving an "unfavorable" advantage to others, their organization or the government, the users are likely to be dissatisfied. Hence, it not unlikely that employees not only compare their net gains using a new system with the net gains of their co-workers or their organizations, but also compare that with the gains of government.

In the context of the *Meaningful Use* policy of the United States government, healthcare workers may feel that compliance to the use of new certified technology only benefits government interests and not them as professionals. To the degree that this evaluation is either deemed fair or unfair, it is likely to influence the satisfaction of the system user.

Fairness perception has been conceptualized in two ways namely: the comparison of inputs/outcomes with those of others or the assessment as to "how" the fairness process is carried out (Adams, 1965; Cropanzano and Folger, 1991). Research shows that when unfairness is perceived: whether in terms of the outcomes or yet in terms of the procedures to arrive at these outcomes, employees become dissatisfied (Dailey & Kirk, 1992). Therefore, it is hypothesized:

Hypothesis 6: A net negative Level 1 Equity Evaluation (being rewarded less than previously due to the introduction of a new system) will lead to greater Perceived dissatisfaction with outcomes.

Hypothesis 7: A net negative Level 2 Equity Evaluation (being rewarded less than the organization due to the introduction of a new system) will lead to greater Perceived dissatisfaction with outcomes.

Hypothesis 8: A net negative Level 3 Equity Evaluation (being rewarded less than referent others due to the introduction of a new system) will lead to greater Perceived dissatisfaction with outcomes.

Hypothesis 9: A net negative Level 4 Equity Evaluation (being rewarded less than government due to the introduction of a new system) will lead to greater Perceived dissatisfaction with outcomes.

Techno-centric Factors

Techno-centric factors refer to the aspects that originate principally from the information system. Here, perceived threats sets in due to the part that technology plays on users experiencing a workplace system change. In identifying these factors, we looked for technology-centered factors that exert the most impact on a user's behavioral decision-making, as well as factors possessing significant explanatory power. Compeau and Higgins (1995) had stated: "Self-efficacy perceptions have been found to influence decisions about what behaviors to undertake" (p. 189). Additionally, Park, Yang and Lehto (2007) also noted that performance expectancy "has been considered the most powerful tool for explaining the intention to use the system regardless of the types of environments, be it mandatory or voluntarily." In this regard, health information technology self-efficacy and performance expectancy were found to be the most important techno-centric factors.

Health information technology (HIT) self-efficacy. Compeau and Higgins (1995) defined computer self-efficacy as "individuals' beliefs about their abilities to competently use computers." It is thought to be "concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses" (p. 391). Applied to the context of this study, HIT self-efficacy is defined as an individual's beliefs that he or she has the ability to perform a specific task/job using a health information technology. Consistent with the suggestion by Agarwal *et al.* (2000) that such a self-efficacy has to be specific to the type of technology in

question, and not just general technology self-efficacy, this construct is purposefully named *HIT self-efficacy*.

Bandura (1986) has shown that self-efficacy is positively associated with expectations of future use of technology (Compeau and Higgins, 1995). One way in which the introduction of new technology can arouse discomfort in the workplace lies in the unpredictable nature of the outcome of the use of the technology. A user may be worried about his competence based on the lack of exposure to similar technologies in the past. Because of this, individuals who have developed skills through the use of similar HIT technologies in the past are more likely to have a sense of control of future outcomes compared to non-users. Also, these individuals are less likely to be concerned about their ability to use the new system to obtain desired outcomes. They generally have a sense of anticipatory satisfaction in the anticipated outcomes of the new system. In fact, a Compeau and Higgins (1995) study showed that individuals with high self-efficacy used computer systems more, derived more enjoyment, and experienced less computer anxiety. People tend to use systems more if they can derive some form of enjoyment and satisfaction. Therefore, it can be expected that HIT self-efficacy will negatively affect *perceived dissatisfaction with outcomes*. Also, as individuals who are high on self-efficacy use computer systems more and more, they become less anxious, and hence develop a sense of control.

Additionally, Compeau and Higgins (1995) also found that the higher an individual's self-efficacy is, the higher his/her outcome expectations would be. In particular, outcome expectations related to job performance were found to have a significant impact on affect and computer use. With increased expectations related to job performance, system users are likely to be satisfied with these outcomes. Furthermore, increased expectation and lower anxiety means that system users will have a sense of control over the process and outcomes.

Bandura (1976) also stated: “Persistence in activities that are subjectively threatening but in fact relatively safe produces, through experiences of mastery, further enhancement of self-efficacy and corresponding reductions in defensive behavior” (p. 191). This means that as an individual develops skills from past experiences of HIT usage, they are less likely to put up defensive behaviors due to the threat of a new system change. In HIT implementation, the more an individual has prior skills in an identical technology, the more likely they are to have a positive judgment of their abilities to execute a course of action (self-efficacy). This sense of competency is then likely to lead to lesser anxiety and greater sense of control; while raising the users’ satisfaction levels. Hence, it is hypothesized:

Hypothesis 10: HIT self-efficacy is negatively associated with Perceived helplessness over process.

Hypothesis 11: HIT self-efficacy is negatively associated with Perceived dissatisfaction with outcomes.

Performance expectancy. Derived from the Unified Theory of the Use and Acceptance of Technology (UTAUT), *performance expectancy* refers to the degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh *et al.*, 2003). Performance expectancy is defined exactly like *perceived usefulness* in the technology acceptance model; except that it is conceptualized as a versatile construct including items derived from *relative advantage* and *outcome expectancy* constructs. Venkatesh *et al.* (2003) have argued that the performance expectancy is the strongest predictor of behavioral intention. Specifically in the HIT context, performance expectancy is the measure of how much people perceive an HIT system will be useful in achieving their goals in terms of job

performance. When people fail in their attempt to achieve job performance goals due to the introduction of a new system, dissatisfaction with this outcome is not uncommon. When this happens, negative emotions of dissatisfaction are aroused. According to Anderson (1973), user dissatisfaction is clearly the effect of disconfirmed expectancy on perceived product performance. Hence, when job performance expectations from the use of a system are not met, frustration results. It is therefore hypothesized:

Hypothesis 12: Performance Expectancy of a new system will negatively affect Perceived dissatisfaction with outcomes.

Facilitating Conditions

Facilitating conditions refer to the degree to which an individual believes that an organizational and technical infrastructure exists to support use of a system (Venkatesh *et al.*, 2003). Formulated by Venkatesh *et al*. (2003), facilitating conditions is a composite measure of three related constructs in literature namely: perceived behavioral control (Ajzen, 1991; Taylor and Todd, 1995), facilitating conditions (as first defined by Thompson *et al.*, 1991), and compatibility (Moore and Benbasat, 1991). Created thus, facilitating conditions is an important construct because it is operationalized to include both technological and/or organizational factors. For instance, *perceived behavioral control* is defined by Venkatesh *et al.* (2003) to reflect perceptions of internal and external constraints on behavior including technology facilitating conditions (p. 454); while the Thompson *et al.* (1991) *facilitating conditions* focuses on the environment of the user; and Moore and Benbasat (1991) *compatibility* looks at the degree to which an innovation is perceived as being consistent with existing values, needs and experiences of system user (p. 454).

In this regard, *facilitating conditions* is unique in its ability to unite individual, organizational as well as technological characteristics. *Facilitating conditions* has therefore been hypothesized a as a multi-faceted construct that directly predict individual behaviors (c.f. Venkatesh et *al.*, 2003) unlike the other constructs of the model that are mediated through *perceived threats*.

Facilitating conditions have been hypothesized to be associated with use behaviors (Venkatesh *et al*., 2003). When there is support for the use of a system from both the organization and from the design characteristics, the likelihood of the system use will increase. Hence, the greater the degree to which a user feels that he/she has both organizational and technical support to back his/her use of a specific HIT, the more likely his/her are to want to use the system, and consequently, the less likely they are to resist usage. On the contrary, if there is little or no support for usage, facilitating conditions are perceived as small and the resistance will be high. Hence, it is hypothesized:

Hypothesis 13: Facilitating Conditions of an organization will negatively affect User Resistance.

Policy-centric Factors

Policy-centric factors refer to the aspects that originate principally from policies that lead to the introduction of a new information system within an organization. Here, perceived threats set in due to the introduction of a new reform. Users of the system are then forced to react to the reality of this workplace system change. In this regard, two variables were found to be important, namely: *principled pragmatism and contingent pragmatism.*

The desire to create reforms that will positively impact the lives of citizens through quality healthcare is a constant concern for governments. Ackroyd, Kirkpatrick & Walker (2007) draw attention to the healthcare sector as one of three sectors, namely housing, health, and social

services, most affected by public management reforms. However, Ackroyd and associates also note that management restructuring for health and social services have been less effective, despite greater resources devoted to it. The authors conclude that this variation in the effectiveness of policy across industrial sectors can be attributed to the "professional values and institutions, against which reforms were directed, and the extent to which different groups became either locked into strategies of resistance or accommodation" (p. 9). Evidently, the way professionals in a particular industry view policy changes would determine compliance or non-compliance.

Embracing or rejecting reform is generally a function of professional ideology and pragmatism (Ackroyd *et al.,* 2007). By professional ideology, we mean the set of beliefs, principles, or creeds that professionals hold. Professional pragmatism, on the other hand, refers to the judgment of the reform by the professional on the merit of its practicality or "common sense." Based on these two elements, professionals in a given field may differ in what they consider to be acceptable or unacceptable reform.

The need to comply with a new public policy within an organizational sector is likely to trigger the threat of losing this somewhat professional identity. It is this form of professional identification that makes individuals to say things like, "This is how we physicians do it" or "Scientists like us won't buy it." As More *et al.* (2002) have pointed out, reform generally changes focus of practice namely: from practices defined by practitioners, to those defined by managers.

Moore *et al.* (2002) have discussed extensively how schoolteachers reposition themselves in the face of new and sweeping reforms. Typically, there are people who would still accept reform in spite of their ideology and pragmatism and others who see reform as a threat to this

ideological and pragmatic freedom. The categorization of professionals' attitude towards policy change by Moore *et al.* (2002) is used. According to this categorization, professionals could be considered as *principled pragmatists* or *contingent pragmatists* depending on the way they pull from, and identify with professional ideologies. Though this categorization has, heretofore, only been used to describe reactions to reform in the educational sector, it is argued here that the basic tenets are plausible in the healthcare sector.

Principled pragmatism. It refers to the positive belief by an individual that a set of reforms will strengthen and affirm his or her professional identity by drawing eclectically on a range of professional practices and traditions. Moore *et al.* (2002) describe these individuals as ones having a positive attitude towards policy change and reform. Furthermore, they are said to be those, "who, regardless of the extent of their choices may be unconsciously guided by 'external' constraints, self-present as decision-making individuals with a clear professional plan and purpose that guide those decisions" (p. 554). This type of professionals mostly attributes their pragmatism to 'effectiveness', strongly linking it to superior performance and outcomes.

In the domain of healthcare, these types of professionals are more likely to be concerned with how the introduction of a system is likely to enhance process outcomes. They seem to be willing to succumb to change as long as it comes along with the promise of better professional outcomes. Hence, these individuals are less willing to lay aside their ideological stance for a different way of practice, if they are unsure that this will lead to better process outcomes. They seem to be more threatened by this change, and do not see themselves losing control of their professional practice. They might even see the lack of better process outcomes through reforms as the increasing their power and influence.

Contingent pragmatism. It refers to the belief by an individual—with oppositional orientations towards reform—whereby enforced reactions to policy change takes on 'something of the function of a survival strategy' (Moore *et al*., 2002, p. 551). Here, the professional is opposed to the policy, and even though they may succumb due to the mandate, they do so an 'only-way-out' option. This phenomenon describes a situation in which professionals express visibly and often quite uncomfortably, a sense compromise or uncertainty in their eclecticism. Their actions seem to reveal the fact that they are in a state of largely enforced adjustment.

Flynn (1999) had commented on the aim and nature of public reform as inherently possessing the ability "to reduce (if not eliminate) the autonomy and independence of the professions" (p. 35). On public reform from 1980-2000, Ackroyd *et al.* (2007) state: "The focus would no longer be on maintaining customary modes as defined by practitioners, but on responding to changing conditions (as defined by managers) in a strategic fashion" (p. 12). The potential of reform to affect autonomy and shift professional ideology and pragmatism is a clear threat to control over one's profession. As Marris (1975) has noted: "Change threatens to invalidate [previous] experience, robbing them [professionals] of the skills they have learned and confusing their purposes, upsetting the subtle rationalizations and compensations by which they [previously] reconciled the different aspects of their situation" (p. 16).

Because of the foregone, healthcare professionals in mandatory technology use settings are required to make necessary, but not always welcomed adjustments to their practice in order to respond to external pressures from the government or other policy stake holders. Consequently, it is hypothesized:

Hypothesis 14: Principled pragmatism will positively affect perceived helplessness over process.

Hypothesis 15: Contingent pragmatism will negatively affect perceived helplessness over process.

CHAPTER IV

RESEARCH METHODOLOGY

This chapter outlines the research methods used in testing the hypotheses proposed in Chapter 3. It describes how the instrument is developed, how the reliability and validity of the instrument is assessed, the way data was collected and analyzed including data analysis procedures. The chapter has the following sections: (1.) research design, (2.) participants, (3.) Sampling, (4.) instrument development and testing, (5.) measures (6.) pre-testing, (7.) pilot testing (8.) survey administration, and (9.) data analysis strategy.

Research Design

This study was designed to respond to the study's goals, objectives, and questions. Given the fact that objectives of the research were to test a comprehensive model and to find out driver constructs and target constructs, a quantitative study design was adopted. Kaplan and Duchon (1988) distinguish between a quantitative hypothesis-testing approach from the qualitative approach as a matter of the goals and objectives of each approach. In a quantitative hypothesis-testing approach, the effects of an intervention on dependent variables are statistically assessed while in a qualitative research approach, categories and theories are developed inductively from the data as generalizations are constructed from the ground up, as various interpretive schemes are tried in the course of the study (Kaplan & Duchon, 1988). Chen and Hirschheim (2004) also noted that while qualitative methods rather emphasize the description and understanding of the situation behind factors, quantitative methods (the chosen method here) typically use numerical

analysis to illustrate the relationship among factors under study. Lastly, Chen and Hirschheim (2004) have also stated the significance of empirical versus non-empirical studies namely that: while non-empirical has as main contribution theory-building, empirical study rather focus on theory-testing. Hence, given that the goal of the study was to build a model from extant theories and to test it, a quantitative hypothesis-testing approach was chosen.

User resistance to information technology has been identified as veritable issue that needs addressing in information technology adoption, implementation and use literatures (Rivard and Lapointe, 2012; Kim and Kankanhalli, 2009; Bhattacherjee & Hickmet, 2007). The question as to how and why people resist the use of information systems continues to be a relevant question among implementers and change managers. With this problem in mind, the current study was designed to answer three specific questions namely: (1) why do healthcare personnel resist health information technology? (2) What are the antecedents of perceived threats to health information technology? And (3) does user resistance vary across various healthcare professions? To answer these questions, social psychological theories, social identity theories and information systems theories were used to develop 15 testable hypotheses as presented in the preceding chapter. Data were collected from healthcare personnel who were users of health information technologies through surveys with items from both pre-validated and non-validated scales developed by the researcher. Collected data were analyzed using statistical tools that permitted the hypothesized relationships to be tested to assess whether they were tenable. Since the hypotheses were all derived from theory, the research design therefore had as its ultimate goal to test the underlying theories that explain the phenomenon of user resistance to information technology. In the following sections, the participants in the study are described, the measures discussed, data collection methods are highlighted, and the analysis strategy is elaborated.

Study Participants

Research in information technology resistance within the healthcare sector with the goal of understanding user resistance and the factors that affect it, has often drawn from a broad population including a wide range of healthcare professionals[1], such as physicians, nurses, staff and even administrators (Bates, 2005; Bhattacherjee and Hickmet, 2007; Lapointe & Rivard, 2005; Thede, 2009; Timmons, 2003). Because this research had similar objectives and goal to measure cognitive and attitudinal perspectives of user resistance to information technology, the sample for the study was drawn from a similar population. Participants in this study included physicians, physician assistants, nurse practitioners, registered nurses, and other healthcare professionals who use electronic health record systems in daily practice.

Sampling

Sampling is the process of selecting units (such as people and organizations) from a population of interest such that by examining the sample, a fair generalization can be made about the population under study. Cook and Campbell (1986) have suggested two steps in examining method design namely: (1) to make explicit some of the specific threats to validity which random assignment does not usually control for and those that are plausible if random assignment does not occur; and (2) to specify how validity threats are controlled.

Campbell and Stanley (1963) have also distinguished two key types of threat to validity: the threat to internal validity and the threat to external validity. By threat to internal validity is meant forces that can systematically bias inferences about causal connections. Threats to external validity, on the other hand, denote forces that can lead to spurious conclusions about the

[1] A healthcare professional is defined in the context of this research as a person who by education, training, certification, or licensure is qualified to and is engaged in providing healthcare. Physicians and nurses are often used in research to study healthcare professionals' behavior to IS (see Bhattacherjee and Hickmet, 2007; Lapointe & Rivard, 2005).

generality about causal effects. Threats to internal validity are perceived as confounding with other agents that could potentially cause changes in outcome measures and be mistaken for effects of the treatment implemented (Cook & Campbell, 1986). Campbell and Stanley (1963) list some examples of the threats to internal validity such as history, maturation, testing, instrumentation, statistical regression, selection biases, differential mortality and selection-maturity. Threats to external validity point to factors that might limit generalizability of causal relationships thereby making them very specific to particular settings, people or times. Since the analysis of causation require that both presumed cause and effect to covary, Cook and Campbell (1979) suggest for that statistical testing should observe high power.

The sampling design for the current study was constructed yield high internal validity as well as external validity. Given the research design, the greatest threat to internal validity regarding sampling, was determined to be selection bias. Selection biases result from particular respondent units being represented to the detriment of other selected treatment units. This threat was addressed by making sure that different sampling units (healthcare institutions) were represented in the final sample. Concerning validity, the target sample was drawn such that the effect size generated is at least 80%, which is considered acceptable in social research (Hair *et al.*, 2014).

To collect data, a variety of organizations and individuals were approached through personal face-to-face contacts, emails and phone calls. The final sample included health professionals from a large hospital, independent healthcare clinics, a nurse practitioner association, a department of nursing in a medium Southwestern university and individual healthcare professionals. These participants represented large, medium, and small healthcare practices drawn predominantly from the Southwestern region of the United States of America.

Since institutional and individual participation was purely on a voluntary basis, the threat of selection bias was mitigated by making sure that large, medium and small institutions were represented in the sample; and that all of the major healthcare professions were represented as well. With such a wide range of participants, it was expected that the heterogeneity of the population would increase the external validity of the study.

Instrument Development

Straub (1989) identified five key elements in instrument validation namely: (1) content validity (i.e. items drawn from all possible measures of properties under investigation), (2) construct validity (i.e. stability of measures across methodologies), (3) reliability (i.e. stability of measures across observations), (4) internal validity (i.e. addresses the absence/presence of a rival hypothesis), and (5) statistical conclusion validity (i.e. results arrived at are independent of random chance).

Content validity of the measurement items means that items are drawn from a universal pool (Cronbach, 1971) such that these items do not carry over into the uncertainty of results. Since content validity is difficult both to create and to verify, Nunnally (1978) has suggested that instrument content validity be subjectively reviewed and evaluated by experts.

Construct validity refers to the ability for the measures of a construct to be more closely related to the given construct than to another construct. This characteristic is main rationale for the determination of convergent and discriminant validities. Construct validity of an instrument can be assessed through multitrait-multimethod techniques (Campbell & Fiske, 1959) or principal component analysis.

Reliability is the measure of the fidelity of an instrument to truly measure what it is meant to measure. An example of a threat to reliability could be a confounding, easily

misunderstood or ambiguous item. With different respondents looking at the same question differently, the resultant responses are likely to measure the respondent's misunderstanding than the true score.

Cook and Campbell (1979) have argued that establishing causation requires the ruling out of plausible rival hypothesis. Internal validity aims at making sure that the variation in the effect is indeed caused by the hypothesized variable and not an unobserved one.

Lastly, statistical conclusion validity is refers to the correctness the mathematical assessment of the relationship between variables (Cook and Campbell, 1979). Statistical validity of a study depends on the reliability of measures, power, and the exclusion of Type I and Type II errors.

It must be noted here that since the questionnaire was intended to be administered in a post-implementation phase, the questionnaire was developed thus, by tweaking all questions to reflect participants' response in retrospect. This served to reduce reliability concerns. The techniques below were used in this study to improve the instrument's ability to accurately capture the variables of interest. For instance, Armstrong and Overton (1977) have suggested the use of brief and concise questions that reduce the likelihood to "read into" or try to "figure out" what the question is, due to ambiguity. For instance, instead of saying, "I was knowledgeable enough to understand how to use the system", it was phrased as: "I had the knowledge necessary to use the system." In the question, "I was knowledgeable enough to understand how to use the system," the participant may think that the item is intending to question their prior ability to use the system rather than whether or not they have been provided the right tools (e.g. manuals, online help, etc.) to use the system.

The instrument for this study was developed through a multi-step approach. First, to understand the key determinants of IT user resistance, an in-depth literature review was conducted to identify all the major factors. Second, each of the determinants was then carefully operationalized using existing scales or by creating new ones. All the predicting constructs used to explain user resistance to information technology were all first identified through literature review to be critical to the model. Hence, constructs representing techno-centric, people-centric and policy-centric factors as well as perceived threats constructs were all derived from their corresponding bodies of literature. Once identified, they were defined and carefully conceptualized paying attention to content validity, construct validity, reliability, internal validity, and statistical conclusion validity suggested by Straub (1989). Where particular words in item conceptualization were used in new contexts, these words were clearly defined through examples. For example, in the equity evaluation constructs section, respondents were asked to compare their "benefits" versus their "stresses" with the introduction of the new system. In order to ensure that the words "benefits" and "stresses" were understood in context, a series of examples were provided to capture the context of the usage of these words (see Equity Evaluation in Appendix A). With all these in place, the initial survey measures were developed.

Measures

Existing validated scales were adopted where possible and, elsewhere, new scales were developed based on previous literature. All construct were measured on a five-point Likert scale (1=strongly disagree; 5=strongly agree) except for *Perceived dissatisfaction with outcomes* (PDO) where a five-point Likert scale with range (1=not dissatisfied at all; 5=extremely dissatisfied) was rather chosen. This was so done to maintain a uni-dimensional conceptualization of the construct. In the subsections below, the scales used for each construct in

the model are discussed. For the entire list of model constructs, origin of definitions and items derivation are shown in the Table 5 below.

User Resistance (UR)

User resistance refers to covert or overt behaviors that oppose change towards the use of- or avoidance of an information system manifested as distrust, reactance, distrust, scrutiny or inertia. It is conceptualized in this study as having "four different but probably related faces" (Knowles & Linn, 2004). The four dimensions are namely: reactance, distrust, scrutiny and inertia. Items for all four dimensions were self-derived based on the definition of each individual dimension by Knowles & Linn (2004). Since all four dimensions were defined to encompass elements of affect, motivation and cognition; items from Oreg (2006) three-dimensional resistance model—encompassing cognitive resistance, affective and behavioral resistance—were adapted and modified to fit the Knowles and Linn (2004) definitions. For example: Oreg's (2006) item, "I was stressed by the change" became "I was stressed by the change brought by the new EHR system." Similarly, "I was quite excited about the change" became "I was enthusiastic about the new EHR system" Lastly, "The change made me upset" became "I was irritated about the way the new EHR system restricts my pattern of work."

The *reactance* items, "I felt frustrated about how the new EHR system works" (UR11); "I was irritated by the way the new EHR system restricts my pattern of work." (UR12); and "I was stressed by the change brought by the new EHR system" (UR13), for example, were conceptualized to reflect the affective ("I don't like it") and motivational ("I won't do it") perspectives defined by Knowles and Linn (2004). In a similar manner, *distrust* items (UR21, UR22 and UR23) are conceptualized to depict the affective ("I don't like it") and cognitive ("I don't believe it") perspectives. *Scrutiny*, (items UR31, UR32 and UR33), was conceptualized as cognitive ("I

don't believe it")[2]. Lastly, *inertia* is defined as a state of equilibrium with the characteristic of "staying put" rather than actual antagonism. Its items (UR41, UR42 and UR43) are also constructed accordingly.

Table 5. Construct/Item Derivation

Item ID	Construct/Item	Derivation/Original item
	User Resistance to IT	
	Reactance	Definition from Linn & Knowles (2004)
UR11	I felt frustrated about how the new EHR system works.	Adapted from Oreg, 2006 (The change made me upset)
UR12	I was irritated by the way the new EHR system restricts my pattern of work.	Adapted from Oreg, 2006 (The change made me upset)
UR13	I was stressed by the change brought by the new EHR system.	Adapted from Oreg, 2006 (I was stressed by the change)
	Distrust	Definition from Linn & Knowles (2004)
UR21	I didn't believe the new EHR system is a better one.	Self-derived
UR22	I didn't think the new EHR system does the job.	Self-derived
UR23	I doubted that the new EHR system is indeed effective.	Self-derived
	Scrutiny	Definition from Linn & Knowles (2004)
UR31	I analyzed different aspects of the new EHR system.	Self-derived
UR32	I saw several weaknesses with the new EHR system.	Self-derived
UR33	I was critical about the new EHR system.	Self-derived
	Inertia	Definition from Linn & Knowles (2004)

[2] Scrutiny is defined to be uniquely cognitive ("I don't believe it"): it was hence conceptualized thus.

UR41	I was watching to see how the new EHR system actually holds up.	Self-derived
UR42	I tried as much as possible to avoid some aspects of the new EHR system.	Self-derived
UR43	I was enthusiastic about the new EHR system*.	Adapted from Oreg, 2006 (I was quite excited about the change)
	Perceived Helplessness over Process	
PHP1	With the new EHR system, I was free to decide how to go about my work*	Adapted from Langfred, 2005 (I am free to decide how to go about getting work done)
PHP2	With the new EHR system, I had control over the scheduling of my work*	Adapted from Langfred, 2005 (I have control over the scheduling of my work in the team)
PHP3	With the new EHR system, I was not free to interact with my patient as I would like to.	Self-derived
PHP4	The new EHR system was inflexible to my professional judgment.	Self-derived
PHP5	Overall, I felt the new EHR system dictates the way my tasks are performed.	Self-derived
	Perceived Dissatisfaction with Outcomes	
	Rate how dissatisfied/satisfied you were with the following aspects of the new system	
PDO1	The speed with which you were able to do your work using the new EHR system.	
PDO2	The ability to easily relate to your patients using the new EHR system.	Self-derived
PDO3	The impact in your skills and abilities using the new EHR system.	
PDO4	The impact in the overall quality of care using the new EHR system.	Self-derived
	Contingent Pragmatism	Definition from Moore et al. (2002)
	Concerning new healthcare reform(s) regarding EHR…	

CP1	I am a flexible professional: I will practice new ideas even if they contradict mine.	Self-derived
CP2	I accept all policy changes as long as they can help me achieve my desired results.	
CP3	I am open to ideological differences: I can adapt to new ideas.	
CP4	I have my personal practice preferences; but I am open to others' ways of practice.	
	Principled Pragmatism	Definition from Moore et al. (2002)
	Concerning new healthcare reform(s) regarding EHR…	
PP1	I am a highly principled professional: I am strictly guided my idea of professionalism.	Self-derived
PP2	I believe professionals should determine practice, not policy-makers.	
PP3	I don't think reforms should change my professional judgment.	
PP4	I will choose professional judgment over policy requirements any day.	
	Performance Expectancy	Venkatesh et al. (2003)
PE1	I found the system useful in my job.	I would find the system useful in my job.
PE2	Using the system enabled me to accomplish tasks more quickly.	Using the system enables me to accomplish tasks more quickly.
PE3	Using the system increased my productivity.	Using the system increases my productivity.
PE4	Using the system increased my chances of getting a raise.	If I use the system, I will increase the chances of getting a raise.
	Facilitation Conditions	Venkatesh et al. (2003)
FC1	I had the resources necessary to use the system.	I have the resources necessary to use the system.
FC2	I had the knowledge necessary to use the system.	I have the knowledge necessary to

		use the system.
FC3	The system was not compatible with other systems I used.	The system is not compatible with other systems I use.
FC4	A specific person(s) was available for assistance with system difficulties.	A specific person (or group) is available for assistance with the system difficulties.
	Social Influence	Venkatesh et al. (2003)
SI1	People who influence my behavior though that I should use the system.	People who influence my behavior think that I should use the system.
SI2	People who are important to me thought that I should use the system.	People who are important to me the think that I should use the system.
SI3	The senior management of this business was helpful in the use of the system.	The senior management of this business has been helpful in the use of the system.
SI4	In general, the organization supported the use of the system.	In general, the organization has supported the use of the system.
	HIT Self-Efficacy	Compeau & Higgins (1995)
	I feel confident that I could have completed my job using the EHR system…	***I could complete the work using the software package…***
SEF1	…if there was no one around to tell me what to do as I go.	…if there was no one around to tell me what to do as I go.
SEF2	…if I could call someone for help if I got stuck.	…if I could call someone for help if I got stuck.
SEF3	…if I had a lot of time to complete the job for which the software was provided.	…if I had a lot of time to complete the job for which the software was provided.
SEF4	…if I had just the built-in help facility for assistance.	…if I had just the built-in help facility for assistance.
	Social Enabling Effect	Definitional concept by More & Averill (2003)
SEE1	I think my colleagues shared my concerns about the new EHR system.	Self-derived

SEE2	I think my supervisor(s) shared my concerns the new EHR system.	
SEE3	I think other users of the new EHR system shared my concerns about it.	
SEE4	I think my organization's experience with the new EHR system confirmed my concerns about it.	
	Level 1 Equity Evaluation	Definitional concept by Joshi (1991)
	Compare your benefits with the use of the old/paper system to your benefits with the new EHR system.	
EQ11	My stresses *increased* with my use of the new EHR system than the old/paper system.	Adapted from Hess & Hightower (2002) "Inputs have increased; I have fewer inputs with the new SAP system; More is required of me"
EQ12	I had fewer stresses using the old/paper system.	
EQ13	My *benefits increased* with the use of the new EHR system than the old/paper system.	
EQ14	Overall, the new EHR system had fewer benefits to me than the old/paper system.	
	Level 2 Equity Evaluation	
	Compare your organization's benefits to yours with the use of the new system.	
EQ21	My stresses *increased* with the use of the new EHR system more than that of my organization.	Adapted from Hess & Hightower (2002) "Inputs have increased; I have fewer inputs with the new SAP system; More is required of me"
EQ22	My organization's benefits *increased* with the new EHR system than my benefits.	
EQ23	More work was required of my organization with the use of the new EHR system than was required of me.	
EQ24	Overall, the outcomes of the new EHR system favor my organization's interests more than my interests.	
	Level 3 Equity Evaluation	
	Compare your co-workers benefits to yours with the use of the new system.	
EQ31	My stresses *increased* with the use of the new EHR system compared to my co-workers.	Adapted from Hess & Hightower (2002) "Inputs have increased; I have

EQ32	My co-workers' stresses lowered with the new EHR system compared to mine.	fewer inputs with the new SAP system; More is required of me"
EQ33	More work was required of my co-workers with the new system than was required of me.	
EQ34	Overall, the benefits of the new EHR system favored my co-workers more than me.	
	Level 4 Equity Evaluation	
	Compare your benefits to that of the government (policy-makers) with the use of the new system.	
EQ41	My stresses have increased with the use of the new EHR system more than the stresses of the government.	Adapted from Hess & Hightower (2002) "Inputs have increased; I have fewer inputs with the new SAP system; More is required of me"
EQ42	The government benefits more from the new EHR system than me.	
EQ43	More work is required of the government with the new EHR system than is required of me.	
EQ44	Overall, the outcomes of the new EHR system favored government interests more than my interests.	

Perceived Threat Variables

Perceived helplessness over process (PHP) refers to an individual's belief that carrying out a new behavior diminishes their ability to maintain control over their current routine. The PHP construct was derived from two important perspectives. First, it used items from the Langfred (2005) autonomy scales as well as insights from the *job characteristics model* extension of Hackman and Oldham (1976) and the *Maastricht Autonomy Questionnaire* (MAQ) (de Jonge *et al*., 1995). The reason for using these items was to particularly capture the "helplessness" factor which is particularly related to loss of autonomy or control. For instance, we used some of developed items by Langfred (2005) to predict individual- and team-level autonomy influences. *Perceived helplessness over process* items that relate to the freedom of "getting work done" or

"scheduling of work" benefited from this scale. *Perceived dissatisfaction with outcomes* (PDO) denotes an individual's belief that carrying out a particular behavior will lead to unfavorable result. The *Job control* scale (de Jonge, 1995) developed from the MAQ informed the *perceived dissatisfaction with outcomes* construct by drawing on elements of the MAQ that deal with "method of working", "pace of work" and "work goals". *Perceived dissatisfaction with outcomes* (PDO) construct was self-derived with insights from Landeweerd and Boumans (1994) and Bankauskaite and Saarelma (2003). Landeweerd and Boumans (1994) and Bankauskaite and Saarelma (2003) particularly addressed the subject of dissatisfaction with the outcomes of healthcare services; and hence, the items seemed particularly suited for this study. However, because they looked at dissatisfaction with the healthcare services from the patient's and not the healthcare professional's perspective, the items had to be reconstructed.

Policy Variables

Contingent pragmatism refers to the belief by an individual with oppositional orientations to reform, whereby enforced reactions to policy change take on 'something of the function of a survival strategy'. On the other hand, *principled pragmatism* denotes the positive belief by an individual that a set of reforms will strengthen and affirm his or her professional identity by drawing eclectically on a range of professional practices and traditions. Both *contingent pragmatism* (CP) and *principled pragmatism* (PP) constructs were self-constructed from the definition and explanation offered by Moore *et al.* (2002) and Ackroyd *et al.*, (2007). The study makes use of the detail meanings and components of each type of pragmatism to derive each of the four-item constructs. Particularly, Moore et al. (2002) exemplified principled pragmatists as those who, regardless of the extent to which their choices may be unconsciously guided by 'external' constraints of what they perceive professionalism to be. On the other hand, contingent

pragmatists are exemplified as those who predominantly live in a state of "enforced adjustments". For example, the question, "I am a flexible professional: I will practice new ideas even if they contradict mine" (see CP1 in Table 5), exemplifies a contingent pragmatist. He/she is flexible, although their flexibility takes the character of an enforced adjustment.

The Unified Theory of the Acceptance and Use of Technology (UTAUT)

Four constructs were taken directly from the validated scales of the TAM and UTAUT models. From the UTAUT model *performance expectancy, facilitating conditions* and *social influence* were adapted from Venkatesh *et al.* (2003). *Performance expectancy* refers to the degree to which an individual believes that using the system will help him or her to attain gains in job performance. *Facilitating conditions* denote the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system. *Social influence* represents the degree to which an individual perceives that important others believe he or she should use the new system. *Health information technology self-efficacy* (SEF), on the other hand, refers to an individual's belief that he or she has the ability to perform specific task/job using a health information technology. The items were drawn from Compeau and Higgins (1995). The construct's four items (SEF1, SEF2, SEF3 and SEF4) were selected and adapted from the ten-item conceptualization of computer self-efficacy by Compeau and Higgins (1995).

Social Enabling Effect (SEE)

Social enabling effect refers to an individual's belief that his/her beliefs are consistent with those of referent others around them. The SEE construct was self-developed based in part from definition of "social enabling mechanisms" from More & Averill (2003) but applied to a context of normative sociology.

The Equity Constructs

The equity contstructs are defined as follows. *Level 1 equity evaluation* refers to an individual's perception that he or she has not been treated equitably compared to his/her previous state, by the evaluation of his/her net benefits in the current state compared with the former. Level 2 equity evaluation is an individual's perception that he or she has not been treated equitably compared to his/her organization, by the evaluation of his/her net benefits compared to that of the organization. *Level 3 equity evaluation* is defined as an individual's perception that he or she has not been treated equitably compared to his/her co-worker, by the evaluation of his/her net benefits compared to that of the co-worker. Lastly, *Level 4 equity evaluation* is defined as an individual's perception that he or she has not been treated equitably compared to his/her government, by the evaluation of his/her net benefits compared to that of the government. The items for the equity constructs were self-developed based on the Joshi, (1991) definition of equity implementation model. The items were modified and adapted from Hess & Hightower (2002). The two original items were: "Inputs have increased," "I have fewer inputs with the new SAP system," and "More is required of me".

Pre-testing

With survey already developed, refining and pre-validation was carried out in two stages. In the first round, three experts were asked to examine questionnaire for any ambiguous, misleading or unclear terminology and to return feedback according to criteria in Table 6 below. Two of these experts were academics: one with several years of experience in the IS field and the second with a background in social-psychology. The third expert was a healthcare professional who is also involved in research activities. The choice of these three experts was based on the areas of knowledge of the current study. First, was the fact that the study is an IS study; second,

that it uses social-psychological theories; and lastly, the fact that it's context is that of the healthcare industry. Based on feedback from these three experts, the survey instrument was then further refined.

Table 6: Pre-test Instrument Review Criteria

Questionnaire Instructions	
Are the instructions concise?	If no, please explain.
Are the instructions clear? If no, please explain.	If no, please explain.
Are the instructions complete?	If no, please explain.
Instrument Items	
Are the items appropriate?	If no, please explain.
Are the items clear?	If no, please explain.
Would you recommend adding to or deleting any items?	If yes, why?
Any additional comments?	Include here.

In the second round of pre-testing three students were chosen to evaluate the instrument to determine approximate length, order of questions and appropriateness of presentation of the survey items. The three students consisted of two healthcare program majors and one non-healthcare program major. This survey was taken online and a feedback was sent to the investigator via email. In addition to the time and presentation of items considerations, these students were also asked comment on the clarity of statements. Based on the additional feedback, the instrument was further refined accordingly. Changes included a shortened instructional section, sentence syntax corrections and the number of questions per page was also adjusted to avoid information overload.

Pilot Testing

The pilot testing involved the administering the finalized survey (see Appendix A) to a potential sample. The objective of this pilot study was two-fold, namely: to assess the reliability

of the survey instrument and to check its validity. This pilot sample consisted of final year students in the physician assistant (PA) program of a medium-sized university in the Southwestern region of the United States. These students were using electronic health records as part of their clinical experience and were at the time on clinical rotations at multiple practicing sites. A written communication by email, a phone call and a face-to-face conversation was first conducted with the Director of the PA program to explain the objectives of the research. The director then scheduled a class meeting of the PI with the students in a week's time. In the mean time, he sent an email notification to the prospective participants about the data collection process.

The paper survey was administered to a final year PA class of about 50 students. Out of the 50 surveys administered, 44 surveys were returned with complete and valid data. The sample of 44 consisted of 36 females (82%) and 8 males (18%). Seventy percent of them worked in environments where electronic health records were mandatory in for daily use while the remaining 30% worked in non-mandatory settings. Over 93% of the sample had a practice experience of two years and below while the rest (7%) had experience of more than two years. Overall, 80% of the sample had personally used electronic health records beyond two years. Only 20% had less than two years of experience with the system.

The data obtained were then coded and analyzed using partial least squares structural equation modeling technique. Data from this sample were analyzed for reliability and validity using smart PLS version 2.0 M3. Most of the construct items showed adequate factor loadings of .5 and greater. Items with lower factor loadings (i.e. explaining less than 50% of the associated construct) were deleted from the analysis. A summary of all the items that were dropped from the analysis are included in Appendix C. The composite reliability measures all exceeded the

recommended .7 threshold level (Hair *et al.*, 2010). Each of the three latent variables (PHP, PDO and UR) had R-squares of 26.5%, 50% and 42.8% respectively. This showed that the predictor variables significantly explained the target dependent variable. Overall the sample data fitted the proposed model quite well. Appendix C contains results of all discriminant and convergent test results, factor loadings, and path coefficients. It must be said however, that the equity constructs seemed unstable and problematic. Details of test and analysis results are presented on the six tables in Appendix C.

Survey Administration

A paper survey and an online survey were prepared to collect the sample data. Surveys have been successfully used in similar studies to investigate IT resistance in both healthcare industry settings and beyond (see Bhattacherjee and Hickmet, 2007; Kim and Kankanhalli, 2009). The paper survey was administered by the investigator at various sites including private independent practices, a nurse practitioner association meeting, and at a student physician assistant gathering. These sites were randomly approached and those that were willing to participate were chosen. The rest of the data were to be collected online through Surveygizmo. As with all research dealing with human subjects, the instrument used in both platforms had to be revised and approved by the Institutional Research Board (IRB).

Cresswell (1994) has suggested a three-step procedure for the questionnaire administration. First, he proposed to send an initial mailing of the instrument along with a cover letter explaining the purpose of the study. Second, he recommended a second post card mailing, two weeks after the initial mailing thanking those that had already participated and encouraging those who had not to do so. And, finally, two weeks after the second mailing, he suggests sending another cover letter asking for participation along with another copy of the instrument.

A similar procedure was observed in this study with the difference all of the initial and follow-up correspondences to the contact persons were both done through email and by phone calls. The paper and online surveys both carried a brief summary of the goals and objectives of the research, the contact information of the principal investigator (PI), the research advisor and the Institutional Research Board (IRB). This introductory information also emphasized the voluntary nature of the respondent participation. Prior to administration of the survey, the entire research goals, objectives and detail instrument were reviewed and approved by the IRB.

The paper survey was administered by the PI, while a few were collected online though links posted by some volunteers. The PI approached the Nursing Practitioner Association of Rio Grande Valley through its President by email and later on face-to-face. After explaining the objectives of the research this contact person, the PI was granted permission to attend the general meeting of association that was due to take place in about a week's time. One week later, the PI attended this meeting which had about 25 attendees. Apart from the nurse practitioners in attendance, two medical doctors and two other support staff were also present. Twenty-five surveys were distributed.

The PI also approached four private clinics, and a hospital. The survey distribution and in these institutions were as follows: dental clinic (5), pediatrician care (5), home healthcare practice (15), physician clinic (7) and hospital (20). Additionally the graduate nursing program of a South Texas nursing program was also approached and surveys administered in two sections of a master's degree nursing course (75). Of the 127 surveys that were distributed in these forums, 115 of them were collected.

The remainder of the surveys (102) was received online and by email to individual contact persons who distributed and collected surveys to other participants. Survey links were

also provided on three Facebook profiles and on two more healthcare professional forums. These participants were also encouraged to share the link with other qualified participants.

This sampling technique is respondent-driven sampling, first introduced by Coleman (1958) under the name snowball sampling. Salganik and Heckathorn (2004) have stated that this strategy is effective at reaching hidden populations. However, they also cautioned that a singular use of this method can make statistical inference difficult as it may not consider those from outside of the referring respondent's group. In this research, this technique was tempered with collection techniques like those described above.

Completed paper surveys were to be received in three ways: (1.) direct collection after administration by the PI, (2.) postal mail and (3.) drop-box collection at administration site. The majority of the surveys were collected directly by PI after administration in different forums. About 3 survey sets were returned in the postal mail while some more were collected from a drop box in one collecting site. The remainder of the online surveys was collected through the Surveygizmo website. Actual data collection including the pilot study lasted about four weeks.

Data Analysis Strategy

The proposed research model required a structural technique for analyzing the relationships. Two structural equation modeling approaches exist to address this (Hair *et al*., 2010; Hair, Ringle and Sarstedt, 2011). One of such is the covariance-based structural equation modeling (CB-SEM) and the other is the partial least squares structural equation modeling (PLS-SEM). To decide which of the SEM techniques to use, Hair, Hult, Ringle and Sarstedt (2014) have suggested that that the objectives and characteristics that distinguish the two methods be utilized. Consistent with this admonition, the data analysis tool of choice for this study was the PLS-SEM technique based on the considerations described below.

Hair *et al.* (2014) lay out five rules of thumb for using PLS-SEM technique namely: (1.) when the goal is predicting key target constructs or identifying "driver" constructs, (2.) when formative constructs are part of the model, (3.) when the structural model is complex (many constructs and indicators), (4.) when the sample is small and/or the data are non-normally distributed, and (5.) when the plan is to use latent variable scores in subsequent analyses. Additionally, Chin (2010) has also noted that PLS-SEM is more suited for complex models (i.e. having more constructs and indicators).

Given that the objectives of this study, as stated earlier, was to (1.) investigate why and how people resist healthcare technology, (2.) uncover the antecedents of *perceived threats*, and (3.) find out whether resistance varied across the type of health profession depending on their role; PLS-SEM was determined to be a proper tool of analysis. First, because the goal of this study is primarily the prediction of and explanation of target constructs and with a greater focus on exploration rather than confirmation (Hair *et al.,* 2014). More so, because the proposed model was also relatively complex (with over 10 constructs and 50 indicators) PLS-SEM truly suited it. Additionally, given the relative small sample size ensuing from the difficulty of collecting data from healthcare personnel and the objective of making this research model a comprehensive departure point for further research, PLS-SEM trumped the use CB-SEM technique.

PLS-SEM typically uses available data to run ordinary least squares (OLS) regression analyses (unlike maximum likelihood for CB-SEM), to estimate path relationships with the goal of minimizing the error terms of endogenous constructs (Hair *et al*., 2014). By so doing, PLS-SEM estimates path coefficients that maximize the R-square values of the target endogenous constructs. This feature of PLS-SEM makes it particularly suitable for theory development and

the explanation of variance (prediction of the target endogenous constructs) that makes it a technique of choice for this study.

CHAPTER V

DATA ANALYSIS AND RESULTS

The data analyses and results of the study are presented in this chapter. It is organized in five sections namely: (1.) data collection and sample characteristics, (2.) PLS model specification and analyses, (3.) measurement model results, (4.) structural model results, and finally, (5.) hypothesis testing results. The first section presents a revisits data collection procedures and a summary of the sample characteristics. Next, the PLS-SEM model specification and analyses procedure are described. Following this, the model is then evaluated. Descriptive data analyses are reported first. Second, the measures for internal consistency and external validity are assessed and reported. Finally, PLS-SEM results are presented. Chin (2010) suggests a two-step presentation of these results, namely: the measurement model results presentation and the structural model results presentation. We follow a similar structure is here in the last two sections of the chapter and conclude by presenting a summary of the results of the hypotheses tests.

Data collection and Sample Characteristics

Following the data collection procedure outlined in the research methods chapter, 261 responses were received: 102 online, and 115 through paper administration. The collected responses were then evaluated on the basis of completeness and the answer to the qualifying question. Any surveys that had more than 5% or more of missing data were eliminated from the

final analysis. Additionally, data from any participants whose response to the qualifying question was negative were also eliminated. A "yes" was required for the qualifying question: "I have personally used electronic health records before." Finally, a total of 162 surveys (excluding the pilot study data) were deemed acceptable for the final analysis with 61 surveys collected online and 101 through paper administration.

The final sample of 162 health professionals consisted of physicians, physician assistants, nurse practitioners, and registered nurses in the major categories. This final sample excludes the data that was used in the pilot study. However, it must be noted here that an ANOVA test was conducted to check for any significance variance in the pilot data and the main sample and results showed no difference (F=1.995, p=.056). The summary of this analysis is provided in Appendix C. Though the pilot data was excluded in the final sample, the ANOVA test demonstrates that the two samples could have been combined. Hence though the results below only represent the main data (i.e. without the pilot study data), a set supplementary results were computed for the main data plus the pilot, the results of which are considered as secondary. The latter set is not discussed here. Of this total, 119 (73%) were females while 43 (27%) were males. About 87% of the respondents operated in mandatory settings where electronic health record system use was mandated while the remaining 13% operated in non-mandatory settings. Additionally, more than a third of the settings had an installed EHR system within the last two years. Almost all the respondents (96%) had previous paper records use. More than a third of the sample had over five years of experience in their professional roles at the time of data collection. About half of the respondents had an average EHR experience of more than two years. Table 7 (p. 97) shows the sample distribution by profession and gender. Table 8 (p. 97) reveals an

alternative sample distribution by profession and years of experience in their current role. The minor professional groups represented in the sample are presented in Table 9 (p. 97).

Table 7. Profession and Gender Demographics

Physicians		**Physician Assistant**		**Nurse practitioners**		**Nurses (RNs, LVN, LPN, CNA)**		**Other professions**	
Male	10	Male	3	Male	8	Male	22	Male	0
Female	13	Female	3	Female	21	Female	72	Female	10
Total	23	Total	6	Total	29	Total	94	Total	10
Sample %	14	Sample %	4	Sample %	18	Sample %	58	Sample %	6

Table 8. Profession and Experience Demographics

Physicians		**Physician Assistant**		**Nurse practitioners**		**Nurses (RNs, LVN, LPN, CNA)**		**Other professions**	
< 2 years	6	< 2 years	0	< 2 years	11	< 2 years	16	< 2 years	5
2-5 years	10	2-5 years	3	2-5 years	5	2-5 years	30	2-5 years	3
>5 years	7	>5 years	3	>5 years	13	>5 years	44	>5 years	2
Total	23	Total	6	Total	29	Total	94	Total	10
Sample %	14	Sample %	4	Sample %	18	Sample %	58	Sample %	6

Table 9. Other Professions Represented in Sample

Profession type	**Representation**
EMR technician	2
Medical assistant	2
Dental assistant	1
Dietitian	2
Pharmacy technician	1
Office manager	2

PLS Model Specification and Analysis

Just before the data was analyzed, the collected data was coded and then recoded for reverse items on the appropriate constructs (see Appendix A). Based on the proposed model in Figure 4, the partial least squares structural equation modeling was chosen as to the statistical technique of choice. As has been discussed earlier, PLS-SEM is has several advantages over traditional statistical techniques. Similar to other structural techniques, PLS-SEM is able to concurrently test the measurement and structural models. Additionally, PLS is not constrained to

data sets that meet homogeneity and normality requirements (Chin, 2010). PLS also has the advantage in that it can handle smaller sample sizes relative to other structural techniques.

Westland (2010) has suggested that sample size choice should be conducted according to the specific algorithm of each SEM technique. This means that sample size considerations in principal component based PLS is clearly different from those gradient search algorithm based LISREL/AMOS or systems of equations algorithms. Though PLS-SEM technique does not require the stringent distributional assumptions like normality and homogeneity; and though small sample size requirements are permitted, this study examined these aspects carefully. The minimum sample size consideration for this study was determined using two criteria suggested by Hair *et al.* (2014). First, the general rule of thumb is to use a sample size that is ten times the largest number of structural paths directed at a particular construct in the structural model. Since the largest number of arrowheads pointing to a latent variable in the proposed model was 8, the 10 times arrowhead rule required a sample size of at least 80.

However, like Hair, Ringle and Sarstedt (2011) have noted, PLS-SEM like every other statistical technique must also consider the background of model and data characteristics. Specifically, power analyses have been highly recommended. Given the characteristics of the proposed model (i.e. with a maximum of 8 arrowheads to a latent variable); it will require a least sample size of 84 to yield a statistical power of 80% at 95% confidence level for a minimum R^2 of .25 (see Hair *et al.*, 2014, p. 21). The same requirement holds true for the two groups that were analyzed. It would require at least 80 observations per group to conduct these analyses. An ANOVA test was conducted to detect any differences within both groups and the results revealed no significant differences (F=1.525, p=.130). While the Non-Prescriptive group (n=104) met both assumptions, the Prescriptive group (n=58) did not meet this standard. However, the results

yielded in group comparison with sample size of 58 were similar to that with sample size of 102 when pilot data was included. The final sample size of 162 met both the general rule of thumb as well as the more rigorous power analyses. Because group comparisons were also envisaged, the normality of the data also checked. Hair *et al.* (2014) have cautioned that though PLS-SEM is a distribution free technique, group analysis assumes normality of distribution. From the kurtosis and skewedness calculations, most variables were within the limits of normality.

Following these sample considerations, the data was checked for missing values. All missing values were replaced with the sentinel value of -99. A sentinel value causes the PLS software to deal with missing values by choosing a particular replacement algorithm. The data were then entered into smartPLS 2.0 M3. The PLS algorithm was then run with a case-wise replacement strategy for missing values.

In order to obtain reliable structural path results and their t-values a bootstrapping procedure of 5000 samples and 162 cases was run. Initial factor analysis was conducted and optimized by eliminating low-loading items. It is worth noting at this point that the *user resistance* construct was specified as a second order construct with four sub-construct each. The measurement and structural model parameters were then obtained and the hypotheses evaluated. Additionally, two subsamples were run to assess differences in user resistance between health profession-types—those with prescriptive versus non-prescriptive authority. Physicians, physician assistants, and nurse practitioners were categorized in the prescriptive group while the rest of the sample was classified in the non-prescriptive category. This distinction was based on the question as to whether the particular profession had the authority to prescribe treatments or just to execute them. Those with prescriptive authority could prescribe treatment while those

with non-prescriptive authority serve to execute treatment plans. The path coefficients, standard errors, and t-values were then used to assess potential differences.

Model Evaluation: Measurement Model Results

The first part of model evaluation is to present the measurement model results. This portion focuses on ascertaining how accurate or reliable the measures are, and assessing the convergent and discriminant validities of the proposed model. This can be achieved by running a factorial scheme or by determining the validity of the measures within the context of the actual structural model (Chin, 2010). In this study, the second procedure was chosen. There are two sets of information that may result from the preceding procedure and that are available through smartPLS. Each set represents the tests of discriminant validity. The first set of results show that a construct is more strongly related to its own measures than with any other construct within the model. This is achieved by examining the overlapping variance. To test this, we compare the square root of the average variance extracted (AVE) with the correlations among the model constructs. In presenting these results, we chose to present the AVE and the squared of the correlations to make it more intuitive and easy to compare as Chin (2010) had suggested. Typically, AVE should be greater than .50 meaning that 50% or more of the variance of the construct in question is accounted for by the indicators. Items that did not explain more than 50% of variance were automatically dropped from the analysis. Appendix D provides information on the items per construct that did not load favorably. An additional measure, composite reliability, has also used to further assess the relationship of the item measures to the constructs they represent. Values exceeding the .70 threshold have been deemed as adequate (Hair *et al.,* 2010).The AVE provides a basis to see that whether each construct is more highly correlated to its own measures than any other measure. If the AVE for a construct is higher than the squared

correlations between it and any other construct in the model, discriminant validity is established (Fornell & Larcker, 1981).

The second set of measures that is equally important is the item loading/cross-loadings with each construct in the model. These set of measures are used to ascertain convergent validity. Convergent validity is defined as the extent to which each block of items strongly agrees (or converges) to represent the construct they are created to measure. Though there is no standard minimum or maximum loading stipulated for a construct, the narrower the range and the higher the lowest loading, convergent validity can be established (Chin, 2010).

Table 10 (p. 102) presents the descriptive statistics of the constructs used in the study. It contains information on the number of items used per construct, the mean and standard deviation values. Table 11 (p. 103) displays the results composite reliabilities constructs and the AVE compared with the square of inter-construct reliability measures. As can be observed, all composite reliability values exceeded the .70 threshold. Additionally, the AVE values were all greater than the squared inter-construct correlations. Given the preceding, discriminant validity is established. Table 12 (p. 104) summarizes the test criteria used and the reliability measures obtained. Table 13 (pp. 105-106) depicts the outer loadings and cross-loadings. As can be seen, all items loadings exceeded the recommended .50 threshold and hence were responsible for explaining at least 50% of variance in the corresponding construct with the exception of the UR construct which did so only marginally (AVE=.4538). Additionally, apart from the *user resistance* (UR) constructs which had the largest gap between the minimum and maximum loading, all other constructs in the model exhibited acceptable narrow gap loadings (typically within a .10 loading gap). However, the equity constructs exhibited the most number of cross-loadings. Hence, it was ascertained that convergent validity is demonstrated.

Table 10. Descriptive Statistics of Constructs

Construct	Number of items	Mean	Standard deviation
Reactance (UR1)	3	3.0065	.0101
Distrust (UR2)	3	2.5307	.1762
Scrutiny (UR3)	2	3.1796	.1270
Inertia (UR4)	2	2.9854	.3103
Perceived Helplessness over Process (PHP)	3	2.8916	.2106
Perceived Dissatisfaction with Outcomes (PDO)	4	2.0340	.1505
Facilitating Conditions (FC)	3	3.5922	.0875
Principled Pragmatism (PP)	3	3.6517	.0616
Contingent Pragmatism (CP)	4	3.9709	.0872
Social Influence (SI)	3	3.5874	.2186
HIT Self-efficacy (SEF)	3	3.2848	.3184
Social Enabling Effect (SEE)	4	3.5583	.1558
Performance Expectancy (PE)	3	3.2658	.4390
Equity Evaluation (EQ1)	2	2.8220	1.1915
Equity Evaluation (EQ2)	1	2.7621	.9916
Equity Evaluation (EQ3)	2	2.2314	.9264
Equity Evaluation (EQ4)	3	2.8289	.8289

Table 11. Inter-construct Correlations and Reliability Measures

			Squared Correlations among constructs													
Construct	**Composite Reliability**	**AVE**	**CP**	**EQ1**	**EQ2**	**EQ3**	**EQ4**	**FC**	**PDO**	**PE**	**PHP**	**PP**	**SEE**	**SEF**	**SI**	**UR**
CP	0.8985	0.6902	1													
EQ1	0.8988	0.8164	0.0633	1												
EQ2	NA	NA	0.0132	0.3939	1											
EQ3	0.8118	0.6879	0.0810	0.1976	0.2590	1										
EQ4	0.9186	0.7902	0.0232	0.3242	0.2700	0.2211	1									
FC	0.8913	0.7330	0.0863	0.0942	0.2440	0.0980	0.1067	1								
PDO	0.9491	0.8235	0.0426	0.2077	0.1925	0.1209	0.2387	0.0779	1							
PE	0.9501	0.8639	0.1305	0.4343	0.3642	0.1329	0.2179	0.3071	0.2934	1						
PHP	0.8529	0.6597	0.0084	0.1186	0.1329	0.0632	0.1159	0.0996	0.1546	0.1136	1					
PP	0.8732	0.6966	0.0656	0.0255	0.0208	0.0075	0.0357	0.0004	0.0052	0.0016	0.0387	1				
SEE	0.9032	0.7006	0.0515	0.0329	0.0185	0.0012	0.0266	0.0005	0.0758	0.0178	0.0588	0.0100	1			
SEF	0.8117	0.5909	0.0050	0.0017	0.0001	0.0022	0.0197	0.0029	0.0370	0.0064	0.0210	0.0259	0.0054	1		
SI	0.8121	0.6061	0.1067	0.0958	0.2059	0.1132	0.1475	0.4989	0.1182	0.3036	0.1200	0.0001	0.0003	0.0056	1	
UR	0.8818	0.4538	0.0107	0.4127	0.2855	0.1272	0.2534	0.2073	0.1769	0.3601	0.1736	0.0137	0.0893	0.0040	0.1397	1

CP (contingent pragmatism); EQ (equity evaluation); FC (facilitating conditions); PDO (perceived dissatisfaction with outcomes); PE (performance expectancy); PHP (perceived helplessness over process); PP (principled pragmatism); SEE (social enabling effect); SEF (self-efficacy); SI (social influence); UR (user resistance); N/A (not available)

Table 12. Summary of Test Criteria and Reliability Measures

Construct	AVE	Composite Reliability	Cronbachs Alpha	Communality
CP	0.6902	0.8985	0.8567	0.6902
EQ1	0.8164	0.8988	0.7797	0.8164
EQ2	NA	NA	NA	NA
EQ3	0.6879	0.8118	0.5897	0.6879
EQ4	0.7902	0.9186	0.8682	0.7902
FC	0.7330	0.8913	0.8185	0.7330
PDO	0.8235	0.9491	0.9284	0.8235
PE	0.8639	0.9501	0.9207	0.8639
PHP	0.6597	0.8529	0.7420	0.6597
PP	0.6966	0.8732	0.7855	0.6966
SEE	0.7006	0.9032	0.8651	0.7006
SEF	0.5909	0.8117	0.6554	0.5909
SI	0.6061	0.8121	0.7030	0.6061
UR	0.4538	0.8818	0.8431	0.4538

CP (contingent pragmatism); EQ (equity evaluation); FC (facilitating conditions); PDO (perceived dissatisfaction with outcomes); PE (performance expectancy); PHP (perceived helplessness over process); PP (principled pragmatism); SEE (social enabling effect); SEF (self-efficacy); SI (social influence); UR (user resistance); NA (Not available because only one item measure was used)

Table 13. Outer Loadings and Cross-loadings

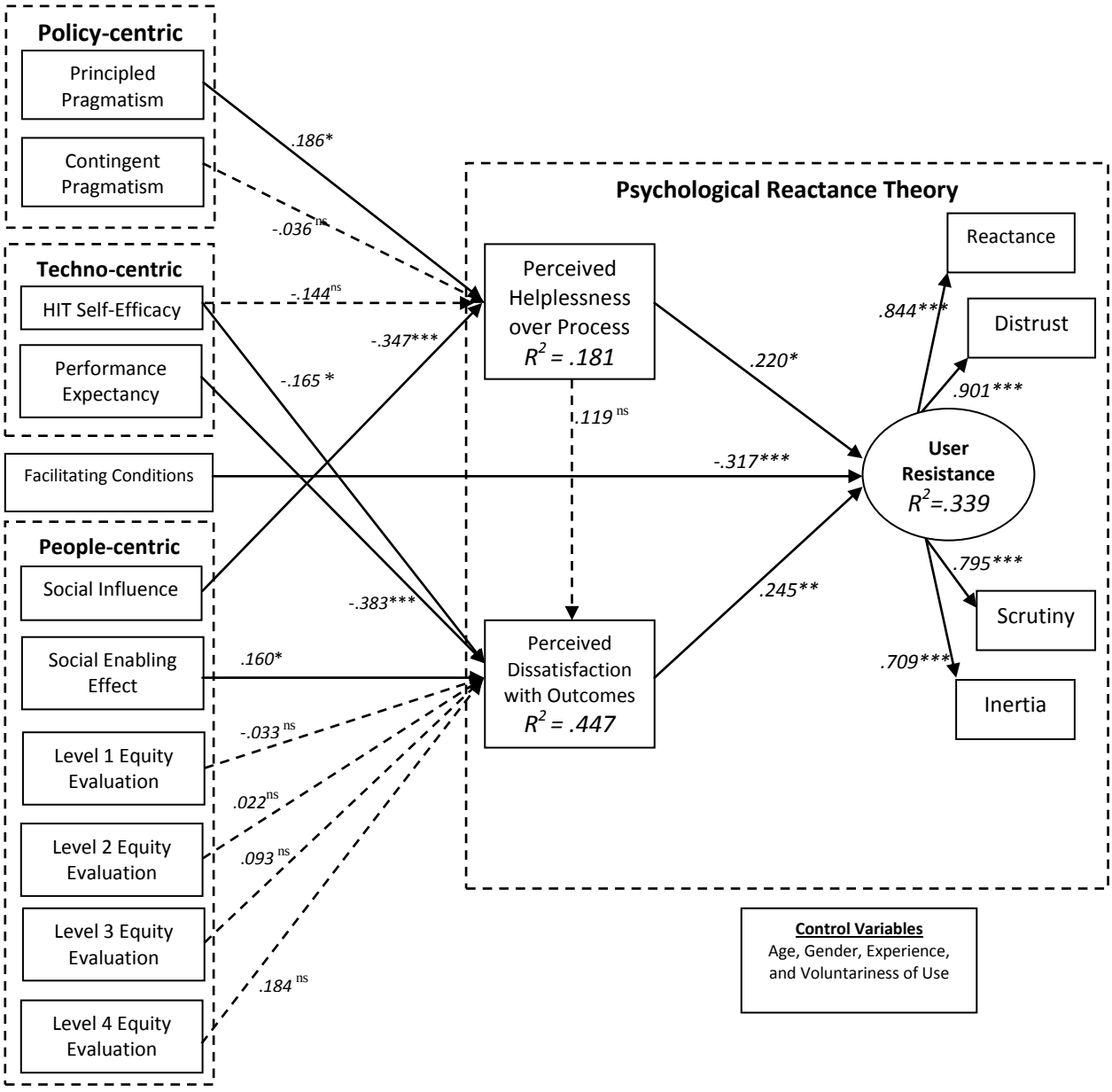
Loadings and cross-loadings for the measurement (outer model)														
	CP	EQ1	EQ2	EQ3	EQ4	FC	PDO	PE	PHP	PP	SEE	SEF	SI	UR
CP1	**0.7578**	-0.0928	-0.0686	-0.1373	-0.0640	0.2527	-0.0532	0.1753	-0.0529	0.2078	0.2047	0.0070	0.2835	-0.0252
CP2	**0.7927**	-0.2560	-0.1116	-0.1903	-0.1172	0.3070	-0.1913	0.4095	-0.0514	0.0555	0.2581	0.1571	0.2614	-0.1091
CP3	**0.9391**	-0.2530	-0.1044	-0.3245	-0.1676	0.2333	-0.2299	0.3330	-0.1117	0.2834	0.1639	0.0357	0.2866	-0.1059
CP4	**0.8225**	-0.2324	-0.1137	-0.2046	-0.1365	0.1976	-0.1690	0.2676	-0.0149	0.3510	0.1689	0.1054	0.2847	-0.1121
EQ11	-0.2716	**0.9324**	**0.6211**	0.4234	**0.5587**	-0.3444	0.4643	-0.6559	0.3490	0.0960	0.1740	0.0378	-0.3424	**0.6517**
EQ12	-0.1699	**0.8738**	**0.5001**	0.3763	0.4602	-0.1897	0.3452	-0.5202	0.2633	0.2110	0.1521	0.0373	-0.1980	0.4904
EQ21	-0.1148	**0.6276**	**1.0000**	**0.5089**	**0.5196**	-0.4940	0.4388	-0.6035	0.3646	0.1442	0.1360	-0.0088	-0.4538	**0.5343**
EQ31	-0.2284	0.4176	**0.5230**	**0.9418**	0.4139	-0.3276	0.3618	-0.3760	0.2060	0.0965	-0.0312	0.0575	-0.3424	0.3295
EQ34	-0.2833	0.3128	0.2627	**0.6991**	0.3901	-0.1490	0.1701	-0.1855	0.2412	0.0289	-0.0291	0.0033	-0.1808	0.2628
EQ41	-0.2108	**0.5875**	**0.5053**	0.4819	**0.8533**	-0.2943	0.4945	-0.4963	0.3355	0.1258	0.1358	0.1474	-0.3555	0.4800
EQ42	-0.1237	0.4242	0.4021	0.3577	**0.8943**	-0.2779	0.3895	-0.3402	0.2801	0.1483	0.1029	0.1290	-0.3382	0.4041
EQ44	-0.0518	0.4797	0.4613	0.3928	**0.9180**	-0.2942	0.3986	-0.3826	0.2802	0.2379	0.1957	0.0907	-0.3232	0.4445
FC1	0.2827	-0.3619	-0.5064	-0.3185	-0.3093	**0.9121**	-0.3145	**0.5948**	-0.3112	-0.0430	-0.0320	0.0854	**0.6763**	-0.4409
FC2	0.2302	-0.2305	-0.3807	-0.2464	-0.2262	**0.8759**	-0.1700	0.4579	-0.2289	0.0239	0.0722	0.0818	**0.5265**	-0.4120
FC4	0.2431	-0.1689	-0.3718	-0.2319	-0.3192	**0.7746**	-0.2306	0.3347	-0.2757	-0.0344	0.0229	-0.0620	**0.6273**	-0.2962
PD01	-0.1596	0.4686	0.4612	0.2626	0.4043	-0.2735	**0.8862**	-0.5610	0.3407	0.0092	0.2717	0.1224	-0.2899	0.4403
PD02	-0.2217	0.4451	0.4186	0.3573	0.4915	-0.2468	**0.9235**	-0.5180	0.3811	0.0319	0.2628	0.1729	-0.3678	0.3847
PD03	-0.1855	0.3351	0.3425	0.2999	0.3832	-0.2277	**0.8863**	-0.4262	0.2869	0.1194	0.1839	0.1882	-0.2426	0.3311
PD04	-0.1821	0.3950	0.3630	0.3410	0.4877	-0.2621	**0.9327**	-0.4523	0.4104	0.1081	0.2727	0.2176	-0.3391	0.3640
PE1	0.3549	-0.4957	-0.5606	-0.4139	-0.3946	**0.6128**	-0.4670	**0.8810**	-0.3351	-0.0212	-0.0632	0.0936	**0.6137**	-0.5415
PE2	0.3317	-0.6842	-0.5628	-0.3184	-0.4577	0.4696	-0.5297	**0.9507**	-0.3179	-0.0218	-0.1475	0.0442	0.4680	-0.5748
PE3	0.3235	-0.6472	-0.5611	-0.2928	-0.4466	0.4749	-0.5113	**0.9549**	-0.2895	-0.0679	-0.1554	0.0883	0.4669	-0.5568
PHP3	-0.1295	0.2973	0.2754	0.2511	0.2118	-0.2042	0.2627	-0.2522	**0.7699**	0.1754	0.1260	0.1140	-0.3077	0.2997
PHP4	-0.0517	0.1451	0.2017	0.0735	0.2068	-0.2890	0.2479	-0.1775	**0.7965**	0.1271	0.1994	0.1651	-0.2724	0.3153
PHP5	-0.0485	0.3751	0.3909	0.2720	0.3870	-0.2752	0.4253	-0.3704	**0.8671**	0.1743	0.2546	0.0840	-0.2698	0.3916
PP2	0.2822	0.1011	0.0682	0.0282	0.1051	0.0407	0.0341	0.0055	0.1540	**0.8414**	0.0954	0.1439	0.0543	0.0619
PP3	0.2925	0.1357	0.1236	0.0289	0.1751	-0.0425	0.0473	-0.0222	0.1390	**0.8467**	0.0243	0.0895	-0.0009	0.0840
PP4	0.0994	0.1572	0.1596	0.1396	0.1869	-0.0432	0.0898	-0.0730	0.1897	**0.8155**	0.1166	0.1587	-0.0241	0.1360
SEE1	0.3115	0.1465	0.0680	-0.1426	0.1938	0.0247	0.2082	-0.0963	0.1962	0.1058	**0.8350**	0.0992	0.0785	0.2988
SEE2	0.2595	0.0619	0.0552	-0.0753	-0.0326	0.0920	0.1367	0.0027	0.1665	0.0393	**0.7590**	0.1092	0.0795	0.1541
SEE3	0.2729	0.1085	0.0087	-0.2024	0.0981	0.0797	0.1614	-0.0700	0.1691	0.0889	**0.8847**	0.0742	0.0881	0.2504
SEE4	0.0446	0.2181	0.2228	0.1482	0.1929	-0.0457	0.3234	-0.1927	0.2437	0.0872	**0.8640**	0.0117	-0.0915	0.2643
SEF1	0.1426	-0.1087	0.0140	-0.0387	-0.0253	-0.0120	0.1927	0.0766	0.0915	0.0298	0.1313	**0.7426**	-0.0355	-0.1371
SEF3	-0.0167	0.1588	-0.0034	0.0511	0.1829	0.0439	0.1123	-0.0377	0.1021	0.2108	-0.0472	**0.7112**	0.1084	0.0071
SEF4	0.0133	0.0866	-0.0329	0.1069	0.1965	0.0982	0.1268	0.1252	0.1411	0.1588	0.0565	**0.8459**	0.1215	0.0048
SI3	0.2335	-0.2462	-0.3970	-0.1941	-0.2961	**0.6598**	-0.2778	0.4890	-0.3412	-0.0280	0.0009	0.0490	**0.9105**	-0.3466
SI4	0.3577	-0.3195	-0.4313	-0.4371	-0.3923	**0.6002**	-0.3527	0.4979	-0.2924	0.0488	0.0244	0.0913	**0.8728**	-0.3355
UR11	-0.1279	**0.5396**	0.4683	0.2124	0.4608	-0.3600	0.3491	-0.4696	0.3268	0.0414	0.2071	-0.1721	-0.2508	**0.7484**

UR13	-0.1046	**0.5599**	0.3939	0.2520	0.3935	-0.2940	0.3959	-0.4705	0.3622	0.0580	0.2710	-0.1449	-0.1758	**0.8143**
UR21	-0.1931	**0.5643**	**0.5051**	0.3021	0.3983	-0.3894	0.4367	-0.5266	0.3717	0.0547	0.2587	-0.0475	-0.2531	**0.8325**
UR22	-0.1325	0.4899	0.4629	0.2783	0.3989	-0.4828	0.3938	-0.5655	0.3763	0.1216	0.2333	-0.0408	-0.4255	**0.8102**
UR23	-0.1299	0.4219	0.3783	0.2823	0.3899	-0.3982	0.3810	-0.5260	0.2911	0.0214	0.1353	0.0081	-0.3599	**0.7402**
UR32	-0.0159	0.4155	0.3835	0.2174	0.2614	-0.3282	0.2059	-0.4058	0.2208	0.0085	0.1870	-0.1550	-0.3641	**0.6895**
UR33	-0.0359	**0.5048**	0.3831	0.2748	0.3130	-0.3192	0.2258	-0.4099	0.3548	0.1813	0.3185	-0.0055	-0.2778	**0.7103**
UR41	0.1904	0.2768	0.1542	0.1978	0.3560	-0.1022	0.2031	-0.1981	0.2165	0.2338	0.2808	0.1448	-0.0583	**0.5825**
UR42	-0.1189	0.3787	0.3261	0.3729	0.3382	-0.2799	0.1384	-0.2973	0.2540	0.0868	0.0809	0.0621	-0.3094	**0.5813**

Model Evaluation: Structural Model Results

With established appropriateness of measures, the next step was to assess evidence supporting theoretical model. As mentioned earlier, the major emphasis of PLS-SEM analysis is on variance explained and the significance of all path estimates. The predictive power of the structural model is assessed by the R^2 values of the endogenous constructs (Chin, 2010). The PLS R^2 is analogous to the ordinary least squares regression's amount of variance measure in the dependent variable.

The structural model with path coefficients is shown on Figure 5. As can be seen, 33.9% of variance in *user resistance* (UR) was jointly explained by *facilitating conditions* (FC), *perceived helplessness over process* (PHP) and *perceived dissatisfaction with outcomes* (PDO). Additionally, 18.1% the *perceived helplessness over process* (PHP) was explained by *principled pragmatism* (PP) and *social influence* (SI); while 44.7% of *perceived dissatisfaction with outcomes* (PDO) was jointly explained by *health information technology self-efficacy* (SEF), *performance expectancy* (PE), and *social enabling effect* (SEE). All the path relationships were significant except for seven paths namely: *contingent pragmatism—perceived helplessness over process* (CP—PHP), *HIT self-efficacy—perceived helplessness over process (SEF-PHP), perceived helplessness over process—perceived dissatisfaction with outcomes* (PHP-PDO), *Level 1 equity evaluation—perceived dissatisfaction with outcomes* (EQ1—PDO), Level *2 equity evaluation—perceived dissatisfaction with outcomes* (EQ2—PDO), *Level 3 equity evaluation—perceived dissatisfaction with outcome* (EQ3—PDO) and *Level 4 equity evaluation—perceived dissatisfaction with outcome* (EQ4—PDO).



Path significance: ***p < .001, **p <. .01, *p < .05, ns p > .05

Figure 5. PLS analysis of research model

As was explained in the analysis procedure, the sample was further split into two to test whether or not there was a difference in the type of health professional role. More specifically, the sample was split into two groups: those with a prescriptive (physicians, physician assistants and nurse practitioners) and without prescriptive authority (registered nurses, licensed vocational nurses, medical assistants, etc.). An analysis of variance test was conducted to assess the statistical fit of

these data into their respective groups, based on the main dependent variable, user resistance. The ANOVA test results showed that there were no differences (F=1.525, p = .130). Details of this result are presented in the table in Appendix C. Table 14 below is a summary of the results of the structural model, path coefficients and the significance levels of the two subsamples. A majority of the relationships did not show any significant difference in the two groups except for the relationship between *level 2 equity evaluation* and *perceived dissatisfaction with outcomes* which was significantly different at alpha-level of .05.

Table 14. Group Comparison Analysis: User Resistance in Prescribing versus non-Prescribing Health Professionals

	Test criterion	Prescriptive authority professions (Physicians, physician assistants and nurse practitioners) n=53	Non-prescriptive authority (remainder of the sample not mentioned above) n=104	*t*-Value	*p*-Value	Significance Level
Latent variable						
UR	R^2	.355	.364			
PHP	R^2	.162	.197			
PDO	R^2	.573	.469			
Hypothesis						
H1: PHP-UR	Path coefficient	.282*	.202^{ns}	.461	.645	ns
H2: PHP-PDO	Path coefficient	.295*	.049^{ns}	1.172	.243	ns
H3: PDO-UR	Path coefficient	.327*	.119^{ns}	1.209	.228	ns
H4: SI-PHP	Path coefficient	-.344*	-.337**	.038	.970	ns
H5:SEE-PDO	Path coefficient	.065^{ns}	.266**	1.024	.309	ns
H6: EQ1-PDO	Path coefficient	-.011^{ns}	-.031^{ns}	.094	.926	ns
H7: EQ2-PDO	Path coefficient	.230^{ns}	.172^{ns}	2.134	.034	*
H8: EQ3-PDO	Path coefficient	.169^{ns}	-.020^{ns}	.954	.343	ns
H9: EQ4-PDO	Path coefficient	.299^{ns}	.092^{ns}	.993	.324	ns
H10: SEF-PHP	Path coefficient	-.062^{ns}	-.208^{ns}	1.111	.27	ns
H11: SEF-PDO	Path coefficient	-.214^{ns}	-.195*	.094	.923	ns
H12: PE-PDO	Path	-.357*	-.417***	.371	.711	ns

	coefficient					
H13: FC-UR	Path coefficient	-.177 ns	-.449***	1.783	.077	ns
H14: PP-PHP	Path coefficient	.088 ns	.217*	.704	.483	ns
H15: CP-PHP	Path coefficient	.122 ns	-.074 ns	.792	.431	ns

Path significance: ***p < .001, **p <. 01, *p < .05, ns p > .05

Hypotheses Testing Results

In Table 15 below, a summary of the hypotheses test results are presented. As can be seen, eight hypotheses were supported while seven were not. These unsupported relationships were CP-PHP, PHP-PDO, SEF-PHP, EQ1-PDO, EQ2-PDO, EQ3-PDO and EQ4-PDO. It should be noted here that the effect of the control variables was tested prior testing the model. This was done by first of all introducing all control variables and the constructs representing the relationships that they control, and finally introducing the rest of the other variables into the model. The test revealed that the effect of the control variables (gender, experience and voluntariness) on *perceived helplessness over process*, *perceived dissatisfaction with outcomes* and *user resistance* was not significant with any of the constructs.

Table 15. Summary of Hypotheses Testing

	Hypothesis	Standardized path coefficient	t-value	Result
H1	*Perceived helplessness over process* of use of the system will positively affect *user resistance.*	.220*	2.471	√
H2	*Perceived helplessness over process* of use of the technology will positively affect *dissatisfaction with outcomes.*	.119 ns	1.284	X
H3	*Perceived dissatisfaction with outcomes* of use of the technology will positively affect *user resistance.*	.245**	2.950	√
H4	*Social influence* will negatively influence *perceived helplessness over process.*	-.347***	4.741	√
H5	*Social enabling effect* will positively influence *perceived dissatisfaction with outcomes* such that if the attitude of referent others are perceived to be negative towards outcomes, the subject will be dissatisfied with the	.160*	2.142	√

	outcomes.			
H6	A net negative *Level 1 equity evaluation* (being rewarded less than previously due to the introduction of a new system) will lead to greater *perceived dissatisfaction with outcomes.*	-.033 ^{ns}	0.335	X
H7	A net negative *Level 2 equity evaluation* (being rewarded less than the organization due to the introduction of a new system) will lead to greater *perceived dissatisfaction with outcomes*.	.022 ^{ns}	.227	X
H8	A net negative *Level 3 equity evaluation* (being rewarded less than referent others due to the introduction of a new system) will lead to greater *perceived dissatisfaction with outcomes.*	.093 ^{ns}	1.116	X
H9	A net negative *Level 4 equity evaluation* (being rewarded less than government due to the introduction of a new system) will lead to greater *perceived dissatisfaction with outcomes.*	.184^{ns}	1.941	X
H10	*HIT self-efficacy* is negatively associated with *perceived helplessness over process.*	-.144^{ns}	1.589	X
H11	*HIT self-efficacy* is negatively associated with *perceived dissatisfaction with outcomes.*	-.165*	2.287	√
H12	*Performance expectancy* of a new system will negatively affect *perceived dissatisfaction with outcomes.*	-.383***	5.113	√
H13	*Facilitating conditions* of an organization will negatively affect *user resistance*.	-.317***	3.900	√
H14	*Principled pragmatism* will positively affect *perceived helplessness over process.*	.186*	2.713	√
H15	*Contingent pragmatism* will negatively affect *perceived helplessness over process.*	-.036 ^{ns}	.386	X

Path significance: ***p < .001, **p <. 01, *p < .05, ^{ns} p > .05
Legend: X = Not supported, √ = Supported

CHAPTER VI

DISCUSSION, CONCLUSIONS AND FUTURE RESEARCH

In this chapter, the findings of the study are discussed, conclusions are summarized, suggestions for future research are offered and a final conclusion is reached. It must be noted here that the study was carried out against a backdrop of massive industry-wide health information technology change. As has been mentioned earlier, the use of electronic health record systems is expected to be mandatory in the United States of America beginning 2015 (Blumenthal and Tavenner, 2010). This implies that the findings and conclusions should be interpreted within the context of a larger changing healthcare landscape. Consequently, while remaining true to the specific application of this study, there are implications to the wider national contextual environment.

Discussion

This study proposed a comprehensive model for understanding user resistance to information technology within a healthcare setting. The model is empirically tested—post-implementation—in various healthcare practices where electronic medical record systems have been introduced and are already being used. This study set out with the objective to understand how and why IT user resistance happens, and to explore the antecedents of IT user resistance. The specific research questions were: (1.) why do healthcare personnel resist health information technology, (2.) what are the antecedents of *perceived threats* to health information technology,

and (3.) does IT user resistance vary across various healthcare professions? In this section, we discuss the results in the light of these research objectives.

Why do Healthcare Personnel Resist Health IT?

This study found that user resistance originates from two major sources: perceived helplessness over the process of use of a new system, and the perceived dissatisfaction with the outcomes of that system. It also found that *facilitating conditions* serve the purpose of reducing user resistance. The two important antecedents of user resistance were uncovered namely: *perceived helplessness over process* (PHP) and *perceived dissatisfaction* with outcomes (PDO). *Perceived helplessness over process* and *perceived dissatisfaction with outcomes* both predicted user resistance significantly ($p < .05$ and $p < .001$ respectively); and in combination with *facilitating conditions* explained 33.9% of variation in *user resistance*.

Bhattacherjee and Hikmet (2007) had expressed the need to uncover other types of threats that lead to user resistance. Their conceptualization of *perceived threats* clearly falls into the category of *perceived helplessness over process* according to the present study. The current study therefore defines and measures an entirely new set of threats (*perceived dissatisfaction with outcomes*) that has not been explored in earlier studies. It should be noted here that with the exception of Bhattacherjee and Hikmet (2007), previous research on user resistance has theorized but not measured the *perceived threats* construct. This study found out that there are two salient but different types of threats that should be considered in determining the cause of user resistance namely: *perceived helplessness over process* and *perceived dissatisfaction with outcomes*.

Facilitating conditions (FC), on the other hand also exhibited a very strong relationship to user resistance at the .001 error level. These results suggest that people's beliefs about how a

new system can help them attain gains in job performance will significantly lessen the probability of being dissatisfied with the outcomes of the system, and consequently reduce their resistance to the given system.

Third, the study confirmed that the four-face conceptualization of user resistance was supported by data. This finding particularly responded to the question of *how* resistance occurs. The analytical specification of user resistance as a second-order construct permitted us to see how the *reactance, distrust, scrutiny* and *inertia* constructs significantly defined user resistance. Of the four dimensions, *reactance* and *distrust* seemed to be the more overt forms of resistance compared to *scrutiny* and *inertia*. Specifically, all dimensions had strong second order paths coefficients of .7 and beyond at $p < .001$. This suggests that the Linn and Knowles conceptualization is an informative and framework for understanding how resistance can manifest. Piderit (2000) suggested the importance of a multi-dimensional conceptualization of user resistance. This study's findings confirm user resistance is truly complex and multi-faceted nature; it demonstrates that *reactance, distrust, scrutiny* and *inertia* are salient manifestations of resistance.

What are the Antecedents of *Perceived Threats* to Health IT?

This study identified two sets of antecedents, based on the strength of their relationships, which were critical in contributing to *perceived threats*. The first set of antecedents was *performance expectancy* and *social influence*. These yielded very strong relationships with the *perceived threats* variables. The second set consists of *principled pragmatism*, *HIT self-efficacy, social enabling effect* and *equity evaluation.* The Lapointe and Rivard (2005) framework considered all of the above under the general umbrella of *initial conditions*. Hence, it can be said that three *initial conditions* were found to be particularly influential in directly or indirectly

determining user resistance namely: *performance expectancy*, *facilitating conditions* and *social influence*. While *performance expectancy* (PE) and *social influence* (SI) both had indirect influences on user resistance through *perceived threats; facilitating conditions* had a more direct influence. Both *performance expectancy* and *social influence* exhibited strong relationships with their mediating variables at the .001 error levels.

This set of findings is consistent with technology use and acceptance studies which predict that positive beliefs about a system's ability to improve job performance will positively influence behavioral intention to use and consequently actual usage (Venkatesh *et al.*, 2003). Hence, high PE and SI can be expected to lower resistance indirectly through the reducing perceived threats. Additionally, facilitating conditions (the extent to which people believe that they have both organizational and technical support) was found to lower resistance. This finding too is consistent with technology acceptance literature (see Venkatesh *et al.*, 2003).

Apart from *performance expectancy*, *social influence* and *facilitating conditions* mentioned above, this study also showed a significant indirect relationship between *user resistance* and three other *initial conditions*. *Principled pragmatism* (PP), *health IT self-efficacy* (SEF), and *social enabling effect* were found to have a significant indirect relationship ($p < .05$) with *user resistance. Principled pragmatism* was found to positively influence *perceived helplessness over process*. Here, it would seem that the more health professionals believe in the idea that professionalism determines practice and not reform, the more they are likely to feel threatened by process of use of reform-induced technological change. It is possible that these professionals see their professional identity so important such that any reform that does not fit into their understanding of what healthcare professionalism is all about would lead to a threat in

loss of control. This type of loss of control can be seen as a reform-induced helplessness due to the introduction of a new system (see Moore *et al.*, 2002).

Health IT self-efficacy, on the other hand negatively influenced *perceived dissatisfaction with outcomes*. This means that the more confident individuals were with their ability to use similar previous systems the less likely they were to be dissatisfied with the new system. This finding is consistent with previous studies on self-efficacy which suggest that computer self-efficacy for example, was critical in new technology acceptance (Bandura, 1986; Compeau & Higgins, 1995). This would mean that technology implementers and change managers at large would need to give more attention to building a sense of confidence in technological aptitude in their employees. This is likely to make employees feel more prepared when similar technological innovations are newly introduced in the future. Being in itself a perception, *HIT self-efficacy* is crucial because at least for one thing, it opens people up to the idea of trying new technology. And though it typically does not guarantee the fact that new technology will be accepted, at least, it is not resisted. When people do not resist a change, they are more likely to be convinced to accept the said change than those who are predisposed to reject it. And so, the mechanism of action of *HIT self-efficacy* is such that it mitigates the potential of rejection of systems due to perceived dissatisfaction, and hence reducing resistance.

Social enabling effect exhibited a positive influence on *perceived dissatisfaction with outcomes*. This finding is consistent with the general normative theory which posits that significant others' behaviors and opinions are likely to influence an individual's opinions in one direction or the other—in this case, in the direction of resistance (Ajzen, 1991). This finding is critical in our understanding of how to deal with resistance. Since *social enabling effect* is a mechanism of influence, change managers can use the knowledge about this construct to their

favor. In people can be influenced negatively by people in their relevant environment, it goes without saying that, efforts at change must be executed at both individual and corporate levels. Hence, managers of change should concentrate on changing the both the larger organizational attitude towards change as well as trying to influence individual change. Management would also do well to sell change outcomes through the use of employee role models whose idea about change outcomes become implicitly accepted and acted upon by other employees who hold them in high esteem. Positively changing the organizational perception about change outcomes in an organization would be critical in determining whether or not this change is resisted, including technology-induced change.

Does IT User Resistance Vary Across Various Healthcare Professions?

Findings showed very little difference in the two groups of healthcare professionals under study. Apart from the relationship between *level 2 equity evaluation* and *perceived dissatisfaction with outcomes*; no other relationship exhibited a significance difference. Given that only one item was used for EQ2 and that EQ2-PDO relationship was neither significant at .05 levels, this significance is clearly spurious. The relationship between facilitating conditions and user resistance was the only relationship that was significant at .1 levels in the subsamples that excluded pilot data and .05 levels in the subsamples that included pilot data. These results suggest that facilitating conditions are more likely to be to distinguish between healthcare professionals with prescriptive authority compared with those having no prescriptive authority. It would seem therefore that while facilitating conditions are important to healthcare professions whose major role is executing treatment options, professionals with prescriptive roles rather seemed to be influenced more by *perceived helplessness over process* and *dissatisfaction with outcomes*.

Insignificant Relationships

The last set of findings regard insignificant relationships. This study found insignificant relationships between *contingent pragmatism* and *perceived helplessness over process*; *perceived helplessness over process* and *perceived dissatisfaction with outcomes; HIT Self-efficacy and perceived helplessness over process; level 1 equity evaluation and perceived dissatisfaction with outcomes; level 2 equity evaluation and perceived dissatisfaction with outcomes; level 3 equity evaluation and perceived dissatisfaction with outcomes* and *level 4 equity evaluation and perceived dissatisfaction with outcomes.* First, we consider the *contingent pragmatism—perceived helplessness over process* relationship. Contingent pragmatists, contrary to principled pragmatists, are professionals who are flexible to change; who believe that positive expected outcomes could change the current practice of the profession. It was expected that *contingent pragmatism* would have negative relationship with *perceived helplessness over process*; such that the more flexible a professional is, the less their feeling of loss of control over the process. However, this relationship turned out not to be significant. It would seem that even though healthcare professionals' "openness" to reform was expected to reduce the sense of helplessness over the process of use, it did not. It is possible that though these professionals try to adjust to new technologies, the fact that they do so "as a function of a survival strategy" (Moore *et al*., 2002, p. 551) their adjustment attitudes may not be strong enough to reduce their feeling of helplessness over the process of use of a new system. Hence, it may be that contingent pragmatism truly reduces the helplessness over process, but probably only over time.

Another relationship which also turned out unsupported by data is the *perceived helplessness over process* to *perceived dissatisfaction with outcomes* relationship. Results showed that loss of control over the process of use of the system may not necessarily translate to

dissatisfaction with outcomes. Again, this may be different in a pre-implementation environment, where we are dealing with dissatisfaction with expected outcomes and not necessarily actual use.

Additionally, the relationship between *HIT self-efficacy* and *perceived helplessness with outcomes* was not significant. It would seem that self-efficacy is not related to a sense of loss of control according to this data. This result is rather strange because studies in technology acceptance suggest that there is a negative relationship with people's confidence with technology to their anxiety to new technology. More investigation is needed to fully understand this result.

Finally, the last set of relationships involved *levels 1, 2, 3* and *4 equity evaluation* and *perceived dissatisfaction with outcomes*. The rationale of this set of hypotheses was that when people perceive inequity ensuing from the introduction of a new system in the work place, they may become dissatisfied with this outcome and are likely to resist the system. As hypothesized, these perceptions of inequity happen when people compare themselves vis-à-vis their previous self (*level 1 equity evaluation*), organization (*level 2 equity evaluation*), co-workers (*level 3 equity evaluation*) or government (*level 4 equity evaluation*). The data supported the *level 4 equity evaluation*—a person's perceived inequity when they compared their net gains in equity with the government. The lack of significance at all these four levels suggests that equity considerations are not nearly as important in determining perceived dissatisfaction with outcomes as other determinants such as *performance expectancy*. It would seem that the greatest determinant of dissatisfaction with outcomes is the expectation of the new system to deliver or not deliver on its promise.

Conclusions

This study set out to find out why and how healthcare professionals resist information technology in the first place. Additionally, it sought to know what the antecedents of perceived

threats were. Finally, the study sought to know whether user resistance to information technology varied across medical profession. The findings clearly addressed these questions. In the following subsections, the key issues of the study are synthesized and research questions answered. Furthermore, the theoretical and practical implications are discussed. We conclude this section by reflecting on some limitations of this study.

A model was proposed in this study to explore the multi-faceted nature of user resistance to information technology based on the overarching guidance of the theory of psychological reactance. The model integrated several useful theories to build on the Lapointe and Rivard (2005) user resistance model. More specifically, the theories used included: the technology acceptance model, the unified theory of the use and acceptance of information technology, the equity theory, the social identity theory, and the cognitive dissonance theory. These theories all combined to inform a simple generic model in which the introduction of an information system into an organization would activate *initial conditions* leading to *threats* that generate *resistance*.

But just how and why do people resist information technology? This study found that user resistance originates from two major sources: perceived helplessness over the process of use of a new system, and the perceived dissatisfaction with the outcomes of that system. Additionally, it shows that facilitating conditions contribute to reduce this resistance. Hence it can be said that people resist information technology when they feel threatened by the process of change in the use of a new system and/or when they are threatened by the discomfort of the of undesired outcomes of the system. People resist information systems through reactant behaviors, distrust, scrutiny and inertia. Reactant actions are associated with frustration and irritation. *Distrust* attitudes are characterized by negative beliefs about the new system. Scrutiny, on the

other hand, manifests as analytical and critical disposition against the new system. Lastly, the inertia approach is typified by a "stay put" attitude that refuses to embrace the desired change.

What are the antecedents of *perceived threats*? As has been discussed earlier, *perceived threats* had been identified as the main antecedent of user resistance and have been hypothesized to be preceded by *initial conditions* (Lapointe & Rivard, 2005). This study identified two sets of antecedents that were critical in contributing to perceived threats. The first set of antecedents was *performance expectancy* and *social influence*. These two were found to influence perceived threats in the most significant way. More specifically, these two initial conditions both contribute to reduce *perceived threats*, and hence *user resistance*. A second group of antecedents were: principled pragmatism, HIT self-efficacy, and social enabling effect. These were all found to increase perceived threats and hence increase user resistance. This second category will clearly need to be mitigated in order to reduce user resistance.

Overall, one system factor, one people factor and a one combination factor seemed critical to influencing *user resistance*. On the system side, performance expectancy was crucial; on the people side, social influence stood out and the combination factor was facilitating conditions. Because facilitating conditions refer to the individual beliefs about technical and organizational support available to them for the system, facilitating conditions can be used to significantly decrease *user resistance*.

Finally, very little difference was found among health professional roles. The only potential difference was in the relationship between *facilitating conditions* and *user resistance*, which in itself was insignificant in the main sample (i.e. sample excluding pilot data), but became strongly significant at .05 levels in the merged sample (including pilot data). It would seem that facilitating conditions such as organizational support is more important to

professionals with a non-prescriptive role than those with prescriptive authority in determining resistance to health IT. In the next subsections the theoretical and practical implications of this study are discussed.

Theoretical Implications

This research offers several implications and contributions to theory. First, the study extends the body of literature by combining social psychological theories, information systems theories and a policy framework to build on the Lapointe and Rivard (2005) model. This work increases our understanding about user resistance by introducing and operationalizing two types of perceive threats to information systems; which until now has only been considered as a single construct in the literature. The research also contributes by operationalizing and testing the developed model through a survey methodology which has had very little precedence in user resistance literature.

The proposed model introduced a policy component. This integration of a policy constituent is clearly important given the fact that HIT implementation is a *policy-driven* organizational change. Contingent and principled pragmatism have been used in educational reform literature to explain professional dispositions to vis-à-vis reform. This study leverages its usage in the IS arena. Additionally, the equity implementation theory is also extended by the addition of a new evaluative dimension—government—to which HIT users make equity comparisons to, in order to determine behavioral decision-making.

Lastly, the Knowles and Linn (2004) classification of resistance is introduced here. This classification, which is relatively new in IS literature, means the complex, and multi-faceted user resistance construct can be understood in its complexity as Piderit (2000) suggests. The study also introduces new perceived threats constructs namely: *perceived helplessness over process*

and *perceived dissatisfaction with outcomes* and a normative construct, *social enabling effect.* These new conceptualizations are all additions to IS user resistance literature that makes it richer and more apt to explain the concept of user resistance.

Practical Implications

This study has several implications for practice. In a healthcare environment fraught with technology-induced organizational change, change managers' understanding of the importance of resistance is critical. Knowles and Linn (2004, p. 9) have suggested that understanding resistance, would shed light about the role of persuasion—its antithesis. Persuasion is seen as a very important antidote to resistance. Persuasion skills are expected, if not required of change managers' portfolio of abilities. This study provides change managers with empirically tested knowledge for decision-making. In this subsection, we consider how change managers and change management programs can benefit from the results of this study.

First, this study increases change managers' knowledge about user resistance. The research identifies three key predictors of user resistance namely: perceived helplessness over process, perceived dissatisfaction with outcomes and facilitating conditions. While *perceived helplessness over process* and *perceived dissatisfaction with outcomes* are threats that fuel user resistance, facilitating conditions help to reduce it. Change management should work to minimize these threats while increasing the facilitating conditions in order to mitigate resistance and improve the chances of successful IT implementation. Change managers could apply this by implementing change management programs that address at least the two most important predictors of *perceived threats* (*performance expectancy* and *social influence*) and *facilitation conditions*. Employees need to be convinced about that the new system will, in fact, positively impact their gains in job performance (performance expectancy). Additionally, prior to

implementation, employees with influential roles could be properly educated and used as project sponsors to increase positive social influence. While working to reduce the threats, change managers can reduce user resistance directly by increasing facilitating conditions. When employees feel that they have all the necessary organizational and technical support they need to properly use the new system, they will be less likely to resist the new system once installed. Hence, persuasive messaging targeted towards employees in the face of change should address the elements here mentioned.

Second, this study can be used as an evaluative framework in two important ways. Change management may use this model during the pre-implementation phase to predict user resistance. By doing this, change managers may be able to uncover the type of threats or antecedents of perceived threats that are important to the employees and address them accordingly. Additionally, the model scales can be used in post-implementation environments as a feedback mechanism tool in understanding employee concerns about the new system and addressing them.

Third, the four-face conceptualization of user resistance is insightful in understanding how resistance is manifested. Previous research has classified resistance into apathy, passive, active, or aggressive categories (Coetsee, 1999). This study's conceptualization as reactance, distrust, scrutiny and inertia categorizations may be more intuitive to managers. The scales for user resistance in this study could be used as a preliminary evaluation to determine the manifestation of IT user resistance.

Overall, this study points to the critical role of organizational support in the change management process. Management would need to provide sensitization, guidance, training and opportunity for employee feedback before, during and after the implementation of a new system.

Just as some researchers have recommended, top management support in organization-wide implementation is critical (DeLone, 1988).

Limitations of Study

The conclusions of this study should be interpreted in the light of its limitations. First, this work uses a selection of constructs based on previous literature like: Brehm and Brehm (1991), Knowles and Linn (2004), and Lapointe and Rivard (2005). It is possible that there are other important constructs that can predict IT user resistance. Second, the study was conducted post-implementation.

A longitudinal approach, covering both pre- and post implementation phases could be more informative since employee outlook on the new system may vary depending on the implementation phase in question (Karahanna *et al.*, 1999).

Additionally the scales that were used for most of the constructs, including user resistance were not pre-validated. Consequently, constructs like the equity constructs experience cross-loadings, with some items being dropped from the analysis. A notable example is *level 2 equity evaluation* (EQ2) in which only EQ21 loaded conveniently. The testing and validation of these scales in future research would be necessary. Furthermore, the use of only three experts in the pretesting stages of instrument is a potential limitation of this research. The study would have benefited from a larger pool of experts to especially refine the measures.

Nevertheless, the proposed model and the results of the empirical test offer a great departure point for a comprehensive outlook on user resistance. It still is one of the few theory-based models of IT user resistance that has been empirically tested following the implementation of a new health information technology.

Suggestions for Future Research

The current study proposed a comprehensive model for examining user resistance to information technology. It identified and incorporated the four faces of user resistance proposed by Knowles and Linn (2004) into IT user resistance literature. It also identified two related but independent dimensions of perceived threats alongside their associated antecedents. Finally, the study integrates and tests various initial conditions in relation to perceived threats and user resistance.

Future research could use this study as an important departure point to answer some answer some important questions: (1.) Do specific threats lead to specific dimensions of user resistance? (2.) Are there more types of perceived threats that are salient to IT user resistance? (3.) Are there any other theories that can inform our knowledge on possible initial conditions yet to be uncovered? These are some areas in which future research could take. Additionally, finding which type of threats and initial conditions contribute to resistance during the different stages of implementation could be particularly insightful. For example, if people-centric factors were found to be particularly associated with user resistance during the pre-implementation phase, then, change management programs could be designed to target causative initial conditions.

Conclusion

The introduction of electronic health records into the United States healthcare system is expected to increase legibility, reduce medical errors, shrink costs and boost the overall quality of healthcare. Early field reports about this transition reveal that healthcare professionals including physicians and nurses are resisting the full use of these systems. This study proposed and tested a comprehensive model that encompassed, people-centric, techno-centric and policy-centric factors that influence user resistance to information technology. Results identified

perceived *helplessness over process* and *perceived dissatisfaction with outcomes* as the two relevant types of perceived threats that are responsible for user resistance. Additionally, user resistance was found to manifest as *reactance, distrust, scrutiny* and *inertia*. The findings stretch our current understanding of the determinants of user resistance as well as present change managers with important tools for mitigating information systems user resistance. The application of these findings has the potential to improve the chances of successful IT implementation within the healthcare industry in particular.

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APPENDIX A

APPENDIX A

CONSTRUCT DEFINITION AND RESEARCH INSTRUMENT

Construct	Definition
Contingent Pragmatism	It refers to the belief by an individual with oppositional orientations to reform, whereby enforced reactions to policy change take on 'something of the function of a survival strategy'.
Facilitating Conditions	It refers to the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.
HIT Self-efficacy	It refers to an individual's belief that he or she has the ability to perform specific task/job using a health information technology.
Level 1 Equity Evaluation	It refers to an individual's perception that he or she has not been treated equitably compared to his/her previous state, by the evaluation of his/her net benefits in the current state compared with the former.
Level 2 Equity Evaluation	It refers to an individual's perception that he or she has not been treated equitably compared to his/her organization, by the evaluation of his/her net benefits compared to that of the organization.
Level 3 Equity Evaluation	It refers to an individual's perception that he or she has not been treated equitably compared to his/her co-worker, by the evaluation of his/her net benefits compared to that of the co-worker.
Level 4 Equity Evaluation	It refers to an individual's perception that he or she has not been treated equitably compared to his/her government, by the evaluation of his/her net benefits compared to that of the government.
Perceived Dissatisfaction with Outcomes	It denotes an individual's belief that carrying out a particular behavior will lead to unfavorable result.
Perceived Helplessness over Process	It refers to an individual's belief that carrying out a new behavior diminishes their ability to maintain control over their current routine.
Performance Expectancy	It refers to the degree to which an individual believes that using the system will help him or her to attain gains in job performance.

Principled Pragmatism	It refers to the positive belief by an individual that a set of reforms will strengthen and affirm his or her professional identity by drawing eclectically on a range of professional practices and traditions.
Social enabling effect	It refers to an individual's belief that his/her beliefs are consistent with those of referent others around them.
Social Influence	It refers to the degree to which an individual perceives that important others believe he or she should use the new system.
User Resistance	It refers to covert or overt behaviors that oppose change towards the use of- or avoidance of an information system manifested as distrust, reactance, distrust, scrutiny or inertia.

Instrument

Please, REFLECT now on your EARLIER EXPERIENCES with the new EHR system at your workplace and when you first began to use it, to answer ALL of the remaining questions. Your answers should somewhat convey this core idea: **"Looking back to when I started to use the new EHR system, I would say…."**	
User Resistance (UR) [1. Strongly disagree; 5. Strongly agree]	
	Reactance
UR11	I felt frustrated about how the new EHR system works.
UR12	I was irritated by the way the new EHR system restricts my pattern of work.
UR13	I was stressed by the change brought by the new EHR system.
	Distrust
UR21	I didn't believe the new EHR system is a better one.
UR22	I didn't think the new EHR system does the job.
UR23	I doubted that the new EHR system is indeed effective.
	Scrutiny
UR31	I analyzed different aspects of the new EHR system.
UR32	I saw several weaknesses with the new EHR system.
UR33	I was critical about the new EHR system.
	Inertia
UR41	I was watching to see how the new EHR system actually holds up.
UR42	I tried as much as possible to avoid some aspects of the new EHR system.
UR43	I was enthusiastic about the new EHR system*.
Perceived Helplessness over Process (PHP) [1. Strongly disagree; 5. Strongly agree]	
PHP1	With the new EHR system, I was free to decide how to go about my work*
PHP2	With the new EHR system, I had control over the scheduling of my work*
PHP3	With the new EHR system, I was not free to interact with my patient as I would like to.
PHP4	The new EHR system was inflexible to my professional judgment.
PHP5	Overall, I felt the new EHR system dictates the way my tasks are performed.
Perceived Dissatisfaction with Outcomes (PDO) [1. Very dissatisfied; 5. Very satisfied]	

	Rate how dissatisfied/satisfied you were with the following aspects of the new system
PDO1	The speed with which you were able to do your work using the new EHR system.
PDO2	The ability to easily relate to your patients using the new EHR system.
PDO3	The impact in your skills and abilities using the new EHR system.
PDO4	The impact in the overall quality of care using the new EHR system.
HIT Self-Efficacy (HSE) [1. Strongly disagree; 5. Strongly agree]	
	I feel confident that I could have completed my job using the EHR system…
SEF1	…if there was no one around to tell me what to do as I go.
SEF2	…if I could call someone for help if I got stuck.
SEF3	…if I had a lot of time to complete the job for which the software was provided.
SEF4	…if I had just the built-in help facility for assistance.
Social Enabling Effect (SEE) [1. Strongly disagree; 5. Strongly agree]	
SEE1	I think my colleagues shared my concerns about the new EHR system.
SEE2	I think my supervisor(s) shared my concerns the new EHR system.
SEE3	I think other users of the new EHR system shared my concerns about it.
SEE4	I think my organization's experience with the new EHR system confirmed my concerns about it.
	Performance Expectancy (PE) [1. Strongly disagree; 5. Strongly agree]
PE1	I found the system useful in my job.
PE2	Using the system enabled me to accomplish tasks more quickly.
PE3	Using the system increased my productivity.
PE4	Using the system increased my chances of getting a raise.
	Facilitation Conditions (FC) [1. Strongly disagree; 5. Strongly agree]
FC1	I had the resources necessary to use the system.
FC2	I had the knowledge necessary to use the system.
FC3	The system was not compatible with other systems I used.
FC4	A specific person(s) was available for assistance with system difficulties.
	Social Influence (SI) [1. Strongly disagree; 5. Strongly agree]
SI1	People who influence my behavior though that I should use the system.
SI2	People who are important to me thought that I should use the system.
SI3	The senior management of this business was helpful in the use of the system.
SI4	In general, the organization supported the use of the system.
	Equity Evaluation
	The questions in this section focus on the ***stresses*** and the ***benefits*** from the use of the new EHR system as compared to the previous system or paper-based process. Some examples of stresses and benefits are listed below:
	Stresses (requirements) / **Benefits (outcomes)**
	The amount of time required to complete the same work / More pleasant work environment
	The manual and cognitive effort used to / Less tension, more job satisfaction
	/ More opportunities for advancement

	complete the same work The amount of work required The level of responsibility required The accountability for the work performed Fear of unknown e.g. failure	Better service to customers More recognition, better visibility Salary increase, grade increase, or higher level title Increase in power and influence
	Level 1 Equity Evaluation (EQ1) [1. Strongly disagree; 5. Strongly agree]	
	Compare your benefits with the use of the old/paper system to your benefits with the new EHR system.	
EQ11	My stresses *increased* with my use of the new EHR system than the old/paper system.	
EQ12	I had fewer stresses using the old/paper system.	
EQ13	My *benefits increased* with the use of the new EHR system than the old/paper system.	
EQ14	Overall, the new EHR system had fewer benefits to me than the old/paper system.	
	Level 2 Equity Evaluation (EQ3) [1. Strongly disagree; 5. Strongly agree]	
	Compare your organization's benefits to yours with the use of the new system.	
EQ21	My stresses *increased* with the use of the new EHR system more than that of my organization.	
EQ22	My organization's benefits *increased* with the new EHR system than my benefits.	
EQ23	More work was required of my organization with the use of the new EHR system than was required of me.	
EQ24	Overall, the outcomes of the new EHR system favor my organization's interests more than my interests.	
	Level 3 Equity Evaluation (EQ3) [1. Strongly disagree; 5. Strongly agree]	
	Compare your co-workers benefits to yours with the use of the new system.	
EQ31	My stresses *increased* with the use of the new EHR system compared to my co-workers.	
EQ32	My co-workers' stresses lowered with the new EHR system compared to mine.	
EQ33	More work was required of my co-workers with the new system than was required of me.	
EQ34	Overall, the benefits of the new EHR system favored my co-workers more than me.	
	Level 4 Equity Evaluation (EQ4) [1. Strongly disagree; 5. Strongly agree]	
	Compare your benefits to that of the government (policy-makers) with the use of the new system.	
EQ41	My stresses have increased with the use of the new EHR system more than the stresses of the government.	
EQ42	The government benefits more from the new EHR system than me.	
EQ43	More work is required of the government with the new EHR system than is required of me.	
EQ44	Overall, the outcomes of the new EHR system favored government interests more than my interests.	
	Contingent Pragmatism (CP) [1. Strongly disagree; 5. Strongly agree]	
	Concerning new healthcare reform(s) regarding EHR…	
CP1	I am a flexible professional: I will practice new ideas even if they contradict mine.	

CP2	I accept all policy changes as long as they can help me achieve my desired results.
CP3	I am open to ideological differences: I can adapt to new ideas.
CP4	I have my personal practice preferences; but I am open to others' ways of practice.
	Principled Pragmatism (PP) [1. Strongly disagree; 5. Strongly agree]
	Concerning new healthcare reform(s) regarding EHR…
PP1	I am a highly principled professional: I am strictly guided my idea of professionalism.
PP2	I believe professionals should determine practice, not policy-makers.
PP3	I don't think reforms should change my professional judgment.
PP4	I will choose professional judgment over policy requirements any day.

*Reversed scoring

General / Descriptive data

- I have personally used paper records before.
  [**YES**] [**NO**]
- I have an experience with an electronic medical/health record system. [**YES**]; [**NO]**
  If **YES,** how long?
  [Less than 1 year] [1-2 years] [More than 2 years]
- I am a…
  [**Physician**] [**Physician Assistant**] [**Nurse**] [**Other**] Please specify_____
- I have been practicing in this capacity for…
  [Less than 2 years] [2-5 years] [More than 5 years]
- My gender is …
  [**MALE**] [**FEMALE**]
- How many hours do you spend on the computer daily?
  _____
- I am required to use the EHR system mandatorily.
  [**YES**] [**NO**]
- How long has this new electronic health/medical record been operational at your practice?

_____

APPENDIX B

APPENDIX B

PILOT RESULTS

Table I: Reliability Measures

			Squared Correlations among constructs													
Construct	**Composite Reliability**	**AVE**	**CP**	**EQ1**	**EQ2**	**EQ3**	**EQ4**	**FC**	**PDO**	**PE**	**PHP**	**PP**	**SEE**	**SEF**	**SI**	**UR**
CP	0.9418	0.8019	1													
EQ1	0.7667	0.6230	0.0012	1												
EQ2	NA	NA	0.0009	0.3363	1											
EQ3	0.7438	0.6120	0.0117	0.2028	0.2216	1										
EQ4	0.8008	0.5734	0.0059	0.3152	0.2083	0.1291	1									
FC	0.8025	0.5910	0.0650	0.1272	0.3959	0.1206	0.0056	1								
PDO	0.9220	0.7476	0.0100	0.2316	0.3068	0.0251	0.2339	0.2290	1							
PE	0.8897	0.7301	0.1966	0.1379	0.1305	0.0012	0.1668	0.1476	0.3059	1						
PHP	0.8336	0.6257	0.1006	0.3290	0.1835	0.0039	0.1682	0.1469	0.1909	0.3175	1					
PP	0.8631	0.6846	0.2902	0.0092	0.0050	0.0007	0.0271	0.0999	0.0040	0.0953	0.0281	1				
SEE	0.8542	0.6047	0.1278	0.0389	0.0356	0.0245	0.0230	0.0116	0.0209	0.0027	0.0067	0.0956	1			
SEF	0.6694	0.4223	0.1672	0.0641	0.0518	0.0700	0.0018	0.2867	0.0537	0.0514	0.0012	0.1196	0.0270	1		
SI	0.9349	0.8271	0.3161	0.0424	0.0312	0.0028	0.0342	0.2163	0.1205	0.3326	0.2107	0.1144	0.1332	0.2192	1	
UR	0.8604	0.4245	0.0047	**0.4753**	0.2482	0.0824	0.2103	0.1406	0.2702	0.2073	0.3371	0.0041	0.0444	0.0001	0.0712	1

Table II. Path Coefficients

	PDO	**PE**	**PHP**	**UR**	**UR1**	**UR2**	**UR3**	**UR4**
CP	0	0	-0.1332	0	0	0	0	0
EQ1	0.07490	0	0	0	0	0	0	0
EQ2	0.32700	0	0	0	0	0	0	0
EQ3	-0.13620	0	0	0	0	0	0	0
EQ4	0.19400	0	0	0	0	0	0	0
FC	0	0	0	-0.0684	0	0	0	0
PDO	0	0	0	0.3026	0	0	0	0
PE	-0.2885	0	0	0	0	0	0	0
PHP	0.0241	0	0	0.4222	0	0	0	0
PP	0	0	-0.0164	0	0	0	0	0
SEE	0.0960	0	0	0	0	0	0	0
SEF	-0.1156	0	0.2592	0	0	0	0	0
SI	0	0	-0.4999	0	0	0	0	0
UR	0	0	0	0	0.8134	0.8167	0.8330	0.7757

Table III. Outer Loadings

	CP	EQ1	EQ2	EQ3	EQ4	FC	PDO	PE	PHP	PP	SEE	SEF	SI	UR
CP1	0.8901	0	0	0	0	0	0	0	0	0	0	0	0	0
CP2	0.9444	0	0	0	0	0	0	0	0	0	0	0	0	0
CP3	0.8851	0	0	0	0	0	0	0	0	0	0	0	0	0
CP4	0.8602	0	0	0	0	0	0	0	0	0	0	0	0	0
EQ11	0	0.8467	0	0	0	0	0	0	0	0	0	0	0	0
EQ12	0	0.7275	0	0	0	0	0	0	0	0	0	0	0	0
EQ21	0	0	1	0	0	0	0	0	0	0	0	0	0	0
EQ31	0	0	0	0.9710	0	0	0	0	0	0	0	0	0	0
EQ34	0	0	0	0.5302	0	0	0	0	0	0	0	0	0	0
EQ41	0	0	0	0	0.7351	0	0	0	0	0	0	0	0	0
EQ42	0	0	0	0	0.7166	0	0	0	0	0	0	0	0	0
EQ44	0	0	0	0	0.8164	0	0	0	0	0	0	0	0	0
FC1	0	0	0	0	0	0.8953	0	0	0	0	0	0	0	0
FC2	0	0	0	0	0	0.8652	0	0	0	0	0	0	0	0
FC4	0	0	0	0	0	0.4720	0	0	0	0	0	0	0	0
PDO1	0	0	0	0	0	0	0.8960	0	0	0	0	0	0	0
PDO2	0	0	0	0	0	0	0.7855	0	0	0	0	0	0	0
PDO3	0	0	0	0	0	0	0.8869	0	0	0	0	0	0	0
PDO4	0	0	0	0	0	0	0.8854	0	0	0	0	0	0	0
PE1	0	0	0	0	0	0	0	0.7587	0	0	0	0	0	0
PE2	0	0	0	0	0	0	0	0.8918	0	0	0	0	0	0
PE3	0	0	0	0	0	0	0	0.9053	0	0	0	0	0	0
PHC3	0	0	0	0	0	0	0	0	0.7756	0	0	0	0	0
PHC4	0	0	0	0	0	0	0	0	0.8269	0	0	0	0	0
PHC5	0	0	0	0	0	0	0	0	0.7694	0	0	0	0	0
PP2	0	0	0	0	0	0	0	0	0	0.8255	0	0	0	0
PP3	0	0	0	0	0	0	0	0	0	0.9892	0	0	0	0
PP4	0	0	0	0	0	0	0	0	0	0.6275	0	0	0	0
SEE1	0	0	0	0	0	0	0	0	0	0	0.7876	0	0	0
SEE2	0	0	0	0	0	0	0	0	0	0	0.9763	0	0	0
SEE3	0	0	0	0	0	0	0	0	0	0	0.7563	0	0	0
SEE4	0	0	0	0	0	0	0	0	0	0	0.5229	0	0	0
SEF1	0	0	0	0	0	0	0	0	0	0	0	0.5832	0	0
SEF3	0	0	0	0	0	0	0	0	0	0	0	0.4270	0	0
SEF4	0	0	0	0	0	0	0	0	0	0	0	0.8628	0	0
SI2	0	0	0	0	0	0	0	0	0	0	0	0	0.8960	0
SI3	0	0	0	0	0	0	0	0	0	0	0	0	0.9007	0
SI4	0	0	0	0	0	0	0	0	0	0	0	0	0.9313	0
UR11	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7558
UR13	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7298
UR21	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7495
UR22	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5983
UR23	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7584
UR31	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1888
UR32	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7845
UR33	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7271
UR41	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5685
UR42	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6899

Table IV: Cross-loadings

	CP	EQ1	EQ2	EQ3	EQ4	FC	PDO	PE	PHP	PP	SEE	SEF	SI	UR
CP1	**0.8901**	-0.0667	0.0806	-0.1108	0.0372	0.1435	-0.1420	0.3962	-0.3015	0.3631	0.2659	0.3232	**0.5393**	0.0294
CP2	**0.9444**	0.0248	0.0971	-0.0678	0.0687	0.2598	-0.0779	0.4543	-0.2782	**0.5591**	0.3737	0.3395	**0.5349**	0.1079
CP3	**0.8851**	-0.0578	-0.0864	-0.1431	0.0687	0.2296	-0.1677	0.3604	-0.2636	0.4025	0.3714	0.3829	**0.5118**	0.0219
CP4	**0.8602**	-0.0209	0.0053	-0.0678	0.1019	0.2846	0.0253	0.3748	-0.2886	**0.6044**	0.2770	0.4201	0.4262	0.0848
EQ11	-0.0180	**0.8467**	**0.6013**	**0.5185**	0.4795	-0.4480	0.4240	-0.3580	**0.5798**	0.1097	0.2426	-0.1466	-0.0646	**0.6446**
EQ12	-0.0387	**0.7275**	0.2796	0.1506	0.4030	-0.0711	0.3288	-0.2140	0.2958	0.0330	0.0460	-0.2714	-0.2915	0.4228
EQ21	0.0297	**0.5799**	**1.0000**	0.4707	0.4564	-0.6292	**0.5539**	-0.3612	0.4284	-0.0705	0.1888	-0.2276	-0.1765	0.4982
EQ31	-0.1265	0.4872	**0.5129**	**0.9710**	0.2917	-0.4041	0.1645	0.0178	0.1262	-0.0580	0.1343	-0.2410	-0.0376	0.3317
EQ34	0.0187	0.0616	0.0516	**0.5302**	0.3929	0.0530	0.0464	0.0725	-0.1986	0.0999	0.1455	-0.1964	-0.0780	-0.0357
EQ41	0.2291	0.3717	0.4812	0.4854	**0.7351**	-0.2508	0.3786	-0.1449	0.2123	0.2512	0.2994	-0.1328	0.0574	0.3286
EQ42	-0.0607	0.0720	0.0819	0.1198	**0.7166**	0.2102	0.1410	-0.2881	0.1743	0.1054	-0.0149	0.1258	-0.2482	0.1017
EQ44	-0.0484	**0.5992**	0.3259	0.1472	**0.8164**	0.0226	0.4407	-0.4684	0.4496	0.0266	0.0021	0.0027	-0.2798	0.4543
FC1	0.3714	-0.3112	-0.6216	-0.3580	-0.0976	**0.8953**	-0.4789	**0.5322**	-0.3795	0.3108	0.0555	0.4898	0.4310	-0.3565
FC2	0.0638	-0.3268	-0.4733	-0.2525	-0.0251	**0.8652**	-0.3641	0.1149	-0.2893	0.2386	0.1320	0.4574	0.3868	-0.3108
FC4	0.0049	-0.0279	-0.3631	-0.0720	-0.1085	0.4720	-0.0995	0.2061	-0.1905	0.1933	0.1840	0.1578	0.2019	-0.0200
PDO1	0.0485	0.4398	**0.5287**	0.1020	0.3614	-0.4577	**0.8960**	-0.5058	0.3792	0.0747	0.2125	-0.1461	-0.2076	**0.5019**
PDO2	-0.1107	0.2898	0.4266	0.2558	0.4428	-0.4571	**0.7855**	-0.4418	0.4171	0.0589	0.1679	-0.1610	-0.1938	0.3502
PDO3	-0.0469	0.4749	**0.5255**	0.1443	0.4044	-0.3849	**0.8869**	-0.3986	0.3418	0.0820	0.0848	-0.2192	-0.3253	0.4560
PDO4	-0.2413	0.4434	0.4326	0.0724	0.4734	-0.3662	**0.8854**	-0.5592	0.3829	0.0071	0.0419	-0.2713	-0.4582	0.4749
PE1	0.4553	-0.3567	-0.4409	0.0026	-0.2590	**0.5294**	-0.4780	**0.7587**	-0.4627	0.3518	0.1667	0.4314	**0.7023**	-0.4007
PE2	0.3077	-0.2666	-0.2518	0.1097	-0.3338	0.2100	-0.4594	**0.8918**	-0.4337	0.2781	-0.0643	0.0061	0.3145	-0.4068
PE3	0.3665	-0.3232	-0.2270	-0.0224	-0.4505	0.2365	-0.4748	**0.9053**	-0.5412	0.1584	0.0260	0.1341	0.4489	-0.3557
PHP3	-0.1321	0.4271	0.2405	0.0455	0.4447	-0.2150	0.2646	-0.4316	**0.7756**	-0.0829	-0.2005	0.0547	-0.2508	0.3365
PHP4	-0.3888	**0.5085**	0.4694	0.2314	0.3123	-0.4836	0.4546	-0.5540	**0.8269**	-0.2887	-0.0342	-0.2653	-0.5315	**0.5331**
PHP5	-0.1712	0.4114	0.2540	-0.1812	0.2493	-0.1451	0.2749	-0.3241	**0.7694**	0.0272	0.0035	0.2130	-0.2406	0.4688
PP2	0.4591	0.0537	0.0373	-0.0673	0.1198	0.2780	0.0954	0.2192	-0.0493	**0.8255**	0.2906	0.3924	0.3279	0.0274
PP3	**0.5344**	0.0910	-0.1016	-0.0245	0.1642	0.3130	0.0517	0.3145	-0.1923	**0.9892**	0.2896	0.3141	0.3207	0.0620
PP4	0.1971	0.3457	0.1583	0.2491	0.1810	0.0667	0.0398	0.1952	-0.0070	**0.6275**	0.3916	0.2309	0.2537	0.2452
SEE1	0.4339	0.1070	-0.1042	-0.0743	-0.0190	0.2573	0.0206	0.2676	-0.1945	0.4551	**0.7876**	0.2209	0.3340	0.0895
SEE2	0.3518	0.1970	0.1982	0.2051	0.1345	0.1158	0.1411	0.0426	-0.0826	0.3148	**0.9763**	0.1810	0.3606	0.2696
SEE3	0.3325	0.2703	0.1439	0.1744	0.2550	0.1954	0.0396	0.0992	0.0165	0.3024	**0.7563**	0.2498	0.4249	0.1724
SEE4	0.3348	0.2121	0.0197	0.2182	0.0982	0.2913	-0.0406	0.1723	-0.0429	0.3808	**0.5229**	0.3265	0.3747	0.3059
SEF1	-0.1445	-0.1562	-0.2528	-0.3240	0.0379	0.4285	-0.1421	-0.0448	0.1379	0.0735	-0.2168	**0.5832**	0.0235	0.0517
SEF4	**0.5959**	-0.2040	-0.1168	-0.1380	-0.0827	0.3802	-0.1884	0.3162	-0.1140	0.3878	0.3462	**0.8628**	**0.5623**	-0.0404
SI2	0.4852	-0.1846	-0.0758	-0.0894	-0.0722	0.3405	-0.2600	0.4568	-0.3616	0.2305	0.2942	0.3162	**0.8960**	-0.2582
SI3	0.4599	-0.1289	-0.0806	0.1092	-0.1066	0.3909	-0.2828	0.4745	-0.3406	0.2506	0.3507	0.4695	**0.9007**	-0.1435
SI4	**0.5676**	-0.2297	-0.2749	-0.1246	-0.2780	**0.5058**	-0.3791	**0.6094**	-0.5110	0.4025	0.3485	0.4774	**0.9313**	-0.2996
UR11	0.3153	**0.5860**	0.4510	0.0905	0.4952	-0.1392	0.4322	-0.3215	0.3906	0.1420	0.1482	0.0922	-0.1478	**0.7558**
UR13	0.0705	**0.7115**	**0.5005**	0.3099	**0.5395**	-0.3224	0.4341	-0.3074	0.4381	0.0750	0.1026	-0.0776	-0.0896	**0.7298**
UR21	-0.1401	0.4905	0.4028	0.2662	0.3290	-0.2509	0.3452	-0.3650	0.3796	0.0994	0.2037	-0.1073	-0.2212	**0.7495**
UR22	-0.1943	0.3835	0.3166	0.3966	0.2138	-0.3932	0.2405	-0.2775	0.3282	-0.2253	-0.1209	-0.3799	-0.2875	**0.5983**
UR23	-0.0838	0.4367	0.3985	0.1685	0.1327	-0.2631	0.2920	-0.3175	0.4600	-0.1675	0.0763	-0.0156	-0.1701	**0.7584**
UR32	0.1009	**0.5505**	0.3576	0.1651	0.3749	-0.3006	**0.5248**	-0.4202	0.4620	0.1752	0.2270	-0.0053	-0.1280	**0.7845**
UR33	0.1018	0.3967	0.2389	0.1845	0.3596	-0.1421	0.3485	-0.3342	0.4031	0.2430	0.2965	0.2344	-0.1754	**0.7271**
UR41	-0.0483	0.3986	0.1097	0.2458	0.2636	-0.0940	0.0860	-0.2766	0.2624	0.0547	0.2821	0.0850	-0.1873	**0.5685**
UR42	0.0615	0.4318	0.2195	0.0605	0.2050	-0.3264	0.4012	-0.2987	**0.5977**	-0.1339	-0.0211	0.0242	-0.3792	**0.6899**

Table V: Summary of Reliability Measures

Construct	AVE	Composite Reliability	R Square	Cronbachs Alpha	Communality
CP	0.8019	0.9418	0	0.9172	0.8019
EQ1	0.6230	0.7667	0	0.4010	0.6230
EQ2	NA	NA	NA	NA	NA
EQ3	0.6120	0.7438	0	0.4757	0.6120
EQ4	0.5734	0.8008	0	0.6602	0.5734
FC	0.5910	0.8025	0	0.7096	0.5910
PDO	0.7476	0.9220	0.5002	0.8867	0.7476
PE	0.7301	0.8897	0	0.8111	0.7301
PHP	0.6257	0.8336	0.2653	0.7092	0.6257
PP	0.6846	0.8631	0	0.8271	0.6846
SEE	0.6047	0.8542	0	0.8817	0.6047
SEF	0.4223	0.6694	0	0.4675	0.4223
SI	0.8271	0.9349	0	0.8976	0.8271
UR	0.4245	0.8604	0.4281	0.8050	0.4245

Table VI: Items that were dropped from analyses due to poor loadings

Construct	Items Dropped
User resistance (UR)	UR12, UR31, UR43
Perceived Helplessness over Process (PHP)	PHP1, PHP2,
Perceived Dissatisfaction with Outcomes (PDO)	None
Principled Pragmatism (PP)	PP1
Contingent Pragmatism (CP)	None
Social Influence (SI)	SI1
HIT Self-Efficacy (SEF)	SEF2
Performance Expectancy (PE)	PE4
Facilitating Conditions (FC)	FC3
Level 1 Equity Evaluation (EQ1)	EQ13, EQ14
Level 2 Equity Evaluation (EQ2)	EQ22, EQ23, EQ24
Level 3 Equity Evaluation (EQ3)	EQ32, EQ33
Level 4 Equity Evaluation (EQ4)	EQ43

APPENDIX C

APPENDIX C

ANOVA RESULTS[1]

Table VII. Analysis of variance between the pilot sample and the main sample

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.225	20	.561	1.995	.056
Within Groups	6.471	23	.281		
Total	17.696	43			

Table VIII. Analysis of variance between the prescriptive sample and non prescriptive sample

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.554	21	.836	1.525	.130
Within Groups	19.731	36	.548		
Total	37.284	57			

[1] The ANOVA results were conducted for the main dependent variable, user resistance.

APPENDIX D

APPENDIX D

TABLE OF ITEMS USED IN THE FINAL MODEL

Table VIII. Items of constructs retrained or dropped from final model

Construct	Item(s) retained	Item(s) dropped
User resistance (UR)		
Reactance (UR1)	UR11, UR13	UR2
Distrust (UR2)	UR21, UR22, UR23	None
Scrutiny (UR3)	UR32, UR33	UR31
Inertia (UR4)	UR41, UR42	UR43
Perceived helplessness over process (PHP)	PHP3, PHP4, PHP5	PHP1,PHP2
Perceived dissatisfaction with outcomes (PDO)	PDO1, PDO2, PDO3, PDO4	None
Facilitating conditions (FC)	FC1, FC2, FC4	FC3
Principled pragmatism (PP)	PP2, PP3, PP4	PP1
Contingent pragmatism (CP)	CP1, CP2, CP3, CP4	None
HIT Self-efficacy (SEF)	SEF1, SEF3, SEF4	SEF2
Performance expectancy (PE)	PE1, PE2, PE3	PE4
Social enabling effect (SEE)	SEE1, SEE2, SEE3, SEE4	None
Social influence (SI)	SI2, SI3, SI4	SI1
Level 1 Equity Evaluation (EQ1)	EQ11, EQ12	EQ13, EQ14
Level 2 Equity Evaluation (EQ2)	EQ21	EQ22, EQ23, EQ24
Level 3 Equity Evaluation (EQ3)	EQ31, EQ34	EQ32, EQ33
Level 4 Equity Evaluation (EQ4)	EQ41, EQ42, EQ44	EQ43

BIOGRAPHICAL SKETCH

Madison N. Ngafeeson was a Ph.D. candidate in Business Administration with emphasis in Computer Information Systems at the University of Texas-Pan American's College of Business Administration. His major area of focus was Health Information Technology management. He also had a secondary area of emphasis in Quantitative Methods. Madison got his Master of Science degree in Management Information Systems from Southern University at New Orleans, New Orleans, Louisiana in the United States. His Master degree thesis focused on how to use information systems to fight crime in developing countries. He got a Bachelor's degree in Biochemistry with a minor in Medical Laboratory Technology from the University of Buea in Cameroon, Central Africa.

Madison served in the healthcare industry as a medical laboratory technician and a dental assistant. He also served as a national president for a not-for-profit organization before joining the graduate school. He is a passionate teacher and researcher. His works have been published in such outlets as the *International Journal of Electronic Healthcare*, *the International Journal of Electronic Government Research*, and the *Proceedings of the Decision Sciences Institute*. He has also served as mini-track reviewer for the *Americas Conference on Information Systems* and *European Conference on Information Systems.* His research covers areas such as adoption, implementation and diffusion of information systems at individual, organizational as well as national levels. His current area of teaching and research interests are in the health information technology, management/computer information systems, and business statistics.