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A Qualitative Study of Information Technology Project Portfolio Management in Higher Education

L. Andy Miller
Indiana State University

A QUALITATIVE STUDY OF INFORMATION TECHNOLOGY PROJECT PORTFOLIO MANAGEMENT IN HIGHER EDUCATION

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L. Andy Miller

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CURRICULUM VITAE

Education

Doctor of Philosophy in Technology Management, Indiana State University, 2020
Master of Science in Computer Science, California State University, Chico, 2002
Bachelor of Arts in Music, California State University, Chico, 1995

Work Experience

Associate Vice Provost for Information Resources, California State University, Chico, September 2017 – Present
Senior Director, Enterprise Applications and Data Services, California State University, Chico, January 2011 – August 2017
Director, IT Systems, Butte College
September 2006 – January 2011
Information Systems Designer/Developer II, Butte College
June 2005 – August 2006
IT Engineer, Cisco Systems, Inc.
June 2000 – November 2006

Publications and Presentations

Miller, L. A. (2018). Chico State's CRM Journey in Salesforce [presentation]. *CSU Information Technology Advisory Committee,* San Francisco, CA.
Miller, L. A. (2014). A Model for Project Prioritization in Higher Education Information Technology. *Educause Review*.
Miller, L. A. (2013). IT Organizational Structures and Project Management [guest lecture]. *CSCI 430, California State University,* Chico, CA.
Banks, B. R., & Miller, L. A. (2012). SharePoint Governance: The Value of an Institution-Specific Approach [conference session]. *Educause West/Southwest Regional Conference,* Seattle, WA.
Miller, L. A., & Slaughter, C. (2010). De-registration for non-payment and Student Payment Plans [conference session]. *CA Community College Datatel Users Group Conference*.
Miller, L. A. (2010). CISP/PCI, SB1386, FERPA, and Privacy Flag Law Round Table [conference round table]. *CA Community College Datatel Users Group Conference.*
Miller, L. A. (2010). Defining YOUR Value in Implementing a Portal [interview]. *Datatel Client Partner Web Interview*.
Miller, L. A. (2010). Datatel Portal Functional Demo [conference session]. *Datatel Users Group Annual Conference.*
Little, J., & Miller, L. A. (2010). From IT Plans to IT Projects: Processes and Priorities [conference session]. *CA Community College Chief Information Systems Officers Association Annual Conference,* Tahoe City, CA.
Miller, L. A. (2010). ActiveCampus: Non-Technical Implementation Considerations [conference session]. *CA Community College Datatel Users Group Conference.*

COMMITTEE MEMBERS

Committee Chair: Dr. W. Tad Foster, Ed.D.

Professor, Department of Human Resource Development and Performance Technology

Indiana State University

Committee Member: Dr. Xiaolong Li, Ph.D.

Chair and Professor, Department of Electronics and Computer Engineering Technology

Indiana State University

Committee Member: Dr. Erol Ozan, Ph.D.

Associate Professor, Department of Technology Systems

East Carolina University

ABSTRACT

This study was conducted to understand the variables, processes, organizational structures, and governance structures that are important and/or that support higher education decision makers in their selection and prioritization of information technology (IT) projects into their universities' portfolios. IT project portfolio management (PPM) is comprised of many different activities, and the selection and prioritization of projects are just two interconnected activities amongst many. Research has suggested that these PPM activities are both important and beneficial; but there is a dearth of research on the subject specifically within higher education IT environments, and some higher education organizations struggle in this area.

This study follows recent recommendations from other researchers to perform practice-based research on IT PPM. Research streams and standards bodies have long espoused the ideals of strategic IT PPM, where organizational strategy is perceived as a driver that strongly guides the practical activities and operations of IT PPM. However, there is a growing recognition that there is room for practice-based research because those ideals of strategic IT PPM are often not aligned with actual IT PPM practices and outcomes, and because IT PPM in practice often results in a bottom-up means for affecting strategy.

This study used a qualitative research design, and included a practice-based exploratory multiple-case study focused on project selection and prioritization activities as they occur within real world higher education IT settings at eight universities in the California State University system. Each university acted as an individual case within the multiple-case study. Interviews were conducted with 27 subjects across these eight universities, and a breadth of other evidence was collected including documentation, physical artifacts, and archival records. Converging

lines of data were developed through triangulation and corroboration of all the evidence, and this formed the informational basis for each case. Results from each case were reported independently, and a cross case synthesis was conducted to aggregate findings across all eight cases.

In addition to questions about the mechanics of project selection and prioritization, the interviews also included questions that were designed to compare and contrast perceptions of technical and non-technical stakeholders. Twelve themes emerged as issues of importance including objectivity, formality, flexibility, alignment with the strategic plan, the difficulty for small projects to compete with large/enterprise projects, senior leadership involvement, transparency in decision-making, transparency in PPM mechanics, the need for consultation and responsiveness, capacity planning, governing bodies' makeup and their representation of campus stakeholders, and satisfaction with the IT organization (and with its project management office). Technical and non-technical subjects' perceptions were aligned throughout most of the twelve themes, but there were indeed areas where opinions differed.

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dedicated time and effort to my doctoral studies over the course of several years. I look forward to giving back to them now that the dissertation is complete.

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CHAPTER 1

INTRODUCTION

There is ample evidence that higher maturity in information technology (IT) project portfolio management (PPM) is correlated with higher performing organizations that have tighter alignment between IT and the business (Miller, 2014). This evidence recurs across many bodies of research including IT PPM (Bardhan, Bagchi, & Sougstad, 2004; Reyck, Grushka-Cockayne, Lockett, Calderini, Moura, & Sloper, 2005; Smith & Sonnenblick, 2013), IT portfolio management (ITPM) (Jeffery & Leliveld, 2004; Kumar, Ajjan, & Niu, 2008), IT Governance (Weill & Woodham, 2002), and IT-business alignment (Tarafdar & Qrunfleh, 2010) among many others.

Broadly speaking, a project portfolio can be considered a hierarchically interconnected series of elements that includes one or more portfolios, programs, and projects. A portfolio can include multiple programs, and programs can in turn include multiple projects. This collection of the portfolio, programs, and projects are positioned in some meaningful way to meet overall business objectives (Project Management Institute, 2004, 2013). Project portfolio management is the higher order management of an entire portfolio of projects.

Project management and PPM are related but distinct. Project management is typically concerned with “doing projects right”, whereas PPM is typically concerned with “doing the right projects”. Objectives of mature PPM include defining the portfolio’s overall goals, performing financial assessments, performing risk assessments, performing project interdependency assessments, performing resource management, performing selection and prioritization of

projects, maintaining a central view (or collection of views) of projects, and performing portfolio optimization (Reyck et al., 2005).

A lack of formal IT PPM processes can result in several types of problems including a proliferation of projects that are either not tied to strategic objectives or that do not add significantly measurable value, the selection of groups of projects that are either unbalanced or uncoordinated, conflicting or redundant objectives, resource constraints and conflicts, and lack of executive support or commitment. Conversely, mature PPM processes can potentially result in improved alignment between the business and IT at both strategic and tactical levels, efficient allocation of resources, maximization of IT investments, and minimization of risk (Reyck et al., 2005; Tarafdar & Qrunfleh, 2010).

PPM processes can exist within a spectrum of maturity, as shown in Figure 1 (Miller 2014). At the simplest level, PPM may be solely comprised of tracking a central view of projects with little "portfolio management" actually occurring. Organizations working in this spectrum may select or prioritize projects on a first-come first-served basis or based on the authority/position of the person requesting a project; at this level there may be little assessment or measurement that informs PPM (Tarafdar & Qrunfleh, 2010). Moving toward a higher level of maturity, tactical PPM is concerned with selecting the "best projects" and managing resource allocations and conflicts between those projects (where the "best projects" may be subjectively defined based on organizational goals and needs). Organizations working in this spectrum may consider the portfolio more holistically, but tend to do so tactically rather than strategically; this can result in a portfolio that is not balanced in the best possible way. Moving toward the highest level of maturity, strategic PPM is not only concerned with selecting the "best *individual*

projects", but rather with selecting and consistently rebalancing the "best *set* of projects" that will meet the organization's strategic goals (Smith & Sonnenblick, 2013).

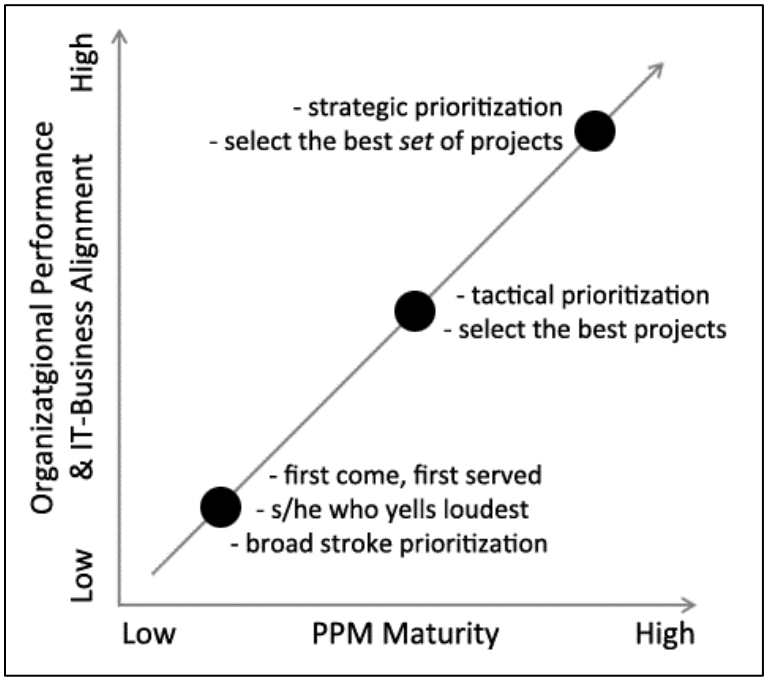


Figure 1. PPM Maturity Spectrum (Miller, 2014).

When an organization seeks to move toward more mature project selection and prioritization processes, several prerequisites are necessary. These include an overall organizational strategy, the buy-in and involvement of executive leaders (both within IT and across business units), and team skills (Reyck et al., 2005). The maturation process may take several years. During this time, the successful organization must demonstrate willingness to act with intent, willingness to address current and future governance mechanisms, willingness to implement incrementally, and willingness to balance the competing forces and needs of the business (Jeffery & Leliveld, 2004; Kumar et al., 2008; Smith & Sonnenblick, 2013; Weill & Woodham, 2002).

Effective prioritization requires governing authorities to understand enough about each individual project and about the portfolio as a whole in order to make rational and objective

decisions. Research literature presents a number of traditional models that are used as a basis to evaluate, select, and prioritize projects. However, many of these models are primarily focused on anticipated financial returns. Within higher education, measuring and evaluating projects for selection or prioritization purposes based on anticipated financial returns can be difficult at best, because higher education IT projects are not always intended to yield a direct financial return. In some cases, projects can contribute to cost reduction via improved business processes; but in just as many cases, the projects contribute toward strategic objectives such as supporting student success, improving graduation rates, improving learning outcomes, and so forth. This is not to say that it is impossible to determine a return on investment for these types of projects, just that such a determination can be very challenging and potentially counterproductive.

There are many measurement techniques which expand beyond a financial focus, and these may be more appropriate for project selection and prioritization within higher education environments (Dutta & Burgess, 2003). But whichever measurement technique is used, one thing is certain: technical and non-technical leaders who are charged with selecting and prioritizing IT projects must have a commonly agreed-upon set of project selection and prioritization processes and organizational/governance structures if they want to move toward higher levels of PPM maturity.

Statement of the Problem

Traditional research has typically conceptualized IT PPM as a top-down construct with organizational strategy being the primary driver of project and portfolio management execution and with little attention paid to the manner in which low-level IT PPM processes truly occur in real-world situations (Clegg et al., 2018; Löwstedt et al., 2018). Likewise, many professional organizations provide best practices recommendations for the execution of IT PPM processes

(Project Management Institute [PMI], 2004, 2013; Association for Project Management [APM], 2018; International Project Management Association [IPMA], 2018), but the recommendations are so broad and at such a high level that they do not provide sufficient guidance for IT PPM practitioners. Specifically within higher education IT PPM environments, there has been a dearth of research altogether.

One of the more challenging aspects of IT PPM is the selection of IT projects into, and prioritization of projects within, the portfolio. In this author's 13 years of IT management and consulting experience within higher education IT environments, the difficulties appear to be multifaceted. Some of the difficulty appears to be the result of a lack of a defined project scoring instrument and/or a lack of agreement on the variables that are captured/measured within the instrument, for the technical and non-technical university leaders who are charged with performing project selection and prioritization; some of the difficulty appears to be a lack of a suitable set of project selection and prioritization processes; and some of the difficulty appears to be the lack of organizational or governance structures and/or conditions to sufficiently support mature project selection and prioritization processes (Miller, 2014).

The problem of this study was a lack of understanding of the variables that are captured and measured within project scoring instruments, the processes, the organizational structures, and the governance structures that are important and/or that support higher education decision makers in their selection and prioritization of IT projects into their universities' portfolios.

Statement of the Purpose

The purpose of this study was to conduct qualitative research, in the form of a practice-based exploratory multiple-case study, to determine the variables, processes, organizational structures, and governance structures that could be considered important to technical and non-

technical decision makers in their selection and prioritization of IT projects into their universities' portfolios, within public master's universities in the California State University system. This study was guided by the following research questions:

1. What are the variables, processes, organizational structures, and governance structures that are being used by higher education decision makers when they are considering the selection and prioritization of IT projects into their university's portfolio? The variables that are specifically under study are those that are captured, weighted, and measured within project scoring instruments.
2. How do perceptions of technical university leaders compare and contrast to their non-technical counterparts, as it pertains to the importance/focus placed on the variables (in terms of the number and types of variables, or the level of importance placed upon them)?
3. How do perceptions of technical university leaders compare and contrast to their non-technical counterparts, as it pertains to selection and prioritization processes?
4. How do perceptions of technical university leaders compare and contrast to their non-technical counterparts, as it pertains to the organizational structures and governance structures involved in selection and prioritization processes?
5. Does an exploratory factor analysis on the variables of importance (i.e. those variables that are being used in project scoring and selection instruments) reveal a smaller number of underlying interpretable factors that might contribute toward the creation of a model that could be used to assist decision makers in the practical selection and prioritization of IT projects into university portfolios?

Statement of the Methodology

Population and Sample

The population under study included all 23 universities in the California State University (CSU) system (n = 23). The study design was intended to include a convenience sample of six universities based on the type and number of variables described in Table 1 (n = 2*3, or 6). In the end, eight universities participated in the study, resulting in a multiple-case study with eight cases (or "embedded units"). A detailed outline of the study design and methodology are provided in Chapter 3, along with an explanation of the deviation between the original design of six cases versus the actual number of eight cases that were included in the study.

Table 1

Factors for Determining Sample Universities

Variable	Num. of Classifications	Classification Ranges/Values
Total FTES[a]	2	1-19,999 20,000+
Degree of IT Centralization	3	Mostly decentralized Evenly centralized/decentralized Mostly centralized

[a]FTES = Full Time Equivalent Students enrolled at the university

The Total FTES data for all CSU universities were retrieved from publicly available reports on the CSU Chancellor's Office Institutional Research and Analysis website (California State University, 2018), and are provided in Chapter 3. Total FTES was used as one of the factors for determining sample universities based on Goldstein's (2004) finding that institution size (as measured by FTES enrollment) was one of the most significant factors for purposes of examining issues in higher education IT funding. Although this study is not focused specifically on IT funding, the fact remains that IT funding has an implicit impact on the selection and prioritization of IT projects, as shown in the literature review in Chapter 2.

The Degree of IT Centralization (as referenced in Table 1) for each university could not be determined in advance; rather, it was determined by subjects' responses and self-identification from an introductory questionnaire. The Degree of IT Centralization was selected as the other factor for determining sample universities because IT centralization is impacted by, and rooted in, organizational theory and agency theory which are both explored in the literature review in Chapter 2.

Potential subjects from each sample university were divided into two distinct groups, referred to as "Group #1" and "Group #2". Subjects from Group #1 included the managerial representative of the central IT project management office (PMO) at each university; i.e., the director/manager of the PMO, or the closest approximation thereof. These subjects were considered technical leaders/decision makers. The study design included gathering a greater and more in-depth amount of information from Group #1 subjects including an introductory questionnaire, an in-depth semi-structured interview, and an identification of potential Group #2 subjects. Given their role as in-depth information providers, Group #1 subjects were considered primary "informants" (Yin, 2009). Group #2 subjects included other university leaders/decision makers responsible for participating in IT project selection and prioritization processes, as identified by Group #1 subjects. The intention was to comprise Group #2 of a combination of two technical decision makers (i.e., information technology professionals) and three non-technical decision makers from each of the sample universities. The study design included a structured set of focused open-ended interview questions for Group #2 subjects. The objective was to interview 36 total subjects across Group #1 and Group #2, comprised of an equal number of 18 technical and 18 non-technical subjects from six sample universities. In the end, 27 subjects participated in the study across the eight sample universities. An explanation of the

deviation between the original design of 36 subjects versus the actual number of 27 subjects is included in Chapter 3.

It should be noted that deviations from the original design, in terms of the number of sample cases and the number of participating subjects, are considered typical for case study research (Yin, 2009). These deviations did not appear to negatively affect the study.

Data Collection

Data collection and analysis for the two groups of subjects occurred separately and distinctly. An invitation and a questionnaire was sent to 20 of the 23 potential Group #1 subjects. The questionnaire asked them to provide organizational information and it also asked for data/evidence related to the instruments, variables, processes, organizational structures, and governance structures that are used during their IT project selection and prioritization processes. In this context, "instruments" refers to the instruments that are used to collect, weight, and score specific variables, which are further used to inform the selection and prioritization of projects. The survey asked respondents to provide copies of their instruments, asked if they would be willing to participate in interviews, and asked if they would be willing to provide the names of potential Group #2 subjects. The intention was to retrieve instruments from as many universities as possible, and to find at least six subjects willing to participate in interviews and to provide names of potential Group #2 subjects.

Nine subjects from Group #1 (across eight unique universities) demonstrated willingness to provide evidentiary information and participate in follow up interviews. Subjects from four of the universities were willing to provide the names of potential Group #2 subjects, and subjects from the other four universities were not willing to do so. In the end, all nine Group #1 subjects were contacted and interviewed. Interviews were comprised of semi-structured open-ended

questions that were primarily focused on interviewees' perceptions related to the variables, processes, organizational structures, and governance structures that are used in their project selection and prioritization processes. Other evidentiary artifacts were also collected, including information from websites, business process guides, help desk ticketing systems, presentations, and so on.

Follow up invitations were sent to the Group #2 subjects at the four universities where the Group #1 subjects were willing to provide their names. Eighteen subjects from Group #2 agreed to participate in interviews.

In total 137 unique articles of evidence were collected. This included a combination of evidence that was provided directly by the Group #1 and Group #2 subjects, evidence that was collected independently from publicly accessible websites, and the interviews of the Group #1 and Group #2 subjects. All evidence was cataloged in a case study database. The evidentiary information and the case study database are discussed in detail in Chapters 3 and 4.

Data Analysis

All of the evidence that was gathered from each university was analyzed, and information was triangulated and corroborated in order to develop converging lines of data. Analysis included a combination of qualitative techniques including open coding. Throughout the analysis, particular attention was paid to the differences in perceptions between technical and non-technical stakeholders. Analysis also included a close review of the project scoring instruments; the variables were analyzed independently on a university-by-university basis, and they were also aggregated and analyzed as a whole. Findings for individual cases/universities were reported independently, and a cross-case synthesis was done to aggregate findings across all cases. All results were synthesized into the final summary of findings.

Statement of the Terminology

Academic Application (AKA Academic Technology): a software application used for teaching and learning purposes; e.g. learning management system (typically server- or web-based as opposed to desktop software).

Administrative Application: an integrated software application used for non-academic purposes; e.g. student information system (typically server- or web-based as opposed to desktop software).

Cabinet: the senior leadership team at each CSU university, typically comprised of the president and four to five vice presidents, and sometimes other members (e.g. chief of staff, or others).

Enterprise Resource Planning System (AKA ERP System): an integrated software application used for core administrative business processes (i.e. non-academic purposes); e.g. student information system (SIS), financial system, human resources system (HR), and so on.

Information System (AKA IT System, AKA IS): any academic or administrative software application (typically server- or web-based as opposed to desktop software).

Information Technology: the combination of infrastructure, applications, and processes used for entering, processing, storing, sending, and retrieving digital data/information.

Return on Investment (AKA ROI): a method for calculating a financial return based on the resources invested.

Statement of the Assumptions

The following were assumptions of this study:

- The final number of cases/subjects could deviate from the original multiple-case study design.

- A multiple-case study that included universities from a large system could be productive, both theoretically and practically.
- The difficulty in collecting evidence could potentially be made easier given the researcher's standing as an employee within the CSU system under study (while still following rigorous research and IRB standards).

Statement of the Limitations

The following were limitations of this study:

- The population and sample were limited to universities in the California State University system.
- The results and findings will not be generalizable to other populations. Case studies cannot be generalized in the same statistical sense as quantitative research studies, because the cases under study are not "sampling units" and they are not selected in the same way as samples in a quantitative study (Yin, 2009).
- The IT projects and portfolios under study were limited to areas of administrative and academic enterprise software applications and their supporting infrastructure (i.e. the study did not cover research projects, advancement/fund-raising projects, etc.).

Summary

Research has shown that higher levels of maturity in information technology (IT) project portfolio management (PPM) are organizationally beneficial, leading to improved alignment between the business and IT, efficient allocation of resources, maximization of IT investments, and minimization of risk. PPM includes many different areas and activities, including the selection and prioritization of projects within the portfolio; these areas are particularly

challenging for a variety of reasons. Although the challenges manifest themselves in higher education IT environments, there has been a dearth of research focused specifically on the problems within this sector and this study sought to fill a gap in the body of knowledge. This study included qualitative research, in the form of a practice-based exploratory multiple-case study, to determine the variables, processes, organizational structures, and governance structures that could be considered important to technical and non-technical decision makers in their selection and prioritization of IT projects into their universities' portfolios. The study focused on public master's universities in the California State University system; in the end the study included eight individual universities (or cases), and 27 participating subjects from those universities.

CHAPTER 2

LITERATURE REVIEW

Project Portfolio Management (PPM) Overview

At the broadest level, a project portfolio is a collection of projects and programs that are positioned in some meaningful way to meet organizational business strategy. A project is a temporary undertaking with a defined start and end, and includes a set of activities and objectives that are intended to create a unique product, service, or result. A program is a set of projects that are related or managed in some coordinated way. Projects across the portfolio and across programs may be related and/or interdependent or they may be completely unrelated. (PMI, 2004, 2013; Ward, 2008).

At the highest level, project portfolio management (PPM) is the set of dynamic management and decision-making processes that are applied to the entire portfolio (Clegg, Killen, Biesenthal, & Sankaran, 2018; Cooper, Edgett, & Kleinschmidt, 1997; Müller, Martinsuo, & Blomquist, 2008; PMI, 2013). Objectives of mature PPM include translating strategy down to a tactical level (i.e. aligning projects with strategy), project selection and prioritization (including project re-prioritization or project cancellation throughout the project lifecycle), portfolio optimization to achieve the appropriate mix/balance of projects and to maximize portfolio value, resource allocation and management (including human, financial, and capital/equipment resources), risk assessment and management, maintenance of a central/holistic view of projects, creating and executing standards to improve efficiency (at the portfolio, program, and individual project levels), and communicating with stakeholders (Berinato, 2001; Bredillet, Tywoniak, & Tootoonchy, 2018; Clegg et al., 2018; Cooper et al., 1997; Dietrich &

Lehtonen, 2005; Jeffery & Leliveld, 2004; Jerbrant & Gustavsson, 2013; Müller et al., 2008; Reyck et al., 2005; Sanchez, Benoit, Bourgault, & Pellerin, 2009).

At the lowest level, project management (PM) is the set of management processes and activities that are applied to an *individual* project throughout the project lifecycle. These include project initiation, project planning, project execution, project monitoring and controlling, and project closing (PMI, 2004, 2013). The project lifecycle also requires an iterative focus on balancing competing constraints including project scope, project quality, project schedule and timelines, project resources (including human, financial, and capital/equipment resources), and project risk. In the end, the goal of project management is to meet or exceed stakeholders' needs and expectations for each project (PMI, 2004, 2013; Ward, 2008).

It is worth noting that PM at the individual project level is different from PPM at the portfolio level. PM is typically concerned with "doing projects right", whereas PPM is typically concerned with "doing the right projects" (Blomquist & Müller, 2006; PMI, 2004, 2013). That said, PM and PPM are intimately related and codependent (Clegg et al., 2018; Keegan & Turner, 2002; PMI, 2013). There is evidence that PM formalization and PPM formalization are both independently positively related to PPM quality, and prior studies have shown that formalization becomes even more important as complexity increases (i.e. complexity has a positive moderating effect on the relationship between formalization and quality) (Teller, Unger, Kock, & Gemünden, 2012).

Prior research has also suggested that performance management should be concurrently examined at the portfolio, program, and individual project levels, and that successful organizations are intentional in their means to do so (Blomquist & Müller, 2006; Martinsuo & Lehtonen, 2007; Müller et al., 2008). Blomquist and Müller (2006) performed a mixed-methods

study to understand middle managers' roles and responsibilities in program and portfolio management environments in nine companies across five different industries; they used regression and correlation analyses to conclude that there were statistically significant differences between low- and high-performing organizations in their governance practices, the responsibilities held by their project managers, and the types of processes used in PPM and PM. Martinsuo & Lehtonen (2007) surveyed 279 companies to understand the relationships between project management variables, project level results, and portfolio management efficiency; they used regression and correlation analysis to conclude that efficiency within project management (at the individual project level) is correlated with efficiency at the portfolio management level. Müller et al. (2008) used the data collected earlier from Blomquist and Müller (2006) and performed a principal component analysis with Varimax rotation to conclude that portfolio performance measures and portfolio performance itself are both positively associated with measurement and performance at the project and organizational levels.

In many organizations, PPM is executed by a central project management office (PMO) and is co-governed by the PMO and a portfolio governance body (Andersen, Henriksen, & Aarseth, 2007; Bates, 1998; Blomquist & Müller, 2006; Hobbs & Aubry, 2006; PMI, 2013). There is a high degree of variability in PMO structures and roles (Aubry & Hobbs, 2010; Hobbs & Aubry, 2006, 2010), but PMOs are commonly responsible for defining and maintaining the standards and processes related to PPM and PM, developing and maintaining historical project archives, providing education and training, and oftentimes performing project management for individual projects (Andersen et al., 2007; Bates, 1998; Bredillet et al., 2018; Dai & Wells, 2004).

Prior research has suggested that the PMO can become increasingly more necessary and valuable as the size and complexity of the portfolio – and the individual projects within it – grow (Bredillet et al., 2018). It has also been suggested that PMOs have a positive impact on the performance and success of PPM (Bredillet et al., 2018; Teller et al., 2012). Bredillet et al. (2018) performed a case study of a large engineering and construction firm that worked in the oil, gas, and petrochemical industries, and they concluded that there is a co-evolutionary nature between the PMO (as an organizational structure) and PPM (as a set of processes); as one changes, it inherently causes change in the other. Other research has repeatedly expressed that PM and PPM are sets of *activities* that represent organizational capabilities, whereas the PMO is an *organizational structure* that exists to solve a specific problem, and that the two share an interconnected relationship (specifically, the problem of performing PPM) (Andersen et al., 2007; Bredillet et al., 2018; Killen & Hunt, 2013; Turner, 2014).

Prior PPM correlational research and practitioner standards have both suggested that there are several prerequisites for PPM success including a defined organizational strategy (Reyck et al., 2005); senior leadership involvement and support, and appropriately skilled teams (PMI, 2013; Reyck et al., 2005); a defined set of project and program management processes, a defined set of organizational roles and responsibilities, a process to evaluate proposed projects for selection/prioritization, and mechanisms to communicate decisions and other information (PMI, 2013).

Prior PPM correlational research and practitioner standards have also suggested that there are several factors that influence, constrain, or otherwise impact PPM and its decision processes. Such factors include organization type (i.e. for profit, nonprofit, or government), organizational governance processes (above and beyond those governance processes directly related to PPM),

organizational culture, organizational hierarchical structure, legal constraints, governmental/industry standards, infrastructure (e.g. capital equipment, facilities, etc.), human resources (e.g. numbers and skills, etc.), personnel administration processes (e.g. recruitment, termination, performance evaluation, training, etc.), market conditions, organizational and stakeholder risk tolerance, competition and/or alignment between projects and operations (i.e. day-to-day organizational activities), and portfolio/project management information systems (Aubry & Hobbs, 2010; PMI, 2013). However, recent research has also suggested that these forces are not unidirectional; PPM and PM performance/results can have a bottom-up impact and can force change back up to the top-level influencing/constraining factors (Clegg et al., 2018).

Figure 2 shows a graphic representation of the relationships between the aforementioned components, themes, prerequisites for success, and factors that influence/constrain/impact PPM.

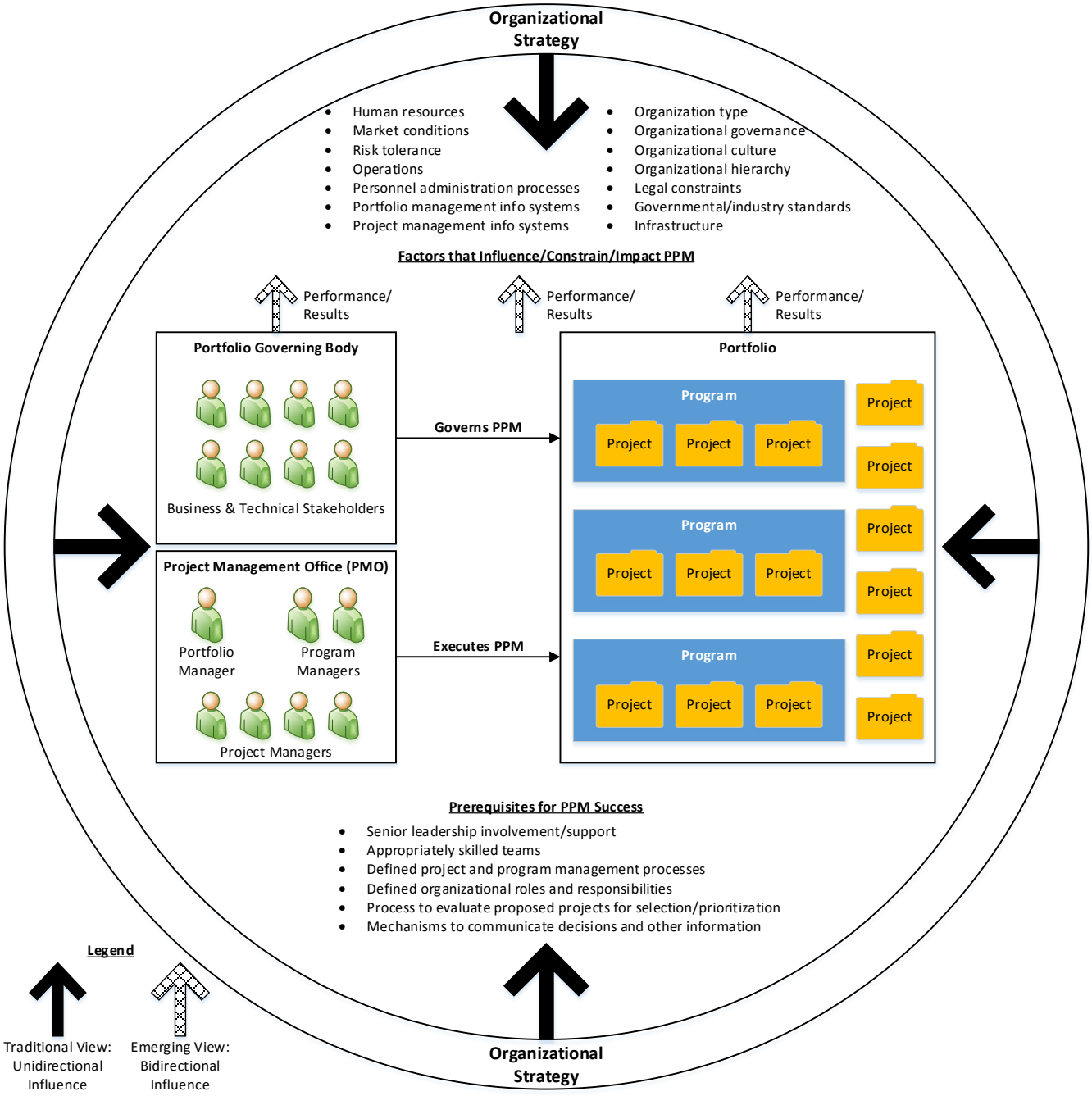


Figure 2. PPM Components, Themes, Prerequisites for Success, and Influencing Factors.

Previous correlational research has repeatedly suggested that effective PPM is associated with better organizational performance, PMOs have been shown to have a positive influence on the success of PPM, and PPM and PMOs have been associated with enabling transformation (Aubry & Hobbs, 2010; Bates, 1998; Bredillet et al., 2018; Dai & Wells, 2004; Hobbs & Aubry,

2010; Teller et al., 2012). In nearly all cases, the research has attempted to measure some aspect(s) of "organizational performance" and has then attempted to correlate it with the efficacy and performance of the PMO (as an organizational structure) and/or with PPM (as a set of processes). At the same time, there has been debate over the manner in which "organizational performance" can (or should) be measured, and many claim that there is too much subjectivity involved in conducting such measurements (Aubry & Hobbs, 2010). The fact also remains that many PMOs have a short life span and/or they do not provide the type or level of demonstrable value that senior executives expect from PPM or their PMOs who perform it; likewise, there is debate about which *elements* of PPM are most responsible for adding value or contributing to success (Aubry & Hobbs, 2010; Clegg et al, 2018; Hobbs & Aubry, 2006, 2010; Reyck et al., 2005; Thomas & Mullaly, 2008). Given these paradoxical issues, it is clear that more research needs to be done in order to understand PPM better.

Standards Bodies and Professional Organizations

The International Organization for Standardization (ISO, 2004) and the National Institute of Standards and Technology (NIST, 2006) describe a standard as a document that is intended to guide common and repeated use through specific rules and guidelines for some specific set of activities. Standards are intended to improve order and efficiency, reduce chaos, and provide for greater economies of scale in design, quality, service, production, delivery, and interoperability. Standards are typically established and approved through consensus by officially recognized standards bodies.

Several standards bodies develop and maintain standards related to project and portfolio management, and these standards are used heavily by PPM practitioners. Moreover, these standards and organizations are regularly cited within scholarly research. The most visible

international bodies/organizations are the Project Management Institute (PMI) (2018b), the Association for Project Management (APM) (2018), the International Project Management Association (IPMA) (2018), and ISO (n.d.).

Although these standards bodies are focused on PM and PPM, it is worth noting that their standards and best practices are typically written with a broad perspective and a general focus by practitioners. They typically are not based on causal or correlational studies. Likewise, they typically do not provide granular/prescriptive instructions for any given aspect of PM or PPM. As a specific example, they may indicate that mature PPM requires an inclusive governance process for selecting and prioritizing projects within the portfolio; however, they do not typically indicate the specific steps, team membership/makeup, or variables that should be considered within the processes.

Origins of PPM and Relevant Theoretical Perspectives

The formal origins of portfolio management can be traced back to 1952 when Harry Markowitz put forth the hypothesis for Modern Portfolio Theory (MPT) in his groundbreaking work *Portfolio Selection* (Berinato, 2001; Reyck et al., 2005), a work for which he would later receive the Nobel Prize in Economics (Nobel Media, 1990). Markowitz' study was focused on financial securities investment portfolios, and centered on the notion of risk management. Markowitz used linear algebra and a set of statistical equations to measure risk versus return, determine portfolio value, and quantify the portfolio selection decision-making process (Markowitz, 1952). Simply stated, Markowitz described an investment portfolio's risk as the standard deviation of its average return. In a practical application of MPT, an investor selects an investment portfolio by comparing amongst portfolios with similar average rates of return and choosing the one that has the least risk (i.e. the smallest standard deviation in average return).

Markowitz also concluded that risk could be reduced through the diversification of the assets within the portfolio, especially by diversification across highly heterogeneous industries with varying economic characteristics (Markowitz, 1952).

By the early 1980s, technology practitioners were attempting to apply elements of MPT to the practical management of information systems (IS) portfolios. In 1981, Warren McFarlan recognized the high level of challenge surrounding implementation of IS applications and the management of IS portfolios, and he concluded that the challenges were the result of three underlying factors: a failure to assess risk as part of the project selection process; a failure to assess the aggregate risk of the IS project portfolio as a whole; and a failure to recognize that projects of different risk level require different approaches to project management (McFarlan, 1981).

McFarlan also identified three primary dimensions that influence risk in IS projects: project size (as measured by cost, duration, the number of staff required for implementation, the number of departments required for implementation, and so on); organizational experience with the technologies being implemented; and project structure (identified by the degree to which project requirements can be defined at the beginning of the project and/or are mutable through its duration) (McFarlan, 1981).

The solution to these challenges, McFarlan argued, was a risk-based approach to selecting and managing IS projects and portfolios (McFarlan, 1981). Other researchers and practitioners took the notion a step further, and advocated for applying MPT more directly/purely to technology/IT PPM (Berinato, 2001).

There are elements and aspects of MPT that certainly seem applicable to IT PPM at first glance. For instance, the notions of risk management and risk mitigation have been applied to IT

PPM in some form or fashion for several decades (PMI, 2013; Reyck et al., 2005; Sanchez et al., 2009). Likewise, there is a notion that IT systems are (or should be) treated as investments, and one of the goals of implementing IT systems is to yield some sort of financial return (Cooper et al., 1997; Reyck et al., 2005). However, there are many reasons why MPT does not appear to apply *directly* to IT PPM (Verhoef, 2002).

One reason that MPT does not apply directly to IT PPM is the inherent nature of MPT math and the data that are available for assessment. MPT calculations are based on securities' historic rates of financial returns. While the rates of return for a given security may fluctuate over time, those rates and fluctuations do not vary based on the *investor* (i.e. investor A and investor B both experience the same relative order of fluctuations). In this regard, the data are stable and clean. In contrast, the data that are available for selection and prioritization of IT systems do not have this same nature. Selection and/or decisions related to development and/or implementation of IT systems is based on data that can be uncertain, unreliable, or altogether unavailable (Cooper et al., 1997; Verhoef, 2002). Consider the difficulty of calculating the return on investment for the implementation of a new ERP system at a large company (where the company is analogous to the investor). Predicting ROI and/or risk based on comparisons to another company's results could be very difficult (if even possible) based on the number/types of variables involved and the amount of noise within those variables. For instance, consider the aforementioned factors that influence, constrain, and impact PPM; and consider the aforementioned prerequisites for PPM success. Further, consider how those factors and perquisites naturally vary between companies. Likewise, consider all the variations between companies in terms of the types of features/configurations that they might implement in a large

scale IT application, the business processes that dictate the use of the application, the number and skillset of application users, and so on.

Another reason that MPT does not apply directly to IT PPM is the nature of investing and divesting in financial securities as compared to the nature of purchasing, implementing, and decommissioning IT systems (Cooper et al., 1997; Verhoef, 2002). Financial securities can be purchased and sold with relatively minimal cost and in very short order, and MPT is based on the assertion that investment/divestment is a dynamic possibility at all times (Verhoef, 2002). However, purchasing, implementing, and/or decommissioning IT systems – especially complex ones – can take months or even years. Depending on the system, there can be an incredible amount of time required for technical aspects (e.g. infrastructure design/development, application development/configuration, integration, security, and so on), human aspects (e.g. training, adoption, skillsets, and so on), and organizational aspects (e.g. business strategy, governance, organizational hierarchy, funding, and so on.)

Yet another reason that MPT does not apply directly to IT PPM is the nature and intent of diversification. MPT is based on the premise that diversification of the portfolio inherently reduces risks. However, within IT environments, diversification is typically viewed as an undesirable risk *producer* (Verhoef, 2002). Efficient and effective IT management is often focused on consolidation and standardization on the numbers and types of infrastructure, platforms, languages, frameworks, protocols, processes, and so on (Verhoef, 2002). Diversification in technologies can actually have a negative impact on the organization's ability to effectively support and leverage the systems.

Although MPT may not translate *directly* to IT PPM, prior research findings have suggested that organizations wishing to move into greater levels of IT PPM maturity should have

some set of processes to perform risk assessment/management; likewise, they should some set of processes to quantify and qualify the benefits/returns of proposed technologies for purposes of project selection and prioritization. As with PPM generally speaking, research has suggested that mature PPM in IT environments can potentially result in any number of benefits. These include improved alignment between the business and IT at both strategic and tactical levels, efficient allocation of IT and non-IT resources, maximization of IT investments, and minimization of risk. Conversely, a lack of formal PPM processes can potentially result in many problems including a proliferation of projects that are either not tied to strategic objectives or that do not add significantly measurable value, the selection of groups of projects that are either unbalanced or uncoordinated, conflicting or redundant objectives, resource constraints and conflicts, and lack of executive support or commitment (Reyck et al., 2005; Tarafdar & Qrunfleh, 2010). A more thorough review of Reyck et al. (2005) is conducted later in this chapter.

Other Relevant Theoretical Perspectives

Outside of MPT, prior research has indicated a number of theoretical perspectives that have implications for IT PPM. For instance, PPM has been viewed through the lenses of organizational theory (Jerbrant, 2013; Jerbrant & Gustavsson, 2013; Kaiser, El Arbi, & Ahlemann, 2015; Teller et al., 2011) and agency theory (Turner & Keegan, 2001; Zwikael & Smyrk, 2015) among others.

Organizational theory is concerned with the manner in which organizations, and the human beings who work within them, are structured in order to make decisions, perform work processes, and accomplish some set of goals; it is also focused on how structure and humans influence one another (Law, 2009; Shafritz, Ott, & Jang, 2016). However, it might be more apt

to refer to organizational theories in the plural, as there are several different schools of thought and many unique organizational perspectives/theorists.

A few classical organizational theories from the early twentieth century include Frederick Taylor's (1913) scientific management, Henri Fayol's (1949) administrative theory, and Max Weber's (1968) bureaucracy.

Scientific management is focused on increasing efficiency and productivity through systematic management via the following four principles: use of a scientific method instead of rule-of-thumb methods; assignment of workers to jobs based on workers' capability and motivation with a focus on providing appropriate training; cooperation between managers and workers to meet objectives/principles; and an equal division of labor between managers and workers to ensure that each are focused on performing the appropriate/specialized work within their respective areas of responsibility (Taylor, 1913).

Administrative theory is similarly focused on increasing efficiency, but with a greater focus on managers and management activity via the following fourteen principles: a division of work; authority and responsibility (i.e. delegation of authority); discipline; unity of command to ensure that a worker receive orders from one, and only one, manager; unity of direction to ensure that there is a single head/plan and that activities have the same objective; subordination of the individual interests to a single/general interest; fair remuneration of personnel; centralization of distribution of orders; a scalar chain of management from the highest officials down to the lowest ranks; order (i.e. "a place for everything and everything in its place"); equity in the treatment of workers exercised throughout the scalar chain; stability of tenure of workers (i.e. job security); initiative in the form of thinking and executing; and esprit de corps, or team

unity/spirit. Administrative theory also focused on the following five functions of management: planning, organizing, command, coordination, and control (Fayol, 1949).

Weber described bureaucracy as a consideration of the organization in a broader sociological construct, focused on the following principles: jurisdictional areas are defined and ordered by laws or administrative regulations; there is an official hierarchy that defines organizational super- and subordination with a defined means for supervision, discipline, and appeals; management of the office is based upon written documents which are preserved in their original form; management should be appropriately specialized and should receive appropriate training; official business activity demands full working capacity of the business officials (i.e. business officials do not perform a part-time job); and management follows established rules which can be learned (Weber, 1968). It is worth noting that Weber's *Economy and Society* covered a wide range of topics not limited solely to the study of bureaucracy, and it was ultimately ranked as the most influential sociological book of the twentieth century by the International Sociological Association (International Sociological Association, 2018).

Neoclassical organizational theory followed in the early to mid-twentieth century, resulting from a criticism of the classical organizational theories for their neglect to consider the impact of informal individual and group behaviors on organizational efficiency and productivity, and for the perceived rigidity of the classical theories' constructs (Food and Agriculture Organization of the United Nations [FAO], n.d.; Shafritz et al., 2016). Neoclassical theory included a greater focus on human sociological relationships and factors, and their impacts on productivity within the organization (FAO, n.d.). One prominent theory was Elton Mayo's human relations theory, an outcome of the Hawthorne studies of the 1930s (Shafritz et al., 2016).

Modern organizational theories followed in the mid-twentieth century, based on the notion that organizations are comprised of a dynamic collection of individual, group, and organizational interactions and interests, and that modern organizations are ever adapting to the changes in their environment (FAO, n.d.). Unlike previous theories, modern theories tended to look at the organization more holistically, and moved away from the notion that there is "one right way" to structure and operate an organization. Prominent theories include Ludwig von Bertalanffy's (1950) general systems theory, and contingency theory.

General systems theory is an interdisciplinary study of interrelated and interconnected systems. As a biologist, Bertalanffy was not initially focused on business organizations, but was rather focused on the order and growth of biological organisms. However, over time others such as Katz and Kahn (1966) applied systems theory concepts to business organizations. Systems theory focuses on the areas of inputs (resources and/or information), throughputs (activities and processes), and outputs (products and/or services that are produced by applying the inputs to the throughputs) with an understanding that organizations are open systems that interact with, and are impacted by, their often unpredictable environments. Systems theory recognizes that organizations are comprised of sub-parts, which are interrelated and interdependent, and systems theorists often articulate the sum of the parts as being greater than the whole (Katz & Kahn, 1966; Shafritz et al., 2016).

Contingency theory proposes that there is no single way to organize a business, and that organizations must adapt to myriad conditions and circumstances, both internal and external, to determine optimal organizational structure (Hellriegel & Slocum, 1973). Contingency theory has a tendency to focus on leadership style, and the relative effectiveness of the leader of the

organization (or organizational sub-unit) in its performance, as studied by Tannenbaum and Schmidt (1957) and Fiedler (1964).

All of the aforementioned organizational theories have specific implications for IT PPM because the theories directly explain different organizational constructs and frameworks that effect PMOs. As discussed earlier, the PMO is an organizational structure that exists to solve the problem – and perform the activities – of PPM. Likewise, as discussed earlier, prior research has suggested that there is a co-evolutionary nature and an inextricability between the PMO and PPM.

Agency theory is a management and economic theory that attempts to explain relationships between agents and principals in business organizations. The agent is a person or group who can make decisions and act on behalf of the principal. Agency theory describes the challenges that can arise when the agent and the principals do not have the same interests, amounts of available information, or risk tolerance (Jensen & Meckling, 1976; Mitnick, 1975). In the case of IT PPM, agency theory can be viewed in multiple ways. For instance, within many organizations a governing body (the agent) evaluates, selects, and prioritizes projects that are requested by stakeholders who represent their own departments/divisions (the principal). Secondarily, many organizations use a PMO (the agent) to perform the actual work of implementing projects on behalf of their organizational stakeholders/clients (again, the principal). In either case, agency theory, and the principal-agent problem, are focused on if/how the agent can/will act in the best interests of the principal.

Information Technology Project Portfolio Management (IT PPM)

Challenges with Immature IT PPM

Dating back to the early 1980s, myriad researchers and practitioners have studied the various challenges that can be encountered by the lack of mature PPM practices in technological environments. As noted earlier, in 1981 McFarlan recognized the high level of challenge surrounding implementation of IS applications and the management of IS portfolios. By the late 1980s, the United States General Accounting Office (GAO; renamed in 2004 to the General Accountability Office) recognized that the information systems (IS) managed by federal government agencies were not providing the same types of benefits as comparable systems managed by private sector and state agency counterparts (United States General Accounting Office [GAO], 1988).

In the early 1990s, Wheelwright and Clark recognized the challenges created by the lack of mature PPM practices within the manufacturing industry. Those challenges included a mismatch between long-term business objectives and the intended outcomes of individual projects, a sprawl of projects, a general over-allocation of engineering resources, and a general ignorance of the fact that some types of projects require different engineering and management skills than others. Although they did not specifically focus on a risk-based approach, Wheelwright and Clark did recognize two of the factors that McFarlan recognized: the importance of considering the portfolio of projects at the aggregate level, and the importance of using different approaches for different project types. They created a framework called the Aggregate Project Plan, which categorized projects across several different types. The intent was to help managers consider projects in the context of the overarching portfolio instead of considering each project as an ad-hoc unit of work; it was also intended to assist managers with

proactive resource allocation, project sequencing, and with development of organizational and individual skill sets necessary to complete different types of projects (Wheelwright & Clark, 1992).

By the mid-1990s, the GAO continued to study challenges in the public sector, and they performed a case study of IS management practices within ten organizations that had been recognized as leaders in the space – five within the private sector and five within state government agencies. The study compared the practices within those organizations to the practices typically found in federal government agencies, and found that the leading organizations were performing IS management in a much more strategic manner than the typical federal agency. Among the report's many recommendations, several were directly related to PPM, including: an increased level of involvement from senior leadership and functional business managers in the selection, prioritization, and management of IS projects; using a disciplined process with explicit decision criteria and quantifiable measures to assess benefits, risk, and costs of IS projects; managing IS projects as investments rather than expenses; and holistically integrating processes for planning, budgeting, and evaluation at individual and organizational levels (GAO, 1994).

The mid-1990s also began to see widespread response to the perceived need for improvement in PPM (Dai & Wells, 2004; Jeffery & Leliveld, 2004; Reyck et al., 2005). Dai and Wells (2004) discovered a rapid growth in the establishment of PMO offices across many industries in the mid to late 1990s. The motivating factors for this growth included the desire to improve on many factors including project management performance outcomes, standardization, accountability, efficient use of resources in multi-project environments, quality, customer satisfaction, and alignment of PPM with strategic goals. During this same time, the federal

government signed into law the Clinger Cohen Act of 1996, which outlined responsibilities for chief information officers (CIOs) in federal agencies. This act directed federal agency CIOs to focus on achieving results through IT investments and "emphasize[d] rigor and structure in how agencies approach the selection and management of IT projects." (United States Department of Defense Chief Information Officer, 1996).

The late 1990s also saw a widely growing recognition that practitioner IT leaders needed to do a better job in measuring and describing the return on their IT investments in a way that was relevant and meaningful to non-IT business leaders (Berinato, 2001; Jeffery & Leliveld, 2004; Reyck et al., 2005). In response, practitioners and researchers began proposing different classification schemes to describe the spectrum of PPM maturity and/or adoption within IT/technical environments. This was also the same time that practitioners and researchers began to acknowledge that Markowitz' MPT was not purely or directly applicable to IT PPM environments (Cooper et al., 1997; Verhoef, 2002).

In the early to mid-2000s, researchers were continuing to study the problems related to lack of effective IT PPM practices. Efforts to develop frameworks to measure IT PPM adoption continued, as did efforts to provide strategies and recommendations for moving organizations forward. In 2004, Jeffery and Leliveld determined barriers to widespread IT PPM adoption, including organizational processes related to metrics and measurement, skills of IT leaders/staff and business leaders/staff, and alignment between IT and the business. They also recommended strategies for senior IT leaders to move their organizations further along the path of maturity based on lessons learned and perceptions of practitioner CIOs from the most mature organizations (Jeffery & Leliveld, 2004). The mid-2000s also saw the study of funding decisions (and associated challenges) for IT projects and IT PPM within higher education; albeit, there

only appears to have been two studies performed within this topic/sector combination (Goldstein, 2004; Jeffery & Goldstein, 2005).

In the late 2000s and early 2010s, researchers began taking a closer look at the challenges associated with the diversity of perceptions related to the performance of PMOs in their function of leading/performing IT PPM. Aubry and Hobbs (2010) studied the variance in types and makeup of PMOs across various industries, and the variance in industry perception of the efficacy of PMOs and PPM in general (Aubry & Hobbs, 2010; Hobbs & Aubry, 2010).

Beginning in the mid-2010s and continuing to the present, researchers have begun to recognize the importance of performing practice-based research in the disciplines of IT PM and IT PPM. Research streams and standards bodies have long espoused the ideals of strategic PPM. However, there is a growing recognition that there is room for practice-based research because those ideals of strategic PPM are often not aligned with actual IT PPM practices and outcomes, and because IT PPM in practice often results in a bottom-up means for affecting strategy (Clegg et al., 2018; Löwstedt, Räisänen, & Leiringer, 2018; Martinsuo, 2013). A focus on practice-based research is a critical driver for this study, since this research is positioned to help understand what is actually occurring within higher education IT PPM environments (irrespective of perfect world top-down strategic perspectives).

Classifications of IT PPM Maturity/Adoption

As noted earlier, by the 1990s there was a widely growing recognition that IT leaders needed to do a better job in measuring and describing the return on IT investments in a way that was relevant and meaningful to non-IT business leaders (Berinato, 2001; Jeffery & Leliveld, 2004; Reyck et al., 2005). By the late 1990s, practitioners and researchers began proposing

different classification schemes to describe the spectrum of PPM maturity and/or adoption within IT/technical environments.

In 2001, Berinato (2001) provided an IT practitioner's classification of IT PPM maturity/adoption. Although the classification does not appear to have been based on quantitative or statistical analysis, it is relevant because it shows the state of mind of practicing CIOs at the time. This classification included five levels:

1. Level 1: *all projects are put into a single database*. Value at this level is created by providing a holistic view of projects, which helps to surface redundancies (especially across organizational divisions).
2. Level 2: *the projects in the database are prioritized*. This can be done with a simple risk-return analysis (i.e., one that does not meet the rigor of MPT). Value at this level is created by enabling dialog and alignment between IT and the business, by helping the business understand the potential risk/value/return of individual projects and the portfolio as a whole, and by creating visible and agreed-upon prioritization.
3. Level 3: *projects are divided into 2-3 budgets based on investment type*. The budgets can be subjective based on organizational strategy or focus. Value at this level is created by helping business leaders understand how, when, and where to increase/decrease focus and/or investments.
4. Level 4: *the repository is automated.* Automation includes management of project metadata and calculated quantification of risk, value, and ROI; it does not include automation of the decision-making processes to select, prioritize, or fund projects. Value at this level is created by ensuring that IT PPM becomes a dynamic and ongoing business process, and by increasing the time spent focusing on evaluation and decision-making.

5. Level 5: *Modern Portfolio Theory is applied*. This requires a transformation in the way IT operates. Even if the organization does not perform formal mathematical MPT computations, it can still use MPT-like practices. Value at this level is created by enabling tight alignment between IT and the business, in helping the organization make rational IT investment decisions, and in helping monitor and measure ROI in an ongoing manner.

In 2004, Jeffery and Leliveld (2004) created a tool called the IT portfolio management maturity model, based on the software development capability maturity model (CMM) that was developed by Paulk, Curtis, Chrissis, and Weber (1993). Jeffery and Leliveld used their tool to perform a mixed methods study of IT portfolio management at Fortune 1000 companies in the United States, and they determined that maturity could be measured across a classification of four stages:

1. Stage Zero: *ad hoc* (4.5% of respondents). Companies at this stage make decisions about investments in an uncoordinated way. At this stage, there is often redundancy and overlap across multiple organizational divisions with huge amounts of waste.
2. Stage One: *defined* (24.5% of respondents). Companies at this stage have identified and documented the key components of their IT portfolios, roughly estimating each element's costs and benefits. Project data are logged in a central database. IT typically performs central budget oversight and typically maintains a central PMO. Pertinent IT personnel have a basic understanding of the financial metrics used to make investment decisions, and the portfolio has been defined in terms of an initial set of agreed upon facts. At this stage, there is inconsistency in organization-wide compliance, there are no links between budgeting cycles and feedback loops to assess

actual returns, and there is a struggle to link the IT portfolio to business strategy because of a lack of common beliefs and standards.

3. Stage Two: *managed* (54% of respondents). Companies at this stage have a standardized process that enables objective project selection and has a clear link with business strategy. Their portfolios are managed as part of existing management-control processes. Financial metrics, such as ROI and net present value (NPV), are consistently calculated and used in reviews with business leaders to align IT spending with strategy; however, such exercises are usually annual rather than ongoing.
4. Stage Three: *synchronized* (17% of respondents). Companies at this stage intentionally and consistently align investment portfolios with business strategy. They use evolving metrics to measure a project's value through its life cycle, and they routinely kill underperforming initiatives. In order to increase the aggregate value of their IT investments, they assess the risks associated with each project (e.g. delays, cost overruns, strategic misalignment, end-user acceptance, and so on) and with the portfolio as a whole. They also weigh the value of investing in a project that will enable future opportunities. They are disciplined about getting frequent feedback from business leaders to ensure that IT efforts stay aligned with strategy after investment decisions are made.

In 2005, Reyck et al. (2005) performed a study of IT PPM at 125 medium and large organizations and created a classification of PPM adoption based on *k*-means cluster analysis with Ward's method and ANOVA. The analysis focused on the extent to which the companies had adopted various elements of PPM (e.g. centralized project control, financial analysis, risk analysis, project interdependencies, constraints, and so on). The findings showed that greater

adoption of PPM processes was correlated with a significant positive relationship with organizational impact and with a significant negative relationship with the level of problems experienced within projects. Findings also showed that these relationships were cumulatively strengthened as more PPM processes were adopted and/or when processes were adopted to greater extents. The classification included the following three stages:

1. Stage I: *portfolio inventory*. Companies at this stage focus on implementing PPM processes related to centralized project administration, risk evaluation (especially financial and technological risks), analysis of resource constraints, and increasing business leaders' accountability for project results. At this stage there are several challenges including lack of commitment from business leaders, lack of alignment between projects and company strategy (often due to the lack of a clear company strategy), lack of coordination between projects, and conflicting project objectives.
2. Stage II: *portfolio administration*. Companies at this stage focus on implementing PPM processes related to project categorization, and evaluating the impact of the portfolio's results on the customers. At this stage there are challenges related to allocating resources to analyze project data, human and financial resource constraint, and an overload of projects.
3. Stage III: *portfolio optimization*. Companies at this stage focus on implementing PPM processes related to governance (i.e. instituting a project portfolio committee consisting of top/senior management), assessment of the portfolio's financial worth, management of project interdependencies, and tracking project benefits. At this stage there can still be challenges related to human/financial resource constraint and communications (although problems tend to be lower than those at the earlier stages).

All of the aforementioned PPM maturity/adoption classification schemes demonstrated common themes; in particular, they all identified breadth and depth of project selection and prioritization processes as key indicators of increased PPM maturity/adoption.

Project Selection and Prioritization in Higher Education IT PPM Environments

Many financial performance measurement and evaluation metrics have been used as part of traditional IT PPM project selection and prioritization processes. A short list includes return on investment (ROI), internal rate of return (IRR), net present value (NPV), risk-adjusted net present value (rNPV), discounted cash flow (DCF), Payback, Expected Commercial Value (ECV), Productivity Index (PI), and cost-benefit analysis (CBA) just to name a few.

But within higher education IT environments, evaluating projects for selection and prioritization based solely on financial performance metrics can be difficult at best (Goldstein, 2004). Indeed, some higher education IT projects are intended to contribute directly to cost savings or revenue generation. However, in many more cases, higher education IT projects are intended to contribute toward strategic business objectives that may not be realistically financially measurable. For instance, projects that support student success and graduation rates, projects that improve learning outcomes, projects that improve student and/or faculty satisfaction, and so forth. This is not to say that it is *impossible* to measure some type of financial return for these latter types of projects, just that it can be extremely challenging and time consuming. A balanced approach would dictate analysis of financial and non-financial factors alike (Dutta & Burgess, 2003; Goldstein, 2004; Jeffery & Goldstein, 2005).

A focus on financial measures is not only difficult and/or limiting at the individual project level, but those difficulties/limitations extend up to the portfolio level. Although for-profit businesses may certainly be interested in measuring and maximizing the financial value of

their project portfolios, Cooper et al. (1997) found that many companies are just as interested in ensuring that their project portfolios appropriately reflect all aspects of business strategy and/or in achieving some specific desired (non-financial) balance in the number and types of projects in the portfolio. This would almost certainly be the case for the higher education environments under study here. Similarly, Gartner (a leading technology research and advisory company) has long espoused a three-tiered categorization of IT projects/assets as "run/grow/transform" (RGT) that categorizes as follows: "run" expenses/activities are those related to supporting existing operations ("keeping the lights on"); "grow" expenses/activities are those related to developing and enhancing the IT environment in support of business growth ("enhancing, extending, or differentiating existing business capabilities"); and "transform" expenses/activities are those related to implementing technologies that enable the business to enact new/different business models, "mov[ing] the enterprise's business into entirely new markets or industries" (Potter, Solanki, & McGee, 2017; Curtis, 2018). Within higher education specifically, Jeffery and Goldstein (2005) suggested a "Hierarchy for IT Investments" classification as shown in Figure 3, which uses the following scheme: infrastructure expenses/activities are the foundation that support all other IT programs and strategies; transactional expenses/activities sit on top of infrastructure and they enable sharing of data/information across the enterprise; strategic expenses/activities and information expenses/activities sit next to one another atop transactional expenses/activities and they enable top-down and enterprise-wide decision making.

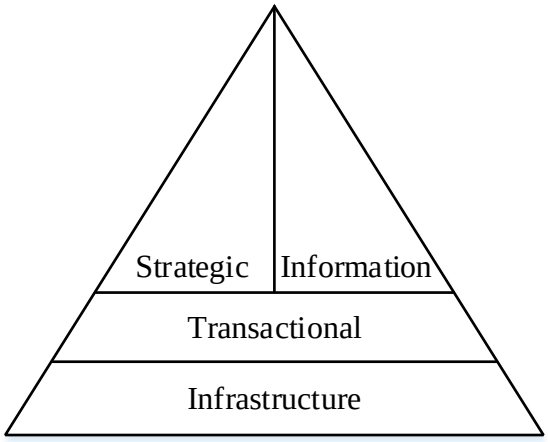


Figure 3. Hierarchy for IT Investments (Jeffery & Goldstein, 2005).

Several measurement/evaluation techniques expand beyond the traditionally narrow focus of finance, and these appear to be promising for project selection and prioritization within higher education IT environments. There is evidence that these have been used in some form or fashion for some time, both within and outside of higher education (Cooper et al., 1997; Dutta & Burgess, 2003; Goldstein, 2004; Harris, Caplan Grey, & Rozwell, 2001). For instance, Harris et al. (2001) suggested that practitioners needed to shift their thinking from *return on investment* (ROI) to *value on investment* (VOI) which focuses more on the value that IT investments can provide based on qualitative benefits derived from "soft" initiatives (i.e. those initiatives that "increase[e] organizational cohesion and the capacity and proficiency to act, react, or transform", but that are very difficult to measure from a purely financial perspective). This could include initiatives that provide benefits such as workplace capabilities, information access, knowledge management, collaboration, and so forth. Similarly, Dutta and Burgess (2003) generically described multi-criteria decision-making (MCDM) as a technique that provides decision makers with the information necessary to select from a set of alternative options based on a combination of quantifiable financial figures and other qualitative variables. Likewise, Cooper et al. (1997) described a proprietary model used by a private R&D company that weighed financial

consideration (with factors such as contribution to profitability, technological payback, and so on) with non-financial considerations (with factors such as business strategy fit, strategic leverage, probability of commercial success, and probability of technical success). However, at the same time, Cooper et al. (1997) discovered that while many companies claim to use such multifaceted project scoring models, many of them are either poorly constructed or they are applied inconsistently and/or inappropriately.

Specifically within higher education, Goldstein (2004) performed a mixed methods study on IT funding in higher education. He found that the use and application of standard criteria within IT project/funding proposals was inconsistent. Approximately 33% of the 482 respondents reported that their institutions did not use standard criteria for IT project funding/selection decisions. For the remaining 67% of respondents, a combination of financial and non-financial criteria were in use as shown in Table 2. Interestingly, fewer than half of those respondents identified risk as a criterion that they used; this could provide evidence to support Verhoef's (2002) claim that MPT does not apply directly to IT PPM, or it could indicate that institutions simply have difficulty in measuring risk for their IT projects.

Table 2

IT Investment Decision Criteria (N = 482) (Goldstein, 2004)

Criterion	Percentage Using
Cost	67.0
Fit with institutional strategy	65.6
Potential to improve productivity	64.1
Fit with IT strategy	61.2
Potential cost savings	57.5
Potential to improve compliance	46.3
Risk	45.6

Goldstein's (2004) study also measured respondents' perception of the efficacy of the business case metrics that they used within their IT funding/selection processes. It is worth

noting that respondents included the organizations' senior-most IT leader (typically Chief Information Officer, or CIO) and the senior-most financial business leader (typically Chief Business Officer, or CBO). The technology and non-technology leaders were in relative alignment in their responses, and on average, they collectively perceived that their business cases only performed slightly well in accurately predicting the benefits of new technology, and in accurately presenting initiatives' one-time or ongoing costs.

Although Goldstein (2004) identified a small number of criteria that were actively used as part of campus IT investment decisions (as identified in Table 2), one must wonder if practitioners were really limiting the criteria in IT project proposals to the degree and/or high level represented in the study, or if any of those criteria were really higher-order factors representing the combination of individual lower-level variables.

Goldstein's (2004) study explored funding and project selection/prioritization in higher education IT environments to some degree of granularity, but this is a rare exception and it has not been the traditional approach within IT PPM research. IT PPM literature often conceptualizes a top-down construct with organizational strategy being the primary driver of project and portfolio management execution (Clegg et al., 2018; Löwstedt et al., 2018), and with little attention paid to the potential for project or portfolio management to have a bottom-up effect. However, a growing number of researchers are suggesting that the relationships between strategy and IT PM/PPM are not as unidirectional as traditional literature would lead us to believe; within the real world, the practical execution of PM and PPM at the lower levels appears to be responsible for driving changes back up to the strategic level, and the dynamics of PPM as a decision making process (rational, or otherwise) are not understood well enough. There is a growing chorus of research voices suggesting that practice-based research of PM and PPM are

necessary in order to understand these dynamics further (Clegg et al., 2018; Jerbrant & Gustavsson, 2013; Löwstedt et al., 2018; Martinsuo, 2013).

Summary

As shown in this literature review, the discipline of project portfolio management is broad. PPM is comprised of many elements; there are many factors that influence, constrain, and impact PPM; and there are many prerequisites for PPM success. The formal origins of portfolio management date back to the early 1950s with Markowitz' Modern Portfolio Theory, and project portfolio management can be viewed through the theoretical lens of organizational theories and agency theory. However, the application of portfolio management to information technology environments only dates back to the early 1980s, making this a very young area of study.

This study is focused on the selection and prioritization of projects within the portfolio in higher education information technology environments. The literature review has placed attention on the relevant prior research, but there have been very few studies focused on this specific set of processes in this particular environment. More broadly, prior studies on PPM in information technology environments have often conceptualized a top-down construct with organizational strategy being the primary driver of project and portfolio management execution. However, recent research has suggested that the relationships between strategy and IT PPM are not as unidirectional as traditional literature would lead us to believe; in real world environments, practical execution of PM and PPM appears to be responsible for driving changes back up to the strategic level. Following the routes and recommendations of recent researchers, this study is focused on the everyday practice of project selection and prioritization, as opposed to focusing on what "should be done".

CHAPTER 3

METHODOLOGY

As noted in the literature review in Chapter 2, there has been minimal research on project selection and prioritization within higher education IT environments. Additionally, researchers have recognized the limitations in IT PPM research outside of higher education IT environments. Recently there has been an increasing call for practice-based research that studies the way that IT PPM occurs in the field instead of continuing to focus on the same top-down constructs as envisioned by traditional researchers. To that end, this study used a qualitative research design and included a practice-based exploratory multiple-case study focused on the specifics of project selection and prioritization within higher education IT environments as they occur in real world settings.

A case study is an empirical study that investigates a contemporary phenomenon in depth and within its real-life context, where the inquiry is focused on a situation that includes more variables of interest than data points, and where results rely on multiple sources of evidence that must all be converged and triangulated (Yin, 2009). In addition, three conditions must be met in order to consider a case study as the appropriate research method (Yin, 2009). The first condition is that the research questions must be in the form of "how" or "why" questions or they must be in the form of "what" questions where the "what" is exploratory in nature. The second condition is that control over behavioral events is not required. The third condition is that the study must be focused on contemporary events. These conditions were all met and the case study (specifically, a multiple-case study) was determined to be the most appropriate method for this study.

Research Questions

This study was guided by the following research questions:

1. RQ1: What are the variables, processes, organizational structures, and governance structures that are being used by higher education decision makers when they are considering the selection and prioritization of IT projects into their university's portfolio? The variables that are specifically under study are those that are captured, weighted, and measured within project scoring instruments.
2. RQ2: How do perceptions of technical university leaders compare and contrast to their non-technical counterparts, as they pertain to the importance placed on the variables (in terms of the number and types of variables, or the level of importance placed upon them)?
3. RQ3: How do perceptions of technical university leaders compare and contrast to their non-technical counterparts, as they pertain to IT project selection and prioritization processes?
4. RQ4: How do perceptions of technical university leaders compare and contrast to their non-technical counterparts, as it pertains to the organizational structures and governance structures involved in selection and prioritization processes?
5. RQ5: Does an exploratory factor analysis on the variables of importance (i.e. those variables that are being used in project scoring and selection instruments) reveal a smaller number of underlying interpretable factors that might contribute toward the creation of a model that could be used to assist decision makers in the practical selection and prioritization of IT projects into university portfolios?

Population and Sample

The population under study included all 23 universities in the California State University (CSU) system (n = 23). This population was selected primarily based on the homogeneity of the universities within the CSU system, with all of them sharing the following characteristics:

- All are four-year public state universities in the state of California
- All are centrally guided and governed by the CSU Chancellor's Office
- All have similar values/missions
- Many use the same standardized CSU business processes, including many technology management processes
- Most of them (18 of 23) fall within the same Carnegie Classification of Masters Colleges and Universities (California State University, n.d.; Indiana University Center for Postsecondary Research, 2017).

The study design included a convenience sample from the population, with each sample university serving as an individual case within the multiple-case study; i.e., the unit of analysis was an individual university, and each university was considered an "embedded" unit (Yin, 2009). Although there is no universally accepted method for determining the appropriate number of cases in a multiple-case study, there is some guidance (albeit, paradoxical in several regards). Yin (2009) advises that the researcher can consider individual cases in a multiple-case study in the same general manner as one would consider multiple experiments in a replication study. However, there is not a case selection method that is directly analogous to the statistical sampling methods used in quantitative replication experiments, and case sample size is a matter of the researcher's discretion. Yin (2009) suggested that the number of cases could range from two to six (or perhaps even more), depending on the complexity of the phenomenon under study

and the degree of certainty that the researcher hopes to have about the analysis and conclusions. Interestingly, Yin (2009) also suggested that it is difficult to determine the number of cases to include in advance, while at the same time broadly suggesting that the case study design should follow a well-planned and predetermined path.

In order to abide by Yin's (2009) recommendation of a well-planned and predetermined design, and in order to include enough cases to meet the minimum inclusion recommendation, two different factors were used to help guide the number of cases that would be selected (as described in Table 3). Total FTES was selected as a factor based on Goldstein's (2004) finding that institution size (as measured by FTES enrollment) is one of the most significant factors for purposes of examining issues in higher education IT funding. Although this dissertation study was not focused specifically on funding, the fact remains that funding and finance have an implicit impact on the selection and prioritization of IT projects. Total FTES was known in advance of sampling. Separately, Degree of IT Centralization was selected as a factor because IT centralization is impacted by, and rooted in, organizational theory and agency theory. As noted in the literature review, PPM is often viewed through the theoretical lens of organizational theory (Jerbrant, 2013; Jerbrant & Gustavsson, 2013; Kaiser et al., 2015; Teller et al., 2011) and agency theory (Turner & Keegan, 2001; Zwikael & Smyrk, 2015). Degree of IT Centralization could not be determined in advance, and was determined through subjects' responses to an introductory questionnaire. The intended sample size included six universities based on the number of classifications within each factor (n = 2*3, or 6). In the end, eight universities were included in the sample, exceeding the original design by two universities. This difference was a function of the number of universities that were willing to participate in every aspect of the study versus those that were willing to participate in select aspects of the study, as described later.

Table 3

Factors for Determining Sample Universities

Variable	Num. of Classifications	Classification Ranges/Values
Total FTES[a]	2	1-19,999
		20,000+
Degree of IT Centralization	3	Mostly decentralized
		Evenly centralized/decentralized
		Mostly centralized

[a]FTES = Full Time Equivalent Students enrolled at the university

Table 4 shows the Total FTES from all CSU universities for fall 2018 (California State University, 2018). These counts include all undergraduate, graduate, and international student enrollments. The researcher is actively employed at Chico, and that university was excluded as a potential sample university in order to avoid undue influence and bias.

Table 4

Total Full Time Equivalent Students for Fall 2018 (California State University, 2018)

University	Total FTES	Classification
Fullerton	32,529.80	20,000+
Northridge	32,409.10	20,000+
San Diego	31,987.80	20,000+
Long Beach	31,571.00	20,000+
San Jose	27,978.90	20,000+
Sacramento	26,719.40	20,000+
San Francisco	25,093.60	20,000+
Los Angeles	23,605.70	20,000+
Pomona	23,078.20	20,000+
Fresno	22,236.00	20,000+
San Luis Obispo	21,204.20	20,000+
San Bernardino	17,748.60	1-19,999
Chico	16,437.30	1-19,999
Dominguez Hills	12,711.50	1-19,999
East Bay	12,371.20	1-19,999
San Marcos	12,288.30	1-19,999
Bakersfield	9,211.60	1-19,999
Stanislaus	8,760.30	1-19,999
Sonoma	8,673.50	1-19,999
Humboldt	7,362.00	1-19,999
Monterey Bay	6,700.80	1-19,999
Channel Islands	6,277.30	1-19,999
Maritime Academy	1,106.60	1-19,999

Potential subjects from each sample university were divided into two distinct groups, referred to as “Group #1” and “Group #2”. Group #1 subjects included the managerial representative of the central IT project management office (PMO) at each university; i.e., the director/manager of the PMO, or the closest approximation thereof. These subjects were considered technical leaders/decision makers (i.e. information technology professionals). The study design included gathering a greater and more in-depth amount of information from Group #1 subjects including an introductory questionnaire, an in-depth semi-structured interview, and identification of potential Group #2 subjects. Given their role as in-depth information providers, Group #1 subjects were considered primary “informants” (Yin, 2009). Group #2 subjects included other university leaders/decision makers (assumed to be primarily comprised of managers) responsible for participating in IT project selection and prioritization processes, as identified by Group #1 subjects. The intention was to comprise Group #2 of a combination of two technical decision makers and three non-technical decision makers from each of the sample universities. The study design included a structured set of focused open-ended interview questions for Group #2 subjects.

There is no universally accepted method for determining the appropriate number of subjects within each case in a multiple-case study. But, as with selecting the number of cases in a multiple-case study (as described above), Yin (2009) implied that the appropriate number of subjects depends on the complexity of the phenomenon under study and the degree of certainty that the researcher hopes to have about the analysis and conclusions. Yin (2009) also essentially suggested that data collection should continue until enough relevant/unique information has been retrieved to allow for an exhaustive analysis. Likewise, Yin (2009) suggested that although it is difficult to determine the number of subjects to include in advance, the case study design should

still follow a well-planned and predetermined path. Taking all of these issues into consideration, the original study design included 36 total subjects across Group #1 and Group #2, comprised of an equal number of three technical and three non-technical subjects from six sample universities as defined below:

- Six technical subjects from Group #1 (one each, from six universities)
- 12 technical subjects from Group #2 (two each, from six universities)
- 18 non-technical subjects from Group #2 (three each, from six universities)

In the end, 27 subjects participated in the study across Group #1 and Group #2. This was fewer than the original design of 36 subjects, and was a result of the number of universities that provided full participation (as described above), combined with the number of Group #2 subjects that were available for inclusion at any of those fully participating universities, as described later.

Case Study Data Collection Principles

Yin (2009) outlined three principles of data collection for case studies, and these principles were used to guide the design and data collection for this dissertation. The first case study data collection principle is that multiple sources of evidence should be gathered and analyzed. Using multiple sources of data allows for the development of converging lines of data through triangulation and corroboration of multiple types/articles of evidence, and contributes toward construct validity (Yin, 2009). Yin (2009) enumerated six possible sources of evidence including documentation, physical artifacts, archival records, interviews, direct observation, and participant observation. It was determined that it would be possible and reasonable to collect four of these types of evidence for this case study. The first type of evidence was documentation, in the form of information collected from publicly accessible websites, business process guides, presentations, email correspondence, and so on. The second type of information

was physical artifacts, in the form of the instruments that are used during IT project selection and prioritization processes; although digital in nature, these typically go beyond mere documentation and tend to be in the form of interactive software tools that can be used to enter data and get a calculated score (thus falling within Yin's (2009) example of "a technological device [and/or] a tool or instrument"). The third type of information was interviews, in the form of in-depth interviews with Group #1 subjects and focused interviews with Group #2 subjects. The fourth and final type of information was archival records, in the form of lists of current and/or previously approved/prioritized projects in the universities' IT project portfolios. It was determined that observation would not be viable due to financial and distance constraints, and participant-observation would not be appropriate/possible.

The second case study data collection principle is that a case study database should be used to organize and document the data collected, with a particular focus on separating the data/evidence from the final results/findings and in presenting the database and its evidence within the case study itself (i.e., not just presenting the findings in absence of the evidence) (Yin, 2009). The case study database contributes toward reliability of the study (Yin, 2009). This study conformed to this principle by using a combination of a simple spreadsheet (Microsoft Excel) to log instances of all the sources/types of evidence, word processing documents (Microsoft Word) to capture the researcher's notes about the evidence (including initial findings and themes), word processing documents (Microsoft Word) to capture interview transcripts, and NVivo 12 Plus for coding and analysis of all data (including additional detailed findings and themes). The data/evidence and the resulting analysis/notes are described later and are included throughout the appendixes of this study.

The third case study data collection principle is to maintain a chain of evidence (Yin, 2009). The chain of evidence should clearly demonstrate the linear connections between the case study questions, the case study design protocols, the citations and references to the specific evidentiary sources in the case study database, the case study database itself, and the ultimate results/findings (Yin, 2009). The chain of evidence combines with multiple sources of evidence (the first principle) to contribute toward construct validity, and it combines with the case study database (the second principle) to contribute toward reliability of the study (Yin, 2009).

Data Collection

Data collection began in July 2019 by gathering FTES data for all 23 of the CSU universities, and by reviewing publicly available IT organizational charts at each of the universities' websites in order to determine the contact information for potential Group #1 subjects. As mentioned above, Group #1 subjects included the managerial representatives from the central IT project management offices (PMOs) at sample universities. There were two universities for which the appropriate Group #1 subject could not be determined because organizational charts were not publicly available and there were no publicly available alternative means of determining the appropriate contact; another university was intentionally excluded to avoid bias (the university where the researcher is employed). This resulted in 20 universities that were viable for inclusion.

An invitation with an introductory questionnaire (included in APPENDIX A) was emailed to the potential Group #1 subjects at each of the 20 viable universities, and nine of the subjects accepted the invitation to participate (from eight unique universities) resulting in a multiple-case study with eight cases (AKA "embedded units"). The introductory questionnaire was designed to gather organizational information and to assist in the collection of information

related to the instruments, variables, processes, organizational structures, and governance structures that are used during IT project selection and prioritization processes at the universities. The questionnaire asked respondents to provide copies of their instruments and any other relevant documentation (e.g. websites, business process guides, lists of prioritized projects, etc.), asked if they would be willing to participate in in-depth interviews, and asked if they would be willing to provide the names of people who would be appropriately included as Group #2 subjects. Given their role as in-depth information providers in the study, Group #1 subjects were considered primary "informants" (Yin, 2009). The nine Group #1 subjects provided information and evidence, to varying degrees, and it was all entered into the case study database and closely analyzed prior to the interviews (as described in the Data Analysis section later). The case study database is described in detail in APPENDIX C.

Although the original study design was intended to include six universities, eight universities were actually included. This pivot was made based on the subjects' responses to the introductory questionnaire. The Group #1 subjects from four universities agreed to provide evidentiary information, participate in interviews, and provide the names of Group #2 subjects. The remaining four Group #1 subjects agreed to provide evidentiary information and participate in interviews, but did not agree to provide the names of Group #2 subjects. But based on the information that this latter group provided within the questionnaire, it quickly became clear that their inclusion would still be highly valuable in helping to answer research question #1 and to contribute to all the research questions within the cross-case synthesis. It is worth noting here that deviations from the original design, in terms of the number of sample cases and the number of participating subjects, should be considered typical for case study research (Yin, 2009). For the remainder of this study, universities that participated in every aspect of the study (including

the inclusion of Group #2 subjects) are referred to as “full participants”, and universities that excluded Group #2 subjects are referred to as “partial participants”.

A semi-structured set of open-ended in-depth interview questions was designed for the Group #1 subjects (the interview questions are included in APPENDIX B). The questions focused on the general make-up and function of the PMO, and (more importantly) focused on Group #1 subjects’ perceptions related to the variables, processes, organizational structures, and governance structures that are used in their project selection and prioritization processes. The interviews were conducted over the phone and extensive transcript notes were taken. Several of the Group #1 subjects provided additional documentary evidence during and/or following the interviews, by way of email and/or verbally explaining where the information could be found online. During the interviews, the subjects were also asked to provide the names of potential Group #2 subjects in a snowball sampling method, based on Group #2 subjects’ participation/roles in IT project selection and prioritization processes.

Following the interview with the Group #1 subject at each university, invitations were sent to the Group #2 subjects (for the four universities where this was possible). Group #2 subjects included university decision makers responsible for participating in IT project selection and prioritization processes. The study design included two technical decision makers and three non-technical decision makers from each of the sample universities. A structured set of focused open-ended interview questions was designed for these Group #2 subjects, and the questions were primarily focused on interviewees’ perceptions related to the variables, processes, organizational structures, and governance structures that are used in their project selection and prioritization processes (the survey questions are included in APPENDIX B). Unlike the Group #1 subjects, Group #2 subjects were not asked about the details of the PMO make-up or function.

The interviews were conducted over the phone and extensive transcript notes were taken. In nearly every case, the information that was provided by Group #2 subjects was limited to their answers to the interview questions (i.e. they did not provide additional documentary evidence in the same way that the Group #1 subjects did). For any given university, it typically took several weeks to correspond with the collection of Group #2 subjects, to schedule and conduct the interviews.

Following the interviews with the Group #2 subjects at each university, all of the evidence, including the interview transcripts, was analyzed again and all of the information was converged and triangulated. This comprised the informational basis for each individual case. This progression occurred across multiple universities in parallel over a seven-month period. In total, across all eight universities, 27 subjects were included from Group #1 and Group #2. This was fewer than the original design, which included 36 subjects. This was a result of the differing levels of participation (i.e. “full participation” and “partial participation”) combined with the number of Group #2 subjects that were available for inclusion at any “fully participating” university. Again, such variance should be considered typical for case study research (Yin, 2009).

Figure 4 shows the basic progression of data collection for an individual “full participant” case. Again, this progression occurred across multiple universities in parallel throughout the duration of data collection. After all the analysis was done for each of the individual cases, information was converged and analyzed for the cross-case synthesis. Results were reported, conclusions were drawn, recommendations were made, and the study was completed in January 2020.

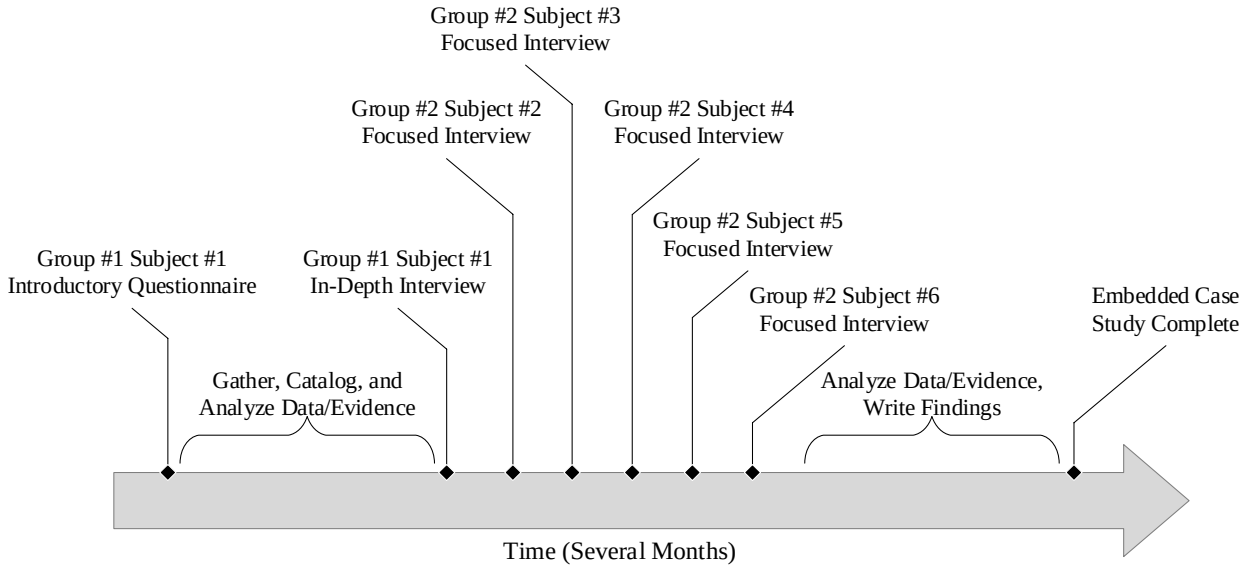


Figure 4. Data Collection Progression (Individual Case).

As a final data collection highlight, it is worth noting that a design decision was made early to protect the confidentiality of the subjects. Although Yin (2009) suggests that disclosing the identities of study subjects/organizations is desirable, there are also times when anonymity is desired. In the case of this study, it was deemed that the findings could potentially be considered sensitive both within and across participating universities. Confidentially was communicated and protected in multiple ways beginning with data collection. Subjects were informed that confidentiality would be protected within the Informed Consent to Participate in Research form. Subjects were also asked not to reach out to, or discuss, their participation with other participants at their university (in the event that they became aware of those other participants through their own communications/means). Finally, the names of subjects/universities were redacted from the evidence that was collected, and contrived codes/names were used when referring to subjects, universities, and individual departments throughout the findings in this study

Data Analysis

As mentioned in the Data Collection section above, the first step of data collection for each case (i.e. each sample university) was to reach out to the Group #1 subject with an

introductory questionnaire to gather evidence related to the instruments, variables, processes, organizational structures, and governance structures that they use during IT project selection and prioritization processes. Information was gathered and analyzed in advance of interviews in order to provide the researcher with context and an understanding of the tools and processes being used by the university. The amount and type of evidence varied broadly across the sample universities. In some cases, subjects were able to provide vast amounts of documentation (e.g. publicly accessible websites, business process guides, presentations that they had provided to their internal university constituents, and so on), artifacts (e.g. copies of their project scoring instruments), and archival records (e.g. copies of current/previous projects that had been approved and prioritized). In other cases, subjects were able to provide little more than archival records (in cases where business processes were not well defined and/or where instruments were not in use).

In every case, each individual piece of evidence was cataloged in the case study database; an entry was included in the case study database log, and a set of narrative notes were included in the case study database notes file. All evidence was analyzed thoroughly. The instruments that the subjects use to score and prioritize projects were closely reviewed, and the variables that are included within those instruments were catalogued into a single spreadsheet (in Microsoft Excel) and analyzed. Attention was paid to the weightings and scores attached to each variable, and data were normalized in order to compare the variables across universities. Notes were taken about points of interest and/or confusion, and these notes were used to help frame tailored follow up questions and/or to provide focus on specific predetermined interview questions for each individual sample university/subject (where applicable).

The next step for each case was to hold the in-depth interview of the Group #1 subject. Interviews were held over the phone, and extensive transcript notes were taken. During the interviews, the evidence that was previously collected was open on the researcher's desktop computer. In addition to the semi-structured open-ended questions, subjects were also asked the specific tailored questions about the points of interest/confusion that were taken during analysis. An individual transcript file for each interview was used to capture transcript notes, and the transcript notes were imported into NVivo to perform additional analysis and open coding later. Open coding is the process of categorizing and comparing events, actions, and interactions to determine similarities and differences between conceptually similar categories and subcategories (Corbin & Strauss, 1990). As part of the interviews, the Group #1 subjects were asked to provide the names of potential Group #2 subjects at their individual university. Several Group #1 subjects were able and willing to provide the names of the Group #2 subjects, whereas several others were not able or willing to do so.

The roles and responsibilities of the potential Group #2 candidates were reviewed for each case, and the next step was to invite them to, and complete, the focused interviews. As with the Group #1 subjects, interviews of Group #2 subjects were held over the phone, and extensive transcript notes were taken. The evidence that was previously collected was open on the researcher's desktop computer during the interviews. Structured open-ended questions were asked, although there were not any additional predetermined/tailored questions for this group. An individual transcript file for each interview was used to capture transcript notes, and the transcript notes were imported into NVivo to perform additional analysis and open coding later.

At this point, all the information that had been collected was used to perform case-specific analysis. Converging lines of data were developed through triangulation and

corroboration of all the evidence, and this formed the informational basis for each case. Results and findings were documented for research questions #1 - #4 wherever possible, with some exceptions. For instance, several of the universities do not use an instrument to capture or measure variables of interest, in which case question #2 could not be answered, since it is specifically focused on the perceptions of university leaders related to the specific variables used within scoring/selection instruments. Likewise, in other cases, the primary informant (the subject in Group #1) was willing to provide the instrument and other evidence, and was willing to participate in an interview, but was not willing to provide the names of the Group #2 subjects. In these cases, research questions #2 - #4 could not be answered, since they focused on comparing and contrasting perceptions of the technical and non-technical decision makers. Any such exceptions are clearly stated within the results for each case in Chapter 4. After all the individual cases were analyzed, the collection of information was analyzed in aggregate in order to answer research questions #1 - #5 as part of the cross-case synthesis; for clarity, research question #5 was only appropriately positioned within the cross-case synthesis (and not within the individual case studies). Additional observations were also documented; in some cases, these additional observations were only indirectly tied to original research questions but these results were still very interesting.

Throughout the analysis, particular attention was paid to the differences in perceptions between technical and non-technical stakeholders. Goldstein's (2004) study showed that in some cases technical business leaders (chief information officers) and non-technical business leaders (chief business officers) are aligned in some, but not all, of their perceptions of the efficacy of their PPM processes.

All results from the analysis of the artifacts that were gathered and the interviews that were conducted were synthesized into the results in Chapter 4, conclusions were drawn and recommendations were made in Chapter 5, and the study was concluded.

Summary

The study was guided by five research questions. Based on the nature of those questions, it was determined that a multiple-case study was the most appropriate method for this study. The population under study included all 23 universities in the California State University (CSU) system. Eight of these universities were included as sample universities/cases, and 27 subjects participated from the eight universities. The study followed three important principles of case study data collection, which collectively contributed toward construct validity and study reliability. The first principle is that multiple sources of evidence should be gathered and analyzed to allow for the development of converging lines of data through triangulation and corroboration of multiple types/articles of evidence. The second principle is that a case study database should be used to organize and document the data collected. The third principle is that a chain of evidence must be maintained to demonstrate the linear connections between the case study questions, the case study design protocols, the citations and references to the specific evidentiary sources in the case study database, the case study database itself, and the ultimate results/findings. Multiple types of evidence were gathered including documentation, physical artifacts, archival records, and interviews with subjects spread across two distinct groups. Converging lines of data were developed through triangulation and corroboration of all the evidence, and this formed the informational basis for each case. Results from each case were reported independently, and a cross case synthesis was conducted to aggregate findings across all eight cases, as described further in the next chapter.

CHAPTER 4

RESULTS

The results of this study are reported across several major sections within this chapter. The first section provides aggregated descriptive information about the cases and subjects, and information about the evidence that was captured and stored in the case study database. The next eight sections describe the findings within each of the individual cases/universities. The final section describes the findings of the cross-case synthesis. Yin (2009) suggested that it is the researcher's discretion to determine the appropriate ordering of the findings of individual cases versus the findings of the cross-case synthesis; for this study, it was determined that it would be more appropriate to report the findings of the individual cases first, and then follow with the cross-case synthesis findings.

Within the results for each individual case, and within the results for the cross-case synthesis, all attempts were made to anonymize and genericize references to specific organizational divisions/departments, IT units, governance bodies, and so on. The names used to represent these groups throughout the remainder of this study will necessarily not match the names that were found in the evidence and/or that were used by subjects during interviews. Likewise, any figures or tables that report on specific instruments or on PPM processes were created by the researcher as replicas of the originals, for the express purpose of this study; by virtue, the figures and tables represented here will not explicitly match the universities' originals. Finally, for the remainder of this chapter, research questions will be referred to as "RQ1" through "RQ5".

Descriptive Overview of Results

Table 5 includes the Total FTES and Degree of IT Centralization for the eight sample universities. There was an even distribution across the two classifications of Total FTES, in alignment with the original design. However, there was an unanticipated distribution across the three classifications of Degree of IT Centralization. Two of the universities in the study had an even mix of decentralization and centralization, six were mostly centralized, and there were no universities in the mostly decentralized classification. In the end, this meant that the sample universities were more homogenous than originally anticipated, at least in terms of their Degree of IT Centralization. This did not have a negative impact on the study. Each university was coded with a unique numeric University ID in order to provide anonymization and confidentiality. Throughout the remainder of this study, any reference to an individual case number corresponds to the individual University ID (e.g., "Case #1" corresponds to "University #1"). The ordering of University IDs was approximately based on the breadth and depth of participation combined with the amount of evidentiary information that was collected (i.e. University #1 is approximately the most robust case, and University #8 is approximately the least robust case).

Table 5

Sample Universities

University ID	Total FTES	Degree of IT Centralization	Study Participation
University #1	1-19,999	Mostly Centralized	Full
University #2	1-19,999	Mostly Centralized	Full
University #3	1-19,999	Mostly Centralized	Full
University #4	20,000+	Mostly Centralized	Full
University #5	20,000+	Even Mix	Partial
University #6	1-19,999	Mostly Centralized	Partial
University #7	20,000+	Even Mix	Partial
University #8	20,000+	Mostly Centralized	Partial

Table 6 includes the number and distribution of subjects from each of the eight sample universities and Table 7 includes the distribution of subjects according to their CSU job classifications. Table 8 includes the aggregated counts of the different types of evidence that were collected and logged in the case study database throughout the course of the study.

Table 6

Subject Counts by University and Group

		Group #2 Subjects	
University ID	Group #1 Subjects	Technical	Non-Technical
University #1 (*N* = 4)	1	2	1
University #2 (*N* = 5)	1	2	2
University #3 (*N* = 6)	1	1	4
University #4 (*N* = 7)	1	2	4
University #5 (*N* = 1)	1	0	0
University #6 (*N* = 1)	1	0	0
University #7 (*N* = 2)	2	0	0
University #8 (*N* = 1)	1	0	0
Totals (*N* = 27)	9	7	11

[a] The Group #1 subject at University #7 requested that a project manager in the PMO be included in the interview (thus, this is the only university with two subjects in Group #1).

Table 7

Subject Counts by Job Classification

Job Classification	Subjects
Senior Management	12
Middle Management	8
Staff	4
Faculty	3
Total (*N* = 27)	27

Note. The CSU has four primary management classifications (codified as Administrator I-IV), and hundreds of non-management staff and faculty classifications. For purposes of this table, Administrator III/IV were considered "Senior Management", Administrator I/II were considered "Middle Management", all non-managerial/non-faculty positions were considered "Staff", and all faculty/chair classifications were considered "Faculty".

Table 8

Case Study Database, Aggregated Evidence Counts

Evidence Type, Format	Count
Documentation	*N* = 84
Web page	42
PDF	16
Email correspondence	14
MS Word document	8
MS Excel document	2
JPEG screenshot	1
MS PowerPoint document	1
Interview	*N* = 27
Group #2 Subject	18
Group #1 Subject	9
Physical artifact	*N* = 13
MS Word document	5
PDF	4
MS Excel document	3
Google sheets	1
Archival Record	*N* = 13
Web page	10
PDF	3
Grand Total (*N* = 137)	*N* = 137

Case #1

University #1 was a full participant, with four total subjects across Group #1 (one subject) and Group #2 (two technical subjects and one non-technical subject). In total, 29 articles of evidence were collected and analyzed, including the four subject interviews. This university has a Total FTES of 1-19,999, and the Degree of IT Centralization is mostly centralized. The IT PMO includes four full-time staff, including a PMO manager. The PMO serves the entire university, and it is heavily involved in the campus-wide IT PPM processes. That said, only a small percentage of the PMO's time is spent on portfolio management or program management. The PMO spends the overwhelming majority of its time working on a combination of individual project management and "other activities". The approximate

aggregate breakdown of work activity for the PMO team, including the PMO manager is included in Table 9.

Table 9

University #1, PMO Effort across Activities

Activity	PMO Effort
Portfolio management	5%
Program management	5%
Individual project management	40%
All other activities[a]	50%

[a] Examples of "all other activities" include system administration for the ITSM/PPM platform and a few other systems, an assessment program, other various administrative duties, and so on.

University #1 uses a formally defined IT PPM process for project intake, analysis, selection, and prioritization for "major" projects. Project definitions and criteria for "major" and "minor" projects are shown in Figure 5.

Major projects are those where:

One or more of the following is true:

It's a new product or service that impacts IT, or
It's an upgrade to an existing product or service that impacts IT, or
It's mandated, sponsored, or funded by the Chancellor's Office

AND

One or more of the following is true:

The one-time cost is $5K+, or the cost for years 1-2 is $10K+, or
It will take 60+ IT staff hours to complete, or
It requires ongoing IT maintenance/funding, or
It's designated as a major project by senior leadership

Minor projects are those where:

One or more of the following is true:

It's a new product or service that impacts IT
It's an upgrade to an existing product or service that impacts IT
It's mandated, sponsored, or funded by the Chancellor's Office

AND

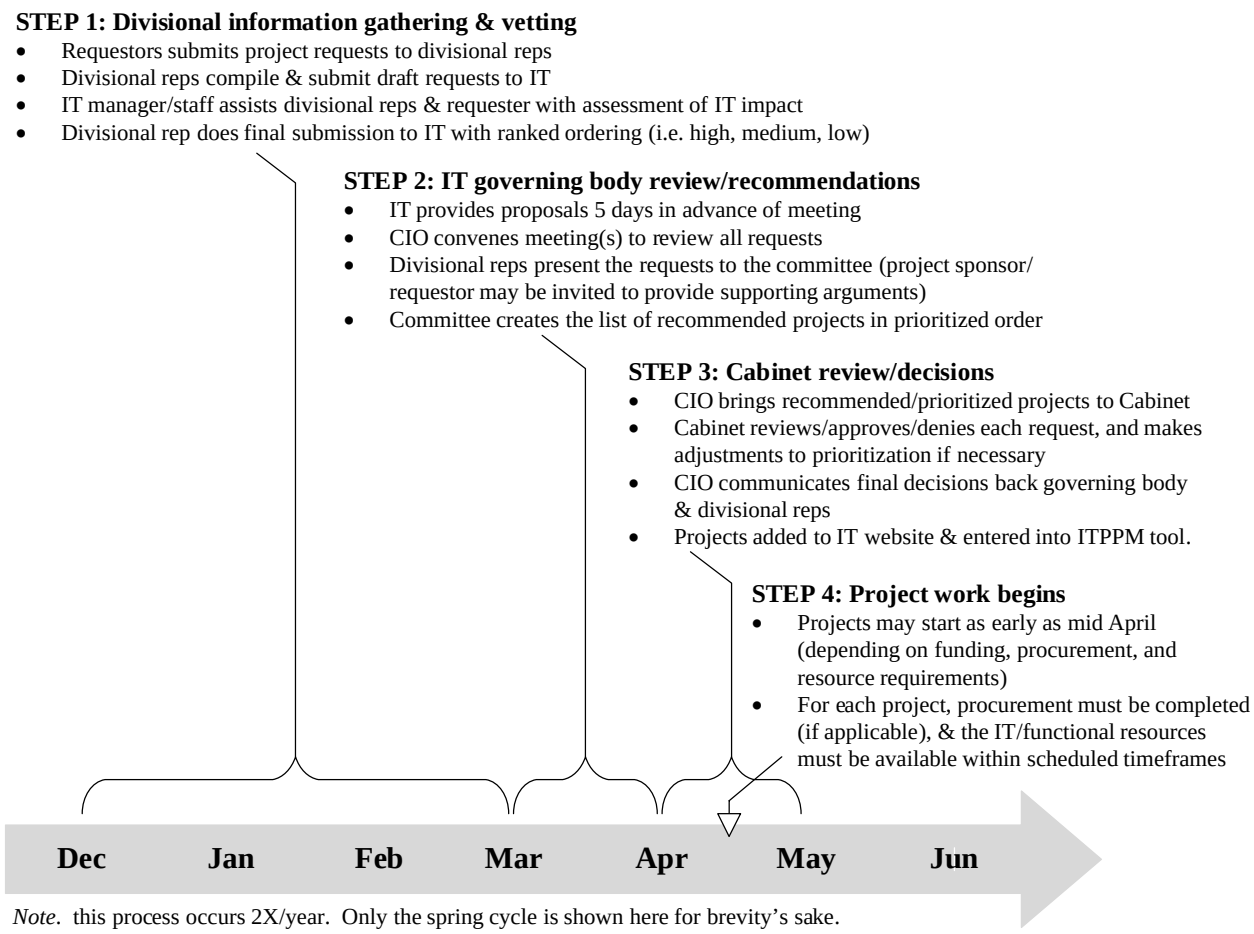
One or more of the following is true:

The one-time cost is ***less than*** $5K, or the cost for years 1-2 is ***less than*** $10K
It will take ***30-*** 60 IT staff hours to complete
It requires ongoing IT maintenance/funding
It's designated as a ***minor*** project by senior leadership

Note. The red ***bold/italic*** text denotes differences between major/minor definitions.

Figure 5. University #1 Project Definitions/Criteria.

The PPM process includes a multi-tiered governance structure, it occurs over two formalized bi-annual cycles, and it includes the use of an instrument to score variables of interest. The PPM process and governance structure can be understood and visualized from two different standpoints: that of the bi-annual cycle (as shown in Figure 6), and that of the interactions between the stakeholders and governing bodies (as shown in Figure 7). The process has a great deal of detail behind it, and the steps shown in the figures below are only intended to touch on the most visible/major portions of the process. It is worth noting that this university had undergone changes in senior leadership and organizational structure in the previous year, and was piloting some significant changes to their scoring instrument and their PPM process at the time that evidence was being collected for this study.



Note. this process occurs 2X/year. Only the spring cycle is shown here for brevity's sake.

Figure 6. University #1 PPM Process (Major Projects), Bi-Annual Cycle.

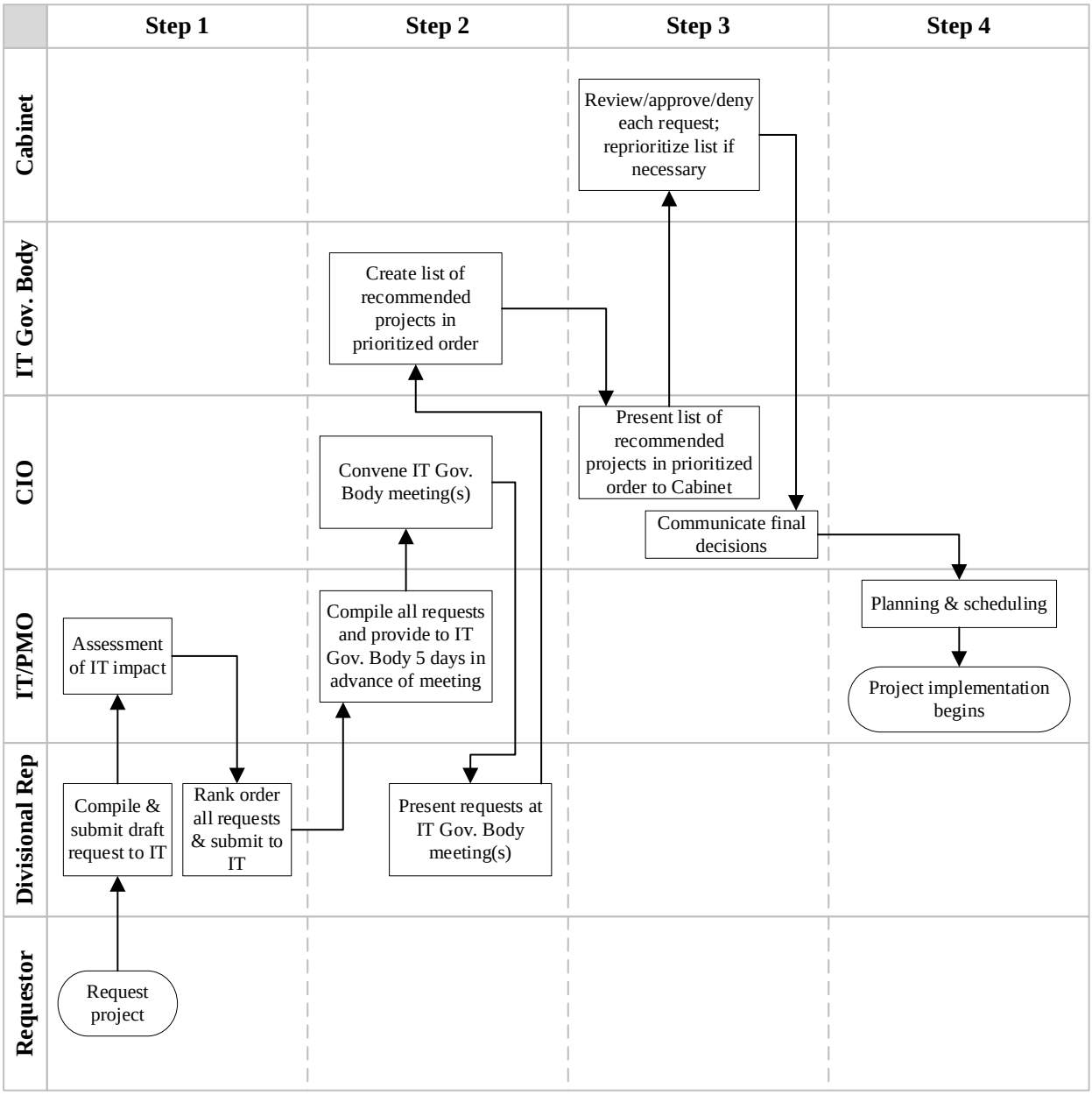


Figure 7. University #1 PPM Process (Major Projects), Stakeholders and Governing Bodies.

The divisional rep and the IT governing body are worth examining further. Each VP appoints one divisional representative to serve as the primary point of contact for the entire division for the IT PPM process (with one exception, in a VP division that has two reps). The divisional reps play a key role in coordinating between the project requestors in their division and IT/PMO, and they play a key role in coordinating between IT/PMO and the IT governing body. Members of the IT governing body are appointed by the CIO to provide recommendations

and input in the IT PPM process. Membership is appointed with the intention of representing perspectives from a broad sector of campus; there are roughly a dozen members. In addition to IT PPM participation, the IT governing body provides input on the IT strategic plan, creation of metrics and guidelines, development and review of university IT policies, and other input and guidance on general IT issues.

University #1 treats large-scale efforts of analysis, evaluation, and product selection as independent projects unto themselves. For example, if the university was going to procure and implement a large-scale system which required a large preparatory effort (i.e. to analyze functional requirements, develop an RFP, go out to bid, and award a contract) then the preparatory effort would be treated as an individual project in and of itself, and the actual system implementation would be treated as a separate individual follow-up project. This is akin to "a project to define a project."

University #1 also uses a formally defined process for "minor" projects (defined earlier in Figure 5), which is much simpler than the process for major projects. Minor projects can be submitted year-round (there is no "cycle"), but the requestor must submit the project request directly to IT (instead of directly to the divisional rep) at least 20 days in advance of the intended start date. The divisional rep is notified for transparency, and IT evaluates the requests on a first-come first-served basis. Minor projects are scheduled as capacity permits. As with major projects, scheduling must accommodate procurement (if applicable) and the IT and functional resources must be available within the anticipated/scheduled timeframes.

University #1 also has an emergency/escalation process for both major and minor projects that allows for rapid acceptance and prioritization of critical/urgent projects that were not able to go through the normal process.

University #1 differentiates between major/minor projects, and "operations", by essentially defining operations as ongoing, repetitive, day-to-day work, which yields the same outcomes/product/service, with no start/end dates, for tasks that typically take less than 30 IT staff hours to complete. The types of responsibilities that might fit into operations include routine system administration/maintenance, patches, bug fixes, minor functional enhancements (that take less than 30 hours), departmental/university committees/meetings, and so on.

University #1 performs IT capacity planning on a six-month interval in advance of step #1 of the IT PPM process, in order to inform project selection and prioritization based on the amount of work that can realistically be accomplished in the upcoming period. They review each IT employee's area of responsibilities (including current and upcoming projects and operational work), starting first with employees who are highly constrained ("bottleneck" resources). Bottleneck resources are those who are in high demand across a large number of projects and/or who have a large operational support responsibility. For example, these include PeopleSoft developers, infrastructure/single-sign-on administrators, web developers who build custom web applications, project managers, and so on. A review is done to determine the amount of time that is required for each employee to perform the area of responsibilities, and any time that is left over is made available for IT projects.

Project requestors typically submit their requests via the online IT PPM tool. Within Step #1 of the IT PPM process, additional information is gathered to help assess the effort, impact, risk, and urgency of the project request. This has traditionally been done through a combination of tools (including a legacy project scoring instrument), but the university was piloting a new project scoring instrument at the time the evidence was being collected for this study. A redacted/curated version of the new/pilot instrument is shown in Figure 8.

Organizational Effort Required (Completed by IT)					
Criteria	**Low (2 points)**	**Medium (3 points)**	**High (5 points)**	**Very High (8 points)**	**Score**
Estimated IT work hours	30 - 100	101 - 200	201 - 300	More than 300	2 - 8
Estimated IT work duration	< 2 months	2-6 months	6-12 months	> 12 months	2 - 8
Total team size (# of persons, inside & outside of IT)	1 - 4	5 - 9	10 - 14	15 +	2 - 8
# of cross-functional workgroups & teams involved (Inside & outside IT)	1 - 2	3 - 4	5 - 6	7 +	2 - 8
Technology and/or business process	In-house expertise; already in widespread use	Familiar; already in limited use, may require limited changes	New to campus; requires significant changes to existing processes	New to campus; requires new business process altogether	2 - 8
Complexity	Solution is well defined; no problems expected	Solution is known; some problems expected	More than 1 approach available	Solution unknown or vaguely defined	2 - 8
PeopleSoft data requirements	No involvement; data already available to campus developers	Campus developers able to extract data from PS and add to other data sources	Financials **OR** Records customization or data extraction	Financials **AND** Records customization or data extraction	2 - 8
				Org. Effort Score	**14 - 56**
Impact/Value for IT (Completed by IT)					
Criteria	**Low (2 points)**	**Medium (3 points)**	**High (5 points)**	**Very High (8 points)**	**Score**
Is this a warranted maintenance upgrade for an existing system?	No	N/A	Yes	N/A	2 - 5
Does the system deliver a more robust platform to support expansion of IT systems?	No	N/A	Yes	N/A	2 - 5
				Impact/Value (IT) Score	**4 - 10**
Impact/Value for the Business Unit (Completed by the Requestor and Sponsor)					
Criteria	**Low (2 points)**	**Medium (3 points)**	**High (5 points)**	**Very High (8 points)**	**Score**
Supports strategic initiative #1	Does not support	Supports 1 objective	Supports 2 objectives	Supports 3 + objectives	2 - 8
Supports strategic initiative #2	Does not support	Supports 1 objective	Supports 2 objectives	Supports 3 + objectives	2 - 8
Supports strategic initiative #3	Does not support	Supports 1 objective	Supports 2 objectives	Supports 3 + objectives	2 - 8
Supports strategic initiative #4	Does not support	Supports 1 objective	Supports 2 objectives	Supports 3 + objectives	2 - 8
Cost	Only costs staff time	Staff time + up to $1,000 (one-time)	Staff time + < $5K (one-time), OR <$5K (annually)	Staff time + > $5K (one-time) OR > $5K (annually);	2 - 8
Return on investment (ROI)	Cannot be calculated **(-8)**	Generates $0-$5,000 in revenue, cost savings or salary savings per year	Generates $5,000-$25,000 in revenue, cost savings or salary savings per year	Generates >$25,000 in revenue, cost savings or salary savings per year.	-8 - 8
Student impact	Does not directly serve students	Serves a limited set of students, or indirectly serves all students	Directly serves all current OR prospective students	Directly serves all current AND prospective students	2 - 8
Department impact	Serves 1 dept.; optional to others; no impact to enterprise systems, and <10% of Univ. users	Serves multiple organizations; impacts enterprise systems and/or >10% of Univ. users	Campus-wide impact; impacts enterprise systems	System-wide impact; regulatory requirement	2 - 8
Does this project reduce or eliminate paper-based workflows or practices?	No observable impact, unknown or may increase paper-based processes	N/A	Observably reduces or eliminates 1 paper-based workflow or process	Observably reduces or eliminates multiple paper-based workflow or process	2 - 8
Is this required or mandated by the President or the CSU CO?	No	N/A	N/A	Yes	2 - 8
Is sensitive or confidential data being compromised, or at risk of being compromised?	No	N/A	N/A	Yes	2 - 8
Is campus out of compliance, or at risk of being out of compliance?	No	N/A	N/A	Yes	2 - 8
Is this required to fulfill the core functions of the requesting unit or division?	No	N/A	N/A	Yes	2 - 8
				Impact/Value (Bus.) Score	**16 - 104**
				Total Impact/Value Score	**20 - 114**
Urgency for the Business Unit (Completed by the Requestor and Sponsor)					
Description	**Low (5 points)**	**Medium (8 points)**	**High (13 points)**	**Very High (21 points)**	**Score**
Urgency	Important for one organization	Urgent for one organization	Important for multiple organizations	Urgent for entire campus	5 - 21
				Urgency Score	**5 - 21**
				GRAND TOTAL	**39 - 191**

Figure 8. University #1 IT Project Scoring Instrument.

The case information provided above for University #1 answered RQ1, by describing the variables, processes, organizational structures, and governance structures that are used for selecting and prioritizing IT projects.

All subjects (technical and non-technical) were generally aligned in their perceptions of the project scoring instrument, and the variables that are tracked/scored within it (RQ2). All subjects held similar opinions about the shortcomings of the legacy project scoring instrument, and seemed optimistic about the new one. The primary theme that emerged was related to objectivity. All subjects were keenly interested in understanding how project requests compare to one other in an objective manner, and they were interested in the ability of the new instrument to help decision makers select projects that align with important campus strategic priorities and initiatives. Subjects consistently commented that the legacy instrument was susceptible to subjectivity, it favored some areas of campus more than others, and it did not provide enough information to decision-makers about whether or not any given project was truly aligned with (or in support of) important strategic priorities and initiatives. Multiple subjects mentioned that the new instrument was specifically designed to address these issues, and although they had not yet gone through an IT PPM cycle with it, they felt that its design would mitigate the legacy issues. Regarding the new instrument, subjects used words and phrases like “more objective”, “fair standards”, “reduces subjectivity”, “appropriate”, “aligns with campus priorities”, and so on. Subjects generally agreed that the selection and mix of variables was good, but nobody commented on any specific variable, weighting, or scoring range.

One technical subject discussed the perception of rigidity that was baked into the legacy instrument/process, wherein a project request might receive a score that was just under an unspoken threshold, and that project request would be denied. The subject expressed a strong

desire to overcome this problem, but it was not immediately apparent from the interviews or other evidence that the new instrument in and of itself could solve this problem. Based on the analysis of all evidence, it is possible that this issue would need to be resolved through a combination of retooling and through the PPM selection/prioritization decision-making process (e.g. perhaps to reduce the minimum score threshold, or to give more credence to projects that support a specific area/need that does not quite rise to the level of "strategic initiative").

Subjects' perceptions of the IT project selection and prioritization processes (RQ3) varied across several themes, including transparency/communications, responsiveness, and flexibility/rigidity, among others. Some of the variance in perceptions of transparency were related to internal IT processes that occur between step #1 and step #2 of the IT PPM process. As mentioned earlier, IT and the PMO do capacity planning on six-month intervals, in preparation for the IT PPM process. They use that information to provide relatively strong recommendations to the IT governing body about the projects that should be approved. On the one hand, this makes sense; it would not necessarily behoove the organization to approve and prioritize a set of projects that could not possibly be accomplished. On the other hand, the lack of transparency is causing confusion. One subject did not understand how or why IT/PMO was making the determinations for their recommendations; one subject perceived IT/PMO as railroading the process to get approval on the projects that they wanted to work on; and yet another subject knew what was happening and why, and appreciated that IT/PMO took the approach of analyzing capacity and recommending the projects with the best chance of succeeding so as to avoid wasting everybody's time. The primary theme is that there is confusion resulting from a lack of transparency, and it could potentially be avoided by getting buy-in from all stakeholders on the acceptable practice of using capacity planning to inform

project selection/prioritization recommendations, and formally documenting it as part of the IT PPM process. There were a few other similar points of confusion about the IT PPM process and/or the decision-making within it, and all of them essentially boiled down to the same issue: a lack of transparency due to an undocumented or unrevealed piece of the process.

On a related note (still within RQ3), there was disagreement about the degree of transparency and communications related to the status of any given project request throughout the IT PPM cycle. The technical subjects closest to the PPM processes and tools believed that there is good visibility about the status of any given submission/request at all times. However, others disagreed and mentioned that they are often unsure about the status of their divisional requests, and expressed some frustration at not hearing any status updates for months until finally learning that their project request(s) had been denied. In some cases, this occurs for the same project request over multiple bi-annual PPM cycles. Similarly, under the theme of responsiveness, there are challenges in the ability of IT/PMO to respond to requestors in a timely manner to consult on project requests when they are submitted (e.g., to provide IT perspective on the appropriate technical solution and/or on the level of effort required). However, in this area, all subjects seemed to agree that there was quite a bit of room for improvement, and this is an area of focus for upcoming PPM process changes.

Finally, with regard to RQ3, a theme emerged on the importance of flexibility. All subjects talked about the need for flexibility within the PPM process and within the tools that are used to manage PPM data/information. Subjects referred positively to multiple aspects of the PPM process that they viewed as providing enough flexibility. Likewise, multiple subjects referred negatively to some aspects of the PPM process that they viewed as overly “rigid” or “mechanical”. Multiple subjects (technical and non-technical) acknowledged that flexibility is a

double-edged sword. As one subject pointed out, it is important to have formality and standards that contribute to a predictable and efficient PPM process, but at the same time the standards and processes must be flexible and dynamic enough to work in the real world ("formality with flexibility").

Subjects' perceptions of the organizational structures and governance structures involved in the PPM processes (RQ4) were primarily focused on how/why/where decision-making occurs. Multiple subjects explicitly expressed confusion about *decision-making*, but the issues appeared to be at least partially related to the recurring theme of transparency. At least one subject mentioned that the divisional reps compile prioritized lists, and the IT governing body reviews and forwards the lists (with some minor modification) to the cabinet, but the final decisions do not always seem to align with those conversations and/or the highest priority projects are not always selected. Another subject opined that the "real" decisions are often made at a level that is too low in the organization and that higher order strategic decisions are not always occurring where they really should (harkening back to the earlier notion that IT/PMO is pushing an agenda). Again, this seems to come back to transparency – in this case, transparency about how/why/where project selection and prioritization decisions were made.

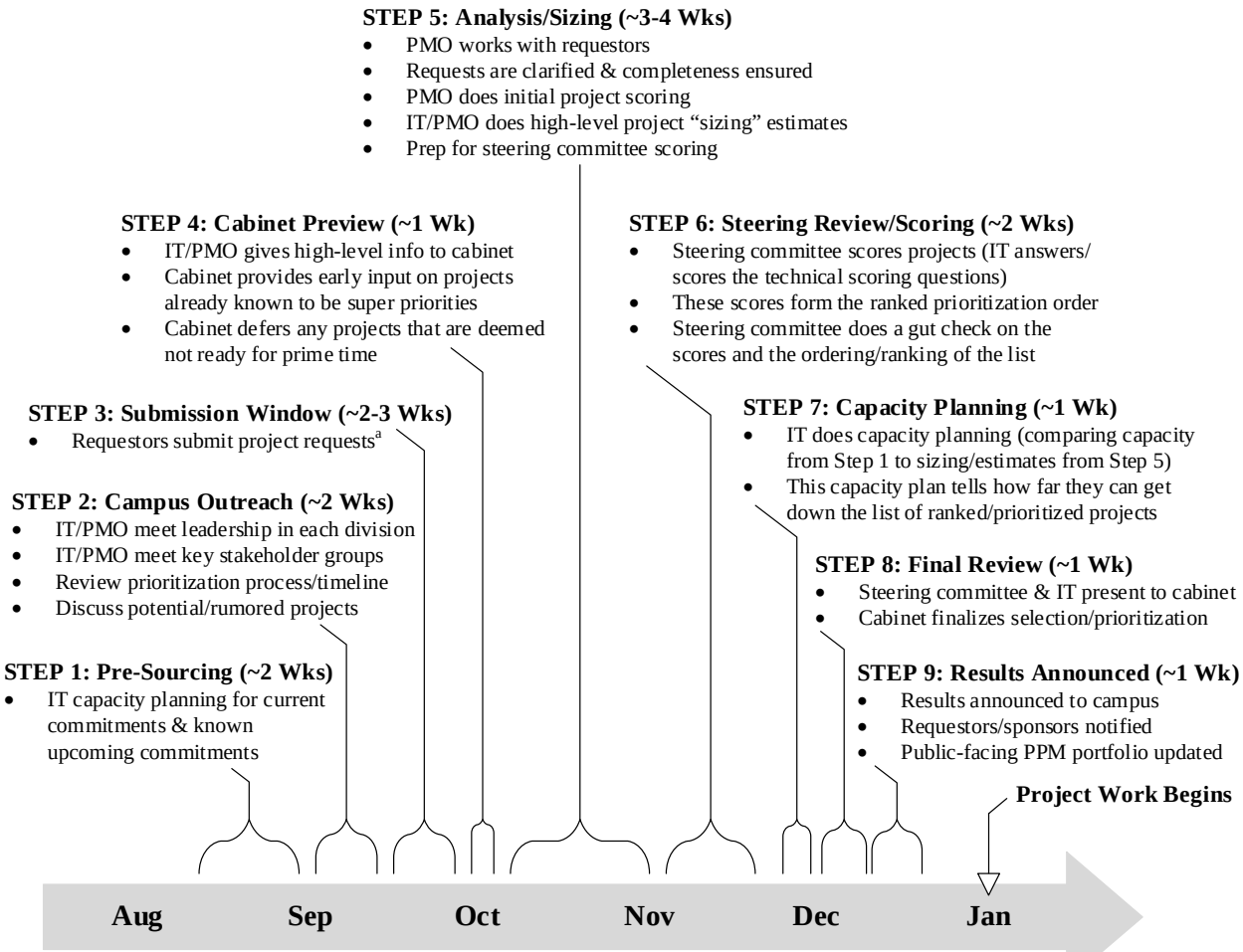
Although some of the themes highlighted here would appear to be critical, it should be noted that all of the subjects acknowledged the dedicated effort and good work that IT and the PMO are doing on behalf of the campus. Subjects repeatedly mentioned that they believe that the IT/PMO teams are working with good intent, they are performing well, and they are dedicated to supporting the university's technology/PPM needs. It is also worth noting that although this university has been using a formal PPM process/structure for the better part of a decade, they are still positively engaged in continuous process improvement.

Case #2

University #2 was a full participant, with five total subjects across Group #1 (one subject) and Group #2 (two technical subjects and two non-technical subjects). In total, 29 articles of evidence were collected and analyzed, including the five subject interviews. This university has a Total FTES of 1-19,999, and the Degree of IT Centralization is mostly centralized. The IT PMO includes four and a half full-time staff, including a PMO manager. The PMO serves the entire university (primarily for enterprise-wide IT projects), and it is heavily involved in the campus-wide IT PPM processes. The PMO team, including the PMO manager, spends about 75% of its time spread across a combination of portfolio management, program management, and individual project management. They consider all of those categories in the same light, and this was the only university in the study that did not delineate between these three categories of work activities. The remaining 25% of time is spent on "other activities".

University #2 was the most mature of all universities in the study in terms of the IT PPM process for project intake, analysis, selection, and prioritization. They have been actively engaged in the continuous improvement of their process for many years. For purposes of their PPM process, projects are "loosely" defined as a one-time effort with a specific scope/goal/timeline which requires 20+ hours of work and two or more people to complete. "Loosely" is used operatively here; the PMO has long recognized that some requests take less than 20 hours but they are really "projects" (in which case they need to go through the PPM process), and some requests take more than 20 hours but they are really more "operational" in nature (in which case they may not need to go through the PPM process). As one of their documents stated, "It's not important what your definition is; what's important is that you have a definition." The PPM process includes a multi-tiered governance structure, it occurs over two

formalized bi-annual cycles, and it includes the use of two instruments to score variables of interest and to do further analysis of the scoring. The PPM process and governance structure can be understood and visualized from two different standpoints: that of the bi-annual cycle (as shown in Figure 9), and that of the interactions between the stakeholders and governing bodies (as shown in Figure 10). The steps shown in the figures are only intended to touch on the most visible/major portions of the process.



[a] Proposals can be submitted throughout the year, but this evaluation/selection cycle serves as the official period when proposals go through full review. Submissions must make the deadline to be considered in the current cycle.

Note. This process is schedule for 2X/year, but a cycle can be skipped if IT is at full capacity. Only the fall cycle is shown here for brevity's sake.

Figure 9. University #2 PPM Process, Bi-Annual Cycle.

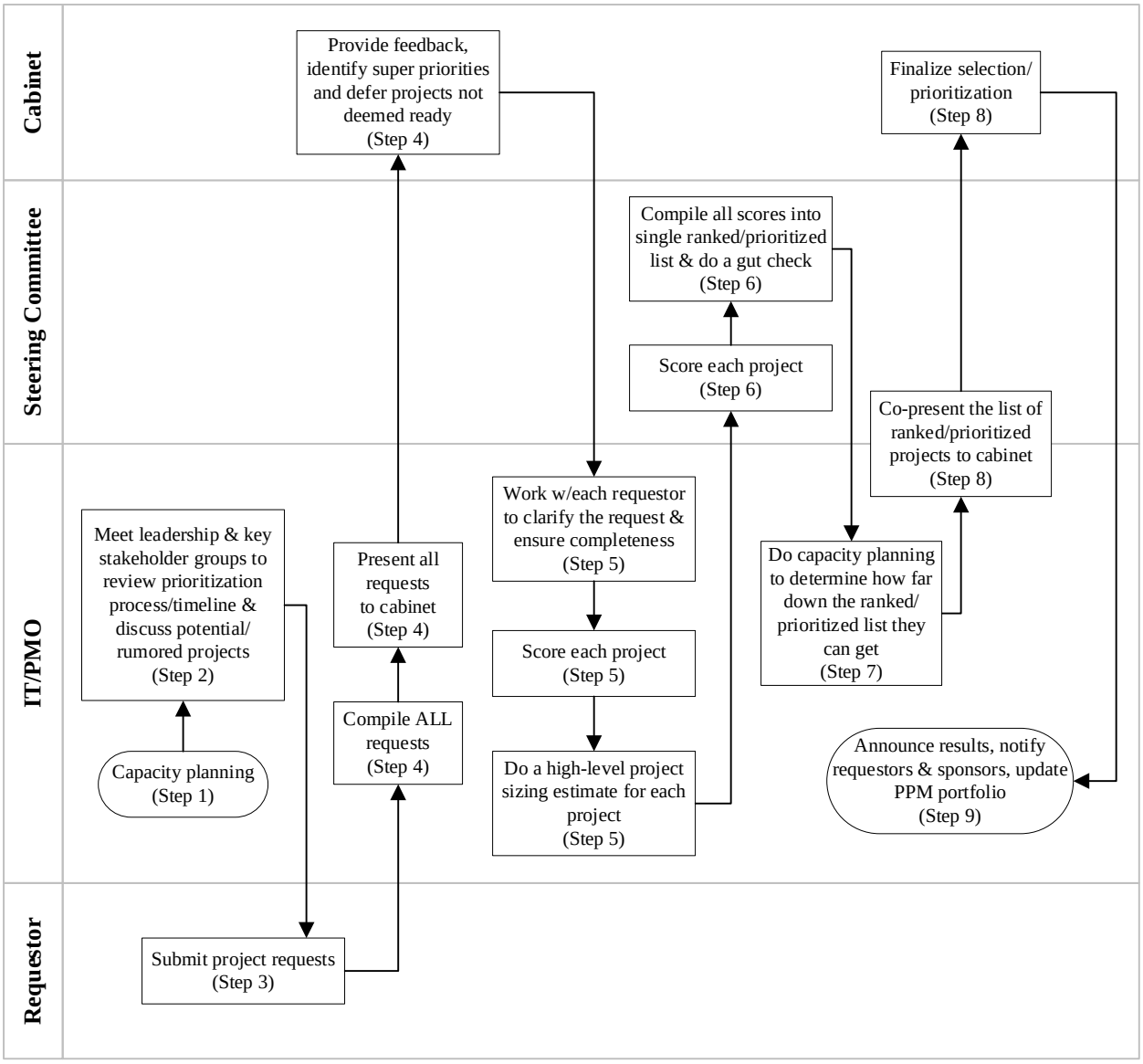


Figure 10. University #2 PPM Process, Stakeholders and Governing Bodies.

At the time of this study, the PMO was moving toward aligning its bi-annual cycle with a new campus-wide integrated planning process, which had been implemented in 2019. Although the major steps of the PPM process are anticipated to mostly stay the same, the cycle will occur over a longer period (extended by several months). The processes shown in the figures represent the old process and timelines, as the new process was not ready for review within the case study.

The steering committee is comprised of six members: the CIO, one representative each from the four VP divisions, and one faculty representative. Although the steering committee is a

small group, members are selected with an understanding that they will bring an objective campus-wide perspective to the project scoring, selection, and prioritization process, and they will not simply act as campaigners for their own division's projects. Based on the opinions expressed during the interviews, this is exactly how the committee members behave.

University #2 differentiates between three classifications of work: projects (as defined above), operations, and work requests. Operations are essentially defined as "keeping the lights on", and work requests are loosely defined as work that is greater than the caliber of normal operations but less than the caliber of a project. This was the only university in the study that uses a pre-defined baseline division of work for its IT workforce; the default assumption is that each IT staff member will spend 50% time on operations, 25% time on work requests, and 25% time on projects (with adjustments made for those employees who may be skewed in any given category). The primary subject acknowledged that delineations between these categories can sometimes be blurry, and they are considering whether some of the work that has traditionally been managed through the "operations" processes should really be managed through the PPM process. For instance, the PeopleTools upgrade cycle (within the PeopleSoft Student/HR system) was recently adjusted from once per year to twice per year, and this is typically a very work-intensive operation. Even though a PeopleTools upgrade is viewed as "operations", the PMO is considering treating it as a "project" for transparency purposes (i.e., as an "operational-type project"). For purposes of capacity planning, the IT organization bases its calculations on a six-hour workday, in a nod of acknowledgement to studies that have shown that it is unrealistic to expect a full eight hours of productivity in an eight-hour workday. This was also the most mature university in the study in its use of an ITSM/PPM system to perform fine-grained capacity planning on an employee-by-employee basis.

Project requestors typically submit their requests via the online IT PPM tool. During the analysis/sizing exercise (Step #5 of the IT PPM process, as shown in Figure 9), additional information is gathered to help assess the request's alignment with strategic objectives, the benefit and value to business operations, the impact on university budget, and the technology system risk. This information is gathered in a project scoring instrument built in a spreadsheet. A redacted/curated version of the instrument is shown in Figure 11. At this point in the process, the PMO also does analysis to determine an initial high-level size estimate for each project. The size estimates are based on a combination of factors (mostly related to the level/type of effort required), and each project is categorized as extra small, small, medium, large, extra-large, or double extra-large. In order to determine each project's final score, yet additional work/analysis is done during the steering review/scoring step (Step #6 of the IT PPM process) when they copy each individual steering committee members' scores *for each variable of each project* into a single large matrix in a separate spreadsheet. A variance analysis is performed on a variable-by-variable basis for each project, and committee members have a chance to review and discuss the variances. Committee members are not *required* to make any changes to their scores on any individual variable, but they can make changes if the conversation so moves them. The individual variable scores are summed for each of the committee members, and the totals are averaged. The average score for each project becomes its final score. The scores, project sizes, and capacity planning information all contribute toward review, selection, and prioritization in subsequent steps of the process.

Category	Weight	Possible Rating	Rating	Total Score
Alignment with Strategic Objectives	**25%**			
Is this project required/mandated?	10%	5 = CSU CO, legal, or collective bargaining reqmt 5 = Directly contributes to student success initiatives 4 = Required to sustain University operations 3 = Required to reduce risk OR maintain significant funding 1 = Required to reduce institutional cost 0 = Not required	0 to 5	0 to 50
Evidence of impact on student success or efficiency	15%	5 = Evidence is measurable, specific, and has objective verifiable long term impact 3 = Evidence is measurable, specific and objective 1 = Limited evidence that is difficult to correlate -2 = Unverified projections of impacts No documented evidence = Proposal Rejected	-2 to 5	-30 to 75
Benefit to University Operations	**20%**			
Has a project scope been defined?	10%	5 = Project scope is well defined, documented and agreed to 3 = A high level scope has been documented -2 = Project scope is undefined or unclear	-2 to 5	-20 to 50
Which users will be impacted or benefit?	5%	5 = More than one division 3 = One division OR more than one department/college 1 = One department/college	1 to 5	5 to 25
Does it improve the ability of users to perform tasks?	5%	5 = Significantly improves efficiency 3 = Moderately improves efficiency 0 = No change to users ability to perform tasks -2 = Increases time for users to perform tasks	-2 to 5	-10 to 25
Value to University Operations	**20%**			
Is the project an urgent need for the University?	6%	5 = Urgent for University or all students 4 = Pressing need of the University or all students 3 = Urgent for college or department 2 = Pressing need for College or Department 0 = Not urgent	0 to 5	0 to 30
What are the consequences of doing nothing?	4%	5 = Direct significant negative consequences, unable to conduct basic services 3 = Failure to resolve customer service complaints/requests 1 = Loss of opportunity for improved service delivery or efficiency	1 to 5	4 to 20
How are business rules and/or processes impacted?	6%	5 = Significant positive changes 3 = Moderate positive changes 1 = Insignificant or no change, or impact not yet known -2 = Significant negative changes	-2 to 5	-12 to 30
What is the effort for customers & functional users to learn the solution?	4%	5 = Minimal or none 3 = Moderate 1 = Extensive and substantial	1 to 5	4 to 20
Impact on University Budget	**15%**			
What is the availability of funding?	10%	5 = Fully funded (initial and on-going costs) 5 = No hard costs 4 = Partially funded (on-going costs funded only) 3 = Partially funded (initial costs funded only) -2 = No funding secured	-2 to 5	-20 to 50
Is there a positive ROI?	5%	5 = Will pay for itself and generate cash or savings 3 = Implemented to avoid cash expenditure 0 = No financial benefit -2 = Non-recoverable cost	-2 to 5	-10 to 25
Technology System Risk	**20%**			
What will the ongoing/operational effect be for IT staffing or technology maintenance?	5%	5 = Staff time saved / system retired 0 = No impact on systems support or staffing -2 = Additional staff / systems needed for support	-2 to 5	-10 to 25
What is the state of the current system?	5%	5 = Completely inadequate, EOL, OR system doesn't exist 3 = Functioning, but close to EOL 1 = Functioning, but could be better	1 to 5	5 to 25
What type of data is involved	3%	5 = Mission critical and/or processes Level 1 confidential data 3 = Secondary restoration and processes Level 2 protected university information 1 = Processes Level 3 public data	0 to 5	0 to 15
What is the technology maturity/complexity, and the University's experience with it?	4%	5 = Proven, standard tech w/sufficient University experience 3 = Proven, standard tech w/no University experience 3 = Emerging/new/complex tech w/sufficient University experience 1 = Emerging/new/complex tech w/little to no University experience	1 to 5	4 to 20
What is the success track record of the vendor and University resources?	3%	5 = Uses documented & repeatable processes for tracking status, problems and change 3 = Good success but without structure for repeatability 1 = Inability to mitigate risk	-2 to 5	-6 to 15
		Grand Total:		**-96 to 500**

Figure 11. University #2 IT Project Scoring Instrument.

The case information provided above for University #2 answered RQ1, by describing the variables, processes, organizational structures, and governance structures that are used for selecting and prioritizing IT projects.

Most of the subjects were generally aligned in their perceptions of the project scoring instruments, and the variables that are tracked/scored within them (RQ2). The primary theme that emerged was related to objectivity. For the most part, subjects perceived the scoring instruments and the variables very positively, and they believe that they do a good job in helping to create a sense of trust in the process. As one subject put it, "the final scoring reduces or eliminates jockeying for position and prioritization". Most of the subjects also agreed that the instruments, and the specific variables, help to align requests with strategic priorities. There were only two major complaints. The first was that project scoring is not baked into the IT PPM tool; rather, scoring is done off to the side in separate instruments. Multiple subjects noted the inefficiency that this created, although at least one subject also noted that it could be difficult to replicate their scoring methodology in an IT PPM tool (including the initial scoring and the follow up variance analysis). The other primary complaint was mentioned by two subjects, one technical and one non-technical, and this complaint was perhaps more concerning. The subjects acknowledged that although the variables and measures are effective for large/enterprise projects, they are not as good when it comes to smaller requests. These smaller requests do not tend to score as well and they do not stack up against the bigger requests, which means they have a much harder time making the final list of selected/prioritized projects. Sometimes these are the requests submitted by faculty for a need within an individual academic program or within an individual course (one subject was adamant that this is a very problematic issue); other times

these are the requests that are submitted by smaller areas/departments. In either case, the project scoring instruments (and the PPM process overall) do not really accommodate those needs.

Subjects' perceptions of the IT project selection and prioritization processes (RQ3) were generally aligned across several themes, and overall their perceptions were largely positive. The first theme was that the process helps to align project selection/prioritization with the strategic plan (also touched on above in RQ2). The next theme was that there is great value in performing capacity planning; this allows the IT team to provide good input and feedback as to the numbers/types of projects that they can realistically hope to accomplish (thus contributing toward the finalized list of projects). The next theme was that the process and the instruments force requestors to think deeply about their requests and to demonstrate the value and strategic alignment of their request. As a related theme, the PMO provides very good consultation to help the requestors clearly articulate these things within their requests, so they are not just left to try to figure out how to demonstrate the value of their requests alone. Finally, there were themes of transparency, objectivity, and trust; the process and the tools are perceived as contributing to all of these.

There was one issue related to RQ3 that was universally viewed negatively: the duration of the PPM process. The process was designed to occur on a bi-annual basis, with a single cycle taking 15 to 17 weeks end-to-end. Multiple subjects commented that the process is good, in part, because it is so comprehensive and rigorous. The primary subject openly acknowledged that the process takes a lot of institutional will and effort, and suggested that organizations attempting to move to a high level of maturity should understand the level of effort that is required going into it. This subject also suggested that the effort is rewarded with huge benefits. However, nearly every subject mentioned that it just takes too long for everybody involved. This duration also

implicitly means that project requestors are forced to make their requests far in advance of when the requests might actually be acted upon, and that has created challenge and frustration. What's more, it is common for one of the bi-annual cycles to be skipped altogether. In this case, the process will only occur once in the year, thus adding to a feeling that project requests must wait for a very long time to be fulfilled (if they are even selected at all).

Subjects' perceptions of the organizational and governance structures (RQ4) were also generally aligned and, again, perceptions were largely positive overall. All subjects had positive things to say about the makeup and function of the steering committee. They perceive that the committee provides good broad representation, and that the team has collaborative dialogue to evaluate projects objectively within the PPM process. Likewise, all subjects were very pleased with the high degree of involvement by the cabinet, including involvement at multiple steps of the PPM process. Finally, all subjects had positive things to say about the consulting services that the PMO provides, and they had good things to say about the work that the IT/PMO team does in capacity planning.

Case #3

University #3 was a full participant, with six total subjects across Group #1 (one subject) and Group #2 (one technical subject and four non-technical subjects). In total, 19 articles of evidence were collected and analyzed, including the six subject interviews. This university has a Total FTES of 1-19,999, and the Degree of IT Centralization is mostly centralized. The IT PMO includes three full-time staff, including a PMO manager. The PMO serves the entire university, mostly focused on high-visibility and/or high-impact projects. Interestingly, the PMO is relatively disconnected from the campus-wide governed IT PPM process, in comparison to connectedness between the PMO and IT PPM processes at other CSU campuses (as discussed in

some detail with multiple subjects). The PMO's focus is almost entirely comprised of individual project management and "other activities". The approximate aggregate breakdown of work activity for the PMO team, including the PMO manager is included in Table 10.

Table 10

University #3, PMO Effort across Activities

Activity	PMO Effort
Portfolio management	0%
Program management	<1%
Individual project management	47%
All other activities[a]	53%

[a] Examples of "all other activities" include: system administration for an enterprise system, and development of PMO/PPM capabilities.

University #3 uses a defined governance structure and process for project selection and prioritization, but there is some ambiguity as to which requests must really go through the process. Formal criteria and definitions were neither available within business process documentation, nor definitively explained during the interviews; however, multiple subjects alluded to funding as being a primary driver. It appears that if a project request requires funding, or if funding has been provided but the project/request needs to be escalated in priority, then the request must go through the governed process. Based on the information available, it was not clear if there is a specific funding *threshold* that triggers the requirement, but subjects implied that the process is focused on larger dollar amounts.

This process is shepherded through a multi-tiered governance structure. A lower-level IT committee is charged with governance and oversight of several different technology areas including review, selection, and prioritization of project requests. The IT committee also provides input on customer service expectations, information security concerns, and IT policies and procedures. This committee includes broad membership (approximately 20 members) representing a variety of interests and perspectives from all across campus, comprised mostly of

management and select faculty. This committee meets at least once per quarter, and it reports up to a higher level IT advisory council. The IT advisory council also includes broad membership (approximately another 20 members), also representing a variety of interests and perspectives from across campus; however, membership in the advisory council includes a greater number of senior leaders (i.e. VPs) and deans, with some overlap in membership with the IT committee. The advisory council meets at least once per year (mostly in alignment with the CSU system wide budgeting cycle, and with the individual campus budgeting cycle), and it reviews the list of projects that have been recommended and prioritized by the lower-level IT committee. The advisory council accepts projects for further consideration or denies them outright, and makes any necessary adjustments to the prioritized order before forwarding the list to the president of the university who has final funding and decision-making authority. The IT advisory council is also responsible for recommending general IT funding and resourcing in order to meet the university's IT objectives. Projects that are approved through this structure/process may or may not be managed by the PMO (i.e. in terms of individual project management). Although these governing bodies are formally defined, the definitions and documentation around the specifics of the process are much less so, and visualizations are not provided for this case as they are for several of the others in this study.

Along the same theme of informality, University #3 does not use an instrument to score individual project requests or to compare across multiple project requests. For that matter, there is not a standard/structured process for getting project requests submitted to the lower-level IT committee. Indeed, there is a project charter document, and there is some expectation that requestors will fill it out and that it will accompany their request. However, emphasis appears to be more focused on the relationships, conversation, and collaboration between project requestors

and their divisional/departmental representatives who sit on the IT committee. As one subject put it, “people across campus know that if you are a boots-on-the-ground technical user, you need to know who your departmental/divisional rep is on the IT Committee so that you can get your request in front of them and provide input as to why that request is important.”

Parallel to the multi-tiered governance structure, the PMO and the IT managers directly field other project requests that do not require funding. The general rule of thumb is that the PMO manages projects that require more than 160 hours and/or more than two participating technical departments, whereas individual IT managers provide project management for the projects that do not meet those criteria. The individual IT managers tend to prioritize these projects in close decision-making coordination with the CIO. Any capacity planning that is performed by the PMO tends to be more focused on the projects (and the resources working on them) within this parallel lane, and could be described as “just in time” capacity planning. As briefly mentioned earlier, there is some disconnect between the process that is managed by the governing bodies and the process that is managed by the PMO. By multiple accounts, this appears to be intentional and subjects perceive the CIO as being more concerned with agility and results than with overly formal or rigid structures. That said, multiple subjects referred to the importance of transparency in terms of the work that IT performs, both within the governed and non-governed areas.

The case information provided above for University #3 answered RQ1, by describing the processes, and organizational/governance structures that are used for selecting and prioritizing IT projects. As demonstrated above, these processes and governance structures could best be described as being defined but with a low degree of formality and objectivity, and a high degree of ambiguity. Because University #3 does not use a standard instrument to measure/score

projects, the case information above does not contribute to RQ1 as it pertains to *variables*. Likewise, RQ2 could not be answered due to the same issue.

In terms of the IT project selection and prioritization processes (RQ3), a theme of strategic alignment quickly emerged. All subjects (technical and non-technical) emphatically agreed that the project selection and prioritization process is highly focused on aligning decisions with the campus strategic plan. Several subjects (technical and non-technical) also agreed that the CIO takes an active role in helping to keep conversations focused on how projects and technology can support the strategic objectives and initiatives. It was clear from all subjects' responses that they take the strategic plan seriously, and they have been intentional in creating a process that supports alignment with that plan.

Likewise within RQ3, all subjects (technical and non-technical) agreed that while the process is somewhat informal, the mere presence of a governance structure and a process have been very beneficial, and these have contributed toward transparency, trust, and strong campus partnerships. At the same time, those same subjects also agreed that the distinct lack of formality within the process causes confusion in several areas including the manner in which projects make their way onto the lower-level governing committee's list, and the manner in which final decisions are really made by the higher-level governing committee. For that matter, several of the subjects referred to the decisions as being made/finalized by that higher-level governing committee, while several others referred to the university president as having final decision-making authority. Subjects also agreed that there is a lack of objectivity in the project evaluation process due to the absence of a formal method or instrument to evaluate projects against a predefined standard or rubric.

Subjects' perceptions of the governance structures (RQ4) were highly aligned. All subjects (technical and non-technical) shared the perception that the lower- and higher-level governance committees include a very good mixture of stakeholders, and the committees do a good job in representing the various interests of most areas/functions across campus. Multiple subjects also suggested that the purpose and membership of the committees are fairly well understood by most people across campus. There was mostly praise, and very few complaints, about the governance committees. However, two complaints (both from non-technical subjects) were notable. The first complaint was that there are some communications gaps between the two committees throughout the project selection and prioritization process, and the messages from the lower-level committee do not always effectively make their way to the higher-level committee. As a result, the decisions of the higher-level committee do not always appear to align with the originally perceived priorities (as noted in the themes from RQ3 above). The second complaint was that the lower-level committee is not always comprised of enough of the stakeholders who will be impacted by the decisions that are made and/or who will be faced with the real world ramifications of the projects/technologies that are implemented.

Also related to RQ4, within the technical subjects group, perceptions were mixed regarding the IT/PMO organizational structure, and there was some confusion and difference in opinion as to the short- and long-term priorities of the PMO. There appears to be a juxtaposition between the desire for the type of formality and structure that a PMO can help to deliver, and the IT organizational zeitgeist of bucking traditional PMO structures and formality/rigidity in favor of a focus on agility and results.

Case #4

University #4 was a full participant, with seven total subjects across Group #1 (one subject) and Group #2 (two technical subjects and four non-technical subjects). In total, 20 articles of evidence were collected and analyzed, including the seven subject interviews. This university has a Total FTES of 20,000+, and the Degree of IT Centralization is mostly centralized. The IT PMO includes nine full-time staff including a PMO manager, four project managers, and four other positions that perform various PPM responsibilities related to communications, marketing, and training. The PMO serves the entire university, and it is involved in the IT PPM processes, but these processes (and the resultant projects) are highly driven and controlled by IT. Only a very small percentage of the PMO's time is spent on portfolio management or program management, and the overwhelming majority of the PMO's time is spent on individual project management. The approximate aggregate breakdown of work activity for the PMO team, including the PMO manager is included in Table 11.

Table 11

University #4, PMO Effort across Activities

Activity	PMO Effort
Portfolio management	1%
Program management	2%
Individual project management	80%
All other activities[a]	17%

[a] Specific examples of "all other activities" were not provided

In order to understand the PPM process at University #4, it is first worth understanding that this university is highly focused on delivering on the objectives of its campus strategic plan. Nearly every subject commented on the intentional focus that the university has on its strategic plan, and this provided a common lens through which subjects described their perceptions. As described by all the technical subjects, the multi-year IT strategic planning and annual IT unit

planning processes are primarily designed to support the objectives in the strategic plan. The campus strategic plan is updated on a five-year cycle. Every five years, shortly after that new plan is finalized, the IT strategic plan is refreshed in order to reflect its support of and alignment with the new campus strategic plan. IT does an annual review and planning exercise to review the accomplishments and progress of the previous year, and to develop the list of projects and initiatives for the upcoming year. This university has a defined IT governance structure consisting of three committees, each of which contributes to this process to varying degrees. By all accounts, these committees do not have hierarchical parent/child relationships, and each committee serves a unique but related purpose. The committees include an IT advisory committee, an IT technical committee, and an Academic Senate IT subcommittee.

The overwhelming majority of project selection and prioritization appears to be based on the work that is done within and across the first two committees – the IT advisory committee and the IT technical committee. Neither of these committees truly "reports to" the other; but in at least one regard, the IT advisory committee acts as a higher-level governing body and the IT technical committee acts as a lower-level governing body.

The higher-level IT advisory committee is comprised of approximately 20 members with broad representation from all across campus, many of whom are assistant/associate vice presidents (or higher in position). This committee provides reviews and recommendations to the CIO that are intended to assist IT in accomplishing its strategic objectives. The committee meets twice per semester, and one of its primary functions is to review and discuss projects that are currently being implemented (and/or those that have been recently completed and/or that are on the very near horizon), and to provide recommendations that contribute to the creation of the list of projects and initiatives for the upcoming year. In a sense, this committee could be considered

as performing a more strategically minded function. Although the committee is tasked with performing a very important function, it does so with relative informality. There is no defined or regulated submission process, there is no instrument or methodology used to objectively score or rank projects, and IT (collectively) appears to have, by far, the most powerful voice in the room. Based on multiple subjects' interview comments, the primary criteria for project selection and prioritization is simply that any given project must align with the IT unit/strategic plans and/or the campus strategic plan. As one subject put it, "if a project doesn't meet one of these goals, then we have to wonder why we should be doing it".

The IT advisory committee works in logical partnership with the lower-level IT technical committee. Whereas the IT advisory committee is comprised of broad membership of mostly senior leaders from across campus, the IT technical committee is almost exclusively comprised of IT management from central IT, with little exception. There are approximately 20 members on this committee, and they meet every other week. This committee reviews potential projects and determines any implications in terms of the impact on staff time and on the potential impact to current technologies that are related to, or integrated with, any given proposal. In a sense, this committee could be considered as performing a more tactically minded function. In addition to reviewing the projects that are candidates for the upcoming annual cycle, this committee also directly receives and reviews requests that may be submitted mid-cycle. Mid-cycle proposals also follow the same relatively informal path as those that come through the IT advisory committee's annual process.

The third committee, the Academic Senate IT subcommittee, appears to function mostly in parallel. This committee includes approximately 25 members, and it meets once per month during the spring and fall academic semesters (notably, they do not meet over summer). The

committee is responsible for reviewing and recommending policies and procedures, and discussing issues related to academic and administrative applications/technologies that are used across the entire campus. The committee's purpose statement implies (but does not state outright) that the committee is responsible for reviewing and recommending IT projects vis-à-vis the review of IT product/service acquisitions, and allocation of IT resources. Although several technical subjects suggested that this committee is involved in the project prioritization process, all of the non-technical subjects were adamant that, for the most part, the committee is told which projects will be on the annual list (based on the list that is generated from the first two committees). That said, the non-technical subjects did all agree that IT actively provides regular and ongoing updates about the current and upcoming projects (with some noted limitations and exceptions, discussed shortly).

Relative to these committees and processes, the PMO involvement appears to be primarily limited to representation on the IT technical committee and in participating in providing estimates on technical and project requirements for the potential projects. Indeed, the PMO's primary focus (as noted earlier) appears to be on its contributions to individual project management. Likewise, in the area of capacity planning, the PMO does not play a broad role, and capacity planning is mostly done independently and sporadically by the individual IT managers who oversee technical staff.

The case information provided above for University #4 answered RQ1, by describing the processes, and organizational/governance structures that are used for selecting and prioritizing IT projects. As demonstrated above, these processes and governance structures could best be described as being primarily driven and guided by IT, and as having a low degree of objectivity (at least in terms of measuring/scoring individual projects proposals, but not in terms of

determining alignment with strategic objectives). Because University #4 does not use a standard instrument to measure/score projects, the case information above does not contribute to RQ1 as it pertains to *variables*. Likewise, RQ2 could not be answered due to the same issue.

In terms of the IT project selection and prioritization processes (RQ3), a few very visible themes emerged and were pervasive throughout the subject interviews. In some cases, the technical and non-technical subjects were in general agreement, and in other cases, they were not. Perhaps most intriguing was the *degree of interest* demonstrated by either of the audiences in any of the themes. Arguably, the two most prominent themes were related to alignment with the strategic plan, and with transparency and decision-making.

Subjects from the technical and non-technical sides all agreed on the importance of the strategic plan. It was clear that all subjects perceive that the campus strategic plan is a primary driver for campus decisions, that the IT strategic plan has been developed with an intention of supporting the campus strategic plan, and that the project selection and prioritization process has been designed to ensure alignment. However, what was interesting was the amount of focus placed upon the strategic plan/alignment by either audience. All of the non-technical subjects certainly mentioned strategic alignment as important, and they all recognized that it is particularly important to the technical stakeholders. But across all the technical subjects, strategic alignment was no less than a mantra, and it framed nearly every consideration, perception, and answer that the subjects provided during the interviews. It was clear that for the technical subjects, strategic alignment is important above all else.

Whereas the technical subjects' mantra was strategic alignment, the non-technical subjects' mantra was transparency, inclusion, and decision-making. While the technical subjects perceived these to be issues of import and agreed that there is some room for improvement, the

non-technical subjects were stronger in their language and opinions about these topics and they generally mentioned them with much greater frequency. On a positive note, all subjects agreed that there is a good degree of transparency and inclusion, as supported by the three governance structures. Of course, the technical subjects were mostly focused on the IT advisory committee and the IT technical committee, and the non-technical subjects were mostly focused on the Academic Senate IT subcommittee. All subjects (technical and non-technical) agreed that the IT team consistently and regularly brings updates to the Academic Senate IT subcommittee. However, opinions differed about the committee's theoretical purpose as compared to its actual operation. The technical subjects all perceived that this committee participates in project prioritization, to some degree. However, every non-technical subject disagreed with this sentiment, and they all perceived that the IT team makes the project selection and prioritization decisions and they bring those decisions to the committee as having been already finalized. On a positive note, however, the non-technical subjects mostly agreed that the IT team makes its decisions in an attempt to proactively meet campus technology needs, and they mostly make attempts to garner input from campus stakeholders about the best way to plan and implement the projects after they have been selected and prioritized (with some occasional exceptions provided as examples, in which case the projects and/or resultant systems tended to have negative outcomes).

In terms of the specific projects and technologies that are selected, multiple non-technical subjects mentioned that they perceive many of the IT decisions to be based on price discounts and economies of scale. Several of these subjects agreed that the CIO is a master negotiator who has been very successful at securing deep discounts on technology purchases, and this has served very well in several areas including infrastructure (for instance, servers, networking, and so on).

However, those same subjects also opined that making technology acquisitions solely based on a deep discount has not always yielded the best result; as one subject put it, “Just because the cost is low doesn’t make the project meritorious”. In each case, non-technical subjects provided specific examples as evidence to their claims.

Finally, in regard to RQ3, all of the technical subjects agreed that the informality surrounding project submission requirements, and the lack of a formalized method for evaluating and/or scoring projects creates challenges for the IT team and for the governance committees (at least for the IT committee and IT advisory committee). All agreed that the primary criterion for accepting projects is whether they are aligned with the campus strategic plan and/or the IT strategic plan. However, with a large number of projects that meet that criterion, all agreed that more formal methods/tools and/or more stringent project submission requirements could certainly benefit those who are charged with making project prioritization decisions. Likewise, one technical subject mentioned that there is an implicit expectation that all approved/prioritized projects will be implemented concurrently, and this is not a realistic possibility. The subject perceived that finer-grained prioritization processes would help in the IT organization’s ability to focus its efforts in a more efficient manner and achieve better outcomes (relative to project implementations).

Subjects’ perceptions of the organizational and governance structures (RQ4) were aligned in some aspects, and not in others. As mentioned above, all subjects generally agreed on the worthiness of the governance structures, and all agreed that the structures provide a good degree of transparency. However, technical subjects tended to perceive the Academic Senate IT subcommittee has having more voice in the decision-making processes than did the non-technical subjects. All subjects (technical and non-technical) also agreed that the IT organization

works diligently to proactively determine, and meet, campus technology needs. When it came to the overarching campus organizational structure, all subjects also tended to agree that decision-making and operations management (in all areas) can be challenging due to the sheer size of the campus community (both its student population, and its faculty/staff population). As one non-technical subject claimed, “The Byzantine bureaucracy means that planning is challenging”.

Case #5

University #5 was a partial participant, with one subject in Group #1. In total, 21 articles of evidence were collected and analyzed, including the subject interview. University #5 has a Total FTES of 20,000+, and the Degree of IT Centralization is an even mix. Although this university did not participate in every aspect of the study (no Group #2 subjects were interviewed), the case was still valuable because the university has a governed PPM process and they use a scoring instrument, thus contributing toward RQ1. The IT PMO includes nine full-time staff including a PMO manager, five project managers, and three other positions that perform responsibilities such as change management, quality assurance, technical writing, and so on. The PMO serves the entire university and it is heavily involved in the campus-wide IT PPM processes. Individual project management comprises the overwhelming majority of the PMO’s work (approximately 70%), and the PMO does not perform program management (a recognized gap, according to the interview). The approximate aggregate breakdown of work activity for the PMO team, including the PMO manager is included in Table 12.

Table 12

University #5, PMO Effort across Activities

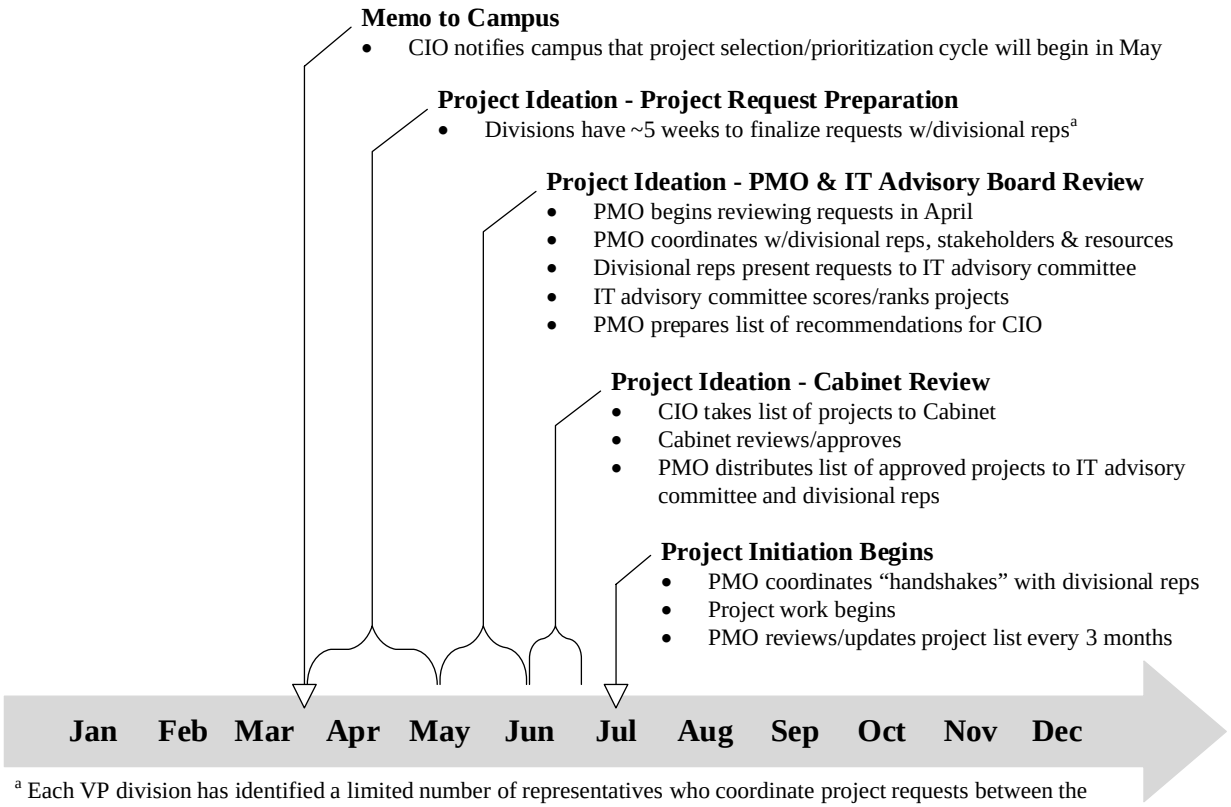
Activity	PMO Effort
Portfolio management	15%
Program management	0%
Individual project management	70%
All other activities[a]	15%

a Examples of "all other activities" include: operational work, system administration for the ITSM/PPM platform, training, and so on.

University #5 uses a defined IT PPM process for project intake, analysis, selection, and prioritization for projects that fit within the definitions/criteria shown in Figure 12. The primary subject self-identified the PMO and PPM processes as being on the lower end of the PPM maturity spectrum, but also mentioned that the program is under significant development with an eye on continuous improvement. There is a multi-tiered governance structure in place, the PPM selection and prioritization process occurs over a formalized annual cycle, and there is an instrument used to score variables of interest. The PPM process and governance structure can be understood and visualized from two different standpoints: that of the annual cycle (as shown in Figure 13), and that of the responsibilities held by the various stakeholders and governing bodies (as shown in Figure 14).

	Project Size			
	Small	**Medium**	**Large**	**X-Large**
Resource Hours	>10 hours	>320 hours	>480 hours	>640 hours
Project Team Size	1-2 people	3-6 people	6+ people	10+ people
Timeframe	Flexible Schedule	Flexible Schedule	Variations	Variations
Complexity	Problem is easily understood, solution is achievable	Problem and solution are understood	Problem is difficult to understand, or solution is unclear. Requires cross-divisional collaboration	Problem and solution are difficult to define and achieve. Requires cross-divisional collaboration
Strategic Importance	Internal interest only	Direct impact to low-medium priority initiatives	Direct impact to medium-high priority initiatives	Campus-wide impact, relates to key strategic initiatives
Level of Change	Impacts single area of one div./college	Impacts single area, or two or more divisions/colleges	Impact to number of areas across all divisions/colleges	Campus-wide impact across all divisions/colleges
Dependencies & Interrelated Projects	No major dependencies	Some low-risk dependencies	Some high-risk dependencies	Major high-risk dependencies

Figure 12. University #5 Project Definitions/Criteria.



[a] Each VP division has identified a limited number of representatives who coordinate project requests between the division and IT ("divisional rep").

Figure 13. University #5 PPM Process, Annual Cycle.

	Project Ideation	**Project Initiation**
Cabinet	Approve and Prioritze Projects	
CIO	Present Projects to Cabinet	
IT Advisory Committee	Score/Rank Projects	
Executive Sponsor	Approve Project Proposal	Ensure Project Goals Align w/Campus Strategies
Project Sponsor	Assist w/Project Concept Create Sponsorship Coalition Submit Project Proposal	Communication Alignment w/Strategegic Initiatives Create an Understanding of Changes/Risks Assist w/Resource Allocation
Divisional Reps		Write Business Requirements Document Participate in Technical/Solution Discussion Inventory impacted groups Identify Managers/SMEs
PMO	Review Project Proposals Coordinate w/Divisional Reps Coordinate w/IT Advisory Committee Prepare Recommendations for CIO	Assign Project Manager Write Project Charter Write Business Requirements Document Change Management Assessment Kick Off Project
IT		Assess Technical Solution

Note: documented responsibilities for additional project phases (Planning, Execution, and Close out) do exist, but have been excluded here for brevity.

Figure 14. University #5 PPM Process, Stakeholders and Governing Bodies.

The divisional reps and the IT advisory committee (shown in the figures above) are worth describing further. Each VP appoints a limited number of divisional reps to serve as their divisional points of contact for the IT PPM process. The divisional reps play a key role in coordinating between the project requestors in their division and the PMO, and they play a key role in coordinating between the PMO and the IT advisory committee. Each VP also appoints representatives from their division to sit on the IT advisory committee, and they are combined with several other members who are appointed from key campus governance groups, to represent a broad set of perspectives and to provide recommendations and input in the IT PPM process. The IT advisory committee has approximately 15 members.

The PMO leads the capacity planning effort across the entire IT division on three-month intervals. Each IT manager reviews their team's commitments (including current/upcoming projects and operational work), and they forecast the amount of time that is available after taking into consideration those commitments. The PMO then uses this information to inform planning for projects that are underway and upcoming, and to inform the capacity for the annual PPM cycle. They also review historic information to get a sense of the amount of time that is generally spent on operations versus projects.

Project requestors typically work directly with their divisional rep to submit project requests. The divisional reps coordinate analysis in strong partnership with the PMO, and ultimately the divisional reps submit the projects as formal requests to the PMO. The divisional reps also perform the initial round of prioritization for project requests from their area. As part of this process, each project is scored within a project scoring instrument. A redacted/curated version of the instrument is shown in Figure 15. During the interview, the primary subject demonstrated an interest in making changes to the instrument based on feedback that the PMO

has received. The subject acknowledged that project requests for some of the smaller divisions/departments/projects do not have a realistic chance to compete with the requests from some of the larger divisions/areas/projects based on the current variables, weightings, and scoring. The subject mentioned the potential future possibility of either adding new variables and/or modifying the weighting and/or scorings of the existing ones.

Strategy/Objective	Criteria	Weight (1-7)	Possible Rating (0-5)	Rating	Total Score (Weight X Rating)
Strategic Alignment	How well does the project support the University's 5 Imperatives? [each imperative listed here]	7	5 = Strongly supports 3 = Supports 1 = Somewhat supports 0 = Doesn't support	0-5	0 - 35
Legal Mandate, Policy, Audit, CO	Is it required by law or by the CSU CO, the President, or the CIO? Is the project a result of an audit finding?	7	5 = Must be implemented by date certain 3 = Required, but repercussion of not having it or not having it on time isn't certain. 1 = Not required yet, but will be within the next year 0 = Not required	0-5	0 - 35
Required Upgrades	Will current version reach end of life? Is there a security risk?	7	5 = Must be implemented by date certain 3 = Required, but repercussion of not having it or not having it on time isn't certain. 1 = Not required yet, but will be within the next year 0 = Not required	0-5	0 - 35
Foundation Project	Is the project required to complete a critical strategic project? Or is the project necessary to replace equipment which is expected to fail, or no longer has needed support?	5	5 = Critical as a foundation to a strategic project or immediate replacement 3 = Important prerequisite to a strategic project, or to replace old equipment. 1 = Would be helpful to have it to support a strategic project or to begin to replace failing or non-supported systems. 0 = Not required	0-5	0 - 25
Operational Efficiency	Does the project improve operations? Improve productivity? Reduce operational costs? Focus on continuous improvement?	5	5 = High value, increased efficiency and is cost-effective 3 = Medium value, improved operations 1 = Low value, minor improvement 0 = No value, no improvement	0-5	0 - 25
Value to Teaching and Learning	Is there value to teaching and learning? Is it something that has been requested for a long time, or is this just a small piece of added functionality? Does it support curriculum, academic standards, and student success or experience?	7	5 = High value 3 = Medium value 1 = Small value 0 = No value	0-5	0 - 35
			Grand Total:		**0 - 190**

Figure 15. University #5 IT Project Scoring Instrument.

The case information provided above for University #5 answered RQ1, by describing the variables, processes, and organizational/governance structures that are used for selecting and

prioritizing IT projects. Because University #5 was a partial participant, RQ2 – RQ4 could not be answered within the individual case; but the primary subject's perceptions did inform the results of RQ2 – RQ4 in the cross-case synthesis.

Case #6

University #6 was a partial participant, with one subject in Group #1. In total, six articles of evidence were collected and analyzed, including the subject interview. University #6 has a Total FTES of 1-19,999 and the Degree of IT Centralization is mostly centralized. Although this university did not participate in every aspect of the study (no Group #2 subjects were interviewed), the case was still valuable because this university was actively engaged in the process of designing and developing a governed PPM process and they were already using a fledgling scoring instrument, thus contributing toward RQ1. The IT PMO is currently under development. The primary subject self-identified the PMO as just being launched ("[we're] in the early stages of building out the program.") and described PPM processes as being under initial design with select components already being used and other components still being designed/developed. The initial incarnation of the PMO includes two full-time staff, including a PMO manager and a business analyst; they further anticipate adding a second business analyst down the road. Because the PMO is still being built out, the primary subject was only able to describe the early *intentions* for the breakdown of work activity for the PMO team, including the PMO manager as described in Table 13 (i.e. these are not fully in place, but are coming soon).

Table 13

University #6, PMO Effort across Activities

Activity	PMO Effort
Portfolio management	5%
Program management	10%
Individual project management	70%
All other activities	15%

University #6 is still developing its IT PPM process for project intake, analysis, selection, and prioritization with an intention to use that process to manage projects that fit into a high-level definition of "work that requires 80+ hours of IT effort and/or $50K+ in products or services". The primary subject expressed concern that the thresholds were very high and that this might result in a large backlog of requests that are not forced through the IT PPM processes but which might otherwise be considered "projects" by traditional definitions. The subject also expressed concern that some requestors might break up larger projects into multiple smaller requests in order to get around the new PPM process and thus "game the system". The process that is being designed includes a multi-tiered governance structure, a PPM selection and prioritization process that will occur over three formalized cycles per year, and an instrument to score variables of interest. The process and structure can be understood and visualized based on the responsibilities held by the various stakeholders and governing bodies as shown in Figure 16.

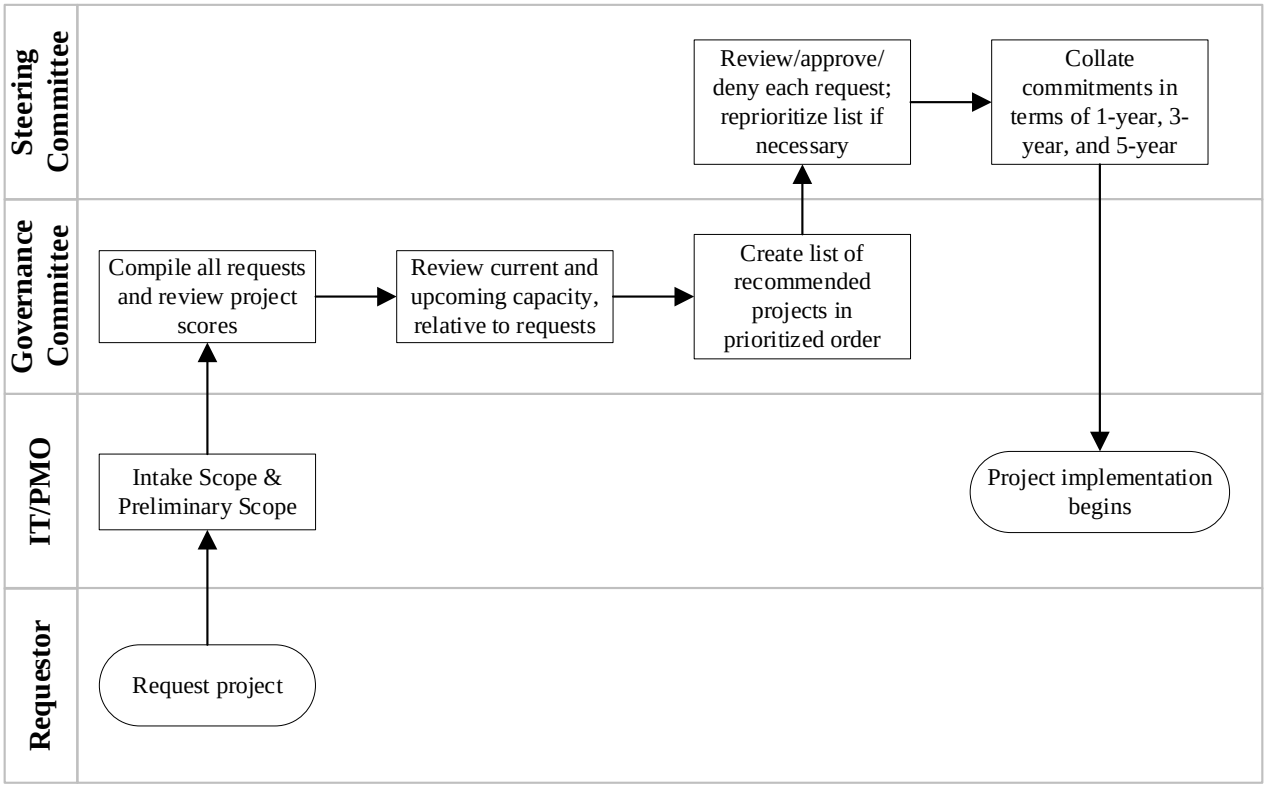


Figure 16. University #6 PPM Process, Stakeholders and Governing Bodies

Although Figure 16 shows a single swim lane for the Governance Committee, there are actually four individual committees. Each of them performs the same role, but they are individually focused on program management within one of four areas: application development, academic technologies (learning management system, classroom technologies, etc.), infrastructure (servers, networking, etc.), and information security. The individual governance committees each have membership and representation from across campus. In addition to reviewing and recommending a prioritized list of projects, they are authorized to deny project requests based on the number of requests that have been received relative to the amount of available capacity. Whereas there are multiple governance committees focused on program management, there truly is only one Steering Committee and it is focused on portfolio management. The Steering Committee is essentially comprised of the cabinet (including the President), and select other representatives from across campus including a small/select number of faculty members. Any work that does not fit into the aforementioned high-level project definition is considered operational work, which falls outside of the process outlined above, which is prioritized at the discretion of the CIO and the IT managers.

University #6 was in the process of implementing an online IT PPM tool at the time that evidence was being gathered for this case study. This IT PPM tool will ultimately be used to manage many of the PPM processes and information, including project intake and project scoring. In the meantime, they are using a spreadsheet as their project scoring instrument. A redacted/curated version of this instrument is shown in Figure 17. Adept readers will recognize this instrument as a near replica of the instrument from university #2, a likely result of collaboration and process/information sharing between sister campuses (a very common practice in the CSU).

Category	Weight	Possible Rating	Rating	Total Score
Alignment with Strategic Objectives	**25%**			
Is this project required/mandated?	10%	5 = CSU CO, legal, or collective bargaining reqmt 5 = Directly contributes to student success initiatives 4 = Required to sustain University operations 3 = Required to reduce risk OR maintain significant funding 1 = Required to reduce institutional cost 0 = Not required	0 to 5	0 to 50
Evidence of impact on student success or efficiency	15%	5 = Evidence is measurable, specific, and has objective verifiable long term impact 3 = Evidence is measurable, specific and objective 1 = Limited evidence that is difficult to correlate -2 = Unverified projections of impacts No documented evidence = Proposal Rejected	-2 to 5	-30 to 75
Benefit to University Operations	**20%**			
Has a project scope been defined?	10%	5 = Project scope is well defined, documented and agreed to 3 = A high level scope has been documented 0 = Limited scope defined, or to be determined -2 = Project scope is undefined or unclear	-2 to 5	-20 to 50
Which users will be impacted or benefit?	5%	5 = More than one division OR all students 3 = One division OR More than one department/college 1 = One department/college	1 to 5	5 to 25
Does it improve the ability of users to perform tasks?	5%	5 = Significantly improves efficiency 3 = Moderately improves efficiency 0 = No change or impact not yet known -2 = Increases time for users to perform tasks	-2 to 5	-10 to 25
Value to University Operations	**20%**			
Is the project an urgent need for the University?	6%	5 = Urgent for University or all students 4 = Pressing need of the University or all students 3 = Urgent for college or department 2 = Pressing need for College or Department 0 = Not urgent	0 to 5	0 to 30
What are the consequences of doing nothing?	4%	5 = Direct significant negative consequences, unable to conduct basic services 3 = Failure to resolve customer service complaints/requests 1 = Loss of opportunity for improved service delivery or efficiency	1 to 5	4 to 20
How are business rules and/or processes impacted?	6%	5 = Significant positive changes 3 = Moderate positive changes 0 = Insignificant or no change, or impact not yet known -2 = Significant negative changes	-2 to 5	-12 to 30
What is the effort for customers & functional users to learn the solution?	4%	5 = Minimal or none 3 = Moderate 1 = Extensive and substantial	1 to 5	4 to 20
Impact on University Budget	**10%**			
What is the availability of funding?	5%	5 = Fully funded (initial and on-going costs) 5 = No hard costs 4 = Partially funded (on-going costs funded only) 3 = Partially funded (initial costs funded only) -2 = No funding secured	-2 to 5	-10 to 25
Is there a positive ROI?	5%	5 = Will pay for itself and generate cash or savings 3 = Implemented to avoid cash expenditure 0 = No financial benefit / Not yet known -2 = Non-recoverable cost	-2 to 5	-10 to 25
Technology System Risk	**25%**			
What will the ongoing/operational effect be for IT staffing or technology maintenance?	5%	5 = Staff time saved / system retired 0 = No impact on systems support or staffing -2 = Additional staff / systems needed for support	-2 to 5	-10 to 25
What is the state of the current system?	5%	5 = Completely inadequate, EOL, OR system doesn't exist 3 = Functioning, but close to EOL 1 = Functioning, but could be better	1 to 5	5 to 25
What is the CSU's experience with this solution/vendor?	1%	5 = A majority of CSUs use this solution 3 = Several other CSUs use this solution (but most use a competitor) 1 = A few CSUs use this solution, there are multiple alternatives 0 = No other CSU use this solution	0 to 5	0 to 5
What is the technology maturity/complexity, and the University's experience with it?	4%	5 = Proven, standard tech w/sufficient IT/University experience 3 = Proven, standard tech w/no University experience 3 = Emerging/new/complex tech w/sufficient University experience 1 = Emerging/new/complex tech w/little to no University experience	1 to 5	4 to 20
What is the project success track record of the vendor and University resources?	3%	5 = Uses documented & repeatable processes for tracking status, problems and change 3 = Good success but without structure for repeatability 0 = Not a third party product, to be developed in house OR successes not yet known -2 = Inability to mitigate risk	-2 to 5	-6 to 15
Is there a CSU systemwide solution for this initiative?	7%	5 = Preferred choice in the CSU w/systemwide contract/MEA 3 = Several CSUs use it, but no CSU systemwide contract/MEA 0 = Only a few or no CSUs use this solution -2 = There is a systemwide solution, but this is a competing solution and no other CSUs use it	-2 to 5	-14 to 35
			Grand Total:	**-100 to 500**

Figure 17. University #6 IT Project Scoring Instrument.

The case information provided above for University #6 answered RQ1, by describing the variables, processes, and organizational/governance structures that are used for selecting and prioritizing IT projects. Because University #6 was a partial participant, RQ2 – RQ4 could not be answered within the individual case; but the primary subject's perceptions did inform the results of RQ2 – RQ4 in the cross-case synthesis.

Case #7

University #7 was a partial participant, with two subjects in Group #1. In total, eight articles of evidence were collected and analyzed, including the two subject interviews. This university has a Total FTES of 20,000+ and the Degree of IT Centralization is an even mix. Although this university did not participate in every aspect of the study (no Group #2 subjects were interviewed), the case was still valuable because the university does have a PMO and they use some lightweight PPM processes, thus contributing toward RQ1. The IT PMO is very small, and the subjects repeatedly described the PPM processes as being somewhat informal and almost exclusively focused on supporting internal IT projects through individual project management efforts. The PMO includes one and a half staff, and the PMO reports up to an administrator who holds responsibility over several other areas (i.e., there is no full time PMO manager). The breakdown of work activity for the PMO is described in Table 14.

Table 14

University #7, PMO Effort across Activities

Activity	PMO Effort
Portfolio management	5%
Program management	5%
Individual project management	80%
All other activities	10%

Again, the subjects acknowledged that the IT PPM process for project intake, analysis, selection, and prioritization is relatively informal. Most of the projects under question are infrastructure projects. They are typically submitted by the IT management team, and they are typically the result of internal departmental meetings or internal planning efforts. The IT management team (including the CIO) meets every other week to discuss and accept potential new projects; they collectively determine and agree to an ordered priority, and then the PMO is engaged. Although the IT organization recently implemented an ITSM tool, they are not yet using it for IT PPM, and so most of the information is managed in standalone documents and spreadsheets. There technically is not a request "cycle" or "window", but the IT organization does perform an annual review of priorities and they attempt to initiate IT infrastructure projects that will support those priorities. While the IT PPM process for selecting and prioritizing projects is relatively informal, the same is not necessarily said for the project management processes themselves (i.e. after the project has been accepted, at the point of project initiation through project execution). University #7 does have a well-defined individual project management process starting with business needs identification, and progressing through eight total phases until handoff to operations/maintenance. Likewise, the primary subject described higher levels of formality within the IT organization's change management program.

Throughout the course of the interview, the primary subject described a yin and yang of perceptions about the need for, and benefits of, formally defined and governed PPM processes. On the one hand, the subject acknowledged several potential benefits and potential problems that could be solved with such a process. For instance, sometimes requests are submitted from outside the IT organization, and there is no effective way to push back on the ones that are misaligned with university/IT strategy because there is no formal review/selection/prioritization

process. Likewise, there is a lack of transparency and visibility of the projects and IT resource allocations to external organizations/divisions (i.e., outside the IT organization), which makes it difficult for IT to advocate effectively for resources. This is particularly challenging because the IT organization has reached a critical mass in terms of the number/amount of resources that they have vis-à-vis the systems and operations that they are tasked with supporting. The primary subject described a very rare instance when a new/large project was accompanied with one new/additional ongoing resource, and it was "an act of god". At the same time, the primary subject also acknowledged that the IT organization is relatively lean, both in terms of the number of overall resources, and in terms of the resources that work on projects. They currently work within a relatively agile paradigm, and it is easy to make decisions and provide direction. The campus overall also would not appear to be tolerant of a highly formal process. Given these factors, the subject perceived that introducing a highly structured and formalized process might be overly challenging and/or the final benefits might not be worth it.

The case information provided above for University #7 answered RQ1, by describing the lightweight processes, and organizational/governance structures that are used for selecting and prioritizing IT projects. Because University #7 was a partial participant, RQ2 – RQ4 could not be answered within the individual case; but the subjects' perceptions did inform the results of RQ2 – RQ4 in the cross-case synthesis.

Case #8

University #8 was a partial participant, with one subject in Group #1. In total, five articles of evidence were collected, including the subject interview. University #8 has a Total FTES of 20,000+ and the Degree of IT Centralization is mostly centralized. The IT PMO is in the very earliest stages of development, and there were little to no PPM structures in place at the

time evidence was gathered for this case study. The subject noted that the newly forming PMO is intended to serve the IT division only, and the primary focus will be on individual project management with no anticipated focus on portfolio management or program management. The fledgling PMO has a single full-time manager, and no other staff. Based on the interview, the lack of PPM governance appears to follow from a general lack of IT governance across all areas of the IT organization, but the subject acknowledged that governance development is an overarching area of focus within the organization. The subject also acknowledged the shortcomings of not having IT governance in place, acknowledged that sister campuses in the CSU have made substantial progress in this area, and demonstrated a strong interest in doing the same within University #8. Although the PMO and PPM processes are only in development, the primary subject shared perceptions in the interview that will contribute toward RQ1 (albeit, only in the cross-case synthesis). Moreover, this case was included in the study to demonstrate that not all universities or their IT organizations have established a PMO or PPM processes. In this particular case, this is a larger university with a mostly centralized IT organization. Given these demographics, and given the subject's acknowledgements of the potential benefits of PPM, it would appear that this university is rife with opportunity in its focus on PMO and PPM process development.

Cross-Case Synthesis

The results of the eight individual case studies showed that there is quite a bit of variety in the variables, processes, organizational structures, and governance structures that are being used by decision makers when they are considering the selection and prioritization of IT projects into their university's portfolio (RQ1). At the same time, there are many commonalities and

consistent themes. The variety, commonalities, and themes across RQ1 are described over the next several pages.

Table 15 shows the staff size for each of the eight PMOs in the case study. There does not seem to be a relationship between PMO Size and either of the other classifications. Figure 18 shows a heat map of the PMO activities across each of the universities. For the most part, the combination of individual project management and all other activities tended to be the most time consuming activities. PMOs in this study focused a very small percentage of their time on portfolio management or program management (with a couple of minor exceptions). It is worth noting that the university demonstrating the most maturity in PPM processes (University #2) was the only university that really bucked this trend.

Table 15

PMO Staff Size in Full Time Equivalent (FTE), across All Universities

University ID	PMO Size (FTE)	Total FTES	Degree of IT Centralization
University #1	4.0	1-19,999	Mostly Centralized
University #2	4.5	1-19,999	Mostly Centralized
University #3	3.0	1-19,999	Mostly Centralized
University #4	9.0	20,000+	Mostly Centralized
University #5	9.0	20,000+	Even Mix
University #6	2.0	1-19,999	Mostly Centralized
University #7	1.5	20,000+	Even Mix
University #8	1.0	20,000+	Mostly Centralized

Note. Total FTES and Degree of Centralization are shown in this table to provide context between those demographics and the size of the respective PMOs.

	University ID							
Activity	#1	#2[a]	#3	#4	#5	#6	#7	#8
Portfolio management	5%	25%	0%	1%	15%	5%	5%	0%
Program management	5%	25%	<1%	2%	0%	10%	5%	0%
Individual project management	40%	25%	47%	80%	70%	70%	80%	60%
All other activities	50%	25%	53%	17%	15%	15%	10%	40%

[a] The PMO at University #2 spends roughly 75% of its time spread across portfolio management, program management, and individual project management. For purposes of this figure, the percentages across those categories are shown as equally divided; however, this may not accurately represent the actual work distribution.

Figure 18. Heat Map of PMO Effort across Activities, across All Universities.

None of the organizations within the study had any IT staff (outside of the PMO) who were solely tasked with working on projects. This is noteworthy because it means that capacity planning and work commitments must take into consideration that each IT employee's work load is split across multiple categories including operations (of potentially varying types) and projects (again, of potentially varying types). Nearly every one of the primary subjects commented that it would be desirable to have IT staff dedicated solely to working on projects, with the notion that this would create a more predictable and efficient means to do capacity planning, portfolio planning, project planning, and project execution. At the same time, none of those subjects thought that it was realistically possible to do this.

Table 16 shows the definitions or thresholds that are used by the eight universities in the study to determine if a request must go through their defined IT PPM process.

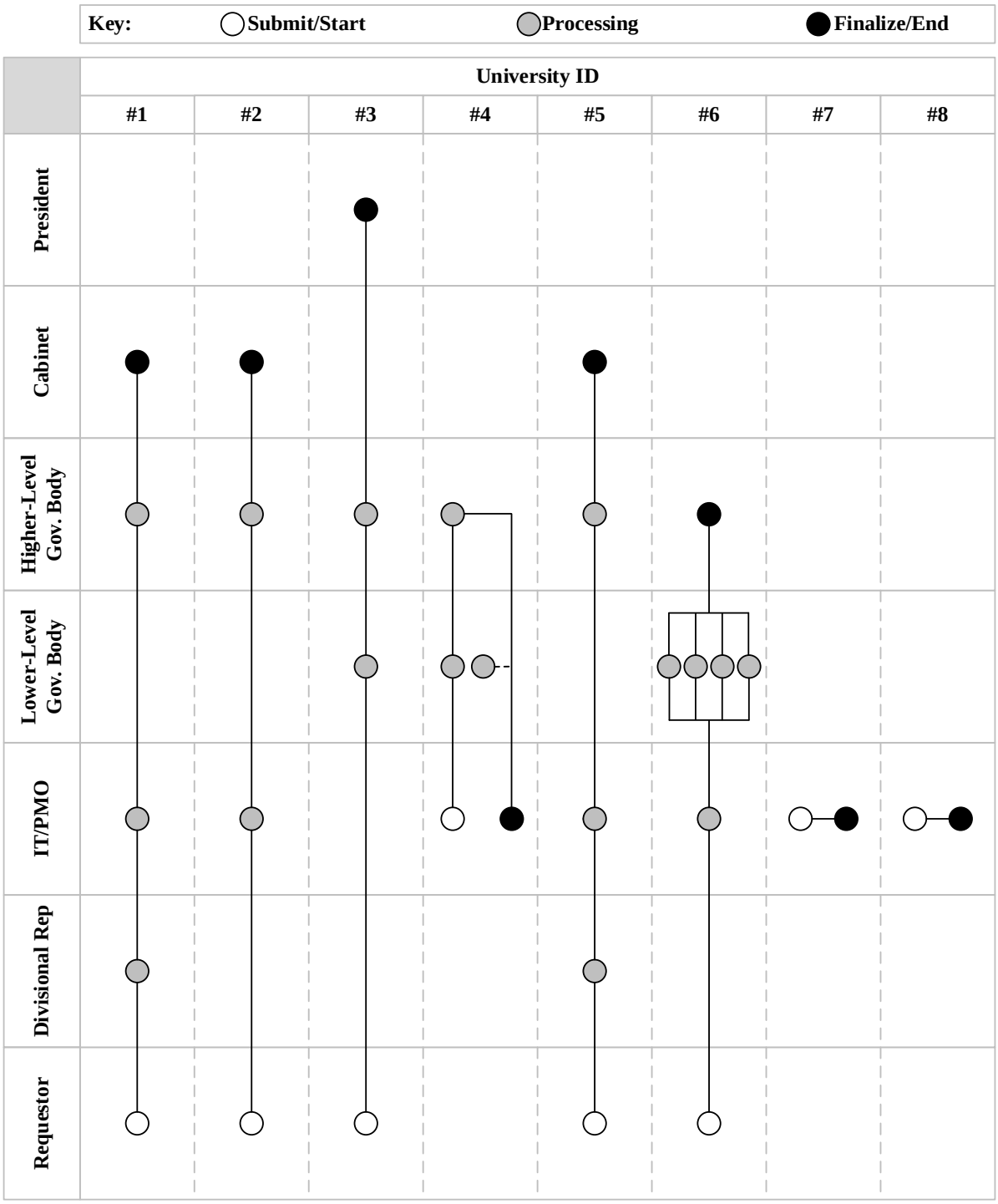
Table 16

Definitions/Thresholds that Trigger the PPM Process

University ID	Definition/Threshold that Triggers the PPM Process
University #1	One or more of the following is true: It's a new product or service that impacts IT, or It's an upgrade to an existing product or service that impacts IT, or It's mandated, sponsored, or funded by the Chancellor's Office AND one or more of the following is true: The one-time cost is $5K+, or the cost for years 1-2 is $10K+, or It will take 60+ IT staff hours to complete, or It requires ongoing IT maintenance/funding, or It's designated as a major project by senior leadership
University #2	The request requires 20+ hours of work and 2+ people
University #3	The request requires substantial funding, or funding has been provided but the project/request needs to be escalated in priority
University #4	The request must align with the IT unit/strategic plans and/or the campus strategic plan
University #5	The request requires >10 hours of effort
University #6	The request requires 80+ hours of IT effort and/or $50K+ in products or services
University #7	Most of the requests are infrastructure projects. They are typically submitted by the IT management team, and they are typically the result of internal departmental meetings or internal planning efforts.
University #8	N/A

Note. University #4 is not really using a definition to trigger the PPM process per se; it would more accurately be described as a condition for projects being selected by IT. As explained within the case study for this university, there is no defined or regulated submission process, there is no instrument or methodology used to objectively score or rank projects, and projects appear to be primarily determined by IT.

Figure 19 shows the major stakeholders and governing bodies that are included in the IT PPM processes across the eight universities in the study.



Note. The PPM processes generally flow from bottom to top; however, there is typically back-and-forth collaboration between stakeholders/groups at any given step of the process. Higher-level governing bodies often include cabinet members.

Figure 19. Major Stakeholders and Governing Bodies in PPM Processes

Table 17 shows the number of annual PPM cycles and the usage of project scoring instruments across the eight universities in the study.

Table 17

PPM Cycles/Year and Scoring Instrument Usage

University ID	# of PPM Cycles/Year	Uses Scoring Instrument?
University #1	2	Yes
University #2	2[a]	Yes
University #3	1[b]	No
University #4	1	No
University #5	1	Yes
University #6	3	Yes
University #7	ongoing/not defined	No
University #8	not defined	No

[a] University #2 often skips one of the bi-annual cycles.
[b] University #3 performs the cycle *at least* once per year.

As shown in Table 17, four of the universities in the study use instruments to score project requests. In the simplest case, the instrument measures six variables; in the most complex case, the instrument measures 23 variables. The variables generally fall into natural categories such as effort, benefit, value, and so on. Although three of the instruments cluster the variables into different sections, in the end each project receives a singular final score and none of the instruments are using multidimensional scoring. All of the variables from each of the individual project scoring instruments were copied into a master spreadsheet and they were all normalized so that aggregate counts could be determined. Table 18 shows the aggregated counts of the normalized variables. This table only provides the normalized variable names for brevity, and a full definition/description of each normalized variable can be found in APPENDIX D.

Table 18

Variables that are Being Measured

Normalized Variable Name	Count
Supports strategic initiative(s)[a]	5
Familiarity with the technology/process	4
Required/mandated	4
Efficiency and productivity	3
Solution is defined clearly	3
Urgency	3
ROI	3
Number of departments/areas that benefit	3
Supports student success	2
Consequence of inaction	2
Vendor track record	2
Funding availability	2
End of life	2
Maintenance/upgrade	2
Technology maturity	2
Number of additional people required to support ongoing	2
Positive/negative results	2
Number of teams required to implement	1
Supports teaching and learning	1
Fulfills core departmental/divisional functions	1
Number/types of students that benefit	1
Compliance requirement	1
Estimated IT work hours	1
Supports robustness/expansion of IT system(s)	1
Prerequisite project	1
Estimated work duration	1
Data requirements	1
System-wide solution availability	1
Cost	1
ERP/SIS data requirements	1
Sensitive data requirement	1
Eliminates paper	1
Number of people required to implement	1

[a] The project scoring tool used by University #1 scores/measures whether a project is aligned with each of its four university strategic priorities (i.e. there are four individual scoring line items to determine strategic alignment), so this variable is artificially bloated.

The rigor and degree of IT capacity planning varied widely across the eight universities in the study. Three of the universities perform formal and rigorous capacity planning on regular intervals, and this planning is used to inform the project selection and prioritization process (University #1, #2, and #5). Three of the universities perform some type of capacity planning,

but there does not appear to be a great deal of rigor or formality, and intervals do not appear to be defined and/or can be seen as "just in time" (University #3, #4, and #6). Two of the universities do not appear to be engaged in any capacity planning efforts.

Nearly every university in the study described project performance measurements that are done upon the completion of a project. Only one subject indicated that their university does not perform such measurements. Of the other seven universities that do these measurements, the frequency varied. Some of the universities measure every project, whereas a few of them only measure larger projects. In all cases, the measurements are limited to project performance. In other words, the metrics describe whether the project was completed on time, whether the project was completed within budget, stakeholders' satisfaction with management and execution of the project, a list of outstanding issues that need to be addressed, lessons learned, and so on. None of the universities does any benefits realization measurements down the road after project completion (i.e. several months later). Several subjects acknowledged that this is problematic because they are not able to determine if the university is getting the type of benefits or the return on investment that were described/anticipated when the project was originally requested.

Moving onto RQ2, the perceptions of technical university leaders were fairly well aligned with the perceptions of their non-technical counterparts, as they pertain to the importance placed on the variables within the project scoring tools. Two primary themes emerged. The first theme was related to objectivity. Without fail, every subject from the universities that use a scoring instrument perceived that the scoring instrument, and the variables within it, help to support an objective scoring and prioritization process. Several subjects suggested that the *mere presence* of an instrument introduces a level of objectivity that is probably not otherwise possible. Several subjects also suggested that their instruments and variables do a very good job in helping to

ensure that project requests are demonstrating if/how they are aligned with the campus strategic plan/initiatives, and more generally the instruments/variables force project requestors to think thoroughly about their requests throughout the submission and evaluation process. Subjects from universities that do not use a scoring tool consistently commented that they wished they had one because they recognize how much more objective it would make their selection and prioritization process.

The second theme that emerged within RQ2 was not as positive. Several subjects, technical and non-technical alike, from multiple universities mentioned that although the scoring instruments (and the variables within them) do a good job in measuring large/enterprise projects, they do not do an adequate job in supporting smaller project requests. This tends to have the most negative impact on requests from faculty for projects related to a single class/major, smaller academic programs, and/or smaller departments/areas. While the technical and non-technical subjects all acknowledged and agreed on this point, the non-technical subjects expressed more intense dissatisfaction (and as many of them pointed out, they have personally been on the receiving end of the problem when the smaller project requests from their areas/departments have not been selected/prioritized). Several subjects described the scenario where project requestors submit the same project request cycle after cycle, year after year, only to continue to be denied. In the worst case, one subject described a project that had been submitted four years in a row.

A broad set of themes emerged relative to RQ3. As with RQ2, the perceptions of technical university leaders were fairly well aligned with the perceptions of their non-technical counterparts, as they pertain to IT project selection and prioritization processes. However, there was variance between the two audiences in terms of the degree of importance placed on any

specific theme. Some of the themes were continuations of the themes that were revealed within RQ2. At a high level, themes included transparency, formality, consultation and responsiveness, capacity planning, alignment with the strategic plan, and the role of senior leadership in the process. Each of these themes are discussed in detail over the next several pages.

A very visible theme of transparency emerged across nearly every case. All subjects, technical and non-technical, agreed on the importance of transparency, and subjects across nearly every university agreed that the *mere presence* of a PPM decision-making process has contributed toward transparency (which has ultimately contributed to trust). However, there were varying opinions from the technical and non-technical audiences on what specifically comprises transparency, and the degree to which transparency is actually being supported or demonstrated within the PPM processes. Transparency was discussed through two primary lenses: transparency related to the mechanics of the PPM process, and transparency of decision-making authority and the decision-making process. It should be noted up front that transparency seems to be directly related to formality (i.e. higher levels of PPM process formality tend to result in a subjects having a perception of greater transparency), but the topic of formality is discussed at greater length later.

In terms of the transparency of the mechanics of the PPM process, subjects tended to focus on the specific steps that occur throughout the process, the timelines when these steps occur, the stakeholders and governing bodies that are involved in any given step, and the information that is made available throughout the process. Subjects who were further away from the process/mechanics regularly cited issues related to undocumented steps of the PPM process, and/or to issues about the information/reports/statuses that are available for individual projects or for the list of projects overall in the submission/evaluation pipeline. The technical subjects

tended to have a better understanding of where any undocumented steps existed and how they contributed to the overall process; but the non-technical subjects were often confused, sometimes not even realizing that there were undocumented steps or when/why/how they were occurring. Likewise, the technical subjects tended to understand how/where to access self-service information/reports for the project requests in the PPM evaluation/selection pipeline (e.g., from the online IT PPM tool, or from other reporting systems/documents); but several of the non-technical subjects perceived that there was a vacuum of information about the status of any given project until the end of the project selection/prioritization cycle when decisions had been finalized.

In terms of decision-making transparency, all subjects agreed that it was important. However, technical and non-technical subjects at some universities had differing perceptions about what really comprises decision-making authority and the manner in which project selection and prioritization decisions are actually made. Most of the universities in the study (six out of eight) included at least one governing body that was responsible for participating in the decision-making process for project selection and prioritization. In some of these cases, there was disagreement between the technical and non-technical subjects about what "participation" and "decision-making" really meant. Largely, the technical subjects perceived that the governing bodies are actively involved/included in the decision-making process. However, several non-technical subjects at some of those same universities perceived that the governing bodies are really just told by IT which projects will be (or already were) selected and prioritized. These subjects clearly distinguished between fully being consulted and merely being informed, and several subjects discussed the implications for shared governance (a core tenet that exists in higher education generally, and one that is of particular focus specifically within the CSU). In

some cases, it was clear that IT was not necessarily telling the governing bodies which projects *would be* selected/prioritized with certainty; rather, they were strongly suggesting to the governing bodies which projects *should be* selected/prioritized based on the available capacity and the greatest chances at success given that capacity. Nonetheless, those strong IT recommendations very often became the final decisions. In other cases, it was clear that IT had a history of making decisions based on technology procurement or technology management/support considerations (e.g. bulk cost discounts, scalability, standardization, and so on), but in absence of any true consultation. In any case, these situations have left some non-technical subjects with a degree of mistrust and a sense that the IT teams have hidden agendas (although it should be acknowledged that on the whole this did not appear to have created permanent damage to relationships, and non-technical subjects repeatedly expressed appreciation for the excellent work that the IT teams perform on behalf of each of the universities).

As mentioned briefly above, there appears to be a direct relationship between transparency and formality, the next theme for discussion within RQ3. Generally speaking, subjects expressed perceptions of a higher degree of transparency at universities with higher levels of formality in terms of the PPM tools, processes, and governance structures. Likewise, subjects at universities with less formal PPM tools, processes, and governance structures tended to view their environment as being somewhat less transparent. Although technical and non-technical subjects all tended to agree on the point/benefit of formality, its absence definitely seemed to have a greater negative impact on technical subjects. Based on the evidence gathered, this would appear to be due to the technical subjects' perceptions of their own roles/responsibilities related to providing leadership and expertise in the PPM process.

One of the most specific and often cited areas of formality was the inclusion (or exclusion) of a project scoring instrument. Subjects at universities that use such instruments consistently explained that the instruments help to introduce greater objectivity (a theme that emerged within RQ2 above) which contributes to a more mature PPM process overall. Likewise, subjects at universities that do not use such instruments consistently said they wished that they did because they perceived that it would make for a more objective overall project selection and prioritization process.

Another of the most specific and often cited areas of formality was in the definition of the PPM process cycle, and the steps within it. For those universities that had a well-defined cycle and a well-defined and documented set of steps that occur within the cycle, subjects tended to express a greater level of satisfaction. This was true for both the technical and non-technical subjects. Again, subjects at universities with low levels of formality in their overall PPM cycles and steps tended to express a strong desire for higher levels of formality. That all said, the duration of the PPM cycle, and the number of cycles per year must be viewed/designed with caution. Multiple subjects acknowledged that a highly formal and rigorous process has contributed toward good project selection and prioritization outcomes. At the same time, they also acknowledged that the longer the process, the greater the toll on the stakeholders and governing bodies who must participate in them. Likewise, longer processes and less frequent cycles tend to affect project requestors and their departments/divisions, because they are forced to consider and submit their requests much further in advance. Multiple subjects acknowledged that it is not realistic to expect requestors to think so far in advance (especially the case for those universities that only conduct a single PPM cycle in a given year).

It is worth noting that several subjects (technical and non-technical) described a balancing act between formality and flexibility. Subjects generally agreed that the PPM processes should not be so overly formal and rigid as to create a problem. Subjects at multiple universities described situations where requestors may have missed the project submission deadline by a day or two only to be denied entry into that PPM cycle; likewise, subjects at multiple universities described situations where otherwise valuable projects were denied because they scored just below some threshold, and flexibility was not provided in the selection/prioritization consideration. It is also worth noting that the primary subject from one campus asserted that their lower level of formality, combined with the lean size of their IT organization, allowed for a great degree of agility.

As a final note on formality, one technical subject at one campus made this observation: although the IT organization and PPM processes are not very formal, and although the IT organization wants to move to a greater degree of IT PPM formality, this could be very difficult given the general campus approach to and tolerance of rigorous/formalized processes. This subject mentioned that although the IT organization perceives the benefits of greater formality, attempting to implement a formal process could be met with such resistance as to not be worth the effort.

Another important theme within RQ3 was strategic alignment. Nearly every subject across the study who commented on the topic viewed the PPM process as an excellent way to align the PPM portfolio with the strategic plan. For many universities, this starts directly with the project scoring instrument (as described above within themes across RQ2), and it continues throughout the entire PPM process. As shown in the individual case studies, some universities focused on this to a very great degree, and others focused on it to a lesser degree. But they all

focused on it to some extent, and they all viewed it as important. For those universities that were not using their PPM process as a way to align with their strategic plan, they expressed a desire to do so. In some cases, non-technical subjects expressed some dissatisfaction with the campus strategic plan itself; in most cases, this was due to the perceived lack of connection between the strategic plan and the primacy of teaching and learning. But even in these cases, subjects acknowledged that the PPM process was designed to align with the strategic priorities and objectives that are present within the strategic plan.

Yet another theme within RQ3 was the importance of consultation and collaboration, a topic discussed and described by technical and non-technical subjects at several universities. Two universities use divisional representatives to work closely with their divisional project requestors to consult on the project requests and to gather enough information to inform the project selection and prioritization process. Several other universities provide such consultation services directly from within the PMO (often in collaboration and consultation with other IT managers or technical experts). Both scenarios seem to work well, but the key is that the consultation must be comprehensive and timely. Nearly all subjects who discussed this topic agreed that it is unrealistic to expect non-technical stakeholders to be able to compile enough information and/or to articulate it effectively in isolation and/or without assistance from technical stakeholders (or at minimum, without assistance from non-technical stakeholders who have a high degree of technical acumen). Likewise, many subjects commented that this consultation should be made available to requestors in a timely manner following their outreach for support.

Capacity planning also emerged as a theme of importance within RQ3. This issue tended to be discussed more by technical subjects, although several non-technical subjects did acknowledge its importance. Subjects at universities that demonstrated a greater level of PPM

maturity overall, and subjects who demonstrated greater experience and understanding of capacity planning, all touted it as a huge key to their success. Those who are doing capacity planning effectively, especially in coordination with their PPM cycles, believe that it greatly contributes to their ability to explain their bandwidth and capabilities to decision makers, and this information tends to benefit the project selection and prioritization process. There was only a single negative comment about capacity planning, or perhaps more accurately a comment about the manner in which the IT group communicates its capacity. That is, this subject felt that the PPM process would be better served if IT could explain its own internal capacity, but also pair that with an explanation of which projects (if any) could potentially benefit from using external consulting to implement rather than relying on internal IT (rather than simply saying "we don't have capacity to do that project").

The final major theme within RQ3 was the importance of the role of senior leadership and the CIO within the PPM processes. This will be discussed in detail within RQ4, but it is worth mentioning here within RQ3, because many subjects commented on the great importance of the leadership and participation by senior campus leaders and the CIO in terms of the validation that they provide to the PPM processes.

Several themes emerged relative to RQ4. Perceptions of technical university leaders were generally aligned with the perceptions of their non-technical counterparts, relative to the organizational and governance structures involved in IT project selection and prioritization processes. Themes that emerged were related to the makeup and membership of the governing bodies, the importance of senior leadership involvement, and satisfaction with the work of the IT/PMO organization. There was only one noteworthy area where technical and non-technical

subjects' perceptions differed, in the theme of how/where decision-making really occurs, as carried over from RQ3.

Subjects generally felt positively about the makeup and membership of their governing bodies. Technical and non-technical subjects alike, from multiple universities, described a breadth of membership, and consistently mentioned that the membership was purpose-built to provide a good/objective representation of interests from all across campus. Likewise, subjects consistently mentioned that the membership of the committees, and the work that they are charged with performing, contributes toward transparency (harkening back to a theme that was discussed in detail within RQ3). Many subjects also discussed the positive collaboration that occurs within any given committee. The only complaint of note about governing bodies was related to occasional situations occurring across multiple governing bodies (e.g. in situations that involve interactions/communications between a lower-level governing and a higher higher-level governing body, or between a governing body and cabinet). In some cases, subjects mentioned occasional confusion or frustration about information/decisions that did not flow smoothly from one group to the next.

Subjects also generally felt positive about senior leadership involvement. In most of the universities that had defined PPM processes, either the cabinet makes the final project selection/prioritization decisions, or a higher-level governing body that includes multiple cabinet members makes the final decisions. In either case, technical subjects and non-technical subjects alike consistently perceived cabinet's involvement positively, and they tended to believe that a high degree of cabinet involvement has provided validation of the PPM processes and has helped to ensure campus-wide participation and compliance. Similarly, the subjects at several of the universities described their CIO as being highly engaged in the process, and they expressed the

same sentiments about CIO involvement as they did about cabinet involvement (admittedly, in some of these universities the CIO *is* a cabinet member). Technical subjects at several universities cited their CIO's involvement as a key to success.

As an additional theme within RQ4, non-technical subjects consistently expressed a relatively high degree of satisfaction with their IT/PMO organizations, and often acknowledged their dedication and hard work. Even during those times when the non-technical subjects expressed dissatisfaction with one area or another of the PPM process, they continued to qualify their frustrations by saying that they understood the constraints that IT is often working under, and they expressed gratitude for the services that they provide. Particular praise was given to the IT/PMO organizations that provide consultation to project requestors throughout the PPM process. Likewise, particular praise was given relative to the continuous process improvements within PPM at multiple universities.

The final theme within RQ4 was something of a carryover from RQ3 (and as discussed in detail there), and it was related to the way that decision-making occurs with the governing bodies and/or within the IT organization. It only bears repeating here because the decision-making is done by these bodies, and they are the focus of RQ4. As a recap, technical and non-technical subjects at some universities had differing perceptions about what really comprises decision-making authority and the manner in which project selection and prioritization decisions are actually made. There were some differences in opinion as to whether the governing bodies were really being included in the decision-making process, and several subjects perceived that in some ways IT is really just providing information to the governing bodies rather than acting in consultation with them on the project selection and prioritization process.

The intent of RQ5 was to conduct an exploratory factor analysis (EFA) on the variables within the scoring instruments to determine if there were a smaller number of factors underlying the overall set of variables. Unfortunately, this research question could not be answered. Although four individual project scoring instruments were collected, the evidence did not include project requests that had been submitted via those instruments. The nature of an EFA would have required numerous completed submissions, and those were not available. In lieu of the EFA, the normalized variables were organized into logical groupings as shown in Figure 20, based on a combination of the organization and sectional clustering of the variables within the original individual scoring instruments, and the researcher's intuition about the relationship between the variables.

Benefits

- **Strategic alignment**
  - Supports strategic initiative(s)
- **Functional benefits**
  - Efficiency and Productivity
  - Eliminates paper
  - Fulfills core departmental/divisional functions
  - Positive/negative results
  - Supports robustness/expansion of IT system(s)
  - Supports student success
  - Supports teaching and learning
- **Number/type of beneficiaries**
  - Number of departments/areas that benefit
  - Number/types of students that benefit

Resource requirements

- **Human Resources**
  - Number of additional people required to support ongoing
  - Number of people required to implement
  - Number of teams required to implement
- **Money**
  - Cost
  - Funding availability
- **Technical Resources**
  - Data requirements
  - ERP/SIS data requirements
- **Time**
  - Estimated IT work hours
  - Estimated work duration

Required/mandated

- Compliance requirement
- End of life
- Maintenance/upgrade
- Prerequisite project
- Required/mandated

Risk

- Consequence of inaction
- **Potential variance**
  - Familiarity with the technology/process
  - Solution is defined clearly
  - Technology maturity
  - Vendor track record
- **Technological risk**
  - Sensitive data requirement
  - System-wide solution availability

Figure 20. Scoring Instrument Variable Logical Groupings

Summary

Data collection and analysis occurred from July 2019 through January 2020. Data collection included 137 pieces of evidence, including 27 interviews with subjects at eight universities. Converging lines of data were developed through triangulation and corroboration of all the evidence, and this formed the informational basis for each case. Results from each case were reported independently, and a cross case synthesis was conducted to aggregate findings across all eight cases. All research questions were answered where possible within each individual case, and within the cross case synthesis. Several themes occurred within and across the individual cases, and these themes were discussed. The themes and findings are summarized further in the next chapter.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This study was conducted to understand the variables, processes, organizational structures, and governance structures that are important to higher education decision makers in their selection and prioritization of IT projects into their universities' portfolios. There was a gap in the body of knowledge on this subject, specifically within higher education IT environments, and this study sought to address that gap qualitatively through a practice-based exploratory multiple-case study. The study was guided by the following five questions:

1. RQ1: What are the variables, processes, organizational structures, and governance structures that are being used by higher education decision makers when they are considering the selection and prioritization of IT projects into their university's portfolio? The variables that are specifically under study are those that are captured, weighted, and measured within project scoring instruments.
2. RQ2: How do perceptions of technical university leaders compare and contrast to their non-technical counterparts, as they pertain to the importance placed on the variables (in terms of the number and types of variables, or the level of importance placed upon them)?
3. RQ3: How do perceptions of technical university leaders compare and contrast to their non-technical counterparts, as they pertain to IT project selection and prioritization processes?

4. RQ4: How do perceptions of technical university leaders compare and contrast to their non-technical counterparts, as it pertains to the organizational structures and governance structures involved in selection and prioritization processes?
5. RQ5: Does an exploratory factor analysis on the variables of importance (i.e. those variables that are being used in project scoring and selection instruments) reveal a smaller number of underlying interpretable factors that might contribute toward the creation of a model that could be used to assist decision makers in the practical selection and prioritization of IT projects into university portfolios?

In order to answer these questions, a population of the 23 universities in the California State University (CSU) system was selected. A convenience sample of eight universities was included from this population, and each sample university served as an individual case within the multiple-case study. Subjects from each sample university were divided into two groups. Group #1 included a single managerial representative from central IT project management office (PMO) at each university. Group #2 included a combination of technical and non-technical decision makers responsible for participating in IT project selection and prioritization processes at each university.

Data collection began with an introductory questionnaire that was sent to the subjects in Group #1, and they were asked to provide documentation and information related to their IT project and portfolio management (PPM) processes, including copies of project scoring instruments (if applicable). Following the initial data collection, a first round of qualitative analysis was conducted, and then in-depth interviews with Group #1 subjects followed. During the in-depth interviews, Group #1 subjects were asked to identify potential subjects in Group #2. Following the in-depth interview with the Group #1 subject at any given sample university, the

Group #2 subjects from that university were then invited to participate in focused interviews. Following all the interviews with the Group #2 subjects at each university, qualitative analysis was done on the comprehensive evidence that had been collected from that university, and this formed the basis for each individual case. After all evidence had been analyzed for each of the individual cases, a cross-case synthesis was done on the collection of cases. Along the way, each individual piece of evidence was cataloged in a case study database.

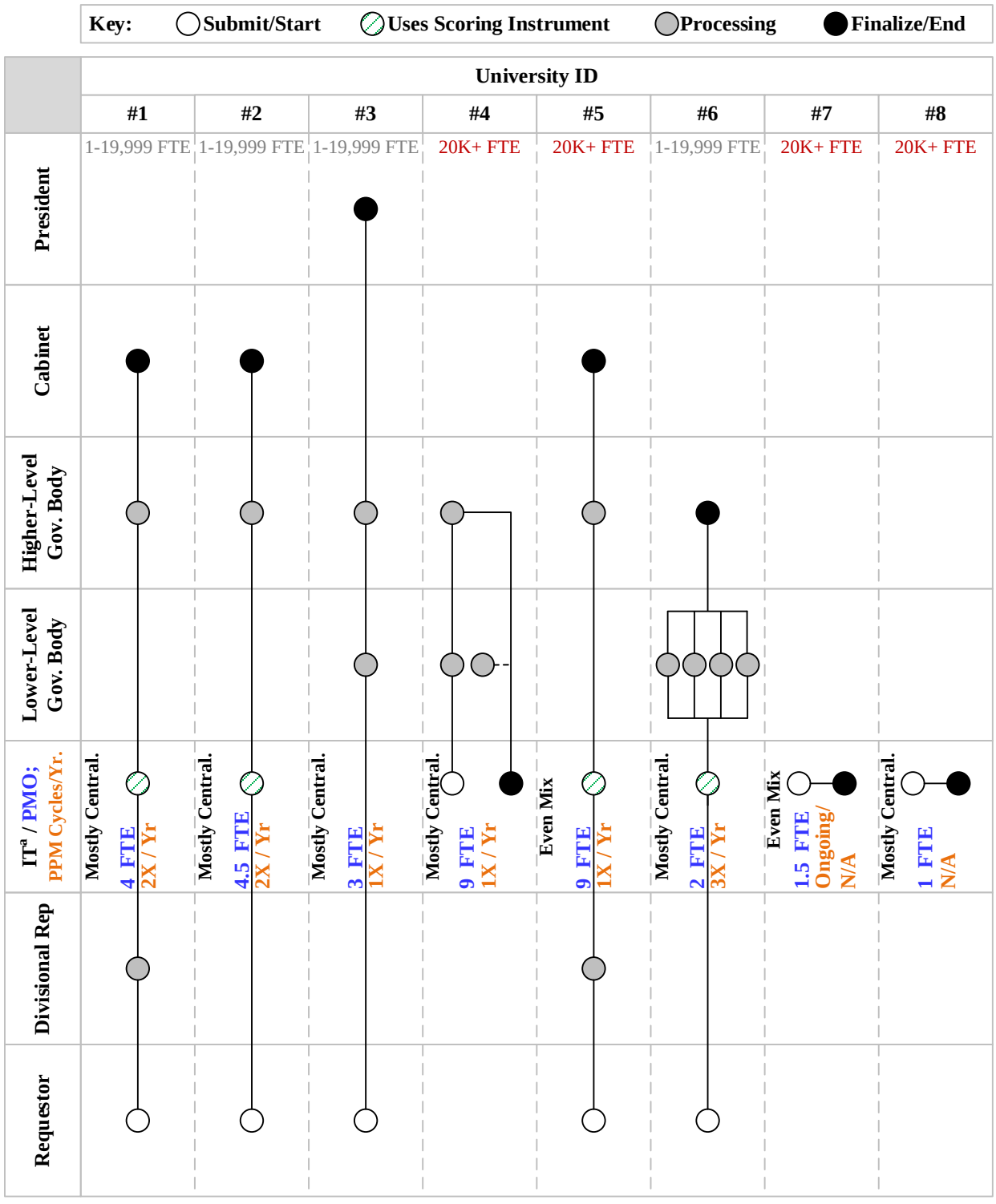
The remainder of this chapter includes the summary of findings for all of the research questions, the researcher's additional observations, the limitations of the research, and recommendations for future research.

Summary of Findings

Eight sample universities were included in the study. There were 27 total subjects from the eight universities, comprised of nine subjects from Group #1 (one university included two subjects in Group #1) and 18 subjects from Group #2. Individual case studies were conducted for each of the eight universities, and a cross-case synthesis was conducted to aggregate findings across all cases. The summary in this chapter is primarily focused on the results from the cross-case synthesis.

Research Question #1

The diagram in Figure 21 provides a visualization of the processes, organizational structures, and governance structures that are being used by higher education decision makers at the sample universities when they are considering the selection and prioritization of IT projects into their university's portfolio.



[a] The degree of IT centralization is noted in black in the "IT / PMO" swim lane. "Mostly Central." = mostly centralized; "Even Mix" = even mixture of centralized employees and decentralized employees.

Note: The PPM processes generally flow from bottom to top. However, most universities typically described back-and-forth collaboration between stakeholders and groups at any given step of the process.

Figure 21. Visual Representation of PPM Processes and Structures in RQ1.

Given the breadth and depth of the information behind all of the processes at the eight subject universities included in Figure 21, specific details are not reiterated here. However, there are some notable highlights. Some points of interest were based on commonalities between the cases, whereas other points of interest were based on variations between the cases.

Within most of the universities, the cabinet is involved in the PPM process in one way or another. However, the manner in which that involvement manifests itself is slightly different. In some universities, the cabinet members are on a higher-level governing body and that is where project selection/prioritization is essentially finalized. At some of the other universities the cabinet performs PPM project selection and prioritization as a matter of the routine cabinet business agenda – albeit, only occasionally since the processes tend to only run once or twice per year. The point worth noting is that campus senior leadership is actively involved in the PPM selection and prioritization processes, and this type of involvement and support was identified as a prerequisite for PPM success in the literature review; likewise, organizational governance and hierarchy were identified as factors that influence, constrain, or otherwise impact PPM.

In terms of the formality of the PPM processes and structures, there was a wide variance between the eight universities, and they essentially fell into four distinct bands. Universities #1 and #2 had the most defined/formal processes and instruments and they were engaged in continuous improvement. Universities #3 and #4 had defined governance structures, but processes and instrumentation were less formal. Universities #5 and #6 were in the early stages of developing formal processes and instruments. Universities #7 and #8 were not quite at the point of developing formalized PPM structures/processes.

Nearly every university in the study performs measurements upon the completion of projects (to some degree or another), although the measurements are limited to mechanical

project outcomes. For instance, measurements are focused on whether the project was completed on time, whether the project was completed within budget, stakeholders' satisfaction with management and execution of the project, any outstanding issues that need to be addressed, any lessons learned, and so on. None of the universities does any benefits realization measurements several months down the road. In this regard, the universities are not able to determine if they are getting the type of benefits or the return on investment that were used to justify the project request in the first place.

All the universities in the study provided definitions that delineated between projects and operations, and in some cases these crossed more than just two categories (i.e. there was often a third category to cover "work requests" or "minor projects"). In all cases, IT staff are responsible for working on projects and operations. This is only noteworthy in that the universities each work on a large number of projects, but they are not "project-based organizations". Several technical subjects acknowledged that they would like to be able to dedicate some portion of their IT workforce to focus solely on projects in the belief that this would contribute toward a better ability to do capacity planning and project execution, but none of them saw a realistic way to get there.

Four of the universities in the study use instruments to score project requests. In the simplest case, the instrument measures six variables; in the most complex case, the instrument measures 22 variables. The variables generally fall into natural categories such as effort, benefit, risk, and so on. Although three of the instruments cluster the variables into different sections, each instrument was designed to calculate a singular final score; i.e., none of the instruments are using multidimensional scoring. All the variables from each of the individual project scoring

instruments were analyzed, and a list of normalized variables was generated so that aggregate counts could be determined (as described in the Cross-Case Synthesis, but not repeated here).

Research Questions #2 - #4

Research questions RQ2 – RQ4 were all designed to compare and contrast technical and non-technical decision-makers' perceptions, and many of the themes that were uncovered crossed the boundaries of multiple research questions. The Venn diagram in Figure 22 shows the twelve major themes that were uncovered, and shows how they presented themselves across these three research questions.

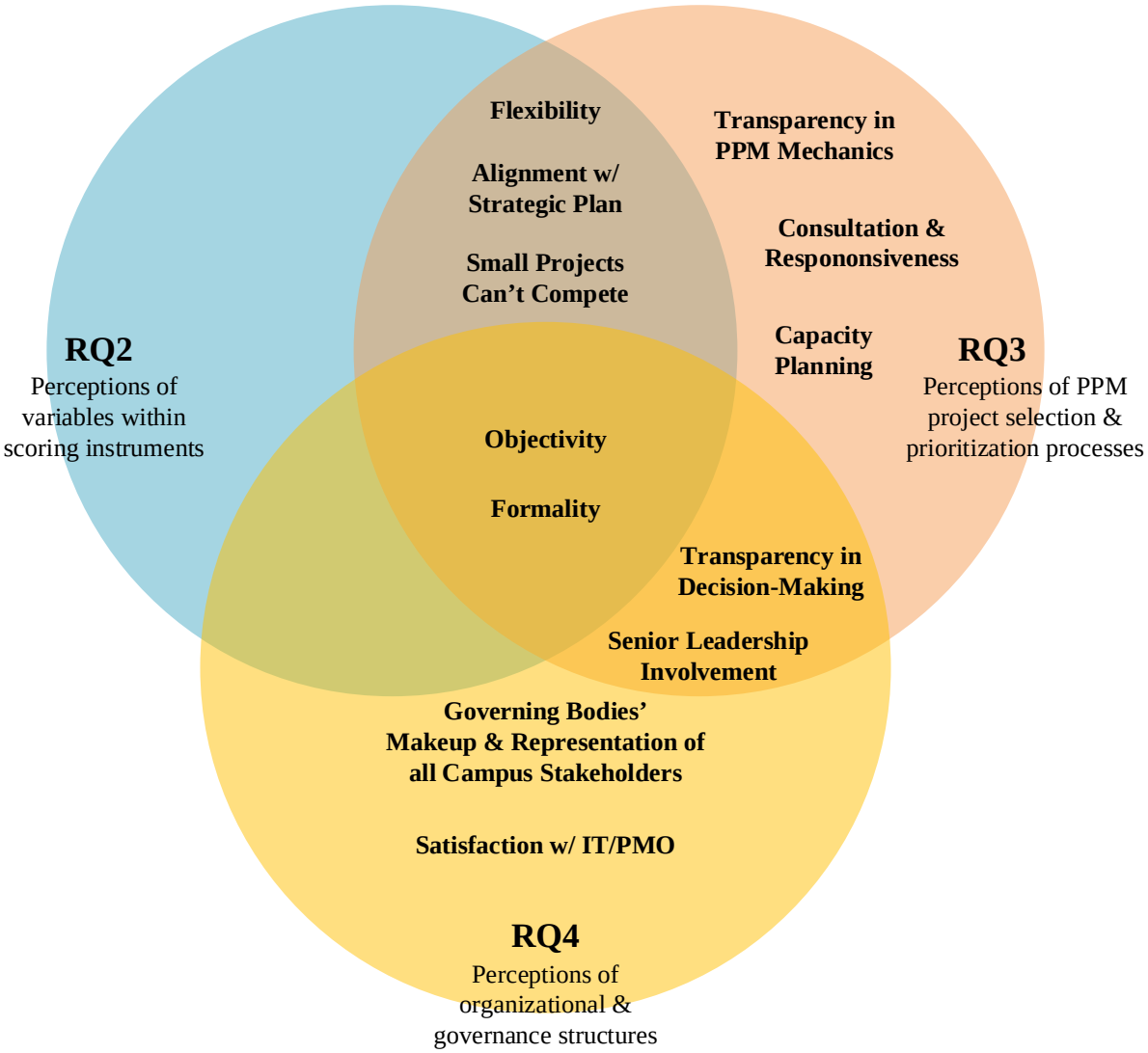


Figure 22. Venn Diagram of Themes That Emerged in RQ2 – RQ4

Highlights of the most important and visible aspects of each of the twelve themes are included below. The parenthetical note following each theme indicates the research question(s) within which the theme presented itself. Technical and non-technical subjects' perceptions were fairly well aligned across the themes, with only a few exceptions, as noted below.

Objectivity (RQ2, RQ3, RQ4). Subjects from universities that use a scoring instrument perceived that it helps to support an objective project selection and prioritization process. Several subjects suggested that the *mere presence* of an instrument has introduced a level of objectivity that was probably not otherwise possible. Likewise, subjects from universities that do not use a scoring instrument regularly said they wanted one because they thought it could introduce a degree of objectivity that they did not otherwise have in their process.

Formality (RQ2, RQ3, RQ4). Subjects generally perceived a greater degree of formality as being beneficial. Subjects regularly cited several areas of formality including the use of a project scoring instrument, the definition and rigor of the PPM process, and the number of annual PPM cycles. Formality seems to be directly related to transparency (a separate theme); subjects at universities with higher levels of formality tended to perceive their environment as being more transparent than subjects at universities with less formal approaches. That said, several subjects described a balancing act between formality and flexibility, and they generally agreed that the PPM processes should not be so formal and rigid as to create problems. Likewise, there is a sweet spot to be found between formality and agility. And finally, while a greater degree of formality is generally perceived positively, the IT organization may only be able to introduce greater formality to the degree that the general campus has a tolerance for it.

Flexibility (RQ2, RQ3). As mentioned above, flexibility tended to be viewed as the flip side of formality. Numerous subjects had negative perceptions of PPM aspects that they felt

were overly rigid, and expressed frustration at situations where they felt flexibility was warranted but had not been applied.

Alignment with the strategic plan (RQ2, RQ3). Nearly every subject across the study who commented on the matter viewed the PPM process as an excellent way to align the project portfolio with the strategic plan. For many universities, this started directly with their project scoring instrument. Several subjects suggested that their instruments did a very good job in helping to ensure that project requests are demonstrating if/how they are aligned with the campus strategic plan/initiatives. This theme of alignment tended to continue throughout the entire PPM process. Subjects at universities that were not using their PPM process as a way to align directly with their strategic plan expressed a desire to do so.

Small projects cannot compete (RQ2, RQ3). Subjects from multiple universities mentioned that although their scoring instruments and their PPM processes worked well for large/enterprise projects, they did not do an adequate job in supporting smaller project requests. This tends to have the most negative impact on requests from faculty for projects related to a single class/major, smaller academic programs, and/or smaller departments/areas. While the technical and non-technical subjects all acknowledged and agreed on this point, the non-technical subjects expressed more intense dissatisfaction. Several subjects described the scenario where project requestors have submitted the same project request cycle after cycle, year after year, only to be denied repeatedly.

Senior leadership involvement (RQ3, RQ4). Many subjects commented on the great importance of the leadership and participation from senior campus leaders and the CIO, in terms of the validation that they provide to the PPM processes. In most of the universities that had defined PPM processes, either the cabinet makes the final project selection/prioritization

decisions, or a higher-level governing body that includes multiple cabinet members makes the final decisions. Technical subjects and non-technical subjects alike consistently perceived cabinet's involvement positively. Likewise, subjects at several universities described their CIO as being highly engaged in the process and several cited CIO involvement as a key to their success.

Transparency in decision-making (RQ3, RQ4). All subjects agreed on the importance of transparency, and subjects across nearly every university agreed that the mere presence of a PPM decision-making process has contributed toward transparency. However, technical and non-technical subject groups at some universities viewed decision-making authority differently, and several disagreed on the way in which project selection and prioritization decisions are actually made. Largely, the technical subjects perceived that their governing bodies are actively involved/included in the decision-making process. However, several non-technical subjects perceived that the governing bodies are really just told by IT which projects will be (or already were) selected and prioritized. These subjects clearly distinguished between the notion of being fully consulted and being merely informed, and several subjects discussed the implications for shared governance.

Transparency in PPM mechanics (RQ3). Through this different lens of transparency, subjects tended to focus on the specific steps that occur throughout process, the timelines when these steps occur, the stakeholders and governing bodies that are involved in any given step, and the information that is made available throughout the process. Subjects who were further removed from the process/mechanics regularly cited issues related to undocumented steps of the PPM process, and/or to issues about the information that is available relative to the projects in the submission/evaluation pipeline. Technical subjects tended to understand where any

undocumented steps existed and how they contributed to the overall process; but the non-technical subjects were often confused, sometimes not even realizing that there were undocumented steps or when/why/how the steps were occurring.

Consultation and responsiveness (RQ3). Some universities use divisional representatives to work closely with their project requestors to consult on project requests and to gather enough information to inform the project selection and prioritization process. Other universities provide such consultation services directly from within the PMO/IT. Both scenarios seem to work well, but the key is that the consultation must be comprehensive and timely. Nearly all subjects agreed that it is unrealistic to expect non-technical stakeholders to be able to compile enough information (or communicate it effectively) in isolation without assistance from technical stakeholders. Likewise, many subjects commented that this consultation should be made available to requestors in a timely manner following their outreach for support.

Capacity planning (RQ3). This topic tended to be discussed more by technical subjects, although several non-technical subjects did acknowledge its importance. Subjects at universities that demonstrated a greater level of PPM maturity overall, and subjects who demonstrated greater experience and understanding of capacity planning, all touted it as a huge key to their success. Those who perform capacity planning effectively, especially in coordination with their PPM cycles, believe that it greatly contributes to their ability to explain their bandwidth and capabilities to decision makers, and this information tends to benefit the project selection and prioritization process.

Governing bodies' makeup and representation of all campus stakeholders (RQ4). Subjects from multiple universities consistently and positively described a breadth of membership in their governing bodies, and consistently mentioned that the membership was

purpose-built to provide a good representation of interests from all across campus. Likewise, subjects consistently mentioned that the governing bodies contribute toward positive collaboration and transparency (discussed earlier). The only complaint of note was related to occasional situations that occur across multiple governing bodies (e.g. in situations that involve interactions/communications between a lower-level governing and a higher higher-level governing body, or between a governing body and cabinet). In some cases, subjects mentioned occasional confusion or frustration about information/decisions that did not flow smoothly from one group to the next.

Satisfaction with the IT and PMO organizations (RQ4). Non-technical subjects consistently expressed a relatively high degree of satisfaction with their IT/PMO organizations, and often acknowledged their dedication and hard work. Even during times when the non-technical subjects expressed dissatisfaction with portions of the PPM process, they continued to qualify their frustrations by saying that they understood the constraints that IT works under, and they expressed gratitude for the services that they provide. Particular praise was given about the consultation provided by the PMO and their efforts in continuous process improvement.

Research Question #5

Unfortunately, this research question could not be answered. Although four individual project scoring instruments were collected, the evidence did not include project requests that had been submitted via those instruments. The nature of an EFA would have required numerous completed submissions, and those were not made available. In lieu of the EFA, the normalized variables were organized into logical groupings based on a combination of the organization and sectional clustering of the variables within the original individual scoring instruments, and the

researcher's intuition about the relationship between the variables (as described in the Cross-Case Synthesis, but not repeated here).

Researcher's Observations

In addition to the findings directly related to the research questions, several other observations were made. The first and perhaps most impactful observation is that the subjects in this case study expressed commonly held perceptions that would lead the researcher to believe that there is a hypothetical optimal PPM project selection and prioritization model that would be viewed positively by all stakeholders, including technical and non-technical stakeholders across the management, staff, and faculty ranks. The optimal PPM model is defined by several characteristics and attributes, as described in the next several paragraphs.

The optimal PPM model would include standard organizational definitions for "IT project", "IT operations", and at least one other category of work that falls in between projects and operations (AKA "IT work order", or similar). Project submission, evaluation, selection, and prioritization would go through a formal and well-governed process in a predictable cycle that would occur two to three times per year without fail. The process would be governed by a multi-layered governance structure. The lower-level governing body would include representation by management, staff, and faculty who could speak to a broad set of campus perspectives and needs; this governing body would be responsible for making project selection and prioritization recommendations to a higher-level governing body. The higher-level governing body would primarily include cabinet, and select other campus senior leaders, and they would be responsible for making final project selection and prioritization decisions (and approve funding where applicable). This structure would honor the spirit of shared governance, but would also respect the role of senior leadership in making final decisions to meet the needs

of the university. The PMO would coordinate the process under the CIO's leadership, and the CIO would be highly engaged.

Early in the PPM cycle, project requestors would express interest in submitting project requests. The PMO (and potentially divisional representatives) would work closely with project requestors in a consultative manner to help define the requestors' needs and help them articulate their requests in a way that would be meaningful to the scoring process and to the governing bodies that select/prioritize projects. Consultation would occur in a timely manner following project requestor's expression of interest or requests for assistance. Projects would ultimately be submitted via an elegant online IT PPM solution.

The project evaluation process would include the use of a scoring instrument, again embedded within or accessible from the IT PPM solution. The scoring instrument would include variables that are meaningful to technical and non-technical stakeholders, and would contribute toward objectivity through its scoring algorithm. The scoring instrument would provide enough information for evaluators to understand the details of each project and to compare projects to one another objectively. The scoring instrument and the PPM process would help to align project selection and prioritization with the strategic plan and with important university initiatives/needs, and would provide the ability for smaller projects to compete with enterprise projects for selection and prioritization. The scoring instrument would also include good visualization features.

As part of the process, the PMO/IT organization would perform accurate and timely capacity planning that would contribute toward project selection and prioritization. If the IT organization did not have enough resources to work on various projects, project requestors would

be provided the opportunity to pay for consulting to implement the project (under appropriate situations, with potential oversight from the IT/PMO organization).

The IT organization would have the right to reserve some amount of time for "operational projects"; that is, operational efforts that are part of normal IT maintenance and compliance but that require significant effort (e.g. large-scale infrastructure upgrades, large-scale software upgrades, etc.). The process would also support some degree of IT standardization and scalability, and would not just create a free for all that would contribute toward an unfettered duplication of products and services.

The entire process would be transparent. Instructions and processes would be documented in an articulate and concise manner (and would make sense to technical and non-technical stakeholders), requestors would understand how/when to request their projects, and information would be communicated clearly and often leading up to the beginning of the cycle, throughout the duration of the cycle, and at the conclusion of the cycle. Information would also be made available to all stakeholders in a visible and on-demand manner throughout the entire PPM process. Likewise, the decision-making process and decision-making authority would be made clear to campus stakeholders, to project requestors, to the IT/PMO organizations, and to the governance committees. The entire process would be formal, but would also provide some degree of flexibility.

The finalized portfolio of projects would include an appropriate mix of different kinds/sizes of projects (not just the large projects), and rationale for any non-standard selection/prioritization decisions would be articulated and communicated clearly. Following project implementations, several months down the road, measurements would be taken to determine if the results of the projects provided the type/degree of benefits that were originally

anticipated (vis-à-vis new products and services that have had enough time to stabilize and be adopted).

The characteristics and attributes described in the hypothetical optimal PPM process/structure above are based on a reconciliation of the positive and negative perceptions held by a majority of the 27 subjects that were included in this study.

Another observation was that within these universities (and very possibly across larger sectors of public higher education), there are many valued issues and traditions such as transparency and participation that often push other considerations such as efficiency and ROI further down the list.

As another observation, many of the subject universities were able to provide rich documentary evidence, but it nearly always only told a portion of the story. In many instances, gaps were filled with the information that was provided through the interviews, particularly with the primary subject in Group #1, and with the *technical* subjects from Group #2. Likewise, in several cases, some pieces of documentary evidence were contradictory to others, and subjects most familiar with the PPM processes had to provide explanations to clarify which information was actually correct. This is noteworthy because much of the documentary evidence that was provided to the researcher is the same instructional material that is intended to provide information to project requestors and campus stakeholders. Given these information gaps, it is not necessarily surprising in hindsight that some subjects were confused about various portions of their university's PPM processes.

A final observation was that multiple universities had gone through relatively recent leadership and/or organizational changes. In cases where this had occurred, it seemed as though this change had provided an opportunity to look at PPM processes (and IT processes more

generally speaking) with new eyes and to consider changes and/or new approaches. In several cases, the changes and new approaches that either had been implemented or were in the process of being implemented were generally perceived positively.

Theoretical Implications

As explained in the literature review, the formal origins of portfolio management can be traced back to Modern Portfolio Theory (MPT), which was focused on financial securities investment portfolios. MPT used linear algebra and statistical equations to measure risk versus return, determine portfolio value, and quantify the portfolio selection decision-making process (Markowitz, 1952). From the MPT perspective, an investment portfolio's risk is essentially represented by the standard deviation of its average return; in a practical application of MPT, an investor selects an investment portfolio by comparing amongst portfolios with similar average rates of return and choosing the one that has the smallest standard deviation in average return (i.e. the smallest "risk"). MPT also suggested that risk could be reduced through the diversification of the assets within the portfolio.

This study revealed two findings that were relevant to MPT. The first finding was that IT/PMO professionals have deviated from Markowitz' original definition of risk. To be sure, project scoring instruments include variables that comply with Markowitz' notions of "standard deviation" and "uncertainty", and these variables are often clustered within a section of the instrument called "risk". Example variables include the proposed system's degree of maturity/complexity, the university's experience with the proposed system, the proposed vendor's track record, and so on. However, IT/PMO professionals also have a notion of "technology risk" that doesn't necessarily focus on aspects of "standard deviation" or "uncertainty", but rather focuses on issues such as potential security breach, potential for

compliance violation, potential for performance disruption, systems approaching end of life, and so on. The second finding was that IT PPM processes have deviated from the notion of reducing risk through the diversification of the portfolio, to an extent. As explained earlier, multiple subjects suggested that their PPM selection and prioritization processes favor large/enterprise projects at the expense of smaller projects. In a manner, this could be seen as a loss of diversification.

This study also revealed findings that held implications related to agency theory. As explained in the literature review, Agency theory attempts to explain relationships between agents and principals in business organizations. The agent is a person or group who can make decisions and act on behalf of the principal. Agency theory describes the challenges that can arise when the agent and the principals do not have the same interests, amounts of available information, or risk tolerance (Jensen & Meckling, 1976; Mitnick, 1975). As was revealed in the study, non-technical subjects from multiple universities held perceptions that their governing bodies are really just told by IT which projects will be selected and prioritized. In the worst case, non-technical subjects complained of hidden IT agendas that led to decisions that were more focused on IT objectives and less focused on serving the true needs of the university. Granted, this was a minority opinion, but it was one that surfaced nonetheless.

Limitations of the Research

The population and sample cases from this multiple-case study were limited to universities in the California State University system. The results and findings will not be generalizable to other populations. Case studies cannot be generalized in the same statistical sense as quantitative research studies, because the cases under study are not “sampling units” and they are not selected in the same way as samples in a quantitative study (Yin, 2009). It is

possible to do analytic generalization for case studies that are designed to support a previously developed theory (Yin, 2009); however, even though there were theoretical bases upon which this study was built, the study was not necessarily designed to provide validation of those theories (and thus analytic generalization would not be appropriate).

The original study design anticipated that six subject universities would act as "full participants" by providing evidence, and by including subject participants from Group #1 and Group #2. The design also anticipated being able to collect six project scoring instruments. In the end, eight subject universities participated, but only four of those were "full" participants. Similarly, only four universities were able to provide project scoring instruments (the other four universities do not use using scoring instruments). As mentioned earlier, case study data collection and analysis often tends to deviate somewhat from the original design, and these deviations were not deemed as negatively impacting the study.

Research question #5 could not be answered. Although four individual project scoring instruments were collected, the evidence did not include project requests that had been submitted via those instruments. The nature of an EFA would have required numerous completed submissions, and those were not available.

Recommendations for Future Research

Additional similar case studies could be performed in the future, on different populations of higher education universities outside of the California State University system to continue to build knowledge about the project and portfolio management processes and practices that are in use and about issues that are in play. Additional understanding could provide greater insights into the factors that influence, constrain, or otherwise impact project and portfolio management in higher education environments.

Given that the exploratory factor analysis (EFA) could not be performed, a future study could be conducted to do this. This study would be best guided by finding a university with a robust scoring instrument that has been in use for a significant time and/or for which many project requests had been submitted and scored. The EFA could provide insights into underlying variables of interest on project scoring instruments.

Finally, future research could include a Delphi study to create a model/instrument for scoring IT project requests in higher education IT environments. The roles of the expert participants in such a study should include (at minimum) project and portfolio management professionals, higher education IT managers, higher education PMO managers and/or project managers, agency theory scholars, and decision theory scholars. Any model/instrument should consider variables/algorithms that support both enterprise projects and smaller scale projects (or perhaps multiple instruments should be considered).

Recommendations for Practitioners

Practitioners would likely benefit from adopting as many elements as possible of the hypothetical optimal PPM model described above. Based on the literature review, and based on the sentiments from the subjects interviewed in this study, putting multiple elements from the hypothetical PPM model into place would positively contribute toward moving an IT organization into higher levels of PPM maturity and would likely result in many positive benefits. But practitioners should know what they are getting into when they do this. As research has shown, and as many subject practitioners suggested, it can be a long road and can require significant ongoing effort.

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APPENDIX A: INTRODUCTORY QUESTIONNAIRE

An introductory questionnaire was embedded as a single section within the recruitment email to Group #1 subjects. The intention of the questionnaire was to gather organizational information (about the subject's organization as a whole and about the specific organization of the PMO) and to collect data related to the instruments, variables, processes, and organizational/governance structures that are used during IT project selection and prioritization processes (as described in the Data Collection section in Chapter 3). The questionnaire follows below:

If you're willing to participate in the study, in addition to signing and emailing back the "Consent to Participate in Research" form, it will help my planning to understand which portions of the study you're willing to participate in, and the degree of IT centralization at your campus. For questions that lead with (Yes/No), please simply indicate the appropriate answer.

- (Yes/No) Provide instruments used for scoring/selecting/prioritizing IT projects on your campus.
- (Yes/No) Participate in an interview (approximately 60 minutes).
- (Yes/No) Provide names of technical and non-technical stakeholders who are involved in your campus processes for scoring/selecting/prioritizing IT projects. Those stakeholders will potentially be invited to participate in interviews (approximately 60 minutes).
- Degree of IT centralization at your campus:
    - Fewer than 40% of IT staff are centralized (i.e. mostly decentralized)
    - 40% - 60% of IT staff are centralized (i.e. an even mix of centralized/decentralized)
    - Over 60% of IT staff are centralized (i.e. mostly centralized)

APPENDIX B: INTERVIEW QUESTIONS

Interviewing chosen key informants can carry the risk of bias. Likewise, in studies involving behavioral research, respondents may be apprehensive about providing answers that are as honest as possible due to concerns that their answers may not be socially acceptable and/or that their answers are not consistent with the way they think the researcher wants them to respond (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). To reduce systematic bias, confidentiality of answers was guaranteed to the informants and they were assured that there were no right or wrong answers.

Instructions/Definitions

1. Project Management Office (PMO) refers to a team that is primarily responsible for portfolio management, program management, and/or project management (where a portfolio can contain multiple programs, and a program can contain multiple projects).
2. Portfolio management refers to the following types of processes and activities:
    a. Project selection and prioritization
    b. Portfolio optimization to achieve the appropriate mix/balance of projects and to maximize portfolio value
    c. Allocation and management of human, financial, and capital/equipment resources
    d. Risk assessment and management
    e. Maintenance of a central/holistic view of projects
    f. Creation and execution of project/portfolio standards
    g. Communicating with stakeholders about the portfolio
3. Program management refers to the following types of processes and activities that are related to a homogenous grouping of projects (e.g. enterprise/administrative applications; academic applications; web applications; and so on):
    a. Project selection and prioritization within the program
    b. Program optimization to achieve the appropriate mix/balance of projects within the program
    c. Allocation and management of human, financial, and capital/equipment resources
    d. Risk assessment and management within the program
    e. Maintenance of a central/holistic view of projects within the program
    f. Communicating with stakeholders about the program
4. Project management refers to the following types of processes and activities that are specific to an individual project:
    a. Project initiation
    b. Project planning
    c. Project execution
    d. Project monitoring and controlling
    e. Project closing
    f. Balancing competing constraints of project scope, project quality, project schedule and timelines, project resources (including human, financial, and capital/equipment resources), and project risk.

Interview Questions for Group #1 Subjects

Group #1 subjects included the primary managerial representative of the central IT project management office (PMOs) at 22 CSU universities (e.g. the director/manager of the PMO, or the closest approximation thereof). CSU, Chico was excluded from the study because the researcher is actively employed there; this exclusion is intended to avoid undue influence and to ensure that bias is not introduced.

Interview Questions:

1. What is your working title and job classification?
2. How long have you been in your current role?
3. What is the department name of your PMO, and to which VP Division does it report?
4. Does your PMO serve the entire campus? If not, please describe the areas it serves.
5. How many full time equivalent employees report to the PMO, including all allocated positions, vacant positions, managerial positions, and non-managerial positions.
6. Considering the combined work hours for all PMO staff and managers, please indicate the approximate percentage of time devoted to each of the following activities: portfolio management, program management, individual project management, and all other activities combined.
7. Is there specific education, training, or certification required as a condition of working in the PMO? If not, please describe your general approach to providing any optional education, training, or certification to PMO staff or managers.
8. Not including PMO staff, are there any IT staff who are *only* responsible for working on projects, as opposed to working on projects while simultaneously supporting other day-to-day IT operations? In this case, "IT Staff" include the CSU technical job classifications such as Analyst/Programmer, ITC (Information Technology Consultant), OSA (Operating Systems Analyst), Network Analyst, and so on.
9. Please describe if and how the PMO and/or the IT organization performs annual capacity planning, relative to the amount of hours that are available for working on projects. For instance, do you allocate a specific number or percent of overall IT hours to work on projects as opposed to hours for day-to-day operations or other work; or perhaps do you allocate hours to specific programs or project types? (If necessary, clarify that this question is not focused on the allocation of hours to an individual project within the project planning phase of project management)
10. Does your organization have a formal definition of an "IT project" for purposes of project submission, scoring, selection, and prioritization? If you have a written formal definition, it can be provided via email or with a URL to a publicly available website.
    a. (If not addressed in the answer) How do you differentiate between operational work and project requests? In this case, operational work might include things such as bug fixes, small enhancements, patches, maintenance, and so on.
11. Please demonstrate and describe the tools, instruments, and processes that project requestors use to submit IT project requests. Please describe any aspects that you feel work well and any aspects that you feel work poorly. For clarity, this question is only related to *submitting project requests*; we'll focus on project scoring, selection, and prioritization in a few minutes.

   a. (If not addressed in the answer) When can IT project requests be submitted? For instance, can they be submitted at any point throughout the year, or only during specific windows?

12. Please demonstrate and describe the tools, instruments, and processes that are used by your governance and/or management teams for scoring, selecting, and prioritizing IT project requests. Please describe any aspects that you feel work well and any aspects that you feel work poorly.
    a. (If not addressed in the answer) When do your governance or management teams score, select, and prioritize IT project requests? For instance, is it done in an ongoing manner throughout the year or is it only done during specific windows of time?
    b. (If not addressed in the answer) How many governance or management teams are involved in IT project scoring, selection, and prioritization? Please describe the teams' general membership such as the number and types of members, and if there are multiple teams please describe the group relationships or interdependencies.
    c. (If not addressed in the answer) Please describe your perception of the specific variables that are being measured, weighted and scored. For instance, do you feel that these variables and measurements are effective?
    d. (If not addressed in the answer) For purposes of scoring, selection, and prioritization, do you gather *different amounts or types of information* for different types of projects? For instance, do you score software application project requests based on a different set of criteria than you do for networking project requests?
    e. (If not addressed in the answer) Please describe if and how your governance and management teams and/or your project scoring, selection, and prioritization instruments and processes either do or do not support clients and functions from across campus. Are all clients, functions, and processes well served or represented?
    f. (If not addressed in the answer) How well do your project scoring, selection, and prioritization instruments and processes help to align your IT project portfolio with your overall campus strategic plan and/or your IT strategic plan?
13. Please describe any measurements that are performed after projects are complete. For instance, do you gather metrics to determine if the original project objectives have been met or to determine if your project stakeholders are getting the type and degree of benefits that were originally anticipated?
14. As a reminder, one of the objectives of this study is to interview other technical and non-technical stakeholders on your campus who participate in IT project scoring, selection, and prioritization processes. If you're able and willing, please provide the names of those stakeholders, and the names of the governance or management groups to which they belong.
15. Please provide any other information that you feel would help explain the variables, processes, organizational structures, or governance structures that are used at your institution for project scoring, selection, and prioritization. We can discuss these items verbally, or you can provide any relevant websites, business process guides, knowledge base articles, and so on.

Interview Questions for Group #2 Subjects

Group #2 subjects include other technical and non-technical stakeholders across each campus who participate in IT project scoring, selection, and prioritization processes. These subjects are identified during the interviews with the subjects from Group #1. Group #2 subjects are drawn from a random selection of the 22 universities, as explained in Chapter 3 of this study.

Interview Questions:

1. What is your working title and job classification?
2. How long have you been in your current role?
3. What department and division do you report to?
4. What is your role in the IT project and portfolio management governance/management process, and how long have you been in this role?
5. Please think about the tools, instruments, and processes that project requestors use to submit IT project requests. Please describe any aspects that you feel work well and any aspects that you feel work poorly. For clarity, this question is only related to *submitting project requests*; we'll focus on project scoring, selection, and prioritization in a few minutes.
6. Please think about the tools, instruments, and processes that are used by your governance and/or management teams for scoring, selecting, and prioritizing IT project requests. Please describe any aspects that you feel work well and any aspects that you feel work poorly.
    a. (If not addressed in the answer) How do you feel about the cadence and the time windows that are used by your governance or management teams to score, select, and prioritize IT project requests? For instance, these processes may be done in an ongoing manner throughout the year, or they may be only be done during specific windows of time. Whatever the case, does it work well?
    b. (If not addressed in the answer) Please describe your perception of the specific variables that are being measured, weighted and scored. For instance, do you feel that these variables and measurements are effective?
    c. (If not addressed in the answer) Please describe if and how your governance and management teams and/or your project scoring, selection, and prioritization instruments and processes either do or do not support clients and functions from across campus. Are all clients, functions, and processes well served or well represented?
    d. (If not addressed in the answer) How well do your project scoring, selection, and prioritization instruments and processes help to align your IT project portfolio with your overall campus strategic plan and/or your IT strategic plan?
7. Please provide any other information that you feel would help explain the variables, processes, organizational structures, or governance structures that are used at your institution for project scoring, selection, and prioritization. We can discuss these items verbally, or you can provide any relevant websites, business process guides, knowledge base articles, and so on.

APPENDIX C: CASE STUDY DATABASE

A case study database contributes toward reliability of the study (Yin, 2009). The case study within this dissertation conformed to this principle, and the case study database (CSDB) is included in this appendix. The CSDB was broken out into multiple file structures:

- CSDB evidence log. This was a spreadsheet in MS Excel. A record was entered for each individual piece of evidence collected, and several pieces of data were stored including an evidence ID (assigned by the researcher), the name of the campus, the name of the article of evidence (as named by the university), the contrived name of the article of evidence (as created by the researcher to protect anonymity), the date the evidence was collected, the type of evidence (e.g. archival record, documentation, interview, or physical artifact), the format (e.g. web page, PDF, or other document type), a brief description, the retrieval method, and a direct link to the evidence (if applicable). The CSDB evidence log is included in Table 19 in the Case Study Database Evidence Log section below.
- Evidence notes. An MS Word file was used for each university, to capture detailed notes about each piece of evidence. This was also where initial findings were outlined. The evidence notes are included in the Case Study Database Notes section below.
- Transcript files. An MS Word file was used for each individual subject interview. For confidentiality and brevity purposes, interview transcripts are not published within the study.
- NVivo project. The evidence notes and transcript files were all imported into NVivo 12 Plus, where open coding and additional analysis was done, and where

additional themes and findings were noted. Nvivo output is not published within the study.

Case Study Database Evidence Log

Table 19

Case Study Database Evidence Log

ID	Evidence Name	Type	Format	Description
1-1	IT Organizational Home Page	Documentation	Web page	Used to determine the name of the PMO Director.
1-2	Email Correspondence w/PMO Director	Documentation	Email correspondence	High-level description of project submission and prioritization process w/attachments/links to documents of interest.
1-3	IT Project Scoring Tool	Physical artifact	Google sheets	Project scoring tool, used to measure variables of interest and score projects objectively; this the new tool being piloted to replace their legacy project charter/scoring tool.
1-4	Legacy IT Project Charter	Physical artifact	MS Word document	Legacy project charter template with a matrix/rubric of variables that were historically used to score a project; being replaced by a new IT Project Scoring Tool (see Evidence ID 1-3).
1-5	Legacy Project Request Form	Documentation	JPEG screenshot	Additional legacy variables historically measured for "major" projects; these variables have been added into the New IT Project Scoring Tool.
1-6	In-Depth Interview w/Subject #1-1	Interview	Group #1 Subject	Interview with Group #1 subject
1-7	Governance Team Roster	Documentation	Email correspondence	Names of faculty reps on the higher-level governing body.
1-8	IT Policies and Procedures	Documentation	Web page	Catalog of, and links to, all campus IT policies and procedures.
1-9	BPG for IT Projects and Procurement	Documentation	Web page	Outlines processes for project submission/scoring/prioritization, defines governance committees' roles, definitions for major/minor projects, glossary of other relevant terms, timelines for project submission and prioritization cycles, and links to other related campus and CSU BPGs.
1-10	BPG for IT Project Close Out	Documentation	Web page	Defines processes for closing out an IT project.
1-11	Project Closure Form	Documentation	MS Word document	Form used to capture/measure info when an IT project is closed out.
1-12	BPG for Tracking IT Project Time	Documentation	Web page	Defines processes for tracking IT employees' time spent on IT projects.

ID	Evidence Name	Type	Format	Description
1-13	BPG for IT Governance	Documentation	Web page	Defines the purpose/membership of the higher-level governing body that recommends IT projects for selection and prioritization.
1-14	BPG for IT Project Intake	Documentation	Web page	Defines the IT project lifecycle, glossary of relevant terms, defines different project classes (based on size/complexity), and defines project intake steps.
1-15	IT Project Coordinators	Documentation	Web page	Defines the purpose/membership of the lower-level governing structure (in the form of divisional reps) that recommends IT projects for selection and prioritization.
1-16	IT Projects Web Page	Documentation	Web page	Links to various project resources, documentation, lists of projects, and access to the project management PPM system.
1-17	Overview of IT Projects Processes and Resources	Documentation	Web page	Defines projects vs. operations, provides general info about the principles of project management, general instructions and links to make project requests, and links to other related web pages/resources.
1-18	IT Project & Procurement Process flowchart	Documentation	Web page	Business process diagram (flow chart) that describes the process for requesting an IT project/purchase.
1-19	PPM System Guides	Documentation	Web page	Links to BPGs and training material for the IT PPM/ticketing system for customers, IT staff, and IT managers.
1-20	Project Lists	Archival Record	Web page	Links to lists of current and previous/archived projects.
1-21	Procurement Policy	Documentation	Web page	Campus policy for IT procurement
1-22	CSU Policy for Contracts and Procurement	Documentation	Web page	Introduction to the CSU policy on contracts and procurement, applies to all CSU universities.
1-23	CSU Policy for Solicitation Thresholds	Documentation	Web page	CSU policy that outlines thresholds of importance for procurement and acquisition, applies to all CSU universities.
1-24	Governance Team Roster	Documentation	Email correspondence	Roster and contact info for the higher-level governing body (used to inform the list of potential Group #2 subjects).
1-25	Answers to Clarifying Questions	Documentation	Email correspondence	Subject's answers to researcher's clarifying questions following the interview.
1-26	Clarification between higher-level and lower-level governing bodies	Documentation	Email correspondence	Subject's answers to researcher's clarifying questions following the interview.
1-27	Focused Interview w/Subject #1-2	Interview	Group #2 Subject	Interview with Group #2 subject

ID	Evidence Name	Type	Format	Description
1-28	Focused Interview w/Subject #1-3	Interview	Group #2 Subject	Interview with Group #2 subject
1-29	Focused Interview w/Subject #1-4	Interview	Group #2 Subject	Interview with Group #2 subject
2-1	IT Organizational Chart	Documentation	PDF	Used to determine the name of the PMO Director
2-2	Email Correspondence w/PMO Director	Documentation	Email correspondence	High-level description of project submission and prioritization process w/attachments/links to documents of interest.
2-3	IT Project Prioritization Conference Presentation	Documentation	MS PowerPoint document	Outlines the entire process for project submission, scoring, selection, and prioritization.
2-4	IT Project Prioritization Workflow	Documentation	MS Word document	Visual representation of the prioritization workflow.
2-5	Project Request Form	Physical artifact	PDF	PDF export of the request form that is housed in the PPM tool and used by requestors to submit a project request (considered a physical artifact because it's a screen shot of the actual tool).
2-6	IT Project Scoring Tool	Physical artifact	MS Excel document	Project scoring tool, used to measure variables of interest and score projects objectively.
2-7	Project Scoring Workbook	Physical artifact	MS Excel document	The tool used to compile and compare all individual projects/scores.
2-8	Project Selection and Prioritization Timeline	Documentation	PDF	Overview of the steps and schedule for a typical project prioritization cycle.
2-9	In-Depth Interview w/Subject #2-1	Interview	Group #1 Subject	Interview with Group #1 subject
2-10	Stakeholders List	Documentation	Email correspondence	List of governance committee members and IT/PMO stakeholders
2-11	IT Home Page	Documentation	Web page	Home page for the IT division
2-12	Project Submission/ Prioritization Page	Documentation	Web page	Provides an explanation of the project submission processes, and the overarching project prioritization process
2-13	IT Projects Lists	Archival Record	Web page	Links to lists of current, proposed, and previous/archived projects.
2-14	Current IT Projects	Archival Record	Web page	List of current projects
2-15	Proposed IT Projects	Archival Record	Web page	List of proposed projects
2-16	Archived IT Projects	Archival Record	Web page	List of closed/archived projects

ID	Evidence Name	Type	Format	Description
2-17	BPG for Project Submission	Documentation	Web page	Provides instructions for submitting a project request through the online IT PPM system.
2-18	BPG for Software Acquisition	Documentation	Web page	Provides instructions for purchasing software
2-19	Campus Strategic Plan Home Page	Documentation	Web page	Home page for the overarching campus strategic plan.
2-20	Strategic Plan	Documentation	PDF	The full campus strategic plan, including all values and strategic goals
2-21	Integrated Planning Home Page	Documentation	Web page	Home page for BPGs related to integrated assessment, planning, and budgeting
2-22	Project Prioritization Calendar	Documentation	Web page	The calendar for the most recent cycle for project submission, selection, and prioritization
2-23	Prioritized Projects	Archival Record	Web page	Contains a list of projects that were selected and prioritized in 2018
2-24	Project Definition	Documentation	Web page	This is the definition for an IT project
2-25	IT Annual Goals	Documentation	PDF	The IT annual unit plan from the previous academic year
2-26	Focused Interview w/Subject #2-2	Interview	Group #2 Subject	Interview with Group #2 subject
2-27	Focused Interview w/Subject #2-3	Interview	Group #2 Subject	Interview with Group #2 subject
2-28	Focused Interview w/Subject #2-4	Interview	Group #2 Subject	Interview with Group #2 subject
2-29	Focused Interview w/Subject #2-5	Interview	Group #2 Subject	Interview with Group #2 subject
3-1	IT Organizational Chart	Documentation	PDF	Used to determine the name of the PMO Director
3-2	Email Correspondence w/PMO Director	Documentation	Email correspondence	High-level description of project submission and prioritization process w/attachments/links to documents of interest.
3-3	Current IT Projects	Archival Record	PDF	A list of the current IT projects.
3-4	IT Governance Home Page	Documentation	Web page	Describes the two-tiered governance structure for IT projects/portfolio management.
3-5	IT Committee	Documentation	Web page	Defines the purpose/membership of the lower-level governing body that recommends IT projects for selection and prioritization.

ID	Evidence Name	Type	Format	Description
3-6	IT Advisory Council	Documentation	Web page	Defines the purpose/membership of the higher-level governing body that recommends IT projects for selection and prioritization.
3-7	In-Depth Interview w/Subject #3-1	Interview	Group #1 Subject	Interview with Group #1 subject
3-8	Email Correspondence w/PMO Director	Documentation	Email correspondence	Links to the Project Charter Request Form and Project Closure Form
3-9	Project Charter	Physical artifact	MS Word document	The tool that acts as a project charter, used to capture information about the intent/purpose of the project.
3-10	Project Closure Form Template	Documentation	MS Word document	Form used to capture/measure info when an IT project is closed out.
3-11	Project Charter Workflow	Documentation	Web page	Visual representation of the workflow and stakeholders involved in creating a project charter
3-12	PMO Home Page	Documentation	Web page	Home page for the PMO.
3-13	IT Committee Minutes	Archival Record	PDF	Meeting minutes from several meetings
3-14	PMO Project Documentation Templates	Documentation	PDF	Acts as a template for project sponsors/managers to use for several aspects of the project lifecycle.
3-15	Focused Interview w/Subject #3-2	Interview	Group #2 Subject	Interview with Group #2 subject
3-16	Focused Interview w/Subject #3-3	Interview	Group #2 Subject	Interview with Group #2 subject
3-17	Focused Interview w/Subject #3-4	Interview	Group #2 Subject	Interview with Group #2 subject
3-18	Focused Interview w/Subject #3-5	Interview	Group #2 Subject	Interview with Group #2 subject
3-19	Focused Interview w/Subject #3-6	Interview	Group #2 Subject	Interview with Group #2 subject
4-1	IT Organizational Chart	Documentation	PDF	Used to determine the name of the PMO Director
4-2	Campus Strategic Plan Home Page	Documentation	Web page	Home page for the overarching campus strategic plan.
4-3	IT Strategic Plan Home Page	Documentation	Web page	Home page for the IT strategic plan.
4-4	In-Depth Interview w/Subject #4-1	Interview	Group #1 Subject	Interview with Group #1 subject

ID	Evidence Name	Type	Format	Description
4-5	IT Committee	Documentation	Web page	Defines the purpose and membership of the IT governing body that provides input to Academic Senate.
4-6	IT Advisory Committee	Documentation	Web page	Defines the purpose and membership of the IT governing body that provides strategic/technical recommendations to the CIO.
4-7	IT Technical Committee	Documentation	Web page	Defines the purpose and membership of the IT governing body that provides input on the major enterprise IT services that serve all of campus.
4-8	Strategic Plan	Documentation	PDF	The full campus strategic plan, including all values and strategic goals
4-9	IT Strategic Plan	Documentation	PDF	The full IT strategic plan, including all values and
4-10	IT Annual Report	Documentation	PDF	Annual report of the IT division's accomplishments for the previous academic year.
4-11	IT Strategic Plan Progress, Goal #1	Archival Record	Web page	A list of current/previous IT projects, as they align with the IT strategic goal #1
4-12	IT Strategic Plan Progress, Goal #2	Archival Record	Web page	A list of the current/previous IT projects, as they align with the IT strategic goal #2
4-13	IT Strategic Plan Progress, Goal #3	Archival Record	Web page	A list of the current/previous IT projects, as they align with the IT strategic goal #3
4-14	IT Strategic Plan Progress, Goal #4	Archival Record	Web page	A list of the current/previous IT projects, as they align with the IT strategic goal #4
4-15	Focused Interview w/Subject #4-2	Interview	Group #2 Subject	Interview with Group #2 subject
4-16	Focused Interview w/Subject #4-3	Interview	Group #2 Subject	Interview with Group #2 subject
4-17	Focused Interview w/Subject #4-4	Interview	Group #2 Subject	Interview with Group #2 subject
4-18	Focused Interview w/Subject #4-5	Interview	Group #2 Subject	Interview with Group #2 subject
4-19	Focused Interview w/Subject #4-6	Interview	Group #2 Subject	Interview with Group #2 subject
4-20	Focused Interview w/Subject #4-7	Interview	Group #2 Subject	Interview with Group #2 subject
5-1	Email Correspondence w/PMO Director	Documentation	Email correspondence	Project submission and prioritization process attachments of interest.
5-2	IT Project Scoring Tool	Physical artifact	PDF	Project scoring tool, used to measure variables of interest and score projects objectively (considered a physical artifact because it's a screen shot of the actual tool).
5-3	Project Scoring Workbook	Physical artifact	PDF	A screenshot of the tool used to compile and compare all individual projects/scores (considered a physical artifact because it's a screen shot of the actual tool).

ID	Evidence Name	Type	Format	Description
5-4	Project Request Form	Physical artifact	PDF	A screenshot of the request form that is housed in the PPM tool and used by requestors to submit a project request (considered a physical artifact because it's a screen shot of the actual tool).
5-5	In-Depth Interview w/Subject #5-1	Interview	Group #1 Subject	Interview with Group #1 subject
5-6	PMO Home Page	Documentation	Web page	The home page for the PMO, acts as a launching point to PMO documentation, support, etc.
5-7	IT Project Request Guidelines	Documentation	Web page	Guidelines for submitting an IT project and definitions of different project sizes/types.
5-8	PPM Templates	Documentation	Web page	Provides links to the Project Management Process and various templates for project management.
5-9	Project Management Process	Documentation	PDF	Outlines the different stakeholders and their responsibilities across five stages of a project's life (from ideation to project close out).
5-10	Strategic Project Request Form	Physical artifact	MS Word document	The request form for strategic project requests (considered a physical artifact because it's a screen shot of the actual tool).
5-11	Project Charter	Physical artifact	MS Word document	The tool that acts as a project charter, used to capture information about the intent/purpose of the project.
5-12	Project Kick Off Presentation Template	Documentation	PDF	Acts as a template for project sponsors/managers to use to present the project during the initiation phase of a project.
5-13	Project Change Order Template	Documentation	MS Word document	Acts as a template for project stakeholders to request changes to their projects.
5-14	Project Status Template	Documentation	MS Word document	Acts as a template for project managers/stakeholders to document the status of a project.
5-15	Issues/Risks Log Template	Documentation	MS Excel document	Acts as a template for project managers/stakeholders to document the issues/risks of a project.
5-16	Quality Assurance Checklist Template	Documentation	MS Word document	Acts as a template for project managers/stakeholders to document the quality assurance steps/deliverables for a project.
5-17	Test Plan Template	Documentation	MS Word document	Acts as a template for project managers/stakeholders to document the project test plan
5-18	Test Case Template	Documentation	MS Excel document	Acts as a template for project managers/stakeholders to document the specific tests that will be conducted within a project.

ID	Evidence Name	Type	Format	Description
5-19	Go No-Go Presentation Template	Documentation	PDF	Acts as a template for project sponsors/managers to use to present the project during the final stages of the execution phase of a project.
5-20	Project Closure Form Template	Documentation	MS Word document	Form used to capture/measure info when an IT project is closed out.
5-21	IT Advisory Committee	Documentation	Web page	Defines the purpose/membership of the higher-level governing body that recommends IT projects for selection and prioritization.
6-1	IT Organizational Home Page	Documentation	Web page	Used to determine the name of the PMO Director
6-2	Email Correspondence w/PMO Director	Documentation	Email correspondence	High-level description of project submission and prioritization process w/attachments of interest.
6-3	IT Project Scoring Tool	Physical artifact	MS Excel document	Project scoring tool, used to measure variables of interest and score projects objectively.
6-4	IT Project Prioritization Workflow	Documentation	PDF	Visual representation of the prioritization workflow.
6-5	In-Depth Interview w/Subject #7-1	Interview	Group #1 Subject	Interview with Group #1 subject
6-6	IT Projects Home Page	Documentation	Web page	This web page provides a list of announcements and status updates of current and upcoming projects.
7-1	IT Organizational Chart	Documentation	Web page	Used to determine the name of the PMO Director
7-2	Email Correspondence w/PMO Director	Documentation	Email correspondence	High-level description of project submission and prioritization process w/attachment of current list of projects.
7-3	Current IT Projects	Archival Record	PDF	A list of the current IT projects.
7-4	In-Depth Interview w/Subject #6-1	Interview	Group #1 Subject	Interview with Group #1 subject (combined interview w/a PMO PM)
7-5	In-Depth Interview w/Subject #6-2	Interview	Group #1 Subject	Interview with Group #1 subject (combined interview w/a PMO PM)
7-6	Email Correspondence w/Project Manager	Documentation	Email correspondence	Explanation of project definitions, and attachments for project charter template and project prioritization process workflow.
7-7	IT Project Prioritization Workflow	Documentation	PDF	Visual representation of the project submission, evaluation, and prioritization workflow.
7-8	IT Project Charter	Physical artifact	MS Word document	The tool that acts as a project charter, used to capture information about the intent/purpose of the project.
8-1	University Organizational Chart	Documentation	Web page	Used to determine the name of the PMO Director
8-2	IT Organizational Home Page	Documentation	Web page	Used to determine the name of the PMO Director

ID	Evidence Name	Type	Format	Description
8-3	IT Organizational Chart	Documentation	PDF	Used to determine the name of the PMO Director
8-4	Email Correspondence w/PMO Director	Documentation	Email correspondence	High-level description of fledgling PMO office/processes.
8-5	In-Depth Interview w/Subject #8-1	Interview	Group #1 Subject	Interview with Group #1 subject

Note. The CSDB evidence log includes more columns, but some info is not published in order to protect confidentiality, and some info is not published for brevity's sake. Evidence IDs are coded as two numbers separated by a hyphen; the first number represents the University ID, and the second number represents the specific article of evidence in the chronological order that it was retrieved (e.g. Evidence ID 1-5 would be for University #1, and it would be the fifth piece of evidence that was retrieved). The values in the Evidence Name column were modified where necessary in order to protect confidentiality. "BPG" refers generically to a "Business Process Guide" – a document that defines the steps that are taken within a single IT/business process or a set of related IT/business processes ("BPG" is common CSU vernacular).

Case Study Database Notes

The notes in this section correspond to the articles of evidence that are described in the Case Study Database Evidence Log above. "FINDING" represents findings of interest that were observed during a first pass analysis. Additional coding/findings were done in follow up passes directly within NVivo. Interview transcripts are represented within this section as informational entries, but the actual contents of interview transcripts are not published within the study.

Evidence ID/Name: 1-1 / IT Organizational Home Page
Type/Format: Documentation / web page
Retrieval Method: Web search on campus web site
Notes
This web page provides a breakdown of the departments in the central campus IT organization, including managerial contacts for each department. It also provides links to various other important web pages and documentation (e.g. strategic plan, IT policies and procedures, etc.). This page was primarily used to determine the PMO point of contact.

Evidence ID/Name: 1-2 / Email Correspondence w/PMO Director
Type/Format: Documentation / email correspondence
Retrieval Method: Email from Subject #1-1 as a follow up to the introductory questionnaire
Notes
This email provided a high-level description of the IT project submission, selection, and prioritization process and it included attachments/links to other pieces of evidence including the

IT Project Scoring Tool (Evidence ID 1-3), Legacy IT Project Charter (Evidence ID 1-4), and Legacy Project Request Form (Evidence ID 1-5).

Evidence ID/Name: 1-3 / IT Project Scoring Tool
Type/Format: Physical artifact / Google sheets
Retrieval Method: Email from Subject #1-1 (see Evidence ID 1-2)
Notes:
This is the project-scoring tool that is used to measure variables of interest and score projects objectively. This is a new tool that is being piloted to replace their legacy project charter/scoring tool. A redacted version of this form is included in the findings in Chapter 4. This tool was described at a high-level by Subject #1-1 in an email as a follow up to the introductory questionnaire (see Evidence ID 1-2) and the tool was explained in greater detail by Subject #1-1 during the in-depth interview.

The tool essentially scores on a combination of variables across three major areas: 1) the amount of IT effort required (filled out by IT project managers), 2) the anticipated level of impact/value (further subdivided into the impact/value to IT which is filled out by the IT project managers, and the impact/value to the business which is filled out by the project requestor), and 3) the level of urgency (filled out by requestor, and as understood from the sponsor's/requestor's perspective). The new tool is intended to provide for improved visualization of priorities, and the goal is to require each project requestor to fill out the form as a Qualtrics survey during the project request (and stored as an artifact of the request in the PPM/ITSM tool).

FINDING: the IT organization is actively engaged in a continuous improvement effort in PPM by enhancing the project review/selection/prioritization process. They had a robust formal legacy process with multiple tools/instruments, but they recognized a number of shortcomings and they are working to solve them, and they are working to provide better support for decision-making and governance. This focus on continuous improvement was demonstrated by this new IT Project Scoring Tool, and it was supported by the interviews of multiple subjects.

Evidence ID/Name: 1-4 / Legacy IT Project Charter
Type/Format: Physical artifact / MS Word document
Retrieval Method: Email from Subject #1-1 (see Evidence ID 1-2)
Notes
This legacy project charter template has a matrix/rubric of variables that were historically used to score a project; it is being replaced by the new IT Project Scoring Tool (see Evidence ID 1-3). The form captures a lot of information, but there are some visible shortcomings; for instance, requestors can score multiple variables, but the score is not automatically summed because it is in a Word document. Likewise, the number of variables that were being scored was limited. The PMO is attempting to address these shortcomings with the new pilot tool.

Evidence ID/Name: 1-5 / Legacy Project Request Form
Type/Format: Documentation / JPEG screenshot
Retrieval Method: Email from Subject #1-1 (see Evidence ID 1-2)
Notes

This screen shot shows additional legacy variables that were historically measured/scored for "major" projects; these variables have been added into the new IT Project Scoring Tool (see Evidence ID 1-3).

Evidence ID/Name: 1-6 / In-Depth Interview w/Subject #1-1
Type/Format: Interview / Group #1 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 1-7 / Governance Team Roster
Type/Format: Documentation / Email correspondence
Retrieval Method: Email from Subject #1-1
Notes
Subject #1-1 emailed names of faculty representatives who sit on the higher-level IT governing body that oversees IT project selection/prioritization. These names were included in the list of potential Group #2 subjects.

Evidence ID/Name: 1-8 / IT Policies and Procedures
Type/Format: Documentation / web page
Retrieval Method: Email from Subject #1-1
Notes
This web page contains a list of dozens of campus IT policies, procedures, and BPGs (with links to all of them) – many of which are related to IT project/portfolio management including links to the BPG for IT Projects and Procurement (Evidence ID 1-9), the BPG for IT Project Close Out (Evidence ID 1-10), the Project Closure Form (Evidence ID 1-11), the BPG for Tracking IT Project Time (Evidence ID 1-12), the BPG for IT Project Intake (Evidence ID 1-14), and the IT Project Coordinators web page (Evidence ID 1-15). Those other individual BPGs also include links to each other (to varying degrees), and links to other resources such as PPM document templates, the ITSM/ITPPM system, training, etc.

FINDING: The IT organization provides a wealth of information, spread across dozens of web pages and documents that collectively describe the campus IT project/portfolio management processes, standards, support, training, and so on. This university has put serious effort into defining a comprehensive process and governance structure, and in providing documentary information to explain it all. However, there are some notable challenges. In some cases the information across multiple web pages is contradictory; in other cases the information is roughly (but not exactly) duplicated. For instance, the terms *project* and *operations* are defined in four separate documents (BPG for IT Projects and Procurement, Evidence ID 1-9; BPG for Tracking IT Project Time, Evidence ID 1-12; BPG for IT Project Intake, Evidence ID 1-14; and the Overview of IT Projects Processes and Resources, Evidence ID 1-17). The definitions are all similar, but they do not match exactly. Similarly, at least two separate documents define processes for project intake, selection, and prioritization processes (BPG for IT Projects and Procurement, Evidence ID 1-9; and BPG for IT Project Intake, Evidence ID 1-14). Again, the documents are similar but don't match exactly, potentially leading to confusion. Finally, there isn't a clear entry point for understanding all the processes and/or for understanding how they all

fit together. For instance, this specific IT Policies and Procedures web page would seemingly be a good launch point since it's essentially a landing page with links to all the other policies and procedures; however, there is at least one other web page (the Overview of IT Projects Processes and Resources, Evidence ID 1-17) that specifically instructs users to start by reading the BPG for IT Projects and Procurement (Evidence ID 1-9). The primary informant and one other subject acknowledged some of these issues and explained that the IT organization was actively working on addressing these issues.

FINDING: duplicative information. This could be seen as the 1st launching point to provide users information about the IT PPM processes.

Evidence ID/Name: 1-9 / BPG for IT Projects and Procurement
Type/Format: Documentation / web page
Retrieval Method: Email from Subject #1-1 as a follow up to the interview
Notes
This web page is a launching point for understanding the IT project processes (the Overview of IT Projects Processes and Resources, Evidence ID 1-17, tells readers to read this page first to understand the processes). This web page outlines processes for project submission, scoring, and prioritization; defines roles of the IT governance committees and divisional representatives; provides definitions for major/minor project and a glossary of other relevant terms; provides timelines for project submission and prioritization cycles, and links to other related campus and CSU BPGs.

The documentation of business process workflows, specific steps and/or responsibilities between divisional reps, IT team, and governance teams should refer to the information from this document. The project request process includes four over-arching steps. One of the steps includes an internal divisional process wherein each VP division does evaluation/prioritization of their projects, and that feeds into the overarching prioritization process. The cycle for major projects occurs in (2) bi-annual cycles (fall, spring) (and a visualization is provided). There is also an exemption and emergency exception process. As a point of confusion/clarification, the timelines that are laid out on this web page did not exactly match the timelines as explained by Subject #1-1 (the subject indicated that the timelines were shifted by approximately 1 month).

FINDING: transparency issue. Per interview with Subject #1-1 (Evidence ID 1-6), IT does capacity planning on a 6-month interval, and this includes an internal review of their constrained resources/availability. The IT group uses this information to make a recommendations of the projects that should be accepted/implemented, based on the priority, likelihood of success, and the resource constraint/availability. This basically occurs/manifests in between step #1 and step #2 of the PPM process, but it is not specifically documented within this BPG. Based on the interviews with the other subjects (Evidence ID 1-27, 1-28, and 1-29), this lack of transparency is confusing. Subjects know IT is providing recommendations/input and that it's weighed heavily in the decision making process, but they don't understand exactly what is going into the IT analysis, and three separate subjects provided three different perceptions.

FINDING: motivating factors for this university's IT PPM processes include a need for transparency, a desire to align resources with the university strategy, a desire to align with

campus budget processes, a desire to perform capacity planning, and alignment with compliance/policy/law.

FINDING: contradictory/duplicative information. This BPG and the BPG for IT Project Intake (Evidence ID 1-14) both describe project intake processes. However, these two documents don't completely align with each other, and a couple of the steps in the documents could be considered contradictory. Subject #1-1 acknowledged the misalignment in a follow-up email, and indicated that documentation was actively being rewritten.

FINDING: documented differentiation between "project" and "operations" (with definitions of both).

FINDING: two classes of projects: major and minor. The differences are primarily in the cost and the effort estimates (the differences between the two are highlighted red).

Major projects have the following characteristics:

- 1+ the following is true:
  - It's new product or service that impacts IT*
  - It's an upgrade to an existing product or service that impacts IT
  - It's mandated, sponsored, or funded by the Chancellor's Office
- AND 1+ of the following is true:
  - The one-time cost is $5K+, or the cost for years 1-2 is $10K+
  - It will take 60+ IT staff hours to complete
  - It requires ongoing IT maintenance/funding
  - It's designated as a major project by senior leadership

Minor projects have the following characteristics

- 1+ of the following is true:
  - It's new product or service that impacts IT*
  - It's an upgrade to an existing product or service that impacts IT
  - It's mandated, sponsored, or funded by the Chancellor's Office
- AND 1+ of the following is true:
  - The one-time cost is less than $5K, or the cost for years 1-2 is less than $10K
  - It will take 30-60 IT staff hours to complete
  - It requires ongoing IT maintenance/funding
  - It's designated as a minor project by senior leadership

*In a follow-up email correspondence with Subject #1-1, it was acknowledged that the university treats "evaluation and selection" projects as independent projects. E.g., if they were going to analyze and write an RFP for a system purchase/implementation, then the analysis and RFP effort would be considered a distinct project unto itself, and the actual resultant implementation would be considered a separate project.

Evidence ID/Name: 1-10 / BPG for IT Project Close Out
Type/Format: Documentation / web page
Retrieval Method: Email from Subject #1-1 as a follow up to the interview
Notes

This web page defines the processes for closing out IT projects. Project closure steps include collection of data into project archive; communication with stakeholders; assessment of the success, failure, costs, and lessons learned; and turnover of operations to the appropriate groups. Although assessments are conducted immediately upon project completion, the Subject #1-1 indicated during the interview (Evidence ID 1-6) that they're limited to the types of things that can be measured/assessed immediately upon completion of a project, and follow-up assessments are not done down the road.

FINDING: confusion and/or contradictory information. This web page indicates that project closure is required for all four classes of projects; however, it doesn't outline all the classes, and all the other web pages that reference classes only refer to two classes ("major", and "minor").

Evidence ID/Name: 1-11 / Project Closure Form
Type/Format: Documentation / MS Word document
Retrieval Method: Email from Subject #1-1 as a follow up to the interview
Notes
Form used to capture/measure info when an IT project is closed out. Asks the user to fill out several sections including completion status details, a list of project accomplishments, a list of lessons learned, a list of outstanding issues, basic performance measurements (e.g. on time/budget), and operational SLA information.

FINDING: clarity and concise delivery of instructions or information (or lack thereof). Interestingly, this form is not linked to from the BPG for IT Project Close Out (Evidence ID 1-10), which you would think it would be so that users could get to it easily.

Evidence ID/Name: 1-12 / BPG for Tracking IT Project Time
Type/Format: Documentation / Web page
Retrieval Method: Found by reviewing Evidence ID 1-9
Notes
This web page defines processes and cadences for tracking IT employees' time spent on IT projects. The underlying justification for doing this is that it contributes toward the ability of IT to do capacity planning and to use resources as effectively as possible, and to contribute toward ability to effectively do chargebacks (where applicable),

Evidence ID/Name: 1-13 / BPG for IT Governance
Type/Format: Documentation / web page
Retrieval Method: Email from Subject #1-1 as a follow up to the interview
Notes
This web page defines the purpose and membership of the higher-level governing body that recommends IT projects for selection and prioritization. The CIO is responsible for appointing members and convening the meetings.

The higher-level governing body is also responsible for governance and IT oversight in several other areas (in addition to IT PPM) including: contributing to the development, updates, and review of the IT strategic plan (based on the university strategic plan); participating in the development of metrics and guidelines to assess the IT strategic plan; assisting in the

development and review of university IT policies; assisting in the development of annual IT resource requests for budget review; and providing general guidance and feedback to the CIO and IT management team.

Evidence ID/Name: 1-14 / BPG for IT Project Intake
Type/Format: Documentation / web page
Retrieval Method: Found by reviewing Evidence ID 1-8 and 1-9
Notes
This web page defines the IT project lifecycle, glossary of relevant terms, and defines project intake steps. The IT project lifecycle occurs across 4 phases (intake, planning, execution/monitoring, closure). This web page and BPG is complementary to the BPG for IT Projects and Procurement (Evidence ID 1-9), and provides additional steps related to steps taken for project intake (i.e. step #1 on the BPG for IT Projects and Procurement document).

FINDING: contradictory/duplicative information (this is a repeat finding/note from Evidence ID 1-9). This BPG and the BPG for IT Projects and Procurement (Evidence ID 1-9) both describe project intake processes. However, these two documents don't completely align with each other, and a couple of the steps in the documents could be considered contradictory. Subject #1-1 acknowledged the misalignment in a follow-up email, and indicated that documentation was actively being rewritten.

Evidence ID/Name: 1-15 / IT Project Coordinators
Type/Format: Documentation / web page
Retrieval Method: Email from Subject #1-1 as a follow up to the interview
Notes
This web page defines the purpose/membership of the lower-level governing structure (in the form of divisional reps) that recommends IT projects for selection and prioritization up to the higher-level governing body. This body is made up of a divisional representative from each VP division, who each act as the primary point of contact for IT project requests within that division, and they also coordinate with central IT to flesh out project requests.

Evidence ID/Name: 1-16 / IT Projects Web Page
Type/Format: Documentation / web page
Retrieval Method: Email from Subject #1-1 as a follow up to the interview
Notes
This web page provides links to various project resources, documentation, lists of projects, and access to the project management PPM system.

FINDING: duplicative information. This could be seen as yet a 3rd launching point to provide users information about the IT PPM processes.

Evidence ID/Name: 1-17 / Overview of IT Projects Processes and Resources
Type/Format: Documentation / web page
Retrieval Method: Email from Subject #1-1 as a follow up to the interview
Notes

This web page defines projects vs. operations, provides general info about the principles of project management, general instructions and links to make project requests, and links to other related web pages/resources.

FINDING: duplicative information. This could be seen as the 2nd launching point to provide users information about the IT PPM processes.

Evidence ID/Name: 1-18 / IT Project & Procurement Process flowchart
Type/Format: Documentation / web page
Retrieval Method: Found by reviewing Evidence ID 1-9
Notes
This business process diagram (flow chart) describes the process for requesting an IT project/purchase. This is essentially a complementary visualization to the information and documentation provided in the BPG for IT Projects and Procurement (Evidence ID 1-9) and the BPG for IT Project Intake (Evidence ID 1-14). The process diagram breaks down the criteria for major/minor projects into individual decision points to help reader understand how those contribute toward project review, selection, and prioritization. A redacted version of this flow chart is included in the findings in Chapter 4.

Evidence ID/Name: 1-19 / PPM System Guides
Type/Format: Documentation / web page
Retrieval Method: Found by reviewing Evidence ID 1-9
Notes
This web page provides inks to BPGs and training material for the IT PPM/ticketing system for customers, IT staff, and IT managers.

Evidence ID/Name: 1-20 / Project Lists
Type/Format: Archival Record / web page
Retrieval Method: Found by reviewing Evidence ID 1-9
Notes
This web page provides links to lists of current and previous/archived IT projects. Interestingly, there are some gaps in archives (i.e. several years' worth of archives are included, then several are missing, then the current projects are listed).

Evidence ID/Name: 1-21 / Procurement Policy
Type/Format: Documentation / web page
Retrieval Method: Found by reviewing Evidence ID 1-9
Notes
This web page describes the campus policy for IT procurement. It references relevant language from the CSU procurement policy, and describes the roles and responsibility of several individuals and departments on campus who are responsible for managing the procurement processes.

Evidence ID/Name: 1-22 / CSU Policy for Contracts and Procurement
Type/Format: Documentation / web page
Retrieval Method: Found by reviewing Evidence ID 1-9

Notes
This web page introduces the CSU policy on contracts and procurement. Like all CSU policies, this policy applies to all CSU universities.

Evidence ID/Name: 1-23 / CSU Policy for Solicitation Thresholds
Type/Format: Documentation / web page
Retrieval Method: Found by reviewing Evidence ID 1-9
Notes
This web page outlines the CSU policy related to the thresholds of importance for procurement and acquisition. Like all CSU policies, this policy applies to all CSU universities.

Evidence ID/Name: 1-24 / Governance Team Roster
Type/Format: Documentation / email correspondence
Retrieval Method: Email from Subject #1-1
Notes
This email included the roster and contact info for the higher-level IT PPM governing body, which is separately described in the BPG for IT Governance (Evidence ID 1-13). This roster was used to inform the list of potential Group #2 subjects.

Evidence ID/Name: 1-25 / Answers to Clarifying Questions
Type/Format: Documentation / email correspondence
Retrieval Method: Email from Subject #1-1
Notes
This email included Subject's answers to researcher's clarifying questions following the interview. Notes about those questions/answers are included within several other articles in this document.

Evidence ID/Name: 1-26 / Clarification between higher-level/lower-level governing bodies
Type/Format: Documentation / email correspondence
Retrieval Method: Email from Subject #1-1
Notes
This email included Subject's answers to researcher's clarifying questions following the interview. Notes about those questions/answers are included within several other articles in this document.

Evidence ID/Name: 1-27 / Focused Interview w/Subject #1-2
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 1-28 / Focused Interview w/Subject #1-3
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 1-29 / Focused Interview w/Subject #1-4
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 2-1 / IT Organizational Chart
Type/Format: Documentation / PDF
Retrieval Method: Web search on campus web site
Notes
This document provides a breakdown of the departments in the central campus IT organization, including managerial contacts for each department. This page was primarily used to determine the PMO point of contact.

Evidence ID/Name: 2-2 / Email Correspondence w/PMO Director
Type/Format: Documentation / Email correspondence
Retrieval Method: Email from Subject #2-1 as a follow up to the introductory questionnaire
Notes
This email provided a high-level description of the IT project submission, selection, and prioritization process and it included attachments/links to other pieces of evidence including the IT Project Prioritization Conference Presentation (Evidence ID 2-3), the IT Project Prioritization Workflow (Evidence ID 2-4), the Project Request Form (Evidence ID 2-5), the IT Project Scoring Tool, (Evidence ID 2-6), the Project Scoring Workbook, (Evidence ID 2-7), and the Project Selection and Prioritization Timeline (Evidence ID 2-8).

Evidence ID/Name: 2-3 / IT Project Prioritization Conference Presentation
Type/Format: Documentation / MS PowerPoint document
Retrieval Method: Email from Subject #2-1 as a follow up to the introductory questionnaire
Notes
This is a slide deck for a presentation that the IT/PMO team gave at a conference. It provides a history of the challenges that university was facing from lack of objective IT project prioritization processes; PMO's standard definition for an IT project (including definitions of the various project sizes); outlines the entire process and governing bodies/structure for project submission, scoring, selection, and prioritization; outlines lessons learned.

FINDING: while IT/PMO does have a standard definition for a project, they recognize that it's not always a black and white determination if a unit of work is really a "project" for purposes of the project selection/prioritization process, and there is often wiggle room. Sometimes a thing that looks like a project isn't really a project; and sometimes a thing that doesn't look like a project actually is one. "…it's not important what your definition is. What's important is that you have a definition."

FINDING: transparency is critical.

FINDING: oftentimes people will request a very specific solution. It can be beneficial to ask them to step back and define the problem that they have before telling IT what the solution is. It's possible that there are multiple ways to solve the problem, and it should be a collaborative/analytical process between IT and the functional team to determine the solution.

FINDING: early assessment and estimation of project size is very beneficial – even if it's just into classifications such as "extra large", "large", "medium", and so on (with broad stroke criteria behind each of those classifications for objectivity).

FINDING: alignment with the campus strategic plan/priorities is important.

FINDING: capacity planning should only assume a 6 hours day of capacity for IT staff. IT/PMO based this assumption on empirical studies.

FINDING: continuous improvement cycle. [Note added much later: this campus has one of the most (if not the most) mature set of PPM processes, and they are engaged in continuous improvement].

FINDING: this IT organization uses a baseline assumption that a typical IT staff member's division of work should be: 50% operations (keeping the lights on), 25% project requests, and 25% work-requests (work that is more than normal operations, but doesn't quite meet the criteria of a project).

Evidence ID/Name: 2-4 / IT Project Prioritization Workflow
Type/Format: Documentation / MS Word document
Retrieval Method: Email from Subject #2-1 as a follow up to the introductory questionnaire
Notes
This is a visual representation of the prioritization workflow, specifically for the PMO team. Each step includes a list of the person(s) within the PMO who is responsible for the step, and the specific actions that need to be taken.

Evidence ID/Name: 2-5 / Project Request Form
Type/Format: Physical artifact / PDF
Retrieval Method: Email from Subject #2-1 as a follow up to the introductory questionnaire
Notes
This is a PDF export of the request form that is housed in the PPM tool and used by requestors to submit a project request (considered a physical artifact because it's a screen shot of the actual tool). The project request form essentially looks like (and has the same information that would be included in) a project charter.

Evidence ID/Name: 2-6 / IT Project Scoring Tool
Type/Format: Physical artifact / MS Excel document
Retrieval Method: Email from Subject #2-1 as a follow up to the introductory questionnaire
Notes
Project scoring tool, used to measure variables of interest and score projects objectively.

This is the project-scoring tool that is used to measure variables of interest and score projects objectively. A redacted version of this form is included in the findings in Chapter 4 under the section for Case #2. This tool was explained in detail by Subject #2-1 during the in-depth interview.

The tool essentially scores on a combination of variables across five major areas: 1) Alignment w/strategic objectives. 2) Benefit to operations. 3) Value to operations. 4) Budgetary impact. 5) Technology risk.

Evidence ID/Name: 2-7 / Project Scoring Workbook
Type/Format: Physical artifact / MS Excel document
Retrieval Method: Email from Subject #2-1 as a follow up to the introductory questionnaire
Notes
This is the Excel tool that is used to compile and compare all individual projects/scores. Each stakeholder individually scores each project using the IT Project Scoring Tool (Evidence ID 2-6), and then all of the individual scores are entered into this master spreadsheet. It's essentially a large matrix of each individual variable scored by each individual stakeholder for each individual project. Subject #2-1 explained that the individual scores are reviewed, with a particular focus on any given variable score that had a wide variance across individual stakeholders. The evaluation team discusses those variances, and each stakeholder has a chance to adjust any of their scores if they had a change of perspective based on the discussion. The adjusted scores are then combined and averaged to determine the final single score for any given project. The final set of scores are used as the rank prioritization of the projects.

Evidence ID/Name: 2-8 / Project Selection and Prioritization Timeline
Type/Format: Documentation / PDF
Retrieval Method: Email from Subject #2-1 as a follow up to the introductory questionnaire
Notes
This is a visualization of the steps and schedule for a typical project prioritization cycle. The cycle occurs in (2) bi-annual cycles (although multiple subjects confirmed in their interviews that they often must skip a cycle because they are at full capacity and cannot take on additional project requests). The project request process includes nine over-arching steps (pre-sourcing, campus outreach, request window, cabinet preview, initial review/analysis, steering review and scoring, capacity planning, final review w/steering and cabinet, and announcement of results to campus).

FINDING: this university has (2) bi-annual cycles for the project submission, review, scoring, selection, and prioritization cycle. However, one of the cycles often gets skipped because the IT team is at full capacity and they have not completed the projects that were selected/prioritized from the previous cycle(s). This implicitly means that it can take a long time to get through project requests, and they may span multiple cycles (this same challenge was discussed with Campus #1).

Evidence ID/Name: 2-9 / In-Depth Interview w/Subject #2-1
Type/Format: Interview / Group #1 Subject
Retrieval Method: Phone

Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 2-10 / Stakeholders List
Type/Format: Documentation / Email correspondence
Retrieval Method: Email from Subject #2-1 as a follow up to the interview
Notes
This email included the list of governance committee members and IT/PMO stakeholders. This roster was used to inform the list of potential Group #2 subjects.

Evidence ID/Name: 2-11 / IT Home Page
Type/Format: Documentation / Web page
Retrieval Method: Web search
Notes
This is the home page for the IT division. It is worth note that there is a very visible link to submit project requests on this page. That should help to demonstrate the level of importance that the IT division places on making the process transparent.

Evidence ID/Name: 2-12 / Project Submission/ Prioritization Page
Type/Format: Documentation / Web page
Retrieval Method: Link from IT Home Page (Evidence ID 2-11)
Notes
This is essentially the home page and launch point for the PPM processes. This page provides an explanation of the project submission processes, the overarching project prioritization process and timelines, and explains the governance process/roster. Of all the universities' PPM websites, this one arguable does the best job in providing a single, concise (and yet comprehensive), understandable, set of explanations and guidelines with links to relevant resources including detailed BPGs and to the IT PPM system.

Evidence ID/Name: 2-13 / IT Projects Lists
Type/Format: Archival Record / Web page
Retrieval Method: Link from Project Submission/ Prioritization Page (Evidence ID 2-12)
Notes
This web page contains links to the lists of current, proposed, and previous/archived projects.

Evidence ID/Name: 2-14 / Current IT Projects
Type/Format: Archival Record / Web page
Retrieval Method: Link from IT Projects Lists (Evidence ID 2-13)
Notes
This web page includes a list of all current projects. This web page is available from directly within the IT PPM tool, and each project can be further explored by clicking a link to that specific project. The page for each individual/specific project includes a wealth of information including the timeline, progress/status, and all of the information that as submitted in the IT PPM tool as part of the original project request (the project request form is demonstrated as a PDF export in Evidence ID 2-5).

FINDING: this university is the most advanced of all the universities in this case study in terms of the way they are leveraging/using their IT PPM system to manage project requests, the PPM project selection process, individual project management, and capacity planning. By far.

Evidence ID/Name: 2-15 / Proposed IT Projects
Type/Format: Archival Record / Web page
Retrieval Method: Link from IT Projects Lists (Evidence ID 2-13)
Notes
This web page includes the list of proposed projects that are currently waiting assessment as part of the current project prioritization cycle. This web page is available from directly within the IT PPM tool.

Evidence ID/Name: 2-16 / Archived IT Projects
Type/Format: Archival Record / Web page
Retrieval Method: Link from IT Projects Lists (Evidence ID 2-13)
Notes
This web page includes the list of closed/archived projects. This web page is available from directly within the IT PPM tool.

Evidence ID/Name: 2-17 / BPG for Project Submission
Type/Format: Documentation / Web page
Retrieval Method: Link from Project Submission/ Prioritization Page (Evidence ID 2-12)
Notes
This BPG provides instructions for submitting a project request through the online IT PPM system, and includes information about the project prioritization process (with links out to additional resources).

Evidence ID/Name: 2-18 / BPG for Software Acquisition
Type/Format: Documentation / Web page
Retrieval Method: Link from Project Submission/ Prioritization Page (Evidence ID 2-12)
Notes
Provides a detailed set of instructions for purchasing software, in alignment with CSU Chancellor's Office requirements and thresholds for different activities. Outlines general guidance on how to conduct an RFP, and provides information about how to assess and evaluate software for purchase.

Evidence ID/Name: 2-19 / Campus Strategic Plan Home Page
Type/Format: Documentation / Web page
Retrieval Method: Link from Project Submission/ Prioritization Page (Evidence ID 2-12)
Notes
This is the home page for the overarching campus strategic plan.

Evidence ID/Name: 2-20 / Strategic Plan
Type/Format: Documentation / PDF
Retrieval Method: Link from Strategic Plan Home Page (Evidence ID 2-19)
Notes

This is the full campus strategic plan, including mission, vision, values and all strategic goals. This university has done a nice job in laying out performance indicators, baselines, and targets for each strategic goal/objective.

Evidence ID/Name: 2-21 / Integrated Planning Home Page
Type/Format: Documentation / Web page
Retrieval Method: Link from Project Submission/ Prioritization Page (Evidence ID 2-12)
Notes
Home page for BPGs related to integrated assessment, planning, and budgeting. The Project Submission/Prioritization page (Evidence ID 2-12) mentions that the process will begin to align closely with the campus integrated assessment process.

Evidence ID/Name: 2-22 / Project Prioritization Calendar
Type/Format: Documentation / Web page
Retrieval Method: Link from Project Submission/ Prioritization Page (Evidence ID 2-12)
Notes
The calendar for the most recent bi-annual cycle for project submission, selection, and prioritization. This calendar includes dates for the eight steps that are outlined in the Project Selection and Prioritization Timeline (Evidence ID 2-8)

Evidence ID/Name: 2-23 / Prioritized Projects
Type/Format: Archival Record / Web page
Retrieval Method: Link from Project Submission/ Prioritization Page (Evidence ID 2-12)
Notes
Contains a list of projects that were selected and prioritized in 2018. Similar to the Current IT Projects (Evidence ID 2-14), this web page is available from directly within the IT PPM tool, and each project can be further explored by clicking a link to that specific project. The page for each individual/specific project includes a wealth of information including the timeline, progress/status, and all of the information that as submitted in the IT PPM tool as part of the original project request (the project request form is demonstrated as a PDF export in Evidence ID 2-5).

Evidence ID/Name: 2-24 / Project Definition
Type/Format: Documentation / Web page
Retrieval Method: Link from Project Submission/ Prioritization Page (Evidence ID 2-12)
Notes
This web page provides the definition for an IT project: a one-time effort with a specific scope, goal, and timeline that requires 20+ hours of work and 2+ people. The page also provides links back to other pages that explain the process and links to submit a project request.

Evidence ID/Name: 2-25 / IT Annual Goals
Type/Format: Documentation / PDF
Retrieval Method: Link from Project Submission/ Prioritization Page (Evidence ID 2-12)
Notes
This document provides the annual unit plan from the previous academic year.

Evidence ID/Name: 2-26 / Focused Interview w/Subject #2-2
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 2-27 / Focused Interview w/Subject #2-3
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 2-28 / Focused Interview w/Subject #2-4
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 2-29 / Focused Interview w/Subject #2-5
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 3-1 / IT Organizational Chart
Type/Format: Documentation / PDF
Retrieval Method: Web search on the campus website
Notes
This document provides a breakdown of the departments in the central campus IT organization, including managerial contacts for each department. This document was primarily used to determine the PMO point of contact.

Evidence ID/Name: 3-2 / Email Correspondence w/PMO Director
Type/Format: Documentation / Email correspondence
Retrieval Method: Email from Subject #3-1 as a follow up to the introductory questionnaire
Notes
This email included an attachment to the Current IT Projects (Evidence ID 3-3) and it provided a high-level description of the IT PPM governance structure with links to the websites for the various governing bodies (Evidence ID 3-4, 3-5, and 3-6)

Evidence ID/Name: 3-3 / Current IT Projects
Type/Format: Archival Record / PDF
Retrieval Method: Email from Subject #3-1 as a follow up to the introductory questionnaire
Notes
This PDF provides the list of current IT projects with status and prioritization/ranking information. This information is also available from a publicly accessible website (in web form,

not PDF). The list includes the prioritization number going back 3 academic years, and it appears that projects requests are sometimes introduced with a given prioritization, and then those projects either span multiple years or they are backlogged for multiple years during which time they move higher in the prioritization list.

Evidence ID/Name: 3-4 / IT Governance Home Page
Type/Format: Documentation / Web page
Retrieval Method: Email from Subject #3-1 as a follow up to the introductory questionnaire
Notes
This web page defines the two-tiered governance structure for IT projects/portfolio management, provides links to each governing body's web page (Evidence ID 3-5 and 3-6), and provides a link to Current IT Projects (Evidence ID 3-3).

Evidence ID/Name: 3-5 / IT Committee
Type/Format: Documentation / Web page
Retrieval Method: Email from Subject #3-1 as a follow up to the introductory questionnaire
Notes
Defines the purpose/membership of the lower-level governing body that recommends IT projects for selection and prioritization up to the higher-level governing body. (see Evidence ID 3-6). In addition to recommending/prioritizing projects, this lower-level body is charged with numerous other responsibilities, including managing customer service expectations, addressing information security concerns, and recommending IT policies and procedures. The committee includes roughly 20 members, representing a wide variety of interests and perspectives from all across campus, and it meets at least once quarterly.

Evidence ID/Name: 3-6 / IT Advisory Council
Type/Format: Documentation / Web page
Retrieval Method: Email from Subject #3-1 as a follow up to the introductory questionnaire
Notes
Defines the purpose/membership of the higher-level governing body that recommends IT projects for selection and prioritization to the cabinet. The higher-level governing body oversees and defines the responsibilities of the lower-level governing body (see Evidence ID 3-5). The higher-level governing body reviews the project recommendations/prioritizations from the lower-level governing body, makes adjustments (accepting, denying, or adjusting them), and then sends recommendations/prioritizations to cabinet. This higher-level body is also charged with numerous other responsibilities, including managing customer service expectations, communicating IT policies and procedures, and recommending IT funding/resources in order to meet the university's technology objectives. The committee includes roughly 20 members, representing a wide variety of interests and perspectives from all across campus, and it meets at least once per year.

Evidence ID/Name: 3-7 / In-Depth Interview w/Subject #3-1
Type/Format: Interview / Group #1 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 3-8 / Email Correspondence w/PMO Director
Type/Format: Documentation / Email correspondence
Retrieval Method: Email from Subject #3-1 as a follow up to the interview
Notes
This email included links to the Project Charter Request Form and Project Closure Form

Evidence ID/Name: 3-9 / Project Charter
Type/Format: Physical artifact / MS Word document
Retrieval Method: Email from Subject #3-1 as a follow up to the interview
Notes
The tool that acts as a project charter, used to capture information about the intent/purpose of a project/request. The form indicates that the PMO will respond to submissions within 2 weeks. Also provides links to the Project Charter Workflow (Evidence ID 3-11).

Evidence ID/Name: 3-10 / Project Closure Form Template
Type/Format: Documentation / MS Word document
Retrieval Method: Email from Subject #3-1 as a follow up to the interview
Notes
Form used to capture/measure info when an IT project is closed out. Asks the user to fill out several sections including completion status details, a list of project accomplishments, a list of lessons learned, a list of outstanding issues, and basic performance measurements (e.g. on time/budget).

Evidence ID/Name: 3-11 / Project Charter Workflow
Type/Format: Documentation / Web page
Retrieval Method: Referenced in the Project Charter (Evidence ID 3-9)
Notes
This is a visual representation of the workflow and stakeholders involved in creating a project charter and submitting a project request for consideration.

Evidence ID/Name: 3-12 / PMO Home Page
Type/Format: Documentation / Web page
Retrieval Method: Web search following review of the other evidence listed above
Notes
This is the home page for the PMO, which provides information about the purpose and mission of the PMO and acts as a launch point to various other PMO/PPM resources, support services, and lists/dashboards of current/previous projects. Web page indicates that the PMO provides project management for project that require 160+ hours of time and/or 2+ departments (this was supported by the interview with Subject #3-1, Evidence ID 3-7).

Evidence ID/Name: 3-13 / IT Committee Minutes
Type/Format: Archival Record / PDF
Retrieval Method: Linked from the PMO Home Page (Evidence ID 3-12)
Notes

This is listed as a single article, but it actually represents IT committee meeting minutes from 4 different meetings in 2018. Meeting minutes demonstrate that the IT committee is actively performing the work that it is charged with performing as described in Evidence 3-5.

Evidence ID/Name: 3-14 / PMO Project Documentation Templates
Type/Format: Documentation / PDF
Retrieval Method: Linked from the PMO Home Page (Evidence ID 3-12)
Notes
This document contains several templates for project sponsors/managers to use for several aspects of the project lifecycle.

Evidence ID/Name: 3-15 / Focused Interview w/Subject #3-2
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 3-16 / Focused Interview w/Subject #3-3
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 3-17 / Focused Interview w/Subject #3-4
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 3-18 / Focused Interview w/Subject #3-5
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 3-19 / Focused Interview w/Subject #3-6
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 4-1 / IT Organizational Chart
Type/Format: Documentation / PDF
Retrieval Method: Web search on the campus website
Notes

This document provides a breakdown of the departments in the central campus IT organization, including managerial contacts for each department. This document was primarily used to determine the PMO point of contact.

Evidence ID/Name: 4-2 / Campus Strategic Plan Home Page
Type/Format: Documentation / Web page
Retrieval Method: Email from Subject #4-1 as a follow up to the introductory questionnaire
Notes
This is the home page for the overarching campus strategic plan. This was one of the two pieces of evidence that the primary subject provided via early email correspondence following the introductory questionnaire (along with Evidence ID 4-3). The question was about the tools/processes that are used at the university to select and prioritize IT projects. The subject's response and inclusion of these plans provides some insight as to the importance that the primary subject (and arguably the IT division) place upon the strategic plan and the IT strategic plan.

Evidence ID/Name: 4-3 / IT Strategic Plan Home Page
Type/Format: Documentation / Web page
Retrieval Method: Email from Subject #4-1 as a follow up to the introductory questionnaire
Notes
This is the home page for the IT strategic plan. This was one of the two pieces of evidence that the primary subject provided via early email correspondence following the introductory questionnaire (along with Evidence ID 4-2). The question was about the tools/processes that are used at the university to select and prioritize IT projects. The subject's response and inclusion of these plans provides some insight as to the importance that the primary subject (and arguably the IT division) place upon the strategic plan and the IT strategic plan.

Evidence ID/Name: 4-4 / In-Depth Interview w/Subject #4-1
Type/Format: Interview / Group #1 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 4-5 / IT Committee
Type/Format: Documentation / Web page
Retrieval Method: Referenced by Subject #4-1 during the interview
Notes
This web page defines the purpose and membership of the IT governing body that provides input to Academic Senate (i.e. it's Academic Senate subcommittee). This committee is responsible for recommending/reviewing policies and procedures and discussing issues related to academic/administrative technology for all areas and types of campus operations. The committee's purpose statement implies (but does not explicitly state outright) that the committee is responsible for reviewing and recommending IT projects (via the review of IT product/service acquisitions, and via allocation of IT resources). There are roughly 25 members, although it is not exactly clear how these members are appointed. It was not immediately clear based on the documentation if/how this committee has a parent/child relationship to the IT Advisory

Committee, but based on subject interviews it was clarified (individual notes and highlights are reflected in those transcripts; Evidence ID 4-4, and 4-15 through 4-20)

FINDING: the perception held by several subjects (Evidence ID 4-17 through 4- 19) was that the committee provides good representation of campus clients/functions, but they also indicated that the committee is relatively passive in nature (i.e. being told what IT projects will be done, as opposed to actively shaping the vision or the selection/prioritization of projects).

Evidence ID/Name: 4-6 / IT Advisory Committee
Type/Format: Documentation / Web page
Retrieval Method: Referenced by Subject #4-1 during the interview
Notes
This web page defines the purpose and membership of the IT governing body that provides strategic/technical recommendations to the CIO, recommends IT policy/procedures, and ensures IT strategic alignment. As with the IT Committee (Evidence ID 4-5), The committee's purpose statement implies (but does not explicitly state outright) that the committee is responsible for reviewing and recommending IT projects (via the establishment of campus-wide IT priorities). Based on subject interviews (Evidence ID 4-4, 4-15, 4-16), it was clarified that this committee does indeed play a strong role in project selection and prioritization.

Evidence ID/Name: 4-7 / IT Technical Committee
Type/Format: Documentation / Web page
Retrieval Method: Referenced by Subject #4-1 during the interview
Notes
This web page defines the purpose and membership of the IT governing body that provides input on the major enterprise IT services that serve all of campus. Based on interviews with multiple subjects, this committee reviews upcoming projects and determines the implications in terms of the impact on staff time and on the potential impact to current related/integrated technologies.

Evidence ID/Name: 4-8 / Campus Strategic Plan
Type/Format: Documentation / Web page
Retrieval Method: Found by reviewing the Campus Strategic Plan Home Page (Evidence ID 4-2)
Notes
This is the overarching campus strategic plan that lays out the mission, values, and strategic priorities for the next five years.

Evidence ID/Name: 4-9 / IT Strategic Plan
Type/Format: Documentation / Web page
Retrieval Method: Found by reviewing the IT Strategic Plan Home Page (Evidence ID 4-3)
Notes
This is the IT strategic plan that lays out the mission, vision, principles, and IT priorities for the next five years, in alignment with the overarching campus strategic plan (Evidence ID 4-8).

Evidence ID/Name: 4-10 / IT Annual Report
Type/Format: Documentation / Web page

Retrieval Method: Found by reviewing the IT division's website.
Notes
This an annual report of the IT division's accomplishments for the previous academic year.

Evidence ID/Name: 4-11 – 4-14 / IT Strategic Plan Progress, Goal #1 - #4
Type/Format: Archival Record / Web page
Retrieval Method: Found by a general web search.
Notes
This is included as a single note entry, but there were actually four web pages. Each page provides a list of current/previous IT projects, as they align with the IT strategic goals (each page is dedicated to an individual strategic goal). Each page shows the progress of numerous projects over the course of a multi-year window. This web page provides a very clear and articulate connection between projects and IT strategic planning, but interestingly these web page were not found as a direct link off of any of the other IT or strategic planning web pages, and rather they were found by doing a general term web search on the IT division's website. This is interesting in as much as the IT division has demonstrate a high degree of intentionality in connecting its work to the strategic plan, and in creating its IT strategic plan; it is curious that they would not provide easily accessible links to these pages. That said, subjects were not asked about this, and there could be a perfectly reasonable justification.

Evidence ID/Name: 4-15 / Focused Interview w/Subject #4-2
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 4-16 / Focused Interview w/Subject #4-3
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 4-17 / Focused Interview w/Subject #4-4
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 4-18 / Focused Interview w/Subject #4-5
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 4-19 / Focused Interview w/Subject #4-6
Type/Format: Interview / Group #2 Subject

Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 4-20 / Focused Interview w/Subject #4-7
Type/Format: Interview / Group #2 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 5-1 / Email Correspondence w/PMO Director
Type/Format: Documentation / Email correspondence
Retrieval Method: Email from Subject #5-1 as a follow up to the introductory questionnaire
Notes
This email provided attachments to other articles of evidence that are used in the IT PPM process including the IT Project Scoring Tool (Evidence ID 5-2), the Project Scoring Workbook (Evidence ID 5-3), and the Project Request Form (Evidence ID 5-4).

Evidence ID/Name: 5-2 / IT Project Scoring Tool
Type/Format: Physical artifact / PDF
Retrieval Method: Email from Subject #5-1 as a follow up to the introductory questionnaire
Notes
This project scoring tool is used to measure variables of interest and score projects objectively. Subject 5-1 described the tool during the in-depth interview (Evidence ID 5-5, see transcript for detailed notes). A redacted version of this form is included in the findings in Chapter 4. During the interview, the subject acknowledged that this is the first year that some of the PMO structures are in place. The subject would probably make some changes to the criteria in the scoring tool, based on the feedback that the PMO has received. For instance, project requests for some of the smaller divisions/areas/projects probably wouldn't really have a chance at competing with the requests from some of the larger divisions/areas/projects (at least based on the scoring of the variables that are currently being measured). The variables don't completely capture the information that is necessary, and the subject is considering either adding new variables/criteria, and/or modifying the weights of the existing ones, etc.

Evidence ID/Name: 5-3 / Project Scoring Workbook
Type/Format: Physical artifact / PDF
Retrieval Method: Email from Subject #5-1 as a follow up to the introductory questionnaire
Notes
This is a screenshot of the tool that is used to compile and compare all individual project requests/scores (considered a physical artifact because it's a screen shot of the actual tool).

Evidence ID/Name: 5-4 / Project Request Form
Type/Format: Physical artifact / PDF
Retrieval Method: Email from Subject #5-1 as a follow up to the introductory questionnaire
Notes

This is a screenshot of the request form that is housed in the PPM tool and used by requestors to submit a project request (considered a physical artifact because it's a screen shot of the actual tool). The information that is captured on the form is very high level (i.e. it's a single page, and captures information such as project name, problem/goal statements, objectives, dependencies and resources).

Evidence ID/Name: 5-5 / In-Depth Interview w/Subject #5-1
Type/Format: Interview / Group #1 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 5-6 / PMO Home Page
Type/Format:
Retrieval Method:
Notes
This is the home page for the PMO, which acts as a launching point to PMO PPM documentation, support, etc. This also contains a link directly into the IT PPM system where users can request a project (the IT PPM system requires university credentials to login, so the researcher could not access it directly).

Evidence ID/Name: 5-7 / IT Project Request Guidelines
Type/Format: Documentation / Web page
Retrieval Method: Email from Subject #5-1 as a follow up to the interview
Notes
This web page provided guidelines for submitting an IT project and provides definitions of different project sizes/types.

Evidence ID/Name: 5-8 / PPM Templates
Type/Format: Documentation / Web page
Retrieval Method: Web search on the PMO website following the interview
Notes
This web page provides links to the Project Management Process (Evidence ID 5-9) and various other templates for project management. This is a launch point of sorts.

FINDING: many of the templates that this page links raise questions about the university's use of its IT PPM tool. Several of the templates are Word/Excel documents to track/report on various pieces of information; however, the university's IT PPM tool provides features that allow for the tracking, resolution, and reporting of this information easily/automatically. Subject #5-1 mentioned that some of the PMO structures/processes/tools were new and also described the PMO as being on the lower end of the maturity spectrum during the in-depth interview (Evidence ID 5-5), so there could be any number of reasons that they are not using those features (either intentionally or unintentionally).

Evidence ID/Name: 5-9 / Project Management Process
Type/Format: Documentation / PDF

Retrieval Method: Link from the PPM Templates page (Evidence ID 5-8)
Notes
This web page outlines the different stakeholders and their responsibilities across five stages of a project's life (from ideation to project close out). This isn't necessarily a flow chart, but it does provide the information that would otherwise be used to populate a flow chart. There does appear to be at least one glaring omission, which is an IT governing body; Subject #5-1 mentioned the governing body during the in-depth interview (Evidence ID 5-5) and described its role in the project review/selection/prioritization process. This document can be used to understand the overall PPM process.

Evidence ID/Name: 5-10 / Strategic Project Request Form
Type/Format: Physical artifact / MS Word document
Retrieval Method: Link from the PPM Templates page (Evidence ID 5-8)
Notes
This is a request form that is used by requestors to submit a strategic project request (considered a physical artifact because it's a screen shot of the actual tool). The information that is captured on the form is almost identical to the information captured on the Project Request Form (Evidence ID 5-4), with the notable exception that this form contains a field for Executive Project Rank. This form was not discussed with Subject #5-1, and it's unclear if/how the forms really differ, practically speaking.

Evidence ID/Name: 5-11 / Project Charter
Type/Format: Physical artifact / MS Word document
Retrieval Method: Link from the PPM Templates page (Evidence ID 5-8)
Notes
The tool that acts as a project charter, used to capture information about the intent/purpose of a project/request.

Evidence ID/Name: 5-12 / Project Kick Off Presentation Template
Type/Format: Documentation / PDF
Retrieval Method: Link from the PPM Templates page (Evidence ID 5-8)
Notes
This is a presentation template for project sponsors/managers to use to present the project during the initiation phase of a project (it looks like a PowerPoint slide deck, even though it's a PDF).

Evidence ID/Name: 5-13 / Project Change Order Template
Type/Format: Documentation / MS Word document
Retrieval Method: Link from the PPM Templates page (Evidence ID 5-8)
Notes
This as a template for project stakeholders to request changes to their projects.

Evidence ID/Name: 5-14 / Project Status Template
Type/Format: Documentation / MS Word document
Retrieval Method: Link from the PPM Templates page (Evidence ID 5-8)
Notes

This is a template for project managers/stakeholders to document the status of a project. It is interesting that this document/template would be offered up, given that the university uses an IT PPM tool, which has built in features to publish/deliver status reports automatically.

Evidence ID/Name: 5-15 / Issues/Risks Log Template
Type/Format: Documentation / MS Word document
Retrieval Method: Link from the PPM Templates page (Evidence ID 5-8)
Notes
This is a template for project managers/stakeholders to document the risks and issues of a project. It is interesting that this document/template would be offered up, given that the university uses an IT PPM tool, which has built in features to allow for the tracking, resolution, and reporting of risks automatically.

Evidence ID/Name: 5-16 / Quality Assurance Checklist Template
Type/Format: Documentation / MS Word document
Retrieval Method: Link from the PPM Templates page (Evidence ID 5-8)
Notes
This is a template for project managers/stakeholders to document the quality assurance steps/deliverables for a project. It is interesting that this document/template would be offered up, given that the university uses an IT PPM tool, which has built in features to allow for the tracking and management of this type of information.

Evidence ID/Name: 5-17 / Test Plan Template
Type/Format: Documentation / MS Word document
Retrieval Method: Link from the PPM Templates page (Evidence ID 5-8)
Notes
This is a template for project managers/stakeholders to document the project test plan. It is interesting that this document/template would be offered up, given that the university uses an IT PPM tool, which has built in features to allow for the tracking and management of this type of information.

Evidence ID/Name: 5-18 / Test Case Template
Type/Format: Documentation / MS Excel document
Retrieval Method: Link from the PPM Templates page (Evidence ID 5-8)
Notes
This is a template for project managers/stakeholders to document the specific tests that will be conducted within a project. This document appears to be intended to work hand-in-hand with the Test Plan Template (Evidence ID 5-17). It is interesting that this document/template would be offered up, given that the university uses an IT PPM tool, which has built in features to allow for the tracking and management of this type of information

Evidence ID/Name: 5-19 / Go No-Go Presentation Template
Type/Format: Documentation / PDF
Retrieval Method: Link from the PPM Templates page (Evidence ID 5-8)
Notes

This is a presentation template for project sponsors/managers to use to present the project during the final stages of the execution phase of a project, during which the "go/no-go" decision is being determined. (it looks like a PowerPoint slide deck, even though it's a PDF). It includes information about the general progression of the project through its various stages, including all testing, etc.

Evidence ID/Name: 5-20 / Project Closure Form Template
Type/Format: Documentation / MS Word document
Retrieval Method: Link from the PPM Templates page (Evidence ID 5-8)
Notes
This form is used to capture/measure info when an IT project is closed out. Asks the user to fill out several sections including completion status details, a list of project accomplishments, and operational transition/maintenance information.

Evidence ID/Name: 5-21 / IT Advisory Committee
Type/Format: Documentation / Web page
Retrieval Method: Web search on the PMO website following the interview
Notes
This web page describes the governing body that participates in the PPM project prioritization process. Campus VPs appoint representatives from their divisions, and there are several other members across campus who provide a campus-wide perspective. The committee has approximately 15 members.

Evidence ID/Name: 6-1 / IT Organizational Home Page
Type/Format: Documentation / Web page
Retrieval Method: Web search on the campus website
Notes
This web page provides a breakdown of the departments in the central campus IT organization, including managerial contacts for each department. It also provides links to various other important web pages and documentation (e.g. IT policies and procedures, etc.). This page was primarily used to determine the PMO point of contact.

Evidence ID/Name: 6-2 / Email Correspondence w/PMO Director
Type/Format: Documentation / Email correspondence
Retrieval Method: Email from Subject #6-1 as a follow up to the introductory questionnaire
Notes
This email provided a high-level description of the IT project submission, selection, and prioritization process and it included attachments to other pieces of evidence including the IT Project Scoring Tool (Evidence ID 6-3), and the IT Project Prioritization Workflow (Evidence ID 6-4).

Evidence ID/Name: 6-3 / IT Project Scoring Tool
Type/Format: Physical artifact / MS Excel document
Retrieval Method: Email from Subject #6-1 as a follow up to the introductory questionnaire
Notes

This is the project-scoring tool that is used to measure variables of interest and score projects objectively. A redacted version of this tool is included in the findings in Chapter 4. This tool was included in an email from Subject #6-1 as a follow up to the introductory questionnaire (see Evidence ID 6-2) and the tool was explained in greater detail by Subject #6-1 during the in-depth interview.

During the interview, Subject #6-1 self-identified the PMO as just being launched ("…in the early stages of building out the program") and described PPM processes as being under initial design with select components already being used and other components still being designed/developed. The subject described the IT project scoring tool as "temporary" in terms of its form factor in Excel (they're planning on developing the rubric directly within their IT PPM system). In terms of the specific variables, the subject acknowledged that some of them could be subjective and open to interpretation; but they feel that this is a good start out the gate. They recently spent a couple governance meetings discussing some of the specific variables. For instance, the variable that measures whether a project is required/mandated. That question could actually be interpreted different ways (e.g. if the CO executes an EO, the EO says you have to do something, but doesn't necessarily say HOW you do it; you might be able accomplish the request multiple ways, and the specific way that was requested might not truly be REQUIRED). Also, "impact on student success" or "measuring efficiency". These might be subjective. This could also be considered a downside of the rubric.

The subject also acknowledged that the project scoring tool is highly geared toward the applications development program group, and there might be slight adjustments to refine rubrics for different groups/project types.

The subject also mentioned that they want to ensure that administrative processes/projects don't suffer due to a hyper-focus on issues such as student success, etc. The intent with the initial design was to make it equitable and fair to all campus departments

FINDING: given the subject's description of the PMO and PPM processes, this university could be roughly described as being "in the early design stage" of PMO/PPM (this is a rough categorization, and doesn't necessarily align with any formal maturity model).

Evidence ID/Name: 6-4 / IT Project Prioritization Workflow
Type/Format: Documentation / PDF
Retrieval Method: Email from Subject #6-1 as a follow up to the introductory questionnaire
Notes
This business process diagram (flow chart) is a visual representation of the process for requesting, selecting, and prioritizing IT projects. The process diagram breaks down the steps across all stakeholders and governance groups. A redacted version of this flow chart is included in the findings in Chapter 4.

Evidence ID/Name: 6-5 / In-Depth Interview w/Subject #6-1
Type/Format: Interview / Group #1 Subject
Retrieval Method: Phone
Notes

A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 6-6 / IT Projects Home Page
Type/Format: Documentation / Web page
Retrieval Method: Web search following the interview with Subject #6-1
Notes
This web page provides a list of announcements and status updates of current and upcoming IT projects.

Evidence ID/Name: 7-1 / IT Organizational Chart
Type/Format: Documentation / Web page
Retrieval Method: Web search on the campus website
Notes
This web page provides a breakdown of the departments in the central campus IT organization, including managerial contacts for each department. This page was used to determine the PMO point of contact.

Evidence ID/Name: 7-2 / Email Correspondence w/PMO Director
Type/Format: Documentation / Email correspondence
Retrieval Method: Email from Subject #7-1 as a follow up to the introductory questionnaire
Notes
This email correspondence included a high-level description of the project submission and prioritization process with an attachment of the current list of projects.

Evidence ID/Name: 7-3 / Current IT Projects
Type/Format: Archival Record / PDF
Retrieval Method: Email from Subject #7-1 as a follow up to the introductory questionnaire
Notes
This is a list of the current IT projects.

Evidence ID/Name: 7-4 / In-Depth Interview w/Subject #7-1
Type/Format: Interview / Group #1 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 7-5 / In-Depth Interview w/Subject #7-2
Type/Format: Interview / Group #1 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

Evidence ID/Name: 7-6 / Email Correspondence w/Project Manager
Type/Format: Documentation / Email correspondence
Retrieval Method: Email from Subject #7-2 as a follow up to the interview
Notes

This email correspondence included an explanation of project definitions, and attachments for the IT project charter template and the project prioritization process workflow.

Subject acknowledged that they don't have a formally documented definition of a project, but indicated that the IT management team is ITIL certified and they understand a project as work that has a beginning, an end, and defined goals/objectives/deliverables.

Evidence ID/Name: 7-7 / IT Project Prioritization Workflow
Type/Format: Documentation / PDF
Retrieval Method: Email from Subject #7-2 as a follow up to the interview
Notes
Visual representation of the project management framework. This document shows the lifespan of a single project starting with a business needs identification phase, and going through eight total phases until handoff to operations/maintenance. Although this was a rich, detailed framework, it was really more focused on individual project management, and not on the PPM selection/prioritization process.

Evidence ID/Name: 7-8 / IT Project Charter
Type/Format: Physical artifact / MS Word document
Retrieval Method: Email from Subject #6-2 as a follow up to the interview
Notes
The tool that acts as a project charter, used to capture information about the intent/purpose of the project.

Evidence ID/Name: 8-1 / University Organizational Chart
Type/Format: Documentation / Web page
Retrieval Method: Web search on the campus website
Notes
This web page was to determine the name of the PMO Director (in conjunction with Evidence ID 8-2 and 8-3)

Evidence ID/Name: 8-2 / IT Organizational Home Page
Type/Format: Documentation / Web page
Retrieval Method: Web search on the campus website
Notes
This web page was to determine the name of the PMO Director (in conjunction with Evidence ID 8-1 and 8-3). There was essentially no other publicly available information related to IT projects or a PPM process (at least none that could be found via searching through this IT website). The lack of information was supported by the interview with Subject #8-1, as this organization is at the very beginning stages of defining its PMO and any PPM processes.

Evidence ID/Name: 8-3 / IT Organizational Chart
Type/Format: Documentation / PDF
Retrieval Method: Web search on the campus website
Notes

This document was used to determine the name of the PMO Director (in conjunction with Evidence ID 8-1 and 8-2)

Evidence ID/Name: 8-4 / Email Correspondence w/PMO Director
Type/Format: Documentation / Email correspondence
Retrieval Method: Email from Subject #8-1 as a follow up to the introductory questionnaire
Notes
High-level description of fledgling PMO office/processes

Evidence ID/Name: 8-5 / In-Depth Interview w/Subject #8-1
Type/Format: Interview / Group #1 Subject
Retrieval Method: Phone
Notes
A comprehensive transcript was documented, but transcripts are not published within the study.

APPENDIX D: NORMALIZED VARIABLE DEFINITIONS

As explained in Chapter 4, four of the universities in the study use instruments to score project requests. All of the variables from each of the individual project scoring instruments were copied into a master spreadsheet and they were all normalized so that aggregate counts could be determined. A full definition/description of each normalized variable is included in Table 20.

Table 20

Full Descriptions/Definitions of all Normalized Variables

Normalized Variable Name	**Count**	**Definition**
Supports strategic initiative(s)	5	The degree to which the project will support one or more campus strategic initiatives/priorities
Familiarity with the technology/process	4	The degree to which the staff are already familiar with the technology and/or processes that are involved. Stated differently, the level of effort will it take staff to learn how to use the new process/technology.
Required/mandated	4	The project is required/mandated by a person/organization that has authority to create mandates (e.g. president, chancellor's office, state government, federal government, accrediting agency, etc.)
Efficiency and productivity	3	At a high level, improves operational efficiency and/or productivity.
Solution is defined clearly	3	The degree to which the solution is already defined. If the project request contains a very high level set of requirements, then perhaps the solution is very vaguely defined; but if the project request already includes a very specific set of requirements and a pre-defined solution then perhaps the solution is very well defined.
Urgency	3	The degree of urgency (irrespective of how important the project is)
ROI	3	The qualitative or quantitative return on investment
Number of departments/areas that benefit	3	The number of departments or areas across campus that will be served or that will benefit
Supports student success	2	Supports "student success" in some form or fashion, in a way that doesn't fit squarely into any of the other variables (e.g., there is a separate variable specifically focused on supporting teaching and learning).
Consequence of inaction	2	The consequences that will be encountered if the project/request is not fulfilled
Vendor track record	2	Does the vendor have a proven track record of success?
Funding availability	2	The degree to which the funding has already been identified and/or allocated, including funding for one-time and ongoing costs.
End of life	2	Project is addressing a system that is approaching/beyond end of life.
Maintenance/upgrade	2	The project is related to maintenance/upgrades of a pre-existing system.
Technology maturity	2	How mature is the technology that is being implemented? Is it reliable/proven, or is it new/emerging? In some cases, this variable might be overloaded if it is also intended to measure the complexity of the process/system being implemented.

Normalized Variable Name	Count	Definition
Number of additional people required to support ongoing	2	The anticipated number of additional human resources that will be required to support the system once it is implemented and operationalized. In some cases, this variable might be overloaded if it is also intended to reflect any ongoing staff/time savings due to a more efficient or decommissioned system.
Positive/negative results	2	The general degree to which the project will positively or negatively impact business processes
Number of teams required to implement	1	The number of teams required to do the project. E.g. if people from the applications team and the networking team are required, this would be 2 teams.
Supports teaching and learning	1	Supports teaching and learning
Fulfills core departmental/divisional functions	1	The degree to which the project will fulfill core business functions/processes of a department/area/division
Number/types of students that benefit	1	The number/types of students or student groups that will be served or that will benefit
Compliance requirement	1	Is the project related to or compelled by a compliance requirement (or risk of violating a compliance requirement)
Estimated IT work hours	1	The estimated total number of hours of work required by IT staff to do the project. E.g., 40 hours' worth of work.
Supports robustness/expansion of IT system(s)	1	The degree to which the solution will deliver a more robust overall platform to support expansion of IT systems, services, or technologies.
Prerequisite project	1	Is this project a prerequisite for a separate/future/larger/strategic project?
Estimated work duration	1	The estimated duration of the project in weeks/months. This is mutually exclusive from the estimated work hours, because there may be more/less than a full FTE working on the project (i.e. a project that requires 500 work hours might only take one month to complete if several people are concurrently working on the project). E.g., 3 months duration.
Data requirements	1	What type of data are required to implement the system? E.g. highly sensitive data, moderately sensitive data, or public data?
System-wide solution availability	1	The degree to which there is a system that is available and/or in use by other sister campuses within the multi-campus university system
Cost	1	Hard costs in dollars
ERP/SIS data requirements	1	The degree to which the project requires data from the ERP/SIS system
Sensitive data requirement	1	Is the project related to protecting/securing sensitive data
Eliminates paper	1	The degree to which the project will eliminate paper-based processes/workflows.
Number of people required to implement	1	The number of individual people, or FTE required to do the project. E.g. 4 people, or 5.5 FTE