ABSTRACT

Exploring the Impacts of Development Methodologies on the Collective Action of Information Systems Development Project Teams

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Information systems development (ISD) constitutes the largest proportion of capital expenditures in most medium to large organizations globally, yet delays and budget overruns are commonplace. ISD methodologies, such as waterfall and agile, systematize and organize the development process, but all methodologies have strengths and weaknesses. Furthermore, ISD methodologies and project team dynamics are impacted by invisible hands in organizations, which are the social forces such as project team composition and culture, the economic forces such as project budget and team knowledge, and the political forces such as stakeholder control mechanisms and arising conflicts within project teams. Using the lens of *collective action theory*, this research explores how invisible hands influence changes to ISD methodologies that impact the ability of project teams to collectively attain their project goals. Through collective action theory, this research ultimately extricates ramifications to project team cohesion while project teams endure the negative impacts of the social, economic and political forces towards the completion of ISD projects. This research employs a multiple case study to examine the team dynamics of three ISD project teams from two research sites with varied project

outcomes: a failed project, a marginally successful project, and an exemplarily successful project. Cutting across the cases, this study proposes a process model that explains the *confluence, bombardment* and *endurance* phases that ISD project teams cyclically experience as project teams sustain the impacts of organizational forces and adjust ISD methodologies to further their projects. This research offers two primary contributions. First, the use of collective action theory helps in providing a more holistic understanding of challenges encountered by ISD project teams through propositions that integrate the impacts of forces in an organization's social, economic and political environments. Second, this study offers a process model that imparts insights from the perspective of ISD project teams who attempt to work cohesively towards the attainment of project goals. These study contributions potentially improve risk mitigation and resolution of challenges in ISD projects as organizations seek to accomplish business goals, as well as enhance ISD project team attributes that may improve project team performance and successes through better team cohesion.

Exploring the Impacts of Development Methodologies on the Collective Action of Information Systems Development Project Teams

by

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A Dissertation

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGMENTS

One's destination is never a place, but a new way of seeing things.

Henry Miller

After the hard work and the achievement of many memorable milestones, completing this dissertation has allowed me to see things in a new and brighter light. I would like to express my deepest gratitude and thanks to all those who have guided and supported me to reach this point in my life. It is my honor to mention them all here.

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DEDICATION

To Lance, who has outdone the morning sun.

To Laura, who is as beautiful and as intelligent as the brightest star.

To Laila, who is as dazzling as the most brilliant ray of sunshine.

CHAPTER ONE

Introduction

> *Men journey together with a view to some particular advantage, and to provide something that they need for the purposes of life.*
>
> *Aristotle*

Research Problem

Information systems development (ISD) constitutes the largest proportion of capital expenditures in most medium to large organizations globally, representing billions of -dollar spent annually (Pattit and Wilemon 2005). Moreover, as the complexity associated with robust, rapid software development processes increases, ISD costs increase as well (Boehm et al. 2000). Yet, a related and even more disconcerting truth about ISD projects persists – project failure and the number of projects with cost and schedule overruns remain high (Pattit and Wilemon 2005; The Standish Group 2013).

Throughout the years, literature reminds us that ISD projects[1] are complex socio-technical endeavors, whose success and failures are largely attributed to social factors (Hirschheim and Newman 1991; Schwalbe 2015) rather than technical factors (Cao et al. 2013; Hirschheim and Newman 1991; Kirsch 2004). As such, research in IS project management has focused on many social factors that influence the success or failure of ISD projects. These social factors include stakeholder and top management support (e.g. Boonstra et al. 2008; Doll 1985; Elbanna 2013; Ngwenyama and Nørbjerg 2010); user participation (e.g. Barki and Hartwick 1994; Hunton and Beeler 1997; Iivari et al. 2010);

[1] Includes software development and IT infrastructure-related projects, and their synonyms

project control, power and politics (e.g. Markus 1983; Sabherwal and Grover 2010; Wiener et al. 2016); project team communication and coordination (e.g. Andres and Zmud 2001; Faraj and Sproull 2000; Hoegl 2004; Koushik and Mookerjee 1995), project team cognition and knowledge (e.g. Ghobadi and Mathiassen 2015; He et al. 2007; Tiwana 2012) and project team performance (e.g. Faraj and Sproull 2000; Nidumolu 1996; Sawyer et al. 2010; Yang and Tang 2004). Yet, among these factors, two critical factors that are intrinsically social in nature but have been neglected in the study of ISD project teams are (1) the impacts of the development methodology employed by ISD project teams on project team behavior and (2) ISD project team cohesion. ISD methodologies guide and alter the efforts and interactions within project teams (Cockburn and Highsmith 2001; Špundak 2014; Vinekar et al. 2006; Wynekoop and Russo 1997), and team cohesion is a key factor for understanding project team performance, which is a key determinant of project success (Chiocchio and Essiembre 2009; Davis 2014; Guinan et al. 1998).

ISD methodologies essentially follow a "divide and conquer" principle that subdivides the entire systems development process into smaller, more manageable stages that are aligned in sequence (Fitzgerald 1996) using software engineering techniques (Mahanti et al. 2012). In many organizations, ISD methodologies are perceived as collections of standardized processes that ISD project teams follow in regards to the analysis, design, implementation and maintenance of information systems (Hoffer et al. 2014; Olerup 1991). In essence, ISD methodologies are intrinsically social in nature because developing information systems embeds, systematizes, organizes and formalizes to some extent the social actions of information systems development (ISD) project participants in the development process (Hirschheim and Newman 1991). As

organizations are compelled to constantly evolve to meet the demands of global markets, however, traditional or waterfall development methodologies[2] are found to constrain the performance of ISD project teams. Consequently, research in IS project management has shifted its focus on newer development methodologies. Agile is a newer development approach that grew in popularity among organizations and researchers because of its capacity to adapt to the turbulent nature of our present-day business environments.

Introduced by Winston Royce (1970), the classic *waterfall* model embodies principles based on traditional software engineering practices whose goal is to decrease the gap between a perceived problem and a solution that could be implemented via computer software programs (Mahanti et al. 2012). Waterfall generally consists of distinct phases—planning, requirements analysis, design, build, testing and implementation phases—such that a complete cycle of phases is termed as the "software development life cycle" (*IEEE Standard Glossary of Software Engineering Terminology*, 1983). In IS project management contexts, however, the traditional software development life cycle is intricately suffused within a *systems* perspective (Hirschheim and Klein 1989). ISD projects capture a larger contextual scope beyond the software to be developed and include associated hardware, computer infrastructures, people in the organization, functional departments, business processes and other organizational entities needed to create an information system (Ahituv et al. 1984; Fitzgerald 1996; Lee and Xia 2010). As such, traditional ISD projects follow a development process that is inherently waterfall.

[2] The term *methodologies* generally pertains to the core development model and its many variants. In waterfall, variants would typically add, insert, regroup or rename certain phases in the life cycle, but nonetheless still follow a cascaded set of phases.

Waterfall relies upon careful, often lengthy, planning prior to the actual development of the entire system. As such, a successfully implemented ISD project is contingent upon careful execution, monitoring and control of tasks at each phase of the waterfall life cycle. It is the division of labor across the project phases that generates the need for copious levels of documentation to develop IS projects in a sequential and increasing manner. Furthermore, although waterfall technically allows changes in the requirements[3] to be delivered (to correct errors or to accommodate stakeholder-induced changes) after the requirements analysis phase, project requirements are generally assumed fixed. In fact, the chief reason for which this methodology is named "waterfall" is that, as in an actual waterfall (body of water), once a specific phase has been completed and signed off (by project stakeholders), the project cascades down to the succeeding phase in a lockstep process (Sircar et al. 2001). Moving back to previous phases would overrun cost allocations in terms of both time and budget. For this reason, organizations leverage their knowledgebase accumulated through documentation to reach a matured set of best practices towards managing a wide gamut of ISD projects with the least errors and likelihood of failures.

Many ISD projects in today's turbulent business environments, however, have become highly innovative and complex, and are implemented rapidly as organizations attempt to seize opportunities to maintain or develop a competitive edge (Alvarez et al. 2012; Cooper 2000; Tushman and Anderson 1986). Being innovative, such projects are typically exploratory in nature, which therefore have high levels of uncertainty in their

[3] A project *requirement* typically refers to a functionality and/or capability that a developed system will provide upon project delivery.

requirements at the beginning phases of the project. Furthermore, as tasks become more complex, learned "best practices" being highly relied upon in a waterfall mindset become less adequate in attaining project goals successfully. Waterfall methodologies have been found constraining and time-consuming to ISD projects of high uncertainty and complexity (Pich et al. 2002).

Agile accommodates many of the limitations of waterfall. Agile methodologies fundamentally adhere to values and principles based on the *Agile Manifesto* (Beck et al. 2001), where customer and employee engagements are valued more over constraining precepts and formalities of locked down project plans and contracts typical in a waterfall model. Agile methodologies are known to follow a procedure where piecewise functionalities of the whole system are developed incrementally through a series of mini-software development cycles or *iterations*. In each iteration, the customer—who may be an actual system user, a project sponsor, or any project stakeholder—actively engages by constantly providing feedbacks about the delivered functionality in a continuous build-inspect-adapt model. As such, errors found and change requests prompted by the customer could be accommodated more rapidly and flexibly within an iteration without having to wait for a lengthy development cycle to complete. Project processes that allow greater room for flexibility in the actions of project teams are more ideal for innovative, creative and complex ISD projects that have high uncertainty (Eisenhardt and Tabrizi 1995; Pich et al. 2002). Agile is perceived to embody highly flexible project processes such that the result of an agile project is believed to yield a narrower gap between what was delivered and what the customer has actually asked for (Cobb 2011; Moreira 2013).

Although the idea of agile is popularly regarded in research and practice as a set of processes, a framework, a tool, or methodology, agile is, in fact, not fundamentally any of those ideas. Rather, agile is an outcome of a shift in the cultural mindset of an organization that adheres to agile *values and principles*, and has, thus, acquired an "agile mindset" (Moreira, 2013). Such a mindset is the result of a movement promulgated by eminent software engineers and advocates towards mindful consideration of human components, where customer needs are given the highest priority when making decisions about the development of software (Beck et al. 2001). The methodologies commonly associated with agile (e.g. Scrum, eXtreme Programmming, Dynamic Systems Development Method, Kanban, and Lean Software Development) are merely formalized software engineering practices meant to reflect the values and principles of agile. However, any changes in IS development methodologies are forewarned to potentially involve changes in the tools and practices not only at the ISD project team level, but at the institutional level altogether (Cobb 2011; Sircar et al. 2001). Being able to accommodate the changes, practitioners of agile may reap many benefits such as flexibility to adapt to highly evolving business demands, rapid time-to-market, and faster return on investments.

There are many stories, however, about agile organizations and/or business units transitioning to agile facing difficulties and challenges that ultimately compromise employee and project performance (Conboy 2010; Conboy et al. 2011). For example, in regards to employee performance, issues such as hard and soft skill acquisition, motivation, and staff level performance are key concerns (Conboy et al. 2011), whereas tight budget goals that impact the success of ISD projects are key concerns at the organizational or

business unit levels (Conboy 2010). As with traditional methodologies, therefore, agile methodologies have their respective strengths and weaknesses as well.

There are organizations that continue to adhere to traditional development methods to deliver projects successfully, especially for projects purposed to update and maintain information systems. There are also organizations, business units, and project teams that employ hybrid versions of traditional and agile methodologies (Fitzgerald et al. 2006) to fit these organizational entities' characteristics (Cao et al. 2013). Hence, the value of an ISD methodology largely relies upon the methodology's ability to improve overall ISD project team performance, which leads towards effectively meeting, or exceeding, project goals and standards, to ultimately successfully deliver projects (Cooke-Davies 2002; Jones and Harrison 1996). While organizations are privileged to choose among a diverse set of ISD methodologies to fit their needs, there is little understanding about how these methodologies are shaped to fit the organization. Furthermore, little is known about how these methodologies are applied and impact project team behaviors in contemporary organizational settings. The differences among the characteristics of ISD methodologies, therefore, suggest a need to explore variations among project team behaviors that employ agile, traditional, hybrid and other development methodologies. Team cohesion is one project team behavior that is influenced by a project team's use of an ISD methodology and one that requires better understanding in ISD project team contexts.

Team cohesion is defined as the strength of social bond within a group and the tendency of a group to remain united in the pursuit of its goals (Carron 1982). Understanding team cohesion in ISD project contexts is important to better explain ISD project team performance. Research in other social sciences (e.g. small group research,

sports psychology and organization management) is rich in explicating the significance of the cohesion-performance linkage towards project success and the successful attainment of group goals (Chiocchio and Essiembre 2009; Yang and Tang 2004). As such, the potential to better understand project team performance, as well as the likelihood of increasing project success in ISD projects, may be obtained with a better understanding of ISD project team cohesion. Yet, literature on IS project management has examined team cohesion with limited depth about the influences of team cohesion on ISD project team dynamics (Jones and Harrison 1996; Yang and Tang 2004). Another equally important limitation to highlight is that it is not well understood how organizational forces—that is, social, economic and political forces—within the project environment and the ISD methodologies used by project teams impact team cohesion as project teams attempt to deliver their projects successfully. Understanding how organizational forces play and impact ISD project team cohesion may lead to further understanding ISD project team performance and increase the likelihood of attaining ISD project success. This research, therefore, fills these gaps by exploring the impacts of social, economic and political forces present in the project environment to ISD methodologies used by ISD project teams, and to the cohesion of ISD project teams.

Research Background

The challenges and failures within IS project management have been examined for decades (The Standish Group 2013) . While some have challenged the statistics offered by the Standish Group (e.g. Glass 2006), there remains an acknowledgement in the IS project management literature that there is room for improvement in terms of delivering successful projects (Pattit and Wilemon 2005). Studies have suggested success factors for ISD

projects (e.g. Matook and Vidgen 2014; Pinto and Slevin 1987), and this research continues in the tradition to explore what actions within an ISD project team enable the team to deliver projects successfully.

Many studies on success factors for ISD projects and project teams paid little attention to how the interaction within the team affects project success. For example, Pinto and Slevin (1987) identified ten critical success factors, yet many of these factors were related to top management, control, and monitoring of the project. Only two factors were moderately related to the interaction within the team: communication and personnel recruitment, selection, and training. Communication focused on whether people felt comfortable expressing ideas and providing input, while personnel focused on skill sets and commitment within the project team. Having diversity in personality traits (Gorla and Lam 2004; White 1984) or the right combination of personality traits are team-related factors that could lead toward a successful ISD project. Studies on ISD project team performance as a success factor of ISD projects include the examination of how knowledge are shared among software developers in the firm impact their performance (Ozer and Vogel 2015). Likewise, team involvement in system design and user representation are additional factors related to the success of the team (Jones and Harrison 1996). One ISD project study revealed that diverse levels of experiences among project team members hinted on impacting team communication, coordination and cohesion as factors that influence project team performance (Guinan et al. 1998). Apart from these contributions, literature about team cohesion in IS project management contexts is close to nil, which could largely impact the IS project management domain's ability to more fully understand IS project team performance and success.

While literature about team cohesion in ISD project settings to date is scant, literature about team cohesion in other social sciences is rich. These social and behavioral sciences seek to understand team cohesion more fully (Greer 2012) because it is a fundamental group dynamic that brings many advantages to the members of the group in that cohesion allows members to work more easily with each other, work through conflicts faced by the group, and feel good about their work with the group (Hogg 1992). Cohesion among groups plays a significant role in understanding conformity, productivity and behavior change (Evans and Jarvis 1980). In addition, literature from the social and behavioral sciences show evidence to suggest that team cohesion is a key determinant of team performance leading towards the successful attainment of group (and project) goals (e.g. Beal et al. 2003; Castaño et al. 2013; Chiocchio and Essiembre 2009; Evans and Dion 2012; Gully et al. 2012). Thus, the limitation in the IS project management literature opens an opportunity for more in-depth investigation about ISD project team cohesion, which may increase our understanding leading to an increased likelihood of attaining ISD project success.

Additionally, ISD project teams work in environments where organizational forces come into play. Issues brought by people and organizational forces into ISD projects, which are generally political, economic and social in nature, are most often the most difficult to resolve and manage (Schwalbe 2015). As such, gaining a better understanding of these forces improve the success rate of ISD projects. While literature in the IS field is replete with examples on the types of political (e.g. Cram and Brohman 2013; Howcroft and Light 2006; Markus 1983; Pinto 2000; Sabherwal and Grover 2010), economic (e.g. Ghazawneh and Henfridsson 2013; Shmueli et al. 2015), and social (e.g. Biggs 1978;

Levina 2005; McAvoy et al. 2013) forces that impact ISD projects, there is sparse literature explaining how these forces impact ISD project team cohesion.

Moreover, extant literature on IS project management has been examined through a few theoretical lenses, which may be grouped into the following frames: social (e.g., agency theory, actor-network theory), economic (e.g. social capital theory), and political (e.g. control theory, clan control theory). Among these theories, control theory is the most utilized.

Control theory has been applied extensively in ISD project contexts (e.g.Choudhury and Sabherwal 2003; Cram and Brohman 2013; Heiskanen et al. 2008; Kirsch 1997; Kirsch 2004; Kirsch et al. 2002; Kling and Iacono 1984; Maruping et al. 2009; Persson et al. 2012) to examine the modus operandi used by individuals to control other individuals' behaviors towards attaining project success (Kirsch 1997). Clan control, an informal control mode typically leverage individual's strong ties between and among other project participants of power to influence decisions about projects (Kirsch 1997), has also been given due attention in the IS project management literature as an extension to control theory (e.g. Choudhury and Sabherwal 2003; Chua et al. 2012; Harris et al. 2009). In agency theory, project team members are perceived as agents who are relied upon by other members of the project team to accomplish project-related tasks (e.g. Austin 2001; Banerjee and Duflo 1999; Mahaney and Lederer 2003). Agency theory has been mostly used to identify key factors, such as contracts (formal or informal), as drivers for project success (Rai et al. 2009). IS project management studies that utilize social capital theory (e.g. Bhandar et al. 2007; Chua et al. 2012; Newell et al. 2004; Tansley and Newell 2007) recognize the structural, cognitive and relational ties of IS project teams and members as resources that

drive commitments and actions towards attaining project goals (Chua et al. 2012). Actor network theory examines the role or influences of technology within social settings (Callon 1986), which have been applied mostly in outsourced and distributed project team settings (e.g. Cho et al. 2008; Heeks and Stanforth 2007; Mähring et al. 2004; Wernick et al. 2008). The limited and segmented perspectives of these theories, however, limit the sub-discipline of IS project management to examine the interplay of organizational forces that vacillate between and among the three environments of an organization – the social, economic and political environments. Yet, what these extant theories could not explain holistically, the multidisciplinary aspects of collective action theory could.

Collective action theory (CAT) is a fundamental group theory, which explains phenomena that are associated to group activities and human tendencies to joining or forming associations to advance a common cause or interest (Gilbert, 2006; Olson, 1977; Sandler, 1992). CAT identifies invisible hands (Olson 1977) that serve as selective incentives, which either reward (also known as benevolent hands) contributors of a collective action or punish (also known as malevolent hands) non-contributors. In ISD project contexts, invisible hands are the social (e.g. project team members, culture), economic (e.g. budget, project team knowledge) and political (e.g. project control, stakeholder control) forces that drive ISD project teams towards delivering their projects successfully. And because CAT is applicable in social, economic and political contexts (Ostrom 2014), the ability to obtain a more holistic understanding of the social, economic and political forces that impact of a ISD project teams is realizable through CAT. Therefore, this research integrates pieced understanding about the social, economic and

political forces that shape ISD methodologies used by ISD project teams and impact ISD project team cohesion as teams attempt to deliver projects successfully.

Research Scope

Understanding the impacts of a chosen ISD methodology to ISD project team behaviors compels the need to understand the organizational forces that influence the decision for the ISD methodology that is used in a given project. Particularly, little is known about how the social, economic and political forces influence alterations to the ISD methodology that is employed by a project team for a specific ISD project and consequently, how the organizational forces and the adjusted ISD methodology impact ISD project team cohesion.

Organizational forces refer to organizational *entities* (e.g., senior leadership positions, functional departments, management positions, project management offices, project teams and members), *standardized practices and mandates* (e.g., organization's financial model, standardized organizational practices), and *institutional traits* (e.g., organizational culture, project team culture) that interplay within the *social, economic, and political environments* of an organization. Organizational entities are responsible for making strategic and functional decisions at the organizational level, as well as on the organization's constituent levels (e.g., business unit level, project team level). These entities may also be responsible for producing, shaping and enacting standardized or common practices and mandates that serve as the "by laws" of the organization. Over time, these by laws may mold characteristic and institutionalized traits such as organizational culture and team culture. Additionally, organizational entities may also exhibit narrow rationality, or self-interests, that may conflict with ISD project team goals. At some point

in time, these forces compete in that, ultimately, decisions brought forth by these forces steer the organization's overall strategic plans. The changes (or lack of changes) imposed by such decisions occasionally stir and disrupt other social, economic and political forces within an organization (Keen 1981). Understanding how these forces dynamically impact ISD methodology decisions may likewise unveil what ISD project team factors may emerge towards the teams' successful (or failed) delivery of ISD projects.

Figure 1.1 illustrates how an organization's sphere of influence may potentially impact an ISD project team's sphere of influence through organizational forces at play. From a project-level perspective, for example, two of the predominant organizational forces that influence project-related decisions and project team level practices are the project management office (Dai and Wells 2004) and organizational culture (Leidner and Kayworth 2006; Yeo 2002). The project management office (PMO) is an organizational entity that directly links the practice of project management intertwined with relevant organizational contexts (Hobbs et al. 2008). These contexts include standardized project practices, mandatory corroboration of functional departments in projects, and allocation of project funds based on an organization's financial model. Furthermore, a PMO acts as a *center of excellence* commissioned to providing support for project managers and leaders, team members and stakeholders to carry out a uniform set of project management practices, tools and techniques across a variety of organizational projects (Dai and Wells 2004). On the other hand, organizational culture, which has been engrained in the employees' ways of life, influences approaches in the development of information systems (Leidner and Kayworth 2006), and may be perceived as a double-edged sword at the project level. This perception means that, while certain organizational cultures encourage innovation,

flexibility and accommodation of organizational change, other organizational cultures may be resistant and less flexible to change that potentially become factors for ISD project failure (Yeo 2002).

A higher goal of this research is to contribute knowledge that better explains ISD project team behaviors that lead to ISD project success. However, there are a number of reasons that focusing on the concept of ISD project success is out of scope from this study.

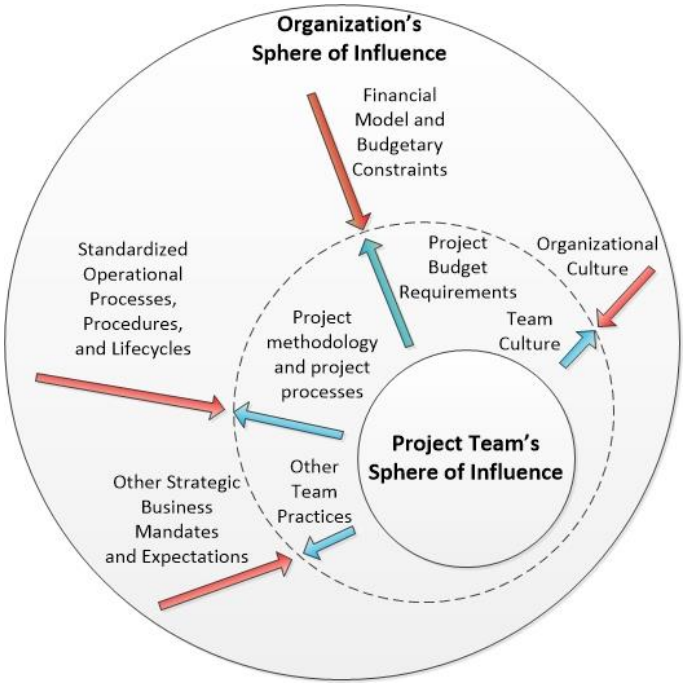


Figure 1.1 Organizational Forces Impacting ISD Project Teams

First, IS project success is a concept that covers many antecedents and has otherwise been extensively investigated in the area of IS project management (e.g. Napier et al. 2009; Remus and Wiener 2010; Robey et al. 1993; White and Leifer 1986). Conducting a study that focuses in that area would be redundant. Further, the sheer enormity of scope needed to understand ISD project success would be confounding, which would otherwise be more beneficial if done as a separate research on its own. Another reason is that the definition of

IS project success varies from context to context (McLeod et al. 2012), such that a comparison of ISD project outcomes across cases could not be effectively obtained. In particular, project teams are challenged by what "success" means, and are no less challenged by the organizational forces that constrain their ability to attain their preconceived notion of "success." For example, the term "success," is elusive in that its meaning varies from one organizational entity to another, depending on that entity's position and role *in* and *to* the project, the project team, and the organization.

From a project management perspective, "success" is traditionally indicated by a collection of metrics about a developed system that is delivered *on time, on budget*, and *within scope and functionality*—also known as the *triple project constraints* (PMBOK 2015). Yet, clear definitions for what is meant by "on time", "on budget" and "within scope and functionality" delivery also vary from entity to entity. For example, organizations that follow the waterfall model typically contract ISD project teams to specify as early in the project planning and analyses phases the timeline, budget, and scope and functionalities of the system to be developed. Towards the end of the project, these contracted estimated metrics are measured against their actuals. While meeting all the agreed-upon values of the metrics indicates success, going beyond any of the agreed-upon values could indicate that the project is either challenged or failed. Organizations that follow agile methodologies, however, expect project teams to develop information systems incrementally such that the project budget and timeline are *running values* updated incrementally until the entire system is completely developed with the desired set of functionalities. In essence, the idea of failing to meet any of the triple project constraints

(in agile) becomes "blurred" in some organizations, unless some apparent project-related expectations of any stakeholders have not been met.

Other organizational entities, however, define success with respect to the organization's success criteria. Ideally, all project goals are aligned with organizational goals (PMBOK 2015). In reality, however, these goals sometimes conflict against each other such that organizational goals often take precedence over project goals. When such conflicts arise, ISD project teams are compelled to circumnavigate foreseen or emergent obstacles that may exacerbate project challenge and failure rates. Therefore, what is rather relevant to consider about ISD project success is as follows: (1) a fundamental assumption that *all ISD project teams are driven to succeed* and (2) the definition of project success is based on the perspective of ISD project teams.

Of the many antecedents of project success, team performance and the relationship between team performance and project success are concepts that have been thoroughly investigated in IS project management as well (e.g. Aladwani 2002; Choi et al. 2010; Guinan et al. 1998; Jones and Harrison 1996; Sawyer 2001). As such, ISD project team performance is a concept that is out-of-scope from this study.

Literature in IS project management, however, has neglected to investigate the impacts of team cohesion on team performance and project success in ISD project contexts. Yet, literature in the social and behavioral sciences, is replete with studies that sought to understand team cohesion because of the many advantages cohesion bring forth to teams such as increased member motivation and performance (Beal et al. 2003), increased conformity to pressures (Turner and Pratkanis 1998), increased member satisfaction (Hogg 1992), and increased member learning (Bruhn 2009).

Lastly, the organizational forces (i.e., social, economic, and political forces), ISD methodologies and team cohesion in this study are investigated and analyzed within the context of collective action theory. The multidisciplinary nature of CAT holistically integrates the perspectives exposed by the impacts of the social, economic and political forces to ISD methodologies and team cohesion within the project environment.

Research Objectives

This study examined ISD project team behaviors by understanding the impacts of different systems development methodologies on the collective action of ISD project teams as teams attempt to deliver IS projects successfully. Depending on the organizational forces at play in the project environment and the ISD methodology used, the interactions of members of the IS project team are likely altered, which could have implications on the IS project team's structure, culture, management style, and communication (Vinekar et al. 2006). Examining the effects of organizational forces and the impacts to the ISD methodology enables an opportunity to explore team cohesion. Therefore, the main objective of this research is: *to examine the impacts of organizational forces—social, economic and political—and adjusted ISD methodologies on the cohesion of ISD project teams.*

In addressing this objective, the study output is a process model that illustrates and explains: (a) the similarities and differences of the natures of the organizations and respective project teams invited for the study, (b) the invisible hands that impact ISD project teams, (c) the rationale of invisible hands for making adjustments to the methodology used for specific ISD projects, (d) the impacts of adjusted ISD methodologies to project team cohesion, and (e) an elucidation of the interplay of forces impacting team

cohesion across the three organizational environments – social, economic, and political – as project teams perform activities that attempt to deliver projects successfully.

Research Approach

To address the research questions, a multiple case study (Yin 2013) was employed to examine behaviors in ISD project teams, which is the unit of analysis, as well as forces that influenced ISD project team behaviors. In fact, case studies are relied upon by IS researchers to investigate a variety of phenomena that include systems development and implementation, as well as organizational change enabled by information systems (Street and Ward 2012). ISD project teams who employed different ISD methodologies from organizations were invited to participate in my study. Data and information collected from the project teams were analyzed through a theoretical lens drawn from group research—collective action theory (Gilbert 2006; Maxwell and Oliver 1993; Olson 1977; Ostrom 1994; Ostrom 1998; Ostrom 2014; Sandler 1992b). Using this theory, the relationships and impacts of the organizational forces on project teams were elucidated by focusing on the intertwinement of the forces in the social (e.g. project teams' perceptions about organizational and projects team structures), economic (e.g. financial impacts to projects) and political (e.g. power relations and stakeholder control) environments surrounding ISD projects. Collective action theory is integral to exposing a fuller and more holistic understanding of the forces that impact ISD methodologies and ISD project teams to remain cohesive while attempting to deliver projects successfully across the social, economic and political environments of an organization as perceived through the teams who develop information systems.

Three project teams from two organizations were invited to participate in the study. One organization is a project-based developer-contractor of websites for clients, while the other organization is an IT group that develops and maintains healthcare IS infrastructures and applications for an affiliated hospital. One of the two project teams in the web development company shared member experiences about a small yet unsuccessful ISD project, whereas the other project team shared experiences about a large successful ISD project. Both project teams used a standardized hybrid-like ISD methodology that largely followed a waterfall approach, but with the certain phases (such as build and testing) closely conducted with the clients in an agile manner (i.e., coding was conducted in *sprints*[4]). The manner in which this methodology was employed by both teams, however, had slight variations that accommodated each project's respective stakeholder requirements. The project team in the healthcare IT group shared experiences about an upgrade of an ongoing large healthcare IS project. The project team has been following a methodology similar to a *spiral methodology* (Boehm 1988), which is essentially waterfall but done repetitively in a spiral or cyclic manner over a period of one year per development cycle. Unlike agile methodology that executes short iterative developments and typically lasts a week per iteration (*sprints*), spiral methodology cycles through all the distinct phases of waterfall repetitively such that one cycle of a spiral methodology implements a large portion of the information system similar to the implementation in one complete waterfall project life cycle. At each cycle of the spiral project, the project team of the healthcare IT group finds themselves delivering major project milestones successfully. However, the

[4] Sprint is a term used to indicate one iteration in Scrum, a development process adhering to agile principles.

project team has concerns about maintaining success in the final stages of the project related to educating the hospital staff on the use of the developed system and transitioning the ownership of a major piece of the project to the hospital's operations department.

Primary data was collected through and among target individuals—that is, members of ISD project teams, project management office director or equivalent, and manager-level to senior manager-level stakeholders involved in the ISD projects—via semi-structured interviews that were mostly done face-to-face. Secondary data, such as fields notes and documentations, archival records and physical artifacts were also gathered from each team. Analyses of diverse data types in case study research is highly synergistic yielding stronger grounding of emergent theories (Eisenhardt 1989). The primary and secondary data were triangulated to identify thematic structures and variations, which were further developed and grouped into related relevant concepts and finally synthesized into a process (theoretical) model following Yin's (2013) study schema, Miles et al.'s (2013) data analysis techniques, as well as Eisenhardt's (1989) theory building guidelines.

Dissertation Overview

The remainder of this dissertation is organized as follows. Chapter two entails a literature review that describes observed trends in IS project management contributions, gaps in the literature, and relevance of the research objectives to the current state-of-the-art of IS project management. Chapter three presents a conceptual model that provides the theoretical underpinnings of the study in parallel organizational and project contexts. More granular aspects of the theory, as well as the relationships highlighted in the research model are explained in chapter three as well. Chapter four describes the details of the research methodology used to investigate and answer the research questions, highlighting

particularly the propositions that were developed through within-case analysis and cross-case analysis. Chapter five discusses the analysis and results of the data obtained for the study, while chapter six provides a discussion of the major findings of this research and implications to both practice and research communities of the IS field. Chapter seven concludes the dissertation with limitations of the study, future research directions and study contributions.

CHAPTER TWO

Review of Literature

> *To improve the success rate of IT projects, it is important for project managers to develop a better understanding of people as well as organizations.*
>
> *Schwalbe 2015, p.47*

This chapter begins by introducing an observed trend over the years in the study of IS project management. It identifies four thematic categories that partition these studies in terms of focal concepts and phenomena, units of analysis and theoretical lenses. Next, the chapter identifies gaps in the literature, which provides justification to the relevance of pursuing this research and addressing associated research objectives described in the previous chapter. It then continues to discuss subcomponents of IS project management relevant to this study—particularly, ISD methodology, organizational environments, collective action and team cohesion—building blocks to understanding the scope and boundaries of this research.

Themes in the Study of IS Project Management

In the IS field, the formalized IS project management research domain that we know today was developed based on early studies concerning the management aspects of systems development. Hence, literature on IS project management largely overlaps with systems development in that IS project management is concerned with the planning and oversight of systems development projects. Consequently, literature reviewed in this study include research concerning IS project management and systems development, which identifies various factors that impact systems development, ISD projects and ISD project

team behaviors that contribute towards the successful delivery, or failed delivery, of projects. The following two sections describe an observed trend in the IS literature and the emergent themes classifying the literature found in major IS journals.

A Trend in the Study of IS Project Management

A quick view of the trend of studies concerning IS project management and systems development identifies the types of knowledge and information present-day ISD project teams leverage to increase the likelihood of successful project delivery. Figure 2.1 illustrates a shifting trend in the study of IS project management, which began with a focus on the more technical aspects of creating systems (e.g. strict adherence to systems development processes and tools), to the more social aspects, which are related to organizational factors (e.g. top management support, stakeholder alignment and user participation) that impact systems development, ISD projects and ISD project teams.

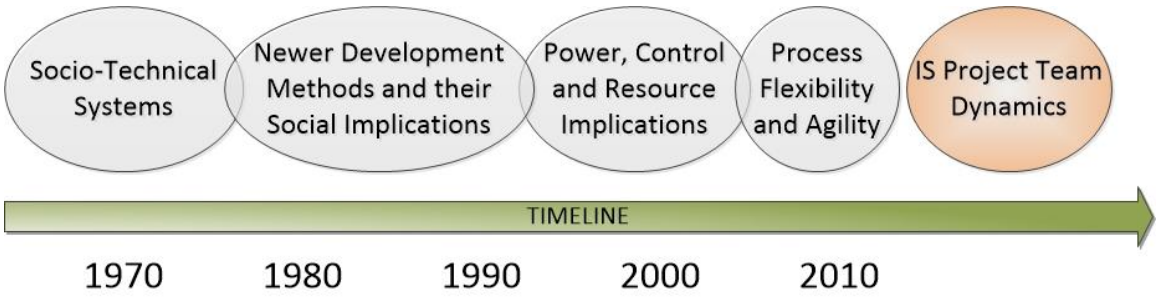


Figure 2.1 A Trend in the Study of IS Project Management

In the late 1970's to early 1980's, there was a recognition of the socio-technical nature of information systems such as the value of user involvement and use of decision-making tools in newer development efforts. Roughly in the late 1980's to the early 1990's, in-depth investigation of social nature of information systems development ensued. Using

theoretical and philosophical underpinnings from behavioral sciences, research in IS project management focused on the impacts of relationships between project participants such as analysts and users, top management and project teams, as well as lessons learned from development approaches. A more in-depth exposition of the socio-technical paradigm followed to expose the political and economic dimensions of IS projects including the exercise of power and control, and the mindful utilization of resources and time factor in the 1990's towards the end of the century. Researchers in the new millennium performed richer investigations on improving ISD performance and software development processes, as well as project team performance, with the introduction of "flexibility" and "lightweightedness" in project team processes typical in newer development methodologies like Agile. These flexible and lightweight approaches are based on incremental and evolutionary lifecycles that parallel the more dynamic nature of organizational processes and large, complex ISD projects (Berger and Beynon-Davies 2009).

The socio-technical perspective of developing information systems gained esteem in the late 1970's as organizations recognize the value of focusing more on the social facets than the technical facets of information systems development. As the design of computer systems and digital communications infrastructures steadily matures, organizations put efforts to shifting company strategies through process reengineering (Cooper 2000). Process reengineering enfolds creative thinking of systems developers with business processes and technology in developing novel system solutions to increase the competitive advantage of firms both locally and globally (Davenport 1993/2013). These strategies envisioned more dynamic and efficient information systems, increased staff productivity

and higher revenue returns (Biggs 1978; Bostrom and Heinen 1977a; Bostrom and Heinen 1977b; Kling 1977; McLean 1973; McLean 1979). As such, contemporary organizations and ISD project teams have been cognizant of intricate intertwinement of functional departments in organizations and automated systems, which increased efficiencies in work processes.

In the 1980's, literature about the design, development and implementation approaches of information systems subsequently followed with a sharing of learned lessons from the development of newer information systems and the use of associated tools (such as decision-making tools) in the conduct of those approaches (Ahituv et al. 1984; Batiste and Jung 1984; Karimi 1986; Semprevivo 1980; Snyder and Cox 1985) Yet, the goal to realize more successful business ventures did not occur instantaneously as more pressing concerns related to the social aspects of systems development and technology adoption unfolded. From an economic perspective, for example, Batiste and Jung (1984) shares an analysis methodology—known as Requirements, Needs, and Priorities (RNP)—used for defining business problems and understanding the impacts of developing a system in an organization prior to the actual development of the system. RNP showcases an effective economic structure for defining an ISD project's requirements and resources commitments so that senior management could better decide if a proposed ISD project should be commenced (Batiste and Jung 1984). In another study, Keen (1981) exposes the pluralistic[5] and political aspects of organizations that challenge systems development and implementation such as social inertia, technology resistance and counter implementation.

[5] Pluralism is a classic political concept that recognizes the distribution of power, influence and political processes in government and organizations.

Bodker et al. (1987) and Ehn and Sandberg (1983) reveal that a factor for resistance to adopt process-based approaches and methods is that IS developers perceive them as deskilling their jobs while unnecessarily turning over significant control of their job functions to management (cf. Ravichandran and Rai 2000). As such, studies in this decade has made ISD project teams aware about the strong political nature that exists in the conduct of ISD projects.

Subsequently, contributions in IS project management up to the 1990's focused on the confluence of social factors that impact IS project management and systems development, particularly, on factors across the economic and political aspects of an organization. Such contributions stimulated investigations that revealed more salient political and economic dimensions of ISD projects as noted by a number of contributions on (1) power and control in design and development phases (Henderson and Lee 1992; Kirsch 1997; Kling and Iacono 1984), (2) on careful appropriation of resources and allocation of time (Ahituv et al. 1984; Batiste and Jung 1984), as well as on (3) situations when allocation of time and resources to a project need to discontinue (Keil 1995). At a deeper level of understanding, therefore, present-day ISD project teams are informed about the finer details of political processes, including the exertion of power and control across various stages of the ISD project.

The concepts of process flexibility and agility emerged in the more recent studies (2000 and later) of IS project management when traditional ISD methodologies have been found to be constraining among ISD project teams. The practice of agile methodologies emerged and grew in popularity among organizations, which followed a flux of investigations by researchers in the IS field (Berger and Beynon-Davies 2009; Cao et al.

2009; Conboy 2009; Ramesh et al. 2012; Vinekar et al. 2006). Because of their philosophical and methodological differences, traditional and agile methodologies have been described to be two contrasting methodologies that lie in a continuum (Edberg et al. 2012). Organizations, therefore, are able to tailor these methodologies in a hybrid fashion to better fit the organization's characteristics (Cao et al. 2009). However, the type of ISD methodology used alters how members of the IS project team interact, which can have implications on the IS project team's structure, culture, management style, and communication, among others (Vinekar et al. 2006).

Thus, the continuous evolution of business processes triggers a constant, rapid change in ISD processes and organizational factors that impact ISD processes. Consequently, the ability for ISD project teams to respond to rapid organizational changes is not well understood. It would also appear that project teams still amiss a holistic vision that integrates knowledge together that could be leveraged to effectively navigate ISD projects to success. Hence, studies that focus more closely on ISD project team dynamics remain a silo in the IS project management literature, which inhibit contemporary project teams to more effectively navigate ISD projects to success. As such, this study conducts a more comprehensive review of literature to more fully understand specific gaps that require further scrutiny.

Themes in the Study of IS Project Management

Research in the IS project management domain is driven to increase the likelihood of project success. The discourse about improving the likelihood of IS project success continues to date. As such, there is a need to investigate what is known and not known within the IS project management literature to inform IS project teams on factors that

influence success of IS projects. To examine the literature on this subject, a systematic literature review was performed following the methodological approach of Leidner and Kayworth (2006), which involved three steps: (1) development of a criteria to identify the literature to be included in, and excluded from, the analysis; (2) performance of a literature search strategy; and (3) performance of an analysis scheme that classifies the studies according to themes.

Included in the first step, a manual search of empirical research articles from the AIS Senior Scholars' Basket of Six journals was performed without publication date restrictions. An assumption of this study is that articles found in the basket of journals serve as the representative core project management knowledge in the IS discipline.

This study is fundamentally interested about ISD projects and project teams in general. To be widely inclusive in the search for relevant literature for review, this study used a concatenation scheme (using the "+" symbol) of the following search terms: "project," "software development," and "teams". The idea is to capture articles that are related to systems development, project teams, project success, project failure, and challenged projects. However, this study also bounds the search of literature using the following exclusion terms (using the "-" symbol) that were inserted in the search string: "open source", "outsource", "offshoring", "distributed" and "global". The purpose of the exclusion string is to omit studies from the resulting search list that focus on open sourcing, outsourcing, offshoring, virtual, distributed and global ISD projects and project teams.

There are two reasons for the exclusion of literature having these features. First, open source software development allows the voluntary participation of the public, very different from the exclusive and proprietary set up of traditional software development in

organizations who employ their own software developers and ISD project staff. Research in open source software development and projects is fundamentally interested in understanding factors impacted by software licensing concerns, open source community memberships and intellectual property (Fitzgerald 2006; von Krogh et al. 2012), which are not the primary interest of this study. Because membership to open source communities is voluntary (Germonprez and Hovorka 2013), software developers and other stakeholders face forces that are different from salary-based ISD project staff employed in traditional corporate settings, whose basic motivation to participate in ISD projects are fundamentally driven by income and salaries. In open source software development research, intrinsic motivators (e.g. self-efficacy, satisfaction) are factors that are more likely investigated (Hertel et al. 2003). The current study, however, focuses on understanding phenomena emerging from traditional organizations and ISD project teams employed in these organizations. Organizations set up in the traditional (closed) way remains largely predominant in today's societies.

Second, the reason for excluding studies that are focused on virtual project management, offshoring, outsourcing, distributed and global project management is that these studies are conducted with respect to a narrower, more restrictive niche of issues in terms of temporal and spatial distance, proximity and separation of project team members (Beranek et al. 2005; Evaristo et al. 2004; Montoya-Weiss et al. 2001), which deserve a separate investigation of their own. On the one hand, these temporal and spatial issues are known to constrain project teams from effectively communicating and coordinating towards the successful accomplishment of tasks (Powell et al. 2004). On the other hand, the current study aims at understanding the more fundamental factors—particularly

organizational forces such as the social, economic and political forces—that generally all project teams potentially face. As such the aim of this study is to explicate and generalize these impacts to all ISD project teams working for organizations without regard to the spatial and temporal configuration of membership that the project teams employ.

Included in the second step is a further identification of the literature to be included for analysis, which entailed a rather crude, more manual scheme of selection of relevant literature and removal of irrelevant articles found in the generated list per journal. The manual selection and removal of articles were performed by reviewing abstracts and inspecting the contents of the manuscripts. Using the same inclusion and exclusion criteria discussed above, the manual removal schemes were necessary as the generated list of articles may have still included studies that were remotely or not necessarily related to ISD project teams, software development and ISD methodologies. In addition, the manual removal activity ensures the concepts being discussed in the studies are consistent with those that befall within the project development lifecycle; that is, from project conception up to project implementation. Hence, literature that talks about issues post-implementation of projects are out-of-scope from this study as well. For example, Tong et al's (2015) study on user performance examined system user experiences post project implementation and excluded from the literature review. Furthermore, certain IS project-related and systems development literature whose title included a term in the exclusion string (e.g. virtual, offshore) but did not necessarily dwell on the spatial and temporal issues, yet focused more on relevant social aspects of this study (such as culture) were nevertheless included in the review (e.g. Rai et al. 2009). Performing the second step resulted to total of relevant 195 articles reviewed for this study. Table 2.1 shows the total number of relevant articles found

and identifies the number of articles, with the articles' corresponding year ranges, per journal that were analyzed as part of the review of literature for this study.

Table 2.1 Summary of Articles Found in the AIS Basket of Six

AIS Basket of Six Journals	No. of Relevant Articles Found	Inclusive Years of the Articles
European Journal of Information Systems *(established in 1991)*	12	2000-2016
Information Systems Journal *(established in 1991)*	43	1992-2015
Information Systems Research *(established in 1990)*	19	1991-2015
Journal of Management Information Systems *(established in 1984)*	66	1984-2015
Journal of the AIS *(established in 2000)*	19	2003-2016
MIS Quarterly *(established in 1977)*	36	1977-2015
TOTAL	195	

The third step of the literature review process reviewed each relevant article and coded the article description, phenomena of interest, antecedents or causes, consequences or implications, theoretical underpinning, research methodology, level of analysis, sampling and data collection schemes, and findings and results. Based on the codes, four emerging themes were observed: (1) characteristics and behaviors of project participants, (2) characteristics and behaviors of project teams, (3) development approaches, methodologies and tools, and (4) power control and politics. Table 2.2 identifies the literature according to the IS project management phenomena and concepts, as well as unit of analyses across four themes. This study expounds on each theme in the following sections and then explains existing gaps from which this research draws its value and significance.

Table 2.2 Focal Themes and Levels of Analysis in the Study of IS Project Management

Focal Theme	Phenomena and Related Concepts	Unit of Analysis	Sample Contributions
Theme 1: Characteristics and Behaviors of Project Participants	User as the Developer User Participation Conflict and Conflict Resolution Fit in IT Project Governance Top Management Support Stakeholder Support Time Pressure and Deadline Software Product Quality Project Escalation Commitment to ISD Projects Determinants of Commitment Economic Success of Projects Heterogeneity Culture Cultural Distance	Organization; Individual Users; Individual Analysts; ISD Project	Austin and Devin (2009) Barki and Hartwick (1994) Beath and Orlikowski (1994) Doll (1985) Kaiser and King (1982) Keil (1995) Keil et al. (2000) Levina (2005) McAvoy et al. (2013) Nandhakumar et al. (2013) Newman and Sabherwal (1996) Rivard and Huff (1984) Salaway (1987) Shmueli et al. (2015) Vessey and Conger (1993) Walsham (2002)
Theme 2: Characteristics and Behaviors of Project Teams	Team Personality Composition Defense Avoidance Behavior Learning Paralysis Project Goal-Setting Project Team Performance Boundary Spanning Factors for ISD Success	Aggregation of Project Participants with Implications to Project Teams; Project team level of analysis; Secondary Cases; ISD Project	Abdel-Hamid et al. (1999) Andres and Zmud (2001) Dibbern et al. (2008) Franz (1985) Guinan et al. (1998) He et al. (2007) Roberts et al. (2004) Sawyer et al. (2010)

Table 2.2 (continued)

Focal Theme	Phenomena and Related Concepts	Unit of Analysis	Sample Contributions
	Coordination Interdependencies Job Satisfaction Goal Conflict Team Cognition Contingency Approach to Coordination		Sawyer (2001) Siau et al. (2010) Tripp et al. (2016) Wang et al. (2012) Wastell (1999) White (1984) White and Leifer (1986)
Theme 3: Development Approaches, Methodologies and Tools	Tactical Plan for DSS Development Alternative Methods for Developing Distributed Systems Requirements, Needs and Priorities Business Systems Planning Application Transfer Team Executive Application Survey Total Manpower Commitment Flexible Approaches to Systems Development Impacts of Formalized Methodologies; Software Crisis Controlled Flexible Process Designs Modularity Loose-Coupling Software Quality	Individual Users; Individual Developers; Organization; ISD Project	Ahituv et al. (1984) Ba et al. (2001) Batiste and Jung (1984) Biggs (1978) Bostrom and Heinen (1977a) Bostrom and Heinen (1977b) Braa and Øgrim (1995) Chiang and Mookerjee (2004) Constantinides and Barrett (2014) Felix and Harrison (1984) Fitzgerald (1996 Ghobadi and Mathiassen (2016) King (1996) Kling (1977) Meador et al. (1984) Subramanian and Zarnich (1996)

Table 2.2 (continued)

Focal Theme	Phenomena and Related Concepts	Unit of Analysis	Sample Contributions
	Software Performance User-Centered Design Bottom-Up Development Approach Knowledge Transfer for Software Process Improvement Iterative Enhancement; Spiral Development Organizational Incentives		Ramasubbu et al. (2015) Ravichandran and Rai (2000) Semprevivo (1980) Sircar et al. (2001) Vidgen (2002)
Theme 4: Power, Control and Politics	Clan Control Control Theory for Agile Stakeholder Control Sense-Making Technical Winnowing Collaborative Coordinating Control Modes Formal Control Informal Control Control Configuration Control Enactment Political Processes	Organization; ISD Project	Azad and Faraj (2011) Chua et al. (2012) Ghazawne and Henfridsson (2013) Henderson and Lee (1992) Howcroft and Light (2006) Kirsch (1997) Kirsch (2004) Maruping et al. (2009) Sabherwal and Grover (2010) Wiener et al. (2016)

Theme 1: Characteristics and behaviors of project participants. Since the IS research community's advocacy for the *socio-technical* paradigm, studies in major journals of the IS discipline have been directed towards understanding one or more types of project participants and their relationships among their peers and higher-level positions within the project and organization (Kaiser and Bostrom 1982; Kaiser and King 1982; Katz 1982; Wastell 1999; White 1984; White and Leifer 1986). The most notable behaviors are examined from system users and their indispensable involvement in almost all stages of the project lifecycle (e.g. Kling 1977; McLean 1979; Rivard and Huff 1984; Yoon et al. 1995). Support from top management and project stakeholders (or lack thereof) has also been given due attention to examine their impacts to the ISD project (Boonstra et al. 2008; Doll 1985; Vidgen 1997). This theme also incorporates studies that examine behavioral factors (e.g. commitment levels, performance dip), psychological factors (e.g. stress, anxiety) and social factors (e.g. communication, coordination, conflict) that influence behaviors of project participants (Arnold et al. 2010; Gallivan and Keil 2003; Pawlowski et al. 2007). Personality types such as those classified according to the Myers-Briggs indicators (Kaiser and Bostrom 1982) and cultural factors such as strict adherence to deadlines and close working relationships with users (Keil et al. 2000; Walsham 2002) have also been examined that influence productivity in the development of information systems.

Theme 2: Characteristics and behaviors of project teams. The second theme examines IS project teams as single-unit entities. In general, concepts studied in this theme focus on collectivistic behaviors of project teams. Project team performance and personality composition of project teams are factors that are linked to ISD success (White

1984; White and Leifer 1986). Other team-level factors are also investigated such as learning paralysis that systems developers manifest as a social defense to reduce high levels of stress and anxiety in developing IS (Wastell 1999), coordination strategies within project teams (Andres and Zmud 2001), and team cognition that project teams develop to facilitate their knowledge activities (He et al. 2007). Salient project attributes that impact ISD team behaviors are sought to be understood as well, such as project goal-setting (Abdel-Hamid et al. 1999), boundary spanning (Guinan et al. 1998), contingency approach to project coordination (Franz 1985).

Theme 3: Development approaches, methodologies and tools. The third theme addresses questions of how newer methodologies, tools and approaches to systems development and project management influence ISD projects. Some studies introduced more fundamental paradigms and philosophical underpinnings that institutionalize perspectives in systems development in IS (e.g. Bostrom and Heinen 1977a; Bostrom and Heinen 1977b; Hirschheim and Newman 1991; Subramanyam et al. 2012). In relation to project lifecycles, some studies dealt contributing practices targeted for specific project stages such as requirements gathering phase or the design phase (e.g. Batiste and Jung 1984; Kling 1977; McLean 1979; Slaughter and Kirsch 2006). Other studies dealt with practices for the whole project lifecycle in general (e.g. Ahituv et al. 1984; Felix and Harrison 1984; Ramasubbu et al. 2015). This theme also includes tools that support improvements in the execution of information systems development and project management (e.g. Biggs 1978; Chiang and Mookerjee 2004), as well as organizational strategies and landscapes that support higher success rates in IS project management (e.g. Ba et al. 2001; Constantinides and Barrett 2014).

Theme 4: Power, control and politics. The fourth theme has received great attention in the IS community as important factors that have high degree of influence to projects and project teams. This theme recognizes salient impacts of power, exercise of control and politics that exist in every project management and systems development efforts (e.g. Kirsch 1997; Kling and Iacono 1984; Markus and Robey 1988). Further, by recognizing the existence of political events, project teams may be able to navigate more successfully political forces at play with due recognition of motivations of specific influential individuals to act, protect or advance their self-interests (Grover et al 1998).

Gaps in the Study of IS Project Management

Within the IS project management literature, there are opportunities for additional research. Understanding the gaps in the IS project management literature set the tone, value and significance of this research.

Themes 1 and 2 suggest a variety of relevant factors and forces that impact project team behaviors. These factors and forces are identified from the members of ISD projects themselves (individual level), to specific roles within, and specific traits of, the project team such as users, analysts, developers, and culture (internal to project team level), to the influence of top management and economic factors (external to project team level). Yet, among these factors, a fundamental yet critical team-level factor that is extensively investigated in various social sciences (e.g. small group research, sports psychology and organization management), but largely neglected in IS project management contexts, is the cohesion of ISD project teams. Team cohesion is a key factor for understanding project team performance, which is a key determinant of project success and the successful attainment of group goals (Chiocchio and Essiembre 2009; Davis 2014; Guinan et al.

1998). Hence, team cohesion might prove to be an intermediary factor that needs to be addressed prior to achieving success in the management of ISD projects.

Team cohesion accounts for the degree of interconnectedness of individuals in a group associated together through a sense of belongingness and feelings of membership in the group (Jones and Harrison, 1996). In IS development and project contexts, cohesion is influenced by factors such as clarity of group goals, frequency of interaction, participation of all group members, mutual trust and support among members (White and Leifer 1986); Yang and Tang 2003). As such, team cohesion is a concept that integrates many of the concepts captured under the themes discussed in the previous section of this study such as user involvement and participation (White and Leifer 1986), team cognition (He et al. 2007), commitment (Newman and Sabherwal 1996), culture (Walsham 2002) and top management support (Doll 1985).

The lack of research on cohesion within ISD project teams provides an opportunity for an increased understanding of project team performance and, consequently, attaining IS project success. In particular, it is not well understood how the social, economic and political forces at play within the project environment, and the ISD methodologies used by project teams impact team cohesion as project teams attempt to deliver their projects successfully. As such, understanding how organizational forces play and impact ISD project team cohesion may lead to further understanding ISD project team performance and increase the likelihood of attaining ISD project success.

An observation from theme 1 pertains to the levels of analysis adopted in the research design. While it may be soundly justified to understand project participants through an analysis of individual project members (theme 1), it would be deemed a weak

justification when implications generated at a level of analysis such as an individual level or project level are made to be generalized at the project team level (Markus and Robey 1988). For example, some studies generalize implications to project teams using an aggregation of project participants not necessarily belonging to the same project teams (e.g. Abdel-Hamid et al, 1999). Other studies use case studies with IS projects as the level of analysis, or use secondary IS project cases to showcase support or lack of support to certain propositions about project teams (e.g. Wastell 1999).

Theme 3 explores a variety of ways to improve ISD processes. These processes pertain to methodologies, approaches, frameworks, and tools that aid to make those improvements (e.g. decision making tools, CASE tools). One notable work was conducted by Fitzgerald (1996) in his attempt to examine the impacts of formalized methodologies on the successful systems development. Through his work, Fitzgerald examines the value and role of methodologies in practice and the pressure methodologies promote to rapidly changing business environments. Many organizations now utilize a variety of methodologies based on formalized versions (e.g. traditional, agile methods) of ISD methodologies; organizations depart from the formal structures of the original versions and customize ISD methodologies to meet specific organizational needs (Beynon-Davies and Williams 2003; Cao et al. 2009). There are also organizations who do not follow typical methods whose processes are purely ad hoc (Harris et al. 2009). Ad hoc methodologies do not necessarily mean chaotic and disorganized, only unstandardized (Fitzgerald 1996). Ad hoc methodologies are a collection of processes and practices that are beneficial for a particular endeavor, such as one-time innovative projects. Yet, it is not well understood how the changes to formalized ISD methodologies or adoption of ad hoc methodologies

produce consequential impacts not only to the dynamics of ISD project teams and project team cohesion, but to the larger organizational environment that surrounds project teams as well.

The last theme, theme 4, exposes, perhaps, the most striking project mechanism that governs every ISD project—project control. This mechanism emerges saliently during political processes or when power of one authoritative figure regulates or supersedes certain project processes thereby impacting attainment of project objective (Sabherwal and Grover 2010). However, it is not well understood how political forces emerge in relation to the other organizational forces, such as the social and economic forces, in the project environment. It is also not understood how political forces impact the dynamics of IS project teams, particularly team cohesion.

Social, Economic and Political Environments in the Study of IS Project Management

Literature in organizational behavior informs us of the ever present social, economic and political environments of organizations, such that the forces in these environments affect the behavior, development and performance of individuals in the organization (Bolman and Deal 2013; Hiriyappa 2009). Being a subunit of organizations, project teams, therefore, need to understand the interplay of forces across these environments to successfully navigate their projects toward successful delivery (Schwalbe 2015).

The social environment of an organization refers to the physical and relational settings of individuals that make up an organization. This environment includes the social structures that define the position, roles and responsibilities of an individual with respect to other individuals internal and external to an organization. Tied to this environment are

the social norms that that shape culture, preferences and basic shared values held within the organization (Hiriyappa 2009). In ISD project contexts, social factors include the human resources dimension in terms of who comprise a project team (e.g. project manager, analysts, designers), the roles and responsibilities tied to each position, and work culture highly valued in a project team (Schwalbe 2015).

The economic environment largely consists of factors that pertain to the availability and use of resources to carry out the mission of organizations. The forces in this environment largely pertain to the available financial resources that bound all work to be performed in an organization. Financial resources typically exist in monetary forms such as wages, funds and budgets. Other available non-financial resources such as technological and logistical in nature may be assessed in terms of equivalent value to carrying out important transactions to completing certain job functions. Human resources are also a source of economic forces because of human beings' abilities to utilize and process knowledge for profitable outcomes (Hiriyappa 2009). These economic factors trickle down to the project team level, which may be perceived in terms of harmony between needs of organization (or project) and the project members, and the economic ideologies that follow maximization utility of resources for successful project delivery (Schwalbe 2015).

The political environment is largely comprised of the stakeholders and decision-makers who hold certain positions of power to influence the mobilization and utilization of both human and non-human resources to effect a change. As such, literature contributes several definitions of the word "politics" such as "the science and art of government", "a way of ruling divided societies" and "man moving man" (Tansey and Jackson 2008). A famous quote by Aristotle—"man, by nature, is a political animal"—reminds us about the

core essence of politics—*human affairs* (Gregor 2006). Perhaps, it is the seemingly unpredictability of human affairs that makes the study about political forces intriguing (Cavarero 2002). As such, politics is an acknowledged phenomenon across all levels of society, which is no less common in organizational and project-level settings.

When power is asserted to impose change, political forces emerge that may cause conflicts (Ferris et al. 1989). Examples of forces in the political environment are investment decisions, factors that impact job opportunities, fiscal policy management, administrative practices, legal system and company by-laws (Hiriyappa 2009). ISD project environments are not void of political forces, and are rather highly prone to them (Schwalbe 2015). Politics in ISD projects emerge in the form of conflicts, power issues and coalitions (Markus 1983; Sabherwal and Grover 2010).

Exerting influence over another is often associated with "power", "coercion" and "control" such that the consequences of politics often manifest in the form of outright opposition such as "confrontation", "resistance", "rebellion" and "coalition" (Sabherwal and Grover 2010). In organizational contexts, the above-mentioned terms are subdued manifestations in an individual's daily activities in the form of "endurance", "struggle" and "conflict". While early works on conflict were misconstrued to be destructive for organizations, contemporary views about conflict cultivate opportunities for growth and creativity for solutions to problems that organizations face (Barki and Hartwick 1994). Literature also reminds that political activities are driven by one's desire to further his or her self-interests. Even though politics is sometimes considered a natural manifestation of human nature and may bring about good results, it nevertheless brings about a period of

"disruption," "conflict", "struggle" and "endurance", which may be perceived negatively by individuals in opposition (Hirschheim and Klein 1989).

In summary, social, economic and political factors in the project environment are *forces* that potentially bound, effectuate and impede the accomplishment of project tasks. As such, the current study closely examines these forces and their potential impacts to the ISD methodology and project team cohesion as project teams perform to accomplish project work.

Lenses Used in the Study of IS Project Management

Extant literature on the management of IS projects is examined through a number of lenses—theories, models and frameworks—which may be grouped according to the following organizational environments: social, economic, and political. Each lens demonstrates applications in one or two dominant environments, which exposes more nuanced behaviors critical to the success, or instrumental to failures, of project teams.

For example, control theory has been applied extensively in IS project contexts (e.g.Choudhury and Sabherwal 2003; Cram and Brohman 2013; Heiskanen et al. 2008; Kirsch 1997; Kirsch 2004; Kirsch et al. 2002; Kling and Iacono 1984; Maruping et al. 2009; Persson et al. 2012) to examine stratagems used by individuals to control other individuals' behaviors towards attaining project success (Kirsch 1997). Further, control theory is a lens typically used to understanding how individuals influence (that is, motivate, regulate, or force) the actions of another in a political environment (Wiener et al. 2016). Clan control, an informal control mode of control theory, typically leverage individual's strong ties between and among other project participants of power to influence decisions about projects (Kirsch 1997). Clan control has also been given due attention in the IS

project management literature as an extension to explaining control theory (e.g. Choudhury and Sabherwal 2003; Chua et al. 2012; Harris et al. 2009). In agency theory, project team members are perceived as agents who are relied upon by other members of the project team to accomplish project-related tasks, as they are equally expected to behave on behalf of the project and the larger organization in which they belong (e.g. Austin 2001; Banerjee and Duflo 1999; Mahaney and Lederer 2003). Agency theory has been mostly used to identify key factors, such as contracts (formal or informal), as drivers for project success (Rai et al. 2009). IS project management studies that utilize social capital theory (e.g. Bhandar et al. 2007; Chua et al. 2012; Newell et al. 2004; Tansley and Newell 2007) recognize the structural, cognitive and relational ties of IS project teams and members as resources that drive commitments and actions towards attaining project goals (Chua et al. 2012). Actor network theory examines the role or influences of technology within social settings (Callon 1986), which have been applied mostly in outsourced and distributed project team settings (e.g. Cho et al. 2008; Heeks and Stanforth 2007; Mähring et al. 2004; Wernick et al. 2008).

Table 2.3 also shows nearly all the theories that are used in the analysis of IS project literature. To date, no study has described and explicated the interplay of forces across all the social, economic and political environments in IS projects. In addition, no one theoretical lens—theory, theoretical framework or model—has expounded how one force in one dominant organizational environment can impact team behavior and other changes in another organizational environment. These pieced theoretical perspectives limit the sub-discipline of IS project management to holistically examine the interplay of organizational forces that vacillate between and among more holistic environmental contexts–the social, economic and political contexts.

Table 2.3 Dominant Environments of Impact of Theoretical Lenses in IS Project Literature

Analytical Lenses	Organizational Environment of Application			Sample Literature
	Social	Economic	Political	
Agency Theory		x		Austin and Devin (2009)
Collective Identity Theory	x			Levina (2005)
Contingency Theory		x		Andres and Zmud (2001)
Control Theory			x	Maruping et al. (2009)
Creativity Model	x			Cooper (2000)
Escalation Theory		x		Keil (1995)
Expectancy Theory	x			Newman and Sabherwal (1996)
Goal Setting Theory	x			Abdel-Hamid et al. (1999)

Table 2.3 (continued)

Analytical Lenses	Organizational Environment of Application			Sample Literature
	Social	Economic	Political	
Henderson's (1996) Framework for Organizational Change	x			Sircar et al. (2001)
Jensen-Meckling's (1992) Theory of Fit in IT Project Governance	x	x		Tiwana (2009)
Knowledge-Based View		x		Dibbern et al. (2008)
Practice-Based Approach to Collaborative Development following Interpretive Paradigms	x			Nandhakumar et al. (2013)
Psychodynamic Theory	x			Wastell (1999)
Robey et al's (1982/1989/1993) Models on User Participation and Conflict Resolution	x		x	Barki and Hartwick (1994)
Sensemaking Theory	x			Tong et al. (2015)
Social Capital Theory	x			Chua et al. (2012)

Table 2.3 (continued)

Analytical Lenses	Organizational Environment of Application			Sample Literature
	Social	Economic	Political	
Structuration Theory	x			Walsham (2002)
Theory of Action	x			Salaway (1987)
Personality and Psychological Types	x			White and Leifer (1986)
Total Quality Management Theory		x		Ravichandran and Rai (2000)
Transaction-Cost Estimate		x		Benaroch et al. (2016)

Past research has examined potential impacts of organizational forces from one environment to another, but never more fully understand how they all play together in a larger context where the interaction of potentially all organizational forces are considered. For example, Cooper (2000) leveraged the use of creativity model (Woodman et al. 1993) in understanding how software development teams design creative software that would incite increase use of IT, and consequently, staff productivity. Although creativity model is largely a concept that induces the creativity of individuals through a collection of methods, techniques and tools (Cooper 2000), the impact of this model is ultimately to realize reengineering process success for salient economic reasons. As such, the interplay in utilizing this model is that of social in nature to something that is economic in nature (social→ economic). As another example, Barki and Hartwick (1994) built upon Robey et al.'s (1982/1989/1993) models to further impress the significance of user participation in the development of information systems. The study's findings explicate the complex relationships between user participation and systems development spanning beyond mere participation to projects to relationships that induce and are intertwined with conflicts that may impede desired system outcomes (social → political).

None of the current studies on IS project management uses a theoretical lens that could explain the impacts of all three environmental forces in ISD projects. By not seeing the larger context, we limit our perception of ISD project behaviors (i.e., team cohesion) in terms of <u>when</u> certain processes contribute to the collapse (or prevalence) of team cohesion, <u>who</u> (or which force) triggers the series of events to its collapse, <u>how</u> the series of events took place, and <u>why</u> such events underwent.

Information Systems Development Methodology

Information systems development (ISD) induces one or more process changes to achieve and maintain some human objectives (Welke 1983). In order to carry out this change effectively, a holistic understanding of the project and its relationship to the environment in which the process change takes place is crucial (Schwalbe 2015; Welke 1983). Systems development is consistent with a "systems" thinking paradigm that describes how projects are executed within organizational contexts (Schwalbe 2015). Hence, systems development is a process that encompasses systems analysis and systems design and implementation. Whereas systems analysis includes the collection, organization and analysis of facts about an information system and the operating environment, systems design and implementation builds upon systems analysis to conceive, produce, install and preserve an information system (Hirschheim et al. 1995). A means to systematize and organize the development process, ISD methodologies have been relied upon to provide basic guidelines on developing information systems using engineering techniques (Mahanti et al. 2012).

The core tenets of ISD methodologies build upon software engineering practices and principles. ISD methodologies essentially follow a "divide and conquer" principle that subdivides the entire systems development process into smaller, more manageable stages that are aligned in sequence (Fitzgerald 1996). In particular, ISD methodologies are a collection of standardized processes that project teams follow in regards to the analysis, design, development, implementation and maintenance of information systems (Hoffer et al. 2014; Olerup 1991). As organizations are compelled to constantly evolve to meet the

demands of global market, traditional or waterfall development methodologies[6] are found to constrain the performance of ISD project teams. Over the years, although newer methodologies—e.g. rapid application development, spiral development, iterative model—emerged to address the weaknesses of traditional methods, research in IS project management has shifted its focus on newer development methodologies. Agile is the newer development approach that grew in popularity among organizations and researchers because of its capacity to adapt to the turbulent nature of our present-day business environments. Regardless of the methodical differences among existing systems development processes, the purpose and value of a systems development methodology largely rely upon its ability to influence the collective social interplay of multiple project actors who attempt to interpret, make sense of, and act upon tasks to meeting goals and each other's expectations to successfully carry out an intended change (Hirschheim and Newman 1991).

Conceptual Underpinnings of ISD Methodology

Hirschheim et al. (1995) define an ISD methodology as an "organized collection of concepts, methods, believes, values and normative principles supported by material resources" (p.22). ISD methodologies are *normative* in that they prescribe a set of behavioral and technical rules on how to address potential and emergent problems during the development process. Hirschheim et al. (1995) and Fitzgerald (1996) identify conceptual underpinnings, which may distinguish one ISD methodology from another, as follows.

[6] The term *methodologies* generally pertain to the core development model and its many variants. In waterfall, variants would typically add, insert, regroup or rename certain phases in the life cycle, but nonetheless still follow a cascaded set of phases.

First, ISD methodologies provide some framework of application techniques and resources purposed to eliminate counter-productive activities and unnecessary work oversight to completing work, which typically follow a "divide and conquer" principle (Fitzgerald 1996). Such a framework details the activities performed in the development of systems, the order in which the activities are performed, the time and frequency entailed to performing the activities, as well as the individuals responsible to perform the activities (Hirschheim et al. 1995). ISD methodologies also facilitate project management control to minimize risk and uncertainty, and to some extent, are legitimized to justify and maintain conformance to use. While motivated by some economic rationale such as rewards and sanctions that help regulate working habits, attitudes and demeanor of project actors, ISD methodologies afford skill specialization and division of labor.

Furthermore, because knowledge is a crucial resource of systems development, ISD methodologies gain value through the ISD methodology's ability to afford systematization of knowledge into structural frames that embed repeatable knowledge processes (Fitzgerald 1996). Knowledge structures may come in the form of documentations produced in each activity that are acceptable and understandable to the social environment of the system being developed (Hirschheim et al. 1995). In addition, the use of repeatable knowledge structures reduces dependency from specific persons while decreasing the learning curve of skilled workers.

Last, ISD methodologies may be distinguished according to the extent of prescription, formalization or standardization of the development process purposed to facilitate interchangeability among developers, and for increased coordination, productivity and quality of outputs (Fitzgerald 1996; Hirschheim et al. 1995). Variations

among the activities in the development process transpire according to the cultural differences across impacted environments and organizations, as well as lessons learned from past development efforts throughout history (Hirschheim et al. 1995).

In a more contemporary setting, Edberg et al. (2012) list a more concise and similarly meaningful set of characteristics that describe a methodology in terms of methodology *core concepts*, *steps*, *guidelines* and *techniques*, such that the ideas within each concept differ from one another in a continuum (Edberg et al. 2012). Table 2.4 shows how Edberg et al.'s characteristics of a methodology concisely map with Fitzgerald's methodology characteristics. This mapping is useful because it shows the parallelism and consistency of characterizing ISD methodologies to more contemporary contexts. Classifying each characteristic in a continuum describes the extent of "waterfall" and "agile" characteristics in an ISD methodology. The study also assumes that waterfall and agile methodologies are contrasting methodologies that lie at the opposite ends of the continuum.

Collective Action Theory

While ISD methodologies describe more specific activities that project teams may follow, a more fundamental underlying idea that could better explain how and why project teams are driven to reach their common goal is through collective action theory. The foundational tenets of collective action theory can be traced as far back as the time of Aristotle (Olson, 1977), which speaks about humans' innate nature or propensity to join and form associations to advancing a common cause or interest (Gilbert, 2006; Olson, 1977; Sandler, 1992). Collective action results when at least two people work together (Gilbert 2006), such that the individuals exhibit interdependencies between and among

Table 2.4 Mapping of Methodology Characteristics of Edberg et al (2012) and Fitzgerald (1996)

Fitzgerald (1996)	Edberg et al (2010)		
		Waterfall ← continuum of variations →Agile	
- A purposeful framework - Eliminates counter-productive activities - Requires less oversight	Core Concepts	- Bring order to chaos - Value repeatability - Value project management - Follow a plan	- Accommodate and respond to change - Value creating working software quickly - Spend time creating rather than planning
- Follows a standardized "divide and conquer" principle - Facilitates interchangeability of work among developers - Affords increased coordination, productivity and quality of outputs	Guidelines	- Work with customer early in project, or possibly not at all if not necessary - Determine requirements before proceeding to development - Gain agreement on requirements - Freeze requirements early in project - Create comprehensive documentation - Separate tasks by function	- Avoid excessive planning because the plan will probably change - Work with customer as available during project - Continue determining requirements during project - Create minimal documentation - usually at the end of the project - Do multiple (or all) tasks in the process with an individual
- Affords use of specialized skills - Systematizes knowledge processes - Reduces learning curve and excessive dependencies on specific persons	Steps	- Predefined - Linear with clear feedback loops - Perform sequentially	- Not predefined - Iterative - Concurrent
- Facilitates use of tools - Exercises project management control to minimize risk and uncertainty	Techniques	- Use of modeling techniques (DFD, ERD, UML); - Project management techniques (Gantt charts, checklists, milestones) - Project repository	- Paired programming - Extremely rapid prototyping in sprints - Minimal modeling

each other as marked by the contributions and influences that one brings to the other (Sandler 1992a). Gilbert (2006) simplistically illustrates some common examples of collective action as "painting the house together" (cf. Bratman 1993), "making music together" (cf. Schutz 1976) and "executing a pass" (cf. Searle 1990). Organizations are composed of individuals with mutual interests and processes that acknowledge and rely upon these individuals to act together to contributing towards, and achieving, shared goals (Bimber et al. 2012). As such, collective action, in organizational contexts, encompasses highly institutionalized social structures where individual choice is tightly coupled in accordance to an organization's hierarchical levels (Bimber et al. 2012). In the fields of economics and philosophy, more fundamentally, understanding collective action formerly assumed that the personal interest of individuals, also known as *narrow rationality* (Hardin 1982), strongly drive a group's collective action to attain a mutual benefit or collective good (Gilbert 2006; Hardin 1982; Olson 1977). Yet, further reasoning directs philosophers and social scientists that this assumption is, in fact, a fallacy known as the *fallacy of composition*, or *fallacy of static generalization* (Hardin, 1982). The assumption is a fallacy because, on the one hand, altruistic individuals tend to forego their personal interests towards willingly seeking some collective good for the group, even though altruism is nonetheless recognized as some 'ultra-subtle' narrow, self-interested trait (Zey 1997). On the other hand, unless some form of coercion or mandate enforces individuals to act, rational, self-interested individuals will not act to supporting a group interest towards achieving a collective good (Olson 1977). The reason for this argument is that, when interests are shared, rational individuals are aware that everyone in the group will nonetheless benefit if they achieved their collective good, and thus, may tend to let others

pay the cost of attaining that collective good by not acting, known as *free-riding* (Olson, 1977). Sandler (1992b) asserts that, therefore, "individual rationality is not sufficient for collective rationality" (p.3).

Fallacy of composition arises because collective goods, being "public goods," are assumed to be nonexclusive and indivisible among members in that when a collective good is made available to one, it is also made available to all members of the collective, including *free riders* (Olson 1977; Sandler 1992b). In addition, conflicts between individual group members, also known as problems of collective action, may arise due to the group members' individual rationality (Olson 1977). That is, when the cost of achieving a collective good is perceived to be higher than the individual benefits, rational self-interested individuals will become obstacles to collective action by not acting towards achieving a collective good (i.e., free-ride), or by deliberately defecting to influence a collective forging of a new decision (Zey 1997). Hence, although individual rationality may not be sufficient to collective rationality, individual rationality may induce transformative consequences to collective rationality.

Yet, people *do* need to act as a collective to obtain countless shared benefits associated to solving problems across a wide scale of social units (Bimber et al. 2005). What drives a group's collective action is then perceived with the notion of *collective rationality* that is argued to be influenced by *invisible hands* (Smith 1952) also regarded as *selective incentives* (Olson, 1977). Collective rationality emerges with the presence of *joint commitments*, *collective intention* and *collective agents* (Gilbert 2006; Sandler 1992b; Tieffenbach 2013).

Invisible Hands

Introduced by Adam Smith (1933), invisible hands are invisible forces that that are felt or perceived by the society at large because invisible hands have the ability to influence a society to advancing a cause (Tieffenbach 2013). Perceived by individuals, invisible hands are motivational concerns, in addition to self-interests, that induce individuals to act (Sandler 1992b). In other words, invisible hands lead individuals to act upon achieving an end which may not necessarily be congruent to an individual's intention or self-interest (Sandler 1992b). In more contemporary settings, the concept of the invisible hand is applied not only in the context of the larger society but in smaller human conglomerations such as organizations and groups. Invisible hands exist in the form of selective incentives such as social (e.g. social status, social acceptance), economic (e.g. monetary incentives, material rewards) and political (e.g. coercion by some authorities of power) incentives (Olson 1977).

Social incentives and social pressures drive people to act in order to win prestige, respect, friendship and other social and psychological objectives. Disobedient individuals may be shirked upon as some form of social sanction, while cooperative individuals may be favored for inclusion in exclusive social circles as some form of prestige and social reward. Social incentives, however, are mainly effective only in small group settings. Olson (1977) describes two reasons. First, in a large, latent group, each member is so small compared to the entirety that the difference in the actions one may bring may not necessarily be felt or recognized by the rest. Second, in a large group, it would be unlikely that everybody knows everyone in the collective, thus, creating further distance to potentially forming friendships. In such a case, one's efforts and sacrifices will be less

likely recognized by the rest, and conversely, one's status will not be affected socially if he or she fails to exert efforts or sacrifices for the fruition of group goals. Social incentives, however, may play a role in a large group only when the large group is a federation of smaller groups. In an organizational context, for example, a relatively large group may be akin to an organization (of about a hundred employees) with a federation of smaller, intermediate groups known as departments (size of about 10-15 members) or functional work groups and teams (size of about 5-8 members). Because people in small groups, and even in a federation of small groups, are likely to know each other to consequently induce social pressures that would help in satisfying a group's interest on a collective good (Olson 1977).

Economic incentives are typical in the form of rewards such as monetary and material rewards, but may also manifest similar to social incentives especially when the cost is outweighed by the benefit of one's actions to motivate an individual into doing such actions (Sandler 1992b). Economic incentives, typically in organizational contexts, may also manifest in terms of trainings that increase skillsets and knowledge of an individual. Information and other personal resources possessed by, or associated to, an individual are other forms of economic incentives. Such possessions and associations are perceived to hold some value, which can be used in exchange for materials, products and services of equivalently perceived value.

Political incentives may manifest in terms of exertion of power, control and influence of one over another individual to act in alignment with the collective's interest to attaining a collective good. Coercion is one form of power exertion over another, and typically, failure to comply with the politically-induced forces result to a sanction felt or

perceived by the individual not following the orders of high power. For example, coercion by government—such that classic analysis of the reason for government is that armies, parks, and sewer systems require taxation impressment, and right to back up these processes with force (Olson 1977). From an IS projects perspective, fear of failing the project and the consequential impacts for being the reason to failed project, such as demotion, shame and regret for failure, are what might push project teams to successfully deliver their projects. In essence, fear of the consequences for failure to comply is what motivates individuals to comply. This kind of incentive may be closely associated more with the "back of the invisible hand" or the "malevolent invisible hand" in that compliance to this kind of invisible hand might not necessarily have a direct positive outcome that could be perceived by member. Yet, the non-compliance of member may result to a direct potential negative outcome in some form of a sanction, punishment or penalty. To Olson (1977), coercion is only one instance but also the "most" important class of selective incentive. Coercion is known as a "malevolent hand". For social and economic incentives, the potential for positive outcomes in favor of the individual complying with collective action are more likely to be obtained, and are therefore foreseen mostly as 'benevolent hands."

Collective Rationality

The link between rationality and collective action has drawn much interest among behaviorists and sociologists. Hollis and Sugden (1993) explain that an individual's actions are driven by the individual's desires such that reason (rationality) accounts for the steps that an individual takes to satisfying those desires (p. 2). From a group perspective, however, Zey (1997) explains that individual rationality fails to sufficiently drive collective

rationality to drive individuals to a course of action towards attaining a collective good (i.e., something that is desired by a group to attain), but individual rationality could potentially transform a collective's preferences of a collective good. Problems where this assertion manifest are explained in the "prisoner dilemma" and "free-riding" concepts discussed by Olson (1977). Hence, collective action is not a result of mere aggregation of individual actions (Buchanan and Tullock 1962; Elster, 1983; Zey, 1998). What makes collective rationality "collective" is with the idea that collective rationality is a result of a public discourse that has led to make a unanimous decision to realizing a common good (Elster 1983; Zey, 1998). Alternatively, collective rationality and its components—collective intention, joint commitment and collective agents—are being examined more fully instead. Collective agents uphold a group's "collective intention," and "joint commitment" (Gilbert, 2006).

Collective agents are likened to "supra-individual" agents, who are different from individual human agents and supersede individual rational actions above and beyond "metaphysical and moral concerns" (Gilbert, 2006, p.4). Rather than being represented by one individual, a collective agent upholds the group's intentions and commitment that are perceived and maintained in each member of the collective. Figure 2.2 shows a depiction of a collective agent from a group of individuals for depiction of a collective agent). Collective agents have the following characteristics: (1) composed of human beings who act as a single entity through their members, (2) can make decisions for, and by, themselves; and (3) are capable of considering the reasons that may influence their decision for acting as one body within the confines of rationality. The members, likewise, are in

full understanding that everyone in the collective is *jointly committed* to one another in order for collective action to take place.

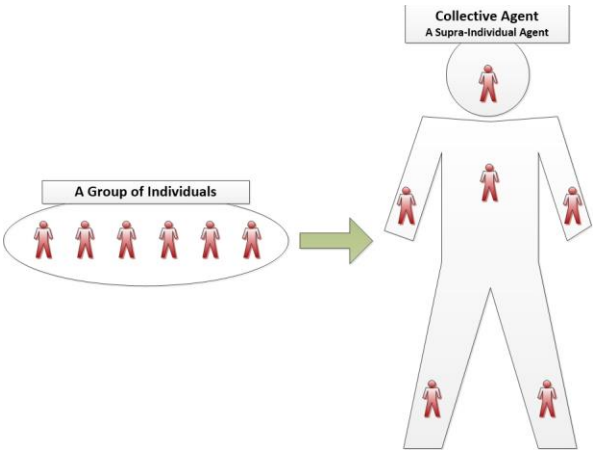


Figure 2.2 Emergence of a Collective Agent from a Group of Individuals

Joint commitment is a mutual expression of commitments *of*, and *by*, the wills of individuals in the group (Gilbert, 1993/2006). Further, joint commitment can only be canceled when everyone in the group involved in the joint commitment agrees to dissolve such expressed commitment since the individual willingness to jointly commit to do a task (as one body) is interdependent to one another at the time the joint commitment was established (Gilbert, 2003/2006). For this reason, the product of joint commitment—collective intention or *we-intention*—either exists as a primitive whole or does not. Thus, *we*-intention is *not* a mere aggregation of *I*-intentions (Tieffenbach, 2013). We-intention exists because every member of the group believes he or she can perform his or her part of the collective action, and (2) every member believes that performing the collective action jointly with his or her fellow participants is *not* impossible (Tuomela 2005). Hence, in we-intentions, participants of a collective action intend to perform activities *with* the rest of the group for the fruition of a certain state or event. Further, while all members of a group

constitute collective agency, there may be members of a group who may proactively embody collective agent roles or act as representatives of a group's collective agency. Such representatives perform tasks that manage group activities and ensure everyone in the group effectively accomplishes his or her share of tasks, while vigilantly discourage acts of free-riding within the team. Hence, collective agents serve as enforcers of joint commitments. It would appear, therefore, that an increased manifestation of collective agency revitalizes joint commitment in some cyclic fashion, in some virtuous cycle, such that a group's rationality (collective rationality) as one body is further reinforced according to the "will" of the collective agent over time (see Figure 2.3).

Social, Economic and Political Perspectives of Collective Action Theory

This study also finds that collective action theory is an appropriate lens to use because of its multidisciplinary nature that has spanned ideas across sociology (Maxwell and Oliver 1993), economics (Olson 1977) and political science (Ostrom 1994; Ostrom 1998; Ostrom 2014). To Flanagin et al. (2006), collective action theory can integrate insights of several theoretical traditions such as those in social capital theory and organizational theory. As such, the theory is appropriate for analyzing and interpreting project management-related perspectives that seek to understand the interplay of forces in the social, economic and political environments of an organization. Hence, the goal is to obtain a thorough understanding of the relationships of the social, economic and political forces in terms of the forces' potential impacts to the ISD project methodology and ISD project team behaviors. Focusing on the social, economic and political environments of ISD project teams entails considering the individual perceptions of team members towards a collective understanding of the entire team's drive to deliver successful projects as well

as their perception of organizational forces—e.g. financial models, power relations and control of stakeholders in the organization.

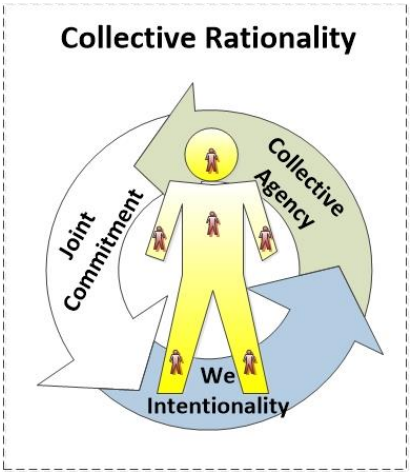


Figure 2.3 Virtuous Cycle of Collective Rationality

Ostrom (2014) listed several contextual variables that may be conducive or detrimental to collective action. These variables are analogous to forces that congruently map to social, economic and political environments in organizations (Hiriyappa 2009). In a CAT perspective, social forces pertain to the size of groups involved in a collective action, the heterogeneity of the group, as well as past experiences and level of social capital. Applied in ISD project contexts, these variables pertain to the size of project teams, the composition of personality types in the team, and the position and role of members in the project team. In an economic perspective, forces that influence collective action pertain to the predictability of resources flows, the type of production to achieve, the allocation of work functions, the relative scarcity of goods, and the size of the total collective benefit. In ISD project contexts, these forces may translate the predictability of availability of project funds, specifications of the information systems to be developed, the assignment of tasks among project members, restrictions in project resources and the size of the project.

From a political perspective, collective action takes place based on the conflicts that are potentially induced such as marginal contribution of one person to the collective good, the size of the temptation to free-ride, the loss of cooperators when others do not cooperate, having the choice to participate or not, the presence of leadership, and the existence of a wide variety or rules used to change the structure of a situation. In an ISD projects, CAT-related political forces may manifest in terms of conflicts among project stakeholders, influence of top management support, and social loafing[7]. A table that summarizes the mapping of the CAT-related variables in terms of the social, economic and political environments of an organization and ISD projects could be found in Appendix A. The table illustrates how environmental forces such as forces in CAT contexts could translate to another context, such as ISD project contexts and vice-versa.

Team Cohesion

Across a variety of social and behavioral sciences, research informs us that team cohesion is among the many team processes that have been heavily investigated for decades (Kozlowski and Chao 2012; Mathieu et al. 2015). Whereas understanding team cohesion is a key determinant for understanding project team performance (Chiocchio and Essiembre 2009; Cummings et al. 2009; Evans and Dion 2012), team performance is a key determinant for project success (Davis 2014; Guinan et al. 1998; Mir and Pinnington 2014).

Cohesion among groups or teams is a "construct used to represent the strength of social bond within a group," which therefore, "can be viewed as the tendency for a group to stick together and remain united" in the pursuit of its goals and objectives (Carron 1982,

[7]Social loafing is a phenomenon that manifests when an individual contributes less than what is required but the lack of contribution is hidden from the rest of the group (Fried 1991).

p. 124). In other words, team cohesion accounts for the degree of interconnectedness of individuals in a group associated together through a sense of belongingness, and feelings of membership in the group (Jones and Harrison 1996). Conversely, cohesion has been defined as a group's resistance to forces that are disruptive (Friedkin 2004) thereby affecting overall team performance. In ISD project team contexts, cohesion is influenced by factors such as clarity of group goals, frequency of interaction, participation of all group members, and mutual trust and support among members (White and Leifer 1986; Yang and Tang 2004). Lack of cohesion, on the other hand, puts forth some degree of constraint among actors of a group that may lead to inferior performance implications in projects (Di Vincenzo and Mascia 2012). When studying cohesion, one must confirm that sufficient time has traversed for team members to become acquainted and develop attraction. Furthermore, because cohesion is a group phenomenon, studies should likewise study cohesion at the group level (Chiocchio and Essiembre 2009).

Consistent with group research literature, team cohesion is a key factor that directly influences team performance in IS project contexts (Yang and Tang 2004). Yet, because membership within project teams may cross organizational boundaries (spatial complexity) and is limited within a definite period of time (temporal restriction), understanding cohesion-performance linkage is perceived more important among project teams than in any other teams in an organization such as service teams and production teams (Chiocchio and Essiembre 2009). Tang (2008) emphasizes the strong manifestation of collective action among groups that are highly cohesive.

Over the years, the definition of cohesion has evolved. Festinger (1950) referred to cohesion as a "field of forces that make group members stay together" (Chiocchio and

Essiembre 2009, p. 7). The vagueness of this version, however, induced development of more concrete measures (Chiocchio and Essiembre 2009; Cota et al. 1995) such as the unidimensional and multidimensional versions.. Chiocchio and Essiembre's (2009) describe a two-dimensional view of cohesion, which is largely based on Carron et al.'s (1985) multidimensional view: task cohesion and social cohesion. The individual-group dimensions reflect how a member can be committed to other members and/or the group itself. On the other hand, the task-social dimension reflects how task commitment (task cohesion) and degree of shared attraction, emotional bonds, and closeness of the members with other group members (social cohesion) describes the strength of ties within the group. With a multidimensional view, "cohesive groups should be able to use their groups' resources more efficiently because they know the members of the group better and are motivated to complete the task successfully" (Beal et al. 2003, p. 991). Another similar study suggests a two-dimensional heuristic for applying for team cohesion using primary and secondary dimensions (Cota et al. 1995). The primary dimension is based on Carron et al.'s (1985) dimensions, which the secondary dimension suggests the use of Griffith's "vertical" dimension of cohesion, which taps on relationships between superiors and subordinates. While the primary dimensions are potentially applicable to all types of groups, the secondary dimension may not be relevant to other types of groups. In IS project contexts, however, and depending on the type of structure of organizations project teams may belong, the need for accounting for the secondary heuristic dimension may deem to be important for investigation. For example, teams who follow pure agile philosophies work well in organizations that are relatively flat where decentralized decision making is encouraged and empowers every team member in contrast to project teams who follow

pure traditional development methodologies within organizations with a considerable hierarchical structure (Cao et al. 2009).

Chapter Summary

This chapter presented relevant literature from organization theory and information systems body of knowledge that highlight the major existing contributions and gaps in the IS field. Results of the review of IS literature show gaps that this study attempts to fill such as a need to focus more on team cohesion and on a more holistic understanding of organizational forces that impact project team dynamics. Team cohesion has been given due attention as it is a concept that has been largely missing in our understanding of ISD project team behavior and performance. Furthermore, literature in the social and behavioral sciences share more details about a basic theory, collective action theory, which could potentially integrate pieced understanding in the IS project management domain of the impacts between organizations and on project teams. The succeeding chapter, chapter three, describes the theoretical model that synthesizes the concepts presented in chapter two, which frames and bounds the blueprint of the research performed in this dissertation.

CHAPTER THREE

Research Model

> *Politics is often viewed by many designers […] as if it were an irrational aberration which needs to be eliminated or curtailed. If designers disdain politics or see their role as separate from it, they will never be able to play an effective part in the negotiation process vital to introducing such systems.*
>
> *Hirschheim and Newman 1991*

In this study, team interactions were examined using collective action theory, a multi-disciplinary theory used in established social sciences such as sociology, economics and political science. The theory's multi-disciplinary nature explicates the interplay of forces impacting the ISD methodology and project team behavior across an organization's social, economic and organizational frames. In developing the research model, this study drew upon the foundational concepts described in chapter two and explain the same concepts in the context of IS project management into this chapter.

Collective Action Theory in IS Project Management Contexts

The concepts central to understanding CAT are invisible hands, joint commitment, collective intention, and the collective agents. Figure 3.1 illustrates how collective action theory may be translated in the context of IS project management.

Interests in collective action is concerned with the treatment of the selective incentives that motivate or pressure groups to action (Hardin 1982). In collective action theory, the concept of the *invisible hand*—e.g., "coercion" (by authorities of power), "monetary incentives," "social status" and "social acceptance" (Olson 1977, p. 61), is what potentially (but not necessarily sufficiently) influences a collective's interest (or collective

rationality) to advance a cause (Tieffenbach 2013). From a project management perspective, these may manifest both as intrinsic and extrinsic motivators such as job titles and positions, opportunities for job promotion, organizational recognition, and, more typically, wages and other monetary rewards.

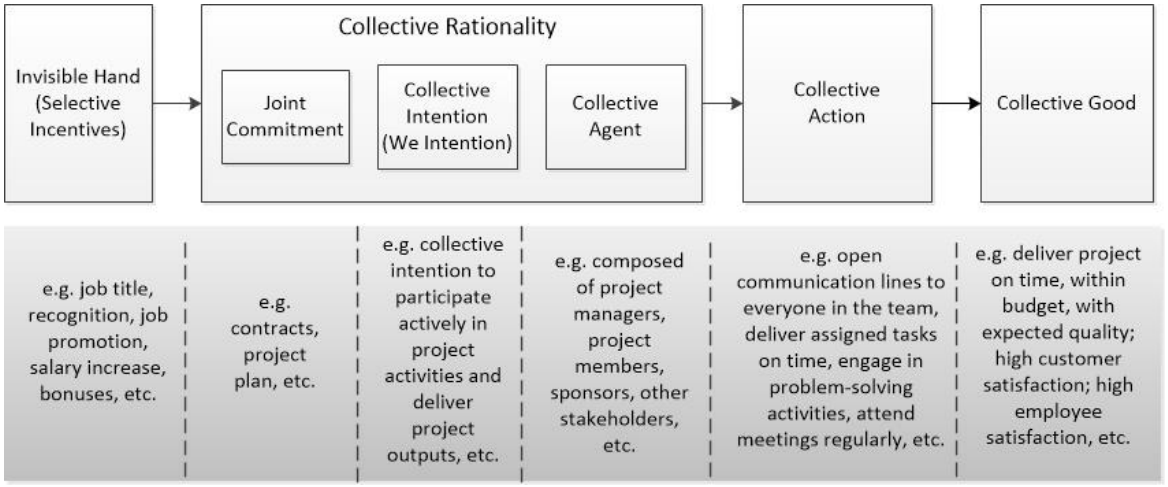


Figure 3.1 Collective Action Theory in the Context of IS Project Management

In the IS project management context, invisible hands may manifest as the organizational forces that motivate, drive, or even coerce project teams to adhering to certain mandates such as systems development standards and financial models, impacting overall project team behaviors. Collective action results when at least two people work together intending to achieve a collective good. In realizing this, all individuals in the group must share beforehand a common understanding of the entire group's intentions (collective intention) to achieving such common goal. Gilbert (2006) illustrates collective intention as follows: "*Persons X and Y collectively intend to perform action A (for short, to do A) if and only if they are jointly committed to intend as a body to do A"* (p.5). Hence, a manifestation of collective intention is determined by the act of each and every individual

comprising a group to jointly committing to perform a collective action. Joint commitment, therefore, is the emulation of a group to act as much as possible as one body that intends to perform an action (Gilbert 2006) such that the individuals in the group exhibit interdependencies between and among each other (Sandler 1992).

Members of IS project teams may manifest similar behaviors as explained above. With the end-goal (or collective good) being the successful delivery of a project, project team members are said to collectively work towards successful project delivery only if they intend to do so a group, and if members effectively contribute towards attaining the group's overall set of goals. In IS project management contexts, joint commitments are usually codified in contracts, project charters, project plans or other intermediate agreement documents. Joint commitments explicitly express the collective's intentions, or plans-of-action, that explain the steps to go about accomplishing specific tasks and deliverables as a group. Yet, certain intentions may also be implicit, which are typically engrained within the team's work culture. Collective agents are said to uphold explicit and implicit (collective) intentions to perform the activities (collective action) necessary towards the attainment of the project goals, and are capable of considering the reasons that may influence their decision for acting as one body within the confines of rationality (Gilbert 2006).

In an IS project management context, all members of the project team are expected to embody collective agency. Project managers, bestowed with limited decision-making authority, typically act as representatives of the group's collective agency more conspicuously to ensure everyone in the group effectively accomplishes his or her share of tasks, while vigilantly discouraging acts of free-riding within the team. Yet, members of

project teams with recognized authority in the organization (e.g., a project sponsor or key project stakeholder, a lead developer), however, may also conscientiously manifest collective agent roles. Such individuals serve as representatives of collective agency who ensure that joint commitments are upheld. It would appear, therefore, that through collective agency, a group's rationality (collective rationality) as one body revitalizes joint commitment in some cyclic process that, over a period of time, stabilizes a group's collective rationality into some state of equilibrium until such state is again challenged by certain forces.

Team Cohesion in IS Project Management Contexts

Understanding cohesion-performance linkage is perceived more important among project teams than in any other teams in an organization such as service teams and production teams (Chiocchio and Essiembre 2009). Team cohesion in IS project management contexts would appear to be similar to any other disciplinary contexts in terms of the basic definition of teams but differ in terms of how individuals are pulled and work together. In other words, while all teams are composed of a group of individuals who are interdependent to, and share responsibilities with, one another, project teams in particular, are assigned to work on endeavors with a predefined start and end dates and whose members are generally pooled together without regard to the restrictions of time, space and organizational boundaries to promote sharing of expertise and the use of staff time more efficiently (Chiocchio and Essiembre 2009). Yet, in the field of information systems, cohesion among project teams is a concept that is not thoroughly investigated. There is sparse research in the major body of knowledge of the IS field that examines cohesion among IS project teams. This study attempts to fill that gap because understanding IS

project team cohesion may take us one step closer to understanding IS project team performance, and consequently, successful IS project delivery.

According to McAvoy and Butler (2009), cohesion among agile software development teams is directly linked to a group's overall performance. More specifically, groups that are highly cohesive perform better in terms of meeting a project's technical quality, cost and schedule goals (Jones and Harrison 1996). Cohesion is influenced by factors such as clarity of group goals, frequency of interaction, participation of all group members, and mutual trust and support among members (McAvoy and Butler 2009; White and Leifer 1986; Yang and Tang 2004). High cohesion within project teams is a strong requirement in order for a team to be perceived as high performing (McAvoy and Butler 2009) . A lack of cohesion, on the other hand, puts forth some degree of constraint among actors of a group that may lead to inferior performance implications in projects (Di Vincenzo and Mascia 2012).

Whether for project teams in distributed or co-located environmental settings, cohesion emphasizes each member's perception as being part of the same team who share project goals and emphasize constant cooperation on all aspects of an IS project (Ramesh et al. 2006). In a model proposed by Jones and Harrison (1996), cohesion is viewed as a single predictor of IS project team performance, whereas other predictors of team performance pertain to task routineity, task priority, user representativeness and team member involvement. Yet, many studies in other social science disciplines found evidence of the multi-dimensional nature of cohesion (e.g. Carron et al. 1985; Chiocchio and Essiembre 2009; Hagstrom and Selvin 1965; Mullen and Copper 1994) which do not only include feelings of social inclusion, but effectiveness of task compliance and completion

of each member towards attaining group end-goals. White and Leifer (1986) posit that highly cohesive software development teams are more effective in accomplishing tasks than groups with low cohesion. As such, this current research leverages the two-dimensional view of cohesion, which includes both social cohesion and task cohesion (Chiocchio and Essiembre 2009). The data collection protocol employed in this study, therefore, examines for each project member's perception of social and task cohesion among IS project teams with respect to how members are related together in the organization.

Parallelism of Organizational Environments across the Contexts of IS Project Management, Systems Development and Collective Action Theory

Extant literature on IS projects and project teams is dominated by studies examined through lenses that focus on one organizational aspect such as social capital theory and actor network theory for the social environment, agency theory for the economic environment and, control theory and clan control theory for the political environment. What these extant lenses could not fully explain, the multidisciplinary aspects of collective action theory could. Flanagin et al. (2006) explains that collective action theory can integrate insights of several theoretical traditions such as those in social capital theory and organizational theory. In particular, collective action theory is appropriate for explaining a holistic view of IS project team behaviors as a team attempts to deliver projects successfully by navigating across turbulent organizational frames (Bolman and Deal 2013; Schwalbe 2015). A mapping of the organization's environments–the *social* (Maxwell and Oliver 1993), *economic* (Olson 1977) and *political* (Ostrom 1994)—across relevant perspectives of this study. Such remapping of frames is essential for interpreting behaviors

using perspectives of the theoretical lens of collective action theory. This study, therefore, supports and extends on Flanagin et al.'s position in utilizing collective action theory to examining the interplay of factors that impact IS project teams by integrating our understanding that impact IS project team behaviors across the social, economic, and political environments towards maintaining team cohesion in their attempts to delivering projects successfully as perceived by project teams who develop information systems themselves.

Building from the discussion of the social, economic and political perspectives of CAT in chapter two, this chapter synthesizes the idea of social, economic, and political forces present within organizations, IS projects, systems development and CAT contexts. A full mapping of congruencies between the environmental forces of an organization, may be found in Appendix A. The mapping serves as an illustration of the appropriateness of relating organizational forces (or invisible hands) that impact project teams according to the social, economic and political forces surrounding ISD project teams.

Construction of the Theoretical Model

The goal is to obtain a thorough understanding of the relationships of the organizational forces in regards to the organizational forces' potential impacts to the ISD project methodology and ISD project team behaviors. Focusing on the social, economic and political environments of ISD project teams entails considering the individual perceptions of team members towards the entire team's drive to deliver successful projects, which includes the financial impacts, as well as the power relations and control of stakeholders in the organization.

Based on extant literature in IS project management, Figure 3.2 illustrates a process model, which is the main focus of this study. The boxes depict essentially five inter-related concepts: (1) invisible hands, (2) chosen ISD methodology, (3) attributes of the ISD methodology used by project teams, (4) collective rationality and its constituents, and (5) team cohesion. Each of these concepts have been discussed individually in the previous chapters. This chapter explains the linkages between relevant concepts: (1) impact of invisible hands on collective rationality of ISD project teams, (2) impact of invisible hands on choice of ISD methodology, and (3) impacts of collective rationality to project team cohesion. Each of these linkages/relationships is explicated across all three organizational environments – *social, economic and political*.

Invisible Hand Impacts to Collective Rationality of ISD Project Teams

In IS project management contexts, invisible hands are organizational forces that influence IS project teams to advance a cause towards achieving a collective goal. These forces may manifest as intrinsic and extrinsic forces that motivate, drive or coerce IS project teams to adhering to work-related mandates towards attaining project success. From a collective action theory perspective, these forces may be perceived as either "benevolent hands" or "malevolent hands" (Olson 1977) – positive forces that motivate teams towards success, or negative forces that coerce teams and cause tensions in the project environment, respectively. Hence, depending on how these forces impact the project team, such forces may either be perceived as malevolent or benevolent. In this study, invisible hands known to impact project teams include, but are not limited to, the organizational mission and vision (Dibbern et al. 2008), organizational culture

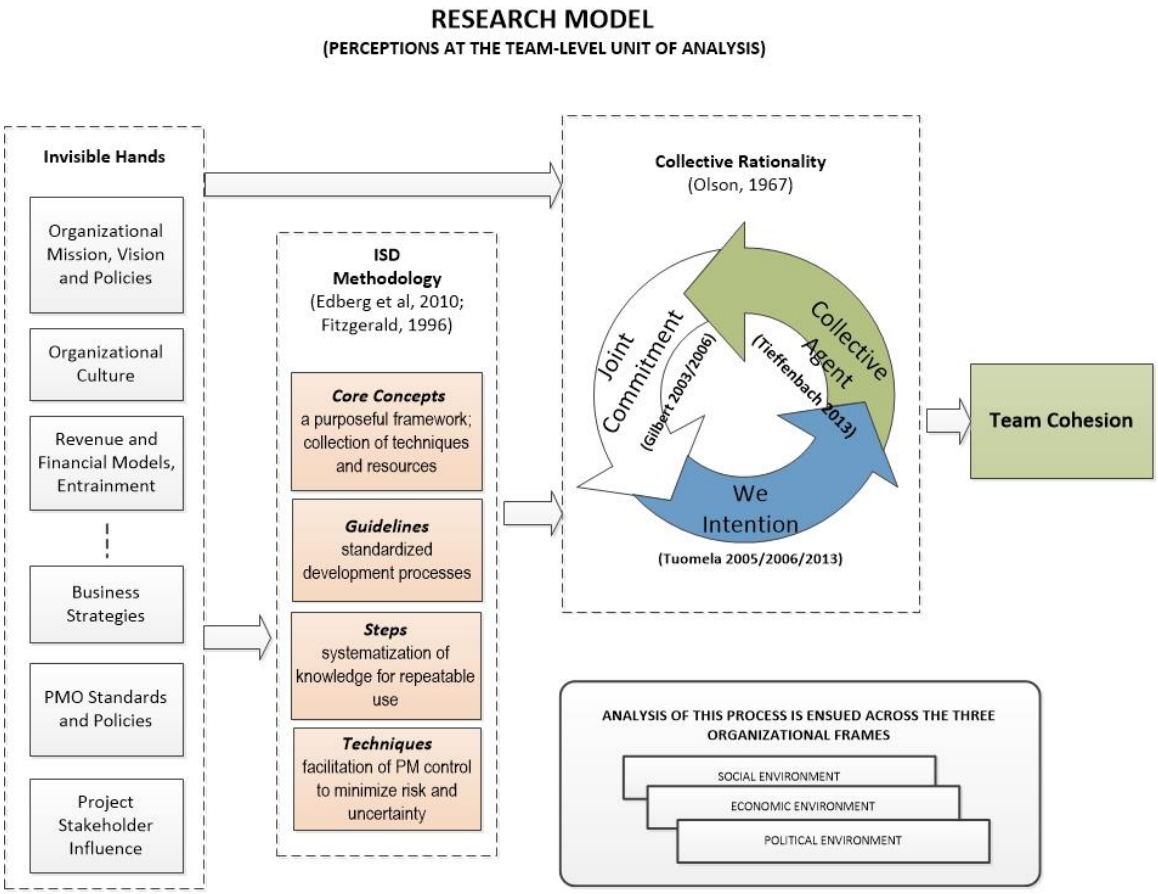


Figure 3.2 The Theoretical Model for Analyzing the Impacts of Systems Development Methodology on the Collective Action of IS Project Teams

(Edberg et al. 2012; Leidner and Kayworth 2006), financial and budget allocation models (Barki et al. 2001; Cao et al. 2013), strategic organizational goals that align with IT projects (Sircar et al. 2001), purpose of IT projects for the organization (Schwalbe 2015), as well as inherent project attributes such as project team size (Schmidt et al. 2001), project size and duration (Cooper 2000), software development tools (Meador et al. 1984), project team knowledge (Xu and Ramesh 2008), and user and stakeholder involvement (Barki and Hartwick 1994; Franz 1985; Iivari et al. 2010). This study highlights the kinds of invisible hands that are perceived to impact project team behaviors positively and negatively in terms of forces that are social, economic and political in nature.

Invisible Hand Impacts to ISD Methodology and Collective Rationality

Invisible hands are known to impact the ISD methodology supposedly chosen for the optimal utilization of ISD project teams (Edberg et al. 2012; Fitzgerald 1996; Fitzgerald 1997). Yet, literature informs us how organizational and project-related factors, as well as the structure of the methodology itself are some of the reasons that affect the adaptation of specific ISD methodologies (Bai 1997; Beynon-Davies and Williams 2003; Cao et al. 2013). Adapting an ISD methodology follows some adjustments to ISD methodologies in terms of characteristics developed by Edberg et al. (2012 and Fitzgerald (1996): methodology core concepts, methodology guidelines, methodology steps, and methodology techniques. As such, the differences among various methodologies differ from one another in terms of the combination of differences between the methodology characteristics, and are punctuated within a continuum demarcated by "waterfall" methodology on one end and by "agile" methodology on another (refer back to Table 2.4). Such manner of classifying differences among employed ISD methodologies is practical because organizations attempt to apply certain characteristics of these methodologies according to how they fit the organizational and business needs. For example, either waterfall, agile, or a combination of both methodologies is chosen in terms of how organizations are capable of funding their IT projects (Cao et al. 2013). In another example, while many organizations still apply true waterfall methodologies, others incorporate agile methods solely within the build phase of the waterfall project life cycle so that user participants of the project could be involved more actively (Vinekar et al. 2006). Additionally, the employment of agile methods are rarely perceived as "true" agile methods in the sense that such methods only partially incorporate agile goals and values to

some degree or extent. For example, the practice of sprints (or small releases) and active involvement of customers by co-locating them onsite with the developers are not necessarily routinely applied among popular agile methods such as scrum, extreme programing and pair programming (Wang et al. 2012). However, the chosen ISD methodologies has a corresponding impact on the behavior of project teams.

This study investigates the direct impacts of invisible hands and the adjusted ISD methodology on ISD project team behaviors. From a collective action theory perspective, the organizational and project-related factors may be perceived as the invisible hands that impact decisions to alterations to an ISD methodology to fit an organization and its project teams. However, how these adjustments affect the formation of joint commitments, awareness of group intentions and manifestation of a collective agency shape the collective rationality of a group (see discussion in chapter two) is not yet known or well understood.

Impacts of Collective Rationality to Project Team Cohesion

There is no known literature that explains the linkage between the collective rationality and team cohesion of ISD project teams. A goal of this study, therefore, is to explicate how the collective rationality of ISD project teams influence team cohesion. Team cohesion is a known influential factor for directly impacting project team performance, and consequently successful project delivery (for a more in-depth discussion of team cohesion, see chapter two and previous section of this chapter). Evidence of team cohesion is sought in this study from a multi-dimensional perspective, with due consideration of Cota et al's (1995) two-dimensional heuristics, that encompasses horizontal characteristics in terms of social cohesion and task cohesion (Chiocchio and

Essiembre 2009), and with respect to hierarchical relationships of project participants in the project environment (Griffith 1988).

Chapter Summary

This chapter presented the research model that serves as the blueprint of the research performed in this dissertation. This chapter expounds on ISD methodologies, collective team cohesion and organizational forces, and collective action theory in IS project management contexts. This chapter then synthesizes these concepts and linkages between concepts that explain the construction of the theoretical model. The research methodology explained in the following chapter, chapter four, describes in detail the approaches and research techniques employed in this dissertation.

CHAPTER FOUR

Research Methodology

The proper place to study elephants is the jungle, not the zoo.
McLean 1973, p. 181

This chapter describes the research approach and the rationale for employing the research design in this study. Particularly, this chapter explicates the sampling design, data collection criteria and activities performed towards obtaining answers for the research objectives of this study. This study extracts evidences that explain and validate the working research model by performing the following analytical approaches—pattern coding, pattern matching, within-case analysis and cross-case analysis.

Research Approach and Rationale

To address the research questions, this study used a multiple case study research approach (Yin 2013). Creswell (2013) defines case study research as a "qualitative approach in which the investigator explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving *multiple sources of information* (e.g. observations, interviews, audiovisual material, and documents and reports), and reports a *case description* and *case themes*" (p.97, emphasis in original).

This research finds multiple case study research as the appropriate approach for answering the research questions because of the following reasons. First, because this research seeks to answer "how" (and underlying "why") questions, the level of complexity

imposed by such questions would be appropriately be answered using case study research (Yin 2013).

Second, this study, being exploratory, develops theory through a set of propositions and refines concepts for further study. The exploratory aspect of this study is ascribed to the study's attempts to holistically examine the social, economic and political forces impacting ISD project team cohesion, a project team attribute directly impacting project team performance towards successfully delivering ISD projects. Multiple case study research is found to be an appropriate tool used by many social scientists for purposes of exploration—the finding of evidence for, and the describing and explanation of, the developed theoretical model and propositions (Eisenhardt 1989; Yin 2013). Glaser and Strauss (2009) acknowledge that theoretical saturation may be determined a priori on the basis of existing theory or conceptual framework, or may emerge from data themselves. This research, however, develops theories based on both a working theoretical model and corroborating evidences from data obtained through the research participants. The working theoretical model was developed from extant literature and through a chain of strong linkages (intimate ties) between decisions about what data to collect, strategies for analyzing data, and theory development and validation (Eisenhardt 1989; Yin 2013). Other qualitative methods (e.g. grounded theory, ethnography) do not necessarily leverage the benefits that a working theoretical model drawn from literature could potentially offer, yet misconceive case study research as a preliminary method strictly for exploratory purposes (Yin 2013).

Next, in regards to this study's holistic examination of the social, economic and political forces in an ISD project, case study research allows understanding of the linkages

between concepts known in the literature and the clear bounding of the cases to be examined. In this study, the interactions within ISD project teams inform the contextual conditions of the cases examined. Appropriately bounding the cases helped in mapping the working propositions to suitable data collection and analytical techniques, while vigilantly avoiding the collection of unnecessary data.

Fourth, having gathered multiple sources of evidence, particularly from organizational entities that play important roles in the development of ISD projects, case study research enable the triangulation and cross-analysis of data leading to the development and validation of resulting theoretical and practical contributions. In particular, this multiple case study research follows a type 3 structure, which is a holistic design of multiple cases (Yin 2013). Although there is generally no wide distinction between a classic (single) case study design and a multiple case study design, the evidence cutting across multiple cases is often considered more compelling and robust (Creswell 2013; Herriott and Firestone 1983).

Lastly, promoting an adaptive posture to flexibly consider opportunistic data collection, emergent themes, unique case features and serendipitous findings, case study research is desirable and appropriate for building (novel) theory especially when: (1) theory-building is not built from prior literature and empirical evidence, (2) existing theory inadequately explains contemporary phenomena that has considerably evolved over time, and (3) an already researched topic compels investigation with a fresh perspective (Eisenhardt 1989). Accordingly, case study research is appropriate for this research study because: (1) this study attempts to build theory bottom up from data; (2) extensive changes in contemporary ISD methodologies evolved and emerged since the idea of software

development was born thus, impacting IS project team behaviors; and (3) extant theories on IS project management and project teams were explained using rather a limited range of narrow lenses, a limitation that this study will attempt to liberate by uncovering salient and nuanced interplay of forces by applying a grander theory, that is, collective action theory, in the context of IS project management. A summary of the methodical rigor performed in this study, based on Dube and Pare's (2003) criteria, is described in the Appendix B.

The following subsections explicate the sampling design, selection criteria, and data collection techniques performed in this research.

Sampling Design

In this study, one ISD project team pertains to one case, which is likewise the unit of analysis and the sampling unit. The data collection protocol (see Appendix C), which contains the interview questions, were asked to each member of the project team to understand the behaviors and interactions at the team-level. Data are analyzed at the team-level as well. Individual team member responses per team were, therefore, consolidated to capture a collective perception of the members' respective teams.

In order to attain the study's research goals, the study sought to collect data from project teams in organizations who conduct ISD projects. As such, project teams were invited through *purposeful sampling*, following a *maximum variation sampling* technique (Creswell 2013). The intent of the technique is to gather a diverse set of project team cases in terms of the nature of the teams' ISD projects, the duration of the ISD projects, the manner in which the ISD methodologies were employed, and the relative outcomes of the projects. For example, the nature of the ISD projects in this study is diverse in that the ISD

projects are a healthcare IS project, a web development project for an arts organization, and a web development project for children with special needs. The project duration is also diverse: one project had a duration of four years (and is currently ongoing), another project lasted six months, and the third project was finished in two years. Furthermore, the outcomes of the projects are described to be marginally successful, failed, and exemplarily successful. As such, while multiple case studies are analogous to multiple experiments, wherein replication is a crucial component of the research design (Yin 2013), through maximum variation sampling, deeper insights and increased likelihood that the findings will reflect diversity or be applicable to various settings and situations may be obtained, which is ideal for qualitative studies (Creswell 2013).

Selection Criteria

To be considered as a case for this research, the following criteria were used for selection and replication: (1) a project team performing an ISD project for an organization, (2) the ISD project is classified as a high complexity project, (3) the ISD project team employs a formalized ISD methodology when delivering projects, and (4) the project team either has recently completed, or currently working on the latter phases of, the ISD project. These selection criteria are succinct yet flexibly align with the investigator's maintenance of an adaptive posture (Yin 2013), one that is open to consider opportunistic data collection, emergent themes, as well as unique case features (Eisenhardt 1989). As previously mentioned, a basic assumption of this study is that all ISD project teams are driven to successfully delivery their projects. This assumption and the selection criteria are what fundamentally yet sufficiently bound a case for this study. As such, while multiple case studies are analogous to multiple experiments, wherein replication is a crucial

component of the research design (Yin 2013), generalizations about the observed phenomena cutting across all cases were obtained.

While there are more formal quantitative measures and scales to distinguish projects in terms of the complexity, this study adopts a less formal scheme of classifying project complexity in terms of three dimensions: structural complexity, organizational complexity and technological complexity (Cicmil et al. 2017; Williams and Samset 2010; Williams 1999; Xia and Lee 2005). Structural complexity refers to the degree of variation, multiplicity, differentiation and coordination among project elements such as existing systems, new technology, users, stakeholders and project team, while organizational complexity pertains to the number of organizational elements surrounding the project such as top management, user groups, and third party stakeholders (Baccarini 1996; Turner and Cochrane 1993; Xia and Lee 2005). Technological complexity refers to the number of included cross-functional platforms, development tools and system integration efforts in the project (Williams 1999). Without loss of generality and for purposes of this qualitative study, the basic definitions of the three dimensions are what drive the identification of the overall complexity of the ISD projects in the cases, which are classified in terms of low, medium and high. Table 4.1 classifies the ISD projects in this study according to the respective classifications and corresponding justifications. For example, ISD project of team 1 is classified overall as high because of high structural complexity due to restrictions in existing client systems and new technology to incorporate, as well as high technological complexity due to high system integration efforts and use of new development tools. This complexity structure is similar to how Thamhain (2013) classified projects in his study.

Table 4.1 Description of Complexity of ISD Projects of Each Project Team

Complexity Dimension	Project Team 1	Project Team 2	Project Team 3
Structural Complexity	High - restrictions in existing client systems - new technology to incorporate - varied technology knowledge within client team	High - new technology to incorporate - limited technology knowledge within client team - requires high coordination efforts	High - new technology to incorporate - requires high coordination among project members - highly specific project deliverables
Organizational Complexity	Medium - sufficiently sized team of about 4 members from the client and 4 small from the contractor teams	High - large stakeholder and user groups	High - large stakeholder and user groups - high top management oversight
Technological Complexity	High - requires use of new development tools - high system integration efforts	High - high cross-functional platforms	High - requires use of new development tools - high system integration efforts
Overall Complexity	HIGH	HIGH	HIGH

Moreover, the process for selecting ISD project teams involved three main steps. First, organizations from the personal network of friends and contacts of this study's principal investigator were invited to participate in this research. Prospective organizations were initially contacted via email or phone call describing the nature of the research project and expectations from the organizations and research participants. A letter of consent was obtained from organizations who elected to participate in the study. Second, the participating organizations identified and invited the project teams who met the target criteria for participation in this research. Last, members of the project teams were

individually invited to be interviewed, from which consent from project team members who expressed willingness to participate in interviews were likewise obtained.

Data Collection

This study analyzes data collected from target interviewees. Primary data are gathered through one-on-one interviews, while secondary data consists of publicly available data about the project teams and their organizations, archival data shared by the participants, observational data of the investigator at the research sites, email correspondences, and follow-up phone calls. All data classified as confidential were obtained with the participants' consent restricted to a non-disclosure agreement of identifiable information that may be traced back to the participants and their organizations. The primary data was coded, from which thematic structures and variations were developed and grouped into related relevant concepts, which were ultimately synthesized into a process model with associated propositions (see study schema, Figure 4.1). The primary and secondary data were triangulated, which allowed for the convergence of evidence that either provides support or contradiction to the working theoretical model.

In order to capture a more holistic view of, and insights about, each project team, this study sought to invite all members of project teams to participate in one-on-one semi-structured interview sessions (see Appendix D for profile of target research participants). Data are collected through and among project teams mainly via a series of semi-structured face-to-face interviews, which lasted for seven months. The project teams were interviewed one project member at a time to decrease the likelihood of agreement bias. The target interviewees essentially act as the study's informants who became the sources

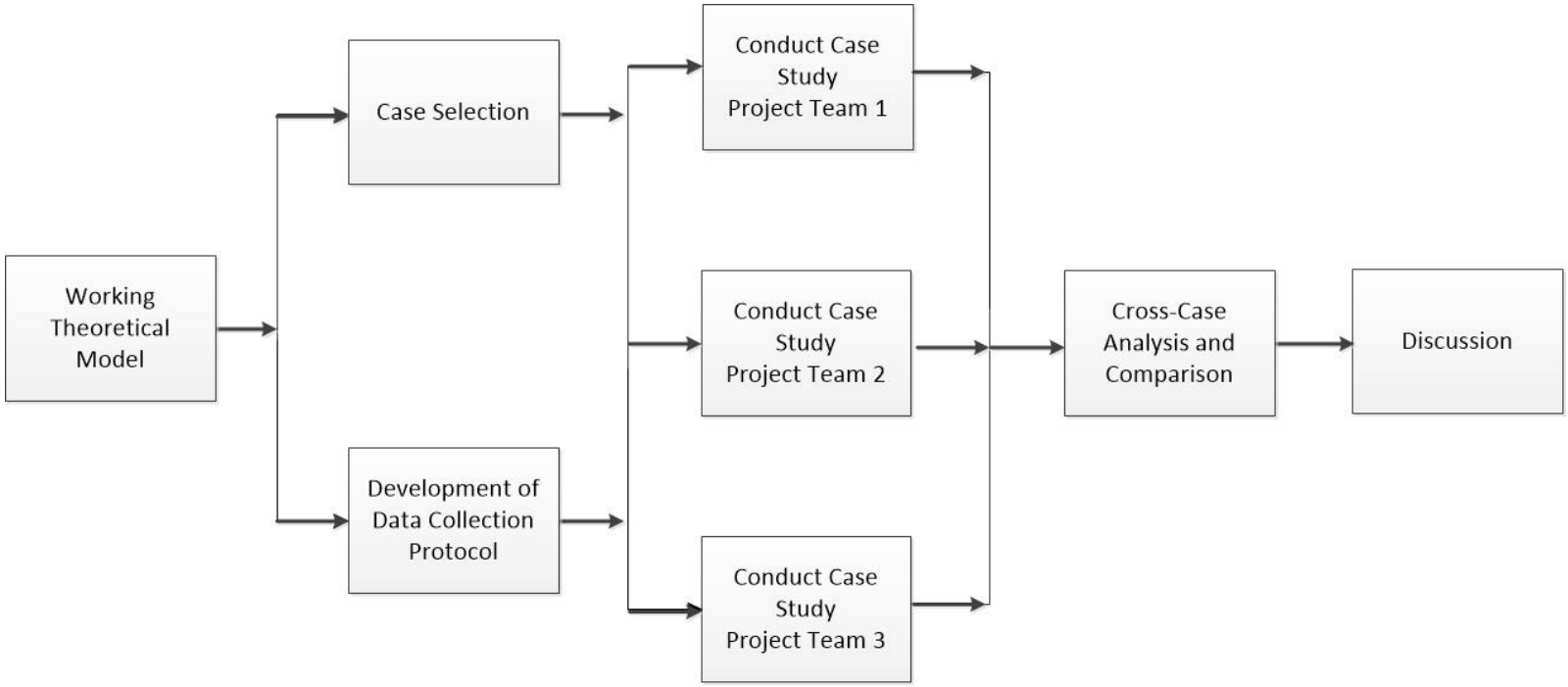


Figure 4.1 Study Schema Based on Yin (2013)

of primary textual data (i.e., interview data), which was recorded and transcribed, and of secondary data (such as documentations, archival records and physical artifacts). For purposes of clarification, there were also some limited follow-up communication that occurred between the principal investigator and the research participants (Yin 2013). All interviews, face-to-face or by phone, lasted between 30 minutes to an hour.

Initial interviews with the project teams were performed along with initial site visits to the project teams' company locations in Texas and Louisiana in the United States. The site visits also served as avenues for performing direct observation (Yin 2013), through which field notes were taken. Two to three interviews were conducted per site visit. Interviews during the first visits were performed to start the study and to establish initial contexts about the project teams and their organizations. The interview questions were refined based on the results of the initial interviews so that more relevant information congruent to the working theoretical model could be obtained. In total, more than 350 pages of transcripts, and field and interview notes were generated from the interviews and direct observation. Other sources of data are the publicly accessible information about the projects, archival data shared by the participants, email correspondences with the participants, and follow-up phone calls. Permissible analyses of diverse data types in case study research is highly synergistic yielding stronger grounding of emergent theories (Eisenhardt 1989). Table 4.2 summarizes the actual types of data collected for this study.

This research examined factors or forces that act upon (external forces) and within (internal forces) information systems development (ISD) project teams while the team

Table 4.2 Summary of Data Collected for the Study

Case	Primary Data			Secondary Data				
	No. of Interviews	Conduct of Interview	Duration Per Interview	Archival Data	Publicly Available Data	E-mail Correspondences	Follow-up Phone Calls	Field and Interview Notes
Project Team 1	6	All face-to-face	45-60 minutes	ISD Methodology	✓	✓	✓	✓
Project Team 2	8	2 face-to-face; 6 phone interviews	30-60 minutes	Organizational Chart	✓	✓	✓	✓
Project Team 3	12	9 face-to-face; 3 phone interviews	30-60 minutes	ISD Methodology	✓	✓	✓	✓

attempts to ensure successful delivery of ISD projects. Internal forces include the interactions among members of ISD project teams, the impact of project development methodologies on the project team's work, and the practices used by teams to ensure successful project delivery. External forces include social, economic and political forces such as those observed through interactions among the project teams and senior leadership, project sponsors, and other project stakeholders that affect the delivery of projects.

Thus, in an attempt to understand the impacts of various systems development methodologies in ISD project teams, this research gathered data through a series of semi-structured interview process following an interview protocol prepared for the individuals being referred as the internal and external forces described above (see Appendix C for interview protocol). Questions in the interview protocol have been designed to provide answers to the following objectives: to understand (1) how current project team practices influence (i.e., support or restrict) the project team's ability to deliver IT projects successfully with respect to a chosen design and development methodology; (2) how forces external to the project teams influence the project team's ability to deliver IT projects successfully with respect to a chosen design and development methodology; (3) how project teams work around the restrictions imposed by organizational and project-level factors on delivering projects successfully; (4) what project team coordination activities and characteristics emerge (beyond the methodology) in ensuring that projects are delivered successfully both in accordance to the team's perception, as well as the stakeholders' perceptions; (5) how these emergent characteristics and team activities interplay towards delivering successful IT projects; and (6) how organizational-level factors.

Research sites. IS project teams who employ different systems development methodologies were invited from two organizations, WebCo and HealthCo (pseudonyms), to participate in this study (see Table 4.3). The goal is to examine least one project team at each organization who employed different development methodologies for their respective projects. The first case site, WebCo (ORG1), is a small-scale firm in Texas that develops web sites for clients, while another case site, HealthCo (ORG2), is an organization that develops and maintains health information systems for a hospital in the state of Louisiana.

Project team characteristics. Table 4.4 shows the summary profile of each of the project teams. Certain members of some project teams, however, either declined to be interviewed, or were no longer affiliated with the company (research site) with whom the project team belonged. For example, the physician champion of client team of project team 2 declined participation in the interview sessions, while the client representatives of project team 1 (i.e., client representative, client director, and client project manager) were unable to be invited for an interview due to confidentiality and legal concerns that arose following project team 1's failed project. While an almost-holistic view could be obtained from project teams 1 and 2, a more complete view about project team 3 could be obtained. Project team 3 members who participated in the interviews included not only the developer sub-team (employees of research site 1, WebCo), but representatives from the client sub-team and the subcontractor sub-team as well, who continue to maintain strong business ties and partnerships with WebCo to date.

Table 4.3 Sample Profile of the Companies of the Project Team Participants

Characteristics	ORG1- WebCo Company of Project Teams 1 and 3	ORG2 - HealthCo Company of Project Team 2
Company Description	A small-scale, private web development firm in Texas that develops and maintains web sites for clients	An IT organization that develops and maintains health information systems for a hospital in the state of Louisiana
Significant Company Milestone	Established in 1999 and continuously growing	Reorganization into a private-public partnership and digitization of health records began in 2011
Number of employees	approx. 26 employees	approx. 100 employees
Standardized ISD methodologies employed in projects	Formalized hybrid of traditional methodology infused with agile-type iterations during development stage; team member and client involvement in project meetings are consistently high	Fundamentally waterfall but tailored according to the project team. Large projects are typically driven by regular weekly and bi-weekly project team meetings following some spiral development methodology; team member involvement in project meetings is medium to high
Average duration of IS projects managed	5-6 months	wide range of projects from minor system configuration (1-2 weeks in duration) to large IS project upgrades (1-2 years in duration)
Average project manager IS experience	13 years	3-7 years
Average project manager tenure	2-5 years	4-10 years

Table 4.3 (continued)

Characteristics	ORG1- WebCo Company of Project Teams 1 and 3	ORG2 - HealthCo Company of Project Team 2
Project personnel knowledge of projects	high knowledge	medium to high knowledge
Project manager and personnel skills of managing projects	A project management office was established in 2014 for continuous upskilling and training; more than half of project managers in the company have received certification as Project Management Professionals (PMP)	To date, request for more project management trainings and certification are pending; learning and continuous education are based on online and personal readings
Senior management involvement in projects	Medium to heavy involvement	Little to medium involvement

Table 4.4 Profile of the Project Teams

	Team Composition	Project Description	Methodology
Case 1: Project Team 1	1 PM; 1 Lead Architect; 1 Lead Designer; 1 Lead Developer; 1 Client Rep; 1 Client Director 1 Client-PM	[Failed Project] Web Development Project (6 months) – development of website for the Arts Department of a university	Formal Hybrid: Largely Traditional with some Agile, (no developers engaged in scope evaluation)
Case 2: Project Team 2	1 PM-IT Director; 4 Functional Analysts; 1 Hospital Quality Management Person; 1 EPIC Support Rep; 1 Physician Champion	[Marginally Successful Project] Large Healthcare IS Project (12 months) – government-mandated project to for hospitals to adhere to the meaningful use of Healthcare IS	Adapted Waterfall-type (Spiral) Development Methodology
Case 3: Project Team 3	1 PM; 1 Lead Designer; 1 Lead Developer; 1 Online Marketing Manager; 1 Usability Architect; 1 Non-Lead Developer; 1 Client Rep; 1 Subcontractor Rep	[Exemplarily Successful Project] Large Web Development Project (18 months) – federally funded development of website for people with disabilities	Formal Hybrid: Largely Traditional with some Agile

ISD methodologies of the project team. Table 4.5 describes the ISD methodologies each project team followed in the execution of their projects. The contracting firm of project teams 1 and 3, WebCo, follow a standardized client-centered, hybrid development process at the organizational level (Appendix F). The process is client-centered because the firm flexibly and transparently accommodates development efforts according to the clients' needs and constraints. The process is hybrid in that the process is fundamentally traditional (i.e., follows a sequential approach) that identifies and sets the timeframe of entire project, while agile iterative cycles of team collaboration and rich client-involvement are interspersed within each traditional development stage. The iterative cycle and

Table 4.5 Description of ISD Methodologies Used by the Project Teams

ISD Methodology Characteristic	Project Team 1	Project Team 2	Project Team 3
	Formal Hybrid (Largely Waterfall)	Spiral (Largely Waterfall)	Formal Hybrid (Largely Waterfall)
Methodology Core Concepts	-bring order to chaos -value project management -accommodate and respond to change -spend time creating -value creating software quickly -project members are split between the contractor and client teams -inflexible cultural perceptions in regards to collaboration	-bring order to chaos -value project management -follow a plan -accommodate and respond to change -spend time planning - project members are mostly internal to the larger hospital organization	-bring order to chaos -value project management -accommodate and respond to change -spend time planning - project members are diversely composed of client, main contractor and multiple sub-contractor teams - family-oriented approach
Methodology Guidelines	-work with customer is available during project -gain agreement on requirements - Create minimal documentation -separate tasks by function -determine requirements before proceeding to development -unexpected changes deep within project timeline	-work with customer early in project - determine requirements before proceeding to development -unexpected changes deep within project timeline - do multiple tasks in the process with an individual	-work with customer early in project - gain agreement on requirements - work with customer is available during project - determine requirements before proceeding to development -create comprehensive documentation -separate task by function -accommodate changes in the requirements

Table 4.5 (continued)

ISD Methodology Characteristic	Project Team 1	Project Team 2	Project Team 3
	Formal Hybrid (Largely Waterfall)	Spiral (Largely Waterfall)	Formal Hybrid (Largely Waterfall)
Methodology Steps	-pre-defined steps -linear and iterative -largely perform steps sequentially -iterative and sometimes concurrent	-pre-defined steps -linear with occasional iteration -perform steps sequentially	-pre-defined steps -linear and iterative -largely perform steps sequentially -iterative and sometimes concurrent
Methodology Techniques	- strict adherence to certain technological solutions - project management techniques (Gantt charts, checklists, milestones) - use of architectural wireframes	-use of spreadsheets as checklists than typical project management tools like Gantt charts - extensive workflow modeling	- willingness to accommodate more sophisticated technical solutions to meet project needs - project management techniques (Gantt charts, checklists, milestones) - use of architectural wireframes -use of online project repositories

collaboration aspect of the entire process are perceived as the hallmark of the firm's grand development process that produce results aligned with client expectations and satisfaction.

One major difference between the methodologies employed by teams 1 and 3, respectively, is that project team 3's methodology leaned more towards being traditional than agile. High team collaboration and user-involvement were hardly achieved in project team 1 due to high cultural differences in participation to project activities and technology acceptance, whereas project team 3 welcomed high cultural diversity of project team members and were more receptive to newer technological solutions.

The healthcare IT organization of project team 2 follows a spiral methodology (Boehm 1988), which is essentially waterfall but done repetitively in a spiral or cyclic manner over a period of one year per cycle. This ISD methodology aligns with the upgrade release of a main healthcare information system, EPIC system, which is largely maintained by a third-party vendor partner, EPIC (Appendix G). This methodology is flexible, in that the vendor plays a large part in driving the upgrade needs of the system to ensure that EPIC is ready for meeting the compliance reporting needs of the project for the hospital.

Analysis Approach

While qualitative data analysis is said to be a *continuous, iterative enterprise* (Miles et al. 2013), the research design of this study essentially allows the conduct of the following key analytic techniques: coding, pattern coding, pattern matching, within case analysis, and cross-case synthesis. These techniques are purposed to link the established working propositions with the case descriptions that were developed ground up from the data, as well as examine the propositions against corroborating or contradicting explanations emerging from the data.

Criteria for Judging Quality of Research

Any social research, whether quantitative or qualitative, posed on a positivist epistemological (realist) stance like this study is judged according to several criteria: creditability, confirmability, trustworthiness, and dependability (Armstrong et al. 1997; Yin 2013), as well as consistency, stability and repeatability of results (Madill et al. 2000). In the conduct of multiple case studies, Yin (2013) suggests that these criteria could be assessed in terms of four design tests: construct validity, internal validity, external validity and reliability. Table 4.6 lists four tactics that could be utilized to impose each of the aforementioned tests (Armstrong et al. 1997; Yin 2013), which were likewise applied in this research.

The purpose of construct validity is to identify correct set and extent of measures with which to operationalize a concept (Bagozzi et al. 1991; Yin 2013). In operationalizing the concepts and relating them with other concepts scoped within the study, a coding matrix was developed and maintained that captures the definitions and descriptions of relevant concepts obtained from peer-reviewed and scholarly literature (structure of coding matrix see Appendix E). Saldana (2010) describes each code similar to how a job description is explained in terms of its purpose and performance, which may specify the following attributes: short and/or detailed description; inclusion criteria (conditions of the datum or phenomenon that merit the code); exclusion criteria (exceptions or particular instances of the datum or phenomenon that do not merit the code); typical exemplars (a few examples of the data that best represent the code); atypical exemplars (extreme or special examples of data that still represent the code); and "close, but no" (data examples that could mistakenly be assigned this particular code).

Table 4.6 Adopted Tactics for Ensuring Case Study Research Quality
Based on Yin (2013)

Design Test	Case Study Tactic	Reference
Construct Validity	• Use of triangulation or multiple sources of evidence for data for convergence or non-convergence of evidence • Establish a chain of evidence • Have key informants review case study report	Yin (2013) Bagozzi et al. (1991) Madill et al. (2000)
Internal Validity	• Conduct pattern matching • Do explanation building • Address rival explanations • Use of logic models	Yin (2013)
External Validity	• Use theory in single-case studies • Use replication logic in multiple-case studies	Yin (2013)
Reliability	• Use case study protocol • Develop case study database • Use triangulation • Conduct Interrater Reliability (IRR) Test	Yin (2013) Campbell et al. (2013) Collingston and Gantt (2008)

Excerpts from the data transcriptions are then *coded* (Miles et al. 2013) – that is, labeled – in accordance to the symbolic meanings that match the descriptive or inferential information of the concept and process (i.e., relationship between two or more concepts) being studied. While the coding process might suggest to be mechanical, researchers should be cautioned in treating theory development (using coded data) as anything but a mechanical process (Auerbach and Silverstein 2003). Also, codes (i.e., the output of coding) are used to detect recurring patterns, which could be clustered together to form categories, which could be clustered even further to form themes (Auerbach and Silverstein 2003; Miles et al. 2013). Detecting recurring patterns in qualitative data analysis is analogous to clustering factors in quantitative data analysis (Miles et al. 2013). Codes, in essence, serve as *prompts* or *triggers* for deeper reflection on the meanings of data, as

condensed data into more readily analyzable chunks, and as a *heuristics* tool (Miles et al. 2013). The codes are then matched to the concepts (or linked concepts) defined or described in the coding matrix, which then serve as evidence corroborating the existence of a concept or interrelated concepts. Evidences for a given concept (or a relationship between concepts) are mapped accordingly across evidences within each case and across all cases. The interrelationships obtained between and among concepts are then used to construct higher levels of meanings for developing assertions, propositions, hypotheses, and theories (Miles et al. 2013).

Internal validity for explanatory case studies seeks to establish a causal relationship between concepts, whereby certain conditions are believed to lead to other conditions. In other words, investigators assessing for the internal validity of relationships between concepts attempt to explain the *how* and *why* event *x* led to event *y*. Investigators should likewise be keen in distinguishing that an event *x* causes another event *y* to occur, and sufficiently be careful to identify if any spurious (unknown) event *z* likewise causes *y* to occur as well. In cases where spurious relationships fail to be identified, then the threat to internal validity of related concepts fail to be addressed (Miles et al. 2013). The logic for the test of internal validity is applicable only to describing relationships and linkages between constructs relevant in this study. Tactics suggested to ascertain internal validity of relationships include pattern matching, explanation building, addressing rival explanations and using logic models (Yin 2013). Almost all these suggested techniques were employed in this study.

External validity is purposed to identify the domain to which a study's findings could be repeated and generalized beyond the immediate study (Yin 2013). For case

studies, Yin (2013) refers to *analytical generalization* as the ability of case study findings, in addition to shedding empirical light about concepts of a case, to be *repeated* or *replicated* across other contexts or seemingly similar situations. This type of generalizability is different from *statistical generalizability*, where an inference is made about a population (or universe) based on empirical data collected from a sample of that universe. Suggested tactics to ensure external validity include the use of theory as well as replication logic in multiple case studies.

The final test, reliability, is meant to ensure that researchers who follow the same procedures described in an earlier case study, the same finding and conclusions will still be obtained in future similar case studies. The goal is to minimize subjectivity, biases and errors (Yin 2013). Yin (2013) suggests additional tactics such as the use of a case study protocol to methodically document and develop a case study database. The goal is to make as many steps in the protocol as operational as much as possible so that an "auditor" (i.e., one who wishes to perform the research once again) may be able to produce the same results upon following the same procedure. The ability to replicate findings across multiple researchers, research methods, and sources increases confidence in the accuracy of the findings; lack of ability to replicate, on the other hand, decreases confidence in the findings (Collingridge and Gantt 2008). As such, from a realist's perspective, Madill et al. (2000) and Armstrong et al. (1997) suggest triangulation as a means to assess consistency. For example, Armstrong et al. showcased how different qualitative researchers of varied backgrounds and schools-of-thought obtained seemingly similar themes albeit 'packaged' differently after performing their respective qualitative theme-development techniques. The result of such triangulation, therefore, is obtained from a convergence of varying

perspectives that likewise imply mutual confirmation of such perspectives. Similar to Campbell et al.'s (2013) procedure, this study has employed a technique well used in quantitative research, known as interrater reliability (IRR), also known as interpretive convergence. For qualitative research perspective, IRR is a consistency assessment technique used to assess the consensus of interpretation between two or more data analysts. Although there is no standard base percentage of agreement There is no base percentage of agreement or standard among qualitative researchers, Saldaña (2015) accounts a minimum 80-90% range that seems to be an acceptable benchmark.

Some qualitative methodologists question the utility and application of inter-coder agreement for qualitative data analysis arguing that the entire process is largely an interpretive enterprise (Saldaña 2015). In this study, however, such qualitative measure was applied since the study researcher has adopted a realist's perspective goaled to generalize my findings in a larger population of IS project teams. As such, this study invited a third-party analyst to code a pilot sample of my interview notes following Miles et al.'s (2013) method for calculating inter-coder reliability and agreement. First, the third party's coded sample is then checked for consistency with the study-author's own coding results, such that a higher the rating obtained, the more consistent are the coded concepts and relationships obtained and used in the development of assertions, propositions and theories. Where disagreements in our coding arise, the third-party analyst and the study researcher entered in a discussion to come up with a consensus, and then reassessed our inter-coder agreement measures. In particular, the overall inter-coder reliability was calculated for all codes as a set of dividing the total number of agreements for all codes by the total number of both agreements and disagreements for all codes (Campbell et al. 2013).

The total number of agreements obtained for the sampled interview notes was 53, and the total number of disagreements was 11. As such, the inter-coder reliability obtained is 82.8 percent [53/(53+11) = 0.828]. This calculation procedure is based on Campbell et al.'s (2013) procedure, where the number of coding agreements and disagreements were counted after trying to reconcile the coding differences.

In seeking evidence to support the conformance and satisfaction of the design tests described above, key data analysis techniques such as pattern coding, pattern matching, within case analysis and cross-case analysis are described in the succeeding sub-sections in more detail. Further, the coding techniques followed in this study follow a two-step cycle suggested by Miles et al. (2013): first cycle and second cycle coding. Whereas codes are initially assigned to chunks or blocks of data in first cycle coding, results of first cycle coding are further processed in the second cycle. There are various first cycle and second cycle coding techniques that a researcher may employ. This study employed provisional coding, process coding, causation coding and attribute coding first cycle coding techniques (Miles et al. 2013). Results of my first cycle coding are further processed in a second cycle through a so-called pattern coding technique. For purposes of this case study, and as suggested by Yin, this study further processed the resulting pattern codes using the following techniques: pattern coding, pattern matching, within-case analysis and cross-case analysis.

Pattern Coding

Coded data chunks obtained from the first cycle coding are pulled together into more meaningful and parsimonious units of analysis, known as meta-codes (Miles et al. 2013). Such meta-codes are then used to generate pattern codes whose meanings coincide

with the descriptions and definitions of concepts and relationships developed in this study's coding matrix (see Appendix E).

In looking for patterns, Saldana (2010) suggests identifying the following characteristics that emerge from the data: similarity (things happen the same way), difference (they happen in predictably different ways), frequency (they happen often or seldom), sequence (they happen in a certain order), correspondence (they happen in relation to othe activities of events), and causation (one appears to cause another).

Miles et al. (2013) describe pattern coding as having essentially four functions: condenses large data blocks into smaller analytical bits; allows researchers to perform data analysis while concurrently gathering richer and more focused data; helps researchers expound an integrated map of incidents and interactions about the phenomena of interest; and lays the groundwork to expose common themes and causal relationships for conducting cross-case analysis. In summary, pattern coding is used to generate categories, causal explanations, relationships among people and theoretical constructs (Miles et al. 2013)

Pattern Matching

Pattern matching, also known as congruence method, is an analytic technique that matches an empirically based pattern with one that describes an a priori concepts (or variables/constructs) and linkages between concepts (or relationships between variables/constructs) typically drawn from prior studies (Yin 2013). In particular, the pattern codes obtained from the data are matched with the constructs and relationships that build the working process model. The higher the correspondence between these patterns increases internal validity of the outputs of the study.

Within-Case Analysis

A key analytic technique in conducting multiple case studies is to explicate in fuller detail what has happened in a single case. In performing within-case analysis for each ISD project team, the focal unit of analysis of this study, the goal is to emerge an empirically grounded sense of reality about each team in the form of themes (Creswell 2013; Yin 2013). Performing within-case analysis typically results to a thorough explanation about the case and the production of logic models (Yin 2013). The purpose of *explanation building* is to explicate a descriptive account of causal links about a case in terms of the "how" and "why" events in the case happened. The current study showcases explanation building outputs in each case.

Cross-Case Analysis

Because of the multi-case nature of this study, a final key analytic technique employed is cross-case analysis. That is, this technique is encouraged if two or more cases are included in a case study. It is through the conduct of a cross-case analysis where findings across different cases may be used to enhance generalizability or transferability to other contexts beyond the present study (external validity). Another reason for performing cross-case analysis is to establish a deeper understanding and explanation about the cases. This reason is especially true in that multiple cases help identify specific conditions that produce certain findings, as well as form higher-level categories that relate those conditions together.

Miles et al. (2013) suggest some strategies in performing cross-case analysis: case-oriented strategies, variable-oriented strategies, and mixed strategies. In case-oriented strategies, individual case study is conducted for each case separately, whose findings are

then aggregated together (Yin 2013). In variable-oriented strategies, themes are often sought that cut across cases (Miles et al. 2013). This study employed both strategies, which is hence called mixed strategies.

Chapter Summary

This chapter presented the research methodology that guided the conduct of the research in this dissertation. This chapter has shown why a multiple case study research approach is an ideal research approach for realizing the objectives of this research as defined in chapter. Incorporating a positivist research stance, this chapter also presented various data collection and analyses techniques, to ensuring a confident degree of objectivity expected of any positivist-type research. In particular, validity and reliability techniques known for case study research have been conducted, and more importantly, the within- and cross-case analyses techniques used to expose generalizable propositions for project teams of similar characteristics. The analysis and results described in detail in the next chapter, chapter 6, illustrates the more granular aspects of the cases as well as the findings that are applicable to all cases.

CHAPTER FIVE

Analysis and Results

> *Behaviour is shaped and maintained by [the environment's] consequences. Once this fact is recognized we can formulate the interaction between organism and environment in a much more comprehensive way.*
>
> *B. F. Skinner*

This chapter is partitioned into two main sections: within-case analysis section and cross-case analysis section. The within-case analysis section is further partitioned to describe each of the three project team cases. Subsequently, each case follows a flow of discussion that is patterned after this study's theoretical model. Further, albeit a higher level of abstraction, the structure of the cross-case analysis for all three project team cases is also patterned after the study's theoretical model. Grounded from data across all cases, a set of propositions is subsequently formulated as part of the study's contributions.

Within-Case Analysis

Case 1: Project Team of a Failed Web Development Project

An opportunity to showcase the capabilities of the contracting firm, WebCo, the marketing team of WebCo signed a contract with the client, thus, kicking off project team 1's five-month-long project. WebCo's client is an organization specializing in the arts in a university that wished to present a portfolio of their creative works via a website. The project entailed a reconstruction of the client's existing website that relied extensively on photos and other graphics. If successfully launched, the new website would be included in WebCo's marketing portfolio showcasing the company's technical, visual and design

prowess of developing dynamic graphical content and a high quality web site to both current and potential clients. Members of the project at WebCo were aware that the budget and timeline were tight and that the firm could potentially lose some money in the process. Such expectation was, nevertheless, recognized by the WebCo while holding on to the potential benefits that could be reaped in return and outweigh the potential loses. About six months after the project kickoff, WebCo and its client found themselves engaged in a legal battle against each other about violations of contract terms. The project did not launch while WebCo and the client resorted to a settlement agreement, rendering the project contract null and void under the following premise: the client will no longer pay WebCo for any pending incurred costs in the project and WebCo will sign a non-disclosure agreement about the client's profile and ownership of the contracted project. Members of the project team at WebCo who participated in this study recounted the reasons they considered the project a failure were because the project was not completed and the current and future relationships between their firm and this client were relinquished.

Invisible hand impacts to project team. To the client, the web development project was to become a visually beautiful site. To WebCo, however, the web development project held some profound perceived value for their company, and was, therefore, given a high priority in that the finished site would eventually become a portfolio piece to showcase the visual impacts of the firm's work. Dealing with art, the site was expected not only to be well-structured and user-friendly, but more importantly, visually stunning both in terms of imagery and design aesthetics. The lead architect of the project shared: *"So in terms of a piece that would be good in our portfolio, that would kind of showcase the visual impact of our work, that was seen as a high priority, you know, I mean we are dealing with art."*

However, the contracting firm was also aware that the project was under-budgeted. Yet, the firm saw this project, if successfully launched, as an opportunity to boost their standing in the market against more established and formidable competitors, as well as enrich their reputation with other clients within and outside the university. The lead architect shared:

> Chances are, we have an expectation, that we're gonna lose a little bit of money in this project. But it's gonna be worth it because the product that we have in the end is gonna be a showpiece that we can put in our portfolio and it will be great for additional and ongoing work. It will be good for us within the university. We already have a couple other university clients that we work with, and this could submit our reputation with our client as the go-to for the university, and it will also be a visually attractive piece for outside clients that they could see to really, not just, I mean, what we're known for historically, the well-crafted, well-structured site, that would tend toward more utilitarian than beautiful.

The client team was composed of a dean and some faculty members, a project manager staff personnel representing this client team, a web designer who was also the technical representative of the client team, and a web development group supporting the client team. The dean was a key stakeholder of the project and had the final decision-making authority for their organization. The faculty members got to pitch their ideas and opinions about the website to be developed but were perceived to be very restrictive in terms of functionality to be incorporated due to intellectual property concerns on the arts to be displayed. The lead visual designer recounts: *"They had very loud voices on what they [faculty] wanted. I mean, you could imagine the art – different artists who had very, very strong opinions on what they want with their work displayed."*

On an administrative level, the project manager of the client team was supposed to be the primary point of contact of and for the client team. Prior to engagement to this project, the project manager was understood to have some minor control over the website that was to be reconstructed, while the web designer had major control over the website.

Yet, despite her official designations for the project, the project manager's roles and responsibilities were hardly felt by the entire project team, who oftentimes missed her involvement in regular project activities. The lead architect shared:

> There was the official PM [project manager], who was a 'non-presence.' I mean she was officially our point person and she was whom we're supposed to communicate with, and the reality was she had no involvement in the project... When it comes to coordinating feedback, coordinating schedules, just making all of those types of interactions work, she was supposed to be there, and she wasn't.

Because no interaction was received from the client's project manager, she was eventually rolled off the project in a manner that the contracting team hardly even felt her ensuing disengagement. *"She was such a non-presence. I mean, I never got feedback from her, never got a reaction from her. She was not a participant in the meetings,"* the lead architect added. Instead, responses and coordination required from the client team were channeled through a relatively more involved and responsive person – the web designer/technical representative of the client team. This client's web designer was tasked for creating the content for, and maintenance of, the website. Yet to the lead developer, this technical person would later be viewed as someone who had more of *"a personal stake in things and had strong opinions about things"* than someone who was a team player. The lead visual designer also perceives this technical representative as someone who *"turned out to be somebody else and who had a major control of the website*" in terms of the technical functionalities on adding, updating, and displaying content. Confusion among the project team members, particularly those from the WebCo, ensued as to who was to be the "lead" client representative.

In the lead visual designer's opinion, there was a *"political battle ongoing in the client side [which] made it difficult to provide a consistent and unified feedback from*

them." Hence, the client sub-team's divided voice generated contradicting requirements such that the contracting team found themselves in constant discussion to get the client team's unified, prioritized decision.

> And the one of the big things that we have to go over with him [web designer] and the rest of the [client] team is that they wanted to have a very custom website – with almost no work [on their part] anymore. Super custom website and everything should be automated…They are raising conflicting requirements in that there is this constant tradeoff in terms of what they didn't wanted to automate, of political stake about whose art is going to be displayed first and how, and of work they didn't want to do that would require them to work manually.

Supporting this story, the lead architect shared how a certain "culture" of the client sub-team, as dominated by the web designer, filtered the client team's interaction with the contracting team:

> He [web designer] had more of a personal stake in things and had strong opinions about things. So he kind of asserted himself into being that main communicator. A problem was that, he would be very opinionated on his own, but he was not as comfortable asserting those opinions in front of his peers and especially not his boss [the dean]. So when we would have meetings and we would present things, if other people were in the room, or especially the dean, his boss, was in the room, he was much less likely to talk or strongly asserts his opinion.

The lead architect continues to describe how the web designer's personal stake restricted communications to be mostly between the web designer and the contracting team, which altered agreements previously made with the rest of the client team:

> He might say a little bit but if somebody pushed back he relented pretty quickly. But if we submitted things online, if we talked to him on the phone or in email, he would be very assertive and opinionated in things and argue for things that he wanted. There were times when we get an agreement in a meeting on a particular approach and he didn't agree with it. But the dean and others in the room would accept the particular course and he would voice his opinion and he would get pushed back and he would stop, the room would accept the course, and we'd move ahead. And then in the ensuing days and weeks, he would keep coming back saying, 'well we really should it this way, we really should do it this way, we really should do it this way' coming to us with it.

The lead developer supports the lead architect's opinion about the client's overall culture, which he termed as being one that is *"very inflexible technologically speaking"*:

> Most areas, or maybe most things in life, you have your playground of stuff – you're intellectual property, you know, your suite of websites that you run. And most people, you know, would feel some sense of ownership and responsibility, and security and protectiveness of that. But when you work with others, there is usually a climate of 'let's play together'… With this particular client, they felt very, very possessive about their process, so that if you were a new professor in the department, you are directed to a website of rules on how to use the website, and not just business rules…but in ways to use the technology that, with their WordPress websites, they would only allow these three plug-ins because they're easy to control and understand but completely shutting off the idea that somebody might want to experiment, might want to try something new, and that's okay.

The lead developer added:

> The department has put a great deal of faith into one of their IT professionals [web designer]. And when that professional says our websites will work like this, they don't know the pros and cons of questioning that. So we walked into an inflexible framework of not realizing perhaps how inflexible it was, and it was only somewhat validating, since I've seen it from different angles, and I knew that they've had similar experiences with people around the campus.

It would appear that, while forces in the social and economic environments become the basis for brewing forces in the political environment surrounding the team, forces in the political environment directly impact the behavior of the project team. Figure 5.1 illustrates the interplay of the forces in the social, economic and political environments of this project team. The sign ("+" or "-") beside each force indicates whether that force is perceived as a positive force (benevolent hand) or a negative force (malevolent hand) by the project team. The brown arrows in the figure represent the interplay of the invisible hands and their impacts to the ISD project team, while the green arrows represent the influences *to* and *of* the ISD methodology. Forces occupying the social environment include the intense intellectual-property culture within the client team stakeholders, ambiguous client team structure and single point of contact, and strong perceived

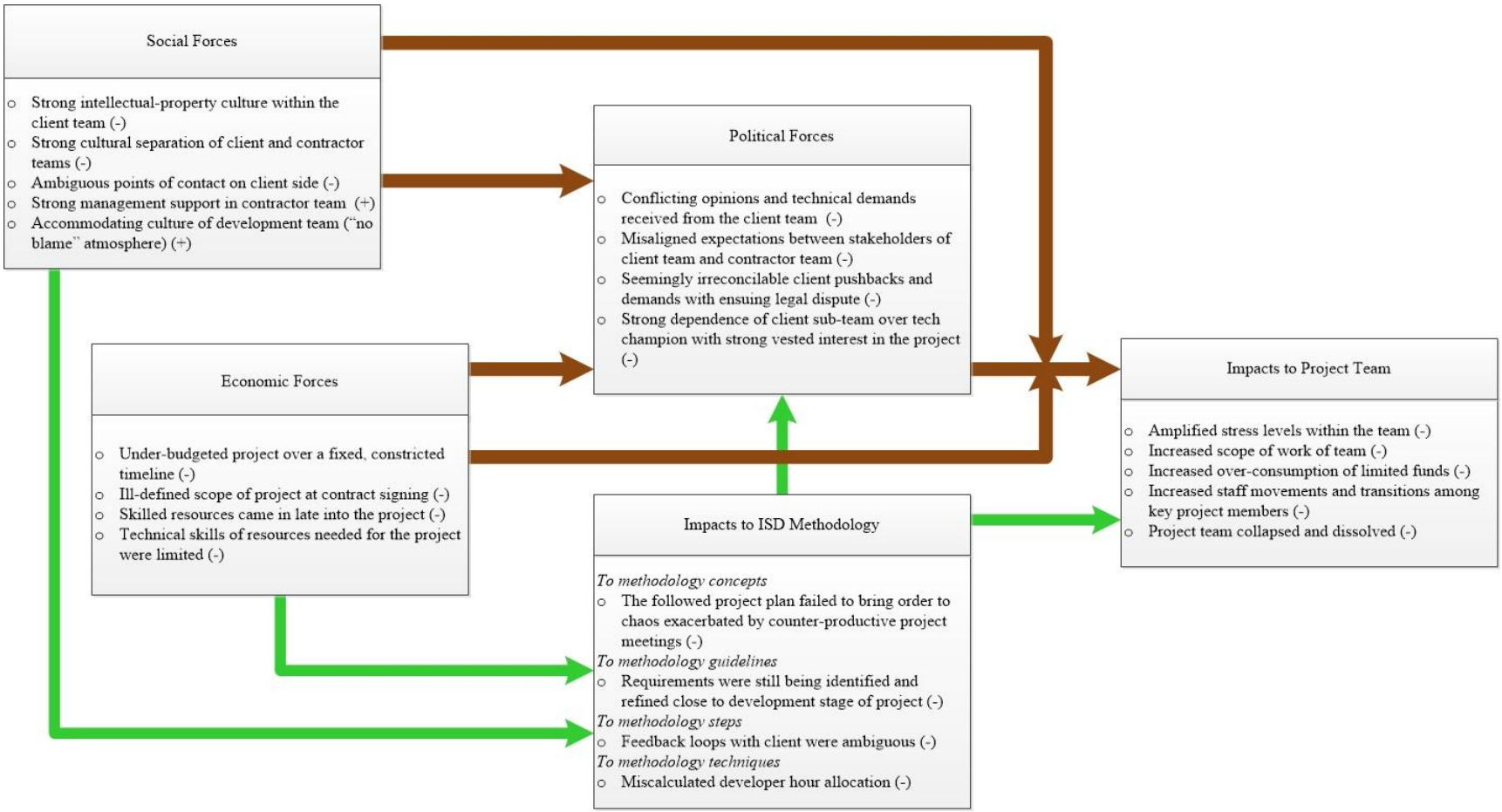


Figure 5.1 Invisible Hand Impacts to ISD Methodology and Project Team 1

separation between the client team and the contracting team. Forces occupying the economic environment include under-budgeted project, ill-defined scope of project upon contract signing, and unavailability of skilled resources appropriate for a given stage of the project. Forces occupying the political environment include increased tension between client and development sub-teams, heightened stress levels, as well as increased movement and replacement of project members on both the client and contractor sub-teams.

As an example, conflicting opinions and demands of the client imposed upon the development team were due to blatant work-culture separation of the "client team" from the contractor team, a factor that defined the social make-up of the project team. The lead developer recounted: *"I don't feel the client was part of the team. I feel they hired us to execute the deliverables that they had, but did not say let's work together to work on a good product."* Another political factor is the increased tension within the team due to ill-defined scope at contract-signing and less-than-sufficient funding of the project, which nonetheless, continually imposed work on manpower resources beyond the agreed-upon project duration. The lead developer continued to share: *"[the] agreed-on project had a very vague scope…scope was not well-defined and under budgeted."* Such conflicts increased tensions and aggravated the relationship between the client and WebCo teams. Stress levels within the team heightened and transitions of key project personnel increased (i.e., project manager and lead developer). The lead visual designer of the team shared: "*the project was going downhill when the PM left and replaced by a new one."* The lead developer, having been engaged late in the project timeline, felt inadequate to save the failing project: *"People was (sic) very stressed in this project. Many moments, legal*

involved…The project switched PM mid-project. The designer changed, the developer changed. It was a huge problem for the project."

Yet, certain forces in the social and economic environments seem to manifest some regulating influences as well, which either amplify or dampen the impacts of political forces to the project team. For example, the contractor team had a strong top management support and an accommodating (or "no blame") culture in the organization, which the staff thought to have encouraged them face the challenges in the project. Such social forces dampened the impacts of the political forces in that the no-blame culture of the contractor team made it easier for constrained team members of the development sub-team (contractor) to push forward despite difficulties encountered with the client's web designer. *"It [contractor organization] was very understanding… no body blamed or pointed anyone. Our attitude was 'what do we need to do today to get this done?',*" the lead developer shared. In addition, it would also appear that the political tensions impacting the project team were likewise intensified by the restrictive nature of the economic forces. For example, the lead information architect recounts how the likelihood of project success could have significantly improved if the web designer did not start pressing demands that cited project scope stipulations at the contract level. The lead architect shared:

> I strongly believe that if people start to point out the contract, that's a bad sign and things are at a very bad place […] 'Cause there is a point in the project when something goes awry. But because of the mutual understanding, because of the trust that exists – 'I trust that you have good intentions, you are trying to meet me at a certain place' - if that level of relationship exists with the client, things could still be okay.

The stipulations in the contract, which the client team used to reiterate their demands concerning project scope further deteriorated the already intense communications within the project team's atmosphere into a bitter legal dispute. The lead developer further shared:

> [Web designer] keeps creating new revisions once a week, keeps coming back to us, [and we said] 'ok this is a scope change.' And once we start arguing over scope change, that becomes a contract issue. So I don't know that we start arguing about scope issues as early or as significantly if [the web designer] isn't creating that mess. But I think there's still the potential that it would have come out.

It would appear, therefore, that forces in both social and economic environments do not only have direct impacts to the brewing forces in the political environment, but also have some modifying influence over the impacts of the political forces to the collective action of project teams.

Invisible hand impacts to ISD methodology. Many invisible hands affected several features of the ISD methodology in terms of methodology concepts, guidelines, steps, and techniques (Edberg et al. 2012). Figure 5.1 further illustrates how the invisible hands directly impacted the ISD methodology that was followed by the project team. For example, in terms of following a supposed methodology concept that allows the creation of a plan to bring order to chaos, the resulting project plan derailed the project due to excessive counter-productive project meetings and back-tracking that voiced mostly the self-interests of the web designer from the rest of the client team. In terms of impacted methodology guidelines, project requirements that were supposed to have been locked down prior to development phase were still being identified and continually modified during the development phase of the project. The lead developer shared how the late engagement of technically skilled developers brought forth ambiguities in the requirements: *"Developers were not involved earlier – but going forward, the process evolved to change that."* Late engagement of technically skilled resources is now considered by the team as a *"poor project management practice"*.

In terms of impacted methodology steps, clear feedback loops supposed to have been opened for a healthy discourse and alignment of expectations were, rather, precluded by dispersed intellectual-property culture within the client team. In addition, impacts to the methodology techniques prompted miscalculations in the work-hours allocated for developers due to lack of technically skilled project resources who could have obtained a better understanding of the overall scope and technical requirements earlier in the project. The lead developer vividly recalled:

> In the original sales pitch, there was mention of a library of things, but the library of things isn't well-defined. There was no expert in the company about the library of products. People were less experienced on a learning curve.

It would appear, therefore, that social and economic forces further shape the ISD methodology into one that accommodates these invisible hand forces.

Ancillary impacts of ISD methodology. Although the ISD methodology appears to be benignly shaped by the social and economic forces in the environment, these adjustments to the ISD methodology increased conflicting technical opinions in the project team and exacerbated the demands of the client to an irreconcilable level. It would appear, therefore, that the resulting ISD methodology have some exacerbating effects to the political environment of the project team. As an example, the lead developer, who was engaged close to the development phase of the project, shared:

> Well, obviously there were some problems in the process. As I look back, we found one of the scope documents made reference to following the guidelines on a website and just one bullet in a scope that otherwise looked healthy…But as I started digging in and really going through their requirements in the website, they were unlike anything any of us had seen before and became very time intensive. Restrictions in our toolsets, meeting approval to use certain strategies to build the website. Things like that we don't' normally deal with and were not accounted for in our scope. So from the development side, there were some surprises working through those.

Along the same invisible hand impacts, the resulting ISD methodology directly contributed to the impairment of the project team from saving the project until the project team's eventual collapse and the project's subsequent termination. For example, the miscalculated developer-hour allocations, an impaired use of methodology technique, amplified the stress levels within the team while the contractor team attempted to contain the ballooning expenses beyond the allocated budget. Furthermore, the misidentification of project requirements in the earlier phases of the project (impacted methodology guideline) triggered a number of repercussive staff movements and transitions. First, in an attempt to clean up the project requirements, the contractor team engaged a highly technically skilled resource (the lead developer) midstream of the project. If the lead developer was engaged prior to contract-signing, he could have validated the initial sales pitch of the contracting firm and avoided miscalculated manpower-hour allocations. Furthermore, the lead designer interviewed for this study used to be the lead architect during the contract signing phases of the project. The new lead architect interviewed for this study stepped in a couple of months into the project. In addition, the lead designer shared that the original project manager of the contractor team resigned from the position when the project was going "downhill". *"It was about three-quarters into the project timeline when I stepped in to replace [the original project manager]"* according to the replacement project manager. It would appear, therefore, that these staff movements and transitions deep into the project timeline impacted the collective rationality of the project team. This impact was further compounded by the aggravated tensions and conflicts between the client and subcontractor and other unresolved political forces.

Collective rationality and project team cohesion. From a collective rationality perspective, collective agency assumes that all of its parts are working toward a common goal. However, collective agency for this project team had been gradually weakened due to increased unresolved conflicts in the political environment and negative alterations to the ISD methodology. In effect, understanding a "common goal" was never reached. The lead designer commented*: "They [client] wanted to be a very custom website – with no work on their end anymore. This alone was a conflicting [technical] requirement."* Likewise, the lead developer supported this idea: *"Client is the most participatory and the most troublesome – most feedback, and most helpful, and most follow-up request; a double-edge sword. And so deviating from the little requirements would be a problem with the client."* Yet, the social setup of separation of the client team that perceived the development team merely as *"hired contractors"* further precluded trust to turn the project team into a highly cohesive team. The lead architect shares how rapport with the client was never actually established:

> Things were never comfortable with this client in my opinion. There is some projects where you have a personal rapport with the client, and the relationship is good. You know, you joke around, you can share personal anecdotes that's casual discussion. There's a relationship there. I never really get that sense from this client.

The seemingly irreconcilable demands and resistance of the client team to arrive at a reasonable compromise with the contractor team made it more difficult to nurture trust and harmony between the client and contractor teams. Undesirable stress levels amplified, movement of resources in the team increased, team cohesion weakened, and the team eventually collapsed and ceased to exist. Having weakened the collective agency, therefore, the joint commitment and we-intentions of the project team began deteriorating

into a continuous vicious cycle. As such, with a further deterioration of the team's collective rationality, the project team's cohesion weakened and rendered the eventual collapse of the project team.

Case 2: Project Team of a Marginally Successful Healthcare IT Project

Adhering to the Meaningful Use (MU) regulations established by the Center for Medicare and Medicaid Services (CMS), the IT group of a hospital in the state of Louisiana, a research site of this study, launched the "meaningful use" project in 2014. MU is an incentive program that provides financial (dollar) incentives paid by the government to hospitals and healthcare providers for their meaningful use of certified electronic health record (EHR) technology (see www.healthit.gov). The program mandates hospitals to showing evidence that the hospitals' certified EHR technology can be used meaningfully in terms of e-prescribing, exchange of electronic health information, and submission of clinical quality and other health care giving measures (for more information about meaningful use, see CMS website at https://www.cms.gov). The project, currently ongoing, is an effort of the IT group to fulfill the requirements of the program in three stages of increasing complexity of requirements. Each stage is geared to satisfying health IT objectives pertaining to the following: data capturing and sharing (stage 1), advancing clinical processes (stage 2), and improving outcomes (stage 3). At each stage of the project that lasts a full calendar year, the IT group seeks to satisfy a list of meaningful use criteria and objectives by generating compliance reports submitted to CMS. The reports show EHR-related data and statistics, which serve as evidence that the healthcare information systems (HIS) of the hospital is compliant to the MU regulations. From a systems

development perspective, generating the necessary reports entails a series of updates and new functionality implementations to EPIC system, the core HIS of the hospital.

Invisible hand impacts to the project team. In October 2016, during which the project aimed to comply with stage 2 regulations, new upgrades and functionalities to the EPIC system [8] had been implemented. The project team (case 2) was headed by a director of the IT group and was staffed by four functional analysts, one hospital quality management person, one dedicated tech support representative from the vendor of the healthcare IT (EPIC), and one physician champion. The completed technology implementation for this stage was considered successful in that the required functionalities have been successfully put in place as planned. To the project team, however, success of the project is beyond the successful implementation of the functionalities. Success is attained when reports submitted to CMS show satisfactory compliance to the meaningful use criteria. Yet, MU compliance is highly dependent on the proper and timely use of the implemented system functionalities by healthcare staff and professionals (e.g. nurses, physicians, pharmacists). The proper use of the implemented functionalities captures the data needed in compliance report-generation. While recently obtained compliance reports satisfy the requirements of stage 2, the team fears they may not be able to adhere to the meaningful use criteria of the last stage (stage 3) in 2018. By the time data gathering for this research study has ended, members of the IT group, spearheaded by project team 2, find themselves struggling with persistent conversations about the ownership of portions of health IT system and associated tasks, and about means to incite medical professionals

[8] A proprietary healthcare software (know more at http://www.epic.com/about)

of the hospital the actual and proper utilization of the implemented healthcare IT functionalities. Confounding this struggle is project team 2's attempt to ensuring that proper system functionalities are put in place that adhere to the more strenuous and pressing reporting requirements of stage 3, as well as to avoiding penalties imposed by CMS upon non-complying hospitals.

Central to the meaningful use project is the EPIC system, which serves majority of the hospital's operations such as in-patient care, out-patient care, ambulatory services, and pharmacy. The project manager, an IT director personnel, spearheads the meaningful use project because the project encompasses many departments of the hospital and IT group teams. The technical support representative shares his view of the EPIC system's role to the meaningful use project:

> So EPIC is a core healthcare EHR system. That is what we do, that is what we're trying to do. We do not make over, tap into, or step into I would call other systems, sometimes even other related maintenance. So for example, EPIC might contain that you need to use for meaningful use and we will help you provide reports or view on that data whatever it is you need to do… For the CMS, the main regulating body, what the organization would do is take all their data out of EPIC at the end of the year or something like that and we help them write these reports, make it all look nice, figure out exactly the right data just like the other, and the organization itself submits it to CMS.

In addition, project team 2's two lead functional analysts (one for in-patient services and one for out-patient services) and the project manager herself, serve as the main liaisons between the IT Group and the hospital for concerns related to the EPIC system, whether such concerns involve the meaningful use project or not. This set up of responsibilities and accountabilities for the EPIC system confounds the project members' day-to-day work. For example, apart from EPIC functionalities meant for the meaningful use project, the in-patient functional analyst is also bound to resolve trouble tickets concerning EPIC in-

patient services not necessarily related to meaningful use. These tickets, many of which are backlogs from prior years, are still pending resolution due to de-prioritization and are considered mini-week-long project tasks. The in-patient analyst would argue that non-meaningful use, EPIC-related tasks should already be addressed by the (hospital) operations department, which largely embody the healthcare professionals and HIS users of the hospital, for resolution. Yet, operations would pushback such tasks from their plate. As the technical representative puts into words: *"There are more operational directors who may not understand who I think have a high degree of fear of IT."*

The IT group under which the project team belongs has been undergoing some reorganizational efforts following a recent acquisition-merger that rendered the hospital and its constituent groups (including the IT group) under a new public-private partnership[9]. As the new organization carefully evolves, consequential manpower transitions carefully avoid radical impacts to hospital operations, especially with the kickoff of the meaningful use project. When asked what challenges they encounter while working on the project, members of the project team revealed some common testimonial patterns. First, the technical support representative from EPIC, being a third-party member of the IT group, perceives this reorganization challenging not only for the project team but to the hospital and its IT group in that the reorganization brought forth gaps and overlaps in the scope of responsibilities and accountabilities between members of the IT group and hospital operations:

> Well, there's still a lot that we're doing from the IT perspective. What I don't think is moving in the right direction is the operational side because the IT portion, no question, started in a bad spot. And it came from, if you know a little about the

[9] Public-private partnerships (or PPPs) is loosely defined as "co-operative institutional arrangements between public and private sector actors" (Hodge and Greve 2007, p. 33).

> history of [the hospital], it was in a way, part of one organization with the larger hospital system, and then the state sold off the hospitals, and then they were all part of one EPIC [system]. It's very complicated. It split and changed, and this and that. And they lost key members of the team.

The technical support representative added:

> And about a year and a half ago, they lost - as part of this hospital split that made it to the [current] organization - they lost probably the person who knew the most about meaningful use. So they went through basically, six months of nobody doing anything in the project, and then it was pretty hectic.

Consequently, some skilled hospital staff were transferred from operations to the IT group on a per need basis. This is to say that, while there is some acknowledged structure in the organization the roles and responsibilities of highly skilled staff are still considered amorphous. One hospital staff member that got pulled into the IT group is the IT director who now serves as the project manager of the "meaningful use" project. This PM-IT director used to serve the hospital as a head nurse of the operating room (OR) highly experienced with the use of the EPIC system.

Furthermore, the reorganization and consequential loss of key resources triggered the need for all IT staff to undergo formal project management trainings on top of the minor, short technical trainings generally all staff could avail. Yet, the decision for the trainings come from the CIO. While many, including the PM-IT director herself, have already expressed sentiments their desire for more formal PM upskilling and trainings, undergoing such trainings is still something that has been pending for some years now as the hospital prioritizes, albeit reactively, other more pressing ad hoc tasks residual to the reorganization. The PM-IT director added, *"We would undergo occasional small trainings but none of them have any formal PM trainings. There is a general unspoken desire by*

'all' teams [in the IT group] to undergo formal PM trainings because we would like to learn how to work proactively and smarter instead of harder."

Moreover, a major pressing concern being encountered by the team that exacerbates the issue of non-use of IT is the manner by which the hospital employs its physicians. The technical support representative shares his opinion:

> Also, I should make a quick comparison. I said they struggle on the hospital side, and that's not the case necessarily for every organization. It is just because [this hospital] does not directly regularly employ their physicians but to be partner with physicians to this organization. In other hospitals, even across Louisiana, they directly employ their doctors, have great compliance rates because they could say, 'Dr. John, you really didn't do your job, we're gonna fire you.' I mean, 'you no longer work in our hospital,' you know. So they have much higher compliance.

Perhaps a deeply underlying exacerbating factor seeping through the hospital system is poverty that persists among the patient population. Funds brought in by indigent communities being served by the hospital are insufficient to fuel the entire hospital system, and consequently, the proper acquisition of electronic information that is required to be fed into the healthcare system to generate meaningful use reports. The technical representative shares his comparison of this hospital with his other client hospitals:

> Basically, being in a poor area of Louisiana is a struggle because if you had the same problem in San Francisco, you just wouldn't have this problem. Because every hospital there is super high-tech, interacts with each other, there's a lot of money going around, there's the patient population that's much more, well also, they're more likely to already have TCPs [short for TCP/IP; alternatively, internet connection] and have solid medical records already. And things are just going to behave more nicely. In a place like [in this city of] Louisiana, you're going to run into issues where their main local other hospital systems, I'd say, doesn't really use their EMR [electronic medical record] is pretty closed often, it's hard to interact with. For the hospital, their patient population, by and large, doesn't have TCPs, so you don't have a lot of information from that, and you can't send that information to them. And they rely extremely heavily on Medicare and Medicaid, so meaningful use becomes an absurdly huge priority.

He added:

> I've mentioned that meaningful use is a system of rewards or penalties that come in the form of your Medicare reimbursement. So for some hospitals in really wealthy areas, they don't even care, they do meaningful use because you're making them look good, but it doesn't actually matter for them. At [this city in] Louisiana, if you don't attach meaningful use, they don't get any money and they'd go out of business. So the nature of where they are and what they're trying to do at being a safety-net hospital, makes their life a whole lot harder.

Figure 5.2 summarizes prominent invisible hand forces that impact the project team 2's dynamics. In particular, the political environment of the healthcare organization directly impacts project team dynamics, and is confounded by various socio-economic issues. Forces sifting through the social environment include turbulent organizational structure, scarce qualified personnel (i.e., technically skilled personnel, knowledge experts and subject-matter-expert), amorphous project team member composition, confusion in scope of responsibilities and accountabilities of IT group and operations group for meaningful use compliance, and engagement of physicians merely as partners instead of as employees of the hospital. Prominent forces lingering in the economic environment include restrictive financial funds being fueled into the organization, lack of sufficient training of IT group staff for both healthcare IT use and PM upskilling, and perceived low cost-benefit obtained from IT use. Consequently, these social and economic forces exacerbate the persistence of political forces perturbing the project team such as physician's resistance to use IT, subdued decision-making authority of IT director to fulfill the training requirements of project staff, pushbacks arising among hospital constituent groups (i.e., IT group, operations, medical practitioners) in terms of scope and boundaries of responsibilities and accountabilities for meaningful use compliance, as well as

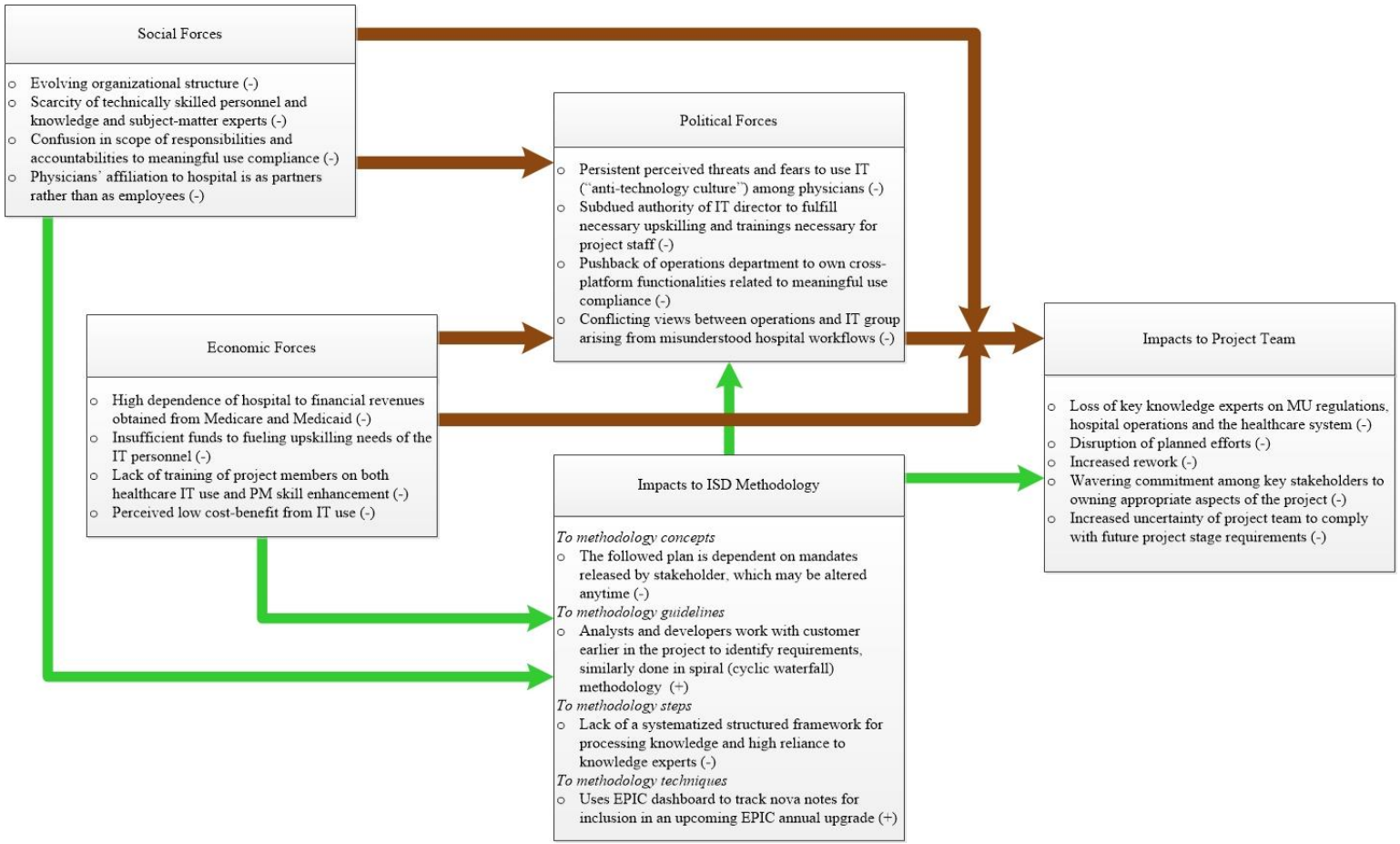


Figure 5.2 Invisible Hand Impacts to ISD Methodology and Project Team 2

conflicting views between operations group and IT group arising from less-than-sufficiently understood cross-functional hospital workflows. Apart from loss of key team members who could support the meaningful use endeavor, members of the project team experience fluctuation of commitment among some project key members needed to participate in meetings. The technical support representative supported this observation.

Invisible hand impacts to ISD methodology. The systems development process followed by the project team of this study, although not a standardized process employed by all project teams at HealthCo, is nonetheless a formalized spiral-like (waterfall) methodology. The project team of this study does not have a label for their development process, but executes their projects in accordance to "what fits their project team best." It is important to note at this point that the project team dynamics – in terms of communication and coordination – occur through regular (weekly) project team meetings, additional meetings called on a per need basis, as well as through emails and phone calls. The project team of this study generally meets (virtually) with the EPIC technical representative to identify certain EPIC features and functionalities that already exist and needed for inclusion (and/or for build) to meet the reporting requirements of a specific meaningful use stage. Aligned with the EPIC target release date, it is the EPIC technical representative who generally sets the pace of the build efforts, while the project team coordinates with hospital operations to identifying and validating operational workflows associated with any build requirements. Based on this description, therefore, the development process being followed by this team is fundamentally waterfall. Planning stage occurs substantially, which is conducted through a series of meetings, prior to the

design, build and implementation phases of an EPIC upgrade and release every calendar year.

The ISD methodology practiced by the project team for a particular compliance stage of the meaningful use program is illustrated in Appendix G. The development methodology being followed by the project, however, is aligned with maintenance and upgrade tasks scheduled for the hospital's EPIC system. The project team consolidates hundreds of so-called "Nova [Release] Notes", equivalent to a list of functional requirements identified in an ISD project, for potential configuration and build efforts to be done to the hospital's EPIC system. The PM-IT director shares:

> When you're an EPIC customer and it's time for upgrades, you get something that what we call 'nova [release] notes', and really EPIC has broken down all the examples in the upgrade. Some are automatic enhancements, some are build that you need to do, some are enhancements really just served to optimize things. So when we know that we are headed into an upgrade, we are assigned nova notes that are specific to the meaningful use build.

Nova notes are identified based on existing EPIC installations mapped against recommended EPIC enhancements, pending upgrades from prior EPIC releases, and Meaningful Use requirements mandated by CMS for a specific compliance stage. Nova notes are classified generally according to four types: (1) required build, (2) required enhancement, (3) optional build and (4) optional enhancement. A nova note is assigned to a functional analyst who is most familiar with the workflow associated to the nova note such that a workflow is typically concerned with (1) in-patient services, (2) out-patient services, (3) ambulatory services, and (4) discharge services. Functional analysts perform impacts assessment to identify the scope of build requirements associated to the system change tied to a nova note. Nova notes classified as optional types are discussed with the

operations department who decides whether the hospital would take the nova notes for inclusion into the current upgrade year.

The PM-IT director explains further that an appropriate analyst on the team takes the notes, and reviews and classifies them according to either required enhancements or optional enhancements:

> What version we went live on at the beginning of last month was EPIC 2015. We were beginning to release I think the week before Thanksgiving, epic 2016 version, and so they [EPIC group] have a host to saying, you know, the whole research and development, to get the stuff ready.

Optional enhancements are reviewed in a meeting, or sometimes, in a series of meetings with operations group to decide whether the hospital will want to take the enhancement for build and testing. The project team underwent an EPIC upgrade in October 2016 to satisfy some requirements under the stage 2 of meaningful use regulation. Furthermore, enhancement-type nova notes are pre-developed features ready for automatic installation into the hospital's EPIC system. All approved enhancement-type nova notes are sent to the EPIC team (through the EPIC technical representative) for inclusion into yearly upgrade effort performed by the EPIC team. In contrast, build types are features that require some planning, development, and testing efforts with the entire project team. During the build stages, the project team validates the workflows associated to build-type nova notes, develop integrate test scripts, builds the required codes, and tests the new system features. In particular, the EPIC team performs build efforts (the actual coding of the features into the EPIC system). Integration testing is performed by the IT project team that is spearheaded by a functional analysts who was assigned with the nova notes. All passing test scripts are included in the list for the upcoming upgrade, while failed test

scripts are returned to the EPIC team for debugging. The build efforts, including integration testing, usually last from five to six months.

Many invisible hands were the cause of several unique features of the ISD methodology practiced by this project team in terms of methodology concepts, guidelines, steps, and techniques. Referring back to Figure 5.2, the figure abstracts how the social and economic invisible hands impact the ISD methodology followed by the project team. For example, in terms of a methodology concept, the overall project framework being followed by the team is that which aligns with the meaningful use reporting dates to CMS. The PM-IT director provides overall guidance and direction to identifying meaningful use requirements for further assessment of the entire team to materialize necessary system changes (enhancement and build) as well as associated system changes the EPIC representative provides direction in terms of the identifying. The PM-IT director, however, strongly relies upon the value-added efforts, expertise and skills of each team member to move the project forward more efficiently and minimize repeat efforts, which, unfortunately, are relatively high, especially with the limited skilled resources which the hospital currently suffers. Likewise, guidance and direction solely relied upon the project manager (versus a standardized process) may impose hard pressing challenges to the team. For example, the ability of the team to respond to change mandated by one or more project stakeholders is slow because the team relies upon project next steps that constantly change with weekly project team meetings like a moving target. Following project stakeholders mandates not aligned with any standardized process of a development effort poses challenges in that the team becomes reactive instead of proactive to stakeholder mandates. For this project team, revised criteria to the meaningful use regulations of a particular

compliance stage may come out anytime, thus, adding or altering the list of functionalities to be built against that which has already been planned for earlier on and scheduled for build. The representative expresses a frustration:

> So working with the government is always tough in that they've been saying for example for two years, every year you're going to have to report the entire calendar year, and of course, when it comes to submission time they say, 'well we lied to you; you don't actually have to report on the whole year, you will only have to report on a 90-day period.' So I guess in one sense it is on a yearly thing that you have to report every year, but after this point, you don't have to actually report on a full year.

The EPIC technical representative is highly influential in terms of identifying which functionalities needed to be included and built into the system, and is also responsible for the build phase timeline. The methodology guideline being practiced, therefore, is very much similar to that in a waterfall methodology where the software developers (in this case, the EPIC team) work with the customer (the IT project team of the hospital) earlier in the project to identify requirements and gain agreement before proceeding to development. While planning through regular meetings is heavy similar to a waterfall methodology, development efforts with of this project (within an EPIC release year) may occur incrementally in iterative fashion similar to agile methodology. With high uncertainty of project success, the project team works extra hard to identifying earlier on the meaningful use requirements for a specific compliance stage. The IT-PM Director asserts:

> EPIC does a good job of dividing it all out, so like I said, you can go into EPIC and say, I want all of the tickets that have anything to do with meaningful use to be assigned to this group of analysts, because those groups of analysts are the ones more familiar with meaningful use and we serve on the committee to make more informed decisions on what we need to do. I mean, a lot of meaningful use, you really don't have a lot of options.

In terms of methodology techniques, project team practices include the constant reviews and updates of the EPIC dashboard to allow the team to identify existing features in the current EPIC release, as well as to list the nova notes (for enhancement and build) needed for inclusion in the next EPIC release. The project team utilizes regular spreadsheets to list down and track progress in tasks and responsibilities Instead of typical project management tools like Microsoft Projects. With the wide-range of project management skills of team members, the project team finds it best to use a very familiar application tool like Microsoft Excel. The lead in-patient care analyst shares her idea about the development methodology being followed by the team:

> It is possible that we are already doing "agile" or "traditional" methods without being aware of it. Excel spreadsheets are the preferred project management tool used to track projects, and even though more specific project management software tools are available (such as Microsoft Projects), they are hardly used.

All build efforts (that is, coding efforts) are assigned to the EPIC team via the technical representative. To this end, the IT group trusts and is grateful for the contributions being imparted by the EPIC technical representative.

Every team member puts an effort to identify and document project requirements with the aid of their tools (EPIC dashboard, spreadsheets, etc.) However, with the current state of the hospital, a systematized structural framework, or methodology step, that embeds knowledge processes for storing, acquiring and reusing knowledge is still not in place, consequently increasing dependency of the team on many people and limited knowledge experts, thereby increasing the learning curve of IT project resources. Hence, by identifying and working earlier on the project requirements, the team puts large time buffers from the reporting deadline to cushion against unforeseen arising problems (e.g. miss inclusion of a system functionality, lack of training of certain hospital staff)

concerning the use and reporting requirements for the meaningful use endeavor. The PM-IT director vividly shares:

> Our goal is to have the upgrade like to decide when we're going to do our next upgrade, and probably a lot about maybe a 5-6 month period of time. But then that's not taking into account what you're asking about what EPIC does on their end. Like I don't…I mean, they are already probably working on future enhancements for future versions, you know, but I don't know how far out for futures they work. But once like they're about to release 2016 the week before thanksgiving, we're currently […] trying to figure out how to make the next steps right. So we're allotting ourselves to probably about a 5-6 months period of time because we have lots of people, because you get hundreds and hundreds of nova notes.

Ancillary impacts of ISD methodology. The resulting ISD methodology of this case produced negative impacts to both the political environment and the ISD project team. In the political environment, for example, the lack of a systematized structured framework, which cause over reliance to limited knowledge experts in the project exacerbates a number of political forces such as persistence of anti-technology culture and pushbacks to own appropriate aspects of the project (by the operations department). The same impact to the methodology step of the ISD methodology directly impacts project teams in terms of disruption of planned efforts that decreases the confidence of project teams to meet the project goals in the final stages of the project.

Collective rationality and project team cohesion. Project team 2 is largely comprised of personnel from the IT Group of the hospital. However, a typical notion of a membership into this group is one who is a part of the IT group of the hospital in that non-IT group members assigned to the project are regarded as a member of "something else." In fact, to the project team members who are also part of the IT Group of the hospital, the EPIC support representative is regarded as a "3rd Party" who works for ITG teams (on the

project) but not necessarily a member the "project team." When asked who the members of the project team are, the PM-IT director would point to functional analysts who directly report under her. A similar answer is given by the functional analysts as well. According to the out-patient functional analyst, there are only 2 members of the project team he interacts with for the meaningful use project, and none of them are hospital staff or users, even though the (information) technology supporting the out-patient services of the hospital is ultimately used by hospital nurses and pharmacists. Thus, if an IT project (as initiated by the IT group) is underway, only people form the IT group are considered members of the project team. Such similar notion of project team membership, unfortunately, expands and is shared among directors in the operations group of the hospital because, as agreed by the PM-IT director, the in-patient functional analyst and the out-patient functional analyst, "*most hospital staff do not trust IT*." The PM-IT director and her "team" express frustration with this idea in that the hospital staff users may complain but none of them are willing to participate to ensuring that the quality of delivered IT are achieved. In the words of the lead out-patient functional analyst: "they [hospital personnel] do not own any IT projects." In terms of team cohesion, therefore, the sense of belongingness of a project participant varies from member to member. There is an apparent pushback of tasks and responsibilities, and ultimately a sense of "ownership" to the project. Where task cohesion dimension is weak and where social cohesion dimension exists among certain members of the non-IT group members of the project, the number of hospital operations members willingly participating in the project are not as significant and as exuding with authority to own more significant portions of the meaningful use endeavor as those in the IT group members. In fact, operations group only participate in the project as

decision makers in terms of approving which optional nova notes are to be built and to training hospital personal on the new new functionalities installed in EPIC. Yet, the IT group sees that operations may still own the "utility" portion of the system (after implementation) by creating policies to mandate hospital personnel (i.e., physicians, nurses, etc.) on the proper and mandatory use of the system to capture data needed for the generation of compliance reports. The EPIC representative shares his idea about the culture of the hospital may make the meaningful use project successful:

> The meaningful use project has an IT component but it is an 'everything project'; it's an operational project, it's a medical project, it's a care project, it's a IDE project. Meaningful use is due successfully organization-wide, it has to be an 'everybody' project.'

However, because there is a sense of great divide and separation between IT and non-IT project members, it deems their sense of ownership of tasks inherently tied to the meaningful use endeavor, both technological or process-related, be pushed solely to members of the IT group. Such sense of separation of technological tasks is embedded in a current culture where the idea of an "everybody project" is not an accepted notion or does not exist, and deems the project team to remain in a distressed state towards attaining meaningful use project success for the upcoming last stage.

Case 3: Project Team of an Exemplarily Successful Web Development Project.

In January 2013, WebCo signed a contract with a government agency in the state of Texas to build a website for children with special needs. The website to be developed is to be used by the children's parents, teachers, counselors and physicians. The primary focus of the site is to provide information that could be accessed easily and used meaningfully by people who wish to help and support these children. The project

underwent two major stages: initially, a research stage, and, upon securing funding from state and federal agencies, a formal development stage that was kicked off a year later. The development stage was contracted to the project team of WebCo and lasted for a year and half. The project was successfully launched in June 2015.

Invisible hand impacts to the project team. As with the rest of the members of the contracting team, the project manager defines project success beyond the website launch, which includes job satisfaction of the project members and the opportunity to maintain strong working relations and repeat business with their client and contracting partners.

> Making sure that everybody's happy, and I mean that both on our end and the clients' ends. So making sure the client felt they were heard, that they got a website they can use both, like, it meets our clients' audience's needs, so they can log into it, and they can make updates, it's easy to use. That they felt like the project manager communicated well with them, always kept them up to speed on what was happening on the project. And then on our end, we're making sure we don't want our developers to feel like they're having to work 12 hours a day in order to meet deadlines, that they were informed early and often about the kind of requirements and they were brought in early to see the design so that they could give their input.

Project team 3 is composed of at least nine members, officially led by a dedicated project manager from the contracting team, whose role was to ensure that the project was to remain on budget and on time. Other members acknowledged for the success of the project include a lead designer, a lead architect, a lead developer, a usability manager, a client, a representative from a content management subcontractor, and a representative of the client sponsor of the project. The project team's membership is also supported by a few executive personnel of the main contracting company, who played many roles in the project. For example, the lead developer of the project team is also the technology director of WebCo overseeing build efforts of all other project teams in the company. As another example, the lead architect of the project is also the chief operations officer and vice-

president for research at WebCo. The lead architect's presence began as early as the research stage and was felt throughout the development stages wearing different hats, which included working closely with the lead developer during the actual development efforts and supporting the project manager throughout the project. The lead architect, who was also juggling a COO role, recalls how her roles have evolved over the years as she tries to delegate many of her tasks to her constituents as the organization grew in size:

> [My role] has really changed. When I started in 2010, we had seven people, and now we have 26. And so I continue to peel off parts of my job and hired people to do it. And this [project] is the first time that [the official project manager] and I worked much, much closely together. Even at the beginning of the project, we really co-project-managed it. But as the project progressed, and certainly now, it's completely hers [the project manager's] to manage. I'm just there once she has questions.

The official project manager was commended for the success of the project primarily for being an exemplary communicator. The lead architect/COO shares her opinion of the project manager that got the team through a major challenging ordeal:

> There was a line in the contract that we needed to meet DIRS, project management requirements, I can't remember the exact wording anymore, but we interpreted that as our traditional project processes here met that need…But it took, we, [the project manager] and I, worked with them, with [the project manager] primarily honestly, working with them through really getting clear expectations set down on what they needed every month. And you know, there was just a lot of communication about that, and I think initially we were talking pass each other, because you know, they were asking for report, and we gave them a report. We gave them a report we would normally give to a client, and they were expecting a different kind of report. And so at first, there was this mismatch of expectations. And so we just talked through it with the client and so every time, what initially came up, we just had you know some working sessions to figure it out. And then every month, [the project manager] sat down with their [the client's] project manager, and they hashed out reporting, and after a couple of months after that, it was smooth. And then we understood what we were asking for and they got what they needed, and you know the requirements were clear… [The project manager] was an exceptional *communicator.*

The project manager acknowledges her strength of serving as the central "hub" of communication for the team and for running the project smoothly. If her role was non-existent, the project manager shares her opinion:

> Um, it [the project] would have been a lot harder. I think that they [the team] would have gotten much, but it wouldn't have been on time and on budget. Or we would have really frustrated clients or contractors, because they wouldn't necessarily know what they needed to know, what was happening at any given time because other people in the project at the TMM side they were busy doing their role in the project. So there wasn't anybody else to make sure that everyone was informed in the kind of like the ship is running smoothly. Everybody was focused on their one piece, and my job was to make sure that all the pieces work and running together.

The project manager's role and strong communication skills were critical to managing many resources in the project, especially since this project was the first large project the company contracted involving government entities and four subcontractors:

> We were really making sure that the lines of communication were open both to our clients and then also to other contractor teams making sure that everybody knew what the expectations are, when deliverables were due, and where things stood and locks along the way, because there were so many moving parts that everybody needed to know at any given time, where things stood, and what was coming up next.

In terms of the project team dynamics, everyone in the team sees the value that each member exerted for the project. The environment wherein every member played was set with a "family-like" atmosphere. The project manager recalls:

> I think everybody got along from this project very well even when there were maybe differences in opinion on how we should move forward from one piece to another on the website, everybody, the end-goal, everyone was so passionate about making this resource available for parents and so, we realize that it was important for Texas to be able to provide this parents that we were able to work through any differences of opinions for that end goal. And so by the end, even though our subcontractor teams haven't worked together before, they all were able to come pieces work together and their different specialties. And [the client] was able to trust their work, and everybody was one big family so seeing everybody doing that on their piece of pie.

Such testimonials were supported by the client sponsor who believed that the project had the right resources and everyone had played their parts really well: *"I've developed a good rapport with these people, and we've become sort of like a family-oriented group."* It would appear that, while forces in the social and economic environment would become the basis for arising conflicts brewing in the political environment surrounding the team, it is also the forces in the social and economic environments that modulate the impacts of the political forces to the project team (Figure 5.3). Forces occupying the social environment include the stable organization of WebCo, presence of an exemplary communicator project manager, presence of knowledgeable executive decision makers, availability of technically skilled and knowledgeable project members, permeation of a family-oriented mindset, culture of openness to member accommodation and inclusion and, high-valuation for collaboration and conflict resolution. Forces occupying the economic environment include availability of adjustable project work rates based on scope, accommodation of knowledge and opinions from all resources, flexibility of available budget allocation to complete intended tasks, availability of sufficient project timeframe despite having an immovable project launch date. Forces occupying the political environment arising from these environments include struggles that arise from unforeseen problem and immovable project launch date, that were nevertheless resolved on time due to inclusion of substantial buffers and time cushions. For example, changes in the organizational structure of key decision-makers on the client side causes some struggles to the project team in that the team tries to maintain the original workflow as previously agreed upon by making adjustments to project resources (i.e., schedule of activities or budget allocations) as far as such resources could stretch within its limits.

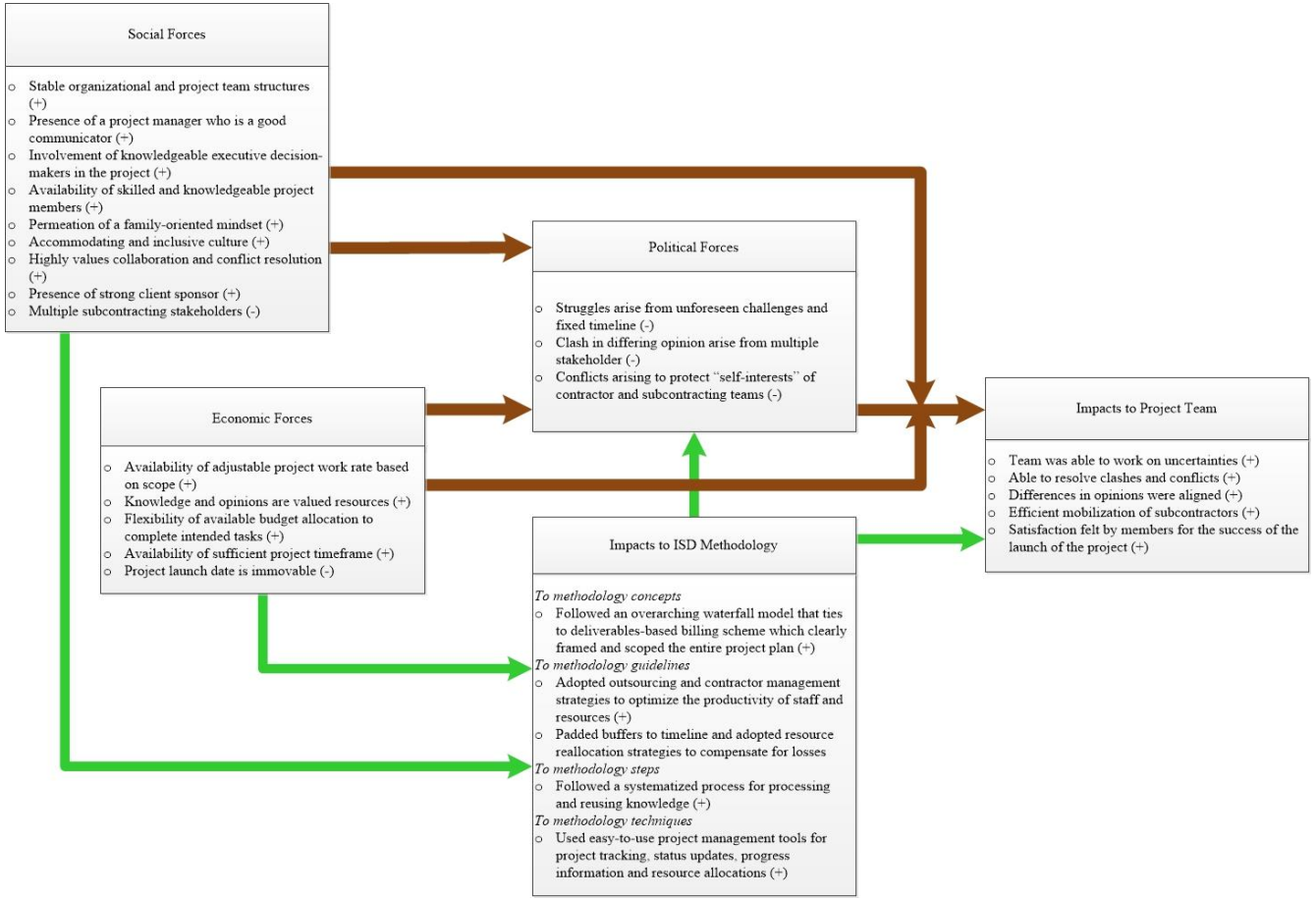


Figure 5.3 Invisible Hand Impacts to ISD Methodology and Project Team 3

> We launched the project on time. But this wasn't accounted for, because changes in decision-making, we weren't expecting that. There were things that happened in the legislator [of our-client]—we weren't expecting that. But yes, we had enough buffer in our schedule so that you know, some extra meetings here and there, um, it was fun, and it did make the phase longer; but we were able to shorten up phases in the future to account for that [loses incurred for the extra meetings].

Consequently, political forces that added include clashes in differing opinions among contractors and new client decision-makers, but were nevertheless clarified and deliberated more optimally due to the environment's accommodating and family-oriented culture.

> Yeah, it was someone who was maybe in a position or given responsibilities that they weren't, not necessarily weren't qualified for, but they just didn't have all the information they needed to make those decisions. They were put in a decision-making role, you know, midway late through the project. And so there was struggle with, you know, when a new decision-maker comes on, or somebody new that has major responsibilities that weren't there for 65% of the project before, or new to the organization and not really familiar with technology, that can make it really difficult, and they're the ones who needed to sign-off on things.

When asked how the team was able to resolve the struggles with the new decision maker, the project manager added:

> We absorbed the information and opinions they were providing with the idea in mind that they didn't always really know what they were talking about but their voice mattered even though they don't necessarily know what they talking about so, when information came in from them, we kinda had to 'decode' it internally and either ask follow up questions or go around to somebody else on their team to say, 'hey, so and so said this; not really understanding what they're talking about. Let's *get you involved so you can kind of smoothen things over.'*

Additionally, conflicts that may have arisen to protect "self-interests" of other contractors were nevertheless made to align with the client's interests, who was strongly involved in, and made final decisions for, the project. The project manager cites an example when pushbacks from other contractors were received about the verbiage on the content of the website:

> In terms of content to have on the site, there were hundreds that were originally written for the project – the tone, you know, how they're going to blend with the pages, that kind of stuff. We had two subcontractors that were subject-matter-experts in this sort of thing. And they have very strong opinions…So there's some political things we have consider like, 'yes, it can be very difficult to work with your school to advocate for your child that has special needs.' We have to be really careful on how to state that to the website because these schools are state schools, you know, so that kind of stuff. Whereas the subject-matter-experts were like, 'I have hundreds of case studies that have awful times dealing with their schools.' We would say, 'yes, we understand that but we cannot talk about it like that.' So that kind of stuff, those I think were really the most frequent sort of given friction, but it all, we were able to work out everything. In the end, the client's mandates are the ones that are followed.

It would appear therefore, that forces in both social and economic environments not only have direct impacts to the arising forces in the political environment, but also have the ability to modify or dampen the impacts of the political forces to the collective action of project teams.

Invisible hand impacts to ISD methodology. Many invisible hands affected several features of the ISD methodology in terms of methodology concepts, guidelines, steps, and techniques. Referring back to Figure 5.3, the figure abstracts the types of invisible hands that directly impact the ISD methodology followed by the project team. For example, the organizational environments in which the project team performs impacted the development methodology in terms of methodology concept in that the management of deliverables were largely client-imposed. The client had very specific specifications of the deliverables in terms of documentation, which framed the project plan all the way up to the launching of the website. While a waterfall-type concept was largely similarly followed, the deliverables served as the objects that drove the billing for the project, and consequently, the underlying efforts that matched and aligned with the specifications described in the documentation deliverables. According to the PM:

> The billing was deliverables-based, so meaning, and that has all been set up before the project even started. The timeline was set. There really was a lot of involvement from the project team, and so what happened was, the project was initiated and we made the individuals' pace based on that, the overall timeline was already set, that it was in, and what we've realized throughout that 'things we need to nudge a little bit and there', and because it was tied to the payments and billing, because it was federally funded partially, there was a lot of reporting requirements, that we didn't know about at the beginning up until, there's so much tracking that we had to done, anything, any of the deliverables - we've folded all as far as delivery. But we made it work along the way.

Additionally, the organizational environments maintained following a methodology guideline that optimized the productivity and quality outputs of the project staff resources. Managing a large and new project, the project team had to change strategies that optimize the productivity of staff and resources by outsourcing many of the efforts that could not be done in-house. And so, the focus is largely a change on the project management piece that had more to do with contractor management than the actual management of the build efforts done in-house. The lead architect/COO shares:

> The only thing that was really different about this project was we had a much larger scale of outsourcing for this project than we normally did. And the PM was much more stringent with the guidelines on how we reported our progress. Normally, for example, we wouldn't, uh, now when we do projects, we tend to write the content and how that suits as part of the project, but, for that project, we outsourced all of the writing and we just did review. We outsourced the video development, and we just did review. We outsourced all of their resource gathering across the state, and we just did the review. So there was a huge contractor management piece to that.

Furthermore, undergoing a research stage outside the actual project development timeline allowed a clearer definition of requirements of the project prior to the actual development, which rendered the project with a sufficiently large buffer to accommodate unforeseen changes and issues along the way. Change order processes are in place to accommodate scope changes in the project that allowed for determination of whether such

changes could realistically be included within the established project timeframe and budget.

As far as the ISD methodology, the approach was generally waterfall in that there were predefined steps put in place to systematize the knowledge processes for repeated use. Hence, what was followed were activities that were refined based on knowledge concurrently obtained by the project team as the project progressed Knowledge processes largely depended on the presence of specific subject-matter-experts and executive decision makers. In addition, resources stayed dedicated to the project from conception until project launch, who were mostly tapped through various available communication channels and extensive mediation efforts of the project manager. The project manager's stable communication presence remained throughout the lifecycle of the project and enabled a steady learning curve of the team. The knowledge accumulated during the research stage, as well as the development stage, was leveraged in resolving conflicts especially during times of unforeseen challenges and major client organizational changes.

In order to successfully deliver the client deliverables as well as manage risks and uncertainties, the project team utilized various tools and techniques such as the use of a project management tool to dynamically track the status and progress of tasks and resources, the use of a risk registry and the use of a traceability matrix. The lead architect/COO vividly recalls:

> It really changed the way we did the project management. Because we've always worked with timelines, online PM tools were very communicative about stuff that we were in the process because we've always done weekly reports to the client about status and what's coming up and that kind of thing. But there we promised the project management or more traditional PMP based, where we had a risk register, and we had a traceability matrix, we had you know just more formal tracking tools.

Ancillary impacts of ISD methodology. Essentially, the positive impacts to the ISD methodology allowed the project team to alleviate arising political forces in the environment. For example, while the adoption of outsourcing and contractor management strategies may be perceived to complicate project activities, the project team perceived these strategies as opportunities to optimize the productivity of staff and resources. The project team also followed a systematized process for processing and reusing knowledge efficiently. These perceived positive impacts to the ISD methodology alleviated conflicts that potentially arose among sub-contractors who imposed strong opinions to the project. For example, some sub-contractors asserted to display content based on insufficiently processed data that were otherwise deemed inaccurate and ethically reproachable. The project manager shared:

> In terms of content to have on the site, there were hundreds that were originally written for the project – the tone, you know, how they're going to blend with the pages, that kind of stuff. We had two subcontractors that were subject-matter experts (SMEs) in this sort of thing. And they have very strong opinions…So there's some political things we have considered like, 'yes, it can be very difficult to work with your school to advocate for your child that has special needs.' We have to be really careful on how to state that to the website because these schools are state schools, you know, so that kind of stuff. Whereas the SMEs were like, 'I have hundreds of case studies that have awful times dealing with their schools.' [But we were like] 'yes, we understand that but we cannot talk about it like that.' So that kind of stuff, those I think were really the most frequent sort of given friction, but we were able to work out everything.

After a careful discussion and with the aid of a supplemental data gathering tool, the team was able to refine a web piece that is appropriate for displaying accurate information at the website. Furthermore, the same perceived positive impacts to the ISD methodology enabled the team to alleviate struggles that arose from unforeseen challenges and pressures brought by the fixed timeline. As such, the perceived positive impacts to the ISD

methodology increased the confidence of the team to work regardless of uncertainties and resolve conflicts.

Collective rationality and project team cohesion. From a collective rationality perspective, collective agency assumes that all of its parts are working toward a common goal. Collective agency for this project team had been maintained as strong and stable due to mini-successes against issues and hurdles that come along the way. A key aspect of the success is the constant awareness about the status of the project by all project teams. For example, a major hurdle that impacted the project was a situation when the client-sponsor was audited for potential decommissioning, which could potentially discontinue the project. The audit meant that the project was paused for a couple of months. The project manager and COO kept constant communication with stakeholders regarding the status of the website and promoted the website's value to the auditors. Doing so kept the team morale high and ready to proceed once a go signal is received from the auditors. Ultimately, the findings of the audit allowed the ownership of the website to remain with the client, and the client agency hired a marketing company to promote the website as a resolution to an audit-finding. The accommodating and inclusive culture of the project team kept everyone involved. Despite political forces at play, the largely agreeable and open mentality among the team members resulted in a largely positive outcome for the team.

Team cohesion was greatly amplified when challenging situations were overcome. In particular, the sense of belongingness felt by the team members to one another and to the project was strong (strong social cohesion). Likewise, assigned tasks of each member were successfully accomplished (strong task cohesion). Strong task and social cohesion

are evident in the expressed satisfaction of the project members following the successful completion of the project. As another way of manifesting strong cohesion, the project manager attributes the project's success to building and keeping strong relationships between WebCo and its client and other partners. In another example, a subcontractor stakeholder in the project team expresses her satisfaction in terms of task completion: "*The common mission [of the project] is felt where everybody pitches in. I don't think you will find another project that could be more unifying than that."* A client sponsor of the project expresses her sentiments about the team with enthusiasm:

> I've developed a good rapport with these people, and we've become sort of like a family-oriented group. We've pretty much learned each other's' attributes, and I would say weaknesses as well. But, you know, [we know] what keep people doing what, and you know, and where to go exactly, and it just works well. It's a well-oiled wheel.

As such, successfully completing project goals, through various perspectives of the members and stakeholders, reverberate in a shared feeling of wanting to keep and nourish relationships with one another just as what happened to this team.

Cross-Case Analysis

A cross-case synthesis is performed through an aggregation of the findings across all three project team cases of this study. Common findings and themes are described in the form of propositions stated below.

Invisible hand impacts to the project team. Across all cases, the social and economic forces become the initial defining attributes of the environment in which project teams navigate. In other words, the collective rationality of a project team, which identifies the project activities necessary to deliver the project successfully (i.e., tasks to be

accomplished to attain the common good), is initially bounded by the social and economic forces in the project environment. In time, how these forces are perceived by individuals in the project team determines the extent of conflicts that may rise into political situations. This leads to the first proposition:

Proposition 1

(a) Social and economic forces initially define the boundaries of the collective rationality of project teams. (b) The initial collective rationality of a project team identifies the project activities that are aligned to the social and economic forces in the environment.

Across all three cases, political situations emerged because of conflicting views and opinions about one or more social and economic forces in the project environment. For example, what promoted the conflicting opinions that elevated tensions between client and contracting technology team in case 1 are largely attributed to misalignment of cultural expectations. That is, while the technology team expects the client team to be more accommodating and more of a team-player, the client team is perceived to be very restrictive in their "intellectual property" thus negatively influencing their openness to more contemporary technological solutions and being agreeable to work closely with the technology team of the project (conflicting social forces). Additionally, there are incommensurate terms of expectations regarding the project timeline and scope of work as agreed upon by the client team, versus the available budget and agreed-upon timeline provided for the technology team, which was likewise not clarified in the signed contract (conflicting economic forces). A similar example manifested in case 2 is that the operations department of the hospital pushes back to the IT group their rightful ownership of the cross-platform functional aspects of meaningful use compliance reporting tasks and

responsibilities even after the IT group has implemented EPIC upgrades and enhancements. Although cross-functional aspects and the use of IT by hospital personnel are in fact operations in nature, the pushback is elevated by the persistence of "fear of IT" among the operations department directors (conflicting social forces), and further amplified by the physicians' perceived low cost-benefit of use of IT (conflicting economic forces) in their medical practices for the hospital. Case 3 shares a similar example when frictions arise due to differences in interests and understanding for the project. In particular, frictions resulted from differing points of view of multiple stakeholders coming from multiple contractors (social forces) who were nonetheless considered "experts in their own turf" and who strongly put forward their opinions and knowledge for the project (economic forces at work). Political impacts, therefore, are strongly felt because political situations induce tensions among project members in the form of friction, conflicts and struggles as individuals in the project team attempt to remain rational in aligning their own interests with others' interests for the benefit of the project and collective good.

In essence, political situations arise when at least two individuals in the team express clashing views, beliefs, and opinions based on seemingly rational social and economic situations. Conflicting views and political situations emerge when at least one individual raises a perceived negative concern in the project team such that another or more remaining members of the project team oppose or contradict that concern. Negatively perceived concerns may be raised as seemingly reasonable social and economic situations at hand to convince or gain control and power over another through a series of negotiations and discourse. Opposing members may likewise resist by leveraging other social and economic resources as well. As such, when political forces build up, negative impacts to

project teams such as rising tensions and stress levels are what is felt the most by the project team. In an environment where political forces emerge, therefore, it would appear that political forces are what directly induce negative impacts experienced by project teams. This situation leads to suggest the following proposition:

Proposition 2

Political forces emerge based on the social and economic forces emanating within the environment of the project team. In particular, negative social and economic forces (malevolent forces) perceived by IS project teams may induce political forces that negatively impact project team dynamics.

However, such a narrow line of observation tends to be myopic. Consequent to the above propositions, a fuller perspective of the case scenarios is necessary for consideration in the analysis. A fuller, less myopic, view across all cases suggests that forces in the social and economic environments may also have the ability to modify the effects of the political forces impacting the collective rationality project team. In other words, certain social and economic forces may either alleviate or amplify the impacts of political forces to project teams. A striking example of alleviating forces is illustrated by case 3 such that, even though conflicting opinions arise among multiple stakeholder contractors, the active involvement of the client stakeholder (an alleviating social force) aligns all incongruences among all contracted stakeholders towards a single unified decision for the project. In other words, conflicts in opinions among multiple stakeholders are dampened because, if needed, a final decision is impressed by the client, which allowed the project team to work on a unified decision to further the project. Similarly, although struggles arise from unforeseen challenges within the project lifecycle and the demands of an immovable project launch date, the project team was able to alleviate rising tensions due to the

adequacy of funding and availability of skilled resources flexible to be "moved around" the project (an alleviating economic force). Because of the availability of sufficient project funding and resources, tensions arising from such unforeseen challenges were alleviated, consequently allowing the project team to work on resolving those challenges. Looking more closely, case 1 illustrates an analogous, albeit reverse, scenario, when tensions between the client and development teams increasingly continued because of conflicting demands and opinions received from the client team (political force). The tensions were further amplified by the intense "intellectual property" culture on the client side (a amplifying social force) and under-budgeted and highly restrictive timeline (an amplifying economic force) of the project. For case 2, the unstable organizational structure (a social force) and lack of revenues to fuel the training needs of resources (an economic force), aggravates conflicting views about the scope of work between IT and hospital operations, thereby increasing the doubt of the project team to comply with the more stringent reporting requirements for the last stage of the meaningful use regulations. Based on this line of thinking, a third proposition is posited:

Proposition 3

Social and economic forces may further amplify or dampen the impacts of political forces to the project team. (a) The impacts of political forces may be dampened by perceived positive (benevolent) social and economic forces. (b) On the other hand, the negative impacts of political forces may be further amplified by perceived negative (malevolent) social and economic forces different from those which initially induced the impacting political forces.

Further, across all cases, there is evidence to suggest that a persistent cultural fear and resistance to IT (social force) and perceived low cost-benefit of IT (economic force) among key project stakeholders may impact the ability of IT project teams to reach an optimal consensus that satisfy the stakeholders. For example, the key stakeholders' highly

restrictive attitude to adopt a more contemporary yet efficient technological solution in case 1 has been the persistent cause of conflicts and struggles in the team. For case 2, the key stakeholders' less-than-sufficient familiarity and knowledge with technology induce a persistent fear of IT, which has been one of the major causes of struggles in the team as pushbacks to own the compliance reporting aspect of the healthcare IS project by the hospital's operations department persist. Likewise, the physicians' perceived low cost-benefit of the technology and their existing partnership agreement with the hospital (rather than an employment arrangement), preclude the project team to mandate the use of the functionalities of the system among the physicians, thereby insufficiently generating compliance data supporting MU regulations. For case 3, certain client stakeholder representatives not necessarily familiar with technology but put in a decision-making role perturb the project teams' ability to work more efficiently in accomplishing day-to-day tasks towards project completion. Because collective rationality is realized based on a team's decision to achieve a collective good, poorly defining a collective good perturbs the collective rationality of the team, which puts the team at risk of collapse. Based on this, another proposition is posited:

Proposition 4

A key decision maker's negative cultural perception and negatively held economic value against an information technology in ISD projects may likely induce political forces that preclude the ability of project teams to clearly define a collective good. A poorly defined collective good destabilizes a project team's collective rationality that risks the dissolution of the project team.

Invisible hand impacts to ISD methodology. In regards to ISD methodology, political forces have less to do with the impacts to ISD methodology, but have more to do with the social forces and the economic forces that play in the project environment. In

particular, across all cases, the resulting methodologies – in terms of methodology core concept, methodology guideline, methodology steps, and methodology techniques – were altered or adjusted based on the social and economic characteristics of the environment. In other words, the methodologies are resulting management "tools" which project teams could use that accommodate or fit the characteristics of the social and economic forces in the project environment. For example, case 1 highlights an overarching waterfall-like methodology whose characteristics were altered negatively by perceived negative social and economic forces: (1) engaged more qualified technically-skilled resources late in the project timeline, (2) technical requirements supposedly identified and refined earlier during the initiation of the project were rather done so close to the build stage, (3) key technical requirements were misunderstood late due to lack of technically skilled project resources at the early stages of the project, and (4) miscalculated resource hour allocations. All such impacts to the development methodology were due to late engagement of technically skilled project resources (negative social force), seriously misunderstood scope of work and grossly inadequate budget (negative economic forces). The resulting methodology followed by the project team of case 1 were contributory to the negative impacts experienced by the project team. The resulting methodology for case 2 is a combination of both negative and positive characteristics. The characteristics that have negative impacts to the team includes (1) a followed plan that is dependent on mandates of the key stakeholder that could be released anytime during project execution and (2) a lack of systematized structural framework for processing knowledge and (3) a high reliance of the project team to very limited knowledge and subject-matter experts to support the project. The resulting methodology of case 3 is one that is perceived to have worked with the team

most optimally, which has allowed team to endure all challenges and evolve to work better for each other over the course of the project. For example, while the team generally followed an overarching waterfall-type model, the client defined very specific deliverables that was tied to billing, and therefore, framed and scoped tangible expectations in the project plan. Another adjustment to the process was the adoption of outsourcing and subcontractor management strategies that optimized productivity of staff and resources. Consequently, knowledge obtained from dedicated knowledge and subject-matter experts were optimally processed with available tools for tracking the status and progress, and which hasten the learning curve of the team. It would appear therefore that the perceived positive or negative social and economic forces in the environment may induce adjustments to the ISD methodology that may be positively or negatively perceived by project teams. This line of thinking leads to suggest another proposition:

Proposition 5

Social and economic forces determine the adjustments to the ISD methodology that is followed by project teams. (a) Perceived negative social and economic forces are positively related to the perceived negative impacts to the ISD methodology. (b) On the other hand, perceived positive social and economic forces are positively related to the perceived positive impacts to the ISD methodology.

Ancillary impacts of the ISD methodology. Further, there is evidence to suggest that the resulting ISD methodology has direct impacts to the political environment of the project team as well. For example, the lead developer of case 1 strongly perceived several problems to the adjusted project processes the team is otherwise normally accustomed to using such as restrictions in toolsets, disapproved development strategies that could have made the website more dynamic and efficient, and technical requirements which were unaccounted in the project scope. Such misaligned expectations unsurprisingly

exacerbated the conflicts that arose between the major stakeholders (i.e., the client group and WebCo), as well as struggles that arose by insisting demands stipulated in the signed contract, however unreasonable. For case 2, technical representative felt a lack of a systematized structure and knowledge management tools of the resulting ISD methodology for more effective and efficient processing of knowledge to accommodate the loss of personnel who could have been tapped as knowledge- and subject-matter experts for the healthcare IT project. This perceived negative ISD methodology characteristic exacerbated the "anti-technology culture" looming among physicians and hospital operations directors. For case 3 positive impacts to the political environment were obtained due to perceived strategies adopted into the ISD process. For example, by padding buffers to timeline and adopting resource reallocation strategies, the project team was able to alleviate struggles brought forth by unforeseen problems and challenges encountered in the project. By this, a sixth proposition is suggested:

Proposition 6

Adjustments to the ISD methodology directly impact the political forces in the project environment. (a) Perceived positive adjustments to the ISD methodology is negatively related the political forces in the project environment. (b) On the other hand, perceived negative adjustments to the ISD methodology is positively related the political forces that negatively impact project teams.

Yet, the resulting ISD methodology also show direct impacts to the project team itself. There are evidences to suggest that perceived negative impacts to the ISD methodology impair project team dynamics. Case 1 illustrates this scenario when impacts to the methodology techniques and methodology guidelines restricted the development team to come up with better technology solutions that amplified stress levels, increased scope of work beyond the allocated project budget, and increased staff movements and

transitions. Adjustments made to case 2's methodology concepts, which reacted to changing mandates of the major stakeholder, as well as methodology steps, which lacked a systematized and structured framework for processing knowledge, impact project teams to occasionally to readjust planned efforts that increased rework and loss key of knowledge experts for the project.

In case 3's successful project, however, positive impacts to the ISD methodology contributed positive impacts to the project team. For example, because of adjustments to the methodology guidelines, such as the adoption of outsourcing and contractor management strategies and padding of sufficient buffers to timeline and budget, the project team was able to mobilize subcontractors and work on encountered unforeseen project challenges more effectively. As such, a reverse situation to cases 1 and 2 is possible in that the perceived positive impacts to the ISD methodology positively impact project teams as well. These scenarios lead to suggest another proposition:

Proposition 7

(a) Adjustments to the ISD methodology used by project teams directly impact project teams in that the perceived positive adjustments to the ISD methodology positively impact project teams. (b) On the other hand, perceived negative adjustments to the ISD methodology negatively impact project teams.

Impacts to collective rationality and team cohesion. Extending the above-mentioned propositions in a CAT perspective, the positive or negative impacts experienced by project teams are what challenge the collective rationality of a project team to either further continue or discontinue working together. The reason is that collective rationality is a result of a "processing of reasons" done through the team's collective agency. In a public discourse, it is the collective agency of a project team that rationally considers the

reasons that may influence the project members' (unanimous) decision for acting as one body. These reasons include the social, economic, and political forces in the project environment, as well as the ISD methodology, followed by the project team. Therefore, depending on the impacts of organizational forces – social, economic, political—and ISD methodology to a project team, the collective agency of a project team may experience a further strengthening or weakening of the collective rationality to work together while trying to remain intact and stable towards attaining the project goals. These situations lead to the following proposition:

Proposition 8

Through collective agency, a project team may experience a strengthening or weakening of its collective rationality by considering the impacts of the social, economic, and political forces, as well as the ISD methodology, to the project team. The perceived positive or negative impacts to the project team is positively related to the likelihood of strengthening or weakening the collective rationality of the project team to work together towards the attainment of collective goals of the project.

Furthermore, because a project team's collective agency upholds the team's joint commitment and we-intentions, impacts to the collective rationality to continue working together also impact the team's joint commitment and formulated intentions to achieving the goals of the project. As such, the weakening of a team's collective rationality weakens the team's joint commitment and weakens the resolve to fulfill the group's intentions to finish the project. For example, case 1 reported only perceived negative impacts experienced by the project team, which, by Proposition 8, significantly deteriorated the team's collective rationality. From a collective agency's perspective, the team's commitment and intentions to furthering the attainment of project goals discontinued when the team agreed to stop the project and relinquish their current and future relationships.

For case 2, although the project team is still intact because of a recent "successful" technology implementation, the team perceives many negative impacts, which by Proposition 8, translate to a considerable weakening of the team's collective rationality. From a collective agency's perspective, expressing a lingering concern of failure to meet the requirements of the project's last stage appears to suggest threats to the team's joint commitment and collective intentions to attain their project goals. These threats showed foreboding signs through the team's recent loss of key knowledge experts and fluctuating commitment of key project stakeholders from owning appropriate aspects of the project. Case 3, in contrast, illustrates a situation of an increased strengthening of the team's commitment and intentions when, by Proposition 8, the team's collective rationality was further strengthened. In particular, case 3 only showcased perceived positive impacts experienced by the project team regardless of political forces that emerged in the project. From a collective agency's perspective, the team's commitment and intentions to furthering the attainment of project goals appears to have been reinforced when the team worked continually through uncertainties and resolved conflicts that eventually ended in the successful attainment of project goals. These situations, therefore, lead to another proposition:

Proposition 9

Through collective agency, a project team's joint commitment and collective intentions are positively related to the relative strength of collective rationality of the team to continue working together towards the attainment of goals of the project.

This study also shows evidence of the direct linkage between collective rationality of project teams and team cohesion. Across all cases, the collective rationality of project teams at a given time, which is a result of the impacts of organizational forces and use of

an ISD methodology, ultimately define the strength of cohesion felt within the project teams. Consistent to the definition of team cohesion being used in this study, evidence of team cohesion found across the cases are in terms of strength of ties between social bonds of members (social cohesion) as well as between the tasks fulfilled as perceived by one member to another (task cohesion). For example, in case 1, the overall team cohesion is obviously "weak" that eventually led to the project team's collapsed and the web development project shut off. From a collective rationality perspective, the increasing negative impacts of the organizational forces, particularly due to unresolved conflicts in the political environment, gradually weakened joint commitment as key members of the project team transitioned and gradually disengaged membership from the project. Both cohesion dimensions were found to have weaken over time such as when separation of client from the rest of the team persisted (weakened social cohesion) and delivery of functionalities contrary to client expectations pervaded (weakened task cohesion). Team cohesion in the second case may be characterized as "weakening" due to loss of key knowledge experts and subject-matter-experts from the project team, as well as fluctuating commitment to attend meetings by other team members. While a marked collapse of the project team has not yet been realized, a looming concern for an increased uncertainty to complying with the requirements of the project in the last regulatory stage is perceived unless ownership of appropriate pieces of the project is accepted by appropriate members of the project. In particular, proper ownership of the project includes the IT-use piece by the physicians and reporting piece by the operations group of the hospital as part of an 'everybody' project and not merely an IT-group project. Because pushbacks on task ownerships linger (weak task cohesion), even though social ties between members of the

project team are perceived to be unaltered (fairly maintained social ties), the overall team cohesion is, therefore, deemed to be weakening. The third case showcases a "strong" team cohesion in both social and task dimensions in that relationships among the client and contractors continued even beyond the successful launch of the project. Permeation of a family-oriented mindset, where every voice is heard and raised issues resolved, lingered throughout the project team (a strong social cohesion). Likewise, the highly collaborative and conflict resolution culture of everyone in the team allowed for resolution of issues and problems dealt along the way (a strong task cohesion). By virtue of Proposition 9, these chains of evidence lead to suggest the following proposition:

Proposition 10

The strength of collective rationality of a project team is positively related to project team cohesion. As such, a project team's joint commitment and collective intentions are positively related to project team cohesion.

Chapter Summary

Supported by chains of evidence found in the data, this chapter presented the study's case findings in two major sections: a more granular description of findings for each case (within-case analysis), as well as a higher-level description of findings across the cases (cross-case analysis). The within-case analysis section details specific social, economic and organizational forces that impact the choice of ISD methodology and overall project team behaviors, as well as the description of the resulting team cohesion present in each project team case. The cross-case analysis showcases theoretical propositions applicable to all the cases of the study. In the next chapter, chapter six, discussions are shared as to how the theoretical findings of this research impact the current state-of-the art of IS project management and the communities of research and practice in the IS field.

CHAPTER SIX

Discussion and Implications of Results

> *Everyone has a theory of human nature. Everyone has to anticipate the behavior of others, and that means we will need theories about what makes people tick.*
> *Steven Pinker*

This chapter is partitioned into three sections: discussion section, implications to practice section, and implications to research section. The discussion section synthesizes and relates the empirical results and propositions found in the previous chapter with the current literature. In cases where there is no support or where there is contradiction against literature, the implications to practice and implications to research sections of this chapter show how the results of the study fills the existing gaps.

Discussion

The primary objective of this research is to examine the impacts of organizational forces particularly, the social, economic and political forces, as well as the consequential impacts of an implemented ISD methodology on the collective action of ISD project teams. In particular, this research develops a process model that explains the interplay of these forces in the project environment and how the forces impact the collective rationality and cohesion of project teams. The research model also explains the impacts of the social and economic forces to the ISD methodology, and the consequential impact of the adjusted ISD methodology to the project team. Chains of evidence that link back to the process model are found from three case studies. As such, from a collective action perspective, the empirical results elucidate a partitioning of the process model according to the following

dominant phases that are named in this study, as follows: (1) *confluence*, (2) *bombardment*, and (3) *endurance.* The confluence phase describes the emergence and interplay of invisible hands that impact project teams and adjustments to the ISD methodology. The bombardment phase describes the negative impacts experienced by ISD project teams from negatively perceived invisible hand forces—social, economic and political—as well as from the ancillary impacts of an adjusted ISD methodology. The endurance phase refers to processes and emergent states of the collective rationality and cohesion of ISD project teams following bombardment.

Confluence

This study showcases the confluence of the social, economic and political forces in the project environment that largely affects ISD project teams. While social and economic forces initially define the collective rationality of project teams, political forces adversely impact and potentially reshape the collective rationality of project teams. Likewise, literature in project and organizational management elucidates the existence of politics and the importance of understanding politics and its aberrant outcomes if neglected and mismanaged (Pinto 2000; Porter et al. 2003). For example, Sabherwal and Grover (2010) present a taxonomy of political processes associated to ISD projects purposed to gaining project control and advancement of self-interests. The current study extends the literature by presenting the social and economic components of political forces that directly impact ISD project teams. However, contrary to following a *dialectic approach*, which assumes a pluralistic world of "colliding forces" emerging without a prescribed order, the political forces in the current study are viewed from a *developmental or life-cycle approach* (Van de Ven and Poole 1995, p. 517). In a life-cycle approach, the political forces in this study

are viewed to develop from negatively perceived social and economic forces in the project environment. One negative social force that is perceived to linger in ISD projects is the "fear of IT". While our contemporary society is better informed about the advantages of IT, the lingering fear that IT may cause an individual's loss of power and reorganization of his or her work persist especially among healthcare professionals, which bring about resistance and intensifying conflicting views about technological solutions (Bhattacherjee and Hikmet 2007). Furthermore, while lessons learned from past development efforts have enabled organizations to provide better estimates for funding ISD projects (Wade and Hulland 2004), the lack of technically skilled personnel who could share knowledge and manage IT-related resources is a perceived negative economic force that could worsen the fear of IT and IT resistance among non-IT-based organizational entities (Lapointe and Rivard 2005). Thus, as an extension to ISD project contexts, seemingly benign social and economic forces in the project environment may be leveraged by an individual against another, oftentimes abetting conflicts, to advance individual self-interests (Grover et al. 1988).

Furthermore, the confluence of social and economic forces in the project environment triggers alterations in the ISD methodology. In particular, perceived positive or negative social and economic forces in the environment may induce adjustments to the ISD methodology that may be positively or negatively impact project teams. This perception is consistent to Cao et al.'s (2009) findings in an agile setting in that the adaptation of agile is affected by the structure of organizations, projects and methods. For example, the current study is consistent in terms of the impacting social forces that are accepted by the project team at face value, such as the project team's accommodation of

different types of stakeholders, as well as the stakeholders' varied cultural inclinations toward IT. Another example is concerned with the impacting economic forces, also accepted at face value, such as the project team's coming-to-terms with specific funding allocations based on a pre-conceived notion of gaining positive returns after the successful delivery of the project. The current study, however, suggests a conceptual approach, which expands the adaptation processes of potentially all types of ISD methodologies resulting from the impacts of social and economic forces.

Adjustments to an ISD methodology, therefore, result to accommodate or fit the characteristics of the social and economic forces present in the environment. In ISD project contexts, *fitness* (Gill and Hevner 2013) is an attribute of the relationship between the ISD methodology and the project team, which allows a team to endure challenges and evolve to work better for each other over the course of the project. Perceived negative impacts to the ISD methodology bring about restrictions in the development process that narrow down opportunities for project teams to device creative workarounds and alternate solutions, thereby resulting to a less-fitting methodology for ISD project teams. The resulting ISD methodology of case 1 was found to constrict the developers' ability to satisfy seemingly perceived unreasonable client demands and requirements because of the negative (restricting) social (i.e.,) and economic forces (i.e.,) in the environment. In contrast, the more flexible project methodologies perceived by project team 3 enable the team to comply with the expected project requirements, thus, affording them some wiggle room for mistakes brought by unforeseen challenges in the project. The resulting ISD methodology of case 3 was found to fit very well with the project team because of optimally empowering social and economic forces acting for the benefit of the project team.

The empirical evidence of this study also suggests ancillary impacts of the adjusted ISD methodology to the political environment surrounding the project team. This is especially true because literature explains that ISD processes, however explained by rational motives, impact political rituals to control vested motives of various from parties involved in the project (Cram and Brohman 2013; Sabherwal and Grover 2010) and as some 'social defense' to operate against daunting political challenges (Wastell 1996). Depending on the perceived fit of the methodology by the project team, therefore, an ISD methodology may alleviate or exacerbate political conflicts in the project environment.

Bombardment

Whereas the confluence phase explains the emergence of political forces and impacts to the ISD methodology, the bombardment phase exposes the negative consequential impacts of political forces and of the adjusted ISD methodology that ISD project teams are likely prone to detect and endure. Yet, a project participant's points-of-view about an aspect or aspects of the project may then be altered according to the perception of the project participant. From a CAT perspective, such perceptions feed an individual's self-interests, which may or may not align with the collective's rationality, consequently asserting a collective forging of a new decision or enforce the maintenance of an already established decision towards the attainment of a collective good at the project team level.

The resulting ISD methodologies in this study have direct impacts to the project teams. This is consistent to Ferris et al.'s (1989) explanation that team processes, such as those generated by ISD methodologies, play a pivotal role on the performance of teams. Propositions 5, 6 and 7 expound on this assertion based on whether the social and economic

forces bounding the ISD methodology are perceived to be negative or positive by the project teams. The perceived negative and positive impacts to the ISD methodology have consequential negative and positive impacts to the project teams, accordingly, as well.

Political forces are strongly felt because they induce tensions among project members in the form of friction, conflicts and struggles among members as the project team attempts to further the attainment of project goals. Yet, literature in organizational politics acknowledges that the innate qualities of political forces that may be perceived to be either positive, if the intent of emerging political forces is aimed at pulling team members together, or negative, if the intent is perceived to create divisions or focused on gaining personal advantages of one member at the expense of others (Ferris et al. 1989). Contrary to this perception, however, the political forces in this study are perceived only to induce conflicts, push backs and struggles that negatively impact project teams such that the magnitude of impacts may either be amplified or dampened by certain social and economic forces in the project environment. The current study is supported by the contrasting outcomes of cases 1 and 3, that is, by the perceived negative and positive impacts to ISD project teams, respectively.

Furthermore, propositions 8 and 9 of this study suggest that, at the group level, political situations challenge the collective rationality of a project team through the team's collective agency. While the collective rationality of a team may be reinforced through some virtuous cycle of revitalization of the team's joint commitment, collective intention, and collective agency[10], negative impacts may weaken collective rationality through an attack on the team's collective agency. Further weakening of joint commitment and

[10] For more information on the virtuous cycle, see discussion of collective rationality in chapter two.

collective intention may follow consequent to a weakened collective agency through some vicious cycle depicted in Figure 6.1.

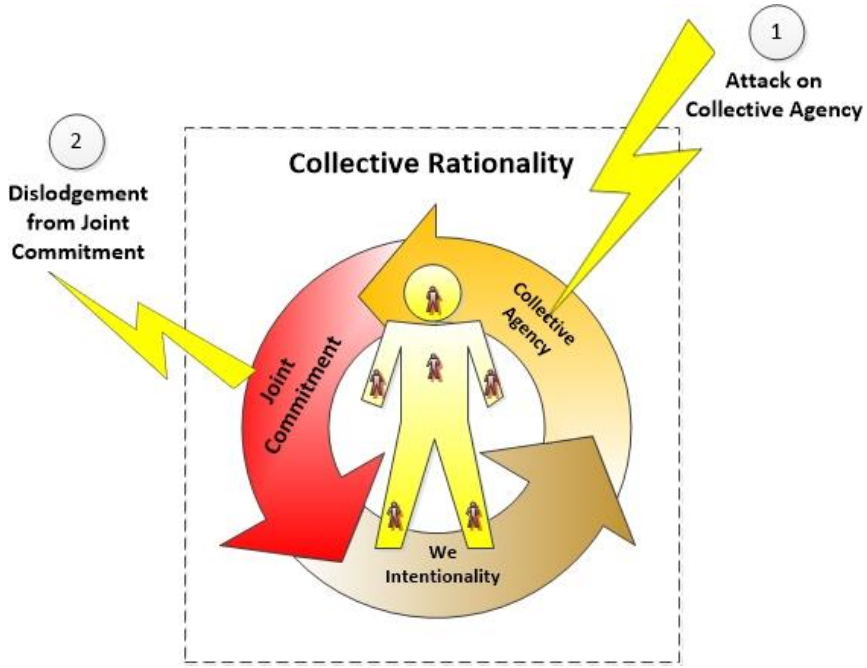


Figure 6.1 Vicious Cycle of Collective Rationality

A logical synthesis of empirical evidence supporting propositions 8 and 9, and a priori findings in the literature appears to suggest a more detailed underlying mechanism that challenges the collective rationality of project teams and that brings about free-riding. In particular, an attack to the collective rationality may begin by challenging the held beliefs of the collective agency through some confluence of social, economic, and political forces, and adjustments to the ISD methodology via some discourse and exchange of opinions. Depending on the type and magnitude of resulting impacts, the challenges that bombard a collective agency may possibly penetrate towards, and alter, the individual members' beliefs. This mechanism is also supported by an assertion in literature in that political situations may inflict a change in opinion of one or more persons, which may

consequently inflict a change to one or more individuals' prior perception of the total benefits that the individual could obtain through collective action (Zey 1997). Free-riding transpires when an individual pushes back from fulfilling his or her tasks without the individual's actual disengagement from the collective (Olson 1977). Literature likewise asserts that free-riding may transpire when the perceived cost of action to obtain a collective good could be realized at the expense of the rest of the group for the free-rider (Finkel et al. 1989). Therefore, even though joint commitment may not be canceled unless everyone in the team has agreed to cancel joint commitment (see chapter two), the presence of free-riding is a likely manifestation of a weakened joint commitment. Subsequently, weakened joint commitment promotes the likely dislodgment of individuals from the project team. Expressed sentiments about the fluctuating commitment to own appropriate aspects of the project in case 2 and the actual dislodgement of membership from the teams in cases 1 and 2 are some evidences that support this underlying mechanism.

In addition, because members of project teams are interdependent to one another, an individual who exhibits free-riding-like behaviors potentially weaken a previously established trust (Ashleigh and Prichard 2012; White and Leifer 1986) to that individual and causes disappointments, frustrations, and tensions among team members. It disrupts or shakes everyone's uniform perception of a preconceived "collective intention", and consequently, the individual members' perception of their group's capacity to act as "one body" (collective agency) into a into a self-reinforcing cycle of distrust (Keil et al. 2014). Thus, a new decision may be forged collectively through some individual decisions and actions (Zey 1997). When decisions of individuals seated at positions of power or authority are altered, such decisions are felt throughout the entire collective depending on the extent

of influence of that decision-maker. These situations are what describe the events that happened in case 1 that resulted to the dislodgement of some project team members.

An underlying mechanism that potentially explains the occurrence of dislodgement in case 1 is depicted in Figure 6.2. When an individual's commitment to the collective weakens, or is completely dislodged, a "hole"—a set of abandoned tasks left by the free-riding and dislodged member—ensues and destabilizes the team's collective rationality when the free-riding and dislodgement is experienced by the team. The size of the hole depends on the volume of tasks and responsibilities left unfulfilled by the free-rider or dislodged team member. Therefore, from a collective agent's perspective, the capacity to align individual interests (i.e., collective rationality) has been corrupted. Patching hole is possible and may be done in some ways, for example, by rolling into the project team qualified external individuals, by allowing one or more internal members of the current team to absorb the hole, or through a combination of both. A caveat to such strategy, however, is that project risk escalates as the external replacement is engaged later along the project timeline. Likewise, project risk escalates when the size of the hole is large enough in that the replacing team member's learning curve needed to get up to speed with the project is longer than what is needed for the project. Furthermore, remaining members of the project team may step up from their current roles to fill that hole but risks overloading their tasks, which may eventually strain team member performance. These situations were described the events in case 1 when the original WebCo project manager left the team and was replaced by a new project manager more than halfway through the project. Therefore, when a team member free-rides or is dislodged, adjustments and new expectations within the modified project team are made to re-fit and re-stabilize the team, consequently forging

a new (or readjusted) collective rationality for the team. Such adjustments and re-adjustments constantly occur until the team's target idea of collective rationality has been achieved.

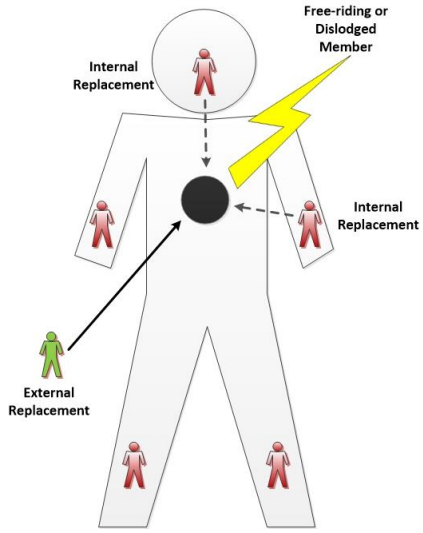


Figure 6.2 Filling a "Hole" in a Collective Agent

Endurance

Consistent to the assumption that project teams are driven to delivery their projects successfully, this study explicates the endurance of project teams to further the attainment of collective goals despite the bombardment of political forces and negative impacts on the ISD methodology. Because team processes are central to team performance (Ferris et al. 1989), team processes impose consequential intervening impacts to team cohesion (Beal et al. 2003; Chiocchio and Essiembre 2009; Evans and Dion 2012). This also follows that team cohesion is likely affected by the political skill of team members, or by the extent to which team members exert political behaviors. As such, together with the empirical evidence of this study, the endurance of a project team against bombarding forces (of

politics and perceived negative impacts to ISD methodology) may be explained through a direct linkage between collective rationality and team cohesion.

Proposition 10 explains how the strength of team cohesion of project teams is dependent on the relative strength of the team's collective rationality. As such, the virtuous and vicious cycles of collective rationality (Figure 2.3 and Figure 6.1, respectively), explain how cohesion is further strengthened or weakened. It would appear, therefore, that the collective agency of the team upholds the strength of the cohesion through the relative strength of the project team's joint commitment and collective intention. It also follows that the free-riding and dislodgement occurrences among project teams directly impact team cohesion. This assertion is consistent with Tang's (2008) findings in that groups that are highly cohesive manifest a strong collective action. Furthermore, when a project member is dislodged, team cohesion is weakened as there are less bonding relationships that reinforce the ties within a team. Team members with bigger roles in the project may be perceived to be carrying more significant bonds that define the strength of cohesion with the other members of the team. Such is analogous to the *centrality* concept in social network analysis in that the more central members of a social network have higher degree of connectivity and influence in the group in which they belong (Yang and Tang 2004). It could be inferred, therefore, that failing projects potentially give rise to tensions within project teams that eventually result to burning bridges or partnerships between organizations and their constituents. In this case, cohesion of project teams could be inferred to be weak indeed, regardless of the specifics that triggered the discontinuance of the partnership.

In summary, a potential consequence of free-riding and dislodgement is a weakened joint commitment. Weakening the joint commitment consequently results to a weakened collective intention, which is a factor that may further weaken collective agency. Because collective agency assumes that all its parts are working toward a common goal, a weakened collective rationality eventually weakens team cohesion.

The resulting process model shown in Figure 6.3 summarizes how invisible hands across the three organizational environments (social, economic and political) and the adjusted ISD methodology impact the collective action of IS project teams and team cohesion. The figure also indicates the phases that ISD project teams undergo and the propositions that are associated to a specific portion of the process model.

Implications to Research

This research extends our current knowledge in several research streams, mainly: IS project management, team cohesion, and collective action theory. First, this study contributes to the IS project management literature by focusing our attention on the confluence of the social, economic and political forces that impact the dynamics of project teams. Prior literature in IS project management affords us to understand how political process emerge (Sabherwal and Grover 2010), how control in IS projects may be exerted (Wiener et al. 2016), or how certain forces relate to another (e.g. social→economic or social→ political) in a limited view. This research extends related research streams through a more holistic understanding of the relationships among the social, economic and political forces in the environment by showcasing how seemingly benign social and economic forces in the environment become instrumental to inducing political forces and sources of conflict in project teams.

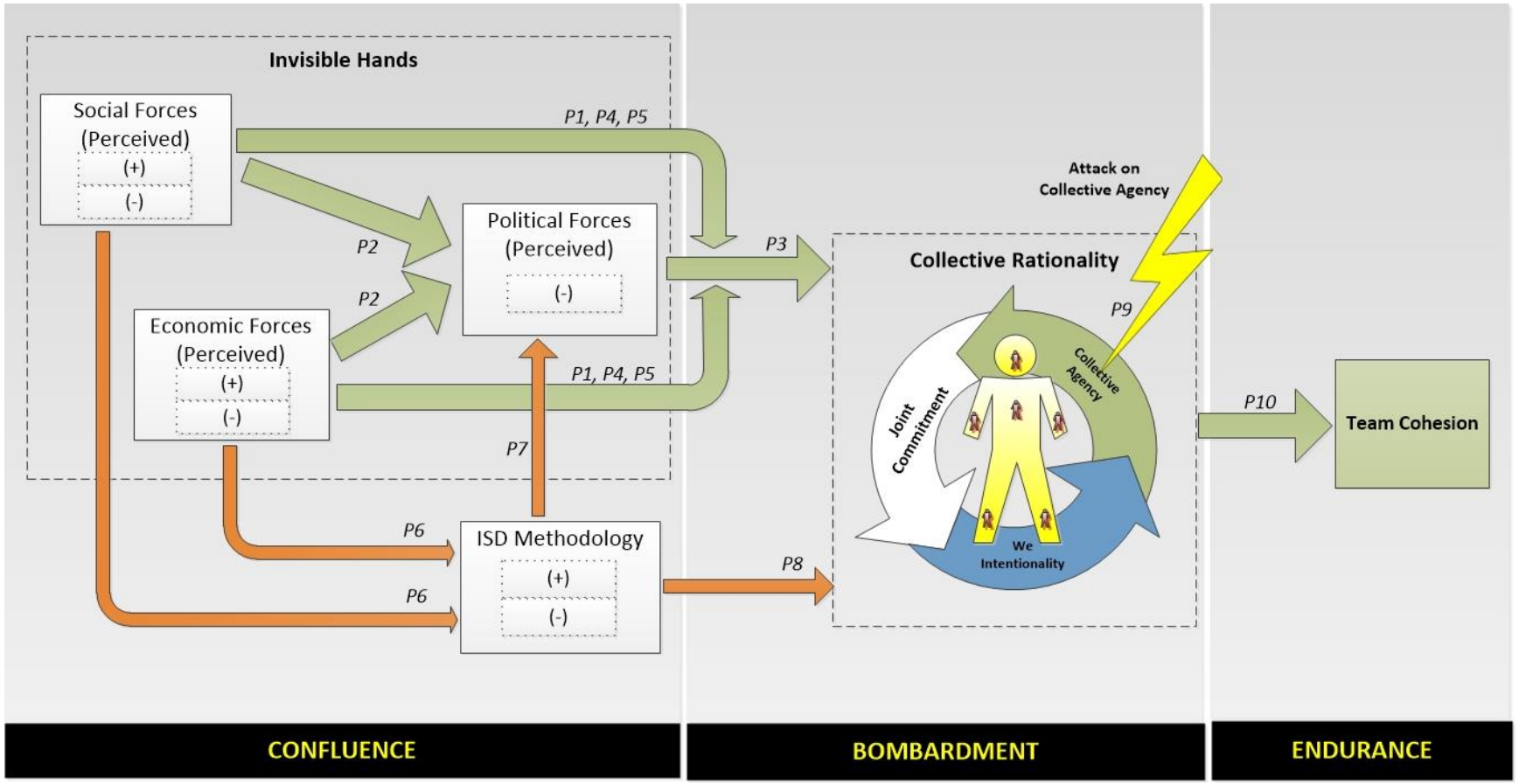


Figure 6.3 A Process Model Showing the Impacts of Invisible Hands and ISD Methodology on the Collective Action of ISD Project Teams

Second, this study offers a better understanding of the impacts of social and economic forces to tailoring ISD methodologies that influence behavior of project teams in more contemporary settings. It draws attention to how ISD methodologies influence (i.e., regulates or exacerbates) in terms of political conflicts and self-interested political agenda (Ferris et al. 1989; Sabherwal and Grover 2010). Along the same line, our understanding of how political processes emerge from stakeholder influences may be enriched. This study provides additional corroboration on the positive and negative outcomes brought by top management and stakeholder support (Boonstra et al. 2008; Doll 1985). For example, the presence of top management highly involved in projects are influential to the success of the projects. In contrast, stakeholder involvement with conflicting agenda to the project may largely impede projects from successful completion.

This study focuses on the perceptions of ISD project teams, which are vital to understanding the importance of a team's resolve to remain cohesive and how that resolve is forged (or lacked) to become a strong factor towards the successful (or failed) completion of ISD projects. Prior research explains the advantages and disadvantages of certain project practices perceived through individual members of the team, but not necessarily through a consensus perception of the entire team.

Furthermore, literature on cohesion has been extensive in other social and behavioral sciences, but not in IS project management. Chiocchio and Essiembre (2009) explain that project team cohesion is highly important to understand because, unlike other team configurations, project teams are effective in responding to increasing competitiveness and complexity in globalized markets. This research extends the literature

on cohesion in IS project management contexts, which may further be extended to understand the linkage between project team cohesion-performance.

This study potentially contributes to the CAT literature by focusing on the collapsed "black box" of collective rationality. The bombardment phase of the process model in this study may help extend understanding of how malevolent invisible hands potentially bombard and then impede groups from attaining the collective good. To date, collective action theory is applied in government (Ostrom 2014), organizational (Bimber et al. 2012), and mass settings (Maxwell and Oliver 1993), as well as in national levels (Sandler 1992b; Tang 2008). Team level application of CAT is sparse; this study aims to contribute to such unit of application.

Using CAT, this study finds strong linkages of collective rationality to team cohesion. As such, a better understanding of `the formation of cohesion may be developed through a better understanding of the processes involved in collective rationality. Along the same lines, understanding of collective rationality and its components (collective agency, joint commitment, collective intention) leads to our understanding of team cohesion and endurance of teams to bombardment of malevolent invisible hands. Additionally, researchers could develop and test hypotheses relating to bombardment and endurance phases of the process model in this study not only in IS project contexts but in many other social and behavioral contexts.

Implications to Practice

From a practical perspective, the findings in this study may offer insights that can be leveraged by project managers, ISD project members, and stakeholders to mitigate the

risks and challenges to ISD projects as these individuals seek to deliver their projects successfully.

First, this study highlights the importance of an ISD project team's negative perceptions about the social and economic environments that may induce negative impacts to the political environment as well as to the ISD methodology as bounded by the social and economic forces. Project managers may use the confluence phase of process model to find similar patterns of social and economic forces that could potentially induce political forces detrimental to efficient project activities and healthy project team interactions. Similarly, gaining a more holistic understanding of the confluence of forces that impact project teams could potentially help generally any project member to identify deeply underlying root-causes of conflicts and tensions for improving risk management strategies.

In addition, developers and analysts may also leverage the confluence phase of the model to better understand potential impacts to an ISD methodology based on the social and economic make up of their organizations. By gaining a better understanding of potential negative impacts to an ISD methodology, project team members may mitigate risks of developing certain political situations that impede project teams from efficiently performing their project tasks. Doing so, project members may be more attuned to becoming more politically sensitive (Sabherwal and Grover 2010) based on a better understanding of the social and economic makeup of the project environment, which could ironically be disguised as seemingly benign environmental forces.

Project members may likewise better understand how a culture of being "technologically inflexible" among stakeholders may aggravate political situations that could potentially collapse project teams. Gaining a better understanding of the impacts of

such a culture may allow project members, especially, the more technically inclined to think of creative ways to explain and highlight the value of the IS that will replace certain established processes such as those in healthcare and other non-core-IT dependent organizations.

Perceived from the top of the organizational hierarchy, the bombardment and endurance phases of the process model could provide better insights for project stakeholders, top management and decision makers on the challenges that politicking impose upon ISD project teams. Although politics and conflicts may be perceived to occasionally cultivate opportunities for growth and creativity (Barki and Hartwick 1994), project stakeholders should also be more sensitive to the heavy toll that conflicts impose upon the collective rationality of project teams. Such tolls may consequently disarray the team's cohesive mindset from efficiently, or even merely effectively, completing desired project tasks. In educational settings, through an understanding of the process model, students learning IS project management may learn to become more politically sensitive to the technical aspects of systems development (e.g. requirements gathering entails better communication skills leveraging information about users and project stakeholders) and managing projects (e.g. request for additional project funding from board members of project approvers).

In general, the process model of this research implies that individuals participating in projects, regardless of role, should be more politically sensitive to the negative impacts of political forces. Depending on their roles, project members may leverage distinct processes in the confluence, bombardment, and endurance phases of the process model. These phases allow a compartmentalization of understanding the consequential impacts of

perceived negative forces detrimental to project team dynamics. As such, IS practitioners who are interested in understanding the consequential impacts to the ISD methodology and ISD project teams will benefit from taking into account the interplay of forces in the project environment.

Consequently, this study may enable organizations and teams to understand what factors drive ISD practices to be modified, customized, or combined, and how these practices may be better implemented for successful project delivery. More specifically, this study aims to contribute to practice by helping teams incorporate effective team attributes that will enhance a project team's coordination capabilities through the suggested process models that emerge in this study.

Chapter Summary

This discussion and implications to results of this chapter presented how the theoretical findings of this research impact the current state-of-the art of IS project management and the communities of practice and research of the IS field. The discussion relates the results in terms of what corroborates and contradicts with the existing literature in the field. In cases where there is no support or contradiction against the literature, this chapter discussed how the results of the study potentially fills the identified gaps. The last chapter, chapter seven, concludes the dissertation by sharing the limitations of the study, future research direction as well as pertinent study contributions to the IS field.

CHAPTER SEVEN

Conclusion

> *Coming together is a beginning; keeping together is progress; working together is success.*
>
> *Henry Ford*

This concluding chapter describes the limitations of the study, future research directions and contributions. Like any research endeavor, this research identified the study's limitations as a step towards identifying future directions to validate the study's theoretical findings. This study closes this dissertation by showcasing the contributions that may further enrich the IS body of knowledge, and particularly, our understanding of the practices of IS project management.

Limitations of the Study

This study employs a qualitative multiple case study research design to explore how a chosen systems development methodology, as well as the organizational forces in the project environment, impacts the collective rationality of ISD project teams. Being qualitative and exploratory in nature, the main goal of the study is to generate highly descriptive scenarios that explicate behavior-related phenomena of project teams concealed within the rich experiences of the project teams. Like any research endeavor, however, this study recognizes a number of limitations in terms of (1) the applicability of the findings and developed propositions both to practice and research, (2) the methodological approach employed in gathering data that support the findings, (3) the researcher's ability to access more data over a limited period of time, which is limited

through the target study participants' willingness to participate in the study and disclose information, and (4) the personal biases infused by the researcher on the interpretation of findings based on similar experiences of situations encountered from the data.

First, while there are corroborating evidences from other data obtained for the study (such as documents shared by study participants and researcher observation), it is important to note that the analysis is mainly based on the testimonials obtained through observations, perspectives and best recall of project team members who were interviewed for the study. Therefore, the level of truth being asserted in this study is that which is according to the "perceptions" of the team. Testing whether this these attestations are applicable to other similar situations is a research objective anticipated for in future research endeavors. As such, this study encourages the further testing of the propositions through identification of appropriate measuring instruments and application of other research techniques, for example, for quantitative research methods.

Second, theoretical contributions generated from case studies is at risk of being viewed as narrow and idiosyncratic (Eisenhardt 1989). As such, even though the assertions are generalizable to theory (Lee and Baskerville 2003), being a multiple case study, the propositions are not generalizable to a population, which is considered a limitation of this study. Generalizing to theory is congruent to Yin's (2013) analytical generalization in conducting case studies, where the validity of the findings remain only within the cases studied (Lee 1989). Therefore, whether these propositions are applicable to other ISD project teams and for project teams in other fields and contextual situations, are yet additional opportunities for further scrutiny, testing and validation.

Third, access to more data that could support the findings in this study is limited to the participants' willingness to share and disclose information, whether through documents, written reports, interviews or other archival data. Further, many of the information shared are highly classified in order to protect the interests of the project participants. As such, there is a risk posed to the generalizability of the findings, which, therefore require further scrutiny and validation through future research efforts with other ISD project teams.

Lastly, all research endeavors are wrought with contamination from researcher biases however rigorous the research methods are conducted. This study recognizes that the rich experiences of the researcher of this study as an IT practitioner and project manager may have been potentially enfolded in the analysis and interpretation of results. Such experiences are considered double-edged in that the prior practitioner experiences may have aided in the accurate capture and interpretation of interview data, but may also have overlooked more nuanced concepts that could otherwise have been interpreted using a different perspective. A future activity to address this concern include validation review of this report by the project participants themselves.

Future Research

This study desires and encourages IS researchers to delve into research endeavors that seek to address the limitations posed in this study. This study encourages the use of other research techniques known to the field, which include but not limited to the use of other qualitative techniques such as grounded theory and the use of quantitative research techniques that allows identification of appropriate measuring instruments of constructs and analysis using quantitative techniques such as statistical and structural equation

modeling techniques. To address potential validity concerns, next steps of the study is to generate a report for each of the case project team participants for their own review and validation of the posed assertions. More data is highly desired to validate the findings. Whether these data corroborate or contradict the propositions is yet new knowledge that allows the field to mature and our knowledge of project team behaviors enriched. Lastly, a next step of this study is to partner with other researchers so that the views and interpretations of results could be perceived from multiple researcher perspective that could further increase the chances of applicability of the results to project teams with similar characteristics.

This study also encourages the future conduct of research endeavors in regards to research that could augment this study's findings. First, while the study explicates the specific impacts of the social, economic and political forces in the environment, this study found no evidence to suggest a net effect or impact of the confluence of positive and negative forces. For instance, it may be possible that one perceived positive force outweighs all perceived negative forces to produce a positive effect on project teams. The net effect of the inverse of this situation is also unknown.

Second, this study tangentially taps on the potential to explain the impacts of the social, economic and political forces to an ISD methodology from a *fitness* perspective (Gill and Hevner 2013). Because the study of ISD methodologies is focused on understanding the impacts to project team behavior, ISD methodology *tailoring* (Cao et al. 2009) has been a topic that is still being investigated in the field. In a larger context beyond agile methodologies, however, the current study wishes to understand tailoring vis-à-vis the fitness concept as applied to ISD methodologies in the context of "design artifacts".

Along the same line of thinking, the concept of fitness of an ISD methodology, future research encourages to investigate the impacts of fitness to project team cohesion, team performance and ultimately, project success.

Contributions

A higher goal is of this study is to deepen and expand our knowledge of the information systems field and of information systems project management. As such, the contributions of this study address the gaps in current understanding of information systems project management. First, this study elucidates how organizational forces impact and play in the decision of ISD methodology choice utilized by a specific project team, that consequently impact project team performance. This study has explicated how the forces in an organization's environment impact project teams' behaviors and the choice of ISD methodology for use of ISD project teams. In particular, this study explains how political forces, rationally shaped by social and economic forces, mainly directly impacts the ability of project teams to deliver their projects successfully. Additionally, this study showcases the confluence phase of the process model, which explains how the social and economic environments of an organization shape the ISD methodology to be used by the team. How negative or positive the perceived impacts of the organizational forces and the ISD methodology are influence the project teams' judgements and actions towards successful project delivery. Overall, this study identifies ten propositions and a process model that explain how the interplay of organizational forces (whether social, economic and political) impact project team behaviors and shape the choice of ISD methodology, which consequently have potential recoiling impacts to the forces in the organizational environment and the project team.

Second, this study is a supplement to the IS field's neglected understanding of team cohesion in IS project contexts. Team cohesion is a social concept that is nearly completely ignored in the study of IT project teams in the IS field's body of knowledge. Yet, team cohesion plays a significant role that directly influences project team performance. This study attempts to break the solitary exclusion of the study of team cohesion in IS project team contexts. It also opens an opportunity to inform and widen the scope of perception of practitioners and researchers of the value of maintaining high team cohesion in the practice of IS project management.

Related to cohesion are processes explicated in the bombardment and endurance phases of the study's process model. Examples of these processes pertain to the virtuous and vicious cycles of collective rationality. Dislodgement and "hole-filling", consequent to weakened collective rationality and exhibition of free-riding behaviors of members are processes that may further our understanding of project team dynamics that may significantly decrease the likelihood of project success.

Third, the current study augments very few studies in the field at the project team level of analysis. This study addresses the limitations of studies conducted in the IS discipline that has focused narrowly on the individual level of analysis or project level of analysis but generalized to the team level of analysis. Problems of inference arise when concepts are defined based on data that are collected at levels of analysis inappropriate for the theoretical propositions being examined (Markus and Robey 1988). There are a few studies in IS project management literature that utilizes team level of analysis (e.g. Roberts et al 2004, Sawyer 2010, Sawyer 2001), but are still considered limited to better understand ISD project team phenomena. Being able to understand project team behaviors through an

aggregation of perspectives and insights from multiple project members belonging to the same projects will offer stronger evidence of team-level behaviors.

Fourth, this study provides a more meaning look of existing methodologies would provide more relevance to our IS community in contemporary settings. It also enriches our scarce literature that attempts to understand the impacts of project processes to project teams. This study also updates our knowledge of the impacts of chosen ISD methodologies to project team behaviors in contemporary settings. Many other ISD methodologies have emerged over the past decades. Many are unnamed hybrid versions of two extremely different methodologies—waterfall and agile—in the organizations' attempts to find a more fitting project process that could be leveraged for the successful delivery of projects.

Fifth, this study, study hints on the nuanced perceived meanings of project team members and stakeholders. Project teams whose members understood varied meanings of project success tend to miss fulfilling certain criteria that encompasses the "true" meaning of success from an "everybody" perspective, while project members whose understanding of project success is fully grasped tend to achieve success above and beyond the expectations of the projects and stakeholders themselves.

Lastly, from a theoretical perspective, the use of collective action theory in IS project management settings may enriched the IS field in explicating phenomena by integrating pieced concepts known about IS project management in a more meaningful means. The findings in this research, through collective action theory, has the potential to showcase similar patterns of behaviors in other social settings. After all, according to Ostrom (2014): "for all of the work, empirical findings have not yet been integrated into a revised theory of collective action" (p.20).

APPENDICES

APPENDIX A

Congruency Mapping of Environmental Factors of Various Contexts across the Social, Economic and Political Environments

Hiriyappa's (2009) Organization's Environmental Factors	Schwalbe's (2015) IT Project Management Organizational Factors	Ahituv's (1984) Factors Impacting Information Systems Development	Ostrom's (2014)Variables that Influence Collective Action
Social Environment			
• Social norms of society's basic values, perceptions, work ethic culture, preferences • Cultural factors • Value factors such as strength of the individuals, beliefs and behavior	• Human resource dimension such as analysts, designers, programmers • Skilled IT workers • Roles and responsibilities identify coordination • Activity dimension at every stage of the development lifecycle • Culture, language, traditions and individual decisions	• Organizational units connected to project • Human resource dimension such as analysts, designers, programmers • Activity dimension at every stage of the development lifecycle	• Size of the group • Heterogeneity of the group • Common understanding of the group • Past experiences and levels of social activities partaking in a collective action • Presence of leadership

Economic Environment			
• Employment level, wage structures • Economic status of individual persons • Outlooks and knowledge of individuals to adopting technological change	• Maximization utility of resources • Human resources including harmony between needs of organization and people •Image, branding and reputation "value" of the organization	• Organizational knowledge and maturity in terms of user experiences in developing and operating IS • Availability of a structured system in processing information • Technological advancement and other non-human resources in terms of computer time, materials, capital investments	• Predictability of resource flows • Type of production and allocation functions • Relative scarcity of the good • Dependence of the group on the good • Size of the total collective benefit • Size of the temptation to free ride • Marginal contribution by one person to the collective good • Loss to cooperators when others do not cooperate
Political Environment			
• Political factors that influence investment decision, job opportunities and fiscal policy management • Political ideology that influence fluctuations of behavior of individuals • Impacts of polity (i.e., government administration and legal systems) for developing citizenship	• Conflict and power issues, individual vs group interests Roles that identify coordination and control mechanisms • Competition among groups or individuals for power and leadership • Coalitions	• Information system policy in terms of delegation of information processing activities Appointment of a central (powerful) or distributed data processing function • Control measures for quality assurance such as code inspections and walkthroughs	• Having a choice of partaking in the collective action or not • Autonomy to make binding rules • Wide diversity of rules that are used to change the structure of the situation

APPENDIX B

Summary of this Study's Methodical Rigor Based on Dube and Pare (2003)

Criteria	Description about this Study
Research Design	
Clear research questions	The research questions are stated in a form of research objectives. A primary research objective was stated and followed by a set of secondary research objectives. Similar to research questions, the research objectives of this study aim at answering *how, what* and *why* questions appropriate for adopting an exploratory case study research design.
A priori specification of constructs and clean theoretical slate	A prior constructs are defined and synthesized to construct the working theoretical model purposed to, and focused at, building theory.
Theory of interest, predictions from theory, and rival theories	While the current study is not an explanatory case study, minimal rival theories were nonetheless mentioned in the discussion. Most of the theories of interests in this study either corroborate or extend existing theories
Multiple-case design	This study was performed using a multiple-case design.
Nature of single-case design and replication logic in multiple-case design	Each case was selected following a selection/replication criteria. Differences among each cases were also highlighted, and the rationale for each case's selection was likewise explained.
Unit of analysis	This study explicates IS project teams as the unit of analysis of this study.
Pilot case	This study did not perform a pilot case. However, the design, data collection plans and data collection protocol were refined based on initial interviews performed with a few research participants.
Context of the study	The context of this study were explicated in terms of the case period, time spent at the research sites and nature of data. The data collected for this study were detailed and summarized accordingly.
Team-based research and different roles for multiple investigators	This study was primarily performed by a single researcher. However, the researcher was guided by a research mentor in the research process. In addition, this study invited a 3rd party analyst to perform pilot coding for measuring the reliability of

	the research process, particularly, the inter-rater reliability (IRR), which turned out to be 82.8%.
Data Collection	
Elucidation of the data collection process	This study explicates the data collection process in detail. The sources of data, frequency and time frame for collecting data, forms of data collected were clearly described. A table (Table 4.2) summarizing these information is included in the study.
Multiple data collection methods and mix of qualitative and quantitative data	This study explains the use of multiple data collection methods. The interview method was the primary method performed for collecting (primary) data. Some archival data were voluntarily shared by the research participants. Other sources of evidence were obtained through email communications, follow-up phone calls and through other publicly available sources such as the company and related websites.
Data triangulation	Triangulation of data obtained from various sources is adopted in this study.
Case study protocol and case study database	Case study protocol is adopted in this study. This study provides detailed information on the data collection process, and mentions the organization of data collected in the form of interview transcripts, field notes, coding schemes and coding matrix.
Data Analysis	
Elucidation of data analysis process	Clear description of the data analysis process is provided in this study from the study schema, the coding schemes, down to the within-case analysis and cross-case analysis.
Field notes, coding, data displays, and flexible process	Field notes were documented to provide a bigger picture about the boundaries of the study. These notes later supported many of the findings obtained from the primary data, which were presented in a form of data displays such as the ISD processes adopted by the teams in this study. This study leveraged the use of an adaptive posture for opportunistic and serendipitous findings from the collected data.
Logical chain of evidence	Logical chains of evidence were presented to trace the steps from the research objectives to the conclusion. The working research model is a synthesized version of front-end portion (mostly based on a priori theories) of the study, while the data collection and analytical approaches detail how the evidences were processed to build and extend theories.
Empirical testing, explanation building, and time series analysis	This study performed empirical testing through pattern matching analytical scheme by explicating how data are summarized into evidences that build explanations towards developing propositions, theories and the study's process model.
Cross-case patterns	This study performed cross-case analysis of patterns of evidences obtained from each single case.
Use of natural controls	Being an exploratory study, this study did not use natural controls that are likely used in explanatory case studies.
Quotes	Quotes were presented in the case reports as deemed necessary.

Project reviews	Project review is step yet to be performed in this study. The researcher will present case reports to the project teams of the findings, which will also serve as a venue to validate the evidences obtained.
Comparison with extant literature	This study compares findings extensively with extant literature.

APPENDIX C

Interview Protocol

Time of Interview:	Date:	Place:
Interviewer:	Interviewee:	Position of Interviewee:

Opening (to be read to the Interviewee):

I thank you for your taking time to talk/meet with me today. I am conducting a study on an IT project team's successful project delivery. I am interested in understanding how IT project teams operate towards successful project completion in the organization. You will gain no benefits for participating in this study, however, your participation may help improve our understanding of
IT project team practices.

Rest assured that any information that is obtained in connection with this study and that can be identified with you will remain confidential and will not be disclosed. Any discomfort or inconvenience to you may come only from the efforts and amount of time you have rendered in this interview. However, your decision, whether or not to participate, will not prejudice your future relationships with Baylor University. And if you decide to participate, you are free to say only the things you would like to. You are also free to discontinue participation at any time without prejudice.

The interview should take between 30-60 minutes, depending on the detail of your answers. I will be recording the session so I can transcribe it later for analysis of themes with other interviews. Are you still okay having the interview recorded? Do you have any questions on what I just explained? Are you ready to begin?

Interview Questions

Questions for Members of the IT Project Team

1. Please think of a recent ISD project that you and your current (agile, waterfall, hybrid, ad hoc) team have worked on towards successful delivery. Please describe the project.
    a. Please describe what was targeted for delivery.
    b. When was this project delivered? How long did the project last?
    c. What were the goals of the project?
    d. What success criteria did this project satisfy to be considered a successfully delivered project?

e. Why are you proud about the project? Or what aspects of the project make you proud about it?

2. Now please think of the team, particularly the members, who worked with you in this project.
    a. Who are included in the project team? What were their roles?
    b. Are all members co-located or are some virtually located? Who are co-located, and who are virtually located?
    c. Are there any members you perceive to be strong members of the team? Please describe their qualities.
    d. Are there any team members you perceive to be NOT strong members of the team? Please describe their qualities.
    e. Overall, what is your impression of your project team as a whole?
    f. What is your impression of the relationships among the members in your team?

3. What challenges do you recall made a critical impact in the project, that if you were not able to manage that challenge as a team, the project would have failed for sure? Please describe what happened.

4. What team processes, interactions or activities do you think your team is really (or outstandingly) good at that might have been a major reason for your team to avert the challenges you mentioned (in #3) towards delivering the project successfully?

5. How do you think your methodology helped you in meeting your project success criteria?

6. Had you followed the other methodology, do you think it would have addressed the challenges towards achieving the success criteria better than your current methodology? How so?

7. If you were to choose between the two:
    a. Follow the same ISD methodology to do a project with different project team, or
    b. Work with the same members of the team on a different project regardless of methodology employed, which would you choose? Why so?

8. Would you support the company to fully follow the same ISD methodology you used in all future projects? Why or why not?

Questions for Project Stakeholders/Sponsors:

1. Please describe briefly the [successful/failed] project you had with your IT project team.

2. Please describe your role in the project.

3. In any IT project, a methodology is usually followed to provide some structure towards delivering the project successfully. Please describe the methodology you think your team followed?

4. What is your impression about this methodology?

5. Please recall a situation when you encountered a difficult challenge in the duration of the project. What did you and/or the project team do to try to resolve it?

6. Please describe the relationships of everyone in the team.

7. What is your impression about the commitment of the team to accomplishing deliverables, milestones and meeting deadlines?

8. Who do you think was the most valuable person to work with in the project (mention of role only is fine)? Why do you think so?

9. Who do you think was not really contributory to the success of the project (mention of role only is fine)? Why do you think so?

Questions for the Project Management Office Contact (if applicable):

1. What set of business processes and practices (e.g. CMMI, ITIL, PMBoK, etc.) does your company follow that project teams are expected to adhere to?
    a. Why do think the company adopted these business processes?
    b. Why do the teams need to adhere to these processes when doing projects?
    c. What do you think is the most important (or critical) business process that project teams are expected to comply with strictly? How so?

2. What (standard) ISD methodology has your company set for the project teams to follow? Why?

3. Please think of an incident or experience when a business process/practice may have affected a project team negatively or positively when trying to deliver a project. Please describe what happened.

4. How do you think teams who follow methodology are able to comply with the business processes and practices you mentioned above?

5. Would you support the company to fully follow project methodology in all its projects going forward? Why or why not?

Questions for Finance Department Head and Project Review Board Contacts (if applicable):

1. What (standard) ISD methodology does your company set for the project teams to follow? Why?

2. How do you think this methodology affects your company's efforts to fund/prioritize ISD projects?

3. Please describe how your office approves projects for funding.
    a. When are projects funded? Who approves project funding?
    b. How are projects prioritized (e.g. are they based on projected ROI, TTM, etc?)
    c. How is the financial model structured in relation to approving projects for funding?
    d. What processes are in place to accommodate change requests in project funding?

4. Do the teams inform you of the development methodology (e.g. agile or waterfall) they plan to employ when they request for project funding?

5. From your perspective as a [state the position and role of interviewee], what do you expect from project teams once their projects are approved for funding?

6. Have you had any situations or incidents when a project team did not meet these expectations? Please describe what happened.

7. Would you support the company to fully follow [the current ISD methodology] in all its projects going forward? Why or why not?

Clearinghouse

Is there anything else you would like me to know related to your experiences during this agile transformation?

Participant Demographic Questions

Gender Identity:_____

Occupation:_____

Years of experience in the profession: _____

Nature of Industry with which Participant is Affiliated: (e.g. financial services, education, manufacturing, etc.)

Age: _____

Closing Questions
It was a pleasure speaking with you today. When I am finished conducting the interviews and analyzing the responses, I plan to present the results in a report in a journal publication. Do you have any questions for me? Thank you for sharing your experience with me. Your inputs are very valuable for the study. Would it be all right for me to contact you again if I have additional questions? Thank you again for your time.

APPENDIX D

Target Profile of Research Participants

Description	Justification

• All members of an Agile Project Team
  o Scrum master, or equivalent (45 minutes to 1 hour)
  o All other members of the agile project team (30 minutes to 1 hour each member)
	By being able to talk to the scrum master and members of an agile project team, we would be able to understand the current practices and challenges being faced by the team with respect to the agile process.

• All members of a Traditional (Waterfall) Project Team
  o Project manager, project leader, or equivalent (45 minutes to 1 hour)
  o All other members of the waterfall project team (30 minutes to 1 hour each member)
	Through the project manager and members of the waterfall project team, we would be able to understand the current practices and challenges team with respect to waterfall process.

• All members of an Ad Hoc or Hybrid Project Team
  o Project manager, project leader, scrum master or equivalent (45 minutes to 1 hour)
  o All other members of the hybrid project team (30 minutes to 1 hour each member)
	Through the project manager and members of the ad hoc or hybrid project team, we would be able to understand the current practices and challenges faced with respect to a hybrid/ad hoc development process.

• If any, a project management office head or personnel who serves as the project standards subject-matter-expert, and decides and implements project development standards of the organization to which project teams adhere; or this individual's equivalent (30 to 45 minutes)	By being able to talk to project standards person, we would be able to understand what established or standard set of business processes (e.g. CMMI, ITIL, etc.) the company follows with which project teams are expected to comply mandatorily.

• Manager-level to senior manager-level stakeholders impacted by ISD projects (20 to 30 minutes). For example, a department chair or head contact from: o Finance department who manages project budget and approves of project funding o Projects review board who prioritizes ISD projects in the organization o Sales and Marketing departments whose systems the project teams are building or updating	By being able to talk to the project stakeholders, we would be able to understand how the project prioritization and project funding approval process work, as well as the expectations with which project teams should comply once funding has been approved.

APPENDIX E

Sample Coding Matrix

This table is a sample coding matrix of relationships between concepts in the theoretical model that were used in the within-case analysis section. This table shows sample quotes from specific interviewees of each case, and the corresponding codes and code descriptions that were assigned to the quotes. Coding was performed using the Atlas.TI software program.

Code	Code Description	Case	Interviewee	Sample Quote
Invisible Hand Impacts to Project Team				
REL_ORGS-CAT_SOCL	Ambiguous Contact Person as a Social Force Impacting the Project Team	Case 1	Lead architect	"There was the official PM [on the client side], who was a non-presence. I mean she was officially their point person and she was whom we're supposed to communicate with, and the reality was she had no involvement in the project...She was such a non-presence. I mean I never got feedback from her, never got a reaction from her. She was not a participant in the meetings."
REL_KNW-CAT_ECON	Lack of Training as an Economic Force Impacting the Project Team	Case 2	PM-IT Director	"We would undergo occasional small trainings but none of them have any formal PM trainings. There is a general unspoken desire by 'all' teams [in the IT group] to undergo formal PM trainings because we would like to learn how to work proactively and smarter instead of harder."
REL_CONF-CAT_POLT	Conflicting Self-interests as a Political Force Impacting the Project Team	Case 3	PM	"We had two subcontractors that were subject-matter-experts in this sort of thing. And they have very strong opinions…So there's some political things we have considered like, 'yes, it can be very difficult to work with your school to advocate for your child that has special

				needs.' We have to be really careful on how to state that to the website because these schools are state schools, you know, so that kind of stuff. Whereas the subject-matter-experts were like, 'I have hundreds of case studies that have awful times dealing with their schools.' We would say, 'yes, we understand that but we cannot talk about it like that.' So that kind of stuff, those I think were really the most frequent sort of given friction, but it all, we were able to work out everything."
Invisible Hand Impacts to ISD Methodology				
REL_CUL-SMTD_CNPT	Organizational Culture as a Social Force Impacting the ISD Methodology (core concept of following a plan)	Case 2	Technical Support Representative	"So working with the government is always tough in that they've been saying for example for two years, every year you're going to have to report the entire calendar year, and of course, when it comes to submission time they say, 'well we lied to you; you don't actually have to report on the whole year, you will only have to report on a 90-day period.' So I guess in one sense it is on a yearly thing that you have to report every year, but after this point, you don't have to actually report on a full year."
REL_PSCOP-SMTD_GDLN	Ill-defined Technical Scope as an Economic Force Impacting the ISD Methodology (guideline for determining scope requirements early in the project)	Case 1	Lead Developer	"Well obviously there were some problems in the process. As I look back, we found one of the scope documents made reference to following the guidelines on a website and just one bullet in a scope that otherwise looked healthy. As I got into the development phase…well, other people looked at the website before and say 'hey, there are some things we do not normally deal with there.' But as I started digging in and really going through their requirements in the website, they were unlike anything any of us had seen before and became very time intensive. Restrictions in our toolsets, meeting approval to use certain strategies to build the website. Things like that we don't' normally deal with and were not accounted for in our scope. So from the

				development side, there were some surprises and worked through those.
REL_PSTKH-SMTD_GDLN	Multiple Subcontracted Stakeholders as a Social Force Impacting the ISD Methodology (guideline by adopting outsourcing and contractor management strategies)	Case 3	COO-Lead Architect	"The only thing that was really different about this project was we had a much larger scale of outsourcing for this project than we normally did. And the PM was much more stringent with the guidelines on how we reported our progress. Normally, for example, we wouldn't, uh, know when we do projects, we tend to write the content and how that suits as part of the project, but, for that project, we outsourced all of the writing and we just did review. We outsourced the video development, and we just did review. We outsourced all of their resource gathering across the state, and we just did the review. So there was a huge contractor management piece to that."
Ancillary Impacts of the ISD Methodology				
REL_SMTD_GDLN-POLT	ISD Methodology (adjusted guideline: padded generous buffers to timeline and reallocated work-hours as needed) Positively Impacting the Political Environment	Case 3	PM	"They were put in a decision-making role, you know, midway late through the project. And so there was struggle with, you know, when a new decision-maker comes on, or somebody knew that has a major responsibilities that weren't there for 65% of the project before or new to the organization that can make it, and not really familiar with technology, that can make it really difficult, and they're the ones who needed to signoff on things...[But] this wasn't accounted for because changes in decision-making, we weren't expecting that; there were things that happened in the legislator, we weren't expecting that; but yes, we had enough buffer in our schedule so that you know, some extra meetings here and there, um, it was fun, and it did make the phase longer; but we were able to shorten up phases in the future to account for that."

REL_SMTD_STEP-POLT	ISD Methodology (impacted step: lack of systematized structured framework for processing knowledge and over-reliance to limited knowledge experts) Negatively Impacting the Political Environment	Case 2	Technical Support Representative	"And about a year and a half ago, they lost - as part of this hospital split that made it to the [current] organization - they lost probably the person who knew the most about meaningful use. So they went through basically, six months of nobody doing anything in the project, and then it was pretty hectic...[Now] there are more operational directors who may not understand who I think have a high degree of fear of IT."
REL_SMTD_GDLN-POLT	ISD Methodology (impacted guideline: late determination of technical scope) Negatively Impacting the Political Environment	Case 1	Lead Visual Designer	"[Already deep into the project] There is this constant tradeoff between what they [client] didn't want to automate things, with political stake about whose art is going to be displayed first, and yet, they didn't want to do the work that would require them to the work manually."
Collective Rationality of Team to Team Cohesion				
REL_SMTD_STEP-POLT	Weak Team Cohesion due to Weakened Collective Rationality (Weak Collective Agency)	Case 2	Technical Support Representative	"The meaningful use project has an IT component but it is an 'everything project'; it's an operational project, it's a medical project, it's a care project, it's a IDE project. Meaningful use is due successfully organization-wide, it has to be an 'everybody' project...My suggestion [to pass through our challenges as a team] is, it's really almost a cultural issue...Their physician and operational leadership in my mind needs to be willing to take a stronger hand on enforcing and let their doctors do certain things."
REL_CAT_AGNT-TCOHS_SOCL(+)	Strong Team Social Cohesion due to Strong Collective Rationality (Strong Collective Agency)	Case 3	Client Sponsor	"I've developed a good rapport with these people, and we've become sort of like a family-oriented group. We've pretty much learned each other's' attributes, and I would say weaknesses as well, but you know, [we know] what keep people doing what, and you know, and

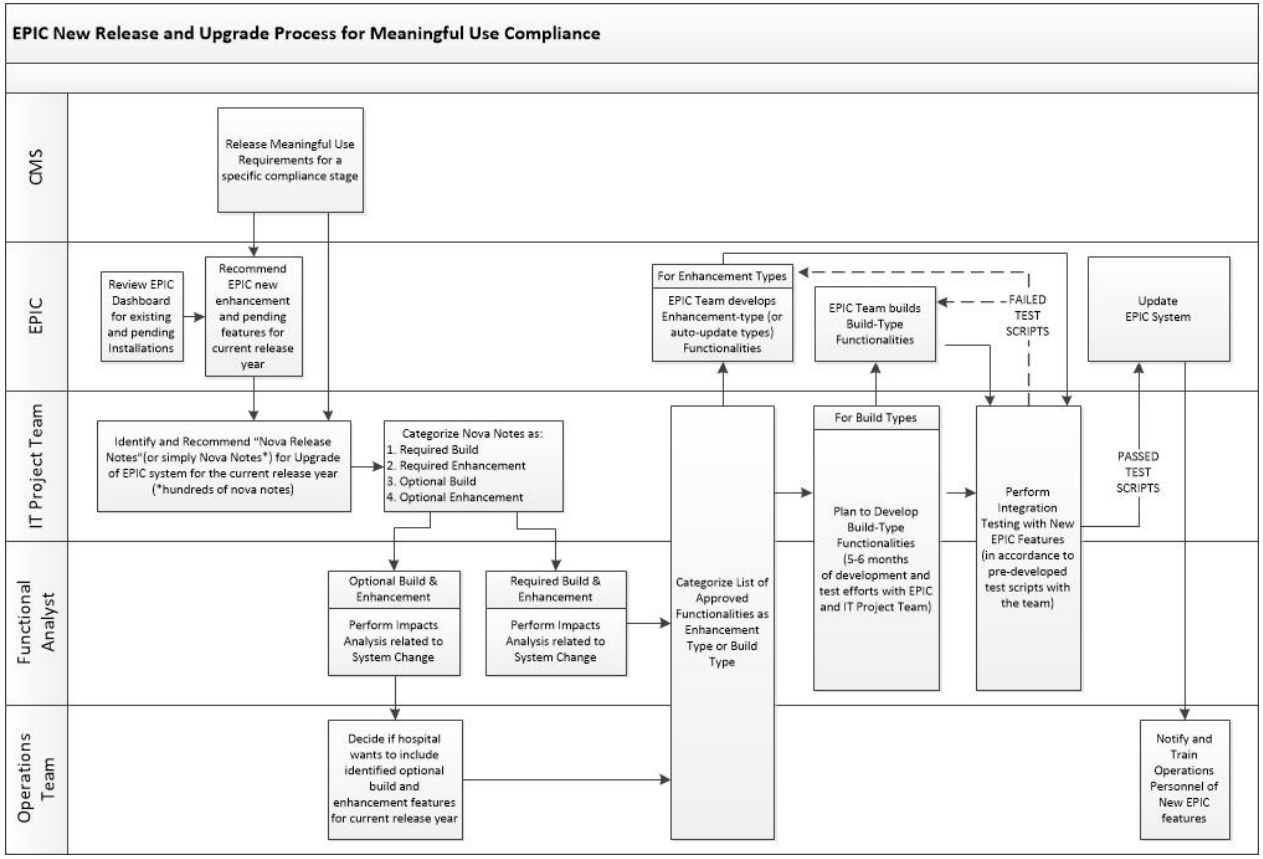
				where to go exactly, and it just works well. It's a well-oiled wheel."
REL_CAT_AGNT-TCOHS_TASK(+)	Strong Team Task Cohesion due to Strong Collective Rationality (Strong Collective Agency	Case 3	Subcontractor	The common mission is felt where everybody pitches in. I don't think you will find another project that could be more unifying than that – people in distress and we're helping them.
REL_CAT_AGNT-TCOHS_SOCL(-)	Weak Team Cohesion due to Weak collective rationality (weak collective agency)	Case 1	Lead Architect	"Things were never comfortable with this client in my opinion. There is some projects where you have a personal rapport with the client, and the relationship is good. You know, you joke around, you can share personal anecdotes that's casual discussion. There's a relationship there. I never really get that sense from this client."
REL_CAT_COMMT-TCOHS(-)	Weak Team Cohesion due to Weakened collective rationality (weak joint commitment)	Case 1	Lead Visual Designer	"Our PM [contractor team] was new to the company [then] and then shifted to a different company. The project was going downhill when she left."

APPENDIX F

ISD Methodology of WebCo

APPENDIX G

ISD Methodology of HealthCo



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