2014

An Evaluation Of Perceived Safety Of Free Software: The Brafs Model

Will Pepper
University of Mississippi

AN EVALUATION OF PERCEIVED SAFETY OF FREE SOFTWARE: THE BRAFS MODEL

A Dissertation

Presented Towards the Doctor of Philosophy Degree in

Management Information Systems at

The University of Mississippi

William Allen Pepper III

August, 2014

ABSTRACT

This dissertation explores the Perceived Safety of Free Software and its relationship with the Intention to Use this technology in a business setting. The newly created construct of Perceived Safety is developed out of the Theory of Planned Behavior. It is researched, scrutinized, and refined according to academic guidelines and two different environmental settings. The constructs that impact Perceived Safety and its relationship with Intention to Use consist of Technology Perceived Risk, Technology Trusting Beliefs, Expected Financial Utility, and Perceived Adverse Impact on Professional Reputation. Each construct consists of multiple operationalized elements. To explore this empirically, beneficial and risk measurements have been adapted from relevant literature in information systems/technology, management, risk, financial, and psychology academic publications. Three Pilot Studies were done in sequence among a student population before the instrument was tested among a Main Study that consisted of individuals with the ability to make software decisions for a nonprofit organization. The results suggest that Perceived Safety is needed in order for the Intention to Use Free Software in business, and that this relationship is impacted through various benefits and risks constructs. The study raises a number of opportunities to be explored and debated by future research, both in the realm of Free Software and beyond.

DEDICATION

This dissertation is dedicated to

- My wife, Samantha, for years of love, support, patience, confidence, and understanding, and, hopefully, for many more to come
- My mother, whose love and support allowed for me to focus on this dissertation and my studies and who knows that it is best to just let a mad scientist be mad.
- My father, whose values and beliefs shaped the man I am and the man I will continue to strive to become.
- My grandparents, both those of blood and of choice, whose love, wisdom, and compassion still make me smile and feel loved.
- Finally, and most importantly, to my Lord and Savior Jesus Christ, whose inspirational life and message benefits us all.

Philippians 4:13 – "I can do everything through Him who gives me strength."

ACKNOWLEDGEMENTS

This dissertation could not have been possible without the support and guidance of the following committee members:

- Milam Aiken, Ph.D.
- Anthony Ammeter, Ph.D.
- Walter Davis, Ph.D.

As a mentor, sounding board, and friend, Chairman Brian Reithel, Ph.D. allowed this student the chance to explore new areas of technological research, all while never hesitating to guide when eventual wandering would occur.

Additional thanks are to Anthony Ammeter, Ph.D., Somali Conlon, Ph.D., Bart Garner, Ph.D., David Pumphrey, and John Young, Ph.D. for allowing access to their students.

I would like to thank The University of Mississippi for employing the extraordinary faculty and empowering the students to pursue great things.

A special thanks to the unnamed organization that allowed me to survey their membership in the Phase 2 of this research.

"Too many of us, when we accomplish what we set out to do, exclaim, 'See what I have done!' instead of saying, 'See where I have been led.'" – Henry Ford

TABLE OF CONTENTS

ABSTRACT.....p.iii

DEDICATION.....p.iv

ACKNOWLEDGEMENTS.....p.v

I. INTRODUCTION.....p.1

II. LITERATURE REVIEW.....p.12

III. METHODOLOGY p.37

IV. PILOT STUDIES DATA ANALYSIS AND RESULTS OF PILOT.....p.57

V. MAIN STUDY DATA ANALYSIS AND RESULTS OF PILOT.....p.75

VI. CONCLUSION.....p.90

BIBLIOGRAPHY.....p.99

APPENDIX A – THE INSTRUMENT, ORIGINAL QUESTIONS, AND ADAPTED QUESTIONS.....p.120

APPENDIX B – SURVEY PREAMBLE, EMAIL MESSAGES, AND INCENTIVES FOR PARTICIPANTS.....p.134

APPENDIX C – REWARD EXAMPLE.....p.137

VITA.....p.139

LIST OF TABLES, MODELS, AND CHARTS

Figure 1 – Benefit and Risk Assessment of Free Software (BRAFS) Model.....p.8

Table 1 – Independent and Dependent Variables.....p.33

Figure 2 – Conceptual Research Model.....p.38

Figure 3 – Propositions in the BRAFS Model.....p.45

Table 2 – Phases of the Studies.....p.46

Table 3 – Variables and Primary Influences for Each Element.....p.47

Table 4 – Hypotheses Derived from Propositions.....p.49

Table 5 – Pilot Study – Demographics.....p.58

Table 6 – Pilot Study 1 – Means, Standard Deviations, Correlations, and Cronbach's Alpha Scores of Study Variables.....p.60

Table 7 – Pilot Study 2 – Means, Standard Deviations, Correlations, and Cronbach's Alpha Scores of Study Variables.....p.65

Table 8 – Pilot Study 3 – Demographics.....p.68

Table 9 – Pilot Study 3 – Means, Standard Deviations, Correlations, and Cronbach's Alpha Scores of Study Variables.....p.70

Table 10 – Confirmatory Factor Analysis of Final Pilot Study.....p.71

Table 11 – Manipulation of the Variables.....p.73

Table 12 – Summary of All Pilot Studies.....p.74

Chart 1 – Free Software Participants' History.....p.79

Chart 2 – Participants' Confidence in Free Applications in Business p.79

Chart 3 – Computer Application Selection Responsibility p.80

Table 13 – Main Study – Demographics and Educational Attainment p.81

Table 14 – Main Study – Means, Standard Deviations, Correlations, and Cronbach's Alpha Scores of Study Variables.....p.82

Table 15 – Main Study – Confirmatory Factor Analysis p.84

Table 16 – Main Study – ANOVA..... .....p.85

Table 17 – Main Study – Coefficient Results from Multiple Linear Regression.....p.86

Table 18 – Main Study – Manipulation of the Variables.....p.86

Table 19 – Main Study – Controlling for Age, Education, Sex, and Race.....p.87

Table 20 – Main Study – Controlling for Age, Education, Sex, and Race – Variance..p.88

Table 21 – Summary of All Pilot Studies and Main Study p.89

Appendix A – The Instrument, Original Questions, and Adapted Questions.....p.120

Appendix B – Survey Preamble, Email Messages, and Incentives for Participants....p.134

Appendix C – Reward Example.....p.137

Vita.....p.139

CHAPTER I

INTRODUCTION

The 2013 Christmas shopping season brought about the awareness of risks rather than benefits for certain department stores. Forty million credit card numbers and 70 million batches of personal information were stolen by a 22-year old Russian teenager. Even with Target's installation of a $1.6 million malware detection agent and the top-of-the-line antivirus protection system, this individual did something that should not be possible: he hacked the system used by over 170 different linked devices (cash registers, inventory recorders, etc.) in each of Target's 1,700 stores. The most impressive accomplishment of this hack was that the security was not an internal product built by Target or even one that was outsourced to a small consulting firm. This hacker bested Microsoft, a household name synonymous with business technology (Gumuchian 2014; Riley, Elgin, Lawrence, and Matlack 2014; Westin 2014).

With the top software company in the world failing to protect the safety of customers' information on such a wide scale, is safety something that businesses perceive important when purchasing software? Some people want as much information as possible before making a choice; others go with personal instinct and beliefs. In the end, an acceptable level of individual safety or a perceived level of safety, with benefits outweighing risks, must exist before a choice is made (Berendt, Gunther, and Spiekermann 2005; Culnan and Bies 2003; Henderson and Snyder 1999; Nehf 2007).

Depending on the source, safety and security can either be perceived as the same or two entirely different constructs. To some, if something is considered safe, then it cannot be harmed, injured, lost, or stolen and if something is deemed secure, then it is free from trespassers or those not invited, whether or not they intend to cause any type of disturbance (Dovey 2002; Gullman 1999; Hong 2003; Pollock 2012). In regards to software, the terms safety and security tend to overlap, particularly when this deals with users' perceptions.

In regards to the different types of software available to consumers, two levels exist in this dissertation: free and pay. By definition software (also referred to as applications or computer code) consists of preprogrammed instructions designed to control and coordinate computer hardware components and resources (Laudon 2009). Free applications are programs or groups of programs developed and distributed at no cost to consumers with the right to use, copy, and to a certain extent alter for communal gains (Heredero 2010; Stallman 2000, 2005, 2009). In contrast, pay software, also known as commercial, shrink-wrapped, closed-source, and/or proprietary applications are programs that are initially revenue-based. The users have to purchase the computer code, but the source code, the way to alter the program, is unavailable to the user. Together, both free and pay segments are designed to meet the needs of a market that is full of competition, customers, and consumers' varying needs (Ammeter 2005; Cheng 2011; Sawyer 2001).

This dissertation focuses on information systems/technology (IS/IT) **Perceived Safety**, the belief that confidential data, programs, and operating systems are free from harm when using Free Software. Safety, particularly Perceived Safety, is a construct that has minimal reference in technology-based disciplines. While some definitions blur the

meanings of safety and security, this research means to keep the two separate. In dealing with safety critical software or services, *safety* means protecting people and their health, while *security* deals with the prevention of invasion (Dewar 2007; Novak and Gerstinger 2010). In the realm of law and computer code, the focus on security over safety also exists (De Mulder and Kleve 2006).

Motivation and Research Questions

While the research of safety in IS/IT is minimal, an evaluation of security in IT does exist and allows for this research to build upon it. According to some scientists, neither pay nor Free Software is more secure than the other (Boulanger 2005). Yet perception plays a role in security, so much so that one of the reasons that people consider pay applications over free is reputational risk. Dave Cullinane, Chief Information Security Officer of Washington Mutual reported that a security breach can cause 20% to 45% of a customer base to leave (Greene 2006). Researchers previously emphasized that some consumers use systems that are proven not completely secure because they are complacent with these insecurities and focus on saving money. Finally, outside of the financial aspect, the annual RSA Conference, an IS/IT security event, concluded in 2006 that when it comes to buying or building computer code, the software most companies chose is not deemed secure enough. The reason for this comes from businesses not knowing the right questions to ask or even how to compare products in the marketplace (Neumann 2003).

So, with the perception of safety at the heart of this dissertation's focus, the questions arise *what factors affect the Perceived Safety of Free Software?* and *if free computer code is perceived safe, does this increase the Intention to Use it in a business*

setting? The aim of this paper is to develop a model based on theory that not only adds to the IS/IT discipline, but can be applied to the evaluation of various forms of free applications by a IT purchasing manager, or a person who has authority to select and use business software. Ultimately, this model may add another facet to evaluating computer code in a manner that has yet to be explored: through the benefits and risks that lead to Perceived Safety. By addressing these questions, hopefully this dissertation will contribute and assist both academics and practitioner by examining the antecedents of Perceived Safety and pursue the influence of Perceived Safety on behavioral intentions.

What Comprises Perceived Safety

Perceived Safety is broken down into the two major segments, **Technology Perceived Risks (TPR)** and **Technology Trusting Beliefs (TTB)**, along with two smaller segments of **Perceived Adverse Impact on Professional Reputation (PAPIR)** and **Expected Financial Utility (EFU)**. According to previous definitions, risk is defined as "measurable uncertainty" that can be operationalized by the probability or chance of losing something (Fraedrich and Ferrell 1992; MacCrimmon 1986). While there are many definitions of perceived risk available, previous works have succinctly defined it as "the consumer's perceptions of the uncertainty and adverse consequences of buying a product or service" (Dowling and Staelin 1994, p. 119). Incorporating perceived risk into this research, this researched develop Technology Perceived Risk, or factors that make up the potential consequences an individual may deal with when intending to use a selected technology.

Beliefs are what a person thinks about an object and these beliefs can influence an attitude, which is the combination of beliefs and emotional value (Fishbein and Ajzen 1972). This research defines trust as a mental relational construct about the willingness of the user to be vulnerable due to expectations on others to perform a particular action or set of actions that is designed to reduce uncertainty (Mayer, Davis, and Schoorman 1995). Further, technology trust has been previously focused on technical safeguards, control mechanisms, and protection measures (Ratnasingam and Phan 2003), so this dissertation's Technology Trusting Beliefs are defined as factors that may benefit an individual while choosing among available technology.

Mixed results have troubled academics in regards to risk and the **Intention to Use** (the plan to utilize applications at some point in time) in certain types of pay e-services and e-commerce (Kim 2008; McLeod 2009; Venkatesh 2003). The IT purchasing manager who chooses a type of computer code for his or her company may be concerned about professional reputational status. While a firm's reputation can represent past performance and the perceived ability to deliver results, an individual's professional reputation can be influenced the perceptions of key stakeholders and their confidence levels towards the individual (Gibson 2006). These insights have been found significant in professions such as both tenured and non-tenured faculty members (Walden 2010). Thus, Perceived Adverse Impact on Professional Reputation (PAIPR) is the belief that selecting Free Software will have a negative effect on an individual's business standing.

Finally, the lack of a financial investment is the top reason people use free computer materials, especially in a business setting (Jepson 2009; Ralston 2009). The cost/benefit tradeoff or risk/benefit ratio may swing more in favor of the positives of

Free Software than the perceived negatives. In this dissertation, that construct is to be measured by Expected Financial Utility (EFU) and is defined as the potential economic benefits that arise from choosing to use Free Software for a business.

Theoretical Background and Influential Framework

Perceived Safety can be traced to several influential sources, specifically perceived risk. Introduced in the 1960's to assist in analyzing risk-reducing behavior, perceived risk is quantifying, and somewhat predicting a subjective threat. This focuses on the subjective over the objective (actual) and is required because consumers do not calculate actual mathematical risk in individual choices; rather they focus on internal and external information (Bauer 1960; Featherman 2006; Slovic 2004). This, in turn, influences the actions people take in a variety of ways, from little choices such as buying food to larger ones such as getting on an airplane. However, if people maximize something's usefulness or utility to identify concerns when engaging in a behavior that is uncertain, then people avoid potential problems and this influences decision making processes (Featherman and Pavlou 2003; Fraedrich and Ferrell 1992). So the supporting theory of this segment of Perceived Safety comes from perceived risk.

The trusting beliefs segment of this research comes from expected-utility theory, initial trust, and commitment trust. Expected-utility theory asserts that each level of outcome is linked with a level of benefit or utility and that people will use subjective opinions to compare options and choose what is they perceive is personally the best choice (Lauer 1996; Von Neumann 1947). Initial trust is a relationship a trustor has with an unfamiliar trustee before any type of bond occurs. Finally, Commitment trust is cooperation between two entities that produces a beneficial cooperation derived from

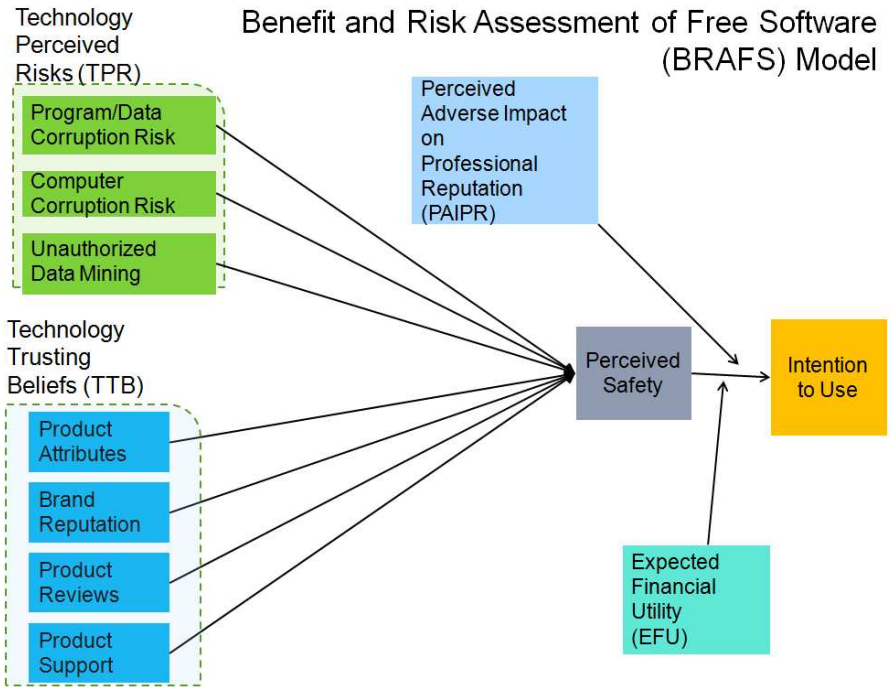
acceptable risks and mutual beliefs (Bhattacherjee 2002; Bigley and Pierce 1998; Gefen 1997; McKnight 1998, 2002; Morgan and Hunt 1994).

The main framework influencing this dissertation explores the trusting beliefs and perceived risks of interorganizational exchanges (Nicolaou and McKnight 2006). That research, as well as this one, was influenced by the Technology Acceptance Model and the DeLone and McLean Model of Information Systems Success (Davis 1989; DeLone and McLean 1992, 2003). All three models are supported by theory, as well as their practical applications for businesses. By including both risk and benefits in a framework, this dissertation adds to the literature where previous publications only focused on one construct at a time (Lucas and Spitler 1999).

The BRAFS Model

The model is comprised of several constructs, the elements that strengthen those constructs, and how they affect Perceived Safety. From there, this research measures how PAIPR impacts the relationship between Perceived Safety and an individual's Intention to Use Free Software, as well as that the impact that EFU has on the same relationship.

Figure 1 - Benefit and Risk Assessment of Free Software (BRAFS) Model



Additional Subsets of Model

In order to develop stronger constructs, several items needed to be recorded to validate each item's development (Kerlinger 1999). Under TPR, this dissertation records items that measure **Program/ Data Corruption Risk** (concern of the particular application will be faulty and cause its data to be corrupted), **Computer Corruption Risk** (concern that faulty computer code will cause other files, software programs and/or the operating system to fail), and **Unauthorized Data Mining** (the gathering and analysis of user information without user permission). The components of TTB in this dissertation include **Product Attributes** (what the product user thinks the software is capable of performing), **Brand Reputation** (how much the product user trusts the company that created the product), **Product Reviews** (extent to which external evaluations, both by friends, relatives, experts, other users, and communal forums, of the product and/or the brand strengthened faith in the application), and

Product Support (the current and future availability of assistance by IS/IT specialists employed by the product's company). While these measures are in no way meant to be comprehensive of all risks and benefits of Free Software assessment, and they are not meant to be a comprehensive framework of Perceived Safety. These instruments are meant to begin this area of research.

Scope and Methodology

The scope of this dissertation includes application software, written for or by users for specific tasks, that manages computer resources, as opposed to operating system software that controls how the hardware works with itself and software (Baltzan 2011). Application computer code is the backbone for many tasks, such as anti-virus, word processing, database management, website development, website maintenance, payroll, customer relationship management, project management, training, and many other type of software (Weinstein 2004). Since this paper is more about the availability, features, tasks, and other user-oriented aspects of software, it is not necessary for the users to be able to change the source code. Thus, this is more of a black-box approach, one where the user knows that the application works but doesn't need to know how, as opposed to a glass-box one, where the user is given or even expecting access and rights to amend the computer code (Adrion 1982; Mayer 1981; Stevens 1974).

This methodology pursued was feasible because it was done in a quantitative and empirical manner, beginning with a Pilot Study on a financially viable group of participants. The instrument was administered through a series of Pilot Studies (Phase 1) to student participants at a medium-to-large university in the southern part of the United States. This allowed for the research to begin small, make changes from the collected results, and adapt the constructs at the early stages of research. The

proprietary software products of Qualtrics and SPSS, along with two free online calculators to be discussed later, were used to gather responses and analyze statistical results.

Phase 2 (the Main Study) segment obtain information from IT purchasing managers, or those wielding that authority, from nonprofit businesses. These individuals are the decision makers in regards to software for their business computer, and possibly their coworkers. With nonprofits relying on donor tracking, report preparation, email lists, and many other software needs, an analysis of whether or not Free Software is beneficial for this segment is warranted (Weinstein 2004).

Chapter Summary and Organization of Remainder of the Study

This chapter was designed to provide an overview of academic and practitioner problems/opportunities as well as foreshadow where this research's potential contributions occur. New constructs were defined from established publications and integrated with reputable ones into a theoretical framework that will pursue whether or not Free Software is perceived to be safe. Finally, a brief synopsis of the route the methodology and technique was introduced.

Chapter 2 provides an in-depth literature review of the antecedents that comprise the variables. Various relationships among the constructs and previous empirical findings strengthen the need for this study. Chapter 3 follows the theoretical development as well as presents a measurable model of the research project and the hypotheses pursue support for various relationships and constructs. An explanation of the measurement instrument and its planned implementation, including study sample(s) and data collection procedures, tests the model. Chapter 4 presents statistical methods and analyses will be performed to create conclusions for this research's Phase 1

(Pilot Study), while Chapter 5 expounds upon this research in a different setting for Phase 2 (Main Study). Finally, Chapter 6 reports the findings from both phases of work and summarizes this dissertation, as well as discuss limitations of the study and future paths for this research stream.

CHAPTER II

LITERATURE REVIEW

Introduction

The Perceived Safety of Free Software has yet to be explored. Consumers' perceptions have been of great interest in information systems / information technology (IS/IT) research, as well as many different disciplines, and to date only three academic publications address the idea of Perceived Safety in IS/IT. Each of these is discussed in greater detail in this chapter.

This research does not address the relationship between perceived risk and actual risk, nor will this address the relationship between Intention to Use and actual use in regards to Perceived Safety issues. The Intention to Use a method has previously been found acceptable when evaluating behavioral intentions (DeLone and McLean 2003; Featherman et al. 2006; Keil et. al. 2008). However, future research may consider actual risk and actual use as constructs.

Discovering which factors impact this dissertation's main construct and building upon research gaps in this literature review are paramount to this dissertation. To strengthen this paper's core, the following discussions occur in this literature review:

- Security
- Safety
- Free Software
- Dependent and independent variables
- Relevant and influential frameworks

Further, problems and potential contributions that may arise by searching for possible relationships among the variables are explored. The sourcing of both academic and practitioner occur, beginning with a method of peer-to-peer top tier academic publications for foundational information, then using supplementary articles.

Parameters of the Literature Review

The literature review began with a technique that recommends using an electronic database to search titles and abstracts for key terms. This methodology focuses on scholarly articles (instead of books, working papers, magazines, and newspapers, etc.) due to a scrutinizing peer review process (David and Han 2004; Newbert 2007; Webster and Watson 2002). An advanced search using Business Source Complete, EBSCOHost's electronic database of over 9,500 scholarly articles and business publications, further strengthens this review by giving emphasis to those research articles that are sourced from top-tier IS/IT publications. These rankings can be found in either the Senior Scholars Basket of Journals or Rawls College of Business at Texas Tech University (Business Source Complete 2012; Rawls 2012; Saunders 2012). However, with a goal of this research to provide a framework that is beneficial to both academics and IT purchasing managers, resources outside of mere peer-reviewed publications are pursued for both rigor and relevance support (Baskerville and Myers

2002; Davenport and Markus 1999; Lee 1999; Nolan and Wetherbe 1980; Whetten 1989).

Safety and Security: An Overlap and Separation

Safety and security often have been synonymous. One author defines security to incorporate safety by explaining both as "policies, procedures, and technical measures used to prevent unauthorized access, alteration, theft or physical damage to information systems" (Laudon 2009, p. 438). In a business-to-business online environment, authors describe security involving the World Wide Web as "risks associated with technologies that work with web assets, such as loss, disruption, and unauthorized access of data, Internet resources, and information" (Lawson-Body and O'Keefe, 2006, p.7). In decision support systems, security on the web is defined as the protection of information from intrusion, such as actions that would leave an e-banking transaction susceptible to fraud (Kim, Ferrin, and Rao 2008). Finally, information security has been defined as applying trust aspects to safeguard data or to prevent unauthorized access (Baltzan 2011).

Security and safety continue to overlap in various disciplines. One study (Hong, Chi, Chao, and Tang 2003) defines that information security is any method that keeps resources protected, which could be interpreted to mean that "secure makes safe". In the United States of America, each individual state has laws that define various crimes. Depending on the state, if someone were to enter a home without permission, the individual has committed the crime of breaking and entering (affecting security), and is also charged with burglary, affecting safety (Garner 2011). In other instances, entering a home without intent to commit a felony (not affecting safety) is merely trespassing (affecting security) and some states have codes that focus on the unwelcome entry part,

thus dividing breaking and entering (Pollock 2012). Finally, in the United Kingdom, security and safety are segregated with regards to protection, such as the terms "secure borders" meaning protected boundaries, while "safe heavens" are the contents of that protected boundary (Yuval-Davis 2006).

In this research, there is a clear division of security and safety. Security is defined as preventing invasion or intrusion, whether intentional or unintentional, from trespassers, and safety means that the contents of an area cannot be stolen, harmed, or lost (Dovey 2002; Gollman 1999). Since security and safety have previously overlapped the next step is discussing the perceptions of security and safety.

Perceived Security

Some researchers define Perceived Security in IS/IT to mean the perception of protection with regards to personal data and transaction details from unauthorized access and that a company will fulfill all requirements needed to access data. Others define it in regards to the Internet as the level of confidentiality and authentication one believes when submitting personal information, and having perceived (web) security increases the intention to purchase in e-commerce settings (Flavian & Guinaliu 2006; Mattila and Mattila 2005; Salisbury et al. 2001). Even the mere presence of security mechanisms, not their actual evaluations, have been found to increase users' trust in online activity (Belanger, Hiller, and Smith 2002; Koufaris and Hampton-Sosa 2004). Finally, Perceived Security was found to have a significant impact on its relationships with customers' attitudes, trust, and perceived risk when shopping at a virtual mall (Shin and Shin 2011; Xu, Fang, Chan, & Brzezinski 2003). This dissertation uses trust

and risk as factors that influence Perceived Safety, the dissertation's main dependent variable, and its relationship with Intention to Use in regards to Free Software.

Perceived Safety (A Dependent Variable)

Perceived Safety is defined in this dissertation as the belief that confidential data, programs, and operating systems are free from harm while using Free Software. Since this is relatively new concept, only four references appear using this term in IS/IT. Two references deal with online publications, with one being an offline and online comparison of the Intention to Use mobile banking in South Korea, and the other one deals with adolescent teens taking greater risks by sharing personal information in chat rooms they perceive safe. Another reference deals with using variable speed limit signs that change in adverse conditions to affect Perceived Safety of roads, and the last reference in a passing phrase involving social groups working and learning together (Wellman 2002). This current research has the opportunity to fill a gap that has just begun.

The three publications that discuss Perceived Safety using technology include two reports involving online access and one with transportation. Just as this dissertation and many other authors have adapted McKnight's 2002 measures of trust, one of the publications (Kang, Lee, Kim, and Lee 2011) did so to fit mobile banking. The authors used broad instruments of risks and benefits, such as safeguards, technical structures, and robust environments. It is a goal of this dissertation to find at least some of the factors that influence Perceived Safety of free applications, a type of software that is predominantly found online. Interestingly, this construction was found not to predict the Intention to Use a mobile banking system. One of the reasons the authors believe

this did not work is because they used perceived satisfaction as an independent variable. This variable is "tentative" because trust should occur beforehand, and this can be supported because both offline trust and online trust increasing that research's Perceived Safety were found to be significant. Further, the authors discussed in their limitations that bi-directional linkages or reverse linkages were possible because they were unable to establish a level of causality, and the use of South Korean participants limited the generality of their research. Finally, just outside of IS/IT traditional publications, the other set of authors found that adolescents in online chat sites were more likely to share personal information on sites they deemed trustworthy and took greater risks when they had a greater perception of safety or "a sense of security that the benefits of sharing personal information in an online chat site outweigh the risks" (McCarty, Prawitz, Derscheid, and Montgomery, 2011, p. 171; Youn 2005). Thus, this dissertation's search for factors that influence Perceived Safety is merited.

Using technology to promote cautionary content and increase familiarity in variable speed limit signs that adjusted according to adverse visibility conditions led to increased Perceived Safety among central Florida motorists (Hassan, Abdel-Aty, Choi, and Algadhi, 2012). Lastly, adding to the transportation research, researchers found that the Perceived Safety of pedestrians at unmarked roadways was a subjective measure based on degrees of risks that are important to understand behavior and improve overall safety (Zhuang and Wu 2012).

Outside of IS/IT research, when dealing with employees of a company, this construct was measured in regards to personal harm. If a manager shows an emphasis on safety, then the employees' safety perceptions increased, and even resulted in lower

injuries, among French/U.S. data. Other researchers found the same results in U.S. fast-food employees' perceptions of safety training and management commitment to safety predicting employees' future injuries when employees perceived that the management has a high level of commitment to safety (Asfahl 1984; Huang, Santosh, Chang, Courtney, Lombardi, Brennan, and Perry 2012; Janssens, Brett, and Smith 1995).

Finally, in psychology, a climate that was perceived safe promotes positive perceptions of policies and practices of workplace wellbeing (Neal, Griffin, and Hart 2000). A safety climate questionnaire of a construction company and its subcontractors in Hong Kong found that management commitment with employee involvement, inappropriate safety procedures, and work practices were significant predictors of the causes with regards to performance (Choudhry, Fang, and Lingard 2009).

Intention to Use (A Dependent Variable)

In this dissertation, **Intention to Use** Free Software means that, given certain norms, information, and other factors, an IT purchasing manager would choose to use Free Software for business tasks. This adapted definition comes from the well established low-to-high range dependent variable of same name that is pursued in research, as well as used in actual business software settings by academics and professionals (Taylor and Todd 1995; Venkatesh and Davis 2000). By including a well-defined and established dependent variable, the research is less speculative and more analytical (Delone and Mclean 1992).

Intention to Use in research originated with the Theory of Reasoned Action (TRA) literature, which is a behavioral intention model that was developed on the

premise that a person's attitude about a certain behavior and the subjective norms surrounding it will predict how likely the individual is to act (Fishbein and Ajzen 1975). TRA uses variables such as beliefs or personal values about the work environment to affect values that lead to specific intentions. This model has been expounded in models such as the Technology Acceptance Model (TAM), an information systems theory model that includes factors that influence how users come to accept and use a piece of technology. With a good portion of research in TRA/TAM focusing on perceived usefulness, ease of use, and their antecedents, some findings suggest that researchers need to include other factors, such as perceived risk and trusting beliefs. Research in new technology and its acceptance area has resulted in theoretical models that have explained, in previous studies, that around 40% of the variance in individual Intention to Use technology, giving support to using it in this new model in asking about Perceived Safety of Free Software (Davis 1989; Venkatesh, Morris, Davis, and Davis 2003)

Free Software

A business assessment of this dissertation includes the area of Free Software. This is defined as a program or group of programs developed and distributed with no initial costs to the consumers via the Internet. These users have the privilege to use this type of application for business needs. However, in this research it is not defined as Free Software that needs or even can be altered by the user. Free computer code is counter to commercial, proprietary, or pay software, which are programs that are revenue-based due to the consumer having to purchase before actual use and this software may not have source code available for public viewing (Cheng 2011; Sawyer 2001).

Free Software originated in the 1950's computing industry, dominated that same industry in the 1960's, and rose through the 1970's because of IBM's unbundling of programs from hardware along with the development of the free and open sourced Linux operating system. In the 1990's companies gave away programs (minus shipping charges) through the mail. The current source for free computer code is the Internet and, with its acceptance as a medium of business, has increased the availability and technological diffusion of software (AlMarzouq 2005; Glass 2004; Jiang and Sarkar 2011). Interestingly, the introduction of free computing material does not hurt commercial applications; rather it increases the size of the available network, creates a survival-of-the-fittest atmosphere for both sets of software, increases customers' valuation of current software products, and enables a commercial firm to charge more for its software (Gallaugher and Wang 1999; Goth 2005). So discussing the benefits of Free Software irrespective of the mere money saving aspect is acceptable.

Depending on the source, Free Software supporters claim that it has superior quality with regards to reliability, features, and security (Grantham 1999; Raymond 1999), while others perceive they get more from paying for material, such as additional features, offers, and services (Ousterhout 1999). The reliability and security of these two segments are topics for debate, but for every proprietary application report that justifies paying for commercial programs' "security through obscurity" positioning a pay product ahead of a competing free counterpart, the free computer code community will respond with a report refuting the proposed dominance (Boulanger 2005; Miller, Fredriksen, and So 1990).

It has been reported that people who consider themselves to be "advanced users" of software are more likely to be open to using Free Software (Brooks 2004; Raghu 2009). For example, even though members of the medical community perceived security risks from free application usage, the U.S. Department of Veterans Affairs chose VistA, a platform that utilizes medical and clinical delivery systems for hundreds of healthcare facilities of various sizes. This is one of the largest open source healthcare success stories (Ralston 2009).

There is no clear winner among these competing sectors, and consumer evaluations change drastically from report-to-report or year-to-year. In 2011, Consumer Reports found free application company Avira's *AntiVir Personal* an equal contender with commercial BitDefender's *Internet Security 2011*. In 2013, Consumer Reports reviewed the same software category and their results scored G Data's *Internet Security 2013*, a pay security suite, much higher than any competing costless product (Consumer Reports 2011, 2013). This supports the belief that Free Software's capabilities can influence pay material improvements. Finally, a recent review of the US Fortune 1000 organizations found that, while they believe the main advantage of Free Software is its low cost, they mix-and-match both pay and free applications as needed (Spinellis and Giannikas 2012). With these two segments evaluated frequently by practitioners and users alike, the need for an assessment of Free Software's Perceived Safety among IT purchasing managers benefits IS/IT research as well.

Risk, Perceived Risk, and Perceived Risk in Technology

Risk has been defined in various publications as a way to measure uncertainty as well as to attempt prediction of loss, loss exposure, and the magnitude of loss (MacCrimmon and Wehrung 1986). These judgments and assessments of potential losses, as well as potential benefits, arise through uncertainty from situations that involve an individual bringing his or her own characteristics into the evaluation of possible outcomes (Conchar, Zinkham, and Olavarrieta 2004; Fraedrich and Ferrell 1992; Lauer 1996).

Perceived risk was first introduced into consumer behavior in 1960 in regards to a consumer's choices at levels of risk-reducing or risk-taking behavior with the focus on subjective (perceived) risk, not objective (actual) risk. The reasoning for this is that consumers are bounded by rational actors that generally do not compute mathematical equations unless it is part of a particular job set (such as an accountant or actuary) and run off of how they weigh the available information (Bauer 1960; Tan 2002). If individual behavior involves risk that creates unpredictable situations, then the two driving elements of perceived risk are uncertainty and consequences (Dowling and Staelin 1994; Jacoby and Kaplan 1972).

Previously perceived risk has been divided into the two parts, uncertainty (a situation where the outcome is never completely known) and consequences (generally adverse result or seriousness of making a poor decision). These expectations of losses that associate the purchase or adoption of something different have been widely used in marketing and IS/IT literature (Peter and Ryan 1976; Taylor 1974). Technology researchers have found that the higher the perceived risk or negative consequences, the

less likely of adoption (Gwebu and Wang 2010; McLeod et al 2009). Depending on the environment and users, however, the acceptance levels of perceived risk vary, particularly in software usage (Featherman and Pavlou 2003).

Although perceived risk has been recorded as a crucial factor influencing individual decisions and behavior, minimal research has been conducted to investigate how this threat can influence individual decisions to use Free Software and which risk components are associated with that decision. Most of the recent research involving risk perception focuses on e-services. Since free computer code is a downloadable and e-serviceable product, the results of some of the related literature benefit as source material.

User perceptions of risk involving application usage have varied results with regards to the relationship between risk levels and Intention to Use. In e-services, a researched interest about new internet banking methods verses the established brick-and-mortar institutions showed that some individuals were less receptive to transacting business online (Costello 2001). Following that purchase method a user's perceived risk was found to influence adoption of escrow service in an online auction setting (Antony 2006). In order for e-services to increase consumer adoption, consumer confusion, apprehension, and threats need to be understood, explained, and alleviated. Therefore, a better understanding of perceived risk and an examination of perceived risk factors that may impact the Perceived Safety of Free Software strengthens this dissertation's goals.

Technology Perceived Risk (an Independent Variable) and Its Elements

Technology Perceived Risk (TPR) includes the factors that make up potential consequences that may arise from the uncertainty of using free applications. While there are other items that exist in perceived uncertainty and consequences scales, this is the first dealing with Perceived Safety of Free Software. Therefore, as there is no operational scale or instrument developed to date to test this model (or some of its newer constructs), one was developed for this dissertation. These items are supported theoretically and, where available, empirically tested, though they have been adapted in usage, environment, and scope to fit this research. With that discussed, the TPR items under review in this dissertation are Program/Data Corruption Risk, Computer Corruption Risk, and Unauthorized Data Mining.

Program / Data Corruption Risk is the concern that the free computer code will be faulty. The theories behind this include Risk theory, specifically perceived risk, TRA, and an offshoot of TRA, the Theory of Planned Behavior. The Theory of Planned Behavior or TPB adds to the credence of TRA by including not only attitudes and norms but also how perceived behavioral controls impact differently on intention and behavior, such as when the participant knows they are being observed opposed to when they do not know they are being watched (Ajzen 1991).

Computer Corruption Risk are the threats that exist that the faulty computer code will cause other files (outside of the free software), other software programs, and even the operating system to cease functioning. This research, too, is supported by TRA and perceived risk. A researched problem with proprietary software is that it can become outdated and, if it is not updated or properly maintained, the chance of system

failure increases (Ein-Dor 1978; Tait 1988). The truth is that "no one knows how many computer-based applications, designed at great cost of time and money, are abandoned or expensively overhauled because they were unenthusiastically received by their intended users (Markus 1983, p.430)."

Finally, Unauthorized Data Mining (UDM) is the gathering and analysis of user information without user permission. This term, while producing hits on Google, produced only one hit under Business Source Complete from an opinion piece in MacWorld about how pop-ups and cookies are used (Pogue 2000). Further exploration for "unsolicited data mining" and "unauthorized data collection", both in-and-outside of quotes, failed to produce anything more than passing phrasing. Hence it is newly defined in this work. Text and data mining, its techniques, organization, and utilization garner knowledge discovery for database collection for many industries (Chen 2012; Chou, Sinha, and Zhao 2010). Strengthened through rough set theory, the estimation of hidden conventional pair sets from an original set, these pairs are filtered through decision trees and algorithms to create useful information, such as the roles played by student in a group, according to IBM's Intelligent Miner (Chiang, Lin, and Chen 2011; Othman, Aris, Abdullah, and Ali 2010). While data mining has proven beneficial to research and business, UDM's exploration of the gathering of information about users without their consent should lead to interesting results.

These three items comprise the initial test of TPR with regards to the Perceived Safety of Free Software. While they are not all inclusive, they are enough to begin research in this realm.

Trust, Trusting Beliefs and Trust in Technology

Trust has many meanings, depending on the setting and discipline, but in this research it draws upon several well-established definitions to be defined as a mental relational construct about the willingness of the user to be vulnerable to the actions of others due to expectations of performance and reduction of uncertainty (Morgan and Hunt 1994). While some of the various levels of trust have been briefly discussed in this research, a distinction between the trust a person has towards another person and the trust a person has in a technology needs to be clarified. When a person trusts another person directly given a certain situation, this is called interpersonal trust (Mcknight and Chervany 1996; McKnight 1998). When a person trusts the reliance on the perceived properties computer code, this is called system trust (Abdul-Rahman and Hailes 2000; McLeod et al. 2009). This dissertation focuses on system trust.

As seen in the risk section of this dissertation, people try to eliminate uncertainties. One way to do this is to obtain information in order to increase trust and to reduce the complexity of decisions (Beldad et al. 2011; Gefen et al. 2005). Beliefs that involve trust are personal viewpoints that can influence attitude. When combined with emotional values, these trusting beliefs can be benevolent, competent, honesty, or predicable in a given situation (McKnight 1998). Finally, while trust in technology has been previously focused on technical safeguards, control mechanisms, and protection measures (Ratnasingam and Phan 2003), this dissertation defines **Technology Trusting Beliefs** (TTB) as the factors that may benefit an individual by intending to use a technology.

Technology Trusting Beliefs (an Independent Variable) and its Elements

The TTB's of this research come from some of the most utilized trusting beliefs (Bhattacherjee 2002; Gefen 1997):

- Ability (influential skills and characteristics of trustee),
- Competence (ability to do what is needed),
- Benevolence (caring and motivation on behalf interests),
- Integrity (honesty and promise keeping)
- Predictability (consistency).

In addition, two levels of effort are included: effort expectancy, the ease of use of software, and performance expectancy, software usage improves task performance. Some researchers using a variation of TAM found that both effort expectancy and performance expectancy influence Intention to Use in technology. With all of these trusting beliefs and expectancy categories, this research's four elements comprise TTB: Product Attributes, Brand Reputation, Product Reviews, and Product Support.

Product Attributes are defined as the beliefs that the user has towards an application's capabilities. These attributes come out of the TRA. In addition, it is influenced by two levels of Trust: Initial trust and Commitment trust. While Initial trust was discussed in the perceived risk section, this type of relationship can lead to Commitment trust, which means a longer relationship that is based on cooperation, benefits, and a level of risks that are acceptable due to mutual beliefs (Casalo et al. 2007). Finally, Product Attributes also include Utility theory, which deals with considering tradeoffs for real and potential gains (Lichtenstein et al. 1990).

Brand Reputation is the perception, be it positive or negative, that a user has towards the company that controls the computer code. This measure has been reviewed in marketing literature and has support from TRA, Initial trust, Commitment trust, and Risk theory.

Product Reviews are external evaluations that are done by both computer experts and individual users about the software available for analysis. Previously researchers found that trust encouraged open communication and knowledge sharing in the virtual settings (Ratnasingam 2005; Wasko and Faraj 2005). For example, one study presented trust in members affected an individual's desire to share and access knowledge. The greater degree of similarity of background of user expectations, the greater level of shared understanding between people (Luo 2002; Ridings et al. 2002). Social exchange theory, a theory that states that an individual wants rewards for a relationship, and Relational capital theory, one that is a dimension of social capital that refers to the affective nature of social group relationships (Casalo 2008; Wu and Tsang 2006) support Product Reviews, as well as the previously mentioned theories of TRA, Commitment trust theory, Risk theory, Utility theory, and Initial trust.

Finally, **Product Support** is the current and future assistance availability by the software company's IT specialists. The research of this area is found in marketing literature, such as service quality, but just like previous constructs, it is supported through TRA, Risk, Commitment trust, Initial trust, and Utility theory.

While trust is not the sole predictor of Internet purchase activity and behavior, researchers found that some people make risky decisions with low levels of trust or even without trust, such as purchasing a tablet from an unknown vendor because of a

discounted price. Due to the nature of the Internet, consumers will always experience threats, but they make bets dealing with uncertainty when trust comes in for specific problems, thus playing a crucial role in future behavior. Yet trust generated from the Internet, its products, and services helped lower the difficulty of evaluating a choice, as well as perceived risk (Kim et al. 2008; Luhmann 1988). That is why both TPR and TTB work in conjunction in this model.

The Connection Between TPR and TTB in Software

Depending on the research, trust is an antecedent of risk, a by-product of risk, or the same as risk. These two categories work together in trusting beliefs and perceived risk, especially in technology (McKnight 2002). First, trust has been found trust relevant in risk due to situations where one does not have complete control over the outcome (Deutsch 1960; Rousseau, Sitkin, and Camerer 1998). As trust increases, users are found to be likely to perceive less risk due to the presence of some level of trust (Bhattacherjee 2002; Gefen 2002). Additional research found negative correlations between perceived risk and Intention to Use technology, as well as negative correlations between trust in security and perceived risk in technology acceptance of e-services and software used on the web. However, when using software involving the Internet to complete a task, such as completing tax filings online, there was not a high concern of security, risk or even privacy that affect Intention to Use that type of system or software (McLoud et al. 2009).

This dissertation is not designed to focus on the completeness of TPR and TTB, nor is it set to establish permanent boundaries or connections between the two. These constructs and their elements are in this dissertation to help better understand the

relatively new dependent variable of Perceived Safety, as well as how it affects Intention to Use Free Software. Therefore, these theoretical and academically supported categories are open to exploration in future research.

Expected Financial Utility (a moderating Independent Variable)

Expected Financial Utility (EFU) is defined in this paper as the potential economic benefits that arise from choosing to use free applications for business tasks. While the cost savings are the main reasons for choosing free computer code, and perceived monetary value or savings are indeed connected to benefits, companies have saved quite a bit in choosing to use Free Software (Dodds, Monroe, and Grewal 1991). The Numerica Credit Union, a $940 million financial institution, used free business software in choosing Open Office (free) over Microsoft Office (pay) and saved as much as $60,000 each year used (Jepson 2009). However, exact savings are not available since IT budgets for most companies are privately kept and have not been readily available since the 1990's (Tallon 2007). In that respect, a 2010 report on Universities and Research Centers in Spain using Free Software resulted in 60% of the Universities servers, 42% of Data Base Systems, 67% of email services, 87% of content management tools and a 90% of online teaching programs revolve around the use of Free Software (CENATIC 2009). However, some companies are not willing to risk all of their needs on Free Software.

There are several theories supporting EFU. Prospect theory states that when a phenomenon is changed through available choices, different outcomes and attitudes towards risk emerge (Kahneman and Tversky 1979). Risk tolerance theory, based out of

Utility and Prospect Theory, explains observable effects. It can also assist research in the understanding of threats and financial management decisions in order for financial advisors to influence practical problems (Ary et al. 1990; Grable and Lytton 2003). Finally, Modern portfolio theory, out of risk and risk tolerance literature, provides an ideal tradeoff instrument for indentifying and evaluating criterion related to financial risk tolerance attitudes and behaviors (Guillemette, Finke, and Gilliam 2012). Other previously discussed supporting theories include Commitment trust, Economic Utility, and Expected utility theories.

Perceived Adverse Impact on Reputational Risk (a moderating Independent Variable)

Previously TPR focused on the risk that comes from using a piece of technology. These risks included a problem that occurs when something goes wrong with the software (performance risks) or risks that data would be corrupted or lost (physical risks). What TPR does not include is the risk to one's reputation or the way others think about the individual, also known as social risks (MacCrimmon et al. 1986; Jacoby and Kaplan 1972; Tan 2002). The overall organizational reputation is a view of the past and present performance the organization has been able to deliver to various stakeholders. Research supports its importance in professional and personal success because esteem and capabilities can originate in others' perceptions. While a firm's reputation can represent performance ability, an individual's professional reputation can refer to the collective images perceived by key stakeholders towards the degree of confidence they have in the individual and has been found to be significant in certain professions, such as those of faculty members. Professional reputation can increase an individual's perceived status accumulated through a series of intangible assets, such as management

trustworthiness, public image, consumer or customer confidence, and employee allegiance (Gibson, Gonzales, and Castanon 2006; Walden and Bryan 2010). Therefore, since trust can be based on previous accomplishments and is affected by risky decisions, professional reputation works into this model.

The reputational risk in this dissertation is **Perceived Adverse Impact on Professional Reputation** or **PAIPR** in this dissertation is defined as the belief that selecting free computer code will have a negative effect on an individual's business standing. Managers want as little risk as possible and seek to avoid any losses or threats of poor performance (Cyert and March 1963; Lyytinen 1998; March and Shapira 1987). Previous research finds that one of the reasons that IT managers might use commercial/pay software over free is reputational risk. Dave Cullinane, Chief Information Security Officer of Washington Mutual, stated that a report of a security breach can cause 20% to 45% of your customer base to leave. Thus, companies are trying to minimize risk in IT by when choosing either proprietary or pay software (Fichman 2000; Greene 2006; King et al. 1994). However, companies that feel stable have a greater risk tolerance and place trust in free applications, so there will be managers that are willing to use Free Software for its benefits over its perceived threats.

The supporting theories of PAIPR include Systems theory, a theory that can help develop frameworks that describe relationships in an empirical world (Boulding 1956). Other previously discussed supporting theories include TAM, TRA, Risk, Commitment trust, Expected utility, Prospect, Modern portfolio, and Economic theories. With the benefits in addition to financial consideration for free applications analyzed, the

question arises of whether or not an IT purchase manager is willing to take the gamble on Free Software.

Table 1 – Independent and Dependent Variables

	Independent Variables		Dependent Variables
TPR	Program/Data Corruption Risk		Perceived Safety
	Computer/Corruption Risk		Intention to Use
	Unauthorized Data Mining		
TTB	Product Attributes		
	Brand Reputation		
	Product Reviews		
	Product Support		
Mod	PAIPR		
	EFU		

Influential Frameworks

The main model that influences the framework for this dissertation explores both the trusting beliefs and perceived risks of interorganizational exchanges by Nicolaou and McKnight (2006). Additionally both this research's model and Nicolaou and McKnight's model are influenced by two well researched academic frameworks: Davis' Technology Acceptance Model and the DeLone and McLean Model of Information Systems Success (Davis 1989; DeLone and McLean 1992, 2003; Nicolaou and McKnight 2006).

The theory behind the Technology Acceptance Model or TAM is the Theory of Reasoned Action (TRA), discussed previously in the Intention to Use section. The dependent variable for the TAM model is the Intention to Use. This dependent variable

has been supported in both academic respect and practitioner use, and is able to be recorded on a low-to-high range. While this research is designed to study Perceived Safety, by including a well-defined/established dependent variable, this particular piece should be less speculative and more analytical (Delone and Mclean 1992).

In 1992, William DeLone and Ephraim McLean based a model on Shannon and Weaver's classic communication theory, as adapted by Mason, to measure Information Systems (IS) impacts (Mason 1978; Shannon 1949). The DeLone and McLean Information Systems Success Model (D&Mc) was designed to be a comprehensive, multidimensional model based off of historic IS/IT frameworks (Ives and Olson 1984). Ten years later, the authors evaluated environmental changes, technology improvements, and almost three hundred academic references, criticisms and challenges of their model. The authors then altered the model to include e-commerce items. The first publication of DeLone and McLean presents a dependent variable of Information Systems Success (ISS), which is one of the most researched measure of IS/IT found through User Satisfaction. Most of the same constructs in this model are used in various TAM research settings. The updated DeLone and McLean model was adapted to help understand more variance, thus it morphed into three levels: production, use, and net benefits, a stakeholder's analysis of all past and expected future benefits. While Use is not mandatory, and time spent using a system does not necessarily mean success, Use and Intention to Use were integrated into their new model (DeLone and McLean 1992, 2002; Seddon 1997).

Nicolaou and McKnight (2006) developed an adoption model that deals with interorganizational systems relationships. The model examines uncertainty dealing with both trust and risk, a less common combinational review found in IS/IT. They discovered that perceived information quality positively affects trusting beliefs and that strong perceived information quality negatively affects perceived risk. They also found that perceived risk negatively affects Intention to Use, trusting beliefs have a positive effect on Intention to Use, and that trusting beliefs decrease perceived risk (Nicolaou and McKnight 2006; Pavlou and Gefen 2004).

A reason to use constructs of the TAM, D&Mc, and Nicoloau and McKnight models and not just add in new constructs to one of the models is because this dissertation's new model deals with Perceived Safety, a recent dependent variable, along with Intention to Use, an established one. The antecedents in this dissertation are not new but are in new format, setting, and for a new cause. Nicolaou and McKnight believed that adding perceived risk and trusting beliefs (about specific Web vendors) would help TAM because of its parsimonious structure when they adapted Delone and McLean's quality constructs to product perceived information quality. Just as Nicolaou and McKnight varied their model in a way that it does not resemble TAM or D&Mc, a dissection of the model shows the strong influences of those and other models in IS/IT (Davis 1989; Delone and McLean 1992, 2003; Lucas and Spitler 1999; Nicolaou and McKnight 2006). That is the hope for this dissertation's Benefits and Risk Assessment of Free Software model or BRAFS model.

Summary

This section started with the historic view of security and safety, separated safety, and developed a conceptual definition of Perceived Safety. The previous publications of Perceived Safety failed to find the construct significantly influence Intention to Use in one area of IS/IT due to the misappropriation of factors that lead to Perceived Safety and a misplacement of the sequence of trust in Intention to Use. This dissertation attempts to find the factors that affect the Perceived Safety of Free Software and its effect on Intention to Use Free Software through a new model, BRAFS.

CHAPTER III

METHODOLOGY

Introduction

In the last section this dissertation discussed Perceived Safety, its history, supporting theories, factors that contribute to it, and framework, all contributing to try to answer the following research questions:

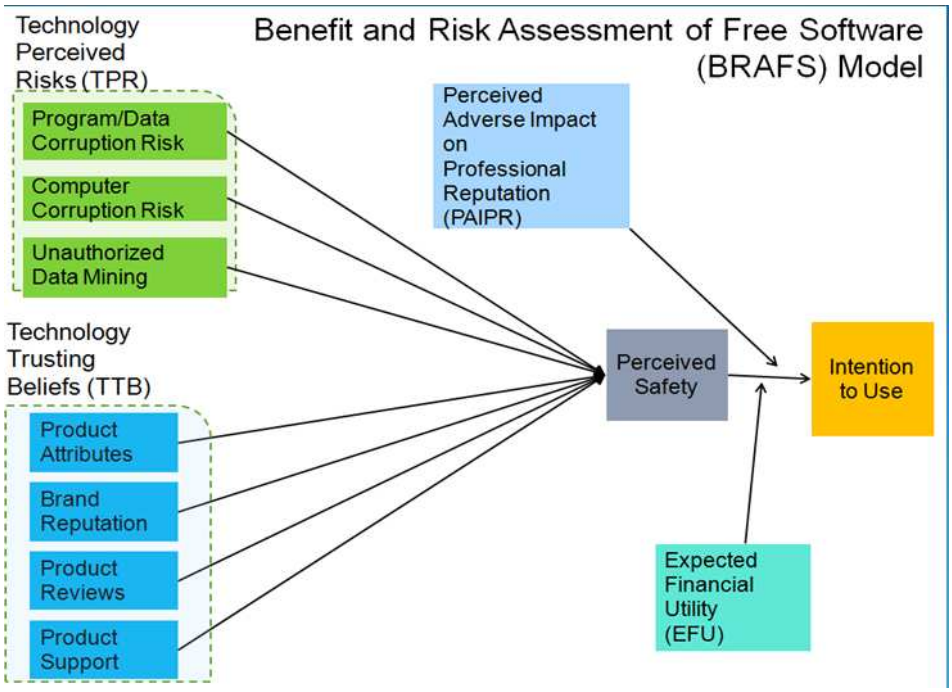
* *What factors affect the Perceived Safety of free computer code?*

* *If Free Software is perceived safe, does this increase the Intention to Use it?*

Opportunities for research exist that include finding the factors that affect the main construct and how it affects a person's Intention to Use Free Software. The format of this section begins with the conceptual model, discusses how the concepts, elements, and relationships lead to propositions, followed by the phases, scope, potential participants and goals of each study along with an operational model, and then presents an instrument to measure hypotheses and relationships. The data collected and analyzed produce answers to a series of statistical, reliability, and validity questions listed.

Conceptual Research Model

Figure 2 - Benefit and Risk Assessment of Free Software (BRAFS) Model



Constructs, Elements, and Propositions

Perceived Safety is defined in this dissertation as the belief that confidential data, programs, and operating systems are free from harm when using Free Software. A relatively new though misinterpreted IS/IT construct, this work rebuilds it from the ground up, using established constructs for best support. Finding which factors affect the Perceived Safety of free applications is a goal of this paper, so an exploration of both constructs that inversely impact and positively relate to the dependent variables occurs.

Technology Perceived Risks

Technology Perceived Risk (TPR) include the factors that make up potential consequences that may arise due to uncertainty from Free Software use or potential use. Various checklists exist for programmers and project designers but very few of these lists, whether academic or practitioner, include a breakdown of risks backed by theory and none exist for Free Software (Boehm 2000; Keil, Mathiassen, and Zheng 2008). Creating a TPR scale using theoretically backed adapted constructs involving various threats allowed for the creation of three (3) elements.

- **Program / Data Corruption Risk**
- **Computer Corruption Risk**
- **Unauthorized Data Mining (UDM)**

Program / Data Corruption Risk is the concern that the Free Software will be faulty. A top concern for businesses approaching the year 2000, a re-coding of legacy systems, transpired to account for the change in millennia listing of bank computer code. Unintentional changes to files or data may not be found by users or programmers unless rigorous testing of software occurs prior to public release. With a survival-of-the-fittest environment existing for Free Software, certain error-checking mechanisms need to be built into the program and future updates (Goth 2005; Yourdon 1999).

Computer Corruption Risk adds to program/data corruption risk by stating that uncertainty exists that the faulty free computer code will cause other files, other software programs, and even the operating system to cease functioning. Even proprietary software fails: Denver International Airport's $193 million baggage handling system suffered a glitch that shut down a hub twice the size of Manhattan, delayed the

grand opening of the airport, and cost the airport over $1.1 million a day in interest, and incurred operating expenses for over six months until it was fixed (Gibbs 1994).

Finally, **Unauthorized Data Mining** (UDM) is gathering and analysis of user information without user permission. Whether it is a federal wiretap case brought against Google stating that viewing, gathering, reading, and analyzing the content of one hundred million Gmail accounts or a blog that finds companies sneaking software onto people's computers, users do not appreciate being turned into data without consent (Hechinger 2014; Rosenblatt 2014). This area of research is new and would be very much benefited by a pursuit in consumer behavior in regards to data mining.

Each of these elements comes from risk literature to affect Perceived Safety in the following way:

P1: Technology Perceived Risks inversely impact Perceived Safety.

Technology Trusting Beliefs (TTB)

A cluster beneficial to the Perceived Safety of free computer code includes the **Technology Trusting Beliefs (TTB)**. Trust, whether it exist in a piece of technology, a company, a method, or an individual, reduces complexity from possible and undesired future behavior of the trustee, and increases the trustor's expectations in the fulfillment of benefits (Gefen et al. 2005). TTB in this work is defined as factors that may benefit an individual by intending to use a technology. Depending on the literature many different antecedents and levels of trust exist for a variety of situations. This dissertation draws from publications that successfully test technology academically and

professionally post-Internet acceptance for business purposes. Supported out of trusting belief literature and trust in technology, these items produce four elements of TTB.

- **Product Attributes**
- **Brand Reputation**
- **Product Reviews**
- **Product Support**

Product Attributes are defined as the beliefs that the user has towards an application's capabilities. When dealing with different types of software, people expect more benefits from pay software than Free Software, which include additional services and features/offers (Ousterhout 1999). Consumer journals do most of the comparisons for user interface, control panel ease of application, speed, configuration, and overall performance provided (Geuss 2011). However, since trusting beliefs and technology trust exist in academic publications that compare benefits, the inclusion of attributes is warranted.

Brand Reputation is the perception, be it positive or negative, that a user has towards the company that controls the computer code. A large subgroup of marketing and marketing literature –– branding and a brand's reputation –– not only affect product pricing, but also its familiarity, quality, consideration, and overall impression to the user (Riedesel 2011). Just like the upcoming Product Reviews measurement, a company's low or negative Brand Reputation could inflict consequences on its subsequent products.

Product Reviews are external evaluations that are done by both experts and individual users about the applications that are available for analysis. Reviews help or hurt the sale of a product, and a recent review of hardware supports that bad reviews affect sales. Reviews matter: 90% of consumers rely on peer recommendations (Qualman 2012). In that regard a 2012 *PC World* survey of over 63,000 readers listed Dell laptops as a "loser" in every category available. They also consider Dell's tablets next to last, and did not even bother to review their available smartphones (Sullivan 2012). Supporting the rationale that reviews of a product reviews can hurt sales, a 2013 report showed that the consumer division of Dell that focused on laptops, tablets, and smartphones decreased in sales 20% from the previous year (Inquisitor 2013). Dell is a multi-billion dollar company and these losses should not lead to bankruptcy, but the same reviews for a small Free Software company could lead to bankruptcy.

Lastly, **Product Support** is the current and future assistance availability of the company's IT specialists. Though the top reported difference between free and pay software is financial savings, concerns of users include technical support for the product. Some availability for free applications direct technical support exists, though at a financial cost. However, free support exists in online product forums (AlMarouq 2005; Larkin 2009). Research suggests that free computer code users may be willing to pay for technical support: in dealing with pirated software and the willingness to pay for non-pirated software, respondents emphasized a high willingness to pay in order to eligible for technical support and customer service (Hsu 2008). Therefore, individuals that use Free Software may desire the option to pay for technical support, though current research has yet to approach this topic.

Each of these elements comes from trust literature to affect Perceived Safety below:

P2: Technology Trusting Beliefs are positively related to Perceived Safety.

Intention to Use in this work means that, given certain norms, information, and other factors, that an IT purchasing manager (or someone with the authority to select business software) would choose to use Free Software for business tasks. A historically successful IS/IT dependent variable, Intention to Use works for both academics and practitioners and adds an established construct to this work. With Perceived Safety relatively new to research in IS/IT and its lone association with Intention to Use in a mobile banking environment failing (Kang et al. 2011), Perceived Safety has found support and benefited other disciplines such as transportation (Hassan et al, 2012; Utley et al 2011; Zhuang and Wu 2012).

A positive relationship with Intention to Use leads to the next proposition:

P3: Perceived Safety is positively related to Intention to Use Free Software.

Perceived Adverse Impact on Professional Reputation (PAIPR) is defined as the belief that selecting Free Software will have a negative effect on an individual's business standing. Most of the research on the Intention to Use free applications comes from individual end users, not managers choosing software (Gwebu and Wang 2010). Generally hampered by a risk adverse nature, managers exacerbate situations through budget overspending, handling various delays, fearing customer rejections, and other problems that lead to a lack of willingness to risk reputational depreciation (Herbig et al. 1994; Lyytinen et al. 1998; March and Shapira 1987; March

and Sproull 1990). With managers avoiding risk wherever possible, they avoid saving money while receiving the same benefits when concerned about professional reputation.

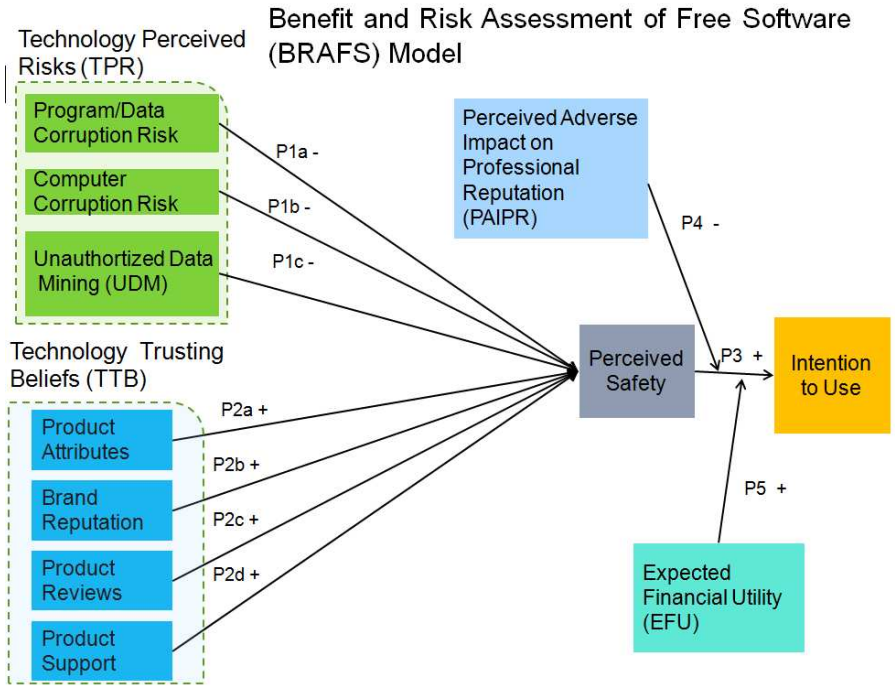
The negative impact from this may impact behavioral intentions in the following manner:

P4: The relationship between Perceived Safety and Intention to Use Free Software is inversely moderated by the Perceived Adverse Impact on Professional Reputation.

Finally, **Expected Financial Utility (EFU)** is defined as the potential economic benefits that arise from choosing to use Free Software for a business. Businesses of all sizes save money using free applications for various tasks. When people think of the concept of free, the emphasis focuses on the financial aspect over the quality. While financial savings for small and medium companies generate from using free computer code, research has show that they tend to utilize it on non-core services (Heredero 2010). With a test of Perceived Safety in free applications reveal other benefits, how a purchasing manager allocates limited funding to generate potential savings may influence the Intention to Use Free Software. That leads to the final proposition:

P5: The relationship between Perceived Safety and Intention to Use Free Software is positively moderated by the Expected Financial Utility of the Free Software.

Figure 3 – Propositions in the BRAFS Model



Phases / Goals of Each Study

A two-phase study is used for the data collection of this research. Phase 1 (the Pilot Study) tested the BRAFS model on a series of small samples, in a sequential order in order to critique the questionnaire, its results, and make changes accordingly while using a timely, cost effective manner. Changes to Phase 2 (the Main Study) are incorporated changes for the purpose of pursuing a different sample of business professionals. Students from a medium-to-large university in the southern part of the United States were used for a Pilot Studies. These convenience samples were small, feasible, and efficient with respect to time and funding. Moreover, it allowed for a receptive, practical, and not too ambitious initial series of studies open to potential changes (Alreck 2003; Shadish, Cook, and Campbell 2001).

Table 2 – Phases of the Studies

	Subjects	Size
Phase 1 (3 studies of 3 different sequential classrooms)	Business, Computing, and	Pilot 1 – 62
	Psychology Students	Pilot 2 – 115
		Pilot 3 - 99
Phase 2	IT purchasing managers (or	94 of 132 surveyed
	those with that authority)	*Nonprofit participants*

Phase 1 (Pilot Studies)

Guidelines and safety protocols from the Institutional Review Board (IRB) at a medium-to-large university in the United States govern the survey instrument (IRB). After the measurement was approved, a recruitment of students commenced for an anonymous online data collection done through Qualtrics.

Potential recruits were solicited through a series of university school classrooms and enticed with extra course credit or Amazon.com gift cards. This first series offered a good starting point through a beneficial and useful illustration in early phases of research (Markus 1983).

Instrument

By administering a questionnaire this measurement gathered simple, structured, and quantifiable data on a low-to-high scale (Grover 2001). With this research's main focus Perceived Safety, a survey instrument measured the participant's perception of model constructs in order to greater understand potentially significant factors and relationships with the dependent variables.

The instruments used in this study stemmed from existing literature to lend greater historical and empirical support to the measurements, as well as to promote valid scales (Segars and Grover 1999). While the original questions, as well as their authors and original publications, are listed in the Appendix A, each element is linked to a particular domain, the table below serves as a brief overview of the variables.

Table 3 –Variables and the Primary Influences for Each Element

Variable	Primary Influence	Authors
Perc Safety	Online Trust, Mobile Commerce	Kang et al. 2011; Kim et al. 2008; McKnight et al. 2002; McLeod et al. 2009
Int to Use	TAM	Gentry and Calatone 2002; McKnight et al. 2002; Venkatesh et al. 2000
TPR_DataCorruption	Protection from Online Violations	Lu et al. 2005; McLeod et al. 2009
TPR_ComputerCorruption	Perceived Risks from Online and Physical Encounters	Bailey et al. 2007; McLeod et al. 2009; Nicolaou and McKnight 2006
TPR_UDM	The Use of Private Information	McLeod et al. 2009; Wu and Tsang 2008
TTB_Attributes	Website and Virtual Community Beliefs	Casalo et al. 2008; Kim et al. 2008; Wu and Tsang 2008
TTB_Brand	Website and Virtual Community Perceived Reputation	McKnight et al. 2002; Wu and Tsang 2008
TTB_Reviews	Virtual Community Benevolence	Casalo et al. 2008; Hsu et al. 2011
TTB_Support	Vendor and Virtual Community Responsibility	Casalo et al. 2008; Nicolaou and McKnight 2006
EFU	Financial Planner Client Risk Evaluation Tools	Dickinger and Kleijnen 2008; Mittal 1994
PAIPR	Professional and Reputational Evaluation Measurements	Hsu 2007; Liao 2009; McLeod et al. 2009
(extra) TPR_Privacy	Privacy of Information, Online	McLeod et al. 2009; Wu and Tsang 2008

To average out the uniqueness of individual items, multi-item measures better specify a construct's domain, assist in the participants' distinctiveness, and produce higher reliability than single item measures (Churchill 1979). Therefore, three instrumental questions were used to measure each hypothesis, increasing reliability or freedom from random error by testing the same construct using several measurements (Nunnally 1994). Finally, a well designed instrument produces a quantitative result or series of results from relevant facts or relationships, so this work's theoretically-backed instruments produced a useful questionnaire (Lichenstein et al. 1990).

Appendix A contains the various instruments refined through the Pilot Studies. This instrument began with computer background variables, such as the participant's prior knowledge and experience with Free Software, comfort level using it, and the level of IS/IT purchase responsibility at his or her disposal. The reason for these questions was to ensure that the person answering the questionnaire possessed the responsibility of purchasing software for his or her computer(s). From there, three items explored each risk and benefit construct, as well as three measurements of Perceived Safety and Intention to Use. In closing, the instrument asked demographic information, such as age, gender, ethnicity, home zip code, major, and highest education level attained, though this last one was deemed irrelevant from an almost entirely college-level sample.

With nearly identical questions, a two-part Qualtrics survey instrument administered to the Pilot Study included literature supported items to pursue the hypotheses (a testable way to measure construct relationships) listed in Table 2 below. Most of the available answers used a Likert-type 1-to-7 low-to-high scale, with anchors ranging from "strongly disagree" to "strongly agree" levels, instead of a 1-to-5 scale to enable a more accurate assessment of the measurements and possibly produce more observed variance (Kekre 1995; Likert 1932). The only other variables not on a 1-to-7 scale include background variables (at the beginning), demographics (at the end), and Expected Financial Utility, which comes from Modern portfolio theory-inspired measurements with a different yet proven format towards what an IT purchasing manager's choices in a given situation (Grable and Lytton 2003; Guillemette et al. 2012). The EFU would be altered throughout the work.

Table 4 – Hypotheses Derived from Propositions

	Construct(s)	With	H's	Effect
TPR				
	Program/Data Corruption Risk	Perceived Safety	H1a	-
	Computer/Corruption Risk	Perceived Safety	H1b	-
	Unauthorized Data Mining	Perceived Safety	H1c	-
TTB				
	Product Attributes	Perceived Safety	H2a	+
	Brand Reputation	Perceived Safety	H2b	+
	Product Reviews	Perceived Safety	H2c	+
	Product Support	Perceived Safety	H2d	+
DV	Perceived Safety	Intention to Use	H3	+
Mod	Perceived Safety and Intention to Use	Moderated by PAIPR	H4	-
	Perceived Safety and Intention to Use	Moderated by EFU	H5	+

Individual decisions for one personal computer or device influence the answers to the first section's questions. Upon that section completion, section two or a role playing scenario, similar to the following, was presented in the first Pilot Study in order to support the data obtained from a student sample:

Vignette

Congratulations on your new job as Regional Information Technology (IT) Purchasing Manager for the non-profit organization United Way of America (United Way)! According to United Way's website, the non-profit deals with community issues such as education opportunities, income stability, and improved health, and relies on a network of partnerships and public support from government agencies, businesses, financial institutions, and others.

To be successful, non-profits must use cost-effective and well-administered services and programs responsive to societal needs and aligned with community values. That means software a IT Purchasing manager perceives as safe must be in place because record keeping, data presentation, accuracy, and usable reports sustain a non-profit's various campaigns.

Your first act as IT Purchasing Manager will be to consider recommending Free Software for your region. Your subjective analysis of the possible benefits and potential risks of Free Software for United Way's information, clients, software, systems, and even network decide whether or not to use Free Software or to request the allocation funds to purchase software.

Data Analysis

As stated previously, most of the data was collected using Qualtrics, except for classrooms without computers (that data was collected through printed surveys) and then analysis performed using SPSS and appropriate statistical measurements. Reported information includes means, standard deviation, statistical power, observed variance, paired t-tests, means, multiple linear regression, analysis of variance (ANOVA), and confirmatory factor analysis (CFA). Factor analysis (FA), which consists of methods for finding clusters of related variables, plays part in three levels of validity and benefits this research. The use of CFA over Exploratory Factor Analysis (EFA) recognizes the use well established items loading similar to their historic counterparts instead of relying on completely new instruments. If completely new instruments were used, then EFA would be a viable statistical option for analysis. Performing a confirmatory factor analysis to test the measurement model leads to an evaluation of the

psychometric properties of the measurement model in terms of reliability, convergent validity, and discriminant validity (Nunnally 1994). Factor loadings greater than .50 will be considered very significant in statistical analysis (Hair et al 1992).

Reliablity, Face Validity, Construct Validity, and External Validity

A review of Cronbach's alpha occurred, as well as item correlation to test reliability of the variables with a .7 benchmark level (Churchill 1979; Cronbach 1970; Gerbing and Anderson 1988). Using multi-item measures supported the existence of instrumental reliability by averaging out the uniqueness on individual items, better specifying a construct's domain, assisting in the distinctions between participants and generating higher reliability than single item measures. Validity deals with the approximate accuracy of an inference or proposition by demanding more rigor to research through systematic measurements that produce clear, interpretable, and trustworthy results (Straub 1989). Different types of that validity investigate this dissertation's measurements. Face validity refers to the appearance of a measure and that a test appears valid after constructing the measurement instrument (Anastasi 1988). A series of consultations and reviews by well-established experts both in-and-out of IS/IT supported the need to test this instrument. For Construct validity, a measure must fit a theory and that theory assumed true. With most of this work's adapted constructs previously tested, support exists for the construct validity of the measures utilized in this study (Nunnally 1994).

External validity (the populations, settings, and variables to whom the effect can be generalized) and construct validity deal with generalizations about how valid the knowledge of the instrument's constructs shed light on external validity when well-

developed theories support them. The results from Phase 2 return will present stronger support exist behind a non-student sample, though relevance exists from the data obtained from Phase 1 because business students become business people (Elliott, Hodge, Kennedy, and Pronk 2007; Shadish et al. 2001).

Convergent Validity, Discriminant Validity, Content Validity, and Internal Validity

Convergent validity occurs when a high correlation among items exists (Churchill 1979). Using item reliability or multivariate analysis' factor loading finds the amount of observed variance. Discriminant validity exists when items do not highly correlate with items that they should not (Bagozzi, Youjae and Phillips 1991). Also, the average observed variance extracted by each of the constructs or observed variance in the item explained by the construct, relative to the amount due an error of measurement, could be recorded (Rivard 1988).

Similar to face validity, if the sample is appropriate for the project and items tend to "look right," the support for measure's content validity and, along with other validity, leads the project towards scientific generalization. The theoretical content needs to be represented correctly for these items needs in the questionnaire. Lastly, a top concern for social scientists involves internal validity or confidence with the results drawn from the data sets produce accurate conclusions. By using historically proven instruments and research methods, the internal validity is supported though some adaptation of the instruments is expected (Kilmann 1979; Thomas and Tymon 1982). In summary, the measurement model will demonstrate adequate reliability, convergent validity, and discriminant validity.

Timeline of Phase 1

In the summer of 2013, the initial Pilot Study's recruitment, testing, and analysis of data occurred, with results available in Chapter 4. In the Spring of 2014, two additional Pilot Studies were performed, one (January 30, 2014) including the changes from the 2013 Pilot Studies and the final one (February 12, 2014) included the changes from the earlier 2014 study.

Phase 2

The Phase 2 target population for this research, IT purchasing managers for non-profit organizations, began March 18, 2014 and end its online recordings on April 1, 2014. The target managers, with some potentially not labeled IT managers, included job duties requiring the majority of the software decisions be made by the participant. The results were designed to cross-validate the Pilot Study's findings. The source for the managers was a nonprofit organization with a network of over 300 organizations and volunteers.

Asking questions regarding the Perceived Safety of Free Software to business people allows the work to benefit both academics and practitioners with an interaction and analysis of perceived outcomes (Orlikowski 2000). Also, analyzing end-users' perceptions instead of programmers' could assist managers lacking experience in programming with evaluating available resources (Adrion 1982; Mayer 1981).

Assumptions

Certain assumptions occurred in this dissertation. These included but may not be limited to:

(1) The awareness of IT purchasing managers with Free Software. The relevance of actual usage of free applications by an IT purchasing manager is not in question; rather, it is countered by his or her awareness of Free Software that leads to his or her intention to never use it.

(2) The need for programmer level knowledge is immaterial. If a manager or employee possesses this knowledge, end-users in the business need not have programming knowledge in order to perform computer related business tasks.

(3) While this work records reputational risk, levels of stress and anxiety that arise from an IT purchasing manager's self-efficacy are not recorded, even though different levels exist considering the specific job, chance for promotion, and economy (Compeau and Higgins 1994).

(4) The relationship between the IV's and the DV's are weighted the same. Future research is suggested to explore the perceived materiality of different types of risks, benefits, and software uses. For this reason, and for parsimonious research, one R^2 is reported per model to report the relationship between the IV's and DV's, except for one Pilot Study that reports the results when items reporting correctable constructs that would improve by removing one item in computing a Cronbach's Alpha score.

(5) Stepwise regression is useful in identifying predictor variables and eliminating predictor variables. However, with this research model being recently created, the exclusion of variables would be something that would benefit future research. Therefore, stepwise regression is not pursued.

(6) Software usage benefits the nonprofit. Whether from clients, credit card system, tracking, database management, cell phone or smart phone with business and personal information, etc., the need for software incorporation into a nonprofit exists. Further, there is no standard line item involving technology among nonprofit budgets (Weinstein 2004). While application utilization lies center for any business product or service (Coradi and Fuggetta 2002), a speculation on an exact dollar amount a nonprofit allocates towards software should be a focus of future research.

(7) Computer self-efficacy varies from person-to-person, including IT purchasing managers (Bandura 1986; Compeau 1995; Venkatesh 2004) and distinctive technological backgrounds, similar to programmer knowledge, and is not considered in this work.

(8) A small sample size exists due to the availability of resources, so a larger number of questions or amount of data is requested from the participants to compensate the lack of a larger pool of respondents and to avoid random sampling error (Assael and Keon 1982).

(9) With the Phase 2 sample coming the southern part of the United States, some level of generalizabilty is possible with other nonprofits.

(10) Finally, since a portion of the trust and risk constructs involve the World Wide Web, e-commerce, m-commerce, and other Internet mediums, the evaluation of Free Software available is more likely to be downloaded than to be picked in an a brick-and-mortar type store.

Chapter Summary

This section of the dissertation presented a model that originated out of theory, created propositions not just out of both academic and practitioner literature resonating logic, discussed the phases required to generate workable data in order to possibly present empirical findings that confirm hypotheses, and allowed for flexibility between the phases due to both predicted and potentially surprising outcomes. A survey instrument was developed and supported by both theory and user publications initiate a ground-up restructuring of Perceived Safety. The often discussed yet rarely academically analyzed domain of Free Software's benefits and risks guides this work in a path of understanding for both academics and business people. Finally, business students and then specifically IT purchasing managers for nonprofits were surveyed. The next section discusses the characteristics and reports results from the Pilot Studies.

CHAPTER IV

PILOT STUDY

DATA ANALYSIS AND RESULTS

Introduction

This section currently addresses the data analysis and results of Phase 1 (the Pilot Studies). Reliability was tested using Cronbach's Alpha. Relationships among the constructs were analyzed through a correlation matrix and all of the hypotheses that were not influenced through moderation were analyzed via multiple linear regression. Two hypotheses that dealt with moderation were analyzed using a moderation Macro that will be discussed later in this section. Other statistical instruments are discussed later in this chapter. All data analysis was gathered using Qualtrics, sorted in Excel, and analyzed using various features of SPSS, SPSS supported software, and online scholarly supported calculators.

Phase 1 – Pilot Study 1

Demographics

The Pilot Study sample pool consisted of five classrooms of undergraduate students from a middle-to-large sized university in the Southeast portion of the United States of America. Since the BRAFS model draws from several different disciplines, so

were the classrooms different areas of study: Psychology, Computer Science, and Management Information Systems. The first Pilot Study questioned three classrooms totaling 69 participants and resulted in 62 workable responses were recovered. Each respondent was given an online anonymous Likert-scale response instrument through a Qualtrics website. The four-part survey instrument consisted of three Computer Background questions, 33 (Personal) Perceived Safety with Free Software IV's and DV's, 33 Role Playing (Professional) Perceived Safety with free computer code IV's and DV's, and finally six Demographic questions. Table 4 below illustrates a mostly male sample (59.7%), which is above the average for this particular university (45.5% male). However, the Ethnicity/Race segment is on par with a 77.8% White or Caucasian sample reflecting 76.5% of the university population. The average age of those surveyed was just over 21, with the youngest surveyed being 15 years old and the oldest at 35 years old. Exactly half of those surveyed were either Other/Undeclared or Declined to Answer in regards to personal major. These demographics were consistent with the other Pilot Studies.

Table 5 – Pilot Study 1 – Demographics

Pilot Study 1	**62 Usable Responses**
Male	37 (59.7%)
Female	15 (40.3%)
White or Caucasian	48 (77.4%)
Asian	6
Black or African-American	6
Hispanic or Latino	1
Two or More Races	1
All Other Selections	0

Paired T-Test to Support Using Student Sample

Role playing using students has been chastised in the past as a convenience sample (Sudman and Blair 1999). For this very reason, and drawing support from the Theory of Planned Behavior, the participants of the first Pilot Study were asked personal business questions, such as what he would do in a given situation for his personal computer. This line of questioning was later followed with the same level of questions except in a role playing scenario where the participant had to make the same type of decision for an organization (Ajzen 1981). The results showed high correlation among variables inquired about from both personal opinions and in a role playing scenario in which software purchasing power exists. The lone exception is Expected Financial Utility (EFU). EFU would prove to be a problem in these first surveys that ultimately is corrected by the end of the Pilot Study period.

Reliability

To test the consistency of the measures, Cronbach's Alpha was analyzed for all scales in the Pilot Study. This measure is designed to support how questions measure a single construct. While not a statistical test, this task is performed to visualize the consistency of instruments. A Cronbach's Alpha score of .7 (or higher) is the benchmark for each variable to exhibit "good" internal consistency (Nunnally 1994).

As expected, the closely adapted DV of Intention to Use scored a Cronbach's Alpha of.75, yet the newly constructed DV of Perceived Safety produced a low Cronbach's Alpha of .47. In regards to low scores, any element involving risk, as well as Perceived Safety, produced a low-scoring Cronbach's Alpha. These low scores may have

been due the researcher's desire to minimize bias by reverse coding the elements (Brace, Kemp, and Snelgar 2009). In each of the low scoring elements, one of the three questions caused the Cronbach's Alpha to drop below .7, sometimes drastically. In the second series of the Pilot Studies, reverse coding was not considered and this potentially bias choice was countered with all beneficial measurements written positively and all risk measurements written negatively.

Table 6 –Pilot Study 1

Means, Standard Deviations, Correlations, and Cronbach's Alpha Scores of Study

	#	Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11
DV's	1	Perceived Safety	3.75	1.05	.47										
	2	Intention to Use	4.64	1.17	.27*	.75									
Risks	3	Privacy (later UDM)	4.19	1.05	-.32*	.12	.44								
	4	Data Corruption	4.08	1.10	-.10	-.11	.42**	.48							
	5	Computer Corruption	4.17	1.04	-.26*	-.03	.35**	.61**	.42						
Benefits	6	Attributes	4.36	1.10	.21*	.26*	-.20	.16	-.04	.70					
	7	Brand Reputation	4.13	1.15	.30*	.39**	-.13	.05	-.25	.69**	.77				
	8	Reviews	4.51	1.16	-.20	.14	.14	.20	.08	.60**	.65**	.76			
	9	Support	3.79	1.12	.39**	.22	-.23	.06	-.07	.54**	.61**	.40**	.74		
Moder.	10	Expected Financial Utility	2.58	.48	.34**	.35**	.04	.17	-.07	.39**	.24	.27*	.27*	.47	
	11	Perc. Adv. Impact on Prof. Rep	4.16	1.17	-.41**	-.17	.27*	.11	.14	-.20	-.15	.03	-.33**	-.24*	.65

Notes: N = 62. * p < .05, ** p < .01 (two-tailed tests). Cronbach's Alpha (Coefficient alpha reliabilities) are listed and underlined on the diagonal for scales.

Correlation and Statistical Power

To test for discriminant validity or that the factors distinguish themselves from different sets of indicators and measure differently, the cut-off level of r = .85 and a significance level of p< .01 was used. No two items loaded at or above .85 and the highest correlation reported was .71 between a Data Corruption and Computer

Corruption Risk. The Computer Corruption Risk item was edited. No other items loaded above .7, and only four others loaded in the .6 level, thus supporting the Pilot Study's discriminant validity (Kline 1998, 2011). Correlations are available in the Appendix B, along with each categorical mean and standard deviation.

To ensure the number of participants in future studies would be enough to support the measurement instruments, the statistical power (probability that a relationships reaching significant levels will be found if it exists) of the previous Pilot Study was tested through a post-hoc statistical analysis. In order to do this compute this statistic, a free piece of software entitled the Post-hoc Statistical Power Calculator for Multiple Regression developed by Daniel S. Soper, Ph.D. was used. This calculator, and others under his website, have a collected usage rate of over 25 million times, has gone through several updates, and allows for the user to provide the P-value at which to test the probability level (.05), the number of predictor (or independent) variables (12), and workable sample size (62 usable of 69), and the observed R^2 (.32, provided by the SPSS calculations) to reach the observed statistical power of .46 (Soper 2013). This level is above the recommended .78 for a sample size of 60 listed in research material, thus there should be an increase in the sample size (Hair et al. 2010).

Confirmatory Factor Analysis and Construct Validity

CFA was attempted but due to a small sample, the KMO score came out to .44, which is well below the 0.6 threshold to report this type of analysis, even though Bartlett's Test of Sphericity reported a significance level of $p \leq .01$ (Brace et al. 2009). Therefore, CFA was next attempted when the sample size was larger than 60.

Multiple Linear Regression

Pilot Study 1's hypotheses were tested using multiple linear regression in SPSS. The first part of the regression dealt with the elements that made up TPR and TTB and their impacts on Perceived Safety. The second part of the regression dealt the Perceived Safety's impact on the Intention to Use Free Software, as well as two variables that were tested for moderating effects of this relationship.

The model that reflects the technological risks and benefits that impact the Perceived Safety of Free Software resulted in an observed $R^2 = .32$ or 31.8% of the observed variance accounted for. Though the sample size is under one hundred, an ANOVA score resulted in $F(7, 53) = 3.53$, $p \leq .01$, thus presenting a significant model for this particular study.

There was a significant negative correlation between the DV of Perceived Safety and the following elements or risk: Computer Corruption ($r = -.27$, $p = .02$) and Privacy ($r = -.32$, $p \leq .01$). There was a significant positive correlation between PS and Attributes ($r = .31$, $p \leq .01$), Brand Reputation ($r = .30$, $p = .01$), and Support/Service ($r = .40$, $p \leq .01$).

However, only three hypotheses were found significant from an analysis using multiple linear regression and all dealt with Benefits: Attributes ($B = .29$, $p = .04$), Brands ($B = .33$, $p = .03$), and Support/Service ($B = .27$, $p = .04$). Again, a problem from the first Pilot Study may have been due to reverse coded questions.

In Pilot Study 1, Hypotheses 2a, 2b, and 2d are supported. In reviewing Hypothesis 3 (Perceived Safety is positively related to Intention to Use Free Software), the hypothesis is supported with an ANOVA score of $F(1, 60) = 4.55$, $p \leq .04$. The model itself has a correlation between Perceived Safety and Intention to Use of .27 with $p = .02$.

To test the moderating effects of Perceived Adverse Impact on Professional Reputation (PAIPR) and EFU on the relationship between Perceived Safety and Intention to Use (H4 and H5, respectively), a free macro that was installed to work with SPSS was used. Developed by Andrew Hayes, Ph.D., a professor at Ohio State University, the PROCESS macro began as work in his dissertation, has evolved over several iterations, and is the topic of several papers, as well as a portion of his book *Introduction to Mediation, Moderation, and Conditional Process Analysis*. This macro uses a regression-based analytical framework for calculating interactions of moderating variables between two constructs and allows us a chance to perform a mediator analysis. Previously, to analyze these type of results, a step-by-step technique had to be done, either by hand or by (1) regressing the mediator(s) on the IV, (2) regressing the DV on the IV, (3) regressing the DV onto both the IV and the moderator, and (4) interpreting the results. The software used in this research does not provide a traditional SPSS step-by-step output. For the sake of simplicity in this research, one R^2 is reported per model per particular study to report the relationship between the IV's and DV's. While using PROCESS to moderate PAIPR, $F(1, 60) = 2.37$ produced a non-significant effect of $p = .10$. However, using PROCESS to moderate EFU resulted in $F(1, 60) = 5.00$ and $p \leq .01$, thus producing a significant result.

Changes Before the Next Pilot Study

A larger sample needed to be collected to accurately use CFA. All negatively coded items were removed and beneficial measurements written in a positive light, whereas negative or risky items were written in a negative way.

Phase 1 – Pilot Study 2

A second Pilot Study attained 115 usable surveys out of 117 submissions. Except for the changes mentioned in the previous section, this instrument is nearly identical to the previous one. While sex, age, and other demographics were reported for the initial Pilot Study, exact demographics of these further Pilot Studies may be reported in additional research, but that data is not critical for the current focus. One additional change is the removal of the role playing option in order to shorten the time needed to complete the instrument and prevent possible participation burnout.

Reliability

The second Pilot Study resulted in all elements meeting their respective .7 or greater threshold except for TTB_Reviews, TPR_Privacy, and EFU. One question under TTB_Reviews dropped the Cronbach's Alpha score to .65. With that item removed, the score increases to .77. TPR_Privacy's Cronbach's Alpha score was .50. This item was re-written for the third Pilot Study and will be discussed further in this chapter. Finally, EFU scored a -.54, which means that the items are not measuring the same construct. After examining EFU in more detail, it clearly needed to be re-focused. Pilot Study 2 suffered from this construct that possessed elements that asked about a case scenario, a

risk level preference, and the willingness to save money. The changes to EFU and other changes are addressed later in this chapter.

Correlation and Statistical Power

As before, no items correlated higher than a .85 cuff-off (highest was .72) and correlations among the IV's averages all reached significant levels when linked with Perceived Safety, except for EFU. Statistical power was tested the same way as before, using Soper's calculator, reaching a score of .99, thus producing a stronger instrument due to a larger number of participants. For more on this particular study, Table 7 presents that information.

Table 7 – Pilot Study 2

Means, Standard Deviations, Correlations, and Cronbach's Alpha Scores of Study

	#	Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11
DV's	1	Perceived Safety	2.73	.67	.83										
	2	Intention to Use	3.16	.78	.67**	.84									
Risks	3	Privacy (later UDM)	3.17	.76	.31	.92	.54								
	4	Data Corruption	3.27	.86	-.36**	-.29**	.31**	.87							
	5	Computer Corruption	3.42	.82	-.21*	-.23*	.13	.46**	.72						
Benefits	6	Attributes	3.09	.75	.45**	.47**	.03	-.20*	-.20*	.79					
	7	Brand Reputation	3.06	.66	.44**	.45**	-.05	.21*	-.09	.47**	.75				
	8	Reviews	2.97	.75	.30**	.20*	.14	-.12	-.18	.14	.26**	.64			
	9	Support	2.78	.75	.40**	.32**	-.03	-.14	-.18	.43**	.43**	.14	.81		
Moder.	10	Expected Financial Utility	2.99	.37	-.12	-.20	-.06	-.04	-.07	-.05	-.10	-.02	.03	-.58	
	11	Perc. Adv. Impact on Prof. Rep.	3.36	.76	-.45**	-.34**	-.02	.26**	-.35**	-.35**	-.24**	-.11	-.39**	.19*	.76

Notes: N = 115. * p < .05, ** p < .01 (two-tailed tests). Cronbach's Alpha (Coefficient alpha reliabilities) are listed and underlined on the diagonal for scales.

Confirmatory Factor Analysis

The CFA scores for TTB and TPR were a major problem in the previous Pilot Study and mostly corrected in Pilot Study 2 after refining the questions and increasing the sample size. All but one of these IV's loaded where they were supposed to load. TPR_Privacy had 2-of-the-3 questions load on the same factor as TPR_ Program/Data Corruption, so all three questions should be structured around TPR_Privacy #2. Also, the KMO, a measure of sampling adequacy, met the .6 threshold with a score of .78 with a significance level of $p \leq .01$, thus there is a large enough sample to report the Factor Analysis.

Multiple Linear Regression

The model had an observed $R^2 = .37$, $F = 9.04$, and $p \leq .01$. Significance at a .05 levels were found for TTB_ Attributes with $t=2.67$ ($p<.01$) and TPR_ Program/Data Corruption with $t = -2.02$ ($p = .04$). When Significance level was moved to .10 TTB_Reviews became significant with $t = 1.76$ ($p = .08$) and TTB_Brand almost reached significance with $t = 2.61$ ($p = .10$).

Perceived Safety's impact on Intention to Use Free Software was found significant with $F = 89.83$, $t = 4.53$ and $p \leq .01$. Using Dr. Hayes' Process SPSS add-on to test for moderation, PAIPR was found to have a significant effect on the relationship between Perceived Safety and Intention to Use with $F = 44.82$ and $p \leq .01$.

Testing Hypotheses When Flawed Questions Were Removed

Running Regression without the flawed Review question and only one Privacy question in it resulted in a model with an observed $R^2 = .39$, $F = 9.76$, $p \leq .01$, and significance levels at $p = .05$ for TTB_Attributes, TTB_Reviews, TTB_Support and TPR_Program/Data Corruption. These questions were re-written for Pilot Study 3.

Changes Before the Final Pilot Study

One of the changes to the study occurred in TTB's Reviews. In order for one of the items to better align with the others, it was altered from reading "most of the free application reviewers are concerned about the needs of other Free Software users" to "most of the comments posted by free application reviewers are truthful" in order to fit the realm of "honesty" that the other questions for that variable fall in. The problem with EFU required a completely new set of questions and for this a series of well-cited publications from the *Journal of Marketing Research* and the *Journal of Interactive Marketing*, where the younger publication builds upon the older's research. These new items dealt with the economic benefits derived from using coupons, both online and offline, and the instruments adapted easily into this dissertation (Dickinger and Kleijnen 2008; Mittal 1994).

Finally, one of TRP_Privacy's questions loaded in factor analysis by itself, whereas the other two elements loaded with TPR_Data Corruption. Further, these two elements correlated with the Data Corruption elements. Exploring the face validity of this occurrence allowed for the discovery that a possible reason for this element loading alone is because it is a gathering-type question, as in the company is gathering

information on the user. Also those surveyed may view the loss of privacy much like losing a file. With this situation, the construct of Privacy and associated questions were adapted to be about the unwanted gathering of a user's information. It is called Unauthorized Data Mining (UDM) and the questions have been adapted to report such.

Phase 1 – Pilot Study 3, the Final Pilot Study

Demographics

The Final Pilot Study sample pool consisted of one classroom of undergraduate students from the same middle-to-large sized university in the Southeast portion of the United States of America. A total of 99 participants completed the survey instrument. Table 8 below illustrates a mostly male sample (75%), which is above the average for this particular university (45.5% male). The Ethnicity/Race segment is much higher with a 92% White or Caucasian sample verses 76.5% of the university population. The average age of those surveyed was just over 21.

Table 8 – Pilot Study 3

Male	74 (75%)
Female	25 (25%)
Age	21.16
White or Caucasian	92
Black or African-American	4
All Other or Not Selected	3
Finance	28
Marketing	22
Accounting	16
Management	9
Insurance	8
All Other or Not Selected	16

Reliability

Cronbach's Alpha met a .7 or greater threshold for all items but one: the newly developed construct of UDM. It reached a .65 level, with one question causing it to drop below .72. That question was amended for the Main Study.

Correlation and Statistical Power

No correlation level among individual items reached the .85 threshold (the highest was .7). This was done to ensure that each element of the construct, while meeting an acceptable Cronbach's Alpha score to ensure Construct Validity, was not merely repeating one of the other elements. Rather, it was gathering useful information. Finally, statistical power was met using Soper's calculator at a level of .97, surpassing the .78 threshold. For more on this particular study, Table 8 presents that information.

Table 9 –Pilot Study 3

Means, Standard Deviations, Correlations, and Cronbach's Alpha Scores of Study

	#	Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11
DV's	1	Perceived Safety	2.72	.76	.81										
	2	Intention to Use	3.18	.81	.60**	.78									
Risks	3	Unauthorized Data Mining	3.31	.70	.10	-.60	.65								
	4	Data Corruption	3.09	.87	-.08	-.13	.11	.81							
	5	Computer Corruption	3.17	.82	-.29**	-.31**	.01	.53**	.72						
Benefits	6	Attributes	3.05	.63	.49**	.49**	.09	-.01	-.24*	.79					
	7	Brand Reputation	2.92	.58	.41**	.34**	.02	-.11	-.35**	.30**	.76				
	8	Reviews	2.68	.79	.15	.01	.15	-.05	.03	.20*	.16	.85			
	9	Support	3.22	.82	.44**	.22*	.03	-.15	-.29**	.36**	.33**	.31**	81		
Moder.	10	Expected Financial Utility	3.22	.77	.49**	.57**	.09	-.24*	-.20*	.34**	.23*	.17	.34**	.84	
	11	Perc. Adv. Impact on Prof. Rep.	3.28	.81	.44**	.41**	.01	.24*	.42**	.30**	-.31**	.07	-.28**	-.44**	.77

Notes: N = 115. * p < .05, ** p < .01 (two-tailed tests). Cronbach's Alpha (Coefficient alpha reliabilities) are listed and underlined on the diagonal for scales.

Confirmatory Factor Analysis and Construct Validity

Table 10 – Confirmatory Factor Analysis of Final Pilot Study

	1	2	3	4	5	6	7
Attributes 1	-.05	.07	.32	.21	.08	-.19	**.63**
Attributes 2	.19	.03	.28	.05	-.17	-.67	**.30**
Attributes 3	-.03	.12	-.06	.07	.08	.01	**.83**
Brand 1	-.09	.12	.18	**.79**	.10	.01	.09
Brand 2	-.01	.12	.04	**.81**	.04	-.07	.22
Brand 3	-.04	-.10	.19	**.50**	-.07	-.35	-.29
Reviews 1	-.02	**.87**	.15	.01	.06	.06	.09
Reviews 2	-.01	**.84**	.11	.03	.13	-.05	-.07
Reviews 3	.01	**.83**	.14	.15	.05	.02	.22
Support 1	-.03	.20	**.82**	.14	-.02	-.15	-.02
Support 2	-.09	.12	**.85**	.15	-.02	.03	.10
Support 3	-.10	.08	**.76**	.03	.12	-.24	.04
Unauthor. Min. 1	-.04	.08	.11	.12	**.85**	.08	-.03
Unauthor. Min. 2	-.05	.19	-.06	.01	**.80**	-.18	.15
Unauthor. Min. 3	.42	-.19	.01	-.13	**.43**	.35	.24
Data Corr. 1	**.84**	.01	-.06	.13	-.02	.02	.18
Data Corr. 2	**.86**	.05	-.09	-.07	-.01	.02	-.02
Data Corr. 3	**.78**	-.15	-.02	-.04	.01	.04	-.17
Comp. Corr. 1	.49	.21	-.19	-.19	-.13	**.60**	.11
Comp. Corr. 2	.42	-.05	-.09	-.07	-.22	**.63**	-.07
Comp. Corr. 3	.22	.13	-.05	-.35	-.03	**.52**	-.12

The CFA scores for TTB and TPR had been a major problem in the previous studies and corrected in this final Pilot Study after refining the questions and using an appropriate sample size. As seen in Table 8, all IV's loaded where they were supposed to load. Also, the KMO, a measure of sampling adequacy, met the .6 threshold with a score of .67 with a significance level of $p \leq .01$, thus there is a large enough sample to report using Factor Analysis. A Varimax rotation was used and the reason for the rotation is because factor analysis prior to any rotation may explain how many factors lie beneath the variables. By rotating, the simplest pattern for these factor loadings can be observed (Brace et al. 2009). This researched used a Varimax rotation because it is the most used method for focusing on simplifying the columns and is considered superior to others for its simplified method (Hair et al. 2010).

Construct Validity and Additional Statistical Assumptions

For the Pilot Studies the data is assumed to be from a normally distributed population, if that population consisted of undergraduates currently enrolled in a small-to-medium sized university in the Southern part of the United States. By using SPSS software to explore this normality, a Q-Q plot was graphed for each variable, with the output occurring on both sides of a diagonal line. Thus, the data is considered normally distributed. For independence of observations to exist, the research design needs to be explained. The first Pilot Study was a one group Pre-test, Post-test. The students were asked questions that led up to how they perceive the safety of Free Software for personal use. Then they role played a startup company's purchase/IT manager and answered the same level of questions, this time for an entire business instead of a single person. Results showed that the choices made at the personal level would be made at the professional level (Hair et al. 2009).

This instrument went through various phases to reach a level that is considered acceptable to submit to working professionals. Every question is based off of a proven academic question, matching content validity. All models have strong observed R^2's and statistical powers with large sample sizes. Every problem with Cronbach's Alpha was addressed after each Pilot Study and sharpened the questions into precise measurements, another part of construct validity. Factor analysis recorded the items loading where they were supposed to load, a comparison of convergent and discriminant validity. Lastly, a face validity issue allowed for the possible discovery of UDM through correlation (Kerlinger and Lee 1999).

Multiple Linear Regression

The model had an observed R^2 = .38, F = 7.72, and sig ≤ .01. Significance at a .05 levels were found for TTB_ Attributes, TTB_Brand, and TTB_Support.

Perceived Safety's impact on Intention to Use Free Software was found significant with F = 53.53, t = 7.32 and p≤ .01. Using Dr. Hayes' Process SPSS add-on to test for moderation, both PAIPR (F = 29.71) as well as EFU (F = 30.49) were found to have a significant effect on the relationship between Perceived Safety and Intention to Use with p≤ .01.

Table 11 - Manipulation of the Variables

Final Pilot Study		
	t	Sig.
Perceived Safety	5.81	.01
IV's		
Attributes	3.62	.01
Brand Reputation	2.23	.03
Reviews	-.27	.79
Support	2.37	.02
Unauthorized Data Mining	.66	.51
Data Corruption	-.06	.96
Computer Corruption	-.05	.64
Moderators		
Expected Financial Utility	7.32	.01
Perc. Adv. Aff. On Prof. Rep.	-4.80	.01

df = 90

Conclusion

These three Pilot Studies allowed for the instrument and its elements to be refined through various tests of different participants. Out of the three studies, the third study had the most success with factor analysis and Cronbach's Alpha requirements. The second Pilot Study supported three-of-the-four Technology Trusting Beliefs being

found significant in the relationship with the Perceived Safety of Free Software, with only the Brand Reputation failing. The only Technology Perceived Risk that was found significant in that relationship was the chance that data would be lost. In the third and final Pilot Study, three-of-the-four TTB's were found significant, however, this time Reviews was not found significant. No TPR's met significance levels.

In both Pilot Studies 2 and 3, the relationship between Perceived Safety and the intention to use free applications reached significant levels, as well as the concern over one's professional reputation being negatively impacted in this same relationship. The economic benefits derived from this relationship also reached significant levels in Pilot Study 3, the only study that tested those new measurements.

Interestingly, those surveyed feel that the risks of a business computer crashing, information being gathered, or losing data files are not high enough to reach significance levels and may mean these are not concerns that deter individuals from using free computer code. For more of a summary, please review Table 12.

Table 12 – Summary of All Pilot Studies

Dates	Size	Model, F, and Sig Levels	Hypotheses Met	Problems	Changes Prior to Next Study
07/2013	62	R2=.32; F=3.53; p ≤ .01	H1b, H1c, H2a, H2b, H2d, H3	Poor Cronbach's Alpha (CA), Power; Unable to use Factor Analysis	Rewritten and Shorter Q's
01/2014	115	R2=.37; F=9.04; p ≤ .01	H1a, H2a, H2c*, H2d*, H3, H4	3 items poor CA's; TPR_P loads with TPR_D	Tweaked Q's and new EFU and UDM Q's
02/2014	99	R2=.38; F=7.72; p ≤ .01	H2a, H2b, H2d, H3, H4, H5	1 construct with 1 element resulting in low CA	Tweak 1 Q
Power met in the last two Pilot Studies and in the Main Study					
* means one question that brought down the Cronbach's Alpha was removed and all tests were run again					

CHAPTER V

MAIN STUDY

DATA ANALYSIS AND RESULTS

Introduction

Upon completion of Phase 1 (the Pilot Studies), the survey instrument and its previous results were reviewed by IS/IT experts. Approval for Phase 2 (the Main Study) led to a meeting with Executive Director for the organization that would administer the survey. This meeting resulted in the following:

- A completed practice survey by the Executive Director
- An edited blank survey
- Recommended wording changes of items for greater clarity
- Approval of the total number of questions and time required to complete instrument
- Recommendation of shortening the definitional part of the survey
- An edited and approved preamble that would be included in the email message to subjects
- Approval of incentives to entice potential participants
- Approval of two additional follow-up email messages during the survey time period

The Executive Director was then given a report about the Pilot Studies in order to understand their results without biasing his survey answers or comments. With both the IS/IT experts and the head of the organization that would be administering the survey in agreement, the Main Study commenced on March 18, 2014.

Phase 2 – Main Study - Details

The organization that administered the survey has one mission: to "strengthen the capacity of nonprofits to serve the people and communities" of its state. This organization is one state's main nonprofit resource center. It trains, advises, coaches, and connects over 300 organizations to volunteers. With the entire population of the state being slightly larger than the population of the city of Chicago, Illinois, these nonprofits range in size from small organizations in small towns to multi-million dollar foundations and companies (Census 2010).

Contact with Potential Participants and Incentives

An initial mass email message was sent out to all volunteers on March 18, 2014. This message was to include the preamble (available in the Appendix C), survey link, incentives, and relevant details. However, errors occurred in that initial message, such as an omission of the incentives. These incentives included a drawing for one-of-many $10 Amazon.com gift cards, as well as the "grand prize" details. The first follow-up email reminder, on March 24, 2014, included the survey link, incentives, as well as the information that those that previously had completed the survey were already entered into contest. A concern about multiple surveys from the same individuals was minimized by the email addresses collection. While double-exposure to an instrument

and possible history bias exist in online surveys, the email portion of the survey, while filtered out before analysis of data to keep the results anonymous, allowed for any duplicate responses to have the most recent responses removed, so that only initial responses were included. Ultimately, only one completed survey was removed because the Executive Director of the organization took the online version during this time period and had previously taken a paper one, thus his responses suffered from history bias. The final reminder, March 31, 2014, included the preamble, survey link, incentives (along with a large incentive of two concert tickets), and a final "thank you" to those that had already taken the survey. On April 3, 2014, the survey period closed. Examples of an email message that was sent out can be found in Appendix C.

Two weeks prior to the email messaging campaign, the organization began and completed their own intensive survey of their membership. This may have led to exhaustion of the membership in answering questions, as well as confusion as to why another survey went out from the institution. Further, contact with the researcher was made by some of those attempting to take the survey because the initial email message did not possess a working hyperlink to the survey. Other potential participants reported to the researcher that the email message wound up in their "Spam Folder" and this, too, may have affected the number of potential participants receiving notice about the survey. The first batch of responses suffered the most from drop-out rates, in that 17 total drop-outs occurred during the entire study and 13 of them occurred that first week. To combat this, several nonprofits were contacted directly by the researcher and permission was granted to submit the survey to their staff. These numbers are counted in the total number of subjects. Any duplication of surveys taken by people receiving

two or more requests would have the newest submission removed and this would be verified by duplicated email addresses. However, this issue did not occur. This was the only time that the email addresses and answers were compared and no further examination using email addresses was conducted. The high "drop out" rate after the first message may have been due to the lack of incentives. Again, most of those that failed to complete the survey did so between the first email message (no incentives) and the second email message (one week later with incentives).

The incentives were divided up among the email addresses provided upon completion of the survey. Each email address was assigned a number. Then a free randomizer application was downloaded and used to decide the winners of the gift cards and the concert tickets. All winners were contacted via the provided email address to obtain full names and business locations in order to mail the prizes. An example of one the prizes is listed in Appendix D.

Free Computer Code Knowledge, Business Responsibilities, and Demographics

In terms of the subjects' Free Software business technology knowledge and acumen, 78% had previous experience using some type of free business application. A question involving confidence in using Free Software in a business setting resulted in an average of 3.17 (between "A Reasonable Amount" and "A Great Deal"). Finally, the question involving the individual's responsibility for selecting/purchasing business software for his computer and/or others resulted in the same level of response, 3.21 (between "A Reasonable Amount" and "A Great Deal"). Charts 1, 2, and 3 present these results.

Chart 1 – Free Software Participants' History

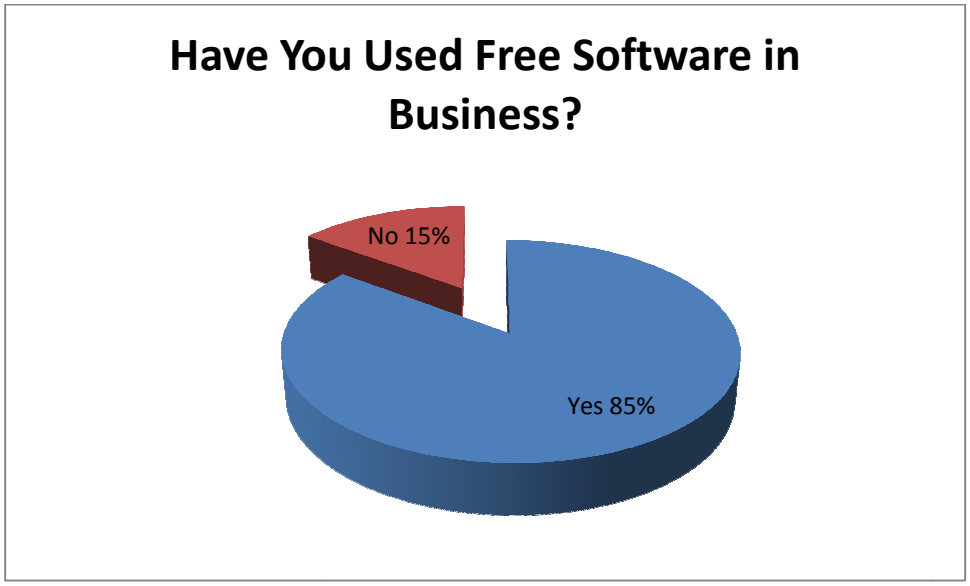


Chart 2 –Participants' Confidence in Free Applications

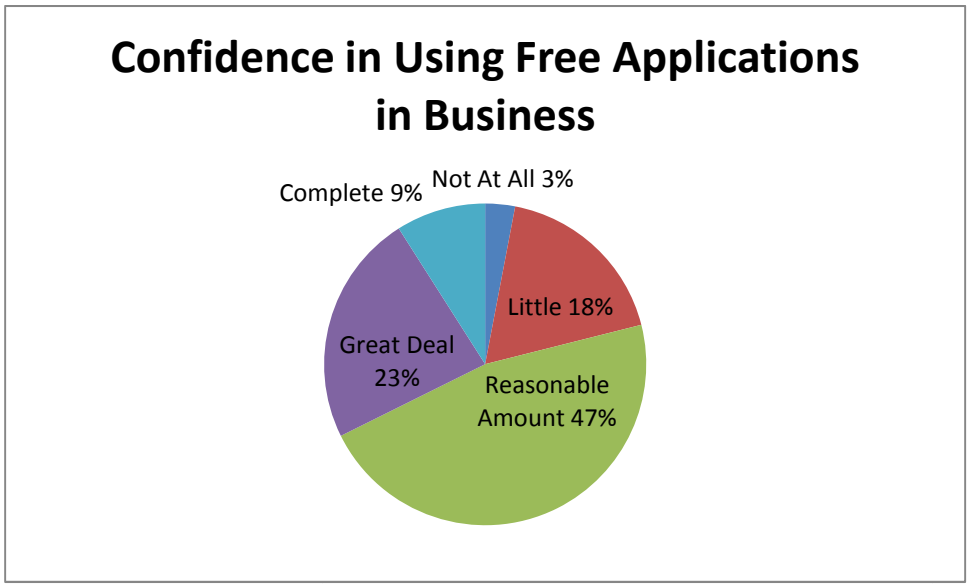


Chart 3 – Computer Application Selection Responsibility

This study received a majority of its feedback from females (75% of those that chose to answer the optional question about their sex; two abstained and were not calculated in the analysis). This was a very well-educated group of subjects, with 60% of those surveyed having indicated that they have at least a Graduate or Professional degree, while 32% had at least a Bachelor's degree. These response, coupled with the industry demographic question that indicated that of 25% of those respondents worked in the education industry and 16% were in professional and business services, supported the notion that this was a relatively a highly educated population. Seventy-four percent of the respondents were white or Caucasian, with 20% selecting black or African-American, and the remaining participants consisting of other races or declining to answer the question. Finally, the average age was just under 46 with a low of 21 and a high of 78.

Table 13 – Main Study – Demographics and Educational Attainment

Main Study	94 Usable Responses	
Female	69 (75%)	
Male	23 (25%)	2 unanswered
White or Caucasian	70 (74%)	
Black or African-American	19 (20%)	
All Other or Not Selected	5 (6%)	
Graduate or Professional Degree	56	
Bachelor's Degree	30	
Some College or Associates Degree	8	

Descriptives, Reliability, and Correlation

All of the measurements were recorded on a 1-to-5 scale, with 1 recording low ("Strongly Disagree") and 5 recording high ("Strongly Agree"). All beneficial items were written in a positive slant (ex: "In general, I feel that the Free Software developers understand…") and all negative effects were written in a negative slant (ex: "I worry about losing my data files…"). The questions were randomized though Qualtrics and Table 14 presents the descriptive results.

Table 14 – Main Study

Means, Standard Deviations, Correlations, and Cronbach's Alpha Scores of Study Variables

	#	Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11
DV's	1	Perceived Safety	3.38	.71	.86										
	2	Intention to Use	3.58	.70	.63**	.92									
Risks	3	Unauthorized Data Mining	3.38	.72	-.22*	-.23*	.83								
	4	Data Corruption	3.06	.78	-.51**	-.40**	.43**	.91							
	5	Computer Corruption	2.97	.74	-.52**	-.45**	.36**	.68**	.72						
Benefits	6	Attributes	3.32	.57	.48**	.39**	-.06	-.24*	-.32**	.74					
	7	Brand Reputation	3.19	.62	.68**	.59**	-.21*	-.37**	-.41**	.51**	.86				
	8	Reviews	3.26	.66	.34**	.45**	-.12	-.19	-.25*	.27**	.46**	.90			
	9	Support	2.99	.70	.51**	.46**	-.14	-.17	-.24*	.35**	.66**	.36**	.88		
Moder.	10	Expected Financial Utility	3.33	.61	.37**	.62**	-.06	-.11	-.17	.49**	.50**	.39**	.48**	.83	
	11	Perc. Adv. Impact on Prof. Rep.	2.67	.71	-.28**	-.49**	-.12	-.42**	-.42**	-.19	-.18	-.21*	-.15	-.42**	.84

Notes: N = 94. * p < .05, ** p < .01 (two-tailed tests). Cronbach's Alpha (Coefficient alpha reliabilities) are listed and underlined on the diagonal for scales.

Cronbach's Alpha was computed for all scales in the Main Study to test the consistency of the measures. Using the "good" internal consistency benchmark of .7 (or higher), all elements loaded greater than this threshold with TPR Computer Corruption the lowest at .72 and the highest being Intention to Use at .92.

A high correlation was found between all averages of the IV's and Perceived Safety. To test for discriminant validity – that the factors distinguish themselves from different sets of indicators and measure differently – the cut-off level of r = .85 and a significance level of p< .01 was used. No two items correlated at or above .85 and the

highest correlation reported was 0.82 between TPR Data Corruption 1 and 2. These findings support the Main Study's discriminant validity (Kline 1998, 2011).

Statistical power was again tested using the Post-hoc Statistical Power Calculator for Multiple Regression developed by Daniel S. Soper, Ph.D. That analysis was constructed adding a Type I error probability of .05, the number of predictor (or independent) variables at 12, workable sample size – 94 of 133 were usable nonprofit surveys – and the observed R^2 (.58, provided by the SPSS calculations and the PROCESS macro) to reach the observed statistical power of .99 (Soper 2013). This level is above the recommended .78 for a similar sample size listed in research material (Hair et al. 2010).

Confirmatory Factor Analysis

CFA was successful, with a KMO of .73, which is above the .6 threshold to report this type of analysis, and Bartlett's Test of Sphericity reported a significance level of $p \leq .01$ (Brace et al. 2009). Therefore, reporting the results of the CFA is acceptable.

The CFA for the Main Study benefited from the questions having been refined after the Pilot Studies and the increased sample size. As seen in Table 15, the appropriate items load on the corresponding factors. The Varimax rotation was used because it is the most-used method for focusing on simplifying the columns and is considered superior to others for its simplified method (Hair et al. 2010). The Varimax rotation resulted in items loading on the seven factors to explain 77.72% of the observed variance.

Table 15 – Main Study – Confirmatory Factor Analysis

	1	2	3	4	5	6	7
Attributes 1	-.10	.03	.26	-.11	**.78**	.05	-.12
Attributes 2	-.19	-.01	.13	-.04	**.76**	.05	-.09
Attributes 3	-.12	.30	-.10	.19	**.65**	.20	.11
Brand 1	-.28	.08	.30	-.05	.14	**.67**	-.11
Brand 2	-.05	.22	.37	-.19	.40	**.62**	-.23
Brand 3	-.10	.33	.39	.04	.39	**.48**	.05
Reviews 1	-.09	**.91**	.17	-.04	.01	.04	.01
Reviews 2	-.05	**.91**	.11	-.08	.15	-.03	.04
Reviews 3	-.10	**.74**	.14	-.01	.16	.42	-.20
Support 1	-.10	.02	**.89**	-.04	.09	-.01	-.13
Support 2	-.09	.25	**.82**	-.01	.15	.33	-.07
Support 3	-.01	.34	**.67**	-.09	.26	.35	.08
Unauthor. Min. 1	.22	-.13	-.11	**.77**	-.05	.26	.32
Unauthor. Min. 2	.23	.08	-.05	**.85**	.01	-.24	-.07
Unauthor. Min. 3	.07	-.09	.02	**.91**	.02	.06	.01
Data Corr. 1	**.73**	-.12	-.05	.32	-.16	-.25	-.07
Data Corr. 2	**.82**	.08	-.11	.19	-.09	-.25	-.03
Data Corr. 3	**.83**	-.09	.07	.16	-.02	-.19	.04
Comp. Corr. 1	.13	-.18	.01	-.09	-.14	.06	**.86**
Comp. Corr. 2	.01	.01	-.25	.09	-.18	.23	**.80**
Comp. Corr. 3	.03	-.03	-.01	.09	-.1	-.15	**.93**

Construct Validity and Additional Statistical Assumptions

This research assumed the data was drawn from a normally distributed population, if that population consisted of people with the authority to make decisions about the selection of business software in a nonprofit business in one of the small-to-medium populated states in the United States. Every question is based upon a well-founded conceptual model and was assessed for reliability and validity as note previously. Each framework tested resulted in strong R^2's and acceptable statistical power levels according to the participant's sample sizes, with the exception of the initial Pilot Study. Every problem with Cronbach's Alpha was addressed after each Pilot Study. Elements that began as rough questions became precise instruments. Lastly, factor analysis recorded the items loading where they were supposed to load, a comparison of convergent and discriminant validity (Kerlinger and Lee 1999).

Multiple Linear Regression

The Main Study's hypotheses were tested using multiple linear regression in SPSS. The first step of the regression dealt with the elements that made up TPR and TTB and their impacts on Perceived Safety. The second step of the regression dealt with the Perceived Safety's impact on the Intention to Use Free Software, as well as two variables that were tested for moderating the effects of this relationship.

The model interpreting the technological risks and benefits that impact the Perceived Safety of Free Software resulted an overall R-square = .58 or indicating that 57.8% of the observed variance was accounted by the model. It yielded an ANOVA score of $F(7, 87) = 16.95$ and $p \leq .01$, thus presenting a significant model for this particular study. Tables 14 and 15 provide ANOVA and Coefficient results.

Table 16 – Main Study – ANOVA

Model	Sum of Sq	df	Mean Sq	F	Sig
Regression	26.99	7	3.86	16.95	.01
Residual	19.80	87	.23		
Total	46.79	94			

There was a significant negative correlation between the DV of Perceived Safety and the TPR of Data Corruption ($F = -2.27$; $p = .03$). There was a significant positive correlation between PS and the TTB of Brand Reputation ($F = 3.36$; $p \leq .01$). Therefore, in the Main Study, Hypotheses H1b and H2b are supported.

Table 17 – Main Study –Coefficient Results from Multiple Linear Regression

	B	Std. Error	Beta	t	Sig.
(Constant)	1.92	.54		3.52	
Attributes	.17	.10	.14	1.66	.10
Brand Reputation	.42	.13	.37	3.36	.01
Reviews	.01	.08	.01	.13	.90
Support	.15	.09	.14	1.54	.13
Unauthorized Data Mining	.04	.08	.04	.46	.65
Data Corruption	-.21	.09	-.23	-2.27	.03
Computer Corruption	-.14	.09	-.15	-1.49	.14

Table 18 – Main Study - Manipulation of the Variables

Main Study		
	t	Sig.
Perceived Safety	5.27	.01
IV's		
Attributes	1.66	.10
Brand Reputation	3.36	.01
Reviews	.13	.90
Support	1.54	.13
Unauthorized Data Mining	.46	.65
Data Corruption	-2.27	.03
Computer Corruption	-1.49	.14
Moderators		
Expected Financial Utility	7.84	.01
Perc. Adv. Imp. On Prof. Rep.	-4.67	.01

df = 87

With the heart of this dissertation being the relationship between Perceived Safety and the Intention to Use free computer code, the relationship was found to be significant among working professionals $F = 61.42$, and $p \leq .01$. The PROCESS macro for SPSS by Andrew Hayes, Ph.D. was used to analyze the moderating the effects of Perceived Adverse Impact on Professional Reputation (PAIPR) and EFU on the relationship between Perceived Safety and Intention to Use (H4 and H5, respectively).

While using PROCESS to analyze EFUs moderation F (2, 92) = 60.73 produced a significant effect of $p \leq .01$. Also, using the same technique PAIPR's moderation effect resulted in F (2, 92) = 46.21, and $p \leq .01$, thus yielding a significant result.

Controling for Age, Education, Sex, and Race

With a majority of the Main Study participants being either female, Caucasians, or highly educated, control variables were put into place. Age, educational attainment level, sex, and race were controlled for and the results show that these four constructs provide very little variance ($R^2 = .05$). The results of this data analyzed used control variables are in Tables 18 and 19.

Table 19 – Main Study – Controlling for Age, Education, Sex, and Race

Model		B	Std. Error	Beta	t	Sig
1.00	(Constant)	3.88	.67		5.76	
	Age	-.01	.01	-.15	-1.35	.18
	Gender	-.27	.17	-.17	-1.54	.13
	Race	.07	.09	.08	.71	.48
2.00	(Constant)	2.63	.84		3.13	
	Age	-.01	.00	-.09	-1.12	.27
	Gender	-.09	.14	-.05	-.64	.53
	Race	-.01	.07	-.01	-.18	.86
	TTA_A_Avg	.18	.11	.15	1.58	.12
	TTA_B_Avg	.40	.15	.34	2.68	.01
	TTA_R_Avg	-.03	.10	-.03	-.29	.77
	TTA_S_Avg	.12	.11	.12	1.17	.25
	TPR_UDM_Avg	.04	.08	.04	.51	.61
	TPR_D_Avg	-.22	.10	-.24	-2.18	.03
	TPR_C_Avg	-.16	.10	-.16	-1.50	.14

Table 20 – Main Study – Controlling for Age, Education, Sex, and Race - Variance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.233a	.05	.02	.70
2	.747b	.56	.50	.50

Conclusion

The data collected from the Main Study's participants produced interesting results. One of the Technology Trusting Beliefs – Brand Reputation – reported significant results in the relationship with the Perceived Safety of Free Software. Also, only one Technology Perceived Risk – Data Corruption – was found to be significant in that same relationship.

The relationship between Perceived Safety and the Intention to Use free applications reached significant levels, as well as the concern over one's professional reputation being negatively impacted in this same relationship. The economic benefits derived from this relationship were also significant.

The subjects were not swayed by user reviews, availability of technical support, or the assortment of features involving Free Software in regards to Perceived Safety. Interestingly, those surveyed feel that the risks of a business computer "crashing", or information being gathered were not high enough to reach significance levels may mean these are not concerns that deter individuals from using free computer code. Table 20 provides a summary of the Main Study, and how it compares with the results of the Pilot Studies.

Table 21 – Summary of All Pilot Studies and Main Study

Dates	Size	Model, F, and Sig Levels	Hypotheses Met	Problems	Changes Prior to Next Study
07/2013	62	R2=.32; F=3.53; p ≤ .01	H1b, H1c, H2a, H2b, H2d, H3	Poor Cronbach's Alpha (CA), Power; Unable to use Factor Analysis	Rewritten and Shorter Q's
01/2014	115	R2=.37; F=9.04; p ≤ .01	H1a, H2a, H2c*, H2d*, H3, H4	3 items poor CA's; TPR_P loads with TPR_D	Tweaked Q's and new EFU and UDM Q's
02/2014	99	R2=.38; F=7.72; p ≤ .01	H2a, H2b, H2d, H3, H4, H5	1 construct with 1 element resulting in low CA	Tweak 1 Q
04/2014	94	R2=.58; F=16.95; p ≤ .01	H1a, H2b, H3, H4, H5	Survey length may need to be shortened	New Population or Software Tested
Power met in the last two Pilot Studies and in the Main Study					
* means one question that brought down the Cronbach's Alpha was removed and all tests were run again					

CHAPTER VI

CONCLUSIONS

No matter the available benefits, no software is immune from risks. Even giants of technology such as Apple (pay) and Facebook (free) have been hacked by individuals trying to obtain company secrets (Gross 2013). More recent evidence of risks include the Heartbleed security vulnerability, one of the most pervasive security issues ever to threaten Internet applications, which has been exploited to mine security passwords and credit card numbers for over two years, until its recent detection. Both free applications, such as Yahoo! Mail and YouTube, and pay software, such as GoDaddy and Netflix, were impacted by this vulnerability (Mashable 2014).

This dissertation focused on the Perceived Safety of Free Software. Through this research, a framework was created that incorporated both well-established research constructs as well as new constructs to help better understand the relationship between the Perceived Safety of Free Software and the Intention to Use that software in a business setting. Each of the constructs was tested using two populations. The measurement instruments were reviewed after each survey and were adapted according to the results. Certain items were replaced to improve the efficacy of the model.

Results

While the Pilot Studies allowed for instrument strengthening and refinement, they also produced interesting results. Excluding the first study, which failed to meet many statistical and validity tests, the other two Pilot Studies brought out strong

opinions involving the Perceived Safety of Free Software used in business. However, most of the participants were full-time students and their business acumen may still be developing. The second Pilot Study found that three-of-the-four Technology Trusting Beliefs had significant relationships with the outcome, excluding Brand Reputation. Revised and improved Brand Reputation items for the third Pilot Study were deemed satisfactory. However, Reviews were not found to be significant in the third Pilot Study.

In the Main Study, Brand Reputation was significant. Therefore, depending on the sample completing the instrument, some of those who took the survey instrument felt that brand was more important than software features or technical support.

In both Pilot Study 2 and the Main Study, one Technology Perceived Risk rejected the null hypothesis: Data Corruption risks inversely impact the Perceived Safety of Free Software. What this means is that the participants, despite their differences in ages, were not concerned about personal information being gathered about them or the free computer code "crashing" their computers to such an extent that they would not use free applications.

In all three Pilot Studies, as well as in the Main Study, the relationship between Perceived Safety and the Intention to Use the free computer code was found to be significant. Though Perceived Adverse Impact on Professional Reputation was slightly modified from Pilot Study 1 to Pilot Study 2, its results from Pilot Studies 2 and 3, as well as the Main Study, found a negative impact on the Perceived Safety/Intention to Use relationship. While Expected Financial Utility was problematic and went through extensive refinement in the first two Pilot Studies, by the third Pilot Study and in the Main Study, it was found to a positive moderator in the relationship between Perceived Safety and the Intention to Use free applications in business.

Contributions and Implications

For Academics

This model was created out of some of the most well-established and researched frameworks of the last thirty years, the most turbulent, disruptive, and insightful time period so far in information systems and information technology history (Baskerville and Myers 2002). The Technology Acceptance Model has been cited and replicated in over ten thousand publications, while the Delone and McLean Information System Success Model has similar acceptance. Furthermore, it appears that the Nicolaou and McKnight Interorganizational Systems Relationships Model, which focuses on both risks and benefits, will continue to gain greater popularity for many years to come.

The theories that back this model and its constructs come from extensive literature and strong research settings. The Theory of Planned Behavior, the theory supporting this dissertation's Perceived Safety construct, has over 25,000 citations on just its 1991 initial publication. Ultimately, these constructs lay the groundwork for exciting new horizons in information technology: Free Software, mobile software, cloud computing, and more.

The instrument developed in this dissertation can be useful for perceptual analysis regarding software utility in different populations, businesses, settings, and timeframes. Just as this dissertation was built upon years of powerful research, so could this dissertation and its model provide emphasis for a stream of research to come.

For Practitioners

With nonprofits needing every investment in their organization to go towards their cause, this beneficial research is warranted since every dollar invested in this state's research returns at least four times its value (CNBC 2014). No previous survey or

model analyzed Free Software beyond security checklists or features checklists (Consumer Reports 2011, 2013; PC World). With the conflicts existing between open-source computer code and "security through obscurity" proprietary code, the realm of safety has not been thoroughly explored. From interviews with those associated with the Main Study's sponsoring organization, the awareness of available software products, as well as a general concern that could be interpreted as fear, may arise from a lack of computer self-efficacy or even awareness of this type of software. Free Software is not going away anytime soon; it is only improving and causing pay software vendors to bring forth their best efforts. The instrument itself can be a "checklist" that will allow various individuals, businesses, and organizations of many sizes to consider whether or not they would benefit from using free applications in business.

Limitations

The investigation of Perceived Safety relatively new endeavor in the field of IS/IT. This dissertation focused exclusively on one particular area of technology: Free Software. Two sets of participants were recruited: (1) undergraduate students and (2) IT purchasing managers in nonprofit organizations. Predicting the Intention to Use these applications in a small-to-medium populated state in the United States may not generalize to the entire country, let alone to other countries. However, this does not exclude it from generalizable traits. States that are within a range of one million population of the tested sample account for 22% of the 50 states. Also, in terms of industries analyzed, the 2010 Census format was used, with industries being divided into ten sections (including "other") and only one industry was added, upon recommendation of the Executive Director of the Main Study's sponsoring organization.

Even with eleven industries listed, the second most selected industry of current/past employment was "other" with 23% of those answering in that category.

Next, to improve the prediction of Perceived Safety and its relationship with the Intention to Use free computer code, additional variables and situational elements could generate various outcomes. Neither actual usage nor a longitudinal study were incorporated into this study. Omitting actual usage is not a problem because empirical support for the linkage between intention and behavior already exists in the IS/IT literature (Wang et al. 2006). This study focused on a single point in time. With perceptions changing from experience and exposure to a method, a longitudinal study could possibly increase subsequent opinions of Free Software. Therefore, the benefit of a longitudinal study and observation of actual usage over a period of time presents an opportunity for future research.

The instrument tested using variety of constructs and did not utilize any single construct to an extent that would be considered extensive. The design of the instrument's parsimonious length helped prevent burnout or lack of willingness by those answering the survey, due to its brevity. Simplified measures were a good fit for the attention spans of participants, while using three measures for each item this study includes a multiple-item measurement without overwhelming the participants.

Some researchers view using students in academic research lazy and even call a convenience sample a "sloppy sample" due to recruitment from one area (Sudman and Blair 1999). Real business experience rejuvenates academic research, but both samples included business educated individuals. While the use of student participants may run the risk of compromising external validity in non-professional settings, students can still serve as good proxies. Just as a single test fails to justify implementing an entire

method through generality, using students as a starting point and illustration in initial research helps refine an instrument (Elliott et al. 2007; Markus 1983). Additionally, the effects in just a single student group in a laboratory setting can sometimes yield generalizable findings on par with real-world data in a single case study, depending upon the nature of the research question (Lynch 1999). Certainly some risk occurs from Social Desirability Response Bias, but that is minimized by using anonymous responses.

Finally, is there a problem with too much or too little education? Does the wide ranges of ages play a factor in the results? Of those surveyed, all participants in the Pilot Studies were pursuing a bachelor's degrees, while 60% of those surveyed the Main Study had at least a graduate/professional degree or higher. The average age of those in the Pilot Studies was twenty-one, while the average age of those in the nonprofit study was just under forty-six. These are listed as limitations, but are also pointed toward interesting opportunities for future research.

Future Research

The focus of this research has been to develop a model that evaluates the Perceived Safety of Free Software in business usage. While the application of this model focused on assisting nonprofits in a single small-to-medium populated state, it could just as easily be used for other nonprofits in other states or nationwide. An analysis in different settings, such as whether someone who works for a "for profit" business would avoid this software, where the recorded nonprofits have reported less concern for these risks, would also be beneficial. Further, the model could assist for-profit enterprises, startups, even multi-million or multi-billion dollar businesses. Research involving Fortune 1000 companies show an active use of a mix-and-match strategy, using both commercial and Free Software for different tasks (Spinellis and Giannikas 2012). With

this technique benefiting the most profitable businesses, its use and analysis in other organizations would be a possibility for future research.

Additional constructs and measurements could be added into this model that could present interesting results, especially since one of the original constructs was removed. Technology Perceived Risk had a construct entitled Privacy Risk. It was tested in two of the Pilot Studies, until one of the elements about the usage of private information loaded by itself. This lead to the creation of Unauthorized Data Mining. Privacy Risk was defined in this dissertation as the fear that a forceful sharing of the user's private information may occur from using free computer code. The invasion of privacy ranks as the number one greatest fear for many computer users, especially since unsophisticated queries could discover some personal and professional information (Denning and Denning 1979; Mason 1986; Straub and Collins 1990). Privacy Risk is supported by the Theory of Reasoned Action and the Theory of Planned Behavior (Fishbein and Ajzen1972; Ajezn 1991). An example of a new construct to use in future research is time or time needed to complete a task. Previous research shows that the faster the method to complete a task, the more greater that method's acceptance (Pepper, Aiken and Garner, 2011).

Its pursuit in Free Software analysis is merited because some individuals prefer a level of control over information and are not willing to part with it in exchange for certain benefits, while others feel it is not a concern when certain benefits occur (Laroche, McDougall, and Bergeron 2005).

This model could even be adapted to make predictions about the use of different types of software. While the model has a focus on Free Software, nothing prevents the model from being tested in the realm of pay, proprietary, or commercial software. Even

in the market for software that combats online threats, which recently reached the $8 billion level, Microsoft is providing free anti-virus software in order to prevent damages from malware to its proprietary operating systems (Robertson 2013; Wildstrom 2009). No company is immune from software risks. Even the security firms are not immune from software collapses and hacker attacks. RSA, a security firm that provides 90% of the Fortune 500 firms with security, was successfully attacked (Blum 2011). With a comparison of the End User License Agreements between pay and Free Software offering the same remuneration (or lack thereof), and users changing their opinions in favor of Free Software when previously choosing pay software, it would be interesting to see users' opinions with a benefits and risk assessment of pay software (Pepper 2014 unpublished working paper). Additionally, a level of perceived materiality or the importance placed on particular software uses may benefit future research.

"We are now getting questions that we didn't before about the safety of hosting applications in the cloud," stated David Bodnick, president of WebIntensive Software, whose clients include LexisNexis, Columbia University, and The United Nations (Ricadela 2011, p. 56). With over 67% of surveyed IT executives feelings that the risks of cloud computing outweigh the benefits and 47% expressing concern over potential security threats (Ricadela 2011), the new realm of research in cloud computing could benefit from a benefits and risk assessment of cloud computing model as well.

To the same extension as this framework, handheld devices are now functioning as mobile business stations. A benefits and risk assessment of mobile software would be another step forward in research. With 88% of Americans avoiding ever using mobile payments and 30% of mobile devices being password protected, there appears to be a greater concern with safety over security (Kharif 2012). Further, with cloud computing

allowing for not just data but also application programs to be run away from an internal hard drive of the operating device, in five years or less the fear of Computer Corruption risk may decrease because of an increasing safety of the data.

BIBLIOGRAPHY

Abdul-Rahman, A., Hailes, S. 2000. Supporting trust in virtual communities. *Proc. Hawaii Internat. Conference on System Sci.* 1-10.

Adrion, W., Branstad, M., Cherniavsky, J. 1982. Validation, verification, and testing of computer software. *ACM Computing Surveys* **142** 159-192.

Ajzen, I. 1991. The theory of planned behavior. *Org. Behavior and Human Decision Processes*. **50** 179-211.

Alreck, P., Settle, R. 2003. *The Survey Research Handbook*. McGraw-Hill/Irwin, New York.

AlMarzouq, M., Zheng, L., Rong, G., Grover, V. 2005. Open source: concepts, benefits, and challenges. *Comm. AIS* **16** 756-784.

AlMarzouq, M. 2008. Spotlight on open source security. *Comp. Weekly* April 18-20.

Al-Natour, S., Benbasat, I. 2009. The adoption and use of IT artifacts: A new interaction-centric model for the study of user-artifact relationships *J. AIS* **109** 661-685.

Ammeter, T. 2005. To pay or not to pay article *Business First* **21** 20-23.

Anastasi, A. 1988., *Psychological Testing*. Macmillan, New York, NY.

Andries, P., Debackere, K. 2007. Adaptation and performance in new businesses: understanding the moderating effects of independence and industry. *Small Business Econ.* **29** 81-99.

Armstrong, J 1967. Derivation of theory by means of factor analysis or Tom Swift and his electric factor analysis machine. *Amer. Statistician* **21** 17-21.

Arnott, D. 2007. Research on trust: a bibliography and brief bibliometric analysis of the special issue submissions. *European J. Marketing* **419** 1203-1240.

Ary, D., Jacobs, L., Razavieh, A. 1990. *Introduction to research in education*. Rhinehart and Winston, Orlando.

Asfahl, R. 1984. *Industrial safety and health management*. Prentice-Hall, Englewood Gliffs, NJ.

Assael, H., Keon, J. 1982. Nonsampling vs. sampling errors in survey research. *J. Marketing*, **46** 114-123.

Bagozzi, R. 1984. A prospectus for theory construction in marketing. *J. Marketing* **48** 11-29.

Bagozzi, R. 1983. Issues in the application of covariance structure analysis: A further comment. *J. Consumer Res.* **9** 449-450.

Bagozzi, R., Youjae, Y., Phillips, L. 1991. Assessing construct validity in organizational research. *Admin. Sci. Quart.* **363** 421-458.

Bailey, S., Ouellet, L., Mackesy-Amiti, M., Golub, E., Hagan, H., Hudson, S., Latka, M., Gao, W., Garfein, R. 2007. Perceived risk, peer influences, and injection partner type predict receptive syringe sharing among young adult injection drug users in five U.S. cities. *Drug and Alcohol Dependence* **91** 18–29.

Baltzan, P. 2011. *Business Driven Information Systems*. McGraw-Hill, New York.

Bandura, A. 1986. *Social Foundations of Thought and Action.* Prentice Hall, Englewood Cliffs, NJ.

Barling, J., Loughlin, C., Kelloway, E. 2002. Development and test of a model linking safety-specific transformational leadership and occupational safety. *J. Applied Psy.* **873** 488–496.

Baskerville, R., Myers, M. 2002. Information systems as a reference discipline. *Management Inform. Systems Quart.* **26** 1-14.

Bauer, R. 1960. Consumer behavior as risk taking. *Proc. the 43rd National Conference the Amer. Marketing Association* 389–398.

Beckwith, N., Lehmann, D. 1975. The importance of halo effects in multi-attribute attitude models. *J. Marketing Res.* **12** 265-275.

Beldad,A., Jong, M., Steehouder, M. 2011. A comprehensive theoretical framework for personal information–related behaviors on the Internet. *Inform. Soc.* **27** 220–232.

Belanger, B., Hiller, S., Smith, W. 2002. Trustworthiness in electronic commerce: The role of privacy, security, and site attributes. *J. Strategic Inform. Systems* **113–4** 245–70.

Berendt, B., Gunther, O., Spiekermann, S. 2005. Privacy in ecommerce: Stated preferences vs. actual behavior. *Comm. ACM*, **484** 101–106.

Bhattacherjee, A. 2002. Individual trust in online firms: Scale development and initial test. *J. Management Inform. Systems* **9**(1) 211-241.

Bickart, B. 1993. Carryover and backfire effects in marketing research. *J. Marketing Res.* **301** 52-63.

Bigley, G., Pearce, J. 1998. Straining for shared meaning in organization science: Problems of trust and distrust. *Acad. Management Review* **233** 405-421.

Blum J. 2011. Hack job. *Entrepreneur* October 2011 59-62.

Boehm, B. 2000. Safe and simple software cost analysis. *IEEE Software* **175** 14-17.

Boulding, K. 1956. General systems theory -The skeleton of science. *Management Sci.* 197-208.

Boulanger, A. 2005. Open-source versus proprietary software: Is one more reliable and secure than the other? *IBM Systems J.* **44**(2) 239-248.

Boudreau, M., Gefen, D, Straub, D. 2001. Validation in information systems research: A state-of-the-art assessment. *Management Inform. Systems Quart.* **25** 1-16.

Brooks, J. 2004. Office 2003 vs. OpenOffice.org., Accessed November 5, 2012, http://www.eweek.com/print_article2/0,1217,a=124918,00.asp.

Browning, J. 1996. Making Free Software pay. *Scientific Amer.* **274**(1) 35.

Business Source Complete. 2012. Accessed June 19, 2012 http://www.ebscohost.com/academic/business-source-complete.

Casalo , L., Cisneros, J., Flavián, C., Guinalíu, M. 2009. Determinants of success in open source software networks. *Industrial Management & Data Systems* **1094** 532 – 549.

Casalo´, L., Flavian, C., Guinaliu, M. 2008. Fundaments of trust management in the development of virtual communities. *Management Res. News* **315** 324-338.

Casalo, L.V., Flavian, C., Guinaliu, M. 2007. The impact of participation in virtual brand communities on consumer trust and loyalty. *Online Inform. Review* **31** 775–792.

CENATIC. 2009.: Study on the situation of Open Source Software in Universities and R+D Centers. *Report* 10-12.

Census. 2010. Accessed March 20, 2014 http://quickfacts.census.gov/qfd/states/28/2801260.html.

Chen, Z. 2012. Database keyword search: Beyond its current landscape. *Internat. J. Inform. Tech. & Decision Making* **112** 491-500.

Cheng, H., Liu, Y., Tang, Q. 2011. The impact of network externalities on the competition between open source and proprietary software. *J. Management Inform. Systems* **27**(4) 201-230.

Chellappa, R., Pavlou, P. 2002. Perceived information security, financial liability and consumer trust in e-commerce transactions. *Logistics Inform. Management* **15** 358–368.

Chiang, D., Lin, C., Chen, M. 2011. The adaptive approach for storage assignment by mining data of warehouse management system for distribution centres. *Enterprise Inform. Systems* **52** 219–234.

Chin, W. 1998. The partial least squares approach to structural equation modeling. *Modern Methods for Business Research*. Erlbaum, Mahwah, NJ.

Chou, C., Sinha, A., Zhao, H. 2010. A hybrid attribute selection approach for text classification. *J. AIS* **119** 491-518.

Choudhry, R., Fang, D., Lingard, H. 2009. Measuring safety climate of a construction company. *J. Construction Engineering & Management* **1359** 890-899.

Churchill, G. 1979. A paradigm for developing better measures of marketing constructs. *J. Marketing Res.* **16** 64-73.

Clarke, S. 2010. An integrative model of safety climate: Linking psychological climate and work attitudes to individual safety outcomes using meta-analysis. *J. Occupational and Org. Psy.* **83** 553–578.

Cliff, N. 1983. Some cautions concerning the application of causal modeling methods. *Multivariate Behavioral Res.* **18** 115-126.

CNBC. 2014. The 10 poorest states in America, Accessed March 27, 2014, http://www.cnbc.com/id/101068491/page/11.

Compeau, D., Higgins, C. 1995. Computer self-efficacy: development of a measure and initial measure. *MIS Quart.* **192** 189-211.

Consumer Reports. 2011. Security software. *Consumer Reports* June 32-33.

Consumer Reports. 2013. Security software. Accessed April 24, 2013, http://consumerreports.org/cro/electronics-computers/computers-internet/security-software/security-software-ratings/ratings-overview.htm.

Conchar, M. Zinkhan, P., Peters, C., Olavarrieta, S. 2004. An integrated framework for the conceptualization of consumers' perceived-risk processing. *J. Acad. Marketing Sci.* **324** 418–436.

Cronbach, L., Lee, J., Furby, L. 1970. How we should measure "change," or should we? *Psychological Bulletin* **741** 68-80.

Culnan, M., Bies, R. 2003. Consumer privacy: Balancing economic and justice considerations. *J. Social Issues* **592** 323–342.

Davenport, T., Markus, M. 1999. Rigor vs. relevance revisited: Response to Benbasat and Zmud. *MIS Quart.* **231** 19-23.

David, R., Han, S. 2004. A systematic assessment of the empirical support for transaction cost economics. *Strategic Management J.* **251** 39–58.

Davis, F. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quart.* **133** 319–340.

Delone, W., McLean, E., 2003. The Delone and McLean model of information systems success: A ten-year update. *J. Management Inform. Systems* **194** 9-30.

DeLone, W., McLean, E. 1992. Information systems success: The quest for the dependent variable. *Inform. Systems Res.* **31** 60-95.

De Mulder, R., Kleve, P. 2006. Privatization of public safety: a rational approach. *Internat. Review Law, Comp.s, & Tech.* **201**(2) 167-175.

Denning, D., Denning, P., 1979. Data security. *Computing Surveys* **113** 227-249.

Deutsch, M. 1960. The effect of motivational orientation upon trust and suspicion. *Human Relations* **13** 123–139.

Deutskens, E., Ruyter, K., Wetzels, M., Oosterveld, P. 2004. Response rate and response quality of Internet-based surveys: An experimental study. *Marketing Letters* **151** 21-36.

Devaraj, S., Fan, M., Kohli, R. 2002. Antecedents of b2c channel satisfaction and preference: validating e-commerce metrics. *Inform. Systems Res.* **132** 316–333.

Dewar, R. 2007. Safety and security. *Dr. Dobb's J.: The World Software Development* **32**(6) 10.

Dickinger, A., Kleijnen, M. 2008. Coupons going wireless: Determinants of consumer intentions to redeem mobile coupons. *J. Interactive Marketing* **223** 23-39.

Dillon, W., White, J., Rao, V., Filak, D. 1997. Good Science. *Marketing Res.* **94** 22-31.

Dodds, W., Monroe, K., Grewal, D. 1991. Effects of price, brand, and store information on buyers' product evaluations. *J. Marketing Res.* **23** 307–319.

Doorley, J., Helio, F. 2010. *Reputation management: The key to successful public relations and corporate communication.* Routledge, New York.

Doty, H, Glick, W. 1998. Common method bias: Does common methods variance really bias results? *Org. Res. Methods* **14** 374-406.

Dovey, S., Meyers, D., Phillips, R., Green, L., Fryer, G., Galliher, J., Kappus, J., Grob, P. 2002. A preliminary taxonomy of medical errors in family practice. *Qualitative Safety HealthCare* **11** 233-239.

Dowling, G., Staelin, R. 1994. A model of perceived risk and intended risk-handling activity. *J. Consumer Res.* **21** 119-134

Ein-Dor, P., Segev, E. 1978. Strategic planning for management information systems. *Management Sci.* **2415** 1631-1641.

Elliott, W., Hodge, F., Kennedy, J., Pronk, M. 2007. Are M.B.A. students a good proxy for nonprofessional investors? *Accounting Review* **821** 139-168.

Elsbach, K., Sutton, R. 1992. Acquiring organizational legitimacy through illegitimate actions: a marriage of institutional and impression management theories. *Acad. Management J.* **35**(4) 699-738.

Featherman, M., Pavlou, P. 2003. Predicting e-services adoption: A perceived risk facets perspective. *Internat. J. Human-Comp. Studies* **594** 451–474.

Featherman, M., Valacich, J., Wells, J. 2006. Is that authentic or artificial? Understanding consumer perceptions of risk in e-service encounters. *Inform. Systems J.* **162** 107–134.

Feldman, J., Lynch, J. 1988. Self-generated validity and other effects of measurement on belief, attitude, intention, and behavior. *J. Applied Psy.* **733** 421-435.

Fichman, R.2000. The diffusion and assimilation of information technology innovations. In: Zmud, R. Ed.., *Framing the Domains of It Management: Projecting the Future Through the Past* Pinnaflex Educational Resources, Cincinnati.

Finmetrica 2013. FinaMetrica Risk Tolerance Questionnaire Accessed March 10, 2013, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&ved=0CE4QFjAB&url=http%3A%2F%2Fwww.lgcdwealth.com%2FFinaMetrica.pdf&ei=DqhZUd_GJ5HS9ATBn4DgBA&usg=AFQjCNGH2onhTWRg1yQplcJYlcToXQFm1A&sig2=PmjZCMnaK2q6n9h6jnt6wQ&bvm=bv.44442042,d.eWU.

Finucane, M., Slovic, P., Mertz, C., Flynn, J., Satterfield, T. 2000. Gender, race and perceived risk: The "white male" effect. *Health, Risk & Soc.* **22** 159-172.

Fishbein, M., Ajzen, I. 1972. Attitudes and opinions. *Annual Review Psy.* **23** 487-544.

Fisher, R. 1993. Social desirability bias and the validity of indirect questioning. *J. Consumer Res.* **20** 303-315.

Fitzgerald, B. 2006. The transformation of open source software. *MIS Quart.* **30**(3) 587-598.

Flavian, C., Guinaliu, M. 2006. Consumer trust, perceived security and privacy policy: Three basic elements of loyalty to a web site. *Industrial Management Data Systems* **106** 601–620.

Fonbrun, C., Gardberg, N., Sever, J., 2000. The Reputation Quotient: A multi-stakeholder measure of corporate reputation. *J. Brand Management* **75** 241-255.

Fonchamnyo, D. 2013. Customers' perception of e-banking adoption in Cameroon: An empirical assessment of an extended TAM. *Internat. J. Econ. and Finance* **51** 166-176.

Fornell, C. 1983. Issues in the application of covariance structure analysis: A comment. *J. Consumer Res.* **9** 443-448.

Fornell, C., Larcker, D. 1981. Evaluating structural equation models with unobservable variables and measurement error: Algebra and statistics. *J. Marketing Res.* **18** 39-40.

Fraedrich, J., Ferrell, O. 1992. The impact of perceived risk and moral philosophy type on ethical decision making in business organizations. *J. Business Res.* **244** 283–295.

Frink, D., Ferris, G. 1998. Accountability, impression management, and goal setting in the performance evaluation process. *Human Relations* **51(**10) 1259-1283.

Gallaugher, J., Wang, Y. 1999. Network effects and the impact of free goods: An analysis of the Web server market. *Internat. J. Electronic Commerce* **34** 67–88.

Garner, B. 2011. *Dictionary of Modern Legal Usage*. Oxford University Press, Oxford.

Garver, M., Mentzer, J. 1999. Logistics research methods: Employing structural equation modeling to test for construct validity. *J. Business Logistics* **201** 33-57.

Gefen, D., Karahanna, E., Straub, D. 2003. Trust and TAM in online shopping: An integrated model. *MIS Quart.* **27** 51-90.

Gefen, D., Rose, G., Warkentin, M., Pavlou, P. 2005. Cultural diversity and trust in IT adoption: a comparison of potential e-voter in the USA and South Africa. *J. Global Inform. Management* **131** 54–78.

Gefen, D., Straub, D. 1997. Gender differences in the perception and use of e-mail: An extension to the Technology Acceptance Model. *MIS Quart.* **214** 389-400.

Gentry, L. Calatone, R. 2002. A comparison of three models to explain Shop-Bot use on the web. *Psy. & Marketing* **1911** 945-956.

Gerbing, D., Anderson, J. 1988. An updated paradigm for scale development incorporating unidimensionality and its assessment. *J. Marketing Res.* **25** 186-192.

Geuss, M. 2011. Best free software. *PC World* October 69-76.

Gibbs, W. 1994. Trends in computing: Software's chronic crisis. *Scientific Amer.* 86-95.

Gibson, D., Gonzales, J., Castanon, J. 2006. The importance of reputation and the role of public relations. *Public Relations Quart.* **513** 15-18.

Gollmann, D. 1999. *Comp. Security*. John Wiley and Sons, New York.

Goth, G. 2005. Open source business models: Ready for prime time. *IEEE Comp. Soc.* **226** 98-100.

Grable, John, E., Lytton, R. 2003. The development of a risk assessment instrument: A follow-up study. *Financial Services Review* **12** 257–274.

Grantham, T. 1999. An open source of business opportunities. *Comp. Dealer News* February.

Greene, T. 2006. Businesses should pay more attention to software security. *Network World* **20** 12.

Gross, D. 2013. Report: Eastern European gang hacked Apple, Facebook, Twitter. Accessed August 15, 2013, http://www.cnn.com/2013/02/20/tech/web/hacked-apple-facebook-twitter/.

Guillemette, M., Finke, M., Gilliam, J. 2012. Risk tolerance questions to best determine client portfolio allocation preferences. *J. Financial Planning* **255** 36-44.

Gupta, N., Beehr, T. 1982. A test of the correspondence between self-reports and alternative data sources about work organizations. *J. Vocational Behavior* **22** 1-13.

Gwebu, K., Wang, J. 2010. Seeing eye to eye? An exploratory study of free open source software users' perceptions. *The J. Systems and Software* **83** 2287-2296.

Habra, N., Alexandre, S., Desharnais, J., Laporte, C., Renault, A. 2008. Initiating software process improvement in very small enterprises: experience with a light assessment tool. *Inform. and Software Tech.* **50** 763-771.

Hair, J., Anderson, R., Tatham R., Black, W. 2010. *Multivariate Data Analysis*. Prentice Hall, New York.

Hassan H., Abdel-Aty, M., Choi, K., Algadhi, S. 2012. Driver behavior and preferences for changeable message signs and variable speed limits in reduced visibility conditions. *J. Intelligent Transportation Systems* **163** 132-146.

Hayes, A. 2013. SPSS, SAS, and Mplus macros and code. Accessed on August 15, 2013, http://afhayes.com/spss-sas-and-mplus-macros-and-code.html.

Hechinger, J. 2014. The shootout over Harvard's web sheriff. *Bloomberg Businessweek* March 17-23, 2014 32-33.

Henderson, S., Snyder, C. 1999. Personal information privacy: Implications for MIS managers. *Inform. and Management* **364** 213–220.

Herbig, P., Milewicz, J., Golden, J. 1994. A model of reputation building and destruction *J. Business Res.* **311** 23–31.

Heredero, C., Berzosa, D., Santos, R. 2010. The implementation of free software in firms: An empirical analysis. *Internat. J. Digital Accounting Res.* **10** 113-130.

Heerwegh, D., Vanhove, T., Matthijs, K., Loosveldt, G., 2005. The effect of personalization on response rates and data quality in web surveys. *Internat. J. Social Res. Methodology* **8** 85-99.

Hong, K., Chi, Y., Chao, L., Tang, J. 2003. An integrated system theory of information security management. *Inform. Management and Comp. Security* **115** 243-248.

Hovland, C., Janis, I., Kelley, H. 1953. *Communication and Persuasion*. Yale University Press, Haven.

Hsu, J., Shiue, C. 2008. Consumers' willingness to pay for non-pirated Software. *J. Business Ethics* **81** 715–732.

Hsu, M., Chang, C., Yenc, C. 2011. Exploring the antecedents of trust in virtual communities. *Behaviour & Inform. Tech.* **305** 587–601.

Huang,Y., Santosh, K., Chang, W., Courtney, T., Lombardi, D., Brennan, M., Perry, M. 2012. Management commitment to safety vs. employee perceived safety training and association with future injury. *Accident Analysis and Prevention* **47** 94– 101.

Inquisitr, The 2013. Dell labtop sales slow, company profits continue to dip. Accessed March 13, 2013, www.inquisitr.com/532997/dell-laptop-sales-slow-company-profit.com.

IRB 2013. Institutional review board. Accessed on May 3, 2013 http://www.research.olemiss.edu/irb.

Ives, B., Olson, M. 1984. User involvement and MIS success: a review of research. *Management Sci.* **305** 586-603.

Jacoby, J. Kaplan, L. 1972. The components of perceived risk. *The Association for Consumer Res.* 382-393.

Janssens, M., Brett, J., Smith, F. 1995. Confirmatory cross-cultural research: Testing the viability of a corporation-wide safety policy. *Acad. Management J.* **382** 364-382.

Jespon, K. 2009. Keep an open mind about closed software. *Credit Union J.* October 26.

Jiang, Z., Sarkar, S. 2010. Speed matters: The role of free Software offer in software diffusion. *J. MIS* **263** 207–239.

Jugdev, K. 2004. Through the looking glass: examining theory development in project management with the resource based view lens. *Project Management J.* **35**(3) 15-26.

Kahmeman, D., Tversky, A. 1979. Prospect theory: An analysis of decision under risk. *Econometrica* **47** 263-291.

Kang, I., Lee, K., Kim, S., Lee, J. 2011. The effect of trust transference in multi-banking channels: Offline, online and mobile. *Internat. J. Mobile Comm.* **92** 103-123.

Kaplan, A. 1964. *The Conduct of Inquiry*. Chandler Publishing Company, Scranton.

Kautz, K. 1999. Making sense of measurement for small organizations. *IEEE Software* **162** 14-20.

Kekre, S., Krishnan, M., Srinivasan, K. 1995. Drivers of customer satisfaction for software products: Implications for design and service support. *Management Sci.* **419** 1456-1470.

Keil, M., Tan, B., Wei, K., Saarinen, T., Tuunainen, V., Wassenaar, A. 2000. A cross-cultural study on escalation of commitment behavior in software projects. *MIS Quart.* **242** 299-325.

Keil, M., Lei, L., Mathiassen, L., Zheng, G. 2008. The influence of checklists and roles on software practitioner risk perception and decision-making. *The J. Systems and Software* **81** 909-919.

Kerlinger, F., Lee, H. 1999. *Foundations of Behavioral Research*. Wadsworth Publishing, New York.

Kharif, O. 2012. A new frontier for criminals. *Bloomberg Businessweek* October 8 – 14 62.

Kilmann, R.1979. On integrating knowledge utilization with knowledge development: The philosophy behind the MAPS design technology. *Acad. Management Review* **4** 417-426.

Kim, D., Ferrin, D., Rao, H. 2008. A trust-based consumer decision-making model in electronic commerce: The role of trust, perceived risk, and their antecedents. *Decision Support Systems* **44** 544-564.

King, J., Gurbaxani, V., Kraemer, K., McFarlan, F., Raman, K., Yap, C. 1994. Institutional factors in information technology innovation. *Inform. Systems Res.* **5** 139–169.

Kline, R. 1998. *Principles and practice of structural equation modeling*. Guilford, New York.

Koufaris, M., Hampton-Sosa, W. 2004. The development of initial trust in an online company by new customer. *Inform. and Management* **413** 377–397.

Kulka, R. A. 1982. Idiosyncrasy and circumstance: Choices and constraints in the research process. *Judgment Calls Res.* 41-68

Larkin, E. 2009. Can you trust free anti-virus protection? *PC World* October 80-97.

Larson, J. 2003. *Strategic Reputation Risk Management*. Palmgrave MacMillan, New York.

Laroche, Y., Z, McDougall, G., Bergeron, J. 2005. Internet versus bricks-and-mortar retailers: An investigation into intangibility and its consequences. *J. Retailing* **814** 251–267.

Laudon, K., Laudon, J. 2009. *MIS*. Prentice Hall, New York.

Lauer, T. 1996. Software project managers' risk preferences. *J. Inform. Tech.* **11** 287-295.

Lawson-Body, A., O'Keefe, P. 2006. Interorganizational relationships in the context of SMEs' B2B e-commerce. *J. Electronic Commerce in Organizations* **44** 1-28.

Leary, M., Kowalksi, R. 1990. Impression management: a literature review and two-component model. *Psychological Bulletin* **107** 34-47.

Lee, A. 1999. Rigover and relevance in MIS research: Beyond the approach of positivism alone. *MIS Quart.* **231** 29-34.

Lee, M., Turban, E. 2001. A trust model for consumer internet shopping. *Internat. J. Electronic Commerce* **61** 75-91.

Liao, C., Lin, H., Liu, Y. 2009. Predicting the use of pirated software: A contingency model integrating perceived risk with the theory of planned behavior. *J. Business Ethics* **91** 237-252.

Lichtenstein, D., Netemeyer, R., Burton, S. 1990. Distinguishing coupon proneness from value consciousness: an acquisition – transaction utility theory perspective. *J. Marketing* **54** 54-67.

Likert, R. 1932. A technique for the measurement of attitudes. *Archives Psy.* **140** 1-55.

Liu, C., Marchewka, J., Ku, C. 2004. American and Taiwanese perceptions concerning privacy, trust, and behavioral intentions in electronic commerce. *J. Global Inform. Management* **121** 18-40.

Lim,S., Lee, S., Park, Y. 2009. An empirical study on the trust-building strategy of Internet automobile insurance: Comparison of male and female customers. *J. Inform. Tech. Applications & Management* **153** 91-110.

Lu, H., Hsu, C., Hsu, H. 2005. An empirical study of the effect of perceived risk upon intention to use online applications. *Inform. Management and Comp. Security* **13**(2) 106-122.

Lucas, H., Spitler, V. 1999. Technology use and performance: A field study of broker workstations. *Decision Sci.* **30**(2) 291–311.

Luhmann, N. 1988. Familiarity, confidence, trust: problems and alternatives. In: *Trust: Making and Breaking Cooperative Relations*. Basil Blackwell, Oxford.

Luo, X., 2002. Trust production and privacy concerns on the Internet: a framework based on relationship marketing and social exchange theory. *Industrial Marketing Management* **31** 111–118.

Lynch, J. 1999. Theory and external validity. *Acad. Marketing Sci.* **27** 367-376.

Lyytinen, K., Mathiassen, L., Ropponen, J. 1998. Attention shaping and software risk: A categorical analysis of four classical risk management approaches. *Inform. Systems Res.* **93** 233-275.

MacCrimmon, K., Wehrung, D., Stanbury, W. 1986. *Taking Risks: The Management Uncertainty*. The Free Press, New York.

Marakas, G., Robey, D. 1996. Managing impressions with information technology: from the glass house to the boundaryless organization. *Impression Management and Information. Technology* Greenwood Publishing Group, Westport.

March, J., Shapira, Z. 1987. Managerial perspectives on risk and risk taking. *Management Sci.* **3311** 1404-1418.

March, J., Sproull, L. 1990. Technology, management, and competitive advantage. *Tech. and Organizations* Jossey-Bass, San Francisco, CA.

Markus, M. 1983. Power, politics, and MIS implementation. *Comm. ACM*. **266** 430-444.

Mashable. 2014. The Heartbleed hit list: The passwords you need to change right now. Accessed on April 14, 2014, http://mashable.com/2014/04/09/heartbleed-bug-websites-affected/.

Mason, R. 1978. Measuring information output: A communication systems approach. *Inform. and Management* **15** 219–234.

Mason, R. 1986. Four ethical issues of the information age. *MIS Quart*. **101** 5-12.

Mattila, A., Mattila, M. 2005. How perceived security appears in the commercialisation of Internet banking. *Internat. J. Financial Services Management* **11** 89-101.

Mayer, R. 1981. The psychology of how novices learn computer programming. *ACM Computing Survey* **131**121-141.

Mayer, R., Davis, J., Schoorman, F. 1995. An integration model of organizational trust. *Acad. Management Review* **203** 709-735.

Mayo, H. 2000. *Investments: An introduction*. Dryden, Fort Worth.

Mazen, A. 1990. The moderating role of social desirability, age, and experience in human judgment: just how indirect is policy capturing? *Org. Behavior and Human Processes* **45** 19-40.

McCarty, C. Prawitz, A., Derscheid, L., Montgomery, B. 2011. Perceived safety and teen risk taking in online chat sites. *CyberPsy., Behavior, and Social Networking* **143** 169-174.

McKnight, D., Chervany, N. 1996. The meanings of trust. *Technical Report* **94**(4).

McKnight, D., Choudhury, V., Kacmar, C. 2002. Developing and validating trust measures for e-commerce: an integrative typology. *Inform. Systems Res.* **13** 334 – 359.

McKnight, D., Cummings, L., Chervany, N. 1998. Initial trust formation in new organizational relationships. *Acad. Management Review* **233** 473-490.

McLeod, A., Pippin, S., Mason, R. 2009. Individual taxpayer intention to use tax preparation software: Examining experience, trust, and perceived risk. *J. Inform. Sci. and Tech.* **61** 25-44.

Mick, D. 1996. Are studies of dark side variables confounded by socially desirable responding? The case of materialism. *J. Consumer Res.* **23** 106-119.

Mitchell, T. 1985. An evaluation of the validity of correlation research conducted in organizations. *Acad. Management Review* **10** 192-205.

Mittal, B. 1994. An integrated framework for relating diverse consumer characteristics to supermarket coupon redemption. *J. Marketing Res.* **31** 533-544.

Money 2009. What a good test looks like. *Money Magazine* November 109.

Morgan, R., Hunt, S. 1994. The commitment–trust theory of relationship marketing. *J. Marketing* **58** 20–38.

Morrison, E., Bies, R. 1991. Impression management in the feedback seeking process: a literature review and research agenda. *Acad. Management Review* **16** 522-541.

Neal, A., Griffin, M., Hart, P. 2000. The impact of organisational climate on safety climate and individual behaviour. *Safety Sci.* **34** 99–109.

Nehf, J. 2007. Shopping for privacy on the Internet. *J. Consumer Affairs* **412** 351–365.

Neumann, P. 2003. Information system security redux. *Comm. ACM* **4610** 136.

Newbert S. 2007. Empirical research on the resource-based view of the firm: an assessment and suggestions for future research. *Strategic Management J.* **282** 121-146.

Nicolaou, A., McKnight, H. 2006. Perceived information quality in data exchanges: Effect on risk, trust, and intention to use. *Inform. Systems Res.* **174** 332-351.

Nolan, R., Wetherbe, J. 1980. Toward a comprehensive framework for MIS research. *MIS Quart.* **42** 1-20.

Novak, T., Gerstinger, A. 2010. Safety and security critical services in building automation and control systems. *IEEE Transactions on Industrial Electronics* **5711** 3614-3621.

Nunnally, J. 1994. *Psychometric Theory*. McGraw Hill, New York.

Passow, T., Fehlmann, R., Grahlow, H. 2005. Country reputation – From measurement to management: The case of Liechtenstein. *Corporate Reputation Review* **74** 309-236.

Pavlou, P., Gefen, D.2004. Building effective online marketplaces with institution-based trust. *Inform. Systems Res.* **151** 37-59.

Pepper, W., Aiken, M., and Garner, B. 2011. Usefulness and usability of a multilingual electronic meeting system. *Global J. Comp. Sci. and Tech.* **11**(5) 34-40.

Pepper, W. 2014. EULA Who?: An analysis between end-user license agreements and users' perceptions of their remuneration. Working paper.

Peter, J. 1981. Construct validity: A review of basic issues and marketing practices. *J. Marketing Res.* **18** 133-145.

Peter, J. 1979. Reliability: A review of psychometric basics and recent marketing practices. *J. Marketing Res.* **16** 6-17.

Png, I, Wang, Q. 2009. Information security: Facilitating user precautions vis-à-vis enforcement against attackers. *J. Management Inform. Systems* **262** 97–121.

Pollock, J. 2012. *Criminal Law*. Anderson Publishing, Waltham.

Ohanian, R. 1990. Construction and validation of a scale to measure celebrity endorsers' perceived expertise, trustworthiness, and attractiveness. *J. Advertising* **193** 39-52.

O'Keefe, D. 1990. *Persuasion: Theory and Research*. Sage Publishing, Newbury.

Orlikowski, W. 2000. Using technology and constituting structures: A practice lens for studying technology in organizations. *Organization Sci.* **114** 404-428.

Othman, M., Aris, I., Abdullah, S., Ali, L. 2010. Knowledge discovery in distance relay event report: A comparative data-mining strategy of rough set theory with decision tree. *IEEE Transactions on Power Delivery* **254** 2264-2287.

Ousterhout, J. 1999. Free software needs profit. *Comm. ACM* **424** 44-45.

Pogue, D. 2000. Take my privacy, please. *MacWorld* December 41-42.

Qualman, E. 2012. 39 social medica statistics to start 2012. Accessed March 17, 2014 http://www.socialnomics.net/2012/01/04/39-social-media-statistics-to-start-2012/.

Raghu, T., Sinha, R., Vinze, A., Burton, O. 2009. Willingness to pay in an open source software environment. *Inform. Systems Res.* **202** 218-236.

Ralston, B. 2009. Open source expected to improve innovation. *Health Management Tech.* **308** 12-13.

Ratnasingam, P., Phan, D. 2003. Trading partner trust in B2B e-commerce: A case study. *Inform. Systems Management* **20**(3) 39-51.

Rawls 2012. Journal ranking scale. Rawls College of Business. Accessed June 11, 2012, http://faculty-staff.ba.ttu.edu/journalRating/.

Raymond, E. 1999. *The cathedral & the bazaar musings on Linux and open source by an accidental revolutionary*. O'Reilly, Cambridge.

Rhoades, D., Waguespack, B. 2000. Judging a book by its cover—The relationship between service and safety quality in U.S. national and regional airlines. *J. Air Transportation Management* **62** 87–94.

Riedesel, P. 2011. What's your brand pricing power? *Marketing Res*. Spring 14-18.

Ricadela, A. 2011. Raining on the cloud's parade. *Bloomberg Businessweek* September 5 – 11 54-58.

Richardson, I., von Wangenheim, C. 2007. Why are so small software organizations different? *IEEE Software* **241** 18-22.

Ridings, C., Gefen, D., Arinze, B. 2002. Some antecedents and effects of trust in virtual communities. *J. Strategic Inform. Systems* **113-4** 271-295.

Riley, M., Elgin, B., Lawrence, D., Matlack, C. 2014. Missed alarms and 40 million stolen credit card numbers: How target blew it. *Bloomberg Businessweek* March 17-23 42-47.

Ringle, C., Sarstedt, M., Zimmermann, L. 2011. Customer satisfaction with commercial airlines: The role of Perceived Safety and purpose of travel. *J. Marketing Theory & Practice* **194** 459-472.

Rittinghouse, J., Ransom, J. 2009. *Cloud computing: Implementation, management, and security*. CRC Press, Boca Raton.

Rivard, S. 1988. Factors of success for end-user computing. *Comm. ACM* 315 552-561.

Robertson, J. 2013. Fighting blame, not viruses. *Bloomberg Businessweek* February 18 – 24 34-35.

Roselius, T. 1971. Consumer rankings of risk reduction methods. *J. Marketing* **35** 56–61.

Rosenblatt, J. 2014. Is Google too big to sue? *Bloomberg Businessweek* March 10-16 38-39.

Rousseau, D., Sitkin, S., Burt, R., Camerer, C. 1998. Not so different after all: a cross discipline view of trust. *The Acad. Management Review* **233** 395–404.

Roy, A., Berger, P. 2005. E-mail and mixed mode database surveys revisited: Exploratory analyses of factors affecting response rates. *J. Database Marketing & Customer Strategy Management* **122** 153-171.

Salisbury, W., Pearson, R., Pearson, A., Miller, D. 2001. Perceived security and World Wide Web purchase intention. *Industrial Management and Data Systems* **1014** 165-176.

Sanzo, M., Santos, M., Va´zquez, R., Alvarez, L. 2003. The effect of market orientation on buyer-seller relationship satisfaction. *Industrial Marketing Management* **324** 327-45.

Saunders, C. 2012. Journals and journal rankings. Accessed on June 4, 2012 http://home.aisnet.org/displaycommon.cfm?an=1&subarticlenbr=346.

Sawyer, A. 1975. Demand artifacts in laboratory experiments in consumer research. *J. Consumer Res.* **23** 317-326.

Seddon, P. 1997. A respecification and extension of the DeLone and McLean model of IS success. *Inform. Systems Res.* **83** 240-253.

Segars, A., Grover, V. 1999., Profiles of strategic information systems planning. *Inform. Systems Res.* **103** 199-232.

Shadish, W., Cook, T., Campbell, D. 2001. *Experimental and Quasi-Experimental Designs for Generalized Causal Inference*. Houghton Mifflin, Boston.

Shannon, C., Weaver, W. 1949. *The Mathematical Theory of Communication*. University Illinois Press, Urbana.

Sheppard, B., Hartwick, J., Warshaw, P. 1988. The theory of reasoned action: A meta-analysis of past research with recommendations for modifications and future research. *J. Consumer Res.* **15** 325-343.

Shin, D. 2009. Towards an understanding of the consumer acceptance of mobile wallet. *Comp.s in Human Behavior* **25** 1343–1354.

Shin, D. 2010. The dynamic user activities in massive multiplayer online role-playing games. *Internat. J. Human–Comp. Interaction* **26** 317–344.

Shin, D., Shin, Y. 2011. Consumers' trust in virtual mall shopping: The role of social presence and perceived security. *Internat. J. Human-Comp. Interaction* **275** 450-475.

Soper, D. 2013. Post-hoc statistical power calculator for multiple regression. Accessed December 10, 2013, http://www.danielsoper.com/statcalc3/calc.aspx?id=9 .

Spinellis, D., Giannikas, V. 2012. Organizational adoption of open source software. *The J. Systems and Software* **85** 665-682.

Steenkamp, J.B.E.M., Geyskens, I. 2006. How country characteristics affect the perceived value of a website. *J. Marketing* **703** 136-150.

Strandburg, K 2006. *Privacy and Technologies of Identity: A Crossdisciplinary Conversation*. Springer Sci., New York.

Straub, D. 1989. Validating instruments in MIS research. *MIS Quart*. **13** 147-169.

Straub, D., Collins, R 1990. Key information liability issues facing managers: Software piracy, proprietary databases, and individual rights to privacy. *MIS Quart*. **142** 143-156.

Sudman, S., Blair, E. 1999. Sampling in the Twenty-First century. *J. the Acad. Marketing Sci.* **27**(2) 269-277.

Sullivan, M. 2012. Which tech brands can you trust? *PC World* January 65-74.

Sun, L. Srivastava, R., Mock, T. 2006. An information systems security risk assessment model under the dempster-shafer theory of belief functions. *J. Management Inform. Systems* **224** 109-142.

Sutton, L. 1994. Using Usenet: Gender, power, and silence in electronic discourse. *Proc. the 20th Annual Meeting the Berkeley Linguistics Soc.*.

Stallman, R. 2000. Why we must fight UCITA. *Comm. ACM* **436** 27-28.

Stallman, R. 2005. Free is not open source. *Comm. ACM* **487** 12-13.

Stallman, R. 2000. Why "open source" misses the point of free software. *Comm. ACM* **526** 31-33.

Tait, P., Vessey, I. 1988. The effect of user involvement on system success: a contingency approach. *MIS Quart*. **121** 91-108.

Tallon, P., Kraemer, K. 2007. Fact or fiction? A sensemaking perspective on the reality behind executives' perceptions of IT business value. *J. Management Inform. Systems* **241** 13-54.

Tan, B. 2002. Understanding consumer ethical decision making with respect to purchase of pirated software. *J. Consumer Marketing* **192**(3) 96–111.

Taylor, J. 1974. The role of risk in consumer behavior. *J. Marketing* **38** 54–60.

Taylor, S., Todd, P. 1995. Understanding information technology usage: A test of competing models. *Inform. Systems Res.* **64** 144-176.

Thomas, K., Tymon, W. 1982. Necessary properties of relevant research: Lessons from recent criticisms of the organizational Sci.s. *Acad. Management Review* **73** 345-352.

University of Mississippi Admissions 2013. Admissions. Accessed April 30, 2013, http://www.mississippi.edu/admissions/curriculum.asp..

University of Mississippi Business School 2013. Business School. Accessed April 30, 2013, http://www.olemissbusiness.com/AcademicPrograms/Undergraduate/business_core.html.

Utley, J., Hensley, R., Dobie, K. 2011. Safety in service operations: A frontline perspective. *J. Service Sci.* **41** 31-37.

Venkatesh, V., Davis, F. 2000. A theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Sci.* **452** 186-204.

Venkatesh, V., Morris, M., Davis, G., Davis, F. 2003. User acceptance of information technology: Toward a unified view. *MIS Quart.* **273** 425-478.

Volkman, R. 2003. Privacy as life, liberty, property. *Ethics and Inform. Tech.* **54** 199–210.

Von Neumann, J., Morganstern, O. 1947. *Theory of Games and Economic Behavior*. Princeton University Press, Princeton.

Walczuch, R., Lundgren, H. 2004. Psychological antecedents of institution-based consumer trust in e-retailing. *Inform. & Management* **42** 159–177.

Walden, P., Bryan, V. 2010. Tenured and non-tenured college of education faculty motivators and barriers in grant writing: A public university in the south. *J. Res. Admin.* **413** 85-98.

Wang, Y., Lin, H., Luarn, P. 2006. Predicting consumer intention to use mobile service. *Inform. Systems J.* **162** 157-179.

Ward, R., Fayad, M., Laitinen, M. 2001. Thinking objectively: software process improvement in the small. *Comm. ACM* **444** 105-107.

Wasko, M., Faraj, S. 2005., Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS Quart.* **291** 35-57.

Webster, J., Watson, R. 2002. Analyzing the past to prepare for the future: writing a literature review. *MIS Quart.* **262** xiii-xxii.

Weinstein, S. 2004. *Capital Campaigns From the Ground Up: How Nonprofits Can Have the Buildings of Their Dreams*. John Wiley and Sons, Hoboken.

Wellman, B. 2002. Designing the Internet for a networked society. *Comm. ACM* **455** 91-96.

Whetten, D. 1989. What constitutes a theoretical contribution? *Acad. Management Review* **14**(4) 490-495.

Wildstrom, S. 2009. Microsoft steps up its war on hackers. *Bloomberg Businessweek*, September 21 76.

Winter, S. 1996. *Impression Management and Inform. Tech.*. Greenwood Publishing, Westport.

Wu, J., Tsang, A. 2008. Factors affecting members' trust belief and behavior intention in virtual communities. *Behaviour & Inform. Tech.* **272** 115 – 125.

Xu, S., Fang, X., Chan, S., Brzezinski, J. 2003. What tasks are suitable for handheld devices? *Proc. HCI Internat. 2003, Human Comp. Interaction: Theory and Practice* **2** 333–337.

Yenisey, M. M., Ozok, A. A., Salvendy, G. 2005. Perceived security determinants in e-commerce among Turkish university students. *Behaviour & Inform. Tech.* **24** 259–274.

Yoo, Y., Alavi, M. 2001. Media and group cohesion: Relative influences on social presence, task participation, and group consensus. *MIS Quart.* **253** 371-390.

Youn, S. 2005. Teenagers' perceptions of online privacy and coping behaviors: A risk–benefit appraisal approach. *J. Broadcasting & Electronic Media,* **49** 86–110.

Yourdon, E. 1999. Data corruption: the silent Y2K killer. *Comp. World* **3342** 44.

Zaichkowsky, J.L. 1985. Measuring the involvement construct. *J. Consumer Res.* **124** 341-352.

Zhuang, X., Wu, C. 2012. The safety margin and perceived safety of pedestrians at unmarked roadway. *Transportation Res. Part F* **15** 119–131.

Zinko, R., Ferris, G., Humphrey, S., Meyer, C., Aimes, F. 2012. Personal reputation in organizations: Two-study constructive replication and extension of antecedents and consequences. *J. Occupational and Org. Psy.* **85** 156-180.

LIST OF APPENDICES

APPENDIX A: INSTRUMENT, ORIGINAL QUESTIONS, AND ADAPTED QUESTIONS

Unauthorized Data Mining Q1	
Instrumental Strenghtening Study	The free computer code must be collecting information about me.
Previous Question	Free Software protects personal and business information information privacy
Original Question	Protects personal information and privacy
Unauthorized Data Mining Q2	
Instrumental Strenghtening Study	Free applications use my information for their own purposes.
Previous Question	Free applications do not use personal or business information for commercial purposes
Original Question	Does not use personal information for other commercial purposes
Unauthorized Data Mining Q3	
Instrumental Strenghtening Study	I am concerned about information about me being gathered when using Free Software.
Previous Question	I worry about the privacy of my information or my company's information when using free computer code
Original Question	I think it is unsafe to use tax preparation software because of privacy and security concerns
Data Corr. Question 1	
Instrumental Strenghtening Study	I worry about losing my data files on my hard drive when using Free Software.
Previous Question	I do not worry about losing my professional data when using Free Software
Original Question	Using the OLA (Online Antivirus) will not prevent data loss or damage to the hard disk (I feel that this is a strong possibility - subset)
Data Corr. Question 2	
Instrumental Strenghtening Study	I feel there is excessive risk of losing data that comes from using free applications.
Previous Question	Free applications are a safe way to perform computing tasks without excessive risk of losing data
Original Question	Tax preparation software is a secure way to prepare taxes
Data Corr. Question 3	
Instrumental Strenghtening Study	Using free computer code increases the risk of losing my data files.
Previous Question	Losing my professional files and programs is a concern when using free computer code
Original Question	Security is a concern when using tax preparation software

Computer Corr. Question 1	
Instrumental	I worry that by using Free Software my business computer will
Strenghtening Study	stop functioning.
Previous Question	I do not worry about my business computer crashing when using Free Software
Original Question	How would you characterize the possibility of using the data exchange offered by this vendor to carry out purchasing transactions? (potential gain/potential loss)
Computer Corr. Question 2	
Instrumental	My business computer not working properly because I am
Strenghtening Study	using free applications is a concern .
Previous Question	My business computer crashing or being corrupted is a concern when using free applications
Original Question	It is risky to use tax preparation software
Computer Corr. Question 3	
Instrumental	If a free application's code were faulty, I feel it would damage
Strenghtening Study	my other computer programs.
Previous Question	A Free Software program will not damage my other computer programs
Original Question	Perceived risk of Hepatitis C infection from receptive syringe sharing (in using illegal drugs to get high and then contracting a disease)
Attributes Question 1	
Instrumental	A Free Software program's features generally match my
Strenghtening Study	expectations of business software
Previous Question	A Free Software program's features generally match my expectations of business software
Original Question	Website content and members performance match my expectations
Attributes Question 2	
Instrumental	I believe that free applications let me accomplish the same
Strenghtening Study	tasks as pay applications.
Previous Question	I believe that free applications let me do the same tasks as pay applications provide
Original Question	Using this website enables me to accomplish a shopping task more quickly than using traditional stores
Attributes Question 3	
Instrumental	In general, I feel that the Free Software developers understand
Strenghtening Study	business needs.
Previous Question	In general, I think that people who develop Free Software know the needs of businesses in order to offer them the

	products they demand
Original Question	In general, I feel very confident about the skills that the other community members have regarding the topics we discuss
Brand Rep Question 1	
Instrumental Strenghtening Study	I believe the brand that makes the free application is truthful in its dealings with consumers.
Previous Question	The makers of free applications have a reputation that makes me believe that their dealings with me are truthful
Original Question	LegalAdvice.com is truthful in its dealings with me.
Brand Rep Question 2	
Instrumental Strenghtening Study	I believe that the Free Software brand makes honest claims.
Previous Question	I have full confidence in free computer code makers' professional ability, even though their company name is unfamiliar to me
Original Question	This brand makes honest claims
Brand Rep Question 3	
Instrumental Strenghtening Study	I trust that the brand behind the free application is reputable.
Previous Question	I feel the company that makes the free applications is a capable and proficient software maker
Original Question	This brand is reputable
Reviews Question 1	
Instrumental Strenghtening Study	Online reviewers of free applications post honest reviews.
Previous Question	In general, most of the reviewers of free computer code behave honestly posting reviews on a website or as part of an online community
Original Question	I think that the information offered by community members (in a virtual community) is sincere and honest
Original Question	Members in the BlueShop community are in general honest
Reviews Question 2	
Instrumental Strenghtening Study	Free Software reviewers post reliable comments.
Previous Question	Free Software reviewers share the same goals and are reliable
Original Question	Members in the BlueShop community are in general reliable
Reviews Question 3	
Instrumental Strenghtening Study	Most of the comments posted by free application reviewers are truthful.
Previous Question	I think that most of the free application reviewers are

	concerned about the needs and interests of the other Free Software users
Original Question	I think that most of the community members are concern about the needs and interests of the other members
Prod Support Question 1	
Instrumental Strenghtening Study	If my company required technical support, the free application company would do its best to help.
Previous Question	If my company required technical support, the free application company would do its best to help
Original Question	If I required help, the vendor would do its best to help me.
Prod Support Question 2	
Instrumental Strenghtening Study	Free Software developers usually support their commitments.
Previous Question	I think people who develop Free Software usually fulfill commitments they assume
Original Question	I think that these community members usually fulfills the commitments they assume
Prod Support Question 3	
Instrumental Strenghtening Study	I have complete confidence in the free application's technical support staff.
Previous Question	I have complete confidence in the free application's technical staff
Original Question	I think I can have confidence in the promises and contributions that these community members make
EFU Question 1	
Instrumental Strenghtening Study	I believe that the financial benefits from using Free Software are worthwhile.
Previous Question	If $5,000 had to be used to start a business you would run from your home and all you needed for this business is a laptop and software, how would you spend the money?
Original Question	If you had to invest $20,000. which of the following investment choices would you find most appealing?
EFU Question 2	
Instrumental Strenghtening Study	Free applications can generate substantial financial benefits.
Previous Question	If you were given the option to use free applications to save money, how confident are you that you would download and use them?
Original Question	How much confidence do you have in your ability to make good financial decisions?
EFU Question 3	
Instrumental Strenghtening Study	The financial benefits that come from using Free Software can be quite large.

Previous Question	What degree of risk would you take to save money by using free computer code instead of spending money on pay software?
Original Question	What degree of risk are you currently prepared to take with your financial decisions?
Prof Reputation Question 1	
Instrumental Strenghtening Study	I believe my supervisors would not support our business using Free Software.
Previous Question	In general, my supervisors would not support our business using Free Software
Original Question	My supervisors will talk to me and ask me to to use it if they find out I use pirated software
Prof Reputation Question 2	
Instrumental Strenghtening Study	In general, my business clients would not support our business using free applications.
Previous Question	In general, my business clients would not support our business using free applications
Original Question	In general, people around me have supported me using tax preparation software,
Original Question	My family and friends will have negative views on me if they findout I use pirated software
Prof Reputation Question 3	
Instrumental Strenghtening Study	I feel that using free computer code will hurt my professional reputation.
Previous Question	I feel that using free computer code will hurt my professional reputation
Original Question	People who influence my behavior would think that I should use pirated software
Original Question	My family and friends will keep me in a distance if they findout I use pirated software
Perc Safety Question 1	
Instrumental Strenghtening Study	I believe that Free Software is safe when used for business purposes.
Previous Question	I believe that Free Software is as safe as pay software when using it for business purposes
Original Question	In general, this mobile banking service is a robust and safe environment in which to transact business
Perc Safety Question 2	
Instrumental Strenghtening Study	I feel that free applications have enough safeguards to make me feel comfortable using them for business.
Previous Question	I do not believe that free applications are safe for my business
Original Question	The Internet has enough safeguards to make me feel

	comfortable using it to transact personal business
Original Question	It would be risky to use tax preparation software
Perc Safety Question 3	
Instrumental Strenghtening Study	I feel that Free Software is safe to use.
Previous Question	I feel that Free Software is more risky than pay software
Original Question	Purchasing from this Website would involve more product risk when compared with more tradtional ways of shopping
Original Question	My tax return will be more accurate when using tax prepartion software than when I do it by hand
Int to Use Question 1	
Instrumental Strenghtening Study	Given that I had access to the free applications, I predict I would use them.
Previous Question	Given that I had access to the free applications, I predict I would use them
Original Question	Given that I had access to the system I predict I would use it
Int to Use Question 2	
Instrumental Strenghtening Study	Faced with a software choice for my business, I would be willing to use free applications.
Previous Question	Faced with a difficult software choice for my business, I would be willing to use free applications
Original Question	Faced with a difficult legal situation that required me to hire a lawyer (for a fee), I would use the firm backing LegalAdvice.com
Int to Use Question 3	
Instrumental Strenghtening Study	Given the opportunity, I would use free computer code.
Previous Question	Free computer code would be my "last resort"
Original Question	I won't use a shop-bot because I would rather start at a bookstore site instead of a shop-hot site
Unauthorized Data Mining Q1	
Previous Question	Free Software protects personal and business information information privacy
Original Question	Protects personal information and privacy
Author	Wu and Tsang 2008
Journal	*Behaviour & Information Technology*
Unauthorized Data Mining Q2	

Previous Question	Free applications do not use personal or business information for commercial purposes
Original Question	Does not use personal information for other commercial purposes
Author	Wu and Tsang 2008
Journal	*Behaviour & Information Technology*
Unauthorized Data Mining Q3	
Previous Question	I worry about the privacy of my information or my company's information when using free computer code
Original Question	I think it is unsafe to use tax preparation software because of privacy and security concerns
Author	McLeod et al. 2009
Journal	*Journal of Information Science and Technology*
Data Corr. Question 1	
Previous Question	I do not worry about losing my professional data when using Free Software
Original Question	Using the OLA (Online Antivirus) will not prevent data loss or damage to the hard disk (I feel that this is a strong possibility - subset)
Author	Lu et al. 2005
Journal	*Information Management and Computer Security*
Data Corr. Question 2	
Previous Question	Free applications are a safe way to perform computing tasks without excessive risk of losing data
Original Question	Tax preparation software is a secure way to prepare taxes
Author	Mcleod et al. 2009
Journal	*Journal of Information Science and Technology*
Data Corr. Question 3	
Previous Question	Losing my professional files and programs is a concern when using free computer code
Original Question	Security is a concern when using tax preparation software
Author	Mcleod et al. 2009
Journal	*Journal of Information Science and Technology*
Computer Corr. Question 1	
Previous Question	I do not worry about my business computer crashing when using Free Software

Original Question	How would you characterize the possibility of using the data exchange offered by this vendor to carry out purchasing transactions? (potential gain/potential loss)
Author	Nicolaou and McKnight 2006
Journal	*Information Systems Research*
Computer Corr. Question 2	
Previous Question	My business computer crashing or being corrupted is a concern when using free applications
Original Question	It is risky to use tax preparation software
Author	Mcleod et al. 2009
Journal	*Journal of Information Science and Technology*
Computer Corr. Question 3	
Previous Question	A Free Software program will not damage my other computer programs
Original Question	Perceived risk of Hepatitis C infection from receptive syringe sharing (in using illegal drugs to get high and then contracting a disease)
Author	Bailey et al. 2007
Journal	*Drug and Alcohol Dependence*
Attributes Question 1	
Previous Question	A Free Software program's features generally match my expectations of business software
Original Question	Website content and members performance match my expectations
Author	Wu and Tsang 2008
Journal	*Behaviour & Information Technology*
Attributes Question 2	
Previous Question	I believe that free applications let me do the same tasks as pay applications provide
Original Question	Using this website enables me to accomplish a shopping task more quickly than using traditional stores
Author	Kim et al. 2008
Journal	*Decision Support Systems*
Attributes Question 3	
Previous Question	In general, I think that people who develop Free Software know the needs of businesses in order to offer them the products they demand
Original Question	In general, I feel very confident about the skills that the other community members have regarding the topics we discuss

Author	Casalo et al. 2008
Journal	*Industrial Management & Data Systems*
Brand Rep Question 1	
Previous Question	The makers of free applications have a reputation that makes me believe that their dealings with me are truthful
Original Question	LegalAdvice.com is truthful in its dealings with me.
Author	McKnight et al. 2002
Journal	*Information Systems Research*
Brand Rep Question 2	
Previous Question	I have full confidence in free computer code makers' professional ability, even though their company name is unfamiliar to me
Original Question	This brand makes honest claims
Author	Jurisic and Azevedo 2011
Journal	*Journal of Brand Management*
Brand Rep Question 3	
Previous Question	I feel the company that makes the free applications is a capable and proficient software maker
Original Question	This brand is reputable
Author	Jurisic and Azevedo 2011
Journal	*Journal of Brand Management*
Reviews Question 1	
Previous Question	In general, most of the reviewers of free computer code behave honestly posting reviews on a website or as part of an online community
Original Question	I think that the information offered by community members (in a virtual community) is sincere and honest
Author	Casalo et al. 2008
Journal	*Management Research News*
Original Question	Members in the BlueShop community are in general honest
Author	Hsu et al. 2011
Journal	*Behaviour & Information Technology*
Reviews Question 2	
Previous Question	Free Software reviewers share the same goals and are reliable
Original Question	Members in the BlueShop community are in general reliable
Author	Hsu et al. 2011

Journal	*Behaviour & Information Technology*
Reviews Question 3	
Previous Question	I think that most of the free application reviewers are concerned about the needs and interests of the other Free Software users
Original Question	I think that most of the community members are concern about the needs and interests of the other members
Author	Casalo et al. 2008
Journal	*Management Research News*
Prod Support Question 1	
Previous Question	If my company required technical support, the free application company would do its best to help
Original Question	If I required help, the vendor would do its best to help me.
Author	Nicolaou and McKnight 2006
Journal	*Information Systems Research*
Prod Support Question 2	
Previous Question	I think people who develop Free Software usually fulfill commitments they assume
Original Question	I think that these community members usually fulfills the commitments they assume
Author	Casalo et al. 2008
Journal	*Management Research News*
Prod Support Question 3	
Previous Question	I have complete confidence in the free application's technical staff
Original Question	I think I can have confidence in the promises and contributions that these community members make
Author	Casalo et al. 2008
Journal	*Management Research News*
EFU Question 1	
Previous Question	If $5,000 had to be used to start a business you would run from your home and all you needed for this business is a laptop and software, how would you spend the money?
Original Question	I believe that the financial gain from using mobile coupons is worthwhile.
Author	Dickinger and Kleijnen 2008

Journal	*Journal of Interactive Marketing*
EFU Question 2	
Previous Question	If you were given the option to use free applications to save money, how confident are you that you would download and use them?
Original Question	The money one can save by using coupons does not amount to much (reverse coded)
Author	Mittal 1994
Journal	*Journal of Marketing Research*
EFU Question 3	
Previous Question	What degree of risk would you take to save money by using free computer code instead of spending money on pay software?
Original Question	Mobile coupons can save you a lot of money
Author	Dickinger and Kleijnen 2008
Journal	*Journal of Interactive Marketing*
Original Question	Coupons can save you a lot of money.
Author	Mittal 1994
Journal	*Journal of Marketing Research*

Prof Reputation Question 1	
Previous Question	In general, my supervisors would not support our business using Free Software
Original Question	My supervisors will talk to me and ask me to to use it if they find out I use pirated software
Author	Hsu 2007
Journal	*Journal of Business Ethics*
Prof Reputation Question 2	
Previous Question	In general, my business clients would not support our business using free applications
Original Question	In general, people around me have supported me using tax preparation software,
Author	Mcleod et al. 2009
Journal	*Journal of Information Systems*
Original Question	My family and friends will have negative views on me if they findout I use pirated software
Author	Hsu 2007
Journal	*Journal of Business Ethics*
Prof Reputation Question 3	

Previous Question	I feel that using free computer code will hurt my professional reputation
Original Question	People who influence my behavior would think that I should use pirated software
Author	Liao 2009
Journal	*Journal of Business Ethics*
Original Question	My family and friends will keep me in a distance if they findout I use pirated software
Author	Hsu 2007
Journal	*Journal of Business Ethics*

Perc Safety Question 1

Previous Question	I believe that Free Software is as safe as pay software when using it for business purposes
Original Question	In general, this mobile banking service is a robust and safe environment in which to transact business
Author	Kang et al. 2011
Journal	*International Journal of Mobile Communications*

Perc Safety Question 2

Previous Question	I do not believe that free applications are safe for my business
Original Question	The Internet has enough safeguards to make me feel comfortable using it to transact personal business
Author	McKnight et al. 2002
Journal	*Information Systems Research*
Original Question	It would be risky to use tax preparation software
Author	McLeod et al. 2009
Journal	*Journal of Information Science and Technology*

Perc Safety Question 3

Previous Question	I feel that Free Software is more risky than pay software
Original Question	Purchasing from this Website would involve more product risk when compared with more tradtional ways of shopping
Author	Kim et al. 2008
Journal	*Decision Support Systems*
Original Question	My tax return will be more accurate when using tax prepartion software than when I do it by hand
Author	McLeod et al. 2009
Journal	*Journal of Information Science and Technology*

Int to Use Question 1

Previous Question	Given that I had access to the free applications, I predict I would use them
Original Question	Given that I had access to the system I predict I would use it
Author	Venkatesh 2000
Journal	*Management Science*
Int to Use Question 2	
Previous Question	Faced with a difficult software choice for my business, I would be willing to use free applications
Original Question	Faced with a difficult legal situation that required me to hire a lawyer (for a fee), I would use the firm backing LegalAdvice.com
Author	McKnight 2002
Journal	*Information Systems Research*
Int to Use Question 3	
Previous Question	Free computer code would be my "last resort"
Original Question	I won't use a shop-bot because I would rather start at a bookstore site instead of a shop-hot site
Author	Gentry and Calatone 2002
Journal	*Psychology and Marketing*

APPENDIX B:SURVEY PREAMBLE, EMAIL MESSAGE EXAMPLE, AND INCENTIVES FOR PARTICIPANTS

Initial Email

Thank you to the (the organization) for agreeing to partner with me…in order to conduct an anonymous survey about your perceptions involving the use of free applications in business.

This survey takes under 8 minutes to complete, can be taken on any type of device (laptop, smartphone, etc.) and is crucial for my graduation. It will give us an accurate depiction of your concerns about the risks and benefits associated with this type of software. Once the survey period ends, the results will be analyzed and we will send you a report.

To Take Survey Clink Here

Reminder Email 1

Survey: Free Business Applications
This is merely a reminder about the anonymous survey you were sent last week about your perceptions involving the use of free applications in business. This brief survey takes under 8 minutes to complete, can be taken on any type of device (laptop, smartphone, etc.) and is crucial for my graduation. It will give us an accurate depiction of your concerns about the risks and benefits associated with this type of software. Once the survey period ends, the results will be analyzed and we will send you a report.

As a reward, at the end of the survey is an area to enter your email address (it is kept separate from your answers) in order to be entered into drawing for one-of-many $10 Amazon Gift Certificates.
Thanks to the organization for agreeing to partner with me….

To Take Survey Clink Here

Final Reminder Email

This is the final a reminder about the anonymous survey that closes tomorrow. It asks about your perceptions involving the use of free applications in business. If you have already completed the survey, your answers have been recorded and you have been entered into all of the prize drawings.

This brief survey takes under 8 minutes to complete, can be taken on any type of device (laptop, smartphone, etc.) and is crucial for my graduation. It will give us an accurate depiction of your concerns about the risks and benefits associated with this type of software. Once the survey period ends, the results will be analyzed and we will send you a report.

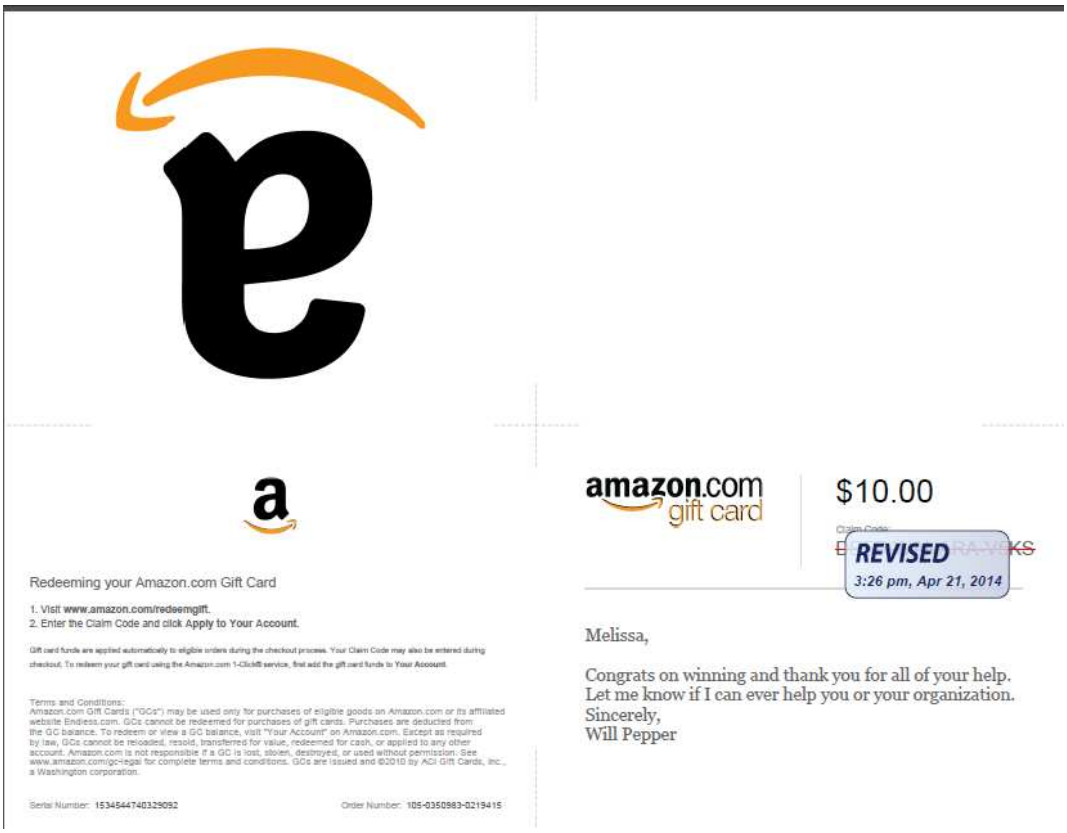
As a reward, at the end of the survey is an area to enter your email address (it is kept separate from your answers) in order to be entered into drawing for one-of-many $10

Amazon Gift Certificates. Additionally, a grand prize has been added: a pair of tickets to a SOLD OUT concert…These are amazing seats!

Thanks to the organization for agreeing to partner with me…

To Take Survey Clink Here

APPENDIX C: REWARD EXAMPLE



Redeeming your Amazon.com Gift Card

1. Visit **www.amazon.com/redeemgift.**
2. Enter the Claim Code and click **Apply to Your Account.**

Gift card funds are applied automatically to eligible orders during the checkout process. Your Claim Code may also be entered during checkout. To redeem your gift card using the Amazon.com 1-Click® service, first add the gift card funds to **Your Account**.

Terms and Conditions:
Amazon.com Gift Cards ("GCs") may be used only for purchases of eligible goods on Amazon.com or its affiliated website Endless.com. GCs cannot be redeemed for purchases of gift cards. Purchases are deducted from the GC balance. To redeem or view a GC balance, visit "Your Account" on Amazon.com. Except as required by law, GCs cannot be reloaded, resold, transferred for value, redeemed for cash, or applied to any other account. Amazon.com is not responsible if a GC is lost, stolen, destroyed, or used without permission. See www.amazon.com/gc-legal for complete terms and conditions. GCs are issued and ©2010 by ACI Gift Cards, Inc., a Washington corporation.

Serial Number: 153454474032909**2** Order Number: 105-0350983-0219415

amazon.com gift card

$10.00

Claim Code:
~~E[illegible]RA-W[illegible]KS~~

REVISED
3:26 pm, Apr 21, 2014

Melissa,

Congrats on winning and thank you for all of your help.
Let me know if I can ever help you or your organization.
Sincerely,
Will Pepper

VITA

William (Will) Allen Pepper III

Address:
1609 Grand Oaks Blvd.
Oxford, MS 38655
662.816.1419
wpepper@bus.olemiss.edu
willpepper@gmail.com

Education

University of Mississippi *Doctorate of Philosophy – Management Information Systems Doctoral Candidate –* *August 2014*

-Minor in Marketing

University of Mississippi *Master of Business Administration (Top 14/Top 3 Most Competitive Programs)*

–Double Emphasis MIS; Emphasis Marketing – December, 2003

University of Mississippi *Bachelor of Business Administration*

–Double Major Banking and Finance and Managerial Finance (Emphasis – Investments) –May, 2001 / May, 2004

Publications and Conferences

- Pepper, W., and Erskine, M. 2014. EDIT Your Emergency: Communication Preparedness Using Emergency Descriptive Information Technology. 20th Americas Conference on Information Systems, August 8, 2014.

● King, R., Pepper, W., Womble, D., and Bush, V. 2013. Brand Beings: Creating The Best Spokesperson For Your Business. American Marketing Association Summer Marketing Educators' Conference, August 9, 2013.

● King, R., Pepper, W., Womble, D., and Bush, V. 2013. I am the Brand: Is Creating a Celebrity Better than Buying one? Southeastern Marketing Symposium, February 2, 2013.

● Williams, K., Aiken, M., and Pepper, W. 2012. Time Value of Accurate Translations. Business Research Yearbook 19(1) 158-165

● Pepper, W., Aiken, M., and Garner, B. 2011. Usefulness and Usability of a Multilingual Electronic Meeting System. Global Journal of Computer Science and Technology 11(5) 34-40.

●Inaugural Presenter in the 24th Annual International Academy of Business Disciplines

● Working Papers involving Emergency Responsiveness Applications, Social Media, Software Knowledge Scores, Trust, E-commerce, M-Commerce, Metrics, Software Evaluation techniques and more available upon request

Technology Achievements and Teaching

● Association of Information Systems (Summer 2013)
- 2013 AIS Gamification (solving non-game problems using gaming judgment) Collaboration Leader
- Manuscript reviewer for five divisions

● Certification Management Services (Summer 2013)
- Content creator, technical reviewer, and Angoff evaluator for over 200 questions for online MBA Business IT, Leadership, and Innovation Management courses
- Classified as IT Management Expert and Financial and Risk Management Expert

● The University of Mississippi Business School (Fall 2011-Current)
- Taught Management Information Systems 309 to high evaluation marks in a virtually Green Capacity. Only 4 pieces of paper total were used as sign in sheets for exams while all homework, quizzes, tests and class work were done using computers and appropriate software.
- Guest teacher, lecturer, and proctor
- Certified CITI researcher in human subjects' research.

Past Work Experience

● Partner for Spruce Street Ventures (April 2007 – March 2009) and

● Director of Business Development for LS Pioneer, LLC (March 2006 – June 2010)

- Worked directly with Providers / Aggregators / Agents / Institutional Clients to research, evaluate and act as liaison between buyers and sellers of life insurance portfolios in excess of $6.9B in face value amount while having access to over $12B in face value amount
- Consulted with sourcing and serving in the marketing, operations and funding of a CO2 recycling system, life insurance capture programs, Insurance Carrier Reserves, Reverse Mortgage, Steel Mills and Oil and Gas Development projects, both on the macro and micro levels
- Developed fixed income products designed to meet different financial models and needs
- Worked on various bond development plans from small municipalities to helping create a platform for a new financial product that guaranteed the client against loss using life settlements and annuities in a bond offering
- Developed ability to write Jargon free educational material for prospective clients in the life settlement acquisition/selling process as well as ROI, IRR and other financial measures
- Sourced new clients and helped due diligence on new funders entering the marketplace as well as maintaining relationships with current clients

● Director of Business Development and Creative Executive for Oxford Entertainment Partners, Inc. (November 2003 – May 2005) / Director of Business Development and Creative Executive for Primary Entertainment Partners, Inc. (May 2005 – September 2008)

- Helped bring in over $3.5M in funding for a children's television program and assisted in a preschool literacy initiative
- Assisted in reengineering a financial product that is a surety bond derivative that will be used by film producers to collateralize offers to bankable film stars in order to get them contractually attached to their films and minimize production and distribution risk
- Developed the platform, marketing program and infrastructure for a motion picture/television studio
- Helped develop and implement the Mississippi

Filmmaker Tax Incentive Act

- Marketed, Budgeted, performed Script Development as well as Screenwriting and Consultation for seven external projects as well as eight internal ones

● University of Mississippi's Ford Center for the Performing Arts Event Coordinator and Graduate Assistant (Spring 2003 – December 2003)
● University of Mississippi Operations Assistant and Student Recruitment Coordinator for University Relations (Fall 2001 – Fall 2002)
● University of Mississippi Administrative Intern for University Relations, (Fall 2000 – May 2001)
● United States Senate Legislative Intern, former Senate Majority Leader Trent Lott, Washington, DC (Summer 2000)
● University of Mississippi Computer Lab Technician (Fall 1998 – Fall 2000)

● Delta State University Computer Systems Technician (Summer 1998, 1999)
● The Commercial Appeal Teen Panel Writer, Photographer (1996-1997)

Licenses and Professional Organizations

●Licensed Life Insurance Agent/Broker in Multiple States
●Licensed Viatical/Life Settlement Broker
●Professional Status in the Institute of Management Consultants

Volunteer experience

●2014 St. Jude Sponsor
●2014 Leapfrog Sponsor
●2013 UM Commencement Volunteer
●VP on Board of Directors for Soleil Homeowners Association
●Delta in the Grove Committee Member
●Oxford-Lafayette County Chamber of Commerce and Economic Development
Foundation Volunteer
● Oxford-University United Methodist Church, various volunteer efforts
●Pollwatcher for 2008 Election
●Relay for Life Logistics Chairman
●Blues Symposium Committee
●Oxford Film Fest Co-Founder, former Co-Director/Columnist
●Christopher Reeve Charity Bowl VIP Volunteer
●Open Doors Celebration
●UM SIFE, Stock Simulation for Holly Springs Jr. High
●Celebrity Golf Classic

●Sigma Nu Charity Bowl
●National Youth Sports Camp
●UM Business School Advisor
●*Mississippi on the Mall*
●Mississippi Blood Bowl and other various blood drives, donor
●*Commitment to Excellence* Walk-A-Thon
●Bolivar County Habitat for Humanity
●Lafayette County Habitat for Humanity
●Lafayette County High School Career Fair
●Canned Food Drive Benefiting the Oxford Food Pantry
●Volunteer Production Assistant in charge of Talent, *Mississippi Rising*
●Red Cross Hurricane Relief Volunteer

References Available Upon Request