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Project Management Competencies Leading to Technology Implementation Success at a Community College

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MS, New York University, 2001

BS, Thomas Edison State College, 1998

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The problem addressed in this study was to understand the knowledge gap between project management competencies available and those needed for successful implementation of technology projects at a community college. The purpose of the qualitative study was to evaluate, compare, and analyze the performance of project managers of 2 large technology projects in a specific community college with respect to each other and what was known about achieving project success at a public institution of higher education (IHE). The research questions for this study examined the competencies exhibited by the project leaders, the success parameters established for the projects, and how the individual project leaders were selected. The conceptual frameworks that supported this study were enterprise wide technology implementation, project management, success assessment, and public IHE operational structures. A comparative case study approach using responsive interviewing techniques with 10 stakeholders from each of the projects yielded dialog that was coded in combination with documentation and observation evidence using recognized competency standards. The relationships and significance of patterns found in this data were analyzed against the proposition that the level of project success is a function of the application of project management competencies of the project leader. The results identified 9 elements that characterized competencies specific to effective project outcome success within the context of the community college. The results contribute to positive social change include implementation of organizational project management initiatives that will enable community colleges to continue to serve a vital role in providing an affordable college education.

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Chapter 1: Introduction to the Study

In this study, I explored the project management competencies that led to successful implementation of enterprise technology projects at a community college that enabled the organization to provide effective administrative services within an environment of shrinking budget allocations. The ability to implement technology at community colleges is increasingly critical to their success in meeting strategic objectives (Goldstein, 2006) as it is for all public institutions of higher education (IHE).

All IHEs have implied obligations to their communities; but, the public IHEs and community colleges in particular are funded largely by local taxpayers (Tollefson, 2009) and this tends to encourage public colleges to employ local talent rather than outsource when possible. The ability to hire the best local talent, especially those with the latest technical skills, for the administrative side of IHEs is difficult given the need to compete with all other industries for the same skill sets, such as network specialists, systems engineers, software developers, database administrators, and web designers (Allison & DeBlois, 2008).

The sets of competencies needed for implementing larger enterprise solutions go beyond having specific technical skills. Most solutions are a mix of technologies and new operational procedures that require coordinating and collaborating across and outside the organization (Brill, Bishop, & Walker, 2006). This combination of managerial and technical skills take many years to develop at IHEs since they cannot simply go out and pay the going rate for those specialized skill combinations, unless it is on a short term consultative basis. The trend of increasing tuition at private IHEs, particularly in a difficult economy has driven enrollments up at public IHEs, and most dramatically at

community colleges since they traditionally do not cap enrollment and require only a high school diploma or equivalent to gain admittance (Fry, 2009). This increased demand for administrative support, and a belt tightening of funding, along with a continual expansion of technological innovations and expectations by college stakeholders puts pressure on the public IHEs to implement more technology related projects in a shorter period of time (Agee & Yang, 2009). However there is a limited pool of individuals with the appropriate management and technology skills available to public IHEs to keep up with the demand as those with the most experience are on the brink of retiring (Jones-Kavalier, Flannigan, & Boggs, 2008, p. 98).

This presents an opportunity for public IHEs to embrace a trend from the business community of hiring or developing project managers as permanent employees to meet the demand for implementing new technology projects rather than depending on the few available local experts who have in depth knowledge of specific solutions and organizational nuances. There is substantial research literature on project management particularly for commercial and government enterprises, covering many domains including information technology (Söderlund, 2004b). However, few researchers addressed the relationship between project manager competencies and technology implementation success at public IHEs. Whereas there is an increasing body of quantitative survey-based research on project managers and stakeholders' perceptions, there is a need to analyze actual projects up close to give insight beyond cold statistics when making human resource decisions that are critical to public IHE operations. Chapter 2 contains a detailed review of the literature connecting enterprise system

implementation, project management, and public IHE environmental aspects that affect project success.

Statement of the Problem

The problem addressed in this study was to understand the knowledge gap between project management competencies available and those needed for successful implementation of technology projects at a community college. In the era of public demand for accountability in government and higher education there is an increased need for public colleges to focus on business efficiencies in running their organizations (Burke, 2005). However, taking a strict business approach to the academic processes of teaching, learning, and research, is arguably not necessarily the most appropriate model to meet the academic missions of IHEs (Katopes, 2009). Where the business operational efficiency methods needs to be applied is on the administrative side of IHEs. Although the academic and administrative missions do not stand independent of each other, the logistics of providing core student services of recruiting, admitting, advising, registering, billing, collecting payment, grading, testing, graduating, and myriad other tasks in between, should share the productivity and quality mandates of commercial enterprises. This operational efficiency emphasis is needed to provide stakeholders with acceptable levels of service.

Public IHEs significant flow of funding from taxpayers and the relative ease of increasing student tuition, based on politicizing the demand for a college education in society at all levels inhibits the accountability mechanism for public colleges that occurs naturally in the business world (Kirwan, 2007). When revenue streams are not tied to performance and operational efficiency, there is little reinforcement for focusing on

effective delivery of administrative services. This reality of civil service personnel models lacking capitalistic performance motivations becomes especially pivotal considering how increasingly all administrative tasks are being enhanced or completely transformed through computerization (Selden, Ingraham, & Jacobson, 2001). Particularly with the Internet, administrative employee functions can now become self-service applications on the Internet for students, faculty, and staff to initiate automated administrative backend functions (Lankes, 2008). This reduces the reliance on traditional clerical labor to complete these administrative tasks. When done well computerizing operational processes is a key element toward meeting the accountability expectations of public colleges.

Background of the Problem

The problem of implementing technology projects in public IHEs is a major concern because of the increasing demand for administrative support services due to growing enrollments and the expectations of faculty and students to use the latest technology in all aspects of their lives (Phillippe & Sullivan, 2006). The ability to implement more technology projects is constrained by the increasing scrutiny of governmental budget processes. By improving the effectiveness of public colleges to implement technology-based solutions these IHEs will be better positioned to survive and even thrive in an ongoing economically difficult environment (Doyle & Delaney, 2009).

The effective implementation of technology to meet administrative functions should result in lower recurring operational costs of performing these services for stakeholders (Casu & Thanassoulis, 2006). Lower costs are achievable using fewer administrative staff to serve more students through leveraging computer and network

technology. More and more tasks that have traditionally needed administrative personnel to perform for a student can now be done by students themselves on the Internet (Oliver, Livermore, & Farag, 2007). In the 1960s to late 1990s, the focus of administrative technology in higher education was on the standard backend processes of accounting, student records, and financial aid. Access to these systems to support students was through the administrative personnel who were trained to use the software and were provided access based on their roles (Cortada, 2007, p. 293).

These systems are being replaced or augmented with web-based front-end solutions that students can access from anywhere. Furthermore, new uses of technology that can only be conceived of with the advent of the Internet, such as distance learning, social networking, and text messaging are increasing the portfolio of systems that need to be implemented in IHEs to meet faculty and student expectations (Gueverra, 2007). Today, technology is not only driven by business return on investment (ROI) models, but by the continually changing ways human beings find to interact with each other (Smith & Hughey, 2006).

Implementing systems to keep up with these expectations is a challenge addressed from many angles by college administrators, vendors, consultants, and in-house staff technologists. Whether the approach is to implement an expansive enterprise resource planning (ERP) system, or create shadow systems to integrate with legacy or hosted applications, or all of the above, the need for appropriately skilled in-house staff to coordinate the implementation is essential for success (Bradley, 2008).

The easier to use a self-service web site that triggers administrative functions, the fewer administrative personnel are needed to execute those functions. The more effective

the implementation of the online self service application, the less technical support staff will be needed to maintain the applications (Lankes, 2008). This efficiency driven business mindset to automating public IHE administrative services will better position organizations to withstand budget cuts without cutting levels of service. Not only can additional services be provided to the student and faculty but also the quality of service delivery is less prone to human error in data entry or individual misinterpretation of complex business rules (Quinn, Lemay, Larsen, & Johnson, 2009).

The need for organizations to effectively implement technology projects is made apparent by the ubiquitous presence of digital technology increasingly everywhere in our lives. For organizations the challenge of implementing these systems takes substantial effort in planning, budgeting, staffing, designing, building, supporting, and maintaining (Kuruppuarachchi, Mandal, & Smith, 2002). The new paradigm of *cloud computing* which enables organizations to host their critical yet nonstrategic systems, such as electronic mail, outside of their environment is a key ingredient for taking advantage of the new technologies without bloating up on technology staff or consultants (Goldstein, 2008). As organizations take advantage of the Internet in this way they can deploy their technology experts internally to develop innovative solutions that enable achievement of strategic goals (Carr, 2004).

Public IHEs are at a disadvantage based on their administrative models to take advantage of the new approaches to rapid adoption of new technology solutions (King et al., 2007). The traditional civil service view of employment within public IHEs defines technology jobs much like construction trades, where a level X laborer in a particular trade has a certain level of skill that will be effective on any job that is at a level X of

complexity for that trade (Hays, 2004). This model has been expanded over the years to categorize technology jobs such as database administrators, web designers, programmers, and network engineers in such rigid skill lists as the non-computer laborers. This approach assumes a static technology infrastructure and application solution model. It ends up stifling the development of the soft managerial coordination skills that promote flexibility in implementing many possible technologies without necessarily being skilled in a specific technology.

Many of these civil service technologist employees will gain the soft skills over time to enable this flexibility, but the rate of development and number of individuals that focus on developing those skills is inadequate to the challenges at hand (Kellough & Selden, 2003). There needs to be an acknowledgement of the limitations of the civil service technology worker model where specific technical skills are the sole or primary determinants for job assignments.

For example, a skilled database programmer could design a system to take incoming job applications and then track their progress through the screening, interviewing, and selection processes. Staff would need to be trained on how to use the system, and it would need to be backed up and maintained by IT administrators. This simple application requires several technologists to implement and does not take advantage of industry best practices and upgrades that packaged software or hosted solutions can offer. It would be more efficient for the public IHE to have a person with the managerial and organizational skills of defining requirements, evaluating outside solutions, navigating procurement, coordinating implementation, and establishing ongoing support procedures (Parolia, Goodman, Li, & Jiang, 2007). What is needed is an

understanding of the competencies for successfully implementing not just building technology solutions within public IHEs.

Purpose of the Study

The purpose of this case study was to evaluate how the project management competencies of project leaders influenced a technology implementation project's outcome at a community college by comparing two completed projects. The intent was to derive an understanding of the influence of project management expertise versus subject matter expertise on project success.

The leader of the first project had strengths in local knowledge of the organization, technology at hand, and academic environments. The second project leader had none of these subject matter skills, but excelled in project management methodologies and tools, possessing industry standard training and certifications. Both project leaders had over 20 years experience in their fields. Through interviewing key participants and stakeholders in each project, a rich set of data was aggregated that reflects upon the conceptual frameworks of project management and individual competency. Through this reflection, the study provides an analysis on the nature of leadership as it relates to successful implementation of technology projects in a community college. These findings provide a useful set of constructs and parameters that can guide community college human resource and hiring managers to consider for project success when staffing for the demands of the advancing digital age.

Conceptual Framework

To examine what it takes to be successful at implementing technology projects in a public IHE, a myriad of conceptual frameworks derived from the social sciences can be

considered (Mingers & White, 2010). To support the purpose of this study, the appropriate frameworks considered were project management, information systems implementation, and individual competency.

Project management as a conceptual framework evolved from the roots of management science established in the late 1800s by Taylor (Mingers & White, 2010). At the time operations management was a primary focus to facilitate the needs of the industrial age as its range of enterprises continued to grow in scale and complexity. At the same time, the industries that were project based such as construction were formalizing project management as their own derivative of management science. This was exemplified in the 1920s, by Gantt's scheduling chart, now used by most project managers in developing work breakdown structures (WBS) which lays out project scope by sequence of its component tasks (Stretton, 2007).

The operations management function of planning and control became more and more formalized as the tools of the critical path method (CPM) and program evaluation and review technique (PERT) were developed in the mid 1950s to better control large military and commercial endeavors. This gave rise to project management as a discreet discipline and career focus (Morris, 2002). The set of tools and techniques continued to develop and in the 1970s, the Project Management Institute (PMI) was established to promote the formalization of project management concepts and practices (PMI, 2004). The first edition of the Project Management Body of Knowledge (PMBOK) was produced in the late 1980s and is revised on a regular basis to reflect the changing nature and focus of the practitioners of project management (PMI, 2004).

The field of management information systems (MIS) developed various methodologies based on many different theoretical frameworks as computer systems evolved from large mainframes in the 1960s to minicomputers in the 1970s and 80s; to client-server computing in the 1990s, and to web services based solutions after the millennium (Lee, Lee, & Gosain, 2004). Although many variations of methodologies have been established, the basic systems development lifecycle phases of requirements gathering, designing specifications, developing software, and implementing the resulting product mirrors the basic model of project management processes (Smyth & Morris, 2007). As technology projects became larger and more complex the need to apply the broader concepts of project management was viewed increasingly as essential to address the issue of IT project failures (Nelson, 2007). There is also a lack of consistency in defining IT project success (Thomas & Fernández, 2008). Where many formulas are proposed, the underlying discussion points are about success of the project in meeting its objectives versus success of the project management process regardless of how well the project output product meets it intended purpose (Baccarini, 1999).

The rapid growth of technology worldwide has spawned a parallel growth of project management as a recognized discipline and body of knowledge (Sauer & Reich, 2009). Since both project management and information technology have evolved through the aggregation and refinement of practical experiences, few refer to either discipline as science (Geraldi et al., 2008). Yet the level of detailed thinking and rigorous analysis on the dynamics and human factors of IT project delivery establishes it as a rich conceptual framework from which to contextualize a study (Harzallah & Vernadat, 2002). For the purposes of this study, specific portions of the framework provided a more focused

perspective with which to shape the analysis into findings. Specifically, individual competency theories can be and have been applied to project management and information systems (Müller & Turner, 2009). I used those derivative and source generic competency frameworks to focus in on project manager competencies that lead to project success within the constraints of a public IHE environment (Crawford, Costello, Pollack, & Bentley, 2003).

Individual competence is defined many ways in the literature; but, most sources from the field of psychology include the concept that cognitive performance of an individual is the measure of one's competence (Mayer, 2003). The key thought being that the competence level of a person in a specific domain of activity is a function of how that individual applies their innate abilities and knowledge gained through experience (Connell, Sheridan, & Gardner, 2003). Forces at work regardless of domain include time pressure, uncertainty, ill-defined goals, and high personal stakes (Ross, Shafer, & Klein, 2006). Researchers on competency focused on superior performance, seeking to identify factors or combinations of factors that could somehow be replicated by others if correctly applied (Chi, 2006). This is valuable analysis to identify drivers to building beneficial traits for individuals to achieve maximal rather than typical performance (Ackerman & Beier, 2003; Simonton, 2003). However, to view competence only in terms of the extraordinarily small percentage of maximal performers denies the reality that extraordinary things can be accomplished by individuals exhibiting average levels of competence through their performance every day (Deakin, Cote, & Harvey, 2006). This is indeed a main point of studying project success in the context of a public sector environment.

Project manager competency has traditionally been viewed as the application of the hard project management methods and tools needed to create a desired product or service (Crawford, 2005). However, these hard knowledge and skills need to be combined with an individual's personality and core character attributes to provide a balanced view of a project manager's level of competence (Morris, 2002). The PMI has established the Project Manager Competency Development (PMCD) framework (PMI, 2007) as a structured means for assessing an individual's level of project management competency through examining the knowledge, performance, and personal dimensions applicable in leading a successful project. The issue to ponder is how does an individual's application of elements of PMCD framework relate to project success and in what types of environments (Ley & Albert, 2003).

Many quantitative studies have been done that described the key success factors for projects (Cooke-Davies, 2002). What is lacking in the field is a real examination of the actuality of projects by qualitatively studying project managers personal experiences in managing projects (Cicmil, Williams, Thomas, & Hodgson, 2006). The study of the actuality of two technology projects in a public IHE with two distinctly different project manager perspectives offered a fertile basis that validated and provided insight to the established notions of project manager competency.

Assumptions

The focus of this study was to identify and explore the key competency traits of successful project leaders in the context of a public IHE. One assumption was that the results would provide useful and valid results because the two projects were selected based on their similarities of size, complexity, and importance to the organization's

strategic plan. The project leaders represented two distinctly different sets of knowledge and skill competencies. The first a technology subject matter expert in the project scope and the second a project manager with no expertise in the project scope, but expertise in the discipline of project management. By studying two projects in the same IHE the significance of organizational differences is eliminated, when comparing and contrasting project management competencies.

By studying only two projects the number of interview subjects and depth of discussion became greater, which elicited significant richness of analysis based on information that was verified from multiple sources, and thereby less anecdotal. The thoroughness achieved helped determine the impact and importance of certain behaviors over other behaviors and why certain competencies were exhibited rather than others in successful technology projects in a public IHE. A further assumption was that the participants would provide adequate depth of detail for effective analysis in addressing the research questions.

Scope and Delimitations

This study covered a single community college focused on the individual competencies of technology project leaders on two large successful technology implementation projects. The level of organizational project management competency was not under study, but rather the dynamics of project team and activity leadership in a public IHE environment.

I interviewed the project leaders, sponsors, core team members, and key customers of the project outcome. The participant pool comprised of 10 individuals for each project. A set of main questions and probes was used along with follow-up

questions to elicit participant mental reconstruction of the projects being studied so that recollection of events and reflections on them could be recorded for later analysis (Rubin & Rubin, 2005). As part of the interviews, the researcher sought out documented evidence that supported the participants' answers and discussion points.

The main interest derived from the interview data was to develop an understanding of how the project leaders' competencies played out in achieving the perceived level of project success. A primary means for this analysis was the framework of project management competencies as defined by the PMI in their PMCD document (PMI, 2007). The PMCD identifies 122 elements of project management competencies and 90 elements of personal competencies.

Each participant was also asked to describe his or her perception of each project's success at the point of cutover to production mode and then their perception 6 months later. The first project was planned and implemented in 2007 to 2009 and the second from 2003 to 2005. The interview session for each participant took about one hour. The interviews of the project leaders took longer to allow for more follow-up questions, such as a self-assessment of what competencies had changed through their experience with the project they completed.

The scope of the first project was to implement a new generation telecommunications infrastructure including hardware and software acquisition. This new digital telecommunications system replaced a 20-year-old analog system, providing many capabilities that were rolled out incrementally. The scope of the second project included a third party web-based student progress and degree audit system for the IHE, including

computer hardware and software acquisition. This system replaced a set of checklists and manual evaluation methods, which were often applied inconsistently.

Both systems have been implemented and meet their stated objectives, although both systems continue to be upgraded and enhancements added as needed. These were generally performed as operational activities using technical support staff without the need for a dedicated project leader to coordinate a large enterprise wide effort.

Limitations

For this study, the primary source of research data came from interviewing the key stakeholders of each of the two projects. Only these individuals were interviewed and thereby their perspectives were the only ones considered in formulating the study's results. They were interviewed about activities and events in the past 2-6 years, and their recollections were not always that fresh. The present status of the project outcome may affect the accuracy of their answers regarding the dynamics at the time of project implementation. However, the distinction between current status and implementation status was useful for validating the perception of success over time.

Since the projects were in the past, the availability of stakeholders for interviews was a limitation. Most stakeholders were still at the community college or were reachable at nearby institutions. I interviewed the stakeholders and was one of the project leaders at the time. This raises concerns of influencing the participants' responses. However, none of the participants directly worked for me and were well cognizant of the issues of academic integrity as they are long time employees in the academic environment.

An expectation was that each of the two project leaders improved their competencies in areas that they were not fully competent in at the time of project

implementation. The project leaders and the key stakeholders needed to remember the project period to do their assessment of competencies. Although the intent of the study was to provide insight to public IHE administrative managers in staffing for technology projects implementation, the results are not directly applicable outside the institution under study.

Nature of the Study

I intended to provide an in depth analysis of project leadership for two similar projects in a single public IHE by focusing on project planning and implementation through the lens of individual competency. Organizing and reflecting upon the large number of factors that will be looked at using the project management competency framework is best addressed with the qualitative approach (Creswell, 1998). The case study tradition was selected given the opportunity to study successful project leadership in a real life context (Yin, 2008, p. 18). The primary source for data was interviews with key project stakeholders. These data were combined with documented evidence as available, such as meeting minutes, project plans, emails, risk assessments, and other written communications. Chapter 3 contains details on the research instrumentation used and the approaches to collecting and analyzing the data.

Definition of Terms

Competency: The combination of knowledge, skills, and behavior utilized in the performance of a given activity (Ley & Albert, 2003).

Institution of Higher Education (IHE): Any academic organization that is accredited by a recognized accrediting body and provides post-secondary education (Snyder & Dillow, 2010).

Information Technology (IT): Term used to identify the function within an organization or a specific type of company focusing entirely on assessing, planning, deploying, and managing computer based systems, which are comprised of hardware, software, and networking elements (Tapscott, 2004).

Project : A temporary endeavor intended to bring about a particular outcome (PMI, 2004).

Project Management: The collective set of techniques, disciplines, standards, and methodologies that pertain to the structured approach for planning and completing projects effectively and efficiently (PMI, 2004).

Project Manager: An individual who is chartered by a project sponsor to lead and take responsibility for completion of a defined project, regardless of their specific level of project management skills (PMI, 2004).

Project Manager Competency Development (PMCD) framework: A Project Management Institute standard that categorizes various aspects of individual knowledge and skills specific to the application of project management (PMI, 2007).

Project Management Institute (PMI): The international organization dedicated to the profession and use of project management (PMI, 2004).

Project Success: Completion of a project that meets the perception of success of the primary stakeholders which is largely a function of meeting the original objectives within acceptable limits of quality, cost, and time (Shenhar, Dvir, Levy, & Maltz, 2001).

Work Breakdown Structure (WBS): An organized list of tasks that define work to be performed to complete a project (PMI, 2006a).

Research Questions

The problem of understanding the project management competencies required for success in implementing technology projects at community colleges was addressed by exploring the answers to the following three research questions:

1. What level of project management competencies are exhibited by project leaders who successfully implement technology projects at a community college?

2. What is an appropriate measure of project success for a community college?

3. What determines how individuals are selected for the role of project leader for technology implementation projects at a community college?

Through these questions, the factors that comprise the dynamics that drive the effective implementation of technology projects were examined. Specifically, the process by which individuals were selected to lead projects and the competencies they brought with them were considered in the context of the level of success of the project outcome. By comparing two successful projects, a useful context for understanding how to prepare a public IHE for implementing a growing portfolio of technology-based initiatives can be established.

Significance of the Study

The results of this study provide an increased understanding and awareness of the importance of implementing technology projects at a community college. These institutions open doors for a college education to those that have few options because of their financial, cultural, or academic limitations (Mellow & Heelan, 2008). Community colleges are experiencing surges in enrollment yet are under siege for a perceived lack of success as defined by graduation rates (Graves, 2005). At the same time, their primary

source of funding from the public is squeezing their budgets and in many cases with deep cuts, which only worsen the prospects for success of these vital social institutions (Tollefson, 2009).

Implementing enterprise technology systems provides organizations with the ability to provide better services at a lower cost if done well. Private industry has demonstrated that the path to performing successfully in this endeavor requires a focused project management approach (Verzuh, 2003). There is often a tendency in public IHEs to eschew the notion of business practices being applicable in academia (Katopes, 2009). Whereas this debate was not the focus of this study, the ability to implement technological administrative support systems such as degree progress advisement, student relationship management, course management, web content management, registration and billing, and other systems to enable the academic mission was. This research demonstrated the importance of effective project leadership in successfully implementing these systems, which can position a community to college to survive and continue to serve their students and community in an effective manner. This demonstration was achieved through analyzing elements of project management competency in comparing the performance of project leaders in two successful technology projects at a community college.

Summary and Overview

There is much literature on the subject of project management, particularly in the private sector (Wierschem & Johnston, 2005). When searching for project management in specific industries there are many trade organizations and special interest groups within PMI that address the areas of engineering, construction, marketing,

pharmaceuticals, energy, government, and many others. There are no IHE project management trade organizations other than those that focus on project management with information technology implementation. This study was focused on the project management competencies in implementing technology at a public IHE without regard to IT organizational project management competency. This will add to the body of literature by revealing the competency elements of project leaders who are successful in an environment that is not able to reward success like the private sector.

This case study provided an up-close analysis of the issues of project leadership competency as a critical project success factor. Although much is written on project success factors, little is written about the relationship of the project manager's competency to that success (Turner & Müller, 2005). This study contributes to filling that gap through the analysis and comparison of these technology implementation leadership factors. Chapter 2 is a review of the literature on technology project management competencies and project success, which provided the framework for this study. Chapter 3 is a description of the research methodology and how the chosen approach was an effective and valid means for addressing the research problem. Chapter 4 is a review of the results of the study reflecting within-case and cross-case analysis. Chapter 5 is a presentation of the conclusions and recommendations of the findings.

Chapter 2: Literature Review

Introduction

This chapter comprises the review of literature relevant to this comparative case study on project management competencies for success in implementing technology projects at a community college. It describes how the literature search was accomplished and organizes the results in a framework that serves as the basis for this study. Research sources included textbooks, books of collected research articles, industry standards organization documents, conference papers and proceedings, consultant reports, electronic only articles and websites, government documents, and peer-reviewed journal articles. The journal articles cited were primarily scholarly with the majority being peer-reviewed journals. This diverse mix of literature sources was necessary to effectively explicate the broad set of factors that derive from the research questions of this study. Online resources were used to identity useful materials for downloading or accessing information from university or other library holdings. Online searches were initiated with key words such as *project management in higher education systems implementation methodology*, and *project success*. As search results appeared and were reviewed, the searches were refined and additional searches with related terminology were performed that yielded more applicable results. In the process of reading, evaluating, and comparing literature sources, many materials were not considered due to lack of relevance or were highly redundant when compared to other sources.

The factors explicated in this literature review are organized into four broad conceptual frameworks of (a) implementation of enterprise wide technology solutions, (b) project management, (c) project success, and (d) implications for public IHE. The

path to presenting the literature in a logical flow started with the core aspects of implementing enterprise technology solutions in general, which included the technologies themselves, the benefits expected to be derived by implementing the technologies, the human resources required to complete the implementations, and applicable methodologies appropriate to the complex nature of enterprise wide solutions.

A review of traditional and modern variants of application development methodologies led to the review of project management methodologies as enterprise systems are implementations of multiple technologies integrated with human processes and not just the development of software. Project stakeholder roles were reviewed with an examination of the variations of the project manager role. The nature of project manager competency and its effect on project performance was reviewed in depth. What constitutes project success is widely discussed and debated in the literature with varying conclusions. This material is reviewed and presented reflecting the diverse research with an emphasis on the context of enterprise technology implementation success at public IHEs.

Implementation of Enterprise Wide Technology Solutions

The evolution of computers from scientific invention to practical business machine came into focus in the 1960s with many companies producing computers (Ceruzzi, 2003, p. 144). Up until the late 1960s, the leading producer at the time, IBM and many of its competitors bundled hardware and software selling them as a single product. When they unbundled their own software from their hardware they created the opportunity for individuals and companies to develop and market software independently to run on their computers (Campbell-Kelly, 1995). As other computer architectures

besides IBM's emerged, such as minicomputers and Unix based systems, the opportunity for independent software companies exploded providing the ability to develop software solutions for any imaginable business challenge(Ceruzzi, 2003, p. 124).

The growth of the use of computers in industry, education, and government was largely through the evolution of software development capabilities and a corresponding improvement in processing speed, storage capacity, peripheral interfaces, and the ability to communicate data between computers in a networked environment (p. 173). Initially only the largest companies, government agencies, and universities could afford the investment necessary to acquire, implement, and maintain computer systems to solve their operational requirements. In the 1970s as computers became more available and software development tools more standard, the business of developing and implementing computer based solutions exploded throughout the world (p. 108).

With the commercialization of open systems architectures and the advent of the IBM Personal Computer (PC) running Microsoft's Disk Operating System (DOS) in the 1980s, the hardware portion of computer solutions became more commoditized as operating systems became portable between different vendor product offerings (p. 282). Software could then be written to a specific operating system independent of the hardware. Organizations were able to focus on how they could build or buy software to automate operations to enable growth, reduce operating costs, and develop competitive advantage (Campbell-Kelly, 1995). In the 1990s with new levels of software sophistication and product availability, it seemed that every possible practical need of organizations, and increasingly individuals through their PCs, had a software solution.

Then the Internet became commercialized having evolved from military and academic roots in the 1960s to become a worldwide means for any computer to connect with any other computer (Ceruzzi, 2003, p. 295). Users were becoming familiar with the ability to send electronic mail to each other over the network. Then the multimedia aspects of human interaction over the Internet became reality as software based browsers were developed and evolved to make it easy to use this World Wide Web of networked computers (p. 301). The web democratized information access for anyone that could get on a network-connected computer. As traditional and not so traditional companies learned to use the web to sell products and services, new business models developed to provide services and information for free, based on advertising revenue, and the hope of their investors that someday a means for creating other revenue streams would develop (Magretta, 2002). This notion of high value for little or no cost became an unexpected outcome from a primarily capitalistic driven phenomenon.

Aside from the world of open source computing where mostly academic research facilities with other sources of funding and volunteer programmers develop code with altruistic visions of the rights of free software for society, software solutions need to be paid for by the user of the software in some manner (Lerner & Tirole, 2002). Even those organizations that chose to use open source software know they need to invest in personnel or consultants for software development and maintenance sometimes at a greater cost than if they relied on a software vendor for enhanced features through version releases and upgrades (Paulson, Succi, & Eberlein, 2004).

The modern paradigm of ubiquitous computing and lifestyle applications that are provided at little noticeable expense to the individual user presents challenges and

opportunities for organizations who have worked within the traditional return on investment view of implementing computer solutions (Griffiths, Heinze, Light, Kiveal, & Sethi, 2010). The ability to provide anytime access to an organization's stakeholders, so they can use online self service applications to review offerings, place orders, request service, download reference materials, and track orders all without any actual employee effort transforms how we think about technology (Oliver et al., 2007). The potential benefits are enormous where clients can experience superior customer service and at the same time do the work that employees normally do, thereby eliminating or redirecting a large set of operating costs. A challenge for organizations is how to implement the appropriate technologies to reap these potential benefits particularly public IHEs that work within constraints that limit the flexibility enjoyed by commercial enterprises (Goldstein, 2008).

Information Technology

The term technology has a broad meaning historically and although there are and will continue to be many technological innovations, the area of interest for this study is information technology. More specifically, information technologies that serve enterprise wide needs rather than individual productivity applications such as spreadsheets and word processing provide the greatest potential for organizations to reap operational and strategic benefits if implemented effectively (McNee et al., 1998). When it comes to applying information technology, the definition of enterprise has many different perspectives.

Enterprise architects look to model technology environments for organizations independent of vendor products. They look at the strategies and goals of the organization

in terms of logical domains as viewed through a technologist's lens, such as organization structure, business processes, software systems, data management, and technical infrastructure (Jonkers et al., 2006). Zachman's framework for enterprise for architecture has been a mainstay since the early 1990s for those looking to grasp the complexities of implementing technologies to meet an organization's mission. The framework identifies key elements of enterprise technologists' concerns as they relate to the what (data), how (function), where (network), who (people), when (time), and why (motivation) of the organization: all mapped against contextual, conceptual, logical, physical, and out of context perspectives. These perspectives are manifested by visualizing scope, enterprise models, system models, technology models, and detailed representations of a specific technology solution (Zachman, 1997).

Other enterprise architecture frameworks have been developed and evolved into specialized architectures, largely the domain of large government agencies, all with similar approaches to applying structured technological elements to organizational influences (Urbaczewski & Mrdalj, 2006). The Open Group Architectural Framework (TOGAF) developed in the 1990s based on the Department of Defense's Technical Architecture Framework for Information Management is a different approach, in that it describes the process for organizations to develop enterprise architectures to meet their needs (Leist & Zellner, 2006; Urbaczewski & Mrdalj, 2006). The Gartner Enterprise Architecture Framework looks at the intersection of an organization's business, information, and technology viewpoints as the focal point for identifying solution architectures, patterns, and portfolios (Robertson, 2008). These models are comprehensive yet complex and only the most rigorous well funded organizations even

attempt to use the frameworks as a means for developing real world enterprise systems (Winter & Fischer, 2006).

What has developed from the intellectual models of enterprise system architectures is an opportunity for vendors and open-source organizations to develop specific solutions that can be applied across an enterprise. This does not necessarily mean that every single department or function in an enterprise will use the solution, although it could, depending on the purpose of the solution and how it is deployed (McNee, et al., 1998). The Gartner Group describes enterprise application solutions as comprised of core and extended solutions (Sood, 1999). The core solutions are those provided by enterprise resource planning (ERP) categories of software, which typically include human resources, payroll, finance and accounting, and software specific to the vertical industry of the organization, such as supply chain management (SCM) and customer relationship management (CRM) (Sood, 1999). These applications reside on an enterprise network communications infrastructure that is made up of LANs, WANs, routers, and Internet Protocol (IP) PBXs along with a wide variety of security management capabilities (Redman & O'Connell, 2010).

How organizations deploy technology to meet their enterprise requirements is rarely as structured as enterprise architectures or vendor software solutions imply, whether they invest in internal infrastructures or use a hosted provider's service. Organizations that have been around for years typically employ legacy systems that were custom developed, or assemblages of packaged software, or a mix of both approaches (McNee et al., 1998). Organizations are increasingly driven to implement best of breed packaged enterprise solutions and focus on user adoption of the applications and

achieving some level of data integration or interoperability between the software packages to meet the their objectives (Vasconcelos, da Silva, Fernandes, & Tribolet, 2004). A key challenge is to maintain continuous operations while transitioning to the new environment. At any given point along the way the organization functions in a mixed environment of legacy and current technologies, and as technology is always advancing, managing a portfolio of applications in various states of maturity and enhancement often becomes the steady state of IT operations (McNee et al., 1998). Any technology implementation activity be it an upgrade to a newer version or a complete replacement requires careful planning and well timed execution to minimize impact to the enterprise's operations and strategic purpose.

Benefits and Risks

Since the explosion of computer capabilities over the last 30 years, industry leaders have embraced the notion that IT is an enabler of strategic advantage (Tapscott, 2004). Early adopters of specific technologies did indeed get a jump on their competitors. However with the ubiquity and commoditization of computing resources, competing organizations have access to the same strategic advantage to enabling technologies and thereby the goal becomes the effective management of risks in implementing and maintaining enterprise technology solutions (Carr, 2004). Many contemporaries of Carr agree with the premise that maturity and availability of technologies such as packaged software layered on top of standardized computer and network infrastructures reduce much of an IT organization's focus to mitigating implementions and operations risk (Chester, 2006; Goldstein, 2008). These same supporters, however, argue against the notion that innovation itself becomes commoditized thus eliminating the ability for IT to

create strategic value for its organization. This is evident in the post-dotcom era with the continued rise of powerhouse companies that use information technology as the means for delivering on their core and evolving innovative business strategies, such as eBay, Google, Amazon, and Salesforce.com (Tapscott, 2004).

Whether enterprise information technologies are commoditized tools or innovative enablers of organizational strategic vision, they are complex to implement, difficult to alter organizational processes and perceptions in adoption, and require vigilance to assure secured continuous operations (Chatzoglou & Diamantidis, 2009; Garner & Raban, 1999; Kim & Kankanhalli, 2009). The fact remains there are many benefits to implementing enterprise information technology even if they do not always differentiate organizations (Carr, 2004). The lack of ability to implement commodity technology would surely affect an organization's ability to survive and grow.

Shang and Seddon (2002) proposed an enterprise system benefits framework that provides a level of detail to enable compelling quantitative and qualitative justification of investments in technology even in times of economic downturn and budget cuts in the public sector. Based on an extensive review of literature on information systems benefits analysis, they have developed a five dimensional view that builds on traditional views of operational, managerial, and strategic dimensions to include IT infrastructure and organization dimensions which are essential to understanding the impact of modern enterprise technology solutions. In summary:

> Operational benefits include: cost reduction, cycle time reduction, productivity improvement, quality improvement, and customer service improvement.
>
> Managerial benefits include: better resource management, improved decision

> making and planning, and performance improvement. Strategic benefits are: support for business growth; support for business alliance, building business innovations, building cost leadership, generating product differentiation, and building external linkages. IT infrastructure benefits include: building business flexibility for current and future changes, IT cost reduction, and increased IT infrastructure capability. Organizational benefits include: changing work patterns, facilitating organizational learning, empowerment, and building a common vision (Shang & Seddon, 2002, p. 277).

Although these benefits are compelling and meaningful, Zachman (1997) cautioned that modern organizations may implement portions of an enterprise solution without close linkage to an overall enterprise view of technology. This would put much of the benefit realization at risk. When assessing the nature of risks associated with implementing information technologies the rationale goes back to the argument of technology as commodity versus technology as strategic advantage (Carr, 2003). When cutting edge innovative technology is to be implemented, the sponsors need to consider if the choice of technology is being used to meet a commoditized need or to meet a strategic opportunity with enough benefits to merit the risk of unproven technology (McNee et al., 1998). Emergent technology solutions should be considered too risky when selecting and implementing basic technology utility services such as email or telephony.

Resources

Many different types of resources are required to configure and implement technologies to meet an organization's objectives and deliver the expected benefits. These resources can reside within the organization or outside of it (Feeny & Willcocks, 1998).

The nature of employment options such as full-time versus part-time, permanent versus temporary, and employee versus third party consulting or contracting might seem to blur the picture (McNee et al., 1998). In general, however these IT workforce provisioning scenarios can all be considered as direct staff resources when the individuals performing the work are compensated based on an hourly or salary rate for their expended effort and not for any specific deliverables (Zwieg et al., 2006).

When separate companies are formed to provide computer solutions to other companies they can be labeled as third party vendors who provide specific prepackaged offerings, planning, configuring, and implementation expertise, such as ERP vendors (Olson, 2009). In these cases, the personnel effort is clearly part of the third party solution where the individuals performing the services do not answer to individuals in the customer organization but rather to those in their solution provider organization subject to the contract between the customer and supplier.

A form of staffing and solutions provisioning became popular in the 1990s as companies outsourced or off-shored their computer operations to third parties who took over staff responsibilities as well as development and maintenance of specific solutions (Michell & Fitzgerald, 1997). A related model is that of third party systems integrators who put together various component solutions into an integrated solution covering specific and unique requirements of the client organization, without necessarily taking on the ongoing staffing and operations of the implemented solution set for the client (Davies, Brady, & Hobday, 2007).

As information technology has evolved and continues to change rapidly, the nature of in-house and third party resources likewise changes. Just as old technology may

be slow to be replaced with new technology and approaches, technology job functions can also be slow to change, yielding a wide range of job titles and roles involved in implementing technology. In the 1998 U.S. General Accounting Office's Information Technology - Assessment of the *Department of Commerce's Report on Workforce Demand and Supply* presented all IT occupations as lumped into three categories: systems analysts; computer scientists and engineers; and computer programmers (Joyner, 1998). The U.S. Department of Labor combines computer and mathematical science jobs in their methodology for identifying information technology occupations.

However, the essential value of the diverse set of resources needed to implement enterprise technology solutions is more about the skills they possess and less about what their human resources job classification or title is. Goles, Hawk, and Kaiser (2008) established a framework of skill categories needed to be deployed by individual resources at some point in the implementation of enterprise technology projects in order to complete them. The categories are: technical, business domain, project management, and sourcing. Sourcing can be either from the viewpoint of an organization using third parties to implement a solution for them, or from a service provider who is implementing a solution for a customer. Technical skills are identified as systems analysis, systems design, programming, system testing, database design/management, data warehousing, IT architecture/standards, voice/data telecommunications, operating systems, server hosting, security, mainframe/legacy, operations, continuity/disaster recovery, and desktop support/helpdesk. Business domain skills are industry knowledge, company specific knowledge, functional area process knowledge, business process design/re-engineering, change management/organization readiness, managing stakeholder expectations, and

communication. Project management skills are project planning/budgeting/scheduling, project risk management, negotiation, project leadership, user relationship management, project integration/program management, working with virtual teams, working globally, and capability maturity model utilization. Skills for sourcing in managing customers are: customer/product/service strategy, customer selection or qualification, contracting and legal, and managing customer relationships. Skills for sourcing in managing suppliers are: sourcing strategy, third-party provider selection, contracting and legal, and managing third-party providers (Goles et al., 2008).

Implementation Methodologies

Building a computer solution to meet its intended objective requires deploying individual skills in the proper measure at the right time on the right activity. As computer systems were deployed in organizations to solve operational needs, methodologies evolved to structure and control the processes from conceptualization to system go-live (Avison & Fitzgerald, 1999, p. 251). The notion of a systems development life cycle, known as SDLC was established in the late 1960s at a time when software, hardware, and networks were typically single vendor proprietary solutions (Boggs, 2004; Campbell-Kelly, 1995) and the systems implemented were largely well funded and usually involved automating well understood manual tasks (Kay, 2002).

Information Systems Audit and Control Association (ISACA) is an international professional organization established around this time as a forum for sharing and communicating ideas and methods that arose from the commercial use of computers to build applications to support organizational processes. ISACA defined SDLC as "the phases deployed in the development or acquisition of a software system. Typical phases

include the feasibility study, requirements study, requirements definition, detailed design, programming, testing, installation and post-implementation review, but not the service delivery or benefits realization activities" (IT-Governance-Institute, 2007, p. 193).

The SDLC is described in seven phases: planning, analysis, design, development, testing, implementation, and maintenance (Haag, Cummings, & Phillips, 2005, p. 278). Many other representations of the SDLC have been defined each with subtle variations on the number and naming of phases (Nandhakumar & Avison, 1999). However, for the most part they contain the same basic activities, which for modern systems include: (a) define the system to be developed; (b) set the project scope; (c) develop the project plan including tasks, resources, and timeframes; (d) gather the business requirements for the system; (e) design the technical architecture required to support the system; (f) design system models; (g) build the technical architecture; build the database and programs; (h) write the test conditions; (i) perform the testing of the system; (j) write detailed user documentation; (k) provide training for the system users; (l) develop a support plan with a defined path for problem resolution; and (m) provide an environment to support system changes (Haag et al., 2005, p. 279).

As the use of computer technology to solve various problems diversified into a wider set of needs, not just those that were well-defined manual tasks, the SDLC's resource intensive linear approach proved too rigid for many system development efforts (Kay, 2002). The traditional SDLC become known as the waterfall method, as the phases of the methodology are often represented as one stage completing before moving on to the next stage in a cascading flow until all phases are completed and the system is live in production mode (Avison & Fitzgerald, 2003). Whereas this model is still followed in

many system development efforts, it is usually applied more iteratively within each phase and less formally to allow for the flexible nature and constantly changing environments associated with building information technology solutions (Boggs, 2004). Furthermore, because of the limitations of the waterfall method many variations of SDLC were developed over the years to handle specific problem domains, organizational preferences, and vendor tools used to build the resultant systems (Garner & Raban, 1999; Glass, 2004). Many system development methodologies and associated software tools were packaged and sold as proprietary solutions by consultants and vendors, which represents a market orientation rather than an information systems development (ISD) perspective (Sawyer, 2001).

Much of the more recent work on software development methodologies has been driven by agile software development (Boehm, 2002), which emphasizes the following values, "individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, responding to change over following a plan" (Beedle et al., 2001, para. 2). With all the work and literature about system development methodologies, it is assumed that a best practice of any successful software developer or development team is to follow a methodology of some type to assure the control needed to deliver a functioning product and to communicate with stakeholders along the way to assure the product will meet their needs. In the 1980s, Carnegie Mellon University (CMU) developed the federally funded Software Engineering Institute (SEI) to establish practices and standards to improve the software development processes. SEI established the Capability Maturity Model (CMM) as a best practice framework for process improvement that enables organizations to

assess their effectiveness in developing software based systems and solutions (Verzuh, 2003). The CMM describes five levels of maturity each of which characterizes an organization's processes in terms of effectiveness in building and implementing software intensive systems. The lowest level of maturity is Level 1, called *initial*, which assumes ad hoc processes if any. Level 2 through Level 5 embody increasingly integrated processes and methods, culminating with a maturity level where the organization is at a high level of quality performance, self-assessment, and continuous improvement (Paulk, Curtis, Chrissis, & Weber, 2002). Riemenschneider, Hardgrave , and Davis (2002) characterized these five levels in terms of use and acceptance of software development methodologies within an organization. The more mature an organization's software development and implementation processes, the better able they are to deploy information technology in meeting operational requirements efficiently and thereby are well positioned to build innovative solutions that provide a competitive advantage. Effectively using implementation methodologies is at the center of that model.

There is substantial literature that describes why system development methodologies are essential for effective systems design, construction, and implementation. However, this literature is for the most part prescriptive, based on specific technologies and/or a sequence of activities and controls adopted by certain organizations or recommended by consultants. Fitzgerald (1997) used a combination of in depth interviews and surveys to compile findings of real world usage of system development methodologies. The results indicated that system development methodologies were eagerly adopted by inexperienced programmers, largely as an instructive template to guide them in the development process. As they became

experienced as software developers they came to find adherence to the methodology restrictive and counterproductive to their ability to develop workable systems and therefore did not follow them. As the developers became even more expert they selectively used parts of the methodology as appropriate based on their judgment of what was called for in the particular situation at the time (Fitzgerald, 1997). Riemenshcneider et al. (2002) contended that the level of adoption of methodologies is dependent on "the presence of an organizational mandate to use the methodology, the compatibility of the methodology with how developers perform their work and the opinions of developers' coworkers and supervisors toward using the methodology" (p. 1135).

Many in the software development community feel that formal plans based on methodologies are counterproductive to the modern paradigm of web application development and software as a service (Avison & Fitzgerald, 2003). This explains much of the popularity of agile methods since it emphasizes the flexibility and quick delivery of small increments of code with regular stakeholder feedback, supposedly delivering a superior solution in less time (Boehm, 2002). Agile methods meet the need for high-speed software development in internet time, and indeed most modern software projects are characterized by their web interface. However, there remain organizations and specific functions in organizations that build complex systems to serve the needs of widely diverse sets of stakeholders requiring their consensus on acceptability of the end-product. These structured document driven environments may be poorly suited for the highly iterative and dynamic nature of agile methods (Turk, France, & Rumpe, 2002).

Above the level of tactical system development methodology lies the strategic view from the top of the organization on how to leverage technology to bring about major

changes in business processes to support strategic targets. These executive driven activities can have methodologies of their own and often contain components of SDLC (Boggs, 2004; Stoica, Chawat, & Shin, 2004). Total Quality Management (TQM) and the more recent Six Sigma continuous improvement methodologies, initially the domain of manufacturing firms have grown to widespread acceptance and usage, primarily in commercial firms were competitiveness is a function of quality processes (Kwak & Anbari, 2006). Core deliverables of these methodologies are most often the implementation or modification of computer systems to support the business processes being addressed. The basic Six Sigma methodology has five phases that are: define the problem, measure it, analyze the problem, improve the situation, and control the new processes (Schroeder, Linderman, Liedtke, & Choo, 2008). Although a strategic approach to business functions, many of the quality techniques can be applied as a subset of a systems development lifecycle (Boggs, 2004). Whereas the focus of quality-based methodologies is continuous improvement, these changes are often incremental. In contrast, the strategic practice of business process reengineering (BPR) is based on making radical changes to organizational processes largely through the implementation of technology and complete replacement of large complex staff intensive operations (Sethi & King, 1998). BPR grew rapidly in popularity in the mid 1990s as many organizations found it an effective means for downsizing their employee population and reducing costs (Cao, Clarke, & Lehaney, 2001). However, the zeal for lower costs often overtook careful planning and execution of the BPR concepts resulting in many failed implementations (Stoica et al., 2004). Where Six Sigma is consistently defined across industries with many documented standards, BPR has many different methodologies defined driven largely by

consulting organizations' packaging (Vakola & Rezgui, 2000). Although much of the hype for BPR has faded, the basic premise of examining and replacing processes with integrated systems solutions has become a basic tenet of surviving and growing in competitive industries. Even in government agencies where competition is less an issue, the requirements to replace inadequate processes and control costs are a constant reality. Since the success of BPR endeavors are dependent on implementation of enterprise level technology solutions, the software development life cycle was often an implied sub-methodology of BPR (Alibabaei, Bandara, & Aghdasi, 2009).

Software development has increasingly become the heart of systems solutions, but as enterprise solutions became much more complex in the 1990s the need for a more overarching methodology to address the assembly of multiple elements became apparent (Olson, 2009). The project management discipline had existed for decades largely as the domain of construction, military, and other physical engineering endeavors (Stretton, 2007). The increasing acknowledgement of the high rate for enterprise IT project failures created a huge demand for project management knowledge and skills in the IT function throughout all industries (Nelson, 2007). The packaging of enterprise software and rise of hosted solutions accessible through the Internet has created a partition between the functions of developing software solutions and implementing them (Goles et al., 2008). This has brought about the need for a broader and more rigorous framework of project management to the endeavor of implementing integrated information technology solutions.

This section summarized the major sets of factors to be considered when implementing modern enterprise wide technologies for an organization. The following

sections describe the other factors needed to complete the conceptual framework on which this study relies.

Project Management

Providers and users of enterprise solutions have adapted project management methods and approaches initially developed in the engineering and construction disciplines to enable the complex planning and implementation activities for a solution to meet its intended objectives (Crawford, 2000). PMI defined project management as "the application of knowledge, skills, tools and techniques to project activities to meet project requirements. Project management is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing" (PMI, 2004, p. 8).

This section is a review of the project management discipline identifying the main aspects that define it conceptually, professionally, and in practice. Established frameworks for project management are described and compared, revealing a diversity of approaches and a common view of the issues to be addressed in applying structure to implementing projects. The underlying concepts that drive the development of the project management discipline and the need for more theoretical research to grow the field beyond a system of guidelines are presented.

Within the context of the project management discipline are the players who interact in various roles to take a project from conceptualization to completely implemented and operational as a product for use by the end customers. The variety of stakeholder roles needed in different types of projects at different points in the methodology lifecycle is explored, culminating in a close look at the cornerstone position

of project manager. The many perceptions of what a project manager is supposed to do are reviewed in the literature and connected with the myriad of competencies that are applied at some level to complete a project.

Discipline

In their article that reflects on discussions regarding the nature of the discipline of project management, Geraldi and other researchers argued that project management, although widely accepted, has come to mean the application of systematic rules and guidelines in the pursuit of implementing a project to meet its objectives (Geraldi et al., 2008). This is indeed the impression made by the various structured frameworks, such as PMI's PMBOK (Project Management Body of Knowledge), and APM Group's Prince2 [Projects in Controlled Environments] (Wideman, 2002). Many professional organizations, training firms, and consulting companies offer project management workshops and certification at many levels based on formula driven approaches (Jasny, 2009). The intent of these certifications is to verify individual's understanding of specific subject areas that have traditionally been the domain of project managers, but not necessarily applicable in all projects. The PMBOK identifies these subject areas as project management integration, scope, time, cost, quality, human resources, communications, risk, and procurement (PMI, 2004). Prince2 described a more structured approach to be applied to all projects where PMI provides a set of processes to be applied by skilled project managers (Wideman, 2002). These are two internationally recognized leading methodologies and as such are designed to be guideline oriented. Many experts in the field have presented other models and viewpoints that provide broader possibilities for the project manager to build their understanding of project management knowledge.

Voropaev, Sekletova, and Archibald (2003) described a model that organizes project management into three aspects: management subjects, managed objects, and management processes. The first includes key participants (investor, customer, general contractor, contractor, executors, subcontractors, and others) and project management team (project manager and functional project manager). The second includes projects, programs, and organizations; with the lifecycle phases of managed objects (concept, development, realization, and closing). The third includes time periods of management, management function spheres (scope, time, cost, quality, risk, personnel, communications, procurement, changes, and other), and states of the management process (initialization, planning, organizational/mentoring, analysis/regulation, and closing). This model provides a way to view and understand the nature of a specific project within the context of the organization that is sponsoring it, not just as an isolated set of prescribed steps and knowledge areas.

The key to understanding project management is to know what a project is. PMI defines a project as a "temporary endeavor undertaken to create a unique product, service, or result" (PMI, 2004, p. 5). Although this appears to be a clear definition it does not always serve to bring clarity in the real world for individuals and organizations when determining the need to apply the discipline of project management to particular activities (Blomquist & Lundin, 2010). Verzuhs (2003) described a continuum of all work performed in all organizations as being between operations, which are completely repetitive activities, and projects which are totally unique. Applying project management discipline therefore becomes a subjective determination. The discipline of project management thereby implies a project with characteristics that demand the rigor of a

skilled project manager applying the processes and methods of project management knowledge. Typical project characteristics to be considered include: (a) project size, (b) project complexity (scope, stakeholders, technology, funding, etc.), (c) external or internal customer, (d) level of customer involvement, (e) level of risk, (f) minor vs. major undertaking, (g) standalone vs. need for post implementation support organization, and (h) standard vs. transitional (R. D. Archibald & Voropaev, 2003).

In addition to specific project characteristics the application area of the project will drive how project management is applied (Crawford, 2005). Muller and Turner (2009) described application area in their model of project categorization as one of four key project attributes, the other three being complexity, strategic importance, and contract type. Archibald provides a project a categorization table that describes most of the types of projects encountered in industry. The main categories of projects are: aerospace/defense; business and organization; communication systems; events; facilities, information systems (software); international development; media and entertainment; product and service development; and research and development. (R. D. Archibald, 2003, p. 45).

The project management discipline is often attacked for being focused only on the particular tools, methodologies, processes, and patterns that occur in real world applications independent of the systems in which projects operate (Morris, 2002). In their efforts to establish a theoretical basis for the management of projects, Smyth and Morris (2007) argued, "that the pursuit of explanations that rely upon identifying general patterns based upon cause and effect marginalizes the particular, while a focus upon the particular

frustrates the emergence of common patterns, shared meanings and normative recommendations" (p. 423).

Many researchers recognize the hard and soft paradigms of project management (Cicmil et al., 2006; Crawford et al., 2003; Fernandez & Fernandez, 2008; Verzuh, 2003). Traditional project management operates as a hard paradigm, where there are predefined goals that can be measured quantitatively with an emphasis on the project manager as the expert exercising structure and control using reductionist techniques. The soft paradigm represents the intuitive approach where goals are ambiguous and are measured qualitatively with an emphasis on learning where the project manager is more of a facilitator focused on gaining involvement of all project participants and focusing on social processes (Pollack, 2007).

Stakeholders

PMI defines project stakeholders as "individuals and organizations that are actively involved in the project, or whose interests may be affected as a result of project execution or project completion. They may also exert influence over the project's objectives and outcomes" (PMI, 2004, p. 24). PMI identified the key stakeholders on every project as: (a) project manager, (b) customer/user, (c) performing organization, (d) project team members, (e) project management team, (f) sponsor, (g) influencers, and (h) optionally the PMO (p. 26).

Project team members are the individuals with a particular subject matter expertise who are assigned to specific work tasks, as distinguished from the project management team members who are directly involved with project management activities, and as such their subject matter expertise is project management (p. 369). The

subject matter experts on the project team can be dedicated full-time staff as is the case in larger projects or they can be assigned part-time staff with other duties elsewhere in the organization. Likewise, the project manager can be full-time or part-time with other duties. PMI describes a continuum of organization structures in which project managers can operate (p. 28). On the one end is a functional organization where project managers have little authority, budget control, or availability of full-time project resources. On the other end is a completely project oriented organization with business functions performed as a collection of projects and programs (Maylor, Brady, Cooke-Davies, & Hodgson, 2006). In between are matrix organizations that create some level of separate project management function and apply project management as rigorously as the organizational structure will permit, typically through means of a PMO (Hill, 2007, p. 223).

The project structure that an organization adopts determines how project resources are acquired, what tasks those resources are assigned to, and who is accountable for work being completed as planned (Söderlund, 2004b). Although a distinction is made in defining the different project roles, the reality of individual participation in projects is such that subject matter experts or technical specialists can acquire and practice project management skills (Goles et al., 2008). Likewise project managers can acquire and practice technical skills, particularly as they work repeatedly on similar projects in a specific industry or application area (Crawford, 2005).

To understand the different roles of the different types of stakeholders it is necessary to understand their relation to the customer organization, the one that is the ultimate user of the project's final product. PMI in their various published standards discuss sponsors and customers as discrete stakeholders, yet when they describe decision

points in project processes, they combine the two stakeholder types without distinction between their roles in decision-making (PMI, 2003, 2004, 2006a, 2006b, 2006c, 2007). The PMBOK defined a project sponsor as "the person or group that provides the financial resources, in cash or in kind, for the project," (PMI, 2004, p. 26) and defined project customer/user as "the person or organization that will use the project's product" (PMI, 2004, p. 26). It goes on to state that "in some application areas customer and user are synonymous, while in others, customer refers to the entity acquiring the project's product and users are those who will directly utilize the project's product" (p. 26). Rowe (2007) provided more insight into the distinction between sponsor and customer in the way she defines these stakeholder roles:

> The sponsor initiates the project and is responsible for its overall success. The project sponsor provides financial resources, approves project plans, and is responsible for removing organizational barriers that might impede project progress. The customer is the person who will use the outcomes of the project. For small projects, the customer might be the same person. If the sponsor and customer are not the same person it is important to engage the customer in the initiating process. The customer is responsible for providing input during the planning phase, contributing to problem-solving and decision-making efforts, and taking ownership of the final product. (p. 53)

Still, when there is a sponsor distinct from the customer where there are no inherent obligations between customer and sponsor the decision making process could become one-sided.

PMI (2004) defined a project manager as

> The person responsible for accomplishing the project objectives. Managing a project includes: (a) identifying requirements; (b) establishing clear and achievable objectives; (c) balancing the competing demands for quality, scope, time and cost; and (d) adapting the specifications, plans, and approach to the different concerns and expectations of the various stakeholders (p. 8).

However, they need to rely on others to get the scope of work complete, and if it is a large complex project they rely on others to complete parts of the project management activity as well. The project manager is considered responsible for project completion but final decision-making is in the hands of the customer or sponsor. Furthermore, the project manager has to direct and control the performing organization, which in a more functional based organization or with external performers can affect the ability of the project manager to drive task completion (Feeny & Willcocks, 1998). Regardless of the project structure an organization adopts, the influencer/stakeholder group is often not within the project manager's range of contacts, although those influencers will still be in place after the project completes, where the project manager will most likely be assigned to another project (Alexander & Robertson, 2004).

To effectively communicate across stakeholder groups, a best practice is to adopt a project management system, which is comprised of a set of tools, techniques, methodologies, resources, and procedures (PMI, 2004, p. 33). Traditional project management techniques and tools include: (a) work breakdown structure (WBS), (b) responsibility matrices, (c) bar charts or Gantt charts, (d) project network techniques (PERT, CPM, PDM, GERT, and others), (e) cost schedules, and (f) project control (variance analysis, PERT/cost, earned value, and others) (Rodrigues & Bowers, 1996).

These tools are computerized and available to anyone who is managing or administrating projects. In practice there is a concern that when applying these computerized tools to planning and tracking progress, that the project management team can lose sight of the actual project, and spend more time monitoring project delays with sophisticated metrics then actually getting out in the field and lead the effort to mitigate delays (Meredith & Mantel, 2003, p. 539).

If project managers are full-time in their role, they are likely well vested in the discipline of project management. However, not all individuals who are called upon to manage projects are full-time professional project managers. Functional managers or technical experts are often placed in the role with varying degrees of effectiveness depending on the project scope, environment, and resource availability (Turner, Müller, & Dulewicz, 2009). More important than the individual's technical, functional management, or project management job description, are the competencies they are able to bring to bear on the task of leading a project to completion.

Competencies

Competency like many terms has immediate and varied meaning to people and that meaning can change depending on the context in which it is discussed. Weinert (1999) examined the various scientific usage of the words competence and competency and noted that they have the following meanings: (a) all performance abilities and skills; (b) only those inherited, domain specific prerequisites necessary for acquiring primary knowledge systems; (c) learned (demand-specific) knowledge and skills; (d) individual needs for effectiveness; (e) subjective evaluation of the self; and (f) the entire set of cognitive, motivational and social prerequisites for successful action. Through this review

of the scientific usage of the term, we can state that the measure of an individual's competence is an assessment of their abilities as reflected in their performance of specific activities in a specific domain. Crawford (2005) identified two primary competency characteristics, "namely knowledge, the information a person has in specific content areas; and skill, the ability to perform a certain physical or mental task, [which] are considered to be surface competencies and most readily developed and assessed through training and experience" (p. 8).

The level of competency achieved by an individual in a particular activity is a matter of judgment of the individual themselves and others who observe the individual performing the activity (Connell et al., 2003). The opinion of those that interact with the individual in the context of performing the activity should be considered under the light of the nature of their interaction, existing rapport, and relative position of power and influence. These qualitative renderings of a person's competence provide anecdotal evidence as to the level of expertise exhibited by the observed individual. Many structured activities are well suited for quantitative assessment of an individual's performance, such as speed in a race, grades in a test, points scored in a game, and many other depending on the domain of the activity. Even still, these quantitative measures are often reached through qualitative means. The level of competency of a person is not a onetime empirical evaluation but a never-ending variable measurement based on a combination of ever changing factors. These include external events in the environment and domain that the individual is performing in, as well as the individual's physical, mental, and emotional state at the time. This is why Connell et al. (2003) asserted that

there are fundamental issues when considering how an individual's "unique profile of capabilities relates to possible future outcomes" (p. 126).

Although, assessing an individual's competence through observing his or her performance provides insight, it does not reveal much about the source of his or her competence. This source is knowledge which can be observed as coming from the interaction of one's ability and one's experiences (Mayer, 2003). Yet knowledge also comes from learning and studying, not just through experiences. PMI defines knowledge "as knowing something with the familiarity gained through experience, education, observation, or investigation, it is understanding a process, practice, or technique, or how to use a tool" (PMI, 2007, p. 74). The proper measure of learned knowledge and practice leads to increasing levels of competence and expertise.

Much of the literature from psychological and sociological traditions dwell on competency in terms of exceptional performers by studying their traits and behaviors in an attempt to define the nature of expertise in a given domain (Chi, 2006). The problem with studying only expert performance is that the findings are not readily applicable to the general population in looking for acceptable levels of competence to produce an acceptable output from performance. Chi asserted that experts excel at generating the best solutions, spending time in qualitative analysis, self monitoring, choosing appropriate strategies, being opportunistic, and controlling their cognitive effort easily. At the same time experts fall short by being domain limited, overly confident, glossing over, dependent on their domain for context of their expertise, inflexible, poor advisors of novices, and demonstrate bias from their fixed view of the world. As Ackerman and Beier (2003) stated "when it comes to expertise, the traditional concept of ability-as-

maximal-performance leaves a lot to be desired. The contrasting contexts for ability assessment and achievement assessment make this point in a salient fashion" (p. 3).

The issue of innate ability versus learned ability is important in that consistent levels of performance require a certain balance of these two abilities. One's potential is considered a function of their natural ability but this can be increased markedly through repetitive practical application of the ability and intellectual understanding of the underlying theories of the applied ability. Connell et al. (2003) described the issues of manipulating individual potential to assure desirable outcomes as follows:

> One must be able to parse the space of human biopsychological capabilities (abilities), as well as the space of culturally valued knowledge and skills (competencies) that comprise domains, in such a way that the proposed link is predictive of success without being unnecessarily over-prescriptive. (p. 126)

Much research is concerned with matching individual ability to a likely domain of success, with the assumption that some people are more inclined to be more successful in some areas than others (Connell et al., 2003). The term domain therefore becomes key in understanding the practical effect of competency in a person's performance. Domain has many meanings depending on the context in which it is used. When describing domains of knowledge different authors often substitute other words for the term domain, such as: subject matter, content-specific, topic, and discipline (P. Alexander, Schallert, & Hare, 1991). Domains as spheres of knowledge can be extracted, mixed, combined, embedded, and otherwise manipulated into contexts that reflect established professions or areas of specialization. Thus, both the telecommunications and software installation domains from

the enterprise technology solutions domain can be combined or separated and in either scenario be perceived through the domain of project management.

In their survey based research of experienced project managers Brill, Bishop, and Walker (2006) identified many categories of competencies by importance to the project managers, which in rank order were: problem-solving expertise, leadership expertise, context knowledge, analytical expertise, people expertise, communication expertise, personal characteristics, project administration expertise, and tools expertise. These skill areas are reflected in a more structured and comprehensive manner in PMI's PMCD, which describes project manager competency in three dimensions. The first dimension, *knowledge* is the sum of PMBOK's defined process, tools, techniques, and nine knowledge areas, plus knowledge of an application area, the project environment and general management (PMI, 2007, p. 2). The second dimension, performance is a multilayered model that reflects how the project manager applies project management knowledge to meet project requirements. At the top of the model are the five units of competence that mirror the PMBOK's processes (initiating, planning, executing, monitoring / controlling, and closing). Each unit contains numerous elements, where each element is defined in terms of multiple performance criteria, and each criteria is assessed by specific evidence (p. 10).

Although identifying relevant project manager competencies is important groundwork, what is needed is an understanding of how these competencies come together and to what level of proficiency in contributing to success in the actuality of projects (Cicmil et al., 2006). The particular of one's competencies becomes reflected in their style and character (Turner & Müller, 2005). When it comes to selecting project

managers, senior managers look at the reputation of the individual as a primary determinant for success when matching a specific project manager to a particular project (Crawford, 2005).

This section described the generic project management discipline and competencies to be understood when studying the performance of project managers within the context of real world projects. The underlying concepts of competency were reviewed to provide a larger framework perspective beyond a simple regurgitation of desired project manager skills. The next section focuses on the factors related to project success.

Project Success

PMI describes the fundamental success criteria of delivering project scope on time and on budget (PMI, 2004). However, PMI and researchers in the project management field recognize that this basic view is rarely sufficient in understanding how to achieve project success particularly for the modern intellectual content driven projects, such as in the information technology domain (Söderlund, 2004a). Furthermore, as scope changes, schedules get impacted, and budgets expand the baseline performance criteria is often forgotten (Morris, 2002).

This section on project success examines how industry experts, academics, researchers, senior management, project managers, and other stakeholders view project success. The essential nature of project success is to judge if the desired outcome, often called the project product, was produced. However, as the literature reveals, insight gained from this after-the-fact assessment is incomplete for enabling project sponsors to plan for success in future projects. As asserted by Cooke-Davis, the real questions to be

asked in determining project success are: what factors are critical to project management success; what factors are critical to success on an individual project; and what factors lead to consistently successful projects. In doing so, he distinguishes between project product success and project management success. Whereas project product success is gauged on the extent that the overall project objectives are met, project management success is a function of the relative performance of the project processes in meeting cost, time, and quality objectives (Cooke-Davies, 2002).

This dual view of project success, being product versus process is dominant in the literature. However, project management success should always be considered subordinate to product success, otherwise there would be no need to show results from work performed in a project (Baccarini, 1999). In their exploratory study to define IT project success, Thomas and Fernandez identify project management success in much the same way, but distinguish technical success from business success within the construct of project outcome success. For example, a system can be implemented to improve customer service, and although the system meets specifications and functions smoothly (technical success), customer service does not improve (business success). Assuming that the appropriate level of quality occurs throughout the lifecycle of the project, the business success aspect is outside the control of the project sponsors (Thomas & Fernández, 2008).

Shenhar, Dvir, Levy, and Maltz (2001) identified four dimensions of success that are often viewed differently over time (project efficiency, effect on customer, business success, and prepare for the future). Business success is an underlying objective of organizational projects. However, aside from risk planning and mitigation activities as

key elements of project process success, business success should not be considered a factor in project success in the context of a study on project management competencies leading to technology implementation success, unless the business failure was clearly due to a project product or process failure.

Each specific type of project, industry, and domain has a unique blend of success criteria that is best suited to the field. For example in large construction projects the emphasis is on the project product by determining if the physically constructed object meets its architectural design and functional purposes. Newcombe (2000) specified five elements to be evaluated when articulating the nature of success in these types of projects, they are purpose of the project, project process, people involved, project structure, and project management system. However, no particular element defines success of the project, and thereby "the success or failure of a project can only be assessed in relation to the stated or implicit objectives of the participants" (p. 197). In the domain of information technology projects the most common success criteria include: meets user requirements, achieves purpose, meets timescale, meets budget, satisfies users, and meets quality standards (Wateridge, 1998). A specific type of information technology project such as enterprise resource planning (ERP) software has success criteria that are a combination of product, process, and subjective elements in a way that meets the complex nature of multilayered software systems (Bradley, 2008; Calisir, 2004).

As part of their research on Information Systems (IS) success, Delone and McLean defined an IS success model comprised of six dimensions, where system quality and information quality drive use and user satisfaction, which affects individuals and the

organization resulting in benefits from the project (Petter, DeLone, & McLean, 2008). This success model works well in supporting the conceptualization of critical success factors in implementing ERP and other enterprise class systems developed for organizational benefit. From the basis of this IS success model, through research with multiple case studies and literature review; Bradley (2008) examined the effect of critical success factors (CSFs) for implementing ERP systems. Ten CSFs were identified based on prior survey research, which if applied effectively should lead to the desired organizational improvements, on time, and on budget. In evaluating eight ERP projects using these CSFs, each project was ranked successful or not successful based solely on the criteria of on time and on budget. The implied message being that those projects ranked successful satisfied most of the CSFs, therefore the CSFs must be a valid indication of how to achieve ERP project success. However, at least two of the projects considered unsuccessful actually did meet the objectives of organizational impact satisfying DeLone and McLean's success model. Other researchers, such as Ngai, Law, and Wat (2008) identified many other ERP CSFs, and in most cases, like Bradley's CSFs they are focused on project process elements. Calisir (2004) evaluated ERP project success based on the actual use and capability of the resultant system, which is the project outcome approach. Although focusing on critical success factors is useful as part of an organization's project strategy it can only be considered effective if the project outcome is actually acceptable.

Outcomes

When assessing the outcome of a project's success different stakeholder groups may come to different conclusions where one group considers the outcome a success,

another may consider it a failure (Belassi & Tukel, 1996). However, project outcomes should be evaluated solely based on the original intentions for the project of those that sponsored and otherwise supported it. Therefore, the measure of outcome success is a review of the success criteria based on the project's objectives established at the beginning of the project (Atkinson, Crawford, & Ward, 2006). Different types of projects in different industries will have different sets of criteria. Outcomes will vary in size, complexity, and importance. To understand the nature of projects generically researchers have come up with frameworks that allow domain independent ways to categorize and thereby characterize projects. Shenhar et al. (2001), classified projects based upon the level of technological uncertainty at the moment of project initiation, which they consider one of the major independent variables among projects. This uncertainty is characterized based on how well established a technology is, from the lowest level having very little opportunity for innovation such as building a brick wall to the highest level of *not-yet-existent* technologies such as mapping the genome. The level of project determines what lens to using in judging its outcome, where the more *high tech* projects have a more flexible gauge and the lower tech projects have a more rigid way of defining success. When the objectives are based on such uncertainty, the success of the outcome may become more subjective from the view of the project sponsor.

This technological uncertainty categorization framework is very similar to the one developed by Wheelwright and Clark in 1992, which described projects in the field of product and service development, in terms of range of deviation of project processes and products from standard offerings. This deviation is characterized by how different the objectives or deliverables are from existing offerings. The lowest level of deviation being

categorized as derivative projects and the highest level as research and development projects (Meredith & Mantel, 2003).

These project classification methods provide a means for determining what type of success is reasonable to expect for a given project. Where a *low tech* or derivative project may have much less tolerance for error or deviation from a standard, the *high tech* and more innovative projects would have a more flexible range of acceptable performance to determine success. A large project may be comprised of different types of subprojects where the success or failure of the outcomes of the subprojects is incidental or consequential to the overall project (Nelson, 2007).

Success determination based on outcome results can vary among different organizations and in different industries (Tukel & Rom, 1998). Thomas and Fernandez (2008) asserted that "companies who clearly define and effectively measure the elusive concept of IT project success have a greater chance of achieving success" (p. 739). Private sector organizations tend to have clearer objectives and thereby the successfulness of the project outcomes can be more easily discerned. Public sector organizations tend to have greater goal complexity and ambiguity than the commercial enterprises and thereby less clarity in determining success of the project outcomes (Rainey & Bozeman, 2000). The key to meeting acceptable or successful outcomes therefore is to have effective project processes particularly at the early conceptualizing and goal setting phases.

Project Processes

The discipline of project management has been described earlier in this literature review in terms of its component processes. These processes generally follow a linear

path from conceptualizing the idea for a project, formalizing the objectives, defining the scope, obtaining funding, selecting resources, initiating the project, planning the work, performing the tasks, and closing out the project by transition to operational mode (PMI, 2004, p. 38). These phases can be organized many different ways, but there is widespread consensus on these elements of project processes. Within each of the phases of this project management lifecycle there are iterations to get to the desired level of adequacy before moving to the subsequent phases (Verzuh, 2003). If an early phase is not completed well, then performance of later phases will suffer and the earlier shortcomings will need to be addressed (Baccarini, 1999).

How these project processes are applied are a function of the size, complexity, importance, and urgency of a given project in the context of the organization in which the project is being sponsored and performed (Fortune & White, 2006). Urgency in a project affects scheduling, causes short cuts in quality, watering down of scope, and impacts communications across the spectrum of project delivery (Belassi & Tukel, 1996). The greater the intensity of these project parameters, the more formalized and documented approach to performing the project processes is indicated (Voropaev et al., 2003). Effective and rigorous application of project processes does not always guarantee project outcome success, but it can be demonstrated that the lack of such project processes in due measure corresponding to the nature of a project will all but guarantee project outcome failure (Baccarini, 1999). Although the best outcomes can be achieved through excellence in each of the project processes, certain key points in a project's life are considered pivotal and require special attention.

The conceptualization phase at the beginning is often the most satisfying part of a project for many since the individuals involved are coming up with ideas to make some aspect of their world better. As the ideas congeal and take form either by a sponsor or at some point adopted by a sponsor, the scope of the project takes shape among the other stakeholders (Rosacker & Olson, 2008). Transitioning from a project idea to initiating a project, often called the project selection process, is not always a precise and clearly observable step (Wheelwright & Clark, 1992). With large projects, or projects in organizations that have an established project management office the initiation phase deliverable, called a project charter provides the level of information necessary for sponsors to move forward with the project. This includes the project objectives, scope, stakeholder interests, resources needed, and relationship to other projects. If the work of developing the charter is not thorough or if a project is initiated without the appropriate level of rigor commensurate with the project idea scope, size, and complexity a project may be initiated with a high risk of failure because the practicality of the idea has not be scrubbed (Thomas & Fernández, 2008). When a project moves from one phase to another such as from concept to initiation the best practice for project success is to evaluate the deliverable with a consistent set of criteria.

This gate review process assures that due diligence in the conceptual phase has occurred and that there is documentation demonstrating the soundness and viability of the idea to become a project (PMI, 2006c, p. 21). This first gate is critical especially for organizations with limited resources because once the decision to invest in a project is made it draws resources and attention from other ideas. The gate process will force the project sponsor and identified stakeholders to compare other project ideas and to consider

if the timing is right for the idea, even though it is valid and can demonstrate realizable benefits (Verzuh, 2003). For most organizations there needs to be a judgment that the return on investment (ROI) anticipated justifies the expense of committing to the project and conversely the opportunity cost of not doing other projects (Blomquist & Müller, 2006). ROI is not always a purely monetary assessment, but speaks more to the value to be achieved compared to effort put in based on the mission and goals of an organization. For IT projects the primary ROI is improved productivity and customer service (Wierschem & Johnston, 2005).

Once a project is initiated, it moves through the lifecycle of the project progressing at a pace established by the project manager operating within the constraints of available resources and environmental factors towards the objectives established for the project. The selection of the project manager is well established in the literature as a critical success factor for projects (Parker & Skitmore, 2005). Therefore, the process of selecting a project manager is integral to successful completion of all other project processes from planning through closure. The reality is that only a small percentage of project managers, or those technical specialists available to assume the project management role are capable of handling the larger more complex projects that are critical to the enterprise (Hauschildt, Keim, & Medcof, 2000). So organizations are wise to put their star project managers, those with the strongest set of project manager competences, on the most strategic of projects. However, most individuals inherently have some levels of project management competency and that competency is increased through training and experience over time (PMI, 2007, p. 39). Therefore, organizations need to understand the level of their staff's skills and match them to projects that they can

handle. This will develop project management competencies by learning through experience. Depending on the project scenario and interpersonal dynamics of the project team, often the demeanor and personality of the person being assigned as a project manager is more important than their specific project management skills (Müller & Turner, 2009).

For the larger more complex projects a key skill required for the project manager is the ability to anticipate, recognize, assess, and address risk areas that arise throughout the project cycle, particularly those inherited from the initiation phase (Cooke-Davies, 2002). Although risk management in and of itself implies many processes and procedures, the project manager is the one person who needs to be attuned to risk constantly almost intuitively bringing the project to completion (Leybourne & Sadler-Smith, 2006). For projects of any significance, the project manager is not doing the work of the project but rather coordinating others in performing the tasks that will produce the interim deliverables and ultimate project outcome. The most effective way for the project manager to oversee many diverse activities is not to focus on the activity but to focus on risks that will affect that activity. By identifying risk areas early, measures can be taken to avoid, prepare for, or otherwise mitigate the potential damage of the risk event (PMI, 2004, p. 61). The effective project manager will focus on the cost, quality, and time triangle as their primary metric for self-assessment throughout the duration of a project. By constantly looking for risk potential in terms of these three factors, the project manager will optimize their performance that should lead to project outcome success.

The larger and more complex the project the more formal the project processes need to be administered (Westerveld, 2003). Project communication effectiveness is

essential for the project manager in getting others to understand what is needed and how their role and work activities integrate with other aspects and resources of the project (Gottschalk & Karlsen, 2005). Therefore, a key aspect of project process success is using tools to communicate with stakeholders throughout the project. Tools can include the fundamental constructs of memos, work breakdown structures, flow charts, spreadsheets, responsibility matrices, mind-maps, and other visual representations of the project scope, work activities, status, risks, and priorities (Verzuh, 2003). These tools communicate specific aspects of the project clearly. Therefore, it would be expected that the successful project manager will be adept at producing these project collateral artifacts using computer technology such that the communication is timely and of high quality to make sure that the intent of the information being sent is the same as the message received.

Adhering to a prescribed set of processes to systematically produce project outcomes is a logical and rational approach to handling complexity and diversity of resources. The level of quality and attention to detail exhibited by the project manager is the best measure of how well the project processes will affect the project outcome (Fortune & White, 2006). Unlike manufacturing processes where repetitive activities can be monitored and adjusted to assure acceptable levels of deviation from standard, projects by definition are unique, and each process is generally performed once, so there is not the opportunity to fix the process and get it right the next time (Tukel & Rom, 1998). This is why project processes, albeit well defined, cannot be assessed as to performance of the processes in a consistent manner to predict the outcome of the project. Determining if initiation, planning, coordinating, communicating, risk management, or transitioning was done rigorously enough or too unnecessarily rigorous becomes subjective, and the

purview of the project post mortem process (Pollack, 2007). Reviewing the project process performance retrospectively by itself is often subjective based on who is doing the evaluation.

Subjective Relativism

"Subjective relativism argues that any assertion must be viewed in relation to the beliefs and attitudes of the particular individual making the assertion" (Mandelbaum, 1979, as cited in Muncy & Fisk, 1987). Therefore, when evaluation is made as to the success of a project including that of the sponsor's, their view should be considered in light of their personal interest in the outcome of the project. A sponsor desires that the project they invest in is a success and will often go to great lengths at convincing others that a project is a success when there is the appearance of dissatisfaction with the outcome by some stakeholders (Thomas & Fernández, 2008). The sponsor's personal interest is centered on achieving an acceptable return on investment, maintaining or growing their personal status and reputation through achieving strategic objectives, and the authority to continue sponsoring other projects (Wateridge, 1998).

Project managers and project team members want the project to be a success, so they get paid, gain satisfaction in their work, and continue to be sought after to do other projects (Bradley, 2008). For enterprise technology projects, the end users' satisfaction with the implemented technology and the integration with other business processes and systems within an organization are common success criteria (Rosacker & Olson, 2008). Therefore, the perspective of the individual users regarding success of the technology implementation project will be rooted in their satisfaction with the new technology and associated processes (DeLone & McLean, 1992). For many technology projects, such as

ERP systems the satisfaction of those using the system day-to-day to perform their operational work activity is not always considered critical in determining overall project success (Fowler & Walsh, 1999). When users of these organizationally mandated enterprise systems express dissatisfaction with using a new system, the project sponsors and suppliers of these systems will often take the position that the users are resisting change and the problem is not the usability of the system but rather the mindset of those who are using the system (Bradley, 2008). Where the expense and visibility of these types of projects is significant, much effort needs to be put into preparing the users for change, since their attitudes could significantly affect the sponsor's perception of success of the project. Commercial suppliers of technologies have their own perspective of success of projects that rely on their offerings (Liang & Xue, 2004). Whereas these vendors want their solutions to be used and satisfy their client's objectives, their primary metric of success is that they meet their own operational profit objectives not their clients (Nelson, 2007).

For those enterprise systems that are not organizationally mandated but made available for use as desired, such as Internet based applications, the satisfaction of the end user becomes the main determinant of success (McNee et al., 1998). If the user becomes dissatisfied or identifies a different Internet application that provides greater satisfaction then success of the original system is at risk. An important perspective to be considered in enterprise technology projects is the customers of the organization. Since enterprise wide technology by definition is for use by most if not all of the organization than those that are served by the organization will be impacted in some way by those systems (Chand, Hachey, Hunton, Owhoso, & Vasudevan, 2005). In many projects, such as

customer relationship management (CRM) systems the project objectives are explicitly defined to impact customers' perception of the organization positively (Roh, Ahn, & Han, 2005). Sometimes technologies are implemented for very sound economic or safety purposes and meet their objectives, satisfy sponsors, and are completed on time and on budget, with the project outcome very usable, but many customers of the technology become dissatisfied and would stop using the product if possible (Nelson, 2005).

The domain of enterprise technology projects is susceptible to the dynamic nature of technology itself, with each passing decade seeing faster rates of change than anyone could ever imagine (Verzuh, 2003). When a project is initiated to build or buy a new system to meet a set of objectives, the risk exists that by the time that system is implemented a better solution or approach will come to market with a much greater return on investment (Carr, 2004). A completely successful project meeting all possible measures of success may never go live because it was made obsolete by other technology before it could be used (Urbaczewski & Mrdalj, 2006). Organizations often adopt a much broader perspective on project success, even when the project itself was an obvious failure. They can rationalize that "when specific system implementations fail, net benefits and organizational success could be achieved by transforming the initial project failure into organizational learning" (p. 734).

For enterprise technology projects in public IHEs there are other perspectives to consider. These include the sponsor, project team, outcome user, organization customer model, and others more specific to the nature of public IHEs. The sponsors in public IHEs aren't necessarily focused on the financial bottom line or competitiveness as their strategic reason for initiating a project (Bryde & Leighton, 2009). The perspectives of

sponsors in IHEs are centered on improving the student's ability to continue and complete a specific stage of their education at the institution (Amey & VanDerLinden, 2002). Administrative staff's view of technology project success is that the resulting system be easy to use and function in a way that meets their specific job's needs (AA Rabaa'i & Gable, 2009). Faculty typically have the same view, but often can become concerned with administrative technologies that appear to impede on their academic freedom (Wickens, 2008). Students view technology project success in terms of how well it helps them specifically meet their academic and career goals. For today's students, often referred to as *digital natives* technology is expected to be intuitive, reliable, and available whenever they want it (Waycott, Bennett, Kennedy, Dalgarno, & Gray, 2010). Thereby an outcome of any technology project that does not meet the level of functionality they have become accustomed to is not considered very successful in their view. For prospective students to the IHE, their main perception of the IHE is increasingly through the institution's web site (Salas & Alexander, 2008). These potential students have little awareness of the technology projects that resulted in specific applications on the college's web site. However, if these prospects do not consider the IHE's web site up to their personal standards they may discount their likelihood of attending that college.

Public IHEs are under the scrutiny of state and local taxpayers more so than private IHEs. The taxpayers' expectation for large technology project investments is that they not be made on wasteful unnecessary boondoggles (Burke, 2005). Donors to the college and local politicians often want to use the prestige of the public IHE to enhance their own image as they garner funds for specific projects at the IHE. A primary success

factor for these individuals is often that the outcome of the project visibly serves a perceived popular or pressing social need closely connected with the IHE's community (King, Douglass, & Feller, 2007). The standard for enterprise technology project success at public IHEs is often quite different from that of other industries. These differences influence what projects are initiated, how they are completed, and who completes them.

This section looked at the variables that comprise project success in terms of outcomes, processes, and subjective perspective. It is important to understand the interplay of these variables as they relate to specific projects since different projects can be judged successful or not by different measures at different times.

Implications for Public IHE

Institutions of Higher Education (IHEs) share many characteristics with each other, but are also quite different based upon their particular mission and environment. "Every college and university is some combination of socially conscious provider of educational services and a business searching for revenues and cost-cutting methods" (Weisbrod, Ballou, & Asch, 2008, p. 2). This duality can be called the *two-good framework*, where "schools provide teaching and basic research, even when they are unprofitable for the individual schools and finance these mission activities through conventional businesslike revenue generating activities" (p. 2).

A key to understanding IHEs is to look at their ownership structures. There are three basic forms of IHEs: private non-profit, private for-profit, and public non-profit. These ownership forms are unusual compared to commercial industry in general, but are very similar to hospitals, nursing homes, museums, and other public service oriented organizations (p. 9).

In the U.S., the primary function of post-secondary public IHEs is to grant degrees to students that complete their academic requirements in specific programs as recognized by regional accreditation organizations. IHEs are typically 4-year or 2-year institutions, with 4-year schools offering bachelors, masters, and doctoral degrees, and 2-year schools offering associate degrees. The public 2-year schools have evolved into the community college model, where a significant portion of the mission is beyond degree conferring and increasingly focused on career oriented programs leading to certificates or transfer to 4-year schools (Weisbrod et al., 2008). With increasing competition for students among all IHEs some community colleges are even expanding into 4-year models offering bachelor's degrees (Floyd, Skolnick, & Walker, 2005).

A defining constraint of public colleges is their ties to local and state government entities. "Public colleges are now arrayed in single independent districts; multiunit independent districts; state university systems and branch colleges; and state systems, some with innovative patterns, such as non-campus colleges" (Cohen & Brawer, 2003, p. 106). These interdependent systems in which public colleges operate add levels of complexity and bureaucracy to the formidable tasks of teaching, administering, and preparing for the future of the institution; that future being driven by a society increasingly reliant on higher education for the masses as the path to personal success and independence (Gumport, 2000).

The perception of runaway costs for higher education (R. B. Archibald & Feldman, 2008) combined with economic pressures and increasing enrollments (Fry, 2009) have put a spotlight on public colleges' operations. "Moreover, the contemporary accountability climate has in effect squeezed public higher education into a vise, even as

various legislative and state actors have taken it upon themselves to dissect the enterprise, inspecting slices of academic life/work/teaching/learning under a microscope" (Gumport, 2000, p. 69).

Although the application of information technology to business operations has traditionally been the path to reducing operating costs and gaining economies of scale for most industries, almost the opposite has occurred at public IHEs (R. B. Archibald & Feldman, 2008). The need to keep up with a society that students come from and the careers, in which they will be employed, requires that colleges have the latest technology to closely mirror what exists in industry as part of their pedagogy. This endless cycle of buying new technology for the academic teaching and research side of IHEs masks the productivity benefits and reduced operating costs that can be achieved on the administrative side (Gumport, 2000).

Technology Demand

The demand for enterprise information technology at IHEs is based primarily on their academic mission and the administration support functions needed to enable teaching by faculty and learning by students (Georgina & Hosford, 2009). The IT-Governance Institute (2007) identified the following technology resources as the cornerstone elements essential in providing for enterprise computing needs for organizations:

- Applications - the automated user systems and manual procedures that process the information.
- Information - the data, in all their forms, input, processed, and output by the information systems in whatever form is used by the business.

- Infrastructure - the technology and facilities (i.e., hardware, operating systems, database management systems, networking, multimedia, and the environment that houses and supports them) that enable the processing of the applications. (p. 12)

"Enterprise applications [are intended] to streamline operations, improve student services, and integrate disparate parts of the campus" (Sood, 1999). Sood organized these application solutions into five categories, with administration, at the center of the spokes connecting: library (library information systems, content databases, and digital/virtual libraries); retail (point-of-sale, inventory, smart-card, and e-commerce); research (lab processing/networks, data analysis software, development tools, and investigator grants administration); and instruction (content development, distribution/distance learning, academic support, and enterprise instruction management).

Administration is sub divided into financial administration (human resources, payroll, procurement, grants administration and development) and student administration (recruiting, admissions, financial aid, registration, records, student billing, degree audit, and alumni relations) (p. 5). These administrative applications map well to general business financial functions similar to other industries, but have unique requirements when it comes to student administration. Providers of ERP systems that have evolved from the commercial manufacturing and service sectors seek to adapt their general enterprise solutions to the student administration requirements for the IHE market (Agee & Yang, 2009). Other IHE specific software vendors have expanded their solution sets to provide ERP class solutions (Luo & Strong, 2004). Whereas most ERP vendors, including those that provide IHE solutions have an ever broadening set of offerings, few colleges and universities will use only the solutions of a specific vendor to meet all of

their administrative computing needs (A Rabaa'i, Bandara, & Gable, 2009). This is a function of the dynamic marketplace of innovative software development firms and the evolving standards of computing that enable interoperability among competing solutions (Botta-Genoulaz, Millet, & Grabot, 2005).

When an IHE needs to acquire an enterprise solution to satisfy an emerging or chronic need they seek out and evaluate solutions available in the marketplace. For public IHEs the task of seeking solutions is more constrained, limited by rigid procurement processes, government approved vendor lists, and the IHE's ability to implement and support the desired solution (Caudle, Gorr, & Newcomer, 1991). Contrary to this approach is when IHEs select open source solutions to meet administrative operational requirements (Allison & DeBlois, 2008). Open source solutions are very common in IHE, but mostly on the research and instructional side of computing such as for course management, wikis, portals, e-portfolios, and other collaborative activities (Agee & Yang, 2009).

The modern paradigm of Internet access providing the ability for any person or group to communicate instantly with others in the world is strongly embraced by IHEs. The combination of open source and advertisement sponsored web services provide academics with an essentially free and easy to use way to practice their craft and increase recognition of their particular intellectual content. The pool of online research sources is larger and more accessible than ever. The ideas for using Internet based technology in the classroom are growing every day as innovative web based products and services are brought to market. The effort of identifying, experimenting with, and applying these

instructional enhancing technologies are largely through the purview of faculty's self-initiative and innate curiosity (Goldstein, 2008).

However, the underlying technical infrastructure that is designed largely to support the administrative computing requirements can become overwhelmed by an easy to implement creative pedagogical innovation, such as introducing streaming video for each student's weekly assignments (Georgina & Hosford, 2009). The administrative solutions for the most part are predictable in data size and network bandwidth requirements. The sizing and use of new administrative applications, particularly large enterprise ones are often evaluated against the available capacity of the hardware, storage, and network infrastructure before implementation. The notion of academic freedom among faculty is not typically concerned with the available bandwidth of the campus network or the capacity of the connection to the Internet. Therefore, most IHEs are always working towards increasing network capacity without a clear understanding of how much is enough and when the capacity should be increased (Chester, 2006).

Because of the collegiality and openness of higher education, particularly in public IHEs their computer systems are often targets for malware attacks from all corners of the world (Yanosky, 2008). The IT organization in public IHEs have the difficult challenge of providing open access to their campus, yet preventing attacks on their systems and protecting the privacy of student data. Public IHEs are obligated under various laws to disclose whenever a possible breach occurred on their systems and what data could have been compromised (Hiller, 2010).

These information technology challenges to IHEs are intensifying as cell phones become more computer than phone and increasingly ubiquitous. This increased power in

a handheld wireless Internet connected device increases network demand while introducing more potential malware threats and security breaches to the IHE campus. Keeping up with the demand to provide a reliable, secure, high-performance network is expensive and is becoming increasingly difficult to maintain in the face of budget constraints for public IHEs (Bonig, 2010). Furthermore, acquiring and maintaining the necessary level of technological competency within the public IHE presents challenges beyond those of simply acquiring the technological components needed to keep pace. These challenges are well summed up by Katz (2008) as follows:

> As the explosion of content continues along with the increasing maturity and availability of web-based academic services and applications, tomorrow's students will arrive on campus with their own IT architectures and service arrangements. These students—and tomorrow's faculty—will have little use for or patience with college or university offerings that underperform or force them to lose precious connections to people and processes that they have accumulated since childhood. (p. 18)

Staffing Models

The National Center for Education Statistics (NCES) categorizes post-secondary education employees into eight categories: (a) instruction/research/public service, (b) graduate assistants, (c) executive/administrative/managerial, (d) other professionals (support/service), (e) technical and paraprofessionals, (f) clerical and secretarial, (g) skilled crafts, and (h) service and maintenance. IHEs often refer to instructional/research/public service individuals and graduate assistants collectively as faculty and all other employees as staff. Of the approximate 1.1 million faculty members

in degree offering public IHEs in the U.S. (785,650 for 4-year and 358,925 for 2-year) about 41% are full-time (45% for 4-year and 31% for 2-year). Of the approximate 1.2 million staff members (non-faculty) in degree offering public IHEs in the U.S. 83% are full-time (86% for 4-year and 72% for 2-year). Staff make up 52% of all full-time employees at public IHEs (55% for 4-year and 42% for 2-year) (Snyder & Dillow, 2010, p. 359).

Faculty represent the core competency and primary value proposition of an academic institution and as such their function is rarely outsourced to other teaching organizations. However, the heavy reliance on part-time contracted faculty is perceived by some as a form of outsourcing (Paulson et al., 2004). When it comes to online distance learning course offerings, many traditional brick and mortar IHEs are turning to other organizations to provide course development and delivery. This is clearly a form of outsourcing, however it is usually for non-credit bearing courses (Sjogren & Fay, 2002).

The non-academic staffing models of public IHEs present many more opportunities for outsourcing specific functions and services to specialty organizations. This includes facility support functions of maintenance, housekeeping, public safety, food service, bookstores, dormitories, parking, building and grounds keeping, printing, and many other non-strategic requirements (Bartem & Manning, 2001).

Various options for outsourcing have evolved for the IT function in industry as well as in higher education. Whereas commercial industry has exploited lower cost IT labor overseas for many years, the U.S. public higher education employment practices generally do not support that approach to reducing costs (Phipps & Merisotis, 2005). However, the notion of outsourcing the IT function in part or in its entirety to a third

party organization is a viable option used by many IHEs (Graves, 2005). The ability to buy software solutions or even lease them in a *software as a service* web-hosted model in effect outsources the design and development of software as well as much of the infrastructure maintenance and optimization (Goldstein, 2008). Certain technical, administrative, and managerial staff need to remain in-house to coordinate activities among solution providers and the IHE technology users, as well as provide training and support functions. Finding the right mix of outsourcing activities and keeping in-house staff is referred to as *multi-sourcing*. Gartner industry research asserted that "IT leaders should come to the realization that a mixed model in sourcing and service delivery may be the most effective and cost-efficient approach to providing higher education IT services" (Bonig, 2010, p. 3). Although effective multi-sourcing provides IHEs with a viable method for meeting their institutions' technology demand, the real costs involved are not always clear over time (R. B. Archibald & Feldman, 2008).

Public IHEs have many governmental compliance requirements (Allison & DeBlois, 2008) and typically deal with multiple labor unions focused on protecting jobs and workers' rights (Wickens, 2008). As such developing an effective multi-sourcing strategy has special challenges. Public IHEs employee agreements with unions typically specify the job functions for each position, and provide for grievance procedures if an individual is considered to be working outside the level indicated by their job classification (Selden, et al., 2001). This puts various pressures on administration management to add additional people to do special functions, or relax their ambitions as to what solutions can be practically implemented and supported with their existing staff.

Because of these workforce challenges, as technology changes overtime eliminating a particular work activity, public IHEs cannot simply lay off workers, they need to find something for the union protected employee to do. Often they will re-train the individuals for other technology positions, but this can raise issues with unions regarding pay scale for different skills (Condrey & Battaglio Jr, 2007). Partly because of these rigid employment models public IHEs benefit from the stability of government bureaucracy which enables a long-term view for implementing technology solutions and fine-tuning them at a pace in which the organization can adapt (Rainey & Bozeman, 2000). However, unions are reluctant to allow a dynamic job description for their members, because of the concern that management will take advantage of workers without compensating them appropriately (Condrey & Battaglio Jr, 2007). This is indeed a genuine concern, but also works against public IHEs' ability to be flexible and adaptable in service delivery using the most appropriate technological solutions. The issue of staffing for enterprise technology projects should be about "the effective and economical delivery options available to IT leaders at higher education institutions for the delivery of high-quality IT services" (Bonig, 2010, p. 2).

The project manager role in implementing technical projects is especially troublesome to historical public IHE job classifications, since the notion of being a manager is not considered the domain of the union employee (Hays, 2004). However, study after study shows that implementing technology regardless of the sourcing structure is dependent on effective project management (Baccarini, 1999; Dvir, Raz, & Shenhar, 2003; Thomas & Fernández, 2008; Wateridge, 1998; Westerveld, 2003). Furthermore, the need to embrace and rapidly apply technological solutions to administrative processes

in the face of mounting budget pressures is rampant in the literature regarding the future of public higher education (Allison & DeBlois, 2008; Amey & VanDerLinden, 2002; Goldstein, 2008; Graves, 2005; Sood, 1999).

Return on Investment

Organizations implement enterprise technology projects to meet strategic objectives. These strategic objectives or goals are often well-defined descriptions of a target to be achieved. They derive from the organization's mission statement, which is a more general assertion of how the organization defines itself and the services it provides to its community of stakeholders. Pearce and David (1987) suggested eight key components of corporate mission statements as:

1. Specification of target customers and markets.
2. Identification of principal products/services.
3. Specification of geographic domain.
4. Identification of core technologies.
5. Expression of commitment to survival, growth, and profitability.
6. Specification of key elements in the company philosophy.
7. Identification of the company self-concept.
8. Identification of the firm's desired public image (p. 109).

Whereas most of these do apply to public IHE missions, the concept of profitability and other financial or even fiscal responsibility is absent from the most common elements among IHE mission statements as is any mention of core technologies (Morphew & Hartley, 2006). "Today's mission statements are often based on the triad (20th-century) mission of the university: teaching, research, and public service. Particular institutions

will add to these fundamental goals their own educational, social, political, or spiritual aims" (Scott, 2006, p. 2). Although not explicitly stated in most IHE mission statements, fiscal viability and the ability to deploy technology is essential for colleges in meeting their missions (Weisbrod et al., 2008). Academic, public service, and other higher purposes are primarily how IHEs define themselves to the world.

Therefore, when describing return on investment (ROI) for implementing enterprise technology projects at public IHEs, the value does not always lie in the operational efficiencies or competitive advantage to be achieved, but in how well the projects contribute to serving the college's mission. When doing a cost and benefit analysis to determine the ROI of projects at an IHE, benefits can be assessed differently by different stakeholders who have their own perspectives. Bottom line benefits for community colleges tend to focus on quality of student outcomes usually in terms of academic transfer, workforce preparation, and lifelong learning; rather than on the aggregated economic profit and loss per student (Amey & VanDerLinden, 2002).

With the changing financial landscape putting pressure on public IHEs, the reality of a financial bottom line is becoming more prevalent in thinking about colleges' missions. Archibald and Feldman (2008) made the case that:

> Without matching revenue increases from public appropriations, private giving, or tuition, quality must erode over time. The constraint also can be moved by productivity-increasing technological change. Cost-reducing technological progress in this sector would shift the constraint downward. This would permit higher quality at a constant cost per unit, lower cost at a constant quality, or some of both (p. 272).

However, the Gartner Group reminded IHE leadership that the value of IT projects does not lie in their low costs, but rather in the high value to the institution, where investment in IT projects enables a higher yield of institutional resources, thereby lowering the cost of production of essential services to IHE stakeholders (Lowendahl, Zastrocky, & Harris, 2008). Hence, the higher yield of institutional resources is the benefit in the cost-benefit equation for measuring ROI. The various constraints and characteristics of public IHEs provide unique challenges and at the same time opportunities for sustained return on investment when implementing enterprise technology to meet strategic objectives.

This section reviewed information technology implementation variables most common to public IHEs within the context of their strategic and operational constraints. The nature of project management and project success within public IHEs is key to answering the research questions. The various elements defining that nature have been presented.

Methodology

Research is commonly characterized as being either quantitative or qualitative, or a mix of both (Leedy & Ormrod, 2005). Qualitative approaches are concerned with understanding a phenomena of interest with the researcher positioned as the primary instrument for gathering data (Creswell, 1998). The detail and richness of the interaction of many variables that comprise qualitative studies presents opportunities for explaining and conveying meaning in ways that quantitative studies cannot. However, the empirical demonstration and repeatability required for many areas of social research are often better served through quantitative methods (Babbie, 2001). Qualitative methods have the obvious risk of bias presented by the researcher's personal involvement, yet at the same

time it is the researcher's pre-existing perspective that brings light to important aspects of study areas that can elude the quantitative method (Trochim & Donnelly, 2001). Case studies as a qualitative method provide a means for understanding specific applications of an area of interest to be studied with a guided approach intended to discover conceptual underpinnings (Dilley, 2004). Multiple case studies further provide the opportunity to find consistency or disparity across cases and contexts, which can further illuminate the study objectives. Case study as a research strategy is considered a structured methodology comprised of a logical design, data collection techniques, and specific ways of analyzing the data (Yin, 2008). Interviewing individuals that were the primary players in a specific case being studied is a commonly used approach employing open ended questions that enable the researcher to probe and get at topics that are not obvious (Kvale & Brinkmann, 2008; Seidman, 1998). Although analysis is typically a function of the researcher reviewing the interview data seeking themes and patterns, qualitative interviewing itself is a form of analysis in real-time (Rubin & Rubin, 2005). Interviews then become the "main road to multiple views of the case" (Stake, 1995). Business case studies are used for research that describes practices and tests hypotheses or theories, such as this study about the proposition that project management competencies relate to project success (Dul & Hak, 2008).

The literature provided several examples of research that uses surveys to capture opinions and perceptions of large numbers of project stakeholders to understand different aspects of the relationship between project management competency with perceived levels of success. Many of these can be considered quantitative in that they model the quantity of responses in specific areas and determine deviation from the mean in some

fashion and then interpret a conclusion from the data results. Crawford's (2005) multi-national survey based study on project competence used a detailed set of project management competence variables self-assessed by the project managers themselves and correlated those results to their supervisor's perceptions of workplace effectiveness. Based on the composite rating for each project manager's effectiveness and value, the researcher characterized those above the median score as higher performers. Although statistically proven techniques of uni-variate, bi-variate, and analysis of variance were used, the reliance on perceptions and broad assumptions to get the data to behave statistically could raise questions as to its usefulness. A main conclusion of the study was that there is little relationship between using project management standards and workplace effectiveness. The conclusion may be statistically sound but the premise that the opinion of supervisors about a project manager's work place effectiveness is a true measure of success can be challenged by observing measurable results of the project outcomes.

Muller and Turner's (2010) study on leadership competency in project managers used a similar survey and quantitative analysis approach, but with a much more rigorous means for defining project success. Fifteen competencies organized by style of leadership were self-assessed by the 400 survey respondents who were selected from membership roles of PMI. The results indicated management style commonalities for like industries and supported other studies, which concluded that project managers' leadership style is strongly related to their achieved level of project success.

Brill, Bishop, and Walker (2006) performed survey based research to identify how project managers ranked the importance of categories of competencies in completing

their projects successfully. The results validated previous findings that ranked problem solving and leadership expertise as the most important to meeting their goals. These and other quantitative studies, primarily survey based, all gather a large number of respondents' current perception of a particular set of competency variables key to some definition of project success. Although they are quite useful for supporting common frameworks and descriptive models, they do little to extend the understanding of how all the many project management variables interplay with respect to the different views of project success with the context of the specific projects themselves.

Summary

The factors that affect the implementation of technology projects at community colleges are many. Four conceptual frameworks were presented to embody the diversity of those factors from the perspective of technologies, project management discipline, project success, and public IHE operating parameters. The flow of literature review began with identifying the historical and current fundamental elements in implementing complex computer systems and networks. The discipline of project management was presented zooming down to the specific set of competencies that are indicators of project success. The literature revealed the difficulty in judging technology implementation project success because of the many diverse ways of assessing outcomes and processes. This brought to light the need to rigorously study specific cases to assure completeness and integrity of assessment. The environmental factors of public IHEs were presented as the context in which community colleges operate providing a more precise lens when evaluating technology implementations as those in this case study. The challenges of understanding how the many factors affecting technology implementation for these types

of projects through quantitative assessments of the large data sets exposes the need for qualitative case studies to fill a significant gap of knowledge in this study area.

Chapter 3: Methodology

The purpose of this case study was to evaluate how the project management competencies of project leaders influenced a technology implementation project's outcome at a community college by comparing two completed projects. The design selected to analyze the complex set of indicators embodied in the review of two distinctly different project leaders is a qualitative comparative case study of the two projects. The key stakeholders of each project were interviewed using responsive interviewing techniques with open-ended questions to develop a corroborated view of the project leaders' competencies and perceptions of project success. The individual project leaders were interviewed to balance the objective perspective of others with a subjective self-assessment of their project management competencies exhibited on the projects being studied.

Documented evidence, such as meeting minutes, project plans, emails, risk assessments, and other written communications were gathered that both supported and sometimes questioned the assertions made by the participants. The resultant implemented technology solutions of the two projects were evaluated against their stated objectives. The data were organized and categorized using industry established project management competency frameworks, and was further coded based on the substance and insights derived from the content of the interviews. The relationships and significance of patterns found in the data were analyzed to test the validity of the proposition that the extent of project success by meeting stated objectives in an acceptable timeframe within budgetary constraints was a function of applied project management competencies. The content of this chapter includes a description of the research approach providing explanation and

rationale for the method used and the means for assuring the credibility of the research. The data collection and analysis activities along with the protection of participants are covered, enabling confirmability and dependability of the study results.

Research Design and Approach

The choice of research design establishes the limits to which the findings can be understood and contribute to the body of knowledge in a specific subject area (Babbie, 2001). Quantitative studies are intended to count and otherwise measure many instances of a few variables and through statistical inference techniques to mathematically describe the likelihood of something occurring based on a set of criteria (Leedy & Ormrod, 2005). This method is the traditional hard science approach to describing physical phenomena; however, its application to social science phenomena is often less useful (Kitchenham, Pickard, & Pfleeger, 1995). Many quantitative studies have been performed based on survey data with large numbers of different types of project stakeholders intended to unravel the secrets to implementing successful projects or to identify the specific factors that predict project failure (Turner & Müller, 2005). These studies tended to be inconclusive and point to organizational, cultural, and individual competency issues with a wide divergence on what constitutes project success through assessment of the outcome or the project management processes.

The most compelling yet anecdotal conclusions are that highly competent project managers are more likely to preside over successful projects (Crawford, 2005). To explore this premise with appropriate research rigor, a qualitative approach is indicated to gain an understanding of the phenomena (Creswell, 1998, p. 41), which in this case was technology project implementation success at a public IHE. Constructing a holistic view

of the complex nature of project management competences observed in project leaders in specific actual projects complements and adds to the understanding of quantitative studies that indicated and ranked project management competencies critical to successful project delivery. The constructivist characterization fits and thereby identified the appropriate study approach as qualitative (Leedy & Ormrod, 2005, p. 64).

Of the five traditions in qualitative studies: biography, phenomenology, grounded theory, ethnography, and case study, only case study provides for an in-depth exploration of a phenomena bounded by time, place, activity, and context (Creswell, 1998, p. 76). The research focus was to discover how project management competencies affected project success when implementing technology within the context of a community college. Project success was discussed at length in the literature review. A project's outcome or product was considered the primary determinant of success. However, different stakeholders have different views of a project's outcome. Project sponsors expect the outcome to meet their original expectations not only from a technical conformance, schedule, and budget standpoint but also in satisfying the strategic purpose of the project. Users of the project product judge success based on their satisfaction within the context of how they use the product. For those that are responsible for planning and implementing the project, the quality of the project management processes are a key determinant of success.

Although a basic approach to understanding project implementation is through analyzing a project leader’s actions, the objective of this study was to explore project management competencies generically, not to describe a specific person's road to such competency. Therefore, this was not biographical research. The experiences of the project

stakeholders were considered, but only as a window into the project leaders' application of project management competencies and thereby the phenomenology approach was not appropriate. Through this study, I did not develop new theories about project management competencies, as does grounded theory. The phenomenon under study was not a cultural group where observations were the primary data collection method as in ethnographies.

Case study is the research design that best handles a variety of data sources and is particularly effective in dealing with complex ambiguous scenarios in real-life settings such as the phenomena at hand (Yin, 2008, p. 18). There are two basic types of case study designs, the single case and multiple cases. When doing a single case study there is an implied imperative that the case be unique, typical, or somehow special so that results of the analysis would be considered valuable to other researchers (p. 46). Studying multiple cases with similar contexts enables the researcher to strengthen the reliability and validity of the findings (Baxter & Jack, 2008). Even though studying many cases yields more validity it can become unwieldy and mitigate against the essence of deeper understanding gained through focusing on many aspects of a single case (Stake, 1995, p. 5). The alternative to looking at these two projects as two separate holistic cases would have been to consider them as embedded instances of a single case study each with their own different unit of analysis. However, for this study two cases were identified that have the same units of analysis, that being successful technology project implementation and project management competencies. This indicated that the multiple case design was a better fit (Yin, 2008, p. 46).

Both these cases have very similar contexts, since they entailed implementing large enterprise wide technology projects at the same college. Each case's main actor, the project leader, came from a different expertise set in the continuum of project competencies. Figure 1 provides a graphic that demonstrates how the project leader competency set relates to ideal project leader competencies. By comparing and contrasting each actor's attributes of project management competencies in relation to their project and to each other, a rich set of themes and patterns emerged that supports a rigorous and insightful analysis (Newcombe, 2000).

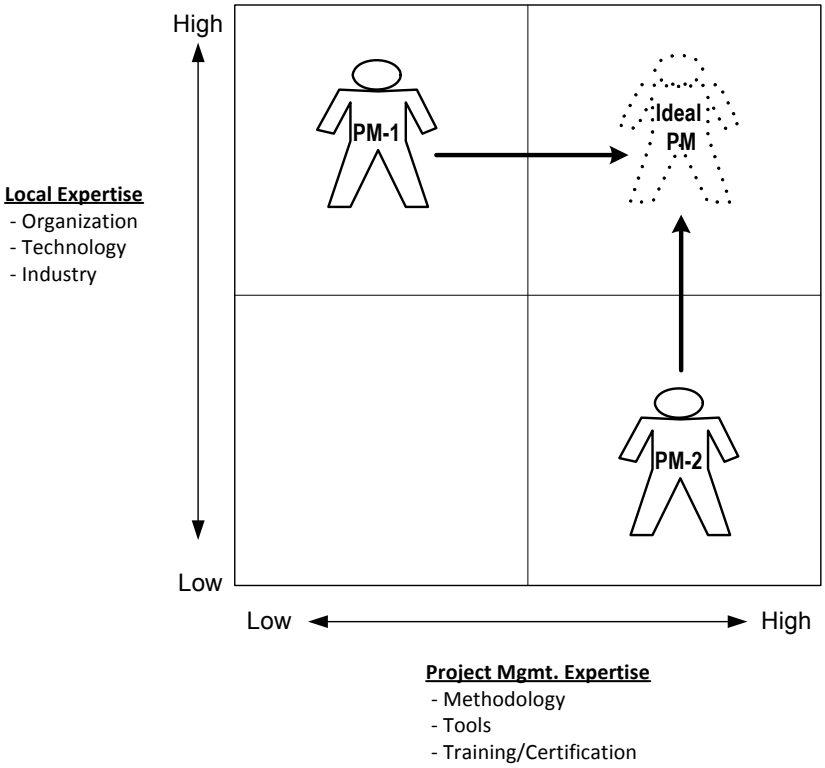

Figure 1. Case Study Actor Attribute Alignment.

An effective approach for a case study to address the *how* and *why* aspect of a phenomenon is for the researcher to establish propositions or issues to test a theory or theories (Stake, 1995, p. 16; Yin, 2008, p. 28). This sets the stage for the entire research

process from planning to data gathering, analyzing, and reporting. A guiding proposition for this study was to consider that if project management competencies were greater in a project leader, then project success as perceived on balance by stakeholders would be greater. To facilitate a range of analysis options, the deterministic relation between the units of analysis was better suited to this comparative case study, than to a sufficient condition or probabilistic relation (Dul & Hak, 2008, p. 139). However, to properly establish the value of the data for analysis required an evaluative approach that was substantiated with the detail from the interviews.

Target Population

The population to consider for validating the relationship between project management competency in project leaders and project success is all projects implemented successfully. To address the research questions of this study this population needed to be reduced to include only successful technology projects implemented in public IHEs. For the purposes of defining the target population parameters, the definition of project success is intentionally broad to encompass all projects where the technology has been implemented and is functioning at generally acceptable levels, such that no plans were being made to replace the project product.

To assure relevance, this population was reduced further to projects completed in the last few years. Since the research design approach was to compare projects performed by two distinct types of project managers, there were really two target populations under study, that of projects implemented by local experts and those implemented by project management experts.

The primary characteristics of the projects selected are that were from the same IHE, were of similar importance to the college's strategic plans, and have been implemented within a timeframe reasonably close to each other. The technology implemented by the projects was to be state of the art, available for use by all members of the IHE enterprise, and dependent on collaboration across the IHE stakeholders with a heavy dependence on a vendor solution. The technology implementations considered needed to have replaced existing technologies and manual activities while at the same time they will have needed to integrate with other existing technologies at the IHE and those planned in the near future.

Sampling Procedure and Sample

Sampling from a target population is a critical activity in quantitative research since the objective is to generalize something about the population based on an analysis of the sample (Singleton & Straits, 2005, p. 118). Traditionally qualitative studies are not considered as a practical means to predict behavior of other members of the target population, even though more modern views do allow for individual case studies to generalize causality for a larger population when they are replicated (Yin, 2008, p. 43). Whether qualitative research is intended to demonstrate causality or not, the specific case or cases to study are drawn with non-probability sampling methods of convenience, quota, snowball, or purposive since the number of cases for qualitative studies is usually small (Trochim & Donnelly, 2001, p. 55). A larger sample size would present the opportunity to use probabilistic sampling methods of simple random, stratified random, cluster, and systematic (p. 50).

For this multiple two-case research study a combination of convenience, quota, and purposive sampling techniques were used. My position at a large city community college enabled convenient access to a sampling frame of many projects that met the target population requirements and occurred over the past 6 years. The research design required two project leaders with distinct competency sets, thus a quota of one of each. Based on the my judgment the projects selected met the characteristics of the target population better than any other projects defined by strategic plan targets of the IHE being studied.

I reviewed the repository of strategic plans for the college to determine those projects which best met the profile of the target population. On average about 100 strategic plan targets were proposed for each year from 2003 to 2010 with some repeated from year to year. The targets were a mix of statements for incremental improvement of various assessment metrics of the college and defined tangible deliverables to be met. Seventeen large deliverable oriented targets were identified which provided the sampling frame from which the researcher selected the two projects to study. Upon reviewing these projects, two stood out as being a best fit to the defined target population. Both affected the entire organization, required sophisticated technology from vendors to be implemented, took about 2 years to complete from initiation, and required cross-functional collaboration within the college. Each project had an identified leader with the desired distinctly different competency sets.

The first project was to replace the aging campus-wide telephone system and the second was to implement a web-based degree audit and advisement system. The leader of Project-A had been with the college for over 20 years, had implemented the first phone

system that was being replaced, and was a line manager responsible for all administrative services. The leader of Project-B joined the college specifically to implement the degree audit system, had over 20 years project management experience implementing various computer solutions in various industries, and was a PMI certified Project Management Professional (PMP). The PMP requires training and proven experience in specific project management competencies. With these two individuals, the quota of one local expert project leader and one project management expert project leader has been filled.

The objective of this study was to analyze project management competencies exhibited by project managers of two comparable projects. The performance of each of the project managers represents a case study. The comparison and contrasting of these two cases with each other and with the project management competencies comprised the research work. Although, the environment where the two projects were performed is the same, the projects have similarities and differences that should be understood in the context of the study.

Both projects required similar funding levels, technology vendor support, and campus wide collaboration. In addition to supporting general-use stakeholders, both projects provided advanced user functions for smaller special purpose groups. Project-A (telephony infrastructure) was considered mostly a derivative project because the final deliverable, a new digital based phone system provided only incremental changes in service at initial roll out (Meredith & Mantel, 2003, p. 79). Project-B (web-based academic progress) was considered a platform project, since the prior manual paper-based means for academically advising students was replaced with an online capability enabling them to self-advise (p. 80). Both projects provided new paradigms of service

delivery that extended the way users interact with each other through exploring and extending capabilities of the technology over time.

User expectations differed, in that Project-A had to be implemented seamlessly such that the phone system was operational with no loss of functionality throughout the migration project, and where Project-B could be implemented gradually in a way that faculty and students could decide when to use it. Project-A's primary risk area was to implement the new system before the old one failed. Project-B's primary risk area was user acceptance issues associated with implementing a new way of doing things (Hill, 2007).

Since these two projects were enterprise projects many stakeholders were involved in the planning, implementation, and usage of the project outcomes. The selection of the project stakeholders as interview participants followed a purposive sampling approach, although they were not the unit of analysis for this study, the projects themselves were. In addition to the individual leaders assigned to each project, the categories of stakeholders included: (a) sponsors, (b) functional managers, (c) technical team members, (d) administrative team members, (e) technical end-users, and (f) vendor representatives. The main criterion for selecting persons as participants within these categories was their level of involvement with the projects under study and their availability to participate in interviews. For each project, the desired number of interview participants is 10, which includes one person from each of the categories of (a) project leader, (b) sponsor, (c) functional manager, (d) administrative team member, and (e) vendor representative; two from technical team members; and three from technical end users.

Instrumentation

The primary means for gathering data for this research was through interviewing key project team members and stakeholders of the two projects studied. Documentation developed in the planning, execution, and evaluation phases of the projects was used to support or weaken what was uncovered in the interviews. Within the naturalist approach of qualitative research a proven technique is to analyze data at the same time it is being gathered and as a result the next step in gathering data was based on what was learned in the prior step (Rubin & Rubin, 2005, p. 21). This responsive style of interviewing has the risk of letting the participant go too far afield of the interview objectives missing the essential data needed to support effective analysis. On the other hand, sticking to a rigid fixed set of questions could cause a skimming over of salient areas that needed to be explored more deeply to provide data sufficient for addressing the research questions (Kvale & Brinkmann, 2008, p. 18). The reality is that no specific set of questions can be crafted that would be used over and over again to replicate the results of qualitative research (Dilley, 2004). As such, the interviewer becomes the instrument. For this case study the researcher was the interviewer and used the responsive interview technique to provide an open conversation environment for the participants to reconstruct in their minds the events, perceptions, and feelings of the projects being referenced (Seidman, 1998, p. 88). To support their recollection of events, project documentation such as meeting minutes, project plans, memos, and flow charts was made available.

The main idea points in the form of open questions are shown here that I used as a guide for each interview.

1. Describe what you believe was the objective and scope of the project?

2. What did you perceive to be your specific role in the project?

3. How successful do you think the implementation of this project was?

4. How effective is the resultant technology solution in meeting its intended objectives.

5. How would you describe the project leader's ability to manage this project?

6. Why do you think the project leader was selected for that role?

Table 1 represents the intersection of these interview questions and the research questions.

Table 1

Interview Questions Mapped to Research Questions

Research Questions	Interview Questions					
	1	2	3	4	5	6
1. What level of project management competencies are exhibited by project leaders who successfully implement technology projects at a community college?	X		X		X	
2. What is an appropriate measure of project success for a community college?	X	X	X	X		
3. What determines how individuals are selected for the role of project leader for technology implementation projects at a community college?	X				X	X

I probed or otherwise drew out elaboration on each of these questions, such that there was a richness of description of what occurred and what people thought about it at the time with a focus on eliciting the competencies exhibited or lacking in the project leader (Rubin & Rubin, 2005, p. 164). Where appropriate the participant was asked to

compare their recall of the project and project leader's performance at the time of the project with their current perceptions.

Depending on the role of the participant, certain questions may need to be covered more deeply than other questions. This point is especially cogent when it comes to interviewing the project leaders. An interview guide showing possible probing questions for different categories of stakeholders was created for reference during the interview to assure the appropriate depth of responses was obtained.

All research sits in judgment as to its accuracy, repeatability, integrity, and an assessment of how well it achieved what it was designed to do. The traditional quantitative research methods offer measurable logical formulas to rate the reliability and validity of the findings based on the specific type of research performed using what instruments and with what controls (Trochim & Donnelly, 2001, p. 103). These methods often focus on the instrument used to gather the data such as experiments and surveys. When it comes to qualitative case studies that rely upon interviews as the primary means for data collection the need to assure reliability and validity is challenging. The repeatability aspect of the research is especially difficult to argue with open-ended questions in environments that are often unique and transitory. The presence of the researcher as the primary instrument for gathering and interpreting data causes many scientists to question if qualitative research is research. The apparent lack of objectivity in the researcher is seen as an impediment to producing valid results (Flyvbjerg, 2006). However, because I had personal experience and perspectives, a deep understanding can be extracted from analyzing a topic they are familiar with. This can be done from many angles rather than repetitively analyzing specific angles of an unfamiliar topic to deem its

probabilistic generalizability. Although qualitative studies cannot easily demonstrate reliability and validity with precision, the importance and value of qualitative research has generated several generally accepted approaches to mitigating the risks. The underlying concepts to these approaches are trustworthiness, credibility, confirmability, and data dependability (Yin, 2008, p. 40). If the researcher applies the validity procedures designed to address those concepts diligently then the study findings will command acceptance from other researchers in the field.

Creswell and Miller (2000) described nine validity procedures organized into three different viewpoints, that of the researcher, the study participants, and those external to the study. From the researcher's standpoint, triangulation of multiple data sources to support specific themes needs to be built into the data collection and analysis activities. Contrary or disconfirming evidence must be identified to demonstrate that the researcher is indeed focused on getting at realities and concepts that will be worthy of being called research. This is to be done at the same time the researcher discloses their assumptions, beliefs, and values that originally led them toward this research. Reviewing data and interpretations with study participants improves data reliability by enabling feedback to be reflected in the analysis activities. Extending this member checking approach to treating participants as co-researchers will further mitigate the bias of the researcher when interpreting the data and determining meaning. People outside the study provide the third viewpoint, where the researcher will consciously build in activities in the research to assure an audit trail of information and decision logic that can be reviewed at a later time. Detailed rich and thick descriptions of activities or perceptions become evidence of the actuality of what is said to have occurred. Finally, the researcher should

review their study along the way with a peer who shares an interest in the topic being studied (Creswell & Miller, 2000). For this study it was that essential that all nine validity procedures were rigorously applied given the researcher's role as the leader of one of the projects being studied with the obvious concern of bias.

Data Collection

Each interview was tape recorded, with the interviewer taking notes to identify any specific non-verbal reactions on the part of the participants as well as ideas formed based on the dialog that led to probing questions or ideas for additional lines of inquiry. The researcher and a typing service transcribe the tapes of the interviews and captured all the nuances of the responses in text form. The text was imported into the NVivo qualitative analysis software tool with some pre-coding mapping responses to idea points from the open-ended questions (Bazeley, 2007, p. 32). More extensive coding occurred later to support holistic and reflective analysis.

Documents identified during the interview process considered germane to the study were imported into NVivo, whether from an electronic source or scanned to a computer image file and coded with a description of content. Observation data included reviewing the output the two project results to verify the fundamental success factor that the products were functioning and available for enterprise use.

I made every effort to assure that the collection of data and the resultant report was accomplished ethically to assure the participants' privacy was respected. The individual names of the participants were replaced with aliases within the NVivo database. All appropriate permissions and consents were acquired in writing before the study began. Any paper records acquired or created for this study were scanned to

electronic media and their paper sources shredded. All data and information gathered or created for this study was archived to digital media and stored for at least five years.

Data Analysis

The purpose of data analysis is to derive meaning from the data collected and present it in a form that is understandable (Kvale & Brinkmann, 2008, p. 201). The case study researcher needs to demonstrate clearly a logical approach that leads from the data to the meaning attributed to it (Stake, 1995, p. 108). This was accomplished by following a standard approach through categorizing the data collected, interpreting each instance, identifying patterns across instances, and then synthesizing the patterns through reflection into generalizations (Leedy & Ormrod, 2005, p. 36). The analysis becomes credible and reliable when the patterns are matched to a theoretical proposition (Yin, 2008, p. 26). The propositions answer the how and why questions of the study (p. 130). They flow from the object of the study and represent the causal relationship between conceptual frameworks as applied to a specific domain (Dul & Hak, 2008, p. 34). Working with the primary proposition that higher levels of project competency led to greater levels of project success, the data collected from each of the two projects was assessed independently. Project success was gauged in terms of outcome conformance to specifications, schedule, budget, and objectives, as well as end user satisfaction and quality of project processes. Then each case was assessed comparatively with each other in respect to their relation to the proposition. This within-case and cross-case analysis provided focus and clarity in identifying emerging themes (Creswell, 1998, p. 63). The fact that both cases are from the same context of technology implementation at the same community college strengthened the reliability of the analysis (Hildrum, 2007; Newcombe, 2000).

As the data were interpreted in terms of the theoretical proposition, rival explanations were sought to counter the assumptions and possible bias of the researcher (Yin, 2008, p. 133). A powerful attribute of interview-based case studies that rely on open-ended questions is the notion of looking for concepts and themes during the interview process through probing and drawing out the participants' thoughts. This allows the researcher to direct the interview based on analyzing what is being heard as it is processed against their existing knowledge and understanding of the topic in real time (Rubin & Rubin, 2005, p. 16). Even so, the literature on project management competencies and success attributes guided and shaped the analysis throughout the study.

Once the interviewing was complete and the conversations transcribed to digital file format, the researcher read all of the transcripts closely and reflected upon appropriate ways to code the text of the interviews as well as the notes taken by the interviewer (p. 207). Coding is the classifying of the contents of the computer files for categorical aggregation, in a way that the patterns of categories can provide constructs for developing naturalistic generalizations and a structure for presenting the results of analysis (Creswell, 1998, p. 148). Case related documents and notes from observations of the projects' products were also be coded (Seidman, 1998, p. 125) to support data triangulation in the analysis activities (Yin, 2008, p. 118).

The qualitative analysis software NVivo was used as means for storing interview transcripts, evidence documentation, and observation data in a manner that allowed coding of content for analysis. The large amounts of text associated with the case study was coded in NVivo by means of defining and attaching nodes to portions of text. These nodes were the computer parameters that enable quick linkage of the proposition

statements, themes, and ultimately the research questions back to the interviews and evidence source data for accurate representation of the study findings (Bazeley, 2007, p. 100). The coding process started with the pragmatic activities of (a) sorting, (b) summarizing, (c) ranking, (d) comparing, (e) weighing, and (f) checking textual data (Rubin & Rubin, 2005, p. 202). This includes coding the transcripts with nodes that represented elements of the Project Manager Competency Development (PMCD) framework. As the researcher iteratively worked through the NVivo database by attaching nodes to text, ideas and questions arose that provided a basis for extracting and conveying meaning that extended beyond validating existing theories (Kvale & Brinkmann, 2008, p. 241). This in turn suggested the need for additional coding nodes.

Throughout the data collecting and coding activities, the researcher analyzed and considered the data up close. At some point I stepped back and established a strategy for analyzing the data in a form that supported pattern matching, explanation building, time series analysis, logic modeling, and cross-case synthesis (Yin, 2008, p. 127). The approach was to describe each case and its context in terms of the proposition statement and conceptual frameworks. Then each case was compared and contrasted with each other (Dul & Hak, 2008, p. 67). The information was organized and prepared for presenting using analytic manipulation techniques appropriate to the cross-case study. These included putting information in different arrays, forming a matrix of categories mapped to evidence, creating graphical representations, tabulating frequency of different events, and organizing data in a logical flow (Yin, 2008, p. 127). All these organized forms of analysis were then connected through a detailed narrative that linked the

research questions to the research data in an appropriately rigorous manner (Rubin & Rubin, 2005, p. 223).

Protection of Participants Rights

Cresswell (1998) identified the main categories of ethical issues in field research in terms of the interaction between the researcher and the participants. For a case study with interviewing as the primary data collection method, the ethical issues include: (a) anonymity of the participants, (b) revealing the purpose of the study, (c) deciding if confidential information gathered will or will not be used, and (d) unduly influencing the participants' answers based on the researcher's experience.

The anonymity of the participants identity was controlled as described in the data collection section, however there was the risk that if specific comments and context are described in the study results, it is possible that their identity could be derived by certain individuals. The researcher consciously avoided such specifics in the study results.

The purpose and public availability of the study will be made clear to participants through the informed consent process. Some of the participants were co-employees of the researcher. The researcher will make it clear that participation is voluntary and that they could choose to decline. However, the shared interest in improving project delivery for the institution minimized the number of those that did decline. Kvale (2009) pointed out that it is very difficult for a researcher to anticipate the consequences that may occur as a result of the study. As such, each participant was the opportunity to review the final draft of the study to assure that risks to their privacy and confidentiality were satisfactorily addressed. The Walden IRB approval number for this study is 06-01-11-0030116.

Role of the Researcher

I am the Associate Dean for Information Technology at the community college under study. In this capacity, I oversee hardware, software, networking, database, and web development operations for the college through the five departments that report to him. I have specialized in project management for technology projects in various industries for over 25 years. I was the project leader for the degree audit project, which is Project-B of the two cases studied. I interviewed approximately 10 participants for each case, including the leader of Project-A. Since I could not interview myself as the leader of Project-B, the leader of Project-A interviewed me following the same open-ended questions and probing techniques.

Summary

Qualitative case studies provide an opportunity to illuminate quantitative studies and increase the understanding and context for the research that will follow. The comparative cross-case analysis method of two projects within the same context but with diverse leadership competencies provided a means by which to filter the essential elements to project success in a public IHE environment. The detailed data provided by responsive interviewing of the core project teams and users of the implemented solutions enabled effective analysis and interpretation. By basing much of the analysis on examining the proposition that project leadership competencies determine level of project success, the study is focused and brings understanding to the complexities of studying the implementation of technology projects. Using the well-defined conceptual frameworks of project management competencies and the not-so-well-defined notion of IT implementation project success provided an opportunity for the researcher to discover

key aspects for public IHEs to more effectively implement transformative technologies. The NVivo qualitative data storage, coding, and reporting engine provided a means for others to verify the sufficiency of this researcher's efforts to mitigate bias and thereby assure validity and reliability of the study's findings. Chapter 4 contains the results of the study with detailed data from the interviews and Chapter 5 summarizes these findings with recommendations for future practice and research.

Chapter 4: Results

Introduction

To understand the project management competencies required for success in implementing technology projects at a community college, this chapter contains how the data were gathered, organized for analysis, and analyzed including a narrative presentation of the findings. I created an interview guide as a standard checklist in preparing and interviewing each participant (see Appendix B). The guide listed the six open-ended interview questions with representative probing questions designed to draw out the researcher's conversation with the participant when the information did not flow naturally out of the dialog process. Ten individuals representative of each of the specific stakeholder roles for the two projects under study as defined in Chapter 3, were invited to participate in an interview as the primary means for gathering data for this research. For Project -A, one technical end user (TEU) stakeholder did not respond, and thereby an alternate stakeholder of this type was invited and accepted. For Project-B, three TEUs did not respond, and three alternative ones were invited and accepted. Thereby a total of 20 participants in specific role categories across the two projects volunteered to be interviewed (see Appendix C).

Data Gathering and Organizing

All of the interviews were audio recorded, with 15 held face-to-face in private offices and five held over the telephone. I transcribed some of the interviews with the bulk transcribed using an outside service (see Appendix D for confidentiality agreement). I reviewed each transcript while listening to the corresponding audio recording, making corrections and simultaneously writing down impressions and ideas generated from this

review process into a separate interview notes file, one for each participant. These interview notes and the transcriptions were formatted in MS Word in preparation for import and auto-coding of content by interview question and speaker role, into the Nvivo qualitative data analysis software tool.

Electronic formats of representative project documentation samples were gathered from the leaders of both projects, and in some cases from the participants who had generated documentation as part of their role in the project. This project documentation and other documents referenced in the interviews were imported to the Nvivo software tool and later coded as part of data triangulation in the analysis activities.

The three research questions designed to address the research problem were coded in Nvivo with each of the interview questions mapped to them as shown in Table 1. This enabled an electronic audit trail from coding interview questions to the research questions. The general relationship between the response to the interview questions and the research questions is shown in Table 2.

Table 2

Interview Question Responses Relationship to Research Questions

Research Question	Related Interview Questions
1.	Interview Questions 1,3,5 1. Evoked nature and scale of project which implied competencies needed. 3. Provided overall baseline of project leader performance in relation to project factors. 5. Provided clues that were related to specific project management competencies as described in the literature.

2. Interview Questions 1,2,3,4
    1. Defined desired outcomes of project from which achievement was measured.
    2. Provided context of the individual's perspective.
    3. Evoked many ways of looking at project success, with a focus on project processes within context of community college.
    4. Provided essential measure of success independent of project processes.
3. Interview Questions 1,5,6
    1. Provided a baseline to derive desired traits from which the appropriateness of selected project leader was judged.
    5. Reflected on actual project leader performance achieved in context of expectations.
    6. Solicited clear criteria from sponsor's perspective, but also considered post-facto opinions of other stakeholders, and informed perception of the project leaders themselves.

Although, this precoding of interview responses to specific research questions is useful, it only set the stage for more detailed analysis, which required additional coding paradigms to be applied to the interview and project documentation data. A deeper understanding of the participants' responses related to the research questions were often found in snippets and comments in the open-ended responses and probing exploratory questions of the researcher. Those responses were handled two specific ways: (a) coded text sections to the conceptual frameworks of project management competencies and success assessment as rendered in the literature review, and (b) reviewed the interviews in detail and identified themes as the researcher reflected on the conversation transcriptions and identified patterns in participant responses. The project management competency framework was represented by the PMCD (PMI, 2007). I initially created Nvivo nodes for the complete hierarchy of 280 PMCD personal and performance

competency dimensions and elements. However, the approach proved too rigid in assessing the response data (see Appendix E). A better approach came about by coding the interview text segments according to how indicative they were of the 27 summary groups of competency element descriptors (see Appendix F). The coding of an interview segment was often to more than one summary PMCD category. Where coding made sense, the researcher reviewed the entire list of competency descriptors to select the best summary category to use. The knowledge competency dimension referred to in the PMCD is comprised of the PMBOK standards, the specific application area a project is concerned with, the organizational environment in which the project is performed, and general management knowledge. These knowledge dimensions provided a good source of data to compare the two projects along the lines of how project manager knowledge of the technology and the organization affected project success.

When interviews provided conversation related to project success frameworks, those descriptions were coded based on the effectiveness of the project processes, the perception of the project outcomes, and the various subjective opinions and comments of the participants. Through the process of rereading the interview transcripts for coding to the predefined frameworks, the researcher identified several themes and patterns not directly organized according to the established frameworks. These insights were captured within the Nvivo tool by adding to the interview notes file, creating reflective memos linked to the source document segments, annotating transcript segments directly, and cataloging them to newly defined nodes when there was clearly repeated patterns in the interview data. These nodes derived through reviewing the interview data were analyzed and consolidated yielding the list of observed patterns as shown in Table 3.

Table 3

Observed Patterns from Reviewing Interview Data as Coded

	Pattern/Concept	Description
1.	Collaboration	Contribution of working and cooperating with other groups within the organization that led towards project success.
2.	Confidence	Indicators of the project leader's demeanor which transcended or integrated all other competencies into a feeling that is reacted to by project stakeholders.
3.	Documentation	How documentation was used or missing in the project.
4.	On the Project Learning	Indicators of ability to grasp new concepts, keep an open mind, learn from mistakes, and moving on.
5.	Constraints	Those environmental limitations that the project leader had to contend with in completing the project.
6.	Organizational Project Management	The presence of organizational practices that acknowledged and supported project management, including an understanding of it, not just implied attitudes.
7.	Project Management & Academia	Aspects of implementing enterprise technology projects that are affected by the baseline tenets of academic culture and processes, such as democratic decision-making, and focus on theoretical goals as opposed to practical ones.
8.	Stakeholder Expertise	Skills and experience of project team members as a contributor towards success of the project and performance of the project leader.
9.	Vendor Impact	Views of vendor performance and the relationship with that vendor which affected success of the project and how the project leader dealt with it.

To verify the authenticity and strength of these patterns, the researcher used Nvivo's query capabilities to search for related terms to uncover further evidence of these patterns.

Findings

The study findings are presented in three parts where the first two parts address the research questions through the interview questions in terms of a within-case perspective for Project-A and Project-B. The third part compares the two projects by integrating the research questions in examining the proposition that project leadership competencies determine the level of project success.

Project-A

Interview question 1. Describe what you believe was the objective and scope of the project. There were two basic objectives for this project. The first was to replace the analog phone switch and instruments with new digital technology that would provide basic telephone voice services for the campus on day one. The second was to deploy new features enabled by the digital technology to transform administrative functions to better support the college's core mission of serving students towards meeting their academic goals. The following participant answers were representative of interview responses to this question. P-A01, the project leader stated:

> We had the switch that was 20 -25 years old or more and we needed to bring it to the 21st century. The software was not up to par with the automated attendant, the telephones were old and we also needed additional memory in the switch. It just wasn't working. We also had expansion of space and we had to increase the number of stations and lines. There was no room left in the switch for the cards. I needed to use the base of switch and bring it to a new release. The current release was about 10-15 years old at the time. It was time to give it a new face.

P-A02 the project sponsor stated:

> It was a capital project that was needed to replace the existing phone system for the institution. I don't remember the year when we got the original phone system, but it seems as if it's been here almost from the day I got here, I mean about 25 years. I suppose it probably was 22 years old or something like that, and it was at the end of its useful life, just technologically couldn't really move forward. It was really time to replace, because we needed different features and all for the phone system.

From the vendor's perspective, P-A05:

> The objective and the scope of the project was to replace the existing legacy phone system over here, upgrade it with a phone system or actually replace it with something, which not only gave the capabilities to the college, to be able to reuse a lot of their handsets for investment purposes, but also to bring new technology on the voice end of it, on the telecommunications end of it to the table, new technologies such as desktop messaging or desktop faxing, which in our world is also called unified communication. And besides that, we also implemented voice over IP technology in the college on that, so that was the objective of this project.

The project scope was clear and the project leader, sponsor, and functional manager understood the project. There was an obvious need to replace the aging system before it failed. Likewise, there was a shared understanding of the potential value in deploying additional features that new technology could bring to the college. This project appeared to be a derivative project that built on existing processes. Based on the digital architecture of the switch there were opportunities for subsequent platform sub-projects where new ways for using voice communications could be developed to support

strategic objectives not envisioned in the original scope.

Interview question 2. What did you perceive to be your specific role in the project? The categories of project roles for the participants were defined earlier in the chapter. This particular question resulted in the most forthcoming and verbose answers from the participants, probably because they could most readily connect with their own feelings and recollections at the time of the project based on their activity. Below are portions from each participant's answer to this question that captured in summary their perception of their role in the project. P-A01 the project leader stated:

> I think my role was to understand what the end user needed, who the stakeholders were, and with my 40 years of experience here at the college, I knew pretty much what the divisions wanted in working with all of the divisions

P-A02 the project sponsor stated:

> My role in this case here was to round up the money we needed in order to do what P-A01 said was time for us to do. So, I guess I play a different role, as one I take full responsibility for the phone system. Secondly, I have to take responsibility to try and get the money to do the phone system.

P-A03 a manager key to the project stated:

> My role was to help the process move along, expedite it, go to -- work with P-A01 to get the spec out, make a decision, look at various installations and find out what's the best option and advise our vice president in the college as to what's the best system in our belief that we should implement.

P-A04 an administrative team member stated:

> What I did was under the direction of P-A01. She was my direct supervisor. She would come up with a master plan with details about what to do and when to do it. I would work with the vendors on how to do it. I would organize the vendors together. I was sort of the go between guy, between P-A01 and our guys and the vendors whom put in the telephone systems along with us.

P-A05 a key vendor representative stated:

> So, my specific role in the project was to oversee the design with the engineering team to make sure that what the college first of all had today was replaced with the new technology, and then also with any other new features that we have talked about, such as what I mentioned before, the desktop messaging, desktop faxing, voice over IP. So, my role was to bring all of it together, put it on paper, give it a pricing model which went with it, and then present it to the college as a whole basically.

P-A06 a technical team member stated:

> I had several functions. It turns out that when the system was initially cut over, there was a bit of an emergency involved, because they were doing some asbestos removal. As a result, it caused it to go ahead and over heat, and it being an old piece of equipment couldn't stand the heat. So, one of my initial functions within this project was jump on as an emergency to immediately get this system going as opposed to rolling it out in a more organized fashion,
>
> Well, I was doing that part of the emergency, some of the things we had going on myself. I was working on the actual assembly of the equipment. A lot of this equipment just doesn't come out of the box, and you mount it in a rack to plug it

in. I was working on the cabling of the equipment as well. Another major thing that I was working on there would be the call center itself

P-A07 another technical team member stated:

My role basically was to first of all find the connections between the new controllers in the building with the existing ones or the older compared to the ones in the C-Building had that communications. So we had to trace the fiber connection between building to building and also between the floors. So that was basically my goal, pulling cables, finding where the cables were going, and connecting them through the switches to the backbone.

P-A08 a technical end user stated:

I had two. One was to conduct an inventory of the telephone uses, current use throughout the division of what was then enrollment management and student development, and I physically checked every single phone assigned to offices or staff of our division, worked with P-A01 to come up with a plan as to what phones and offices should be converted to an ACD environment. Then in terms of the student information center, also known as the call center, I develop work with P-A01 and now P-A04 from telephone services to develop scripts for ACD environment.

P-A09 another technical end user stated:

My specific role in the project was to support the project in terms of collecting information about the ACD specifically Automated Call Distribution groups, for the helpdesk. And also, in the end, it turned out to be a technology support question, because I think some of the fiber optic cables which were used to

> implement the new system to connect to another buildings were utilizing our fiber or our switches at some point.

P-A10 another technical end user stated:

> It was informational. I was mostly giving feedback as to the best way to structure it for the helpdesk. Since not all calls get logged in, I sent the technicians a survey for the top 10 calls regardless if they were solved at first contact or a ticket had to be created. I ask the technicians to categorize it 1-10 in priority. Once I received all the replies I took the Top 10 and send it to P-A09. Base on the top 10 it would be easier to categorize and create a useful menu for the user.

The internal stakeholders interviewed had specific operational roles in the college that were directly tied to their role in the project. They had well defined responsibilities in the project and needed little direction to accomplish their tasks. The vendor representative handled much of the technical team management for the project. These participants for the most part had worked with each other many times over the years on various activities for the college. This provided an atmosphere of existing teamwork that did not need to be developed within the course of the project itself.

Interview question 3. How successful do you think the implementation of this project was? The project processes were done well in the initiation and procurement phase through a close collaboration between the functional manager and the project leader. The functional manager brought expertise in the specification and contractor negotiations portions based on his years in construction and experience with structured project management methods. The project leader brought a clear understanding of what the college requirements for a new phone system were. As conveyed by P-A03:

> Well, the strength that P-A01 had, the technical know-hows on the system that we have at the college. The strength that I could bring was putting the spec based on my construction background. So, if you see the construction -- the specification of our typical construction job and the phone system upgrade, they follow the same patterns.

As initiation moved into planning, the project leader's understanding of telephony systems combined with the reliability and expertise of the implementation vendor enabled smooth planning. P-A03 stated:

> I think our insurance policy, if you could call it, the vendor we had, actually we trusted -- we had a good working relationship. The vendor was reliable. They also helped us navigate through some of these things, how we could plan the transition/migration to the new system, and how do you phase it.

However, as the planning activities were lightly documented there was little detail to provide to the implementation project team members to help them understand the big picture. This brought about some frustration at the lower levels of the project team hierarchy. For example a technical team member (P-A07) felt there was not enough preparing or communicating about what the project work schedule would be, but rather was given things to do on short notice with little context of how it related to the overall project. In his words:

> I guess the worst part was just getting to know last minute "oh we need to get this done as soon as you can". I think they shouldn't have that, there should be more communication between the teams between the people who were managing not

> managing but planning, and the team itself or members of the team would've went lots smoother.

At the higher-level stakeholders of project sponsor and functional manager, the project processes were deemed almost flawless. This can be attributed to the many years of their working with the project leader and the accumulated personal respect, more so than actual evaluation of project management processes.

Asked what they would do if they did not have a project leader available with so much knowledge of the technology and organization, the functional manager described how they use contractors to perform detailed planning with work breakdown structures and documented progress reports. In P-A03's words:

> Ideally, you would get a consultant to design the system from soup to nuts. You do a project lay out, similar to what you do in a construction project. You lay out, you do phasing plan, and develop a schedule, and follow that with milestones in mind.

They felt comfortable without that level of industry standard controls because of the local expertise of the project leader. He explained that the issue with using structured project management is the additional cost, as opposed to having existing employees lead the project who will get things done as best as they can along with their operational duties. P-A03 continued:

> We didn't have that opportunity, partly because there's limited funding. We wanted to maximize the utilization of those funding towards purchase and installation of the equipment rather than paying consultants in developing plans. So, we used in-house expertise.

Interview question 4. How effective is the resultant technology solution in meeting its intended objectives? The basic phone system came up quicker than planned because the old system died unexpectedly. However, it was the fortune of circumstances that made this unlikely scenario so. Many of the digital switch's components were already shipped and at the vendor's facility being assembled. The old system failed just before a holiday weekend, giving the vendor time to scramble and deploy technicians on site. Phone service for the college was down for only one day before the start of classes. As P-A06, a technical team member recalls:

> The old phone system at that point had died and we were able to go ahead, and over a weekend, restore service, but looking at it maybe a little deeper, I mean the college was looking to go ahead and stay with the same manufacturer of the system and wanted to keep current with technology, and we were able to go ahead and take care of both for them.

The sponsor and functional manager considered this project a great success, although acknowledged that the limitations of funding may have impacted that view for some. The sponsor stated:

> I think the project was highly successful, but as with any project, we don't have the resources to bring to it. We have P-A01 who manages the area, but she can't do it on a daily basis. She has so many different things she does. We have P-A04 the system administrator who is on a day-to-day basis, but you don't have a lot more depth. So, when we talk about trying to have a great automated attendant, or great call distribution, and all the other little features of the phone system, it's

> hard to get it all to bear, because we don't have a group to go out and work with the customers.

From the vendor's perspective, P-A05:

> We wanted to get the basic user population going right from the beginning, and then all features that the new platform was bringing into the table, we want to implement that in steps, specifically with the top down model, or we're going from the executives and then working it down to whatever else. It was some point in time that we put a stop onto it, because we had other things going on, and we started building a call center for the whole college.

Some technical end users who were relying on the advanced digital capabilities to transform their operations were disappointed with the time it took to achieve those features. P-A08 noted, "In terms of what we were led to believe in terms of the enhancements and increased functionality, I have not seen that."

P-A09 stated, "I think in the end of the project we were finally able to hook up wireless telephones, which we used for the 802.11 wireless Wi-Fi technology for the helpdesk."

The limitations of funding and the extent to which the project leaders and functional manager went to scrape together the money needed in phases was not always clear to those waiting for the advanced functions. The main success of the project was to release basic functionality and a platform that could later transform operations subject to the resources that could be applied with the proper leadership, whether in the user department or the service-providing group. As evidence of the implemented system, Appendix G contains three documents that demonstrate that the telephone upgrade and

replacement project outcome was completed. These include: (a) consolidated phone instrument inventory showing summary of new endpoint phone equipment installed across the college, (b) Nortel CS 1000E configuration showing the core switch hardware components and settings, (c) call center information guide index used for training call center staff, and (d) classroom ACD user guide for faculty to obtain real time assistance while teaching.

Interview question 5. How would you describe the project leader's ability to manage this project? The findings for this question are presented according to the PMCD, project management competency model that is organized into three dimensions: (a) knowledge, (b) performance, and (c) personal attributes. The project leader's knowledge of the college operations and the legacy telephone system combined with her strong personal dimension skills brought about an effective performance of project management activity phases, even though she lacked an understanding of many of the common artifacts of project management knowledge.

Knowledge. The interview data did not contain any evidence that the project leader had awareness of the PMI's project management knowledge areas. However, as she was exposed to project managers who did have understanding of these knowledge areas, she sought them out and acquired their assistance in formalizing the project definition process. She knew that the new phone switch was far more complex and capable than the system she had implemented and managed for many years. To get the funding necessary would require documenting the objectives, defining the scope of work, identifying resources, and explaining how the work would be accomplished within the constraints of the college. In her own words, P-A01 stated:

> Well I sat with a project manager in the IT division to do the scheduling. What it did for me was give me a different way for looking at the project, and think what it did was give me confidence to do it. Because when I sat down went though the stakeholders and the definition and what their needs were. We wrote it down, I realized that my knowledge was there but I just never put on a piece of paper that way. Once I did it, it got over that hump of writing. It was the outline I used to write the spec.

A major premise of this study is that the leader of Project-A had extensive knowledge and experience with the technology being implemented (application area) and the college's organization structure (project environment), but did not have an understanding of structured project management. The wealth of the project leader's application area and project environment knowledge came out in the interviews, across all stakeholder types. For example, P-A02, the project sponsor stated, "P-A01 is a very well respected director. She's very knowledgeable. She put up the original telephone system. Over all of the years she always kept the knowledge of phone systems current." P-A05, the vendor representative stated:

> One thing about P-A01 is that she knows this institution inside out, so when the time came for questions, because I only deal with the institution in terms of bringing this technology to the institution, and P-A02 has been here for a long time, but I think from P-A01's end of it, the expertise of knowing the institution played a big, big, big role in the implementation of this project, and the planning of this project.

P-A06, a technical team member stated:

> She had this prior knowledge of how the system works, and a pretty sizeable amount of technical knowledge as well. She was able to provide us with some details that we normally had to spend fairly significant amount of time trying to extract from end users to get their interpretation.

P-A09, a technical end user stated:

> The project leader was selected for this role, because the project leader had managed that system initially when she started to work at the college, and then she was familiar with the system, she ran the system, and from the support point of view, operational point of view, and then maintenance. P-A01 was responsible for bills in terms of T1 connectivity and then tie lines and long distance. So, that person knew the PBX, and then all the telephony components very well.

Although the project leader clearly had general management experience through her operational responsibilities, no stakeholders other than she referenced the value of that knowledge area. She stated:

> When you manage a large area and you manage it to the best interest of the college you learn a lot and you develop a relationship with people . That's part of my success rate, my experience and reputation and my ability to deliver. That's why when we talk about the telephones I can say just tell me what is needed and trust that I know my stakeholders and I'll do it.

Performance. Initiating the project was a strong collaboration with the project leader and her supervisor, the functional manager interviewed, P-A03. The project leader, sponsor, vendor representative, and the functional manager brought this out in earlier cited comments. The project leader relied on the standard plans of the vendor and

her own experience in implementing the prior system, which did not include detailed work plans. Whereas this approach allowed for great flexibility in execution, especially as the old system failed prematurely, there was a sense among the technical end users and team members that having a work schedule to review would have enabled them to be more productive in the implementation. P-A07 commented, "Not only that, if you plan it better, in my case where I was in the field doing the work the physical work per se, it would be easier for me because then I could schedule my day." P-A09 mentioned, "I think more preparation from the project management's point of view could be better, communication could be better."

The project leader excelled in monitoring and controlling the activity of the project through constant interpersonal communication, which from some key perspectives of success, have effectively compensated for the lack of documented plans. For instance, P-A08 noted:

> The project leader knew what was going on, what was coming up next, and what the status was at any point in time, and could explain clearly as to what was the cause for the delay, and know what that meant.

Personal. The nature of the project environment supported *face-to-face* communications, since all 2,000+ employees work onsite within a five-block campus. The project leader created very little documentation and relied on communicating directly with individuals and building relationships as a means for holding people accountable. This was particularly effective as noted by the administrative team member, P-A04:

> I think there was a great relationship between the vendor and P-A01. This made things easier. If there wasn't a great relationship there it would've made

> everybody's job a little more difficult, sort of like two great forces working against each other. The meetings and everything were very cooperative.

The approach was effective in bringing critical basic function activities to completion in short order, but was less so for the more complex deliverables of the system such as ACD (Automatic Call Distribution) and advanced report generation. From the vendor's standpoint, the project leader was an effective leader and manager making their life easier, as noted by P-A05:

> Anything that we needed, we went to P-A01. She always had an answer and a direction on how it needed to be done, and then she put it down in writing, that made sure that that path was open for us to be able to implement it.

This point where the project leader did deal in writing for specific work requests was somewhat contrary to the internal project team members noted lack of documentation. The project leader brought to the project a deep sense of self-understanding developed over years and a keen insight for what users needed in a telephone system. In her own words, she described these attributes that drive her:

> I have the philosophy that telephones are only instruments, and that management decides how they work and how they don't work. You can't say a phone didn't do something for you, it's the management that has to do it. So I believe strongly in that and I believe everything can be changed to accommodate the needs of an office. One of my management skills is the fact that I love challenges and I like to change, I like to do something new, I like to be number one. I've gotten awards for being number one. After 40 years I'm my own competition against myself. That's what makes me feel new and keep doing things.

This project leader relied largely on the personal dimension of her competencies. The project sponsor and functional manager lauded her as a consummate professional always willing to learn and is dedicated to serving the institution.

Interview question 6. Why do you think the project leader was selected for that role? The project leader selection was considered a non event since as several participants pointed out, the person who put in the old phone system was still at the college and considered very capable in general so she was selected as the project leader. In her words, P-A01, the project leader said, "First of all telephones are my area of responsibility. It's a given that I would be given the job." The sponsor was much more specific in his response:

> There are a number of reasons. Of course it's the many years of technical experience, the many years of operating at a high level. She's very smart in the use of money, she's good in negotiations, and she works well with most people in the institution. So, I think she has the full bundle of abilities that you need for a project like this. She's loyal to the institution. So, she really cares, she's spent almost her entire adult life here, she really cares about the place.

The functional manager explained further:

> Ideally you would want someone who's in this business design it, oversee the thing and then work with the college. We didn't have that because funding was an issue. My estimate at that time was that it would cost close to $150,000 to get a consultant and an implementation manager in there. So, again P-A01 had experience with running the contractor, and I knew that they were not going to

cheat her with inferior products or by cutting corners. She's always there. She never gave it any chance to fail or allow anything to be an obstacle to this project.

A team of experienced professionals within the college working with a reliable and previously engaged vendor, initiated, planned, and managed Project-A. The project leader had many other duties besides implementing the new phone system, but was able to juggle them all largely due to her knowledge of the phone switch, her relationships with the project stakeholders, and the availability of skilled subject matter experts. The project success was largely due to the personal dimension of her project management competency set. The college also got lucky in the sense that if the new phone switch equipment and technical team members were not available when the old switch died they would have gone for quite a while without a basic phone system. This would have tainted the perception of success to some degree. A more structured project management approach would probably have highlighted the risk of the asbestos abatement activity instigating preventive measures to avoid the failure.

Project-B

Interview question 1. Describe what you believe was the objective and scope of the project. There were two basic objectives for this project. The first was to implement a self-service tool for students to improve their understanding of their degree requirements and *point-in-time* progress against those requirements, so that they could make better decisions in class selection when registering and when considering changing their major. The second was to provide a standardized tool for anyone that advised students to improve the consistency and reliability of their advice. P-B01, the project leader stated:

> The DegreeWorks project was to implement a web-based software to be used by faculty, staff and students to provide a degree audit, in other words to show what courses the students have taken and how these courses satisfy the requirements of their major.

P-B02 the project sponsor stated:

> I think that from my perspective, the scope of the project was to help us as an institution solve a critical problem that we have or had at the time, maybe to some extent still exists, in terms of student success, that is getting students the advice and support that they need in terms of making decisions about their academic careers here at LaGuardia. So, that was, that was the big picture, institutional kind of issue. And then there was the immediate issue of getting this technology up, running, implemented and adopted within the community.

From the functional manager, P-B03's point of view:

> The scope of the project was to implement an online academic advisement system that would be used by both students and advisors to help guide students on understanding their degree requirements and helping them audit their courses against the catalog requirements to help them complete the correct requirements to increase their graduation rates.

The project scope was straightforward and the project leader, sponsor, and functional manager understood it. They needed an online system that students and advisors could use to give a unified institutional view of each particular student's progress to codify the process for selecting the right courses to take. For this project, more was learned about the project objectives over the course of the remaining questions,

particularly when discussing success of the project outcomes. No one mentioned anything about data reports from the system in their response to this question, yet later on in the interviews they were considered very important.

Interview question 2. What did you perceive to be your specific role in the project? Below are portions from each participant's answering to this question which captured in summary their perception of their role in the project. P-B01 the project leader stated:

> My role was clear. I actually came from the outside for this as a consultant. I was hired to be the project leader or the project manager, and the person that brought me in had a clear understanding of what he expected.

P-B02 the project sponsor stated:

> I knew what we expected out of this system, and my role was to make sure that we got as much of that as possible in terms of the functionality, but also that we got parties who were going to be working on implementing this on the ground, to the table, engaged and moving forward.

P-B03 a functional manager key to the project stated:

> My specific role in the project, I always felt, was kind of a dual role. One as the registrar I knew that we would have the responsibility for the maintenance of the project and it was absolutely critical that the degree requirements were coded correctly, so that students would follow the system -- would follow the requirements that in fact reflected their requirements for the year that they entered. My second role was really, I felt also to make sure that the institution understood how to utilize the project and the various functions that it offered. And

so I felt that we had a dual role. I don't need to make sure that the audits were accurate, but that everyone in the institution understood how to utilize it in their various roles.

P-B04 an administrative team member stated:

I coordinated with people from other departments, and make sure that I receive time sheets from people from SunGard, because I remember they were supporting and they have to be here and they have to help people with their concerns. So, it was more like -- it was administrative.

P-B05 a key vendor representative stated:

Well, actually at that point I was doing double duty at SunGard. I was doing sales, but at the same time I was supposed to facilitate the transition from the sales component of moving DegreeWorks and booking the revenue.

P-B06 a technical team member stated:

As a programmer, I thought that they wanted me for clarifying some of the functions that we used to do, either using other pieces of software or manual work for advisement, and basically be like the translator between the end users and the technical team, that was what I perceived to be my role. After the project was implemented and we saw how big it was and how helpful it was, then I was more involved in knowing more about the software and relating the software with other pieces of the technology we were using. And over time, I became more responsible for other pieces of the software.

P-B07 another technical team member stated:

> I was the DBA, so basically to make sure that there was a database functioning to be available to the system, and also anything else that I could provide to make sure that the project was a success. It also included automating tasks, developing scripts, doing maintenance on the system, creating logins for end users.

P-B08 a technical end user stated:

> My role was as the director of Educational Planning Services, we were responsible for providing advisement support, addressing the issues when the students were using DegreeWorks, if they had particular problems. I think that my understanding was there were technical problems and there were advisement problems. I think we handled mostly the advisement problems with this.

P-B09 another technical end user stated:

> My job was to represent, in effect, the end users here, who are students, faculty, chairs, and program directors -- like we're 90% of the end users. Student affairs staff are 10% of the end users

P-B10 another technical end user stated:

> I think, and I hope I wasn't wrong about my perception. I think it was primarily one of my responsibilities to make sure that the information getting into DegreeWorks was the correct information for each one of the majors, so I felt like I was more of a coordinator maybe, and making sure.

Like Project-A the stakeholders of Project-B had existing operational roles. For those in the registrar, P-B03 and P-B10 their project role was on top of their regular duties, not simply part of their duties, as was the case for the other stakeholders. This proved very stressful for them and the project progress often had to slow down around

their peak registration periods. The vendor representative's role was not that visible in the day-to-day management of the project, but was largely an escalation point for the project leader. P-B09 represented academic affairs, but was not directly responsible for any hands on tasks of implementing the system. Except for the project leader and a technical end user, these stakeholders had worked with each other in the past, but were never organized into a project team on a new technology implementation.

Interview question 3. How successful do you think the implementation of this project was? The project processes were laid out clearly from the initiation phase where the sponsor deferred to the IT division to apply structured project management. The functional manager, P-B03's view was:

> I think the project was highly successful. I think the fact that we had subject matter experts, that we had a diverse group of members from various sections of the college. Academic affairs, IT, the registrar's office, input from academic advisement. I think the structure that was used to implement the project was a highly structured one that led to I think a successful project.

The vendor followed a template that covered the salient aspects of reviewing and coding the catalog rules into the software, defining the look and feel of the web displays, training core team members, and then training the larger community of advisors. The project leader extended that baseline approach to include regular reviews of progress, facilitating collaboration across the academic and student affairs divisions, and persistent communication with the vendor to assure progress and compliance with the project's objectives. The project leader, P-B01 described his approach:

> I used the basic materials from the vendor, but included many of the project documentation tools that I had been familiar with over my years as project manager. For instance, I would always have written project agendas, I would use Microsoft Project to organize the set of tasks and scheduling information defined through project meetings. I am a big believer in documentation to avoid miscommunication among the stakeholders.

The study participants indicated in their own words that the project management processes were well structured and managed closely, which led to it completing its objectives. The sponsor, P-B02 stated:

> On a scale of one to 10, I would give it an eight. I thought it was really well done. It is one of those projects where I thought the college came together, the different divisions within the college came together and worked well together to get this moving.

From the administrator's point of view, P-B04:

> I think it was very good. I mean I know that we use it now -- you have to do a lot of informational sessions I think, training sessions, and I guess after that some people will have questions about it, but it was good, it was very successful.

P-B08, a technical end user responsible for advisement, stated:

> I think it was very successful. I don't know whether it's an astounding success or not, but we did roll out and we were using it, and the program was implemented. And then we were following -- we were doing our role, functions pertaining to Degreeworks.

Then there were some contrary opinions, based largely on other operational aspects affecting the individuals at the time, but they are worth noting. P-B10, a technical end user from a different functional department stated:

> I wish I could say I felt we were a 100% successful, but I think it was because -- as we went along and we had turnover in staff, things started falling between the cracks. And I know just before I left registrar, I did not feel it was working well at all.

Opposite to that comment at the same point in the project, P-B06 a technical team member stated:

> I was absolutely impressed when I saw that it was coming to an end. And at the end pretty much everybody in the team was involved, and also other people, that were not part of the team, wanted to get involved. From the registrar's office, the end users or that type of SMEs were fully involved in the project.

The academic affairs representative P-B09, clearly acknowledged the effectiveness of the project processes in rolling out the software to the college, when he stated:

> Since I'm identifying it as a pretty successful implementation, I don't really think there are things in the process that I don't agree with. When I say that it's a successful implementation, I'm not minimizing at all the fact that what project management brought to it got us to the end. I don't know if we would have gotten there in the same way.

However, he expressed discomfort and concerns about the systematic procedural approach that limits the academic processes for review and exercising their prerogatives in planning and implementing tools for their use. He stated:

> The kinds of things that I value are not the kinds of things that are valued in getting this process through to timely implementation. My note and my reporting back to my Vice President's cabinet, is that the people who are using the tool remain always an afterthought in the planning process

Interview question 4. How effective is the resultant technology solution in meeting its intended objectives? The degree audit software was rollout out 18 months after it was purchased. This was six months longer than originally planned, but the end result was considered satisfactory in meeting its primary objective of supporting student academic progress by providing an accurate self-service tool. P-B03 the functional manager noted:

> I think it was very effective. I think that in fact we have an application that's robust if it's maintained and it is accurate, if folks are trained on how to utilize it, that it can be used for multiple purposes in the institution

A technical team member stated:

> I think it's very effective. We have a lot of -- it's also about the end users. The DegreeWorks software is really effective. It's very helpful for students. We had a lot of resistance at the beginning, because a lot of people didn't know how to use the new technology, but now I think more people are using technology, younger faculty members and all the students, I find it very helpful for them. And that's what they expect.

As evidence of the implemented system, Appendix H contains three documents that demonstrate that the degree audit project outcome was achieved. These include: (a) sample degree audit of a student showing how student progress is tracked, (b) sample

usage data report showing faculty, staff, and student usage of the tool, and (c) sample scribe block inventory, which represents the complete set of five years' course catalog data coded in the system at the time it went live.

Meeting the other two project objectives continues to be a challenge to this day. The use of the tool by advisors is inconsistent, baffling the ability to measure its effectiveness in bringing about consistent academic advisement. P-B09 noted that many faculty members use their own methods for advising students using the basic transcript and catalog. He stated, "I think of it more as another arrow in my quiver. I mean if the student brings me a transcript, I can do the same work with the transcript 99% of the time."

Technical end users P-B08 and P-B10 indicated out that people who are dedicated to performing advisement only, use the new web based tool almost exclusively. The online immediacy of reviewing academic progress is appreciated and even expected by students. P-B08 stated, "I think it was very effective in terms of my area, advising the students, when it comes down to freshmen advisements or first year advisement." P-B10 stated:

> We really enjoyed working on it together, sharing information, trying to bring it to fruition, and the satisfaction that when a student logged on and was pleased with what they were seeing, and you heard about it, that was good.

However, many administrators and faculty needed the assurance of paper in the process and require students to print their audits before they can be advised. P-B09 noted:

> You've got a tool that's in your face, so that is something the product gives you that -- and I'm substituting product there for technology in your question, because

> I don't -- to me this isn't a technology, it's a piece of paper, and it's not a technology.

There were some issues in getting all advisors to embrace the tool as pointed out by P-B10:

> Yes, the counselors felt that it wasn't a tool that they needed to be using, that they were more successful in advising students without having to check off various course work, and they felt it was taking away from the one-on-one relationship that they would've established with the students.

The reporting capability of the software has been a disappointment to the sponsor. The original contract included a feature called the *Curriculum Planning Assistant*. However, release of the feature came in dribs and drabs, and never proved useful to the analysts and academic planners who needed to use the data in their work. The project sponsor, P-B02 repeatedly noted this in the interview, as he summed it up as follows:

> As I harped on this whole idea of the reporting function within DegreeWorks, that didn't come to fruition. I saw it as a missed opportunity for us in terms of -- not just for us here, but for us across the system in terms of having this tool really change the way that we do business, and some of our academic decision making.

The perceptions of success of this project vary widely. The sponsors, including the president of the college feel the software was configured effectively and rolled out well with ample feedback from students, faculty, and staff. P-B03 who was the Registrar at the college during the project and later moved on to the university level to manage the implementation of 12 centrally hosted college DegreeWorks instances, discussed user adoption rate in comparison to other colleges.

> I would say that the different institutions have different commitments to the application. Most institutions maintain the application, but not at all institutions is there great buy-in and support from advisors in terms of utilization. Utilizations at some institutions vary significantly.

There were challenges to perceptions of success from a faculty perspective due to their view of how the tool should work. The project leader, P-B01 noted:

> You can have a -- you think you have a new curriculum, and then the chancellor has to approve it, and then people had to go along the way, but they never come back. So, you update DegreeWorks with what is indeed the correct curriculum requirement, but the catalog says something else, and people are immediately saying DegreeWorks is wrong, when in fact DegreeWorks is right, but the catalog is wrong, but the catalog is a contract.

Conversely, if changes are not made in a timely manner in the degree audit software or with errors, it affects the accuracy of the audit and further damages the perceived success of the outcome. This indeed occurred when there were major staffing changes in the Registrar shortly after the software was released, as noted earlier by P-B10.

Interview question 5. How would you describe the project leader's ability to manage this project? The project leader's knowledge of project management and familiarity with implementing technology solutions, particularly large vendor based solutions, established a baseline from which he applied personal dimension skills to learn the environment and the specific technology just enough to meet the project objectives. The following paragraphs reflect findings from the interview data regarding the project leader's application of PMCD's three dimensions of project management competencies.

Knowledge. The interview data, other than from P-B01 the project leader himself, did not explicitly call attention to project management knowledge. He stated:

> Since I'm the project leader, I think my abilities lent itself well. I've been through a lot of project management training, I've taken manager's courses, I've been through a lot of seminars. I've worked in IT project management for vendors and consultants for the last 20 years plus.

Most of the study participants had little exposure to project management except for the project sponsor, P-B02 who commented:

> Interestingly enough I did, because my masters training is in operations management, so it's part of that training, which has to do with industrial engineering as well. I focused on project management and really looking at processes and mapping processes and so forth. So, I was familiar with the process.

P-B03, the functional manager relayed her understanding as:

> At the time I had not worked under the methodology of project management in a very formal way. And so not only -- I mean I understood conceptually what had to be done in order to get a project implemented, but I hadn’t been exposed to some of the key concepts in terms of a project schedule and things like that, even though I understood that there were certain tasks that had to get done and had to get done within a certain time frame and things like that.

P-B06, a technical team member expressed, "well, at the beginning of the project I had no idea what project management was." P-B10's response was similar, "I had heard of the word, but I had no clue. All I knew it was a technique for organizing huge projects and breaking them down into segments to move along."

As the project progressed, the stakeholders developed a keen awareness of project management through their exposure to the practices of the project leader. P-B04 noted, "I learned about project management when P-B01 came here." P-B06 expressed how he learned project management through this project:

> Then I realized we were working in a project management environment and I really loved the concept. It was like I said before, more structured. It helped us manage better our time. I knew exactly what to expect at any given time, what were our milestones, if we were falling behind a project. And it was very, very helpful. And now, I think I know it pretty much.

P-B08 conveyed his experience:

> Actually I learned how to do project management like at novice level, because before I didn't really have to think about like rolling out programs and designing programs. I never used like management sort of methods, but it taught me -- like for example when P-B01 was presenting it in a project log or the charts, I learned how to emulate those things. So, whatever I do, whatever -- if I need to do -- design particular small programs or whatever I do, that's what I -- we've been using so far.

The project leader relied on the technical and subject matter experts from the vendor and in-house specialists to navigate the many configuration, coding, and system integration tasks of the project. Lacking the application area expertise, such as web programming and academic advisement, the project leader had to take at face value whatever the local experts told him. He noted that, "If there are any other skills I could've brought, it would

probably be more knowledge of a particular software environment, more technical knowledge or more business knowledge."

The project environment was complex by any measure, comprised of multiple advisement groups across academic and student affairs who had to collaborate and agree on curriculum requirement algorithms for over 500 courses across 40 majors. These rules were not always clearly defined in the course catalogs. Five years worth of catalogs rules had to be scribed into the software as logic driven code. The project leader had to learn the language of the academic requirements establishment, while the project stakeholders were learning the language of project management. The project sponsor, P-B02 commented:

> And so, the language is something that we have to work with. And I know that in some of our later projects, we had more issues with the whole business of project management, than we had I think in this particular project, DegreeWorks, but there's always that danger of getting buy-in in higher education, when you're introducing models from business.

Performance. This project was initiated prior to the project leader being engaged. He came into the project right after the contract with the vendor was signed. He focused on organizing the project through the development of project documentation instruments, such as a work breakdown structure, issues logs, testing scripts and controls, agendas, status reports, and a project knowledgebase. Since the project leader had very limited application area and project environment knowledge he established weekly meetings with key subject matter experts. He stated:

> So, I think that as part of the way I did things, we tried to make their roles clear, especially when we developed the task schedule and we had testing and we had reviews of things, but I think it took a while.

At first the planning activity was driven by the vendor since they had experience implementing their product and had a documented sequence of activities that were normally followed. As the project activity unfolded, it became clear that the vendor was not being very responsive to the unique requirements of the college. P-B01, the project leader noted:

> The vendor would promise things and say they'd do it and they wouldn't do it, and I had to constantly chase them, that the software face and the functionality was very good, but underneath it was a convoluted mess, it was very hard to maintain.

The project leader then established additional bi-weekly meetings with the internal project team and the vendor to assure clear communications and status updates. Although this control helped, it was a constant struggle to keep the vendor focused, as P-B-05 the vendor rep recalls in the interview years after the project completed:

> Our implementation project manager was a person who once she lays down a path, she doesn't want to deviate from that path. The problem with implementations is that they very seldom go in straight line. They usually meander all over the place.

The project closing activity was formalized with training workshops and the introduction of a problem reporting ticket system and workflow to manage issues once the system was released for general use. As noted by P-B02 the project sponsor:

> Having the wherewithal for faculty and students to register their complaints by filling tickets that were used to address the issues, the kind of training that we did, which in hindsight was perhaps never enough.

Personal. This competence dimension although present with all people was rarely mentioned regarding the project leader in the interviews, not even by the project leader himself. P-B10 a technical end user commented, "There were times we were a little concerned that P-B01 wasn't getting the feeling for the way the college students react with things like their graduation problems." When discussing the project leader's communication ability, P-B06 stated:

> I think it was adequate. Once we were after the kickoff meeting and everybody was already involved in the project, it was very adequate. We were not being pushed to this task that we didn't know how to do. We were given enough time to do our task.

P-B06 indicated cognitive attributes of the personal dimension when she stated, "P-B01 absolutely showed a lot of knowledge. And if there was something that he didn't know, by the next time we talked to him, he knew exactly what you were talking about."

It would appear the substantial focus of performing based on project management knowledge sidelined the awareness of personal traits of the project leader. This is in stark contrast to the discussion on Project-A where there was much dialog on the project leader's personal dimension and very little on project management skills. For instance, the functional manager P-A03 noted regarding the attribute of leadership and professionalism, "P-A01, she was very focused, and she also builds relationships. I think these two things helped them move along."

P-A05 noted managing and effectiveness attributes:

> P-A01 juggles a lot of things. I mean it is not just telecommunications, she juggles a lot of the facilities functions, the cleaning and the paper, and all of that goes through her. I really got to commend her on the way she manages that whole area downstairs.

Interview question 6. Why do you think the project leader was selected for that role? The project leader selection was a highly conscious process, as the subject matter experts in the Registrar visited other campuses that used the degree audit software in their discovery activity. As noted by P-B10 they became acutely aware of the complexity and need for a dedicated focus that they could not provide in addition to performing their regularly functions.

> We had gone to see a demonstration by SunGard with the VP of IT at Brooklyn College, and actually it was at that point that we knew we were going ahead with a degree tracking system, and we found one of the more important things was that we definitely had to have a project manager. We could not handle this huge undertaking through the registrar's office exclusively.

The sponsor gave the task of actually selecting the specific project manager to the VP of Information Technology. The sponsor's understanding of his operations and his awareness of project management made this a straightforward decision, as he reflected in the interview:

> It goes back to the creative tension bit as well. When you have a subject matter expert who is bogged down in the day-to-day of the work that is done with the system, what you have is a pretty myopic view of what you're doing. Once you

> had someone who wasn't vested in this on a day-to-day basis, but was vested in the project, made sure that it moved. Otherwise we could have had people who would put this on the backburner and saying, "well, you know, I have to get the work done". So, this was really very helpful in that it required that we carve time out of the day-to-day to focus on this project.

P-B01 the project leader recalled when interviewing for the consultancy position:

> The VP of IT said he knew that he couldn't find a seasoned, experienced registrar with lots of project management experience. So, he figured he could get one or the other. And I was the guy with the project management experience, so that's how he picked me.

The project sponsor and the VP of IT initiated Project-B to meet strategic objectives established for the college in the area of improving student advisement. The project was funded and had support across the executive leadership of the college. However, the project was not without controversy. It created a means for student self-advisement and changed the way the various advisors worked with students in choosing courses to take. The registrar department and student affairs advisors embraced the product widely and relied on it to advise students. Academic affairs consider it an optional tool and some groups use it regularly while others do not. All the stakeholders considered the project a success, largely because it did complete and meet its core objectives. Several stakeholders reflected skepticism early on in the project that it could ever be completed, given the challenges of collaboration in their environment. The consensus was that creation of a separate dedicated project manager role was a key to the project being completed satisfactorily.

Cross-Case Analysis

The previous individual review of each project was against the standard project management framework as shown in Appendix E and summarized in Appendix F. In this section, the approach is to compare and contrast each project in terms of the proposition that project management competencies effect project success at a community college based on observed patterns and derived themes rather than against an independent framework.

Observed patterns. Table 3 is a list of nine patterns revealed through repeated review and reflection on the interview data. Initially the list was longer but was consolidated into these main concepts. The first four patterns represent those areas where project leaders have control, and the next five are those outside of the project leaders' direct control.

Collaboration was clearly a key element of both project managers' ability to complete their projects. For the leader of Project-A the collaboration style was less formal and built on the long-standing rapport with an understanding of the functions of the college. P-A01 described her collaboration style: "I had a very good working relationship with the college in general. People trust that if something goes wrong and it goes down they know that I am there, which I was." From the project sponsor P-A02's view:

> I think what really evolved, that was very helpful to all is rather than each side trying to take away from the other, it became more of a supportive relationship of what could we do for the institution. If P-A01 does a good job on the telephone,

> and IT does a great job with the other -- telecommunications, so let everybody run with this and stay together.

The leader of Project-B formally set up meetings to foster the collaboration necessary, which did not always flow as smoothly as expected. He noted,

> I would get to the point where I know that I needed to get the collaboration. So, I needed to get agreement on the team. And some frustration was that -- and I remember several times we had a clear thing that we wanted to do and not do, and then the president would say "No, I want you to do it this way" and even though everyone was 100% in agreement, and probably more experienced in the detail. We had to do what the president said, because she was the President, and so we had some of those challenges.

There were hidden concerns and individual stances that the project leader did not understand. It took a while for some of the team to feel comfortable with collaborating. P-B06 pointed out that the project leader's assumptions of assigning tasks and setting completion targets was different from the way the college was used to operating:

> The only thing I think that would have been helpful for me and maybe others in the team, at least on the technical team, was that maybe we should have been told, "This is a new approach. This is how it works. This is what you need to expect once you're in the project," because we weren't told anything. We were just pulled on the side and we were told, "You're going to be in this project" and that's it.

Confidence was a key strength for both project leaders based on their experiences that they brought to bear on the project. Project-A leader's confidence was based on knowing the college's needs and the technology. As she stated:

> Because my success rate is high and because my reputation precedes me, in the sense that I'm known as a person that will get things done on my own, and meet the needs of whoever I'm working for, but I pretty much understand what their needs are, not just I'm a go to person

This earned confidence was echoed by the functional manager, P-A03, when he stated:

> P-A01 was instrumental in two things. One is the system itself, because she was there when the system was installed. She managed the system. She knew people involved. She had contact with various people at Nortel. If she wasn't there, I don't think I would have felt that comfortable moving the project this way.

Project-B leader's confidence was based on his years of practicing project management to implement a diverse set of technologies in a variety of industries, as cited earlier regarding the competency dimension of knowledge. The administrative team member, P-B04 made an observation of how the project leader's confidence was noticed by the project stakeholders: "They knew that P-B01 knew what he was doing. That's what he used to do, he was a project manager."

Documentation as a communications tool in Project-A was limited to mostly informal emails. The details of technology features and usage instructions were provided in direct vendor materials for both projects. For Project-A detailed configuration data was compiled by P-A04, as he reflected:

> It was half and half, she always wanted a cabling record to show and document what was there. I myself was a big pusher for document. It is very important in any kind of technology, you know where the stuff is going, you don't have time to figure it out. That just takes time away from actual improvement.

The project leader coordinated the activity of developing training workshops and ACD rules documentation by technical team members. P-A06 remembered:

> I have provided documentation on like basic phone usage and some of the more advanced things. I know I've sat down with P-A04 and actually provided some multimedia documentation and that there are some tasks that he would have to perform on peoples computers to do certain integrations between the computers.

For the leader of Project-B documentation was a primary means for keeping team members accountable to what was agreed to in meetings. Task assignment schedules, issue lists, meeting agendas/notes, end user training guides, and support flow charts were all developed by the project leader and evolved over the course of the project. Appendix I contains four documents as examples of this project process documentation developed during the course of the project. These include: (a) project schedule - work breakdown structure, (b) issues log, (c) support model, and (d) training workshop agenda. P-B04 observed:

> I believe that P-B01 got a lot of information here with a lot of paperwork and a lot of those charts, like the one on the board with deadlines and assignments. It was something that the project manager really assigned to people what they have to do.

P-B08 took note of the documentation, when he said, "I think P-B01 was very meticulous in terms of putting the plans together and the charts were just phenomenal."

On-the-Project-Learning was a strong pattern in both project leaders. For Project-A the leader had lots of experience and knowledge in the technology, but did not rest on that knowledge, nor did she seek to become the expert on the new systems technologically as she was on the prior system. As she was building awareness of project management she learned to do things differently and addressed her shortcomings in the area of documenting specifications. She stated:

> My panic mode was writing the specs and saying I have to have it done in two weeks. I don't like writing to be honest with you. I'm a numbers person, and I'm a hands on person, I've never been a great writer and I don't say that I am. I know my specs, I know what I need but sometimes I need assistance in getting there. Like the executive director of the division helped me write the spec and review it. That was my hardest part.

The administrative team member pointed out that P-A01 made a point about reviewing lessons learned with the team, when he commented: "That was one of the self-critiques that we had, that we should have trained the campus more because for some area. We did hold about 3-4 training sessions, but that was not enough."

The leader of Project-B had to learn the new application and project environment to be successful. He reflected on this:

> I grew a lot. I grew in terms of -- I think I probably grew a lot in patience and I learned to do things a little differently, to be able to kind of go with the flow, even though I felt as a project manager that the time constraint was really critical.

The project sponsor P-B02 commented:

> The tension I think may have been helpful as well, and I'm not using the word tension in a negative way, but it was good, it was a learning experience for P-B01, but it was also very much a learning experience for us, as higher education professionals who weren't used to doing things that way.

Whereas the learning was positive in both project scenarios, the leader of project-B was driven more by necessity and survival than as a desire to improve his skills.

Constraints of the project environment were well known to the leader of Project-A who had mastered her craft within that environment, as such there were few comments about challenges in dealing with constraints other than a limited understanding of some of the newer parts of the technology and the often repeated issues with funding.

A limitation that P-A01 did have to deal with was that she had to manage the project without being the technical expert as she was the first time she put in the system. She commented:

> In the past with the old system I did all the programming, I identified all the numbers, I set the scheme and it was my project. It was a little harder for me to rely on someone else and believe that they could do it as well as I could. I don't mean it to mean I do well and they don't. I meant that when I do it, I know it's done. When I rely on someone else I have to judge and rely on them in the hope that they do it well. If they don't they have to correct it.

For the leader of Project-B the project environment constraints were all new. He was well experienced dealing with the many variations of bottom line orientation of companies and government agencies, but found the academic environment seemed to

prefer debate over decision making which affected changing administrative operations. He noted:

> There wasn't so much a get-it-done attitude, there was no bottom line orientation. It's almost like time was an option, and there was a strong sense that it was more important to be democratic and collaborative than to get the thing done and meet the objective.

Organizational Project Management was a pattern in that it was clearly missing at the outset of both projects. There was a strong understanding of structured project management in the facilities department with construction projects, which the leader of Project-A reported to organizationally. However, the application of the tools and techniques was kept to only the few larger projects in that department, and only through the work of contractors. P-A03, the functional manager of the facilities department commented, "I think we followed two different paths. One is the technical part. For major capital projects, we go through the whole process of project management. For regular things, for operating budgets, we compartmentalize." Outside of the facilities department project management was unknown as a set of practices in which to achieve other organizational objectives. A technical end user noted "I don't think project management was expected or was looked at in terms of a standard operation."

The leader of Project-B had strong project management skills but had to operate within an environment that was devoid of a project orientation in the non-facilities world. The functional manager, P-B03 noted that this project was the introduction of project management to most of the college:

> Well, I think that it is interesting, because I think it was also an introduction of project manager methodology to the other team members in addition to myself. So, I think it was a methodology that was being introduced into the institution in terms of how to bring about projects.

Project Management and Academia seemed in opposition many times to the leader of Project-B. The academic representative on the core project team was more interested in thinking conceptually about the degree audit software and struggled with translating the project leader's pragmatic task and deliverable paradigm to his fellow academicians. P-B09 explained:

> I think that we think differently. I think that people who are in the academic side are much more inclined to think conceptually, and you know, what do I care about scribing? Quite honestly, what do I care about layout? I really don't, as long as I see the checkboxes. I mean we spent a lot of time on that stuff. I mean I know what I want out of it, whether it is this color or that color -- doesn't really bother me very much, that kind of stuff. So, I think that it makes it difficult for me to translate what it is that's going on in terms of implementing the product to people who live in the academic world.

As he learned more about project management through the course of the project he became more convinced that academia's view is primary, and that all that project management stuff is useful but should not be the key driver of completing projects. He continued:

> What do we know from Microsoft project? What do we care about a Microsoft project? What do we know about Gantt charts? What do we know about mind

> mapping? We don't do any of that. Would they have understood the substantive issues, they've understood the substantive issues better. Project management is not about the substance.

The leader of Project-A had to deal with the same academic culture, but since the object of implementation was telephone service there was no change expected in the way they were to perform their functions. Furthermore, the leader of Project-A would leverage her relationships and knowledge of the academic division, as opposed to the leader of Project-B who was attempting to practice proven methods that had led to his success in technology implementations across his career. P-A01 commented:

> The academic division trust what I had to say and had to do. I made life easier for the faculty and once you make life easier for the faculty, it is easier for the administration. So that wasn't a problem.

Stakeholder Expertise was an indirect pattern across both projects that contributed to the project leaders' success. Appendix C shows the number of years of work experience in the college under study and in higher education in total for each stakeholder. These projects had the benefit of core team members that had on average 20 years experience in higher education and 15 years at the college under study. At the time of the projects, two people from each project had over 30 years experience within the university. This seniority of stakeholders raises the question of project management competency with senior level resources versus junior level or a more diverse mix. It could also possibly raise the question of doing modern complex technology projects with resources having more experience with older systems than with those well versed with only the newest technologies.

Vendor Impact is a significant pattern across both projects. For Project-A there was the equipment vendor and there was the implementation vendor. As conveyed by the functional manager P-A03, the equipment vendor went Chapter 11 in the middle of the project, but was such a market share leader that the company would, and in fact was purchased by a more stable firm. He explained:

> So, the only system that actually could be compatible or at least utilize a majority of the infrastructure was a Nortel system similar to us, but given this issue with the bankruptcy, we went and visited the company's headquarters. They showed us that this was just more like a restructuring, Nortel wasn't going away, even it was purchased by somebody else.

The implementation vendor was specialized in implementing the chosen vendor's equipment and had great familiarity with the college's legacy system prior to migrating it. The vendor representative stated:

> I've gotten to learn LaGuardia pretty well. I was -- you can call me as the second project manager in this project. So, somebody like P-A01 would always depend on me to make sure. And what I did was I brought my team into it to make sure that everything that we had discussed and everything that needed to be coordinated.

For Project-B the single software and implementation vendor was recently purchased by a larger company, who experienced constant organizational changes behind the scenes. The vendor's assigned implementation manager was new and had little influence on the vendor's technical delivery resources as cited earlier in the review of

interview question #5. Managing the vendor in Project-B was a major challenge consuming much of the project leader's energy. P-B01 remarked:

> So, I would say that the vendor did not have a good software development and release protocol. And that eventually changed when they got bought out by another company, but at first that was probably the messiest part, but we worked through it.

However, in Project-A the vendor was almost self-managing and worked seamlessly with the functions within the college, thereby relieving the project leader to work on other activities outside the project.

Themes and relationships. The data indicates that each of these two project leaders worked within the areas that they were able to control in a way that enabled them to address those areas outside their control. This brought about project success as described for each project earlier. For the leader of Project-A, collaboration skills and confidence in her knowledge of the application and environment were strengths that she leveraged in learning new skills needed to complete the project. For the leader of Project-B the confidence of his project management capability and strong documentation skills enabled him to overcome the limitations of the organization and difficulty with the vendor.

Proposition evaluation. To address the proposition that project management competencies affect project success, we go back to the within-case evaluation of the two projects against the PMCD standards. The personal dimension leveraged the knowledge dimension to yield the level of achievement in the performance dimension for each project leader.

For Project-A, the leader's knowledge was heavy in the application area and project environment, but weak in the project management discipline itself. Comparatively the leader of Project-B was strong in project management, weak in the project environment, and had related experience in the application area but not specific to the project at hand. Each project leader had enough knowledge for their strong personal competence dimension to yield sufficient results in completing the projects.

However, these two cases might be considered extreme given the depth of experience of each in their respective different elements of the knowledge dimension. Both had strengths in the personal dimension, but because the leader of Project-A had little project management knowledge these personal competencies were expressed more so in the interviews. For the leader of Project-B, the personal competencies were expressed in participants' views of his project management skills.

Although these findings indicate that a project leader without an explicit understanding of project management knowledge can succeed in implementing a project there were many compensating factors, which would make it very difficult for an average subject matter expert to take on a project with the same results. P-B03 who was the Registrar at the college and moved on to be responsible for multiple college degree audit project installations at the university level, summed it up by saying:

> I think one of the things that project management methodology brings to the table, is a very structured approach in terms of how to guide a project to success at the end. I think that when you don’t have that underpinning and understanding, sometimes as a subject matter expert you can flounder and not be sure about how to deal with the issues when you’re confronted with them.

Evidence of Quality

With interview-based research, demonstrating the rigor and integrity of data collection and analysis is essential for assuring validity in qualitative inquiry. For that reason and the researcher's role in Project-B great care was taken throughout the case study to provide an audit trail as evidence of quality. To begin with, each interview was audio recorded. The audios were transcribed to include all the words used by the participants. The researcher listened to each audio session at least twice, once to proofread the transcription quality, and the second time to reflect on the dialog and write up interview summary notes.

Member checking was achieved by sending each participant a copy of his or her transcript for review. There were a few minor edits requested. Whenever documentation was mentioned in an interview, a copy was acquired. The interview transcripts, notes, and documentation were imported into the Nvivo qualitative data repository. The data in Nvivo was reviewed and coded in multiple ways in preparation for deriving the findings presented here, and is available for independent evaluation.

Data triangulation of the results was achieved by using multiple sources of data through interviewing 10 participants for each case, and the documentation provided as evidence of topics discussed. Furthermore, there were diverse perspectives of the same data consistently across each of the two projects, through the roles of *Project Leader* (1), *Project Sponsor* (1); *Functional Manager* (1), *Administrative Team Member* (1), *Vendor Representative* (1), *Technical Team Members* (2), and *Technical End Users* (3). A draft of the study's findings was distributed to the participants with a 2-week opportunity to provide feedback. Both project leaders where immersed in their projects for at least two

years which satisfied the validity procedure of prolonged engagement in the field as defined by Creswell and Miller (2000).

Summary

The results of this study represent an in-depth analysis of the interview data of key stakeholders and related documentation for two enterprise technology projects at a community college. Through a combination of structured analysis against industry standard competencies and reflective pondering to identify salient patterns and themes, the researcher has linked the data to the interview questions to the research questions. Through this multiple analysis approach to answering the research questions, this study addressed the problem statement of providing an increased understanding of the knowledge gap between project management competencies available and those needed for successful implementation of technology projects at a community college.

The findings indicate that successful project managers are largely defined by the results of their efforts whether the structure of project management is visibly applied or not. However when project management structure is applied the findings show that lack of knowledge of the particularly technical object being implemented can be overcome to yield a successful outcome. Chapter 5 draws these findings into conclusions and describes how they relate to future research and improved practices.

Chapter 5: Summary, Conclusions, and Recommendations

In this final chapter, conclusions are drawn from the study findings and organized by the study's research questions. Some recommendations for practice and recommendations for further study are presented based on key points brought out in the findings. The contribution to positive social change made by this study are reviewed along with the researcher's reflections on why this study was done.

Summary

This research study was undertaken to explore the applied project management competencies of project leaders who successfully implement enterprise technologies at a community college. By looking closely at two comparable projects at the same institution implemented by project leaders with distinctly different backgrounds and approaches, this case study establishes a nuanced understanding of how project competencies relate to the level of success achieved for each project. The approach to the research was a case study to examine two projects through the eyes of 10 project stakeholders who were instrumental in the phases of the projects. These project team members were interviewed and related documentation identified and reviewed. The interview and documentation data were analyzed using qualitative techniques through a combined within-case and cross-case methodology.

For the two projects, each project leader exhibited great depth in specific dimensions of the project competency framework. These applied competency dimensions were different between the project leaders, but sufficient in strength to achieve the basic project outcome success desired. Within the context of each project, there were some objectives that were not met as expected and the perceptions of success

varied among the stakeholders. Each project had different challenges, which seem to suit the particular strengths of each project leader. The project leaders were selected based on their sponsor's confidence and knowledge of the project leader's skill sets, the project environment, and the expected challenges each would face in deploying the new technology.

Conclusions

This research started with a journey through four conceptual frameworks to form the literature review. Information technology implementation factors were reviewed historically, where they are today, and where they are likely to go. The project management discipline was reviewed in terms of project managers' competencies and organizational structures where projects are performed. Project success was studied in the literature where the black and white notion of completing a project on-time and on-budget rarely represents true success. Thomas and Fernandez (2008) studied the nature of project success definitions in dozens of companies in several industries, which illustrated the complexity of evaluating success. This complexity of perception ties to this study's results and conclusions. The effects of successful project processes on meeting successful project outcomes is the traditional view of critical success factors and was articulated in the context of the individual stakeholder's perception of success. The constraints of public IHEs, particularly community colleges were explored.

These four frameworks provided the basis for eliciting the conclusions of this study in terms of the three research questions. For research question #1 on project management competencies, the frameworks of information technology implementation and project discipline were the main lenses. For research question #2 about evaluating

project success achieved, the frameworks of project success and constraints at public IHEs were considered foremost. For research question #3 about the process for selecting a project manager, all four of the conceptual frameworks come into focus. Study conclusions as relayed and bounded in the findings are presented here organized by research question.

Research Question-1

What level of project management competencies are exhibited by project leaders who successfully implement technology projects at a community college? The Project Management Competence Development (PMCD) framework as defined by PMI has three dimensions: (a) knowledge, (b) performance, and (c) personal. The ability to perform well as a project leader is a function of the strength of their personal dimension in applying their knowledge dimension. There is not a precise metric for identifying which elements or units of competence of the personal dimension bring about desired levels of performance. Different stakeholder perspectives yield different perceptions of project leader performance. A persistent element in the performance and personal competency model is the need to engage stakeholders throughout the project.

Knowledge is the linchpin of the three PMCD competency dimensions, with regards to affecting project success, because it can be measured and is not subject to perception. The PMCD knowledge competency dimension contains the subdimensions (a) PMI's PMBOK, (b) application area, (c) project environment, and (d) general management. The knowledge area of general management is not well defined and it can be observed in the findings that the important aspects of general management knowledge with relation to managing projects are encased wholly in the PMBOK. For example, staff

management as a general management knowledge element is reflected in the PMBOK area of human resource management. Financial management knowledge is reflected in the PMBOK areas of cost and procurement management. As such, only the first three knowledge subdimensions should be considered when evaluating effective project leadership performance.

The personal dimension of the PMCD embodies the soft management skills of communicating, leading, managing, cognitive skills, effectiveness, and professionalism. Through exemplary application of this dimension, a successful project leader can compensate for a lacking of project management knowledge. Whereas the project leader with strong project management knowledge and experience is following a formula of requirements definition and user sign-off, the local expert with strong personal skills intuitively seeks out stakeholder buy-in because experience tells her it is the right thing to do.

This study has shown that neither of the two project leaders had depth across all three knowledge subdimensions. However, the project outcomes demonstrated that substantial application area and project environment knowledge can adequately substitute for project management knowledge and vice versa. What is also evident is that as a project progresses, application area and project environment knowledge increase for the project leader who is lacking in these subdimensions. For the project leader who is lacking in the PMBOK knowledge subdimension there needs to be exposure to someone practicing this knowledge or specific training in project management to acquire this knowledge subdimension. When this exposure or training is available, the project leader who is lacking in the knowledge will recognize the value of acquiring it to improve their

ability in managing projects or will seek assistance in performing portions of project management functions with which they are uncomfortable.

When a community college does not have an organizational project management consciousness then the project leaders who run projects to deliver on strategic objectives have to be well equipped across the project management competency dimensions as was the case for these two projects. Conversely, if the organization invests in project management training and applying industry standards for their key projects through establishing a project management office, the reliance on depth of individual competency can be lessened. This would enable the organization to address more projects effectively because project leaders could be developed with in-house resources rather than going outside of the organization and paying high-priced project specialists to push a project through a non-project friendly environment. An organizational project management view would enable a framework for improved utilization of project resources because they would be aware of the project methodology and their role from planning through execution and transition to operations. Much literature on modern project management points to the benefits of a project management organizational mindset. Blomquist and Muller (2006) described the potential that can be achieved through the interrelationship of functional management and project management. This notion reinforces the conclusion of extending project management competency beyond the individual project manager.

Research Question-2

What is an appropriate measure of project success for a community college? The finding from studying these two projects indicated that achievement of the core

objectives within the budget constraints constituted success to the sponsor and most of the other stakeholders. The project outcome was the main determinant of success. Project process success was more deliberate and visible in Project-B than it was in Project-A. As such, it was difficult to observe the quality of project processes in Project-A. This could indicate that project process success is not inherently a significant success factor at the college. The conclusion could be that detailed project documentation is not necessary for project outcome success. However, the strong project processes in Project-B were considered a primary factor in that success. This could lead one to conclude that project process success is only as good as the project outcome success. The careful execution of project management processes in Project-B provided a bonus beyond the project outcome. Those project stakeholders who were not familiar with project management at the beginning achieved a clear understanding and appreciation for much of what project management is about by the time the outcome was achieved.

Beyond meeting the basic objectives and functionality of the project outcomes, each project had their disappointments when it came to fulfilling the transformative possibilities that their products were touted to bring about. With enough time, it can be seen that much of the transformative goals may come about. Yet it can also be seen that changes in organizational focus over time could reduce the importance of meeting those transformative goals. The greater the investment in a project in terms of funding the more likely the project can meet its expected level of success. If expectations are high and budget is low, success will probably not be perceived. Conversely, when projects are well-funded expectations for their success increase. A community college sometimes

establishes projects with ambitious goals without allocating sufficient budget in alignment with the strategic importance.

Decisions made at project initiation set the stage for project success. For Project-A the equipment vendor selected leveraged existing knowledge of their technology at the college. The selected implementation vendor's experience and their flexibility enabled major obstacles to be overcome seamlessly. For Project-B the decision to hire an outside dedicated project manager set the stage for making sure the departments collaborated and did not compete at the expense of project success.

For Project-B, challenges to perceptions of project success were pronounced between the academic and administrative missions of the college. This diversity of perspectives between these two forces create equally diverse opinions of the validity of the project's objectives regardless of project outcome success achieved. The study findings brought out an inherent conflict between successful administrative outcomes and academic collegial outcomes. Administrators tend to assume project deliverables are more important than how inclusive the process was to define and achieve those deliverables. The nature of academia is to broadly discuss and debate all salient aspects of any worthy endeavor without a lot of concern for the timeliness of ending discovery, limiting objectives, and strictly managing tasks to achieve those defined objectives (Smith & Hughey, 2006). It is this nature of the community college that makes the determination of project success less definitive than in the more typical return-on-investment driven organization. This result ties directly to the findings of Wierschem and Johnston (2005) in their study of project management in university computing resource departments.

Research Question-3

What determines how individuals are selected for the role of project leader for technology implementation projects at a community college? The process for selecting a project leader for a project parallels the discovery for and decision to initiate a project and allocate funds for the components to implement a given technology. The nature of a project affects the criticality of project management skills needed to lead the effort. This study has shown that the vendor's ability to deliver their products and services by being flexible and responsive to their customers' needs, will affect the amount of effort the project leader will need to expend in managing them. The skills, reliability, and availability of internal project team members to perform assigned tasks and actively participate will influence the type of project leader needed. Most importantly, the sponsor's perspective will determine ultimately how a project will be managed. If the project objectives are unclear and the organizational commitment is lukewarm there will be trouble for whoever is selected to lead the project.

For this case study, the two projects were well defined and enjoyed strong executive backing. As such, there was a conscious process for each project in determining how the project should be managed. There were three factors involved when selecting who was to lead these technology projects at the college. They were: (a) use an existing in-house resource or bring one in from the outside, (b) percentage of work time the individual project leader would be dedicated to the project, and (c) the level of project management and application expertise appropriate for the given project environment.

Budget plays an important role. Project-A funding was very tight and an appropriately skilled project leader was available in-house. Project-B funding was set

with the assumption that a dedicated project leader outside of the organization was essential. The end users for Project-B influenced the project sponsor based on the project discovery activity that revealed the complexity of planning for and implementing the technology. The sponsor who was familiar with project management understood that need and made sure the project would not be initiated unless a full-time project manager was allocated. This was an important decision since the cost of the software, equipment, training, and implementation services from the vendor were significant. It would have been less expensive simply to put the project lead responsibility on the back of existing internal staff. However, the real cost of doing so was evaluated as too high. Where for Project-A it was determined that a technical support person was more needed and the in-house project leader would be more effective with the added support. The project leader selection process is an important step in initiating a project. In their study on project critical success factors, Fortune and White (2006) stressed the importance of a project manager's competency match to their particular project's attributes. This was a key element of the two projects in this study, where the decisions made at the beginning of the project set the stage for success in the deployment activities.

Recommendations for Practice

The conclusions drawn from the study for the three research questions point to the need for community colleges leaders to take technology projects seriously. Beyond the conceptualizing of a technology solution and mapping out objectives to be met, college leaders need to understand that without appropriately skilled project leaders the best of ideas will struggle to meet their realization. When the decision is made to marshal the resources to implement a project, careful thought needs to be made regarding nature of

the particular project and the challenges it will face in gaining widespread adoption in the organization. Mapping individual essential project management competencies to project constraints could prove a useful benchmarking tool for community colleges to objectively select the right project leader for the job. The administrative decision makers should not sacrifice the funding of a project leader to save money in the implementation activity, because the hidden opportunity costs of not fulfilling project outcomes as envisioned would be far more expensive in the long run. The temptation to add project activities to the tasks that operational staff perform on a daily basis is a recipe for poor morale and reduced quality of service within the organization. Incentives and adding temporary assistance through consultants and contractors should be considered when committing to major transformative projects.

Community colleges need to start moving towards an organizational project management mindset and head down the road of establishing a project management office (PMO), or if they already have one, to continue maturing it. This structure is usually found in IT departments in companies and many colleges. The PMO provides project management standards for the organization and promotes learning and support for compliance with project management processes. This group should also be the one that mentors project sponsors in mapping project management competencies to their projects while in the discovery phases of project formation. They should facilitate the project sponsors and stakeholders in visualizing what success for the project should look like as part of the resource allocation process at project initiation.

Additionally, community college leaders should consider ways of introducing the project management discipline and competency sets into the academic side of their

institutions. Community colleges should more carefully consider the business impact on achieving their academic missions when embarking on large-scale technology projects. At the same time, those who apply project management in community colleges need to be sensitive and aware of the academic core of the institution. Project leaders in these environments cannot rely on executive fiat for people to adopt new technologies and processes. The academic nature of community colleges' mission and the individualistic perspective of faculty require that including them in projects must be factored into project task scheduling. This will add to the duration of project completion, but it will yield more widely accepted project outcomes, further increasing the return on investment of projects in the community college.

Recommendations for Further Study

This study raised many questions that should be addressed in subsequent studies to further extend the understanding of project management competencies in implementing technology projects at a community college. Whereas I looked at different projects at the same community college, an alternate approach would be to look at the same project at different community colleges. For example, DegreeWorks is implemented at many colleges. Analyzing the project management approaches used and the different perceptions of success would provide further insight into the relationship of project management competencies to project success.

I looked at projects implemented by senior level project leaders with depth in the project management dimension of knowledge, albeit different subdimensions. These projects were implemented in an environment with very little organizational project management presence. As such, the sponsors' were reliant on the project leaders' strength

of the knowledge, performance, and personal competencies to push their projects to success.

Future researchers could look at the context of implementing complex technology projects where there is a strong organizational project management culture, as exemplified by a functioning PMO. This would be very important in developing the capability to implement more projects with less reliance on individuals with strong subject matter expertise and would enable the development of competent project managers in-house. The competency mapping of project leader to project would be less critical as project management competency is distributed across the organization reducing the risks of depending on a single person.

I focused on a derivative and a platform category of project. These are the two lower categories of projects in Wheelwright and Clark's (1992) taxonomy of four project categories, which characterized projects by the amount of process change they introduce to an organization (Meredith & Mantel, 2003). The two higher category projects are called breakthrough and R&D. These types of projects may show a different pattern of project management competency due to their more open-ended nature. It would be worthwhile to study these types of projects, particularly when success may be harder to define. These types of projects appear to be better aligned with the academic approach to completing objectives, and as such could provide insight on how project management can be applied in academia in a cohesive manner.

Researcher's Reflection

I selected the research topic of project management competencies at a community college because I am heavily vested in that career track. I chose to study two projects

within the college where I work. There were many challenges I had to face during the research process to assure that my position at the college and my closeness to the projects being studied was kept objective. Protection of individuals became more of a concern than I expected. Although in my position I had access to these projects and the people behind them, I had to make sure that I was not intimidating the participants. The IRB process for Walden established a clear set of controls for me to follow. Additionally, since my study was done at a community college I went through their IRB approval process as well, which introduced even more controls for interviewing people in the college.

I have a personal bias that has come through years of involvement with project managing the implementation of large technology projects in industry. My bias is that project management works in all environments and should work just as well in higher education. I learned that this is true. However, there needs to be clear understanding of how academia will affect technology project planning and deployment. Academic adoption of the project outcome will increase in relation to the amount of time spent including them in the project processes. I have noticed no negative effects on the people who participated in the study. I work with several of them on a regular basis. Their voluntary participation has only strengthened my understanding of what they do and their understanding of the value of project management to the community college.

Contribution to Positive Social Change

Community colleges provide an opportunity to achieve a college education that will lead to an improved quality of life to those who could not easily afford or qualify for other forms of college education. With the economic challenges and escalating cost of a

college education, community colleges have experienced surges in enrollment. At the same time they have seen their budgets reduced based on their large dependence on public funding. This puts pressure on their ability to fulfill their academic and administrative missions. The ability to implement technology projects that meet their objectives within the constraints that these institutions operate under is a key to their continued effectiveness. Deploying technologies to support these institutions will require more rapid and repeatable methods that can be applied by project management capable individuals who aren't necessarily long time local experts relying on relationships and specific technology skills.

This study provides a detailed view of two projects, which serve to provide insight as to what competencies yield successful results. Based on this study's findings community colleges will be able to pragmatically consider what they expect to achieve through implementation of technologies and what it will take in terms of project management to meet those goals. The trade-off of monies spent as compared to level of success to be achieved can be evaluated up front, thereby bringing more certainty to the process. Understanding the need to engage an appropriately skilled project leader to assure the soundness of an enterprise technology investment will become increasingly important for community colleges who cannot count on a growth of public funding to match their growth in enrollment.

Concluding Statement

The application of project management knowledge is immediately recognized as a performance asset to observers whether they understand what project management is or not. The project management discipline has evolved from practical roots of actual

projects and the realities and potentials of human nature. The organizing of its elements and understanding of it becomes a language for communicating how to get things done. This is a powerful tool for an organization beyond the short-term results of meeting project objectives. Knowledge of structured project management processes is clearly an asset for project leaders when implementing successful projects. However, it is not always essential given specific circumstances of a project leader and the project environment. At a minimum, community colleges should strive to introduce project management in any form they can to start fostering an organizational project management mindset. This will be increasingly important to their survival and success as economic pressures mount driving up enrollment and driving down budgets.

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Appendix A: Individual Consent Form

You are invited to take part in a research study of how project management competencies of individual project leaders relate to perceived success of information technology projects at a community college. You were chosen to participate in the study because of your prominent role in one of the projects being evaluated. Please read this form and ask any questions you have before agreeing to be part of the study.

This study is being conducted by a researcher named Bradford Orcutt, who is a doctoral student at Walden University, and the Associate Dean for Information Technology (IT) at LaGuardia Community College.

Background Information:
The purpose of this case study is to evaluate how the project management competencies of project leaders influence a technology implementation project's outcome at a community college by comparing two completed projects. The intent is to derive an understanding of the influence of project management expertise versus subject matter expertise on project success.

Procedures:
If you agree to be in this study, you will be asked to:

- Participate in a one hour interview with the researcher. The interview will be comprised of open ended questions and the audio will be recorded and transcribed.
- Review interview transcript and provide opportunity for a follow up interview if requested. Reviewing the transcript would take about one-half hour and any needed follow up interview would take no longer than one hour.
- Review the research findings to provide feedback about the researcher's interpretations. This could take up to one hour.

Voluntary Nature of the Study:
Your participation in this study is voluntary. This means that everyone will respect your decision of whether or not you want to be in the study. No one at CUNY / LaGuardia Community College or its IT Division will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind later. If you feel stressed during the study you may stop at any time. You may skip any questions that you feel are too personal.

Risks and Benefits of Being in the Study:
There are no risks or penalties associated with being a participant in the study. The potential benefits of being in this study include gaining a more robust understanding of the diverse factors and project leader competencies involved in implementing technology systems as well as developing an appreciation for what constitutes project success at a community college.

Compensation:
There is no compensation for participating in this study.

Confidentiality:
Any information you provide will be kept confidential. The researcher will not use your information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in any reports of the study.

Contacts and Questions:
The researcher's name is Bradford Orcutt. The researcher's faculty advisor is Dr. Lilburn Hoehn. You may ask any questions you have now. Or if you have questions later, you may contact the researcher via phone ([redacted]) or email ([redacted]) or the advisor at [redacted]. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Director of the Research Center at Walden University. Her phone number is 1-800-925-3368, extension 1210. Walden University's approval number for this study is 06-01-11-0030116 and it expires on May 31, 2012.

The researcher will give you a copy of this form to keep.

Statement of Consent:

___ I have read the above information. I have received answers to any questions I have at this time. I am 18 years of age or older, and I consent to participate in the study.

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By signing below, I am agreeing to the terms described above.

Printed Name of Participant

Participant's Written or Electronic* Signature

Researcher's Written or Electronic* Signature

Electronic signatures are regulated by the Uniform Electronic Transactions Act. Legally, an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically.

Appendix B: Interview Guide

Technology Project Stakeholders - Interview Guide

Researcher: Bradford Orcutt

For use in data collection for the Walden Dissertation "Project Management Competencies Leading to Technology Implementation Success at a Community College".

Interview Logistics

Researcher is the Interviewer
Date and Time
Duration
Location
Audio Taping
Project Files
Notepad and Pen
Schedule Follow-up if Needed

Content

Introductory Statement to Participant:

This interview will take about an hour. I will be asking you 6 open questions. Depending on your response and role in the project, I will ask additional probing questions to elicit more detail. Based on your responses I may think of different data or analysis concepts for this study that I did not originally envision, and may take the conversation down a new path for a short while.

Our conversation will be recorded to audio media. We can stop and take a break at any time you request. If the conversation requires follow-up discussions, we will schedule them as appropriate. All interviews for this study will be transcribed, but your identity will remain confidential and will not appear in any final results report. You will be given an opportunity to review the transcripts as well as the final report.

Since the projects that we are interviewing you about occurred a few years ago, you may need to jog your memory of events at the time. I have brought organized project documentation folders and can review the material at any time during the interview, or you may choose to review your own documentation and provide your feedback later.

Interview Questions:

The following 6 questions will be asked of each participant. Some participants may have more to say on each question based on their particular role, or communication style. For each of the 6 questions, possible probing questions are identified, and the researcher may come up with more as each interview proceeds.

1. Describe what you believe was the objective and scope of the project?

- why was this project important to the college?
- what was the process for deciding on doing this project?
- did this project have visibility and backing at the top levels of the organization?
- was this project considered complex compared to other large technology projects at the college?
- was there any resistance to this project by other stakeholders or users?

- was there buy-in by the main customers of the projects that the objectives were sound?

2. What did you perceive to be your specific role in the project?

- how much of your time was expected to be spent on the project, and how much time actually was spent?
- do you feel you made a significant contribution to the project outcome?
- have you worked with the other project team members before?
- were you pleased to be part of project?
- what challenges did you personally experience in this project?

3. How successful do you think the implementation of this project was?

- how smooth do you think the project ran compared to other projects at the college of this type?
- what was the best part of the project ... what was the worst part?
- what would you have done differently, or recommend others do differently?
- have you ever worked on projects like this before?
- how would you characterize your familiarity with project management discipline and techniques? .... now and at the time of the project being implemented?

4. How effective is the resultant technology solution in meeting its intended objectives.

- at the time the project was rolled-out to the community to what extent did it satisfy user needs?
- what would have made the project outcome better at the point of go live?
- how has the project outcome changed over time, since go live?
- in retrospect was the solution implemented the right one for the need it was filling?

5. How would you describe the project leader's ability to manage this project?

- did the project leader plan effectively for the implementation?
- were project team members clear about their roles and responsibilities?
- was their adequate communication from the project leader to project constituents?
- how would you characterize the written communication during the project?
- were risks anticipated and planned for?
- how would you characterize the project leader's ability to motivate project team members to perform well?
- did the project leader seem in control? did they attend to details?
- what were the project leader's strengths and weaknesses?
- how do you think the project leader grew through the experience of this project?

6. Why do you think the project leader was selected for that role?

- was the project leader familiar with the technology and environment that the technology was going into?
- do you think the project was funded adequately?
- was the knowledge and experience of formal project management methodologies a consideration in selecting the project leader?
- was the selection of the project leader done well in your opinion?
- were there others available who were more capable to lead the project than the project leader selected?

Closing Statement to Participant:

Thank you very much for your participation in this interview. If you think of any answers later that you would have liked to have given or would like to modify your answers let me know in the next 5 business days by email. Once the audio is transcribed I will send you a copy for your review.

Appendix C: Participants Interviewed

Participant	Project Role	Functional Position	Years at College	Years in IHE
P-A01	Project Leader	Line Manager	40	44
P-A02	Project Sponsor	Executive	25	40
P-A03	Functional Manager	Executive	13	23
P-A04	Administrative Team Member	Contributor - Civil Service	2	8
P-A05	Vendor Rep	Contributor - Contracted	5	5
P-A06	Technical Team Member	Contributor - Contracted	2	3
P-A07	Technical Team Member	Contributor - Civil Service	10	10
P-A08	Technical End User	Contributor - Tenured	16	25
P-A09	Technical End User	Line Manager	15	18
P-A10	Technical End User	Contributor - Civil Service	19	19
P-B01	Project Leader	Contributor - Contracted	8	8
P-B02	Project Sponsor	Executive	9	31
P-B03	Functional Manager	Contributor - Tenured	24	33
P-B04	Administrative Team Member	Contributor - Civil Service	19	19
P-B05	Vendor Rep	Contributor - Contracted	2	42
P-B06	Technical Team Member	Contributor - Civil Service	14	14
P-B07	Technical Team Member	Contributor - Tenured	17	17
P-B08	Technical End User	Contributor - Tenured	15	25
P-B09	Technical End User	Executive	11	37
P-B10	Technical End User	Contributor - Tenured	28	28

Appendix D: Confidentiality Agreement

CONFIDENTIALITY AGREEMENT

Name of Signer: ASHISH RICKY SEBASTIAN
of ScriptoSphere Transcription Services

During the course of my activity in collecting data for this research: "Project Management Competencies Leading to Technology Implementation Success at a Community College" I will have access to information, which is confidential and should not be disclosed. I acknowledge that the information must remain confidential, and that improper disclosure of confidential information can be damaging to the participant.

By signing this Confidentiality Agreement I acknowledge and agree that:

1. I will not disclose or discuss any confidential information with others, including friends or family.
2. I will not in any way divulge, copy, release, sell, loan, alter or destroy any confidential information except as properly authorized.
3. I will not discuss confidential information where others can overhear the conversation. I understand that it is not acceptable to discuss confidential information even if the participant's name is not used.
4. I will not make any unauthorized transmissions, inquiries, modification or purging of confidential information.
5. I agree that my obligations under this agreement will continue after termination of the job that I will perform.
6. I understand that violation of this agreement will have legal implications.
7. I will only access or use systems or devices I'm officially authorized to access and I will not demonstrate the operation or function of systems or devices to unauthorized individuals.

Signing this document, I acknowledge that I have read the agreement and I agree to comply with all the terms and conditions stated above.

Signature: _____ **Date:** 07/06/2011

Appendix E: Project Management Competency Development (PMCD)

PERFORMANCE COMPETENCIES

1.0 Initiating a Project

- 1.1 Project aligned with organizational objectives and customer needs
  - 1.1.1 Understands the project alignment
  - 1.1.2 Achieves agreement on project alignment with project sponsor
  - 1.1.3 Establishes key stakeholders' needs and expectations
  - 1.1.4 Determines product or service characteristics
- 1.2 Preliminary scope statement reflects stakeholder needs and expectations
  - 1.2.1 Selects and uses a suitable project management methodology or process
  - 1.2.2 Understands the preliminary scope of the project
  - 1.2.3 Frames high-level project scope ensuring alignment with organization and customer needs and expectations
- 1.3 High-level risks, assumptions and constraints are understood
  - 1.3.1 Establishes the project's high-level assumptions and constraints
  - 1.3.3 Identifies, qualifies and quantifies the project's high-level risks
- 1.4 Stakeholders identified and their needs are understood
  - 1.4.1 Identifies project stakeholders
  - 1.4.2 Conducts stakeholder analysis to gain buy-in and identify needs for the project
  - 1.4.3 Identifies high-level communication requirements

  Project charter approved
- 1.5
  - 1.5.1 Develops a high-level project strategy
  - 1.5.2 Establishes the project's key milestones and deliverables
  - 1.5.3 Develops summary budget
  - 1.5.4 Supports the project charter preparation
  - 1.5.5 Uses governance process to obtain sponsor approval and commitment

2.0 Planning a Project

- 2.1 Project scope agreed
  - 2.1.1 Defines project deliverables using a work breakdown structure (WBS)
  - 2.1.2 Obtains agreement for the scope defined by the WBS
  - 2.1.3 Implements scope management
- 2.2 Project schedule approved
  - 2.2.1 Defines activities and dependencies to deliver approved scope
  - 2.2.2 Estimates time for completion of each activity
  - 2.2.3 Identifies internal and external dependencies
  - 2.2.4 Schedules the project activities against the resource commitments
  - 2.2.5 Obtains approval for the project schedule
  - 2.2.6 Communicates project schedule with stakeholders
- 2.3 Cost budget approved
  - 2.3.1 Estimates costs for each activity
  - 2.3.2 Estimates all other project costs
  - 2.3.3 Develops the project budget
  - 2.3.4 Develops cost management plan
  - 2.3.5 Gains approval for the planned project budget

- 2.3.6 Communicates planned budget to stakeholders
- 2.4 Project team identified with roles and responsibilities agreed
  - 2.4.1 Identifies specific resources
  - 2.4.2 Defines roles and responsibilities
  - 2.4.3 Reaches agreement with the organization for access to suitable resources
  - 2.4.4 Plans resource ramp up and team building
- 2.5 Communication activities agreed
  - 2.5.1 Builds a project communication plan
  - 2.5.2 Selects suitable tools and methods to communicate with identified stakeholders
  - 2.5.3 Schedules activities to address the communication plan
- 2.6 Quality Management process established
  - 2.6.1 Establishes quality standards to be used within the project that aligns with organizational quality policy
  - 2.6.2 Defines processes to be used to deliver the project deliverables
  - 2.6.3 Establishes project quality metrics for deliverables, processes and project management performance
  - 2.6.4 Develops a project quality management plan
- 2.7 Risk response plan approved
  - 2.7.1 Develops project risk management plan
  - 2.7.2 Identifies and quantifies major risks
  - 2.7.3 Leads/delegates the effort to find response strategies for each identified risk
  - 2.7.4 Estimates risk contingency costs
  - 2.7.5 Documents risk response plan
  - 2.7.6 Assigns risks responsibility
  - 2.7.7 Gains agreement from key stakeholders for the project risk response plan
- 2.8 Integrated change control processes defined
  - 2.8.1 Leads/delegates the effort to establish a change control process
  - 2.8.2 Involves stakeholders in generating change control plan
  - 2.8.3 Ensures the use of a change control processes and procedures
  - 2.8.4 Communicates with key stakeholders on change control process
- 2.9 Procurement plan approved
  - 2.9.1 Analyzes material requirements
  - 2.9.2 Plans purchases and acquisitions
  - 2.9.3 Plans external labor procurement
  - 2.9.4 Plans contract administration
  - 2.9.5 Obtains plan approval
- 2.10 Project plan approved
  - 2.10.1 Reviews organizational process assets
  - 2.10.2 Reviews enterprise environmental factors
  - 2.10.3 Integrates the planning activities into a complete project management plan
  - 2.10.4 Seeks approval by key stakeholders
  - 2.10.5 Establishes project baselines
  - 2.10.6 Communicates approved plan to key stakeholders
  - 2.10.7 Conducts kick-off meeting

3.0 Executing a Project

- 3.1 Project scope achieved
  - 3.1.1 Verifies task completion as defined in the project plan
  - 3.1.2 Closes identified performance gaps
  - 3.1.3 Executes risk management plan
  - 3.1.4 Manages phase transitions
- 3.2 Project stakeholders' expectations managed
  - 3.2.1 Reviews stakeholder expectations throughout the project to ensure they are being met within the project scope
  - 3.2.2 Interacts with stakeholders to ensure support for the project
- 3.3 Human resources managed
  - 3.3.1 Acquires human resources per staff management plan
  - 3.3.2 Builds project team
  - 3.3.3 Develops project team members
- 3.4 Quality managed against plan
  - 3.4.1 Executes quality assurance activities
  - 3.4.2 Ensures compliance with quality standards and processes
- 3.5 Material resources managed
  - 3.5.1 Requests seller information
  - 3.5.2 Selects suitable sellers
  - 3.5.3 Executes procurement tasks against schedule commitment
  - 3.5.4 Acquires internally supplied resources

4.0 Monitoring & Controlling a Project

- 4.1 Project tracked and status communicated to stakeholders
  - 4.1.1 Executes the process for capturing project information
  - 4.1.2 Communicates status to stakeholders
  - 4.1.3 Ensures action plans are put in place to address any variations to plan
- 4.2 Project change is managed
  - 4.2.1 Identifies changes to baseline project plans
  - 4.2.2 Identifies the impact of the changes to the project plan
  - 4.2.3 Follows the change management process to manage and record changes
  - 4.2.4 Communicates changes to project stakeholders
  - 4.2.5 Execute configuration management process
- 4.3 Quality is monitored and controlled
  - 4.3.1 Records acceptance of completed deliverables
  - 4.3.2 Collects project and product metrics
  - 4.3.3 Monitors deviation from project baselines
  - 4.3.4 Recommends corrective and preventive actions
  - 4.3.5 Facilitates audits
- 4.4 Risk is monitored and controlled
  - 4.4.1 Updates risk response plan
  - 4.4.2 Recognizes when unknown risks occur
  - 4.4.3 Establishes workarounds for previously unknown risks
  - 4.4.4 Recognizes new risk
  - 4.4.5 Reviews risk response strategies
  - 4.4.6 Facilitates audits

- 4.5 Project team managed
  - 4.5.1 Holds regular team meetings.
  - 4.5.2 Conducts team building activities
  - 4.5.3 Monitors team satisfaction
  - 4.5.4 Provides feedback on team and individual member performance
- 4.6 Contracts administered
  - 4.6.1 Ensures seller contracts are effectively managed
  - 4.6.2 Collects seller performance metrics
  - 4.6.3 Ensures sellers are part of the project team culture
  - 4.6.4 Facilitates audits

5.0 Closing a Project

- 5.1 Project outcomes accepted
  - 5.1.1 Obtains final acceptance
  - 5.1.2 Meets all contractual requirements where required
  - 5.1.3 Transitions all deliverables to operations
- 5.2 Project resources released
  - 5.2.1 Executes the organizational processes for releasing project resources
  - 5.2.2 Provides performance feedback to project team members
  - 5.2.3 Provides feedback to the organization regarding team members' performance
- 5.3 Stakeholder perceptions measured and analyzed
  - 5.3.1 Surveys project stakeholders
  - 5.3.2 Analyzes results of feedback
- 5.4 Project formally closed
  - 5.4.1 Executes closure activities for the project associated with project
  - 5.4.2 Closes all financial activities
  - 5.4.3 Notifies stakeholders formally of project closure
  - 5.4.4 Closes all project contracts
  - 5.4.5 Documents and publishes project learning
  - 5.4.6 Updates organizational process assets

PERSONAL COMPETENCIES

6.0 Communicating

- 6.1 Actively listens, understands, and responds to stakeholders
  - 6.1.1 Actively listens
  - 6.1.2 Understands explicit and implicit content of communication
  - 6.1.3 Responds to and acts upon expectations, concerns and issues
- 6.2 Maintains lines of communication
  - 6.2.1 Engages stakeholders proactively
  - 6.2.2 Disseminates information effectively
  - 6.2.3 Maintains formal and informal communication
- 6.3 Ensures quality of information
  - 6.3.1 Uses appropriate information sources
  - 6.3.2 Provides accurate and factual information
  - 6.3.3 Seeks validation of information
- 6.4 Tailors communication to audience

- 6.4.1 Provides relevant information
- 6.4.2 Uses suitable communication method for the audience
- 6.4.3 Aligns communication with environment or setting

7.0 Leading

- 7.1 Creates a team environment that promotes high performance
  - 7.1.1 Expresses positive expectations of team
  - 7.1.2 Promotes team learning and advocates professional and personal development
  - 7.1.3 Encourages teamwork consistently
  - 7.1.4 Demands and models high performance
- 7.2 Builds and maintains effective relationships
  - 7.2.1 Confines relationships to work-related matters appropriate to the project and local culture
  - 7.2.2 Builds trust and confidence with stakeholders
  - 7.2.3 Creates an environment that encourages openness, respect and consideration of stakeholders
- 7.3 Motivates and mentors project team members
  - 7.3.1 Establishes and communicates to the team the project vision, mission statement, and strategic value
  - 7.3.2 Rewards performance according to organization guidelines
  - 7.3.3 Establishes mentoring relationships for team members' development
- 7.4 Takes accountability for delivering the project
  - 7.4.1 Demonstrates ownership of, accountability for, and commitment to the project
  - 7.4.2 Aligns personal activities and priorities toward increasing likelihood of achieving project goals
  - 7.4.3 Supports and promotes team's actions and decisions
- 7.5 Uses influencing skills when required
  - 7.5.1 Applies appropriate influencing technique to each stakeholder
  - 7.5.2 Uses experts or third parties to persuade others

8.0 Managing

- 8.1 Builds and maintains the project team
  - 8.1.1 Ensures expectations and responsibilities are clear to team members and they understand their importance to the project
  - 8.1.2 Maintains a positive attitude and effective relationships among team members
  - 8.1.3 Identifies, evaluates, and selects internal and external talent
  - 8.1.4 Promotes healthy work—life balance
- 8.2 Plans and manages for project success in an organized manner
  - 8.2.1 Works with others to clearly identify project scope, roles, expectations, and tasks specifications
  - 8.2.2 Applies organization or industry standards and generally accepted practices to the project
  - 8.2.3 Tailors generally accepted practices for successful completion of the project
  - 8.2.4 Organizes project information, emphasizing appropriate levels of detail
  - 8.2.5 Insists on compliance with processes, procedures, and policies
- 8.3 Resolves conflict involving project team or stakeholders
  - 8.3.1 Ensures that the team and stakeholders are fully aware of team rules

- 8.3.2 Recognizes conflict
- 8.3.3 Resolves conflicts

9.0 Cognitive Ability

- 9.1 Takes a holistic view of project
  - 9.1.1 Understands project stakeholders needs, interests, and influence for project success
  - 9.1.2 Understands how project actions impact other areas of the project, other projects, & organizational environment
  - 9.1.3 Understands both the formal and informal structure of organizations
  - 9.1.4 Understands organizational politics
  - 9.1.5 Uses emotional intelligence to understand and explain others' past actions and current attitudes, and anticipate future behavior
- 9.2 Effectively resolves issues and solves problems
  - 9.2.1 Simplifies complexities for a complete and accurate analysis
  - 9.2.2 Applies complex concepts or tools when needed
  - 9.2.3 Applies lessons learned to resolve current project issues
  - 9.2.4 Aggregates multiple related issues to understand the complete picture
  - 9.2.5 Observes discrepancies, trends, and interrelationships in project data
- 9.3 Uses appropriate project management tools and techniques
  - 9.3.1 Understands PM tools and techniques
  - 9.3.2 Selects appropriate tools and/or techniques
  - 9.3.3 Applies selected tools and/or techniques to project management
- 9.4 Seeks opportunities to improve project outcome
  - 9.4.1 Provides a framework to address opportunities and concerns
  - 9.4.2 Looks for opportunities to improve project value or execution
  - 9.4.3 Seizes relevant opportunities as they emerge
  - 9.4.4 Consolidates opportunities and passes them to the organization

10.0 Effectiveness

- 10.1 Resolves project problems
  - 10.1.1 Employs appropriate problem solving techniques
  - 10.1.2 Validates that proposed solutions resolve the problem and are within the project boundaries
  - 10.1.3 Chooses solutions that maximize project benefit and minimize negative impacts
- 10.2 Maintains project stakeholder involvement, motivation and support
  - 10.2.1 Uses stakeholder communication to maintain stakeholder motivation
  - 10.2.2 Constantly seeks opportunities to communicate project status and directions to meet the needs and expectations of stakeholders
  - 10.2.3 Includes experts in meetings and discussions to influence and obtain stakeholder support
  - 10.2.4 Uses objectivity for consensus building
- 10.3 Changes at the required pace to meet project needs
  - 10.3.1 Adapts to changes in the project environment to minimize adverse project impacts
  - 10.3.2 Demonstrates flexibility towards changes that benefit the project
  - 10.3.3 Takes positive actions to capitalize on opportunities or to resolve present problems
  - 10.3.4 Enables a change-friendly environment by fostering continuous learning
  - 10.3.5 Acts as a change agent

- 10.4 Uses assertiveness when necessary
  - 10.4.1 Takes initiative when required, assuming calculated risks to expedite project delivery
  - 10.4.2 Prevents inconclusive discussion, makes a decision, and takes appropriate action
  - 10.4.3 Shows persistence and consistency in actions
  - 10.4.4 Makes timely decisions based on facts while managing ambiguity
- 11.0 Professionalism
  - 11.1 Demonstrates commitment to the project
    - 11.1.1 Understands and actively supports the project's and organization's mission and goals
    - 11.1.2 Cooperates with all stakeholders to achieve project objectives
    - 11.1.3 Makes sacrifices where necessary to move project forward
  - 11.2 Operates with integrity
    - 11.2.1 Adheres to all legal requirements
    - 11.2.2 Works within a recognized set of ethical standards
    - 11.2.3 Seeks to avoid and discloses any possible conflict of interests to all stakeholders
    - 11.2.4 Maintains and respects confidentiality of sensitive information
    - 11.2.5 Respects the intellectual property of others
  - 11.3 Handles personal and team adversity in a suitable manner
    - 11.3.1 Maintains self-control in all situations and responds calmly
    - 11.3.2 Admits shortcomings and explicitly accepts responsibility for failures
    - 11.3.3 Learns from mistakes to improve future performance
  - 11.4 Manages a diverse workforce
    - 11.4.1 Develops elements of trust and respect within the project environment
    - 11.4.2 Ensures team's adherence to cultural issues, legal requirements, and ethical values
    - 11.4.3 Respects personal, ethnic, and cultural differences
    - 11.4.4 Creates an environment of confidence and respect for individual differences
  - 11.5 Resolves individual and organizational issues with objectivity
    - 11.5.1 Respects the organizational framework for running projects
    - 11.5.2 Balances individual interest with organizational interest
    - 11.5.3 Assigns team members in an unbiased way to appropriate tasks

(PMI, 2007)

Appendix F: PMCD Competency Element Descriptors - Interview References

PROJECT MANAGEMENT COMPETENCE
by PMCD Dimensions

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
PL	PS	FM	ATM	VR	TTM	TTM	TEU	TEU	TEU

B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
PL	PS	FM	ATM	VR	TTM	TTM	TEU	TEU	TEU

	References from Project-A											References from Project-B											Grand
Dimensions	A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	Total	B01	B02	B03	B04	B05	B06	B07	B08	B09	B10	Total	Total
1. **Knowledge**	23	6	17	2	5	2	4	3	7	2	**71**	4	7	8	8	8	4	5	7	3	5	**59**	130
2. PM Knowledge Areas	6	3	12	2	3	1	3	3	5	2	**40**	3	3	7	7	7	3	2	4		2	**38**	78
3. Integration Management			1								**1**	1	2			1			1			**5**	6
4. Scope Management	3			1	2	1	1	1	1	1	**11**	1	1	3	2	1	1	1	2		2	**14**	25
5. Time Management	2						1	1			**4**				2	2	2					**6**	10
6. Cost Management		1	2						1		**4**												4
7. Quality Management														3								**3**	3
8. Human Resources Management														1	1							**2**	2
9. Communications Management				1			1	1	2	1	**6**							1	1			**2**	8
10. Risk Management		1	6		1				1		**9**	1										**1**	10
11. Procurement Management	1	1	3								**5**				2	3						**5**	10
12. Application Area (Enterprise Tech)	6	2	2		1	1			2		**14**		2	1			1	2	2	1		**9**	23
13. Project Environment (IHE&LAGCC)	7	1	3		1		1				**13**	1	2		1	1		1	1	2	3	**12**	25
14. General Management	4										**4**												4
15. **Performance**	3	1	7	1	3	1		2	2	1	**21**	4	4	5	1	3	2	1	3	1	4	**28**	49
16. Initiating a Project	1		2		1						**4**	1	2	2		1						**6**	10
17. Planning a Project	2		3	1	2	1		1	1	1	**12**	1					1	1	1			**4**	16
18. Executing a Project			1								**1**	1		2	1	2	1				2	**9**	10
19. Monitoring and Controlling a Project			1						1		**2**		1	1					1	1	2	**6**	8
20. Closing a Project												1	1						1			**3**	3
21. **Personal**	17	1	2	2	5			1	1		**29**	4		1	3	1	3	1	1		5	**19**	48
22. Communicating	1			1	1			1	1		**5**				2	1	1		1		2	**7**	12
23. Leading	3		1		2						**6**	1		1	1		1				1	**5**	11
24. Managing	1		1		2						**4**										1	**1**	5
25. Cognitive Ability	2										**2**	1										**1**	3
26. Effectiveness	3										**3**	2						1			1	**4**	7
27. Professionalism	6	1		1							**8**						1					**1**	9

Appendix G: Project-A: Evidence of Outcome

Equipment Inventory Summary

LaGuardia Community College - Campus Phone Inventory Summary - 1/10/2010

Location Bldg/Floor	DES	DN	Conf. Phones	Model 3902	Brackets	Model 3903	Model 3904	Model 3905	IP	TTY Phones
MB	17	23		59	12	111	23	7		
M1	10	3		83	25	52	26	11		
M2	5	0		21	5	55	2			
M3	2	1		8	0	33	2			
M4	9			1	0	43	9		6	
L2	0			0	0		0			
E1	7	6	1	88	4	51	21			
E2	13	1	2	170	30	49	31	4		
E3	2	2		62	25	8	5			
E4	8	2	2	5	2	59	20			
E5	13	2	6	12	4	37	29			
Cmezz				4					4	
C2-1										
C2-3				70		20	3			
C3-1	5	4	1	36	9	52	7			
C3-2	22	2	1	69	14	109	30		3	11
C3-3	12	2	1	40	9	55	31			
C3-4	2	0	0	43	3	27	2			
C3-7	2	0	0	26	4	15	3		46	
C3-8	0			1	0	0	0			
C3-9	3	1		2	0	17	13	12		
Extra				50		50	50			
Con Edison		1								
Aux		1								
TOTAL	**132**	**51**	**14**	**850**	**146**	**843**	**307**	**34**	**59**	**11**

Nortel Switch Configuration

```
CEQU
  SUPL V004 V008 V012 V016
       V020 V024 V028 V032
       V036 V040 V044 V048
       V052 V056 V060 V064
       V072 V076 V100 N104
  SUPC
  SUPF
  XCT
  CONF
  MGTDS         IPMG  IPMG_TYPE

          190  076  1   MGC
<===============   These are gateways with various cards.
          192  072  0   MGC
          194  072  1   MGC
          196  076  0   MGC
          198  064  0   MGC
          200  004  0   MGC
          202  004  0   MGC
          204  008  0   MGC
          206  008  0   MGC
          208  012  0   MGC
          210  016  0   MGC
          212  020  0   MGC
          214  024  0   MGC
          216  028  0   MGC
          218  032  0   MGC
          220  036  1   MGC
          222  036  0   MGC
          224  040  0   MGC
          226  044  0   MGC
          228  048  0   MGC
          230  052  0   MGC
          232  056  0   MGC
          234  060  0   MGC
          236  040  1   MGC
          238  044  1   MGC
          240  048  1   MGC
          242  052  1   MGC
          244  056  1   MGC
          246  060  1   MGC
  MGCONF        IPMG  PORTS  IPMG_TYPE
          191  076  1   30    MGC
          193  072  0   30    MGC
          195  072  1   30    MGC
          197  076  0   30    MGC
          199  064  0   30    MGC
          201  004  0   30    MGC
          203  004  0   30    MGC
          205  008  0   30    MGC
          207  008  0   30    MGC
          209  012  0   30    MGC
          211  016  0   30    MGC
          213  020  0   30    MGC
          215  024  0   30    MGC
          217  028  0   30    MGC
```

```
        219  032  0   30    MGC
        221  036  1   30    MGC
        223  036  0   30    MGC
        225  040  0   30    MGC
        227  044  0   30    MGC
        229  048  0   30    MGC
        231  052  0   30    MGC
        233  056  0   30    MGC
        235  060  0   30    MGC
        237  040  1   30    MGC
        239  044  1   30    MGC
        241  048  1   30    MGC
        243  052  1   30    MGC
        245  056  1   30    MGC
        247  060  1   30    MGC
IPCONF       NODE
IPTONE       NODE

DLOP  NUM DCH FRM TMDI LCMT YALM T1TE TRSH MG_CARD
 TRK  086 24  D4  YES  AMI  DG2  0    00 060  0  02
 PRI  081 24  ESF YES  B8S  FDL  0    00 004  0  02
    <===============   These are PRI's
      082 24  ESF YES  B8S  FDL  0    00 004  0  03
      083 24  ESF YES  B8S  FDL  0    00 060  1  01
      084 24  ESF YES  B8S  FDL  0    00 060  0  01
      085 24  ESF YES  B8S  FDL  0    00 060  0  03
      087 24  ESF YES  B8S  FDL  0    00 060  1  02
      088 24  ESF YES  B8S  FDL  0    00 004  0  01
      089 24  ESF YES  B8S  FDL  0    00 064  0  02
      091 24  ESF YES  B8S  FDL  0    00 032  0  04
MISP         MG_CARD
EXT0  3PE
EXT1  3PE
MCFN  006 MB
```

Call Center Information Guide Index

Index

Information for Call Center Agents

Information for Call Center Supervisors

Classroom ACD Codes

College Phone Use Guide for Faculty

To provide a direct connection between faculty members and the college department that provides specific support functions, a phone has been installed in every Smart Classroom. These phones have been programmed to provide routing to specific phone numbers based on staff assignments and hours of operation for the supported function when the specific phone button is pressed. The instructions will be mounted near the phone unit in each classroom for ease of reference. Those codes are provided here to introduce the concept prior to teaching in the Smart Classroom. These phones are restricted to campus use only with the exception of having the ability to **dial 911 at any time**. At the same time 911 is notified, Public Safety will also be notified so that they will know the specific location on campus that dialed 911.

0	**Campus Security**	Any facilities or personal emergency scenario that presents a danger or high risk situation for any individual at the college.
#	**Dial a LAGCC Campus Phone**	Contact your department for some specific information or supply needed to teach. Or dial any extension in college. Follow prompts to look up extensions.
1	**Cleaning**	Spills, debris, or other situations that need a cleaning person.
2	**Maintenance**	Electricity, lighting, temperature, fumes, leaks, any non computer room structures (whiteboards, screens, etc.)
3	**Web Attendance**	Login issues, software problems, other concerns with using web attendance in the classroom.
4	**Office of Student Services**	Any student personal issue that needs to be addressed immediately, including disabled student accommodation needs.
5	**Blackboard Course Mgmt. Support**	Access or usage issues with Blackboard at CUNY or LaGuardia
6	**ePortfolio**	Questions regarding placement of assessment data.
7	**Other Computer Related**	Any issues or problems with Projector, Computer Hardware, Printers/Accessories, Network Connectivity, and Software.
8	**Registrar**	Room conflict or student roster issues.

LAGUARDIA COMMUNITY COLLEGE CUNY

Appendix H: Project-B: Evidence of Outcome

Sample Audit

SunGard Bi-Tech DegreeWorks Audit — Page 1 of 2

LaGuardia Community College

☑ Completed ☐ Not Completed ☑ In Progress ☒ See Advisor

Detailed Advice AA161386 as of 08/05/04 17:04

Student	BROWN , CHARLIE	**Major**	ADMIN ASSISTANT
Group	Continuing	**Catalog Year**	2001-2002
Cumulative GPA	2.867	**Status**	Day
Academic Status	Satisfactory	**Advisor**	Not Assigned
Residence Code	934	**Advisement**	Not Required
Financial Aid	No	**College Discovery**	N/A
Initial Reading Code	0046	**Retest Reading**	N/A
Initial Writing Code	0078	**Retest Writing**	E
Initial Math Code	0044	**Retest Math**	N/A
CPE Message	CPE taken 1 time.	**Registration Appointment**	Term: Fall 2003 Appointment Date: 05/28/2003

Developmental Skills & General Requirements — Catalog Year: 2001-2002 Credits Required : 60 Credits Applied : 61

☑ CUNY Reading Requirement Completed					
☑ CUNY Math Requirement Completed					
☑ CUNY Writing Requirement Completed					
☐ Developmental Writing Requirement-ESR098					
☑ ESR III and IV for Select Readers	ESR 098 ESR 099	ESL 3 SELECT READERS ESL IV SEL READERS	A @	0 0	Fall 2001 Fall 2001
☐ Basic Writing: EN_ 099					
Still Needed	Need to Pass CUNY ACT Test after taking ENG099				
☑ Developmental Math Requirement:Mat 096					
☑ Mathematics in Action II:Mat 096	MAT 096	MATH IN ACTION II	A	0	Fall 2001
☑ CUNY Proficiency Examination	Noncourse	CPE P	University Proficiency Exam		
All students are required to take the CPE Test upon registering for their 45th credit. Students must have passing ACT scores and a 2.00 GPA to take the CPE Test. Students are allowed three attemps to pass the CPE Test, and are required to pass the test to graduate.					
☑ GPA Requirement met					

College Preparatory Initiative

You may earn CPI units by submitting your GED scores and/or High School Transcript to The Registrar's Office located in E-242.

☐ CPI requirements 2000 to Present					
☑ English 2000-Present	ENG 101	COMPOSITION I	C+	3	Spring 2002
☑ Foreign Language 2000-present	CPI LNG CPI LNG	CPI HIGH SCHOOL UNIT FOR LNG CPI HIGH SCHOOL UNIT FOR LNG		0 0	Fall 2001 Fall 2001
☐ Performing & Visual Arts 2000-present					
Still Needed	1 Class in HUA 101, 103, 110, 120, 130, HUC 106, 170, 180, 190, HUH 100, HUM 110, 140, 151, 155, 160, 165, 170, 180, HUN 192, 245, HUP 101, HUR 101				
☑ Mathematics 2000-Present	CPI MAT	CPI HIGH SCHOOL UNIT FOR MAT		0	Fall 2001
☐ Science 2000-present					
Still Needed	2 Classes in SCB 101, 201, 202, 203, 204, 208, 209, SCC 101, 140, 200, 201, 202, SCP 101, 140, 201, 202, 240, 241, SCS 099, CIS 241, 242				
☑ Soc Science 2000-present	SSS 100 CPI SSS CPI SSS CPI SSS	INTRO TO SOCIOLOGY CPI HIGH SCHOOL UNIT FOR SSS CPI HIGH SCHOOL UNIT FOR SSS CPI HIGH SCHOOL UNIT FOR SSS	C-	3 0 0 0	Fall 2002 Fall 2001 Fall 2001 Fall 2001

Major in Administrative Assistant - AAS

Still Needed: 2 Credits needed

☑ New Student Seminar Exempted					

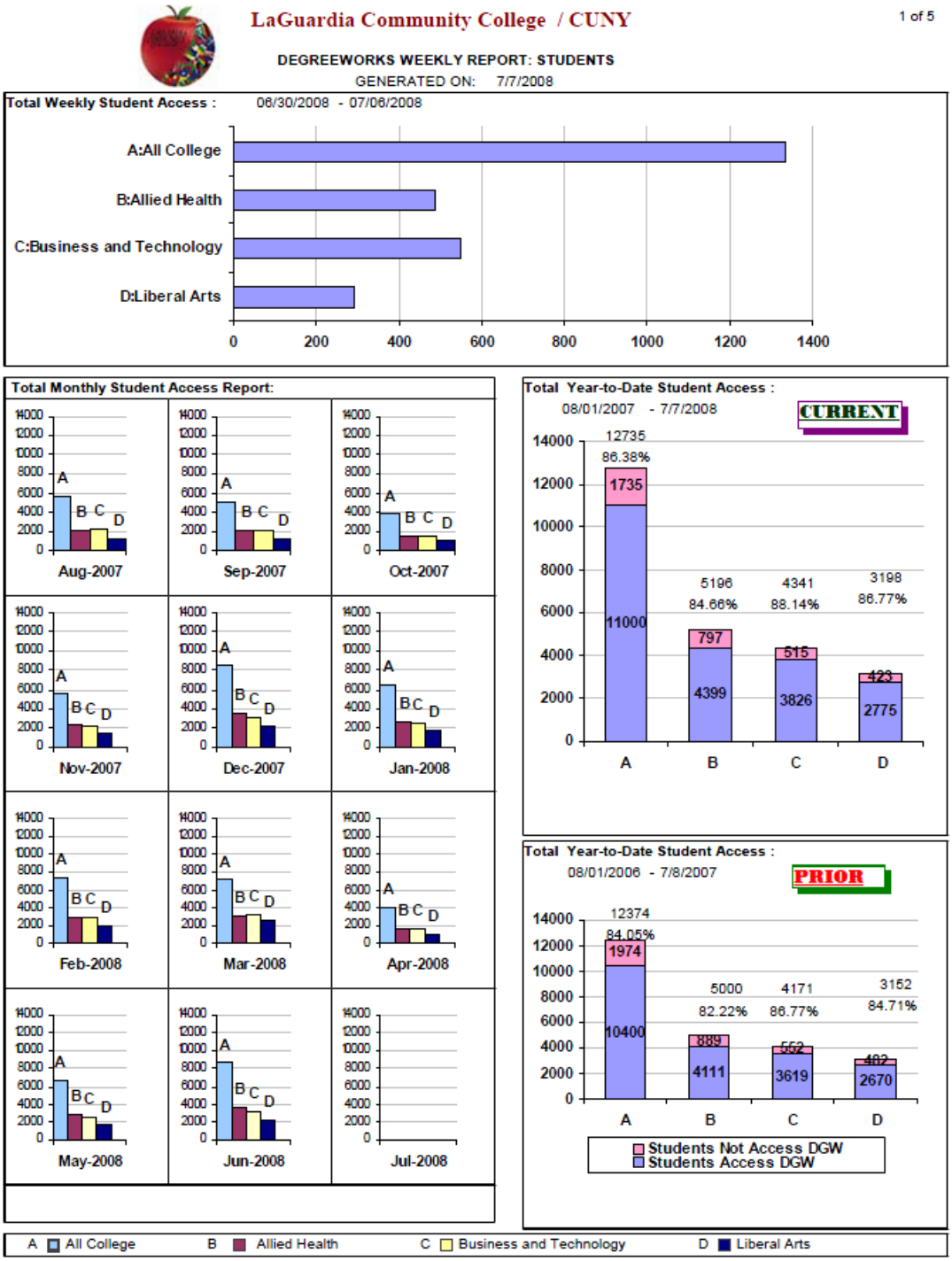
☑ ENGLISH:6 credits					
☑ Composition I	ENG 101	COMPOSITION I	C+	3	Spring 2002
☑ Writing Through Lit	ENG 102	WRITING THRU LIT	B	3	Fall 2003
☑ HUMANITIES: 3 credits					
☑ Oral Communication	HUC 101	ORAL COMMUNICATION	B-	3	Spring 2002
☑ SOCIAL SCIENCE: 3 credits					
☑ Introduction to Sociology	SSS 100	INTRO TO SOCIOLOGY	C-	3	Fall 2002
☐ ACCOUNTING/MANAGERIAL STUDIES: 30 credits					
☑ Essential Computer Skills	AMO 116	COMPUTER SKILLS	CR	2	Fall 2001
☑ Word Processing I	AMO 155	WORD PROC I	A	3	Fall 2002
☑ Word Processing II	AMO 156	WORD PROC II	A-	3	Spring 2003
☐ Business Communications					
Still Needed	3 Credits in AMO 260				
☑ Electronic Office Procedures	AMM 116	E-BUSINESS	C+	3	Fall 2002
☑ Principles of Accounting I	AMA 111	PRIN OF ACCOUNTING 1	A-	4	Spring 2002
☑ Accounting Appl for Microcomputer	AMA 130	ACCT APL MICRO	D+	3	Fall 2002
☑ Introduction to Business	AMM 101	INTRO TO BUSINESS	B-	3	Spring 2002
☑ Business Law I	AMM 110	BUSINESS LAW 1	B+	3	Fall 2002
☐ Accounting & Managerial Electives	AMA 112	ACCOUNTING 2	C+	4	Spring 2003
Still Needed	Any Acctg & Managerial Studies Dept Courses				
☑ COMPUTER INFORMATION SYSTEMS: 3 credits					
☑ Intr to Computers & their Applications	CIS 100	INTRO TO COMPUTERS	B	3	Spring 2002
☑ COOPERATIVE EDUCATION: 6 credits					
☑ Gateway to the Workplace	CEP 100	CO-OP ED: GATEWAY	A-	1	Spring 2003
☑ Part-Time Internship	CEP 151	CO-OP P/T INTERNSHIP	A-	2	Spring 2003
☑ Full-Time Internship	CEP 201	F/T CO-OP INTERNSHIP	B+	3	Fall 2003
☑ **Urban Study Course**					
☑ Urban Study Requirement	SSN 187	URB STD-URBAN SOC	A	3	Spring 2003
☑ **Math/Science Elective-Liberal Arts**					
☑ Math/Science Elective-Liberal Arts	SCH 150	DRUGS & BEHAVIOR	D	3	Fall 2003
☑ **Liberal Arts Electives - 6 credits**					
☑ LIBERAL ARTS ELECTIVE	HUP 102 SSN 187	CRITICAL THINKING URB STD-URBAN SOC	B- A	3 3	Fall 2003 Spring 2003

Courses Not Counted Towards Your Degree Requirements, but Included in Cumulative GPA				
CIS 172	PRESENTATION GRAPHIC	A-	3	Spring 2003
CPI ENG	CPI HIGH SCHOOL UNIT FOR ENG		0	Fall 2001
CPI MAT	CPI HIGH SCHOOL UNIT FOR MAT		0	Fall 2001

Notes

Note Text	Created By	Create Date
July 8th	BRAD ORCUTT	07/08/2004
This a new note I did not select hide from student	BRAD ORCUTT	06/14/2004
NOTE NOT HIDDEN	DGW Manager	12/09/2003

Sample Usage Report



DGW-WKLY-ST-2008-0707.pdf

As of November 2006 Business (C) and Technology (E) are combined into Business and Technology (C)

Sample Scribe Block Inventory

#	Block Title	Catalog Year From	Catalog Year To	Reg Type	Type Value	Req ID
1	AA in Liberal Art-SocSci & Hum ORIGINAL	20032004	99999999	OTHER	RA081ORIG	RA000237
2	AA in Liberal Arts/Soc Sci & Hum ORIGINA	19992000	20022003	OTHER	RA080ORIG	RA000236
3	COOP: Full-Time Internship	19981999	99999999	OTHER	COOPFULL	RA000212
4	COOP: Gateway to The Workplace	19981999	99999999	OTHER	COOPGATE	RA000213
5	COOP: Part-Time Internship	19981999	99999999	OTHER	COOPHALF	RA000214
6	College Preparatory Initiative	19992000	99999999	OTHER	CPI	RA000003
7	Cooperative Education	19981999	99999999	OTHER	COOP3CR	RA000211
8	Cooperative Education	19981999	99999999	OTHER	COOP	RA000166
9	Degree in Associate in Applied Science	99999999	99999999	DEGREE	03	RA000038
10	Degree in Associate in Arts	99999999	99999999	DEGREE	01	RA000037
11	Degree in Associate in Science	99999999	99999999	DEGREE	02	RA000039
12	Degree in Certificate Program	99999999	99999999	DEGREE	04	RA000040
13	Developmental Skills & General Requireme	19992000	99999999	OTHER	DEV3	RA000169
14	English/Humanities Elective-Liberal Arts	20032004	99999999	OTHER	ENGHUM	RA000102
15	English/Humanities Elective-Liberal Arts	20022003	20022003	OTHER	ENGHUM	RA000101
16	English/Humanities Elective-Liberal Arts	19992000	19992000	OTHER	ENGHUM	RA000005
17	English/Humanities Elective-Liberal Arts	20002001	20012002	OTHER	ENGHUM	RA000100
18	General Ed Courses-Nursing	20002001	99999999	OTHER	GENUR	RA000159
19	General Ed Courses-Nursing	19992000	19992000	OTHER	GENUR	RA000158
20	General Ed Courses-Occupational Therapy	19992000	99999999	OTHER	GEOT	RA000148
21	General Ed Courses-Physical Therapist As	20032004	99999999	OTHER	GEPH	RA000154
22	General Ed Courses-Physical Therapist As	20022003	20022003	OTHER	GEPH	RA000153
23	General Ed Courses-Physical Therapist As	20012002	20012002	OTHER	GEPH	RA000152
24	General Ed Courses-Physical Therapist As	20002001	20002001	OTHER	GEPH	RA000151
25	General Ed Courses-Physical Therapist As	19992000	19992000	OTHER	GEPH	RA000150
26	General Ed Courses-Veterinary Technology	19992000	99999999	OTHER	GEVET	RA000156
27	Humanities Elective - Liberal Arts	19981999	99999999	OTHER	HUM_PLS	RA000230
28	Humanities Elective - Liberal Arts	19992000	20002001	OTHER	HUM	RA000004
29	Humanities Elective - Liberal Arts	20032004	99999999	OTHER	HUM	RA000113
30	Humanities Elective - Liberal Arts	20012002	20012002	OTHER	HUM	RA000111
31	Humanities Elective - Liberal Arts	20022003	20022003	OTHER	HUM	RA000112
32	Humanities/Soc Sci Elective-Liberal Arts	19992000	19992000	OTHER	HUMSOC	RA000006
33	Humanities/Soc Sci Elective-Liberal Arts	20012002	20012002	OTHER	HUMSOC	RA000104
34	Humanities/Soc Sci Elective-Liberal Arts	20002001	20002001	OTHER	HUMSOC	RA000103
35	Humanities/Soc Sci Elective-Liberal Arts	20032004	99999999	OTHER	HUMSOC	RA000106
36	Humanities/Soc Sci Elective-Liberal Arts	20022003	20022003	OTHER	HUMSOC	RA000105
37	Key Courses-Nursing	19992000	99999999	OTHER	KEYNUR	RA000157
38	Key Courses-Occupational Therapy	19992000	99999999	OTHER	KEYOT	RA000147
39	Key Courses-Physical Therapist Assistant	19992000	99999999	OTHER	KEYPH	RA000149
40	Key Courses-Veterinary Technology	19992000	99999999	OTHER	KEYVET	RA000155
41	LIBERAL ARTS ELECTIVES 2 CREDITS	19981999	99999999	OTHER	LA_2-3_CR	RA000162
42	LIBERAL ARTS ELECTIVES 5 - 6 CREDITS BLO	19981999	99999999	OTHER	LA_5-6_CR	RA000163
43	Liberal Arts Elective - 1 credit	19981999	99999999	OTHER	LA_1CR	RA000226
44	Liberal Arts Elective - 2 credits	19981999	99999999	OTHER	LA_2CR	RA000221
45	Liberal Arts Elective 4 credits	19981999	99999999	OTHER	LA_4CR	RA000222
46	Liberal Arts Electives	20032004	99999999	OTHER	LA	RA000110
47	Liberal Arts Electives	20012002	20012002	OTHER	LA	RA000108
48	Liberal Arts Electives	20022003	20022003	OTHER	LA	RA000109
49	Liberal Arts Electives	20002001	20002001	OTHER	LA	RA000107
50	Liberal Arts Electives	19992000	19992000	OTHER	LA	RA000010
51	Liberal Arts Electives - 16 credits	19981999	99999999	OTHER	LA_16CR	RA000227
52	Liberal Arts Electives - 5 credits	19981999	99999999	OTHER	LA_5CR	RA000224
53	Liberal Arts Electives - 6 credits	19981999	99999999	OTHER	LA_6CR	RA000225
54	Liberal Arts Electives 3 credits	19981999	99999999	OTHER	LA_3CR	RA000223
55	Liberal Arts Electives: 9 credits	19981999	99999999	OTHER	LA_9CR	RA000165
56	Liberal Arts Introductory Cluster Core	19992000	99999999	OTHER	LACORE	RA000011
57	Major in Accounting - AAS	19992000	99999999	MAJOR	021	RA000012
58	Major in Accounting/Computer - AAS	19992000	99999999	MAJOR	022	RA000013
59	Major in Administrative Assistant - AAS	19992000	20012002	MAJOR	361	RA000014
60	Major in Administrative Assistant - AAS	20022003	99999999	MAJOR	361	RA000015
61	Major in Business Administration AS	19992000	99999999	MAJOR	081	RA000016
62	Major in Business Finance AAS	19992000	99999999	MAJOR	732	RA000018
63	Major in Business Management AAS	20002001	20012002	MAJOR	731	RA000030
64	Major in Business Management AAS	20022003	99999999	MAJOR	731	RA000031
65	Major in Business Management AAS	19992000	19992000	MAJOR	731	RA000029
66	Major in Child Development AA	19992000	20022003	MAJOR	141	RA000215
67	Major in Child Development AA	20032004	99999999	MAJOR	141	RA000216
68	Major in Comm Foodservice Mgmt - AAS	19992000	99999999	MAJOR	261	RA000017
69	Major in Comm Photo-Digital	20032004	99999999	MAJOR	173	RA000160
70	Major in Comm Photo-Fine Arts	20032004	99999999	MAJOR	174	RA000161
71	Major in Commercial Photography AAS	19992000	20022003	MAJOR	171	RA000032
72	Major in Commercial Photography AAS	20032004	99999999	MAJOR	171	RA000033

#	Block Title	Catalog Year From	Catalog Year To	Reg Type	Type Value	Req ID
73	Major in Commercial Photography - CERT	19992000	99999999	MAJOR	091	RA000043
74	Major in Comp Oper - Network Systems AA	19992000	19992000	MAJOR	812	RA000062
75	Major in Comp Oper - Network Systems AA	20032004	99999999	MAJOR	812	RA000067
76	Major in Comp Oper - Network Systems AA	20002001	20012002	MAJOR	812	RA000064
77	Major in Comp Oper - Network Systems AA	20012002	20022003	MAJOR	812	RA000066
78	Major in Comp Tech-Telecommunication AAS	19992000	99999999	MAJOR	962	RA000027
79	Major in Computer Operations AAS	20032004	99999999	MAJOR	811	RA000051
80	Major in Computer Operations AAS	19992000	19992000	MAJOR	811	RA000048
81	Major in Computer Operations AAS	20002001	20012002	MAJOR	811	RA000049
82	Major in Computer Operations AAS	20022003	20022003	MAJOR	811	RA000050
83	Major in Computer Science AS	20022003	99999999	MAJOR	251	RA000047
84	Major in Computer Science AS	19992000	20012002	MAJOR	251	RA000045
85	Major in Computer Technology AAS	19992000	99999999	MAJOR	961	RA000061
86	Major in Dietetic Technician AS	20012002	99999999	MAJOR	071	RA000070
87	Major in Dietetic Technician AS	19992000	20002001	MAJOR	071	RA000069
88	Major in EMT Paramedic AAS	19992000	20012002	MAJOR	831	RA000238
89	Major in EMT Paramedic AAS	20022003	99999999	MAJOR	851	RA000022
90	Major in Ed Assoc-Bilingual Child AA	19992000	99999999	MAJOR	751	RA000019
91	Major in Education Associate AA	19992000	99999999	MAJOR	981	RA000071
92	Major in Fine Arts AS	20012002	20012002	MAJOR	511	RA000079
93	Major in Fine Arts AS	19992000	19992000	MAJOR	511	RA000074
94	Major in Fine Arts AS	20002001	20002001	MAJOR	511	RA000075
95	Major in Fine Arts AS	20022003	20022003	MAJOR	511	RA000077
96	Major in Fine Arts AS	20032004	99999999	MAJOR	511	RA000078
97	Major in Gerontology AA	20032004	99999999	MAJOR	142	RA000218
98	Major in Gerontology AA	19992000	20022003	MAJOR	142	RA000217
99	Major in International Business AAS	19992000	99999999	MAJOR	733	RA000052
100	Major in Legal Secretary AAS	19992000	99999999	MAJOR	362	RA000097
101	Major in Lib Art-Social Sci & Humanities	19992000	20022003	MAJOR	371	RA000080
102	Major in Lib Art-Social Sci & Humanities	20032004	99999999	MAJOR	371	RA000081
103	Major in Lib Arts-Deaf Studies AA	20022003	20022003	MAJOR	373	RA000087
104	Major in Lib Arts-Deaf Studies AA	20032004	99999999	MAJOR	373	RA000088
105	Major in Lib Arts-International Studies	20002001	20022003	MAJOR	372	RA000082
106	Major in Lib Arts-International Studies	20032004	99999999	MAJOR	372	RA000083
107	Major in Lib Arts-Labor & Comm Org AA	20022003	99999999	MAJOR	375	RA000089
108	Major in Lib Arts-Math & Science AA	19992000	20022003	MAJOR	391	RA000091
109	Major in Lib Arts-Math & Science AA	20032004	99999999	MAJOR	391	RA000092
110	Major in Lib Arts-Media Studies AA	20032004	99999999	MAJOR	374	RA000085
111	Major in Lib Arts-Media Studies AA	20022003	20022003	MAJOR	374	RA000086
112	Major in Lib Arts-Theater & Comm AA	20022003	99999999	MAJOR	376	RA000208
113	Major in Media Technology AAS	20022003	99999999	MAJOR	271	RA000068
114	Major in Mental Health AA	19992000	20022003	MAJOR	143	RA000219
115	Major in Mental Health AA	20032004	99999999	MAJOR	143	RA000220
116	Major in Microcomp Sys & Appl AAS	20002001	20002001	MAJOR	451	RA000057
117	Major in Microcomp Sys & Appl AAS	19992000	19992000	MAJOR	451	RA000056
118	Major in Microcomp Sys & Appl AAS	20022003	99999999	MAJOR	451	RA000060
119	Major in Microcomp Sys & Appl AAS	20012002	20012002	MAJOR	451	RA000058
120	Major in Mortuary Science AAS	19992000	99999999	MAJOR	041	RA000093
121	Major in Nursing AAS	19992000	99999999	MAJOR	471	RA000023
122	Major in Occupational Ther Asst AS	19992000	99999999	MAJOR	541	RA000026
123	Major in Paralegal Studies AAS	19992000	99999999	MAJOR	571	RA000094
124	Major in Physical Ther Assist AAS	19992000	99999999	MAJOR	351	RA000096
125	Major in Programming & Systems AAS	20002001	20022003	MAJOR	201	RA000054
126	Major in Programming & Systems AAS	19992000	19992000	MAJOR	201	RA000053
127	Major in Programming & Systems AAS	20032004	99999999	MAJOR	201	RA000055
128	Major in School Foodservice Mgmt AS	19992000	99999999	MAJOR	991	RA000098
129	Major in Teacher Ed-Childhood Ed AA	19992000	99999999	MAJOR	112	RA000073
130	Major in Teacher Ed-Secondary Ed AA	19992000	99999999	MAJOR	111	RA000072
131	Major in Travel & Tourism AAS	19992000	99999999	MAJOR	741	RA000028
132	Major in Veterinary Tech AAS	19992000	99999999	MAJOR	401	RA000099
133	Major in Word Processing Spec - CERT	20002001	99999999	MAJOR	101	RA000042
134	Major in Word Processing Spec - CERT	19992000	19992000	MAJOR	101	RA000041
135	Math/Science Elective-Liberal Arts	19992000	99999999	OTHER	MATHSCI	RA000007
136	Mathematics: Liberal Arts Elective	19992000	99999999	OTHER	MATH	RA000008
137	Social Science Elective-Liberal Arts	20032004	99999999	OTHER	SOCS	RA000115
138	Social Science Elective-Liberal Arts	20002001	20022003	OTHER	SOCS	RA000114
139	Social Science Elective-Liberal Arts	19992000	19992000	OTHER	SOCS	RA000009
140	Social Science Requirements 9 Credits	19981999	99999999	OTHER	SOCSR	RA000201
141	TEST BLOCK BY KEITH	19981999	99999999	OTHER	SELECT	RA000168
142	Unrestricted Elective	19992000	99999999	OTHER	UNE	RA000128
143	Unrestricted Elective-2 credits	19992000	99999999	OTHER	UNE2	RA000200
144	Unrestricted Elective-3 credits	19992000	99999999	OTHER	UNE3	RA000205
145	Unrestricted Elective-4 credits	19992000	99999999	OTHER	UNE4	RA000203

#	Block Title	Catalog Year		Reg	Type	
		From	To	Type	Value	Req ID
146	Unrestricted Elective-5 credits	19992000	99999999	OTHER	UNE5	RA000202
147	Unrestricted Elective-6 credits	19992000	99999999	OTHER	UNE6	RA000206
148	Unrestricted Elective-9 credits	19992000	99999999	OTHER	UNE9	RA000204
149	Urban Block for Occupational Therapy	19992000	99999999	OTHER	URBAN	RA000190
150	Urban Studies block for Comp.Tech-Teleco	19992000	99999999	OTHER	URBAN	RA000181
151	Urban Study Block for Bilingual Eduacati	19992000	99999999	OTHER	URBAN	RA000185
152	Urban Study Block for Childhood Educatio	19992000	99999999	OTHER	URBAN	RA000183
153	Urban Study Block for Computer Tech	19992000	99999999	OTHER	URBAN	RA000197
154	Urban Study Block for Dietetic Techician	19992000	99999999	OTHER	URBAN	RA000182
155	Urban Study Block for Human Services-Chi	19992000	99999999	OTHER	URBAN	RA000186
156	Urban Study Block for Human Services-Ger	19992000	99999999	OTHER	URBAN	RA000187
157	Urban Study Block for Human Services-Men	19992000	99999999	OTHER	URBAN	RA000188
158	Urban Study Block for Nursing	19992000	99999999	OTHER	URBAN	RA000189
159	Urban Study Block for Physical Therapy	19992000	99999999	OTHER	URBAN	RA000191
160	Urban Study Block for School Foodservice	19992000	99999999	OTHER	URBAN	RA000193
161	Urban Study Block for Secondary Educatio	19992000	99999999	OTHER	URBAN	RA000184
162	Urban Study Block for travel & Tourism	19992000	99999999	OTHER	URBAN	RA000194
163	Urban Study Course	19992000	20012002	OTHER	URBAN	RA000001
164	Urban Study Course	19992000	20012002	OTHER	AC_URBAN	RA000232
165	Urban Study Course	20022003	99999999	OTHER	URBAN	RA000002
166	Urban Study Course for L.A.: Internation	19992000	99999999	OTHER	URBAN	RA000234
167	Urban Study Course for Liberal Arts Deaf	20022003	99999999	OTHER	URBAN	RA000233
168	Urban Study for Paralegal Studies	19992000	99999999	OTHER	URBAN	RA000196
169	Urban Study for Vet Tech	19992000	99999999	OTHER	URBAN	RA000195

Appendix I: Project-B: Project Process Documentation Examples

Project Schedule - Work Breakdown Structure

LaGuardia Community College - DegreeWorks Implementation

ID	Task Name	% Compl.	Duration	Start	Finish	Predecess	Res.Grp.	Resource Names	Comments
1	**Project Initiation**	**100%**	**15 days**	**9/15/03**	**10/3/03**				
2	Hand-off Transition call with client, sales staff, and DW Account Manager	100%	1 day	9/15/03	9/15/03				
3	Review contract	100%	1 day	9/15/03	9/15/03				
4	Review source documents for scribing	100%	1 day	9/15/03	9/15/03				
5	Schedule Software Installation and Project Launch meeting	100%	1 day	9/15/03	9/15/03				
6	Project Launch Meeting & Technical Orientation	100%	3 days	10/1/03	10/3/03				
7	**SunGard Scribe Catalog Requirements (PowerBoost)**	**100%**	**204 days**	**8/25/03**	**6/17/04**				
8	Obtain site specific coded values (UCX tables)-excel spreadsheet	100%	0.5 days	8/25/03	8/25/03		LAGCC-IT	Henry	
9	Create flow chart for block structure and matrix	100%	60 days	8/30/03	11/24/03	8	SunGard	Mary S.	
10	Scribe degree requirements for current catalog and four prior catalogs	100%	43 days	9/2/03	10/31/03	9	SunGard	Mary S.	
11	Scribing questions & answer cycle; make changes in blocks & other components	100%	134.25 days	9/15/03	6/17/04	58FF	SunGard	Mary F.	Completed at Block Maintenance Ownership Transfer to LAGCC
12	**Installation of DegreeWorks Software on Unix Server**	**100%**	**78.2 days**	**10/2/03**	**1/30/04**				
13	Implement SafetyNet VPN Device at LAGCC	100%	2 days	10/2/03	10/3/03		SunGard, LAGCC-IT	Aarron L., Ted	
14	Install Oracle 9i (Ent. Ed.) on Sun Solaris 8	100%	3 days	10/7/03	10/9/03	13	SunGard	Colin R.	Oracle Patches? Veritas Volume Manager?
15	Install Other PreRequisite Software (Forte C, Perl 5, Gnu C)	100%	11 days	10/8/03	10/23/03	14	LAGCC-IT	Ted	
16	Install DegreeWorks 7.3.3, MicroFocus COBOL, LaTex, & OmniAccess and Test Functionality	100%	3 days	10/24/03	10/28/03	15	SunGard	Colin R.	shp_entry hangs; does not impact progress
17	UCX table review and site configuration set-up	100%	1 day	10/29/03	10/29/03	16	SunGard	Veronica B.	
18	Implement Microsoft IIS Web Server and Configure for DegreeWorks (CGI Map, Port, etc.)	100%	1 day	10/28/03	10/29/03	16,17	LAGCC-IT, SunGard	Ted, Gianina, Colin R.	Temp installation 10/17; new server to be installed and tested prior to GoLive
19	Initiate System Management Activities (Daily, Weekly, Monthly, Semi-Annual, Annual, As-Needed)	100%	60 days	10/29/03	1/30/04	18	LAGCC-IT	Ted, Jairo, Billy	
20	Create Production Environment on Same Server as Test Environment	100%	3 days	1/21/04	1/23/04		SunGard, LAGCC-IT	Colin R., Jairo	Run RAD11/DAP22 twice (TEST & PROD)?
21	**Installation of PC software at client site.**	**100%**	**9 days**	**10/2/03**	**10/15/03**				
22	Provide PC Software (Scribe, Transit, SureCode)	100%	1 day	10/2/03	10/2/03		SunGard	Mary F.	
23	Install PC Software on Training Lab & Core Team PC's	100%	2 days	10/14/03	10/15/03	22	LAGCC-IT	Ted	Modify master config.ini & copy to PCs later (just before Scriber Training)
24	**Develop Bridge Extract**	**100%**	**153 days**	**10/6/03**	**5/18/04**				
25	Build Initial Bridge Extract File and Download to Unix (create BIF)	100%	13 days	10/6/03	10/23/03		LAGCC-IT	Alicia, Jose	Tables: 1-Student Master; 2-Primary Master; 3-Degree Detail; 4-Class Detail;
26	Import Initial Bridge Downloaded File (BIF) to DegreeWorks & Review Accuracy	100%	2 days	10/30/03	10/31/03	25,17	LAGCC-IT, SunGard	Alicia, Jose, Mary F.	
27	Setup & Test Bridge Extract on All Students	100%	20 days	1/2/04	1/30/04	26	LAGCC-IT	Jose	
28	Modify, Fine-Tune, & Finalize Bridge Extract Program	100%	120 days	11/3/03	5/18/04	54FF,26	LAGCC-IT	Alicia, Jose	Bridge changes need as requirements are fine tuned

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ID	Task Name	% Compl.	Duration	Start	Finish	Predecess	Res.Grp.	Resource Names	Comments
29	**Pre-Customization Focus Groups**	100%	**37.63 days**	**10/15/03**	**12/9/03**				
30	Establish User Focus Groups; Review Basic Functionality solicit feedback	100%	26 days	10/15/03	11/19/03		LAGCC-IT, LAGCC-EM,	Henry, Peter, Paul	Awaiting feedback
31	Prep & Hold Focus Groups "Before Session" - DGW Generic Demonstration, Feedback, etc.	100%	11.63 days	11/20/03	12/9/03	30	LAGCC-IT, LAGCC-EM	Brad, Olga, Alicia, Henry	1. Chairs; 2. Students; 3. Faculty & Counselors; 4 EMSD FrontLine
32	**SunGard Initial Test Requirement Blocks with Student Data**	100%	**3 days**	**11/3/03**	**11/5/03**				
33	Testing of scribed blocks and modification of blocks	100%	2 days	11/3/03	11/4/03	26	SunGard	Mary S., Mark N., Veronica B.	Was this done at FINISH date, or is there more to do?
34	Running WEB audits on selected sample students in specific degrees, majors, etc..	100%	1 day	11/5/03	11/5/03	18,26	SunGard	Mary S., Mark N., Veronica B.	Is this done?
35	**Create Overall LAGCC Test Plan**	100%	**15 days**	**10/20/03**	**11/7/03**				**Setup Separate Meeting**
36	Identify all programs to be tested	100%	2 days	10/20/03	10/21/03		LAGCC-EM	Olga	Other Resources?
37	Identify/document manual audit processes to compare with DGW automation	100%	5 days	10/22/03	10/28/03	36	LAGCC-EM	Olga	Departmental vs. Registrar; Degree Gap Process, Exception Mgmt., Advising, etc.
38	Determine selected/sample student records to test	100%	2 days	10/29/03	10/30/03	37	LAGCC-EM	Olga	Other Resources?
39	Identify Testers, Schedule, and Workload	100%	2 days	10/31/03	11/3/03	38	LAGCC-EM	Olga	Other Resources?
40	Develop documentation to guide testing processes and problem reporting/tracking	100%	4 days	11/4/03	11/7/03	39	LAGCC-EM	Olga	Other Resources?
41	**Scriber Training**	100%	**6 days**	**11/3/03**	**11/10/03**				**Dates Confirmed by Instructor (Mark Nichols)**
42	DegreeWorks Pre-Training Consulting	100%	1 day	11/3/03	11/3/03	33SS	SunGard	Mary F., Mark N.	
43	Scribe --PC based tool for entering and maintaining degree requirement information	100%	1 day	11/5/03	11/5/03	42	LAGCC-EM, LAGCC-IT	Olga, Linda, Norella, Jane,	
44	SureCode--PC based tool for entering and maintaining UCX data	100%	1 day	11/6/03	11/6/03	43	LAGCC-EM, LAGCC-IT	Olga, Linda, Norella, Jane,	
45	Transit--PC based tool for batch reporting and printing of batch audits	100%	1 day	11/7/03	11/7/03	44	LAGCC-EM, LAGCC-IT	Olga, Linda, Norella, Jane,	
46	DegreeWorks Post Training Consulting	100%	1 day	11/10/03	11/10/03	45	SunGard	Mary F., Mark N.	
47	**Web Functionality Training**	100%	**5 days**	**12/8/03**	**12/12/03**				**Confirmed training for core team only; 12/9-11**
48	DegreeWorks Pre-Training Consulting	100%	1 day	12/8/03	12/8/03		SunGard	Mary F., Mark N.	
49	DegreeWorks on the Web	100%	0.5 days	12/9/03	12/9/03	48	LAGCC-EM	Olga, Linda, Norella, Jane,	
50	Running and reviewing audits	100%	1 day	12/9/03	12/10/03	49	LAGCC-EM	Olga, Linda, Norella, Jane,	
51	Exception management	100%	1 day	12/10/03	12/11/03	50	LAGCC-EM	Olga, Linda, Norella, Jane,	
52	Student Planner	100%	0.5 days	12/11/03	12/11/03	51	LAGCC-EM	Olga, Linda, Norella, Jane,	
53	DegreeWorks Post Training Consulting	100%	1 day	12/12/03	12/12/03	52	SunGard	Mary F., Mark N.	
54	**Registrar Testing & Modifications**	100%	**150 days**	**11/10/03**	**6/17/04**				
55	Majors' Courses Verification	100%	85 days	1/8/04	5/7/04		LAGCC-EM	Olga	Waiting on Math Major.

LaGuardia Community College - DegreeWorks Implementation

ID	Task Name	% Compl.	Duration	Start	Finish	Predecess	Res.Grp.	Resource Names	Comments
56	Review, Test, and Modify Scribe Blocks	100%	28 days	11/10/03	12/19/03	45,40,17,2	LAGCC-EM	Olga, Linda, Norella, Jane,	151 blocks as of 12/19
57	Run Web audits on selected sample students in specific degrees, majors, etc.	100%	80 days	1/22/04	5/13/04	56	LAGCC-EM	Olga, Linda, Norella, Keith	**Combined Remediation Process (Registrar / Chairs / Counselors)**
58	*Block Ownership Letter. Transfer of block maintenance to client.*	*100%*	*0 days*	*6/17/04*	*6/17/04*	*57*	*SunGard*	*Mary F.*	*at point of OnLine Support training with IT staff*
59	**Pilot DGW as Registration Advisement Tool**	**100%**	**13 days**	**2/17/04**	**3/4/04**				**1-2 Counselors in separate room during registration (50-60 students)**
60	Prepare Pilot Reference Guide, Feedback Method, & Logistics (location, logins, etc.)	100%	3 days	2/17/04	2/19/04				Bruce to identify counselors via Joan; Who from Team will be present?
61	Train Designated Counselors on DegreeWorks and Pilot Process	100%	1 day	2/23/04	2/23/04	62SS-1 day			Fine tune date based on scheduling with counselors
62	Hold DGW Pilot During Registration in Separate Room (select students from line)	100%	3 days	2/24/04	2/26/04				Rm E144 on 2/25 & 26; 2/24 room to be determined
63	Remediate Counselors' Audit Issues & Document Work Process Recommendations	100%	5 days	2/27/04	3/4/04	62	LAGCC-EM, LAGCC-IT	Olga, Alicia	Items added to Testing Issue Log
64	**Program Verification - Academic Counselors**	**100%**	**21 days**	**4/8/04**	**5/6/04**				**Hardcopy Transcripts and DegreeAudi**
65	Prepare Audits Packets for Counselors Review & Arrange "Festival" Logistics	100%	5 days	4/8/04	4/14/04	66SS-5 days	LAGCC-EM, LAGCC-IT	Olga, Brad	Bruce to identify counselors; Olga to identify (2) Registrar Staff at Festival
66	Hold Counselors' "Festival" Audit Review & Feedback	100%	16 days	4/15/04	5/6/04		LAGCC-EM	Olga, Linda	Completion deemed at 60 reviewed with LibArts to be done separate
67	**Program Verification - Academic Chairs & Designees**	**100%**	**47 days**	**4/6/04**	**6/9/04**				
68	Prepare Audits Packets (pre-test Audits), Arrange "Festival" Logistics, and Brief Program Directors	100%	4 days	4/6/04	4/9/04	57	LAGCC-EM, LAGCC-IT	Olga, Brad	**Briefing Sessions to Be Scheduled!!!**
69	Chairs' Self Review of Audits & Sign-Offs	100%	43 days	4/12/04	6/9/04	68			See Issues Log
70	Hold Chairs' "Festival" Audit Review & Sign-Offs	100%	1 day	4/20/04	4/20/04	69	LAGCC-EM	Olga, Linda	Limited attendance, followup meetings established; need target completion date
71	Remediate Outstanding Issues ("Can Live With") to Registrar standards	100%	50 days	5/14/04	7/29/04	57,66,70	LAGCC-EM, LAGCC-IT	Olga, Alicia	See Issues Log. Major issues = CPI and Exclusive/Non-Exclusive
72	**Performance Benchmarking & Simulation**	**100%**	**142 days**	**11/17/03**	**6/11/04**	**71**	**LAGCC-IT**	**Ted, Alicia**	**Install/Implement Production Web Server before Benchmarking**
77	***Audit Accuracy Verification Complete***	***0%***	***0 days***	***6/11/04***	***6/11/04***	***72***	***LAGCC-EM***	***Olga***	
78	**Prepare for Student Web Audit Availability**	**100%**	**35.5 days**	**6/4/04**	**8/2/04**				**Review Target Dates**
79	Setup/Move Users Logins to PRODUCTION environment	100%	10 days	6/4/04	6/17/04		LAGCC-IT	Jose	Student Ids completed. Alicia to determine list from SIMS users.
80	Initiate PROD Environment Update & Maintenance Schedule (Blocks, UCX, Bridge, Web, etc.)	100%	7 days	6/18/04	7/15/04		LAGCC-IT	Jairo, Jose	Manual update works. Need to automate and assure nightly process.
81	Develop Student Training Materials & Methods	100%	22 days	6/7/04	7/9/04		LAGCC-IT, LAGCC-EM	Brad, Olga, Linda	Intro. Slide Show, OnLine Help, 1-page FAQs/Training Sheet
82	Develop Advisor Reference Guide & Training Materials	100%	8 days	6/28/04	7/9/04		LAGCC-EM	Olga, Linda	
83	Establish Initial Web Audit Support Process	100%	16 days	6/21/04	7/15/04		LAGCC-EM	Olga, Peter	Weekly Meetings with Peter Jordan
84	*Verify PROD Environment Audits equal TEST Environment Audits*	*100%*	*0 days*	*7/29/04*	*7/29/04*	*77*	*LAGCC-IT*	*Brad*	*Final Bridge & UCX/Block Copy Before*
85	Link DegreeWorks PROD to Web Site	100%	0.5 days	8/2/04	8/2/04	84	LAGCC-IT	Gianina, Brad	
86	***Go Live (Audits Available) - Basic Functionality***	***100%***	***0 days***	***8/2/04***	***8/2/04***	***85***			
87	**Rollout**	**97%**	**140 days**	**6/8/04**	**12/29/04**				**Review Target Dates**

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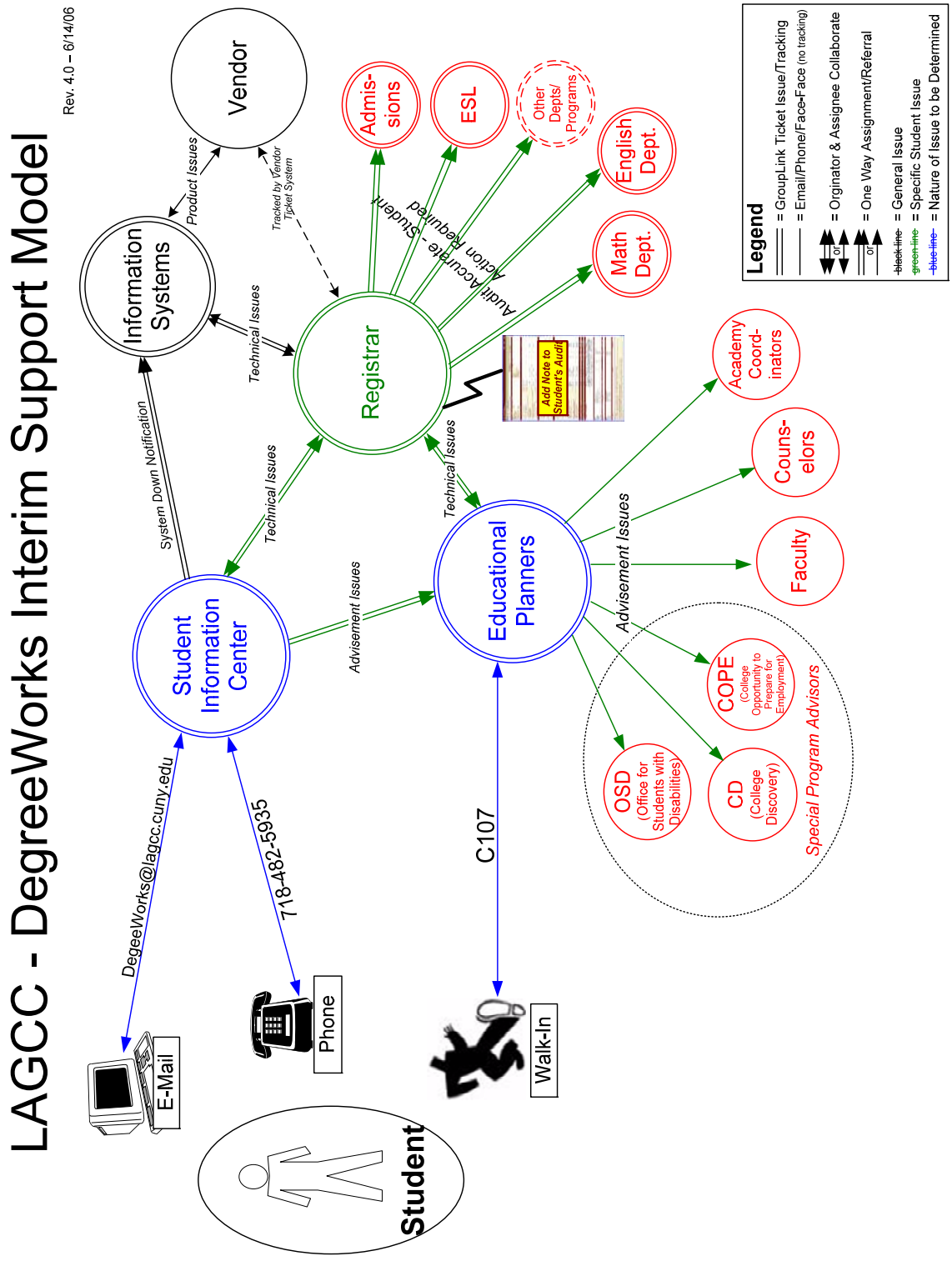
ID	Task Name	% Compl.	Duration	Start	Finish	Predecess	Res.Grp.	Resource Names	Comments
88	OSD Pilot	100%	14 days	6/24/04	7/19/04		LAGCC-EM	Linda	
89	Staff & Student Training	100%	120 days	7/8/04	12/28/04		LAGCC-EM	Linda, Olga	SEE SEPARATE TRAINING SCHEDULE
90	**Internal Marketing**	95%	**140 days**	6/8/04	**12/29/04**				
91	Develop MultiUse Flyer (self train, schedules, etc.)	100%	10 days	7/1/04	7/19/04		LAGCC-EM	Olga, Linda	
92	Mailing to Students Who Have Not Registered or been Advised	100%	5 days	7/20/04	7/27/04	91	LAGCC-IT	Alicia	
93	Mailint to Students Taking Classes in Spring-II	100%	5 days	7/20/04	7/27/04	91	LAGCC-IT	Alicia	
94	Place Ad for DegreeWorks on LaGuardia Home Page	85%	50 days	6/8/04	8/25/04		LAGCC-IT	Gianina	
95	Email Students & Facilty	100%	10 days	8/26/04	9/8/04	94	LAGCC-EM	Peter	
96	Display Posters & Plasma Screen Awareness Messages	100%	80 days	9/9/04	12/29/04	95		Linda A.	

On Track Issues Database - CLOSED

#	Initiator	Date Entered	Next Status Meeting Action	Issue / Modification / Question	Status	Assigned To	Last Update	Next Steps	Comments
59	Focus Group	12/29/03		**Web Audit Printout Student Name on Footer** - Student Header on page 1 clearly states the student name, but if the audit is more than 1 printed page (almost always), then there is no way to clearly assure you are looking at the correct student's page 2, 3, etc.; this could cause many issues when advisment is based on review of web audit hard copy.	Tabled	Brad	4/26/04	Work on at Student SelfService Pilot	
58	Keith	12/19/03		**Watermark on "What-If Audit Page"** - place a large watermark (background) so that the distinction of a What-If Audit is clear and obvious on Screen and when Printed.	Tabled	Brad	4/26/04	Work on at Student SelfService Pilot	
71	Sandra Hanson	2/3/04		**Writing Placement Test Score** - needs to be added to code in student header for Initial and Retest values	Tabled	LAGCC	2/12/04	This turns out to be much more complex effort than originally assumed. Decision made to put off until after go live.	
2	Mary Fitch	10/8/03	Data Conversion	Admit date on SIMS will be bridged as catalog year. What will happen if a student is off for over a year and falls under a new catalog?	Closed	Alica			The new catalog year will be stored in another field on SIMS (so as not to lose the historical record admit date). The new catlog year will be bridged for that student. A student can also run a What-If audit.
3	Mary Fitch	10/8/03	Functionality	Who gets e-mail notification in the petition process?	Closed	Mary Fitch		10/16/03 LAGCC requested additional information.	An e-mail goes to the Registrar saying that petitions are awating approval or have been approved and need to be applied. The client must modify the bin/petsend script to specify who should be notified and some other options.
8	Mary Fitch	10/8/03	Functionality	Can client select students by gpa?	Closed	SunGard DW team	10/31/03	Transit Tool method.	
11	Mary Fitch	10/8/03	Hardware/ Technology	Is the data encrypted?	Closed		10/30/03	Client should have a Verizon certificate installed on web server that uses SSL (secure sockets layer) and the information going between the web server and the user's browser is encrypted; the URL gets changed to https instead of just http. Private segmment can be used to ensure the information from SIMS to DegreeWorks is secure. Information going to RAD08 or to WEB08 via FTP or TCP/IP will be secure.	
14	Mary Fitch	10/8/03	Functionality	What name is displayed on the audit (the name of the person who approved the petition or the name of the person who applied the exception)	Closed	SunGard DW team	10/30/03	The name of the person who applied the exception is displayed	
15	Mary Fitch	8-Oct-03	Hardware/Technolo gy	Is there data outside of Oracle that the client needs to be concerned about in regards to back-ups?	Closed	SunGard DW team	24-Oct-03		The client should back up the dgw environment not just the databases.
17	Mary Fitch	10/8/03	Hardware/ Technology	SIMS Mirror. If this on the same box as DegreeWorks --how long does it take to load the SIMS data and will it cause problems with nightly DW batch processes?	Closed	Client technical team			10/16/03 conference call. LAGCC reports that they will be moving SIMS mirror to another box.

Support Model



Training Workshop Outline

- DegreeWorks Function Overview
  - *Student Audits Generated from Data & Rules*
    - Student Data from SIMS (Bridge)
    - Catalog Rules Recorded in Blocks
  - *General Lease – August 2, 2004*
    - Student Support Model/Process
    - Staff Training Workshops
  - *Volume Usage – Mid October*
    - Awareness Marketing
    - Student Training Workshops

- Functional Walk-Through
  - *Student Login*
    - LaGuardia Web Page (I am a student)
    - Login / Password same as SIMS
    - Self Train Slide Show
    - Disclaimer
  - *Degree Audit*
    - Header Info & Legend
    - Blocks
      - General Info
        - *Requirements Check Box Structure*
        - *Course/Non-Course to Satisfy or Has Satisfied*
        - *Naming Conventions*
        - *Remarks*
        - *Credits vs. Courses*
        - *AdviceLink (mouse over link to course catalog & schedule)*
      - Specific Blocks
        - *Developmental Skills & General Requirements*
        - *College Preparatory Initiative (CPI)*
        - *Major & Related*
        - *Courses Not Counted …*
        - *Unsuccessful Course Attempts …*
        - *In Progress*
    - Notes
    - Printing
    - Help
    - Alternate Audit Formats (Detailed, Concise, or Advice Only)
    - Data Bridge Date & Process Audit Date
  - *What-If Audit*
  - *Student Planner*
  - *Advisor Login & Additional Features*
    - Find a Student
    - Add Notes
    - Other Features
    - Advisor Fact Sheet

- Exercises
  - *Login As Advisor*
  - *Find a Student*
  - *Display Student's Audit*
  - *Examine Audits (Open Lab)*
    - Identify Student Major
    - Determine Progress towards Graduation
    - Determine Developmental Skills Progress
    - Determine CPI Progress
    - Identify advisement issues you see from reviewing the audit

Curriculum Vitae

Bradford Orcutt
Lambertville, New Jersey

Degrees

Ph.D. Applied Management & Decision Sciences - Walden University

M.S. Management & Systems - New York University

B.S. Business Administration - Thomas Edison State College

Work Experience

LaGuardia Community College, City University of New York (Sept. 2003 to present)

Associate Dean - Information Technology

Oversee technology deployment and management functions, including: project management, information systems, network administration, web services, and instructional services. Collaborate with college leaders to establish strategic plans.

Sprint Corporation - Data Center Migration Manager (Jan. 2000 to July 2003)

Developed business services to support migration of client computer operations from in-house to hosted in data centers.

Data General Corporation - Enterprise Program Manager (Feb. 1994 to July 2003)

Planned and manage enterprise technology solutions implementations for clients. Managed professional services for New York Area.

Image Business Systems, Inc. - Project Manager (July 1993 to Feb. 1994)

Planned and manage document imaging systems implementation for banking clients.

Wang Laboratories, Inc. - Project Manager (March 1984 to July 1993)

Provided presales engineering support, performed consulting services to assist clients in implementing systems. Manage implementation of integrated solutions.