Walden University
A higher degree. A higher purpose.

Walden University
ScholarWorks

Walden Dissertations and Doctoral Studies

Walden Dissertations and Doctoral Studies Collection

2018

The Relationship Between Leadership Style and Cognitive Style to Software Project Success

Jacquelyne L. Wilson
Walden University

Follow this and additional works at: https://scholarworks.waldenu.edu/dissertations

Part of the Databases and Information Systems Commons

This Dissertation is brought to you for free and open access by the Walden Dissertations and Doctoral Studies Collection at ScholarWorks. It has been accepted for inclusion in Walden Dissertations and Doctoral Studies by an authorized administrator of ScholarWorks. For more information, please contact ScholarWorks@waldenu.edu.

Walden University

College of Management and Technology

This is to certify that the doctoral dissertation by

Jacquelyne L. Wilson

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Robert DeYoung, Committee Chairperson, Management Faculty
Dr. Jean Gordon, Committee Member, Management Faculty
Dr. Abraham Meilich, University Reviewer, Management Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2018

Abstract

The Relationship Between Leadership Style and Cognitive Style to Software Project Success

by

Jacquelyne L. Wilson

MBA – University of Phoenix 2007

BA, Christopher Newport University 1985

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Management

Walden University

November 2018

Abstract

Project managers can be change agents providing direction and motivation for subordinates to meet and exceed goals; however, there is a lack of information about the soft skills needed to achieve project success. Understanding the relationship between cognitive style and transformational leadership to software project outcomes is important. This study describes the lived experiences of software project managers by focusing on their attitudes towards, perceptions of, and behaviors related to using transformational leadership and cognitive styles in agile software development environments. Husserlian phenomenological design was used to identify the structure of participants' experiences. The naturalistic decision-making model and the theory of constraints were a framework for the study. Software project managers identified as transformational leaders were selected from government agencies and commercial companies. Prior to being interviewed, individuals completed the Cognitive Style Indicator. In-depth, semistructured interviews and member checking were used for data collection. Qualitative, phenomenological analysis was used to code the interview data and identify thematic response categories. Results indicated that transformational leaders possessing a planning or creating cognitive style stimulate an environment with an uplifting work atmosphere in which team members are fulfilled and product development outcomes are successful. The implications for positive social change include broadening project managers' leadership and decision making regarding overall project success and leading executives to reexamine the leadership and decision-making styles of their managers resulting in their organizations' prosperity, employee effectiveness, and cost containment.

The Relationship Between Leadership Style and Cognitive Style to Software Project Success

by

Jacquelyne L. Wilson

MBA – University of Phoenix 2007

BA, Christopher Newport University 1985

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Management

Walden University

November 2018

Dedication

I dedicate this dissertation to my family who supported me along my doctoral journey. To my husband, Maurice G. Wilson, Jr., whose unwavering support, steadfast unconditional love, and continuous encouragement have made all my educational endeavors and career aspirations possible. You have given of yourself unselfishly and put aside much for me to complete this chapter in my life. For that I love you and are eternally grateful!

To my children, Jasmine, Darin, and Aaron, who have been guideposts and supporters cheering me on, from day one. Thank you for being patient and understanding, for loving me through my grouchiness and tiredness after long nights of finishing coursework and dissertation chapters or when I was delirious from juggling everything!

To my parents, also in the cheering stand, who have shown how proud they are of me. Thank you for cheering me on and loving me as I have made my way through this journey! Your words of encouragement and love have meant a lot to me! Thank you!

Thank you to my family and friends, especially Levonia, for their unconditional support, which boosted and encouraged me to finish the research study.

Acknowledgments

First and foremost, I thank my Lord and Savior, Jesus Christ. God answered my prayers.

I acknowledge and appreciate my exceptional dissertation committee chair and members; Dr. Robert DeYoung, Dr. Jean Gordon, and Dr. Abraham Meilich. Dr. Robert DeYoung you are the champion of chairs! I appreciate your continuous support, for your patience, your positive words of encouragement, which kept me focused on completing my journey. To each of you, I thank you for serving on my dissertation committee; your insights, feedback, and encouragement is invaluable.

I equally appreciate the following individuals, Dr. Porkorni, Dr. McCollum, Dr. Felton, Dr. Ford, Dr. Hay, Dr. Chester, Dr. Johnson, Ms. Gilde, and Ms. Parker. Thank you all for your sound advice, reviews and writing tips, and unwavering support during the doctoral process. Sharing your knowledge with me, time and time again is greatly appreciated

I wish to thank all the software project managers who participated in the study. This study would not have been possible without their time to complete the leadership and decision-making assessment and interviews.

Without all of you, this dissertation would not have been possible.

Table of Contents

List of Tables vi

List of Figures vii

Chapter 1: Introduction to the Study 1

Background of the Study 2

Problem Statement 8

Purpose of the Study 9

Research Questions 10

Conceptual Framework 10

Naturalistic Decision Making 12

Theory of Constraints 14

Study Alignment Matrix 16

Nature of the Study 17

Definition of Terms 21

Assumptions 23

Scope and Delimitations 24

Limitations 25

Significance of the Study 26

Summary and Transition 27

Chapter 2: Literature Review 29

Literature Search Strategy 30

Conceptual Framework 32

Naturalistic Decision Making 33

Recognition-Primed Decision Making 34
Theory of Constraints 35
Tools of the Theory of Constraints 37
Application of Naturalistic Decision Making Model and Theory of Constraints 38
Literature Review 40
Information Technology Project Outcome 40
Leadership 44
Transformational Leadership 47
Project Management 49
Federal Enterprise Architecture Framework 52
Agile Project Management 53
Government Transition to Agile Project Management 57
Cognitive Styles 58
Summary and Conclusions 62
Chapter 3: Research Method 64
Research Design and Rationale 64
Role of the Researcher 68
Methodology 69
Participant Selection Logic 70
Instrumentation 72
Expert Panel 82
Expert Panel Qualifications and Feedback 82

Recruitment 85
Data Collection 87
Data Analysis 91
Data Management Plan 95
Issues of Trustworthiness 95
Credibility 96
Transferability 97
Dependability 97
Confirmability 98
Ethical Procedures 98
Summary 101
Chapter 4: Results 102
Expert Panel 103
Research Setting 104
Recruitment 104
Interviews 105
Demographics 106
Data Collection 107
Instrumentation 108
Semistructured Interviews 109
Data Analysis 110
Preparation of the Data 110
Overview of the Analysis 110

Evidence of Trustworthiness 111
Credibility 111
Transferability 112
Dependability 112
Confirmability 113
Study Results 114
Cognitive Style 115
Influence of Managers' Cognitive Styles and Transformational Leadership on Project Outcomes 118
Conclusions 145
Understanding Project Success and Failure, Cognitive Style, and Transformational Leadership 146
Interconnections Between Transformational Leadership, Cognitive Style, and Project Success 147
Evolving Transformational Leadership to Address Challenges and Risks 147
Strategies for Risk Management: Identification and Mitigation through Communication and Transparency 147
Summary 148
Chapter 5 Discussion, Conclusions, and Recommendations 149
Interpretation of Findings 150
Limitations of the Study 156
Recommendations 157
Implications 159

Significance to Social Change 159
Significance to Theory 160
Significance to Practice 161
Conclusions 162
References 163
Appendix A: Participant Interview Protocol 190
Appendix B: Participant Inclusion/Exclusion Screening Questions 192
Appendix C: Expert Panel E-mail Invitation 193
Appendix D: Post-Interview Bracketing Questions 196

List of Tables

Table 1. Study Alignment Matrix 17

Table 2. Matrix of Interview Questions, Research Questions, and Resulting Data 76

Table 3. Recruitment Sources 105

Table 4. Participant Demographics 107

Table 5. Responses to Personal Understanding of Cognitive Style or Decision-Making 117

Table 6. Perceptions of a Successful Project 120

Table 7. Key Elements of Project Success 122

Table 8. Perceptions of a Failed Project 123

Table 9. Reasons for Project Failure 126

Table 10. Understanding of Transformational Leadership 128

Table 11. Perceived Effect of Transformational Leadership on Decision Making 130

Table 12. Perceived Links Between Transformational Leadership, Cognitive Style, and Project Success 134

Table 13. Leadership Challenges 140

Table 14. Changes in Leadership Approach 142

Table 15. Strategies Used to Address Risk Factors and Support Success 145

List of Figures

Figure 1. The cyclical nature of the five focusing steps in Goldratt's theory of constraints 15

Figure 2. Organization of study conceptual elements 19

Figure 3. Data collection process flow chart 90

Chapter 1: Introduction to the Study

The management of software projects is challenging. Numerous issues are involved including design-reality gaps, ineffective project management, unrealistic planning, lack of client involvement, lack of knowledge transfer, hidden costs, lack of trust among the outsourcing companies, lack of coordination mechanisms, and communication problems (Anthopoulos, Reddick, Giannakidou, & Mavridis, 2016; Niazi et al., 2016). The goal of project management is to promote the probability that projects are delivered on time, within budget, and with the required features and functions.

The success and failure of software development projects have inspired researchers and practitioners who have examined them extensively since the 1970s (Dwivedi et al., 2015; Silva, Moreno, & Peters, 2015). These experiences have resulted in industries investing heavily in the development of management software to meet the demands of stakeholders. Despite best efforts at managing software projects, organizations continually struggle to deliver projects on time, within budget, and with value to the customer. According to Ahimbisibwe, Cavana, and Daellenbach (2015), two thirds of software projects do not meet their time and budgetary goals because of inappropriate project management styles. Even with the use of various methodologies (e.g., Agile and Prince2), projects are sometimes successful when managed poorly or, conversely, they may fail when executed well.

The U.S. Government Accountability Office (GAO) reported in its 2015 High-Risk Report that two of the nine reasons for failure of information technology (IT) projects are related to ineffective management. Specifically, managers lack the necessary knowledge and skills and senior executives do not always support the program. Schwalbe

(2016) noted that factors that led to project failure included a lack of foresight, lack of focus on methodology, recurrence, and, most importantly, simple project management.

A project manager's role is critical to the success of projects. The project manager provides direction, goals, motivation, and assistance in resolving organization and project issues (de Carvalho, Patah, & de Souza Bido, 2015). Project failure is inevitable when project managers are inept at communicating with team members and clients. When there is inadequate tracking of progress on deliverables and resource assignment, it may be the project manager's failure. Factors for effective project management include a manager's perception, personality, information processing, and relations with subordinates.

Over the past decade, research has focused on managers' leadership style as indicators for project success. As Chatterjee and Dey (2015) indicated, the success of most managers is related in some form to cognitive style. Therefore, it is important to understand the relationship that transformational leadership style and cognitive styles has on IT project outcomes. This understanding can be potentially useful in guiding staff and training efforts in increasing the success of IT projects in government organizations. This effort may produce new insights to enable managers to expand their skill set to guide a range of software projects toward success.

Background of the Study

Instructional technology projects in both commercial and government organizations are known for their problems and failures. Missed deadlines and cost overruns have plagued the software community for decades. The Standish Group is a commercial organization dedicated to researching software project failures with the goal of improving the probability of success. The Standish Group International Report

indicated that 31% of IT projects are cancelled before completion, and 52.7% of projects cost 189% of the original estimates (Standish Group International, 2014). The Standish Group International Report (2013) indicated that 43% of IT projects faced challenges while 18% were late, over budget, or produced insufficient results. These statistics show that the portion of cancelled IT projects is substantial and that a closer examination into the reasons behind project failures is warranted.

Failed projects are typically defined as cancelled projects or completed projects that delivered a substandard or low-quality product. Ahimbisibwe et al. (2015) reported that nearly two-thirds of software projects do not meet their time and budget goals, and they often do not meet their business objectives. Researchers have suggested that the failure of software projects is widely acknowledged as an ongoing problem with reasons that are complex and multifactorial. Factors contributing to failures include misalignment of engineering practice with requirement tasking, poor project management and planning, ineffective project management, user resistance, and poor contractor and stakeholder relationships (Ahimbisibwe et al., 2015; Hughes, Rana, & Simintiras, 2017; Skinner, Land, Chin, & Nelson, 2015). Of the factors mentioned, poor project management and planning have been identified as contributing factors to the failure of projects (Hughes et al., 2017).

The reasons for IT project failure have been widely studied by researchers who have identified important factors contributing to failures. According to Lehtinen, Mäntylä, Vanhanen, and Itkonen (2014), factors that affect the outcome of software project development are related to project environment, people, methods, and tasks. Ghazi, Moreno, and Peters (2014) asserted that software projects commonly fail due to a

lack of clearly stated requirements, inadequate user involvement in testing and development, and/or failure to communicate and collaborate with project stakeholders from within and outside the organization. Other researchers focused on technical factors such as unrealistic project scope, improper management, introduction of new technology, and organizational issues (Whitney & Daniels, 2013). These various studies illustrate that software development projects are multidimensional and involve the interconnection of people and technology.

Numerous soft skills are necessary for successful management of software projects. Successful projects require people with compatible personalities to work together while maintaining communication between internal and external team members (Pinto & Mantel, 1990). Some of these personal skills include communication skills, team building skills, flexibility, creativity, leadership, and the ability to manage stress and conflict. Leadership skills play a major role when organizations are trying to increase their effectiveness, performance, and productivity (Hornstein, 2014). Project managers need to be forward thinkers and motivators if they are to influence individuals and groups towards set goals. Bajcara, Babiaka, and Noal (2015) recommended that managers be strategists regardless of their interpersonal capabilities. Strategic thinking and cognitive abilities are needed to ensure continued progress of a project. Managers are also required to make responsible decisions regarding efficient allocation of resources and to provide project teams with clear direction (Hughes et al., 2017; Too & Weaver, 2014).

The role of IT project managers varies based on the type of project being carried out. The supervisor of a government project may have the title of program manager or functional manager based on the structure of the division and the individual's position

within the division (Burns, 2016). In organizations that engage in multiple projects simultaneously, such as the federal government, management is faced with multiple challenges, potentially in different development environments. Irrespective of the title, supervisors of government IT projects must possess attributes that define their ability to supervise projects on both small and large scales.

Cognitive styles signify the preferred way a person perceives, thinks, learns, solves, and relates to others. Cognitive styles can potentially affect leadership style including how mangers make decisions (Jain & Jeppesen, 2013). Understanding the cognitive processes that occur during decision making is necessary to comprehend the way leaders arrive at decisions and how decision making sometimes becomes impaired. Fiedler (1978) suggested that individuals' style of leadership, personal characteristics, and approach in perceiving and evaluating information about people and entities may be significantly related to their overall cognitive style.

Leadership styles signify the preferred way managers provide direction, implement plans, and motivate their people. Burns (1978) identified transformational and transactional leadership styles, while Bass (1990) and Bass & Avolio (1995) identified the laissez-faire style. There are other approaches to leadership including the authentic leadership style (Kayode, Mojeed, & Fatai, 2014).

Transformational leadership, along with participants' cognitive styles, are the focus of this study. According to Elqadri, Priyono, Suci, & Chandra (2015), a leader's style can influence subordinates' performance in a manner that affects achieving company goals. This suggests that leadership styles may directly influence leaders' decision making and, over time, shape their preferred cognitive style.

Transformational leaders who are aware of their decision-making style can help the organization reach its objectives. They can also develop necessary skills, deal better with problem solving, and improve their motivation of, and interaction with, others (Neha, Bhat, Rangnekar, & Barua, 2013). Various studies have shown that cognitive styles (the methods people use to make decisions) and leadership styles are interrelated and influence each other (Esa, Alias, & Samad, 2014; Neha et al., 2013). Effective decision-making also requires effective implementation and knowledge of how leaders guide decisions regarding implementation (Neha et al., 2013). Educating leaders in appropriate decision making is necessary to reduce the failure rate of software projects. Understanding how the cognitive styles of transformational leaders influence IT project outcomes is important in improving the successful management of the projects.

Project management is a practice used by organizations to improve their productivity. Project managers were assigned command and control responsibilities to plan and deliver products successfully (Mergel, 2016; Taylor, 2015). The philosophy and values encompassed in the agile methodology provide a more simplified approach that is flexible, iterative, incremental, and value driven (Taylor, 2015). Agile methodology promotes incremental release rather than a single delivery to the customer; it places the emphasis on team accomplishments. Traditional software development projects were managed using a front-end planning approach that requires the first phase to be completed before the team moved to the next phase.

The most common software project management concept is the waterfall approach that requires the project to be divided into six phases for which a specific set of requirements is clearly defined and documented at the beginning of the project. This

method of software project management is cumbersome, rigid, and results in excessive rework, lack of flexibility, and customer dissatisfaction (Serrador & Pinto, 2015). Managers using the waterfall model have the potential to fully develop a project only to learn the customer's needs for the technology had changed. This results in excessive waste of time and underutilized projects. Banerjee (2016) agreed with this assessment of the approach by listing the following limitations of the waterfall process that hinder projects from achieving their objectives:

- The project plan and activities are planned in the initial phase of the project. All the activities might not be required later.
- A project may require additional time to complete as one phase needs to be completed before another phase begins.
- The project manager is responsible for prioritization of daily activities.
- Once the project begins, changes in project objectives are difficult to accommodate.
- Documentation is created to measure the accountability of the team.

Starting as early as December 2010, federal government agencies, specifically the Department of Veteran Affairs, adopted agile methods for software project management because of dissatisfaction with traditional software development methods (GAO, 2012). Government agencies have adopted agile methods in software development to overcome the systematic flaws with traditional methodology. The GAO (2012) advocated the use of agile methods for government projects to reduce the risk of lengthy IT projects that incur cost overruns and schedule delays. The goal was shorter software delivery cycles with usable functionality in 60 to 120 days, which agile software development methods

support (GAO, 2012). The adoption and application of agile methods in software development environments does not come without challenges. These challenges were examined to identify the most appropriate cognitive style for working in an agile development environment to ensure successful outcomes.

Problem Statement

Software has transformed the world; however, despite every effort for development projects to be successful, they sometimes fail. Many IT projects fail to complete on time, within budget, or within scope, which leads to cost overruns, schedule slippage, and missed business opportunities (Standish Group International, 2014). When projects are not managed properly, there is a higher possibility that the project will go awry. Nguyen (2016) asserted that successful IT projects depend on project managers possessing the effective traits of decision-making, leadership, and project management skills.

The general problem regarding project failure is that a large percentage of project failure may be due to poor project management. While numerous studies identify poor project management as a reason for project failure, a gap exists in the literature regarding whether the cause of the failure is a result of the methodology, the experience or expertise of personnel, or the individual approach and style of the project manager (Hughes et al., 2017). The specific problem this study addressed is that managers may not have adapted their cognitive style with their transformational leadership style when managing agile projects, a frequently used methodology, to achieve project success. Da Cunha, da Silva, de Moura, and Vasconcellos (2016) resolved the need for research on the decision-making process from the software project manager's perspective by focusing on

competencies, behavioral insights, and social science perspectives (Becker, Walker, & McCord, 2017). A gap in the literature exists regarding how IT project managers lead and make decisions as they guide a software development project to a successful outcome.

The social change implications of this study are rooted in improved awareness of senior management in the federal government to promote effective leadership for project managers. The implications are directed more specifically to senior management in the federal government as they facilitate effective decision making of project managers who use agile methods on software development projects. An additional social change promoted by this research includes providing IT professionals knowledge about cognitive style and transformational leadership and their impact on software project success.

Purpose of the Study

The purpose of this qualitative phenomenological study is to describe the lived experience of software project managers' transformational leadership and cognitive styles and how they relate to project outcomes. Cognitive styles are identified as an excellent indicator of managerial performance (Muneera & Naziah, 2015). I used the qualitative phenomenological design to conduct semistructured interviews with open-ended questions to understand how managerial decisions affect outcomes of software projects using the agile software development process (Nguyen, 2016).

The purpose of this study was to establish an understanding of each participant's experience as well as the shared meaning among the participants regarding how their cognitive styles and transformation leadership contribute to the success or failure of projects. I chose a phenomenological research design as the appropriate design for this study because this approach allows the researcher to delve into the participants'

perspective and experience of a phenomenon (Van Manen, 2014; Simon & Goes, 2013). The implications for positive social change include broadening management knowledge regarding the influence a manager's leadership and cognitive style have on the outcome of software projects.

Research Questions

The research questions addressed how transformational leadership and cognitive styles of project managers influence IT project outcomes to be successful or unsuccessful. The central research question (RQ) that I sought to answer and the two subquestions (SQs) that helped guide this qualitative phenomenological study were:

RQ: What are IT project managers' attitudes towards, perceptions of, and behaviors related to the use of transformational leadership and cognitive styles in agile software development environments?

SQ1: What types of cognitive styles are used by IT software development project managers for decision-making?

SQ2: How do managers' cognitive styles and transformational leadership influence their achievement of desired project outcomes?

SQ3: How do project managers perceive the factors contributing to success or failure rates of projects based on their lived experiences?

Conceptual Framework

Two conceptual models were germane to this study. The first was Zsambok and Klein's (2014) naturalistic decision making model (NDM). The NDM is used to understand how people make decisions in a naturalistic setting and take actions (Zsambok & Klein, 2014). The goal of NDM is to improve the quality of decision-making of the

traditional approach. The second model is Goldratt and Cox's (2004) theory of constraints (TOC). The TOC is focused on system improvement to enable researchers to identify limiting factors known as constraints that prevent an organization from achieving its goals (Goldratt & Cox, 2004). The goal of the TOC is to remove the constraint until barriers no longer exist. Although NDM and the TOC are recently established frameworks, their development is attributed to their substantial impact on leadership-making decisions that produce successful project outcomes. The following sections describe NDM and TOC in greater detail.

These two conceptual models underpin this study. Naturalistic decision making is a useful heuristic for software project managers' reflection on their decision-making practices. Software project managers' perceptions of decision making are systematically achieved through a reflective thought process which NDM facilitates. recognition-primed decision making (RPD), a model in the NDM framework, is focused on decision making for assessment of individual situations rather than a successive process of evaluation (Johnston & Morrison, 2016).

For projects to meet specified requirements, it is important to eliminate existing standards, behavioral or procedural, that are harmful to achieving the objectives of the project. The theory of constraints (TOC) aids identification of a system's weakest link as a constraint so it can be eliminated (Simsit, Gunay, & VayVay, 2014). The TOC is becoming an important "problem structuring and solving methodology which changes the way of thinking of managers" (Simsit et al., 2014, p. 930). The TOC forces managers to break out of the traditional method of process improvement and requires them to focus on constraints, or bottlenecks, to keep improving a project's output.

Leadership development and formation is a complex topic. Describing software project managers' personal experiences utilizing the NDM and the TOC to make decisions will be beneficial to project managers to discover the core values that frame their leadership practice. Once core values are discovered, project managers will be better equipped to align these values to decisions and, ultimately, to influence others by their personal and formal leadership style (Izmailov, Korneva, & Kozhemiakin, 2016). Framing the study with these two conceptual models allowed emergence of salient themes regarding leadership and decision making that may be useful for software project leaders.

Naturalistic Decision Making

Naturalistic decision making evolved in the late 1980s from the efforts of researchers who desired to step outside of the traditional decision-making paradigms. The researchers studied how people made decisions in their natural environment. Klein and colleagues held a conference for researchers to share their findings on commonalities in decision-making processes of various industry leaders (Shan & Yang, 2016; Zsambok & Klein, 2014). They subsequently published a book on the proceedings. During the 1989 NDM conference, the organization identified nine contextual factors affecting the way real-world decisions occur (Zsambok & Klein, 2014). According to Zsambok (2014), the contextual factors affecting the naturalistic decision-making process include:

1. ill-defined goals and ill-structured tasks;
2. uncertainty, ambiguity, and missing data;
3. shifting and competing goals;
4. multiple events–feedback loops;

5. time constraints;
6. high stakes;
7. multiple players;
8. organizational goals and norms; and
9. dynamic and continually changing conditions. (p. 5)

In the 10 years following the 1989 conference, there was increased interest in NDM. To further research on the NDM, the 1989 conference was followed by three other conferences and a book about NDM (Klein, 2015a; Klein, 2015b). In decades that followed, NDM researchers broadened the inquiry to include "additional cognitive phenomena, not only decision-making" (Klein, 2015b, p.383). According to the NDM philosophy, good decisions represent a broad evaluation rather than simply the best decision from a list of several options. According to Klein (2015b), experienced decision makers use their intuition, the patterns they have learned from similar encounters, to generate a response.

Naturalistic decision making strategies assist managers to identify options different from those generated by traditional decision-making theories. Traditional decision makers evaluate alternatives, while naturalistic decision makers reach the most desirable option by using situational awareness and initial information gathered from an assessment of the current situation being processed (Shan & Yang, 2016). NDM is used primarily by individuals possessing the experience to draw inferences to make the best decisions possible. Although NDM began with a focus on decision making, it has evolved to address the broader question of how cognition adapts to complexity.

The NDM framework was developed based on studies of the decisions made by experienced decision-makers. The NDM approach looks at the cognitive efforts performed by project managers to confront and resolve conflicts that could hinder meeting organizational goals (Nemeth et al., 2016). The NDM approach was used in this study to "understand human cognitive performance" by examining how project managers make decisions during their day-to-day management of software teams (Nemeth et al, 2016, p. 352).

Theory of Constraints

Constraints are restrictions that prevent an organization from operating at its peak performance and reaching its goals. Constraints can occur internally or externally to an organization and can involve people, supplies, information, equipment, and/or policies. The TOC was created and introduced by Goldratt and Cox in the 1984 version of *The Goal*. Goldratt focused on identifying constraints, known as bottlenecks, that hindered the processes used in manufacturing organizations (Goldratt & Cox, 2004). The theory conveys that regardless of performance, every system has a constraint preventing it from a high rate of performance; the constraint becomes the system's weakest link. All other weaknesses become nonconstraints unless they become the weakest part of the system (Goldratt & Cox, 2004). Although the TOC was originally used in manufacturing, it is now employed in a variety of settings with the goal of identifying the constraint and making changes in work processes to overcome it.

The TOC provides a methodology for identifying and eliminating constraints. Goldratt (1990) explained the application of this methodology in his book, *Theory of*

Constraints. Goldratt (1990) described the theory as a cyclical process consisting of five steps—referred to as the five focusing steps. The cyclical process is shown in Figure 1.

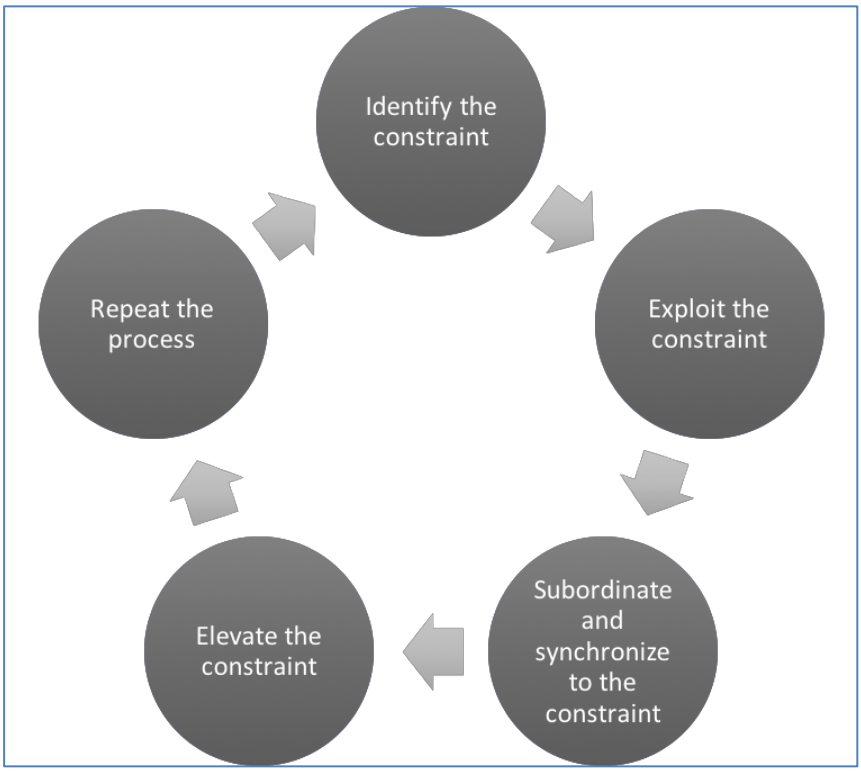

Figure 1. The cyclical nature of the five focusing steps in Goldratt's theory of constraints.

Managers can minimize constraints and efficiently accomplish organizational goals by working through the first three steps: (a) identify, (b) exploit, and (c) subordinate and synchronize. For this study, I focused on these first three steps. Step 4 is used if the constraint has not moved and requires considering the action to take to eliminate it. Step 5 is a reminder to never become complacent and to be unrelenting in removing the current constraint and moving on to the next constraint. Managers can work

efficiently to accomplish organizational goals by working through the first three steps for removing constraints (Pretorius, 2014).

The TOC was used in the study to describe how participants use their transformational leadership to examine the constraint as it relates to cognitive styles and the effect on software project outcomes. The TOC suggests that long-standing, unresolved problems or undesirable effects in any system are caused by conflicts or dilemmas within the system that might not be explicitly acknowledged (Goldratt & Cox, 2004). For the purposes of this study, the system being examined was the decision-making process for software development projects.

Study Alignment Matrix

Table 1 displays the alignment of the conceptual framework with the research questions and the instrumentation. A screening process to ensure that only participants who demonstrate transformative leadership included administering the *Transformational Leadership Behavior Inventory*. All study participants were working professionals who demonstrated use of the transformational leadership style, a criterion of the study. Study participants were, by virtue of their training and/or experience, expected to understand cognitive style and their personal cognitive style. Appendix A includes a list of open-ended interview questions that was presented to and approved by a panel of experts for use in this study.

Table 1

Study Alignment Matrix

Conceptual framework	Research questions	Instrumentation
Naturalistic decision making model (Zsambok & Klein, 2014)	SQ1: What types of cognitive styles are used by IT software development project managers who demonstrate transformational leadership?	*Cognitive Style Inventory* (Cools & Van den Broeck, 2007) Recognition-Primed Decision Making
Theory of constraints (Goldratt & Cox, 2004)	SQ2: How do the cognitive styles of managers who demonstrate transformational leadership influence the achievement of desired project outcomes?	Open-ended interview questions

Nature of the Study

A phenomenological research study describes an experience from another person's vantage point. A phenomenological study is focused on individuals who have had similar experiences or operate in similar environments in an attempt to uncover commonalities and shared connotations (Simon & Goes, 2013). Project managers' perceptions of their shared beliefs and experiences of the effect of their transformational leadership style and cognitive style on software project outcomes were analyzed (see Giorgi, 2009; Moustakas, 1994; Van Manen, 2014). As the lived experiences of project manager participants were described and interpreted, themes emerged that provided meaning and efficacy to social behaviors involved in decision making.

Quantitative methods draw from statistical information to understand the outcomes of cause-effect relationships. Quantitative methods do not allow insight into the

participants' personal experiences, thus impeding understanding of a phenomenon (Yilmaz, 2013). Use of mixed methods research integrates quantitative and qualitative methods, although one method has priority for the analysis of the data (Venkatesh, Brown, & Bala, 2013). The integration of the two methods was not relevant for this study because qualitative interviewing and coding formed the basis for the overall research and analysis. The quantitative instrument, *Transformational Leadership Behavior Inventory*, was used solely to identify participants having the transformational leadership style for purposes of recruitment.

The study was designed to demonstrate the relationship between project managers' cognitive styles and transformational leadership and software project development outcomes. Figure 2 graphically depicts the overall organization of the study. The goal of the research was to use qualitative exploration of IT project managers' experiences in their natural settings to provide a greater understanding of the influence of transformative leadership and various cognitive styles on software development project outcomes. I expected that the use of phenomenological methods would provide an understanding of the managers' decision making and the meaning they ascribed to their experiences.

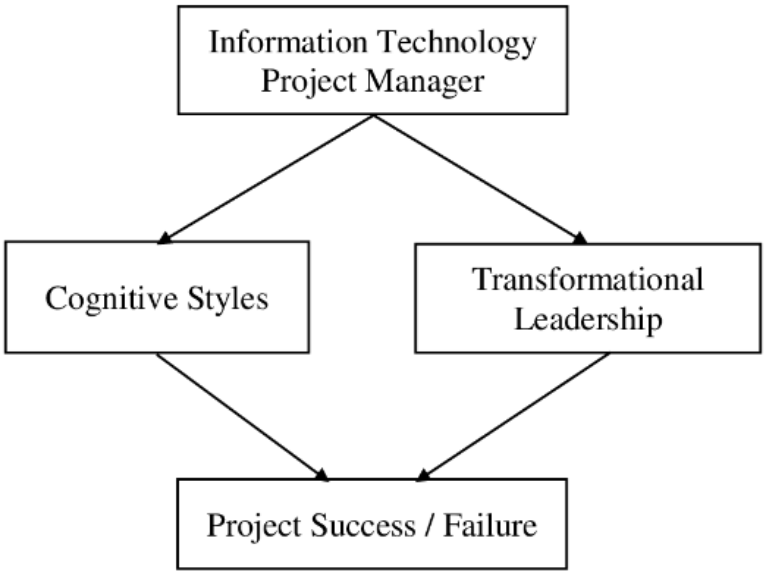

Figure 2. Organization of study conceptual elements.

The phenomenological approach served as a means to examine project managers' experiences of supervising and decision making for IT software development projects. The Husserlian approach is used to identify the structure of experiences as described by the research participants. Edmund Husserl, a German philosopher, uncovered and described the fundamental structure of a person's life world emphasizing the description of a person's lived experience (Moustakas, 1994). Due to its descriptive orientation, Husserlian phenomenology was suited for this study. It is appropriate in that it allowed for rigorous inquiry into the essence of a project manager's transformational leadership style and cognitive traits while managing IT projects (Giorgi, 2009; Moustakas, 1994; Van Manen, 2014).

The purpose of the study was to describe the lived experience of software project managers to understand the essence of their experiences as it related to the phenomena of

transformational leadership and cognitive styles and, in turn, to identify the relationship of the phenomena to project outcomes. As defined by seminal philosophers, the phenomenological approach emphasizes a way of knowing and understanding the experiences of participants with a goal of describing their experiences (Husserl, 2002; Van Manen, 2014). The phenomenological approach includes steps to allow for a reliable exchange between researcher and participant to describe lived experiences of project managers' efficacy of decision-making in software development projects. These ideals may provide an illustration of participants' beliefs that aid in clarifying the meanings of phenomena from lived experiences (Simon & Goes, 2013).

A project manager's leadership style and competence are necessary for successful performance in any business sector. Researchers have demonstrated a significant relationship exists between a project manager's performance and cognitive styles in decision-making (Chatterjee & Dey, 2015; Esa et al., 2014). Using a phenomenological approach shed light on the multifaceted nature of transformative leadership, cognitive styles, and outcomes of IT development projects.

The target sample included 15 IT software project managers with a minimum of 5 years of project management experience. The participants were required to have managed agile projects within the last 2 years in the Washington, DC, metropolitan area. To participate in the study, project managers were also required to demonstrate a transformational leadership style.

To identify potential participants who demonstrate transformational leadership, I administered *The Transformational Leadership Behavior Inventory* (Bormann, & Rowold, 2016; Podsakoff, MacKenzie, & Bommer, 1996). After identifying15 potential

participants, I invited the project managers to participate in the study. Once study participants were identified, I administered the *Cognitive Style Inventory* (Cools & Van den Broeck, 2007) to identify their cognitive styles. This provided a profile of the cognitive styles used by this group of project managers. I then conducted interviews with each participant using open-ended questions to identify how their cognitive styles and transformational leadership influenced the achievement of IT project outcomes.

Definition of Terms

The following alphabetical list includes terms germane to this study. Some of the terms, while common, have a specific technical meaning when used within the project management profession. These definitions are included solely for clarification.

Agile: A label involving a diverse and broad set of techniques, methods, and methodologies for software development (Torrecilla-Salinasa, Sedeñoa, Escalonaa, & Mejíasa, 2015).

Agile methodologies: The named methods of techniques used on software development projects. Most popular agile methods include eXtreme Programming (XP), Crystal, Scrum, Lean Software Development or Kanban (Torrecilla-Salinasa et al., 2015). This study will examine project management using Agile Scrum, which is the most common method currently being used.

Cognitive style: A strategic and stable characteristic preference for the way people process information, solve problems, and make decisions (Jablokow, Teerlink, Yilmaz, Daly, & Silk, 2015)

Information technology (IT): A computer-based tool used to manipulate, store, or communicate information that supports the information needs of an organization (Schwalbe, 2016).

Leadership style: A manager's way of providing direction, implementing strategies or plans, motivating team members, and building relationships vital to ensuring the success of a project (Cunningham, Salomone, & Wielgus, 2015).

Naturalistic Decision Making Model (NDM): A framework used to understand how people use their experiences to identify, assess their situations, make decisions, and take actions in a naturalistic setting (Goldratt & Cox, 2004).

Project: A short-term effort to create a unique product or service. A project can be tangible or intangible with a specific beginning and end (PMI, 2013).

Project failure: The result when a project has not delivered specified requirements based on a customers' expectations. The PMI (2013) indicates that a project fails when the expected outcome or deliverable does not meet the stakeholder's agreed requirements.

Project outcome: The completion of the implementation of a short-term effort that meets the requirements and expectations of the project's stakeholders, project management team, and project management organization (PMI, 2013).

Project management: The process of planning and organizing tasks using the knowledge, skills, tools, and techniques to meet specified requirements and goals (PMI, 2013; Schwalbe, 2016).

Theory of Constraints (TOC): A philosophy referred to as *Five Focusing Steps* developed by Dr. Eliyahu M. Goldratt to assist managers in improving the performance of organizations by logically and systematically answering the following three questions

essential to any process of ongoing improvement (Goldratt & Cox, 2004): What is change? To what to change? and How to cause the change?

Thinking process (TP): A suite of tools supporting the TOC that guides the user through the decision-making process for solving complex problems, including problem structure, problem identification, solution building, barriers to overcome, and implementation solution (Peltokorpi et al, 2016).

Transformational leaders: Leaders who inspire their followers to identify with a new and shared vision (Verma, Bhat, Rangnekar, & Barua, 2013). This leader provides vision and pride and promotes optimism in subordinates (Top, Akdere, & Tarcan, 2015; Verma et al., 2013; Wang, Waldman, & Zhang, 2013).

Waterfall: A traditional software development methodology based on sequential (non-iterative) phases, requirements, design, implementation, verification, and maintenance. Progress is determined by completion of each step downward, as a waterfall, through the phases.

Assumptions

The exploration of participating project managers' experiences of how their cognitive and transformational leadership style influence project outcomes was based on several assumptions. The first assumption was that the individuals being interviewed will accurately identify themselves as having the required experience as an IT project manager of agile software development projects in the last 2 years. The second assumption was that participants will be forthcoming with their responses to interview questions. Participants will be encouraged to be candid while reflecting their experiences because conventional corporate responses will not provide the necessary data. An

anticipated requirement was to have participants sign confidentiality agreements. Adherence to supporting participants' rights to privacy encourage them to respond candidly. The third assumption was that senior management would not instruct participants on how to respond. Participants were able to devote uninterrupted time in a quiet and private location to participate in this study. The fourth and final assumption was that the participant sample would accurately represent the population and the sample would provide accurate descriptions of the decision-making process on IT projects within federal agencies.

Scope and Delimitations

The scope and delimitations of the study include information on relevant factors that encourage the need to investigate project managers' perceptions of IT software project outcomes. The exploration of project managers' experiences will contribute to a deeper understanding of leadership and decision factors within a software development environment. Additionally, the exploration will lead to a greater understanding of management characteristics that influence project outcome. Positive social change comes about when project managers adjust their decision-making processes to adapt to the development environment (Esa et al., 2014). Although organizational upper echelon resources assist with managing software projects, a project manager remains in the role of influencer for and advisor to upper echelon management.

The project manager's role as an influencer on a software development project can conceptually impact the project's outcome. Traditional project management skills are entry-level skills (rather than interpersonal or soft skills) that may not include the leadership ability to ensure a successful project outcome (Creasy & Anantatmula, 2013).

Literature to date has focused extensively on the soft skills of project managers such as personality traits and attitudes. As Creasy and Anantatmula (2013) maintain, managers need their personality traits, competencies, and management style to be compatible with the project type. Descriptive reports of findings may identify themes to broaden the perspectives of leadership involved in software development—a much needed positive social change.

Delimitations are characteristics which emerge from the limitations in the scope of the study used by the researcher to set boundaries for the study and minimize external influences (Simon & Goes, 2013). This study includes clear constraints to contribute to understanding factors in leadership and cognitive styles influencing the success of IT software projects. The study is limited by a small sample size of 15. Participants were limited to IT project managers who have managed agile software projects in the last two years.

Limitations

The current study is subject to several limitations. First, this research was limited to managers working in the Washington, DC, metropolitan area. Project managers will be limited to those having experience managing an agile software development project within the last 2 years. The findings may not be applicable to other agencies or in other regions of the U.S. nor to project managers who have not managed agile software development projects. The small sample will limit the generalizability of the research findings.

Second, a criterion sample will be used for the recruitment of participants for this study and will not be representative of the entire software project management

population. This lessens the ability to apply the results to a wider population of project managers and organizations (Moodley, Sutherland, & Pretorius, 2016). A sample size of 15 to 18 managers limits the transferability of research findings.

The research design applied in this study, a phenomenological approach, has the limitation of being dependent on the interpretations and insights of study participants. This may limit the generalizability of results and raise the question of the objective truth of any conclusions drawn. Participants might provide, for example, only positive responses which would give the impression that all IT projects under their leadership are successfully completed on time and within budget.

Significance of the Study

The significance of this qualitative phenomenological study is its potential to contribute to a greater understanding of transformational leadership and cognitive styles and their relationship to software project outcome. According to Kissi, Dainty, and Tuuli (2013), a leader's behavior and leadership style are important factors influencing innovation and performance in the workplace. The success or failure of a project is directly proportional to the project manager's leadership style (Munir, Furqan, Shahzad, & Basit, 2017). Leadership ability, along with other intervening variables, such as the cognitive style of the project manager, is necessary for projects to be successful.

A sound understanding of various factors that contribute to the risk of project failure is useful for purposes of risk reduction. By being informed of the factors peculiar to the development environment, project managers can better adapt their leadership and cognitive style to ensure successful project outcomes. Identifying and considering risk factors throughout the life of the project can also increase the likelihood of success

(Whitney & Daniels, 2013). With greater understanding of cognitive styles, managers may be able to differentiate the cognitive style suitable for directing an agile development environment.

Technology crosses all boundaries including the social and ethnical boundaries. Therefore, effective development of technology is critical for organizational growth, education of our youth, and enhanced personal growth. According to Thackeray and Hunter (2010), positive social change occurs only when technologists have information, people, and tools. This study will help project managers to better understand their personal transformational leadership and cognitive styles and, thereby, assist them in generating appropriate solutions. Possessing insights regarding cognitive style and implementing appropriate leadership strategies is expected to lead to better project management, greater productivity, increased cost benefits, and improved efficiency.

Summary and Transition

Chapter 1 introduced the problem that a project manager's transformational leadership style and cognitive styles may negatively impact software project outcomes. Software development project failure that occurs because of poor project management contributes to failure or cancellation of information systems projects (Boyles, 2015; Cunha, Moura, & Vasconcellos, 2016). Numerous simple and complex reasons cited for such failures (Ahimbisibwe et al., 2015; Skinner et al., 2015) were briefly described in this chapter. Poor project management remains a critical component contributing to these failures. Cognitive style, the preferred way a person perceives, thinks, learns, solves, and relates to others, has been linked to a transformational leadership style and may influence job outcomes. The chapter presented a brief description of current seminal research (van

Kelle, van der Wijst & Plaat, 2015) regarding various factors for successful information systems software projects. The chapter also included mention of the skills sets needed by IT project managers to organize and direct software projects. The chapter also included the proposed research questions, the purpose of the study, and a brief description of the study.

Chapter 2 will include a review of literature germane to the cognitive and leadership styles of project managers and the potential effect of style on IT software development projects. It will begin with an overview of the theoretical foundation and conceptual framework on which this research is based. The body of literature on the Zsambok and Klein's (2014) NDM model and Goldratt's TOC (Goldratt, 1990) will be presented along with research on the application of these models to organizational management and, more specifically, to management within software development environments.

Chapter 2: Literature Review

The focus of this study was on understanding the extent to which project managers' cognitive style and their leadership style relate to software project outcome. The goal was to articulate the experiences of software project managers demonstrating transformational leadership regarding how their management of IT projects affects the outcome of the projects. I assumed that managers apply their preferred type of leadership according to their personal preferences and their organizational structure; however, their cognition can shift as a result of different leadership styles (Kahai, Jestire, & Huang, 2013).

Software project failure has been a focus of modern research for many years. When projects fail, it is often assumed the failure is associated with deficient management—a problem that can be corrected by better management (Sage, Dainty, & Brookes, 2014). This literature review includes an examination of the existing literature regarding software project managers' cognitive and leadership styles and their effect on project outcome.

A project manager's leadership style and competence are necessary for successful performance in any business sector. The general problem regarding software project failure is that a large percentage of failures are due to poor project management. Literature exists that suggests project management is a reason for project failure. However, a gap in the literature exists regarding whether the cause of failures is the individual approach/style of the project manager, methodology, or the experience or expertise of personnel (Hughes et al., 2017). The work of Esa et al. (2014) indicates that management decisions should dictate the cognitive style managers use and that managers

should be able to switch between styles depending on situations. The specific problem is that, as more projects use the agile methodology for software project development, a corresponding shift in how managers adapt their cognitive and leadership style to achieve project success may not have occurred.

The purpose of this qualitative phenomenological study is to describe the impact of the relationship software project managers' cognitive styles and transformational leadership have on outcomes for projects using the agile software development methodology. Personal skills, such as social, decision-making, and problem resolution skills are recognized as personal attributes that influence project success (Chatterjee & Dey, 2015). Thus, there is a need to strengthen the understanding of how a manager's personal skills, including their cognition, enhance project success.

In this chapter, I first describe the literature search strategies, which included the databases searched, keywords and phrases, and iterative searches. Next, I describe the conceptual framework that includes the TOC and the NDM. I include an examination and synthesis of research literature pertinent to cognitive styles and transformational leadership as they relate to software project outcomes. The section on the gap in the research includes the shortcomings in knowledge regarding the relationship of management soft skills with project success. Finally, I provide a summary of the literature on the relationship of cognitive style and transformational leadership to software project outcomes in an agile development environment.

Literature Search Strategy

This literature review involved retrieving information germane to a study of the relationship of cognitive style and transformation leadership to project outcomes. This

systematic literature review began with a search of business management databases and information systems and technology databases. The business and management databases included Business Source Complete, ABI/INFOMR Collection, Emerald Insight, and Science Direct. The information and technology databases included ACM Digital Library, Computers and Applied Science Complete, IEEE Xplore, ProQuest Computing, and ScienceDirect. Multidisciplinary and other database searched included ProQuest Dissertation, PsycARTICLES, and Thoreau Multi-Database Search. In addition, Google Scholar search engine produced 134,000 articles and books for years 2013 to 2017 for the various search terms.

The selection of relevant materials began with searches through several peer-reviewed academic journals, books, and dissertations available through the Walden University Library. These included ABI/Inform, Business Source Complete, Computers and Applied Science Complete, Ebscohost, IEEE Xplore, ProQuest Central, PsychArticles, Sage Publications, and Science Direct. Peer-reviewed literature included the collection of management and IT studies within the scope of project management, cognitive styles, leadership, software development, the TOC, and NDM.

The literature search consisted of an exhaustive review of materials on the relationship of cognitive styles and transformational leadership on project outcome. Ineffective decisions and leadership constructs in the workplace that lead to IT project failure continue to be management concerns (Farlik, 2016). I retrieved resources using specific keywords and phrases examining cognitive styles and transformational leadership within management. Specific identifiers were used to provide information on IT project success.

I searched each database using the following keywords and phrases: *cognitive styles, decision theory, project management, project success and outcome, and transformational leadership, transformational leadership and cognition, transformational leadership and project outcomes, agile software development,* and *SCRUM.* For library searches on naturalistic decision-making, I used the following keywords and phrases: *naturalistic decision making (NDM), decision-making, decision errors, decision training, organizational decision-making (ODM),* and *recognition-primed decision-making.* Library searches on TOC included the following keywords and phrases: *theory of constraints, theory of constraints thinking process, TOC,* and *continuous improvement.*

I searched the literature from the period between 1975 to 2017 for seminal works on NDM and the TOC. Both emerged in the literature in the 1980s which established the timeline for the literature review. The concentration of current literature for this study focused on items published within the last 5 years.

Conceptual Framework

The conceptual framework for qualitative research are concepts used for the purpose of understanding a problem or phenomenon. The conceptual framework of a research study is constructed by incorporating parts of existing theories and research relevant to the study that serve as essential sources to understand phenomena (Maxwell, 2013). Simon and Goes (2013) indicated a conceptual framework can be used by researchers to explain the reason for and expected experience regarding the research path based on similar prior research.

Project management best practices are not applicable for every project team and managers should apply best practice, decisions, and frameworks based on each environment with the goal of improving project success (Tomanek, Cermak, & Smutny, 2014). The NDM model and the TOC support the phenomena of the relationship of cognitive style and transformational leadership on project success. Seminal and current research in this review includes information concerning decision-making and leadership concepts for the exploration of the relationship of transformational leadership and cognitive styles on project outcome.

Naturalistic Decision Making

The NDM framework described in the literature resulted from the efforts of researchers seeking alternatives to the traditional decision-making models. The traditional models failed to explain how people make decisions in real world environments under time constraints and other complications (Klein, 2008; Zsambok & Klein, 2014). Seminal authors of NDM agreed that people use their experience to make routine or critical decisions based on a repertoire of patterns, which fits within the RPD model (Klein, 2008; Lipshitz, Klein, & Carroll, 2006; Zsambok & Klein, 2014).

Although NDM describes fast, intuitive decision-making by experienced leaders, I found little information on NDM when used by leaders with less experience. Another possible shortcoming of NDM is that expert leaders make naturalistic decisions when they think analytically (Gore, Flin, Stanton, & Wong, 2015). Gore et al. (2015) conducted studies into the analytic reasoning process and verified its reality. In their study, the NDM model contributed an understanding of the typical patterns software project

managers use in decision-making while remembering to utilize the experiences of skilled leaders.

The NDM model is based on studies of the decisions made by experienced decision makers. This creates limitations in the applicability of NDM for leaders with minimal experience. As Boyes and Potter (2015) stated, a limitation of NDM is the applicability for leaders with less experience faced with unfamiliar task and conflicts with organization goals. Joslyn and Jones (2006) stated that the limitations in expertise and experience in an area can relate to the demands of the task. The authors explain that, to avoid time pressure, expert decision makers zoom in on insightful cues and filter out all others. In contrast, a novice is inclined to select cues based on ease of access (Joslyn & Jones, 2006). The more a decision maker knows about the work area, the more their decision strategies will be systematic and structured.

Recognition-Primed Decision Making

Traditional decision-making models provide an understanding of how decisions should be made or, rather, what the leader did wrong. The RPD model stresses situational awareness in that leaders understand the significance of the situation, possess the ability to mentally evaluate options, and are able to decide on a course of action (Riegel, Dickson, & Topaz, 2013). The RPD model describes how leaders can evaluate previous experience to identify patterns in decision making. The patterns highlight relevant cues, possible expectancies, plausible goals, and choices a leader may exercise for a given situation (Gore et al., 2015; Klein, 2008; Zsambok & Klein, 2014).

The RPD model is unique in embracing intuition as the guiding influence in making decisions. Experts recognize critical cues in specific natural environments and

identify patterns from memory through subconscious, automated cognition (Kahneman & Klein, 2009). From their experiences, option selection is often automatic and time efficient. However, there are times when there is an interaction of the intuitive and the analytical, especially when the variants of RPD necessitate more cognitive work (Kahneman & Klein, 2009; Klein, 2008).

Theory of Constraints

The TOC has a wide range of research implementations that can be used to improve an individual's performance and establish the most effective solutions. The TOC can be applied in industries such as production, logistics, distribution, project management, accounting, research, and development (Simsit et al., 2014). The TOC emphasizes the importance of promoting initiatives that are in line with the goal of the organization (Bhowmik & Ray, 2015). Once the organizational goals are defined, TOC can be used to identify and manage constraints so that time and resources are used on areas where the potential for returns are greater.

For organizations to make significant and lasting improvements in the way software projects are managed, it must actively address the root causes leading to problems such as projects not completed on time and budget, too much rework activity, and constant shift in priorities. The primary idea of TOC is that each system has at least one constraint that will limit the system's ability to achieve the highest level of performance (Izmailov, 2014). The TOC has the goal of improving systems by identifying limiting factors, known as constraints, that prevent an organization from achieving its goals (Goldratt & Cox, 2004).

To achieve system improvement, one must focus on the area of the constraint. To make significant and long-term improvements in the way software projects are managed, organizations must address the principal causes leading to negative project outcomes (Pretorius, 2014). Izmailov (2014) identified two dominant root causes leading to management problems: (a) organizations performing multiple projects with shared resources, and (b) organization managing individual projects. The first dominant cause creates unavoidable conflict for managers who are not sure when to begin new work without causing disruption on current projects. The second dominant cause is due to planning and scheduling processes.

Multiple projects using shared resources cause conflict and make it difficult for management to schedule new opportunities. Izmailov (2014) discussed the challenges managers have allocating resources on shared projects and noted that timing is paramount to avoid compromising the organization's ability to meet current commitments. On individual projects, the root causes preventing the execution is caused by planning and scheduling built on erroneous assumptions such as that excellent performance from an individual will lead to project success (Izmailov, 2014). Unless these two causes are addressed, there is a low probability the organizations will make significant and lasting improvements in project management performance.

The TOC implementation process offers a solution to address root causes and coping mechanisms for the conflicts mentioned. As discussed in the previous chapter, the TOC includes a five-step process that results in a continuous improvement process to increase throughput of the system (Goldratt & Weiss, 2005; Gupta & Snyder, 2009). The TOC process capitalizes on constraints in the transformational leader's cognitive style

which prevent successful outcome of software projects (Goldratt & Weiss, 2005). At the end of the fifth phase, the organization has a lot of visibility into their project management system. The constraint is broken; the process allows the researcher to seek the next constraint and process it to prevent constraint on the organization. The TOC process gives people in the organization an opportunity to pinpoint and implement change that ultimately brings the most improvement for a company overall.

Tools of the Theory of Constraints

The thinking process (TP) TOC is a set of tools for use by individuals or logically incorporated into the company processes. Some authors, (Librelato, Lacerda, Rodrigues, & Veit, 2014), consider TP-TOC an identification, analysis, and problem-solving method to identify central problems, obstacles, and solutions to implement. The TP-TOC uses a method that assists managers to understand difficult problems by answering three questions; *what to change, what for, and how to create change* (Librelato et al., 2014).

The thinking process tools of the TOC are structured steps aiding managers to: (a) identify the existing managerial situations and determine the root cause of undesirable effects (UDEs), (b) develop and analyze appropriate strategies to successfully address UDEs and meet organizational goals, and (c) assess the impact of proposed strategies on various aspects of a system's performance (Dalci & Kosan, 2012). Seminal authors of TOC-TP agree the thinking process is an effective tool that provides project managers with a structured method to identify and address problems preventing an organization from meeting its goals (Dalci & Kosan, 2012).

An NDM framework facilitates evaluation of leaders' behaviors from a cognitive perspective. In addition, NDM impacts the behaviors of leadership—leadership styles and

traits. Using the TOC results in the development of solid leadership by promoting behaviors of leader such as leadership styles and traits. This study describes how the TOC and NDM impact decision making and, thereby, produce successful and effective project outcomes. This results in managers who perform at their highest level when leading agile projects from conception to completion to reach successful project outcome.

Application of Naturalistic Decision Making Model and Theory of Constraints

Project risk is an important issue effecting a project's outcome. A successful project manager's primary concern is to focus on the assessment and management of risk by using available tools to lessen the likelihood of risk. Within the project management field, NDM and the TOC are two approaches used by project managers to reduce risk by improving their management skills.

The NDM model is used to describe how experts make decisions in their natural work environments. The Recognitions-primed decision (RPD) model, a model within NDM, refers to the ability of decision makers to recognize a new situation and chose an approach similar to a situation that worked in the past (Groenendaal, & Helsloot, 2016). NDM has been implemented in a wide array of contexts including those involving firefighters, medical personnel, pilots, military personnel, IT, sports training, weather forecasting, traffic incident management, and others.

NDM has been applied in both controlled and naturalistic settings. For example, in areas such as sports performance, Cotterill and Discombe (2016) found the majority of NDM studies were conducted in controlled settings. While these controlled studies demonstrated the application of NDM to sports, there exists a need for more studies that stress both "ecological validity and representative design" (Cotterill & Discombe, 2016,

p. 63). These studies would be useful across a range of sports to develop talent and improve decision-making skills. With each new NDM application, the findings are applied to NDM thereby enhancing the scope of research on decision-making. As more industries apply NDM methods and tools, greater improvements in understanding and mitigating decision errors can be developed and implemented.

The TOC is a management philosophy which focuses on the weakest link in a chain of processes to gain control and improve the performance of systems. TOC improves resource constraints, project cost, project risk, and project scheduling (Parker, Parsons, & Isharyanto, 2015). The TOC has a wide range of implementation spanning almost every sector and size of companies. TOC philosophy has been implemented in a wide range of systems including production, logistics, supply chain, distribution, project management, accounting, research and development, aerospace, sales, and marketing (Simsit et al., 2014). Applying the TOC process involves tailoring it to the constraints in an organization's system and how the organization plans to manage the constraints.

The literature reviewed on applications of TOC indicates that most organizations focus on process improvement. In a study by Peltokorpi et al. (2016), TOC tools were used in process planning and control practices. However, in a study by Ribeiro, Schmitz, Alencar, and da Silva (2017), the use of TOC in the software development process was rarely addressed or discussed, which suggests possible areas for research. The common theme in the TOC literature is the ability to use TOC to focus on improvement of factors that have the greatest impact on achieving the overall goal. This literature illustrates that the application of the TOC within projects can increase project performance by the successful management of project constraints.

Literature Review

This study focuses on software development project outcomes and their direct relationship to the IT project manager's cognitive style and transformational leadership. This literature review provides a rigorous examination of recent research that describes the current perceptions of software project managers regarding the relationship of cognitive style and transformational leadership to software project outcome. The review describes literature as it pertains to IT project outcome, leadership, project management, and cognitive styles.

Information Technology Project Outcome

Researchers indicate that IT projects continue to fail at a high rate. The Standish Group International Report (2014) indicated that 31% of IT projects are cancelled before completion and 52.7% of projects cost 189% of the original estimates. In the 1970s, project success was determined by the examination of technical aspects of the project, while in the 1980s and 1990s success factors shifted to examine how projects related to the organizations (Davis, 2013). Davis (2013) stated this period of thought resulted in a list of uncategorized success factors demonstrating the importance of understanding project managers and the project team's view of success.

Projects in today's organizations not only provide technical solutions but they are a mechanism to implement change and improve business processes. Project management is designed to ensure the success of a project, but the identification of project success or failure is a subjective concept (Berssaneti & Carvalho, 2015; Müller, 2016). Project success cannot be fully quantifiable due to the impact of subjective judgement of individuals evaluating project outcomes (Serrador & Pinto, 2015). Cecez-Kecmanovic,

Kautz, and Abrahall (2014) suggested that a subjective perspective of project success or failure is not assumed but is perceived by "organizational, socio-cultural, and political processes" (p. 565).

A basic understanding of the concept of a successful project exists and, yet, inconsistences in the topic occur within the project management field. Variations in evaluating project success occur because of the factors used in measuring success. Lehtinen et al. (2014) reviewed existing software engineering literature regarding software project failures and concluded that project failures are most often caused by the project environment, tasks, and people. When project failure occurs in processes, it commonly includes management, sales, and implementation (Lehtinen et al., 2014). Nguyen (2016) argued that some software projects fail because project managers don't perform critical task such as identifying and controlling software risk, adequately monitoring, and addressing variables related to schedules, cost, and scope. Other researchers focused on technical factors such as unrealistic project scope, improper management, introduction of new technology, and organizational issues (Whitney & Daniels, 2013). However, Nguygen (2016) and Lehtinen et al. (2014) agree with other researchers that failures result from interconnection of multiple variables that have relationships to one another.

A performative perspective alters the focus of the assessment from a subjective question of technological success to a focus on socio-material accomplishments performed in and by diverse project managers who continually reconfigure information systems. Cecez-Kecmanovic et al. (2014) proposed the performative perspective as a better option for assessing project success or failure. The performative perspective opens

new possibilities of understanding and provides unique insight into information system assessments.

A common understanding of success is important to reduce subjectivity in determining project success. The IT community recognizes that project success parameters must be defined and accepted by a team at the onset of their project. Project Management Institute PMI (2013) and other authors supported this in stating that criteria for success must be defined during the initiating phase of a project (Heagney, 2013; Joslin & Müller, 2015). The PMI (2013) defined project success as "balancing the competing demands for project quality, time, budget, as well as meeting the varying concerns and expectations of the project stakeholders" (p. 8). Many researchers still term success criteria as the *iron triangle* that includes time, scope, and cost (Bronte-Stewart, 2015; Davis, 2013). These attributes are termed the iron triangle of project management because of the intense connection among them (Bronte-Stewart, 2015). The PMI terms this *triple constraints*.

Literature on the iron triangle discusses potential problems in it use in determining project success (Bronte-Stewart, 2015). Using time, cost, and scope as the sole criteria in evaluating project success can bias against a broader project evaluation (Bronte-Stewart, 2015). When leaders focus solely on these short-term measures, they lose sight of emergent properties produced by the project. Bronte-Stewart (2015) recommended considering a wider range of indicators such as "benefits realization, risk management, stakeholder views, process simplification and efficiency, team performance, methodology issues and lessons learnt" (p. 2). Expanding the view could possibly stress richer aspects of a project's success and failure.

The literature also dealt with other issues including placing too much emphasis on the iron triangle. A potential problem with placing undue importance on time, cost, and scope is the risk that results from project management teams that take a narrow view on their ability to meet these standards (Bronte-Stewart, 2015). This is the difference between measuring project success on tangible benefits of the project versus on the successful management of the project (Bronte-Stewart, 2015). One example of inappropriate emphasis on the iron triangle is the situation in which project A is a business success, but the project manager is dismissed because the project was 3 months late. In this case the team did not meet the three success constraints. Another example is project B, which satisfies the time, cost, and scope criteria, but is a business failure and, thus, does not satisfy benefit for the business.

Projects can meet cost and time requirements but not meet the expectation and specifications of the customer which can cause the project to fail. In addition to time, cost, and scope, it is also important to consider the stakeholder's objective for the project. Both Bronte-Stewart (2015) and Heagney (2013) asserted the importance of involving project stakeholders when identifying project success by focusing on the strengths they bring to the project. According to Joslin and Müller (2015), project success measures of time, scope, and cost have evolved into measures relating to effectiveness and organizational impact. Project stakeholders select success criteria they believe are important in assessing success (Joslin & Müller, 2015). The advanced measures focus includes the stakeholders' needs and other measures such as resources and risk (Cullen, & Parker, 2015). Thus, attributes of measuring project success have evolved to be more quality-based.

The manner in which project managers use scope, time, and cost is a primary determinate in project success. Project success is an ambiguous, inclusive, and multidimensional concept that depends on a specific environment that requires specific skills that change over time (Rodríguez-Segura et al., 2016). These researchers maintained that organizations expect project managers to have a distinct combination of leadership and technical, interpersonal, and cognitive-aptitude skills to achieve a positive project outcome. These skills are in addition to the skills that result from the project management training provided by companies. While every organization should have a clear understanding of what project success means for it, the exploration of the interpersonal skills of project management is more important (Rodríguez-Segura et al., 2016).

Project managers are required to monitor and report to senior leadership any variations in the project rather than waiting until a milestone is reached. Researchers Bronte-Stewart (2015), Heagney (2013), and Rodríguez-Segura et al. (2016) have agreed that project managers must understand the effectiveness and practical application of project management methods. The iron triangle, when utilized effectively, can reduce risks in managing projects.

Leadership

An understanding of leadership comes from years of history taking place over a century. According to Allio (2013), the concept of leaders and leadership can be traced as far back as the sixth century B.C. in the work of ancient philosophers like Confucius, Lao Tzu, and Sun Tzu. In the 1950s, trait theorists conducted studies to uncover characteristics of successful leaders (Gencer & Samur, 2016). Some categories of

leadership traits necessary to be an effective leader include a leaders' physical, social, and intellectual characteristics. A few of the specific leadership traits include patience, the ability to handle stress, persistence, cooperation, and attention to detail (Keil, Lee, & Deng, 2013).

Leadership skills are essential components in equipping executives to make thoughtful decisions geared towards reaching organizational mission and goals. Leaders require the necessary knowledge, skills, competencies, and characteristics to ensure successful completion of projects accomplished using the right decisions and employing individuals capable of meeting project goals (Riaz, Tahir, & Noor, 2013). Allio (2013) asserted it is essential for leaders to develop a work environment that enables followers to coalesce around the purpose of the organization. Goswami, Nair, Beehr, and Grossenbacher (2016) described how a leader's positive humor can result in positive emotions at work and during work engagement. Since leaders must influence the direction of others, effective communication is important. Leaders need to recognize that leadership style and personality traits are critical factors affecting the success or failure of projects.

Leaders are organizational representatives and agents of change. Their actions facilitate others to promote support for organizational goals. Bass and Bass (2009) asserted that leaders are role models that motivate individuals towards defined visions and goals. A leader's personal actions aid in developing the organizational expectations and behaviors of others in the organization which, in turn, influences job performance (Demirtas & Akdogan, 2015). Hocine and Zhang (2014) maintained that leaders motivate and guide subordinates to complete organizational initiatives which contributes to project

outcome. When a project is directed by effective leadership, team performance and productivity is enhanced, work quality is improved, and the probability of positive project results increases (Araújo & Pedron, 2015).

The competencies of the software project leaders, their personalities, characteristics, technical and managerial skills, and their cognitive and leadership styles impact the outcome of software projects. Collaboration is critical for project teams. The performance of each team member and the team as a unit is also critical to achieving project success (Liphadzi, Aigbavboa, & Thwala, 2015). To collaborate effectively, the project team must have productive lines of communication. Besteiro, de Souza Pinto, and Novaski (2015) suggested that communication is the most relevant factor for leading a project. Liphadzi et al. (2015) explained that to achieve success requires leaders to manage in such a way that team members are inspired to perform and that boundaries are set to ensure team functionality. Liphadzi et al. (2015) also asserted that a leader needs to possess a clear vision, clarity in reasoning, practicality in scheduling, and the ability to attract a talented and efficient team.

A project leaders' competencies and style are important to the success of a software project. In a study to identify a project leader's competencies and style, Pandya (2014) identified behavioral competencies useful to project success–leading, personal capabilities, and interpersonal skills. In another study (Bajcar et al., 2015), the authors identified strategic thinking of project leaders as indicators of their leadership style. According to Serrador and Pinto (2015), there is increasing recognition that different types of projects require different methods for their management and leadership and they require management procedures tailored to meet the needs of the specific project.

Transformational Leadership

Transformational leaders are change agents whose goal is helping others succeed. Burns (1978) explained that leaders using transformational leadership to provide vision and mission establish a level of expectation, embrace values, and demonstrate care and concern for subordinates. Burns (1978) posited that transformational leaders encouraged followers to align their personal goals with the goals of the organization. Burns (1978), along with Avolio and Bass (1988), supported this claim in stating that transformational leaders are proactive and that, through their vision and personality, this leadership style enhances the development of individuals in the organization.

The Bass Transformation Leadership Theory was founded on an interest in understanding how leaders influence their followers. Thus, Bass and Bass (2009) decided to expand the views of Burns (1978) and created a theory known as the Bass Transformational Leadership Theory. According to Bass's theory (Bass & Bass, 2009), there exist four dimensions to transformational leadership: (a) role models for followers to emulate and accept their ideas, (b) motivators for followers to attain higher organizational goals, (c) intellectual stimulation to promote followers' creativity and intellectual learning, and (d) offers of individualized attention to followers.

Effective leaders can achieve profound result from subordinates' involvement, cohesiveness, commitment, and performance. Top et al. (2015) emphasized that effective leaders display an extraordinary influence on their subordinates to perform beyond normal expectations. This form of leadership can transform individuals and the organization into a more suitable state to facilitate project success.

Transformational leaders are concerned with differentiating the developmental needs of their followers by attempting to understand the needs and to develop their followers to a higher level (Bass & Avolio, 1996). Transformational leaders help their followers acknowledge the vision of the team working together towards team objectives; they consider members' needs and perspectives, provide intellectual stimulation, and become role models (Kahai et al., 2013). Transformational leaders focus on the developmental needs of the followers and the way followers examine problems; they also encourage followers to put in extra effort to achieve group goals (Soliman, 2016).

Transformational leadership are leaders that transform their employees to perform beyond their own expectations. Because of their connection with leadership effectiveness and follower satisfaction, transformation leaders are assets to their organizations (Breevaart, Bakker, Demerouti, Sleebos, & Maduro, 2014). Dartey-Baah (2015) described transformational leaders as possessing the ability to adapt an all-inclusive and individual approach that meets the needs of the overall goal as well as to be sensitive to the needs of followers. Soliman (2016) described this as *charismatic leadership* whereby the leader can articulate a vision while being sensitive to followers' needs and by demonstrating novel behavior. Transformation leadership offer an informative view into the relationships between leaders and their followers, which is important when investigating strategies used by leader in managing software projects.

Transformational leadership as a source for positive employee response, however, could be further surmised to be an enhancement to the other leadership attribute discussed in this study, namely, the cognitive style of the leader. In a discussion on leadership effectiveness, Ahmed, Azmi, and Masood (2013) stated that most effective

leaders have (a) a high degree of emotional intelligence with both technical capabilities and cognitive abilities such as analytical reasoning, (b) the ability to be a leader of change, and (c) the ability to work well with others. The success factors mentioned in this section, along with project managers applying their transformational leadership style, will bring about project success (Liphadzi et al., 2015).

The *Transformational Leadership Behavior Inventory*, developed by Podsakoff, MacKenzie, Moorman & Fetter (1990), will be used to assess software project managers' self-reported transformational leadership style. The *Transformational Leadership Behavior Inventory* consists of 14 items measuring four dimensions of leadership behavior: articulating a vision, high performance expectations, individualized support, and intellectual stimulation (Breevaart et al., 2014). These four dimensions relate closely to the definition of transformational leadership of Bass and Bass (2009).

Project Management

As the number of IT projects grows and their complexity increases, there is renewed interest in project management. The PMI (2013) defined project management as the application of knowledge, methods, techniques, and tools tailored and applied to specific situations for managing projects efficiently and effectively. Specially, software project management is the linear sequence of activities of requirements, design, coding, and testing. Since 1995, the success rate of software projects has increased; however, only about one-third of projects are meeting scope, time, and cost goals (Schwalbe, 2016). Thus, there remains a need for a more disciplined approach to managing software development projects.

Construction and engineering industries have been using project management tools and techniques since the 1900s. As new industries realize its benefits, project management has grown as a profession. Project management slowly diversified from construction and engineering into other fields such as IT, education, and operations research (Schwalbe, 2016). Projects are unique and temporary, while organizational operations are ongoing and repetitive. As the project management literature evolved, a focus for education and training emerged from academia and the PMI (Seymour, & Hussein, 2014).

There are numerous factors that can contribute to a project not meeting the defined time and cost. Ahmed et al. (2013) observed that projects fail when they don't meet time and cost marks due to low morale and a lack of motivation as well as poor employee interaction, commitment, and productivity. In these observations, Ahmed et al. (2013) found that the human factor plays a critical role in project performance. This raises the importance of the management and leadership role of the manager in project outcome. To achieve project objectives, managers can articulate project vision, organize resources, and motivate and inspire investors to plan and prioritize (Riaz et al., 2013).

Project managers have the important role of overseeing the project, the project team, and, ultimately, project success. To effectively accomplish organizational goals and achieve positive project outcome, project managers must possess essential leadership proficiencies coupled with management skills (Obeidat & North, 2014). These skills are needed to manage problems in the areas of assessment, measurement, and accountability (Medina, 2014). Empowered with these skills, project managers are in the position to use both their knowledge and skills for every aspect of a project (Riaz et al., 2013).

At the very least, project managers should possess business and technical knowledge. Ramazani and Jergeas (2015) determined in their study that competencies of project managers were not dependent solely on knowledge of project management, but also on technical knowledge and leadership skills. Ko and Kirsch (2017) added that project managers often lack clear understanding of the business domain and rely on users to provide guidance during the software develop process. In a paper discussing the evolution of project management, Seymour and Hussein (2014) maintained that project managers' skills must develop to align with an evolving organization, but fundamental elements like leadership, pragmatism, decisiveness, communication, and foresight do not change.

Project teams without a complete and productive mechanism for communication will likely be unable to uncover the challenges and issues of a project which could present management complications. Project managers and other team members need to have good communication skills, since communication plays a significant role in the success of software projects (Ramazani & Jergeas, 2015). The study conducted by Ramazani and Jergeas (2015) revealed the importance of developing project managers' competencies and identified three factors for educational institutions as they develop project managers. The three areas for development are: (a) critical thinking skills to enable project managers to handle complexity, (b) soft skills of managers rather than technical skills, and (c) project managers prepared for real life projects (Ramazani & Jergeas, 2015).

Federal Enterprise Architecture Framework

Over the past decade, several frameworks evolved regarding the implementation and management of enterprise architecture systems. The Federal Enterprise Architecture Framework (FEAF) is a framework adopted by the federal government to establish a common approach for agencies to aid in planning, decision making, business, and technology management (U.S. Executive Office, 2012). The creation of FEAF was inspired by one of the original frameworks—Zachman Framework for Enterprise Architecture (ZFEA). Established in 1999 by the chief information officer (CIO), FEAF was created in response to the Clinger-Cohen Act of 1996. The purpose of the framework was to provide standards for governing business, information, and technology architectures; it was designed to facilitate consistency across the federal government (Bernal, Caballero, Sánchez, & Paéz-Logreira, 2016; U.S. Executive Office, 2012).

Since the Clinger-Cohen Act of 1996, enterprise architecture practices were mandated within the federal government. The FEAF is the directed enterprise architecture for the federal government. It provides a guidance for developing, maintaining, and facilitating enterprise architecture in federal agencies to increase mission effectiveness (U.S. Executive Office, 2012). The framework emphasizes alignment between the agency's strategy, mission, results, and business processes that interact with human and technology resources. Most enterprise architectures are applied to task areas such as project visualization, project planning, project execution, project control, and the development of project and organizational capabilities including continuous improvement, knowledge management, training, and compliance (Browning, 2014). This

describes the use of FEAF for project management that facilitates modeling of the business from strategy to execution.

Agile Project Management

The goal of software engineering is to provide the customer with quality products with no defects and to meet the customer's expectations. As technology advances, projects become more complex with components comprised of advanced technologies (Davies & MacKenzie, 2013). Another source of increasing complexity for project managers is the integration of project components and the integration's effect on the entire project (Davies & MacKenzie, 2013).

For decades, the project management community has followed the traditional project management model for project planning and execution to ensure the successful initiation, planning, execution, monitoring, and completion of projects (Farlik, 2016) until technology advanced an business required an alternative approach (Morris, 2013). The waterfall approach was the most common traditional project management type. Under traditional project management, projects were divided into phases, requirements, design, coding, and testing; each phase was completed before starting the next phase and previous phases were not revisited (Banerjee, 2016). In contrast to this linear sequence of traditional project management, agile project management, a more recent approach, implements short iterative cycles of product delivery (Heidrich, Rombach, & Klas, 2014). Product features are delivered incrementally, and code is integrated continuously. With this method, the customer has a functioning product quickly rather than waiting for completion for months under the traditional model.

Since its inception over a decade ago, agile software development has become a mainstream software development model in use today. Management competencies outlined in the Agile Project Management Handbook stress "flexibility over predictability, value-driven as opposed to plan-driven, with incremental rather than one-shot delivery, putting greater emphasis on a team-based approach" (Taylor, 2015, p. 673). The agile approach was designed to embrace changes during project development. Like the traditional project management approach, agile is set up in phases. Rather than a single, large process model implemented in the conventional software development life cycle, the development cycles are broken into smaller parts and the increments are revisited at each phase of development (Leau, Loo, Tham, & Tan, 2012).

Gandomani and Nafchi (2016a) stated the agile manifest identifies four major agile factors: (a) early customer involvement, (b) iterative development, (c) self-organizing teams, and (d) adaptation to change. In the agile manifest, agile principles are explained with the improved software through customer feedback moving towards final solutions (Leau et al., 2012). Additionally, the agile iterative approach assists in speeding up project execution by delivering results early and often to achieve better control (Špundak, 2014). There currently are six agile development methods: XP, SCRUM, feature-driven development (FDD), TDD, lean software development, and crystal methodologies (Gandomani & Nafchi, 2016a).

The agile project management model has fewer manager roles than traditional models. The IT sector commonly used the SCRUM project management methodology. SCRUM defines the team as a self-organizing team consisting of development team, product owner, and scrum master (Heidrich et al., 2014). The *scrum master* is the

development team organizer who holds meetings to ensure the team addresses any issues encountered. The *product owner* is usually the customer representative who is primarily responsible for prioritizing the development work (Heidrich et al., 2014). Some organizations, such as government entities, assign a project manager to assist the product owner in managing requirements and other matters not directly related to software development (Heidrich et al., 2014). In smaller projects, some roles are similar and can be executed by a single individual; for example, the product owner and the senior user can represent the customer view of the project (Tomanek et al., 2014). If the team leader has scrum master experience, these roles can be combined for one person (Tomanek et al., 2014).

Agile project management (APM) modifies the fundamental way software projects are managed rather than how products are developed. Heidrich et al. (2014) stated that agile changes the team collaboration, coordination, and communication in software projects. In APM, the focus shifts from extensive start-up planning to handling complexity and unpredictability (Heidrich et al., 2014). In APM, being involved during the planning and control of the project improves interaction and communication among the project team members (Conforto, Salum, Amaral, da Silva, & de Almeida, 2014). In addition, APM improves the individual's ability to adapt and learn in a complex development environment (Conforto et al., 2014).

Both the traditional and agile approaches have their advantages and disadvantages; each approach has a role in software development depending on the specifics of the project and its use (Špundak, 2014). According to Špundak (2014), during the early stages of project planning, project managers should keep in mind the

appropriateness of the approaches. Selecting an inappropriate approach will not help achieve project success and could cause additional problems that lead to project failure.

Some research findings demonstrate that the agile project management approach is best suited for creative, innovative projects or innovative product development projects (Conforto et al., 2014; Špundak, 2014). According to the research conducted by Papadopoulosa (2015), agile framework can be successfully adopted for large, distributed projects. Papadopoulos's (2014) results showed that distributed projects can improve quality, allow requirement changes, and improve employee satisfaction during project development. An important characteristic of APM is the priority placed on people, their roles, and the interaction rather than on management processes and tools (Gandomani & Nafchi, 2016b).

The SCRUM methodology is built on teams; teamwork plays a fundamental role in attaining project success. Agile methods stress collaboration and are a people-oriented approach to software development (Hoda & Murugesan, 2016). The use of self-managing teams is a core concept of agile software development. Self-managing teams empower employees and are used as a strategy for learning, improving team cohesiveness, and involving then daily in project management activities (Dyba, Dingsøyr, & Moe, 2014). In addition to software development responsibilities, team members are expected to be highly independent, take ownership, and share project management responsibilities such as estimating, planning, requirements gathering, task allocating, project tracking, and stake-holder collaborating (Hoda & Murugesan, 2016). Under the traditional models, these tasks are limited to project managers and technical leaders.

Government Transition to Agile Project Management

Government organizations operate in a highly complex, dynamic, and regulated environment in which IT is the core element used to support the delivery of service to their customers. For many government projects, the traditional project management methodology, waterfall, is still being used (Mergel, 2016). Software projects with sub-components constituted a large portion of work that experienced increased failure rates (Ghazi et al., 2014; McQuaid, 2012). A new method for managing these types of projects was under evaluation to meet the shifting needs in the project management landscape (Morris, 2013).

A software development process is the practice of dividing development into distinct phases to improve design, product, and project management. In the 1990s, software project managers planned their projects using extensive methodology and workflows designed to capture requirements initially to eliminate rework later (Morris 2013). Methodologies used to achieve this result include waterfall, prototyping, spiral development, rapid application development, and extreme programming. In 2001, leaders within the agile software development movement met to discuss their approaches. They discussed SCRUM, Extreme programming (XP), several others and their commonalities. This resulted in the birth of the Agile Manifesto (Gandomani, & Nafchi, 2016a; Tarwani & Chug, 2016). The complexity and the culture of greater customer involvement, rather than the standard processes of traditional project management, led to the emergence of agile development.

The timeline of agile project management in the U.S. federal government is relatively difficult to construct. In contracts for a government agency, agile project

management practices became more of a requirement in 2010. Mergel (2016) stated that individual agencies incorporated agile concepts and practices into their management processes; however, these early adopters of agile practices experience mixed results. Mergel (2016) explained further that agencies were asked to submit confidential budgets outlining funds needed to incorporate agile management practices. Even with this effort, the Government Accounting Office (GAO) was dissatisfied with federal procedures used for IT assets (Mergel, 2016).

Despite the early adoption of agile practices by individual agencies, most approached agile as an *add-on* to their existing process of operation. The federal government realized that the successful incorporation of agile method will require a major change in mindset and culture. Motivated by negative experiences and management oversight failures, the federal government used the Healthcare.gov software implementation to begin the use of agile development processes (Mergel, 2016). Agile development is performed in *sprint cycles* in which the development team may fail often and early, rather than fail disastrously and waste tax payer's dollar. The latter was demonstrated with the rollout of Healthcare.gov (Mergel, 2016). The Office of Management and Budget (2013) issued guidance urging the adaption of agile methods within government agencies. Today many agencies and programs have adapted agile to improve government management practices and project outcomes.

Cognitive Styles

Software projects involve dealing with trade-offs between characteristics, preferences, and quantities. The trade-offs are balanced with requirements, expectations, perceptions, opportunities, and risks. Cognitive style refers to a wide range of theory

related to information processing and decision making (Luse, McElroy, Townsend, & DeMarie, 2013). Cognitive style is the manner in which individuals gather, process, and organize information (Chatterjee & Dey, 2015; Mello & Delise, 2015). Cognitive style influences how people frame problems and how they perform during decision-making (Chatterjee & Dey, 2015). In this study I used the *Cognitive Style Indicator* (CoSI) by Cools and Van den Broeck (2007) to categorize managers within a three-factor model of cognitive style consisting of knowing, planning, and creating styles.

The CoSI instrument is based on a versatile framework created for a broad range of participants in business and psychology research. CoSI was created in response to the use of a "bipolar unidimensional cognitive style model" (Knockaert, Foo, Erikson, & Cools, 2015, p. 66). Esa et al. (2014) stressed the importance of educating project managers about the cognitive effect on the decision-making process by identifying their personal cognitive styles. Adomako, Danso, Uddin and Ofori-Damoah (2016) explained the CoSI management styles as follows: (a) people with a *knowing style* are characterized as having an ambition for data, facts, and figures, (b) people with a *planning style* are described as people who need structure and value preparation and planning, and (c) people with a *creating style* are intuitive, experimental, and think out of the box.

In studies of cognitive style, there has been some debate over which style is best suited for management. In a study of the cognitive styles suited for management, Armstrong, Cools, & Sadler-Smith (2011) found cognitive styles used in the field of management are diverse, active, and achieving progress while, however, raising more questions than answers. For example, cognitive style has an impact on a person's perception and communication when a person is working in teams. Occupations like

software project management require social interaction and collaboration among team members. The research of Armstrong et al. (2011) found that, despite a general knowledge regarding team dynamics, there remains a shortage of studies on the influence of cognitive styles on project management.

Researchers seem to concentrate more on the technical issues of managers while discounting their soft-skills. In a study of Malaysian project managers, cognitive styles of decision making were examined, based on a psychological perspective, to reveal how project managers organize and process information and make judgements (Esa et al., 2014). How effective managers make decisions is an important human-factor consideration that could be better understood. An important recommendation from the Esa et al. study is that project managers need to pay closer attention to the *Creating Style*. The study (2014) indicated that the *Creating Style* aids project managers in interpreting problems and strategizing in an effective and creative manner.

The body of literature on cognitive style is growing and scholars agree that the topic is studied in diverse research areas. Esa et al. (2014) discussed the two main research areas of cognitive styles: education and organizational behavior management. Armstrong et al. (2011) studied cognitive style from 1969 to 2009. From their work emerged the following eight research areas related to cognitive style: (a) vocational and occupational issues, (b) national culture, (c) teamwork and interpersonal relationships, (d) learning, (e) decision-making, (f) creativity, innovation, and entrepreneurship, (g) sales and marketing, and (h) management information systems, information management and use. According to Armstrong et al. (2012), these areas indicated that a project manager's cognitive style is associated with performance under certain work conditions.

Every organization has its own goals, mission, and objectives that determine the mode of operations. Decision-making is a fundamental part of the management process because it provides insight into how managers with the same skills and abilities make different decisions (Armstrong et al., 2012). Kayode et al. (2014) posited that managers will lead and make decisions based on their organization's goals and objectives. Kayode et al. (2014) explained further that managers cannot make decisions in isolation; they need the support and ideas of subordinates. Subordinates' views should be acknowledged and accepted, especially if they don't go against organizational goals (Kayode et al., 2014).

Knockaert et al. (2015) and other researchers have performed studies using CoSI to determine the impact of cognitive styles on academia, risk preferences, decision-making, information processing, and entrepreneurial self-efficacy (Esa et al., 2014). Other researchers (Muneera & Naziah, 2015; Vanderheyden & De Baets, 2015) have studied the effect of cognitive style on performance and project success. These studies signified that cognitive style is significantly associated with individual performance in a variety of environments. The literature on cognitive style and the decision-making process of project managers provides important insight on organizational psychology.

Cognitive style becomes a part of decision-making when project managers select a style to use in the execution process—including whether to progress forward (Dewberry, Juanchich, & Narendran, 2013). For over a decade, researchers have examined the influence of cognitive style on decision-making. Cognitive style has been found to have an impact on how individuals frame problems and how they behave while making decisions (Mello & Delise, 2015; Zsambok & Klein, 2014). Decision makers

vary their strategies and rationalize choices based on the presenting problem (Zsambok & Klein, 2014). According to Esa et al. (2014), cognitive style influences decision-making based on the rules of *intuition* (right brain orientation) and *analysis* (left brain orientation). As a result, individuals select decision-making processes and strategies compatible with their cognitive style (Esa et al., 2014).

Managerial effectiveness is important for an organization to be successful. Factors such as individual perception, employee relations, work style, trust, manner of thinking and processing information, and organizational climate are elements of cognitive style necessary to achieve managerial effectiveness (Chatterjee & Dey, 2015). Cognitive styles influence the tasks individuals accept in their jobs to make most use of their chosen manner of perceiving and information processing (Chatterjee & Dey, 2015). Moreover, researchers (Gallén, 2006; Khatri & Ng, 2000; Ritchie et al., 2007) have demonstrated that cognitive styles are significantly related to the decision-making process that determines a project manager's performance.

Summary and Conclusions

Organizations use IT as a mechanism to gain competitive advantage. Software that is developed efficiently can improve business processes and simplify complex business problems. As the complexity of software increases, so do the chances of software project failures. Despite the use of software development models and project management methodologies, software projects continue to fail in both the commercial and government sectors.

Researchers have suggested that project managers' cognitive styles are predictors of effective management (Chatterjee & Dey, 2015; Creasy & Anantatmula, 2013). To

effectively manage a software project, project managers must possess leadership proficiencies and managerial skills to meet organizational goals and produce successful project outcomes (Obeidat & North, 2014). The literature clearly indicates that cognitive styles used by project managers in executing project tasks influence project outcomes.

Chapter 2 focused on pertinent literature regarding cognitive styles, transformational leadership, and software project methods and outcomes as they relate to project management. While there are studies regarding project outcomes and transformational leadership (Liphadzi et al., 2015; Riaz et al., 2013), there are few studies that investigate the non-technical or soft skills related to project management that contribute to project success or failure (Esa et al., 2014; Liphadzi et al., 2015). This warrants a study of cognitive and leadership styles and their relation to project outcome. The articles, books, and dissertations reviewed in this chapter lay the groundwork for the proposed study and the methodology described in the next chapter.

Chapter 3 will contain the research design and rationale for the study. I will explain the appropriateness of the phenomenological approach and describe the proposed procedures for investigating software project managers' experiences managing agile software projects and the impact their cognitive style and transformational leadership style have on project outcome. The primary goal of this research is to address the perceived views of software managers regarding cognitive style and managing agile software projects.

Chapter 3: Research Method

The purpose of this qualitative phenomenological study was to describe the lived experience of software project managers' transformational leadership and cognitive styles and how they relate to project outcomes. This chapter includes a description of the method and design of the study. In this chapter, I also discuss the proposed research design and rationale, the role of the researcher, the methodology, and issues of trustworthiness. Chapter 3 ends with a summary of the components used to ensure the trustworthiness of the data.

Research Design and Rationale

The qualitative phenomenological approach used in this research was designed to provide data to answer the question:

> RQ: What are IT project managers' attitudes towards, perceptions of, and behaviors related to the use of transformational leadership and cognitive styles in agile software development environments?

The following subquestions guided this qualitative phenomenological study:

> SQ1: What types of cognitive styles are used by IT software development project managers for decision-making?
>
> SQ2: How do managers' cognitive styles and transformational leadership influence their achievement of desired project outcomes
>
> SQ3: How do project managers perceive the factors contributing to success or failure rates of projects based on their lived experiences?

A quantitative research design is a statistics-based methodology. A quantitative research methodology emphasizes the formulation of hypotheses to study relationships between variables by using preexisting statistical data or polls, questionnaires, and

surveys (Leavy, 2017). Due to the statistical basis of quantitative methodology and the requirement for hypothesis testing, I did not select a quantitative method for this research. Because this study sought to gain an understanding of the underlying insights into how project managers view cognitive style and how the methods of transformational leaders contribute to the outcome of software projects, I did not choose a quantitative methodology.

Other methodologies were considered but rejected as ineffective research methodologies for the research questions to be investigated in this study. A mixed methods design involves the integration of qualitative and quantitative methods into a single study for the purpose of understanding a phenomenon. A mixed method model was selected solely to use the quantitative instrument *Transformational Leadership Behavior Inventory* to identify participants who are transformational leaders. The mixed method approach, with extensive use of quantitative methods, would not have been efficient in providing a rich understanding of the cognitive and leadership styles in the lived experiences of participants who were program managers of software development projects (Patton, 2002).

The perceptions of project management professionals regarding the influence that cognitive styles and transformational leadership have on software project outcome formed the central concept of this study. Personal decision-making processes and strategies are selected based on an individuals' cognitive style (Esa et al., 2014). Project managers' cognitive style influences their attitudes and values as well as their soft skills of collaboration, perception, and attention (Chatterjee & Dey, 2015). Transformational leaders have a strong relationship with their followers; their development of

subordinates' motivation leads to job satisfaction and, ultimately, increased performance of the organization (Girma, 2016).

The review of literature revealed a gap in studies regarding the influence that decision and leadership methods contribute to management of software projects with successful outcomes. For example, Ahimbisibwe et al. (2015) and Anthopoulos et al. (2016) cited a multitude of factors, including poor management, that lead to failure of software development projects. In their study of critical success factors, they demonstrated that many of the causes of project failures stem from poor management. Thus, it is clear that organizations lack an understanding of aspects of management, including qualities of managers, that result in the success or failure of software development projects. Qualitative research provides the structure to observe an organizations' business management processes from the participants' perspective to gain insight and understanding of managers' decision making and leadership styles (Weerawardena, Mort, Salunke, Knight, & Liesch, 2014). I had hoped that the exploration of software project managers' experiences would contribute to the enhancement of organizational social change initiatives that lead to successful software project outcomes.

The phenomenological research design provides a method to interpret the data collected and to describe participants' experiences making decisions and leading agile software development projects. Phenomenological studies explore the conscious experiences that, when compiled and interpreted, proffer the nature of the research participants' reality (Merriam & Tisdell, 2016; Moustakas, 1994). The phenomenological approach permits addressing research questions through the exploration of participants' experiences (Moustakas, 1994). In this study, the exploration pertained to the way project

managers use transformational leadership and cognitive style to manage agile software teams. Interpretive phenomenology provides an instinctive method to data collection and analysis that facilitates delineating participants' experiences with making critical decisions and leading software projects. Van Manen (2014) suggested that phenomenological methods provide the basis for the researcher to reflect on and analyze participants' experiences.

I did not select other research approaches because they would not offer a deep understanding nor explore the complex issues and situations of lived experience pertaining to the various perspectives of individuals in software leadership and management. A phenomenological approach was selected because it allowed data to be analyzed in a manner that enables the researcher to identify patterns and themes. In phenomenology, the focus is placed on the lived experiences of individuals, unlike the case study approach, where the focus is on an individual, group, or event (Merriam & Tisdell, 2016).

A case study is a research design that focuses on a bounded case rather than a population sample. Hyett, Kenny, and Dickson-Swift (2014) stated that the qualitative case study explores a real-life, bounded system (a case) or multiple bounded systems (cases). Case studies use multiple data sources and the findings are case descriptions or themes (Hyett et al., 2014; Simon & Goes, 2013). The research methodology must be driven by the research questions. In case study research, the investigator seeks to answer questions asking *how* and *why* versus phenomenology, in which the researcher seeks to answer the broad question: What is the meaning of a person's lived experience? (Simon, & Goes, 2013).

Role of the Researcher

The role of the researcher is to explore a recognizable human experience and gather detailed information on participants' views regarding the experience. In this study, the experience being explored is how cognitive style and transformational leadership of project managers influence software project outcomes. The phenomenological approach is a viable option for research on this topic because the researcher's role is that of a listener rather than a person who conceptualizes, theorizes, or reflects on the topic (Maxwell, 2013; Patton, 2002). Xu and Storr (2012) described the researcher as a person who does not collect data from a representative sample but who interrogates the data and provides an informed explanation.

The qualitative phenomenological design includes guidelines for accurate sampling and data analysis. Accurate sampling and data analysis include member checking and reflexive methods that minimize bias (Clancy, 2013; Merriam & Tisdell, 2016). The sampling methods are designed to minimize bias and conflicts of interest (Miles & Huberman, 1994; Patton, 2002). In this study, all information regarding participants' current and past experiences were documented and revealed. The ethical procedures for this study are described in this chapter in the section on trustworthiness. The ethical procedures addressed concerns that may have occurred while obtaining, analyzing, and reporting participants' interview responses.

As discussed by Moustakas (1994), I used bracketing to identify any preconceived beliefs about a software development project with which I may have had an association. I used bracketing to mitigate the potentially harmful effects of preconceptions that may taint the research process. As the researcher, it was my responsibility to put aside any knowledge, beliefs, values, and experiences so I could accurately describe participants'

life experiences (see Merriam & Tisdell, 2016). The bracketing process is self-reflecting (known as epoché or phenomenological reduction) and prepares the interviewer to look beyond preconceptions.

There are three main bracketing techniques and varying views on who should bracket (researcher and/or participants). Chan, Fung, and Chien (2013) noted an author expressed the belief that researchers (and not the participants) should employ bracketing, because it is the participants lived experience that the researcher is attempting to understand. Other authors maintain that both the researcher and participants should engage in bracketing by putting aside *assumptions* and *interpretations* in order to simplify the relationship that will form between the two parties. Not employing bracketing may "invalidate," "inhibit," and "disqualify" all assurances with reference to previous knowledge and experience (Moustakas, 1994, p. 2).

To facilitate the epoché process, I used bracketing prior to interviews to capture my preconceptions and assess my personal bias. In accordance with the phenomenological model described by Moustakas (1994), I separated myself from previous knowledge by suspending judgement gleaned from past experiences. Bracketing is the process for acknowledging preconceptions relating to the research and suspending them to mitigate potential harm and to increase the rigor of the study. I solicited a technical member of the agile software development team to take part in this bracketing technique.

Methodology

The evaluation of software project managers' experiences includes a method and design for data collection and interpretation (Miles, Huberman, & Saldaña, 2014; Vagle, 2014). In this section, I discuss components of the qualitative phenomenological study.

The components are participant selection logic, instrumentation, recruitment strategy, data collection, data analysis, and the data management plan.

Participant Selection Logic

For this qualitative phenomenological study, I used several recruitment strategies to select 15 software project managers, the point at which saturation occurred. Participants were limited to IT software development project managers working in government organizations in the Washington, DC, metropolitan area. I used a criterion-based selection process to narrow the list of IT project managers who have managed agile software projects in the last 2 years.

I selected participants based on inclusion and exclusion criteria. Inclusion criteria included (a) project managers working full-time, (b) project managers who have managed government agile software development projects in the last 2 years, and (c) project managers with a transformational leadership style. Exclusion criteria included (a) project managers who have not managed agile software projects within 2 years, (b) project managers who are not transformational leaders, and (c) project managers who are not working full-time. I used a screening form (see Appendix B) in the recruitment of individuals who possessed the attributes that reflected the purpose of the study (Merriam & Tisdell, 2016).

Criterion-based selection. Participants were selected based on a sampling process called criterion-based selection (Miles et al., 2014). In this process, individuals were selected based on the assumption that they have knowledge of and experience with the research topic and could provide information about it with depth and breadth.

Criterion-based selection within this study involved gaining information from software project managers employed at various government agencies.

Snowball strategy. The snowball sampling strategy involved recruiting participants using recommendations from already-acquired participants (Merriam & Tisdell, 2016). Since a sufficient number of participants were not identified using the criterion-based selection process, additional participants were recruited by asking already-identified participants for names of individuals they believe fit the criterion. I then approached those individuals and invited them to attend if they met study criteria. If they accepted, they were e-mailed an informed consent form.

Maximum variation. This sampling technique was used to allow for a wider range of participants with different viewpoints to the study's phenomenon. As stated by Patton (2015), maximum variation sampling involves "purposefully picking a wide range of cases to get variation on dimensions of interest" (p. 267). Other strategies (e.g., snowball and criterion sampling) are used to narrow the range of variation and focus on similarities, while maximum variation focuses on expansion. This sampling technique results in: "(1) high-quality, detailed descriptions of each case, which are useful for documenting uniqueness, and (2) important shared patterns that cut across cases and derive their significance from having emerged out of heterogeneity" (Patton, 2002, p. 235). The range of selected participants should be fair to the larger population. This sampling technique should allow the widest possibility for the readers of the study to connect and apply the findings to their situation.

Saturation. Data saturation is important in qualitative research and achieving it has a considerable impact on the quality of research. However, each research method has its own criteria for reaching data saturation (Lowe, Norris, Farris, & Babbage, 2018). In a

phenomenological study, data saturation is attained differently than in other research approaches. In a phenomenological study, probing questions and the epoché process assist the researcher to probe deeper into the context in understanding the perspective of the participant (Fusch & Ness, 2015; Seidman, 2013). According to Seidman (2013), this process helps to attain data saturation.

Instrumentation

Four instruments were used in this study:

1. Participant inclusion/exclusion screening questionnaire
2. The *Transformational Leadership Behavior Inventory* assessment,
3. The CoSI
4. Interview protocol

Phenomenological assessment of the relationship of cognitive style and transformational leadership of software project managers to project outcomes required gathering, from participants' memories, information on the essence of the phenomenon (Merriam & Tisdell, 2016). The participant inclusion/exclusion screening questionnaire included questions used to determine whether a potential participant met the study criteria. The *Transformational Leadership Behavior Inventory*, developed by Podsakoff et al. (1990) to measure self-reported transformational leadership style, was used to determine if potential participants met the study criteria of demonstrating transformational leadership. The *Transformational Leadership Behavior Inventory*, along with the participant inclusion/exclusion screening questionnaire, was used to determine eligibility for the study. I used the CoSI to identify the cognitive style of study participants. Finally, I created the main instrument, the *Participant Interview Protocol* used to ensure a uniform set of questions were asked of each participant.

Data for the study were collected after obtaining approval and permission from the Walden University Institutional Review Board (IRB). Once approved, I invited participants using the informed consent letter. I e-mailed the letter to screened research participants to thoroughly explain the purpose, benefits, and risks related to the study.

The third component, the interview of the participants, consisted of web conferencing interviews. Interviews followed the interview protocol. If a participant is unsure of any question, I will further elaborate on the question. The interviews included administration of the CoSI, to identify participants' cognitive style as the knowing, planning, or creating style.

Participant inclusion/exclusion screening questionnaire. I used the participant inclusion/exclusion screening questionnaire (see Appendix B) to determine if a potential participant met the criteria for participating in the study. Participants were also given the *Transformational Leadership Behavior Inventory* to determine if they demonstrated a transformation leadership style. Table 2 provides a matrix of the instruments as they align with the research questions.

Transformational Leadership Behavior Inventory. The *Transformational Leadership Behavior Inventory* was used to identify potential participants who demonstrated transformational behaviors. The *Transformational Leadership Behavior Inventory*, a 26-item scale, was developed by Podsakoff et al. (1990) to measure six dimensions of the transformational leadership behavior construct (Top et al., 2015). The dimensions include:

1. articulating a vision,
2. providing an appropriate model,
3. fostering the acceptance of group goals,

4. high performance expectations,
5. providing individualized support, and
6. intellectual stimulation (Bormann, & Rowold, 2016; Podsakoff et al., 1996).

A study by Podsakoff et al. (1990) is recognized as the one that has empirically examined the properties of the *Transformational Leadership Behavior Inventory*. The study participants were rated on the frequency of transformational leader behavior on a 5-point Likert-type scale (1 = never, 2 = seldom, 3 = sometimes, 4 = often, and 5 = always) (Ewen et al., 2013).

Cognitive Style Indicator. This study used a multidimensional cognitive style model to examine the relationship of cognitive style and transformational leadership and its effect on software project outcome. The CoSI was used to determine the cognitive style category of each software project manager participating in the study. The CoSI was developed by Cools and Van den Broeck's (2007) as a tool to measure professional and managerial group cognitive style. The CoSI is an 18-item questionnaire measuring three cognitive styles: the knowing, planning, and creating styles (Cools & Van den Broeck, 2007). Items are scored on a 5-point scale ranging from 1 meaning "totally disagree" to 5 "totally agree." This cognitive model was used in previous research to distinguish entrepreneurs from non-entrepreneurs (Mikuskove, Hanak, & Čavojova, 2015).

Interview protocol. There are various research methods for qualitative research data collection. Web-based surveys, polls, e-mails, interviews, and questionnaires are effective data collection tools to gather information from participants. I used open-ended interview questions to investigate participants' perceptions of their experiences regarding the influence transformational leadership and their cognitive style had on agile software development projects they managed. All interview questions were derived from the study

research questions to ensure participants' responses address the central question and are relevant to the focus of the study. The sequence of questions, which was consistent for all participants, was designed to facilitate genuine responses that describe the relationship of cognitive style and transformational leaders to agile software project outcomes.

Table 2

Matrix of Interview Questions, Research Questions, and Resulting Data

Research Questions	Interview Questions	Instrumentation	Data to be Collected
Introductory/Warm up questions	1. What constitutes a successful project? 2. What constitutes a failed project? 3. Why do some projects fail while others succeed? 4. What is your understanding of cognitive style? 5. What is your understanding of transformational leadership?		Overview of participants' knowledge of project management, cognitive style, and transformational leadership
SQ1: What types of cognitive styles are used by IT software development project managers who demonstrate transformational leadership?		*Cognitive Style Inventory*[1]	Knowing Style Planning Style Creating Style
SQ2: How do the cognitive styles of managers who demonstrate transformational leadership influence the achievement of desired project outcomes?	6. How does transformational leadership affect making decisions on software projects? 7. Do you think there is a link between transformational leadership and project manager success? 8. Do you think there is a relationship between cognitive style and transformational leadership to project success or failure? Please explain your response.		Transformational leadership and: project decisions Project managers' success Cognitive style

Research Questions	Interview Questions	Instrumentation	Data to be Collected
	9. What is your perception of the relationship between your current cognitive style and transformational leadership?		Perceptions of current cognitive style & transformational leadership
	10. How does your current cognitive style and transformational leadership affect software project outcome?		Effect of styles on project outcomes
	11. Would you agree or disagree that projects with mainly Transformational Project Leadership tend to be more or less successful?		
	12. As a software project manager, describe the major leadership challenges you face leading an agile team that are different from leading teams using other development models.		Leadership challenges & strategies used in project management
	13. What strategies do you use to address risk factors that could affect the successful outcome of your project?		
	14. Do you manage project differently today than you have in the past? Describe how your leadership approach is different today than in the past?		Personal evolution of management & leadership styles
	15. Do you have any thoughts, perceptions, insights, or comments about project management of agile project not addressed in the questions above?		Summary remarks

Notes: 1. *Cognitive Style Inventory* developed by Cools & Van den Broeck, 2007

Expert Panel

An expert panel comprised of three members was used to evaluate the open-ended interview questions for alignment with the problem, purpose, and research questions (Jorm, 2015). Panel members included individuals with unique knowledge in specific technical areas and were assembled to proffer opinions based on their experiences (Damberg et al., 2014; Jorm, 2015). Each panelist was provided a brief synopsis of the study and a list of interview questions. Panelists were asked to evaluate the open-ended questions for clarity, appropriateness, and relevance. A follow up e-mail to panel members included revisions to the interview questions for their approval. Feedback from the panelist facilitated a basis for modification and addition of questions to ensure the questions met the requirements for creditable data collection and analysis.

Potential panel members with academic or professional expertise in project management were invited to participate on the expert panel. E-mail invitations (see Appendix C) were sent to individuals within the management fields of academics, business, and IT. The invitation e-mail outlined the research problem, purpose, and conceptual framework that was used to examine the influence of project managers' cognitive style and transformational leadership on project outcome. Three expert panel members were selected through an e-mail invitation.

Expert Panel Qualifications and Feedback

The expert panel, industry experts with a professional background in project management, consisted of two women and one man. The panel members included experts who have published books and research articles on topics on project management. An

industry leader and consultant in the field of project management and change management was also included.

Expert Panel Member A is the executive director/dean student of affairs at a fully accredited university. Prior experience consisted of 14 years of professional background including working as a corporate executive for top Fortune 500 companies. This work included leading teams in the areas of organizational development, quality management, process improvement, change management, and human capital. Expert Panel Member A has an extensive background in management–specifically change management. Coming from a management background, Expert Panel Member A understands that a project manager's decisions and leadership style, specifically transformational leadership, effects both a project's goal and the goals of the organization. Expert Panel Member A has published six books and articles in several review journals. Expert Panel Member A holds an Associate of Applied Sciences degree in Business Management, a Bachelor of Science degree in Psychology, a Master of Arts degree in Management, and a Ph.D from a fully accredited university in Applied Management and Decision Sciences with a specialization in Leadership and Organizational Change.

Expert Panel Member B is a consultant, practitioner, speaker, trainer, and author in the IT industry. Expert Panel Member B is a faculty member at two fully accredited universities. Expert Panel Member B has worked for these two universities for over 10 years instructing undergraduate- and graduate-level courses in computer science and business. Prior experience includes 10 years as a senior project manager for an aerospace research center leading four multi-unit cross-functional teams that designed and delivered a space shuttle that met time and functional requirements. Expert Panel Member B's

project management background includes, but is not limited to, project planning and leadership, collaboration with management and external agencies, and project scheduling. Expert Panel Member B has written and published a book titled *Outsourcing Information Technology*. Expert Panel Member B holds a Bachelor of Science degree in Accounting, an MBA in Business Management, an MBA in Accounting, and a Ph.D. in Information Systems, Applied Management & Decision Sciences.

Expert Panel Member C has over 12 years of experience as a project manager working with organizations utilizing enterprise resource planning (ERP) and customer relationship management (CRM) systems. Expert Panel Member C began a career as a Unix System Administrator and evolved into positions that included project manager for the U.S. Army and Air Force in a joint environment. Expert Panel Member C then transitioned as a freelance data consultant helping businesses better understand their data through analytical insights and visualizations using SQL and Excel. Expert Panel Member C has written a scholarly article in *The International Journal of Applied Management and Technology* and other articles that can be found in the ACM Digital Library. Expert Panel Member C is currently a faculty member at a fully accredited university teaching mathematics. Expert Panel Member C has a Ph.D. in Information Systems, Applied Management and Decision Sciences from a fully accredited university.

I provided the expert panel members the research problem, purpose, research questions, and the interview questions. The expert panel members reviewed the interview questions for alignment with the research problem, purpose, and research questions. The expert panel members did not recommend any changes to the original interview questions. Expert Panel Member B recommended three additional questions, which I

incorporated into a list of 15 interview questions (see Appendix A). Expert Panel Member B recommended a total of 10 interview questions. I considered her recommendation. I removed interview questions number 7 and 8 from the original interview questions. I decided not to remove additional questions to meet the limit recommended by Panel Member B because I wanted to ensure I covered all aspect of this research study including cognitive styles, project management, project success, transformational leadership, and agile project management. A copy of the revised interview questions (see Appendix A) was sent to the expert panel members for final review. The expert panel participants did not offer any additional changes to the questions.

Recruitment

Recruitment began once approval from Walden University's IRB was received. Upon gaining permission to conduct my research, I identified and obtained consent from 15 participants. Seminal authors of phenomenological research indicate that small sample sizes typically range from 6 to 25 participants to ensure rich, thick descriptions (Moustakas, 1994; Van Manen, 2014). This range is desirable because of the in-depth nature of the information shared among participants. Sampling is considered continual, and it is recommended that researchers gather participants until the point of saturation is reached (Merriam & Tisdell, 2016). Sampling saturation occurs when no new data emerges during research participants' interviews (Fusch & Ness, 2015; Merriam & Tisdale, 2016). However, knowing when saturation occurs is challenging (Merriam & Tisdale, 2016). It was expected that obtaining permission from 15 participants before data

collection began would allow sufficient sampling and analysis of the research phenomenon.

I identified potential participants in the following ways.

- I mailed the recruitment flier to local representatives of the PMI chapters in the Washington DC metro area requesting permission to distribute the flyer.
- I posted the recruitment flier (see Attachment E) on the Walden participant pool's virtual bulletin board.
- I identified potential participants by reviewing the publicly available database/membership list of LinkedIn to identify current members with technology backgrounds and sent them an e-mail with an electronic copy of the recruitment flier (see Attachment E).

The recruitment flier was designed to invite individuals interested in participating in the study to respond to me using the telephone number listed. When potential participants contacted me, I asked them the screening questions (see Attachment B) to determine if they met the initial criteria listed on the recruitment flier (see Attachment E). I recorded the name, e-mail address, and phone number of individuals who expressed interest in participating in the study. Of the 18 interested participants, 15 eventually met the screening criteria.

Recruitment was conducted in two phases. The first phase was a two-step screening process. Once I receive confirmation or intent to participate, I sent the participant inclusion/exclusion screening questions (see Appendix B). These questions served in determining if the participant fit the criteria for this study.

I sent the informed consent form via e-mail to the 15 participants that met the screening criteria. The Informed Consent Form thoroughly explained the purpose, requirements, benefits, and risks related to the study and indicated that all personal information would be kept confidential and that their participation was voluntary. In the e-mail, I asked them to review the inclusion criteria and the information on the Informed Consent Form and, if they were still interested in participating, to return the completed form indicating they met the management criteria and they consented to participate in the study. I then requested that participants to e-mail their intention to join within five calendar days. To ease any concerns regarding participation in the study, I emphasized that all information discussed would be kept strictly confidential. I emphasized that the study was voluntary, and that, at any time, participants have the option to withdraw their participation for any reason without any repercussions. After the participants completed the interview, I presented a $5 gift card as a small token of appreciation for taking the time and effort in this study.

I conducted the second step of the screening process by verifying that the individual possessed the behaviors of a transformation leader. This was accomplished by administering the *Transformational Leadership Behavior Inventory*. If their *Transformational Leadership Behavior Inventory* score indicated that they are a transformative leader, they were invited to participate in the study interviews.

Data Collection

The data collection process followed the phenomenological interviewing process (Vagle, 2014). The phenomenon of the study, as experienced by the research participants and described in the research questions, was the driver of the methodology used in this

study. I collected research data through either face-to-face interviews or a video conferencing interviews using either WebEx and UberConference. Video conferencing was selected over face-to-face interview sessions. While there are advantages to face-to-face interviews (i.e. ease at establishing report, body language and facial expressions are identified and understood), video conferencing was used to accommodate the geographically diverse group of participants. Video conferencing allowed for greater flexibility and efficiency, and it was considered an excellent substitute for face-to-face interaction. Given the participants were technical project managers and 'tech savvy', each was comfortable and, in most cases, indicated a preference for video conferencing. Data collection incorporated the steps and processes necessary to gather and prepare interview documentation for analysis. The data collection phase lasted approximately 7 months.

I used e-mail to schedule a convenient time for the teleconference interviews. The interviews were semistructured. This ensured collection of rich data while allowing flexibility and facilitating a participant-guided interview (Merriam & Tisdell, 2016). The target population for this phenomenological study included software project managers who used agile methods to manage software development projects (Yin, 2014).

In preparation for the interviews, I prepared a folder for each participant. The folder contained: (a) informed consent letter, (b) inclusion screening questions, (c) results of the *Transformational Leadership Behavior Inventory* questionnaire and the CoSI, and (d) the interview protocol with note sheets. A 45-60-minute time frame was scheduled for each participant interview (Seidman, 2013). During the interview, a voice recorder was used to record the participant's responses to the interview questions. Participants were encouraged to respond truthfully while sharing their perceptions and experiences. Patton

(2015) advised qualitative researchers to avoid making assumptions when interviewing participants. I avoided generalizations and asked for clarification of responses that were not clear. This approach was used to secure valid and reliable responses. Figure 3 summarizes the data collection process used in this study.

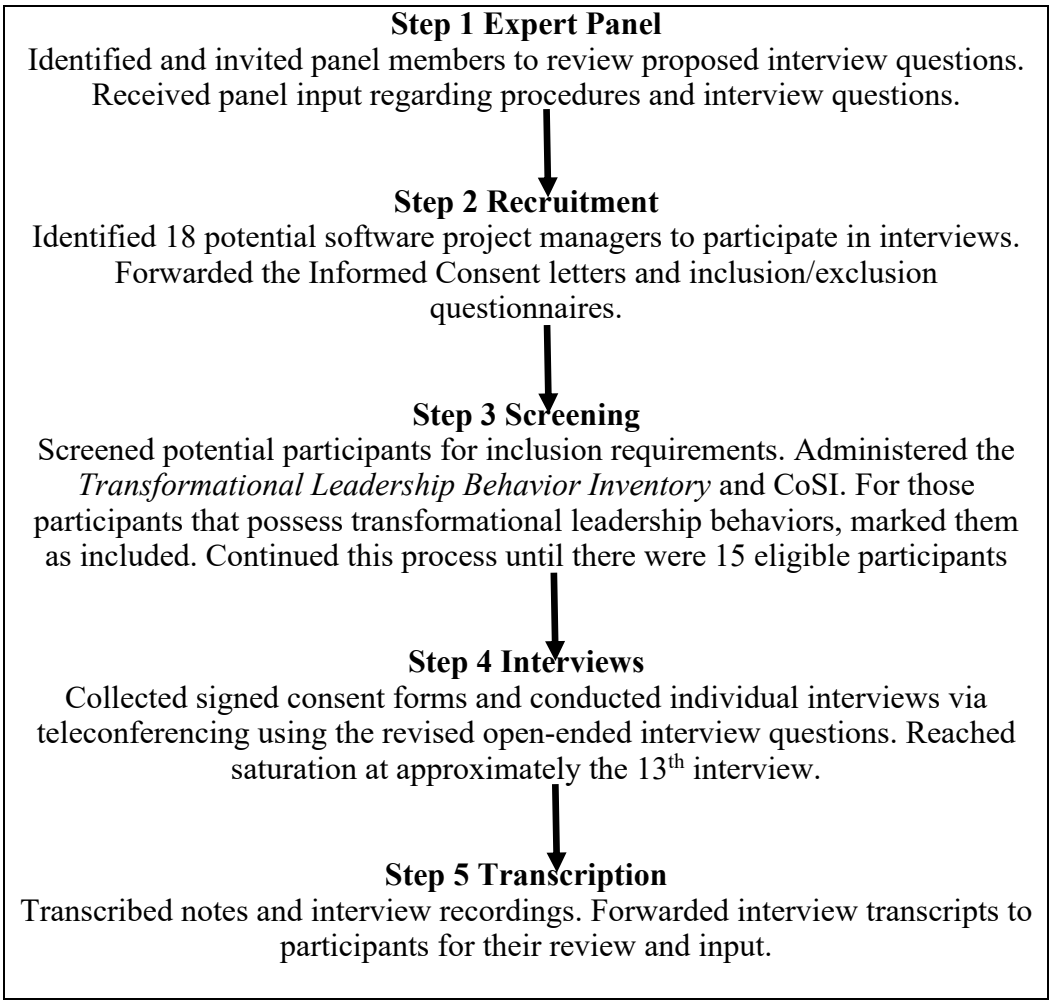

Figure 3. Data collection process flow chart.

Data collected consisted of participant interviews and my observations. All digitally recorded data were accessible only to myself. Five years after the conclusion of this study, all notes, paper artifacts, and digital artifacts will be destroyed. If participants had chosen to withdraw from the study, their data would have been purged. No participants withdrew from the study. The informed consent and debriefing process information addressed in the ethical procedures section of this chapter describe my intentions regarding the protection of participants' rights.

Data Analysis

Qualitative data is particularly varied in nature. Data analysis, according to Merriam and Tisdell (2016), is performed simultaneously with data collection. Phenomenological data can essentially have any information that can be captured but aren't numerical. With a phenomenological approach, data are words that require translation into text. These data must be processed before they can be analyzed; raw data must be cultivated and crafted into text that is readable to both the participant and the researcher (Miles & Huberman, 2014; Vagle, 2014).

Further, in processing the data, the researcher interprets information provided by participants regarding the phenomenon in order to develop a deep understanding of the phenomenon (Merriam & Tisdell, 2016). Removal of the researcher's personal meaning within data collection and analysis will reduce researcher judgements. Moustakas (1994) proposed that qualitative phenomenology inquiry is a rigorous analytic process during which the researchers' biases and predetermined ideas are put aside to elucidate truth and reality. Vagle (2104) confirmed that data analysis methods should reduce bias that hinders participants' interpretation of their experience. The collaboration of data collection, analysis, and interpretation are the activities in qualitative research that contribute to the quality of the research inquiry.

The data analysis plan contains qualitative procedures used to reduce biases that can jeopardize the trustworthiness of participants' responses and research interpretation. The data analysis plan included the following procedures: (a) member checking, (b) bracketing and reduction, (c) delineating and constructing meaning units, (d) horizontalizing, and (e) interpreting participants shared experience. The five procedures

were used to accentuate the lived experiences of software project managers using their cognitive style and transformational leadership behaviors to progress agile projects towards a successful outcome. I used the following data analysis procedures.

Member checking. The trustworthiness of results is the foundation of high quality qualitative research. Member checking is a procedure in the data analysis plan that allows researchers to verify their understanding of data and to build credible results. Birt, Scott, Cavers, Campbell, & Walters, (2016), in citing Lincoln and Guba (1985), recommended member checking as a means of promoting rigor, thus proposing that credibility is enhanced by the accurate description and interpretation of the participants' own meanings and perspective. I compiled and transcribed data from participant interviews. During member checking, I provided research participants with a transcription of their interview for them to verify the accuracy of the data collected (Harper & Cole, 2012; Vagle, 2014). A follow-up meeting or telephone call was available if needed to clarify the participants' questions or concerns regarding the transcript. The conversation allowed time to clarify interview questions and confirm that the information in the transcript was an absolute representation of the participant's experience.

Bracketing and reduction. *Epoché* or bracketing and reduction was conducted during the data collection phase. According to Husserl (2002), bracketing and reduction occurs regularly during the data collection and analysis stages of the study. Epoché and reduction represent two conditions required for successful phenomenological research (Van Manen, 2014). In phenomenological interviewing, the researcher must bracket their beliefs and knowledge to allow the emergence of themes that develop from the participants' description of their experiences (Bevan, 2014). Reflexive journaling was the

form of bracketing used to gain insight and separate the investigator's reactions from past encounters and present research (Tufford & Newman, 2012; Vagle, 2014). Aligning the methods defined by Tufford and Newman (2012), bracketing and reduction was used to help diminish barriers that could prevent the effectiveness of the researcher. Implementation of this bracketing and reduction technique helped with the coding and with the interpretation of the perceptions of the participants regarding the influence of cognitive style and transformational leadership on project outcome.

Delineating meaning units. Delineating meaning units involves defining and interpreting participant's responses that are audio recorded. Using meaning units consists in extracting those words, phrases, or sentences that describe the experience under study (Grossoehme, 2014). DeFelice and Janesick (2015), in citing Giorgi (2009), similarly described meaning units as a semantic revealing of unknown feelings of the lived experience of a person. I delineated meaning units to provide a simple understanding to find themes conveying the essential meaning of the project manager's lived experiences.

Horizontalization. Horizontalization involves clustering meaning units and giving them equal worth (Miles et al., 2014). Assembling the significant units from individual interviews provides the parts needed to generate a list of statements representing the participant's own words. I examined these significant statements and transformed them into expressions that could be directly related to participants' responses. I analyzed the interview data for meaning in relation to the phenomenon (Vagle, 2014). Each description was read first in its entirety to allow me to get reacquainted with the data. Then I identified follow-up questions and performed multiple line-by-line readings. Line-by-line reading included note-taking and marking passages

that contributed to text regarding the phenomenon (Vagle, 2014). A final line-by-line reading was performed to articulate patterns based on the markings and notes. Subsequent readings were executed with the goal of seeking what Vagle (2014) describes as *tentative manifestations* and Van Manen (2014) identifies as *themes*. A summary of my reflections during data collections and analysis minimized issues of trustworthiness within the creditability and confirmation of project manager participants' explanations (Vagle, 2014)

This data analysis plan included a data reduction process that focused on the only data relevant to the research questions. Member checking addressed discrepant and inapplicable data (Maxwell, 2013). Where incomplete or inadequate interview responses were discovered, member checking was used to confirm or disconfirm evidence. Member checking generated information for follow-up discussions with participants to clarify and amplify meaning (Vagle, 2014).

Epoché and reflexivity represent the two conditions required for successful phenomenological research (Giorgi, 2009; Merriam & Tisdell, 2016; Van Manen, 2014). Epoché, used throughout the analysis process to support validity through nonbiased analysis and interpretation of the data, contributed to the need to identify saturation of the data, wherein no additional information was being revealed from the data (Fusch & Ness, 2015; Guest et al., 2006) and the study was considered replicable (O'Reilly & Parker, 2012). This activity helped to support the validity of the study. Based on the phenomenological design, all confirmed information contributed to exploration of the influence that software project managers' cognitive style and transformational leadership had on project outcome.

Data Management Plan

Data management and analysis are inherently related throughout the research process and must be organized such that the data can be easily retrieved. I analyzed interview data for meaningful themes, characteristics, and descriptions (Maxwell, 2013). To accomplish this analysis, I used the NVivo 11 software application. Software applications like NVivo allow researchers to organize large volumes of information (Miles et al., 2014).

Miles and Huberman (1994) reported five principals of proper storage and retrieval of qualitative data. These data management principals are:

- formatting method to structure, transcribe, and document interviews;
- cross-referral procedure used to reference participants' information from one file to another for ease of retrieval;
- indexing, a coding system performed to identify and organize terms as they evolve from participants interviews;
- abstracting procedure to condense lengthy text into brief and concise summary while retaining a link back to the original notation; and
- pagination using unique numbers or letters to assist with location of terms in interview transcripts.

A data plan is vital in conducting qualitative research in that the steps described in this section for storing and retrieving information supported effective analysis.

Issues of Trustworthiness

Lincoln and Guba (1985) posited that trustworthiness in qualitative research is cultivated through credibility, dependability, confirmability, transferability, and

authenticity. Vagle (2014) supported this position by proposing the use of quality and creditability to establish value within research roles and methodologies. Evaluating issues of trustworthiness strengthened the data collection and analysis of participant cases.

Credibility

Credibility refers to the believability of study results from the perspective of the participants involved in the research (Houghton, Casey, Shaw, & Murphy, 2013; Elo et al., 2014; Vagle, 2014). Qualitative research credibility is enhanced when the researchers' findings are believable to the participants of the research and to other people outside the study who share a similar experience. Lincoln and Guba (1985) argued that ensuring credibility is one of most important factors in establishing trustworthiness.

The goal of qualitative research is to demonstrate through creditable means and to supply evidence of research rigor in the articulation, verification, and arrangement of data collection practices (Miles et al., 2014). During the sampling process, I attracted and retained participants by establishing creditability of the study methods and design. For this study, techniques such as peer review and member checking were used to enhance the credibility of findings. Initially, I established rapport with participants by discussing the research objectives to minimize participants' misconceptions about the interview process as well as to increase understanding of the scope of the management of project data. The informed consent process helped to explain to participants the research objectives, interview process, and participant rights. These steps assisted in establishing the level of trust needed to achieve thick descriptions of participants' experiences.

Transferability

In qualitative research, transferability is the ability of the reader to see that the research findings are pertinent to other situations, times, and populations (Lincoln & Guba, 1985). Audio recordings and notes taken during interviews helped create and access a thorough understanding of the research topic. During data collection, thick descriptions provided robust and detailed accounts of participants' experiences regarding the influence their cognitive style and transformational leadership had on agile software project outcomes. Lincoln and Guba (1985) discussed thick descriptions as describing the phenomenon in great detail to show, upon evaluation, that the research findings are transferable to other situations and people. Maximum variation in the selection of participants ensured representativeness and diversity of organizations and individual participants (Palinkas et al., 2015). The selection strategy facilitated the selection of participants from different government agencies and businesses to provide a fundamental understanding of the components that inspire software project managers' experiences.

Dependability

Dependability is similar to internal reliability in quantitative research in that dependability relates to the researcher's ability to repeat a study with the same participants and to reach similar results. Dependability refers to how stable the data are. Lincoln and Guba (1985) supported this claim by stating dependability results in research findings that are consistent and repeatable. Cuthbert and Moules (2014) explained dependability as verification that the procedures in the research were "logical, traceable, and clearly documented." The detailed description of the data collection practices is pertinent to future research replication. Lincoln and Guba (1985) suggested the use of

inquiry audits to institute dependability. For this study, audit trail was used to document steps taken to initiate contact with participants, to collect data, and to conduct the analysis.

Confirmability

Confirmability is another foundational criterion supporting trustworthiness; it refers to the neutrality and accuracy of the data. The researcher must demonstrate that the data represent the participants' genuine responses of their perspectives without the researchers' biases or viewpoint interfering with the findings (Podsakoff et al., 2016; Houghton et al., 2013). The researcher can establish confirmability by describing how conclusions and interpretations are developed and how the research findings were derived directly from the data.

An audit trail was used throughout the study to provide visible evidence of the research decisions and activities. Guba and Lincoln (1985) discussed an audit trail as a record-keeping process of all procedural decisions, such as data sources, sampling, decisions, and analytical procedures and implementation. Confirmability is established through the recording of activities over time in such a way that anyone outside of the study can follow the evidence and thought processes that led to the conclusions (Anney, 2014; El Hussein, Jakubec, & Osuji, 2015). The level of detail in the audit trail should be sufficient enough that other researchers can repeat the same inquiry in the same setting.

Ethical Procedures

The collection and analysis of participant interview data require the researcher to follow ethical standards and strict codes of conduct (Maxwell, 2013). Decisions a researcher makes should account for data collection and analysis, participant

relationships, validity concerns, and ethics (Maxwell, 2013). The process of gathering data through participant experience may pose an issue when measures do not exist to ensure the safety of human research participants (Miles et al., 2014). The relationship a researcher plans to establish for those involved in the study is important but is not an explicit part of the study design.

Ethical principles and standards, such as informed consent, role of the researcher, and description of participants, are described in this section. They demonstrate the relationship between the standards and the actions to be taken. This ensures the greatest protection for the participants, the researcher, and others involved in the study.

Institutional permissions. Institutional permissions include IRB approval. Data from participant interviews were not gathered until the IRB approved the research proposal. The IRB number for this study is 01-03-18-0088416 with an expiration date of January 2, 2019. The sampling strategy enabled a focused selection of research participants. Participants' name and other personally identifiable information will remain confidential and be destroyed after use. Researcher ID numbers will be assigned and will be used to identify participants in the research findings. Transcripts, audio recordings, and journal notes from interviews are stored in a password protected, encrypted, external hard drive to prevent unauthorized access. Electronic files will be kept for 5 years. All data will be shredded and removed from physical and computer storage devices according to IRB guidelines and requirements (Miles et al., 2014).

Informed consent. An informed consent was signed during the participant selection process and before interviews began. The informed consent identifies the research objective, clarifies that participation is voluntary and confidential, and delineates

participants' rights. Participants were informed of their right to withdraw from the interview or study at any time. The debriefing process, held after the interview, clarified questions and concerns regarding the study.

Debriefing process. The debriefing process establishes follow-up communications plan and instructions for the member-checking process. The debriefing process was conducted at the conclusion of the interview. During the debrief, I reiterated the participants' rights outlined in the informed consent and provided an approximate turnaround time for review of transcripts. Participants were advised that, upon initial review of the transcript, a follow-up meeting would be held to go over participant questions and inconsistencies discovered during review of the interview transcripts. The participant can select the median for this meeting: face-to-face, Video conferencing, e-mail, or telephone conference although inconsistences in documentation and interpretations are best resolved at a face-to-face meeting.

Data security. Data management is crucial for the protection of research participants and to allow researchers to share their results with the public. Storage of information on a password protected, encrypted device will ensure the security of research documents including transcripts, digital recordings, and computerized data. Procedures to secure data included backing up all information to a separate drive. Backups of digital recordings, journals, instrumentation, and forms were secured in a locked safe. Digital software and equipment were updated to ensure efficient data recording, analysis, and reporting.

Data management practices are essential to the integrity and implementation of methods identified within this qualitative research inquiry (Miles et al., 2014; Vagle,

2014). Upon conclusion of this study, all notes, paper artifacts, and digital artifacts will be destroyed after 5 years. I will take every precaution to maintain a secure platform for data analysis and accessibility.

Summary

This chapter addressed the methodological aspect of this phenomenological study including the research design, research population, participant selection, and data collection process. It also included data management, privacy and confidential protocols, detailed systematic and analytical process, validity and reliability measures, and research tools/instruments and how they apply to data evaluation. The processes and devices explained in this chapter are considered appropriate to derive informationally rich and thick descriptions from software project managers who will provide a lens to their phenomenological experiences. Chapter 4 will include the findings, which consist of the patterns, relationships, and themes from the analysis of the collected data. Chapter 5 will include the interpretation of the research findings and a discussion of recommendations for future research as well as implications for positive social change.

Chapter 4: Results

The purpose of this qualitative phenomenological research study was to explore the lived experiences of software project managers using their cognitive style and transformational leadership behaviors to progress agile projects towards a successful outcome. Obtaining software project managers' perceptions of challenges in leadership and decision-making may assist in better understanding what can aid in increasing positive project outcomes. Hindrances affecting the successful outcome of software projects may be caused by improper decisions and ineffective management. An understanding of these hindrances may assist in identifying and implementing strategies to mitigate problems and improve project outcome.

This study addressed the problem of leadership and decisions that continue to negatively affect the outcome of software development projects. The research questions addressed by this study were:

RQ: What are IT project managers' attitudes towards, perceptions of, and behaviors related to the use of transformational leadership and cognitive styles in agile software development environments?

SQ1: What types of cognitive styles are used by IT software development project managers for decision-making?

SQ2: How do managers' cognitive styles and transformational leadership influence their achievement of desired project outcomes?

SQ3: How do project managers perceive the factors contributing to success or failure rates of projects based on their lived experiences?

The interview questions were derived from the research questions. This chapter presents the data collected through semistructured, teleconferenced interviews with 15 voluntary participants who were identified as agile software project managers. I analyzed interview responses describing participants' experiences using Van Manen's (2014) Husserlian phenomenological approach, which resulted in identification of a number of common themes. The chapter is divided into the following sections: (a) the expert panel, (b) the research setting, (c) the participants' demographics, (d) the data collection method, (e) the data analysis, (f) evidence of trustworthiness, and (g) the results of the findings. The chapter concludes with a summary transitioning into Chapter 5.

Expert Panel

I convened an expert panel comprised of three members to evaluate the open-ended interview questions. The open-ended interview questions were evaluated for alignment with the problem, purpose, and research questions (Jorm, 2015). Panel members possessed an academic and professional expertise in project management fields of academics, business, and IT. Panel members included individuals with unique knowledge in specific technical areas and were assembled to proffer opinions based on their experiences (Damberg et al., 2014; Jorm, 2015). Each panelist was provided a brief synopsis of the study and a list of interview questions.

Panelists evaluated the open-ended questions for clarity, appropriateness, and relevance to the main research question. I made revisions to the interview questions and then sent them to the panel for their approval. Feedback from the panelists facilitated a basis for modification and the addition of questions to ensure the questions met the requirements for creditable data collection and analysis. Three expert panel members

were selected through an e-mail invitation. The invitation e-mail outlined the research problem, purpose, and conceptual framework that I used to examine the influence of project managers' cognitive style and transformational leadership on project outcome.

Research Setting

Recruitment

I collected the data for this study using a qualitative phenomenological approach. To recruit participants, I presented my research to three local PMI chapters. Local PMI chapters distributed my recruitment flyer prior to my presentation, and I met with chapter members after the meeting to answer questions about the research. Research flyers were distributed to over 50 chapter members in the Washington, DC, metro area.

Using LinkedIn, I contacted an additional 60 individuals (both men and women) identified on LinkedIn and who appeared, from their descriptions, to meet the research criteria (see Appendix B). I sent an introductory e-mail to the 60 individuals, which resulted in seven participants expressing interest in the study. Presentations at various PMI chapter meetings resulted in two participants meeting the research criteria. The distribution of the recruitment flier resulted in four participants meeting the research criteria. Two additional participants were referrals from a current research participant and associates recruited through snowball strategy.

To meet study criteria, potential participants needed to pass a screening identifying them as possessing transformational leadership. A total of 15 participants met criteria and participated in the data collection activities. Table 3 summarizes results of recruitment.

Table 3

Recruitment Sources

Recruitment source	Number recruited
LinkedIn	7
PMI chapter meetings	2
Referred by a study participant	2
Recruitment flier	4
Total	15

During recruitment, the 15 potential participants completed a leadership assessment, the *Transformational Leadership Behavior Inventory*. The *Transformational Leadership Behavior Inventory* is used to identify individuals as having or not having transformational leadership behaviors. In this study, I used it to verify that participants practiced transformational leadership. The CoSI, which I also administered to study participants, identified each participant as possessing either the *knowing*, *planning*, or *creating* cognitive style.

Interviews

Participants were required to sign the consent form prior to starting the research process. In preparation for interviews, I sent participants a list of the questions that were to be used during the interview. Before each interview, I sent reminder e-mails to participants to verify they had received and reviewed the interview questions. Additionally, I verified that the participant could connect and receive audio using either WebEx Conferencing or UberConference. All interviews were scheduled outside working hours.

Only the participants and I participated in the interview process. The conference call was recorded using the online conferencing tool recorder and a portable digital recorder as a backup in the event the online recording failed. Use of online conferencing was chosen for the convenience of the participants. In order to maintain confidentiality, participant numbers (P01 to P15) were used in place of participant names on all audio and electronic documents.

Demographics

This research study involved examining the lived experiences of software project managers using the agile development model. The demographic information collected from participants included their organization type, their management experience, and their project management experience using agile methods. The target sample size for this study was 15 to 18 participants. None of the 15 participants who provided information for the study worked for the same organization.

Table 4 presents participants' demographic information. Five participants worked in the commercial arena and 10 in government agencies. The length of time participants worked in management positions ranged from 5 to 30 years with an average of 10.3 years and a median of 11 years. Participants' years managing agile teams, specifically, ranged from 2 to 15 years with an average of 7.1 years and a median of 7 years. Table 4 summarizes participants' demographic information. These data demonstrate that each of the participants had the lived experience to respond adequately in a descriptive, qualitative phenomenological study of leadership and cognitive style and management of agile software projects as described in Chapters 1 and 3.

Table 4

Participant Demographics

Participant	Organization type	Years of management	Years managing agile teams
P01	Government	11	9
P02	Commercial	8	5
P03	Government	15	5
P04	Government	8	7
P05	Government	10	10
P06	Commercial	15	7
P07	Government	30	10
P08	Government	11	2
P09	Commercial	9	9
P10	Commercial	5	3
P11	Commercial	15	8
P12	Government	7	7
P13	Government	22	5
P14	Government	25	15
P15	Government	10	5

Data Collection

Data saturation was achieved after conducting 13 interviews. To obtain data saturation, I interviewed 13 participants; two more participants were then interviewed to confirm that saturation was achieved. A semistructured interview protocol was the primary method of data collection. Ten software managers worked in government agencies. The remaining five software managers worked for commercial companies. This is a change from the original collection plan stated in Chapter 3 in which participants would be limited to project managers working in government organizations in the Washington, DC, metropolitan area. Due to limited responses from individuals working

in government agencies in the Washington, DC, area, the participant search was expanded to organizations, governmental and commercial, outside the area.

Data collection began after I received approval from the Walden University IRB on January 3, 2018. Data collection lasted approximately 28 weeks during which I conducted 13 interviews (90%) using WebEx Conferencing and two interviews using Uber Conferencing (10%). The recording device of both conferencing platforms was used for the interviews. I also used a digital recorder as backup in the event something happened with the online device.

Instrumentation

The following four instruments were used in this study:

1. Participant inclusion/exclusion screening questionnaire
2. *Transformational Leadership Behavior Inventory*
3. CoSI
4. Participant interview protocol

Once potential participants indicated an interest in the study, they were e-mailed the participant inclusion/exclusion screening questions (see Appendix B). Once the participant met the screening criteria, they were e-mailed the *Transformational Leadership Behavior Inventory* (Bormann & Rowold, 2016; Podsakoff et al., 1996). This inventory was administered to verify that the participant demonstrated transformative leadership behaviors. Once participants met the criteria as a transformational leader, the CoSI (Cools & Van den Broeck, 2007) was e-mailed to them to identify their cognitive style as either knowing, planning, or creating. The semistructured interview followed with each participant responding to open-ended questions that identified how their

cognitive styles and transformational leadership influenced the achievement of IT project outcomes.

Semistructured Interviews

All participants received a copy of the demographic and interview questions prior to the interview. The participants chose a convenient date and time for their interview. The web conference calls were placed using audio; video was optional if the participant agreed. Field notes were used in the interview to identify topics to follow up on during the interview or points to clarify.

An e-mail, with the interview questions attached, was sent to the participants prior to setting a date and time for the interview. I provided participants with the interview questions to allow them the opportunity to read and reflect on the material before their interview. This also reduced the amount of time participants spent collecting their thoughts during the interview. For the participants convenience, I created a Google form with a list of available interview dates for participants to use to select an interview date and time that was convenient for them. If none of the available times was convenient, participants were instructed to e-mail me their preferred time. None of the participants used this option since I offered a wide range of interview times.

The 15 participants were identified throughout data collection and analysis as P01 through P15. The participants were interviewed using a free online conferencing tool; Cisco WebEx meeting room or UberConference. Cisco WebEx Conferencing was used for interviews with all participants except P12 and P15. These two participants were interviewed using Uber Conferencing. Cisco WebEx was used for participants P01 – P11, P13, and P14. After each interview, I annotated my thoughts about the interview. A post

interview bracketing session followed the same set of questions used with the participants and assisted me in assessing my reaction to the interview session. Appendix D contains the bracketing questions.

Data Analysis

Preparation of the Data

Upon completion of each interview, the audio recording was downloaded from the conferencing platform or the primary digital recorder into the computer. The interview recording was transcribed into a typed format. Researchware's HyperTRANSCRIBE was used to manually create the interview transcript for P01 and P04. Rev.com was used to create the interview transcript for P10. A transcriptionist, ScriptoSphere Transcription, was used to transcribe the interview recording for P02, P03, P05 – P09, P11 – P15. None of the participants' personal information, such as names, appeared in the transcribed interview documents. The completed transcription was exported into a MS Word document. For ease of analysis, I divided each transcript by interview questions and participant's response.

Overview of the Analysis

Qualitative, phenomenological analysis of the interview data was used to code the data by breaking up the responses into thematic categories. This enabled me to group related responses and ideas offered by participants during the interviews that were delineated as meaning units (Grossoehme, 2014). These meaning units provided insight and understanding regarding the project managers' lived experiences. Through a process of constant comparisons and grouping and regrouping (clustering) of the response data (meaning units), thematic categories were solidified, and themes were revealed. This

process of horizontalization constitutes the second step in phenomenological reduction recommended by Moustakas (1994). Finally, themes revealed in each category constituted the findings of the analysis.

Evidence of Trustworthiness

Issues of trustworthiness were addressed as described in the proposed methodology. As such, trustworthiness in qualitative research is cultivated through credibility, dependability, confirmability, transferability, and authenticity (Lincoln & Guba, 1985). Issues of trustworthiness are readdressed in this section to confirm or revise procedures conducted to enhance the study trustworthiness.

Credibility

As proposed, a peer review process was used in the development of the interview questions by using an expert panel to review and suggest revisions, as needed, to support clarity and participants' understanding of the questions. Panel recommendations were noted, and revisions were made accordingly. The researcher was able to establish trust with the participants which supported thick descriptions of participant experiences and led to greater credibility of the data. The process of member checking was also used to support the accuracy of the data collected. After transcription of the interview data, participants were asked to review their transcription and revise, as needed, to ensure accuracy of the transcribed participant responses.

In addition, I used bracketing, a step in phenomenological reduction also recommended by Moustakas (1994), to reduce potential researcher bias. I bracketed text that reflected personal beliefs and knowledge to more fully allow for the emergence of themes from participants' responses (Bevan, 2014). Bracketing was used to put aside my

repertoire of knowledge, beliefs, and experience of software project management in an effort to accurately describe the participants' lived experiences.

As noted in Chapter 3, the process of epoché was used throughout the process of analysis to support data saturation and the validity of the study. Through efforts to eliminate bias during the analysis and interpretation process, the researcher was able to more adequately ensure identification of data saturation by supporting evidence that no additional information or insight was being revealed from the data in the form of new concepts or themes (Fusch & Ness, 2015; Guest et al., 2006; Usher & Jackson, 2014) and that the study was considered replicable (O'Reilly & Parker, 2012).

Transferability

The data collected contributed to generating thick descriptions, which describe the experience or phenomenon in great detail to show transferability to other situations or populations (Lincoln & Guba, 1985). These descriptions provided robust and detailed account of participants' experiences regarding the influence their cognitive style and transformational leadership had on agile software project outcomes. In addition, participants were selected from different governmental agencies and businesses which provided a wide range of experiences.

Dependability

A reliable study has clearly defined consistent research procedures. These procedures include participant selection, data collection, data analysis, and data integrity. Miles, Huberman and Saldaña, (2014) list ten strategies to consider for evaluation dependency in a qualitative research study. This study used four of the authors points. First, the research questions were clear, and the research design emerged from the

research questions (point number 1). Second, I explicitly described my role as the researcher to the participants (point number 2). Finally, data quality checks were performed (i.e. for bias, deceit) while field notes captured the process of gathering and analyzing data points 3 and 4).

An auditor would see a clear process for the study from data collection through data analysis. A Microsoft Word document was used to establish an audit trail of all research activities. The audit trail was incorporated into the data collection plan, and the data analysis procedure was detailed to allow for replication (Lincoln & Guba, 1985). All printed or hand-written materials associated with each participant were scanned and stored on my computer. This information includes pre and post interview bracketing, interview transcripts, field notes, and other materials. Loh (2013) noted that several researchers recognized the use of an audit trail to establish dependability. All physical and electronic files are available upon request in the event of an audit.

Confirmability

This study used a phenomenological approach to address issues of confirmability. This approach allowed for minimal injection of my bias during the interviews. Biases were minimized using an open dialogue interview protocol and avoiding the use of leading questions. The use of NVivo for categorizations and the thematization process, facilitated minimizing the risk of bias.

I used several avenues to demonstrate that the data represented genuine and accurate accounts of the participants' experiences. Miles et al. (2014) advised qualitative researchers who wanted to produce a confirmable study to create specific methods and procedures for collecting, processing, analyzing, and displaying data. Specifically, I

included an audit trail as a way to ensure a systematic approach was taken when executing data collection and analysis. I used specific technical organizations and LinkedIn to choose and recruit 15 software project managers using agile methods to join my study.

Another strategy used was epoché (bracketing). This post-interview bracketing was used to annotate my thoughts about the interview session. Bracketing sets aside text that reflects my own biases and expectations (Moustakas, 1994). I used member checking to confirm the transcribed interview truly reflected the participants' intended responses to the questions. The 15 participants confirmed the accurateness and completeness of my interpretation to their interview responses. The data and handwritten notes will be held for 5 years and then destroyed per the plan approved by the IRB. The data collection process helped achieve the confirmability of my data analysis and conclusions.

Study Results

This section provides the findings that emerged from the qualitative analysis of the interview data. In the following sections, each thematic category is discussed with themes that emerged from consideration of common response types found in the 15 transcripts related to the research questions. Themes revealed in each category support the conclusions of the analysis. The themes addressed the overarching research question of the study:

> RQ: What are IT project managers' attitudes towards, perceptions of, and behaviors related to the use of transformational leadership and cognitive styles in agile software development environments?

The themes also addressed the following, more specific subquestions:

SQ1: What types of cognitive styles are used by IT software development project managers for decision-making?

SQ2: How do managers' cognitive styles and transformational leadership influence their achievement of desired project outcomes?

SQ3: How do project managers perceive the factors contributing to success or failure rates of projects based on their lived experiences?

To address SQ1 the data provided responses of the participants that described their personal cognitive style. To address SQ2 and SQ3, the following areas are discussed:

- participants' perceptions of project success and failure;
- transformational leadership and its effect on decision making;
- the connections between cognitive style, transformational leadership, and project success;
- the specific challenges and risks experienced by the project managers; and
- mitigation of the problems in the context of cognitive style and transformational leadership.

Cognitive Style

Participants were asked to describe their own cognitive style. The participants in this study were split between self-reported creating style (n = 9) and planning style (n = 6). Six participants scored high in a secondary cognitive style dimension. These participants scored within 3 points of their primary cognitive style dimension; a creating style with a secondary in planning (n = 4) and a planning style with a secondary in creating style (n = 2).

Participants were also asked to describe their personal understanding of cognitive or decision-making style. Multiple responses highlighted a common theme that participants' perception of cognitive style was primarily an understanding of the way one processes and receives information. For example, Participants 03, 10, and 02 described this concept of how one processes information. Participant 03 stated,

> I think cognitive style is the way you process information. I think also that can come from—I don't know, when I think about it, it's sort of like if you say to me—you know, sometimes it's about tone, "Oh, that's a nice sweater you have on," or something, or "Oh, that's a nice sweater you have on," you know, like just—it could be that way. But, it's also about understanding I guess how do you perceive, and receive info.

According to Participant 10, "Cognitive style is trying to model the way I function, think or react to things. I understand there are three cognitive styles, knowing, planning and creating."

Participant 02 said,

> So, my understanding of cognitive style is basically just like my view of the world, like my thinking style, my view, my approach, kind of psychologically the way I view things. And I think what you sent me was like the creative style, which is more about like free-flow ideas, more about like experimentation.

However, another theme in the interview transcripts regarding cognitive style was that it connoted thinking outside the box/being open-minded/being prone to experimentation. While participants used these terms in describing their understanding of cognitive style, they may more closely represent the creative cognitive style specifically.

For example, Participant 12, when discussing understanding of cognitive style, simple responded, "*Honestly, being open-minded*." Participant 06 described a similar concept with more detail:

> Well, my identified cognitive style has to do with being able to think outside of the box, has to do with all aspects of creativity, being able to think on the fly, and think of that element that might not have been identified, or that's revolutionary at the end of the day.

Table 5 provides the range of participant responses and the number of participants associated with each response. By far, the most frequent response associated with cognitive style with the way one processes and receives information. Indeed, 10 of the 15 participants ascribed to that definition while five participants posited that cognitive style was associated with thinking outside the box. Other less frequent responses suggested that the participant either did not understand the concept, had never heard of it, or gave textbook definitions of it. I provided participants who needed a better familiarity with the concept of cognitive style an article to familiarize them with it. I also suggested they google "cognitive style" to become better informed and able to proceed with the interviews.

Table 5

Responses to Personal Understanding of Cognitive Style or Decision-Making

Responses	Number of participants offering the response
Understanding the way you process and receive information	10
Thinking outside the box, being open minded, experimentation	5
Creating helps improve planning	1

Work-breakdown structure	1
Save money and resources by using existing solutions	1
Creating means constant personal growth	1

For this thematic category, saturation in terms of obtaining no additional information was attained after 13 interviews from the total of 15 interviews. However, coding continued for all interview data, with no additional information obtained. The pattern of responses for the theme of understanding the way one processes and receives information was clear early in the analysis, as Participants 1-6 all cited this theme. For the theme of thinking outside the box, additional information was gathered through Participant 12. However, additional information in the responses to the questions was still gained through Participant 13. For this reason, saturation was felt to be achieved at Participant 13.

Influence of Managers' Cognitive Styles and Transformational Leadership on Project Outcomes

Participants were asked a series of questions regarding project success and failure. They also discussed their understanding of transformational leadership, cognitive styles, and decision-making and the interaction among the three. Finally, participants responded to questions regarding both the challenges of project management and strategies to mitigate problems arising in projects. Themes that arose in each of these areas are discussed in this section.

Perceptions of project success and failure. When asked for their perceptions of what constitutes a successful project, participants most commonly noted: (a) the delivery

of the project on time and on budget, (b) that the customer was pleased with the results, (c) that the project met expected requirements and maintained an appropriate scope. Thus, a strong theme was that project success was perceived in terms of meeting expectations for the project (i.e., timelines, budget, scope, and deliverable). For example, Participant 01 explained,

> A successful project is one that is delivered on time, within budget, and has appropriate scope. So, again, there's pretty much a triad for a project, three things that you always have to consider, and that's going to be scope, it's going to be budget, and -- I'm thinking of the other one -- and then, it's going to be time. (Participant 01)

The other aspect of success, in addition to scope, time, and budget, is whether the customer is pleased with the result (i.e., the deliverable). Participant 04 explained,

> I think first and foremost, you have to complete the task at hand, you have to meet your customer's needs. I think that is the primary responsibility. And if you fail to do that, then, no matter what else happens, the project has failed.

Table 6 displays the variety of responses offered by participants regarding their perceptions of a successful project and the number of participants to offer each response. The results indicate the level of commonality among the participants for each perception.

Table 6

Perceptions of a Successful Project

Responses	Number of participants offering the response
Delivered on time	14
Delivered on budget	13
Customer pleased with results	11
Meeting the expected requirements	10
Has appropriate scope	6
Followed appropriate methodology	1
Team has improved as a unit and individuals	1
Added Value	1

However, despite the perceived importance of being on time and on budget, Participant 10 described the perception that the most important aspect of a successful project was added value to the client. This participant concluded that the other elements of the deliverable expectations, particularly regarding time, were less important than providing a value to the client in a useful project deliverable:

> To, me it [the most important aspect] would be bringing value to the company or the client, which means, sometimes it's not because the project is delivered on time that is necessarily successful to me. Sometimes you deliver the product, and it's exactly what was needed, what was asked, but not necessarily what was really needed on the ground and nobody will be able to use it. I think you have many of those in our industry, the IT industry. In other industry, it could be you successfully built a car, and they have bad sales. Just producing the car as designed and on time doesn’t make it a successful product. In IT, you could build many products, many new features, and those might not be used at all at the end.

> On time project is not necessarily a successful project. So, to me, a successful project would be really bringing value to the company, either an edge against the competition or really added value to your user, saving them a lot of time, money, things like that.

Data saturation for this thematic category was achieved through 10 participants. Themes of delivered on time, on budget, customer satisfaction, and meeting expectations consistently showed in participants 1-9 and additional information was not gained at all beyond the responses of Participant 10.

Regarding agile projects, participants offered their perceptions of the key elements supporting project success of agile projects. Common themes that were identified included: (a) a positive team environment, (b) time management, (c) well-articulated and clear project criteria (communication), and (d) leadership.

These themes were weaker in the degree of commonality of responses among the research participants. The number of respondents was lower for these themes compared to other themes mentioned earlier. This result may be due to a fewer number of participants offering responses to this question about agile projects. Saturation was met for this group of themes by Participant 14. The saturation level took longer to achieve for these related sub-themes, perhaps due to the lesser degree of commonality among responses and, therefore, additional insight being obtained, regardless of commonality. Table 7 displays the variety of responses offered by participants regarding their perceptions of the key elements of project success.

Table 7

Key Elements of Project Success

Responses	Number of participants offering the response
Positive team environment	5
Good pace and time management	3
Clear criteria	2
Leadership (having the right person in charge)	2
Documentation	1
Favor importance of working code	1
Funding flexibility or rigidity	1
Asking for help when necessary	1
Upfront analysis	1
Bringing value	1

In addition to perceptions of success in agile project management, the participants described what they perceived constituted a failed project. The participant responses in this category revealed two specific themes derived from the most common responses: (a) failing to meet cost and time expectations, and (b) customer dissatisfaction. These responses mirror the participants' definitions of project success. Participants 02 explained, "So, pretty much the exact opposite of that [project failure], right? So, things that haven't really met expectations, that really aren't delivered in the right way, at the right time." Participant 05 added, "Pretty much the opposite—not meeting the requirements, not meeting the needs of the customer." Again, the participants discussed customer dissatisfaction. Participant 01 explained,

> A failed project, in my opinion, would be one where the customer is not satisfied with what they have received. You did not meet the customer's demand. So, even

> if you stay within scope, even if you deliver on time, and you stay within the budget, you've met the parameters of the project, but if the customer is not pleased, then your project is failed.

Table 8 offers the full range of participant responses. Data saturation for this thematic category of perceptions of a failed project was met after 11 participants. After participant 11, no additional information or insight was gained in terms of no further sub-categories developed from the responses. However, as in all parts of the analysis, data from all 15 participants were coded.

Table 8

Perceptions of a Failed Project

Responses	Number of participants offering the response
Failing to meet cost and time expectations	11
Customer dissatisfaction	9
Issues and unmanaged risks	1
Team is not satisfied with project	1
Failing to meet ROI goals	1
Fail to add or bring value	1

In addition to their reported perceptions of a failed project, the participants offered specific reasons for those failures. Common responses highlighted poor communication and lack of clear instruction or understanding of requirements, rapidly changing project needs, poor project and risk management, lack of external support, and lack of customer engagement. Many of these responses can be loosely categorized under communication and engagement, or lack thereof (i.e., clear instructions, changing project needs, and poor engagement signal poor communication and engagement among the IT

workers, project managers, and the client). This need for communication and being engaged as a team was described in detail by Participant 04, whose words offer a better understanding of how communication and engagement affects the outcome of the project including the success of the project:

> I think that's largely in part how people communicate and get along. So, I think the most successful projects are those where the customer, and the people doing the work realize that they're a team, and that they have to work in concert. And you do it that way—I always tell people, no one should ever be surprised. So, if you have great lines of communication with your customer, and if the information flows back and forth, they're never surprised, and they become your partner, and you become their partner. So, ultimately, when you get to the end, everybody is happy with the product that they got, because they felt like they came together as a team, both contractor and customer, and built it. . . . The project that fails, there seems to be a divide between the customer, and the contractor, or the person doing the work. And they feel like, "You didn't give me what I wanted" versus "We did a great job, and we got here together." So, the moment you're talking about you and me, I think the project is heading down a dangerous path, and more than likely is going to fail. . . . communication is key. I don't care what—I've had customers who were told that "What we delivered you we are not going to be able to deliver in five weeks, and here's why." And the customer is like, "Okay, not a problem, I understand." And it's because they were kept in the loop, and they were informed the entire way, and they understood the delay, and why it came up, and they were cool with that. And I've had other customers that treated—much more

> like an us versus them scenario, and when it came time to deliver, we delivered everything we were supposed to deliver, and a couple of things extra, and they were unhappy. And it's because there wasn't that constant communication, so that they knew what was coming all along the way. And so, on the best project, I'm convinced that effective communication is the most critical thing. (Participant 04)

Risk management within project management is another theme, such that failure may stem from the lack of effectively identifying and mitigating risks and challenges on the part of the project manager. Participant 01 stated:

> In my opinion, it would be the management of the project, the communication measures, how that person, you know, communicates, or stays in touch with the stakeholders, is able to communicate the feedback to the team, and really just able to manage the risks along the way, is very proactive, and determining what risks may be present, and then mitigating them as appropriately. But, there are many complexities that will come, or that will arrive during the course of the project, and it's up to the project manager to handle those complexities, so that the outcome is favorable. (Participant 01)

Thus, the significant themes in this category are inadequate project/risk management and poor communication and engagement. Table 9 provides the variety of participant responses and highlights the common responses in relation to the themes. For this category of responses, data saturation was met through coding of all participants up to Participant 13 (i.e., Participants 1-13). As such, Participant 13 was the last participant to add additional or new response type to the data related to reasons for project failure.

Table 9

Reasons for Project Failure

Responses	Number of participants offering the response
Communication	11
Lack of clear instructions or requirements	7
Changing project needs rapidly	5
Project management/risk management	4
Customer was not engaged or understood	3
Lack of external support	3
Complexities or dependencies	2
Customer will accept failure at a certain level	2
Misalignment between company or user needs and deliverable	1
Failed time estimations	1
Poorly written contracts	1
Lack of vetting, approval from third party sources	1
Team skill deficiencies	1
Ineffective risk management	1
IT arrogance; think know better	1
Lack of environment to support positive failure	1

Transformational leadership. The participants also discussed their understanding of transformational leadership. A strong theme emerged regarding participants' descriptions of transformational leadership in that 10 participants defined it as the ability to motivate employees to work and to provide their best work.

Other participants offered similar, although slightly different, perspectives of this theme. For example, Participants 01 and 11 described transformational leadership as very clearly motivating and getting the best out of the team of employees. Participant 01 said,

> So, my understanding of transformational leadership would be your ability to encourage and motivate your employees to get the best out of them. You can always say, "You know, you're aboard this project, and this is what I ask you to do." But, if you want the most from your employees, then you want to make sure that they're encouraged, that they have the tools to succeed, that they feel that their input, and feedback is valuable. So, that would be my impression of transformational leadership. (Participant 01)

According to Participant 11,

> From the little I've read and looked around, it [transformational leadership] looks like an approach to leading and motivating teams by inspiring them to do their best both for personal satisfaction and as a member of a community. In other words, you know, you're not only inspiring somebody to do the best you can do but contribute to a community and become part of a community and a team, and together is how you do good work. (Participant 11)

Elaborating on this notion of motivating employees, Participant 06 described how the transformational leader can inspire the best work from employees, particularly when dealing with more challenging circumstances:

> I think that leadership challenges the team to bring their A game, to bring their best, to find their next level of energy, because there's always that time in a project when issues are extremely difficult, when the team hits a period of overwork or extremely challenging work. And I think through transformational leadership, through encouragement, through putting in the time, and the effort upfront, that it pays off, and those team members are encouraged to continue, and

to push through in those more difficult times, so that they can accomplish whatever it is that is causing that difficult period. (Participant 06)

Other common, but similar or related, responses regarding transformational leadership included having and executing a vision, prioritizing goals, having empathy and caring for employees, mentoring and leading by example, encouraging the team to function as a unit, and having the ability to take a project or group to the next level. These common responses seemed to highlight different aspects of the theme of motivating employees to provide their best work, so they are included in the theme. Table 10 includes a list of the most common responses regarding participants' perceptions of transformational leadership. Data saturation for this category of themes was determined after coding 13 participants. No additional information to generate new themes were revealed after the 13th participant.

Table 10

Understanding of Transformational Leadership

Responses	Number of participants offering the response
Ability to motivate employees to get the best work	10
Having and executing a vision	5
Prioritizing goals	4
Empathy, caring about employees as people	3
Mentoring and leading by example	3
Encouraging team to function as a unit; socializing	3
Ability to take a project or group to the next level	3

Transformational leadership and decision making. During a further discussion of transformational leadership, participants shed light on the perceived effect of transformational leadership on decision making. Common responses among participants

highlighted encouraging team work, encouraging the use of different approaches, supporting the agency, and displaying positive energy (i.e., feeling happy). Participant 06 described this type of encouragement and support for team work:

> Transformational leader as a project manager, someone who is doing things differently, who is encouraging their team members to do things differently, who is encouraging their team members to try that different technology, who is encouraging their team members to make that software run more efficiently, "Yes, go take that class, do whatever it takes to be better."

Transformational leaders encourage and empower the team by providing a vision and allowing the team to grow, create, and innovate, as noted by Participant 09:

> I think transformational leadership -- the leader provides the vision, but it really lets the team decide, and grow, and get to the decision. You know, I think they encourage discussion, they encourage all kinds of different ideas, they encourage creativity, innovation, doing things differently, not just doing the same old way we've done it just because we do it, open to new ideas. But, I really think that they empower the team to make the decision. And they will help the team overcome obstacles, and impediments, and things like that, and try to keep the decision on track, so that it is successful.

Table 11 shows the various responses offered by participants regarding the effects of transformational leadership on decision making and the number of participants offering each response type. Although encompassing a variety of responses without strong themes, the data were determined to be saturated after coding 10 participants. No

additional themes or related content were revealed from that point in the coding process, which indicated saturation was achieved.

Table 11

Perceived Effect of Transformational Leadership on Decision Making

Responses	Number of participants offering the response
Encouraging team work	4
Encouraging team to use different approaches	5
Goal of team members feeling happy	3
Instilling agency in team	3
Effective communication necessary	2
Transformational Leadership helps assign tasks appropriately	2
Retaining employees, less turnover	1
Positive impact of transparency	1
Foresight and calculation of risks, difficulties	1
Diplomatically communicating which proposals are good or bad	1
Trust based communication	1
Bottom up innovation; manager must enable not block creativity	1

Cognitive style, transformational leadership, and project success. Participants also described their perceptions of the connections between transformational leadership, cognitive style, and project success. Twelve of the 15 participants reportedly perceived a link between transformational leadership and project management success, whereas the other three participants did not perceive such a link. The common responses among those who perceived a link revealed the theme of perceived higher success rates in projects with transformational leadership, cognitive *creative* style supporting transformational

capacities, cognitive planning style supporting transformational leadership, and positive effects of transformational leadership and cognitive style on software project outcomes.

The most commonly noted link was project success. Both transformational leadership and cognitive style were felt to be linked with project success. Transformational leadership was felt to contribute to the success of a project directly. This was perhaps best described by Participant 01:

> I'm going to say that they tend to be more successful. . . . In general, if you have in place the practices that make a—you know, that encourage, or foster, and support transformational leadership—it's always focused on like positive outcomes, it's always focused on big picture, so I'm going to feel—I feel like there will be more opportunities for a successful project, or be more closely aligned to a successful project. . . . I agree that projects that have a transformational leadership approach, or, you know, leader, or project manager would be more successful.

Participants who considered cognitive planning style as a link to success, also noted that both the creating and planning styles have a positive effect on success. For Participant 01, the link supporting success was with transformational leadership and the planning cognitive style:

> Desired project outcomes are defined, measurable and planned at the outset of a project. Often during the course of a project, myriad factors can impact the outcome, including but not limited to scope creep, emergent requirements, technical difficulties and resource limitations. Although, it is next to impossible to spearhead a software development project that is risk and issue free, a leader that is a detailed planner and employs transformational leadership skills has increased

> odds of ensuring that the project outcomes are consistent with the stakeholders' needs and planned objectives.

However, Participant 08 described how transformational leadership and a creative cognitive style work together to generate greater success:

> Yes, I do believe there's a relationship between the style, and how transformational leadership can help a project succeed. I think that the styles like a creating style that I think is aligned with the transformational leadership allows a project manager to go beyond the boundaries of normal project manager principles when necessary for a project to succeed, and, you know, maybe a little bit more intuitively understand when things aren't going as well maybe even despite with the measures, or whatever the normal, you know, metrics would say that—you know, sensing that there's—for example, there might be some, you know, disappointment on the team, and, you know, working to break out of that, and keep people moving forward. I guess I think that if the—I would call it the by the book style of not—is—you know, can succeed on a simple project, but I think that you need a little bit of creativity frequently for more complex projects to be successful. . . . I think they are aligned. I think—to my understanding, I think as I understand transformational leadership, and cognitive styles, that the creating style I think has a lot to do with that. And you can't necessarily change what's going on without being a little creative. So, I think there's definite link between the two.

Table 12 illustrates the full variety of participant responses regarding the connections between cognitive style, transformational leadership, and project success. It

includes the five themes: (a) perceived higher success rates in projects with transformational leadership, (b) creative and planning cognitive styles supporting transformational capacities, and (c) the positive effects of transformational leadership and cognitive style on software project outcomes. It also displays responses provided by smaller number of participants. For this thematic category, no additional insight was gained for the creation on a new category after coding the first 12 interviews. Thus, data saturation was achieved at participant 12.

Table 12

Perceived Links Between Transformational Leadership, Cognitive Style, and Project Success

Responses	Number of participants offering the response
Relatively higher success in projects with TL	12
Cognitive creating style supports transformational capacities	9
Cognitive planning style supports transformational leadership	8
Positive effect of TL and cognitive style on software project outcomes	7
Perceived link between cognitive style and project success	4
Important not to ignore other cognitive styles	3
Balancing cognitive styles creates project success	3
TL is most important form for project management	3
Need TL to understand different CS	2
Other kinds of leadership are necessary	2
Necessary to match CS with compatible team	1

Leadership challenges and project risks. When discussing the challenges encountered in a leadership role, participants offered varied responses. Most common challenges cited were (a) agile allows for constant changes by the customer (5 participants), (b) the employees adjusting from a waterfall software development approach to an agile software development approach, (c) introverted employees struggle with the required communication level, and (d) discomfort with customer awareness of progress (transparency). While participants praised the use of agile development, one challenge related to the defining characteristic of agile (i.e., the ability to adjust and make changes during development) was client understanding of the consequences and impact

of changes to a project. For example, Participant 03 described the impact of constant changes:

> I think one of the hardest things I've had with customers is that -- let's say -- generally, we've operated on three-week sprints, and, you know, sometimes customer, you know, a week or so in wants to switch something. Well, okay, that means something else goes out, right? But, this change is not as well vetted as the item we had before. So, it carries over to another sprint.

Furthermore, this subjectivity can be mistaken for a “free for all,” as described by Participant 04:

> In an agile world, that's kind of subjective, because needs change sometimes mid sprint. . . . So, I think the biggest challenge is all in customer relationship, because I think often times you have customers who hear agile development, and what they believe is that they can make changes all along the way, and the consequences will be minimal. And that's not what agile is. Agile does give you the opportunity to make changes along the way, so that you're not committed to something long term, but it's not a free for all.

These challenges also can be related to difficulties experienced by employees and clients adjusting from a waterfall strategy to agile. This adjustment requires going from a development strategy in which the requirements and expectations are detailed up front, to one using agile that entails an iterative process in which portions are developed incrementally along the way. Participants 07 and 09 both provided vivid and detailed descriptions of the difficulties experienced in the transition from waterfall to agile development and the overall impact on the project development. Participant 07 said,

> I think the biggest one is a lot of people are used to—especially where I am, they're used to the waterfall. You know, we're going to get all the requirements upfront, we're going to get all the stuff, that we're going to do the design, and that we're going to do development, and then, three, four years later, "Ah, see, we're done." Whereas, agile, what you do is you do an iterative process, and three, or four years later, you are done, but along the way, you have developed the screen, you've developed the database, you've developed whatever, so if funding ever gets cut, you can at least come in, and say "See, I got 50% working, or 60% working," or some number, and then here you are, you haven't spent all that money, and got boxes, and boxes of papers sitting on the wall. You actually have something you might be able to use, or at least can partially use if you're lucky.

According to Participant 09,

> One of the challenges is people want to know everything right now. And if they don't know everything, they tend to get in a panic. I think also because you don't know everything from the get-go with an agile project, you know, you're incrementally building something, I think because you don't know everything upfront, that chaos adds a lot of stress for people. And often times what I've seen is people don't know where to start. They can't get out of their own way, they can't get off the dime. "You know, I don't know the whole thing, so I'm scared. I don't know if I'm going in the right direction." And in waterfall, you have all these requirements, you know you're going to do analysis, you know you're going to find everything you need to know in analysis, then you're going to go into coding, you know, and on down the line. . . . And with agile, you're going to take a little

> bit of what you know, you're going to analyze it, build it, test it, deliver it, give it back to customer, get some feedback, and then you'll know at the end of that if you're going in the right direction. If you're going in the right direction, you press on, and if some of that's not right, then you have to regroup, and go over. And I think people want to be successful, so they are afraid of not having all the information and making a mistake. And one of the things with agile is they want you to fail fast. So, you know, go ahead, and go with it, you know, let's have these conversations with the product owner, and make sure that, you know, we understand what we think they want, that we'll deliver it to them, and then that's the time they'll tell us that it's not what they want. So, I think people struggle with that.

Other challenges commonly noted by the participants were challenges associated with employees who struggle with the level of communication and transparency needed to support successful agile project development. As described by Participants 12 and 09, this level of communication can be a challenge for developers. Participant 12 stated,

> The challenge here is the communication is at a very high level in an agile team compared to waterfall. And so, in agile, it really becomes, you know, very important to understand—to build the team dynamics. . . . And also, the product owner involvement, right? Now, you need a product owner that is constantly grooming the backlog, that is looking at the product reviews after every sprint, giving their feedback. So, if we have a disengaged product owner, that can become a big challenge too.

Participant 09 said,

> Also, there's a lot of planning, and a lot of rehashing, and re-planning, and planning the plan, and preplanning, and post-planning. And I think sometimes for computer people who are not really that conversational, or in touch with their feelings, or that kind of thing, I think some of that becomes sort of impractical, some of—what I hear is people say "Oh my god, another meeting, another meeting, we already planned a plan, and now we have to preplan, and pre, pre plan, and—" so, I think some people get a little bit caught up in the ceremonies, and not in the value of what the ceremonies add. So, those were some of the things that I've experienced.

The communication and transparency can be particularly difficult for more introverted or less conversational employees, as was described by several participants. For example, Participant 03 explained,

> Well, one thing I mentioned earlier was that, you know, like as a developer, you can't hide you know, and I think that's been hard for some people, you know, it's been an adjustment. But, they've all sort of known that "Here we are, this is the way we're going, and this is the direction we're going." They don't like being in the spotlight, they don't like that the customers can see—you know, look on the—sprint board and see how things are getting done. So, that can be a little bit challenging for some people.

According to Participant 09,

> I think the other thing is that people are not used to talking to each other. And in agile, one of the things we do every day is meet together, and talk about "What did you do yesterday, what are you going to do today, do you have any

impediments?" And often times, this, you know, is new to people. They're like, "Wait a minute, I didn't become a coder so I could talk to people, I like computers." And so, that is I think kind of a struggle for people. And I think the transparency part of agile is a little bit scary for people. "You know, I don't want to show people—I don't know—I'm insecure about what I did, so I don't want to show people that I don't know everything," or "I have a question, but I don't want to ask the question, you know, let me spend three weeks trying to figure out what the answer is on my own." So, I think those are some of the challenges.

Table 13 provides the common responses to leadership challenges offered by participants, highlighting the themes of constant changes using agile and the associated adjustment to agile from waterfall, as well as the challenges of employees who struggle with the necessary level of communication and transparency. For this thematic category, data saturation was achieved after 11 participants. No additional information was gained beyond the coding of interview 11 to contribute to new categories of responses. Therefore, data saturation was concluded at 11 participants.

Table 13

Leadership Challenges

Responses	Number of participants offering the response
Agile allowing for constant customer changes	5
Waterfall/Adjusting from Waterfall approach	5
Introverted employees discomfort with communication level	4
Discomfort with customers awareness of progress	3
Need for a hybrid approach to support presence of a structure and repeatable process for team members	2
Understanding project parameters	2
Miseducation and misinformation surrounding agile	2
Communication and documentation challenges	2

As a result of these challenges, participants described how their leadership approach has changed over time. Common responses highlighted an evolution of personal leadership style toward a more transformational style that is less hands on and more encouraging and engaging in nature. Without always explicitly saying that they have changed to a transformational leadership style, participants described their evolution in leadership that included characteristics of transformational leadership. For example, Participant 01 described it this way:

> So, I think originally, when I first started out, I was focused on the traditional concepts of project success, and that is, you know, just make sure it's going out the door. I was not as concerned about the team members, and their feelings, or how they felt, you know, I felt we're all here, we all have a task to do, just do it. And my thinking, and my approach has definitely evolved over time. I realize that I'm able to get more out of people when they want to work for me, that they

> appreciate I guess the extra mile that I go for them. And so, I can see it come back, and the code that I get, the process that they're willing to put in place, they're making sure that they support me, so that I can support them. So, it's not an us versus them type mentality on the project, which it definitely was that way when I first started out.

Regarding how this shift positively affects outcomes, Participant 13 described how the shift to incorporating these characteristics and people management skills supported the creation of a better, more effective work team:

> In the past I was more of a micro manager but now I spend a lot time mentoring my team and getting to know their strengths and weaknesses. By doing this, I have a better chance at putting the right team member on the right task and having the confidence they will complete their task without someone hovering over them.

One participant described the shift from doing the work but not really leading to managing, i.e., allowing others to be more accountability and being more like an orchestra conductor:

> So, for me, I definitely do things differently today than I did in the past. Again, I think it's difficult when you've been an engineer, because your natural tendency is to want to do the work. And now, I realize when you're leading a project, the last thing that you should be doing is actually doing the work. Now I spend a lot more time getting to know the team, fostering team relationships, removing blockers from their path, communicating with the customer, making sure the customer has a nice, warm, fuzzy feeling about where we are, talking with customers about the direction that they want to go in, making sure I fully understand their mission,

> their mission space, trying to come up with creative ways to help them achieve their goals, and objectives. So, now, I look at project management as almost -- it's almost like being a conductor of an orchestra. To be an effective conductor of an orchestra, you can't sit down at the piano. The moment you sit down at the piano, the orchestra is without a conductor. So, now, I think of my role much more as a conductor, and not a person in the orchestra, and I spend all of my time trying to make sure that everybody else is achieving maximum success. (Participant 04)

The common responses of participants related to changes in leadership over time are illustrated in Table 14. Again, data saturation was met by participant 11. No additional response types or information relevant to this thematic category was gained beyond coding of the first 11 interviews, indicating data saturation was achieved.

Table 14

Changes in Leadership Approach

Responses	Number of Participants Offering the Response
Personal leadership has evolved to be more transformational	6
Less hands on; more accountability, managing, encouraging, engaging team work	6
More assertive and proactive	2

Strategies to address risks. Lastly, participants shared the strategies they have used to address risks that had the potential to affect project success. The participants asserted the need to identify risks early in a project and mitigate them. Accordingly, they revealed that this kind of identification and mitigation requires constant communication

and evaluation as well as transparency with the customer—elements that were previously also identified as challenges.

The primary strategy described by participants regarding strategies to address risks was risk management and mitigation. Participant 01 described, for example, the perceived importance of identifying risks as early as possible to drive successful mitigation:

> Typically, my strategy for risk factors is one, to identify them as early as possible, and then, two, to try to drive the mitigation. And so, most often, if I identify a risk, I have a suggested mitigation. And that's because I'm most familiar with the project, so I don't want to push a risk up to an oversight board, or to the PMO, or to the stakeholder, and look to them for the solution. I want to make sure that I identify it, and that I weigh in on the particular solution. I consider it a failure just for me personally if my stakeholder identifies a risk, and I haven't, especially if it's one that I should have uncovered.

Similarly, Participant 04 detailed the importance of looking for risks, taking the time to identify potential risks, and using creative thinking to mitigate the risks and support the success of the project:

> So, I think the most important strategy that you have to have is to actually look for the risks. I think it's easy to get on a project, start to deliver, get on a role, and forget to look for the risks. I think the biggest strategy is to actually take time to identify the risks. Once you actually identify the risk, then you give yourself at least a fighting chance. For me, in my experience, I always try to think outside of

> the box when dealing with risks. So, you know, in an ideal world, you have a risk, you come up with a mitigation strategy.

Participants indicated one way to address risk is to maintain a risk register to track risks and identify successful mitigation of the risks. The risk register on projects is used to "identify what mitigation things we can do to eliminate the risk or reduce it" (Participant 07). The use and importance of a risk register was detailed clearly by Participant 06:

> Definitely maintain a risk register. We have at a bare minimum, a weekly review with team members of the risk/issue register where we use a ROAM plan to address the risks, ensure that there is ownership, and management of those risks, mitigation of the risks. And if the risks warrant it, we review those risks and issues more frequently, I typically do address them more frequently.

Communication was also a theme in the discussions of strategies to address risks. Participants described how communication fits with and can be used to support successful risk management. For example, Participant 09 explained:

> I would say communicate, communicate, communicate. One of the things we always do is we go through our risk exercise, and we use the Sailboat model. So, one area represents wind, and that's stuff that pushes you along. So, those are like good risks, and things that we want. Then, there is the crosswind, or the wind that's coming towards you. You know, what are some of the problems we're going to encounter, what's going to be hard to get through, what are we going to have to address? And then, we put down an anchor for things that are really going to slow us down, and we are not going to make any progress, and those are more like

external things, external risk. And then, when we get all of the things kind of put together, we'll put them in groups, and then we'll prioritize, you know, what are the things we need to work on, and then we start working on what are strategies? You know, what can we do to eliminate this risk, or mitigate it, or ROAM it -- you know, ROAM the risk -- the risk is resolved, the risk is owned, the risk is accepted, or the risk is mitigated.

The common responses are given in Table 15. For this thematic category, data saturation was not achieved until Participant 13. Because no additional response types or insight was gained in this thematic category after the coding of Participant 13, data saturation was achieved after 13 interviews for responses related to this thematic category.

Table 15

Strategies Used to Address Risk Factors and Support Success

Responses	Number of participants offering the response
Identify risks early and mitigate	10
Constant communication	9
transparency with customer	6
Code testing	4
Risk registers	3
Daily scrums	3
ROAM plan	2

Conclusions

Using the thematic categories and constantly comparing the responses of the participants detailed in the previous sections, I identified a number of themes that

emerged from the qualitative data analysis process. These themes contribute to our understanding of project success and failure, cognitive style, and transformational leadership; they provide background and a framework from which to further our understanding of the specific challenges, risks, and strategies used to support project success, as perceived by the participants in this study. The themes are described in the following sections.

Understanding Project Success and Failure, Cognitive Style, and Transformational Leadership

Project success is perceived as being defined by the ability to meet expectations for the project in terms of time, budget, scope, and value, with the key elements of success including a positive team environment, time management, well-articulated and clear project criteria (communication), and leadership.

Project failure is perceived to be defined in terms of failing to meet cost and time expectations and customer satisfaction. These failures were felt to be due primarily to poor communication and poor engagement.

Cognitive style is defined in three primary ways: the understanding of the way one processes and receives information; planning or gaining as much information as possible; and thinking outside the box/being open-minded/experimentation.

Transformational leadership was perceived as the ability to motivate employees to provide their best work, including having and executing a vision, prioritizing goals, having empathy and caring for employees, mentoring and leading by example, encouraging the team to function as a unit, and having the ability to take a project or group to the next level.

Interconnections Between Transformational Leadership, Cognitive Style, and Project Success

The effect of transformational leadership decision making was described as supporting encouragement of team work, agency, positive energy, and the use of different approaches to problem solving. The connection between transformational leadership, cognitive style, and project success was perceived as having higher success rates with transformational leadership, more *creative* style supporting transformational capacities, and cognitive *planning* style supporting transformational leadership and positive software project outcomes.

Evolving Transformational Leadership to Address Challenges and Risks

Regarding specific leadership challenges, findings highlight the difficulties adjusting to agile from the waterfall approach and adjusting to the level of customer engagement, communication, and project transparency involved for a successful project that requires an evolving transformational leadership style. Participants described how their leadership approach changed over time with the evolution of their personal leadership style toward a more transformational style that is encouraging and engaging in nature.

Strategies for Risk Management: Identification and Mitigation through Communication and Transparency

The final theme revealed from the analysis of the transcripts is the importance of identification and mitigation of risk, a process of risk management. Critical to risk management and mitigation, as expressed by the participants in this study, is the early

identification and the use of constant communication and evaluation. Participants also expressed the importance of transparency with the customer.

Summary

The purpose of this qualitative phenomenological study was to describe the lived experiences of 15 transformational software project managers experienced in managing agile software projects. In this study, the researcher sought to describe how transformational leaders, considering their cognitive style (planning, creating, or knowing) affected the outcome of software projects. Four key themes emerged that reflected the essence of the software project managers' lived experiences related to their leadership and cognitive style and project success. Conclusions, drawn based on the themes revealed in the analysis, are discussed further in the next chapter in relation to the research questions and the relevant literature in the field.

Chapter 5 Discussion, Conclusions, and Recommendations

This chapter includes a summary and discussion of the research results regarding the relationship of transformational leadership strategies and cognitive styles to successful agile software project outcomes. The findings contribute to the body of knowledge on the unsuccessful outcomes of software projects caused by improper decisions and ineffective management. The results may assist in identifying and implementing mitigation strategies to improve project outcome. This chapter also includes conclusions from the results and recommendations for future research on this topic.

The purpose of this qualitative phenomenological study was to explore the lived experiences of software project managers. Specifically, it was designed to help investigate the project managers' use of their cognitive style and transformational leadership behaviors to progress agile projects towards successful outcomes. The study involved 15 self-proclaimed software project managers with experience managing agile software development projects within the last 2 years. I conducted semistructured interviews to explore how transformational leadership style and cognitive style of the participants influenced the outcomes of their software projects. I used the Husserlin descriptive phenomenology approach to analyze and interpret the data. Seven key themes emerged from the study related to (a) cognitive style, (b) perceptions of project success and failure, (c) transformational leadership, (d) transformational leadership and decision making, (e) transformational leadership and project success, (f) leadership challenges and project risks, and (g) strategies to address risks.

Interpretation of Findings

The project manager is responsible for successful project completion. The PMI (2013) identified project success as "completing the project within the constraints of scope, time, cost, quality, resources, and risk as approved between project management and senior management" (p. 35). Project management is just one of a number of factors affecting the success of software projects. Project managers and other project professionals understand the immense challenge of ensuring the success of a project and satisfaction of the customer. As a result, project managers experience constant pressure from individuals within and outside of projects to ensure they meet their goals.

Project management is driven by minimizing cost, delivering projects on time, delivering a quality project, and satisfying stakeholders. Given the literature supporting that 31% of IT projects are cancelled before completion and 53% of projects cost 189% of the original estimate (Standish Group International, 2014), defining and managing the success of a project is critical. Yet, it remains subjective (Berssaneti & Carvalho, 2015; Müller, 2016). For project management, the elements of time, scope, and cost, which are attributed to success, are known as the *iron triangle* (Bronte-Stewart, 2015; Davis, 2013), a term adopted due to the intense connection between these attributes (Bronte-Stewart, 2015).

Many organizations experience projects that exceed the budget, change scope over time, and ultimately do not end on time. The literature suggests that project failure is often due to project environment, tasks, and people, and that when a project fails in process it includes management, sales, and implementation (Lehtinen et al., 2014). Prior research highlighted project management as key to success or failure. Failure resulted

most often from lack of a project manager performing critical tasks, such as identification and control of risk, monitoring and addressing schedule variables, cost, and scope (Nguyen, 2016). Generally, previous research agreed that failure results from multiple correlated variables (Lehtinen et al., 2014; Nguygen, 2016). Similarly, results of this study support the interrelatedness of multiple variables. Study participants also defined project failure in terms of the failure to meet cost and time expectations as well as customer satisfaction; however, this failure was described by participants to be primarily due to poor communication and engagement.

Alternately, participants perceived project success as the ability to meet expectations of time, budget, scope, and added value to the client, thus aligning project success with failure. Distinct key elements of success included a positive team environment, time management, well-articulated communication. clearly defined project criteria, and leadership. The finding of the importance of communicating clear project criteria supports prior research asserting that the criteria for success must be defined in the initial phase of project development (Heagney, 2013; Joslin & Müller, 2015; PMI, 2013).

Prior research has supported the importance of also considering the project stakeholders' objectives and involving the stakeholders when determining project success (Bronte-Stewart, 2015; Heagney, 2013). This involvement allows stakeholders to select the criteria for success that is important to them (Joslin & Müller, 2015). It also provides a focus on the needs of the stakeholder as well as available resources and risks (Cullen & Parker, 2015). Thus, the attributes of measuring project success have evolved to be more

quality-based. In this study, the notion of success defined by added value to the client, therefore, aligns with this focus on the needs of the stakeholder.

A key element to project success is a manager's ability to motivate and guide subordinates toward completion of goals and initiatives (Bass & Bass, 2009; Hocine & Zhang, 2014). The actions of the leader serve to develop expectations and behaviors of others within the organization that affect performance, quality, and results (Araújo & Pedron, 2015; Demirtas & Akdogan, 2015). Transformational leaders help their followers acknowledge the vision of the team working together towards common objectives; they consider members' needs and perspectives, provide intellectual stimulation, and become role models (Kahai et al., 2013). Transformational leaders are able to adapt an all-inclusive and individual approach that meets the needs of the overall goal as well as is sensitive to the needs of followers (Dartey-Baah, 2015). In alignment with the concepts of transformational leadership in the literature, the findings of this study revealed that participants perceived transformational leadership as the ability to motivate employees. Specifically, they motivated employees to provide their best work, which included leaders having and executing a vision, prioritizing goals, having empathy for employees, mentoring and leading by example, encouraging the team to function as a unit, and demonstrating the ability to take a project or group to the next level.

According to the literature, cognitive style refers to the manner in which individuals gather, process, and organize information (Chatterjee & Dey, 2015; Mello & Delise, 2015). Cognitive style influences how people frame problems and how they perform during decision-making (Chatterjee & Dey, 2015). In this study I used the CoSI by Cools and Van den Broeck (2007) to categorize managers within a three-factor model

of cognitive style consisting of knowing, planning, and creating styles. Analysis of the data revealed that participants described and defined cognitive style in three primary ways: the understanding of how a person processes and receives information; planning or gaining as much information as possible; and thinking outside the box/being open-minded/experimenting.

Researchers have examined the influence of cognitive style on decision-making and found it to have an impact on how individuals frame problems and how they behave while making decisions (Mello, & Delise, 2015; Zsambok & Klein, 2014). Decision makers vary their strategies and rationalize choices based on the presenting problem (Zsambok & Klein, 2014). According to Esa et al. (2014), cognitive style influences decision-making based on the rules of *intuition* (right-brain orientation) and *analysis* (left-brain orientation). As a result, individuals select decision-making processes and strategies compatible with their cognitive style (Esa et al., 2014).

From the literature, the most effective leaders have (a) a high degree of emotional intelligence with both technical capabilities and cognitive abilities, (b) the ability to be a leader of change, and (c) the ability to work well with others (Ahmed et al., 2013). These characteristics support project success (Liphadzi et al., 2015). The findings of this study support the positive role of transformational leadership in the success of projects because participants described its effect as supporting encouragement of teamwork, agency, positive energy, and the use of different approaches to problem solving. The results supported a connection between transformational leadership, cognitive style, and project success, in which participants perceived (a) higher success rates with transformational leadership, (b) more *creative* style supporting transformational capacities, and (c)

cognitive *planning* style supporting transformational leadership and positive software project outcomes.

Study participants noted that transitioning to an agile approach and adjusting to a high level of customer engagement and communication was difficult and required an evolving transformational leadership style. Participants described how, over time, their personal leadership style evolved toward a more transformational style that was encouraging and engaging in nature. Participants also expressed the importance of transparency with the customer. The adaptability and flexibility of a more transformational leadership style facilitated a more successful transition with a focus on communication and transparency.

The final theme revealed through the analysis supports the importance of identification and mitigation of risk (i.e., risk management). As noted earlier, risk management is a key component to assessing risk. The findings of this study support the notion that transformational leadership promotes risk management through the identification and mitigation of risks using communication and transparency. Critical to risk management and mitigation, as expressed by the participants in this study, is the early identification and use of constant communication and evaluation.

The literature, supported by the results of this study, indicates that identification and mitigation of project risk are critical to a project's outcome. Thus, the successful project manager remains focused on the assessment and management of risk and uses available tools to lessen risk. In the project management field, NDM and TOC are two approaches used by project managers to reduce risk by improving their management skills. The NDM model is used to describe how experts make decisions in their natural

work environments. One model in NDM is the RPD model. The RPD model enables decision makers to recognize a new situation and to identify and use software development approaches that have worked in similar situations in the past (Groenendaal & Helsloot, 2016). This model can be used to develop and implement improvements in understanding and mitigating decision errors.

The results of using a management style such as transformational leadership, which highlights the role of leaders in developing others, suggest the potential benefits of the TOC philosophy in software development. The TOC is a management philosophy focused on performance improvement of the weakest link in a chain of processes. It improves resource constraints, project cost, project risk, and project scheduling (Parker et al., 2015). Although prior applications of TOC focused on process improvement with limited evidence of its use in process planning and control practices (Peltokorpi et al., 2016), the use of TOC in software development processes is rarely addressed (Ribeiro et al., 2017). However, the common theme in the TOC literature is the ability to use TOC to focus on improvement of factors that have the greatest impact on achieving the overall goal; therefore, the application of the TOC with software projects can increase performance. It facilitates the successful management of project constraints and transformational leadership to build and support high performance teams.

The discussion of the findings in the context of previous literature highlights the interconnection of transformational leadership characteristics, cognitive style, and project success and failure. Furthermore, the results of this study highlight the adaptability and flexibility of a transformational leadership style. These results support the successful

transition to agile methods through a focus on communication and transparency, transformational leadership, cognitive style, and project success.

Limitations of the Study

It is the nature of qualitative exploration to produce deep, rich, and meaningful data gathered through phenomenological reduction, constant reflexivity, and acknowledgement of one's personal bias and its potential impact on the research process. Although a means of obtaining the unique view of a phenomenon from the perspective of the participant population, phenomenology renders findings non-generalizable to the population at large (Silverman, 2017; Merriam & Tisdell, 2016; Moustakas, 1994; Yin, 2014). This study's small sample limits the generalizability of findings discussed throughout this study. While the findings of this study may not generalize to other populations, they should provide a baseline for insight and understanding to inform research, industry practices, and personal decisions (Maxwell, 2013). Notwithstanding, qualitative research is the chosen methodology for this study due to the gap in the literature regarding the influence that leadership methods and decisions contribute to management of software projects that attain successful outcomes.

Due to a limited response from individuals working in government agencies in the Washington, DC, area, the participant search was expanded to commercial companies outside this area. The result was that study participants included those from both government agencies and commercial companies. A limitation exists in that the findings may not be applicable to other agencies or companies nor to those in other regions of the U.S. Additionally, findings may not be applicable to project managers who have not managed agile software development projects, a criterion for study participants.

Phenomenology is dependent on the interpretations and insights of the participants. Since criterion sampling was used for this study, findings may not be representative of the entire software population. Participants were limited to IT software project managers and, therefore, a limitation exists regarding the transferability of the research since it does not represent the entire software project management population. This lessens the ability to apply the results to a wider population of project managers and organizations (Moodley et al., 2016). However, utilizing the criterion sampling structures created advantages. One advantage of criterion sampling is the ability to collect different perspectives on the research topic from software project managers who share a specific skill set.

Recommendations

This qualitative study offered the researcher the opportunity to examine, in detail, a phenomenon focusing on the lived experience of 15 software project managers. The results of this study indicate that software project managers generally understand the current state of projects they managed. The participants of this study understood the effect their leadership and decision-making style had on project outcome. While this study took the first step to understand the association of project managers' cognitive style and transformational leadership style to software project success, there is more work to be done to understand project outcomes using agile methods. There is also a need for more details surrounding how the interactions of project managers impact a project's success.

Improving the success rate of software projects is a multidimensional construct with varied perspectives from many authors. Traditionally, project success was related to

compliance with scope, time, and cost (Carvalho & Rabechini, 2017). A project that is not on time, on budget, and within cost may not be considered a *failed* project. There does exist a distinction between project success and the success of the project management. Success should include both project success and project management.

The intent of this study was not only to contribute to research but also to offer knowledge about interpersonal skills, transformational leadership, and cognitive style to IT professionals to impact their agile software project outcomes. The following recommendations are aimed toward those within IT who have the authority and responsibility to make software projects successful. The intended audience for this project was software project managers.

Research studies are designed to focus on a specific phenomenon or set of questions. Future researchers may apply a different qualitative research approach, such as case study, to examine the same phenomenon by interviewing participants in executive positions such as senior management, researchers, executive boards, IT professionals, IT clients, vice presidents, chief information officers, and technical directors of agile software development projects. The phenomenological approach was used for this study to gain an understanding and interpretation of the participants' experience for the IT industry. This researcher considers the case study approach an appropriate next step in expanding the understanding of the influence leadership and decision have on project outcomes. The outcomes from a case study can directly influence program planning, policy, practice, and future research (Yin, 2014).

As previously stated, phenomenology attempts to uncover a given phenomenon through delving into people's lived experiences. Phenomenography, similar to

phenomenology, is a qualitative research approach with the goal of describing and understanding individuals' perception of reality (Mkono, 2018; Novais, Ruhanen, & Arcodia, 2018). Where phenomenology tells how the individual views a phenomenon, phenomenography explains how the individual sees something as varied, "between people under the same circumstances and/or within people under different circumstances" (Cibangu & Hepworth, 2016, p. 31).

An additional recommendation for future research would be to apply the phenomenography research approach using the findings from this study. This study's participants worked in government and commercial arenas. A phenomenography approach to the research data could possibly inform on the varied responses between the two groups of participants. Although phenomenography is rooted in curriculum development, Cibangu and Hepworth (2016) posit the need to examine phenomenography applied outside of education.

Implications

Significance to Social Change

The findings of this study can potentially impact positive social change at both the individual and organizational levels. On a personal level, the results can provide software managers with insight into how these 15 managers perceived themselves in their role and how their decisions and leadership affected the outcome of a software project. Software project managers are leaders, liaisons, and mentors. Their role is important to the success of a project. At the organizational level, this study also provides leaders with insight into participants' perceptions which will assist organizations in making informed decisions about improving project management processes. Findings suggest that organizational

leaders can initiate training on the concepts examined in this study, which, in time, could result in the preparation of a pipeline of managers to be more successful in leading projects.

It is hoped that this study raises social awareness of the importance of transformational leadership and decision making and their positive effect on software project outcomes. Goswami et al. (2016) presented information on the importance of transformational leadership and its contribution to a stimulating work environment and the fulfillment of followers. Parker et al. (2015) illustrated how focusing on improvement of factors can greatly impact the overall goal of project management. The findings may lead executives to reexamine the leadership and decision-making styles of their managers. By doing so, they may contribute to the organization's prosperity, their employees' effectiveness, and the cost containment of the products produced. This research provides a better understanding of project managers' perception of their leadership and decision making in light of overall project success.

Significance to Theory

The results of this study highlights (a) the adaptability and flexibility of the transformational leadership style, which can support successful transition to agile methods through a focus on communication and transparency, (b) the need for effective risk management, and (c) the interconnection between transformational leadership, cognitive style, and project success. Findings also reveal that software development project success can be supported through the use of transformational leadership skills within the NDM model and the TOC philosophy. With a recognitions-primed decision model, continued use of NDM and TOC can support greater understanding and

mitigation of decision errors by identifying what works and what does not work in other similar situations (Groenendaal & Helsloot, 2016).

Within the TOC, transformational leadership, in which leaders focus on the positive experiences and development of team members, can be used to support more positive project outcomes. This is particularly true regarding the ability to meet the expectations of transparency and communication, which, in turn, improve resource constraints, project costs, project risks, and project scheduling (Parker et al., 2015). The use of TOC and transformational leadership skills can therefore build and support high performance teams. This is accomplished through a focus on improvement of factors with the greatest impact on achieving the overall goal and increasing project performance by more effective and successful management of project constraints

Significance to Practice

The goal of this study is to educate project management practitioners about the importance of transformational leaders' decisions on project outcome. In particular, it is hoped that dissemination of study results will occur so that future researchers and organizational leaders may use them to inform others and develop further research. This study may inform IT leaders on how managers with a transformational leadership style and decision-making process promote a work environment where subordinates are satisfied with their leadership and job position. This work environment creates an atmosphere where employees want to support project goals and which results in project success. With this understanding, organizational leaders may better carry out transformational strategies and implement action plans to improve software project performance.

Conclusions

This Husserlian phenomenological research study was used to describe the lived experiences of 15 participants who used transformational leadership style to manage agile software development projects. The inclusion criteria for study participants included: (a) software project management experience, (b) minimum of 5 years of project management experience, and (c) management of an agile software development project within the past 2 years. The NDM model and the TOC philosophy were used as the study's framework to determine how the participating project managers made decisions in real life settings and to identify the contextual factors that may have influenced those decisions.

The findings demonstrate that transformational leaders stimulate an environment with an uplifting work atmosphere in which team members are fulfilled and product development outcomes are successful. These managers also displayed a different approach to analyzing and resolving project issues. Based on this study, organizational leaders may be able to develop strategies and training programs that facilitate managers' leadership styles to be more transformational, improve project decision making, and clarify managers' project goals in an effort to increase project success rates.

References

Adomako, S., Danso, A., Uddin, M., & Ofori-Damoah, J. (2016). Entrepreneurs' optimism, cognitive style and persistence. *International Journal of Entrepreneurial Behavior & Research*, *22*(1), 84-108. doi:10.1108/IJEBR-07-2015-0158

Ahimbisibwe, A., Cavana, R. Y., & Daellenbach, U. (2015). A contingency fit model of critical success factors for software development projects: A comparison of agile and traditional plan-based methodologies. *Journal of Enterprise Information Management*, *28*(1), 7-33. doi:10.1108/JEIM-08-2013-0060

Ahmed, R., Azmi, N., & Masood, T. (2013). What does project leadership really do? *International Journal of Scientific & Engineering Research*, *4*(1). Retrieved from http://www.ijser.org

Allio, R. J. (2013). Leaders and leadership: Many theories, but what advice is reliable? *Strategy and Leadership*, *41*(1), 4-14. doi:10.1108/10878571311290016

Anney, V. N. (2014). Ensuring the quality of the findings of qualitative research: Looking at trustworthiness criteria. *Journal of Emerging Trends in Educational Research and Policy Studies*, *5*(2), 272-281. Retrieved from eteraps.scholarlinkresearch.org

Anthopoulos, A., Reddick, C. G., Giannakidou, I., & Mavridis, N. (2016). Why e-government projects fail: An analysis of the healthcare.gov website. *Government Information Quarterly*, *33*, 161-173. doi: 10.1016/j.giq.2015.07.003

Araújo, C. C., & Pedron, C. D. (2015). IT project manager competencies that impact project success: A qualitative research. *Organisational Project Management,*

2(1), 53-75. doi:10.5130/opm.v2i1.4142

Armstrong, S. J., Cools, E., & Sadler-Smith, E. (2011). Role of cognitive styles in business and management: Reviewing 40 years of research. *International Journal of Management Reviews*, *14*, 238-262. doi:10.1111/j.1468-2370.2011.00315.x

Avolio, B. J., & Bass, B. M. (1988). Transformational leadership, charisma, and beyond. In J. G. Hunt, B. R. Baliga, H. P. Dachler, & C. A. Schriesheim (Eds.), *Emerging Leadership* (pp. 29-49). Lexington, MA: Vistas.

Bajcara, B., Babiaka, J., & Noal, C. S. (2015). When leaders become strategists: A new look at determinants of leadership styles through their relationship with strategic thinking. *Procedia Manufacturing, 3*, 3669-3676. doi:10.1016/j.promfg.2015.07.777

Banerjee, S. (2016). Role of a project manager in managing agile projects. *Journal of Business and Financial Affairs*, *5*(3), 1-4. doi:10.4172/2167-0234.100020

Bass, B. M. (1990). From transactional to transformational leadership: Learning to share the vision. *Organizational Dynamics*, *18*(3), 19-31. doi:10.1016/0090-2616(90)90061-s

Bass, B. M., & Avolio, B. J. (1996). The transformational and transactional leadership of men and women. *Applied Psychology*, *45*(1), 5-34. doi:10.1111/j.1464-0597.1996.tb00847.x

Bass, B. M., & Bass, R. (2009). *The Bass handbook of leadership: Theory, research, and managerial applications* (4th ed.). New York, NY: Free Press.

Bernal, W. N., Caballero, G. C., Sánchez, J. O., & Paéz-Logreira, H. (2016). Enterprise architecture framework oriented to cloud computing services. *Computers*

Communications and Control (ICCCC), 2016 6th International Conference, 64-69. doi:10.1109/ICCCC.2016.7496739

Berssaneti, F. T., & Carvalho, M. M. (2015). Identification of variables that impact project success in Brazilian companies. *International Journal of Project Manag*ement, *33*(3), 638-649. doi:10.1016/j.ijproman.2014.07.002

Besteiro, É. C., de Souza Pinto, J., & Novaski, O. (2015). Success factors in project management. *Business Management Dynamics*, *4*(9), 19-34. Retrieved from http://ebscohost.com

Birt, L., Scott, S., Cavers, D., Campbell, C., & Walter, F. (2016). Member checking: A tool to enhance trustworthiness or merely a nod to validation? *Qualitative Health Research*, *26*(13), 1802-1811. doi:10.1177/1049732316654870

Bormann, K. C., & Rowold, J. (2016). Transformational leadership and followers' objective performance over time: Insights from German basketball. *Journal of Applied Sport Psychology*, *28*(3), 367-373. doi:10.1080/10413200.2015.1133725

Bhowmik, C., & Ray, A. (2015). The application of theory of constraints in industry: A case study. *International Journal Extensive Research*, *2*, 21-29. Retrieved from http://www.journalijer.com

Boyles, K. (2015). *Exploring critical success factors for managing complex information technology projects in federal agencies* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (Accession No. 3722645)

Boyes, M., & Potter, T. (2015). The application of recognition-primed decision theory to decisions made in an outdoor education context. *Australian Journal of Outdoor Education*, *18* (1), 2-15. doi:10.1007/bf03400975

Becker, C., Walker, D., & McCord, C. (2017, May). Intertemporal choice: Decision making and time in software engineering. In *Proceedings of the 10th International Workshop on Cooperative and Human Aspects of Software Engineering*, (pp. 23-29). IEEE Press. doi:10.1109/CHASE.2017.6

Bevan, M. T. (2014). A method of phenomenology interviewing. *Qualitative Health Research*, *24*(1) 136-144. doi:10.1177/1049732313519710

Breevaart, K., Bakker, A. B., Demerouti, E., Sleebos, D. M., & Maduro, V. (2014). Uncovering the underlying relationship between transformational leaders and followers' task performance. *Journal of Personnel Psychology*, *13*(4), 194-203. doi:10.1027/1866-5888/a000118

Bronte-Stewart, M. (2015). Beyond the iron triangle: Evaluating aspects of success and failure using a project status model. *Computing and Information Systems*. *19*(2), 18-19. Retrieved from http://ebscohost.com

Browning, T. R. (2014). Managing complex project process models with a process architecture framework, *International Journal of Project Management*, *32*(2), 229-241, doi: 10.10.1016/j.ijproman.2013.05.008

Burns, J. (2016). *Critical skills for supervisors of information technology project managers in government: An interpretative phenomenological analysis case study* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (10108949)

Burns, J. M. (1978). *Leadership*. New York, NY: Harper and Row.

Carvalho, M. M., & Rabechini, R. (2017). Can project sustainability management impact project success: An empirical study applying a contingent approach. *International*

Journal of Project Management, *35*(6), 1120-1132. doi: 10.1016/j.ijproman.2017.02.018.

Cecez-Kecmanovic, D., Kautz, K., & Abrahall, R. (2014). Reframing success and failure of information systems: A performative perspective. *MIS Quarterly*, *38*(2), 561-588. doi:10.25300/misq/2014/38.2.11

Chan, Z. C., Fung, Y., & Chien, W. (2013). Bracketing in phenomenology: Only undertaken in the data collection and analysis process. *Qualitative Report*, *18*(30), 1-9.

Chatterjee, D., & Dey, S. (2015). Cognitive styles as predictors of managerial effectiveness: A study of private sector managers from manufacturing industries. *International Journal of Indian Psychology, 3*(1), 36-43. Retrieved from http://www.ijip.in/

Cibangu, S. K., & Hepworth, M. (2016). The uses of phenomenology and phenomenography: A critical review. *Library & Information Science Research*, *38*, 148-160. doi: 10.1016/j.lisr.2016.05.001

Clancy, M. (2013). Is reflexivity the key to minimizing problems of interpretation in phenomenological research? *Nurse Researcher*, *20*(6), 12-16. doi:10.7748/nr2013.07.20.6.12.e1209

Cools, E., & Van den Broeck, H. (2007). The hunt for the Heffalump continues: Can trait and cognitive characteristics predict entrepreneurial orientation? *Journal of Small Business Strategy*, *18*(2), 23-41. Retrieved from http://search.proquest.com

Conforto, E. C., Salum, F., Amaral, D. C., da Silva, S. L., & de Almeida, L. F. M. (2014). Can agile project management be adopted by industries other than software

development? *Project Management Journal*, *45*(3), 21-34. doi:0.1002/pmj.21410

Cotterill, S. T., & Discombe, R. (2016). Enhancing decision-making during sports performance: Current understanding and future directions. *Sport and Exercise Psychology Review*, *12*(1), 54-68. Retrieved from http://ebscohost.com (Accession No. 113283396)

Creasy, T., & Anantatmula, V. S. (2013). From every direction: How personality traits and dimensions of project managers can conceptually affect project success. *Project Management Journal*, *44*(6), 36-51. doi:10.1002/pmj.21372

Cullen, K., & Parker, D. W. (2015). Improving performance in project-based management: Synthesizing strategic theories. *International Journal of Productivity and Performance Management, 64*(5), 608-624. doi:http://dx.doi.org.ezp.waldenulibrary.org/10.1108/IJPPM-02-2014-0031

Cunha, J. A., Moura, H. P., & Vasconcellos, F. G. (2016). Decision-making in software project management: A systematic literature review. *Procedia Computer Science*, *100*, 947-954. doi: 10.1016/j.procs.2016.09.255

Cunningham, J., Salomone, J., & Wielgus, N. (2015). Project management leadership style: A team member perspective. *International Journal of Global Business, 8*(2), 27-54.

Cuthbert, C. A., & Moules, N. (2014). The application of qualitative research findings to oncology nursing practice. *Oncology Nursing Forum*, *41*(6), 683-685. doi: 10.1188/14.ONF.683-685

da Cunha, J. A. O. G., da Silva, F. Q. B., de Moura, H. P., & Vasconcellos, F. J. S. (2016). Decision-making in software project management. *Proceedings of the 9th*

International Workshop on Cooperative and Human Aspects of Software Engineering, 26-32. doi:10.1145/2897586.2897598

Dalci, I., & Kosan, L. (2012). Theory of constraints thinking-process tools facilitate goal achievement for hotel management: A case study of improving customer satisfaction. *Journal of Hospitality Marketing & Management*, *21*, 541-568. doi:10.1080/19368623.2012.626751

Damberg, C. L., Sorbero, M. E., Lovejoy, S. L., Martsolf, G. R., Raaen, L., & Mandel, D. (2014). Measuring success in health care value-based purchasing programs: Findings from an environmental scan, literature review, and expert panel discussions. *Rand Health Quarterly*, *4*(3). Retrieved from www.ncbi.nlm.nih.gov

Dartey-Baah, K. (2015). Resilient leadership: A transformational-transactional leadership mix. *Journal of Global Responsibility, 6*(1), 99-112. doi:10.1108/jgr-07-2014-0026

Davies, A., & Mackenzie, I. (2013). Project complexity and systems integration: Constructing the London 2012 Olympics and Paralympics games. *International Journal of Project Management, 32*(5), 773-790. doi: 10.1016/j.ijproman.2013.10.004

Davis, K. (2013). Different stakeholder groups and their perceptions of project success. *International Journal of Project Management, 32*, 189-201. doi:10.1016/j.ijproman.2013.02.006

De Carvalho, M., Patah, L. A., & De Souza Bido, D. (2015). Project management and its effects on project success: Cross-country and cross-industry comparisons. *International Journal of Project Management, 33*(3), 1509-1522.

doi:10.1016/j.ijproman.2015.04.004

DeFelice, D., & Janesick, V. J. (2015). Understanding the marriage of technology and phenomenological research: From design to analysis. *The Qualitative Report. 20*(10), 1576. Retrieved from http://nsuworks.nova.edu/tqr/

Demirtas, O., & Akdogan, A. A. (2015). The effect of ethical leadership behavior on ethical climate, turnover intention, and affective commitment. *Journal of Business Ethics*, *130*, 59-67. doi:10.1007/s10551-014-2196-6

Dewberry, C., Juanchich, M., & Narendran, N. (2013). Decision-making competence in everyday life: The roles of general cognitive styles, decision-making styles and personality. *Personality and Individual Differences*, *55*, 783-788. doi:10.10. 10.10.1016/j.paid.2013.06.012

Dyba, T., Dingsøyr, T., & Moe, N. B. (2014). Agile project management. In T. Dyba, T. Dingsøyr, & N. B. Moe (Eds.), *Software Project Management in a Changing World* (pp. 277-300). Berlin, Germany: Springer. doi:10.1007/978-3-642-55035-5

Dwivedi, Y. K., Wastell, D., Laumer, S., Henriksen, H. Z., Myers, M. D., Bunker, D., & Srivastava, S. C. (2015). Research on information systems failures and successes: Status update and future directions. *Information Systems Frontier*, *17*, 143-157. doi:10.1007/s10796-014-9500-y

El Hussein, M., Jakubec, S. L., & Osuji, J. (2015). Assessing the FACTS: A mnemonic for teaching and learning the rapid assessment of rigor in qualitative research studies. *Qualitative Report, 20*(8), 01, 02, 1182-1184. Retrieved from http://search.proquest.com

Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., & Kyngäs, H. (2014).

Qualitative content analysis: A focus on trustworthiness. *Sage Open*, 4(1), 1-10. doi:10.1177/2158244014522633

Elqadri, Z., Priyono, P., Suci, R., & Chandra, T. (2015). Effect of leadership style, motivation, and giving incentives on the performance of employees—PT: Kurnia Wijaya various industries. *International Education Studies*, *8*(10), 183-192. doi:10.5539/ies.v8n10p183

Esa, M., Alias, A., & Samad, Z. A. (2014). Project managers' cognitive style in decision making: A perspective from construction industry. *International Journal of Psychological Studies*, *6*(2), 94-113. doi:10.5539/ijps.v6n2p65

Farlik, J. T. (2016). *Project success in agile development software projects*. (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses. (10108921)

Fiedler, F.E. (1978). The contingency model and the dynamics of the leadership process. In L. Berkowitz (Ed.), Advance

Fusch, P. I., & Ness, L. R. (2015). Are we there yet? Data saturation in qualitative research. *The Qualitative Report*, *20*(9), 1408-1416. Retrieved from http://search.proquest.com

Gallén, T. (2006). Managers and strategic decisions: Does the cognitive style matter? *Journal of Management Development, 25*, 118–133. doi:10.1108/02621710610645117

Gandomani, T. J., & Nafchi, M. Z. (2016a). The essential prerequisites of agile transition and adoption: A grounded theory approach. *Journal of Internet Computing and Services (JICS)*, *17*(5), 173-183. doi:10.7472/jksii.2016.17.5.173

Gandomani, T. J., & Nafchi, M. Z. (2016b). Agile transition and adoption human-related

challenges and issues: A grounded theory approach. *Computers in Human Behavior*, *62*, 257-266. doi:10.1016/j.chb.2016.04.009

Gencer, M. S., & Samur, Y. (2016). Leadership Styles and Technology: Leadership Competency Level of Educational Leaders. *Procedia - Social and Behavioral Sciences*, *229,* 226-233. doi:10.1016/j.sbspro.2016.07.132

Goswami, A., Nair, P., Beehr, T., & Grossenbacher, M. (2016). The relationship of leaders' humor and employees' work engagement mediated by positive emotions: Moderating effect of leaders' transformational leadership style. *Leadership and Organization Development Journal*, *37*(8) 1083-1099 doi:10.1108/LODJ-01-2015-0001

Ghazi, P., Moreno, A. M., & Peters, L. (2014). Looking for the Holy Grail of software development. *IEEE Software*, *31*(1), 96-96. doi:0.1109/MS.2015.71

Gill, A., Smith, S., Beydoun, G., & Sugumaran, V. (2014, June). Agile enterprise architecture: A case of a cloud technology-enabled government enterprise transformation. *Proceeding of the 19th Pacific Asia Conference on Information Systems*, 20. Retrieved from http://ro.uow.edu.au/cgi/viewcontent.cgi?article=5101&context=eispapers

Giorgi, A. (2009). *The descriptive phenomenological method in psychology: A modified Husserlian approach*. Pittsburgh, PA: Duquesne University Press.

Girma, S. (2016). The relationship between leadership style and employee job satisfaction study of federal and Addis Ababa sport organizational management setting in Ethiopia. *International Journal of Applied Research*, *2*(3), 92-96. Retrieved from http://www.allresearchjournal.com

Goldratt, E. M. (1990). *What is this thing called theory of constraints and how should it be implemented?* [Kindle version]. Retrieved from https://read.amazon.com/?asin=B00L7XYW2Q

Goldratt, E. M., & Cox, J. (2004). *The Goal: The process of ongoing improvement* (3rd ed.). [Kindle version]. Retrieved from https://read.amazon.com/

Goldratt, R., & Weiss, N. (2005). Significant enhancement of academic achievement through application of the theory of constraints (TOC). *Human System Management, 24*(1), 13-19.

Gore, J., Flin, R., Stanton, N., & Wong, B. L. W. (2015). Applications for naturalistic decision-making. *Journal of Occupational and Organizational Psychology*, *88*, 223-230. doi:10.1111/joop.12121

Groenendaal, J., & Helsloot, I. (2016). The application of Naturalistic Decision Making (NDM) and other research: Lessons for frontline commanders. *Journal of Management & Organization*, *22*(2), 173-185. doi:10.1017/jmo.2015.31

Grossoehme, D. H. (2014). Overview of qualitative research, *Journal of Health Care Chaplaincy*, *20*(3), 109-122. doi:10.1080/08854726.2014.925660

Gupta, M., & Snyder, D. (2009). Comparing TOC with MRP and JIT: A literature review. *International Journal of Production Research*, *47* (13), 3705-3739. doi:10.1080/00207540701636322

Harper, M., & Cole, P. (2012). Member checking: Can benefits be gained similar to group therapy? *The Qualitative Report*, *17*(2), 510-517. Retrieved from http://nsuworks.nova.edu/tqr

Hays, D. G., Wood, C., Dahl, H., & Kirk-Jenkins, A. (2016). Methodological rigor in

Journal of Counseling & Development Qualitative Research articles: A 15-year review. *Journal of Counseling & Development*, *94*(2), 172-183. doi:10.1002/jcad.12074

Heagney, J. (2013). *Fundamentals of project management* (5th ed.). New York, NY: AMACOM.

Heidrich, J., Rombach, D., & Klas, M. (2014). Agile project management. In G. Ruhe & C. Wohlin (Eds.), *Software Project Management in a Changing World* (pp.1- 32). New York, NY: Springer.

Hocine, Z., & Zhang, J. (2014). Autonomy support: Explaining the path from leadership to employee creative performance. *Open Journal of Social Sciences*, *2*(6). 417-412. doi:10.4236/jss.2014.26048

Hoda, R., & Murugesan, L. K. (2016). Multi-level agile project management challenges: A self-organizing team perspective, *Journal of Systems and Software*, *117*, 245-257. doi: 10.1016/j.jss.2016.02.049

Hornstein, H. A. (2014). The integration of project management and organizational change management is now a necessity. *International Journal of Project Management*, *33*(2), 291-298. doi:10.1016/j.ijproman.2014.08.005

Houghton, C., Casey, D., Shaw, D., & Murphy, K. (2013). Rigor in qualitative case-study research. *Nurse Researcher*, *20*(4), 12-17. doi:10.7748/nr2013.03.20.4.12.e326

Hughes, D. L., Rana, N. P., & Simintiras, A. C. (2017). The changing landscape of IS project failure: An examination of the key factors. *Journal of Enterprise Information Management*, *30*(1), 142-165. doi:10.1108/JEIM-01-2016-0029

Husserl, E. (2002). *Husserl at the limits of phenomenology: Including texts by Edmund*

Husserl. Evanston, IL: Northwestern University Press.

Hyett, N., Kenny, A., & Dickson-Swift, V. (2014). Methodology or method: A critical review of qualitative case study reports. *International Journal of Qualitative Studies on Health and Well-Being*, *May* 7(9), 23606. doi:10.3402/qhw.v9.23606

Izmailov, A. (2014). If your company is considering the theory of constraint. *Procedia-Social and Behavioral Sciences*, *150*, 925-929. doi: 10.1016/j.sbspro.2014.09.103

Izmailov, A., Korneva, D., & Kozhemiakin, A. (2016). Effective project management with theory of constraints. *Procedia - Social and Behavioral Sciences*, *229*, 96-103. doi: 10.1016/j.sbspro.2016.07.118

Jablokow, K. W., Teerlink, W., Yilmaz, S., Daly, S. R., & Silk, E. M. (2015, June 14). *The impact of teaming and cognitive style on student perceptions of design ideation outcomes*. Paper presented at the ASEE Annual Conference and Exposition, Seattle, WA. Retrieved from http://lib.dr.iastate.edu/industrialdesign_conf

Jain, A. K., & Jeppesen, H. J. (2013). Knowledge management practices in a public sector organization: The role of leaders' cognitive styles. *Journal of Knowledge Management*, *17*(3), 347-362. doi:10.1108/JKM-11-2012-0358

Johnston, D., & Morrison, B. W. (2016). The application of naturalistic decision-making techniques to explore cue use in rugby league playmakers. *Journal of Cognitive Engineering and Decision Making*, *10*(4), 391-410. doi:10.1177/1555343416662181

Jorm, A. F. (2015). Using the Delphi expert consensus method in mental health research. *Australian and New Zealand Journal of Psychiatry*, *49*(10). 887-897.

doi:10.1177/0004867415600891

Joslin, R., & Müller, R. (2015). Relationships between a project management methodology and project success in different project governance contexts. *International Journal of Project Management*, *33*(6), 1377-1392. doi: 10.1016/j.ijproman.2015.03.005

Joslyn, S., & Jones, D. (2006). *Strategies in naturalistic decision-making: A cognitive task analysis of naval weather forecasting* (Report No. 62). Seattle, WA: University of Washington.

Kahai, S., Jestire, R., & Huang, R. (2013). Effects of transformational and transactional leadership on cognitive effort and outcomes during collaborative learning within a virtual world. *British Journal of Educational Technology, 44*(6), 969-985. doi:10.1111/bjet.12105

Kahneman, D., & Klein, G. (2009). Conditions for intuitive expertise: A failure to disagree. *American Psychologist*, *64*(6), 515–526. https://doi-org.ezp.waldenulibrary.org/10.1037/a0016755

Kayode, B. K., Mojeed, A. O., & Fatai, I. A. (2014). Leadership and decision-making: A study on reflexive relationship between leadership style and decision-making approach. *British Journal of Education, Society & Behavioral Science*, *4*(4), 473-484. doi:10.9734/BJESBS/2014/5514

Keil, M., Lee, H. K., & Deng, T. (2013). Understanding the most critical skills for managing IT projects: A Delphi study of IT project managers, *Information & Management*, *50*(7), 398-414, doi:10.1016/j.im.2013.05.005

Khatri, N., & Ng, H. A. (2000). The role of intuition in strategic decision making. *Human*

Relations, 53, 57-86. Retrieved from Ebscohost. (Accession No. edsgcl.59245316)

Kissi, J., Dainty, A., & Tuuli, M. (2013). Examining the role of transformational leadership of portfolio managers in project performance. *International Journal of Project Management*, *31*(4), 485-497. doi:10.1016/j.ijproman.2012.09.004

Klein, G. (2008). Naturalistic decision making. *Human Factors*, *50*(3), 456-460. doi:10.1518/001872008X288385

Klein, G. (2015a). A naturalistic decision-making perspective on studying intuitive decision making. *Journal of Applied Research in Memory and Cognition*, *4*(3), 164-168. doi:10.1016/j.jarmac.2015.07.001

Klein, G. (2015b). Reflections on applications of naturalistic decision making. *Journal of Occupational and Organizational Psychology*, *88*, 383-386. doi:10.1111/ joop.12121

Knockaert, M., Foo, M. D., Erikson, T., & Cools, E. (2015). Growth intentions among research scientists: A cognitive style perspective. *Technovation*, *38*, 64-74, doi:10.1016/j.technovation.2014.12.001

Ko, D. G., & Kirsch, L. J. (2017). The hybrid IT project manager: One foot each in the IT and business domains. *International Journal of Project Management*, 307-319. doi: 10.1016/j.ijproman.2017.01.013

Leau, Y. B., Loo, W. A., Tham, W. Y., & Tan, S. F. (2012). Software development life cycle AGILE vs traditional approaches. *International Conference on Information and Network Technology, 37*, 162-167. Retrieved from http://www.researchgate.net/publication/268334807

Leavy, P. (2017). *Research Design: Quantitative, Qualitative, Mixed Methods, Arts-Based, and Community-Based Participatory Research Approaches.* New York, NY: The Guilford Press.

Lehtinen, T. O., Mäntylä, M. V., Vanhanen, J., & Itkonen, J. L. (2014). Perceived causes of software project failures: An analysis of their relationships. *Information and Software Technology*, *56*, 623-643. doi: 10. 1016/j.infsof.2014.01.015 0950-5849

Librelato, T. P., Lacerda, D. P., Rodrigues, L. H., & Veit, D. R. (2014). A process improvement approach based on the value stream mapping and the theory of constraints thinking process, *Business Process Management Journal*, *20*(6), 922-949. doi:10.1108/ BPMJ-07-2013-0098

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publications.

Liphadzi, M., Aigbavboa, C., & Thwala, W. (2015). Relationship between leadership styles and project success in the South Africa construction industry. *Procedia Engineering*, *123*, 284-290. doi: 10.1016/j.proeng.2015.10.091

Lipshitz, R., Klein, G., & Carroll, J. S. (2006). Naturalistic decision making and organizational decision making: Exploring the intersections. *Organization Studies*, *27*(7), 917-923. doi:10.1177/0170840606065711

Loh, J. (2013). Inquiry into issues of trustworthiness and quality in narrative studies: A perspective. *The Qualitative Report*, *18*(65), 1-15. Retrieved from http://nsuworks.nova.edu/tqr/

Lowe, A., Norris, A. C., Farris, J., & Babbage, D. R. (2018). Quantifying thematic saturation in qualitative data analysis, *Field Methods*, *30*(3), 191-207. Retrieved

from Sage database

Luse, A., McElroy, J. C., Townsend, A. M., & DeMarie, S. (2013). Personality and cognitive style as predictors of preference for working in virtual teams, *Computers in Human Behavior*, *29*(4), 1825-1832. doi: 10.1016/j.chb.2013.02.007

Maxwell, J. A. (2013). *Qualitative research design: An interactive approach* (3nd ed.). Thousand Oaks, CA: Sage Publications.

Mikuskove, E. B., Hanak, R., & Čavojova, V. (2015). Appropriateness of two inventories measuring intuition (The PID and the RID) for Slovak population. *Studia Psychologica*, *57*(1), 63-82. Retrieved from Ebscohost. (Accession No. 101723346)

Medina, K. (2014). Closing the project management skills gap in the federal government. *Public Manager*, Fall, 41-43. Retrieved from Ebscohost. (Accession No. 97938762)

Mello, A. L., & Delise, L. A. (2015, March). Cognitive diversity to team outcomes. *Small Group Research*, *46*(2), 204-226. doi:10.1177/1046496415570916

Mergel, I. (2016). Agile innovation management in government: A research agenda. *Government Information Quarterly*, *33*(3), 516-523. doi: 10.1016/j.giq.2016.07.004

Merriam, S. B., & Tisdell, E. J. (2016). Qualitative research: A guide to design and implementation. San Francisco, CA: Jossey-Bass.

McQuaid, P. A. (2012). Software disasters: Understanding the past to improve the future. *Journal of Software Evolution and Process*, *24*, 459-470. doi:10.1002/smr.500

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage Publications.

Miles, M. B., Huberman, A. M., & Saldaña. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Mkono, M. (2018). Troll alert: Provocation and harassment in tourism and hospitality social media. *Tourism*, *21*(7), 791-804. doi:10.1080/13683500.2015.110644

Moodley, D., Sutherland, M., & Pretorius, P. (2016). Comparing the power and influence of functional managers with that of project managers in matrix organisations: The challenge in duality of command. *South African Journal of Economic and Management Sciences*, *19*(1), 103-117. doi:10.4102/sajems.v19i1.1308

Morris, P. (2013). Reconstructing project management reprised: A knowledge perspective. *Project Management Journal*, *44*(5), 6-23. doi:10.1002/pmj

Moustakas, C. E. (1994a). *Phenomenological research methods*. [Kindle version]. Retrieved from: www.amazon.com

Moustakas, C. (1994b) Epoche, phenomenological reduction, imaginative variation, and synthesis. In *Phenomenological research methods* (pp. 84-102). Thousand Oaks, CA: Sage Publications. doi: 10.4135/9781412995658

Müller, R. J. R. (2016). The impact of project methodologies on project success in different project environments. *International Journal of Managing Projects in Business*, *9*(2), 364-388. doi:10.1108/IJMPB-03-2015-0025

Muneera, E., & Naziah, S. M. (2015). For better built environment: Do thinking styles of project managers matter in project success. *Advances in Environmental Biology*, *9*(23), 81-88. Retrieved from http://www.aensiweb.com/AEB/

Munir, M. O., Furqan, R., Shahzad, S., & Basit, A. (2017). Examining the role of leadership of portfolio managers in project performance. *Journal of Strategy and Performance Management*, *5*(2), 23-41.

Niazi, M., Mahmood, S., Alshayeb, M., Qureshi, A. M., Faisal, K., & Cerpa, N. (2016). Toward successful project management in global software development. *International Journal of Project Management*, *34*, 1553-1567. doi:10.1016/j.ijproman.2016.08.008

Neha, V., Bhat, A. B., Rangnekar, S., & Barua, M. K. (2013). Association between leadership style and decision making style in Indian organizations. *Journal of Management Development*, *34*(3), 246-269. doi:10.1108/JMD-03-2012-0038

Nemeth, C., Blomberg, J., Argenta, C., Serio-Melvin, M. L., Salinas, J., & Pamplin, J. (2016). Revealing ICU cognitive work through Naturalistic Decision-Making Methods. *Journal of Cognitive Engineering and Decision Making, 10*(4), 350-368. doi:10.1177/1555343416664845

Nguyen, P. D. (2016). Success factors for building and managing high performance agile software development teams. *International Journal of Computer*, *20*(1), 51-82. doi:10.1016/j.ijproman.2015.01.006

Novais, M. A., Ruhanen, L., & Arcodia, C. (2018). Destination competitiveness: A phenomenographic study. *Tourism Management*, *64*, 324-334. doi:10.1016/j.tourman.2017.08.014

Obeidat, M., & North, M. M. (2014). A comparative review of information technology project management in private and public sector organizations. *International Management Review*, *10*(1), 55-62. Retrieved from http://ebscohost.com

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research, 42*(5), 533-544. doi:http://dx.doi.org/10.1007/s10488-013-0528-y

Pandya, K. D. (2014). The key competencies of project leader beyond the essential technical capabilities. *IUP Journal of Knowledge Management*, *12*(4), 39-48. Retrieved from http://ebscohost.com

Papadopoulosa, G. (2015). Moving from traditional to agile software development methodologies also on large, distributed projects. *Procedia-Social and Behavioral Sciences*, *175*, 455-463. doi:10.1016/j.sbspro.2015.01.1223

Parker, D. W., Parsons, N., & Isharyanto, F. (2015). Inclusion of strategic management theories to project management. *International Journal of Managing Projects in Business*, *8*(3), 552-573, doi:10.1108/IJMPB-11-2014-0079

Patton, M. Q. (2002). Qualitative research & evaluation methods (3rd ed.). Thousand Oaks, CA: Sage Publications.

Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). Thousand Oaks, CA: Sage Publications.

Peltokorpi, A., Nisén, N., Groop, J., Reinikainen, T., Bengs, A., & Pirttimaa, M. (2016) Applying the theory of constraints to improve throughput in a forensic DNA laboratory. *Forensic Science Policy & Management. An International Journal, 7*(1-2), 37-49. doi:10.1080/19409044.2015.1110734

Pinto, J. K., & Mantel, Jr., S. J. (1990). The causes of project failure: *IEEE Transaction*

on engineering management, *37*(4), 269-276. doi:10.1109/17.62322

Podsakoff, P. M., MacKenzie, S. B., Moorman, R. H., & Fetter, R. (1990). Transformational leader behaviors and their effects on followers' trust in leader, satisfaction, and organizational citizenship behaviors. *Leadership Quarterly*, *1*(2), 107–142. doi:10.1016/1048-9843(90)90009-7

Podsakoff, P. M., MacKenzie, S. B., & Bommer, W. H. (1996). Transformational leader behaviors and substitutes for leadership as determinants of employee satisfaction, commitment, trust and organizational citizenship behaviors. *Journal of Management*, *22*(2). 259-298. doi:10.1177/014920639602200204

Pretorius, P. (2014). Introducing in-between decision points to TOC's five focusing steps. *International Journal of Production Research*, *52*(2), 496-506. doi:10.1080/00207543.2013.836612

Project Management Institute. (2013). *PMBOK® Guide: A guide to the project management body of knowledge* (5th ed.). Newtown Square, PA: Author.

Ramazani, J., & Jergeas, G. (2015). Project managers and the journey from good to great: The benefits of investment in project management training and education. *International Journal of Project Management*, *33*(1), 41-52. doi:10.1016/j.ijproman.2014.03.012

Riaz, A., Tahir, M. M., & Noor, A. (2013). Leadership is vital for project managers to achieve project efficacy. *Research Journal of Recent Sciences*, *2*(6), 99-102. Retrieved from http://www.isca.in/

Ribeiro, S. A., Schmitz, E. A., Alencar, A. J., & da Silva, M. F. (2017). Research opportunities on the application of the theory of constraints to software process

development. *Journal of Software*, *12*(4), 227-239. doi:10.17706/jsw.12.4.227-239

Riegel, B., Dickson, V. V., & Topaz, M. (2013). Qualitative analysis of naturalistic decision making in adults with chronic heart failure. *Nursing Research*, *62*(2), 91-98. doi:10.1097/NNR.0b013e318276250c

Ritchie, W. J., Kolodinsky, R. W., & Eastwood, K. (2007). Does executive intuition matter: An empirical analysis of its relationship with nonprofit organization financial performance. *Nonprofit and Voluntary Sector Quarterly*, *36*(1), 140-155. doi: 10.1177/0899764006293338

Rodríguez-Segura, E., Ortiz-Marcos, I., Romero, J. J., & Tafur-Segura, J. (2016). Critical success factors in large projects in the aerospace and defense sectors. *Journal of Business Research*, *69*, 5419-5425. doi: 10.1016/j.jbusres.2016.04.148

Sage, D., Dainty, A., & Brookes, N. (2013). Thinking the ontological politics of managerial and critical performativities: An examination of project failure. *Scandinavian Journal of Management 29*(3), 282-291. doi:10. 1016/j.scaman.2013.01.004

Schwalbe, K. (2016). *Information technology project management* (8th ed.). Boston, MA: Cengage Learning.

Seidman, I. (2013). Interviewing as qualitative research: A guide for researchers in education & the social sciences (4th ed.). New York, NY: Teachers College Press

Serrador, P., & Pinto, J. K. (2015). Does Agile work?: A quantitative analysis of agile project success. *International Journal of Project Management*, *33*, 1040-1051. doi:10.1016/j.ijproman.2015.01.006

Seymour, T., & Hussein, S. (2014). The history of project management. *International Journal of Management & Information Systems*, *18*(4), 233-240. Retrieved from http://www.cluteinstitute.com/

Shan, Y., & Yang, L. (2016). Fast and frugal heuristics and naturalistic decision making: A review of their commonalities and differences. *Thinking and Reasoning*, *23*(1), 10-32. doi:10.1080/13546783.2016.115299

Silva, P., Moreno, A. M., & Peters, L. (2015). Software project management: Learning from our mistakes. *IEEE Software*, (3), 40-43. Retrieved from www.computer.org/software

Silverman, D. (2017). *Doing qualitative research* (5th ed.). London, United Kingdom: Sage Publications.

Simsit, Z. T., Gunay, N. S., & VayVay, O. (2014). Theory of constraints: A literature review. *Procedia-Social and Behavioral Science*, *150*, 930-936. doi:10.10.1016/j.sbspro.2014.09.104

Simon, M. K., & Goes, J. (2013). *Dissertation and scholarly research: Recipes for success* (2013 ed.). Seattle, WA: Create Space Independent Publishing Platform.

Skinner, R., Land, L., Chin, W., & Nelson, R. R. (2015). *Reviewing the past for a better future: Reevaluating the IT project retrospective*. Paper presented at the International Research Workshop on IT Project Management, Ft. Worth, TX. Retrieved from http://aisel.aisnet.org/irwitpm2015/3

Soliman, A. F. (2016). Investigating the leadership style effect on the technology transfer effectiveness: A proposed new model (An applied study on the dairy manufacturing Sector in Egypt). *International Journal of Business and*

Management, *11*(10). doi:10.5539/ijbm.v11n10p141

Špundak, M. (2014). Mixed agile/traditional project management methodology: Reality or illusion? *Procedia-Social and Behavioral Sciences*, *119*, 939-948. doi:10.1016/j.sbspro.2014.03.105

Standish Group International. (2013). *CHAOS Manifesto: Think big, act small*. Antwerp, Belgium: Author. Retrieved from http://www.immagic.com/eLibrary/ARCHIVES/GENERAL/GENREF/S130301C.pdf

Standish Group International. (2014). *CHAOS* [White paper]. London, United Kingdom: Project Smart. Retrieved from https://www.projectsmart.co.uk/white-papers/chaos-report.pdf

Tarwani, S., & Chug, A. (2016). Agile methodologies in software maintenance: A systematic review. *Informatica (03505596)*, *40*(4), 415-426. Retrieved from http://ebscohost.com

Taylor, K. J. (2015). Adopting Agile software development: The project manager experience. *Information Technology & People*, *29*(4), 670-687. doi:10.1108/ITP-02-2014-0031

Thackeray, R., & Hunter, M. (2010). Empowering youth: Use of technology in advocacy to affect social change. *Journal of Computer-Mediated Communication, 15*(4), 575-591. doi:10.1111/j.1083-6101.2009.01503.x

Tomanek, M., Cermak, R., & Smutny, T. (2014). A conceptual framework for web development projects based on project management and agile development principles. *Proceedings of the European Conference on Management, Leadership*

& Governance, 550-558. Retrieved from http://ebscohost.com

Too, E. G., & Weaver, P. (2014). The management of project management: A conceptual framework for project governance. *International Journal of Project Management*, *32*(2014) 1382–1394. doi:10.1016/j.ijproman.2013.07.00

Top, M., Akdere, M., & Tarcan, M. (2015). Examining transformational leadership, job satisfaction, organizational commitment and organizational trust in Turkish hospitals: Public servants versus private sector employees. *The International Journal of Human Resource Management, 26*(9), 1259-1282. doi:10.1080/09585192.2014.939987

Torrecilla-Salinasa, C. J., Sedeñoa, J., Escalonaa, M. J., & Mejíasa, M. (2015). Agile, web engineering and capability maturity model integration: A systematic literature review. *Information and Software Technology, 7*, 92-107. doi: 10.1016/j.infsof.2015.11.002

Tufford, L., & Newman, P. (2012). Bracketing in qualitative research. *Qualitative Social Work*, *11*(1), 80-96.

U.S. Executive Office. (2012, May 2). *The common approach to federal enterprise architecture*. Retrieved from https://obamawhitehouse.archives.gov/sites/default/files/omb/assets/egov_docs/common_approach_to_federal_ea.pdf

U.S. Government Accountability Office. (2013). *Software development: Effective practices and federal challenges in applying Agile* (Publication No. GAO-12-681). Washington, DC: U.S. Government Printing Office.

Usher, K. & Jackson, D. (2014). Phenomenology. In Mills, J., & Birks, M. *Qualitative*

methodology, 181-198. 55 City Road, London: Sage Publications. doi: 10.4135/9781473920163

Vagle, M. D. (2014). *Crafting phenomenological research.* Walnut Creek, CA: Left Coast Press.

Vanderheyden, K., & De Baets, S. (2015). Does cognitive style diversity affect performance in dyadic student teams? *Learning and Individual Differences*, *38*, 143-150. doi:10.1016/j.lindif.2015.01.006

van Kelle, E., van der Wijst, P., & Plaat, A. (2015). An empirical study into social success factors for agile software development. *Proceedings of the Eighth International Workshop on Cooperative and Human Aspects of Software Engineering*, 77-80. doi:10.1109/CHASE.2015.24

Van Manen, M. (2014). *The phenomenology of practice: Meaning-giving methods in phenomenological research and writing.* Walnut Creek, CA: Left Coast Press.

Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *MIS Quarterly*, *37*(1), 21-54. doi:10.25300/misq/2013/37.1.02

Verma, M., Bhat, A. B., Rangnekar, S., & Barua, M. K. (2013). Association between leadership style and decision-making style in Indian organizations. *Journal of Management Development, 34*(3) 246-269. doi:10.1108/JMD-03-2012-0038

Wang, D., Waldman, D. A., & Zhang, Z. (2014). A meta-analysis of shared leadership and team effectiveness. *Journal of Applied Psychology*, (2), 181. doi: 10.1037/a0034531

Weerawardena, J., Mort, G. S., Salunke, S., Knight, G., & Liesch, P. W. (2014). The role

of the market sub-system and the socio-technical sub-system in innovation and firm performance: a dynamic capabilities approach. *Journal of the Academy of Marketing Science*, *43*(2), 221-239. doi:10.1007/s11747-014-0382-9

Whitney, K. M., & Daniels, C. B. (2013). The root cause of failure in complex IT projects: Complexity itself. *Procedia Computer Science*, *20*, 325- 330. doi:10.1016/j.procs.2013.09.280

Xu, M. A., & Storr, G. B. (2012). Learning the concept of researcher as instrument in qualitative research. *Qualitative Report*, *17*(21), 1-18, Retrieved from https://nsuworks.nova.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1768&context=tqr

Yilmaz, K. (2013). Comparison of quantitative and qualitative research traditions: Epistemological, theoretical, and methodological differences. *European Journal of Education, 48*(2), 311-325. doi:10.1111/ejed.12014

Yin, R. K. (2011). *Qualitative research from start to finish*. New York, NY: Guilford Press.

Zsambok, C. E. (2014). Naturalistic decision making. In C. E. Zsambok & G. Klein (Eds.), *Naturalistic decision making* (pp. 3-17). New York, NY: Psychology Press.

Zsambok, C. E., & Klein, G. (2014). *Naturalistic decision making*. New York, NY: Psychology Press.

Appendix A: Participant Interview Protocol

Participation in this interview is completely voluntary. The initial questions of the interview are focused on demographics to help clarify the participants' personal characteristics. The interview will be audio recorded, but the recording will be done in a manner that is confidential, this interview will not be video recorded. The proposed interview questions are as follows:

1. What constitutes a successful project?

2. What constitutes a failed project?

3. Why do some projects fail while others succeed?

4. What is your understanding of cognitive style and your identified cognitive style?

5. What is your understanding of transformational leadership?

6. How does transformational leadership affect making decisions on software projects?

7. Do you think there is a link between transformational leadership and project manager success?

8. Do you think there is a relationship between cognitive style and transformational leadership to project success or failure? Please explain your response.

9. What is your perception of the relationship between your current cognitive style and transformational leadership?

10. How does your current cognitive style and transformational leadership affect software project outcome?

11. Would you agree or disagree that projects with mainly Transformational Project Leadership tend to be more or less successful?

12. As a software project manager, describe the major leadership challenges you face leading an agile team that are different from leading teams using other development models.

13. What strategies do you use to address risk factors that could affect the successful outcome of your project?

14. Do you manage project differently today than you have in the past? Describe how your leadership approach is different today than in the past.

15. Do you have any thoughts, perceptions, insights, or comments about project management of agile project not addressed in the questions above?

Appendix B: Participant Inclusion/Exclusion Screening Questions

I'm calling because you expressed interest in my research study evaluating the experiences of software project managers influence with transformational leadership and cognitive style on agile software project outcome. Can you please take a moment to answer the following questions?

Please be advised that all questions are to ensure that you fit the criteria for this research. I must stress that all information is confidential and for research participation purposes only.

- What is the name of your organization/agency?
- What is your organization's primary field of business or service?
- How many years have you been with the organization/company?
- How long have you worked as a software project manager?
- How many years of experience do you have managing agile development projects?
- Have you managed an agile development project within the last two years?
- Finally, this question is necessary, in that English is the primary language used in the development of the interview questions. Do you understand English and speak it fluently?

The information will assist in identifying if the individual fits the following criteria:

- Have software project management experience.
- Have a minimum of 5 years of project management experience.
- Managed an agile software development project within the past two years

Appendix C: Expert Panel E-mail Invitation

Study Title: The Relationship Between Leadership Style and Cognitive Style to Software Project Success

Dear XX,

My name is Jacquelyne Wilson, I am a doctoral candidate in the College of Management Department at Walden University. I am conducting a dissertation study as part of the requirements for my management degree specializing in Information Systems, and I would be honored if you could find the time to assist me with the evaluation and validation of my qualitative interview tool. The purpose of the qualitative interview is to understand the experiences of software project managers regarding the influence cognitive style and transformational leadership have on software project outcomes.

The main research question is**: *What are IT project managers' attitudes towards, perceptions of, and behaviors related to, the use of transformational leadership and cognitive styles in agile software development environments*?** The two sub-questions are: (1) *What types of cognitive styles are used by IT software development project managers for decision-making?* and (2) *How do managers' cognitive styles and transformational leadership influence their achievement of desired project outcomes?*

Panel members must possess experience managing Agile software projects within the last two years. If you do not meet this requirement, please feel free to recommend individuals who meet the criterion.

The qualitative interview is constructed to describe software project managers' experiences of successful project outcome through questions that address the essence of project management performance. The draft interview questions are as follows:

1. What constitutes a successful project?
2. What constitutes a failed project?
3. Why do some projects fail while others succeed?
4. What is your understanding of cognitive style and your identified style?
5. What is your understanding of transformational leadership?
6. How does transformational leadership affect making decisions on software projects?
7. What is your understanding of the Iron Triangle or the Triple Constraint as defined by the Project Management Institute?
8. How does the Iron Triangle factor into your decision process?
9. Do you think there is a relationship between cognitive style and transformational leadership to project success or failure? Please explain your response.
10. As a software project manager, describe the major leadership challenges you face leading an agile team that are different from leading teams using other development models.
11. What strategies do you use to address risk factors that could affect the successful outcome of your project?

12. What is your perception of the relationship between your current cognitive style and transformational leadership?
13. How does your cognitive style and transformational leadership affect project outcome?

Expert panel validation of the interview items is critical for effective sampling. The qualitative interview analysis form attached is provided to assist you in evaluating the content, clarity, and appropriateness of the questions. Once I receive panel members' reviews, I will promptly revise the interview questions as needed. A second e-mail correspondence will include edits for panel members' approval. If you have questions regarding my dissertation research, please contact me at [redacted] or e-mail to jacquelyne.wilson@waldenu.edu.

Thank you in advance for your time and expert input.

Jacquelyne Wilson

Appendix D: Post-Interview Bracketing Questions

- Did the interview go the way I anticipated? Why or why not?
- What resonated with me?
- Did I obtain material that will produce thick rich descriptions?
- What can I do better on my next interview?