

PEMM IN HIGHER EDUCATION

Educational Leaders' Perception of the Utility of the Process and Enterprise Maturity Model as  
an Assessment Tool in Higher Education

A Dissertation submitted

by

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to

College of Saint Mary

in partial fulfillment of the requirement

for the degree of

DOCTOR OF EDUCATION

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### Dedication

This dissertation is dedicated to my family who has relentlessly supported me. To the other half of me, for without I would not be whole, my husband, Sam. You have been with me since the beginning of this journey, and I want to express my appreciation for your love, guidance, and encouragement. To my parents, for teaching me that you can reach challenging goals with good old-fashioned hard work. To my sweet jelly bean, Cora Mae, for being the inspiration behind my perpetual attempt to be the best me I can be. Each of these individuals helped me reach my goals, and I will be forever grateful.

## Acknowledgements

*“If I have seen further, it is by standing on the shoulders of giants” –Isaac Newton*

I wish to acknowledge the ongoing support of my advisor, Dr. Lois Linden. She provided me with direction in the beginning of this journey so long ago. I am so grateful for her support and guidance throughout the years. I could not have chosen a better advisor. I would like to sincerely express my appreciation to my dissertation committee. To Dr. Kristin Haas who has been with me since 2008. Thank you for your insight, guidance, and encouraging words throughout two programs of study at the College of Saint Mary. In addition, I would like to acknowledge my committee members, Dr. Shari Prior and Dr. Jaime Garafalo-Peterson. Your time and effort to assist me in completing this dissertation is much appreciated. A special thank you to my mentor and process sensei, Brian Gruber; because of you, I will forever see the world differently.

## TABLE OF CONTENTS

Abstract.....	13
<b>CHAPTER I: INTRODUCTION</b>	
Background and Rationale.....	15
Problem Statement.....	19
Purpose of the Study.....	20
Research Questions.....	20
Definition of Terms.....	21
Assumptions, Limitations, and Delimitations.....	24
Summary.....	26
<b>CHAPTER II: REVIEW OF THE LITERATURE</b>	
Theoretical Framework.....	27
General Systems Theory.....	28
History.....	28
System.....	30
Isomorphic Law.....	31
Higher Education.....	32
The Capability Maturity Model.....	34
Model Origins.....	34
Maturity Levels.....	37
Internal Structure.....	39
Evolution of the CMM.....	43
Conceptual Framework.....	44

PEMM IN HIGHER EDUCATION	7
Higher Education Maturity Models .....	45
Broad Scope Model Development .....	45
Broad Scope Model Application.....	47
Narrow Scope Model Development.....	48
Narrow Scope Model Application .....	50
Narrow Scope Model Validation .....	52
Higher Education Maturity Model Benefits .....	54
Current State Transparency.....	54
Organizational Change.....	56
Organizational Performance .....	58
Collaborative Best Practice.....	58
Higher Education Maturity Model Limitations .....	59
Sole Process Perspective.....	60
Insufficient Model Development and Research.....	61
Unverified Organizational Results.....	62
Fragmented Improvement Blueprint.....	62
Research Synthesis.....	63
The Process and Enterprise Maturity Model .....	66
Summary .....	67
<b>CHAPTER III: METHODS</b>	
Research Design.....	69

PEMM IN HIGHER EDUCATION	8
Population .....	70
Selection Criteria .....	71
Ethical Considerations .....	72
Protection of Human Rights.....	72
Permission to Participate.....	73
Confidentiality .....	73
Honesty .....	73
Research Procedure.....	74
Data Collection .....	75
Phase 1 .....	75
Phase 2 .....	76
Data Analysis .....	77
Data Quality .....	78
Summary .....	80
<b>CHAPTER IV: RESULTS</b>	
Research Questions.....	81
Pilot Study.....	82
Participant Demographics.....	83
Characteristics of the Cases .....	84
Participant A .....	85
Participant B.....	86
Participant C.....	87
Participant D .....	89

PEMM IN HIGHER EDUCATION	9
Participant E.....	90
Research Results.....	90
Theme 1: The PEMM may provide a triangulated and detailed way to assess process and enterprise state for a process-based transformation .....	91
Subtheme 1: Model Content .....	92
Subtheme 2: Model Format .....	93
Theme 2: There may be positive outcomes of using the PEMM.....	93
Subtheme 1: One Institution .....	94
Subtheme 2: Institutional Insight .....	94
Theme 3: Despite its potential, apply the PEMM may pose significant barriers ..	97
Subtheme 1: Application Concerns .....	97
Subtheme 2: Change Management .....	100
Results Summary .....	101

## **CHAPTER V: DISCUSSION AND SUMMARY**

Results Interpretation.....	104
Central Research Question.....	105
Perceived Strengths of the PEMM.....	105
Perceived Limitations of the PEMM .....	108
Perceived Feasibility of the PEMM.....	109
Implications.....	110
Limitations .....	111
Future Research Recommendations.....	112
Summary .....	113

PEMM IN HIGHER EDUCATION	10
<b>REFERENCES</b> .....	115
<b>APPENDIX A: Process and Enterprise Maturity Model Permission</b> .....	132
<b>APPENDIX B: Figure 1 Permission</b> .....	133
<b>APPENDIX C: Table 1 Permission</b> .....	134
<b>APPENDIX D: Institutional Review Board Approval</b> .....	135
<b>APPENDIX E: Research Procedure</b> .....	136
<b>APPENDIX F: Follow-up Email</b> .....	137
<b>APPENDIX G: The Process Audit Permission</b> .....	139
<b>APPENDIX H: Interview Procedure</b> .....	141
<b>APPENDIX I: Consent Form</b> .....	145
<b>APPENDIX J: The Rights of Research Participants</b> .....	148
<b>APPENDIX K: “How Mature are Your Processes?” Matrix</b> .....	149
<b>APPENDIX L: “How Mature is Your Enterprise?” Matrix</b> .....	150
<b>APPENDIX M: Data Analysis Procedure</b> .....	151
<b>APPENDIX N: Audit Trail Letter</b> .....	152

**LIST OF TABLES**

TABLE		PAGE
1	Maturity Levels Primary Foci with Associated Key Process Areas .....	42
2	Participant Demographics .....	85

**LIST OF FIGURES**

FIGURE		PAGE
1	Internal Structure of the Capability Maturity Model (CMM).....	41
2	Count of Codes by Category for Participant A.....	87
3	Count of Codes by Category for Participant B.....	88
4	Count of Codes by Category for Participant C.....	89
5	Count of Codes by Category for Participant D.....	90
6	Count of Codes by Category for Participant E.....	91
7	Educational Leaders' Perceived Strengths of the PEMM.....	98
8	Educational Leaders' Perceived Limitations and Feasibility of the PEMM.....	101
9	Educational Leaders' Perceived Utility of the PEMM as an Assessment Tool...	103

### Abstract

Higher education institutions will need to embrace transformative change in order to meet society's needs (Norris, Brodnick, Lefrere, Gilmour, & Baer, 2012). Higher education institutions must assess their processes before improvement can occur. While higher education has recognized the importance of process improvements, research exploring the fundamental concept of process maturity is limited.

The purpose of this qualitative case study was to explore how educational leaders perceive the utility of the Process and Enterprise Maturity Model (PEMM) as an assessment tool to determine process and enterprise maturity for process-based transformations. General Systems Theory (von Bertalanffy, 1969) served as the theoretical framework for the study. Participants read "The Process Audit" (Hammer, 2007) as an introduction to the model. A public document review and semi structured interviews characterized the perceptions of educational leaders' views of the model as an assessment tool. Results found that five educational leaders perceived that the PEMM may provide a triangulated and detailed way to assess process and enterprise state for a process-based transformation and that its application would likely yield multiple positive outcomes. Despite the potential of the PEMM, participants also perceived that there might be significant barriers to its application in higher education because of a variety of concerns with its actual application and the change management that would be required.

While this study provided some support for further research on the PEMM in higher education institutions, it also uncovered a gap in the understanding of institutional processes and the maturity of those processes. Future research should address this gap before seeking to learn more about improvement tools and methodologies in this setting.

*Keywords:* maturity model, process maturity, process improvement, higher education

## CHAPTER I: INTRODUCTION

Operational excellence is the pursuit of achieving excellent performance while also creating a culture of behaviors that is rooted in principle (The Shingo Prize for Operational Excellence, n.d.). Leaders that align their organizations toward this goal must consider and balance a large number of factors, many of which are complex. Fortunately, process thinking helps characterize complexity (Waheed, 2013). Those looking to make meaningful change embrace process thinking to help identify the “why” behind the current state of the organization (The Shingo Prize for Operational Excellence, n.d.). Taking a process perspective, then, becomes a method for understanding current state and addressing gaps in performance. Research focused on process thinking in higher education is in its infancy. It can be argued that a majority of the process improvement tools and methodologies seen in the literature focus on the adoption of best practices rather than taking a true process or systems perspective of the work.

Fundamentally, in order to be effective at improvements, leaders must have a strong understanding of the current state of their organizations’ processes. One way to understand the state of an organization’s processes is to understand its robustness or maturity. Process maturity refers to a process state that is overtly defined, understood by all, monitored, managed, and proven effective (Marshall, 2010b; Paulk, Curtis, Chrissis, & Weber, 1993). While higher education has recognized the importance of process improvements, research exploring the concept of process maturity is limited.

A maturity model is a framework that provides the key elements of process maturity. It can function as an assessment and an improvement tool. In other industries, maturity models are well known, but to date, the research of maturity models in higher education is limited. There has yet to be an investigation into how a generic maturity model functions in this setting.

Accordingly, this study sought to explore and describe education leaders' perceptions of the utility of a generic maturity model, the PEMM (Hammer, 2007; see Appendix A for documented permission of its use in this research), as an assessment tool for process-based transformations in higher education.

This chapter begins with a discussion of the background and rationale for this research study. It details the history and current context of process issues witnessed in higher education. This includes the role of process improvements and maturity models. Following this, the chapter identifies the problem statement, purpose, and research questions of this research. These sections identify the research gaps discovered in current literature and the need for this research. The chapter ends with a collection of research definitions, assumptions, limitations, and delimitations. In essence, this chapter provides justification for this study.

### **Background and Rationale**

The quality of higher education has struggled to keep up with the needs of society (Bender, Jonson, & Siller, 2010; Watson & Watson, 2013). In present day, higher education is struggling to make transformative change (Norris et al., 2012). Historically, institutions have emphasized what needs to be taught rather than how it needs to be taught (Saulnier, Landry, Longenecker, & Wagner, 2008). Ineffective systems have contributed to this issue. These process issues have manifested themselves as the inability to effectively share information between isolated departments, capture the right information in measurement systems, and solve complex problems (Bender et al., 2010). In order to improve performance in this setting, it will require a "comprehensive continuous improvement system" (Bender et al., 2010, p. 1).

Since the 1990s, higher education has used process improvements to support more effective and efficient systems. Much of the literature in this area has focused on the adoption of

the Total Quality Management methodology; the first process-based methodology to be positively implemented in this setting (Bender et al., 2010). Since this time, scholars have continued to explore other process-based methodologies including Lean (Balzer, 2010; Francis, 2014; Holm & Waterbury, 2010; Thirkell & Ashman, 2014), Six Sigma (Antony, Sivanathan, & Gijo, 2014; Holmes, Jenicke, & Hempel, 2015; Mazumder, 2014), and Lean Six Sigma (Antony, Krishan, Cullen, & Maneesh, 2012). Most of this research is still in its infancy but, with increasing empirical evidence, scholars continue to dismiss the myth that process improvement cannot be successful in the higher education setting.

The above-mentioned methodologies make a lofty assumption that higher education has an understanding and appreciation for process maturity. Higher education has yet to comprehensively explore the maturity of higher education processes. The inability of the field to identify the desired outcomes of higher education processes (Baig, Basharat, & Maqsood, 2007; Marshall, 2011), let alone identify the steps needed to create these outcomes (Achi, Salinesi, & Viscusi, 2016; Chen, Chen, & Chen, 2014; DeBruin, Freeze, Kaulkarni, & Rosemann, 2005) displays the gap. In seeking to make the transformative change that is required for operational excellence, it is advantageous to start at the most fundamental level. Some have stated that defining the work of academia has the potential to modernize the profession (Coates, 2017). It is apparent that additional research on the higher education processes would advance the industry.

A maturity model is a framework that takes a critical look at processes by defining and measuring maturity. It is an assessment and improvement model that defines, structures, and measures process maturity in order to make improvements in a disciplined manner (Paulk, 1996; Wendler, 2012). The underlying hypothesis of this model is that an intentional process will lead to an intentional outcome (Paulk et al., 1993). The translation and application of this core

philosophy has yet to come to fruition in higher education. Maturity models fill the gap in current literature as the models provide the basic process knowledge needed for effective improvements; this is precisely the intent of this study.

In the quest to explore how maturity models function in higher education, current literature is convoluted. One of the more significant issues is that researchers fail to use guidelines to develop new models. This has led to misconceptions of the purpose and role of maturity models. Consequently, many of the models do not contain all of the elements typically seen in a traditional maturity model. This is a significant validity risk as it is difficult to know if these models will function in the manner promised by their names.

The lack of empirical research during model development is another factor that proliferates the fragmentation. A robust maturity model requires iterative redesign (Underwood & Dillon, 2004). Currently, the literature is crowded with newly developed models. Many of these models have not advanced past the initial development stage (Alrasheedi, 2015; Chen et al., 2014; Lutteroth, Luxton-Reilly, Dobbie, & Hamer, 2007; Rossi & Mustaro, 2015). A handful of researchers applied established models from other industries in the higher education setting for the first time (Drinka & Yen, 2008; Ramanamurthy, Jain, & Jain, 2012; Solar, Sabattin, & Parada, 2013). Questions regarding validity remain within these studies as the researchers applied these models with speculative modifications, again without any standards or guidelines. While the increased research attention signifies an interest in the concept of process maturity, much of the research is lacking.

Current literature also reveals that higher education maturity models' address a wide range of processes. Some models are comprehensive and scoped to address all of an institutions' processes (Duarte & Martins, 2014; Manjula, & Vaideeswaran, & Archarjya, 2012; Petrie,

2004), whereas others are scoped to address only one type of process, like e-learning (Marshall, 2010b), academic integrity (Glendinning, 2014), or student retention (Clarke, Nelson, & Stoodley, 2013). Currently, it is very difficult for end-users to know which model or models are required for an accurate assessment of process maturity.

Regardless of the noted limitations, there is research evidence that supports the use of maturity models in higher education. Some of the noted benefits of using this model include the ability to provide transparency around the current state of processes (Aytes & Beachboard, 2007), the ability to set up organizational change in a disciplined fashion (Marshall, 2010a), improve organization performance (Drinka & Yen, 2008), and share best process practices (Marshall & Mitchell, 2004). While these are positive outcomes, they may not be in direct alignment with the intent of the original maturity model, the Capability Maturity Model (CMM; Paulk et al., 1993).

Higher education literature reveals inconsistencies in the definitions and levels of process maturity. Some define process maturity as a state of performance (Ramanamurthy et al., 2012), whereas others define it as the implementation of best practices (Alrasheedi, 2015; Chen et al., 2014; Manjula et al., 2012; Marshall & Mitchell, 2002). This discrepancy signifies the need for reassessment of the theoretical foundation of maturity models. The first maturity model, the CMM, adopted the philosophy that the process determines performance. The theoretical threads of this model stress the intentional design of the process to create a very specific outcome. The emphasis is on embracing a systems perspective and understanding the causal role that processes play in creating outcomes. This notion moves beyond the simple adoption of process elements like evidence-based strategies. Rather, the original theory behind the CMM was focused on process design as well as process content. Some in higher education have noted the importance

of this dual perspective, saying, “The main ingredient of success is good structure and the use of best practices, i.e., a process that helps us to structure and do things right” (Lutteroth et al., 2007, p. 1). Unfortunately, many of those in the field do not yet share this understanding.

In looking outside of the higher education literature, there are a large number of maturity models. Many of the models reviewed present with industry-specific elements, which would make modifying them to higher education highly questionable. Fortunately, there is a model that stays close to the original theoretical threads of the CMM and does not contain industry-specific information—the PEMM. The PEMM is a generic maturity model that identifies the process elements needed for effective process-based transformations. The revolutionary aspect of this model is that it is not limited to a specific setting so there is no argument about interpretation. This alone eliminates many of the limitations identified in the current higher education literature. In addition, the PEMM is unique in that it considers the role of the enterprise. This is relevant because in order to be effective with process improvements, there must be an understanding of not only process maturity, but the elements of the enterprise that support the maturity of the processes as well.

No one has yet explored how the PEMM functions in the higher education setting. There needs to be an investigation in order to illuminate theoretical and practical considerations. Because this is the first research to study a generic maturity model in higher education, a qualitative case study research design is used. This study provides a unique contribution to higher education research that will benefit anyone who is attempting to define, manage, or improve processes. This study provides pioneering evaluative information about its utility as an assessment tool that will generate new ideas and suggestions about its application (Smith, 2016).

### **Problem Statement**

The fundamental problem is that most of the process improvement research in higher education is focused on isolated process elements rather than process design, which is the essence of process improvements. One such model, a maturity model, distinctly embraces this process thinking through the assessment of process maturity. However, the research of maturity models in higher education is in its infancy and severely fragmented. This research project addresses this gap by exploring educational leaders' perceptions of the PEMM as an assessment tool to determine current process and enterprise state for process-based transformations.

### **Purpose of the Study**

This study contributes to the understanding of higher education process improvements. The purpose of this qualitative case study is to explore how educational leaders perceive the utility of the PEMM as an assessment tool to determine process and enterprise maturity for process-based transformations. The focus is only on the educational leaders' perceptions of the model as an assessment tool, despite its capability of functioning as an improvement model as well. The lack of widespread process thinking in academia (Al-Ammary, Mohammed, & Omran, 2016; Chen et al., 2014; Drinka & Yen, 2008; Mitasiunas & Novickis, 2012) supports this research design in order to prevent inaccurate research conclusions.

### **Research Questions**

The central research question of this study explored the perceived utility of the PEMM as an assessment tool in the higher education setting. This study was designed to answer this central research question: How do educational leaders who work in higher education institutions in the Midwest perceive the utility of the PEMM as an assessment tool to determine process and enterprise state for process-based transformations? Three research questions assisted in the investigation of the central question:

1. How do educational leaders describe the perceived strengths of the PEMM as an assessment tool?
2. How do educational leaders describe the perceived limitations of the PEMM as an assessment tool?
3. How do educational leaders describe the feasibility of using the PEMM as an assessment tool?

These research questions guided the creation of the interview questions asked in the data collection section of this study. In sum, this qualitative study is a detailed representation of educational leaders' perceptions of the PEMM's utility, which may lead to improved success with process maturity assessment for effective process-based transformations.

#### **Definition of Terms**

The following terms have been defined to ensure consistent meaning throughout this research project.

*Assessment tool:* An instrument that evaluates a certain phenomenon (Assess, n.d.). In this research, a maturity model functions as an assessment tool to evaluate current process state (Gilberto, 1995).

*Common features:* A subcomponent of key process areas within a maturity level that reveal whether the key process areas are sustainable through the identification of specific organizational characteristics (Paulk et al., 1993). Common features describe the degree implementation of the key process areas throughout the organization.

*Educational leaders:* Administrators who supervise the provision of academic, research, and student services in postsecondary education settings (U.S. Department of Labor, 2017). As

specific job duties and scope of responsibility may vary according to institution, the job title and description may vary as well.

*Enterprise state*: An organization's readiness for a process-based transformation (Hammer, 2007). Enterprise state is composed of four capabilities that are required for effective transformations: leadership that supports process change, culture that demonstrates operational excellence principles, expertise in the skill of transforming, and the governance or organizational mechanisms in place to support process change (Hammer, 2007).

*Feasibility*: The characteristic that proposes if something is capable of being done (Eldridge et al., 2016).

*Higher education institutions*: A public or private institution that is legally authorized and accredited to deliver formal education to students who have a certificate of secondary education completion in order to prepare students for workforce transition through the awarding of a degree (U.S. Department of Education, 1998).

*Key process areas*: A component of a maturity level that identifies the process categories fulfilling a maturity level (Lutteroth et al., 2007).

*Key practices*: The collection of related organization infrastructure and support activities needed to facilitate sustainable performance of key process areas (Hurst, 2007; Paulk et al., 1993).

*Limitations*: A lack of capability or a restrictive weakness (Limitation, n.d.).

*Process capability*: Process capability describes how qualified a process is to produce planned results (Petrie, 2004). It allows the ability to foresee a potential result (Ling, Jusoh, Abdullah, & Alwi, 2012a).

*Maturity level:* The senior-most component of a maturity model that is representative of the achievement of a specific level of process capability. Each maturity level contains a set of key process areas, key practices, and common features (Lutteroth et al., 2007).

*Maturity model:* An assessment and improvement tool that defines, structures, and measures process maturity in order to address issues in a disciplined manner (Paulk, 1996; Wendler, 2012).

*Process:* The sequence of operational activities that is required to transform an input to a customer-valued output (Hammer, 2010; Humphrey, 1988). This is not an isolated or discrete sequence of tasks, but rather the system-wide work that has significant impact to the institution and external stakeholders (Hammer, 2010; Haukijärvi, 2014).

*Process improvement:* A methodology that adopts a disciplined, scientific approach to process understanding, analysis and change (sequential or redesign) in order to achieve a specified business objective (Khan & Keung, 2016; ReVelle, 2004).

*Process maturity:* The degree to which a process embodies a perfect state in relation to its understood purpose (Wendler, 2012). A perfect process state is considered as one that is overtly defined, understood by all, monitored, managed, and proven effective (Marshall, 2010b; Paulk et al., 1993).

*Process state:* The elements relative to the processes that determine sustainable performance (Hammer, 2007). Process state is composed of five enablers that are required for effective transformations: the design of the process, the skills of the performers of the processes, the degree of ownership for the performance of the processes, the congruency between the processes and the organization's information and management infrastructure, and the measurements that are used to assess the performance of the processes (Hammer, 2007).

*Strengths*: The effective or essential properties of a phenomenon (Strength, n.d.).

*System*: A bordered group of elements that interrelate to sum a product beyond its discrete parts in order to achieve an established purpose (Broks, 2016; Drack & Schwarz, 2010; Sawhney & de Anda, 2017; Williams & Hummelbrunner, 2010).

*Transformation*: Systemic, pervasive improvements that significantly redefine an institution's fundamental business model for improved outcomes (Berwick, 2010; Norris et al., 2012).

*Utility*: The state of being useful (Utility, n.d.). This is the quality of having practical worth (Usefulness, n.d.).

### **Assumptions, Limitations, and Delimitations**

It is important to reflect on the research design, as it is the foundation of the study. This study recognizes the following assumptions and limitations. The use of a qualitative case study is advantageous because of its ability to comprehensively investigate a single phenomenon in its context (Creswell, 2013) and help answer the "how and why" (Baxter & Jack, 2008, p. 556). The use of this research design is the first logical step toward understanding how a maturity model may function in the higher education setting.

This research focuses on gaining insights into educational leaders' perceived utility of the PEMM as an assessment tool. The research assumes educational leaders are more likely to have an understanding of current process and enterprise state than typical faculty. To ensure appropriate representation of the population, participant inclusion criterion was established. As this study is assessing the utility of a generic maturity model, it is assumed that the location, setting, type of program, and department is irrelevant.

This research investigated the utility of the PEMM. Utility is defined as the state of being useful (Utility, n.d.). Usefulness is a multifaceted concept that is difficult to operationalize secondary to its value construct (Diedrich, Benedek, Jauk, & Neubauer, 2015). For the purposes of this study, utility is defined as the participant's perceived practical worth of the PEMM relative to the participant's role of enhancing organizational performance as an educational leader (Behringer, Sassenberg, & Scholl, 2017; Surendran, 2012). This study chose to operationalize this attribute into three categories as reflected in the subresearch questions: strengths, limitations, and feasibility.

This is the first research that has chosen to measure the utility of a generic maturity model in this setting. Accordingly, a pilot study assessed all aspects of the data collection procedures in order to counteract its unproven reliability and validity. Hammer (2007) stated that one of the primary benefits of the PEMM is that it is easy to learn and apply. This study assumes that through a brief introduction to the PEMM, participants can assess the utility of the model as an assessment tool. The data collection procedure reminds participants of this study's strict adherence to confidentiality and their ability to withdraw at any point without consequences to support honesty.

One of the primary restrictions of case study research is its ambiguity regarding how much information is enough to appropriately represent the phenomenon (Creswell, 2013). To balance quality research with realistic application, this project set three boundaries that are the delimitations of this research. First and most prominently, this study sought to investigate the utility of the PEMM only from the lens of how it may function as an assessment tool for process and enterprise maturity in higher education. This research is not exploring how the model actually functions. Likewise, this research will disregard its performance as an improvement

model and only focus on the assessment function. The second limitation is that the targeted setting of this research is higher education. This research does not address other educational settings (education primary education, secondary education, corporate settings, etc.). Lastly, there are many factors that influence operation excellence, this study only focuses on the process element.

### **Summary**

This chapter presented a high-level overview of the current state of higher education process improvement literature that is evidence enough to support this project. While there are a number of avenues to take in designing a research project that is focused on this topic, this research placed a concentrated effort on exploring educational leaders' perceptions of the utility of the PEMM as an assessment tool in higher education to determine current process and enterprise state for process-based transformations. In detail, this chapter identified the problem statement and purpose of this research ensuing the targeted research questions. In order to create a realistic and worthwhile project, this chapter concluded with identifying the project's operational definitions, assumptions, limitations, and delimitations.

## **CHAPTER II: REVIEW OF THE LITERATURE**

This chapter focuses on the theoretical and conceptual frameworks surrounding the use of maturity models in higher education. The first section of this chapter considers the theoretical framework of this study, General Systems Theory (GST; von Bertalanffy, 1969). Understanding this theory will provide the context required for understanding the benefit of maturity models in higher education. The second section of this chapter provides a historical overview of the first maturity model, the CMM. This section will discuss the CMM in detail with a review of its history and how the model is structured. The CMM was the stimulus for all other maturity models. Accordingly, this section will provide a brief history of its evolution to help explain how a model that originated in the software industry is applicable in higher education. The final section presents a conceptual framework for the use of a generic maturity model in higher education. This section will summarize current literature on the use of maturity models in higher education, including a brief introduction to the 20 different models. As there are a significant number of models with a wide variety of applications, this section will adopt an organization strategy that fosters a clear understanding of its current state. Chapter II will conclude with a synthesis of the benefits, limitations, and the implications of the current literature that display the need for this research project.

### **Theoretical Framework**

Maturity models embrace the theoretical constructs put forth by GST. Theories grounded in the study of systems are useful for improving the understanding of complex phenomena (Waheed, 2013). This is perhaps the greatest benefit of embracing a systems theory. Accordingly, this theory provides the underlying perspective needed to understand how maturity models function to create organizational excellence. Equally important, the concepts and

principles of GST are universal. For this reason, GST also explains how a model that originated in software engineering can be beneficial for others outside of this field.

The study of a systems theory is overwhelming due to a lack of a single understanding of its role (Rousseau, Wilby, Billingham, & Blachfellner, 2016). This has created a muddled understanding of systems theory. A comprehensive review of systems theory with its complex history is beyond the scope of this paper. Rather than attempting to explain the differences between terms and methodologies, in similar fashion to Peters (2014), this section will promote the essence of systems thinking by discussing its original theoretical principles. This section will focus on the original system principles published in the GST.

### **General Systems Theory**

GST is the original, broad-based system theory that promotes a different way of understanding the world around us. It is a relevant theoretical framework for this study because of its ability to characterize complex organizations, like higher education institutions (Watson & Watson, 2013). Additionally, this theory provides the perspective needed to understand the basic assertions of maturity models.

**History.** Although experts regard a few different scholars as contributors of systems thinking, von Bertalanffy (1969) was the first to publish GST. In the 1950s, scientific research was focused on discrete variables and investigating the direct relationships between them. This was somewhat beneficial but mostly it was limiting progress due to its inability to connect these small variables to real-life complexities (von Bertalanffy, 1950). This was not unique to one discipline, but a universal issue across all fields. Von Bertalanffy made a pertinent discovery by recognizing that in order to understand the behaviors of a microorganism; it would require an understanding of the system to which it belonged (Yurtsevena & Buchananb, 2016). This

discovery supported a critical transition of this theory into pragmatic realms (von Bertalanffy, 1972). It challenged society's understanding of reality and encouraged researchers to consider the complex interplay of system influences. Naturally, this was one of the first steps that evolved research to more broad and complex norms (von Bertalanffy, 1950).

In 1968, GST was published as little more than a framework of principles (Boulding, 1956). It was unique in that its principles challenge the conceptual understanding of the world at that time. Over the years, many have gotten lost in interpretation. Those who attempt to take a discipline-neutral theory and apply it in a discipline-specific manner, or those who attempt to modify it into a rigid set of principles (Guberman, 2004) exemplify the misconceptions. Today there are over 20 different manifestations of GST including a philosophy, a theory, a paradigm, a scientific discipline, and a worldview (Rousseau, Billingham, Wilby, & Blachfellner, 2016). GST is useful because it provides a new hypothesis of conceptualization (Boulding, 1956; Broks, 2016; Rousseau, Billingham, Wilby, et al., 2016).

GST is valuable to science for two significant reasons. First, this theory transcends discipline. In light of this capability, GST is analogous to the laws of nature; it provides an understanding that crosses disciplines (Rousseau, 2015). If modern research stays close to the fundamental propositions of GST, all disciplines have the ability to expedite system theory advancement through collaboration (Midgley & Wilby, 2015). The ability to generalize and influence all industries is only a portion of its value. GST also functions as a scientific catalyst. Comparatively, this situation is similar to how the periodic table stimulated the discovery of the elements (Rousseau, Billingham, Wilby, et al., 2016). Despite criticisms and its fragmented history, it is satisfactory to adopt the original GST framework for research purposes (Rousseau, 2015).

GST is a collection of concepts that relate to the study of natural structure. Some of the concepts, which one can witness in general across industries, are totality, organization, equifinality, static and dynamic states (von Bertalanffy, 1950). In staying close to its fundamental propositions, it is important to remember that, “Somewhere however between the specific that has no meaning and the general that has no content there must be, for each purpose and at each level of abstraction an optimum degree of generality” (Boulding, 1956, p. 197). For this reason, this review will not discuss each individual concept proposed by GST, but rather provide a high-level overview of the relevant concepts that are needed to understand how this theory pertains to the study of maturity models in higher education.

**System.** System is the foundational element of GST and the common thread in all literature related to the study of systems (Rousseau, Wilby, Billingham, et al., 2016). For the purposes of this research study, a system is operationally defined as a bordered group of elements that interrelate to sum a product beyond its discrete parts in order to achieve an established purpose (Broks, 2016; Drack & Schwarz, 2010; Sawhney & de Anda, 2017; Williams & Hummelbrunner, 2010). A system is intangible and lacks parameters for a specific reason. It is a product of how we perceive wholeness and its influencing parts (Guberman, 2004). Any inferences made in systems research are rooted in the perception of the system (Terra & Passador, 2015). GST is an organizational perception used to make meaningful inferences.

The investigation and interpretation of systems research is dependent on the type of system. Defining a system is relative, rather than absolute. It falls on a continuum with open at one end and closed at the other (Kast & Rosenzweig, 1972). A closed system has define boundaries (Peirson, Boydell, Ferguson, & Ferris, 2011). Interpretations of closed systems recognize a fundamental natural law—homeostasis. In any system, there is a perpetual state of

change (von Bertalanffy, 1950). When attempting to make sense of system phenomenon, one must recognize that a system is not static but in a state of continuous change. A closed system reaches a state of equilibrium for interpretations to be made (von Bertalanffy, 1950). On the other end, one must consider an open system for environments that are not or will never be defined by a set of parameters. The previous theoretical assumptions witnessed with closed systems cannot be replicated to open systems. Wherein one can make inferences based on a set of parameters within a defined scope, equifinality is the opposite. This concept recognizes that the outcome of an open system is independent of any specific set of conditions (von Bertalanffy, 1950). Open systems allow appreciation for how an outcome can be reached in many ways through many different means.

When considering GST in the context of higher education maturity models, it is pertinent to recognize that it is the study of a system. While the system can be defined under different parameters (i.e., the distance education department or the organization as a whole), an understanding of its elements and relationships to outcomes must remain. It was once said that GST adopts the perspective that, “[The] cause of everything is [an] interconnection of everything” (Broks, 2016, p. 409). This comprehensive mindset helps illuminate how complex change can be in a higher education institution. Once one understands how a system is defined—not only by content, but also by the structure and the relationship of elements—its generalizability becomes apparent. The ability of systems to function in this manner exposes the second primary element of GST, isomorphic law.

**Isomorphic law.** Isomorphic law refers to the occurrence of similar system characteristics in fields that bear no apparent resemblance to one another, “There exist therefore general system laws which apply to any system of a certain type, irrespective of the particular

properties of the system or the elements involved” (von Bertalanffy, 1950, para. 16). When von Bertalanffy provided empirical evidence of this concept, it was revolutionary. It not only expanded conceptual understanding for one field, but for the entire scientific community as a whole. GST provides the foundation needed to generalize system principles across disciplines (von Bertalanffy, 1950) in the manner proposed by this research.

**Higher education.** The type of systems thinking conveyed in GST is a change from standard scientific reasoning as it challenges the perception of a situation. GST creates the framework for varying perspectives, which is a challenging feat (Sterman, 2002). Adopting GST promotes the perspective needed to meaningfully address organizational problems. In order to advance to a future state, higher education institutions need to focus on systems (Foster-Fishman & Behrens, 2007). A true understanding of reality is not as simple as recognizing the direct, mechanical relationships between elements, but rather the dynamic and complex interactions of an entire system (von Bertalanffy, 1950). Despite this revolutionary discovery years ago, the failure to appreciate the holistic nature of systems is still very much present. Many times the approach to organizational improvement is flawed because it fails to account for the complexity of change. Commonly, organizations focus on solving the few isolated issues that have grabbed the attention of senior leaders. This undisciplined approach to change produces a fragmented, pieced-together system with trial and error improvement efforts (Abaci & Pershing, 2017; Foster-Fishman & Behrens, 2007). This approach will never yield the transformative change needed. Foster-Fishman and Behrens (2007) explained the importance of taking a systems perspective:

Systems’ thinking helps to explain why system level outcomes often fail to leverage systemic change by reminding us that a sole emphasis on a unitary system part (e.g.,

policy change) is usually insufficient for sustained system transformation (unless, of course, one is fortunate enough to locate that butterfly flapping its wing). (p. 193)

Educational systems need to appreciate GST and the more general “psychology of thinking” (Broks, 2016, p. 408). Higher education institutions are complex systems (Watson & Watson, 2013). This means that the field has a limited understanding of itself as a system and cannot predict performance (Guberman, 2004). GST can help with this limitation:

[General Systems Theory] Concentrates on systems with descriptions that have failed to consider the relations between parts. The idea is that taking in consideration these relations will resolve the problem, i.e., one will be able to predict the behavior of the system. By labeling higher education in this manner, it illuminates how the industry needs to revolutionize its fundamental perspective of themselves. (Guberman, 2004, p. 9)

GST provides a method to reset the understanding of higher education institutions by breaking them down into more easily understood terms despite its multifaceted features (Caddy & Helou, 2007; Terra & Passador, 2015). Without this perspective, it is difficult to understand the change mechanisms required (Waheed, 2013).

GST promotes a broadened understanding of the world around us. This should not intimidate those who engage in these efforts, but rather support problem-solving efforts. This has been regarded as one of the most valuable benefits of this theoretical framework (Peters, 2014; Sterman, 2002). It illuminates the limits of our own understanding and continues to challenge what is known (Sterman, 2002). It provides the perspective required to challenge current assumptions, unveil new opportunities, and solve complex problems (Peters, 2014; Rousseau, Wilby, Billingham, et al., 2016). When broadening the scope to one that includes the many complexities of a system, it facilitates better decision making by grasping the issue in context

and allowing for discussion to occur regarding the best approach to solving it (Foster-Fishman & Behrens, 2007; Rousseau, Billingham, Wilby, et al., 2016; Yurtsevena & Buchananb, 2016). GST offers the theoretical foundation needed for complex, continuous improvement based on disciplined, deductive logic (Boulding, 1956; Terra & Passador, 2015).

Rising above the mechanical work elements to a broadened conceptual awareness of systems fosters the identification of similarities with other disciplines that are highly advanced at performing transformative changes. There is global benefit for all disciplines to adopt this perspective as it provides an organized effort toward improving the work of all (Rousseau, 2015). A maturity model is one tool that has applied the concepts proposed by GST and has been successful in other industries. The following sections will take a closer look at how maturity models apply GST theoretical principles, including a look at the first maturity model and those seen in current higher education literature.

### **The Capability Maturity Model**

This section details the first published maturity model, the CMM. This section provides a brief history of the origins of the model, and then a detailed review of its components. This includes the internal elements of maturity levels, key process areas, common features, and key practices. This model was quickly appreciated for its generalizability (Paulk, 2009), and it stimulated the evolution of other maturity models. The first significant model after the CMM was the Capability Maturity Model Integration (CMMI). As suggested by its name, the CMMI demonstrated the ability to apply process principles across different services.

### **Model Origins**

Maturity models embrace the well-known process principles put forth by quality founding fathers Deming, Crosby, Humphrey, and Juran (Neuhauser, 2004; Petrie, 2004). In the

early 1980s, International Business Machine discovered how the process of developing software had significant influence on the software's final performance (Neuhauser, 2004). A team at the Software Engineering Institute (SEI) at Carnegie Mellon University expanded on this concept, and in 1987 the CMM was published. This model was built on the notion that process influences outcome.

Before the publication of the CMM, the software industry faced many challenges. There was a widespread inability to keep up with customer demand, and quality was at an all-time low. The industry needed transformation but found itself in a state of firefighting with little idea how to improve (Marshall & Mitchell, 2002). It became so bleak that the United States Department of Defense stepped in and directed the need for a revolutionary change (Hurst, 2007). It was this action that stimulated creation of the SEI team and, ultimately, the CMM.

Although software engineering was the first industry to create a model built on this process principle, some believe its earliest footprint was found in traditional engineering when structural accidents decreased when there was an increased focus on the process that created the structures (Mitasiunas & Novickis, 2012). There was appreciation for the connection between the performance of the process and its resultant outcome. In a similar manner, software engineering evaluated its processes and discovered its inability to produce an intentional outcome. The issues pointed to immature processes (Paulk et al., 1993). This example helped people learn about process maturity:

It is much like driving an automobile. Few drivers with any experience will continue driving for very long when the engine warning light comes on, regardless of their rush. Similarly, most drivers starting on a new journey will, regardless of their hurry, pause to consult a map. They have learned the difference between speed and progress. In software,

coding and testing seem like progress but they are often only wheel spinning. While they must be done, there is always the danger of going in the wrong direction. Without a sound plan and a thoughtful analysis of the problems, there is no way to know.

(Humphrey, 1988, p. 73)

Without a defined process, there is limited ability to manage the process and thus an inability to predict the outcome. There is a similar immature process situation occurring in higher education today (Marshall, 2010b).

Higher education focuses on obtaining educational outcomes with little appreciation for the processes that create these outcomes. There has yet to be a concentrated focus on how to create a great process, as it is known that a great process will yield great results. A great process is synonymous with a mature process. A mature process is as a process that embodies a perfect state in relation to its understood purpose (Wendler, 2012). It is a process that is overtly defined, understood by all, monitored, managed, and proven effective (Marshall, 2010b; Paulk et al., 1993). The CMM is a model that has operationalized this concept. The CMM is unique in that it functions as both an assessment and improvement model through its ability to quantify process maturity and illuminate opportunities to improve it (Lutteroth et al., 2007). This proves to be advantageous; commonly, organizations are aware of the issues but there is disagreement on where to focus improvement (Paulk et al., 1993). CMM's ability to determine discrete gaps allows for the prioritization of opportunities in a manner that facilitates enterprise alignment and organizational excellence (Paulk, 2009). The model's structure provides objectivity, transparency, and the ability to identify critical variables and relationships that create the ability to predict outcomes (Jalote, n.d; Manjula et al., 2012). The next sections will introduce the structural elements of the CMM that allow it to function in the manner just described.

## **Maturity Levels**

The CMM rates an organization based on its overall maturity level. A maturity level assigns a whole number that is representative of the performance of the work throughout the organization (Mitasiunas & Novickis, 2012). Five levels cover the range of process maturity.

The first maturity level is defined as “initial.” Disorganization and chaotic are words used to describe processes at this maturity level (Paulk, 2009). Commonly, a process is not even seen as a process secondary to its undefined nature. The employees do not have a common understanding about how they should perform the work. Individual employee efforts create outcomes, rather than a process (Drinka & Yen, 2008). Every employee completes the work differently; hence, improvement efforts at this stage are ineffective (Humphrey, 1988). To become a more mature organization, the focus shifts from single project completion to a concentrated focus on all project completions in a repeatable manner (Drinka & Yen, 2008).

Maturity level 2 emphasizes process repeatability with the ability to replicate prior successes organizationally (Paulk, 2009). In order to move an organization into the second level of maturity, there must be a fundamental shift in approach regarding what contributes to project success. This is a significant change, as it requires the broadened understanding of how not just employees, but processes as well create outcomes. Many continue to live in the chaotic world of level 1 as individuals in these organizations fail to see any negative consequences of it (Humphrey, 1988). There is evidence of level 2 when an organization has identified basic process elements that are critical for repeated success. This allows for basic project management (Humphrey, 1988) including the tracking of quality, time, and budget (Paulk, 1996). Process controls at level 2 focus on broad process understanding. Accordingly, organizations at maturity level 2 demonstrate an inability to adapt to new challenges in real time (Humphrey, 1988). It is

not until level 3 that the organization becomes more nimble through defining the work of the frontline (Paulk, 2009).

At maturity level 3 there are also mindset changes that have powerful implications to the advancement of the organization. This level is considered “defined” as this is the first time when process standards are set. Documented standards ensure there is a common understanding of the way the processes are completed throughout the organization (Paulk, 2009; Paulk et al., 1993). This defined work sets the foundation for meaningful conversation about how to improve its performance or meet specific customer needs (Humphrey, 1988; Paulk, 2009). Process definitions allow meaningful conversations to occur, but at this maturity level there is no quantitative data available to help with decision-making. The transition into level 4 allows improved ability to understand the process through the means of quantitative measurement (Humphrey, 1988).

When process management uses quantitative measurement, the organization has reached maturity level 4 (Paulk, 1996). The addition of process measurement means conversation regarding how to measure effectiveness and efficiency is occurring throughout the organization. This permits a deeper understanding of the processes. The unambiguous nature of quantitative information helps leaders distinguish if variation from the standard is significant (Humphrey, 1988). Although these terms were not used at the time of the CMM conception, Paulk (2009) notes that level 4 is consistent with using statistical quality control tools to promote evidence-based decision-making. To advance to the final maturity level, an organization must develop an even more holistic perspective on the processes and their measures.

Despite many claiming to be in a state of continuous improvement, it is not until maturity level 5 that true continuous process improvement occurs. The “paradigm shift” (Humphrey,

1988, p. 73) that occurs in level 5 is displayed when the organization no longer focuses on a few process elements known to affect outcomes, but focuses on managing all process elements.

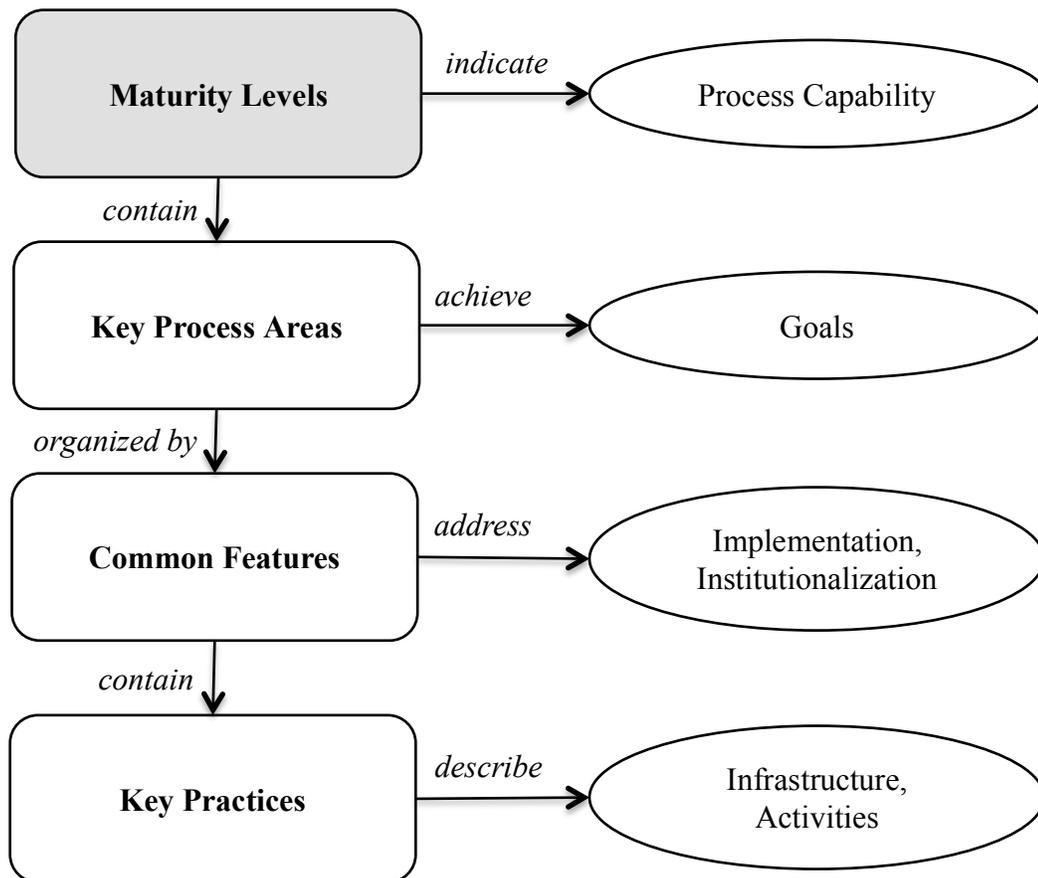
Through the understanding of all potential variables and relationships, an organization can be proactive in improvement efforts.

The CMM is a descriptive model because it describes an organization by its degree of process maturity (Paulk et al., 1993). The maturity levels in the CMM provide an objective snapshot of how the processes within an organization are functioning, as well as determine the level of capability. Process capability indicates how qualified a process is to produce planned results (Ling, Jusoh, Abdullah, & Alwi, 2012b; Petrie, 2004). Inherently, process capability is a component of process maturity. The connection between the two concepts is that as a process moves closer to a mature state, the variance between the processes' planned results and actual results will decrease (Paulk et al., 1993). With higher maturity comes increased process capability (Paulk et al., 1993). The organization's maturity level rating indicates the level of process predictability, hence its capability (Neuhauser, 2004). Because the CMM also functions as an improvement model, it is applicable to look closer into the architecture of the CMM and its connection to process capability at each maturity level.

### **Internal Structure**

It is within the internal structure of the CMM that processes become more capable. The maturity levels previously described are the overarching components that are comprised of three subcomponents: key process areas, key practices, and common features. See Figure 1 for a comprehensive visual display of these internal elements and their relationships to one another (see Appendix B for documented reprint permission of Figure 1). Whereas the maturity level is simply a number with an associated definition, these internal components are the essence of the

model. This content is considered the most critical as it explicitly identifies the elements of maturity at the particular maturity level and the measurements that are needed for validation (Nelson, Clarke, Stoodley, & Creagh, 2015; Paulk, 2009).



*Figure 1.* Internal structure of the Capability Maturity Model (CMM). Rectangles on the left denote the main components of a maturity level, circles on the right denote each component's evidence of achievement. These elements are connected through a multifactorial combination of component relationships postulated by the model. Adapted from Paulk, M. C., Curtis, B., Chrissis, M. B., & Weber, C. V. (1993). Capability Maturity Model, Version 1.1. *IEEE Software*, 10(4), 18-27. Copyright 1993 by Carnegie Mellon University. Reprinted with permission.

The CMM functions uniquely from many other process models in that it identifies what is needed to increase maturity rather than a prescription of how this should be accomplished

(Paulk et al., 1993). A maturity levels are inclusive of key process areas (Lutteroth et al., 2007). As each maturity level is different, so too are the key process areas. See Table 1 for a visual display of the CMM's maturity levels and associated key process areas (see Appendix C for documented reprint permission of Table 1). It is important to note that key process areas do not include all process elements, only the ones considered to have significant impact on outcomes (Paulk et al., 1993). Once all the key process areas are complete for a specified maturity level, the organization reaches a new level of process capability and will be rated in the successive maturity level.

Table 1

*Maturity Levels Primary Foci with Associated Key Process Areas*

Maturity Level	Level Description	Focus	Key Process Areas
5	Optimizing	Continuous Process Improvement	Defect Prevention Technology Change Management Change Management
4	Managed	Process and Product Quality	Qualitative Process Management Software Quality Management
3	Defined	Engineering Processes and Organizational Support	Organization Process Focus Organization Process Definition, Training Program Integrated Software Management Software Product Engineering Intergroup Coordination Peer Reviews
2	Repeatable	Project Management Processes	Requirements Management Software Project Planning Software Project Tracking and Oversight Software Subcontract Management Software Quality Assurance Software Configuration Management
1	Initial	Competent People and Heroics	

*Note.* Adapted from Paulk, M. (1996). *Effective CMM-based process improvement*. Paper presented at the 6th International Conference on Software Quality, Ottawa, Canada. Copyright 1993 by Carnegie Mellon University. Reprinted with permission.

The CMM was created to facilitate change through a disciplined approach to process improvement (Paulk et al., 1993). It is a hierarchical model that requires fulfillment of all pertinent elements for a new level of organizational maturity (Paulk, 2009). The added layer of key process areas defines the essential elements of process capability at that maturity level. This allows for the detection of either the presence or absence of these elements. Gaps identified help guide organizations toward “the vital few” (Paulk, 2009, p. 8) improvements required for improved performance. This design was intentional as it ensured the CMM would be used in this disciplined manner, rather than allowing organizations to skip elements that would likely lead to fragmented strategy and suboptimal outcomes.

In order to provide further guidance of how to reach a new level of capability and sustain it, the key process areas are broken down into two subcategories: common features and key practices. Common features reveal whether the key process areas are sustainable through the identification of specific organizational characteristics (Paulk et al., 1993). They describe the degree implementation of the key process areas throughout the organization. This assesses not just the presence of specific features, but of actual implementation and the effectiveness of it.

Key practices are similar as there is focus on actual capability results and sustainability. Key practices are the collection of related infrastructure and support activities needed to facilitate sustainable performance of key process areas (Hurst, 2007; Paulk et al., 1993). These process activities provide guidance, but not dictation: “The key practices describe ‘what’ is to be done, but these should not be interpreted as mandating ‘how’ the goals should be achieved. Alternative practices may accomplish the goals of the key process area” (Paulk et al., 1993, p. 41). As shown above, the internal structure of the CMM explains why the current state is what it is (Aytes &

Beachboard, 2007) and promotes a disciplined approach to improvement. This unambiguous model developed a coherent understanding and measurement of process maturity.

### **Evolution of the CMM**

The rapid success of the CMM quickly gained attention from scholars across the industry. Ingeniously, because the CMM exclusively focused on process maturity it was abstract enough to allow for generalization beyond the software development process (Paulk, 2009). Once awareness regarding its versatility became known, there was an influx of new models. This created a confusing collection of maturity models that lacked consistency and uniformity (Royce, 2002). In 1997, the Department of Defense halted new model development and diverted all effort toward creating an integrated model (Paulk, 2009). Just 3 years later, the most widely known revision of the CMM was published under the title, CMMI.

The CMMI has three different versions, each with its own foci: software and systems engineering, integrated product and process development, and acquisition (Sheard, 2001). Additionally, a few significant changes occurred within the internal structure of the model. One of these changes was the inclusion of continuous representation. The CMMI continued to promote improve discipline but through a more dynamic application. All three versions of the CMMI were available in the traditional staged representation, as well as the new structure, called continuous representation (Sheard, 2001). In reference to key process areas, scholars felt process measurement was a critical variable of repeatable processes. In light of this, instead of having metrics for each individual key process area, level 2 addresses this (Paulk, 2009). There was another difference within the subcomponents of key process areas. While the CMM identified common features and key practices, the CMMI provided even more detail by categorizing key practices into categories of general and specific practices (Duarte & Martins, 2013). Overall, the

CMMI was extremely influential. It was the first model revision that confirmed the CMM's generalizability by staying conformed to the concepts of process maturity and not compromising validity (Paulk, 2009).

The CMMI is considered the standard model from which all other maturity models have evolved (Achi et al., 2016; Hurst, 2007; Wendler, 2012). Current literature points to over 22 different industries having used maturity models (Wendler, 2012). Due to the broad application and varying iterations witnessed today, it is important to assess if model development in higher education has repeated the history of creating a state of complexity or if contemporary models have stayed stable with the theoretical principles seen in the original CMM.

### **Conceptual Framework**

The focus of this study is on maturity models, which inherently embrace systems thinking. The principles of GST create the theoretical foundation for understanding and solving problems in a system as a maturity model assumes. In addition to reviewing theoretical system principles and the history of maturity models, this chapter also presents a review of maturity model research in higher education. This section uses an organization strategy to promote a logical presentation of its complex state. This section concludes with a synthesis of the reviewed research benefits and limitations while pinpointing one significant research gap that is the focus of this project.

### **Higher Education Maturity Models**

There has been a rapid development of maturity models in the past decade. This growth has complicated the understanding of the current state of maturity models secondary to the various states of development and broad range of applications (DeBruin et al., 2005). This section presents an overview of maturity models seen in higher education. In order to comprehend the current state and its complexity, this section follows an adapted version of the concept-central approach to organization as detailed in Wendler (2012) and DeBruin et al. (2005). This section is primarily organized by model scope: broad or narrow. This serves as a good organizational platform because it communicates the model's purpose of use, target audience, application, and differentiation from other like models (Poppelbuss & Roglinger, 2011). Nested underneath the respective model scope, the review presents the corresponding models based on its current position on the continuum of model development: development, application, validation, or meta-analysis.

**Broad scope model development.** Broadly scoped maturity models refer to those models that are not restricted to a specific domain but address the institution as a whole. In higher education literature, eight maturity models fit into this category. Six of these eight models are in the model development subcategory. This development stage means the research is concentrated on developing and describing a new model (Wendler, 2012).

The earliest broad model witnessed in higher education is the Engineering Education Capability Maturity Model (Petrie, 2004). This model is unique in that its focus is on improving process maturity across three domains: the higher education institution, the faculty, and the student. Accordingly, there are three different models under this overarching title. Each model used the CMM as a base model and includes the same five levels of process maturity. However,

the institution model contains a hybrid of key process areas and key practices for each corresponding maturity level, but there is no further internal structure beyond the maturity levels for the faculty or student models.

In like manner, the Educational Capability Maturity Model (Baig et al., 2007) addresses the needs of the higher education institution. This model also used the CMM as its base model, but changed the maturity level terminology and some process areas to ensure meaningful application in higher education (Baig et al., 2007). Process maturity in this model is the adoption of best practices. Hence, literature on this model identified implementation issues witnessed when attempting to make the leap from software engineering to the educational sector (Baig et al., 2007). Despite using a maturity model that is rooted in system principles, both proceeding models adapted their models using the People Capability Maturity Model and addressed the people side of the processes.

The Capability Maturity Model for Engineering Education System (Manjula & Vaideeswaran, 2011) is similar to the previously discussed models in that it used the CMM as its base model for development, yet different because the sole perspective of this model is on the processes, not the people performing them. It also appears this model was more comprehensively developed as evidenced in its identification of not just maturity levels and associated key process areas, but also of key practices. This model emphasizes not only improved capability but the importance of support processes as well. It differed from its predecessors because the literature explains how to apply the model in practice for accurate assessment of maturity (Manjula & Vaideeswaran, 2011). There is no discovered empirical research on this model.

The Maturity Model for Academic Process Management (Silva & Cabral, 2010) focuses on assessing a higher education institution's process maturity and providing insight into the next

actions needed for improved performance. This model included four internal structure elements including a 5-point maturity level scale modified from the CMM and CMMI, the identification of academic processes, expected process results, and process attributes. Literature on this model was purely theoretical, and the review failed to reveal any empirical research.

The Education Capability Maturity Model – EduSpice (Mitasiunas & Novickis, 2012) aligned with theoretical concepts of the CMM, the CMMI, and the Software Process Improvement and Capability Determination. This model differs drastically from the ones detailed up to this point. The first discernable difference is that this model fails to have maturity levels, but rather just steps to improved maturity. The authors adopted this approach believing that a structure of steps allows for a less intimidating way for an organization to assess and improve its processes.

A broad maturity model that differentiates between low- and high- performing higher education institutions is the CMMI for Education (Ramanamurthy et al., 2012). It used the CMMI as its base model but adapted the five maturity levels to be inclusive of organizations that are struggling (level 1) to those who are leading (level 5). The model identified 18 key process areas. Rather than connecting key process areas with each maturity level, the model provided information regarding the evidence of the effectiveness of each process. There is no literature regarding its application.

**Broad scope model application.** A maturity model reaches the application stage of development when research is focused on studying a model's application (Wendler, 2012). Two broadly scoped maturity models fall into this category. The Capability Model for Quality Education (Manjula & Vaideeswaran, 2012) is composed of questionnaires and a rating model of the CMM maturity levels. This model is in the application stage as the authors quantitatively

studied the underlying mechanism of the maturity levels. Results revealed that higher levels of maturity are associated with different implementation strategies and improved performance (Manjula & Vaideeswaran, 2012).

The Business Process Maturity Model is seen in higher education literature once. A case study studied the model in two academic institutions to assess if it would facilitate improvement from maturity level 2 to level 3. Results revealed positive, preliminary evidence for it (Duarte & Martins, 2014). Despite applying only a portion of the model, concluding statements recommended a specific higher education extension to the model (Duarte & Martins, 2014).

In review of the generic broadly scoped maturity models, it is readily apparent that current literature lacks specificity and empirical evidence. It has been noted that many developed models fail to be composed of all the essential elements of a traditional maturity model (Mitasiunas & Novickis, 2012). The ambiguous nature of these models is likely due to the lack of iterative model development. It is evident that many are still attempting to understand how to translate the original CMM principles to higher education, as evidenced by the disproportionately large number of newly constructed models that fall within the first stage of the model development continuum. In the literature's current state, each scholar appears to have his or her own understanding of maturity models' mechanism and application, rather than an industry consensus and adoption of a single model for iterative model development. The next section provides an overview of narrowly focused maturity models that concentrate on a single process within the higher education setting.

**Narrow scope model development.** Narrow scope maturity models refer to those models that are restricted in a certain way. Scholars have made diverse scoping decisions when creating

new maturity models in the higher education domain. Review of the literature has identified 12 distinctive maturity models that fit into this category.

The Teaching Capability Maturity Model (Chen, Kuo, & Chen, 2011) is inspired by the CMM and CMMI but is uniquely designed to only address teaching processes. The authors of this model propose that teaching processes are at the heart of educational quality. Secondary to this, the focus should be on the teachers' work, not the entire higher education institution (Chen et al., 2011). Hence, this model is a quality model that identifies the teaching building blocks and associated practices that would lead to improved process maturity. This model is composed of a 5-point maturity scale, a 6-point capability scale, and the identification of 10 teaching process areas with associated practices and goals. The model's structure permits a dynamic approach to improvement through the ability to focus on a single process area (capability scale) or overall performance (maturity scale). This newly proposed model is in the model development stage as the authors have only conducted a single exploratory study during its development.

The Curriculum Design Maturity Model (Ling et al., 2012a, 2012b) was based on two maturity model applications that will be discussed later in this paper: the Online Course Design Maturity Model (Neuhauser, 2004) and a curriculum-centric model (Drinka & Yen, 2008). Published literature provides the model's maturity levels with a brief description, but not any further internal elements. During its development, a pilot study was conducted in a private higher education institution. Results supported its use for self-assessment and identifying improvement opportunities (Ling et al., 2012a).

The Computing Education Maturity Model (Lutteroth et al., 2007) focuses solely on the course development process. This model only has maturity levels and some informal

descriptions. There is no identification of key process areas, common features, or key practices. There has yet to be an empirical study of this model.

The Information and Communication Technologies in School Education Maturity Model is inclusive of the entire higher education institution but under the unique perspective of technology (Solar et al., 2013). The model adopted a hierarchical structure that is a modified version of the CMM with 5 maturity levels, 25 key domain areas, and critical variables. In this model, process maturity is a reflection of the institution's technology as a whole, whereas capability references each key domain area's level of progression. A pilot study was conducted to assess the validity of the model. Results revealed that the model was beneficial for identifying current maturity status and the identification of improvement opportunities (Solar et al., 2013).

The Quality Model for Educational Products Based on Information and Communication Technology (Rossi & Mustaro, 2015) addressed the maturity of digital education. The structure of the model grossly followed the CMMI by organizing digital education best practices into three improvement levels based on six elements that have associated implementation rules. There is no empirical research on this model.

**Narrow scope model application.** Developed models that need to be tested are inclusive of the model application stage. This review discovered four models that fit into this category. The need for a more precise assessment tool surrounding academic misconduct stimulated the creation of the Academic Integrity Maturity Model (Glendinning, 2014). A 3-year project called the Impact of Policies for Plagiarism in Higher Education across Europe identified the need for a tool to measure not just the existence of integrity policies, but how the degree of implementation. This review failed to discover any maturity levels, key process areas, or key practices. Rather, this model was a questionnaire instrument comprised of nine integrity categories scored on a 0-4

scale (Glendinning, 2013). One empirical study that applied to the model to retrograde survey data, the researchers could differentiate between institutions based on academic integrity characteristics (Glendinning, 2014).

The Online Course Design Maturity Model is inclusive of five levels of process maturity (Neuhauser, 2004). This model has five key process areas with associated general and specific literature-supported practices. A pilot study revealed that this model allowed research participants to identify their institution's maturity level but questioned if participants understood the meaning of maturity (Neuhauser, 2004).

One of the more contemporary maturity models was the Mobile-Learning Maturity Model (Alrasheedi & Capretz, 2013a). Despite apparent similarities between e-learning and mobile learning, it was determined that the mobile learning domain contrasts enough from e-learning that a new model was needed (Alrasheedi, 2015). Research-based best practices supported the definition of mobile learning maturity and the development of this model (Alrasheedi & Capretz, 2015a, 2015b). Further, specific research determined that mobile learning process maturity is measurable (Alrasheedi & Capretz, 2013b, 2013c, 2013d). The findings from these studies supported the development of a mobile learning maturity model. This was a CMM-inspired model with five maturity levels. It is a self-assessment questionnaire composed of a 4-point rating scale, spanning the continuum from "completely achieved" to "unachieved" (Alrasheedi, 2015). Once the model was developed, five case studies findings support the validity and internal reliability of the created questionnaire (Alrasheedi, 2015).

The Student Engagement Success and Retention Maturity Model (Clarke et al., 2013) is a synergetic model that measures student engagement processes against five dimensions (Nelson, Clarke, & Stoodley, 2014). A case study conducted at a large metropolitan higher education

institution discovered that the model allowed for greater student engagement transparency than other models in the field and was able to identify specific improvement opportunities (Nelson et al., 2015).

**Narrow scope model validation.** Once research on a maturity model has moved beyond confirming its application and is studying its effects under a number of different variables, the model has reached the validation stage of development (Wendler, 2012). This type of research seeks to identify if the maturity model can predict the relationship between higher maturity levels and improved outcomes (Tarhan, Turetken, & Reijers, 2016). This section discusses the maturity models that have reached this stage of development, including those from other industries and the one higher education-specific maturity model to reach this stage.

A few scholars felt the CMM/CMMI was generic enough that it could be utilized within higher education with minor modifications. Two studies used the original models to guide their improvement efforts during discrete research efforts. The studies used a modified version of the CMM to facilitate the transition from a traditional curriculum structure to one that was project-centric (Drinka & Yen, 2008). This study found general positive results but concluded with acknowledging the need for a specialized tool for higher education.

In like manner, researchers applied the CMM with minor academic revisions to assess instructors' maturity with regard to developing course projects (Collofello & Ng, 2001). Although the created survey lacked sound scientific development principles, it allowed the authors to objectively compare different instructors' processes and identify improvement opportunities.

The most recognized maturity model in higher education literature was the E-Learning Maturity Model (Marshall, 2010b). This higher education maturity model is different than the

prior discussed models in two significant ways. First, this model mirrors most of the CMM's underlying process philosophy and the CMMI's dynamic representation. This model is a holistic, dynamic model that focuses on measuring and evaluating process capability. The traditional 5 maturity levels are not seen. Rather, there are 5 capability dimensions and 35 processes with associated practice statements (Marshall, 2010b). This type of model allows for the identification of process issues but does not prescribe a specific improvement path (Marshall, 2011).

The E-Learning Maturity Model is unique from other models in that it has undergone iterative model development. The original model was published in 2003 and, within a few short years, the second version was published in 2006. Marshall (2011) summarized the application and validation studies from July 2004 to March 2005 that helped to refine the model into its second version. Despite criticisms about the amount of resources needed to complete the assessment (Haukijärvi, 2014), this model has proven to support e-learning strategy alignment (Al-Ammary et al., 2016), identify e-learning adoption barriers (Marshall, 2010a, 2011, 2012), and understand what activities lead to high quality e-learning (Marshall, 2010a). The E-Learning Maturity Model's ability to unambiguously isolate key e-learning components allows organizations to implement e-learning systems through a specific focus on practices and measures that support effectiveness (Tawsopar & Mekhabunchakij, 2013).

The narrow scoped maturity models reveal similar limitations as the broadly scoped models. Over half of the models are in a stage beyond initial development. Despite this, the literature reveals that many of these models fail to be comprised of all traditional maturity model internal components. This is a significant limitation and puts into question the validity of the models themselves. Although there is more research on the narrow scoped models, one could still argue it is superficial evidence as the majority of the research lacked robust design. Overall,

the narrowly scoped models uncover some significant limitations, but there is some evidence to support their use. Whereas this section focused on introducing and providing an overview of the maturity models seen in higher education literature, the following section takes an in-depth look into the benefits and limitations of these models.

### **Higher Education Maturity Model Benefits**

Maturity models have a unique perspective on quality and improvement, making them unlike many other quality models. For example, the International Organization for Standardization (ISO) is readily apparent in quality literature. These standards are in contrast to maturity models that do not focus on obtaining a minimal set of standards, but reinforce the never-ending pursuit of excellence (Garoot, Farhan, & Dahlan, 2016; Manjula & Vaideeswaran, 2011). Other quality frameworks have a narrow focus of quality, whereas maturity models are more comprehensive (Clarke et al., 2013). Because of this, assessment information reflects the needs of all stakeholders and allows educational leaders to create effective strategy (Manjula et al., 2012). Paradoxically, despite its expansive scope, maturity models also provide a discrete evaluation of quality, more than most other quality models (Jalote, n.d.). Specifically, maturity models explicitly identify current process state, promote organizational change and performance, and provide a means to sharing best practices. The following sections detail each of these identified benefits in more detail.

**Current state transparency.** Research supports the use of maturity models based on a number of benefits. At the forefront, maturity models bring transparency to the current state of organizational processes. This provides benefit to both the organization and its students (Alrasheedi & Capretz, 2013a). Usually it is difficult to get the objective information needed to make institutional decisions (Becker, Knackstedt, & Poppelbuss, 2009). Thus, maturity models

prove to be immensely beneficial for many organizations because of the model's ability to assimilate a large amount of complex information into a comprehensive, yet easy to understand, manner (Aytes & Beachboard, 2007; Wendler, 2012). This easy-to-understand manner is seen with an overall maturity level rating, which provides an objective data point on the diagnosis of the organization's processes as a whole (Rossi & Mustaro, 2015; Solar et al., 2013). This transparency cascades down to each level of maturity with information regarding specific process capabilities. This level of detail is very beneficial for those conducting maturity assessments (Al-Ammary et al., 2016; Dounos & Bohoris, 2007; Hurst, 2007; Tawsopar & Mekhabunchakij, 2013). This promotes awareness and a greater appreciation for the elements proven to have an impact on outcomes (Aytes & Beachboard, 2007; Manjula & Vaideeswaran, 2012). The results of the assessment provide an unambiguous explanation for why the current state is the way that it is (Aytes & Beachboard, 2007). This is extremely beneficial for leaders (Al-Ammary et al., 2016) and front-line staff (Ling et al., 2012a) because this is the information needed to improve current performance. The improved transparency is one of the first steps toward improved outcomes, as enhanced visibility can identify discrete opportunities for improvements (Petrie, 2004).

Many recognize the flawed nature of most higher education institutions measurement systems as it only assesses quality from one stakeholder (the student) and is based on opinion (Marshall & Mitchell, 2002; Rossi & Mustaro, 2015). Many times this is the only way process quality is measured (Chen et al., 2014). Despite its popularity, this type of assessment does not assess the achievement of learning goals (Marshall & Mitchell, 2002; Petrie, 2004; Saulnier et al., 2008). It unequivocally adopts a people-centric focus of quality. This is in stark contrast to the process focus of maturity models. Additionally, this method of assessment fails to recognize

or obtain the perspective of many other stakeholders who are customers of the higher education institution (Manjula & Vaideeswaran, 2011). Because the higher education institution is a complex setting with many unique customers who all have unique needs, it is pertinent that an assessment model captures this complexity of elements and the relationship amongst them (Clarke et al., 2013; Lutteroth et al., 2007; Underwood & Dillon, 2004). Maturity models have proven to be models that can provide this multidimensional perspective of organizational quality (Harrison, Tomás, & Crook, 2014).

There is a clear benefit for organizations to adopt maturity models, as they not only provide an assessment of the industry's best practice of processes, but also identify specifically what needs to improve. Interestingly, these models have also proven to be beneficial for customers as they could allow a customer to quickly review an organization's maturity level and its correlated likelihood of success. Jalote (n.d.) notes how this benefit shifted the software engineering industry, as customers were demanding a higher level of maturity and performance that in turn promoted dramatic improvements. In the current state of higher education, it is difficult to distinguish the performance of different universities (Ramanamurthy et al., 2012). If society follows its own history with the adoption of maturity models, this would increase transparency and the demand for improved outcomes would facilitate the transformational shift needed to improve education outcomes (Jalote, n.d.). Beyond just customer demand, the use of maturity models can positively influence organizational change.

**Organizational change.** Beyond the explicit nature of identifying current state through assessment results, maturity models also function as an improvement tool by identifying a roadmap toward improvement (Marshall, 2010b; Neuhauser, 2004; Ramanamurthy et al., 2012). Maturity models frame improvement in a controlled manner that can manage risk (Drinka &

Yen, 2008; Garoot et al., 2016; Hurst, 2007) by promoting a shared understanding of the opportunities. Because maturity models explicitly identify strengths and weaknesses, it is difficult for anyone to argue what the organization should work on next. Traditionally, maturity models have adopted a gradual progression of change (Ling et al., 2012b) but improvement initiatives can be adaptable to any desired pace of change (Dounos & Bohoris, 2007). The critical point is that maturity models promote data-driven (Vezzetti, Violante, & Marcolin, 2014) and impactful improvement efforts through a relentless focus on a defined set of practices (Neuhauser, 2004) by means of a controlled progression of change (Ling et al., 2012b; Petrie, 2004). This perpetual approach to improvement (Drinka & Yen, 2008; Petrie, 2004; Solar et al., 2013) can be measured over time to assess the degree of implementation and success (Underwood & Dillon, 2004). This condition facilitates a culture of continuous improvement as the improvement effort is embedded in the value adding work that is completed each and every day (Chen et al., 2014).

Assessment results provide the information executives need to know in order to be decisive when formulating strategy. Because maturity models provide information about current process state, it is possible to distinguish between process performance and staff performance (Petrie, 2004), which is a significant delineation to make when considering the next steps of the organization. The explicit nature of the model allows executives to consider the “learning curve” (Demir & Kocabas, 2010) that is required for improved process maturity within the organization’s context (Rossi & Mustaro, 2015). This stratification in opportunity reinforces short- and long-term strategy creation (Baig et al., 2007; Dounos & Bohoris, 2007; Ling et al., 2012b; Silva & Cabral, 2010), as well as accounts for a system-wide coherence (Baig et al., 2007; Harrison et al., 2014; Nelson et al., 2015). Additionally, maturity models also ensure a

constancy of purpose by ensuring that processes and resources are aligned (Sari, Hariyanto, & Maharani, 2012). Maturity models have the ability to stimulate organizational change in a meaningful way, which has naturally led to improved organizational performance.

**Organizational performance.** Creating a change strategy is only the first step toward operational excellence; implementation of this strategy must also be successful. Inherently, maturity models focus on the ability to predict performance (Chen et al., 2014; Hurst, 2007), which is inclusive of not just the existence of best process practices, but also of the measuring the effectiveness of these mechanisms (Glendinning, 2013). Maturity models facilitate the ability to manage processes for competitive advantage (Haukijärvi, 2014). This is because maturity models make statements about organizational performance, achievement, sustainability, strategy alignment, and responsiveness to change (Al-Ammary et al., 2016). The literature provides evidence for the claim that maturity models improve higher education outcomes (Baig et al., 2007; Drinka & Yen, 2008; Ling et al., 2012b). More specifically, research proves maturity models improve curriculum design efficiency (Ling et al., 2012b), organizational flexibility (Marshall & Mitchell, 2002), and organizational communication (Baig et al., 2007). Most notably, it is important to note that the highest performing organizations have a competitive advantage over competition not solely because of high-performing employees, but because of well-designed processes. An underlying process foundation provides the foundation for high performance, despite personnel changes. Maturity models have supported the transition from an organization's dependency on people to a dependency on processes (Ramanamurthy et al., 2012). The final benefit seen in the use of maturity models is how to share the lessons learned.

**Collaborative best practice.** The structure of maturity models promotes the unique ability to plug and play with best process practices within (Marshall & Mitchell, 2004) and

outside of the organization. This type of benchmarking is different from other higher education quality models as it allows organizations to specifically identify a process area to compare and contrast against one another (Ling et al., 2012b; Marshall & Mitchell, 2002, 2004; Petrie, 2004). Garoot et al. (2016) noted how this is advantageous as it allows leaders to easily identify and seamlessly integrate best practices without demanding resources (Solar et al., 2013). This enhances improvement efficiency and prevents re-creation of the same solution.

Maturity models are composed of the essential elements of success. This means a well-designed higher education maturity model would provide a common language within the industry regarding the process elements that are widely accepted across the industry as best practice (Moreno, Sanchez-Segura, Medina-Dominguez, & Cuevas, 2014; Petrie, 2004; Solar et al., 2013). Best practices govern higher education but there is limited evidence of the actual outcomes of these practices (Marshall, 2011). Once research endorses best practices, there can be an ongoing discussion in the higher education community regarding what truly are the best ways to integrate the practices (Marshall & Mitchell, 2002; Underwood & Dillon, 2004). Once process elements are refined and determined effective, it will be seamless to update the global understanding of high-quality educational practices (Mitasiunas & Novickis, 2012). This could advance the entire industry, in a way similar to what has occurred with the CMMI in software engineering. Given all of these points, maturity models are beneficial due to their ability to display current state, positively influence organizational change and performance, while providing a platform for sharing best practices. Even so, there are limitations with these models. The following section will detail the primary limitations of maturity models seen in higher education.

### **Higher Education Maturity Model Limitations**

While research has identified some positive outcomes of using maturity models in higher education, the literature also identifies some limitations. These limitations include the models' sole focus on the process element of operational excellence, the lack of robust model development, inadequate empirical evidence around its ability to improve organizational results, and a fragmented blueprint for knowing what improvements to work on next. The following sections will provide more insight into each of these limitations.

**Sole process perspective.** Maturity models are models that focus on assessing and improving organizational processes. The most glaring opposition to maturity models in higher education is that some scholars still question if creative work is a process (Mitasiunas & Novickis, 2012). In higher education, there is no universal understanding of the key elements required for high-quality educating (Chen et al., 2014). Rossi and Mustaro (2015) identify how higher education processes still vary, largely based on different models and standards. Consequently, this situation fails to have a solid foundation upon which process improvements can be successful (Collofello & Ng, 2001). If those in this setting do not see their work in this manner, it may hinder the effectiveness of any process-centric ideas.

The second limitation against the sole process perspective of maturity models is the failure to address other aspects of the organization. Maturity models only address one element of a complex organization (Albliwi, Antony, & Arshed, 2014; Aytes & Beachboard, 2007; Kulpa, 2007), thus disregarding other organizational influences (Baig et al., 2007). A good example of this is how a maturity model does not address how a mature process functions with external influences, like communication (Albliwi et al., 2014). Failure to address, or at least recognize, other influencing factors may influence the role that these models play in higher education.

In the study of discovering how to translate maturity models to the higher education setting, it is important to note that these models fail to embrace any pedagogical approach. Some see the lack of a specific strategy or theory to be a large limitation of maturity models (Haukijärvi, 2014; Poppelbuss & Roglinger, 2011; Tarhan et al., 2016; Wendler, 2012), whereas others have argued that having a process-centric perspective is beneficial for a broad application of different learning pedagogies (Marshall, 2010b). A conceptual issue with the models is that they only address a single element. This literature review also identified some limitations with the empirical and practical aspects of these models as well.

**Insufficient model development and research.** The quick adoption and development of maturity models in the literature appears to be a positive for those who are in support of such a model in higher education. Nevertheless, a closer look reveals this situation as a grave downfall. There are a considerable number of maturity models with a puzzling number of different scopes within various stages of model development. In current state, it is extremely difficult for end-users to know which model or models to use for an accurate assessment of their processes. This has led scholars to question if there is any practical use for maturity models (Becker et al., 2009; Helgesson, Host, & Weyns, 2012; Tarhan et al., 2016).

The lack of development guidelines or standards is an influencing factor to this confusing state (Garcia-Mireles, Garcia, & Moraga, 2012; DeBruin et al., 2005; Poppelbuss & Roglinger, 2011). Perhaps secondary to the lack of guidance, scholars have carelessly attempted to replicate the well-researched components of the CMM without conceptualizing the elements in detail (Albliwi et al., 2014; Becker, Niehaves, Poppelbuss, & Simons, 2010). Many models were developed at the same time the CCM was published, thus suggesting limited reflection and research (Garcia-Mireles et al., 2012; Tarhan et al., 2016; Wendler, 2012). Many models have

been criticized as being little more than a collection of basic process terminology due to lack of structure (Becker et al., 2010). Even further, it is interesting to note that there is no theoretical basis in the literature (Becker et al., 2010; Garcia-Mireles et al., 2012; Wendler, 2012). This is significant, as this is usually the first step in any research endeavor.

**Unverified organizational results.** If there is limited research on the development of new models, it should come as no surprise that there is limited research on already published models (Albliwi et al., 2014; Becker et al., 2009). In the studies reviewed, there was limited to no research that investigated how maturity models function as improvement models (Marshall, 2010b). Accordingly, there is little empirical evidence to suggest that improved process maturity will yield improved results (Albliwi et al., 2014; Duarte & Martins, 2014; Tarhan et al., 2016; Vezzetti et al., 2014). Sheard (2001) argues that the heavy focus on what constitutes a mature process has facilitated an over analysis of process components, consequently losing the essence of the model: the outcomes. Proponents of maturity models argue this is because many models are still in the preliminary stages of model development (Garcia-Mireles et al., 2012; Vezzetti et al., 2014; Wendler, 2012). Despite anecdotal suggestions, it is unknown if maturity models facilitate improved ability to monitor, control, and improve the targeted processes (Marshall, 2010b). In addition to the lack of research supporting model development or its use in changing performance, higher education literature challenges the improvement function that maturity models can provide to end users.

**Fragmented improvement blueprint.** Traditionally, maturity models are designed to be both descriptive and, to some degree, prescriptive regarding the ability to identify a few key improvement opportunities. In their current state, maturity models, at best, can only function in a descriptive manner (Albliwi et al., 2014; De Man, 2015; Tarhan et al., 2016). Many maturity

models are only a part of what many researchers would consider a well-established model (Wendler, 2012). Secondary to the lack of robust model development and many models lacking the essential internal components, maturity models in higher education may give false hope to those looking to improve the maturity of their organization as the concepts are easy to identify, but implementation is difficult (Aytes & Beachboard, 2007). Some question if the effort is worth the outcome because maturity model assessments are time and resource heavy (Albliwi et al., 2014).

The lack of robust research surrounds the limitations of maturity models in higher education and causes end users to pause when considering what model to adopt for assessment and improvement. Overall, this review of the literature discovered misconceptions and critical gaps that need research attention.

### **Research Synthesis**

Higher education maturity model research reveals a limitation that is similar to many other industries: there is no standard model development (DeBruin et al., 2005; Vezzetti et al., 2014). This has created a complex and confusing current state. Besides the first CMM publication, there is minimal documentation regarding the composition of a maturity model (Mitasiunas & Novickis, 2012). Because the literature lacks a unified way of developing a sound model, there are questions regarding validity (Manjula & Vaideeswaran, 2012). In addition, researchers have not empirically studied many maturity models after publication. This lack of model refinement also calls into question validity, as all models should undergo iterative development (DeBruin et al., 2005; Glendinning, 2014). It appears that many models address similar components. Rather than building upon an already developed model, a new model is developed creating large gaps or overlapping disconnects (Zhou, 2012). This is readily apparent

when considering the scope of maturity models in higher education. Because most of the reviewed models focus on isolated higher education service lines (Duarte & Martins, 2014), there is significant overlap. For example, there are multiple models that address the process of educating through an electronic platform (Alrasheedi, 2015; Marshall, 2010b; Neuhauser, 2004). On the other hand, there are also large gaps. Of the research reviewed, few models have concentrated on the system perspective of the entire higher education institution (Achi et al., 2016; Al-Ammary et al., 2016; Duarte & Martins, 2014). In current state, it is very difficult for the higher education community to understand what is the best fit for the needs of the industry (Vezzetti et al., 2014). It is apparent that the adoption and application of any of the reviewed models would facilitate a confused and fragmented perspective of the work, which contradicts the sole purpose of the CMM.

Despite the above limitations, there is a larger issue. At first glance, it may appear that these models are adopting a process perspective. Many of the reviewed studies identify a set of processes addressed by the model. Correlating to these processes, a set of best practices is structured into framework similar to that of a maturity model. While these models may have some proven benefits, as mentioned above, it may not be in the same way the CMM intended. It was system principles that guided the creation of the CMM and the definition of process maturity (Paulk et al., 1993). Process maturity gets at the intentional design of a process that is required to create a predictable outcome (Paulk et al., 1993). The maturity models reviewed have a strong focus on the best practices of higher education processes. This is one aspect of creating a process with an intentional outcome, the process content. However, there are no models that embrace this understanding. Maturity models in higher education focus on best practice without understanding how or in what manner the strategy are applied (Marshall, 2010b). Taking a process perspective

is not a one-dimensional approach. Adopting best practice process elements is advantageous, but this alone will quickly create a poorly stitched together web of best practices. A systems perspective promotes a comprehensive understanding of how all of these elements, including best practices, must fit together under the organization's context to be effective.

The term *process* is commonly used in reference to improvement efforts, but the true essence of taking a process perspective is not present in higher education maturity model literature. This is evidenced by the lack of a universal understanding of quality (Marshall, 2011), the inability to determine the final output of education (Baig et al., 2007), and the inability to see the knowledge work of higher education as a process. Higher education as a whole has failed to identify the core processes of higher education and the relationships between them (Chen et al., 2014). There is little appreciation for the similarities between processes, despite the type of content. Referencing GST, higher education institutions need to step back from the content to embrace a more comprehensive perspective of the work.

The first perspective that needs to be accepted is that the work of educators can be described as a process. The benefit of taking this type of perspective is that it facilitates the understanding of a complex phenomenon. This perspective allows one to see the process, explain it, and improve upon it. Once this is achieved, educators can witness the multifactorial relationships and its impact on outcomes. GST provides the perspective to transcend discipline through process assumptions and principles. Once these two perspectives are accomplished, it yields a situation where the industry of higher education can look to other industries and systems to figure out how to create a robust process. In accordance, if all work is a process and all processes have similar system laws, one could assume a maturity model that is rooted in generic elements could be remarkably beneficial for all processes, no matter the industry. For these

reasons, this research will seek to explore educational leaders' perceptions of a maturity model that focuses solely on system principles, the PEMM.

### **The Process and Enterprise Maturity Model**

The PEMM is unique in that it is a generic maturity model. In contrast to the CMM or many other maturity models, the PEMM does not identify content-specific elements, but rather it identifies the essential process and enterprise attributes an organization should have in order to be effective at process improvements. After years of experience examining organizations during process-based transformations, Hammer (2007) realized that high-performing processes and the environment to support those processes do not happen by accident. At the time, there was no framework to help with this complex endeavor. In 2006, the PEMM was published to enable organizations to have a better understanding of their current process and enterprise state to be more effective at transformation efforts (Hammer, 2007).

The PEMM is composed of two distinct matrices that function together as an assessment and an improvement model. The "How mature are your processes?" matrix measures process maturity based on the five process enablers: design, performers, owner, infrastructure, and metrics. These elements are present in any high-performing process. Simply having these elements does not guarantee high performance, but in Hammer's (2007) experience, all high-performing processes, no matter the industry, are comprised of these five elements. These five process enablers are further broken down in the matrix as 13 distinct categories organized into four maturity levels. Each of these categories has quantitative measurement based on the enabler statement associated with each level and its implementation as largely true, somewhat true, or largely untrue. While this matrix addresses processes, transformations do not happen in isolation. The environment in which the transformation is occurring must be receptive to process change.

The “How mature is your enterprise?” matrix addresses the organizational capabilities needed to support an environment focused on transformation. There are four enterprise capabilities: leadership, culture, expertise, and governance. In similar fashion to the process matrix, these elements are further broken down in the matrix as 13 distinct categories and organized into four maturity levels. Together, these two matrices combine to illuminate the current strengths and weaknesses influencing an effective transformation. Since enterprise capabilities make it possible to integrate and support the sustainment of the process enablers pervasively throughout the organization, the model promotes full attainment of an enterprise maturity level before work on the same process maturity level. Due to the straightforward nature of the PEMM, novice users can use the model with only a brief introduction (Hammer, 2007).

### **Summary**

The literature reviewed in this chapter supports the purpose of this study. GST provides the basic thinking and underlying mindset needed to understand the role of maturity in higher education. It supported the revolutionary concept that by taking a systems perspective of the work, improvement models used in other disciplines may provide benefit in the higher education setting. In addition, this chapter reviewed relevant literature on maturity models. This comprehensive review included a historical brief of the first maturity model, the CMM, as well as the current research on maturity models in higher education. The literature exposed how one can consider process improvements against content-specific elements as well as the generic system elements. This exposed the significant gap in the literature regarding maturity models that adopt the principles embraced by GST. The theoretical framework and maturity model literature presented here, in addition to the current societal need for transformation in higher education,

emphasize the significance of helping educational leaders who engage in improvements to maximize their success.

### **CHAPTER III: METHODS**

There is fragmented research surrounding the use of maturity models in higher education. Further, there had yet to be a study that investigated the utility of a generic maturity model in this setting. Given this gap in current literature, this qualitative case study explored educational leaders' perceptions of the utility of the PEMM as an assessment tool. As this is the first research of its type, a qualitative methodology allow for open exploration and understanding (Creswell, 2009). This chapter provides an overview of the critical elements of this research design including the methodology, studied population, ethical considerations, data collection, analysis, and quality measures. All of these elements demonstrate the intentional design of this research to answer the research questions.

#### **Research Design**

A research design describes how a researcher plans to study the issue revealed in the conceptual framework (Rossman & Rallis, 2012). Qualitative research investigates the deeper understandings of phenomena in order to obtain a comprehensive perspective (Leedy & Omrod, 2016). Embracing this type of approach goes beyond traditional ways of thinking and opens the door for exploration. Before this research, there was no research on the utility of a generic maturity model in the higher education setting. As this was the first study of its kind, this research design was in alignment with its purpose. A quantitative design would have failed to capture the complexity and comprehensive nature of this unstudied phenomenon. At this point in the research process on this model, it would have been difficult to control variables (Grove, Burns, & Gray, 2013) or place participant perceptions into quantitative measures (Creswell, 2009). While there are a number of different types of qualitative research, this project adopted a case study methodology.

A case study is a detailed investigation of an identified unit of study (Creswell, 2013). It is an appropriate approach to use when conducting preliminary research on something that is unknown (Leedy & Omrod, 2016) as it allows all variables to be considered rather than taking a concentrated look at just the critical elements of a phenomenon (Grove et al., 2013). This research project is an instrumental, collective case study. It was instrumental because of its investigation of a unique case (Creswell, 2013). The unique case was the study of a generic maturity model in a previously unstudied setting. This research project was also collective due to the inclusion of more than one case (Creswell, 2013). This research included multiple cases, each with its own perception of the phenomenon. This research design, as well as the targeted sample, supported answering the research questions.

### **Population**

Research that investigates a single phenomenon comprehensively, as is the case with qualitative research, must take care in scoping the study (Creswell, 2009). Because of the open exploration of all variables, the sample should be conservative (Grove et al., 2013). The population under investigation was educational leaders working in a higher education setting. To ensure consistent representation, the study operationalized the term *educational leader*. For the purposes of this study, educational leaders are defined as administrators who supervise the provision of academic, research, and student services in postsecondary education settings (U.S. Department of Labor, 2017). As the specific job duties and scope of responsibility varied according to institution, the job title and description varied as well.

This instrumental, collective case study sought to capture educational leaders' perceptions of the utility of the PEMM. The objective was to locate participants who were representative of this population. It is important to note that qualitative research can study

phenomenon at different levels of abstraction, and it is good practice to design research to represent these different aspects (Creswell, 2013). As this research focused on the utility of a generic maturity model, it was assumed that the location, setting, type of program, or department was irrelevant. Regardless, this research set parameters to ensure a diverse representation. This case study used criterion, purposive, and convenience sampling methods. First, recruitment is criterion because the participants met the established inclusion criterion (Creswell, 2013). The next section details the criterion. It is purposive as participants were recruited based on three factors of institutional size as measured by total student enrollment, institution governance (public or privately owned), and the business sector in which the leader worked (academics or operations). Lastly, recruitment is convenient because participants were readily accessible by the researcher.

### **Selection Criteria**

Secondary to the case study design and limited sample size, there were multiple layers of inclusion criteria related to the participant and the institution. Inclusion criterion mandated that the participant must: (a) possess a bachelor's degree at minimum, (b) have held a full-time leadership role in an externally accredited higher education institution for more than 6 months, and (c) be responsible for the management of at least one improvement project. The educational leader's higher education institution had to be externally accredited. Lastly, this study set exclusion criteria to strictly reject any participant who had an interest or bias in the results of this research.

Utilizing the sampling method detailed, the researcher contacted potential participants through a telephone call. During this call, the researcher informed the participant of the study by communicating the purpose of the study, the research questions, and detailing participation

requirements. The researcher explicitly mentioned that participation was voluntary. After being informed, if the participant was willing to participate a meeting time was set for the in-person interview.

### **Ethical Considerations**

To conduct a well-constructed study, this project considered not only the research design but the elements of research ethics and integrity as well (Grove et al., 2013). The research procedure is grounded in a set of ethical principles. The researcher obtained approval from the College of Saint Mary's Institutional Review Board before any data collection (see Appendix D for the documented approval). This was a fundamental endorsement necessary for ensuring ethical conduct of the proposed research (Grove et al., 2013). After approval was granted, the study took calculated steps to ensure adherence to ethical standards throughout the study. There are four ethical concepts to consider: (a) protection of human rights, (b) permission to participate, (c) confidentiality, and (d) research honesty (Grove et al., 2013; Leedy & Omrod, 2016). The following sections explain the actions taken by the researcher to mitigate risks in these categories.

#### **Protection of Human Rights**

At the heart of ensuring human rights is the principle of doing no harm. This project went beyond just avoiding harm by demonstrating respect in all procedures (Creswell, 2013). The researcher accomplished this by minimizing disruptions by letting the participant schedule the in-person session (Creswell, 2013).

**Permission to Participate**

This research recognized participants as independent individuals who have the right to participate (Brown, 2014; Grove et al., 2013). Accordingly, the research procedure instructs research participants on the objective of the study and participant information management during analysis (Creswell, 2013). To ensure informed and voluntary participation, an IRB-endorsed consent form is used. Additionally, participants were educated on their ability to withdraw at any time without penalty (Creswell, 2013). These actions ensured that any participation was strictly voluntary (Leedy & Omrod, 2016).

**Confidentiality**

Another research design component essential to conducting an ethical study was to ensure that all research information is strictly confidential. Because a violation of privacy can occur by accident, this study developed fabricated profiles from the onset to ensure anonymity and mitigate any risk (Creswell, 2013). This profile included an assigned letter for the participant and institution. All audio recordings were destroyed after the audio was transcribed into written format. Collected data was stored on a password-protected USB flash drive and will be destroyed after 3 years.

**Honesty**

The final ethical element, honesty, had four manifestations in this study. During participant recruitment, the researcher avoided inviting any participants or institutions with an interest or bias toward the outcome of the study (Creswell, 2013). This element was essential and was included in the exclusion criteria. All offered statements in this paper utilized the American Psychological Association publication guidelines (American Psychological Association, 2010) to ensure appropriate acknowledgement and prevent plagiarism (Leedy & Omrod, 2016). The last

two factors were the consent process and the dissertation authorship determination, which adopts the criterion put forth by the College of Saint Mary's dissertation guidelines.

Following the design of the research procedure, the researcher used purposeful strategies to ensure honesty. The researcher took care to ensure that the written language in this research accurately expressed the research components without deceit. Leading or biased questions were not used during data collection (Creswell, 2013). This research has precise records to ensure transparent honesty. This explicitly communicates not only the inferences made from the raw data, but also the supported reasons behind those decisions (Creswell, 2013). This allows external interested parties to analyze and replicate the study if necessary (Shamoo & Resnik, 2015). Additionally, this provided the evidence required to support the research analysis, findings, and conclusions (Creswell, 2013). The final report avoided the common qualitative research interpretation weakness of claiming more significance than reality by reporting all research findings (Creswell, 2013; Shamoo & Resnik, 2015). The research conclusions do not advance outside the scope of the studied phenomenon.

Despite the best of intentions and plans, not all ethical considerations can be anticipated. Because of this, a pilot study was conducted on the research procedure. The pilot study addressed issues of validity, reliability, practicality, and ethics.

### **Research Procedure**

Qualitative research seeks to understand the studied phenomenon under a range of diverse data collection and analysis strategies (Brown, 2014). The unique aspect of this research methodology is that data collection and analysis occur together (Brown, 2014). The use of a structured data collection procedure allowed for a dynamic, yet effective, approach (Leedy & Omrod, 2016). This section will detail the research procedure (see Appendix E) that includes

both research components. The research procedure is the overarching document that guided the behavior of the researcher, and it will reference the documents that were used with each procedure step.

### **Data Collection**

In case study research, it is important to utilize multiple forms of data collection in order to build a comprehensive perspective (Creswell, 2013). This research collected data from two information sources: document review and interview. Phase 1 collected data on the demographics of the participant and institution through a document review of public information. This progressed into a more comprehensive data collection in Phase 2. Phase 2 was comprised of a 60-minute interview session that included an interview in order to capture perceptions of the PEMM.

**Phase 1.** Phase 1 of the research procedure collected data about the participant and the institution. After the participant verbally agreed to participate on the recruitment phone call, a meeting location and time, dictated by the participant, was set. Once the in-person session meeting was established, a pre-work assignment was sent via an email (see Appendix F). The email instructed the participant to read “The Process Audit” (Hammer, 2007; see Appendix G for article permission) before the in-person session. The aim of this task was not to provide in-depth education or training, but to provide basic awareness of the underlying philosophy of the PEMM and its elements. For this reason, the email instructed the participant to read the article for preliminary awareness of the instrument rather than taking an in-depth study of it. Then, the researcher initiated the first phase of data collection. The researcher achieved this through reviewing publically available documents as related to the objective of this study. While review of documents may seem distant to the research questions, it provided contextual details required

for a comprehensive understanding of the phenomenon (Grove et al., 2013). The transition toward more tangible aspects of understanding of the cases occurred during the subsequent phase.

**Phase 2.** Phase 2 collected data during a 60-minute interview session with a participant (see Appendix H for review of the interview procedure) at a place and time of convenience. The session began with introductory greetings, a reminder of the study's purpose, and its adherence to ethical considerations. There was an explanation of the data collection methods, including the use of an external recording device. It was during these initial steps that the participant received information about the purpose, risks, and benefits of the study. After the participant was involved and voluntarily agreed to participate, the participant signed the written consent and rights of research participants documents (see Appendix I for the consent form and Appendix J for the rights of research participants form).

The aim of Phase 2 was to capture participant perceptions of the utility of the PEMM as an assessment tool. The researcher used a semi structured interview technique to collect data. The purpose of this interview was not to test the research questions or make assessments, but rather to understand "a lived experience of other people and the meaning they make of that experience" (Seidman, 2006, p. 9). The beginning of the interview focused on characterizing the participant, whereas the second half focused on capturing perceptions of the PEMM. Initiating the session in this manner helped establish a positive rapport with the participant. The participant already reviewed the PEMM during the pre-work, but for the second half of the interview, they were provided with a printed copy of the "How Mature are Your Processes?" (Appendix K) and the "How Mature is Your Enterprise?" (Appendix L) matrices (Hammer, 2007). The interview

session concluded with debriefing remarks, concluding appreciation statements, and information regarding next research steps.

### **Data Analysis**

The process of analyzing data focused on detecting manifestations in the collected data (Grove et al., 2013). Data analysis occurred in parallel with the data collection procedure. Since a paper trail of all analysis is recommended (Grove et al., 2013), there was an organized and structured approach to data storage. For this study, all documentation was stored on a USB flash drive that was password protected. The information is secure through encryption of the entire flash drive, thus ensuring that all folders, files, and other documents are confidential.

Secondary to the exploratory nature of this research project, data analysis commenced using a gradual, inductive approach (Patten, 2014). Note that the research procedure included built-in analysis periods to promote a logical flow of analysis that was built on Creswell's (2013) Data Analysis Spiral. This spiral is the art of iterative synthesis, and it is composed of four classifications: organizing, examining, interpreting, and representing (Creswell, 2013; The analysis procedure is outlined in Appendix M).

The data analysis that occurred in parallel with the data collection yielded superficial insights into the phenomenon. To aid deeper analysis, the researcher converted all data into text format and organized it. Early in this process, analysis only focused on organizing and examining. The first step involved reviewing the entire set of data in order to gain a general understanding. Upon analysis of all the data, broad ideas were apparent and vague organization around meaning took shape (Creswell, 2009). Broad categories of meaning emerged, and the researcher identified initial codes. The researcher used this organization strategy to help focus interpretation through the process of identifying meaningful sections of transcript that related to

the identified codes (Seidman, 2006). The researcher completed further analysis to link these broad categories down into meaningful interpretations of reality.

The process of translating the participants' words into meaning is known as interpretation (Grove et al., 2013). During data analysis, the researcher used both convergent and divergent processing strategies to make sense of the information. At this stage in the analysis, further immersion into the data had to occur. It was at this point that the codes began to have some finite parameters because of the approach of "pulling the data apart and putting them back together in more meaningful ways" (Creswell, 2013, p. 199). Whereas earlier coding focused on description, now analysis compared, contrasted, and refined codes. If there was repeated evidence of the code, the researcher considered it a theme (Grove et al., 2013). Then, a cross-case analysis occurred by identifying the similarities and differences across cases (Patten, 2014). The purpose of this type of analysis was to recognize and address the complexity of the phenomenon (Creswell, 2013). At this point in data analysis, there was a formulated list of themes with subthemes detailing specific characteristics and examples (Leedy & Omrod, 2016). The researcher validated the data analysis and its findings with an external quality audit (see Appendix N for the audit trail letter). The next section details the measures this study took to ensure a high-quality research outcome.

### **Data Quality**

Data quality refers to how credible a study is in relation to validity and reliability. This research produced credibility through the intentional use of five different quality strategies. The first of these was an expert review. A quality consultant with over 25 years of experience reviewed the newly developed data collection instruments. Based on the expert review recommendations, the researcher revised these instruments. The second strategy was the use of

triangulation. Triangulation is the use of numerous information sources and analysis methodologies (Creswell, 2013). The use of two information sources promoted the exploratory nature that is required for valid meaning creation. Thirdly, after data analysis, there was an external audit completed by an institutional faculty. This audit reviewed the collected data and research findings to critically assess how well themes and interpretations were supported by the data (Creswell, 2013). The written report of the research also addressed the validity of the research by providing a detailed description of the study logistics and findings. The transparency of communicating research information regarding the data analysis procedure and how concepts were compared and contrasted in order to interconnect with discrete participant quotes allows the research to be critically assessed and validated (Creswell, 2013). The final data quality strategy used was the disclosure of researcher bias. The next section explains this step.

The researcher plays a critical role in data collection and interpretation in a case study design (Creswell, 2009). Because of this, it is pertinent to disclose the role of the researcher (Creswell, 2013). It is pertinent to share that this researcher currently works as a quality improvement consultant for a medium-size health system that is inclusive of a college of health sciences. Since Fall 2015, this researcher has come to understand some of the process issues that occur in higher education institutions. As a facilitator of improvement work in this setting, this researcher has firsthand experience witnessing the root cause of these issues and the methodologies that are advantageous in counteracting them. Interestingly, despite working with different departments within the health system, this researcher discovered process elements that transcend discipline in the manner von Bertalanffy (1969) proposed in his GST. Therefore, this researcher's professional career has been devoted to studying improvement methodologies with particular interest in how these elements function globally in different settings. Despite informal

experience and positive results with utilizing process improvement methodologies, this researcher has acknowledged this belief. To prevent bias, the researcher will put aside this expectation and recognize that there has been no empirical research completed in this area to support this claim. It is unknown if maturity models, can function in this manner as well, hence the need for a study of this type.

### **Summary**

Chapter III provided an overview of the research design and methodology that was used to answer the research questions. In the study of exploring educational leaders' perceptions of the utility of the PEMM as an assessment tool, this section explained the design, population, research data collection, and analysis procedure. It included the fundamental elements of ethics and data quality measures to demonstrate the credibility of this research project. All of these elements provided the support needed for this qualitative case study research to adequately investigate this phenomenon.

## CHAPTER IV: RESULTS

In alignment with a qualitative case study, this research used an exploratory analysis approach to determine educational leaders' perceived utility of the PEMM. The findings resulted in three themes: (a) the PEMM may provide a triangulated and detailed way to assess; (b) there may be positive outcomes of using the PEMM; and (c) despite its potential, applying the PEMM may pose significant barriers. Chapter III described the research design and the data collection method. This chapter details the process of analysis and the research findings including the research questions, the results of the pilot study, characteristics of the cases, and the research findings.

### Research Questions

The focus of this study was educational leaders' perceived utility of the PEMM as an assessment tool in higher education. The central research question was, "What are the perceptions of the utility of the PEMM as an assessment tool to determine process and enterprise state for process-based transformations from the perspective of educational leaders who work in higher education institutions in the Midwest?" Three research questions assisted in the investigation of the central question:

1. How do educational leaders describe the perceived strengths of the PEMM as an assessment tool?
2. How do educational leaders describe the perceived limitations of the PEMM as an assessment tool?
3. How do educational leaders describe the feasibility of using the PEMM as an assessment tool?

The focus on the educational leaders' perceptions in these questions provided the basis for data analysis. The next section will detail the results of the pilot study. The remainder of this chapter will characterize the participants of the study and present the findings that emerged during the data analysis.

### **Pilot Study**

This researcher conducted a pilot study in order to assess the validity and reliability of the data collection procedure, as well as the instruments used to collect the data. This is recommended for research projects that use a case study design (Creswell, 2013), as well as those with newly created instruments (Patten, 2014), both of which are utilized in this research. For these reasons, this researcher conducted a pilot study before actual data collection. The pilot study obtained one conveniently sampled participant that met inclusion criterion. Once the participant was recruited, the pilot study followed the research procedure to effectively evaluate its use (Grove et al., 2013). This included assessment of the questionnaire, the document review, interview, and follow-up reflection questions. In addition, the researcher conducted an interview with the sampled participant after the research procedure in order to capture qualitative feedback. The results of this preliminary testing identified factors that were facilitators and should be emphasized, as well as barriers that need to be refined for improved effectiveness (Grove et al., 2013). Revisions were made as indicated. The next section will detail the specific elements within the procedure that created research robustness. The pilot study revealed the need to include the PEMM attachment in the pre-work reading assignment to avoid confusion during the in-person session. Additionally, the pilot study found that the use of an initial demographic questionnaire and a follow-up reflection survey was not realistic, as exemplified by the lack of

participation from the pilot study participant. Lastly, the researcher modified the interview questions to be more aligned with the research questions.

### **Participant Demographics**

This instrumental, collective case study sought to capture educational leaders perception of the utility of the PEMM. The objective was to locate participants who were representative of this population. This case study used criterion, purposive, and convenience sampling methods to capture a broad perspective of the phenomenon. The established criterion of this study and three factors from the literature review guided participant recruitment. The size of the institution, as defined by the number of students, is a variable that may be influential in the study of maturity models (Hurst, 2007). The educational leaders in this study worked in higher education institutions ranging in size from 300 to 30,000 students. There are two types of higher education institutions based on governance: public or private institutions. This study captured the perceptions of educational leaders from both sectors, two from public institutions and three from privately owned institutions. Thirdly, it was important to include participants from the operations or business side of the institution as well as the academic side. This study included three participants from academics and two from operations. Evaluating participants who differed in these three aspects offered a representative study of the research questions. Due to resource constraints, recruitment occurred in a convenient manner, as all the participants were readily accessible by the researcher. Based upon the information collected in the public document review and the interview, Table 2 outlines the demographic information for the five participants. It is pertinent to note that two of the participants also worked as Peer Reviewers for the Higher Learning Commission.

Table 2

*Participant Demographics*

Participant	Gender	General Job Description	Years in Higher Education	Institution Type	Enrollment Range
A	Female	Mid-Level, Business	14	Public, Nonprofit	20,000 to 25,000
B	Female	Mid-Level, Academic	10	Private, Nonprofit	6,000 to 8,000
C	Female	Executive, Business	26	Private, Nonprofit	300 to 800
D	Male	Executive, Business	12	Public, Nonprofit	20,000 to 25,000
E	Female	Executive, Academic	18	Private, Nonprofit	400 to 1,200

*Note.* \*Denotes working as a Peer Reviewer for the Higher Learning Commission.

### Characteristics of the Cases

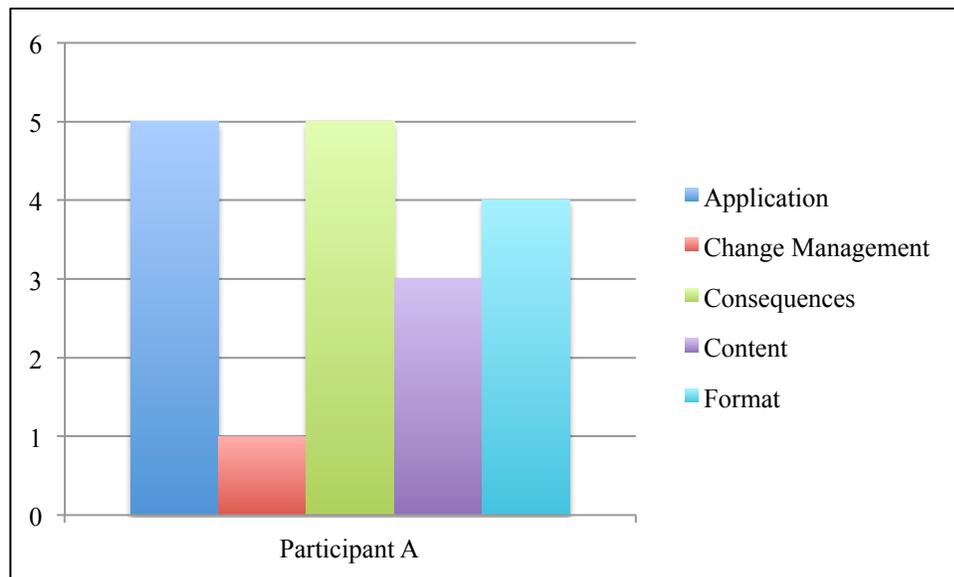
Characterizing educational leaders' perceptions largely occurred through the interviews. Because of this, data analysis primarily focused on the transcribed interview data. After each interview, the researcher reflected on the session and performed some preliminary analysis. Once all interviews were completed, the researcher converted audio recordings into written text. Logically, the researcher reviewed all collected data in its entirety to obtain a general sense of the educational leaders' perceptions. Then, each case underwent a detailed analysis. During this thorough investigation, the researcher highlighted information that was relevant to the research questions and assigned each segment of information an ascending number in the comment section of the Microsoft Word transcription document. A copy and paste function transferred the segments between documents. This spreadsheet served as a tool to organize and analyze data. Each segment of data was entered into a column labeled "Raw Collected Data" and linked to the original transcription by its assigned number. This assisted the researcher in analysis because the

segments of information linked to original demographic information, despite manipulation during analysis. After this step, there were 188 individual segments of information that were appropriate for further analysis.

The researcher reviewed all of the information in the spreadsheet again on a case-by-case basis, and similar segments of information were grouped together using an identifiable code. The conceptual meaning that emerged from the similar segments of information created the code's name. For example, *Learning Curve* was the label for one code that included segments of information relative to data collected about the need for further education on the model. At this point in analysis, there were 13 unique codes. The five participants in this research project represent the five cases of this collective case study. The following sections will detail the characteristics of each of the cases as related to the discovered codes.

### **Participant A**

Of the five studied cases, participant A has a length of employment that is near the mean of all the cases and is employed at the largest institution, which happens to be publically owned. During the interview, the participant revealed no experience with formal improvement methodologies but felt the work of educational leaders requires process improvements to meet institution goals. An analysis of this case's interview data reveals consistent codes across five code categories, without any one category more frequently mentioned (as shown in Figure 2).



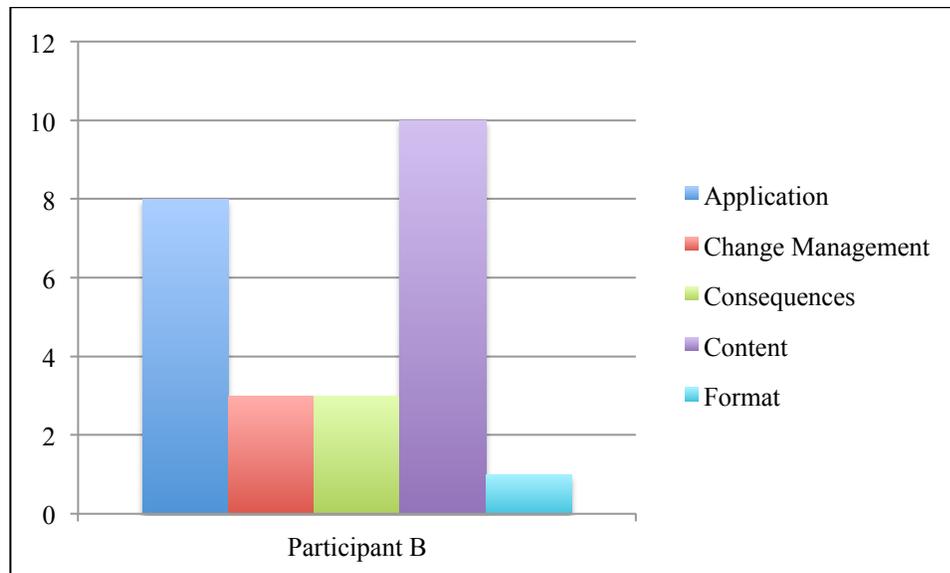
*Figure 2.* Count of codes by category for Participant A's within case analysis.

The two categories with the largest number of codes were application and consequences. Within the application category, this participant's codes revealed concerns about application of the PEMM in a higher education institution as related to the actual procedure to follow and how it would fit into existing organizational structure. There were codes around the concept of consequences as well. The majority of codes highlighted how the PEMM may have the capability of uniting the diverse work groups of a higher education institution. Just below these two categories, this participant's codes also revealed the perceived user-friendly format of the model and the content, specifically the location of the enabler. The participant perceived this to be a strong aspect of the PEMM.

### **Participant B**

While participant B had the least numbers of years working in higher education, the public document review and interview data reveals that this participant has experience with institutional improvement projects. This participant conducted projects on recruitment, an

innovation clinical education program, and frequent use of the 5P model. Despite this background, this participant expressed limited experience with formal process assessment. An analysis of this case's interview data reveals two primary code categories: application and content (as shown in Figure 3).



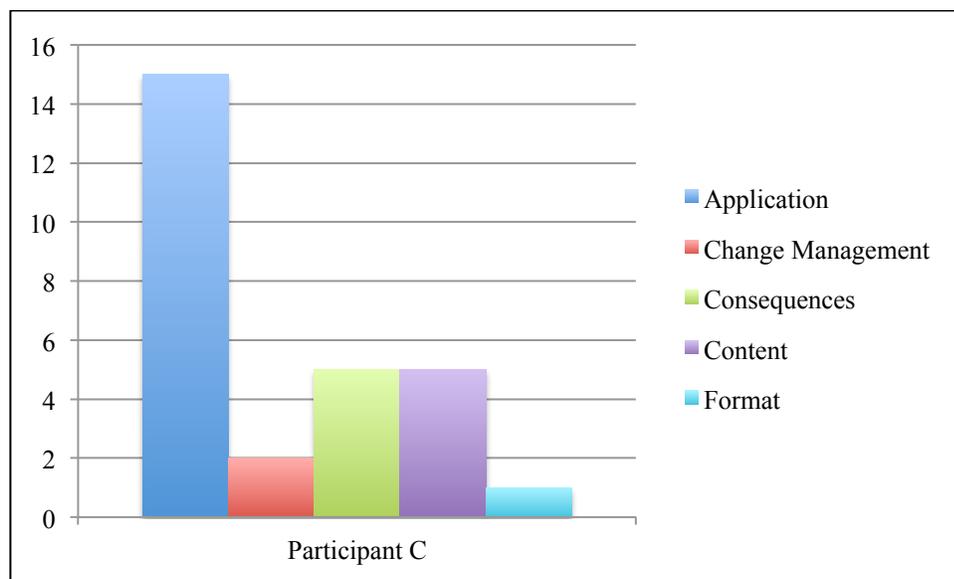
*Figure 3.* Count of codes by category for Participant B's within case analysis.

Codes related to the category of content centered on the quality of the content. This participant used phrases like, “really helpful”, “depth and breadth”, and “real valuable”, to describe the content of the PEMM. Whereas participant A focused on the application concerns around how to apply it, this participant felt the learning curve to understand the model before it could be used was the most significant limitation of the model.

### **Participant C**

Participant C has the most years of experience in higher education of all the participants; in fact, 8 years beyond the next longest employment. Public document review identifies that this participant has significant years of experience doing improvements in a healthcare setting and an

academic setting. Participant C revealed being a Peer Reviewer for the Higher Learning Commission and expressed frustration with the lack of robustness in academic improvement efforts, saying, “I’ve been disappointed in the fact that they’ve been chosen to do this quality improvement and they have no idea how to do it.” Data analysis discovered a single category of codes that was most significant in the study of this participant’s perception of the PEMM: application (as shown in Figure 4).



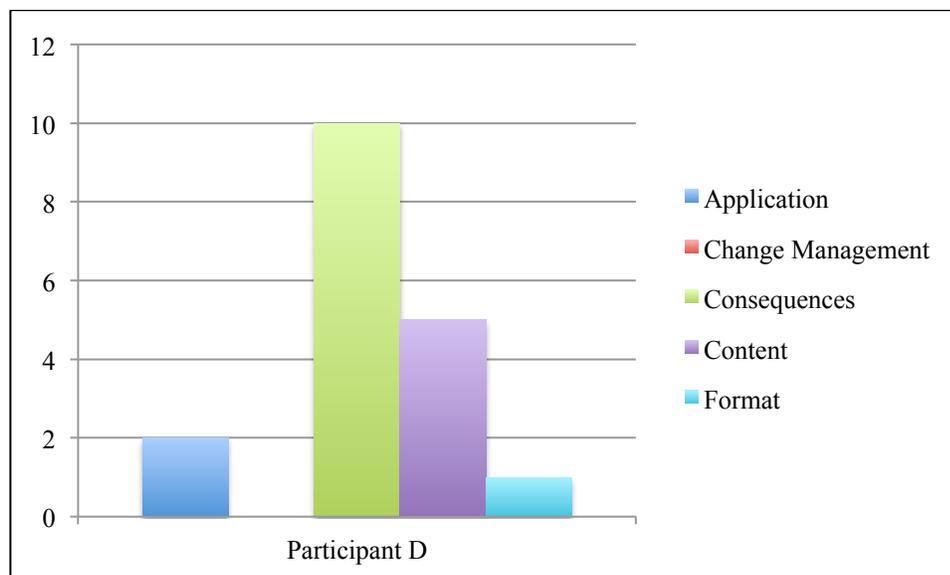
*Figure 4.* Count of codes by category for Participant C’s within case analysis.

Of the 15 codes related to application, 13 specifically related to the perceived learning curve required for successful implementation of the PEMM. Participant C repeatedly expressed concern with the amount of education or training that would be required. This participant referenced himself or herself as a benchmark by explicitly identifying the years of experience with process improvements, working for the Higher Learning Commission, and despite all of that, self-disclosing that many of the concepts in the PEMM were unfamiliar. This participant felt the entire concept of process is unfamiliar in higher education, “You have leaders and you

have process leaders. People have to understand that you're looking at a process." Note, this participant works on the operations side of the higher education institution.

### Participant D

Participant D was the second participant that also worked for a large higher education institution. Public document review identified this participant as working on the operations side of the institution. During the interview, this participant felt past experiences with adopting "corporate" tools did not work because of application differences in how the institution was governed. Note this participant worked in a publically owned institution. Data analysis revealed that this participant had one primary code: consequences (as shown in Figure 5).



*Figure 5.* Count of codes by category for Participant D's within case analysis.

The codes within the consequence category revealed that this participant perceived the PEMM as a tool that might be able to integrate the many departments of a higher education institution. This participant expressed past frustrations about lack of alignment between

departments, saying, “We’re sort of focused on our own professional needs, above the needs of the organization.”

### Participant E

Participant E works on the academic side of a small, non-profit institution. During the interview, this participant revealed being familiar with the academic process and “informal” improvement efforts. Similar to the previous two mentioned participants, Participant E also had one primary code category of consequences (see Figure 6).

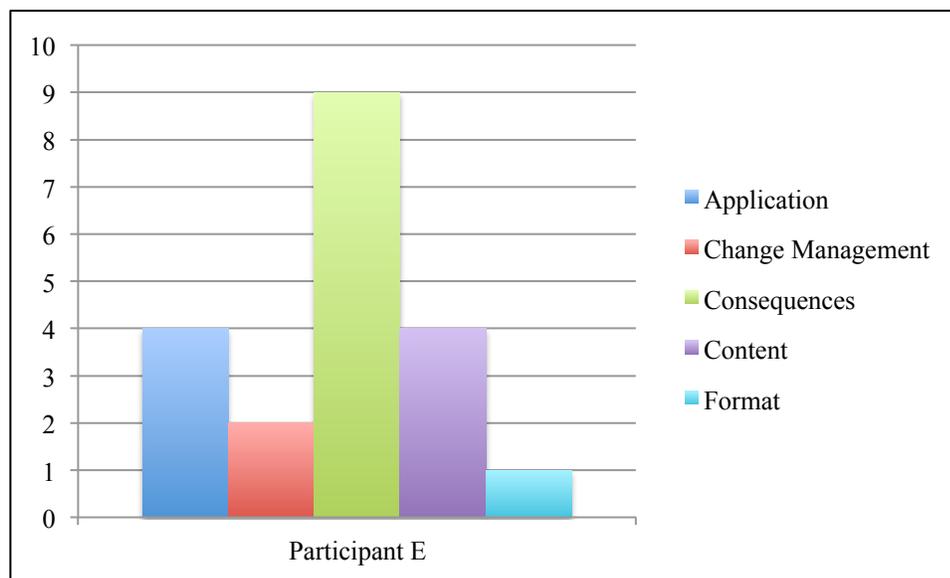


Figure 6. Count of codes by category for Participant E’s within case analysis.

Similar to participant D, the codes within the consequence category revealed that this participant also perceived the PEMM to be a tool to integrate the departments of the institution into one, cohesive system. This participant mentioned the “silo” aspect of departments and how many do not know the function of the surrounding departments, but felt the PEMM might address this.

## Research Results

After the intensive process of combing through the collected data and assigning codes, the next step was to look at the data on a case-by-case basis. Once this was completed, the data analysis looked at the codes in relation to their patterns, relationships, and if there were any outliers or contraindicating data. In alignment with the stated procedure, the next step the researcher completed was a cross-case analysis to compare and contrast information from different cases. The use of the created spreadsheet allowed for a structured comparison of the various codes. While the data collection procedure included a public document review to triangulate data, during analysis the researcher discovered information gained from this information source only helped characterize the participants. After performing the comparative analysis on the codes, themes of meaning emerged. This research study discovered three themes as related to educational leaders' perceptions of the utility of the PEMM as an assessment tool for process-based transformations. Findings discovered that educational leaders noticed that the PEMM might provide a triangulated and detailed way to assess process and enterprise for a process-based transformation, and that there may be positive outcomes of using the PEMM. Despite its potential, educational leaders perceived that applying the PEMM might pose significant barriers. The following sections in this chapter present the three thematic categories that illustrate the patterns that emerged. Each theme section presents a general overview of the theme, and then uses subsections to provide a detailed illustration of the theme.

**Theme 1: The PEMM may provide a triangulated and detailed way to assess process and enterprise state for a process-based transformation.**

The study's first subresearch question sought to identify how educational leaders perceive the strengths of the PEMM as an assessment tool. The first theme that emerged from the

collected data aligned with this research question. Model content and model format are the two subthemes that support this theme.

**Subtheme 1: Model content.** In this study, the participants had one common response when asked about the strengths of the model: its content. Research Participants (RPs) A, B, C, and D made positive statements about the content of the model, using words like “useful” and “really good.” RP E was more explicit in stating the benefit of the content, saying, “This would be a good evaluation tool to use for processes.” When asked to share the strengths of the PEMM, the participants acknowledged its content as related to its validity, comprehensiveness, and novelty. Three out of the five participants made comments about the content’s validity. RP B stated, “Where things fall down quite often have to do with the thing over the left-hand side made a lot of sense to me.” RPs C and E also made remarks about how the enablers measured not only existence of relevant items, but measured the performance of them as well. These same three participants also made statements about the content’s comprehensiveness. RP B used terms like “triangulated” and the phrase “360 approach” to describe the content. RP C agreed the comprehensiveness of the PEMM was a benefit: “What I really like about it is that it doesn’t look at any of these things in isolation.” Lastly, three participants also made note of the PEMM’s content as new information or data points never considered before in process and enterprise assessment for a process-based transformation. RP B felt that the content of the model would be valuable to those in higher education “. . . to help them know what kinds of things to look at.” RP D felt that, despite its origin in a corporate setting, “I actually think this fits better with higher ed [*sic*] than maybe corporate.” While the content of the model clearly emerged as a subtheme for this research question, the model’s format also emerged as a relevant subtheme.

**Subtheme 2: Model format.** Similar to the previous subtheme, all five participants described the layout or format of the model as a positive feature. Two of the participants mentioned the user-friendly format of the PEMM's matrices. RP B likened it to a well-known tool in higher education, saying, "It's like a rubric." This participant went on to highlight how all of the elements are clear, concise, and measurable. RP A described the PEMM's format as a clear way to identify, understand, and measure each enabler. The other three participants also felt the format was a strength of the model due to its ability to quantitatively measure the enablers. Both RPs D and E commented that the ability of the PEMM to provide a quantifiable number would prove very valuable to an educational leader. RP C shared the benefit of having a number rather than narrative information: "It's a nice thing in that it pulls people back, makes it less personal. I think it perhaps is less blaming in that if you're a P1 you're a P1. You're not bad, you're a P1."

Overall, participants described the PEMM and its perceived ability to provide a triangulated and detailed way to assess as a positive feature. All participants expressed the model's content as a contributing factor to this capability. Three of the participants elaborated on the content validity and comprehensiveness. Three participants also noted the novelty of its contents. All participants acknowledged the format of the PEMM as a perceived strength. Participants either identified the general layout of the content or the quantitative measurement system of the model's format as a beneficial feature of the model. In the study of characterizing educational leaders' perceptions of the PEMM, the findings also found that leaders identified that there may be positive outcomes of using the PEMM. This is the second theme that emerged from the collected data.

**Theme 2: There may be positive outcomes of using the PEMM.**

The study's first subresearch question sought to identify how educational leaders perceive the strengths of the PEMM as an assessment tool. The first theme that emerged from the collected data aligned with this research question. The second theme—there may be positive outcomes of using the PEMM—emerged out of the collected data and assisted in answering this research question. One institution and institution insight are the two subthemes that supports this theme.

**Subtheme 1: One institution.** The participants expressed the perceived strength of the PEMM as its potential ability to unite the processes of a higher education institution. This was a significant subtheme evidenced by the fact that all of the participants but one made at least three statements about the lack of uniformity in higher education institutions. Most expressed the “individualized” (RP A) and “independent” (RP D) nature of the various work groups currently witnessed. Although the participants were not able to articulate how it could be done or if it really could be done, it was evident that there was hope in the voices of the participants when describing PEMM: “This makes me think all parts play in some type of role together” (RP A). RP D went into significant detail expressing current frustrations around the lack of a unified purpose. When describing the alignment and infrastructure enablers, RP D used the words “very interesting” to describe their function in this model. RP C expressed how the PEMM “set it up so that hopefully you have grasped the systems that you need to do.” Lastly, RP E felt the PEMM might break down the silo mentality in the higher education setting. While the collected data saturates the one institution subtheme, the second subtheme was not quite as prominent but still relevant to the study of educational leaders' perception of the PEMM as an assessment tool.

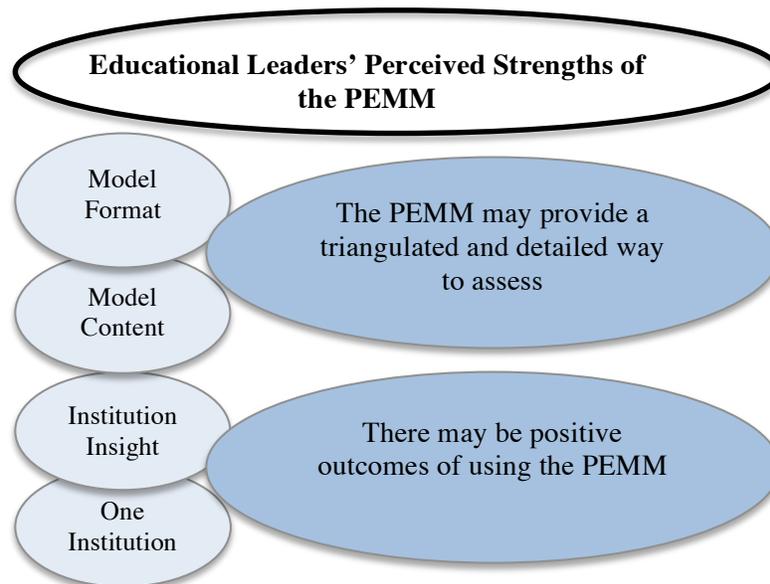
**Subtheme 2: Institution insight.** The perceived institution insight that may occur with use of the PEMM is the second subtheme of the anticipated consequences of the PEMM theme.

Typically, process methodologies and tools provide information that is relevant to the management and improvement of an operation. Therefore, it is not too surprising that the participants of this research study identified a perceived strength of the PEMM as the possibility of gaining better insight into the performance of the higher education institution. Three of the participants anticipated that the PEMM would be beneficial for providing additional information about the current state of the enterprise and its processes. RP E described the PEMM as an assessment tool that may be able to provide information about how an outcome is reached: “Is it working the way you want it to work? Then, use that information to see if you need to make other adjustments.” RP A was very explicit in saying that it is difficult for educational leaders to know if the department is successful or not. This participant felt that the PEMM might provide a means of measuring different performance elements. From this participant’s perspective, this would be significant because it could help educational leaders figure out if there is progress after a change is put in place. Even further, RP A expressed how it might have the potential to influence work satisfaction: “That would really just change how I felt about work in general. I don’t like to just work to be working.” While the other two participants did not describe the specific strength of possibly gaining insight into current performance, these two participants described the benefit of being able to obtain institution information about improvement. Both RPs B and C described the benefit of information of the current process and enterprise state that would facilitate effective improvement efforts. RP B stated, “I do think that it gives you a better handle on being realistic about changing a process,” whereas RP C took it even further to identify how the PEMM may fit in with other improvement methodologies.

The predominant subtheme—*there may be positive outcomes of using the PEMM*—was the potential of the PEMM to unite the processes of a higher education institution, with all

participants making multiple comments on this idea. It is also appropriate to note that all of the participants described the possible benefit of gaining institutional insight, whether it is solely to gain operational information about current processes or for improvement efforts.

The first subquestion of this research sought to learn about educational leaders' perceptions of the perceived strengths of the PEMM. In summary, participants identified the strengths of the PEMM (see Figure 7).



*Figure 7.* Educational leaders' perceived strengths of the PEMM. The top graphic enclosed in the dark circle displays the first subquestion of this research. The dark colored circles on the bottom half denote the two themes associated with this subresearch question. The light colored circles embedded within each theme represent the subthemes.

**Theme 3: Despite its potential, applying the PEMM may pose significant barriers.**

The second and third subquestions of this research sought to gain information about educational leaders' perceptions of the limitations and feasibility of the PEMM as an assessment tool. While this study only aimed at capturing educational leaders' initial perceptions of the PEMM and not its actual application, all participants commented about limitations and feasibility related to application. *Despite its potential, applying the PEMM may post significant barriers* is the final theme discovered during data analysis. The two subthemes supporting this theme were application concerns and change management.

**Subtheme 1: Application concerns.** When evaluating the PEMM, all participants shared perceived limitations of the PEMM as an assessment tool. These limitations are also directly

linked to the participants' perceptions of the PEMM's feasibility. All of the participants were transparent in stating unfamiliarity with the model and its components. This is not surprising as this research failed to discover any literature of this model in this setting. What was intriguing was that, despite all of the participants describing benefit in what the model was, all participants expressed concerns about its potential application. Four of the five participants specifically mentioned limitations related to the usage of the model in the higher education setting. Examples of this include how RP A expressed concern with not knowing who uses the model: "If I was leading the department maybe, but because I lead from the middle, no [it would not be useful]." RP E felt it would be difficult to determine at what level of process the model should be used: "I was having trouble identifying what those processes may be." RP C elaborated on this concept with identifying issues with knowing how to score the enablers.

In addition to the limitations, or rather unknowns of how to apply the model, two participants expressed concerns with the learning curve that would be needed to properly apply it. RP C, who had 26 years of experience in higher education and works for the Higher Learning Commission, stated:

I kept thinking there's got to be a bigger definition to some of these things and I kept thinking that even I have worked [with] a lot of these things, I think some of the nuances would still get away from me.

This participant also expressed an interesting concept around the perceived feasibility of the PEMM:

I think as leaders, as administrators, you see so many things that are telling you how to change your processes and how to make things work. So many books and that sort of thing, and it does get to be a little numbing after a while. I do like this because I think it

can be very educational. It can open some people's eyes just the fact that there are all of these things but it could also be overwhelming. I think some people might not want to take it on because it is a little intimidating.

RP B was transparent in stating that some of the terms in the PEMM were unfamiliar and felt there would be training necessary to properly understand and apply. The other three participants shared a variety of responses about the limitations and feasibility of the PEMM.

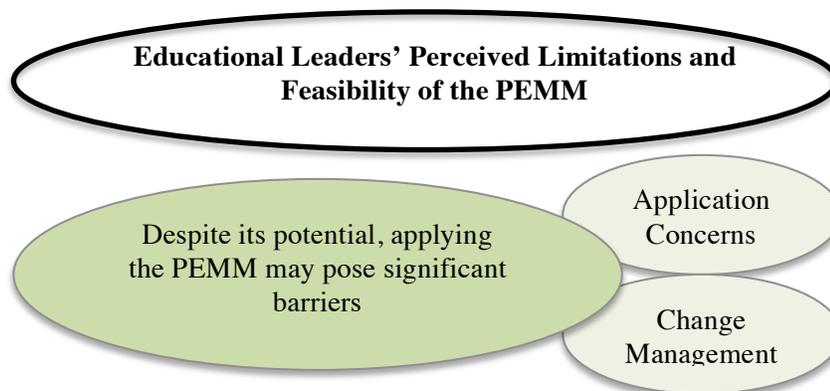
The interview questions aimed at capturing the perceived model limitations conjured up a variety of responses about application concerns beyond the logistics of application or the learning curve that would be required. RPs D and E mentioned the uncertainty with the governance enterprise enabler. RP B perceived that it would take significant effort to integrate the model: "I think you'd have to really be vested in this for this to work." RP C perceived the tool as valid, but that it would need some modification for application: "I think I love what this is but the only thing I can say is I think to be really successful, you'd almost have to build your own evaluation." Lastly, RP E expressed concerns with the PEMM and questioned if the model would be able to account for variability in context. This participant felt people, processes and resources in higher education are ever changing and was unsure if the PEMM could truly address such complexity.

There were perceived limitations and questions of feasibility from all participants when considering the application of the PEMM in higher education. This subtheme revealed a variety of different participant concerns including the logistics of how to apply the PEMM as an assessment tool, the learning curve required to get a true grasp of the model, how the governance enterprise enabler would be measured, the amount of resources required for success, and how to

apply this model in an ever-changing environment. In addition to application concerns, participants also expressed perceptions about change management.

**Subtheme 2: Change management.** As with any change effort, leadership must manage the change. In this research, four of the five participants perceived elements of change management that would affect the overall feasibility of the PEMM. RPs A, C, and E felt the PEMM would challenge the people and the culture. RP A felt that all those involved would have to be on board and understand the purpose of the tool. RP C had similar thoughts, stating, “You either have a culture that accepts the fact that being that you’re not perfect . . . or you don’t.” Beyond just the culture, RP E felt that getting all the different owners to understand the purpose would be a significant limitation.

Participants indicated that, despite its potential, there might be significant barriers to actually applying the model in the higher education setting. The two subthemes of application concerns and change management speak to the two subresearch questions regarding limitations and feasibility of the PEMM. In summary, participants identified limitations that may influence the feasibility of the PEMM (see Figure 8).



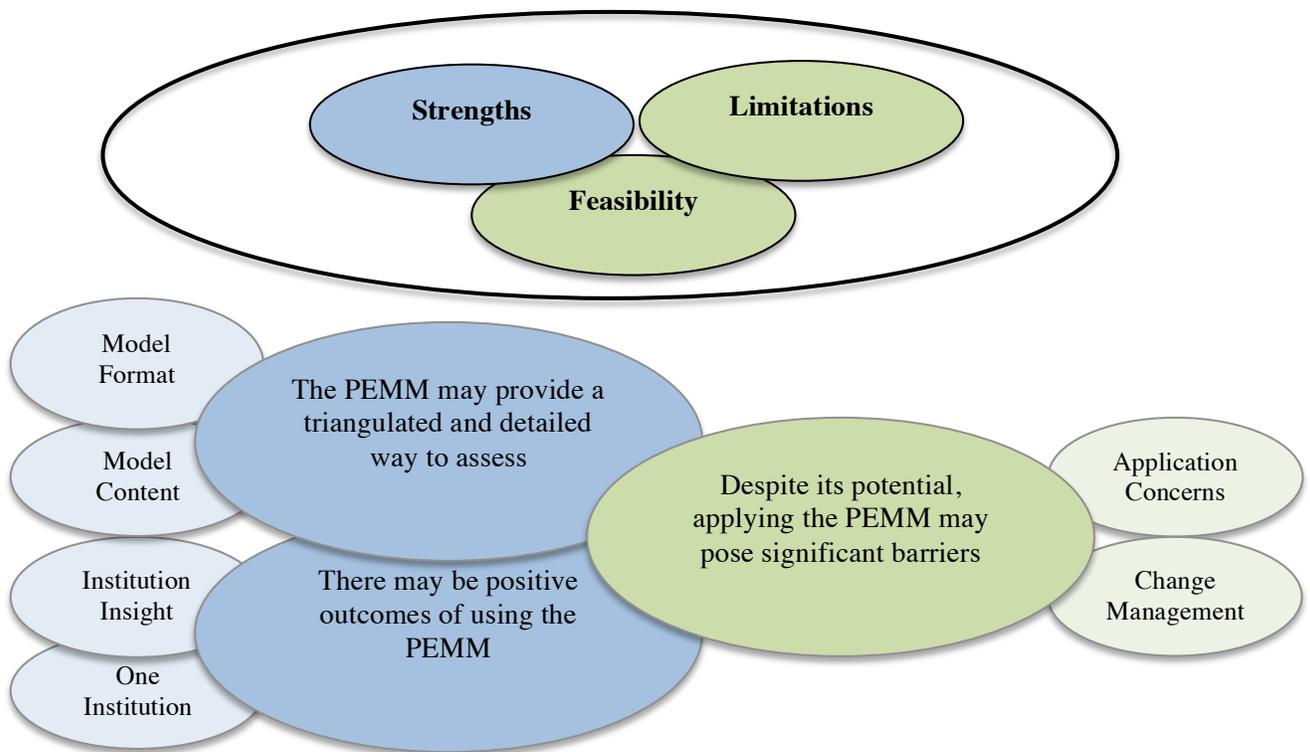
*Figure 8.* Educational leaders' perceived limitations and feasibility of the PEMM. The top graphic enclosed in the dark circle displays the second and third subquestions of this research. The dark colored circle on the bottom half denotes the theme associated with these subresearch questions. The light colored circles embedded within the theme represent the subthemes.

### Results Summary

In conclusion, the purpose of this qualitative case study was to characterize educational leaders' perception of the utility of the PEMM as an assessment tool. The research studied one overarching research question and three subquestions. During examination of the collected data, the following three themes, as well as subthemes, emerged related to the study's research questions. The first two themes answered the first subresearch question related to the model's strengths. It found that educational leaders perceive the PEMM as a tool that may provide a triangulated and detailed way to assess process and enterprise state for a process-based transformation. Educational leaders felt this would be possible because of the model's content and format. Additionally, participants perceived the PEMM as a tool that would likely have multiple positive consequences, including the possibility of uniting all an institution's workgroups and providing insight into the current performance of an institution. The third theme answered the remaining subresearch questions related to the model's perceived limitations and

feasibility. While analysis did indicate some similarities in participant responses, which created the two subthemes of application concerns and change management, participants also perceived model limitations. These limitations included the logistics of how to apply the PEMM as an assessment tool, the learning curve required to get a true grasp of the model, how the governance enterprise enabler would be measured, the amount of resources required for success, and how to apply this model in an ever-changing environment. The data analysis revealed consensus among many of the participants about the perceived utility of the PEMM as evidenced by the three identified themes (see Figure 9). The only exceptions to this were a few isolated perceptions regarding the application concerns subtheme. In relation to the purposive sampling technique used, there was saturation of the data across all cases. Despite care in the recruitment process to allow for assessment against the criteria of institution size, type of governance, and business side of the institution (operations or academic), there were no notable differences.

### Educational Leaders' Perceived Utility of the PEMM as an Assessment Tool



*Figure 9.* Educational leaders' perceived utility of the PEMM as an assessment tool. The top graphic enclosed in the dark circle displays the central research question and its subquestion components. The dark colored circles on the bottom half denote the three themes as associated with the subresearch questions. The light colored circles embedded within each theme represent the subthemes.

This chapter detailed the process of analysis and the research findings of this qualitative case study. The first section reviewed the central research question and subquestions. Then, the next section discussed the pilot study and its results. As the central objective of this research was to study educational leaders' perceptions, the next section of this chapter characterized the cases. This chapter ended with a discussion of the analysis procedure, its findings, and a final summary paragraph of the interrelationship of the identified themes. In Chapter V, the results are interpreted in light of current literature and the theoretical framework. Final concluding sections in Chapter V will list limitations and future research recommendations.

## **CHAPTER V: DISCUSSION AND SUMMARY**

Transformative change will be required to revolutionize higher education institutions in the way that society needs. There are many different ways to improve, but a dramatic change in performance requires process redesign (Hammer, 2007). The first step in this type of improvement is taking an assessment of the maturity of institutional processes. Historically, this is done in a rather informal and inconsistent method. This study specifically used a generic process model to ensure there was a structured approach to assessment and that there was a focus on process design, not content. Accordingly, the purpose of this qualitative case study was to characterize educational leaders' perceptions of the PEMM's utility to determine process and enterprise state for process-based transformations. The results of this study will provide information that will enable educational leaders in higher education to align maturity assessments with institutional change efforts. Chapter IV explained the process of analysis and the findings of the research. This chapter completes the results discussion by providing an interpretation of findings through the lens of the research questions. The chapter will conclude with a review of the findings' implications, as well as research limitations and recommendations for future research.

### **Results Interpretation**

This study has provided valuable information about the use of a generic maturity model in the higher education setting. This maturity model takes an authentic look at process design, which is the essence of process improvements. In order to grasp the realities of the institution before a transformation, assessing process maturity is a foundational step. This study discovered three themes that emerged from the data analysis that supported answering the central research question of this study.

**Central Research Question**

The central question of this study was, “What are the perceptions of the utility of the PEMM as an assessment tool to determine process and enterprise state for process-based transformations from the perspective of educational leaders who work in higher education institutions in the Midwest?” Findings identified that educational leaders perceived the PEMM as a tool that may provide a triangulated and detailed way to assess process and enterprise state for a process-based transformation. Participants felt this way because of the model’s comprehensive content and format. One participant likened it to a robust rubric. In addition, participants anticipated there would be multiple positive outcomes of its application. A majority of the participants felt the use of the PEMM in higher education would likely provide critical institutional information that could be used in a variety of ways, process improvement being just one of them. The participants shared that because the sole focus of the PEMM is process design and taking a systems perspective of the work, there was potential to unite the independent work groups of a higher education institution. Despite the potential of the PEMM, participants perceived that there might be significant barriers to its application in higher education settings because of a variety of concerns with its actual application and the emotional journey of change that would need to come with it. The following subsections will interpret these findings as related to the subresearch questions of this study.

**Perceived strengths of the PEMM.** In the quest to understand educational leaders’ perceptions of the PEMM’s utility, the first characteristic sought was the strengths of the PEMM. All participants acknowledged the model’s content, described as comprehensive and valid, as one of its primary strengths. Participants shared examples of how some enablers linked to prior experiences in the educational leader role. The layout and format of the content was beneficial

for providing quantitative evidence of performance. While all the participants mentioned unfamiliarity with the content before this study, it was noteworthy that the most essential element of the PEMM was a perceived strength. These subthemes are in direct alignment with other scholars who also felt that maturity models provide a more detailed way to assess than most other institutional assessments (Manjula & Vaideeswaran, 2011).

There were two noteworthy elements of these findings. The first is that all participants expressed unfamiliarity with the tool's content. The novel part of this research was that this specific model has never been studied in higher education, not that the content of the model was new. Operational knowledge tells us that to manage performance, there must be an understanding of processes and current performance. This baseline information is a prerequisite to understanding what and how a process needs to be improved. In the sample of educational leaders studied in this research, not one of the participants was familiar with these essential process elements. This reveals a significant gap in the way educational leaders view the work. This finding is in alignment with other research that has identified that lack of process or systems thinking in higher education (Mitasiunas & Novickis, 2012). In organizations that do not understand or manage processes, the effort of individuals is the sole basis for performance. This is not a reliable or sustainable method of managing performance, and it provides no foundation for improvement (Paulk et al., 1993). Work that is dependent on individual employees and cannot be meaningful poses significant risk to the institution (Marshall, 2012). The second interesting part of these findings is that, despite the many different assessment tools out there, all the participants felt this model would be a valuable addition to the current repertoire of assessments. Previous research also identified the value of maturity models because of their ability to encompass all aspects of an institution, and focus on not only the presence but the

performance of key process elements as well (Al-Ammary et al., 2016; Clarke et al., 2013; Marshall, 2010a; Zhou, 2012). This gives further support for the use of maturity models in higher education.

The second theme of this study identified that educational leaders perceived that the PEMM would likely have positive outcomes through its application in relation to providing institutional insight and uniting the institution as a whole. This is an extension of the first theme. Because of the model's content and format, educational leaders perceived a possible outcome of using the PEMM could be its ability to provide institutional insight. In seeking to learn about the PEMM's utility, or practical worth, the potential ability of the model to provide this type of operational information is essential to the role of an educational leader. It would be extremely difficult to make decisions about performance if an educational leader did not have a strong or accurate understanding of why a process is performing the way it is. This finding was consistent with current literature that found maturity models beneficial due to the ability to provide transparent information about the current state of processes (Alrasheedi, 2015; Ling et al., 2012b; Petrie, 2004).

While the literature identified other strengths—such as promoting organizational change (Marshall, 2010b; Neuhauser, 2004), improving performance (Haukijärvi, 2014; Ling et al., 2012b), and sharing best practices (Petrie, 2004; Solar et al., 2013)—this study did not contribute to further understanding in these areas. This is not surprising as this study was only a preliminary study of educational leaders' initial perceptions, rather than a study of its use. What was of interest was that this research discovered that educational leaders perceived the PEMM as a conduit to uniting the various work groups of a higher education institution. It is widely recognized that higher education institutions are composed of independent groups that struggle in

seeing the whole picture (Baig et al., 2007; Drinka & Yen, 2008). What has yet to be discovered is how to ensure these various groups are working together effectively to achieve outcomes. While this research can only conclude that educational leaders perceived this as a potential outcome, this possibility alone provides justification for further research of the PEMM in this setting.

In light of the theoretical framework of this study, these findings support the use of systems theory in not only the study of process methodologies, but in process transformations as well. While previous research has heavily focused on the content of processes in process improvements, the PEMM focuses solely on process structure and relations. The PEMM is a manifestation of systems theory, and this research improves understanding of how systems thinking may be beneficial in the higher education setting. While participants noted many positives, there were also some perceived limitations when considering the utility of the PEMM.

**Perceived limitations of the PEMM.** This study characterized educational leaders' perceptions of the PEMM's utility. All participants mentioned concerns with application when asked to share limitations of the PEMM. Because this was the first research of its type, this study intentionally avoided addressing model application. Accordingly, little to no information was shared with the participants about how to apply the model. Because all the participants perceived limitations around application, it is difficult to discern if this was simply due to the lack of information provided about model application or if these perceived limitations were in fact impactful in considering the use of the PEMM in higher education institutions. Regardless, participants felt there were limitations beyond just application, including the learning curve needed to truly understand the model. This finding revealed that participants were concerned about the practicality of its use. None of the participants, all who had 10 years or more of

experience in higher education, were familiar with the content. This illuminates a gap in the research, and future research should explore if this was a unique or a common finding. The amount of time and resources that would be required to get educational leaders to truly understand the model and its content is unknown. This could be significant, as low maturity institutions struggle to find time for improvements due to the overwhelming pressures of reacting to ineffective processes (Collofello & Ng, 2001, Paulk et al., 1993). The participants perceived this as a significant obstacle because it was difficult for them to imagine a time when higher education institutions would readily have these resources available. Other scholars have noted these limitations as well (Albliwi et al., 2014; Haukijärvi, 2014).

The participants also perceived a limitation in the process enabler of governance. The governance aspect of higher education institutions is unique, so it is not surprising that the educational leaders perceived this element as a possible limitation. Due to the research design, participants could only make speculation on this element. One participant felt this element would need modification. Lastly, the participants also perceived the change management that would be required for positive use of the model in higher education. Managing the perception of change is a normal aspect of any change effort. This, again, is not a surprising finding but, nonetheless, a limitation perceived by participants. Considering all the perceived strengths and weakness together, participants also shared how they felt about its overall feasibility.

**Perceived feasibility of the PEMM.** Although participants were able to share strengths and limitations of the PEMM, it was evident that reporting on feasibility was difficult without actually using the model. In reflection of the central research question and the design of this research, this was an inappropriate subresearch question to study. This study sought to explore initial perceptions of a model. It was inappropriate to try to have participants explain feasibility

based only on a superficial review of the model. Inherently, when participants shared perceived limitations, feasibility concerns also arose. As detailed above, the practicality of using a model that is so foreign would require an investment of time and resources. At this point in the research of the PEMM in higher education institutions, it is unknown if the PEMM would produce positive outcomes. Participants shared angst at the risk of investing that amount of resources on something that is unverified to produce results.

The literature review revealed four limitations of maturity models, including the models' sole focus on process (Albliwi et al., 2014; Aytes & Beachboard, 2007), the lack of robust model development (DeBruin et al., 2005; Garcia-Mireles et al., 2012), limited evidence about its ability to produce results (Duarte & Martins, 2014; Tarhan et al., 2016), and a fragmented improvement tool (De Man, 2015; Wendler, 2012). The findings of this research further shed light on the impact of inadequate empirical evidence to produce results. If the PEMM can produce the results perceived, the investment may be worth it, but at this moment, it is difficult to make this value proposition without more research information. The fact that educational leaders perceived the PEMM as such risk may help explain why higher education settings do not commonly use maturity models.

### **Implications**

Despite the recognition that process improvement is needed, there is little known about the maturity of higher education institutions' processes. Thus, this study addressed this gap in a unique way by characterizing educational leaders' perceptions of the utility of the PEMM as an assessment tool to determine process and enterprise state for process-based transformations. Whereas previous research focused on maturity models that addressed specific process content, this research more closely aligned with GST by using a maturity model that solely focused on

process design. By utilizing a generic maturity model, this study uncovered educational leaders' perceptions of the PEMM's utility, expanding understanding of what constitutes a process and its level of maturity. Those looking to make transformative change in the higher education setting would be interested in the findings of this study because the participants of this study perceived it to be an effective tool to measure and learn about current processes in a comprehensive and detailed way. This is in alignment with the literature that states improvement is difficult without well-defined criteria (DeBruin et al., 2005). Further, the participants perceived the PEMM's ability to quantify performance as a strong benefit in the quest to improve performance in higher education institutions.

There is pressure on higher education institutions to improve to get better results, but little focus on how to improve processes (Saulnier et al., 2008). This is inconsistent with the philosophy that process determines performance. The way to improve results is to improve the process that creates the results (Hurst, 2007). A process must have an intentional design that is capable of creating results (Hammer, 2007) and is manageable (Paulk et al., 1996). Most significantly, the perceived potential of the PEMM to do something that has long been believed to be one of the largest barriers of transformative change in this setting—to unite the independent work groups of a higher education institution—is a finding that supports more research on this model. Despite these encouraging findings supporting more research on the model, those looking to make change in higher education may not yet be convinced of this model's utility because the model is unproven and perceived to require significant resources.

### **Limitations**

The findings of this research are limited in a number of ways. Significantly, this collective case study conveniently recruited a small sample of educational leaders from higher

education institutions in the Midwest. Of these participants, this research captured educational leaders' perceptions about the PEMM as an assessment tool in higher education. This scope meant that no actual application occurred and the research was limited to only one aspect of how this tool can function. For these reasons, this research has identified preliminary research findings that have little to no generalizability.

### **Future Research Recommendations**

This qualitative case study sought to explore educational leaders' perceptions of a generic maturity model. This study contributes to a small amount of maturity model research in a foundational way. In order to understand the complex phenomenon of assessing process maturity in the context of improving the performance of higher education institutions, more research is needed. This study identified a significant area of focus that needs more research attention. The PEMM is constructed around essential process components and it breaks each one of these components down into different levels of maturity. The inadvertent finding that the research participants in this research were largely unfamiliar with these process components, let alone their various levels of maturity, illuminates a foundational gap that needs more research attention. Reevaluating the literature review exposes other researchers that have found this gap as well (Chen et al., 2014; Collofello & Ng, 2001; Mitasiunas & Novickis, 2012; Saulnier et al., 2008). Future research in this area must strongly consider evaluating educational leaders' understanding of processes, and the maturity of these defined ways of working.

Beyond just the study of the PEMM, this gap reveals concerns that are more profound. The role of educational leaders in higher education institutions is to create systems that support process capability (Haukijärvi, 2014). If process—the basic tenant of process improvement—is not commonly defined or misinterpreted, it would be inappropriate to study any process

improvement methodologies. In alignment with this notion, there also needs to be more research into how educational leaders define processes and process improvements in general.

Traditionally, benchmarking a best practice is a different type of process improvement than one that looks at process value, design, and flow. It would be misguided to give any future research recommendations on applying maturity models when this research has discovered this foundational gap.

### **Summary**

Higher education is in an unstable state and needs transformative change (Norris et al., 2012). There are many different ways to improve, but to dramatically change performance requires process redesign (Hammer, 2007). The use of a maturity model to assess the maturity of higher education processes is the first logical step toward transformative change. Uniquely, this study used a generic maturity model to intentionally study process design elements that are closely aligned with principles put forth by GST, rather than a focus on process content. The results of this research that looked at the PEMM as an assessment tool revealed that five educational leaders in the Midwest perceived it to be a tool that may provide a triangulated and detailed way to assess process and enterprise state for a process-based transformation. Findings also revealed that the participants perceived that its application would likely yield multiple positive outcomes. Despite the potential of the PEMM, participants perceived that there might be significant barriers to its application in higher education because of a variety of concerns with its actual application and the change management that would be required. While this study provided support for further research on applying the PEMM in higher education institutions, it also uncovered a gap in the understanding of processes and the maturity of these processes. Research should address this gap before looking at improvement tools and methodologies.



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**APPENDIX A**  
Process and Enterprise Maturity Model Permission

**To:** naetowne@gmail.com  
**From:** wpopper@fcbpartners.com  
**Subject:** RE: Permission  
**Date:** Monday, January 30, 2017 at 08:01 AM

No problem Renee, feel free to proceed

Where did you first encounter Hammer's methodology?

--

Walter Popper  
FCB Partners  
617 388 3618  
wpopper@fcbpartners.com

**To:** wpopper@fcbpartners.com  
**From:** naetowne@gmail.com  
**Subject:** Permission  
**Date:** Sunday, January 29, 2017 at 07:43 PM

Hello,

I am a graduate student in Lincoln, NE. I am looking to use Michael Hammer's PEMM in a research study. I will be referencing his model from this publication (Hammer: Process Audit) in APA, but I was curious if there were any other permissions I needed to be aware of before constructing my research study as you own the rights to his intellectual property. I have also reached out to the publisher for utilizing his model and this article as well.

Regards,

Renee Towne

**APPENDIX B**  
Figure 1 Permission

**To:** naetowne@gmail.com  
**From:** dsjack@sei.cmu.edu  
**Subject:** RE: Permission  
**Date:** Monday, April 24th at 07:35AM

Hi Renee,  
Thank you for the heads up, proper academic citation will again be sufficient.

Best regards,  
Dan Jack  
Administrative Assistant, Contracts  
Software Engineering Institute  
Carnegie Mellon University  
4500 Fifth Avenue  
Pittsburgh, PA 15213  
Email: [dsjack@sei.cmu.edu](mailto:dsjack@sei.cmu.edu)  
Phone: 412-268-3656

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**To:** dsjack@sei.cmu.edu  
**From:** naetowne@gmail.com  
**Subject:** Permission  
**Date:** Saturday, April 22nd at 10:29 AM

Daniel,  
For my dissertation, I plan to use another reference graphic from your company's intellectual property.

**Identification of material:**

*Paulk, M. C., Curtis, B., Chrissis, M. B., & Weber, C. V. (1993). Capability Maturity Model, Version 1.1. IEEE Software, 10(4), 18. Copyright 1993 by Carnegie Mellon University.*

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Thank you for your consideration, Renee Towne

**APPENDIX C**  
Table 1 Permission

**To:** naetowne@gmail.com  
**From:** dsjack@sei.cmu.edu  
**Subject:** RE: Permission to use SEI Material  
**Date:** Friday, March 24th, 2017 at 07:33 AM

Hi Renee,  
Proper academic citation will suffice in this instance.

Best regards,

Dan Jack  
Administrative Assistant, Contracts  
Software Engineering Institute  
Carnegie Mellon University  
4500 Fifth Avenue  
Pittsburgh, PA 15213  
Email: [dsjack@sei.cmu.edu](mailto:dsjack@sei.cmu.edu)  
Phone: [412-268-3656](tel:412-268-3656)

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My name is Renee Towne and I am a graduate student at the College of Saint Mary in Omaha, NE. I am contacting you for permission to reproduce a graphic from one of your publications. I am looking to adapt figure 1 (page 2) from Paulk, M. (1996). Effective CMM-based process improvement. Paper presented at the 6th International Conference on Software Quality, Ottawa, Canada.

Thank you for your consideration, Renee Towne

**APPENDIX D**  
Institutional Review Board Approval



September 23, 2017

Dear Ms. Towne,

Congratulations! The Institutional Review Board at College of Saint Mary has granted approval of your study titled *Educational Leaders' Perception of the Utility of the Process and Enterprise Maturity Model as an Assessment Tool in Higher Education*. Your CSM research approval number is **CSM 1711**. It is important that you include this research number on all correspondence regarding your study. Approval for your study is effective through October 31, 2018. If your research extends beyond that date, please submit a "Change of Protocol/Extension" form which can be found in Appendix B at the end of the College of Saint Mary Application Guidelines posted on the IRB Community site.

Please submit a closing the study form (Appendix C of the IRB Guidebook) when you have completed your study.

Good luck with your research! If you have any questions or I can assist in any way, please feel free to contact me.

Sincerely,

Vicky Morgan

Dr. Vicky Morgan  
Director of Teaching and Learning Center  
Chair, Institutional Review Board \* [irb@csm.edu](mailto:irb@csm.edu)

**APPENDIX E**  
Research Procedure

\* = Indicates the step utilizes the data analysis procedure (Appendix M).

<b>Phase</b>	<b>Step</b>	<b>Description</b>	<b>Check Point</b>	<b>Key Actions</b>
0	1	Research institutions and participants	Documented educational leader phone numbers	Use recruitment strategies and inclusion criteria to guide research
0	2	Send follow-up email	Emails sent	Use Appendix F.
1	3	Collect public information about institution	Institution's public information collected and stored.	Perform internet-based research of the institution. Collect data.
1	4	Analyze institution's public information*	Institution's public information is analyzed.	Review all collected data and make analysis notes.
2	5	Interview session	Signed consent and participant rights; Collected interview data	Use Appendix H for the interview procedure.
2	6	Session reflection*	Documented session	Mental review of session with additional notes captured. Reflection on collected data.
0	7	Send audiotape to be transcribed	Audiotape sent.	Research and identify transcriptionist. Send to transcriptionist.
0	8	Data analysis*	Identified themes and subthemes.	Use Appendix M for data analysis of all collected data.
0	9	External appraisal*	Validated analysis by faculty	Send analysis and research findings to faculty member

**APPENDIX F**  
Follow-up Email



Date: <enter date>

**EDUCATIONAL LEADERS' PERCEPTION OF THE UTILITY OF THE PROCESS AND ENTERPRISE MATURITY MODEL AS AN ASSESSMENT TOOL IN HIGHER EDUCATION**

**IRB # CSM 1711**

Dear Educational Leader,

You are invited to take part in a research study because you possess a bachelor's degree at minimum, have held a full-time leadership role in an eternally accredited higher education institution for more than six months, responsible for the management of at least one improvement project, and you do not have a vested interest or bias in the results of this research. The purpose of this study is to explore educational leaders' perceptions of the utility of the Process and Enterprise Maturity Model as an assessment tool to determine process and enterprise state for process-based transformations. This research study is being conducted as part of the requirements of my doctorate program at College of Saint Mary.

Participation in this research would take approximately 90 minutes of your time and includes:

- An in-person session where you will share your perceptions about the utility of the Process and Enterprise Maturity Model (PEMM) (60 minutes). Pre-work to this session involves reading an article that provides preliminary information about the model (30 minutes).

You may receive no direct benefit from participating in this study, but the information gained will be helpful to anyone who is attempting to make a process-based transformation in higher education.

Your participation is strictly voluntary. Furthermore, your response or decision not to respond will not affect your relationship with College of Saint Mary or any other entity. Please note that your responses will be used for research purposes only and will be strictly confidential. No one at College of Saint Mary will ever associate your individual responses with your name or email address. The information from this study may be published in journals and presented at professional meetings.

Your verbal commitment to the in-person session indicates your consent to participate in the study. You may withdraw at any time by cancelling the interview. This study does not cost the participant in any way, except the time spent participating. There is no compensation or known risk associated with participation.

There are no known risks to you from being in this research study. However, talking about this topic may make you feel upset or uncomfortable. If you feel this way, tell your researcher so that they can provide you with support resources.

If you have questions about your rights as a research participant, you may contact the College of Saint Mary Institutional Review Board, 7000 Mercy Road, Omaha, NE 68144 (402-399-2400).

If you are 19 years of age or older and agree to the above, please complete the pre-work. **As pre-work to this session, you are asked to read the attached article, *The Process Audit*.** The purpose of this assignment is to provide preliminary awareness of the instrument. Please refrain from studying the PEMM in-depth before the session.

Thank you sincerely for participating in this important research study. If you have comments, problems or questions about the survey, please contact the researcher(s).

Sincerely,

Renee Towne  
402-202-5116

Dr. Kristin Haas  
402-384-5281

**APPENDIX G**  
The Process Audit Permission

**To:** naetowne@gmail.com  
**From:** support+id365425@hbphelp.zendesk.com  
**Subject:** RE: Permission  
**Date:** Thu, Jun 15, 2017 at 12:42 PM

Hi Renee,

Thank you for your follow up. We will approve republication of the excerpted HBR material in your dissertation with ProQuest at no charge provided the HBR material is fully cited:

-----  
Reprinted with permission from "Process Audit" by Michael Hammer. Harvard Business Review, April 2007.  
Copyright 2007 by the Harvard Business Publishing Corporation; all rights reserved.

-----  
For corporate training use or further republication, we would need to know both the exact HBR material excerpted from the article in your dissertation and the print run / distribution.

Regards,

Tim Cannon  
Permissions Coordinator  
HARVARD BUSINESS PUBLISHING  
20 Guest St, Suite 700 | Brighton, MA 02135  
phone: 617 783 7587  
Fax: 617 783 7556  
hbr.org |  
harvardbusiness.org | hbsp.harvard.edu

**To:** customerservice@harvardbusiness.org  
**From:** naetowne@gmail.com  
**Subject:** Permission  
**Date:** Thu, Jun 15, 2017 at 5:47 AM

Tim,

I need some further clarification regarding your last email. I am using the "Process Audit" as a component in my research procedure (case study), thus it is strictly being used for research purposes. This is a dissertation for a Doctorate of Education degree. It is a requirement of the program to publish, at minimum, with ProQuest before graduation... and hopefully a presentation with a professional organization and/or further publication after this point.

Could you provide further information about the royalty charges knowing this information?  
Thank you!

**To:** naetowne@gmail.com  
**From:** support+id365425@hbphelp.zendesk.com  
**Subject:** RE: Permission  
**Date:** Monday, January 30<sup>th</sup>, 2017 at 09:09 AM

Dear Renee Towne,

Thank you for your email and we appreciate your checking with us. As long as the HBR material is only being used to fulfill the class assignment in the pursuit of your degree, permission would be granted at no charge as long as the excerpted material is fully cited (see following).

Reprinted with permission from “Process Audit” by Michael Hammer. Harvard Business Review, April 2007.

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If the thesis is later published or distributed as training material, however, then there may be a royalty charge for use of the HBP material that would be based on how much material is used and the print run.

Regards,  
Tim Cannon  
Permissions Coordinator  
HARVARD BUSINESS PUBLISHING  
20 Guest St, Suite 700 | Brighton, MA 02135  
phone: 617 783 7587  
Fax: 617 783 7556  
hbr.org |  
harvardbusiness.org | hbsp.harvard.edu

**To:** customerservice@harvardbusiness.org  
**From:** naetowne@gmail.com  
**Subject:** Permission  
**Date:** Sun, Jan 29, 2017 at 6:03 PM

Hello,

I am a graduate student in Lincoln, NE. I am looking to use Michael Hammer’s PEMM in a research study. I have reached out to his company (Hammer and Company’s Intellectual Property) with regard to intellectual property and rights for utilizing his model. Obviously I will be referencing his models from this publication (Hammer: Process Audit) in APA, but I was curious if there were any other rights I needed to be aware of before constructing my research study as you were the original publisher.

Regards, Renee Towne

## **APPENDIX H**

### Interview Procedure

#### **Session Preparation**

1. Pilot audiotape to ensure power source/battery life and recording capabilities.
2. Print consent and rights of participants' forms.
3. Print interview questions.
4. Use fabricated profile during session.

#### **General Introduction**

I would like to thank you for agreeing to participate in this research study. During this session you will be interviewed using a series of questions related to your perceptions of the utility of the Process and Enterprise Maturity Model as an assessment tool to determine process and enterprise state for process-based transformations.

A process improvement framework that addresses process maturity is a maturity model. These models embrace systems thinking through the assessment of process maturity. Higher education literature reveals the research of maturity models in this setting is in its infancy and fragmented. This research project will be the first to study the PEMM in the higher education setting.

Today's sixty-minute session will be comprised of two parts. First, you will be interviewed about the assigned pre-work, *The Process Audit*. Then, you will perform a detailed evaluation of the PEMM's components. You will be asked a few questions about your perceptions of the matrices at periodic times throughout this session. Do you have any questions about anything I have just said?

With your permission, this meeting will be recorded using audiotape. Recordings will be analyzed and transcribed for this research project. Your comments will remain confidential and your identity will remain anonymous. Throughout the session, please feel free to request to take a break or to ask me any questions you may have at any time. You may stop this meeting at any time, for any reason without any negative consequences.

Before we begin, I would like you to review the adult consent and the rights of research participants' forms. <Hand participant forms and allow voluntary signage>

#### **Process Audit**

It is known that there are research needs and questions related to process improvements in higher education. However, for this project, we want to stay focused on the PEMM and your perception of its utility as an assessment tool –In your opinion, could the PEMM be a useful tool to determine process and enterprise state for a transformation? If our conversation starts to drift into a broader discussion of process improvement, I might try to steer us back to this research objective.

Phase A Questions

1. Before we jump into the session, can you tell me a little bit about yourself and the level of familiarity you have with process-based transformations.
2. How would you describe what a process-based transformation is.
3. How do you **monitor** the processes in your scope of responsibility?
  - a. What process features are important to consider?
  - b. How frequently do you do an assessment?
  - c. How much time do you devote to monitoring the processes?
  - d. Do you use any tools or methodologies?
  - e. How do others in your institution do this?
4. How do you **improve** the processes in your scope of responsibility?
  - a. What type do you engage in: daily management, small, large projects?
  - b. How do you know what to work on next?
  - c. If there is a performance gap, how do you determine if it is a result of the people or the processes?
  - d. How much time do you devote to improving/leading improvement events?
  - e. How much time/What percentage of time do your direct reports engage in improvement work?
  - f. Do you use any specific tools or methodologies?
  - g. How do you know what type of improvement is needed? Monitoring, daily management, large transformation?
  - h. How do others in your institution do this?
5. How do you **monitor** the readiness of your institution to support a process-based transformation?
  - a. How do others in your institution do this?
6. How do you **improve** the readiness of your institution to support a process-based transformation?
  - a. How do others in your institution do this?

**How Mature are Your Processes?**

Now I will have you review the How Mature are Your Processes Matrix. This is only the first of the two matrices that comprise the full PEMM. I will ask you some question during and after your review. <Review each enabler, its subcomponents, the four different levels and the way the enabler is measured>

Phase B Questions

*Ask during participant interaction with the matrix.*

1. Describe what you are noticing about the utility of the matrix/enabler as you are reviewing it.
2. Help me understand what you are thinking right now?
3. How would you describe this matrix/enabler?
4. How would you describe the strengths of the data and information in this matrix as an assessment tool to determine process state for process-based transformations?
5. How would you describe the limitations of the data and information in this matrix as an assessment tool to determine process state for process-based transformations?

6. How would you describe the feasibility of using this matrix as an assessment tool to determine process state for process-based transformations?

### **How Mature is Your Enterprise?**

Now I will have you review the How Mature is Your Enterprise Matrix. This is the second of the two matrices that comprise the full PEMM. I will ask you some question during and after your review. <Review each enabler, its subcomponents, the four different levels and the way the enabler is measured>

#### Phase C Questions

*Ask during participant interaction with the matrix.*

1. Describe what you are noticing about the utility of the matrix/enabler as you are reviewing it.
2. Help me understand what you are thinking right now?
3. How would you describe this matrix/enabler?
4. How would you describe the strengths of the data and information in this matrix as an assessment tool to determine process state for process-based transformations?
5. How would you describe the limitations of the data and information in this matrix as an assessment tool to determine process state for process-based transformations?
6. How would you describe the feasibility of using this matrix as an assessment tool to determine process state for process-based transformations?

### **PEMM Conclusion**

#### Phase D Questions

*Ask after participant interaction with both matrices.*

1. This study is looking at your perception of the PEMM and its utility as an assessment tool to determine process and enterprise state for process-based transformations. This being said, in your opinion, do you think the PEMM could be useful to those in higher education institutions?
  - a. Why? Or why not?
2. What was, in your opinion, the most critical element in the PEMM? And why?
3. What was, in your opinion, the least critical element in the PEMM? And why?
4. Consider your experience with process-based transformations. Are there factors or areas that did not receive enough attention? Please explain.
5. What assertions and/or concerns do you have about process-based transformations now after learning about the PEMM?
6. Before we wrap things up and talk about next steps, is there anything else you wish to share?

### **Session Conclusion**

Thank you for your participation. Remember all information will be kept strictly confidential. Please do not hesitate to call or email if you have any questions or concerns.

**Session Logistics**

1. Turn audiotape off.
2. Store consent, rights of participant, and interview forms.
3. Complete reflection session for data collection and analysis.

**APPENDIX I**  
Consent Form**ADULT CONSENT FORM****IRB#: CSM 1711    Approval Date: 9/23/2017    Expiration Date: 10/31/18****EDUCATIONAL LEADERS' PERCEPTION OF THE UTILITY OF THE PROCESS  
AND ENTERPRISE MATURITY MODEL AS AN ASSESSMENT TOOL IN HIGHER  
EDUCATION****Invitation.**

You are invited to take part in this research study. The information in this form is meant to help you decide whether or not to take part. If you have any questions, please ask.

**Why are you being asked to be in this research study?**

You are being asked to be in this study because you are an educational leader and meet the inclusion criteria for this study.

**What is the reason for doing this research study?**

It is unknown how the Process and Enterprise Maturity Model (PEMM) functions in the higher education setting. This research is designed to better understand how educational leaders perceive the utility of this model as an assessment tool to determine process and enterprise maturity for process-based transformations.

**What will be done during this research study?**

Participation in this study will take approximately 90 minutes of your time and includes:

- As pre-work to an in-person session, read the written text of *The Process Audit* (30 minutes)
- Participate in an in-person session where you will share your perceptions about the utility of the PEMM during a semi-structured interview (60 minutes)

**What are the possible benefits to other people?**

The proposed study will provide a unique contribution to higher education research that will benefit anyone who is attempting a process-based transformation in this setting.

**What are the alternatives to being in this research study?**

Instead of being in this research study you can choose not to participate.

**Participant Initials** \_\_\_\_\_

**ADULT Consent Form - PAGE TWO****What will being in this research study cost you?**

There is no cost to you to be in this research study.

**Will you be paid for being in this research study?**

You will not be paid or compensated for being in this research study.

**What should you do if you have a concern during this research study?**

Your well-being is the major focus of every member of the research team. If you have a concern as a direct result of being in this study, you should immediately contact one of the people listed at the end of this consent form.

**How will information about you be protected?**

Reasonable steps will be taken to protect your privacy and the confidentiality of your study data. Confidentiality will be maintained through the use of a fabricated profile to ensure anonymity to you and your institution. Additionally, all collected data will be stored on a password-protected USB flash drive and will be destroyed after three years.

The only persons who will have access to your research records are the study personnel, the Institutional Review Board (IRB), and any other person or agency required by law. The information from this study may be published in scientific journals or presented at scientific meetings but your identity will be kept strictly confidential.

**What are your rights as a research participant?**

You have rights as a research participant. These rights have been explained in this consent form and in *The Rights of Research Participants* that you have been given. If you have any questions concerning your rights, talk to the investigator or call the Institutional Review Board (IRB), telephone (402)-399-2400.

**What will happen if you decide not to be in this research study or decide to stop participating once you start?**

You can decide not to be in this research study, or you can stop being in this research study (“withdraw”) at any time before, during, or after the research begins. Deciding not to be in this research study or deciding to withdraw will not affect your relationship with the investigator, or with the College of Saint Mary (also add any other sites to this statement, if needed).

You will not lose any benefits to which you are entitled.

If the research team gets any new information during this research study that may affect whether you would want to continue being in the study, you will be informed promptly.

**Participant Initials** \_\_\_\_\_

**ADULT Consent Form - PAGE THREE****Documentation of informed consent.**

You are freely making a decision whether to be in this research study. Signing this form means that (1) you have read and understood this consent form, (2) you have had the consent form explained to you, (3) you have had your questions answered and (4) you have decided to be in the research study.

If you have any questions during the study, you should talk to one of the investigators listed below. You will be given a copy of this consent form to keep.

If you are 19 years of age or older and agree with the above, please sign below.

Signature of Participant:

Date:

Time:

My signature certifies that all the elements of informed consent described on this consent form have been explained fully to the participant. In my judgment, the participant possesses the legal capacity to give informed consent to participate in this research and is voluntarily and knowingly giving informed consent to participate.

Signature of Investigator:

Date:

Principal Investigator: Renee Towne  
Secondary Investigator: Dr. Kristin Haas

Phone: 402-202-5116  
Phone: 402-384-5281

**Participant Initials \_\_\_\_\_**

**APPENDIX J**

## The Rights of Research Participants

Each participant in your research study needs to receive a hard copy of the form below (or one like it that has been adapted to your population):

**COLLEGE OF  
SAINT MARY****THE RIGHTS OF RESEARCH PARTICIPANTS\*****AS A RESEARCH PARTICIPANT AT COLLEGE OF SAINT MARY  
YOU HAVE THE RIGHT:**

1. TO BE TOLD EVERYTHING YOU NEED TO KNOW ABOUT THE RESEARCH BEFORE YOU ARE ASKED TO DECIDE WHETHER OR NOT TO TAKE PART IN THE RESEARCH STUDY. The research will be explained to you in a way that assures you understand enough to decide whether or not to take part.
2. TO FREELY DECIDE WHETHER OR NOT TO TAKE PART IN THE RESEARCH.
3. TO DECIDE NOT TO BE IN THE RESEARCH, OR TO STOP PARTICIPATING IN THE RESEARCH AT ANY TIME. This will not affect your relationship with the investigator or College of Saint Mary.
4. TO ASK QUESTIONS ABOUT THE RESEARCH AT ANY TIME. The investigator will answer your questions honestly and completely.
5. TO KNOW THAT YOUR SAFETY AND WELFARE WILL ALWAYS COME FIRST. The investigator will display the highest possible degree of skill and care throughout this research. Any risks or discomforts will be minimized as much as possible.
6. TO PRIVACY AND CONFIDENTIALITY. The investigator will treat information about you carefully and will respect your privacy.
7. TO KEEP ALL THE LEGAL RIGHTS THAT YOU HAVE NOW. You are not giving up any of your legal rights by taking part in this research study.
8. TO BE TREATED WITH DIGNITY AND RESPECT AT ALL TIMES.

**THE INSTITUTIONAL REVIEW BOARD IS RESPONSIBLE FOR ASSURING THAT YOUR RIGHTS AND WELFARE ARE PROTECTED. IF YOU HAVE ANY QUESTIONS ABOUT YOUR RIGHTS, CONTACT THE INSTITUTIONAL REVIEW BOARD CHAIR AT (402) 399-2400. \*ADAPTED FROM THE UNIVERSITY OF NEBRASKA MEDICAL CENTER, IRB WITH PERMISSION**

## APPENDIX K “How Mature are Your Processes?” Matrix

		<b>To be used in conjunction with “The Process Audit” by Michael Hammer (HBR April 2007, Reprint R10949).</b>			
		<b>How Mature Are Your PROCESSES?</b>			
		You can evaluate the maturity of a business process and determine how to improve its performance by using this table. Decide how the statements defining the strength levels, from P-1 to P-4, for each enabler apply to the process that you are assessing. If a statement is largely true (at least 80% correct), color the cell green. If it is somewhat true (between 20% and 80% correct), shade the cell yellow, and if it is largely untrue (less than 20% correct), mark the cell red.			
		P-1	P-2	P-3	P-4
Design	Purpose	The process has not been designed on an end-to-end basis. Functional managers can identify a corridor for functional performance improvement.	The process has been redesigned from end to end in order to optimize its performance.	The process has been designed to fit with other enterprise processes and with the enterprise IT systems in order to optimize the enterprise performance.	The process has been designed to fit with customer and supplier processes in order to optimize overall enterprise performance.
Design	Context	The process inputs, outputs, suppliers, and customers have been identified.	The needs of the process's customers are known and agreed upon.	The process owner and the owners of the other processes with which the process interfaces have established mutual performance expectations.	The process owner and the owners of customer and supplier processes with which the process interfaces have established mutual performance expectations.
Design	Documentation	The documentation of the process is primarily functional, but it identifies the interconnections among the organizations involved in executing the process.	There is end-to-end documentation of the process design.	The process documentation describes the process's interfaces with, and expectations of, other processes and links the process to the enterprise's system and data architecture.	An electronic representation of the process design supports its performance and management and allows analysis of environmental changes and process configurations.
Performers	Knowledge	Performers can name the process they execute and identify the key metrics of its performance.	Performers can describe the process's overall flow, how their work affects customers, other employees in the process, and the process's performance, and the required and actual performance levels.	Performers are familiar both with fundamental business concepts and with the drivers of enterprise performance and can describe how their work affects other processes and the enterprise's performance.	Performers are familiar with the enterprise's industry and its trends and can describe how their work affects enterprise performance.
Performers	Skills	Performers are skilled in problem solving and process improvement techniques.	Performers are skilled in teamwork and self-management.	Performers are skilled at business decision making.	Performers are skilled at change management and change implementation.
Performers	Behavior	Performers have some allegiance to the process, but own primary allegiance to their function.	Performers try to follow the process design guidelines correctly and work to ensure that all enable other people who execute the process to do their work effectively.	Performers make it a point to ensure that the process delivers the results needed to achieve the enterprise's goals.	Performers look for signs that the process should change, and they propose improvements to the process.
Owner	Identify	The process owner is an individual or a group that timely changes with improving the process performance.	Enterprise leadership has named an official process owner and works with a team of process managers who have the authority and credibility.	The process owner has the authority in terms of time, education, time spent, and personal goals.	The process owner is a member of the enterprise's senior decision-making body.
Owner	Activities	The process owner identifies and documents the process, communicates it to all the performers, and sponsors major, cross-functional projects.	The process owner articulates the process's performance goals and a vision of its future, sponsors redesign and improvement projects, and ensures that the process and other components with the process design are in compliance with the process design.	The process owner works with other process owners to manage processes to achieve the enterprise's goals and coordinates as well as the process's budget.	The process owner develops a rolling strategic plan for the process, participates in enterprise-level strategic planning, and sponsors projects that improve the process for customers and suppliers to improve the enterprise process design outcomes.
Owner	Authority	The process owner lobbies for the process but can only encourage functional managers to make changes.	The process owner can convene a process redesign team and implement the new design and has some control over the technology budget for the process.	An integrated IT system, designed with the process in mind and adhering to enterprise standards, supports the process.	The process owner controls the process's budget and owns strong influence over personnel assignments and evaluations.
Infrastructure	Information Systems	Fragmented legacy IT systems support the process.	An IT system constructed from functional components supports the process.	An integrated IT system, designed with the process in mind and adhering to enterprise standards, supports the process.	An IT system with a modular architecture adheres to industry standards for interoperable communication supports the process.
Infrastructure	Human Resource Systems	Functional managers reward the attainment of functional excellence and the resolution of functional problems in a process context.	The process's design drives role definitions, job descriptions, and competing priorities. Job learning is based on process documentation.	Hiring, development, reward, and recognition systems emphasize the process's needs and results and balance them against the enterprise's interests.	Hiring, development, reward, and recognition systems reinforce the importance of role- and enterprise-wide education, personal learning, and organizational change.
Metrics	Definition	The process has some best cost and quality metrics.	The process has end-to-end process metrics derived from customer requirements.	The process's metrics as well as cross-process metrics have been derived from the enterprise's strategic goals.	The process's metrics have been derived from the enterprise goals.
Metrics	Usage	Managers use the process's metrics to track performance, identify root causes of faulty performance, and drive functional improvements.	Managers use the process's metrics to compare its performance to benchmarks, best-in-class performance, and customer needs and to set performance targets.	Managers present the metrics to process partners for awareness and inclusion. They use dashboards based on the metrics for day-to-day management of the process.	Managers regularly review and refine the process's metrics and targets and use them in strategic planning.
		P-1	P-2	P-3	P-4
		P-1	P-2	P-3	P-4
		P-1	P-2	P-3	P-4

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## APPENDIX L “How Mature is Your Enterprise?” Matrix

		To be used in conjunction with “The Process Audit” by Michael Hammer (1993, April 2007, Reprint 8/09/14)			
		How Mature is Your ENTERPRISE?			
		To determine if your organization is ready to support a process-based transformation, evaluate the statements in this table, then show the strength levels, from E-1 to E-4, of the capabilities that enterprises need in order to develop their business processes. If a statement is at least 80% correct, color the cell green; if it is between 20% and 80% correct, shade it yellow; and if it is less than 20% correct, make it red.			
		E-1	E-2	E-3	E-4
Leader-ship	Awareness	E-1	E-2	E-3	E-4
Alignment	Behavior	E-1	E-2	E-3	E-4
Style	Teamwork	E-1	E-2	E-3	E-4
Customer Focus	Responsibility	E-1	E-2	E-3	E-4
Attitude Toward Change	Methodology	E-1	E-2	E-3	E-4
People	Accountability	E-1	E-2	E-3	E-4
Integration	Governance Model	E-1	E-2	E-3	E-4
Awareness	The enterprise senior executive team recognizes the need for process-based transformation and has a limited understanding of the power of business processes.	E-1	The enterprise senior executive team understands the need for process-based transformation and has a moderate understanding of the power of business processes.	E-2	The enterprise senior executive team has a strong understanding of the power of business processes and is actively engaged in the process of transformation.
Alignment	The hierarchy of the process program lies in the middle management ranks.	E-1	A senior executive has taken leadership of, and responsibility for, the process program.	E-2	The enterprise senior executive team has taken leadership of, and responsibility for, the process program.
Behavior	A senior executive has endorsed and invests in operational improvement.	E-1	A senior executive has publicly set stretch performance goals in customer terms and is prepared to commit resources, make deep changes, and remove roadblocks in order to achieve those goals.	E-2	Senior executives operate as a team, manage the enterprise through its processes, and are actively engaged in the process program.
Style	The senior executive team has started shifting from a top-down, hierarchical style to an open, collaborative style.	E-1	The senior executive team holds the process program in a position about the need to change and about process as the key to its change.	E-2	The senior executive team has delegated control and authority to process owners and process performers.
Teamwork	Teamwork is project focused, occasional, and ad hoc.	E-1	The enterprise commonly uses cross-functional project teams for improvement efforts.	E-2	Teamwork is the norm among process performers and is commonplace among managers.
Customer Focus	There is a widespread belief that customer focus is important, but there is limited appreciation of what that means. There is also uncertainty and conflict about how to meet customer needs.	E-1	Employees realize that the purpose of their work is to deliver extraordinary customer value.	E-2	Employees understand that customer demand underpins excellence and a seamless experience.
Responsibility	Accountability for results rests with managers.	E-1	Frontline personnel begin to take ownership of results.	E-2	Employees feel accountable for enterprise results.
Attitude Toward Change	There is growing acceptance in the enterprise about the need to make modest change.	E-1	Employees are prepared for significant change in how work is performed.	E-2	Employees are ready for major multi-year structural change.
People	A small group of people has a deep appreciation for the power of processes.	E-1	A cadre of experts has skills in process redesign and implementation, project management, communication, and change management.	E-2	A cadre of experts has skills in large-scale change management and enterprise-wide transformation.
Methodology	The enterprise uses one or more methodologies for solving execution problems and making incremental process improvements.	E-1	Process redesign teams have access to a basic methodology for process redesign.	E-2	The enterprise has developed and standardized formal processes for process redesign and the integrated use of a standard process for process improvement.
Governance Model	The enterprise has identified some business processes.	E-1	The enterprise has identified a complete set of business process models, and the senior executive team has developed a process redesign program.	E-2	The enterprise process model has been communicated throughout the enterprise, is used to design project priorities, and the enterprise uses technologies and data architectures.
Accountability	Functional managers are responsible for performance. Project managers are responsible for improvement projects.	E-1	Process owners have accountability for individual processes, and a steering committee allocates resources for process redesign projects.	E-2	Process owners share accountability for the enterprise's performance.
Integration	One or more groups advocate and support possibly discrete operational improvement techniques.	E-1	An informal coordinating body provides needed resources for process redesign projects.	E-2	A formal program management office, headed by a chief process officer, coordinates and integrates all process projects, and process owners manage resources in all process improvement techniques and tools in an integrated manner.

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**APPENDIX M**  
Data Analysis Procedure

1. Convert all collected data into a comparable format.
2. Organize all collected data into logical categories.
3. Analyze data while documenting ideas, reflections and trends of the raw data.
  - a. Comprehensively analyze all data to obtain general sense.
  - b. Individually analyze each information source for more detailed analysis.
4. Identify codes.
  - a. Identify noteworthy segments of data.
  - b. Make a list of all segments.
  - c. Combine similar segments together into a code.
  - d. Name code using participant-provided terminology.
  - e. Readdress noteworthy segments and label according to respective code.
  - f. Visually depict relationships between codes.
5. Identify broad categories of meaning and assign themes.
  - a. Perform quantitative analysis on the data (frequency and quality).
  - b. Identify outliers, exceptions, and contraindicating data.
  - c. Evaluate patterns and relationships among the codes.
  - d. Compare and contrast within each case and across cases.
6. Interpret findings.
  - a. Create a detailed description of each using codes to make a logical sequence of supporting evidence.
  - b. Determine how this information will be characterized.
7. Create representation.
  - a. Consider the interpretations in light of research questions, theoretical and conceptual frameworks.
  - b. Integrate and summarize findings with its related supporting evidence.
  - c. Display findings in a visual format (table, chart, graph).

**APPENDIX N**  
Audit Trail Letter



February 23, 2018

Renee Towne requested an Audit Trail be conducted for her qualitative dissertation, “Educational Leaders’ Perception of the Utility of the Process and Enterprise Maturity Model as an Assessment Tool in Higher Education”. The Audit Trail was conducted on February 20, 2018.

In my opinion, the study followed the established processes for qualitative studies, remaining consistent with the intended purpose statement, research questions and planned procedures approved by the Institutional Review Board. Excel was used for organization of transcript interviews and manual coding was used to create themes and categories that emerged from the qualitative data analysis. The themes identified flowed directly from the documents that were in interview format. The procedures utilized were clear, transparent, and well documented.

In summary, I attest that the criteria for trustworthiness, credibility, and dependability of the findings met the standards for data quality management. I served as auditor as part of my role as Dissertation Course Faculty.

Sincerely,

**Lois Linden**

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