What is this Document?

It's the written portion of my doctoral dissertation proposal. The slide deck for the oral defense can be found here: http://marcschmalz.com/research/schmalz-proposal-defense-20191209.pdf

2019-12-08 Update: I defend in the morning, so this is the last version of my proposal before my defense.

Important Note: Michelle Carter (one of my co-advisors) provided the structure, and suggested that each part should basically stand alone. This lets people focus on a single section without having to read it all. (Also, I suspect, it sets up each section as a stand-alone paper, if desired: Part One was already published as a RIP paper for a conference.) So, you will find some repetitive material. In fact, you will find copy-and-paste duplication of some material. This is an attempt to keep my language consistent as I replicate the material to help those sections stand alone.

The anatomy:

- Part One: Overview - was published at AMCIS 2019 (link below) and has been re-integrated.
  https://aisel.aisnet.org/amcis2019/it_project_mgmt/it_project_mgmt/5/
- Part Two: Problem Domain Literature Review - covers Project and Risk Management.
  When I develop it as a stand-alone lit review, I'll do it here:
  4aUT2b_bOsCq3QiqR5tcHA-0AdZnRoqMA11VwA/edit#heading=h.mp4q1nvghlj9
- Part Three: Theory and Hypotheses - the theoretical framework I'll use to approach the problem.
- Part Four: Methodology - explains the specifics of the proposed project.
- Part Five: Potential Outcomes and Importance - theoretical and practical contributions
- Part Six: References - exactly what you think.

Identity and Project Risk:

A Dissertation Proposal

Abstract

Software project failure continues to be a concern and managing risk our best hope of project success. While IS literature has investigated the role of culture in projects, such cultural work is largely limited to the management of multinational project work and focused on ethnic or national identities and their impact on enterprise-level system development. Recently, information systems researchers have begun to focus on how a user's identities—their internalization of cultural meaning—can affect adoption and use of technology, but identification with technology may also impact its development*. This proposed study will examine the ways in which worker identification with the technological outcome of a project might affect risk behavior. The results will inform both theory and practice, contributing to IT identity research as well as best practices for project and risk management in software development.*

Part 1: Overview

The software development industry is experiencing slow improvement in the realm of project success, but professionals and academics still find concern with each year's rate of failed projects despite decades of research regarding project management. Industry analysts provide snapshots of the cost of software failures to industry: "On average, large [information technology (IT)] projects run 45 percent over budget

and 7 percent over time, while delivering 56 percent less value than predicted. Software projects run the highest risk of cost and schedule overruns" (Bloch, Blumberg, & Laartz, n.d.).

Defining risks as "factors that can, when present, adversely affect a project" (Wallace & Keil, 2004, p. 68), we understand why managing project risk is a fundamental aspect of the project management profession. In the project context, risk is often expressed as threats to the triple constraint (or "Iron Triangle") of time, cost, and scope of a project (W. Lee, 2010). Continued research into software project risk promise improvements to project success rates by helping software professionals identify, understand, and address these potential problems within their projects.

A great deal of research has gone into identifying risk factors in the context of IT development projects. While there is no single accepted list of software project risk factors, multiple researchers have developed their own classification systems, largely based on studies of practitioners (e.g. Schmidt, Lyytinen, Keil, & Cule, 2001; Taylor, 2006; Wallace & Keil, 2004). Among the common sources of risk identified by these studies are risk factors associated with uncertain or changing project scope (a concept often expressed colloquially as *scope creep* or *feature creep*), as well as many factors associated with staffing, technology, and organizational culture. Staffing and technology factors often seem to overlap, as they tend to be framed in terms of staff skill, experience, or familiarity with technology.

While project literature has further investigated the role of culture as an aspect of project risk, work is largely focused on the effects of organizational culture on the development process (e.g. Leidner & Kayworth, 2006) or on gender, ethnic, or national identities, and often focus on their impact on multinational system development efforts (e.g. Rai, Maruping, & Venkatesh, 2009). However, worker identities (their internalization of cultural meaning) extend far beyond their affiliation with work units or their country of origin.

In this body of literature, the focus is often on organization managers who have traditionally been responsible for project- and risk-based decision-making (e.g. Khan & Kumar, 2009; Taylor, 2007). In recent years, the growth in popularity of agile development methods has changed the nature of decision-making on project teams. In agile work, it is much more likely that innumerable decisions are being made by project team members working in concert with clients.

> "This creates a pluralist decision-making environment due to the diverse backgrounds, attitudes, goals, and cognitive dispositions of the team members. Decision making in this environment is more difficult compared to the traditional approach where the project manager is responsible for most decisions" (Nerur, Mahapatra, & Mangalaraj, 2005, p. 76).

According to the PMI (2017), "71 percent of organizations [reported] using agile approaches for their projects sometimes, often, or always" (p. 4). With contemporary IT development continuing to become more agile, and with agile development distributing decision-making through product teams rather than concentrating it on management, it becomes important to understand the decision-making behavior of project team members.

Recently, information systems (IS) researchers have begun to examine how individuals self-identify with technology (Carter & Grover, 2015) and how this self-identification affects adoption and use of IT. We have not yet begun to explore how self-identification with technology impacts its development. By self-identifying with the IT under development, project workers' behavior—including risk behaviors—may be affected in significant ways and therefore impact the course of the project and its final product.

Objectives

This research is intended to inform project and risk management practices. It examines the manner in which individual IT project team members self-identify with the products they are developing, and explores the relationship between self-identification with the IT under development and risk-related project behavior for the purpose of informing IT identity research and improving project and risk management practices. It seeks empirical evidence that such self-identification takes place on project teams and the conditions in which it may occur. While there are multiple ways that personal decisions may affect projects, this work focuses on critical decisions that involve choices which would accept or prevent feature creep.

Research Question

Stated formally this research addresses the following question:

- In what ways, if any, does self-identification with an IT under development affect project team members' personal risk-related decision-making behavior on IT projects?

"Risk-related" indicates that the investigation will involve critical incidents that may have resulted in substantial changes to the product specification. "Decision-making behavior" does not involve objective evaluation of decisions on the outcomes of the project, only on personal behavior that constitutes input or opinion.

Theoretical Perspectives

This work will be conducted within a framework of structural symbolic interactionist theories regarding identity (*identity theories*) including Carter & Grover's (2015) application of these theories in the IS domain through their theorization of IT identity. This framework also includes elements from British cultural studies—whose researchers often work from a symbolic interactionist perspective (Becker & McCall, 1990)—to explain the cultural source of our identities.

British cultural studies (or simply *cultural studies*) is an approach "dedicated to the notion that the study of cultural processes, and especially of popular culture, is important, complex and both theoretically and politically rewarding" (Grossberg, Nelson, & Treichler, 1992, p. iv). It attempts to explain how social meaning is created, and is partially based on the works of Saussure and Foucault in linguistics, semiotics, and discourse (Turner, 2003; Weedon, 1994). It contends that "culture is a terrain on which there takes place a continual struggle over meaning" (Storey, 1994, p. ix), and that "when we are at our most natural, our most everyday, we are also at our most cultural.... when we are in roles that look the most obvious and given, we are actually in roles that are constructed, learned and far from inevitable" (Willis, 1979, p. 185).

Cultural studies views economic systems in a cyclical relationship with culture. All industry comes into existence within a cultural context, but then products from those industries can influence culture (Hesmondhalgh, 2012; Willis, 1994). This is especially true of products from the *cultural industries*. Organizations are categorized as part of the cultural industries "because **they deal primarily with the industrial production and circulation of texts**" (Hesmondhalgh, 2012, p. 6) and "are most directly involved in the **production of social meaning**" (Hesmondhalgh, 2012, p. 16) [emphasis in original]. Along with digital games (which are a segment of IT as well as part of the cultural industries), the list of cultural industries includes journalism, film, television, radio, and marketing. Their basic products (e.g.

games, articles, movies, programs, and advertisements) are in a class that cultural studies scholars refer to as *cultural texts*. For these, the intent of production is less about utility than conveying a message of social significance (Hesmondhalgh, 2012). By contrast, television manufacture is not part of the cultural industries: While all objects have some social meaning by simply existing within society, a television is primarily an electronic good that affords consumers a utilitarian function (interpreting audio and visual signals) rather than a cultural text. This is true even though a television is used to consume cultural texts.

Identity theories share many structuralist and post-structuralist concepts with cultural studies. They contend that one's sense of self is comprised of many identities, each of which is the personal internalization of the meaning one finds in society. The set of meanings attached to each identity is its *standard*. While an identity may be shared among many, each individual's standard for an identity is unique: Many see themselves as scholars, but no two scholars have the exact same standard (Burke & Stets, 2009).

Identities tend to be classified into one of four types. Most heavily analyzed in identity literature are *role* identities, which internalize society's expectations for individuals acting in a given societal role (Burke & Stets, 2009). "Educator," "worker," and "parent" are all examples of role identities and may even all be part of a single individual's self-concept. *Group* identities serve a similar function for members of groups (Burke & Stets, 2009), including religious, ethnic, and cultural groups. *Person* identities are those that attempt to distinguish one as a unique individual (Burke & Stets, 2009). "Trustworthy," "frugal," and "artistic" are all examples of person identities. More recently, researchers have explored *material* identities, tied to possessions or places (Clayton & Opotow, 2003; Tian & Belk, 2005), which are constructed and function like role, group, and person identities. These can be with most any physical or conceptual thing or class of things: A theoretical framework, a make of car, or a software package.

While Carter and Grover (2015) originally conceived of IT identity as a positive self-identification with an IT, exploration has also shown that some negatively self-identify with an IT (Carter, Compeau, & Schmalz, 2018). IT identities are independent of expertise with an IT: A person can be an expert with a given technology and still feel it has little to do with who they are (dis-identification) or even antithetical to who they are (anti-identification). For example, a competent MacOS user may feel that OS is antithetical to who they are, perhaps having a positive IT identity involving Windows or a flavor of Linux.

These identities are the source of our behavior. As different social situations arise, some of one's identities become more salient, and one acts in accordance with the standards of those identities, confirming them as part of one's self. The salience hierarchy of one's identities is determined by a number of factors, including one's ideal sense of self (their *prominence* hierarchy of identities), one's perceptions of the ways in which identities have been *supported* and *rewarded* in the past, and the perceived *opportunities* for reward and support involved in the current situation. Supporting behavior associated with an identity also reinforces that identity, making it more prominent in one's self and more likely to become salient again in the future (Burke & Stets, 2009).

IT project team members presumably have a number of identities that may become salient during the course of a project, and govern behavior on project teams. While project and risk management researchers have studied the impact of culture on development, these efforts usually focus on the interactions of national cultures in multinational development efforts (e.g. Rai et al., 2009) or the effects of organizational culture on the development process (e.g. Leidner & Kayworth, 2006). Intentionally or otherwise, these studies have focused on group identities and may be overlooking other identities affecting project behavior. By utilizing IT identity's conceptualization as a form of material identity, this

research adds material identities to the scope of project-culture or project-identity studies, examining the manner in which self-identification with the IT under development affects specific risk-related project behaviors involving changes to project scope. We expect these identities to appear more frequently and to be relatively stronger when developing IT that has a larger cultural presence, with digital games on one end of the spectrum and infrastructure or management information systems representing the other end as highly utilitarian IT.

Empirical Setting

The research question will be approached through a set of four case studies, each representing an IT project, chosen to facilitate internal replication, comparison, and analysis. The unit of analysis in each case is the individual project team member. Cases will be chosen from the American Pacific Northwest and participants will have to be fluent in spoken English to eliminate costs associated with long-distance travel and translation, respectively. Both the English requirement and the regional requirement may limit recruitment and diversity of responses, but should also reduce error that could be introduced by other identity factors not targeted in the research.

Contributions

This study has implications for both theory and practice. The work has the potential to extend IT identity theories by specifically investigating the effects of IT identity on IT project behavior and the development of IT. Even if the study finds no evidence that project worker self-identification with the IT under development affects project behavior, this would be an important finding for IT identity research. If a such self-identification is discovered to be part of team member decisions, the results will also offer

insights into the content of IT identity standards and the behavioral effects of self-identification with IT, which will further inform future IT identity research.

Practically, the work also has the potential to inform human resource decisions and risk management techniques in digital game, consumer IT, and other forms of technology development. If the study shows a correlation between identification with technology and risk behavior on technology projects, the nature of the relationship will be able to inform an organization's human resources, training, and technology decisions. It may become possible to identify better hires for project work not only by their skill sets, but also by the manner in which they self-identify with the technologies involved.

Proposal Organization

The remaining text proceeds as follows: Part 2 contains a detailed literature review of concepts within project management literature as they pertain to this research; Part 3 contains information regarding the theoretical framework; Part 4 covers the proposed methods for the empirical study and introduces a new theoretical model; and Part 5 concludes with a discussion of the intended contributions of the work.

Part 2: Problem Domain Literature Review

Introduction

This proposed research project concerns worker identities and their effects on software project risk behavior. It is inspired by the emergence of IT identity work within the IS domain and reflects an understanding that identity frameworks have not been applied to software project risk. A literature review of this problem domain is required to create a more complete understanding of software project risk and its intersections with concepts from IT identity scholarship. (IT identity scholarship is explored in depth in Part 3 of this proposal.)

Literature Search

This review was completed in the context of a broader literature review on the subject of IS conceptualization of software project risk. For the broader review, the Association for Information Systems' electronic library (AISeL) was used to conduct a search on May 21, 2019, using the search phrase '"risk management" AND "project management"'. The search was constrained to peer-reviewed articles. This produced a list of 345 articles. The results were imported into a spreadsheet for tracking, and the articles were reviewed in chronological order by year of publication. Those articles which could not be reliably excluded based on their titles and abstracts were opened and the body searched using "risk" or "risk management" to determine how risk was represented. Articles which included analysis or classification of risk factors as they pertain to IT development were retained, including those defining and exploring a single category of risk. Examples of rejected article types include those where risk management was presented as a job skill, a teachable specialization within project management, or as specializations within information security, operational, or financial risk management. Promising

references were also followed to uncover additional related material outside of the AISeL, resulting in 83 additional sources which were reviewed.

In the next section, we start with a general description of the major concepts of the broader domain of project management, and focus on the concepts of risk management, identify several established works dealing with the conceptualization of risk in the domain, and analyze those sources to uncover the way in which they explore risk using the areas of focus mentioned above.

Project and Risk Management

The Project Management Institute (PMI)—the largest international organization of project managers both within and outside the software domain—defines a project as a "temporary endeavor undertaken to create a unique product, service or result" (Project Management Institute, n.d., para. 1). Unlike many other business functions, project work has a defined start and endpoint. Projects also serve to create something new and unique: The design of a new smartphone would be a project, but each smartphone produced is part of an ongoing process and not a project itself.

While the modern concept of a project manager arose in the late 1950s, project managers have practiced for millenia. For example, the Great Pyramid of Giza, built over two to three decades and finished circa 2560 BCE, was not created by a single individual or through random chance. Rather, people conceived of the structure, planned its construction, and executed the plan while monitoring progress until completion.

In the modern project context, as well as most research studying technology development projects, risk is often expressed as threats to the triple constraint (or "Iron Triangle") of time, cost, and scope of a project (W. Lee, 2010), though some espouse more performative measures of project success

(Cecez-Kecmanovic, Kautz, & Abrahall, 2014). Potential threats to project success, however measured, are risks.

Commonly, one might define risk as *exposure to danger, harm, or loss* (Oxford University Press, 2019). Many disciplines—among the most prominent are finance, organizational operations, and IT security—include a specialized concept of risk, how it affects practice, and how it can be understood and controlled to minimize danger, harm, and loss. This work focuses on risk as addressed in the domain of IT development projects.

Defining IT project risks as "factors that can, when present, adversely affect a project" (Wallace & Keil, 2004, p. 68), we understand why managing project risk is a fundamental goal of project management. Since contemporary project managers have most often expressed success as meeting a project's planned schedule, budget, and specification, risk has been primarily analyzed as the potential for events that negatively impact those measures. If one considers more performative measures of project success, factors that might adversely affect those measures are still risks by this definition.

The PMI considers risk management to be one of the required skills for a competent project manager (Project Management Institute, 2009): "Project Risk Management includes the processes concerned with conducting risk management planning, identification, analysis, responses, and monitoring and control on a project" (p. 4). The PMI concept of risk also includes the possibility of positive risk (the potential for an unexpected positive event that a project team would want to exploit to their advantage), which is out of scope for this research project. Risk management practices are intended to minimize the probability of risks from becoming actual problems, and to minimize the impact of these problems if they do occur; the benefit or reward for accepting project risk is being able to follow a project plan with more efficient

schedules, less costly budgets, and an effective feature set than if every risk was fully addressed before starting.

In one fashion, all of project management is risk management. There would be no need to follow any project management processes if there was no risk involved in execution. For example, the choice of project management frameworks (waterfall vs. agile, for example) implicitly includes a decision regarding which methodology will likely produce the best results, adopting the inherent risks of one framework over those of another because one is considered less risky, overall.

As with other domains where risk is studied to stop or decrease the impact of dangers, losses, and harm, continued research into software project risk provides increased understanding of why projects underperform or fail and promises improvements to project success rates by helping software professionals better identify, understand, and address potential problems within their projects.

The PMI suggests consulting lists of known risks as one possible way to identify risks on a specific project (Project Management Institute, 2009). In using list of known risks, each risk is treated as a prompt for consideration of the ways in which a project may be specifically impacted by risk factors, sometimes also including proactive steps for preventing the risk from becoming a problem, measures for determining whether or not the risk has become a problem, and contingencies for action when the risk becomes a problem (Larson & Gray, 2018). For example, if one is prompted by a risk factor list item called Upper Management Support, one may identify a specific project risk regarding the need for continued support from a particular key executive at the company where the project takes place, make plans for regular communication with that executive to maintain their support, develop a means of measuring the executive's current disposition, and define a set of actions to take if the executive pulls support for the

project. While these lists can be very helpful in analyzing risks associated with a project, the PMI does not offer its own list of risk factors for software development projects.

In academia, several research efforts have attempted to identify risk factors in the context of IT development projects. While the literature provides no single accepted list of software project risk factors, multiple researchers have developed their own lists and classification systems, largely based on studies of project or risk management practitioners (e.g. Barki, Rivard, & Talbot, 1993; Jones, 1994; Schmidt et al., 2001; Taylor, 2006; Wallace & Keil, 2004). As with any classification system, these risk classification efforts also illustrate the ways in which IS scholarship conceptualizes the domain, guiding both research and practice.

Agile Methodologies and Risk

Changes to development practices also bring a need for new investigations of project risk. Prior research tends to focus on organization managers who have traditionally been responsible for project- and risk-based decision-making (e.g. Khan & Kumar, 2009; Taylor, 2007). In recent years, the growth in popularity of agile development methods has changed the nature of decision-making on project teams. In agile work, it is much more likely that innumerable decisions are being made by project team members working in concert with clients.

> "This creates a pluralist decision-making environment due to the diverse backgrounds, attitudes, goals, and cognitive dispositions of the team members. Decision making in this environment is more difficult compared to the traditional approach where the project manager is responsible for most decisions" (Nerur et al., 2005, p. 76).

In a 2017 report, "71 percent of organizations [reported] using agile approaches for their projects sometimes, often, or always" (Project Management Institute, 2017, p. 4). With contemporary IT development continuing to become more agile, and with agile development distributing decision-making through product teams rather than concentrating it on management, it becomes important to understand the decision-making behavior of project team members.

Culture and Identity in Risk Literature

As stated in Part 1, our sense of self is comprised of many identities that are formed by processing *cultural meaning* found in society. These identities can involve one's roles in society (*role identities*), one's memberships in groups (*group identities*), the qualities one believes distinguishes them as an individual person (*person identities*) (Burke & Stets, 2009), and things with which one self-identifies. While this last class of identities can be with physical or conceptual things, the class is commonly referred to as *material identities* (Clayton & Opotow, 2003).

Without directly utilizing identity theories, researchers have coincidentally explored ways in which projects are impacted by workers' role, group, and person identities. Project management literature has investigated the role of culture as an aspect of project risk, largely focused on the effects of organizational culture on the development process (e.g. Leidner & Kayworth, 2006) or on gender, ethnic, or national identities, and often focus on their impact on multinational system development efforts (e.g. Rai et al., 2009). With identity theories, these constitute studies of group identities ("I am a [nationality]"; "I am a [company] employee") or role identities ("I am a [job role]"). Job descriptions often frame person identities as job requirements ("I am dedicated"; "I am organized"; "I am a multitasker"). Little, however, has been done concerning material identities in the workplace (cf. Tian & Belk, 2005) and less (perhaps none) regarding the impact of those on performance. The recent work regarding IT identity—conceptually

defined as a material identity—is a catalyst for researchers to investigate the impact of worker identification with their (material) project outcomes.

Our identities are important, in part, because they explain our behavior. For any given situation, a person's identities can change in salience. That person then acts in accordance with the standards of their most salient identities, confirming them as part of their self. In the context of identity theories, project and risk management research has done incomplete work to tell us *who developers are* while at work and when making decisions affecting their projects. Project workers, confronted with daily decisions regarding their projects, certainly self-confirm those identities by making choices that confirm the content of their identities. However, our existing risk frameworks tend to consider workers as collections of skills rather than individuals with identities. While skills may affect a worker's ability to perform tasks, their identities drive their actual behavior.

IT identity has built upon identity theories to explain why understanding an individual's material self-identification with technology is vital to understanding technology adoption and use behavior. This could affect IT project worker use and adoption of tools, including integrated development environments, version control systems, company-provided computers, and office productivity packages. Outside of adoption and use, IT identity research also promises that understanding a technology worker's self-identification with the technology they are producing is vital to understanding project team behavior. It is possible that identification with a project's technology, including the intended final product, affects many of the risk factors identified in risk management literature. Whether or not IT identities are found to be particularly important, there remains the issue of understanding which other identities are salient during project work, and how self-confirming behaviors from different identities affect project behavior. The salient identities and their self-confirmatory behaviors will affect project member interactions with their co-workers and their performance of their work duties.

Digital Games as a Highly Salient Context

Within the digital games industry, academic and popular coverage shows that the industry tends to hire game enthusiasts as gameworkers (Dovey & Kennedy, 2006; Kerr, 2006). All IT segments undoubtedly hire experts in specific technologies, but hiring practices in digital games may lead to environments in which more of the tech workers have strong IT identities regarding their intended product. These practices may cause non-game developers to behave in accordance with more role, group, and person identities than with their material self-identification with their product. For example, a worker who identifies as a player of driving games who participates on a project team developing a driving game may exhibit self-confirmatory behaviors that impact project performance and outcomes: "We need to adjust the schedule so we can add a feature to make our game more appealing to players like me." By taking actions to make a game this individual would personally like to play, they are confirming their own identity and subjecting the project to additional risk in order to do so. This effect may appear less often in the development of asset management packages, where the products are not cultural texts. For these reasons, this investigation of material self-identification on project teams will draw from multiple sectors of IT development, including digital games.

Project Management and Theory

Overall, project management is largely lacking a strong, central theoretical base. For example, Wallace, Keil, & Rai (2004) note a "lack of theory to explain the linkages between various dimensions of software project risk and project performance" (p. 289). Approaches have been largely practical in nature while touching on a wide variety of theoretical frameworks. For example, Bérubé & Gauthier(2017) use a framework of justification to explore project management, which has its roots in political economy scholarship; Barki, Rivard, & Talbot (2001) rely on organization theory; and Shmueli, Pliskin, & Fink

(2015) study three very specific sociological "behavioral effects" in order to examine personal behavior in software development projects. Identity theories and IT identity offer a new context in which an established theoretical framework may be used by researchers to approach project and risk management in a new and meaningful manner.

Feature Creep

This research intends to investigate using interviews that will focus on decisions regarding project feature creep. Multiple project management phenomena may be conflated in this term. While the proposed research project will not involve an objective measure of feature creep, it will involve *worker perceptions* regarding whether their critical decisions supported the current specification or alterations that would be categorized as feature creep. With no accepted single method for identifying, categorizing, and classifying risks, research into feature creep should include an exploration of the concept leading to a strong definition.

One category of feature creep definitions involves changes to a specification during development, after requirements gathering and specification writing are completed. Boehm (1991) lists *Continuing stream of requirements changes* as a top-10 software risk item and suggests the following techniques (which are not further defined by the author) for managing that risk: "High change threshold, information hiding, incremental development (deferring changes to later increments)" (p. 35). This is "based on a survey of several experienced project managers" (p. 35) but the survey is uncited. Aside from the descriptive name for this risk, Boehm does not provide a definition. Since change management seems to be the controlling mechanism, one might presume Boehm is talking about a risk that happens after a product specification has been written and handed off to development.

Elliott (2007) also defines creep as occurring after requirements gathering and specification writing are done. By attempting to reduce risks associated with time-to-market, organizations are more prone to feature creep:

> "From a project manager's point of view, feature creep is defined as changes in features while a product is still in development. It is also known as requirements creep, mission creep, scope creep or featuritis. In a small, fastmoving product development organization characterized by rapid innovation, ideas come quickly, rigid procedures do not. The organization counts on the good judgment and experience of its members to release a successful product in the market, without the bureaucratic overhead of rigid procedures" (p. 304).

Lee & Lee (2015) paraphrase Norman (Norman, 1998) (1998) for their study:

> "adding and emphasizing features has become more popular than in the past, and many products, such as software, now have excessive functionality. This phenomenon of adding features to or emphasizing the current features of a product is termed 'feature creep' (Norman, 1998)" (p. 346)

Here, feature creep is *over-specification* of a product, without regard for whether the additional (unnecessary) features are part of the original spec or introduced later. This might also be called bloat. This is comparable to the term *over-requirement* found in Shmueli, Pliskin, & Fink (2014): "When a product or a service is specified beyond the actual needs of the customer or the market" (p. 380). Over-requirement is defined as synonymous with over-specification and *gold-plating*. Here, the implication is that over-requirement only happens during spec writing:

> "The over-requirement phenomenon is common in software projects and it is seldom reversible since it is very difficult, if not impossible, to eliminate from the overall project scope software

features that were introduced during the requirement-engineering phase or later (Dominus, 2006; Wetherbe, 1991)" (p. 380).

Surowiecki (2007) defines feature creep by describing projects that embody it. This description does not discriminate based on when features are added, only requiring them to be beyond consumer demand:

> "...too often it seems to make things harder, leaving us with fifty-button remote controls, digital cameras with hundreds of mysterious features and book-length manuals, and cars with dashboard systems worthy of the space shuttle. This spiral of complexity, often called "feature creep," costs consumers time, but it also costs businesses money" (para. 1).

This family of definitions that involve over-specification apparently would not consider a change to the specification to be creep as long as the market would feel the feature was necessary for the product.

For the purpose of this research, feature creep will be defined as *changes to a product during development that introduce new functionality and requires additional development work*. The following notes apply to this definition:

- Changing a product specification prior to sign-off, hand-off, or the beginning of development would not be feature creep.
- Changing a product during development by removing features would not be feature creep, though it is conceivable that change management regarding the removal of features could have some negative impact on the project in terms of schedule and budget.
- Changing a product during development by swapping features with zero effect on the overall amount of work done would not be feature creep.

- While "creep" implies multiple slow changes over time, my definition disregards the interval and scale of changes; any single instance of change meeting the details above would be considered feature creep.

While engineers can have great insight that leads to interesting new features, they can also threaten projects with the same behaviors. Even when late feature ideas originate outside the product team, they still need to be accepted and implemented by those creating the product.

> "New needed features become apparent as the developers plunge into the details of the product and the technology. However this tendency of engineers to identify, self-approve, and implement new features can turn into a non-optimal behavior from a project completion standpoint. This behavior may derive from perfectionist tendencies engineers often exhibit, which is a positive trait when applied to developing a robust product and crushing bugs, but can be less than optimal when trying to stop feature creep" (Elliott, 2007, p. 304).

While Elliott (2007) speculates on one possible source of feature creep behaviors, no evidence is to indicate that the perfectionist standard within the engineer identity is the true source. Other identities, including those tied to self-identification with the IT under development, may be driving these project behaviors. This research asks: To what extent does their self-identification with the technology being created impact these behaviors?

Summary

Software project failure continues to be a concern and managing risk our best hope of project success. Risks related to staff are often implicitly or explicitly based on skills, and while skills may affect a worker's ability to perform tasks, their identities drive their actual behavior. Identities are internalized

cultural meaning, and while IS literature has investigated the role of culture in projects, such cultural work is largely limited to the management of multinational project work and focused on ethnic or national identities and their impact on enterprise-level system development. Studies regarding worker identification with the product of their work were not found in an extensive review of IS literature. Identity theories are a promising, novel framework with which to examine project worker risk behavior in an attempt to increase project performance by improving our understanding of project and risk management.

In the following section, we will more thoroughly explore the framework of identity theories that will be used to explore this problem domain.

Part 3: Theory and Hypotheses

Introduction

This section is intended to summarize research regarding culture, identity, and risk management that helps address the proposed research question: "In what ways, if any, does self-identification with an IT under development affect project team members' personal risk-related decision-making behavior on IT projects?" This theoretical framework is then used to suggest a theoretical model for IT identity in the IT development context.

This proposed research project will be conducted within a framework of structural symbolic interactionist theories regarding identity (*identity theories*) including Carter & Grover's (2015) application of these theories in the IS domain through their theorization of IT identity. This framework also includes elements from British cultural studies (or simply *cultural studies* outside of the US (Turner, 2003)) to explain the cultural source of our identities. Cultural studies researchers often work from a symbolic interactionist perspective (Becker & McCall, 1990), making them an excellent fit with identity theories. After a review of cultural studies and identity theories literature, a review project and risk management literature follows, including a discussion of the applicability of identity theories within project and risk management research. Finally, the new model is described.

Theoretical Background

Cultural studies is a common term for an approach for research into culture that had an early home at the Birmingham Centre for Contemporary Cultural Studies (CCCS) in the 1960s. It is an approach to the study of culture that is "dedicated to the notion that the study of cultural processes, and especially of

popular culture, is important, complex and both theoretically and politically rewarding" (Grossberg et al., 1992, p. iv). It attempts to explain how social meaning is created, and is partially based on the works of Saussure and Foucault in linguistics, semiotics, and discourse (Turner, 2003; Weedon, 1994). It contends that "culture is a terrain on which there takes place a continual struggle over meaning" (Storey, 1994, p. ix), and that "when we are at our most natural, our most everyday, we are also at our most cultural.... when we are in roles that look the most obvious and given, we are actually in roles that are constructed, learned and far from inevitable" (Willis, 1979, p. 185).

Linguistically, there is no inherent link between a word and what it represents. The word dog only has meaning because English speakers agree it does. Other languages have other words to represent the same concept. Further, any distinction between dog and mutt, dog and wolf, or dog and cat, are also cultural. It is convention and not universal natural law that gives these words meaning. Extending these principles beyond linguistics, Saussure claims that these principles also apply to other forms of communication, including "non-linguistic systems such as those governing images, gestures or the conventions of 'good manners'... seeing them all as 'signifying systems'" (Turner, 2003, p. 13) that allow humans to construct shared meaning.

While some disciplines study culture as a society's ideals, and others define culture as the major artistic works of a society, cultural studies sees culture as the daily *lived experience* of members of a society or group. While this definition includes the material found in those narrower concepts of culture, cultural studies research includes "analysis of elements in the way of life that to followers of the other definitions are not 'culture' at all: the organization of production, the structure of the family, the structure of institutions which express or govern social relationships, the characteristic forms through which members of the society communicate" (Williams, 1998, p. 48).

Bourdieu (2010) explains this tenet by stating that "one cannot fully understand cultural practices unless 'culture', in the restricted, normative sense of ordinary usage, is brought back into 'culture' in the anthropological sense, and the elaborated taste for the most refined objects is reconnected with the elementary taste for the flavours of food" (p. xxiv). This concept of culture motivates cultural studies scholars to analyze the symbols and meanings within popular culture, which other disciplines tend to reject.

These meanings of the symbols we find within society are never fully settled. Cultural studies "assumes that capitalist industrial societies are societies divided unequally along ethnic, gender and class lines [and that] culture is one of the principal sites where this division is established and contested" (Storey, 1994, p. viii).

> "Because different meanings can be ascribed to the same cultural text or practice, meaning is always the site and the result of struggle. A key question for cultural studies is: Why do particular meanings get regularly constructed around particular cultural texts and practices and achieve the status of 'common sense', acquire a certain taken-for-granted quality? However, although the cultural industries are a major site of ideological production, constructing powerful images, descriptions, definitions, frames of reference for understanding the world, cultural studies reject the view that ordinary people who consume these productions are 'cultural dopes', victims of 'an up-dated [sic] form of the opium of the people'" (Storey, 1994, p. ix).

Given inequalities in society, "culture is a terrain on which there takes place a continual struggle over meaning, in which subordinate groups attempt to resist the imposition of meanings which bear the interest of dominant groups" (Storey, 1994, p. ix). These often-invisible power struggles over meaning are not a consequence of societal structure and history, but are its core. Cultural studies "argues that culture's

importance derives from the fact that it helps to constitute the [social] structure and shape the history" (Storey, 1994, p. viii) rather than merely reflecting them.

Some of these struggles for meaning include forces from industry. Cultural studies views economic systems in a cyclical relationship with culture. All industry comes into existence within a cultural context, but then products from those industries can influence culture (Hesmondhalgh, 2012; Willis, 1994). This is especially true of products from the *cultural industries*. Organizations are categorized as part of the cultural industries "because **they deal primarily with the industrial production and circulation of texts**" (Hesmondhalgh, 2012, p. 6) and "are most directly involved in the **production of social meaning**" (Hesmondhalgh, 2012, p. 16) [emphasis in original]. Along with digital games (which are a segment of IT as well as part of the cultural industries), the list of cultural industries includes journalism, film, television, radio, and marketing. Their basic products (e.g. games, articles, movies, programs, and advertisements) are in a class that cultural studies scholars refer to as *cultural texts*. For all of these, the intent of production is less about utility than on conveying a message of social significance (Hesmondhalgh, 2012). By contrast, television and monitor manufacture is not part of the cultural industries: While all objects have at least some social meaning by simply existing within society, the primary goal of creating a television or monitor is the production of an electronic good that affords consumers a utilitarian function (interpreting audio and visual signals) and not the production of social meaning. This is true even though these products are used to consume cultural texts.

Structural Symbolic Interactionist Identity Theories

Identity theories share many structuralist and post-structuralist concepts with cultural studies. These theories seek to understand an individual's sense of self, examining "what it means to be who you are" (Burke & Stets, 2009, p. 3). Their application to IS research is exemplified by Carter & Grover (2015).

An individual's sense of self is "that which characterizes an individual's consciousness of his or her own being or identity. The self has the ability to take itself as an object, to regard and evaluate itself, to take account of itself and plan accordingly, it to manipulate itself as an object in order to bring about future states" (Burke & Stets, 2009, p. 32).

A person's sense of self is comprised of many identities, each of which is the personal internalization of the meaning that person finds in society. When we are born, we have no sense of self, but we are born into society. We create our selves from the meaning that we find in society—largely through the teachings of others in society, intentional or otherwise—and then we influence society by sharing those interpretations of society with others. In this way, individuals and society affect each other, but society always comes first since it existed prior to any person's birth (Burke & Stets, 2009). In the terms of cultural studies, we construct our sense of self through lived experience of the culture into which we are born and in which we live.

The self contains many identities, and each identity is an interpretation of concepts we encounter in society. We absorb information from our social environment about that environment and internalize the meaning we find there into our concepts of our self and of others. The set of meanings a person attaches to an identity is its *standard*. While an identity may be shared among many, each person's standard for that identity is unique: Many see themselves as scholars, but no two individuals have the exact same standard for their scholar identity (Burke & Stets, 2009). Despite these variations, scholars of identity theories assert that societal meaning changes slowly enough that generalizations can be made about individuals who share an identity in a given cultural context. This slow-changing societal structure gives *structural* symbolic interactionists their differentiation from symbolic interactionists (Burke & Stets, 2009).

These identities are not all of equal importance to an individual. The position of an identity within the default hierarchy of all one's identities is its *prominence*, while *salience* is situational. "The prominence hierarchy is more enduring and stable" while "the salience hierarchy is rather fluid as role identities become temporarily activated in different situations" (Burke & Stets, 2009, p. 41). This does not mean the standards of these identities change easily, just their position in one's salience hierarchy, as the situation dictates.

These identities are the source of our behavior. As different social situations arise, some of one's identities become more salient, and one acts in accordance with the standards of those identities, confirming them as part of one's self. According to a model specifically regarding role identities, the salience hierarchy of one's identities is determined by a number of factors, including one's ideal sense of self (their *prominence* hierarchy of identities), one's perceptions of the ways in which identities have been *supported* and *rewarded* in the past, and the perceived opportunities for reward and support involved in the current situation (Becker & McCall, 1990; Burke & Stets, 2009). Supporting behavior associated with an identity also reinforces that identity, making it more prominent in one's self and more likely to become salient again in the future (Burke & Stets, 2009).
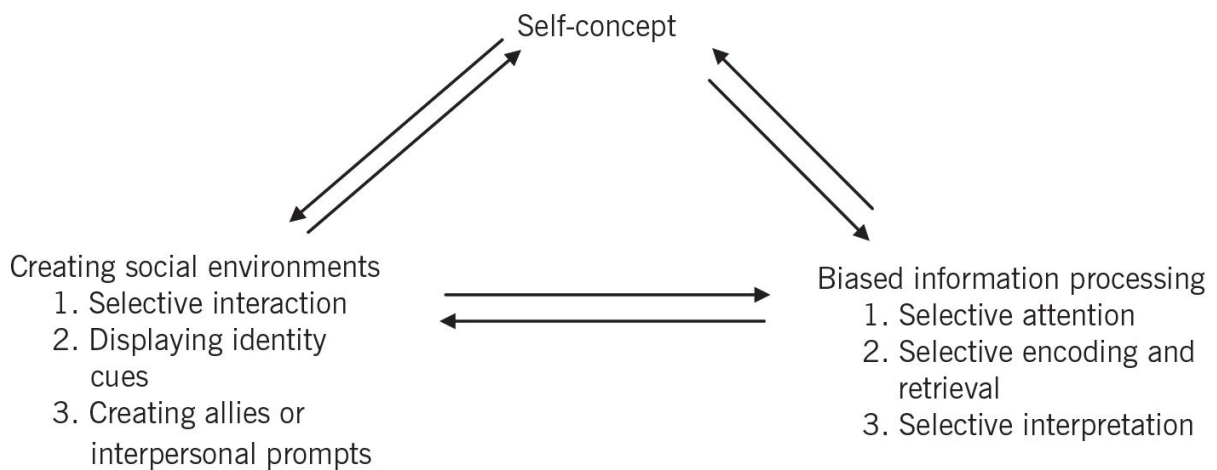
While identities do change, they more commonly serve as stabilizers. When an identity becomes salient, a person tends to react in ways that maintains that identity, confirming or verifying it rather than change it. Our reactions are based on perception, a function that is often compared to a thermostat, which will react to cool a room even if it only feels too hot because someone is holding a flame to it (Burke & Stets, 2009). When a person's perceptions tell them that they are not maintaining an identity standard, their behaviors will rectify that perceived error until the standard is achieved (see Figure 1).
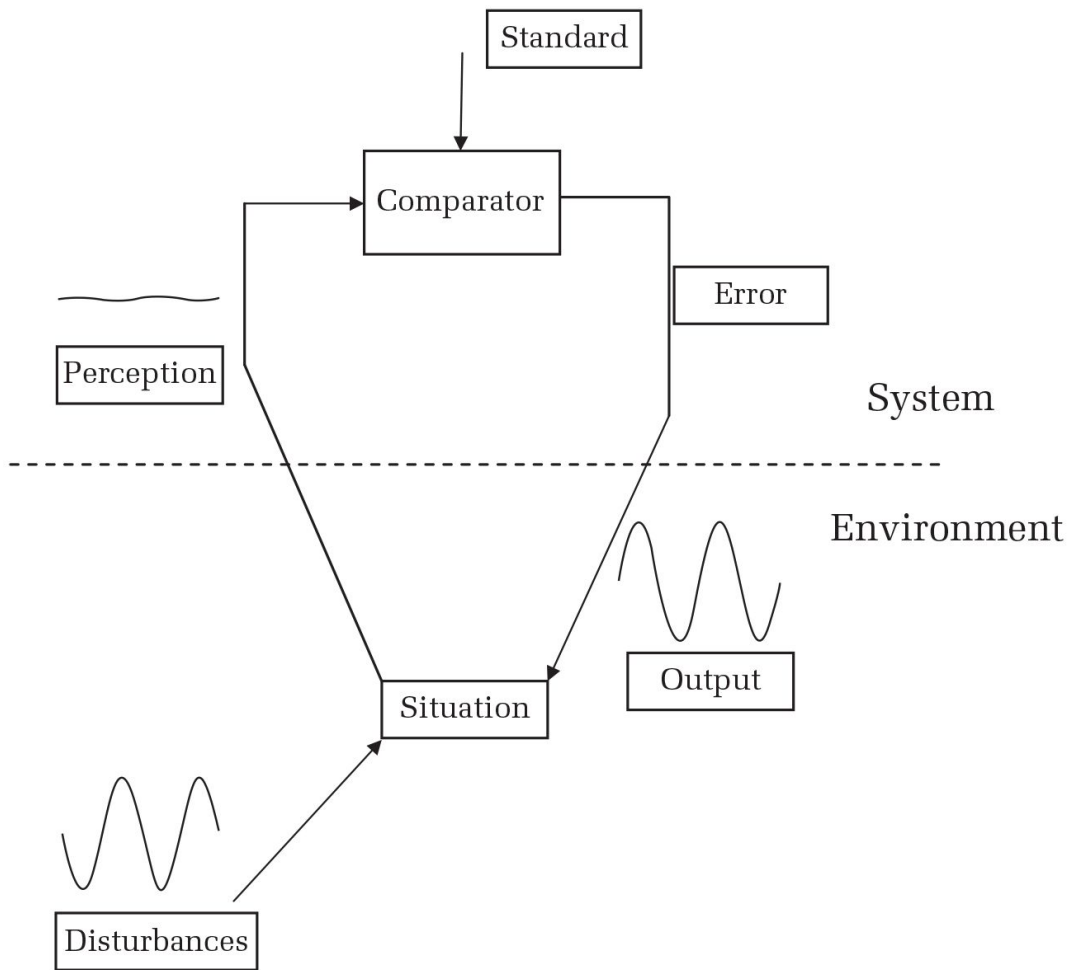
[Figure 1. Perceptual Control Model (Burke & Stets, 2009, p 30)]

Figure 2 illustrates ways in which behavior can be used to self-verify when a person's self-concept does not match one's perceptions. For example, a bad review might challenge a person's "teacher" identity. This incongruity between the teacher identity's standard and the feedback may be addressed in several ways. Selective interaction may allow the teacher to avoid students that give bad reviews. The teacher may choose to display identity cues to indicate the quality of their teaching, such as past awards or positive feedback. The teacher may also alter behavior in an attempt to prompt verifying feedback from

those who had given the disconfirming feedback. It is also possible that the teacher may pay selective

attention to confirmatory feedback, even selectively remembering confirmatory feedback rather than

disconfirmatory feedback. Finally, the teacher may choose to selectively interpret the bad review,

justifying it as "not really that bad." In each of these ways, the perception that one's identity has been

disconfirmed has resulted in behavior that confirms or verifies the identity.

Self-concept

Creating social environments
1. Selective interaction
2. Displaying identity cues
3. Creating allies or interpersonal prompts

Biased information processing
1. Selective attention
2. Selective encoding and retrieval
3. Selective interpretation

[Figure 2. Self-verification Process (Swann & Buhrmester, 2014, p. 408)]

Since they are relatively stable, identities act a framework through which individuals can predict the

way others react to their behavior. When individuals interact, it's never two whole selves interacting, but

rather it's an interaction of salient identities (Burke & Stets, 2009). In a classroom, the interactions are

governed by the expectations of a teacher interacting with students. A specific situation, perhaps the

discussion of a topic of particular importance to a student, may bring a non-student identity into

prominence. While potentially a positive experience, this situation may also lead to unexpected behavior

that challenges the expected social norms of a teacher-student interaction. "People strive to avoid such

disasters by entering into and creating social worlds that confirm their self-views" (Swann & Buhrmester, 2012, p. 407).

Identities tend to be classified into one of four types. Most heavily analyzed in sociological approaches to identity are role identities, which internalize society's expectations for individuals acting in a given societal role (Burke & Stets, 2009). "Educator," "worker," and "parent" are all examples of role identities and may even all be part of a single individual's self-concept. Group identities, which are the focus of research in psychology, serve a similar function for members of groups (Burke & Stets, 2009), including religious, ethnic, and cultural groups. Person identities are those that attempt to distinguish one as a unique individual (Burke & Stets, 2009). "Trustworthy," "frugal," and "artistic" are all examples of person identities. More recently, researchers, particularly in the domain of consumer research, have explored material identities, tied to possessions or places (Clayton & Opotow, 2003; Dittmar, 2008; Tian & Belk, 2005). Material identities, which are constructed and function like role, group, and person identities, refer to self-identification with most any physical or conceptual thing or class of things: A theoretical framework, a make of car, or a software package.

Historically, the IT literature tends to look at the relationship between technology use and identity in three ways: technology use can be a *medium* for identity, *determinant* of identity, and *consequent* of identity. As a medium for identity, it allows us to express an identity: A graphics application may allow an artist to express themselves through their digital creations. As a determinant of identity, technology use is seen to change existing identities or bring about new identities: An individual in the 1980s who gained access to a modem may have developed a telecommuter identity. As a consequent, technology use driven by our other social roles may give rise to new identities or bring about changes in old ones: A teacher may begin to use new technologies as a consequence of verifying their teacher identity, should part of its

standard involve keeping current with new teaching techniques (Carter & Grover, 2015). None of these historic approaches to identity and IT explore self-identification with the IT itself.

Recent research has theorized an IT identity, defining it as "the extent to which an individual views use of an IT as integral to his or her sense of self" (Carter & Grover, 2015, p. 932). Understanding IT identity is fundamental to understanding how individuals interact with technology on a day-to-day basis, both at work and in their personal lives. It was originally conceived to explain phenomena involving the of use and adoption of consumer technologies. An IT identity is theorized in three dimensions: *relatedness*, *emotional energy*, and *dependence*. People having an IT identity will feel that they are connected to IT; experience sensations of "confidence, enthusiasm, and energy" (Carter & Grover, 2015, p. 945) when considering IT; and believe that they can rely upon IT to help them in their work and personal lives. Users exhibiting their IT identities will have comparatively higher levels of use, seek out ways to use the IT and explore additional affordances of the IT, and resist replacing it with new, different technology.

IT identity was originally conceived as a new form of material identity, encompassing technology at many levels (Carter & Grover, 2015). As defined, IT identity applies to an "an IT," but identities can be complex and overlapping. An IT identity may be with a class of devices, a device, an operating system, an application, or a function of an application. In the same way, game-related identities may exist at the level of a platform, a device, a game genre, a game franchise, a specific game, or a game mechanic.

IT identity was also conceived as a positive self-identification with an IT (Carter & Grover, 2015), running in strength from indifference ("this has nothing to do with who I am") to positive identification ("this is who I am") rather from negative identification ("this is antithetical to who I am") to positive identification. Further investigation explored negative identification, and has proposed that our complex

relationships with IT may be theorized in two dimensions, including measures of both positive and negative self-identification with IT. The resulting grid includes positive and negative self-identification as well as dis-identification and ambivalent self-identification (Carter et al., 2018).
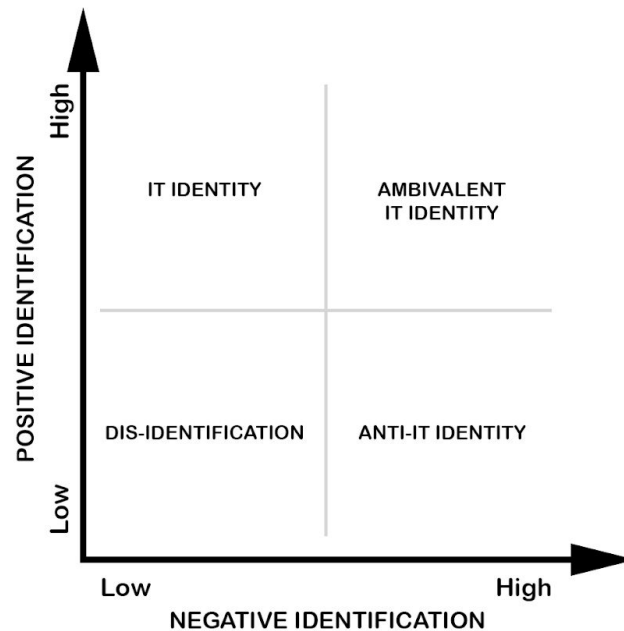

[Figure 3. The Emergent Qualitative Framework (Carter, Compeau, & Schmalz, 2018, p. 5)]

IT identities are independent of expertise or self-efficacy with an IT: A person can be an expert with a given technology, feel capable of using that technology, and also feel it has little to do with who they are (dis-identification) or even that it is antithetical to who they are (anti-identification) (Carter et al., 2018). For example, a competent MacOS user may feel that OS is antithetical to who they are, while perhaps having a positive IT identity involving Windows or a flavor of Linux.

In the IT identity theoretical model (Carter & Grover, 2015), an IT identity influences behavior, and that influence is moderated by a set of Situational Influences which include Opportunities and Support

(which incorporates training, policies, infrastructure, interpersonal ties, and technological ties), Perceived

Behavioral Control ("the extent to which a person feels able to enact the behavior in accordance with an

IT identity" (p. 944)), and IT Dynamism (the frequency and extent of changes to the technology).
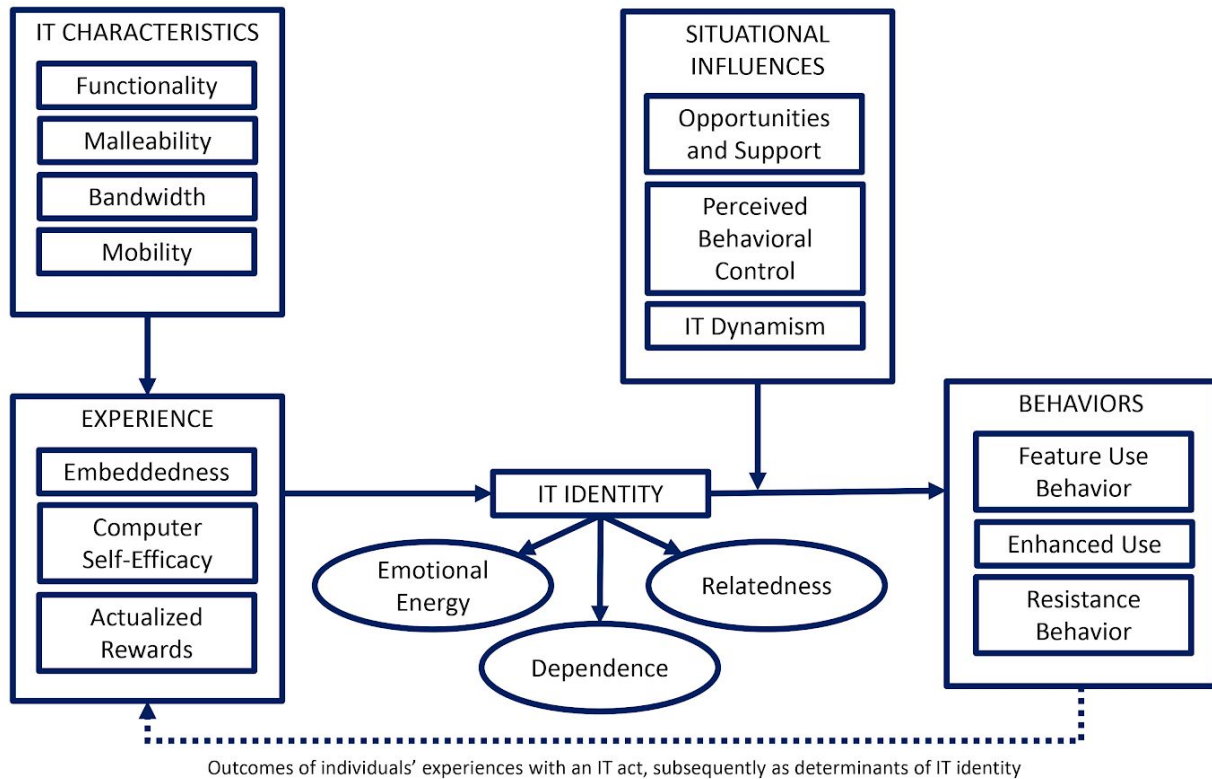
[Figure 4. An Initial Theoretical Model for IT Identity (Carter & Grover, 2015, p 943)]

Psychological Ownership

Psychological ownership is conceptually related to self-identification with an object but is not

synonymous. Material identities concern who a person is in relationship to an object while psychological

ownership concerns a person's feelings of possessiveness towards an object. It is also not synonymous

with legal ownership, as a person can have feelings of possessiveness towards objects they do not own,

including immaterial objects such as "ideas, words, artistic creations, and other people" (Pierce et al., 2003, p. 4).

In the domain of psychology, psychological ownership is thought to have its roots "in three human motives: (a) efficacy and effectance, (b) self-identity, and (c) 'having a place'" (Pierce, Kostova, & Dirks, 2003, p. 8). Efficacy and effectance refers to the human motivation to feel a sense of control over their environment, and having a place refers to the human motivation to have personal space that provides a sense of security. The basic motivations of maintaining a sense of self are detailed above, and illustrate the strongest conceptual connection between material identities and psychological ownership. "Ownership may emerge as the result of any one, or any subset, of these needs. For example, an individual may feel ownership when he/she has a strong efficacy and effectance motive, even though the identify motive might be non-active" (Pierce et al., 2003, p. 21). These motives are not entirely independent of one another: Satisfying any one of them has the potential to reinforce the others.

There are also three theorized paths (or mechanisms) that give rise to psychological ownership: controlling the ownership target, coming to intimately know the ownership target, and investing the self into the ownership target. Pierce suggests "that the three routes to psychological ownership… are distinct, complementary and additive in nature. Any single route can result in feelings of ownership independent of the others. However, the feelings of ownership for a particular target will be stronger when an individual arrives at this state as a result of traveling multiple routes… rather than just one route" (Pierce et al., 2003, p. 21)..

Recent IT identity scholarship suggests that psychological ownership is a consequent of IT identity. "Self-identification with a material object can give rise to psychological ownership… [implying] that as a

person reflects upon and positively self-identifies with use of an IT, s/he may begin to experience a sense of ownership over the technology" (Carter, Petter, Grover, & Thatcher, In Press).

Research Model

This work explores the way self-identification with technology affects work-based risk behaviors using identity theories as a theoretical foundation. Existing models of identity and behavior are insufficient due to the uniqueness of the project context. While the IT identity theoretical model is based on identity theories involving material identities, it is primarily a model to explain adoption and use, not creation. We require a new model to consider phenomena related to worker behavior when the individual self-identifies with the technology they are creating. This work proposes to explore such a model.
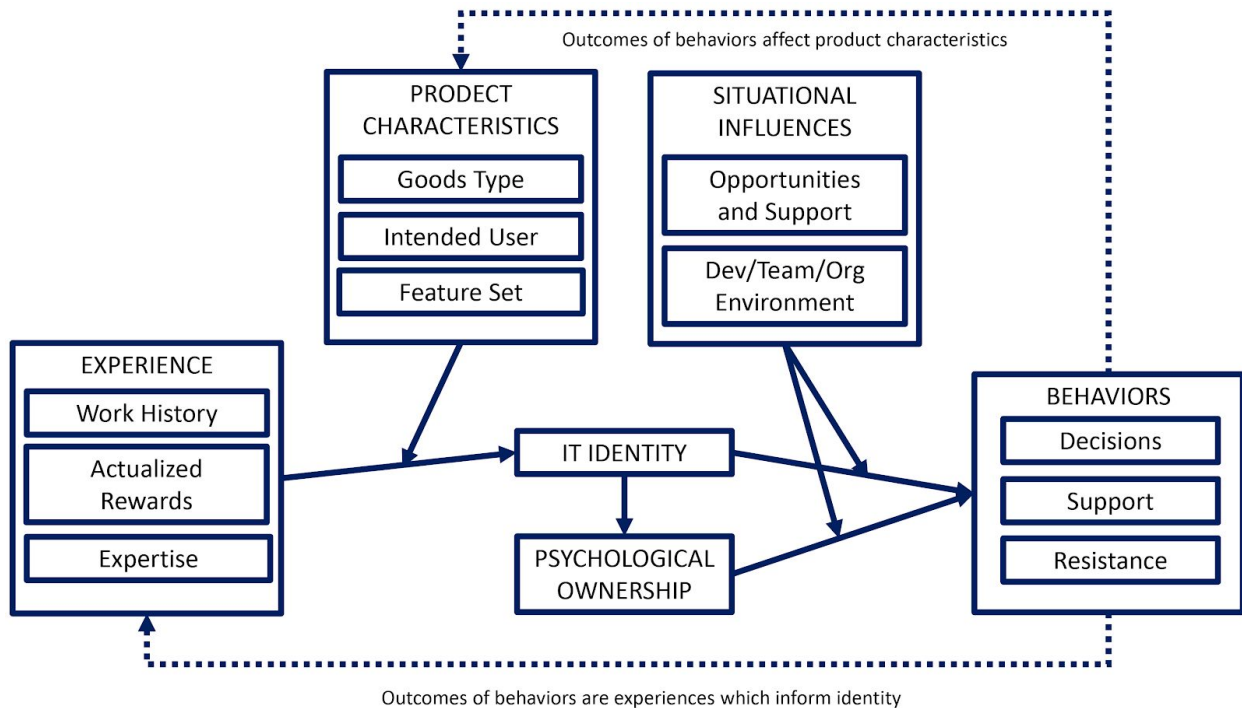
[Figure 5. New Theoretical Model for IT Identity and Development Team Members]

In this model, a worker's Experience with related technologies influences the formation of an IT identity regarding a new IT they share in creating. One cannot form an identity around something one has never experienced, at least conceptually. For workers participating from the start in the creation of new technology, we look to their experiences with related technologies which will influence early identity formation. Since this study is focused on development team behaviors, past technology experiences may include a history of past projects, expertise in the form of technological skills and knowledge, and perceived rewards from the use or creation of similar technologies. It is also possible that a worker is introduced to a team responsible for ongoing development of a working technology, in which case these factors can actually include experiences directly with the IT under development.

The process is moderated by the characteristics of the product under development (Product Characteristics). These characteristics can be both current and planned, and can even change due to the development process. A product's Goods Type is an expression of its presence on a continuum of its cultural meaning. While this continuum is theorized as ranging from purely utilitarian to consumerized to highly cultural, exact measurement of this construct is beyond the scope of this work. Instead, case selection will be performed to allow a binary evaluation of good type as a cultural good or a utilitarian good. Further moderating the process is the worker's perception regarding their closeness to the product's target user, which may involve other types of identities. Finally the product's current and planned feature set will influence the worker's self-identification with it.

This theoretical model includes Psychological Ownership as a consequent of IT identity, consistent with recent IT identity research. Self-identification with a technology creates a sense of Psychological Ownership of it, and these two drive work Behaviors. Most important to this project is decision-making behavior which either affirms or alters project characteristics, specifically the product's feature set, by

allowing or resisting feature creep. Non-decision behaviors may also support or resist the effective functioning of the project team. The outcomes of work behaviors (for example, the manner in which the behavior is rewarded or resisted) are experiences themselves, influencing the worker's self-identification with the IT under development.

The influence of the IT identity and psychological ownership on behaviors is moderated by Situational Influences. Opportunities and Support comprise a set of organizational policies or features which an individual might perceive to grant opportunities for enacting an IT identity and support for doing so. Carter & Grover (2015) include training, policies, infrastructure, interpersonal ties, and technological ties in their original model, but this list may change in the development context. Another situational influence is the nature of the dev team and the organization, and their perceived tendencies to reward or resist the enacting behaviors. This is an expression of the culture in which the IT is being developed, and is expected to involve worker identification with those groups. Table 1 summarizes these constructs.

Category	Construct	Definition
Behaviors	Decisions	Project-related decision-making behaviors which impact development plans and may involve risk.
	Support	Behaviors which support current development plans of project/org leadership.
	Resistance	Behaviors which resist current development plans of project/org leadership.
Experience	Work History	Related work on similar projects.
	Actualized Rewards	Benefits/Rewards/Satisfaction with products similar to project outcomes.

	Expertise	Skills and knowledge applicable to the work performance and the use of the final product.
Outcome Characteristics	Goods Type	A continuum regarding the cultural meaning embodied by the product ranging from Cultural to Consumerized to Utilitarian.
	Intended User	Perceived similarity between worker and the target user.
	Feature Set	The current specification.
Situational Influences	Opportunities and Support	Perceived opportunity and support for enacting the IT identity (possibly including training, policies, infrastructure, interpersonal ties, and technological ties) (Carter & Grover, 2015)
	Dev/Team/Org Environment	Work environment traits (may involve group identities for worker)

[Table 1. Constructs]

Behaviors driven by self-identification with the product must either support the current set of characteristics or alter them. I expect to find a self-confirmatory decision-making behavior where IT identities are salient: Workers who self-identify with the technology will tend to make decisions that move the outcome characteristics closer to their ideal. In the established identity thermostat metaphor, our behavior corrects for perceived imbalances between the way we think we are perceived and our identity standard, but here the perceived imbalance involves the tech we are developing, too.

As with all models, this is an abstraction to help better explain the mechanisms behind phenomena. The research is not intended to simply verify or refute this model, but to use it as a starting point to develop an improved model that represents a greater understanding of these constructs and their interactions.

Summary

This proposed research project will be conducted within a framework of structural symbolic interactionist theories regarding identity, particularly IT identity. These identity theories can help us better understand product team behavior, but are currently unused in the domain. This proposed research will use these identity theories, particularly IT identity, to explore and test a proposed theoretical model for IT identity in the IT development context.

In the following section, we will look at the specific methods proposed for this investigation into the sources of project worker risk behavior, particularly as they apply to self-identification with the product under development.

Part 4: Methodology

IT project failure remains a problem after decades of study, and our analysis of why projects fail has done little to explore who is participating in project teams in terms other than analyzing their skills. While skills are certainly a factor in project success, and while certain behaviors are impossible without having skills, it is one's identities that drive behavior on project teams and project behaviors affect project success. For example, while a developer may have skills in the use of a programming language, it is that developer's identities that determine when and how that skill is used. While the literature regarding risk and project workers contains observations that would indicate an effect by role, group, and person identities of project team members, connections to material identities are weak, as described in Part 2.

This proposed study focuses on distinguishing those identities which are salient during IT project work, particularly those which are salient during decisions which have a high likelihood of affecting the scope, schedule, and budget in a way that affects project performance. In this section, I detail a qualitative research project involving a carefully chosen set of four internally replicating case studies of project teams and their members that reveals these identities and their standards—including the possible presence of self-identification with the IT under development—and explores their impact on decision-making behavior in IT projects. This case study work and takes place within the IS domain. As such, this research design attempts to adhere to the Dubé & Paré (2003) guidelines for rigor in such studies.

Rationale for Research Approach

This research is being performed from a post-positivist critical realist perspective. This ontological perspective "holds that an (objective) world exists independently of people's perceptions, language, or

imagination. It also recognizes that part of that work consists of subjective interpretations which influence the ways in which it is perceived and experienced" (Edwards, O'Mahoney, & Vincent, 2014, p. 2). In that regard, the phenomena regarding self-identification with technology are seen as an objective part of our reality, but our understanding of these phenomena are imperfectly understood due to subjective interpretations of them. The goal, then, is to use research methods to bring our subjective understanding closer to the objective reality. In this research, this goal is accomplished by proposing a model based on theory and testing it through qualitative analysis of the accounts of people who directly experience the phenomena (Edwards et al., 2014).

Research Context

Rigorous case studies include a set of important details about the context of each case:

> "The first relates to the setting: a detailed account describing where the research was conducted the specific period of time under investigation. Other key aspects are related to the moment data was collected in relation to the time the events occurred, whether there were one or more data collection periods, whether the researcher was able to gain sufficient access and spend enough time to develop an intimate understanding of the setting and the phenomenon of interest, and whether the researcher collected data during the course of the events (on-going) or *a posteriori*" (Dubé & Paré, 2003, p. 610).

While many of the specifics will only be available after case selection, some are selection criteria. Cases will be selected from the Pacific Northwest as a matter of cost and convenience. Data gathering is by interview, not observation, so data collection will be a posteriori, though the projects involved may still be active. The critical incidents under discussion will have taken place within a year of the interview. Interviews are planned for one hour to ninety minutes, which has been sufficient for past IT identity

research. All interviews for a single case are intended to be performed within one business week to avoid problems which may arise with changes to constructs in the theoretical model.

Research Sample and Data Sources

This work will select four IT project teams from the Pacific Northwest to serve as cases. Each case will exist in a grid with dimensions that describe the team in terms of its product (cultural or utilitarian) and its owner (internal or outsourced):

	Utilitarian Product	Cultural Product
Outsourced Product	Case One	Case Two
Internal Product	Case Three	Case Four

An outsourced project is one in which an outside organization has contracted with the project team's organization to complete development work. An internal project is financed by the project team's organization. This dimension is included in order to help distinguish psychological ownership from self-identification with a material object. It seems likely that workers will have a lower sense of psychological ownership when working on outsourced projects. In order to emphasize the distinction between cultural and utilitarian products, the cultural products will be publicly published digital games and the utilitarian products will be management information systems intended only for use within a single organization.

A common flaw in case study research is a lack of specificity about the unit of analysis within the case (Dubé & Paré, 2003). The theoretical framework used in this research explains how an individual forms a

sense of self and how that determines behavior. While each case in this research is an IT development team, the unit of analysis is the individual tech worker.

The case grid dimensions are theorized factors in worker self-identification with the IT product under development by their teams. As previously stated, the literature shows that companies developing digital games tend to hire game enthusiasts to produce games. This intentional relationship between product and employee identity does not seem to appear in MIS literature. Cultural product team members are expected to report greater salience of material identities related to their product.

With the second dimension, we attempt to isolate factors related to psychological ownership that may be associated with self-identification with the team's product. Teams developing products for their own companies (rather than working as outsourced labor for other companies) are theorized to have a higher sense of psychological ownership which should be related to material identities with the object of that psychological ownership. Internal product team members are expected to report higher levels of psychological ownership and greater salience of material identities related to their product.

The use of case studies and the selection of cases must also take into consideration the individual tech workers involved, since the individual is the unit of analysis. IS work is not known for its diversity, and the use of project teams as cases will almost certainly limit the diversity of my participants far more than a purposive selection of tech workers from across the industry. An extensive search for diverse project teams may delay this research and also introduce other cultural factors that may impact identity salience during development. For this study, I will not use team demographics as a factor for case selection, but I will carefully track participant identification with demographic groups. Future work will necessarily include additional investigation across the breadth of IT worker demographics as the range of salient worker identities is explored.

Proposed Data Collection Method(s)

The primary instruments for data collection will be a Twenty Statements Test (TST) (Kuhn & McPartland, 1954) and a semi-structured critical decision (Klein, Calderwood, & MacGregor, 1989) interview. Secondarily, participants will be asked to provide access to any work-related documents or other artifacts they feel may contribute to understanding their decision-making process.

The TST has been used in identity studies for more than 65 years, and is a proven tool for eliciting information on those identities which the participant claims. Participants are asked to complete the prompt "I am…" in twenty different ways. The results of the TST will inform the semi-structured critical decision interview. Participants will be asked to complete the TST days before the interview in hopes of inducing further identity reflection prior to the interview phase.

The critical incident method is another long-standing, proven technique, allowing researchers to explore the decision-making processes of participants. It aids researchers in the expression of "expert knowledge in situations where the experts have difficulty accessing their knowledge" (Taylor, 2006, p. 52). It "applies a set of cognitive probes to actual nonroutine incidents that required expert judgment or decisionmaking. Once the incident is selected, the interviewer asks for a brief description. Then a semistructured format is used to probe different aspects of the decisionmaking process" (Klein et al., 1989, p. 464). In addition to eliciting expert tacit knowledge, the critical incident method is also helpful in revealing differences in participant perspectives by focusing on the context of a critical situation (Klein et al., 1989), which will be highly beneficial if and when participants give different perspectives on a common work decision within their case. While structured interviews follow a strict script and unstructured interviews have no formal script, the semi-structured format generally follows a script but allows researchers the flexibility to improvise for the exploration of emerging themes (Brinkmann, 2014).

Participants will be asked if they will allow audio recording of the interview. If not, copious notes will be taken during the interview. The interview will begin with a set of short questions regarding demographics, the project team, and the product being developed. Participants will then be asked to recall an incident where they were required to contribute to a decision-making process that may have resulted in feature creep. Prompts, informed by TST results, will be used to ascertain which identity or identities were salient during the decision and which features of the salient identity standards were causing those identities to be activated. Additional prompts will be used to explore each construct in the theoretical model.

At the end of the interview, participants will be asked if they can provide any documents or other artifacts related to the team's decision and their personal decision-making process. Artifacts such as bug reports or email threads regarding the decision may shed additional light on the identities which were salient during the incident.

Prior to use in cases, I will test the interview instrument with volunteers from at least two of the case quadrants. Choosing diagonally positioned quadrants (either One and Four or Two and Three) will allow me to test across both dimensions using only two tests. These tests will allow me to refine the data collection instruments (the script's structure, the language used, and the time required to participate) as well as the model prior to large-scale data collection. Given the flexible nature of semi-structured interviews, the pre-test instrument can be sent to the institutional review board for human subjects approval.

Proposed Data Analysis Method

After completion, interviews will be transcribed. If funding permits, the audio recordings will be transcribed by a professional; if not, the audio will be auto-transcribed through a voice recognition service and the resulting script cleaned by me. Clean read transcripts are preferred to verbatim transcripts. The transcripts exist to facilitate analysis, but original audio recordings will be kept through publication to allow me to verify the transcripts and the coding of the interviews, and to review the audio for participant inflection.

Each transcript, as well as any documents or other artifacts supplied by a participant, will be qualitatively analyzed using *analytic induction* to test the relationships represented in the research model. Ryan & Bernard (Ryan & Bernard, 2000) explain the process:

> "First, define a phenomenon that requires explanation and propose an explanation. Next, examine a case to see if the explanation fits. If it does, then examine another case. An explanation is accepted until a new case falsifies it. When a case is found that doesn't fit, then under the rules of analytic induction, the alternatives are to change the explanation (so that you can include the new case) or redefine the phenomenon (so that you can exclude the nuisance case). Ideally the process continues until a universal explanation for all known cases of a phenomenon is attained" (p. 787).

In this fashion, gathered data will be used to test the fit of the research model from Section 3. If any data falsifies the model, the model will be revised and analysis performed iteratively until the model matches the evidence. During this process, procedural and analytical memos will be written in order to track process and progress. Once all cases have been processed under a single emerging model, additional

analysis will be done to compare the cases in order to analyze differences that might relate to the case grid's dimensions.

Ethical Considerations

Participants will be supplied with informed consent documents. Since each case takes place in the context of a software organization, there may be some perceived pressure to participate if it is requested by management, so the documents will be clear that participation is not required and each individual may choose not to answer any or all questions without reprisal. Any data provided will be anonymized for publication. Also, when recording information from multiple individuals on the same incident, caution must be taken to avoid linking knowledge of an incident to specific participants in a fashion that might harm them socially or professionally. Any promised compensation will be commensurate to the effort required to participate in order to avoid problematic inducements to participate.

Strengths/Limitations

Dubé and Paré (2003) provide a framework for producing rigorous case study research in the IS domain. This work will follow as many of their recommendations and guidelines as possible, ensuring the research meets the high standards of the domain.

While a single case study may provide sufficient evidence to falsify a theory, "frequent criticism of case study research is that its dependence on a single case renders it incapable of providing a generalizable conclusion" (Dubé & Paré, 2003, p. 609). As recommended, this work uses multiple cases rather than a single case. In fact, this work involves four case studies, chosen for traits that allow them to be internally replicated, as per Sherif, Zmud, & Browne (2006). By carefully selecting four cases based upon a set of characteristics represented in my variance model, both similarities and differences, I will be

able to use both literal and theoretical replication to improve the validity of my results: Literal replication lets researchers compare cases that should have similar results where theoretical replication lets researchers compare cases that should have inverse results.

The generalizability of the study results will be limited by the selective, purposeful nature of case selection. Yin (2009) explains that "case studies, like experiments, are generalizable to theoretical propositions and not to populations or universes" (p. 15).

Yin (2009) also suggests that case study methods are best when they focus on contemporary events. Identity research would also be best if it focuses on contemporary events since identities, though relatively stable, may change over time. This design involves the risk of being unable to find timely, convenient cases that fall into specifics of its four case structure. It also may limit the opportunities to recruit a diverse pool of IT workers, since the industry tends to be dominated by caucasian males. A research design that did not rely on the selection of project teams would provide more opportunities to purposively recruit for diversity. Hopefully, these limitations will be overcome by future work.

This work relies heavily on finding software organizations that are willing to allow one of their project teams to participate, and on the willingness of team members to support that position. While I do not anticipate a failure of the four case study structure of the proposed project, it is a possibility. If that risk were to become an actual barrier to timely completion of the work, it will still be possible to complete analysis of the proposed model by recruiting individuals and closely tracking any project traits that may affect the model.

Schedule

Under ideal conditions, this work can be completed in nine months. A rough representation of this optimal schedule is depicted in Figure 6. The Institutional Review Board (IRB) approval process can begin almost immediately using the instruments in Appendix A. Case recruitment can occur on a rolling basis, overlapping data collection. Transcription can begin shortly after each interview is conducted. While some analysis, in the form of notes and memos, may actually begin before transcription is complete, final analysis cannot occur without transcripts. Final report writing is scheduled for four months, with the oral defense occuring at the end of Summer Quarter 2020.

Phase	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
IRB	■	■							
Recruitment		■	■						
Data Collection			■	■	■				
Transcription				■	■	■			
Analysis					■	■	■		
Reporting						■	■	■	■
Defense									■

[Figure 6. Ideal Schedule]

There are many risks to this schedule, and given the problem domain, it seems important that several of them should be discussed. I do not anticipate problems with the IRB approval process since this work is similar to past projects which have quickly received exempt status, While I do not anticipate problems recruiting cultural project teams for participation, my connections to the utilitarian software development community are considerably weaker, and finding those participants may cause delays in the schedule. If

such recruitment is overly difficult and the comparative case structure needs to be abandoned, individual recruitment will likely take even longer.

My work is funded by my employment as an academic student employee, eating up 20 hours per week of work time through Winter and Spring. My Winter schedule is not ideal for spending multiple consecutive days conducting interviews in each case, which may cause delays in data gathering. Spring funding is guaranteed, but my specific schedule is undetermined. Summer funding may have to come in the form of industry work or teaching, which may delay progress. Part of Winter will be spent seeking alternate forms of funding in order to relieve employment pressures through Spring and Summer. The optimal schedule presumes outside, professional transcription of interview recordings, and problems with funding may mean personal transcription, which can greatly impact the schedule. This schedule also presumes no research-in-progress reporting, or individual reports on the various cases, which may be publishable if completed.

Summary

This proposed study uses qualitative methods to explore IT identity on project teams, examining the influence of self-identification with the product under development on risk-related behavior. Four carefully chosen cases will allow for internal replication of analysis based on the TST, semi-structured critical decision interviews, and document collection. The proposed model will be either verified or falsified and revised until the work produces a theoretical model that supports the data, and which can be tested again through future studies.

In the following section, we will look at the potential impact of this work on theory and practice.

Part 5: Potential Outcomes and Importance

This proposed study uses qualitative data gathering and analysis techniques to explore a theoretical model to explain the influence of IT identity on project behavior, specifically the ways in which self-identification with the IT under development affects risk-related decision making in project team members. It extends previous work on IT identity and takes a novel approach to the study of software development risk. The results have implications for both theory and practice.

Theory

Overall, project management is largely lacking a strong, central theoretical base. For example, Wallace, Keil, & Rai (2004) note a "lack of theory to explain the linkages between various dimensions of software project risk and project performance" (p. 289). Approaches have been largely practical in nature while touching on a wide variety of theoretical frameworks. Identity theories and IT identity offer a new context in which an established theoretical framework may be used by researchers to approach project and risk management in a new and meaningful manner. This work contributes to project and risk management studies by exploring the use of this framework in the domain.

While this study focuses on IT identity—a project team member's self-identification with the IT under development—it must also reveal and consider other identities (including other IT identities) that become salient in members of project teams as they perform their work. For example, this study will almost certainly uncover parts of the *software engineer* role identity standard and various organizational group identity standards. This work further contributes to project and risk management studies as preliminary

work into the breadth of identities influencing project team behavior, which may be used to inform future studies.

Specifically regarding IT identity research, the work presented here has the potential to it in a number of ways. At this time, IT identity work remains focused primarily on the adoption and use of consumer technologies. This proposed study focuses on behaviors regarding the design, creation, and development of technology, which have not appeared in previous IT identity studies.

IT identity was originally conceived to explain phenomena involving the use and adoption of consumer technologies. This proposed research project also extends the range of IT identity research by examining its influences with forms of IT which were not part of its original conceptualization by applying IT identity theories to explain phenomena in other forms of technology, from non-consumer utilities to highly cultural digital entertainment. The examination of IT identity constructs in these new segments should allow deeper theoretical insights into IT identity.

Even if this proposed study finds no evidence that project worker self-identification with the IT under development affects project behavior, this would be an important finding for IT identity research. If a such self-identification is discovered to be part of team member decisions, the results will also offer insights into the content of IT identity standards and the behavioral effects of self-identification with IT, which will further inform future IT identity research.

Practice

Practically, the work also has the potential to inform human resource decisions and risk management techniques across all industry segments. Our existing risk frameworks tend to consider workers as collections of skills rather than individuals with identities. While skills may affect a worker's ability to

perform tasks, their identities drive their actual behavior, and research into worker behavior has practical implications for the industry. By exploring these identities, this proposed research promises insights into worker behavior. Identity theories include models for how these identities can be formed and modified.

If the study shows a relationship between identification with technology and risk behavior on technology projects, the nature of the relationship will be able to inform an organization's human resources (HR), training, and technology decisions. Insights into HR practices may provide interventions capable of reinforcing productive project behaviors and minimizing negative behaviors. It may become possible to identify more ideal hires for project work not only by their skill sets, but by the manner in which they identify with the technologies involved.

Regarding technology decisions, this proposed study also lays a foundation for further development team studies where the IT identity component more closely ties to its origins in technology use and adoption. For example, this study may provide a foundation for IT identity research regarding computer languages, version control systems, and integrated development environments. The outcomes of such work promise to inform the creation, adoption, and user of these technology development tools.

Summary

In addition to immediate contributions to identity theory and IT identity research, this proposed research project promises practical applications in IT development teams and software organizations. It undertakes a new approach to the study of IT development risk by changing the focus of worker-based risk from their skills to their identity-driven behavior.

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Appendix: Sample Data Collection Instruments

Twenty Statements Test

1. I am _____

2. I am _____

3. I am _____

4. I am _____

5. I am _____

6. I am _____

7. I am _____

8. I am _____

9. I am _____

10. I am _____

11. I am _____

12. I am _____

13. I am _____

14. I am _____

15. I am _____

16. I am _____

17. I am _____

18. I am _____

19. I am _____

20. I am _____

Interview Protocol

The following protocol has been compressed. The final instrument will contain whitespace and a reference image of the theoretical model to facilitate note taking. The TST response sheet will be available for reference and notes as well.

Introduction

"Thanks for taking the time to talk with me. I'm doing research that involves how risk is handled on IT development teams. I'm particularly interested in discussing the ideas and values that influence your decision-making about project risk. Essentially, I'm interested in who you are when you're making important decisions about your projects. The Twenty Statements Test you took gives me a foundation that we can build on in this interview."

Confidentiality

Assurance of confidentiality: Names of organizations and people will be removed in any publications resulting from this research.

Permission to Record: Ask for voice confirmation. Notes will also be taken. Would you like copies of notes/transcript forwarded to you for accuracy checks?

Background

"As we start, let's talk a bit about your history working with [class of software]."
Record roles, time in role (current/past roles, what kind of work they did, companies and org styles).
Reference TST answers as they seem to apply.

Probe	Notes
Work History	
Actualized Rewards	
Expertise	

"Now let's talk about the project you're currently working on."
Record info related to product characterists construct. Also note dimensions of IT identity that arise.

Probe	Notes
Goods Type	
Intended User	
Features	
Psych. Ownership	
Emotional Energy	
Dependence	
Relatedness	

Questions

"Now I'd like you to think back to a recent time when you've had to make a decision or recommendation where the outcome could cause feature creep." Verify their understanding of feature creep.

Probes below represent constructs in the new theoretical model.

Probe	Notes
Decisions	
Support	
Resistance	
Opportunity & Support	
Environment	
Impacts on Prod. Char.	

Closing

"Anything else you'd like to add?"

"Thank you for your time – may we email you if I have further queries?"

If desired, remind participant that they'll get a copy of notes/transcript to look over and check – any comments, additions etc would be appreciated.