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A New Role for the Seasoned Project Manager – Advocate for Project Management Ready Youth

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Abstract

In the Fall 2020, the Project Management Institute [PMI] launched their newest certification program – PMI Project Management Ready®. This revolutionary certification program targets high school students to immerse them in the project management industry and connects them with a very passionate community of professionals – the PMI membership. This entry-level certification does not require prior work experience or previous education/training in project management. Young people will be able to fast forward their careers as they prepare for entry level positions in project management at an early age.

Although this PMI Certification fills a critical void both nationally and globally, implementing this program within the American high school education system is a certain challenge. The program implementation will require the Project Manager to serve in a new role – *Advocate for PM Ready Youth*. Further, initiating this new certification program will require adept leadership of the key stakeholders, especially the HS educators who will need coaching in their new role of the executive sponsor. This program presents exceptional opportunities for PMI Chapters and PMI members to outreach to high school educators and their local community.

This paper will address these challenges and opportunities. Items covered include a review of the PMI Project Management Ready Certification Program content, a discussion of the individual requirements to serve as an advocate for the project management profession, and insights from the author's own advocacy journey initiating the PM Ready Youth certification program.

Background

James R. Snyder, PMI founder and lifelong innovator, has long prophesied that the future of the universe requires a "generation of project-oriented people to solve project-oriented problems" to solve pressing global problems [Ginevri & Trilling, pg. vii]. This lofty yet realistic goal requires the integration of project management skills into the K-13 education system. The PMI Educational Foundation and an army of committed PMI volunteers have made great strides in providing project management awareness and training programs for youth, K-13 educators, and non-profit organizations. However, awareness is not enough for young people to

enter the workforce; solid education programs for students with verifiable knowledge attainment is essential for project management ready youth.

If the reader is not already aware of PMI's Project Ready Youth Certification™ program, check out the *Out of the Box* video entitled "Students Can Jump into Project Management Now with PMI Project Management Ready™" **(https://www.pmi.org/certifications/pmi-project-management-ready)**

This cutting-edge certification program was developed following sound project management practices by the PMI Certification Department. *Surprised?*

PMI Certification Program Development

The subject PMI Certification Study Item included the following parameters:

a) the associated courseware, companion study tests and certification exam would be suitable for the target audience ["early age" future project managers] as the recognized entry level credential to project management,

b) the course materials would be appropriate for the target audience [high school students] who can read and reason competently at a seventh-grade level,

c) collaborate with the right education services partner who can refine the input from project management subject matter experts [SME] into the required package [course materials, prep tests and certification exam] for the target audience and administer the sale, distribution and execution of the PM Ready Youth Certification program.

PMI chose Certiport to be their partner to provide the full pathway solution that educators can use to prepare students for this PMI certification. The PMI Project Management Ready curriculum is divided into four modules that introduce the young learners to:

- Project Management Fundamentals and Core Concepts
- Traditional Plan-Based Methodologies
- Agile Frameworks/Methodologies
- Business Analyst Frameworks

Candidates for the PMI Project Management Ready Youth Certification Exam will be expected to have key conceptual knowledge and principles of project management through *at least 150 hours* of instruction, which the noted 4-module curriculum and the practice tests adequately provide.

The Project Management Ready Youth package [4-module curriculum, practice tests, certification exam] was developed in the Summer 2020. A team of four PMI volunteer subject matter experts worked with Certiport curriculum specialists on each of the modules crafting 8-session courses that could be tailored by the teacher to fit their instruction needs. The course materials and practice tests are sufficient for a CTE teacher to adequately prepare their students for the certification exam.

The 4-module courseware product was available in October 2020 with the certification exam launched in December 2020. The writer served as one of the four PM-SME volunteers, assisting on the Traditional Plan-Based Methodologies module. In the writer's experience, my volunteer activity on the certification program planning and design work was quite elegant. However, my efforts on helping to implement the Project Management Ready Youth program in my home state of Michigan has been quite a rocky road.

Dr. Bill's "PM Ready Youth" Initiative Attempts – Trials & Tribulations

A comical look at the phases of any project are excitement and euphoria, disillusionment, crisis, search for the guilty, punish of the innocent, accolades for the non-involved. Not that that the writer's efforts track in lockstep with these project phases, the implementation initiative has been a challenge.

Having invested a considerable amount of volunteer time and effort in the summer 2020 on PMI's newest certification program, the writer was very keen on ensuring its success. Personally, PMI's Project Management Ready Youth Certification program was considered the critical solution to Jim Snyder's vision for a generation of project-oriented people to solve project-oriented problems. The writer's goal was to make it happen in his home state of Michigan.

Initial interest was quite enthusiastic. Presentations to the Board of my home PMI Chapter and to my alma mater in the fall 2020 were very encouraging. The PMI Great Lakes Chapter [GLC] saw the PMI Project Management Ready Youth program as part of their ongoing outreach to Metropolitan Detroit High Schools. The College of Business & Information Technology at Lawrence Technological University [LTU-B&IT] considered including the curriculum as one of the University's on campus summer programs for high school students. As all project managers know, executing a cutting-edge project is fraught with peril.

The fall 2020 was the *Excitement* phase, 2021 has proven to be the *Distractions & Derailing* phase. Scheduling any project under uncertainty is always challenging. The COVID-19 Pandemic induced a series of delays that upended the entire world order. In early spring 2020, the Lawrence Tech administration cancelled the in-person summer camp programs. At that time, the LTU-B&IT considered re-scheduling their pre-college programs to the fall 2020 as alternative after school offerings. Come late summer 2020, with COVID-19 morphing into the Delta variant, all in-person programs for non-regular students were put on hold. The B&IT faculty considered the Project Management Ready Youth course suite potentially suitable for first year students. However, without a champion, the "grade 13" offering faltered.

In early 2022, LTU-B&IT considered offering the Project Management Ready Youth program through a grant from MICHIGAN-Works as a *job-entry* initiative.

This idea was derailed by a change in the State's funding philosophy for MICH-Works to *job retraining*.

The PMIGLC Community Outreach to area high schools is fueled by eager Chapter volunteers wanting to make an impact with youth. Their headline offering is the *"PM101 Skills for Life"* program, which is available for free from the PMI Educational Foundation. (Incidentally, the PM101 1-day course materials were developed by the PMIGLC.) The PMIGLC targeted three high schools located in the city of Detroit, who initially expressed interest. The *unknown-knowns* of this Chapter outreach initiative project are: the specific scope, adequate funding sources for the course materials and instruction, and identified in-house champions at the targeted high schools. The Chapter initiative has stalled for now.

Finding Traction. In ongoing discussions with Certiport, a promising opportunity was identified. In November 2021, Certiport participated in the annual conference of the Michigan Business Educators Association [MBEA]. The attendees for these business educator events are Career & Technical Education [CTE] Teachers of Business in high schools and community colleges - the appropriate target for potential champions of the PMI Project Management Ready Youth Certification program.

Career & Technical Education (CTE) is the practice of teaching specific career skills to students in middle school, high school, and post-secondary institutions. CTE is split into **16 career clusters** that apply to different high-demand careers. Business is listed at #2 and Information Technology comes in at #5 in the order of preferences among CTE programs.

It is common practice for CTE teachers to couple their courses with companion professional certifications. This makes their graduates very attractive to business and industry for entry-level jobs. The Certiport representatives advised soliciting CTE teachers of business and information technology subjects to determine how the four modules of the PMI Project Management Ready Youth program could augment and blend with their current course offerings. Better to start with a receptive audience [CTE teachers] than to attempt to sell a totally foreign product [project management] to a skeptical market [high school administrators].

Looking Ahead. The writer's efforts continue. Two activities are planned for the summer 2022. First, arrangements are underway for a 1 to 2 day "Project Management for Educators" [PM4EDU] workshop at the MBEA Summer Conference. The book *Project Management for Educators-The Bridge to 21st Century Learning* (Trilling and Ginevri, 2017) published by PMI Educational Foundation will be part of the workshop materials. Second, the LTU Blue Devils Toastmasters Club [which the writer is an active member] will present the *"PM101 Skills for Life"* workshop along with the "Youth Leadership" ® program from

Toastmasters International, will be offered at Lawrence Tech University as a 2022 summer camp program for interested teenagers.

The writer's personal objectives for presenting the PM4EDU workshop for CTE teachers [potential PM course instructors] is to gauge acceptance and cultivate commitment for the PMI Project Management Ready Youth Certification program. The LTU summer program for high school students [future project managers] is to raise awareness among the attendees and their parents about project management as a profession. We shall see.

Lessons Learned Thus Far. The subject implementation initiative has not followed a linear path. Rather, the pandemic-induced havoc has caused changes to the traditional project management 'plan the work / work the plan' planning and execution mantra. Some critical learning lessons that have been gleaned from the bleeding edge. The working list of Lessons Learned includes:

Use an *Agile* versus a *Traditional* Approach. Be nimble to function within the variances of uncertainty [unknown unknowns], which the initiative and stakeholders have no control over.

Engage the Right Stakeholders. As the biblical parable extols on "many are called, but few are chosen" (Matthew 20:16), cultivating champions for the cause is an arduous task. The lesson learned is to partner with CTE-Teachers of Business and Information Technology to blend the PMI Project Management Ready Youth Certification program into their existing education courses.

Utilize PMI Volunteers in the Right Way. The PMI volunteer best serves the CTE educator as their "guide on the side" providing technical advice about project management, as opposed to acting as the "sage on the stage" preaching to high school students about the virtues of PM. To best leverage their project management expertise and enthusiasm, let PMI Volunteers exhibit their stuff conducting "PM101 Skills for Life" training workshops.

Sponsoring PM for Education [PM4ED] Requires the PM's Solid Commitment. In a bacon and eggs breakfast, what's the difference between the chicken and the pig? The chicken is involved, but the pig is COMMITTED. On becoming an advocate for project management for education [PM4EDU] broadly, and specifically being a zealot for the PMI Project Management Ready Youth Certification Program, requires the interested project management professional to exhibit the commitment of the pig bringing the bacon to the farm breakfast party.

Conclusion

Becoming an Advocate for the PMI Project Management Ready Youth Certification program is not for the casual project management volunteer nor the faint of heart. As noted previously, the key recommendations the writer suggests are from the following lessons learned:

- Use an *Agile* versus a *Traditional Plan-Based* Approach
- Partner with CTE-Teachers as their "Guide on the Side"
- Project Management as Life Skill Requires PM's Solid Commitment

In addition, spread the word to other project managers on how professionally rewarding and personally uplifting it is to be a mentor to youth (Ginervi & Trilling, 2017). Helping to create the next generation of project managers will be the best long-term project you will ever work on.

References

Ginevri, W & Trilling, B [2017] *Project Management for Education – The Bridge to 21st Century Learning*. Project Management Institute Educational Foundation (Newtown Square, PA).

Publications available from the PMI Educational Foundation [pmief.org/]:

PROJECT MANAGEMENT FOR CAREER & TECHNICAL EDUCATION - Business Projects.

Project Management 101 *Skills for Life.*

Demonstrating Product Success in an Agile Project Environment[1]

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Executive Summary

Have you ever struggled with demonstrating and communicating product success to your Agile project stakeholders? If yes, then let me show you how to better connect with your stakeholders through the development and use of performance measures.

As project managers, we need to demonstrate to our stakeholders how well our agile projects are doing and there are some good project measures currently in place, such as burndown and agile velocity, to describe how the agile project is doing. What is not so accessible, are the measures that demonstrate how well your project is producing a product that meets customer requirements and expectations. This paper will present a process to help Agile project managers to identify and develop meaningful and unique measures to demonstrate product success.

[1] *Any opinions and conclusions expressed herein are those of the author(s) and do not reflect the views of the U.S. Census Bureau.*

Introduction

Theoretically, every agile project is working toward producing a product or service that is fulfilling an organizational need that aligns to a strategic goal and vision for the future of the organization. Maybe that alignment to the bigger vision is very clear to the project team, maybe it has been buried in the day to day demands of meeting project deadlines or lost to staff turnover. Whatever the reason, prioritizing the production of metrics that demonstrate progress to the future state tends to get lost in the speed to produce features and meet user expectations. The process covered in this paper will help project managers use strategic documents to identify and develop measures that will demonstrate the success of products created within the Agile project environment.

Program Management

Before the work begins, this process assumes that there is some level of program management at your organization. Measure development is one piece of program management and relies on all phases of program management to be effective. Figure 1 and the descriptions below show how each area of program management contributes value to the identification, development and use of performance measures.

Strategic Planning

This process is where the organization leadership develops vision and priorities for the future of the organization. The strategic plan will document the vision and strategic priorities for the organization.

Portfolio Management

This process is where the organization selects and funds projects that will move the organization to its future state. When done right, the projects within the portfolio will be aligned to the strategic goals and objectives.

Project Management

This process manages the work of a project. A well-run project will produce data that can be used to create measures to demonstrate progress to the future state.

Figure 1 Program Management

Performance Management

This process is where metrics are identified and produced. The metrics will inform leadership if they are moving their organization to its future state. It is this process we will be improving by developing metrics for product success.

Agile Environment

Next, we need to understand the Agile environment to design how to identify and development product metrics. Most important is that Agile project management is based on a mindset. This Agile mindset recommends an iterative development methodology that utilizes person to person communication and feedback, continuous change, continuous improvements, and producing working results.

Agile Project Characteristics

When working with measures, these characteristics, described below, influence how measure data should be collected.

Iterative – The Agile process is iterative in nature. The products are developed in pieces with each sprint improving and building the product and the team learning from the preceding work in the previous sprints.

Mindset - Agile is an approach and a mindset. It does not have a list of instructions, specific certifications, or a black-and-white template. There is project management software that is promotes agility, but the practice is meant to be freestyle in its practice.

Efficient Communication – The Agile process incorporates communication directly into the work. The 12 principles behind the agile manifesto stipulate: "The most efficient and effective method of conveying information to and within a development team is face-to-face conversation."

Tangible Results - Agile is creates tangible, working results. After each iteration, the team delivers a version that is then revised by the stakeholders. According to the 12 principles, "Working software is the primary measure of progress."

Agile Product Characteristics

The characteristics of an agile product, described below, capture the changeable product nature of the Agile environment, and can make measuring product success more challenging.

Customer Oriented – The success or failure of the products delivered in an Agile environment are determined by the Customer. Customer oriented products are the number one priority of the Agile team.

Feature Based – In Agile a feature-based flow of work defines the attributes of the product before the final product is complete. This makes the final product fluid with customer requirements driving the work.

Adaptative – Adaptation is expected in an agile work environment. Project teams will embrace the change and adapt the products produced in the agile process to the change. This is normal and adaptive process defines Agile.

Collaborative – Agile is collaborative. It is about working and communicating with the customer and across the team and the resulting products need to be a collaboration between the team and customer to be successful.

Innovative – Agile is the perfect platform for innovation. The iterative, learning nature of innovation is a good match to the development process created in the Agile process. Innovation

grows during iterations and is not stifled by a "final" product vision found in the waterfall method.

The Right Solution – Lastly, agile products are the right solution. If the process is fully embraced, the development team and the customer work together to envision and develop the final product.

Demonstrating Success

With the Agile project environment in mind, the process in this paper will help align your product success with the vision of success within your organization. This process utilizes strategic documents to build a framework so that you can identify and develop metrics. These strategically aligned metrics will in turn help the team to demonstrate product success to their stakeholders. Specifically, the stakeholders that are more removed from the Agile process (i.e., leadership), but nonetheless, are necessary to reassure that the project is moving the organization to its future state (and deserving of funding).

Demonstration Example

Here is an example to demonstrate how to align an organization's vision to an Agile project.

This project is to solve a problem of duplicate legacy systems providing similar, if not the same functionality. The impact of this problem is that the legacy systems create unnecessary IT complexity and increased operational costs and they complicate the organization's ability to implement cutting-edge methodology. The project was funded to complete a new consolidated system for processing operations residing it the legacy systems. Figure 2 provides a summary of this information.

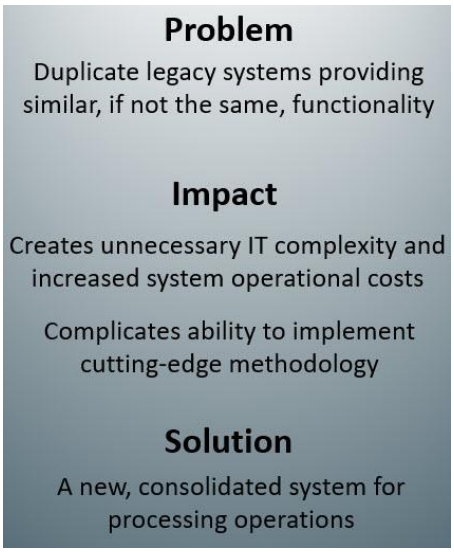

Figure 2 Demonstration Project

Epics

The epics in Agile are a collection of multiple tasks or user stories. They are usually responsible for producing a major deliverable, which may include various features. The epics in this example are as follows:

- Data Management
- System Metadata
- Customer Portal
- Customer Management
- Operational Controls
- Adaptive Design

Defining Success

The process to define product success will help you build a framework of strategic goals and objectives so that you may focus on the best and most informative metrics. There are many different forms of strategic planning, but this process focuses on the most common practice that produces a strategic plan with goals, objectives, and outcomes. In addition to a strategic plan, hopefully there are other documents in your organization to review such as vision boards, project charters and stakeholder presentations that will provide insight into the vision that leadership has for your project. Each level of information within the strategic plan and other documents will provide a path to follow as you work toward specific metrics to describe "product success." To begin, the five levels of strategic information used in the examples are defined below.

Goals – Focused 3-5 years out, goals provide a broad base for your organization's strategic vision. In a strategic plan the vision is the broadest statement of vision followed by the goals which provide a smaller target. When reviewing your strategic plan, you should see your project within one or more of the goals.

Objectives – Focused 1-2 years out, objectives provide a more specific target for your measure ideas. Objectives are action statements that describe the intended results of activity designed to accomplish the strategic goals and vision. Aspects of your project should align to one or more objectives and the measure ideas should capture that activity.

Outcomes – Focused 1-2 years out, outcomes describe the final state or achieved results of strategic objectives. Outcomes describe the effect of the objectives and provide a more specific blueprint of what to measure in your project.

Benefits – The focus of benefits can be short-term or long-term depending on where in the text you find them. Ultimately, they should be at a level to help you focus your search for measures to define product success.

Success Factors – The focus of success factors are usually incremental steps to an outcome. Success factors, when done correctly, will provide useful targets for measurement. You may find them readily available, or you may be able to extrapolate them from strategic objectives and outcomes.

Figures 3-5 are examples that were developed to show what the process can look like. Using the demonstration project as the target, a review of the Census Bureau's strategic plan and some vision canvases (for real projects), the process generated the flows shown in the examples. The wording for the goals, objectives, outcomes, benefits, and success criteria have been shortened from the original text for space constraints.

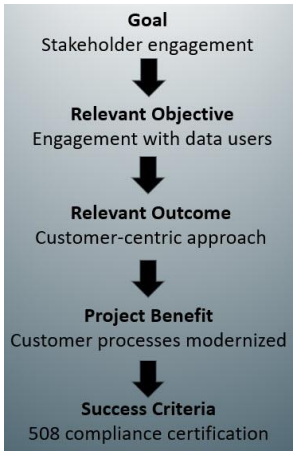

Figure 3 Example 1 Stakeholder Goal

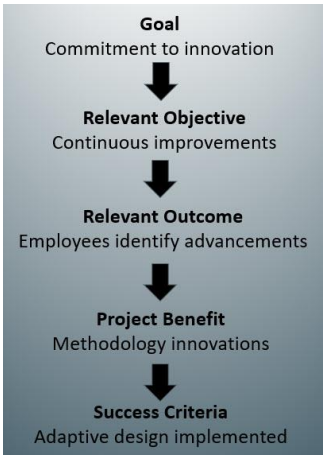

Figure 4 Example 2 Innovation Goal

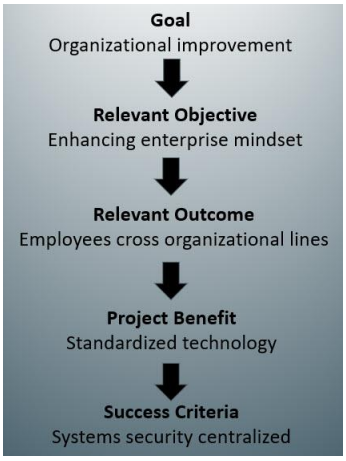

Figure 5 Example 3 Organization Goal

Measure Framework

The intermediate goal of the strategic alignment process is to create a measure framework. The framework, as it evolves, will begin to illustrate, and demonstrate the strategic alignment of your agile project. Figure 6 shows how the alignment examples create a framework when placed side by side. Ultimately, the alignment process will not only communicate where your project connects with the strategic vision but also creates a robust framework to help in the search and identification of strategically aligned measures.

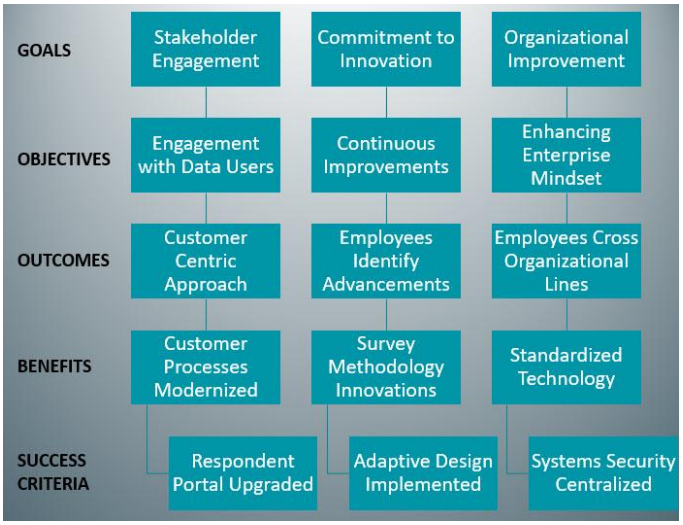

Figure 6 Measure Framework Example

Measure Identification

The next step in the process is measure identification. The framework will provide the guidance for where to look for measures, but research will help to identify good candidates to demonstrate the success of your project's product.

Measure Types

It helps to understand the two different types of measures to use, leading and lagging indicators, to show product success. These two types of measurements are used when assessing performance in a business or organization. A leading indicator is a predictive measurement, and a lagging indicator is an output measurement. The difference between the two is a leading indicator can

influence your project's direction and a lagging indicator can only show the outcome of what has been completed.

To apply it to our process, let's use the accommodation of users with disabilities, commonly known as 508 compliance, as an example. 508 compliance is where software products and websites assure accessibility to users with disabilities. In this example, a leading indicator would track the implementation of 508 compliance requirements as a predictive measure for screen reader functionality and accessibility. Conversely, a lagging indicator would track the rate of accessibility for users with disabilities to measure the result or outcome for accommodation of users with disabilities. This example shows how important it is for you to include a mix of both leading and lagging measures to demonstrate product success.

Measure Teams

When you are working to identify the measures, standing up a measure team could be beneficial. The measure team is a good way to engage staff closest to the data to identify measures and later develop prototypes. Teams help create direct accountability and can provide a relaxed and non-judgmental approach for integrating the project team into the decision-making process. Measure teams work best when members possess a diversity of skill sets such as programming, data analysis, and communication skills. The team process may also allow you to matrix in extra resources if your project team does not have the time to identify and create meaningful metrics.

Search for Measures

The strategic alignment exercise will have given you a head start on identifying measures and the measure team will also be a good resource. Additionally, a document review of your project charter and other scope documents will provide measure ideas along with other scope documents. Searching customer requirements and lessons learned from previous projects could provide measure candidates and researching industry standards, quality standards, and benchmark projects may provide tried and true measures to use in your project.

Organize Your Work

What project manager doesn't love a good spreadsheet? Once you have your measure framework together – or even as you create your measure framework, a spreadsheet will help to keep the effort organized, more thorough, and possibly more understandable for those who need the details together. Teams usually become more productive if work is organized into boxes to fill. Figure 7 shows one way to organize the information with tabs for the goals and lines for each column in the framework. Depending on the number of goals, objectives, outcomes, and epics the lines can become quite numerous. Using a spreadsheet format will help keep a large operation organized and will also support working bottom up as you find new success factors or existing measures that need to be aligned or justified.

Objective	Outcome	Benefit	Success Criteria	Epic	Leading Measure	Lagging Measure
Engagement with Data Users	Customer Centric Approach	Customer Processes Modernized	Respondent Portal Upgraded	Respondent Portal		

Stakeholders | Innovation | Organization

Figure 4 Measure Framework Spreadsheet Example

Identify Key Measures

The process to identify key measures uses a systematic review to reduce a big list of measures to a defendable and socialized list of the best and most feasible choices. The process uses two sets of criteria - those that describe a measure's purpose and those that quantify the development of a measure. The purpose criteria represent a conceptual process where you elevate those measures that are perceived to provide the most informative data (think about the questions that you get over and over) and best portray the organization's strategic vision. The review of the development criteria will assign values to elevate those measures that are ready to be developed (think easy wins, low hanging fruit) to higher positions on the list. The final step in the scoring process is to combine the purpose and development results and calculate a total score. The resulting score will quantify the value of each measure so that leadership may decide how best to spend project resources producing and maintaining performance measures. For a more in-depth description of this scoring method, please see my 2021 paper titled *Performance Management Reality Check* and co-authored with John Walsh.

Measure Development

Plan for Measure Data

Developing measure prototypes will be an iterative process where the measure teams will develop measures, present the metrics in graphical form, and create sample reports with the metrics and analysis. The process of pulling together the measure data, creating the graphs, and developing the sample reports will help you determine a baseline effort for the whole process and examine the usefulness of the resulting metrics. In an Agile project environment, a project team would need to revise project scope to include data capture, insert data gathering into the requirements and add storyboards into the appropriate increments. If outside resources are not available, then the project manager would need to identify resources for developing, maintaining, and communicating measures.

Produce Metrics

Perhaps the most crucial step to the production process is to work with leadership to develop the final version of the metrics. Involving leadership and other stakeholders in the development process will ensure that the final reports and dashboards will contain metrics in their most usable and understandable form. After the new metrics are approved by the stakeholders, the project manager will need a person or team to manage the inventory of old and new metrics, metric

production, and the metric review process. Depending on the number of measures and size of leadership group, this process may require a good deal of time to manage. The list below is some of the tasks required to produce metrics:

- Generate metrics, analyze results, and develop reports and/or update a dashboard
- Schedule metric review meetings and ensure subject matter experts are there to discuss the data
- Store and maintain an archive of old metrics and reports

Periodically, the project team should review the measures because, as the agile project progresses, some measures will become less important or useful and new measures will need to be added.

Conclusion

An agile project environment is by design changeable, and this can make product success metrics hard to identify. By following the process presented here a project manager should find a solid method for identifying leadership priorities, aligning products and measures to those priorities, and producing metrics to demonstrate that alignment. The process has a few steps that will require resources to complete, and the project manager will need to balance resources with the project itself. Ultimately, both the project manager and the organization will need to choose to invest resources to product metrics that demonstrate to stakeholders the success of the agile project and its products.

Exploring the Perspectves of Private Sector Project Managers as to Project Portfolio Management Practices

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ABSTRACT

The general business problem is that private sector project managers continue to deliver IT megaprojects that fail to meet the desired outcomes. The specific business problem is that private sector project managers have been unable to deliver federal government financial system megaprojects on time, within budget, and within scope, which delays the expected benefits from these megaprojects. The gap in practice is the lack of proven project portfolio management practices used to deliver financial systems megaprojects on time, within budget, and within scope.

The scope of the capstone project was the exploration of perspectives of private sector project management practitioners regarding the successful strategies used to deliver financial systems megaprojects to the executive branch of the US federal government on time, within budget, and within scope. The data collection method consisted of semistructured interviews using open-ended interview questions. The interviews were conducted using the Zoom platform with private sector project managers who delivered financial systems for executive branch agencies of the federal government from January 2016 to December 2021. Nine participants were able to participate during the interview process.

Five sets of results emerged from the analysis of interview data. Forty-two PPM standards and three themes emerged from the interview question focusing on recommended PPM standards. Forty roles and three themes emerged from the interview question focusing on recommended PPM roles. Thirty-one PPM tools/technologies and three themes emerged from the interview question focusing on recommended PPM tools/technologies. Thirty-six PPM skills/competencies and two themes emerged from the interview question focusing on recommended PPM skills/competencies. Twenty-nine additional PPM practices and four themes emerged from the interview question focusing on additional PPM practices.

SECTION 1. BUSINESS PROBLEM AND PROJECT SCOPE

1.1. Introduction

The delivery of information technology (IT) megaprojects is costly and time-consuming for the private and public sectors (Bloch et al., 2020; Zurong & Feng, 2018). CIO Magazine reported in 2019 that 70% of IT megaprojects were either late, over budget, or failed to meet their customer's requirements (Sisco, 2019). Megaprojects are defined as those project activities that span over several years that cost over $1B (Flyvbjerg, 2014; Larson & Gray, 2018). The technology used and how information technology systems are implemented are similar in the private and public sectors (Wood, 2017). The common theme of project delays includes cost overruns and scope creep that resulted from the lack of proper project portfolio management techniques (Hines & Carrington, n.d.; Oostuizen et al., 2018; Pratt, 2021).

The risk for failing to deliver information technology (IT) projects to the federal government on time, within budget, and within scope remains high (Adams, 2016; Clark, 2013; Mares, 2020). Marinaro (2019) revealed that over 50% of federal government IT projects were deemed medium or high risk. A government report in 2019 noted that $87.8B was spent on information technology (Office of Management and Budget, n.d.-b). The risk for failure led the General Accountability Office to evaluate over 100 IT projects to identify high-profile projects that needed to be watched closely (Boyd, 2020). One focus area of high-profile IT projects was the delays, cost overruns, and scope creep with financial system projects (General Accountability Office, 2018, 2020; Office of Management and Budget, 2013). Financial systems projects involve the modernization of systems used to process accounting, budget, payroll, and purchasing transactions, mandated by the CFO Act (General Accountability Office, 2005). Miller (2021) noted that 56 federal financial systems are nearly the end of their useful life; thus, the pressure to modernize is high.

The need for effective project portfolio management revealed a more significant problem. The program/project managers were not using proper project portfolio management techniques in managing their megaprojects (Project Management Institute, 2017). Since 2013, research conducted by the Project Management Institute (PMI), the leading global project management association, provided similar results in the private and public sectors. PMI noted in its 2013 Pulse of the Profession that for every $1B spent on projects, $135M is lost and not recoverable (Project Management Institute, 2013). The 2015 Pulse of the Profession survey from PMI revealed that 34% of projects, in general, failed to reach their goals (Project Management Institute, 2015). The 2016 Pulse of the Profession survey noted that over 30% of government strategic initiatives failed to achieve their goals while wasting $101M for every $1B spent on projects and programs (Langley, 2016). PMI reported in 2018 that project managers identified over $99M in losses for every $1B per the use of poor project management techniques and tools (Project Management Institute, 2018). The surveys from PMI showed that IT megaprojects have similar problems in the private and public sectors. Burtseva et al. (2019) noted that project managers and sponsors need to pay close attention to risks, especially financial ones.

1.2. Capstone Topic

This project is being completed as part of the Capella University Doctorate in Business Administration (DBA) program specialization project management. The project topic explores the perspectives of private sector project managers in the Mid-Atlantic region of the United States regarding the successful project portfolio management practices used to deliver financial systems megaprojects to executive branch agencies of the federal government time, within budget, and within scope.

The DBA project management specialization at Capella University allowed learners to advance their project portfolio management background by exploring current and emerging methodologies, techniques, theories, and practices, to solve real-life project portfolio management problems (Capella University, n.d.-b). Learners can improve their knowledge and skills, develop new tools, and techniques to research and evaluate project portfolio management improvement practices. The DBA project management specialization improves learners' abilities to effectively lead programs and portfolios and infuse knowledge about project portfolio management missing in the business world.

The proposed project aligned with the DBA project management specialization, where learners research and evaluate project portfolio management practices to solve general/specific business problems via a series of course projects (Capella University, n.d.-a). The first two specialization classes, BMGT8430 and BMGT432, focused on the phases of a project. Marinaro (2019) noted that failed projects do not start correctly, which indicates a lack of understanding regarding what is needed to plan and initiate the project. BMGT8434 focused on the risks with projects, while BMGT8436 examined the dynamics with project portfolio management. The proposed project fell within one of the perspective areas for applied/practitioner research (Capella University, 2021). The capstone project explored the successful project portfolio management practices used by private sector project managers to deliver financial systems megaprojects to executive branch agencies of the federal government on time, within budget, and within scope.

The private sector has been a leader in project portfolio management for many years (Mares, 2020). Institutions like the Project Management Institute (PMI) and Gartner (Gartner, n.d.-b) continue to provide insights into proven project portfolio management practices for consumption and adoption by all. PMI is the leading authority group for the project management profession that practitioners and scholars rely on (Project Management Institute, n.d.-a). Gartner is one of the world's leading IT research and advisory services firm (Fortune, n.d.; Gartner, n.d.-a; Hoover's Inc., 2021; Market Line, 2021). Private sector firms like Booz Allen, IBM, and others involved in project portfolio management practices with the federal government will be a valuable source of information for federal agencies to meet the mandate of the Program Management Improvement and Accountability Act (PMIAA) to improve the management of programs and projects within the federal government to improve desired outcomes (U.S. Congress, 2016; Weiss, 2019).

1.2.1. Problem of Practice

The general business problem is that private sector project managers continue to deliver IT megaprojects that fail to meet the desired outcomes (Boulton, 2021; General Accountability Office, 2018; Langley, 2016). CIO Magazine reported in 2019 that 70% of IT projects were either late, over budget, or failed to meet their customer's requirements (Sisco, 2019). The Project Management Institute noted that between 2013 and 2014, over $244M was lost for every $2B invested in projects (Project Management Institute, 2013, 2014). From 2016 to 2018, organizations lost $318M for every $3B invested in projects (Project Management Institute, 2016, 2017, 2018). Abu-Hussein et al. (2016) noted that tight timelines and broad project scope, typical in project management, will lead to difficulty reaching expected and desired results. Managing projects is already a difficult task, so adding the challenges of tight lines and broad scope will lead to mistakes being made (Wysocki, 2019). The challenges will lead to project managers skipping proven project management strategies deemed critical, such as post-project phase reviews (Doskočil & Lacko, 2018). Ignoring proven strategies, such as phase reviews, will trigger project delays, unfilled objectives, and cost overruns.

The specific business problem is that private sector project managers have been unable to deliver federal government financial system megaprojects on time, within budget, and within scope, which delays the expected benefits from these megaprojects (Burmistrov et al., 2018; Hines & Carrington, n.d.; Weigelt, 2010). The classic example of this was the failure of the Healthcare.gov deployment, which led to delays in consumers registering for healthcare coverage (Thibodeau, 2013). While managers may possess general management practices, they lack vital project portfolio management best practices in planning and managing megaprojects (Project Management Institute, 2017b; Welde & Odeck, 2017). Several project portfolio management areas from the PMI Body of Knowledge (PMBOK), such as project communications management, project human resource management, project time management, and project risk management, are overlooked by managers (Project Management Institute, 2017a). These areas are critical to effective project portfolio management. The literature shows that effective project portfolio management can only occur when resources are equipped with the right skills, such as project management (Project Management Institute, 2017b; Shinde & Govender, 2017; Whitby et al., 2020.).

The evidence supported the general and specific business problems as found in scholarly research and practitioner-based analysis. Burmistrov et al. (2018) concluded that many project managers lack the necessary financial and project management skills to initiate and plan programs and portfolios. The inability to initiate and plan will impact the execution, monitoring/controlling, and closure phases. Organizations rely on inefficient strategies, such as relying on schedule and cost variances for measuring program and portfolio performance, which led to programs that were not effective (Jugdev et al., 2013). The selection of inefficient strategies was developed from a lack of skills that contributed to an inability to measure success (Project Management Institute, 2017).

Weiss (2019) noted that organizations should take no one-size-fits-all project portfolio management methodology, for the methodology should be one that the organization can embrace and benefit. The Boston Consulting Group noted the importance of project portfolio management processes and tools and the involvement of leadership and sponsorship in any project portfolio management methodology (Keenan et al., 2021). Gartner (n.d.-b) noted that organizations must reinvent the project portfolio management processes to support the change of a digital world. Gartner is one of the world's leading IT research and advisory services firm (Fortune, n.d.; Hoover's Inc., 2021; Market Line, 2021).

1.3. Purpose of the Project

The purpose of this qualitative inquiry project was to explore the perspectives of private sector project managers in the Mid-Atlantic region of the United States regarding the successful strategies used to deliver financial systems to executive branch agencies federal government agencies on time, within budget, and within scope.

1.3.1. Project Need

Industry project managers need to understand how to improve the delivery of financial systems megaprojects to the federal government (Langley, 2016). Organizations continue to assign managers to lead and manage megaprojects without clear expectations of project portfolio management roles and responsibilities (Nijhuis et al., 2018). Senior leaders may not be involved in project portfolio management, for they delegate management responsibilities and oversight to others within the firm who lack project portfolio management knowledge (Blair, 2015). The lack of expectations and senior management involvement has added more burden to managers (Zwikael & Meredith, 2018). For example, megaproject managers may not have full ownership over obtaining funding for their programs. While still responsible for managing the funding, project managers may need to rely on senior leaders as stakeholders, such as CFOs and budget managers, to locate the financing of their programs (Breese et al., 2020; Eskerod et al., 2015). The lack of project funding has contributed to the issues of general and specific business problems.

The federal government attempted to address the general and specific business problems posed in the project. First, Congress passed the Program Management Improvement and Accountability Act (PMIAA) to address the general and business problem noted above (U.S. Congress, 2016). Another action taken by Congress was the passage of the Federal Information Technology Acquisition Reform Act (FITARA) of 2017, which required each agency to review and approve all IT project expenditures and performance (U.S. Congress, 2017). The White House followed this action by updating the President's Management Agenda (PMA) to include a new goal to improve the management of government programs (White House, 2018a). The PMA serves as the foundation for improving the business of government. Government agencies are measured by their ability to meet the goals established by

the PMA. The Office of Personnel Management followed this attempt by updating its five-year strategic plan to implement PMIAA with the federal government (Office of Personnel Management, 2019). These attempts are a small start to address the general and specific business problems, but the pressing question remains unanswered.

These practices can be used to improve project portfolio management practices for cabinet-level agencies, like the Department of Justice. The Department of Justice, a law-enforcement agency within the federal government, is responsible for over $3 billion in information technology programs and portfolios (Justice Department, n.d.-b; Office of Management and Budget, n.d.-a). Another beneficiary of this project will be government agencies responsible for complying with the PMIAA mandate covering project portfolio management practices (Office of Personnel Management, 2019; White House, 2018b).

The project was very feasible. First, I have over 20 years of project portfolio management with public sector and private sector organizations that deliver financial systems megaprojects. Second, my current role as a financial systems program manager for an executive branch agency afforded me insight into understanding financial systems megaprojects' challenges. My position allowed me to contact other executive branch agencies who recommended participants (private sector project managers that they work with) for this project. The contacts in these agencies were informed that I needed private sector project managers who shared their perspectives of successful project portfolio management practices for this project. The qualitative inquiry project technique provided me with the data from interviews that revealed successful project portfolio management practices. The collection of perspectives regarding successful project portfolio management practices regarding the delivery of financial system projects may address the proposed project question once analyzed. The presentation produced from the analysis included outcomes, findings, and recommendations regarding the delivery of financial system projects by private sector project managers that may be useful to others. Finally, I and the participants understood that we could not disclose non-public government information for this project (Federal Acquisition Regulations, n.d.; Justice Department, n.d.-a; U.S. Office of Government Ethics, 2017).

1.3.2. Project question

What are the perspectives of private sector project managers regarding the successful strategies used to deliver financial systems megaprojects to executive branch federal government agencies on time, within budget, and within scope?

1.3.3. Project Justification

The gap in practice is the lack of proven project portfolio management practices used to deliver financial systems megaprojects on time, within budget, and within scope (General Accountability Office, 2018; Hines & Carrington, n.d.; Project Management Institute, 2018). Koppmann et al. (2017) and Pettey (2019) noted that historically, program management offices (PMOs) were responsible for overseeing

programs and portfolios, but they have not updated their standards or tools to reflect the profession's changes. Nijhuis et al. (2018) conducted a study where participants believed that project management and management skills were the same, but they were not. PMI developed a guide on project management competencies but is not widely referred to (Project Management Institute, 2017b). In general, managers rely on too much what they have been done in the past to manage their programs (Allahar, 2019). Project managers continue to over-rely on past techniques, such as earned value management. Past techniques need to be updated to improve the delivery and management of complex programs.

Effective program and portfolio management occur when project managers are equipped with the right tools and standards to reduce waste (Project Management Institute, 2018). Selecting the correct project management tools and project management standards will lead to continuous improvement. Continuous improvement will provide program and project managers with the dynamic capability to ensure that their programs and projects achieve their organizational goals and objectives while dealing with time and cost constraints (Galeazzo et al., 2017). The outcome and improvements can only be achieved by equipping managers with the proper project portfolio management best practices to be the best stewards of their organizational resources for their company or industry.

The justification for this qualitative inquiry project promoted project portfolio management's desired state, where project managers rely on technology and project standards. Computer simulation, combined with organizational strategy and performance information, can improve project portfolio management (Vacik et al., 2018). PMI has produced standards, such as the Standard for Program Management (Project Management Institute, 2017d) and the Standard for Portfolio Management (Project Management Institute, 2017b), to provide project portfolio management guidance. Adopting technology and standards may address managers' gaps in project portfolio management (Langley, 2016).

The belief is that a one-size-fits-all approach taken by organizations contributes to the gap in practice (Abdelmoniem, 2016). Project portfolio management managers continue to rely too much on past practices to manage their programs and portfolios (Allahar, 2019). An example of this is the over-reliance on earned value management (EVM) tools. Research has been conducted that resulted in pinpoints using tools like that EVM only provides an analytical view of project performance for management (Rajagopalan & Srivastava, 2018; Vacik et al., 2018).

Private sector IT project managers lack prescribed, mandated project portfolio management practices to deliver financial systems projects to the federal government (Alexander, 2017; Blair, 2015; General Accountability Office, 2020). The lack of guidelines leads to confusion regarding the roles and responsibilities of project resources, such as managers and sponsors, in their use of project portfolio management (Breese et al., 2020; Kloppenborg et al., 2014). The result establishes a current state of project portfolio management usage that has contributed to programs and portfolios not achieving their desired goals via project portfolio management.

1.3.4. Project Context: Company or Industry

The context of this project is CFO Act agencies, who are required to maintain updated financial systems (General Accountability Office, 2005). The delivery of these systems by private sector project managers continued to be delayed, over-budgeted, and experienced scope creep. In 2010, the Office of Management and Budget (OMB) suspended the deployment of financial system projects until they had reassurances from agencies for successful project delivery (Weigelt, 2010). Later, OMB issued a memo that directed agencies needing new financial systems to consider migrating to a shared services center operated by the public and private sectors (Office of Management and Budget, 2013). Quantitative data from the Office of Management and Budget's Information Technology Dashboard (Office of Management and Budget, n.d.-b) and the Department of Treasury's Data Accountability and Transparency Act dashboard (Treasury Department, n.d.-b; U.S. Congress, 2014) provides schedule and cost data regarding financial system megaprojects. Unfortunately, the General Accountability Office continues to issue reports highlighting delivery issues (schedule, scope, and costs) with financial system projects (General Accountability Office, 2017, 2018, 2021b).

Delivery issues with IT projects have relied on the traditional measurement tool of earned value management (Jugdev et al., 2013). Earned value management is a performance indicator that measures a project's performance via its value of work performed in terms of dollars earned or lost (Wysocki, 2019). Earned value management is a series of metrics (e.g., actual costs, cost variance, schedule variance) available to project managers for managing performance (Larson & Gray, 2018). While these are the minimum set of metrics for measuring performance, the Federal Government has narrowed its view of the performance of portfolios to cost and schedule variances (Office of Management and Budget, n.d.-b). The decision to narrow the use of performance measures, combined with constraints of shrinking resources, increased mandates, and technology changes, has led to the need for improvement in project portfolio management. The General Accountability Office (2017, 2018) noted that these portfolios are expensive. More emphasis must be placed on project portfolio management to reduce mistake that impacts success (Larson & Gray, 2018; Wysocki, 2019).

The capstone project supported the federal government's mandate for project portfolio management oversight and management of projects, programs, and portfolios per the passing of the Program Management Improvement and Accountability Act (Office of Management and Budget, n.d.-b). Within each cabinet-level agency, the Chief Information Officer (OCIO) serves as the primary program management office (PMO) for the project portfolio management of IT activities (Office of Management and Budget, n.d.-b). Tshuma et al. (2018) noted that a PMO function serves as a medium for sharing and exchanging information that will benefit the management of projects, programs, and portfolios. A review of publicly accessible documents shows that updates are needed in the areas of project portfolio management standards, competencies, and best practices (Justice Department, 2018, 2019).

1.3.5. Terms and Definitions

Actual costs (AC). Actual costs are defined as the actual money that has been spent on a project to date (Larson & Gray, 2018).

Budget at Completion (BAC). Budget at completion is defined as the project's cost when the project was planned (Wysocki, 2019).

Cost Variance (CV). Cost variance is defined as the difference between Earned Value and Actual Cost, where a positive cost variance means the project is spending more money than planned (Wysocki, 2019).

Earned Value (PV). Earned value is defined as the value in terms of costs that should have been earned during the work that has been completed on the project (Larson & Gray, 2018).

Earned Value Management (EVM). Earned value management (EVM) is defined as the performance indicator that measures a project's performance via its value of work performed in terms of dollars earned or lost (Wysocki, 2019).

Estimate at Completion (EAC). Estimate at completion is defined as the estimated cost of the project at completion, based upon current progress (Larson & Gray, 2018).

Estimate to Complete (ETC). The estimate to complete the remaining work of the project is defined as the amount of money it will take to complete the project from a given point in time (Wysocki, 2019).

Financial Systems. Financial systems are IT systems that handle the collection and processing of financial management transactions for the federal government (General Accountability Office, 2005)

Megaprojects. Megaprojects are project management activities with technical and organizational complexities (Deng et al., 2021; Larson & Gray, 2018).

Planned Value (PV). Planned value is defined as the costs that should have been spent on a project to date, based on the project's budget and what should have been completed (Larson & Gray, 2018).

Project Management Body of Knowledge (PMBOK). The Project Management Body of Knowledge (PMBOK) is defined as the set of standards, practices, and procedures used in the project management profession, as defined by the Project Management Institute (Project Management Institute, 2017a).

Schedule Variance (SV). Schedule variance is the difference between Earned Value and Planned Value, where a positive schedule variance means the project is ahead of schedule (Larson & Gray, 2018).

Victim Compensation Fund (VCF). Congress established the 9/11 Victim Compensation Fund to compensate individuals or representatives of a deceased individual injured or killed due to the 9/11 attacks, including those who removed debris from those attacks. The fund will accept and process claims through December 31, 2020 (Victim Compensation Fund, n.d.).

1.4. Doctor of Business Project Specifications

The project met the core specifications for a capstone project in the Doctor of Business program. Exploring successful perspectives from private practitioners is

important to evaluating project portfolio management practices. The qualitative inquiry collected the necessary data to support the project.

1.4.1. Importance of the Project

The importance of this project was to explore the perspectives of private sector project managers in the MidAtlantic region of the United States regarding the successful strategies used to deliver financial systems megaprojects to executive branch federal government agencies on time, within budget, and within scope (Project Management Institute, n.d.-a, 2017b, 2018). These project portfolio management practices were not limited to the technical aspects of project portfolio management, for they alone cannot address the general and specific business problem presented (Alexander, 2020; Shinde & Govender, 2017; Takey & Carvalho, 2015). Once the practices are established, they can serve as a starting point for identifying project portfolio management best practices that will improve the delivery of financial systems projects. These practices must be able to overcome the challenges faced by managers.

The project technique used for this capstone project was the qualitative inquiry technique. Qualitative inquiry allowed learners to make recommendations for improvement based on exploring knowledge from experts regarding successful and unsuccessful practices from the past (Capella University, 20202; Hughes et al., 2007). Other project techniques (consulting, critical incident, modified Delphi, and quantitative) do not support this focus because of the need to explore successful practices from participants that will be used to improve performance (Schindler, 2019).).

Despite the efforts of private sector project managers, the gap in practice of using proven project portfolio management practices for delivering financial systems megaprojects on time, within budget, and within scope exists (General Accountability Office, 2018; Hines & Carrington, n.d.; Project Management Institute, 2018). PMI has taken a few actions to address the gap in practice. The PMI Talent Triangle and Project Manager Competency Development Framework identifies the necessary skills (e.g., leadership, technical project management, strategic/business management) expected in resources involved in project portfolio management (Cartwright & Yinger, 2007; Project Management Institute, n.d.-c). PMI updated its standards in 2017 to reflect changes to address problems in program and portfolio management (Project Management Institute, n.d.-b, 2017c, 2017d). In 2017, PMI updated its competency framework that focused on core competencies for managers leading and managing programs and portfolios (Project Management Institute, 2017b). PMI released a new set of standards to improve program and portfolio delivery and management (DePrisco, 2020; Project Management Institute, 2021b).

The private sector has improved project portfolio management practices by embracing the need for change, while the public sector has not (Picciotto, 2020). Practically, every private sector firm has created its project portfolio management methodology that takes advantage of the latest changes to PMBOK and other frameworks. The federal government is looking to its Program Management

Improvement and Accountability Act (PMIAA) as a way to establish standards and policies that govern program/project management practices in the federal government by relying on best and proven practices from the private sector (Adams, 2016; Alexander, 2017; Tereso et al., 2019).

The Federal Government continues to trail the private sector in improving project portfolio management practices (Clark, 2013; Wood, 2017). Proven practices, such as agile project management, were slow to be used across the federal government while widely adopted and used by the private sector for several years (Jarvis, 2018). Government agencies, such as the U.S Department of Energy, have been cited by the General Accountability Office for failing to provide adequate training in the areas of program management while private sector firms have been encouraging training for years (General Accountability Office, 2017; Langley, 2017; Overby, 2006). In their empirical study, Bueno and Gallego (2017) noted that training and communications are the foundation for successful project delivery. While Congress has mandated agencies comply with PMIAA no later than 2023, there is no roadmap to meet this mandate. An example of this is seen where OMB and OPM have deferred the implementation of PMIAA to the Program Management Policy Council (National Academy of Public Administration, 2017). The Program Management Policy Council is part of the General Services Administration that works with the Office of Management and Budget and other federal agencies regarding matters related to PMIAA (General Services Administration, n.d.).

1.4.1.1. ***Challenges.*** The project was essential to address the project portfolio management challenges of shrinking resources, increased mandates, and technology that led to the general and specific business problems with delivering IT projects to the federal government (Allahar, 2019; Koppmann et al., 2017). These challenges, combined with the core project portfolio management challenge in dealing with triple constraints, demand more focus on competencies and best practices in project portfolio management (Larson & Gray, 2018). The lack of focus will significantly impact managers' ability to deliver and manage IT projects according to budget, scope, and cost expectations (Wysocki, 2019).

1.4.1.2. ***Practices.*** The project was important to address the lack of proven project portfolio management practices. In the past, the preferred project portfolio management tool for success or failure has been via earned value management (Jugdev et al., 2013). Robinson et al. (2007) recommended a three-phase approach to identify and develop competencies needed in the future to meet upcoming needs. Government agencies have minimal standards related to project portfolio management oversight. An example can be seen as the Federal Government has focused its performance review on costing and scheduling variances of projects and programs within portfolios (Office of Management and Budget, n.d.-b).

1.4.2. Approach for the Project

The approach used for this project is the qualitative inquiry technique to collect and analyze data to formulate recommendations to address the project questions (Capella University, n.d.-a). The data collected via interviews focused on successful project portfolio management practices. The project was limited to private sector project managers who deliver financial systems to the US federal government executive branch agencies. These resources had insight into successful practices since they served in lead roles regarding financial systems megaprojects. The use of non-public government information was prohibited for this project (Federal Acquisition Regulations, n.d.; Justice Department, n.d.-a; U.S. Office of Government Ethics, 2017). Other project techniques, such as consulting, critical incident, modified Delphi, and quantitative techniques, were not appropriate for this project because of the need to develop themes based upon successful experiences various data types that can be collected to recommend improvements (Capella University, 2020).

1.4.2.1. ***Sources of Data.*** The primary data sources used in the project were qualitative data related to the general and specific business problems. Qualitative data were obtained from interviews with private sector practitioners who provide project portfolio management services to the federal government regarding the delivery of financial systems. The data collected was based on the participants' perspectives (Merriam & Tisdell, 2016). The experiences covered successful project portfolio management practices used in delivering financial systems.

1.4.2.2. ***Sample Size.*** The sample size for this qualitative inquiry is planned for seven to ten while recruiting 12 to 15 participants to account for attrition (Mayan, 2016). The participants were private sector program/project managers who delivered financial systems projects to the federal government. The participants were limited to managers who worked performed this service for executive branch agencies of the US federal government. The plan solicited participants who have completed financial systems projects within the last five years. A 5-year window allowed exploring project portfolio management practices perspectives before and after the PPMIA mandate. The final pool of nine participants met the requirements to provide a sufficient number of perspectives (Mayan, 2016).

1.4.2.3. ***Data Collection Techniques***. The data collection was manageable over 10 weeks because of access. First, the interviews were tailored to collect successful practices. The interview was semistructured that contained nine open-ended questions. Two Capella professors reviewed the interview questions to align with the project questions and the proposed applied framework. A test run of the interview questions was performed to ensure the interview could be done in the allotted amount of time and ensure that the right amount of data can be collected for analysis (Capella University, 20202; Gray, 2016). The interview was set for a 60-minute time limit to allow in-depth exploration regarding these experiences. Secondly, the transcripts from interviews were analyzed to identify initial codes, which were further refined via Goodall's Verbal Exchange Coding method to classify the codes as practices (Saldaña, 2016). The themes were later developed from the

codes. The result addressed the project question (successful project portfolio management practices regarding the delivery of financial system megaprojects) and concepts presented in the proposed P2MI applied framework (Leech & Onwuegbuzie, 2011; Merriam & Tisdell, 2016).

SECTION 2. LITERATURE REVIEW AND PROJECT PLAN

2.1. Introduction

The partnership between the Federal Government and the private sector is strong in technology. The Federal Government spends billions on contracts with the private sector for IT projects (Gianfortune & Butler, 2021). Extensive technology projects such as the international space station rely upon a strong partnership from private sector firms like Boeing (Boeing, n.d.; National Aeronautics Space Administration, n.d.). Another example of relying on the private sector is being played out as agencies modernize their financial systems against the backdrop of new Department of Treasury initiatives, such as G-Invoicing. The G-Invoicing mandate will require agencies to modernize their financial systems to improve the process of buying goods and services between government agencies (Treasury Department, n.d.-a). A key reason for partnering with the private sector is that the federal government can move the risk to the private sector since they have already invested in proven technologies (Ahmadi-Javid et al., 2019; Wood, 2019).

Despite this partnership, problems exist in the delivery of IT megaprojects. CIO Magazine reported in 2019 that 70% of IT projects were either late, over budget, or failed to meet their customer's requirements (Sisco, 2019). Since 2013, PMI has conducted surveys to solicit feedback on this pressing issue. PMI noted in the 2013 Pulse of the Profession that for every $1B spent on projects, $135M is lost and not recoverable (Project Management Institute, 2015). The 2015 Pulse of the Profession survey from PMI revealed that 34% of projects, in general, failed to reach their goals (Project Management Institute, 2015). In 2018, a survey of project managers identified over $99M in losses for every $1B per the use of poor project management techniques and tools (Project Management Institute, 2018). In 2016, PMI noted that over 30 percent of government strategic initiatives failed to achieve their goals while wasting $101 million for every $1 billion spent on projects and programs (Langley, 2016). The underlying problem is that private sector project managers have been pressured to increase the costs and the time it takes to deliver IT megaprojects (General Accountability Office, 2017, 2018; Langley, 2016; Project Management Institute, 2017, 2018).

The best way to address the problem was to work with the private sector. History has shown that the private sector can be a problem-solver for the federal government (Bain, 2009; GNC Staff, 2005; Nisar, 2007; Wood, 2019). From forming the space program to developing a vaccine for COVID-19, the private sector has been counted on to solve some of the government's most significant problems (General Accountability Office, 2021a; History Channel, n.d.). The purpose of this capstone was to explore the project portfolio management practices of private sector project managers in the Mid-Atlantic region of the United States who deliver financial

system megaprojects to executive branch agencies of the federal government on time, within budget, and within scope. Other project techniques (critical incident, modified Delphi, quantitative, and consulting) did not support this focus because of the need to explore successful practices from participants to improve performance.

The need for this project is great. It has been noted that the federal government continues to lag the private sector in developing standards and training its workforce regarding program/project management (Brantley, 2017, 2019). In their empirical study, Bueno and Gallego (2017) noted that training and communications are the foundation for projects. By considering the perspectives, whether they are good or bad, information can be shared with the federal government to assist it with its plans from the private sector. The start of this plan begins with the formation of an applied framework.

2.1.1. Applied Framework

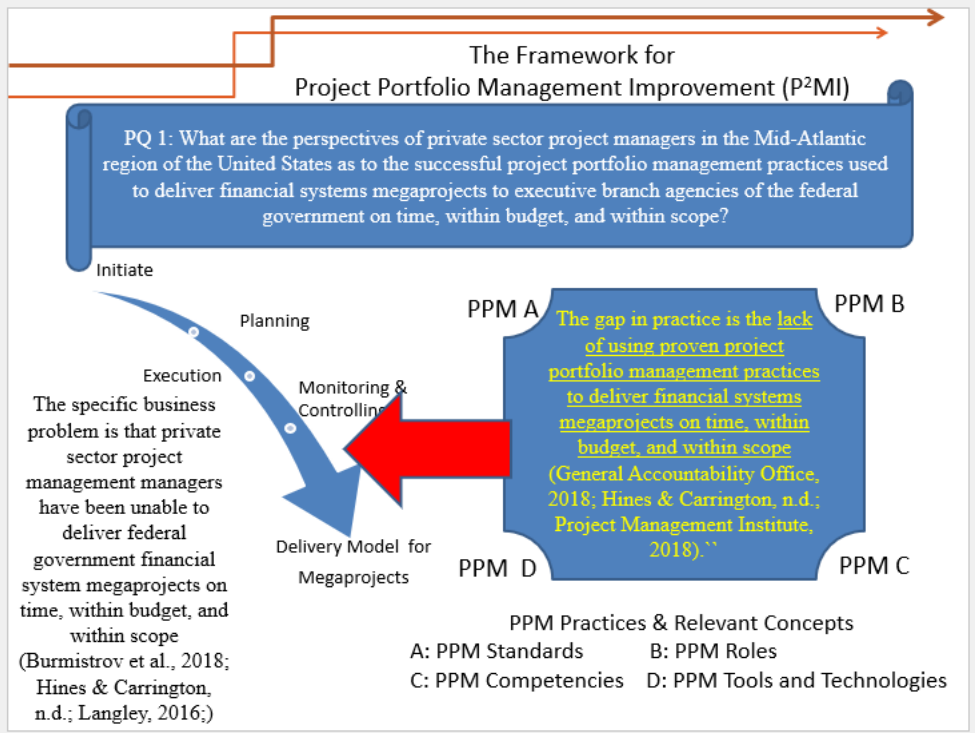
The purpose of an applied framework is to develop an argument that links business problems and gaps in practices with core concepts that will be used to address the project questions. The arguments presented served as the basis to justify the project. The justification was clear and straightforward enough to understand that it can be defended as support for the project. The concepts explored in the project must relate to the problem, gap in practice, and project questions. Lastly, an applied framework must link all the elements together to form a cohesive project. The applied framework is similar to a theoretical framework where it is essential; they have the right blueprint for constructing your framework (Osanloo & Grant, 2016).

2.1.1.1. ***Developing an Applied Framework.*** The choice for developing an applied framework is quite simple. First, locating an existing applied framework to solve the business problem is rare. Existing frameworks like the 7S McKenzie framework or the Project Manager Competency framework are great but may not fully apply to the problem. Other reasons for developing an applied framework are that theoretical and conceptual theories do not help solve specific business problems. Yamauchi et al. (2016) noted that theoretical frameworks focus on theories that have already been tested, while conceptual frameworks focus on examining the progression of a phenomenon. In the case of existing applied frameworks, theoretical frameworks, or conceptual frameworks, they are not specific enough to solve a specific business problem. East and Peters (2019) noted how important selecting the proper framework is to support your research; thus, developing a unique framework is the best course of action.

2.1.1.2. ***Proposed Applied Framework.*** The proposed framework for this capstone project was project portfolio management improvement (P2MI). The P2MI framework, as seen in Figure 1, focuses on the need to address the project question related to the delivery of financial systems megaprojects by private sector project managers. The framework starts with the problem where private sector project managers cannot deliver financial system megaprojects on time, within budget, and

within scope. The specific business problem fed the gap in practice in using proven project portfolio management practices by private sector project managers for delivering financial systems megaprojects on time, within budget, and within scope (General Accountability Office, 2018; Hines & Carrington, n.d.; Project Management Institute, 2018). The results from this project answered the project question.

Figure 1. *The Framework for Project Portfolio Management Improvement*



Note. Based partially on the research conducted and discussed in Section 2.1.1.5 (Costantino et al., 2015; GSA, n.d.; Project Management Institute, n.d.-c, 2017b; see also Kock & Gemunden, 2021; Seelhofer & Graf, 2018).

The proposed applied framework was developed partially based on the research I conducted regarding frameworks, models, and theories involving project portfolio management as discussed in Section 2.1.1.5 since no existing framework could cover the specific business problem, gaps in practice, and project questions. Traditional project management life cycles (PMLCs) helped frame the specific business problem where PMLCs do not guarantee that cost overruns and delays will not occur. Project management practitioners such as Larson and Gray (2018) and Kerzner (2017) identified five phases (initiation, planning, execution, monitoring/ controlling, and closeout) that every project follows. I found that the PMI Talent Triangle and the Project Manager Competency helped identify some relevant concepts (standards, skills, competencies) that are part of the proposed framework (Project Management Institute, n.d.-c, 2017b). The Artificial Neural Network was used to identify the skills and competencies construct of the framework (Costantino et al., 2015). The M3 Framework, Innovation Project Portfolio Management Framework, and National Project Maturity Model provided additional concepts

(standards, roles, tools) in finalizing the framework (GSA, n.d.; Kock & Gemunden, 2021; Seelhofer & Graf, 2018).

At the top of the framework is the project question. The project question focused on the perspectives of private sector project managers in the Mid-Atlantic region of the United States regarding the successful project portfolio management practices used to deliver financial systems megaprojects to executive branch agencies of the federal government on time, within budget, and within scope. The General Accountability Office (2017) recommended that the government look towards the private sector for guidance as improving how best to address the requirements of PMIAA. One of the reasons for consulting the private sector is the variety of PPM expertise they can provide. The question follows the model that supports the qualitative inquiry project technique where it is focused on collecting perspectives from participants regarding their lived experiences as private sector project managers.

The specific business problem is highlighted on the right side of the framework. The specific business problem is how private sector project managers cannot deliver financial system megaprojects on time, within budget, and within scope (Burmistrov et al., 2018; Hines & Carrington, n.d.; Langley, 2016). Doskočil and Lacko (2018) noted that when pressed to deliver their projects, project managers will skip activities that can contribute to cost overruns and schedule delays, leading to unfilled objectives and cost overruns. The specific business problem is caused by the gap in practice

The gap in practice is highlighted on the right side of the framework. The gap in practice exists in using proven project portfolio management practices by private sector project managers for delivering financial system megaprojects on time, within budget, and within scope to the federal government. The gap may be related to the lack of core competencies, as noted by PMI (2017b).

2.1.1.3. *Relevant Concepts.* There are four relevant project portfolio management concepts presented in the P2MI framework that anchored this project: standards, roles, and responsibilities; skills and competencies; and tools and technologies. While each concept is separate and distinct, they provided the construct for the framework. The first concept, project portfolio management standards, explored academic/practitioner project portfolio management standards that may be useful for improving the delivery of financial systems megaprojects. One set of standards will include proposed updates to the PMBOK in 2021 and the proposed standards by the Program Management Improvement & Accountability Act (DePrisco, 2020). The second concept, project portfolio management roles/responsibilities, examined critical roles and responsibilities desired in project management resources to improve the delivery of megaprojects. Project roles and responsibilities must be clearly defined initially; otherwise, problems will arise and not contribute to bringing value and improving delivery (Chandler & Thomas, 2015). The third concept, project portfolio management skills/competencies, was important for the lack of skills and competencies feeds the gaps in practice in delivering megaprojects (Joslin & Muller, 2016; Kock & Gemunden, 2021). Robinson et al. (2007) recommended a three-phase approach to identify and develop competencies

needed in the future to meet upcoming needs. The final concept is project portfolio management tools/technologies. In their study, Khumalo and Mearns (2019) noted that such tools like Microsoft Project could improve the sharing of knowledge to improve program management when integrated with project management practices.

2.1.1.4. ***Relevance to Project.*** The P2MI framework was relevant to this capstone project for it provided a roadmap that shaped how the rest of the project unfolded. The framework provided a mechanism to identify key concepts that drove the literature search for the project. In this case, the P2MI framework helped me identify core PPM that deliver IT megaprojects and core concepts related to PMIAA.

The literature search allowed me to determine trends related to the business problem and what was done to address the problem. In this case, I focused my search on scholarly and practitioner-based literature covering my general/specific business problem and gap in practice. Some of the sources that I used include the *Project Management Journal*. Lastly, the framework established the game plan for collecting and analyzing the data to support the project. As identified above, my project technique used the qualitative inquiry project technique. This technique explored success and unsuccess perspectives from private sector IT project managers.

2.1.1.5. ***Review of Existing Theories, Models, and Frameworks.*** As part of the P2MI Applied Framework development, several existing models, theories, and frameworks were reviewed. Over ten theories, models, and frameworks were found during a framework discovery session, and the final list of candidates was narrowed down to five. Three candidates were models/theories/frameworks developed by researchers, while practitioners developed the rest. The proposed candidates are discussed below.

2.1.1.5.1. ***The Artificial Neural Network (ANN) Model.*** Costantino et al. (2015) developed a theoretical model that relies on an artificial neural network model that uses critical success factors as a mechanism for assessing and measuring projects. Critical success factors would be developed to drive project selection, initiation, and planning activities. The study showed how this would lead to poor delivery and management of projects. Reitsma and Hilletofth (2018) noted the importance of user-centric critical success factors (CSFs) to improve project delivery and management. The foundation of the ANN model is that if by selecting the right projects initially, success will more likely happen. The backbone of the model looks at components of project portfolio management to develop a selection model.

The ANN model was not selected as a framework for this capstone project. First, the model was theoretically based; thus, it was not considered. Second, the model is quantitative; thus, it does not align with the qualitative inquiry project technique. While the model is very logical, it does not address the gap in practice or problem-solving. Unfortunately, the model only covers the initiation and planning phases of a project, limiting the perspectives that could be explored.

Despite its flaws, the ANN model provided insights into the need for project portfolio management standards and tools that would compromise a proposed

framework. First, the model provides invaluable information on concepts, such as key performance indicators (KPIs) and critical success factors (CSFs), that should be considered for measuring project performance. A study completed by Abdelmoniem (2016) concluded that when managers rely on the right critical success factors (CSFs), their organization's value will increase. Second, the model definition of project success expands on the focus of project success for the capstone. Costantino et al. (2015) looked beyond completing a project's budget/schedule to include factors such as quality and stakeholder satisfaction. The inclusion of other factors is an essential consideration since cost and schedule information provides only an analytical view of performance where management needs to look at more than just analytics (Rajagopalan & Srivastava, 2018).

Lastly, the ANN model identified ten factors attributed to measuring project performance that will help me develop the probing questions. One of the factors Costantino et al. (2015) identified, personnel, is an essential aspect of project performance in terms of cost and schedule, but the model's focus was on the selection and training of personnel involved in initiating planning projects. This factor falls in line with the competencies construct of the P2MI framework (Skills & Competencies). It will be interesting to hear perspectives from private sector project managers in this area.

2.1.1.5.2. ***The General Services Administration (GSA) M3 Framework.*** In 2016, the General Services Administration developed the Moderation and Migration Management (M3) framework to assist private sector project managers involved with IT modernization projects, such as financial systems projects, for the federal government (GSA, n.d.). The M3 framework provides a step-by-step approach for delivering IT projects in the federal government. The M3 framework consists of 6 phases, starting with the assessment phase of a project to the project's delivery phase. The M3 framework includes tools and templates to help project managers deliver IT projects within the federal government. These tools and templates were based on recommendations from government agencies and private sector firms (Wood, 2019).

The M3 framework was not selected for this capstone project. While the framework is applied-based, only one of the framework's phases (engagement) covers project costs and schedule, and it is limited to finalizing the costs and schedule. The challenge is having the correct information to correctly estimate the cost and duration of a given project in the beginning. Once the project manager has the correct information, they can move forward with the proper financial control of the project (Tervala et al., 2017). The M3 framework does address the financial control of projects. While the model is very logical, it does not address the gap in practice or the specific business problem that needs to be solved.

Despite its flaws, the M3 framework does provide much value for this project. First, the M3 framework comes with templates that can be considered tools for the P2Mi framework. Second, the M3 framework is the only government-wide framework available for delivering IT projects. Each private sector firm that delivers IT projects for the federal government has its firm-based framework, and many have updated theirs to incorporate features of the M3 framework. Lastly, three of the four

M3's focus areas (program management, workforce, and technology) align with the fundamental concepts of the P2MI framework.

2.1.1.5.3. ***The Innovation Project Portfolio Management Framework.*** Kock and Gemunden (2021) developed a conceptual framework model that measures the success of projects based upon the ability to screen, select, and prioritize projects and allocate resources based upon their prioritization. Confido et al. (2018) emphasized the need for a developing selection method that will aid in choosing the right set of initiatives that bring the most value to the organizations. The foundation for this model is taking an entrepreneurial view toward measuring project performance where performance is linked toward the ability to create competitive advantage through the firm's purpose and vision and ensuring that purpose and vision are intertwined into the project. The basis for this model is that higher priority projects will be given the necessary resources to ensure success. The challenge lies in determining the various factors in a selection method.

The Kock framework was not selected as a framework for this capstone project. First, the model is conceptually based; thus, it is not considered. Second, a model is quantitative; thus, it does not align with the qualitative inquiry technique. More importantly, the framework focuses on project portfolios and not individual projects. Measuring the success of a portfolio will leave out the ability to isolate underperforming projects. For example, if a portfolio has ten projects and eight perform well in delivering on time and within budget, the underperforming projects may not be securitized. Lastly, the framework focuses more on the initiation and planning phases of a portfolio, limiting the perspectives that could be explored.

Despite its flaws, the model does provide some value for this capstone project. First, the model provides invaluable information on PPM's roles and responsibilities. One example was the role and responsibility of stakeholders and executives in delivering projects. Kock and Gemunden (2021) concluded that higher stakeholder involvement translates to better performance. The rationale for this is that project managers will perform better when stakeholders are involved (Eskerod et al., 2015). Another area of discussion that I found interesting was the influence of risk management on project performance. Kock and Gemunden (2021) noted that risk management positively influenced performance. Burtseva et al. (2019) noted that project managers and sponsors need to pay close attention to risks, especially financial ones.

2.1.1.5.4. ***The National Project Maturity Model (NPMM).*** Seelhofer and Graf (2018) developed a conceptual framework for measuring project performance. The National Project Maturity Model (NPMM) framework consolidates several organizational project maturity models, such as PMI's Organizational Project Management Maturity (OPM3) model and Humphrey's Capability Maturity Model Integration (CMMI) model, into a 3-dimensional model. The National Project Maturity Model has three core domains: project maturity levels, project maturity drivers, and perspectives. The model identified ten key performance indicators that can predict project performance in terms of schedule and cost. Dolata (2019)

proposed that when the skills needed to manage project costs are improved, an increase in the maturity level of management will occur, which will improve project delivery.

The National Project Maturity Model was not selected as a framework for this capstone project. First, the model is conceptually based; thus, it is not being considered. Second, the model is a mixture of qualitative and quantitative; thus, it does not align with the qualitative inquiry technique. While the model is very logical, it does not address the gap in practice or the problem to be solved. The three-dimensional model makes it challenging for alignment.

Despite its flaws, the model does provide some value to me as part of this capstone project. First, the model's perspectives and drivers link the learners to the core concepts being explored. Each of the perspectives and drivers will align itself with one or more concept areas. For example, Seelhofer and Graf (2018) identified a KPI regarding the number of projects completed on time and within budget under its Resource Management perspective. This KPI is the foundation of the project.

Another example can be seen with the model's application support driver in evaluating government initiatives to identify and mitigate risks (Seelhofer & Graf, 2018). Doskočil and Lacko (2018) developed a RIsk PRoject ANalysis (RIPAN) empirical model for managing risks. There is an additional need to see how it can be adopted as a best practice by the PMIAA and the project management profession. Secondly, and just as important, the model provides a framework for developing probing questions. For example, when engaging with private sector project managers regarding their perspectives on successful practices, the influence of stakeholder involvement can be probed. Seelhofer and Graf (2018) noted that it is vital to know the stakeholder's influences and contributions to a project and see how that impacts performance.

2.1.1.5.5. ***Project Management Institute Standards and Frameworks.*** The Project Management Institute has many standards and frameworks to use regarding the delivery of IT projects. PMI's Project Management Body of Knowledge is considered the bible for all things project management (Project Management Institute, 2017a). PMI has even created supplement guides for PMBOK that focus on program management, portfolio management, and competencies. The Standard for Organizational Project Management provides a framework that aligns organization strategy with PPM practices (Project Management Institute, n.d.-b). The Standard for Program Management focuses on program management activities, while the Standard for Portfolio Management focuses on portfolio management practices (Project Management Institute, 2017d.). The Project Manager Competency Development Framework focuses on the skills and competencies needed for project managers (Project Management Institute, 2017b). The Governance of Portfolios, Programs and Projects focuses on core governance aspects of portfolios, programs, and projects (Project Management Institute, n.d.-b).

The decision not to use any of the frameworks available via PMI was quite simple. First, none of the frameworks cover everything needed to address the problem and gap in practice. Second, a consolidation of components from the various

standards and guidelines would create a complex framework that would explain the framework difficult.

2.2. Method for Discovering Literature

The method for discovering literature, including using Cappella-based and non-Cappella resources, focused on project portfolio management. Some resources, such as the ACM Digital Library, were excluded due to their limited focus on project management. An iterative search strategy was used to find the most significant number of resources that could be used for this study. I will discuss the inclusion and exclusion strategies utilized.

2.2.1. Inclusion and Exclusion Criteria

The inclusion criteria used for the capstone project included scholarly/practitioner articles and material from the Project Management Institute, government websites, and academic textbooks. References were selected that focused on various portfolio project management topics that cover the gaps in practice while supporting the general/specific business problems to answer the project questions. The date used for inclusion ranged from 2007 to 2021 to ensure that historical and current trends could be identified

In terms of scholarly and practitioner articles, the primary focus was to select peer-reviewed ones. Peer-reviewed articles undergo a review and acceptance process to provide credibility (Gray, 2016). Two of the most used journals were the *International Journal of Project Management* and the *Project Management Journal*. The *International Journal of Project Management* works with the Association of Project Management and the Internal Project Management Association to promote research in leading trends in Project Management (Science Direct, n.d.). The *Project Management Journal* is the academic research group within the Project Management Institute that focuses on techniques, trends, theories, and applications in the project management field (Sage Journals, n.d.).

The criteria for excluding articles focused on several areas. First, articles older than December 2000 were excluded for they were too old to cover the general/specific business problems and gaps in practice. Second, articles that were focused on narrow project management concepts such as risk management that were not relevant concepts related to the framework were excluded. The exclusion of these articles will not support the literature review needed for this capstone project.

2.2.2. Search Strategy

The search strategy for locating articles involved repetitive searches using various keywords. The primary keywords for searching for articles included *project portfolio management*, *project management*, and *megaproject*. Additional keywords included *frameworks, models, theories, megaproject, ERP, and financial systems were used to locate articles.* Table 1 provides a breakdown of each of the keywords and how they were used to search for articles.

Table 1. *Keywords Usage*

Keywords	Usage of keywords
Project management	Narrow search criteria for articles that cover the specialization for the capstone
Project portfolio management	Narrow search criteria for articles that cover an area of research for the project management specialization
Framework, models, theories	Narrow search criteria for articles that cover project management and/or project portfolio management frameworks, models, and theories
Megaprojects	Narrow search criteria for articles that cover megaprojects involving project management and/or project portfolio management
ERP, Financial systems	Narrow search criteria for articles that cover ERP and/or financial systems involving project management and/or project portfolio management

Note. The table provides an overview of how each keyword was used to locate potential articles. Table developed by J. Pullen, 2021.

Several databases and search engines were used to develop a listing of potential articles. The initial database used was the Summons database. Summons was used to provide a general listing of sources that were to be considered. In order to perform a more focused search, the following databases were used Business Source Complete, Google Scholar, and Sage Journal Online. These databases allowed me to perform more precise searches, but more importantly, they provided the best scholarly and practitioner sources. Some of the best sources I found were the Project Management Journal and the International Journal of Project Management. These two journals provided focused topics around project management. In terms of practitioner resources, information from websites such as CIO and PMI provided valuable insight.

An example of this was using the keywords *project portfolio management,* which revealed a potential framework resource that was used. Another example was using the keywords of *project portfolio management,* and *best practices* provided me with resources on best practices as stated by Kharat and Naik (2018). This article provided insight into the best practices and benefits of using project portfolio management practices.

2.3. Review of Scholarly and Practitioner Literature

The search strategy used for this project provided scholarly and practitioner literature that provided evidence to support the general and specific business problem that has been prevalent for more than 5 years. The literature highlighted trends that

reinforced the problems and gaps in practice. The trends discussed will fall into PPM standards, competencies, tools, and roles.

2.3.1. Historic and Current Business Problem Trends

Since 2006, scholars and practitioners have authored project delays, cost overruns, and scope creep. While the articles generally cover the project management profession, they apply to financial system megaprojects. Megaprojects are defined as those project activities that span for several years that cost over $1B (Flyvbjerg, 2014; Larson & Gray, 2018). Financial systems projects involve the modernization of systems used to process accounting, budget, payroll, and purchasing transactions, mandated by the CFO Act (General Accountability Office, 2005). Miller (2021) noted that 56 federal financial systems are nearly the end of their useful life; thus, the pressure to modernize is high. This pressure has led to a renewed focus on delays, cost overruns, and scope creep with financial system projects (General Accountability Office, 2018, 2020; Office of Management and Budget, 2013)

2.3.1.1. ***Trends From Practitioners***. Since 2013, practitioners from PMI, LinkedIn, and Forbes have quantified the impact of project delays, cost overruns, and scope creep. PMI has conducted yearly surveys to solicit feedback on this pressing issue. PMI noted in its 2013 Pulse of the Profession that for every $1B spent on projects, $135M is lost and not recoverable (Project Management Institute, 2013). The trend continued with the 2014 Pulse of the Profession survey, where another $109M was lost (Project Management Institute, 2014). The 2015 Pulse of the Profession survey from PMI revealed that 34% of projects, in general, failed to reach their goals (Project Management Institute, 2015). In 2016, PMI noted that over 30% of government strategic initiatives failed to achieve their goals while wasting $101M for every $1B spent on projects and programs (Langley, 2016). Marr (2016) noted that most projects fail (e.g., not delivered on time) because of poor management during the same year. Between 2017 and 2018, a survey of project managers identified over $98M in losses for every $1B per the use of poor project management techniques and tools (Project Management Institute, 2017, 2018). Mishra (2017) and Nieto-Rodriguez (2017) reported several high-profile project failures. Sisco (2019) reported that 70% of IT projects were late, over budget, or failed to meet their customer's requirements (Sisco, 2019). The underlying problem is that this is a failure of people, processes, and communications to address the threats of problem failure (Discenza & Forman, 2007). The result is that private sector project managers have been pressured to increase the costs and the time it takes to deliver IT megaprojects (Langley, 2016; Project Management Institute, 2017, 2018).

Since 2009, the federal government has been concerned about delivering financial systems projects. In 2009, OMB created the Information Technology Dashboard, which tracks information technology spending across the government (Office of Management and Budget, n.d.-b.). In 2010, OMB suspended financial system modernization projects across the federal government so that a review of projects could be performed (Weigelt, 2010). Later, OMB reported that $1.6B in savings was realized in the delay, postponement, or cancellation of modernization

projects (General Accountability Office, 2012; Tuutti, 2012). An external review of the OMB mandate conducted by the GAO highlights key contributors to project delays: lack of funding, lack of standards, and lack of management oversight (General Accountability Office, 2012). Congress later passed the Digital Accountability and Transparency Act to provide insight into federal spending on contract activities (U.S. Congress, 2014). To address the lack of standards and management oversight, Congress passed the Program Management Improvement and Accountability Act (PMIAA) (U.S. Congress, 2016). Another action taken by Congress was the passage of the Federal Information Technology Acquisition Reform Act (FITARA) of 2017, which required each agency to review and approve all IT project expenditures and performance (U.S. Congress, 2017). The White House followed this action by updating the President's Management Agenda (PMA) to include a new goal to improve the management of government programs (White House, 2018a). None of the actions dealt with the core problem of the ability of private sector project management to deliver financial system projects on time, on budget, and within scope.

2.3.1.2. ***Problems Reported by Scholars.*** The research that I conducted revealed various factors that have contributed to the problem of delivering financial systems projects on time, on budget, and within scope. The factors discussed below fall into various gaps in practices that support the four relevant concepts (standards, roles, competencies, and tools) of the P2MI framework. The factors may fall into more than one concept.

2.3.1.2.1. ***Skills.*** Scholars have differing opinions regarding the right set of skills and competencies needed in project portfolio management (Suikki et al., 2006; Welde & Odeck, 2017). Suikki et al. (2006) noted that project managers need to adjust from the 'old world' of managing projects to the 'new world.' Nijhuis et al. (2018) conducted a study where participants believed that project portfolio management and management skills were the same, but they were not. The study completed by Welde and Odeck (2017) confirmed that project managers lack the skills in planning and managing project costs. Cost overruns will occur when the estimates are too low (Langley, 2016). Sang et al. (2018) concluded that while project managers may possess core technical program management skills, they lack other important competencies such as leadership, financial management, and emotional intelligence needed for monitoring, controlling, and executing the successful delivery and management of projects.

2.3.1.2.2. ***Project Approvals*****.** Scholars have discussed cases where project approvals were granted when they should not have been. Confido et al. (2018) discussed how some projects were approved and should have been disapproved because of financial considerations. A study completed by Vacik et al. (2018) revealed a lack of automated tools to review and approve projects. Allahar (2019) promoted the use of innovation in the approval process. Traditionally, the proposed selection process follows traditional processes that began with listing projects for

consideration and selecting the optimal projects that align with the firm (Milosevic & Srivannaboon, 2006). Guest et al. (2013) recommended inductive probing as a method where the additional questions regarding the specifics of projects will result in a more incredible richness of data to serve as a basis for validation. The problem is that related projects that bring the most value to the organizations should be approved together; thus, related projects that do not bring the most value will be disapproved together

2.3.1.2.3. ***Managing Costs*****.** The inability to manage project costs during the project life cycle remains a concern. Welde and Odeck (2017) conducted a study where there were signs of cost overruns missed in the early stages. Ali and Miller (2017) detailed the challenges with managing costs involving ERP projects where technology changes and new mandates are constraints. These constraints are also present in financial systems projects undertaken by the federal government in order to modernize them (Office of Management and Budget, 2019). Dolata (2019) and Galeazzo et al. (2017) noted that a key component of managing projects involves managing project costs. Project delays and scope creep will occur when project costs are not effectively managed.

2.3.1.2.4. ***Project Roles.*** The success or failure does not rely solely on the project manager. Breese et al. (2020) noted that the project sponsor role is an essential factor regarding the success or failure of projects. While the project manager is responsible for managing the project, the project sponsor has significant influence over a project. The sponsor provides financial resources for the project, and they must be appropriately managed (Breese et al., 2020; Clarke, 2010; Ilin et al., 2018; Zwikael & Meredith, 2018). The project sponsor provides guidance and support to the project manager and the team (Breese et al., 2020). The role and expectations of the project manager, project sponsor, and other roles need to be clearly defined at the beginning of the project so that everyone feels empowered (Jonas, 2010). The key is making sure that the project manager and project sponsor has the right competencies to succeed in all phases of the project (Breese et al., 2020; Kloppenborg et al., 2014; Suikki et al., 2006).

2.3.1.2.5. ***Critical Success Factors*****.** The traditional measurement of project success has been via earned value management and other general tools, which does not address the need for critical success factors (Hartman & Ashrafi, 2002; Jugdev et al., 2013). Reitsma and Hilletofth (2018) proposed that project managers should consider identifying critical success factors that are more user-centric instead of technical-centric or project-centric. Even when using critical success factors, project managers may not perform a proper risk assessment of which factors should be used or excluded (Jenko & Roblek, 2016). The choice of success factors would be an innovative way to identify and manage critical success factors (Gunduz & Almuajebh, 2020; Hartman & Ashrafi, 2002). Some notable missing factors included the involvement of top management and the importance of change management.

2.3.1.2.6. ***Impact of Culture.*** Liu et al. (2015) concluded that culture has a definite impact on a contractor's ability to manage risks to projects. Risks are identified, assessed, managed, and controlled differently when dealing with cultural differences. Cultural differences will be impacted by political, economic, cultural, technological, legislative, and environmental (PESTLE) factors (Hussey et al., 2017; Rodríguez‐Rivero et al., 2018). These factors can affect the delivery of financial system projects if the project manager does not understand the client's culture beforehand; thus, managers may not know how to address the differences.

2.3.1.2.7. ***Importance of Risk Management.*** While risk management is one of the ten knowledge areas, many project managers consider this activity a simple exercise that underestimates risks for projects (Doskočil & Lacko, 2018; Shishodia et al., 2018). Traditionally, project managers would identify risks at the beginning of a project and manage them as they come up. Burtseva et al. (2019) noted that project managers and sponsors need to pay close attention to risks, especially those with a financial nature. Doskočil and Lacko (2018) noted how risk management activities were not being done at the end of each project phase or even using advanced risk management techniques. The use of reviews at each phase of the project may provide crucial information that can be shared with that team or across similar projects that span a portfolio, which will reduce risks, as noted by Tshuma et al. (2018). The goal is to provide timely data so that decisions can be made promptly to reduce risk (Romano, 2017).

2.3.2. Previous Efforts to Address the Problem

Scholars and practitioners have provided recommendations to address the problems with project delays, cost overruns, and scope creep (Eskerod et al., 2015; Williams et al., 2012; Wysocki, 2019). Their recommendations have generated mixed results. PMI noted in its 2013 Pulse of the Profession that for every $1B spent on projects, $135M is lost and not recoverable; however, the losses dropped to $98M in 2018 (Project Management Institute, 2013). The following sections summarize some of the recommendations that may apply to improving the delivery of financial systems projects by private sector project managers.

2.3.2.1. ***Early Warning Systems.*** Resources responsible for managing complex financial system programs/projects must quickly determine when their program/project is in trouble. If they react too slowly, the program/project will become distressed. Wysocki (2019) defines a distress project or program as performing outside nominal values. One of the easiest ways to look at nominal values is assessing values related to earned value management, such as schedule or cost variances (Williams et al., 2012). These values will indicate a high degree that the project will never achieve its purpose.

The early warning system must be established in the beginning phase of a project (Williams et al., 2012). Once the system is in place, managers must use it on a routine basis. Williams et al. (2012) proposed that an early warning system consists of conducting project reviews, performing project health checks, establishing benchmarks, implementing project audits, and performing evaluations of a project once they are completed. The proposed early warning systems will help managers limit project crises but provide a playbook for managing and resolving the crises if they do arise.

2.3.2.2. ***Project Portfolio Management Governance.*** Governance is an especially important aspect of managing programs and portfolios with my firms. Most programs/portfolios will have two sets of governance models: one that is financial-based and one that the project management-based. These governance models will report to different executives who have a different focus. The financial-based model may report to a CEO, COO, CFO, or Controller, while the project management based-model will report to a CIO or PMO group. Each group will require some sort of status of the program and portfolio; thus, the information presented will vary. The consolidated information does paint a clear picture of the program/portfolio; however, the information presented varied by the audience.

Establishing the right governance model is a recommended best practice. As noted above, portfolio managers must respond to financial and non-financial pressures for performance. The portfolio manager is required to design a governance structure that can respond appropriately to these pressures while keeping all their stakeholders updated (Eskerod et al., 2015). When this is done, Lehnert et al. (2016) and Milosevic and Srivannaboon (2006) emphasized that improvement to organizational performance can be linked to improvement in business processes.

2.3.2.3. *Innovative Metrics.* Program/project managers need a different way to measure success or failure. Traditionally, project performance dictated if a project was successful or not. The traditional measurement of project success has been via earned value management and other general tools (Jugdev et al., 2013). Innovative metrics, such as the project health index, as Rajagopalan and Srivastava (2018) proposed, should be used as a performance measurement for projects. These metrics must go beyond factoring in the triple constraint. Abu-Hussein et al. (2016) noted how important it is to consider the triple constraints as part of planning for a project; therefore, a metric like this will be required as part of a project's initiation and planning phase.

Innovative metrics, such as the project health index, are imperative for managing portfolios. Managers will be able to use innovative metrics to identify access to the performance of their portfolios. Innovative metrics can be used as an early warning system in this manner. From an organizational viewpoint, the firm must be prepared to take the necessary action when performance is not optimal (Ward & Chapman, 2011). Organizations that embrace using metrics to address performance will increase their overall value. The challenge is reducing the barriers to using them, as Dandage et al. (2018) noted.

2.3.2.4. *Project/Risk Management Lifecycle Selection*. The choice of a project (PMLC) and risk (RMLC) management life cycle must withstand the challenge of project delays and failures. Burmistrov et al. (2018) noted that 25% of all projects fall within 10% of their stated deadlines. While most projects are well-defined, some projects are not. The lack of a well-defined PMLC / RMLC leads to managers dealing with many aspects of uncertainty. The selection of the right PMLC / RMLC will provide program and project managers with the dynamic capability to ensure that their programs and projects achieve their organizational goals and objectives while dealing with time and cost constraints (Galeazzo et al., 2017).

Wysocki (2019) proposed five PMLCs that can be used by project and program managers. The traditional/linear PMLC is the classical waterfall model that has been used for years and serves as the conventional model for project management. A variation of the traditional/linear model, the traditional/iterative model, was devised to account for supporting a phase/increment deployment of projects. The agile/iterative and agile/adaptive was born out of the need to consider deploying projects via an agile flavor that focuses on cycles or iterations. The final PMLC, the extreme PMLC, takes the best from both the agile and traditional PMLC models. Each of these PMLCs has its strengths and weakness. The successful project manager will know which PMLC is best for their project (Laufer et al., 2015).

Two RMLC models would be used within a PMLC. The first RMLC model, the Performance Uncertainty Management Process (PUMP), assigns responsibility via their ‘clarify ownership’ activity (Ward & Chapman, 2011). The second RMLC model, the Project Management Institute’s Risk Management Process (RMP), identifies responsibilities within the Project Management Body of Knowledge and the Standard for Risk Management in Portfolios, Programs, and Projects (Project Management Institute, 2017a, 2017b).

2.5. Recruitment

The recruitment of participants for this qualitative inquiry study focused on identifying and selecting private sector project managers who have delivered financial systems projects for executive branch agencies of the federal government from January 2016 to the present. There were several reasons for focusing on executive branch agencies. First, all executive branch agencies (e.g., Department of Justice, Department of State) must comply with the CFO Act. CFO Act agencies must keep their financial systems updated to handle federal financial management reporting requirements (Jones & McCaffery, 1992). Secondly, my role as a financial systems program manager will afford me easy access to candidates for interviews. These candidates will share perspectives regarding successful deliveries of financial system megaprojects. Lastly, these agencies are located in the Mid-Atlantic region of the United States, which makes it easier to contact participants.

The process for recruiting potential participants was the purposeful sampling method. The method relied on recruiting candidates who know the area of interest related to the study who are able and willing to participate (Gray, 2016; Schindler, 2019). First, I have a working relationship with the various CFOs and CIOs within the federal government. Instead of sending them a message to ask for assistance, I will contact them via phone. During the call, I will explain to them the purpose of my project and if they know of any private sectors project managers in their organization who may be candidates to help me with my project. If they have referrals, I will ask them to contact the referrals in advance of me contacting them via email. Once I confirm a possible participant, a recruitment message (see Appendix B) with the corresponding consent form (see Appendix G) will be provided to them. I will have a follow-up phone call with each participant to gauge their interest and to confirm their eligibility. All participants' eligibility will be determined via completing an eligibility checker during a phone call with prospective candidates (see Appendix H). During the phone call, eligible participants would be requested to send the completed form to me via email; otherwise, they would be requested to delete the form simply. At the end of the call, I will ask them if they know of additional private sector project managers interested or eligible to refer them to me via email.

The purposeful sampling method provided a reduced population that was used to establish an appropriate sample size. Study participants met the eligibility criteria. All study participants were information technology private sector project managers who had delivered at least two financial systems projects for a US federal government executive branch agency. Participants who did not meet this criterion were excluded. The key is getting experienced project managers who can share their perspectives. The targeted sample included seven to 10 private sector project managers who have delivered financial systems projects for executive branch agencies within the US federal government.

2.6. Project Study Protocol

The importance of this project was to explore the perspectives of private sector project managers in the Mid-Atlantic region of the United States regarding the

successful project portfolio management practices for delivering financial systems megaprojects on time, within budget, and within scope to executive branch agencies of the federal government (Project Management Institute, n.d.-a, 2017b, 2018). The protocol that I followed for this project was to explore project portfolio management practices presented by approved participants that addressed the general and specific business problems with delivering IT projects to the federal government (Alexander, 2020; Shinde & Govender, 2017; Takey & Carvalho, 2015). Once the practices are established, they can serve as a starting point for identifying project portfolio management best practices that will improve the delivery of financial systems projects. These practices must be able to overcome the challenges faced by managers.

The foundation for collecting, analyzing, and presenting the data for this qualitative inquiry study was based upon thematic analysis using an inductive approach. Thematic analysis is standard in qualitative inquiry studies, for it helps in identifying and interpreting themes from data provided by participants (Gray, 2016; Merriam & Tisdell, 2016)]. The inductive approach focused on a bottom-up approach that reviewed the data to see what patterns can be used to confirm the constructs of the applied framework, gaps in practice, and answers to the project question.

The inductive analysis answered these questions, which fell into the four constructs of the proposed applied framework, the Framework for Project Portfolio Management Improvements. The constructs for this applied framework included project management standards, competencies, tools and techniques, and skills.

The data collection requirements were solid to support answering the project questions. The project questions focused on exploring the perspectives of participants. The requirements to support this were broken down by the who, what, when, and how. The *who* requirement required identifying and using participants who can answer the project questions. The *what* requirement involved developing an interview guide that guided the interviewer to get the participants to share their perspectives. The *how* requirement was the actual interview, a semistructured interview that allowed probing questions to the done. The *when* requirement focused on when the interview will be done.

2.6.1. Data Sources

The qualitative inquiry project technique required that interviews of participants be conducted to explore the project questions being addressed. The interviews served as a basis to establish a preliminary set of data analyzed to report findings. An interview guide was developed to guide the interview to ensure that the necessary data was collected. Tests of the interview guides were performed before any final interviews were conducted.

2.6.1.1. ***Preliminary Sources of Data Expected.*** There were two preliminary data sources used for this project. The first data sources were practitioner and scholarly articles used in Sections 1 and 2 of this project. These articles were important to develop the general/specific business problems, gaps in practice, and project questions (Langley, 2016; Sang et al., 2018; Weigelt, 2010). Once this was

done, additional articles were used to develop the proposed applied framework and literature review (Gunduz & Almuajebh, 2020; Hartman & Ashrafi, 2002; Jenko & Roblek, 2016). Additional articles were used to support the recruitment of participants and other aspects of this project (Gray, 2016; Merriam & Tisdell, 2016; Schindler, 2019). The foundation of this capstone project would not exist without these articles. The second set of data sources came via semistructured virtual interviews via Zoom. Zoom allowed me to collect data from participants safely and efficiently. First, due to the current state of COVID-19, neither the participants nor I needed to be in the room to conduct the interview. Second, the use of Zoom captured the commentary of the interview so that I could focus on the tasks of answering questions. Finally, Zoom provided a record of the interview that the participants could review to ensure the accuracy of their comments.

An interview guide (see Appendix E) was created to list the questions asked during the interview. A series of questions was posed to the participants to solicit their perspective of project portfolio management practices used to deliver financial system megaprojects per the triple constraint. The questions supported the applied framework exploring participants' perspectives related to successful project portfolio management practices (Merriam & Tisdell, 2016). The data collected during the interview was analyzed and presented per the data collection and presentation plan presented in Section 2.6.

2.6.1.2. ***Instrumentation and Data Collection Tools.*** The essential tools to collect data were the interview guide and an audio conference call tool (Zoom). The interview guide provided the questions asked of each participant. The conference call tool (Zoom) recorded and transcribed each interview.

2.6.1.2.1. ***Interview Guide.*** The interview guide focused on the core project questions. The questions supported the need for collecting participants' perspectives related to their field of expertise (Gray, 2016; Merriam & Tisdell, 2016). The first three questions will focus on the demographics of the participants. These questions will allow the researcher to analyze the data collected by years of experience, professional/academic background, and the number of projects led as a manager. A series of four pinpointed questions solicited from the participants their perspectives regarding successful project portfolio management practices used to deliver financial system megaprojects. The pinpointed questions were supported by probing questions that may reveal additional details regarding the practices. In the end, the participant was asked if they had any additional information to share and final reminders regarding the interview. The interview guide is provided in Appendix E.

2.6.1.2.2. ***Audio Conference Call Tool***. The interview was conducted via Zoom online audio conference call tool to capture the interviews. Zoom is a leader in cloud-based audio/video conference calls. Zoom is used in many Fortune 500 firms and within the federal government. The platform is very secure as the Biden administration uses it for some of its cabinet meetings. Also, Capella University

provides free use of Zoom for all its learners. The IRB approved my use of Zoom as long as an audio recording was done.

Zoom allows the interviewer to record the interview and automatically transcribe the content or transfer the recording to another tool for transcribing. The transcribed content can be exported to a file loaded into other tools, such as Nvivo or Microsoft Excel, to code the data. These tools allowed me to analyze the data to present findings.

2.6.1.2.3. ***Expert Review***. Expert reviews were necessary for interview guides to ensure that the interviews will be credible (Capella University, 2020). In order to perform an expert review of an interview guide, feedback from experts was needed. The use of experts to review the interview guide will bring credibility to the research, plus much more. Expert reviewers from Capella University's School of Business, Technology, and Health Care Administration were used. Experts ensured a direct alignment between the interview, interview questions, project questions, and research problems to ensure that they were unambiguous. The interview was semistructured.

The expert review process began with the selection of two expert reviewers. Once the reviewers were selected, they were sent the Expert Panel Participant Form (see Appendix L) to review and complete. The reviewers were provided no more than two weeks to complete the form. Based on the expert review feedback, consultation with my mentor determined what changes would be made. The expert review was completed on August 16, 2021, and August 19, 2021. The feedback from their reviews was discussed with my mentor, and a few changes were required.

2.6.1.2.4. ***Test Run*****.** Conducting a test run allowed me to test the interview questions before conducting the study (Capella University, 2020; Gray, 2016). There were several benefits and risks to performing a test run. The first benefit was to practice interviewing to ensure plenty of time was allotted to the interview. It is essential to ensure that the respondents have sufficient time to answer the question. The second benefit was to collect the right amount of data per question. The questions cannot be so narrow that insufficient data is being collected. The first risk with a field test is that it takes time to coordinate and complete the interview. A second risk with the test run is getting people to participate. A final risk with a test run is the desire for perfection. It may be necessary to tweak the questions and conduct another test run. In general, a test run takes time and effort. It is important to maximize the benefits of performing a test run while reducing the risks.

The test run was conducted with one participant. The participant was a private sector project manager responsible for managing IT projects with the federal government. The participant was prescreened to ensure that they had the background for answering the questions.

The test run will be conducted no differently than the actual data collection process. The protocol would ask all of the questions listed in the interview guide (see Appendix L). The interview would be recorded. Once the test was done, the recording and the interview transcript were sent to the mentor for review. The test run was

evaluated by completing the test run form by my mentor and I to evaluate the interview (see Appendix F). If the mentor approves the field test, I can proceed with actual interviews; otherwise, the process is repeated until a successful test run has been done.

2.6.2. Data Collection

The first phase of data collection involved preparing for the interview. No interviews were performed until IRB approval had been obtained and a successful test run of the data collection protocol. Section 2.5 described the recruitment process that was followed to obtain the seven to 10 participants. The date and time for the interview were during the participants' non-working hours. Once an agreement had been made, the interview was scheduled in Zoom using a calendar invite via Google Calendar. The calendar invitation, which contained the link to the interview, was sent to each participant. Each interview contained a passcode for security purposes. Zoom generated the passcode that the participant and I know. The interview was set to be recorded to the cloud until they were removed for safekeeping. Recording the interviews to the cloud will reduce space and technical problems if recorded on a PC. Zoom has many protocols in place to ensure the security of these recordings (Zoom, n.d.)

The second phase of data collection was the interview. The participants and I needed to understand the expectations of the interview. Before the Zoom interview was conducted, both the interviewer and the participants tested their internet / mobile connection with Zoom to reduce the possibility of technical problems. The Zoom interview session was expected to last 60 minutes and may last longer or shorter based on the conversations. When it was time to begin the interview, the participant and I clicked on the link provided in the calendar invitation. Only the participant and interviewer were present online in Zoom during the interview. The interview was recorded via Zoom; however, if the participant wanted to say something that should not be recorded, the recording was paused. The interview proceeded using questions from the interview guide. Finally, after the interview was conducted, the participants were offered a recording transcript to confirm what was said. I reviewed the recording to ensure that the audio quality was clear and that the transcript was readable. Participants who wanted an audio recording were given 5 business days to review the transcript. A non-response from the participants will mean that the participants have no feedback to the transcript, and the transcript was used as-is for analysis. None of the participants requested a copy of the recording or transcript.

2.6.3. Data Analysis Plan and Presentation

The proposed data analysis plan and presentation for this qualitative inquiry study were to address the proposed project questions. The data analysis plan and presentation were broken down into two segments to achieve this goal. The first segment focused on how the data will be analyzed. Since the preliminary data source came via interviews, the data was transcribed before being analyzed. The second

segment of the data analysis and presentation involved describing how the data will be presented. Tables were the primary method of presenting the data. The use of tables served as the foundation for developing the narrative finding. The findings may be valuable to practitioners interested in the perspectives of private sector project managers who deliver financial systems projects for the federal government.

2.6.3.1. ***Data Analysis Plan.*** The first step of the data analysis plan involved becoming familiarized with the data. Once the data was transcribed, I performed several transcript reviews to make sure I understood what was said during the interview. I may need to make some edits based upon the quality of the transcription but will note any edits via tracked changes. Also, I recorded some initial notes during the review as comments. These comments will be noted as 'author notes' to ensure that they are separate from other notes.

The second step of the data analysis plan involved the generation of initial codes. As I browsed through the transcript, I highlighted portions of the transcript that were of value/importance to the study and assigned a code to them. The highlighting was done via the Comments features in MS Word and assigning an appropriate code to the text. The challenge was deciding what phrase would represent the text to consolidate codes.

The third step of the data analysis plan involved using Goodall's Verbal Exchange Coding method to assign a descriptive to those initial codes that are either practice-based or cultural-based performed (Saldaña, 2016). The method involves categorizing codes as routine, surprises; risk-taking; crises; or rites of passage. Codes categorized as routine would be project management practices one would expect to experience/perform in the project management profession. In some cases, codes that are generally not experienced as practices in the project management profession will be classified as surprises. The third and fourth categorizations of codes would be classified as risk-taking or crisis management practices experienced/performed in the project management profession. The fifth categorization would be classifying codes as practices that could be considered as rites of passage where they could advance the project management profession.

The final step of the data analysis plan involved an initial development of themes based upon the initial codes. During this step, similar or related codes were grouped together to form an initial theme. As I go through this process, I may develop major and minor themes. The formation of major and minor themes may help present the data as part of my data presentation plan. Themes were formed via the constant comparison data analysis method to determine themes applicable to the project question (successful project portfolio management practices regarding the delivery of financial system megaprojects) and the proposed P2MI applied framework (Leech & Onwuegbuzie, 2011; Merriam & Tisdell, 2016).

2.6.3.2. ***Data Analysis Presentation.*** The analysis of data involving a qualitative inquiry study required a presentation that can present outcomes, findings, and recommendations. Since the preliminary data were recordings from interviews, the data was coded in a format that allowed the ability to generate outcomes, findings,

and recommendations linked to the project questions. Determining the format for the outcomes, findings, recommendations was a challenge because I did not know what could be presented until I had conducted the proper analysis.

Bazeley and Jackson (2013) provided a three-phase approach for presenting qualitative data: describe, compare, and relate. The description phase involved looking at the significant themes that arise from the data and seeing what similarities and differences were presented by the participants. During the description phase, it will be essential to see what themes are more significant than others. The compare phase will involve presenting the data based on some of the established demographics that are presented in the interview guide. In this case, a comparison can be made based upon years of experience, the number of projects delivered, academic and professional background. The relate phase involves looking at the themes and seeing what additional questions could be posed. An example of this would be how can the same theme be present in successful deliveries of financial system projects. The goal would be to link the themes to the constructs of the P2MI applied framework.

Tables served as the primary measure for presenting summary data from the analysis that has been completed. Tables were in a particular format that supported the narrative analysis required. In general, the narrative analysis and the corresponding tables were linked together so that an accurate picture was painted for the readers of the study. The challenge here was that generating too many tables may distort the presentation of outcomes, findings, and recommendations.

2.6.4. Trustworthiness

The use of the qualitative inquiry project technique for exploring the perspectives of private sector project managers requires that the information provided is trustworthy, dependable, credible, confirmable, and transferable. Trustworthiness occurs when the information is sensed as honest and truthful (Gray, 2016; Smith, 2017). Dependability occurs when the findings from this study will be seen in future studies (Gray, 2016; Smith, 2017). Credibility exists when the author and readers of the study have confidence in the results and the process (Gray, 2016; Smith, 2017). The findings must be confirmed by the author, the participants, and others who review the study.

Trustworthiness occurs when others have confidence in how a study was completed (Connelly, 2016; Polit & Beck, 2014). The confidence level will determine how well the findings will be accepted. Carcary (2009) recommended having an audit trail to support your findings. One way to accomplish both would be to record all of your interviews and a detailed, repeatable process that interviews contents into findings. As participants explain their perspectives of project portfolio management practices, they must be accurate.

Dependability will be seen when the data collected/analyzed stands over time (Connelly, 2016; Polit & Beck, 2014). Like trustworthiness, the use of audit trails will improve dependability. The best audit trail occurs when proper care and handling of the data from the studies. Capella's IRB provides guidelines for proper care and handling of the data.

Credibility occurs when others have the highest confidence in the study's findings beyond any other factor (Connelly, 2016; Polit & Beck, 2014). One way to ensure credibility can be done via the selection of participants for the study. Baxter and Eyles (1997) recommend the use of purposeful sampling as a way to ensure credibility among the participants. Purposeful sampling will be used in this study to select participants. Another method for ensuring credibility is completing expert reviews and a test run. The completion of these activities will provide the readers of this report with confidence in the perspectives of the project managers regarding the delivery of financial systems megaprojects. Credibility is also improved through transcription verification.

Confirmability is seen when the study is objective; thus, future studies can duplicate the finding. Transparency has to exist with the data in order to enforce confirmability. Baxter and Eyles (1997) recommended using audit trails to support confirmability. This will allow readers to link the findings to the literature and the project questions. A detailed interview guide provided the linkage.

Transferability occurs when the study's findings can be applied to other studies different from the current study (Connelly, 2016; Polit & Beck, 2014). Carcary (2009) noted that sufficient details regarding the project are provided to establish transferability. The details include but not limited to project questions, sample size, data collection techniques, and data analysis plans are documented. With the exploration of project portfolio management practices regarding financial system projects, transferability will occur if the practices are applied to other types of projects, including but not limited to IT and construction projects.

The combination of trustworthiness, dependability, credibility, confirmability, and transferability are essential to presenting findings that will be acceptable to the audience of a project. The challenge to making the results acceptable to a reader will be dependent on the data collection instrument, the analysis of the data, and the generation of the results. The instruments will be designed to ensure that the participants' perspectives are adequately collected. The data analysis has to be done to facilitate the generation of findings that can be produced.

2.6.5. Ethical Considerations

The exploration of perspectives of private sector project managers will pose ethical challenges that must be managed. Challenges in privacy, confidentiality, and data security may risk the validity of the project. The challenge will be present because of the nature of the project technique used. The qualitative inquiry technique requires participants to express their perspectives regarding situations that they have experienced. All participants in this study will be required to complete the informed consent form as provided in Appendix G. Informed consent provides potential participants with information about the project to decide whether to participate or not (Crow et al., 2006; Gray, 2016). When participants complete the informed consent form, they have agreed to participate in the interview and agree to the risks associated with the interview and the measures to protect their privacy and confidentiality. The

informed consent form must be completed and returned via email. The informed consent forms will be stored on a secured flash drive for seven years.

The privacy and confidentiality of the participants; the organizations that they work for; and the projects discussed must be protected. The use of the qualitative inquiry will allow participants to discuss their perspectives regarding the delivery of financial system projects to the federal government. The use of non-public government information is prohibited for this project (Federal Acquisition Regulations, n.d.; Justice Department, n.d.-a; U.S. Office of Government Ethics, 2017). Any disclosure may pose professional and personal harm to them, so measures need to be taken to protect the participants (Department of Health and Human Services, n.d.). In order to protect the identity of the participants, crosswalks will be used to reference participants (see Appendix I), organizations (see Appendix J), and projects (Appendix K) by codes in the results of the capstone project. The crosswalks will be stored in a password-protected file on a secured flash derive located in a fire-proof safe.

All data collected must be adequately secured. Capella requires that data be protected at least for seven years. Data from Zoom interviews will be stored on secured flash drives and removed from Zoom within 30 minutes of the interview's conclusion. All crosswalks' documents will be stored on secured flash drives. As noted above, all data will be stored on secured flash drives. The flash drives will be stored in a fire-proof safe. Once the 7-year period is up, the flash drives will be broken with a hammer, and the contents disposed to the Charles County Maryland landfill. These actions will ensure that no one can access the data.

The actions taken here will reduce the threat of privacy, confidentiality, and data security compromise. While no one method or set of methods is foolproof, the actions taken are a start. Participants must feel comfortable about sharing their perspectives without worrying about what they have disclosed being compromised.

SECTION 3. RESULTS, DISCUSSION, AND IMPLICATIONS

3.1. Introduction

The purpose of this qualitative inquiry project is to explore the perspectives of private sector project managers in the Mid-Atlantic region of the United States regarding the successful strategies used to deliver financial systems to executive branch federal government agencies on time, within budget, and within scope. The completed study supported the proposed applied framework where the gap in practice feeds the specific business problem. The specific business problem is that private sector project managers have been unable to deliver federal government financial system megaprojects on time, within budget, and within scope, which delays the expected benefits from these megaprojects (Burmistrov et al., 2018; Hines & Carrington, n.d.; Weigelt, 2010). The gap in practice is the lack of using proven project portfolio management practices used to deliver financial systems megaprojects on time, within budget, and within scope (General Accountability Office, 2018; Hines & Carrington, n.d.; Project Management Institute, 2018).

The findings of this project were discussed in several sections leading up to this section. First, a review of the results from the data collected was presented. Next, an analysis of the data was performed, and the results were presented, including their contribution to the literature, knowledge base, and theory related to project management. The discussion concluded with the application of the results to the profession.

3.2. Data Collection Results

Participants were recruited using the purposeful sampling method that relied on candidates who have knowledge in delivering financial system megaprojects to the federal government. The population base for recruitment was based upon my professional relationship with various CFOs and CIOs within the federal government. The recruitment process used the recruitment message that was presented in Section 2.5. The recruitment resulted in an initial population of 15 candidates, of which nine candidates agreed to participate in interviews.

Interviews were conducted with the participants between November 6, 2021, and December 16, 2021. The date and time for each interview were agreed in advance by the participants. By spreading the interviews over this period of time allowed me to spend time reviewing and evaluating the data.

Each interview began with a conversation with the participant thanking them for their participation and walking them through the interview process. At that point, the interview recording began with me asking each participant if I had permission to record the interview, followed by an icebreaker opening statement. After the opening, four demographical and informational questions were asked. These questions provided demographic and experience information from each participant. Once this was done, four interview questions were asked related to the key concepts from the applied framework. Follow-up questions were asked when necessary. The interview concluded with a question to see if the participant wanted to add anything else and a closing statement. The questions asked are the same as noted in the interview guide from Appendix E.

There were no issues encountered during the interviews. In order to protect the identity of the participants, only an audio recording of the interview was performed. Once the interview was concluded, the Zoom audio recording was downloaded to my computer for evaluation. The quality of the audio recording and transcription of the interview was clear.

Each interview was transcribed separately by Otter AI. After the audio files were transcribed, I updated each transcript to correctly identify each speaker; assigned each participant and any organization/project references by their own code as referenced by the codes in Appendix I, J, and K to maintain privacy. The transcription performed by Otter AI took anywhere from 15 to 20 minutes, depending on the size of the audio recording. After this, Otter AI created a text-based version of the transcription, which was imported in Microsoft Excel to review and support the generation of tables for reporting. Each transcript was reviewed to ensure that the

transcription was done correctly. The Excel document was saved and was used to serve as a source for coding purposes.

3.2.1. Interview Results

The interviews were scheduled for a 60-minute time limit. None of the interviews exceeded the time limit. The interview varied from 25 minutes to 58 minutes, with an average interview length of 37 minutes. Every question from the interview guide was asked during the interview, and the participants provided detailed responses to the questions asked. Table 2 summarizes the interviews that were conducted and when they were transcribed.

Table 2. *Interview Summary*

Participant Code	Date of Interview	Length of Interview	Date of Otter AI Transcription
PM#1	November 6, 2021	25	November 8, 2021
PM#2	November 20, 2021	42	November 25, 2021
PM#3	November 20, 2021	25	November 26, 2021
PM#4	November 20, 2021	43	November 27 2021
PM#5	December 1, 2021	39	December 3, 2021
PM#6	December 1, 2021	36	December 5, 2021
PM#7	December 4, 2021	42	December 8, 2021
PM#8	December 4, 2021	20	December 9, 2021
PM#9	December 16, 2021	58	December 17, 2021

Note. The table represents the dates that interviews and transcriptions were done. Table developed J. Pullen, 2022.

3.2.1.1. *Demographics Results*. The demographics of the participants were pretty divided. The sample includes participants from six organizations. Forty-four percent of the participants were either female or minorities. These numbers are higher than what is reported by Zippia (2021) that 30% of project managers were either minorities or were female. Table 3 provides a demographical summary of the participants.

Table 3. *Demographical Summary*

Participant Code	Race	Sex	Organization Code
PM#1	Black	F	Org#1

Participant Code	Race	Sex	Organization Code
PM#2	White	M	Org#2
PM#3	White	M	Org#2
PM#4	White	M	Org#3
PM#5	White	M	Org#4
PM#6	White	F	Org#5
PM#7	Black	F	Org#6
PM#8	Black	F	Org#4
PM#9	White	M	Org#5

Note. The table represents a demographical recap of the interview participants. Table developed J. Pullen, 2022.

3.2.1.2. ***Experience Results.*** The experience of the participants varied but experienced. Thirty-three percent of the sample held a master's degree. Fifty-six percent of the sample had more than 20 years of experience. The sample's average number of years of experience was 23 years, which is higher than the 2021 study from PMI (Project Management Institute, 2021b). Seventy-eight percent of the sample hold an active project management certification from PMI. Forty-four percent of the sample led twenty or more financial systems projects during their professional career. Table 4 provides a summary of the participants' experiences.

Table 4. *Experience Summary*

Participant Code	Degree Code	Years of Experience	PM Certification	Number of Projects Led
PM#1	BS	18	Y	35
PM#2	BS	18	N	5
PM#3	BS	40	Y	50
PM#4	MBA	26	Y	20
PM#5	MS	30	Y	20
PM#6	BA	20	Y	5
PM#7	BS	22	Y	5
PM#8	MA	13	N	5

Participant Code	Degree Code	Years of Experience	PM Certification	Number of Projects Led
PM#9	MS	18	Y	16

Note. The table represents a summary of the participant's PM experience. Table developed J. Pullen, 2022.

3.3. Data Analysis

The purpose of this qualitative inquiry project was to explore the perspectives of private sector project managers in the Mid-Atlantic region of the United States regarding the successful strategies used to deliver financial systems to executive branch agencies federal government agencies on time, within budget, and within scope. The specific business problem is that private sector project managers have been unable to deliver federal government financial system megaprojects on time, within budget, and within scope, which delays the expected benefits from these megaprojects (Burmistrov et al., 2018; Hines & Carrington, n.d.; Weigelt, 2010). The need for effective project portfolio management revealed a more significant problem that program/project managers were not using proper project portfolio management techniques in managing their megaprojects (Project Management Institute, 2017).

The approach to analyzing the data from the interviews involved a four-step approach. The first step of the data analysis plan involves becoming familiarized with the data through reviews and editing of each transcript. The second step of the data analysis plan involved the generation of initial codes by highlighting portions of the transcript that are of value/importance to the study and assigning a code to them. The third step involved using Goodall's Verbal Exchange Coding method to assign a descriptive perspective (routine, surprises; risk-taking; crises; or rites of passage) to each code (Saldaña, 2016). The final step involved the development of themes based upon related codes. Themes will be formed via the constant comparison data analysis method to determine themes applicable to the project question (successful project portfolio management practices regarding the delivery of financial system megaprojects) and the proposed P2MI applied framework (Leech & Onwuegbuzie, 2011; Merriam & Tisdell, 2016).

3.3.1. Familiarization with the Data

The first step of familiarizing myself with the data was a review of the actual audio recording. After each interview, the recordings were downloaded from Zoom and saved on my laptop. I reviewed each audio recording twice to ensure I had a clear understanding of the responses from the participants. What I was listening for was to ensure that participants answered each question and make sure that the recording was clear. This review took roughly 1-3 hours per interview to complete. There were no issues with the recording. The recordings were removed from my computer and stored on a secured flash drive. The flash drive is stored in my home office's SentrySafe HD4100 Fireproof Safe.

The second step involved transcribing the audio recording. Each interview was transcribed separately by Otter AI. After the audio files were transcribed, I updated each transcript to correctly identify each speaker; assigned each participant and any organization/project references by their own code as referenced by the codes in Appendices I, J, and K to maintain privacy. Otter AI took anywhere to 15-20 minutes to perform the transcription. At the conclusion of this, Otter AI created a text-based version of the transcription, which was imported in Microsoft Excel for review and to support the generation of tables for reporting. Each transcript was reviewed to ensure that the transcription was done correctly. There were no significant errors with the transcription. There was no removal of data per the transcription. Otter AI transcribed a phrase incorrectly in a few cases, such as PMBOK (the PMI Project Management Body of Knowledge). There were no cases where the candidates had their names, their organization's name, or any other project-specific names that were not publicly known. The Excel document was saved and was used to serve as a source for coding purposes. The Excel document will be stored on the flash drive and moved to the Sentry Safe once I am done with the capstone project.

3.3.2. Generation of Initial Codes

An inductive probing technique was used to generate an initial set of codes. Guest et al. (2013) recommended this approach to produce an increase in data provided by the respondents (Guest et al., 2013). The probing was done to generate codes that were in alignment with the P2MI applied framework that addressed the project question of this study.

3.3.2.1. ***Coding for Project Portfolio Management Standards.*** The first set of coding focuses on recommendations for project portfolio management (PPM) standards to support the delivery of financial system projects on time, on budget, and within scope. The project management profession lives by many standards, so it was interesting to evaluate practitioners' feedback regarding standards. A total of 42 codes were generated from the analysis of the respondent's comments to Interview Question #1. The most frequently recommended standard from the respondents was establishing a set of robust policies and procedures. Deng et al. (2021) and El Khatib et al. (2020) recommended using policies and procedures to reduce project risk. Table 5 provides a listing of the project portfolio management (PPM) standards code assigned, a description of each code, and the number of participants who responded to each code.

Table 5. *Coding of PPM Standards per Interview Question 1*

PPM Standards Coding	Description of PPM Standards Coding	Number of Respondents
Accurate delivery	Setting a standard for accurate delivery of the project	1
Agile	Relying on agile project management as a standard	2
Change management	Incorporating change management to project portfolio management (PPM) practices	1
Client Partnership Management Framework	Contractor processes for managing and engaging their clients as part of the PPM practices	1
CMMI	Adoption of the Capability Maturity Model Integration as a standard	2
Communications	Ensuring proper communications (e.g., oral, written) occurs during the project	1
Comprehensive plans	Ensuring that as part of any project, we have detailed, comprehensive plans	1
Consistency	Ensuring consistency across the project	1
Contractor standards	Relying on private sector contractors to have standards in place to support PPM	2
Decide on what is important	The project team needs to establish standards to determine what is important	3
Deliverables	Establishing processes to manage deliverables related to the project	1
Earned value management	Adoption of Earned Value Management to manage financial system megaprojects	1
Enterprise Project Portfolio Management	Adoption of Enterprise Project Portfolio Management (EPPM) practices for managing financial system megaprojects	2
Escalation path	The project team needs to establish standards for escalating issues	1

PPM Standards Coding	Description of PPM Standards Coding	Number of Respondents
Evidence-based decision making	Updating the decision-making process to rely more on evidence	1
Functional team	Establishing a functional (non-technical) team to support the financial system megaproject	1
Government standards	Relying on government standards to support PPM	1
Internal tools and templates	Incorporating the use of internal tools and templates to aid in the creation of deliverables	1
Leading indicators	Relying on the use of key indicators to support decision making	1
Lessons learn	Using feedback from lessons learned to incorporate improvements for delivering financial system megaprojects	1
Managing to an end-date (ribbon cutting)	Move away from managing the project from a delivery date	1
Measuring success	Establishing criteria success factors for measuring success	3
Monitoring issues	Establishing standards in place for monitoring issues	1
Performance metrics	Incorporating performance metrics into managing financial systems megaprojects	1
Personal experiences	Relying on personal experience	1
PMBOK	Incorporating Project Management Body of Knowledge (PMBOK) standards into managing financial systems megaprojects	1
Policies and procedures	Establishing a set of robust policies and procedures in place for managing financial systems megaprojects	5
Project plan	Ensuring that a detailed project plan is developed	3
Quality measures		1

PPM Standards Coding	Description of PPM Standards Coding	Number of Respondents
	Establishing quality measures into the process of managing financial system megaprojects	
Requirements management	Establishing requirements management into the process of managing financial systems megaprojects	1
Response flexibility	Maintaining the ability to respond timely	1
Responsibility matrix	Developing a matrix that identifies roles and responsibilities	1
Review and approval process	Establishing review and approval process for managing financial systems megaprojects	1
Risk management	Establishing risk review and approval process for managing financial systems megaprojects	1
Scope creep	Having a process to control scope creep in the management of financial system megaprojects	1
Scope determines team Size	Understanding how scope drives the size of a team	1
Stakeholder management	Ensuring that there is a plan to identify and manage stakeholders	2
Staying on budget	Ensuring that there are standards in place to manage the budget to ensure that the financial system will be delivered within budget	1
Staying on schedule	Ensuring that there are standards in place to manage the schedule to ensure that the financial system will be delivered on-time	1
Technical team	Establishing a technical (non-functional) team to support the financial system megaproject	1
Training	Ensuring that proper training is included as part of any financial system megaprojects	2

PPM Standards Coding	Description of PPM Standards Coding	Number of Respondents
Waterfall methodology	Using the standard waterfall methodology for managing financial system megaprojects	2

Note. PPM Standards codes were identified from transcribed data collected from interviews. Table developed J. Pullen, 2022.

3.3.2.2. ***Coding for Project Portfolio Management Roles***. The second set of coding focuses on recommendations for project portfolio management (PPM) roles to support the delivery of financial system projects on time, on budget, and within scope. Many roles are needed to successfully deliver projects on time, on schedule, and within scope. The practitioners who were interviewed discussed a variety of roles. A total of 40 codes were generated from the respondent's comments. As expected, the project manager role was the most frequently recommended, while the testing lead role was the next most recommended. Wilkin and Chenhall (2020) emphasized the importance of project management roles concerning the governance of information technology activities. Kashiwagi (2018) noted how testing could reduce organizational resistance. Table 6 provides a listing of the project portfolio management (PPM) roles code assigned, a description of each code, and the number of participants who provided responses for each code.

Table 6. *Coding of PPM Roles per Interview Question 2*

PPM Roles Coding	Description of PPM Roles Coding	Number of Respondents
Analysts	Analysts are used to provide analysis support to the project team that is responsible for delivering financial system projects	1
CAM Manager	Control Account Manager (CAM) tracks the budget on behalf of the project/program manager	1
Central person to press the button	The person, either on the government or contract side, who is considered the point person for all issues	1
Client Relationship Management	Client Relationship Management (CRM) is a process in which the contractor uses to manage his government client	1
Cloud Lead	Cloud Lead is the lead technical person involving any cloud-based project	1
Communication Staff	Communications staff supports the projects by handling all internal and	1

PPM Roles Coding	Description of PPM Roles Coding	Number of Respondents
	external communications on behalf of the project team	
Configuration Lead	Configuration Lead is the lead technical person who controls the configuration of the financial system	4
Configuration Staff	The Configuration Staff are responsible for configuring the financial system	1
Conversion Lead	The Conversion Lead is the lead technical person who is responsible for all data conversion activities	2
Coordinator	The Coordinator works with the Project/Program Manager to coordinate meetings and other activities	1
Data Architect	The Data Architect is the lead technical resource who is responsible for developing the data architecture of the proposed financial system	1
Data Scientists	Data Scientists are technical resources who analyze data patterns in existing systems that will be helpful in the development of a new financial system	1
Delivery Manager	The Delivery Manager is an oversight role that provides support to the Project/Program Manager by engaging corporate resources in support of the financial system project	1
Deputy Program Manager	The Deputy Program Manager is the right-hand person who supports the Program Manager and will serve as the de facto Program Manager when the Program Manager is not available	2
Designers	Designers are technical resources who work with technical and functional staff in designing the proposed financial system	1
Development Lead	The Development Lead is the lead technical person responsible for any software development changes needed to support the financial system project	3

PPM Roles Coding	Description of PPM Roles Coding	Number of Respondents
Development Staff	The Development Staff are technical resources who work under the guidance of the Development Lead in addressing software changes to support the financial system project	1
Engagement Manager	The Engagement Manager is an oversight role that provides support to the Project/Program Manager by engaging corporate resources in support of the financial system project	1
Executive Management	Executive Management are leaders from the Government and Contract teams who provide executive support to the financial systems project team	4
Financial Manager Lead	The Financials Manager Lead is responsible for tracking and managing all of the financials related to the financial system project	1
Functional Lead	The Functional Lead is the lead functional resource who oversees all of functional (non-technical) activities related to the financial systems project	3
Functional Staff	The Functional Staff are resources who perform functional activities (e.g., training) related to the financial systems project	1
Implementation Lead	The Implementation Lead is a resource who is responsible for the implementation of a financial systems project	1
Leadership team	The Leadership team are leaders from the Government and Contract teams who provide executive support to the financial systems project team	1
Program/Project Management Office	The Program/Project Management Office (PMO) is a group of resources that provide program/project management oversight.	1
Product Owner	The Product Owner is the person who oversees the functionality changes in agile projects related to financial systems project	1

PPM Roles Coding	Description of PPM Roles Coding	Number of Respondents
Program Manager	The Program Manager is the lead resource who oversees the program-related activities regarding the financial systems project	1
Project Manager	The Project Manager is the lead resource who oversees the project-related activities regarding the financial systems project	8
Project Scheduler	The Project Scheduler works with the Program/Project Manager in developing the project schedule	3
Quality Assurance Staff	The Quality Assurance Staff are resources that review project deliverables and artifacts to ensure that they meet the quality standards required by the Government and Contractor	1
Scrum Master	The Scrum Master is the de facto project manager for agile-related activities involving financial system projects	1
Scrum Team	The Scrum Team are project resources who are using agile project management techniques in financial system projects	1
Sprint Teams	The Sprint Team are project resources who are assigned to a sprint as part of their financial system project. A sprint involves a set of focused activities to be completed over a specific period of time.	1
System Administrators	System Administrators are resources who oversee the administration (e.g., account management) functions in a financial system project.	1
System Architecture	System Architecture resources are responsible for developing the information system architecture needed to support financial systems	1
Technical Lead	Technical leads are resources who are responsible for managing the technical	4

PPM Roles Coding	Description of PPM Roles Coding	Number of Respondents
	aspects (e.g., development, testing) of a financial system project	
Testers	Testers are technical and functional resources who will validate the various functions and features of a financial system	1
Testing Lead	The testing lead is responsible for leading a set of testers who will validate the various functions and features of a financial system	5
Training Team	The Training Team are functional resources responsible for training end-users in their use of a financial system. They are also responsible for developing the materials used in training classes.	3
Training Lead	The Training Lead is responsible for leading the training team to develop training materials and deliver training end-users using a financial system.	4

Note. PPM Roles codes were identified from transcribed data collected from interviews. Table developed J. Pullen, 2022.

3.3.2.3. *Coding for Project Portfolio Management Tools and Technologies.*

The third set of coding focused on recommendations for portfolio management (PPM) tools and technologies needed project roles to support the delivery of financial system projects on time, on budget, and within scope. The interviewed practitioners identified a variety of tools and technologies besides the Microsoft Project. A total of 31 codes were generated from the respondent's comments. The profession relies on a core set of tools, namely Microsoft Project and Primavera (Pellerin & Perrier, 2019). Table 7 provides a listing of the project portfolio management (PPM) tools/technologies assigned, a description of each code, and the number of participants who responded to each code.

Table 7. *Coding of PPM Tools/Technologies per Interview Question 3*

PPM Tools and Technologies Coding	Description of PPM Tools and Technologies Coding	Number of Respondents
Action item list	Action Item Lists are used to track financial system project issues.	2

PPM Tools and Technologies Coding	Description of PPM Tools and Technologies Coding	Number of Respondents
Adobe Captivate	Adobe Captivate is a tool to develop computer-based training materials used in financial system projects.	1
Checklists	Checklists are used to track and manage financial system project issues.	1
Confluence	Confluence is a JIRA tool used by teams to collaborate and share documents regarding a financial system project.	2
Deliverables	Deliverables are formal project artifacts generated by the financial system project team and reviewed/approved by the customer.	1
Design documents	Design documents are deliverables focused on the design of the proposed financial system.	1
Earned Value Management (EVM)	Earned Value Management (EVM) is a tool to measure financial system project performance in terms of costs and schedule.	1
JIRA	JIRA is a software tool that supports agile development for financial system projects.	4
Kanban	Kanban is a software tool that supports agile development for financial system projects.	1
Lector Software	Lector Software is a software tool used to develop computer-based training materials for financial systems.	1
MS Office	MS Office is a suite of office automation tools that includes Access, Excel, Outlook, PowerPoint, and Word used to develop financial system project deliverables and artifacts.	9
MS Project	MS Project is the leading project management tool used to manage financial system projects.	8
MS SharePoint	MS SharePoint is a document management/collaboration tool used in financial system projects.	5
MS Visio	MS Visio is a software tool used to develop business processes and systems flows for financial system projects.	2
Mural	Mural is a software tool used to develop business processes in a graphical mode for financial systems.	1

PPM Tools and Technologies Coding	Description of PPM Tools and Technologies Coding	Number of Respondents
Primavera	Primavera is a project management system used for complex financial system projects.	2
Project Server	Project Server is a server-based project management system used with MS Project for complex financial system projects.	1
Rational	Rational is an application suite that includes tools for managing the configuration of a financial system and testing a financial system	3
Remedy	Remedy is an application tool (e.g., incident tracking) used to track and manage issues in a financial system.	1
Requirements Traceability Matrix (RTM)	Requirements Traceability Matrix (RTM) is used to track and manage system requirements associated with a financial system.	1
Review boards	Review Boards are used to review and approve financial system requirements	1
Risk logs	Risk Logs are simplified versions of risk registers to track and manage financial system program/project risks	1
Risk register	Risk Register is a tool to track and manage financial system program/project risks	1
ServiceNow	Service Now develops cloud-based products that focus on workflows to improve financial system operations.	1
Survey Monkey	Survey Monkey is a web-based tool used to develop and collect survey data.	1
Tableau	Tableau is a data analysis software product used by the project team.	1
Team calendars	Team calendars are used to track critical dates associated with team (e.g., training team, functional team, technical team) activities.	2
Tool awareness	Tool awareness is vital in program/project management, for the more familiar the team is with tools being used in a project, the more effective they will be.	1
Training logs	Training logs are used to track comments, issues, decisions, etc., that occurred during a training class.	1

PPM Tools and Technologies Coding	Description of PPM Tools and Technologies Coding	Number of Respondents
Training materials	Training materials are developed to train users in their use (e.g., step-by-step process) of a financial system.	1
WebSphere	WebSphere is a cloud-based solution that supports the development of web-based applications.	1

Note. PPM Tools and Technologies codes were identified from transcribed interview data. Table developed J. Pullen, 2022.

3.3.2.4. *Coding for Project Portfolio Management Skills and Competencies*.

The next set of coding focused on recommendations for skills in portfolio management (PPM) to support the delivery of financial system projects on time, on budget, and within scope. The practitioners who were interviewed identified a variety of preferred skills needed. A total of 36 codes were generated from the respondent's comments. The respondents' communication skills were the most frequently recommended skill set, followed by people management skills. Obwegeser et al. (2019) recommended various skills needed in ERP projects, including communications and people management. Table 8 provides a listing of the project portfolio management (PPM) skills/competencies code assigned, a description of each code, and the number of participants who provided responses for each code.

Table 8. *Coding of PPM Skills/Competencies per Interview Question 4*

PPM Skills and Competencies Coding	Description of PPM Skills and Competencies Coding	Number of Respondents
Ability to sift through things	The ability to sift through things occurs when the project team can sort through many things and remain focused.	1
Active listening	Active listening occurs when the financial system project team is engaged in listening with their customer.	1
Adaptive to technology advances	The financial system project team and its customer needs to be open to technological advances that will benefit both sides.	1

PPM Skills and Competencies Coding	Description of PPM Skills and Competencies Coding	Number of Respondents
Agile training	Agile training is required for any financial system project team that plans to use agile project management methodologies in the delivery of financial system projects.	1
Attention to detail	Attention to detail requires that the financial system project team focus on details to ensure the proper delivery of financial system projects.	3
Backup plan	Financial system project managers need to have alternative plans in case the primary plan has issues.	1
Certifications	Certifications, such as the Project Management Professional, are important to hold. Certifications show that the license holders have the requisite knowledge to plan, manage, and deliver projects.	1
Change management	The project team needs to be effective in handling change management as part of the financial system project.	3
Collaboration skills	Collaboration skills allow the project team and the customer to work together to ensure that they will deliver the financial system project on time, on budget, and within scope.	1
Committed to outcomes	Committed to outcomes require the financial system project team and its customer to be focused on the same outcomes, which eventually leads to the successful delivery of the financial system for the customer.	1
Communication skills	Communication skills include the project team's oral and written communication skills in their interactions with their customer.	9
Conflict management skills	Conflict management skills are used to reduce conflict that arises in many projects. One example of a conflict management skill is using tradeoffs to move forward.	1

PPM Skills and Competencies Coding	Description of PPM Skills and Competencies Coding	Number of Respondents
Corrective actions	Correction actions involve the project team taking actions to ensure the successful delivery of the financial system project.	1
Customer focus	The focus of the financial system project needs to be on the customer, the ultimate user of the system that will be delivered for them.	1
Do not expect perfection	The financial system project team and its customer needs to understand that issues will come up that were not foreseen, so do not expect perfection.be open to technological advances that will benefit both sides.	1
Do not expect things to be static	The successful delivery of a financial system project will evolve, so the financial system project team and its customer should not expect things to be static	1
Federal financial management	The financial management concepts for financial systems in the federal government are much different from the private sector; thus, the financial system project team needs to understand concepts related to federal financial management.	3
Federal government regulations	Operating in the public (federal government) sector is different from operating in the private sector; thus, the financial system project team needs to understand the regulations associated with the federal government.	1
Flexibility	Flexibility is important for the financial system project team has to be flexible for things will come up that must be addressed	1
Follow-through	Project members, including project leaders and customers, must follow through on what they say that they will do. Stay the course regarding their guiding principles.	1
Functional skills		1

PPM Skills and Competencies Coding	Description of PPM Skills and Competencies Coding	Number of Respondents
	Functional skills, such as communications, are important skills needed to successfully deliver financial system projects.	
I/T background	A background in information technology is needed since this involves an information system.	1
Managing risks	It is important to have a process for managing the risks related to financial systems megaprojects	1
Middle management involvement	In order to successfully deliver financial systems, it requires the involvement of all levels of management. Sometimes we are more focused on senior management involvement, but middle management involvement is just as important.	1
People management	People are the cornerstone of a project; thus, the ability to manage people is crucial	4
Resource allocation	Resource allocation involves allocating human and non-human resources appropriately so that the team can deliver the financial system project on time, on budget, and within budget.	1
Skills transferability	There will be times when the skills of one set of resources assigned to a set of tasks will need to be transferred to other tasks in the project to address the needs of the financial system project.	1
Stakeholder management	Stakeholder management occurs when the project team has identified key stakeholders and has a process for managing them.	1
Strategic thinkers	Strategic thinkers tend to focus on the medium and long-range goals of the financial system project.	1
System development life cycle	The tasks to complete the delivery of a financial system will follow a system development life cycle that begins with	1

PPM Skills and Competencies Coding	Description of PPM Skills and Competencies Coding	Number of Respondents
	planning activities that conclude with deployment activities	
Tactical thinkers	Tactical thinkers tend to focus on the short-range goals of the financial system project.	1
Technical skills	Technical skills involve skills in such areas as information systems needed for a financial systems project.	1
Time management	Time management skills allow the financial system project team to handle multiple priorities simultaneously and be able to deliver them.	1
Trust	Trust occurs when the project team and/or customers trust each other to do their part to ensure project success.	1
Visionary	The successful delivery of financial systems requires the key leaders on the project team to be visionary	1
Work experience	The work experience that the financial system project team must include experience supporting the public sector, namely, the federal government so that they understand the unique needs of the federal government as it relates to financial systems.	1

Note. PPM Skills/Competencies codes were identified from transcribed interview data. Table developed J. Pullen, 2022.

3.3.2.5. ***Coding for Additional Project Portfolio Management Practices***. The final set of coding focused on additional project portfolio management practices from the respondents to support the delivery of financial system projects on time, on budget, and within scope. A total of 29 codes were generated from the respondent's comments. Constant communications, partnerships, and the use of program/project management methods were the highly recommended additional practices. Table 9 provides a listing of the additional project portfolio management (PPM) practices code assigned, a description of each code, and the number of participants who responded to each code.

Table 9. *Coding of Additional PPM Practices per Interview Question 5*

Additional PPM Practices Coding	Description of Additional PPM Practices Coding	Number of Respondents
Achieving milestones	In order to stay on schedule, within scope, and on budget, the financial systems project team must not only establish milestones (e.g., key deadlines) but meet them consistently.	1
Agile coaching	The Agile coach is a key member of the agile project management team who guides the team on agile concepts and methodologies.	1
Being true to your standards	Project members, including project leaders and customers, must stay the course regarding their guiding principles.	1
Change management usage	The project team needs to be effective in handling change management as part of the financial system project.	1
Constant communications	You must have ongoing and constant communication within the project team as well as outside of your project team with your customers and stakeholders	3
Corrective actions	The project team needs to have a way to take corrective actions to keep the financial system project on time, on budget, and within scope.	2
Do not make assumptions	Do not make assumptions regarding things you do not have knowledge of	1
Expecting things to go well	Things will not go well during a financial system project, so do not expect everything to go well.	1
Focus on success outcomes	By focusing on successful outcomes, the team will focus on the key outcomes that the customer is focused on.	2

Additional PPM Practices Coding	Description of Additional PPM Practices Coding	Number of Respondents
Get to the end-users	The project team needs to focus on the end-user, who is the ultimate user of the financial system.	1
Hybrid approach of agile and waterfall	A proposed method for delivering financial system projects involves an approach that includes agile and waterfall project management methodologies.	1
Keep it under budget	One of the key aspects to the successful delivery of financial system projects is the ability to deliver the project under budget.	1
Legal skillset	Due to the complexity of financial system projects, the project team needs to add resources that have some legal skillset to support legal-related matters.	1
Manage the activities	Managing project activities (tasks) is especially important to ensure that the project team can deliver the financial system project on time, on budget, and within budget.	1
Managing the team	Managing the team (project resources) is especially important to ensure that the project team can deliver the financial system project on time, on budget, and within budget.	1
Managing the schedule	Managing the project schedule (people, activities, and budget) is especially important to ensure that the project team can deliver the financial system project on time, on budget, and within budget.	1
Nothing perfect	The project team and its customers will strive for perfection but will realize that nothing is perfect, so there has to be a realization of this.	1
Paralysis via analysis	Do not spend too much time analyzing issues and problems, for it will paralyze the team	2

Additional PPM Practices Coding	Description of Additional PPM Practices Coding	Number of Respondents
Partnership	The key ingredient to delivering financial system projects on time, on schedule, and within scope requires a partnership between the project team, its customers, and its stakeholders.	3
Policy skillset	Due to the complexity of financial system projects, the project team needs to add resources with some policy skillset to support financial management policy-related matters.	1
Problem-solving	Problem-solving skills are needed to address key issues and problems during the financial system project.	2
Program and project management methods	Program and project management methods are the foundation that project teams rely on to deliver financial systems projects successfully.	3
Realignment	The project team needs to have a way to keep the financial system project on time, on budget, and within scope.	1
Relying on your processes	Relying on your processes requires the project team to rely on the proven project management practice it has experience in.	1
Resource management	Resource management (human and capital resources) is especially important to ensure that the project team can deliver the financial system project on time, on budget, and within budget.	2
Scope creep	Scope creep occurs when the project team and/or customer fail to identify those items that are needed to deliver financial system projects successfully	1
Stakeholder management	Stakeholder management occurs when the project team has identified key stakeholders and has a process for managing them.	2

Additional PPM Practices Coding	Description of Additional PPM Practices Coding	Number of Respondents
Training	For a financial system project to be successful, the right set and amount of training have to be provided to the financial system users.	1
Trust	Trust occurs when the project team and/or customers trust each other to do their part to ensure project success.	2

Note. Additional PPM Practices codes were identified from transcribed interview data. Table developed J. Pullen, 2022.

3.3.3. *Transition of Initial Codes to Goodall's Verbal Exchange Coding*

Once codes have been developed, the next step is to assign them a code from Goodall's Verbal Exchange Coding scheme. Goodall's Verbal Exchange Coding method relies on assigning perspectives as routine, surprises, risk-taking, crises, or rites of passage (Saldaña, 2016). Perspectives will be categorized as routine project management practices that one would expect to experience/perform in the project management profession. In some cases, perspectives that are generally not experienced as practices in the project management profession will be classified as 'surprises. Other categories that can be used include risk-taking, crisis management, or rites of passage.

3.3.3.1. *Goodall Coding for Project Portfolio Management Standards.* The first set of Goodall coding was assigned to the initial codes regarding recommended project portfolio management (PPM) standards. In Section 3.3.2, 42 recommended PPM standards were identified. These codes were translated into three Goodall codes (routine, rites of passage, and risk-taking). Thirty of the PPM standards were assigned the routine coding, which means these PPM standards are expected to be used routinely in the successful deployment of financial system megaprojects. Table 10 summarizes the Goodall coding related to the PPM standards identified during the first interview question.

Table 10. *Goodall Coding of PPM Standards per Interview Question 1*

Goodall Coding	Description of Coding	PPM Standards Coding
Risk-Taking (3)	Standards used to reduce risks associated with the successfully delivery of	Agile CMMI Enterprise Project Portfolio Management

Goodall Coding	Description of Coding	PPM Standards Coding
	financial system megaprojects	
Rites of Passage (9)	Standards that have evolved with the successfully delivery of financial system megaprojects	Client Partnership Management Framework Escalation path Evidence-based decision making Leading indicators PMBOK Requirements Management Response Flexibility Responsibility Matrix Risk management
Routine (30)	Standards that have been used routinely with the successfully delivery of financial system megaprojects	Accurate delivery Change Management Communications Comprehensive plans Consistency Contractor Standards Decide on what is important Deliverables
Routine (30)	Standards that have been used routinely with the successfully delivery of financial system megaprojects	Earned value management Functional team Government Standards Internal tools and templates Lessons learn Managing to an end-date (ribbon cutting) Measuring Success Monitoring issues Performance metrics Personal Experiences Policies and Procedures Project plan Quality measures Review and approval process Scope creep Scope determines team size Stakeholder Management Staying on budget Staying on schedule Technical team Training Waterfall Methodology

Note. Goodall codes were identified from coded PPM Standards data. Table developed J. Pullen, 2022.

3.3.3.2. *Goodall Coding for Project Portfolio Management Roles.*

The second set of Goodall coding was assigned to the initial codes regarding

recommended project portfolio management (PPM) roles. In Section 3.3.2, 40 recommended PPM roles were identified. These codes were translated into three Goodall codes (routine, rites of passage, and risk-taking). Twenty-seven of the recommended PPM roles were assigned the routine coding, which means these PPM roles are expected to be used routinely in the successful deployment of financial system megaprojects. Table 11 summarizes the Goodall coding related to the PPM roles identified during the second interview question.

Table 11. *Goodall Coding of PPM Roles per Interview Question 2*

Goodall Coding	Description of Coding	PPM Roles Coding
Risk-Taking (8)	PPM Roles are used in reducing risks associated with the successfully delivery of financial system megaprojects	Coordinator Data Architect Data Scientists Delivery Manager Designers Engagement Manager Leadership team Scrum Master
Rites of Passage (5)	PPM Roles that have evolved with the successfully delivery of financial system megaprojects	Cloud Lead Program Manager Quality Assurance Staff Scrum Team Sprint Teams
Routine (27)	PPM Roles that have been used routinely with the successfully delivery of financial system megaprojects	Analysts CAM Manager Central person to press the button Client Relationship Management Communication Staff Configuration Lead Configuration Staff Conversion Lead Deputy Program Manager Development Lead Development Staff Executive Management Financial Manager Lead Functional Lead Functional Staff Implementation Lead Product Owner Program/Project Management Office Project Manager Project Scheduler System Administrators System Architecture Technical Lead Testers Testing Lead

Goodall Coding	Description of Coding	PPM Roles Coding
		Training Lead Training Team

Note. Goodall codes were identified from coded PPM Roles data. Table developed J. Pullen, 2022.

3.3.3.3. *Goodall Coding for Project Portfolio Management Tools and Technologies.* The third set of Goodall coding was assigned to the initial codes regarding recommended project portfolio management (PPM) tools and technologies. The initial coding generated 31 recommended PPM tools/technologies were identified. These codes were translated into three Goodall codes (routine, rites of passage, and risk-taking). Twenty-six of the recommended PPM tools/technologies were assigned the routine coding, which means these PPM tools/technologies are expected to be used routinely in the successful deployment of financial system megaprojects. Table 12 recaps Goodall coding related to the PPM tools/technologies identified during the third interview question.

Table 12. *Goodall Coding of PPM Tools/Technologies per Interview Question 3*

Goodall Coding	Description of Coding	PPM Tools and Technologies Coding
Risk-Taking (1)	PPM Tools and Technologies are used to reduce risks associated with the successful delivery of financial system megaprojects.	Confluences
Rites of Passage (4) Rites of Passage (4)	PPM Tools and Technologies usage has evolved with the successful delivery of financial system megaprojects. PPM Tools and Technologies usage has evolved over time with the successful delivery of financial system megaprojects.	JIRA Kanban MS Visio Tableau
Routine (26) Routine (26)	PPM Tools and Technologies usage is routinely used with the successful delivery of financial system megaprojects. PPM Tools and Technologies usage is routinely used with the successful delivery of financial system megaprojects.	Action Item List Adobe Captivate Checklists Deliverables Design documents Earned Value Management (EVM) Lector Software

Goodall Coding	Description of Coding	PPM Tools and Technologies Coding
		MS Office MS Project MS SharePoint Mural Primavera Project Server Rational Remedy Requirements Traceability Matrix (RTM) Review Boards Risk logs Risk Register ServiceNow Survey Monkey Team calendars Tool Awareness Training Logs Training materials WebSphere

Note. Goodall codes were identified from coded PPM Tools/Technologies data. Table developed J. Pullen, 2022.

3.3.3.4. ***Goodall Coding for Project Portfolio Management Skills and Competencies.*** The fourth set of Goodall coding was assigned to the initial codes regarding recommended project portfolio management (PPM) skills/competencies. The initial coding generated 36 recommended PPM skills/competencies were identified. These codes were translated into two Goodall codes (routine and rites of passage). Twenty-four of the recommended PPM skills/competencies were assigned the routine coding, which means these PPM skills/competencies are expected to be used routinely in the successful deployment of financial system megaprojects. Table 13 recaps the Goodall coding related to the PPM skills/competencies identified during the fourth interview question.

Table 13. *Goodall Coding of PPM Skills/Competencies per Interview Question 4*

Goodall Coding	Description of Coding	PPM Skills and Competencies
Rites of Passage (12)	PPM Skills and Competencies that have evolved over time with the successfully delivery of financial system megaprojects	Adaptive to Technology Advances Agile Training Certifications Change Management Committed to outcomes Communication Skills I/T Background Managing risks

Goodall Coding	Description of Coding	PPM Skills and Competencies
		Strategic Thinkers System Development Life Cycle Tactical Thinkers Technical Skills
Routine (24)	PPM Skills and Competencies that are used routinely with the successfully delivery of financial system megaprojects	Ability to sift through things Active Listening Attention to Detail Backup Plan Collaboration Skills Conflict Management Skills Corrective Actions Customer Focus Do not expect perfection Do not expect things to be static Federal Financial Management Federal Government Regulations Flexibility Follow-through Functional Skills Middle management involvement People Management Resource Allocation Skills Transferability Stakeholder Management Time Management Trust Visionary Work experience

Note. Goodall codes were identified from coded PPM Skills/Competencies data. Table developed J. Pullen, 2022.

3.3.3.5. *Goodall Coding for Additional Project Portfolio Management Practices.* The final set of Goodall coding was assigned to the initial codes regarding additional recommended project portfolio management (PPM) practices. The initial coding generated 29 additional recommended PPM practices. These codes were translated into four Goodall codes (crisis, routine, risk-taking, and rites of passage). Nineteen of the additional recommended PPM practices were assigned the routine coding, which means these additional PPM practices are expected to be used routinely in the successful deployment of financial system megaprojects. Table 14 summarizes the Goodall coding related to additional PPM practices identified during the fifth interview question.

Table 14. *Goodall Coding of Additional PPM Practices per Interview Question 5*

Goodall Coding	Description of Coding	Additional PPM Practices
Crisis (1)	Additional PPM considerations that are used in crisis moments with the successfully delivery of financial system megaprojects	Paralysis via Analysis
Risk-Taking (3)	Additional PPM considerations that are used to reduce risks with the successfully delivery of financial system megaprojects	Agile Coaching Legal Skillset Policy Skillset
Rites of Passage (6)	Additional PPM considerations that have been evolved over time with the successfully delivery of financial system megaprojects	Achieving Milestones Focus on Success Outcomes Get to the end-users Hybrid Approach of Agile and Waterfall Partnership Program and Project Management Methods
Routine (19)	Additional PPM considerations that are used routinely with the successfully delivery of financial system megaprojects	Being true to your standards Change Management Usage Constant Communications
Routine (19)	Additional PPM considerations that are used routinely with the successfully delivery of financial system megaprojects	Corrective Action Do not make assumptions Expecting things to go well Keep it under budget Manage the activities Managing the schedule Managing the team Nothing Perfect Problem Solving Realignment Relying on your processes Resource Management Scope Creep Stakeholder Management Training Trust

Note. Goodall codes were identified from coded Additional PPM Practices data. Table developed J. Pullen, 2022.

3.3.4. Assignment of Themes

The next step of the data analysis plan is to use thematic analysis with an inductive approach to assigning themes to the initial codes generated. Thematic analysis is standard in qualitative inquiry studies, for it helps in identifying and interpreting themes from data provided by participants (Gray, 2016; Merriam and Tisdell, 2016). The inductive approach focuses on a bottom-up approach that will review the data to see what patterns can be used to confirm the constructs of the applied framework, gaps in practice, and answers to the project question. Once themes were assigned to each code, they were consolidated to generate a listing of themes with similar, related codes.

3.3.4.1. ***Themes for Project Portfolio Management Standards.*** The first set of themes was created against the initial codes assigned from practitioners' comments regarding recommended project portfolio management (PPM) standards. The initial coding generated 42 codes. These codes were translated into four themes. Practical Project Management Standards was the dominant theme, with twenty-three of the PPM standards being assigned. Table 15 lists each theme, a general description, and the associated PPM standards.

Table 15. *Thematic Coding of PPM Standards per Interview Question 1*

General Theme	Description of Theme	PPM Standards Coding
Management Standards (12)	Management Standards are common practices associated with the successfully delivery of financial system megaprojects	Change management Communications Consistency Decide on what is important Escalation path Evidence-based decision making Measuring success Monitoring issues Policies and Procedures Response Flexibility Staying on schedule Training
Other Standards (4)	Other Standards are unique practices associated with the successfully delivery of financial system megaprojects	Client Partnership Management Framework Contractor standards Government standards Personal Experiences
Practical Project Management Standards (23)	Practical Project Management Standards are general project management practices associated with the successfully delivery of	Accurate delivery Agile Comprehensive plans Deliverables Earned value management Enterprise Project Portfolio Management

General Theme	Description of Theme	PPM Standards Coding
Practical Project Management Standards (23)	financial system megaprojects Practical Project Management Standards are general project management practices associated with the successfully delivery of financial system megaprojects	Functional team Internal tools and templates Leading indicators Lessons learn Managing to an end-date (ribbon cutting) Performance metrics PMBOK Project plan Requirements management Responsibility matrix Review and approval process Risk management Scope creep Scope determines team size Stakeholder management Staying on budget Technical team Waterfall methodology
Quality Standards (2)	Quality Standards are general quality management practices associated with the successfully delivery of financial system megaprojects	CMMI Quality measures

Note. Themes were identified from coded PPM Standards data. Table developed J. Pullen, 2022.

3.3.4.2. ***Themes for Project Portfolio Management Roles.*** The second set of themes was created against the initial codes assigned from practitioners' comments regarding recommended project portfolio management (PPM) role. The initial coding generated 40 unique codes. These codes were translated into three themes. Project Management – Leads was the dominant theme, with twenty-two of the PPM roles being assigned. Table 16 lists each theme, a general description, and the associated PPM roles.

Table 16. *Thematic Coding of PPM Roles per Interview Question 2*

General Theme	Description of Theme	PPM Roles Coding
Project Management – Leads (22)	Project Management – Leads are roles that serve as lead/management roles	CAM Manager Cloud Lead Configuration Lead

General Theme	Description of Theme	PPM Roles Coding
	associated with the successful delivery of financial systems megaprojects.	Conversion Lead Delivery Manager Deputy Program Manager Development Lead Engagement Manager Executive Management Financial Manager Lead Functional Lead Implementation Lead Product Owner Program Manager Program/Project Management Office Project Manager Project Scheduler Scrum Team System Architecture Technical Lead Testing Lead Training Lead
Project Management – Others (2)	Project Management – Others are additional roles associated with the successful delivery of financial systems megaprojects.	Central person to press the button Leadership team
Project Management – Staff (16)	Project Management – Staff is non-lead/management roles associated with the successful delivery of financial systems megaprojects.	Analysts Client Relationship Management Communication Staff Configuration Staff Coordinator Data Architect Data Scientists Designers Development Staff Functional Staff Quality Assurance Staff Scrum Master Sprint Teams System Administrators Testers Training Team

Note. Themes were identified from coded PPM Roles data. Table developed J. Pullen, 2022.

3.3.4.3. *Themes for Project Portfolio Management Tools and Technologies.*

The third set of themes was created against the initial codes assigned from practitioners' comments regarding recommended project portfolio management (PPM) tools/technologies. The initial coding generated 31 unique codes. These codes

were translated into three themes. Specific Project Management Tools was the dominant theme, with twenty of the PPM tools/technologies being assigned. Table 17 provides a listing of each theme, a general description of the theme, and the associated PPM tools/technologies.

Table 17. *Thematic Coding of PPM Tools/Technologies per Interview Question 3*

General Theme	Description of Theme	PPM Tools/Technologies Coding
Office Admin Tools (3)	Office Admin Tools are general software programs used to deliver financial system megaprojects successfully.	MS Office MS SharePoint MS Visio
Other Tools (8)	Other Tools are specialty software programs used to deliver financial system megaprojects successfully.	Adobe Captivate Lector Software Rational Remedy Review Boards ServiceNow Survey Monkey Tableau
Specific Project Management Tools (20)	Specific Project Management Tools are project management software programs and practices used to successfully deliver financial system megaprojects.	Action Item List Checklists Confluences Deliverables Design documents Earned Value Management (EVM) JIRA Kanban MS Project Mural Primavera Project Server Requirements Traceability Matrix (RTM) Risk logs Risk Register Team calendars Tool Awareness Training Logs
Specific Project Management Tools (20)	Specific Project Management Tools are project management software programs and practices used to successfully	Training materials WebSphere

General Theme	Description of Theme	PPM Tools/Technologies Coding
	deliver financial system megaprojects.	

Note. Themes were identified from coded PPM Tools/Technologies data. Table developed J. Pullen, 2022.

3.3.4.5. *Themes for Project Portfolio Management Skills and Competencies.*

The fourth set of themes was created against the initial codes assigned from practitioners' comments regarding recommended project portfolio management (PPM) skills/ competencies. The initial coding generated 36 unique codes. These codes were translated into two themes. Management Skills were the dominant theme, with twenty-two of the PPM skills/competencies being assigned. Table 18 provides a listing of each theme, a general description of the theme, and the associated PPM skills/competencies.

Table 18. *Thematic Coding of PPM Skills/Competencies per Interview Question 4*

General Theme	Description of Theme	PPM Skills/Competencies Coding
Management skills (22)	Management skills are general skills and practices used to successfully deliver financial system megaprojects.	Ability to sift through things Active listening Attention to Detail Backup Plan Collaboration Skills Committed to outcomes Communication skills Conflict Management skills Corrective actions Customer focus Do not expect perfection
Management skills (22)	Management skills are general skills and practices used to deliver financial system megaprojects successfully.	Do not expect things to be static Flexibility Follow-through Managing risks Middle management involvement People management Strategic thinkers Tactical thinkers Time management Trust Visionary

General Theme	Description of Theme	PPM Skills/Competencies Coding
Technical skills (14)	Technical skills are specialized skills, including project management and technology, used to deliver financial system megaprojects successfully.	Adaptive to technology advances Agile training Certifications Change management Federal financial management Federal government regulations Functional skills I/T background Resource allocation Skills transferability Stakeholder management System development life cycle Technical skills Work experience

Note. Themes were identified from coded PPM Skills/Competencies per data. Table developed J. Pullen, 2022.

3.3.4.5. *Themes for Additional Project Portfolio Management Practices.*

The final set of themes was created against the initial codes assigned from practitioners' comments regarding additional recommended project portfolio management (PPM) practices. The initial coding generated 29 unique codes. These codes were translated into four themes. Leadership practices were the dominant theme, with twelve of the additional PPM practices being assigned. Table 19 lists each theme, a general description of the theme, and the associated additional PPM practices.

Table 19. *Thematic Coding of Additional PPM Practices per Interview Question 5*

General Theme	Description of Theme	Additional PPM Practices Coding
Leadership Practices (5)	These are additional leadership practices used to successfully deliver financial system megaprojects.	Being true to your standards Constant Communications Corrective Action Nothing Perfect Trust
Management Practices (12)	These are additional management practices used to successfully deliver financial system megaprojects.	Change Management Usage Do not make assumptions Expecting things to go well Focus on Success Outcomes Get to the end-users

General Theme	Description of Theme	Additional PPM Practices Coding
		Keep it under budget Managing the team Paralysis via Analysis Partnership Problem Solving Realignment Relying on your processes Scope Creep
Other Practices (2)	These are additional other practices used to successfully deliver financial system megaprojects.	Legal Skillset Policy Skillset
Technical Practices (9)	These are additional technical practices used to successfully deliver financial system megaprojects.	Achieving Milestones Agile Coaching Hybrid Approach of Agile and Waterfall Manage the activities Managing the schedule Program and Project Management Methods Resource Management Stakeholder Management Training

Note. Themes were identified from coded Additional PPM Practices data. Table developed J. Pullen, 2022.

3.4. Contribution to Theory, the Literature, and the Practitioner Knowledge Base

The framework for project portfolio management improvement (P2MI) was developed to address the project question of this capstone project. The project question explored the perspectives of private sector project managers regarding the successful strategies used to deliver financial systems megaprojects to executive branch federal government agencies on time, within budget, and within scope through a series of interview questions. The information shared by private sector practitioners contributed to the theory, literature, and practitioner knowledge aspect by reinforcing what is needed to successfully deliver financial system megaprojects on time, within budget, and within scope.

3.4.1. Contribution to Theory

The findings from the capstone supported the basis of the P2MI applied framework. The foundation of the P2MI applied framework is based upon identifying project portfolio management standards, roles, tools/technologies, and skills. PPM Standards generated the highest number of codes, followed closely by PPM Roles. Table 20 shows a breakdown of the coding of each of the four relevant concepts.

Table 20. *Summary of Applied Framework Key Concepts Coding*

Applied Framework Key Concept	PPM Coding Generated	Goodall Coding Generated	Themes Generated From PPM Coding
PPM Standards	42	3	3
PPM Roles	40	3	3
PPM Tools and Technologies	31	3	3
PPM Skill and Competencies	36	2	2

Note. A summary of the coding (PPM, Goodall, themes) for each applied framework concept. Table developed J. Pullen, 2022.

On the other hand, the findings extended the P2MI framework to include one additional key concept/element – Additional Practices. Table 21 shows a breakdown of the coding derived beyond the four relevant concepts.

Table 21. *Summary of Additional Applied Framework Key Concepts Coding*

Applied Framework Key Concept	PPM Coding Generated	Goodall Coding Generated	Themes Generated From PPM Coding
Additional Practices	29	4	4

Note. A summary of the coding (PPM, Goodall, themes) extended the applied framework. Table developed J. Pullen, 2022.

As you can see, many PPM codes were generated across the core concepts of the P2MI framework. In general, the average number of PPM codes generated was 36. When applying this against the number of respondents, an average of four unique codes were generated from each respondent. These 36 codes represented diversity in what is considered a success factor for successfully ensuring the delivery of financial system megaprojects.

3.4.2. Contribution to the Literature

The data collected from the participants supported the literature reviewed for this study. The literature in this study covered each of the four concepts (standards, roles, tools/technologies, and skills/competencies) that comprised the applied framework and the participants' feedback validated this. The data collected from the participants was remarkable since participants came from 9 different firms. Each of these participants brought various perspectives regarding what is needed to successfully deliver financial system megaprojects on time, within budget, and within scope.

The first area of contribution can be seen in identifying recommended PPM standards the findings. Twenty-three of the recommended 42 PPM standards are related to PMI standards. PMI's Project Management Body of Knowledge is considered the bible for all things project management (Project Management Institute, 2017a). PMI has even created supplement guides for PMBOK that focus on program management, portfolio management, and competencies. The Standard for Organizational Project Management provides a framework that aligns organization strategy with PPM practices (Project Management Institute, n.d.-b). The Standard for Program Management focuses on program management activities, while the Standard for Portfolio Management focuses on portfolio management practices (Project Management Institute, 2017d.). The Project Manager Competency Development Framework focuses on the skills and competencies needed in today's project managers (Project Management Institute, 2017b). The Governance of Portfolios, Programs, and Projects focuses on core governance aspects of portfolios, programs, and projects (Project Management Institute, n.d.-b).

The second area of contribution focuses on the importance of the right roles when delivering projects. The findings from this study identified 40 specific project management roles needed for projects of this sort. These findings showed the variety of roles needed for financial system megaprojects. The result of this means that organizations must assign project managers and project staff with clear expectations of project portfolio management roles and responsibilities (Nijhuis et al., 2018). Executive management, including senior and middle-level management, must reduce the team's burden of delivering successful projects (Breese et al., 2020; Zwikael & Meredith, 2018). Kock and Gemunden (2021) concluded that higher stakeholder involvement translates to better performance. The lack of clarity of role definitions contributed to this study's general and specific business problems.

There are many project management tools used in the project management profession. The findings identified 31 specific tools for use. The dominant tool recommended was Microsoft Project, and the literature supported that. The profession relies on a core set of tools, namely Microsoft Project and Primavera (Pellerin & Perrier, 2019). When integrated with project management practices, Khumalo and Mearns (2019) noted that such tools like Microsoft Project can improve the sharing of knowledge to improve program management. PMI noted that executive leaders listed acquiring the right technologies as a key driver for success (Project Management Institute, 2019, 2020). Ayyagari and Atoum (2019) concluded that using PPM tools would reduce project failures and delays by 59%.

The fourth area of contribution focused on the necessary skills and competencies to successfully deliver financial system megaprojects. Thirty-six recommended skills are competencies were identified by the respondents. These skills are aligned with skills and competencies, such as communication skills, conflict management, people management, noted in The Project Manager Competency Development Framework (Project Management Institute, 2017b). PMI noted that executive leaders listed securing the right skills is a key driver for success (Project Management Institute, 2020). Sang et al. (2018) concluded that while project managers may possess core technical program management skills, they lack other important competencies such as leadership, financial management, and emotional intelligence needed for monitoring, controlling, and executing the successful delivery and management of projects.

3.4.3. Contribution to Practitioner Knowledge

The data collected from practitioners represented a variety of perspectives. The practitioners came from six different firms in the greater Washington DC area. Fifty-six percent of the practitioners had more than 20 years of experience delivering financial system megaprojects. Forty-four percent of the sample led twenty or more financial systems projects during their professional career. Forty-four percent of the participants were either female or minorities.

Despite the diversity of the practitioners, they share similar perspectives. Regarding the successful perspective regarding project portfolio management standards, six of the nine respondents identified measuring success as a key standard. In terms of roles, lead roles in configuration, technical, testing, and training were identified as important roles to have on the financial system megaproject team, besides traditional roles of executive management and project management. While software programs such as Microsoft Project and Office were the dominant recommended tools by practitioners, other tools such as Microsoft SharePoint (a document and collaboration management application) and JIRA (a software suite that focuses on agile project management practices) were mentioned by at least four respondents. JIRA is important due to the move to agile project management practices. While everyone noted the importance of communication skills as a key skill/competency, four respondents noted the importance of people management as a recommended skill/competency. Finally, in the areas of other recommended practices, three of the respondents noted the importance of constant communications and partnership for ensuring the successful delivery of financial systems projects.

3.5. Project Application and Recommendations

The findings presented in this capstone project are applicable to the successful delivery of financial systems megaprojects. The risk for delivery failure remains high (Adams, 2016; Clark, 2013; Mares, 2020). Between 2017 and 2018, a survey of project managers identified over $98M in losses for every $1B per the use of poor project management techniques and tools (Project Management Institute, 2017, 2018). Mishra (2017) and Nieto-Rodriguez (2017) reported several high-profile project failures. CIO Magazine reported in 2019 that 70% of IT projects were either late, over budget, or failed to meet their customer's requirements (Sisco, 2019). These findings may aid firms in reducing the risk of delivery failure.

The ability to reduce the risk of delivery failure will depend on organizations' ability to focus their efforts on the four constructs of the applied framework presented in this capstone. First, organizations need to determine which project portfolio management (PPM) practices are applicable. Reducing risk will require them to change and adapt new PPM practices to meet the changing landscape (Project Management Institute, 2020). Second, organizations need to determine the right roles and skills needed by their project teams required by new PPM practices, such as agile project management (Project Management Institute, 2021a). Lastly, organizations need to make the right investment in tools and technologies that not only reduce delivery failure but increase customer value (Project Management Institute, 2019, 2020)

The findings were focused on the successful delivery of financial system megaprojects for the executive branch agencies federal government agencies. It will be important to share the findings with many stakeholders so that they can consider the implementation of these findings. There will be two methods for sharing the findings with stakeholders. First, I am an active member of the Project Management Institute and the Association of Government Accountants. The first method will be to share my findings at conventions held by both associations. I have conducted presentations at both associations, so performing a presentation at associations will allow me to disseminate the findings to many. The second method for sharing my findings is to submit a paper to a PMI-sponsored event.

An example is submitting a paper to the University of Maryland Project Management Symposium (UMDPM), the largest project management event in the Washington, DC, area. The event focuses on sharing best practices, trending topics, and research related to the project management profession, including special sessions focused on the federal government (Project Management Center for Excellence, n.d.). Any paper submitted will be available for review for current and past attendees. Also, *PM World Journal*, the media sponsor of UMDPM, selects 6-12 papers each year to publish on its website.

3.6. Conclusion

The DBA program has improved my appreciation and understanding of the critical issues facing the project management profession. Each of the project specialization courses provided me with the necessary knowledge to support this project. BMGT8430 and BMGT 8432 introduced me to key project management concepts that are the cornerstone to the successful delivery of information technology projects that applied to financial system megaprojects. BMGT8434 enlightened me on the various risk management approaches needed to reduce project delays and failures. BMGT8436 expanded my knowledge of project portfolio management practices.

The core DBA classes were instrumental in developing my doctoral skills. Each research class (DB8002, DB8008, and DB8015) provided me with the necessary skills to conduct doctoral research. DB8006 provided the opportunity to decide between a qualitative or quantitative approach to the project. The two residencies (DB-8960 and DB-8962) and mentoring classroom (DD9940) provide me with a

laboratory to develop and refine my capstone topic to focus on completing my project during my capstone classes.

The purpose of this qualitative inquiry project was to explore the project portfolio management practices being used by private sector project managers in the Mid-Atlantic region of the United States regarding the successful project portfolio management practices used to deliver financial systems megaprojects to executive branch agencies of the federal government. The findings produced by the project may improve the delivery of financial system megaprojects. The perspectives shared by private sector project practitioners were based upon an average of 22 years of experience in project portfolio management. The practitioners shared 178 unique concepts that formed the P2MI applied framework. The challenge will be deciding which concepts apply to the organization.

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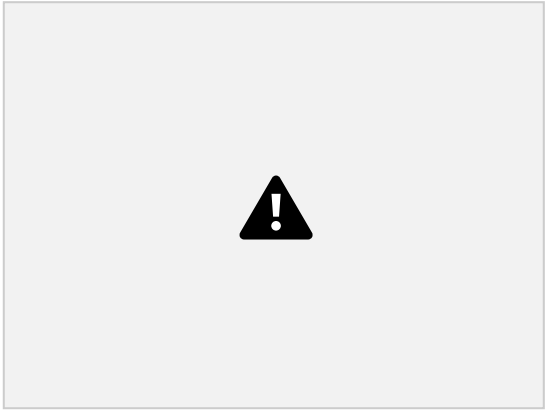
Five Immutable Principles of Project Success 2022

PRINCIPLES ARE THE BASIS OF PRACTICES AND PROCESS OF PROJECT SUCCESS

Successfully managing any project, Capital projects, Software Intensive System of Systems projects, or home garden – project success starts with Five Immutable Principles of success, listed to the right.



These five principles of project success are stated as questions that must be answered in units of measure meaningful to the decision makers:

1. Do we know what ***Done*** looks like in units of measure meaningful to the decision maker?
2. Do we have of ***Plan*** to reach ***Done*** on time, on budget, with a technical solution that delivers capabilities to satisfy the customer's needs? 3. Do we have the ***Resources*** needed to execute this Plan. Time, money, staff, facilities, capacity for work needed to reach the destination?
4. Have we identified the ***Impediments*** to our progress along the way to *Done*? Have we defined how we are going to remove, avoid, or handle these impediments at the proper time? 5. Do we have some way to measure our ***Progress to Plan***, in units of measure meaningful to the decision makers? Reaching the needed Effectiveness, Performance, Key Parameters, for the planned cost?

Each Principle is supported by Practices, Processes, and the Data they produce shown below that provide actionable information to the decision makers.

1. Identify Capabilities needed to achieve the project objective or an end state for a specific scenario to accomplish a mission or business outcome.	▪ Define capabilities as Operational concepts ▪ Define capabilities with scenarios or Use Cases ▪ Assess needs, Cost, and Risk of the Capabilities simultaneously ▪ Define explicit, balanced, and feasible alternatives.
2. Elicit Technical and Operational requirements needed for the capabilities to be fulfilled in the order that maximizes business value.	▪ Perform fact finding ▪ Gather and classify requirements ▪ Evaluate and rationalize requirements ▪ Prioritize requirements ▪ Integrate and validate requirements
3. Establish a Performance Measurement Baseline – a time phased network of work activities – the produces project deliverables for the planned cost.	▪ Decompose scope into small Work Packages ▪ Assign responsibility for deliverables from the Work Packages ▪ Develop the budget for the Work Packages ▪ Assign Work Package Measures of Performance and Effectiveness ▪ Set the performance measurement baseline
4. Execute the Performance Measurement Baseline while assuring planned technical and operational performance is met.	▪ Perform the authorized work in the planned order ▪ Accumulate and report work package performance ▪ Analyze work package performance ▪ Take corrective management action

5.Apply Continuous Risk Management to programmatic and technical risks with risk handling processes to reduce, remove, or prevent impacts on the project's probability of success.	▪ Identify risks ▪ Analyze risks ▪ Plan risk response ▪ Track risk management activities ▪ Control or accept risks

 [1]

Five Immutable Principles of Project Success 2022

❶Identify Needed Capabilities

Identifying System Capabilities is the starting point for any successful project. The System Capabilities are not direct requirements, but statements of what *abilities* the system must provide when it is complete. [1] Here's what some Capabilities sound like:

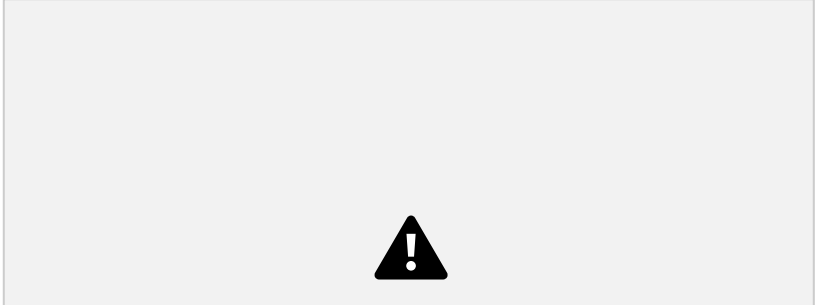
- We need the capability to remove 1½ hours from our supply chain ordering process once the merger of our two firms is complete.
- We need the capability to change the Wide Field Camera and the internal nickel hydride batteries, while doing no harm to the telescope.
- We need the capability to dock four oil tankers at the pier and unload their cargo in 18 hours, while operating the ground transportation system concurrently.
- We need the capability to control the Hell Fire Missile with a new touch panel while maintaining existing navigation and guidance capabilities in the helicopter.

How are these capabilities delivered? What are the technical and operational requirements needed to implement each capability? We may not know yet, but a Capabilities Based Plan identifies program needs, allocated resources, and tracks activities and outcomes. The critical reason for starting with capabilities is to establish a home for all the requirements. To answer the question *why is this requirement present*? *Why is this requirement needed*? *What business or mission value does fulfilling this requirement provide*?

Capabilities statements define units for measuring project progress to plan. Measuring progress with physical percent complete at each level is mandatory. But measuring how the Capabilities are being fulfilled is most meaningful to the customer with Measures of Effectiveness and Measures of Performance. The *meaningful to the customer* unit of measures are critical to the success of any project. Without these measures, the project may be a cost, schedule, and technical success, but fail to fulfill the mission.

Without defining the needed capabilities, it is not clear the mission will be a success, because there is no clear and concise description of what *Done* looks like. Success means providing the needed capabilities, on or near schedule and cost.

The paradigm of Capabilities Based Planning recognizes the interdependence of systems, strategy, organization, and support in delivering the capability, and the need to examine options and trade–offs in terms of performance, cost



and risk to identify optimum development investments.

Capabilities Based Planning relies on Use Cases and Scenarios to provide the context to measure the level of maturity for each capability.

[1] Capabilities Based Planning, http://www.rand.org/topics/capabilities-based-planning.html

Five Immutable Principles of Project Success 2022

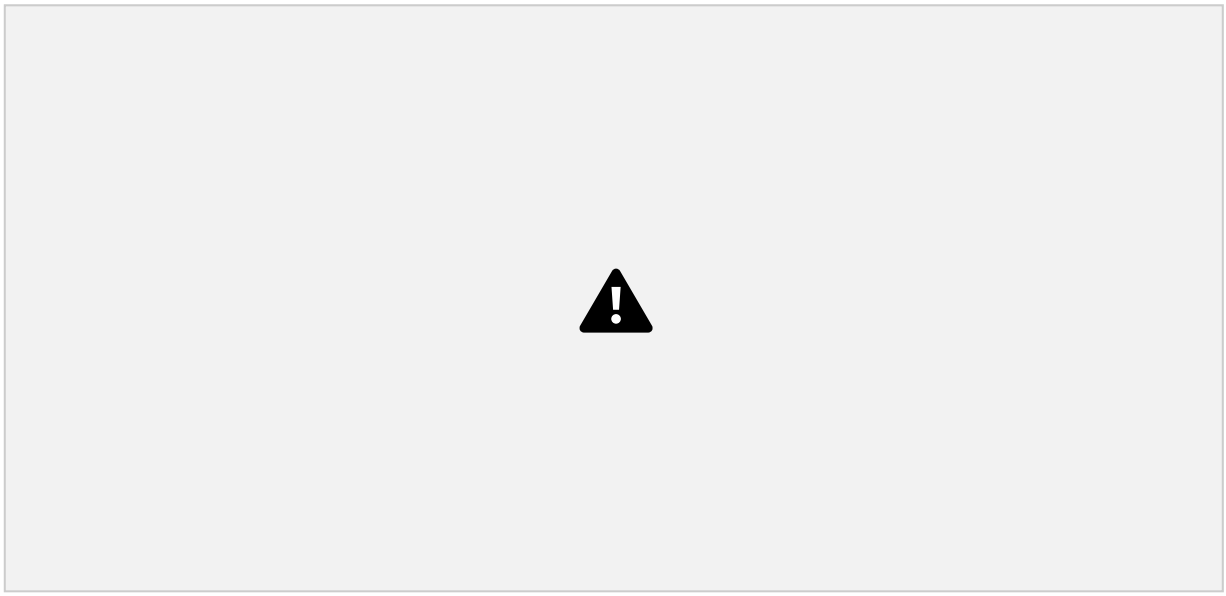
❷ESTABLISH TECHNICAL AND OPERATIONAL REQUIREMENTS BASELINE

Poorly formed requirements have been shown to contribute as much as 25% to the failure modes of programs and projects. [2]

Requirements are the defined attributes for an item prior to the start of the work to develop a design for that item. System requirements analysis is a structured, organized, methodology for identifying an appropriate set of resources to satisfy a system need (the needed capabilities) and the requirements for those resources to provide a sound basis for the design or selection of those resources. Requirements act as the transformation between the customer's capabilities needs and the design concept implemented by the organization's engineering resources. [3]

The requirements engineering process decomposes a statement of the customer need through a systematic exposition of what that system must do to satisfy that need. This need is the ultimate system requirement from which all other requirements and designs flow. There are two fundamental classes of requirements.

- **Process Performance Requirements** – define how the work processes are used to produce a beneficial outcome to the customer.
- **Product Performance Requirements** – define the product specifications and how they are related to the process requirements.[4]



Most requirements methods focus on specification. It is better to focus on elicitation and with fact-finding, classification, evaluation and rationalization, prioritization, and integration and validation of the requirements. These baseline requirements define the Work Packages and Planning Packages and the work efforts needed to produce the deliverables from the project. These deliverables fulfill the needed technical and operational capabilities to the customer.

[2] *The Requirements Engineering Handbook, Ralph R. Young, Artech House*

[3] "Issues with Requirements Elicitation," Michael G. Christel and Kyo C. Kang, Technical Report, CMU/SEI–92–TR–12, Software Engineering Institute, Carnegie Mellon University Pittsburgh, Pennsylvania 15213.

[4] *System Requirements Practices, Jeffery O. Grady, McGraw Hill, 1993*

Five Immutable Principles of Project Success 2022

❸Establish Performance Measurement Baseline

The Performance Measurement Baseline (PMB) is the primary assessment document for assuring the credibility of the project plan. The PMB is the baseline of the cost, schedule and deliverables for each Work Package in the plan.

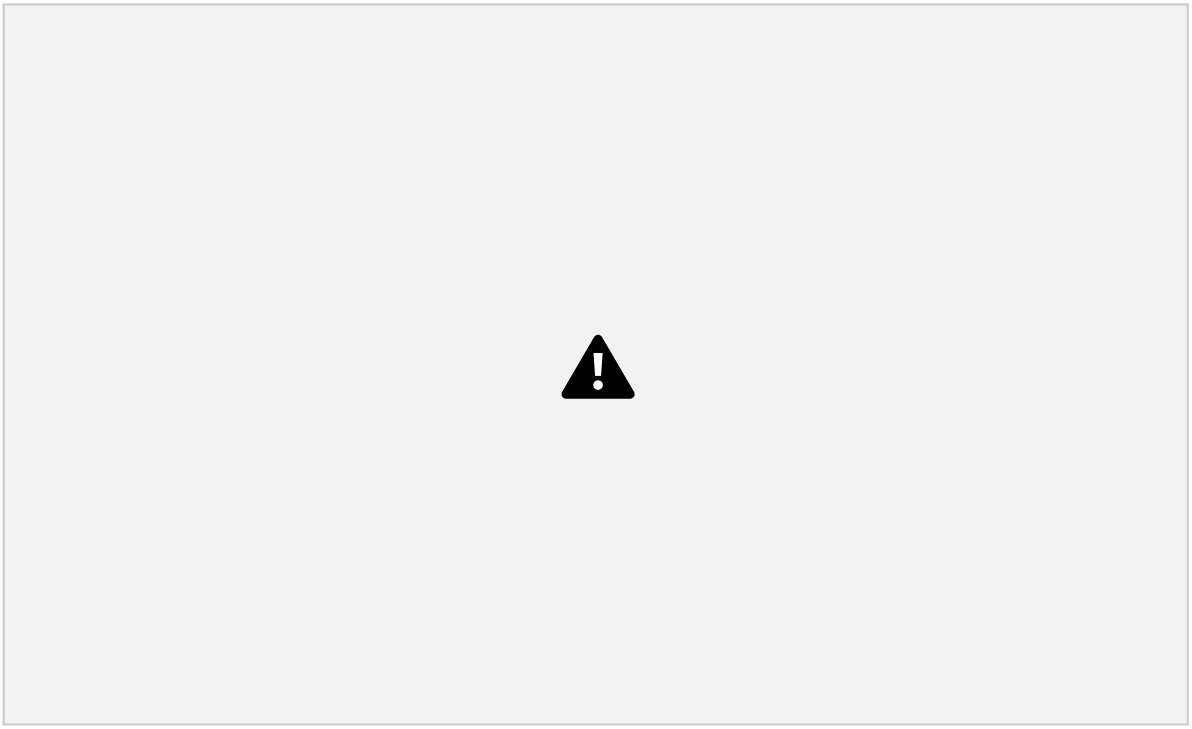
Constructing the PMB requires knowledge of the business and technical requirements, skill in developing the Work Packages that produce the deliverables for these requirements, and discipline in assembling the cost, schedule and relationships between the Work Packages. This discipline requires the most focus for the planners and project controls staff. Without this discipline, the development of a credible PMB is not possible.

The PMB is where the Measures of Effectiveness and Measures of Performance are defined to assess progress to plan. These are units of measure meaningful to the decision makers for each deliverable:

- Deliverables are what the customer has paid money for.
- Deliverables contain the business or technical capabilities, the associated value that fulfill the requirements of the business plan.

The critical success factor in building the PMB is the decomposition of the system requirements into technical capabilities, then into deliverables that enable those technical capabilities, and finally into the Work Packages that produce those deliverables. Defining the decomposed deliverables from the needed system capabilities in a Work Breakdown Structure. This decomposition process must be iterative and incremental. Assessment of the validity of this decomposition requires thought. The first decomposition is likely not the best approach.

A credible Plan and Schedule for the delivery of the needed capabilities *on time* and *on budget* have three baselines – technical, schedule, and cost:



Five Immutable Principles of Project Success 2022

❹Execute the Performance Measurement Baseline

With the Performance Measurement Baseline established in step ❸, the proper execution becomes critically important.

The execution process is the *project rhythm*. this means the processes are performed in a repeated manner – at least on a monthly basis. This business rhythm creates actionable information for the project manager on a time scale that allows corrective actions to be taken to stay on schedule, on budget, and assure technical compliance

These tangible, physical deliverables, are defined in the Work Packages created during the Planning process. No matter the duration of the assessment of performance a measure of physical percent complete is mandatory if the project manager is to receive actionable information. The measures of physical percent complete can be applied on weekly boundaries in a variety of ways:

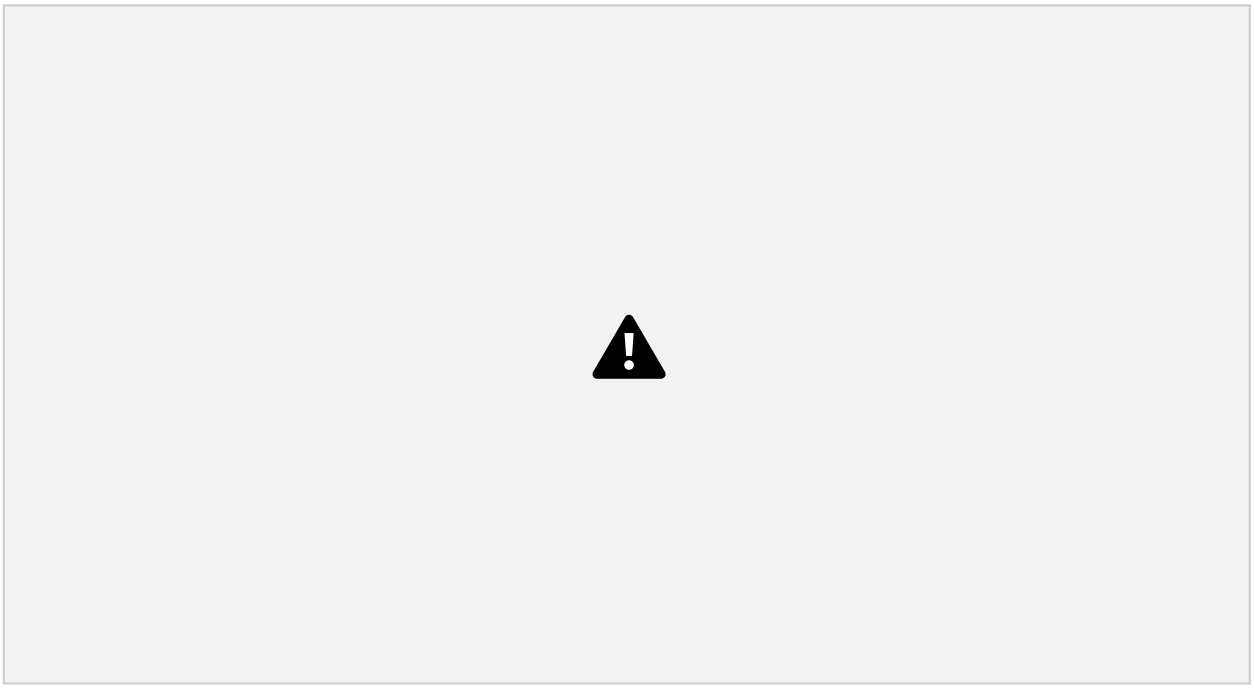
- Have short duration tangible deliverables.
- Have apportioned milestones to measure progress to plan from the deliverables. ▪ Have

tasks short deliverable cycle and record 0%/100% complete at the end of each week.

This approach provides the answer to the question:

How Long Are We Willing To Wait Before We Find Out We Are Late?

The answer must be *short enough to take corrective action to stay on plan.* In all cases, a measure of physical percent complete is mandatory if the project manager is to receive actionable information to stay on plan. The important process here is to have an agreed on measure of performance that is defined before the work starts.



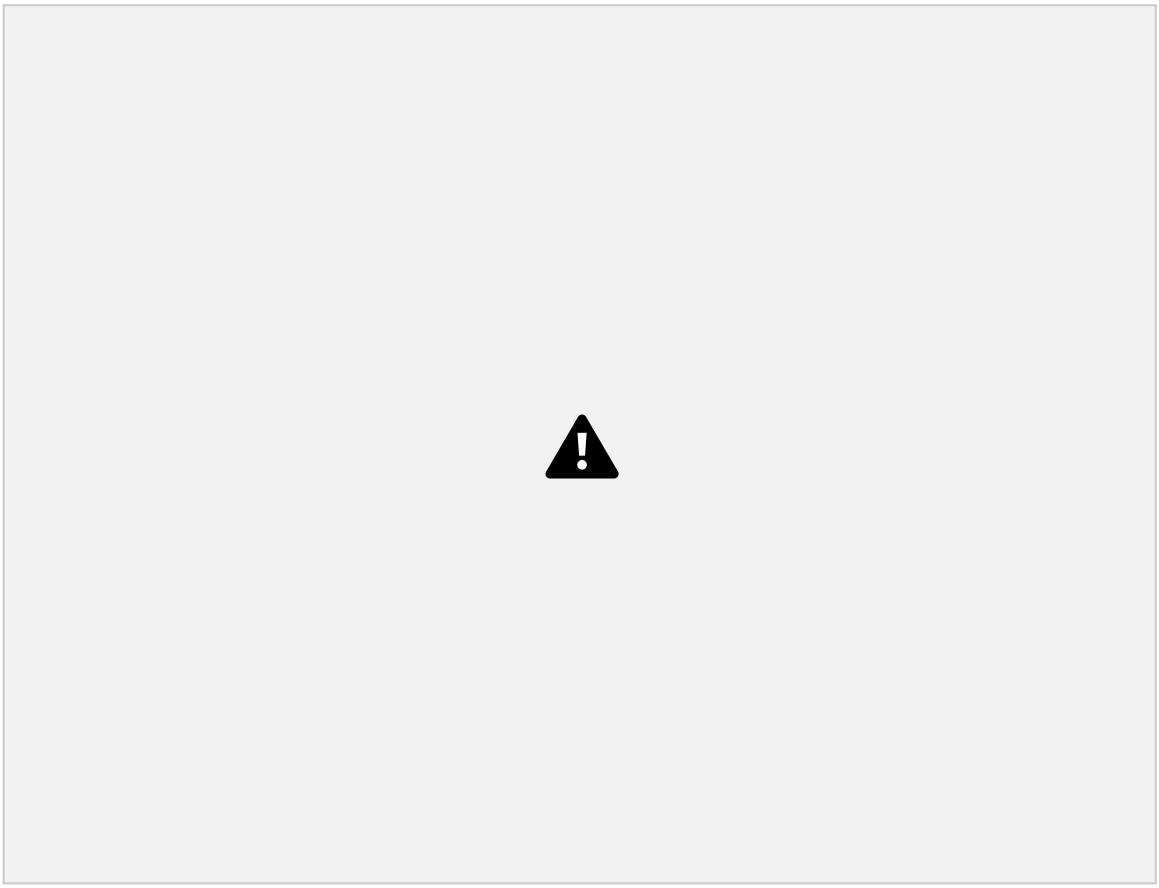
Five Immutable Principles of Project Success 2022

❺Perform Continuous Risk Management

Continuous Risk Management provides tangible benefits to increase the probability of project success:

▪ Prevent problems before they occur, by identifying and dealing with them early. ▪ Improve quality, by focusing on project objectives and consciously looking for activities that effect quality throughout the project lifecycle.

▪ Enable better use of resources, for early identification of potential problems.



Risk Management Activities and their Outcomes	
Identify Risks	▪ Identify and classify risks in a Risk Register. ▪ Manage this Risk Register through a Risk Management Board. ▪ Connect these risks and their handling in the Master Schedule.
Analyze Risks	▪ Convert risk data into risk decision–making information. ▪ Use this analysis information as the decision basis for the project manager to work on the "right" risks.
Plan Risk Response	▪ Turn risk information into decisions and actions (both present and future). ▪ Develop actions to address individual risks, prioritize risk actions, and create an integrated risk management plan.
Track Risk Management Activities	▪ Monitor the status of risks and actions taken to ameliorate risks. ▪ Identify and monitor risks to enable the evaluation of the status of risks themselves and of risk mitigation plans.
Control Or Accept Risk	▪ Risk communication lies at the center of the model to emphasize both its pervasiveness and its criticality. ▪ Without effective communication, no risk management approach can be viable.

UMD Project Management Symposium

Relevant challenges and lessons in the implementation of a Project Management Office in a legislative power

The experience of the National Chamber of Representatives of Argentina (2016-2019)

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ABSTRACT

This study analyzes the functioning of the Project Management Office (PMO) under the authority of the Administrative Secretary of the National Chamber of Representatives between 2016 and 2019. During this period, the Presidency of the Chamber saw its role strengthened in the strategic planning of the government program, in the coordination of management action, in the monitoring of the fulfillment of the government's priority goals, and in accountability to the citizenry. The text examines in-depth the experience of the Planning and Control Management Unit (UPCG), a project management office (PMO) created in 2017 that allowed maintaining the strategic coherence of the government program and focusing it on the achievement of results during the government period. It also identifies opportunities for improvement in the development of the functions exercised and provides lessons for other countries and legislative institutions interested in strengthening these capabilities.

Keywords: project management office, strategic planning, coordination, monitoring, accountability, methodology, communication.

1. Case study: the experience of the Project Management Office in the National Chamber of Representatives of Argentina (2016-2019)

1.1 Immediate context

The National Chamber of Representatives of the Nation is one of the two Houses that compose the National Congress of the Argentine Republic. That is, the National Chamber of Representatives and the National Chamber of Senators form the Parliament and are the legislative power of the country. The representatives elected are in office for four years. Every year the legislative body chooses the Speaker of the Chamber of Representatives that it is the one

who proposes the authorities who will hold the Secretaries and will be the Speaker's assistants in the institution management[1].

During 2015 the economic crisis affecting Argentina and its fiscal deficit had made it clear that it was necessary to improve human and financial resources management. At the same time, society was demanding political leaders to manage public resources in a transparent way and to account for the way they are used, as well as to provide better services delivery.

As a response to this demand, the new national government administration that took power in December 2015 had expressed, among other measures, the need to establish a state modernization plan proposing a substantial change inside each public body. While other governments in the region were already working on the New Public Management agenda, Argentina had failed attempts during the nineties[2].

Even though the National Chamber of Representatives, as a public body, does not aim at maximizing profitability or providing direct services to the community, the urgency of improving the allocation of resources by promoting responsible management and accountability became evident. For such purposes, the President of the National Chamber of Representatives created the "Program for Parliamentary Modernization, Innovation, Transparency and Democratic Strengthening 2016/2017"[3].

Historically, the administration of the National Chamber of Representatives had been at the service of political activity and had not considered efficiency values or criteria. The modernization and achievement of results had not had an impact on the efficient use of spending and resources, nor had it been carried out with performance management tools.

In December 2015, a new administration took power, and the authorities of the National Chamber of Representatives were changed. In this framework, one of the first measures put into practice was to promote an organizational diagnosis carried out by the Administrative Secretary since its mission is to guarantee the functioning of the National Chamber of Deputies, assuring the responsible management of its resources promoting public management transparency and accountability. Specifically, at that moment, it oversaw managing 6200 employees, 13 buildings, and a budget of 3.647 million pesos, equivalent to 280 million dollars. This diagnosis detected the non-existence of internal processes or mechanisms of control and planning, low communication among the different organizational units generating isolated silos, double efforts,

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[1] The Secretariats are political authorities, which means that they are appointed and removed by the speaker of the Chamber at its will or if the speaker changes. There are four Secretariats: Parliamentary Secretariat, Administrative Secretariat, General Secretariat of the Presidency, and General Coordination Secretariat.

[2] The demand for decentralization and privatization of government functions demand had increased coordination between central governments and service providers, to guarantee their adherence to central government policies and complementarity in producing the inputs needed to provide services. The experience of OECD countries shows that the shift away from the central government's provision of services has been coupled with an oscillation between greater policy implementation autonomy for service delivery agencies and greater central government control (Gonzalez, Lafuente, 2018). The experience of Latin American countries at the end of the 1990s has advanced towards strengthening fiscal policy and results-based management (World Bank, 2020).

[3] The purpose of the Program was deepening the modernization process that had been carried out in the previous administration through the "Modernization Program of the Honorable Chamber of Deputies of the Nation" (2013/2015 Program). Although the guidelines of the 2013/2015 Program are maintained some changes are introduced. Somehow, the modernization process that later developed in the Administrative Secretary began to be glimpsed in the 2016/2017 Program, since that secretariat is entrusted with: *"streamline processes under the systemic approach conducive to the improvement of management, in order to facilitate the administration of information and the systematization of processes; promote transparency; streamline the management of the secretariat transparency; streamline the agency's management; promote the efficient delivery of services, and strengthen the culture of continuous improvement*".

and inefficiency in the use of resources, large amounts of paper used in errands, almost no systematization, low professionalization of human resources. The Administrative Secretariat recognized that many of these challenges required multisectoral approaches.

1.2 Structure, Functions and Processes of the PMO

To fulfill public policy promises made in the campaign, the Speaker and President of the Chamber appointed the Administrative Secretary to push forward most of the reforms. To this end, the Administrative Secretary considered it was essential to separate the urgent from the important and form a team focused on the latter to lead the government agenda. First, she hired and appointed a group of advisors to analyze and propose administrative initiatives to order, modernize, and make resource management and allocation more efficient. However, she soon realized she needed support to manage their coordination as the organizational unit authorities of the Administrative Secretariat had also begun to complain that they were receiving similar requests for information from different people. Inspired by the management system implemented in the City of Buenos Aires government and leveraged in the Presidential Resolution (PR) 951/16 that created the "Program for Parliamentary Modernization, Innovation, Transparency, and Democratic Strengthening 2016/2017" dependent of the General Secretary of the Presidency, the Administrative Secretary promoted the creation of the Planning and Control Management Unit (UPCG) within the structure of the Administrative Secretariat of the National Chamber of Representatives of the Nation in January 2017.

The Planning and Control Management Unit (UPCG) was designed in function to the needs of the highest authority, the Administrative Secretary and its structure and functions resulted from a combination of functions that were already being performed without this specific structure, such as the organizational diagnosis, the organization of follow-up meetings between the highest authorities of the areas and the Administrative Secretariat, the leadership of strategic projects and communicational initiatives.

According to its mission and specific functions, it corresponded to the Planning and Control Management Unit (UPCG) the design, formulation, and monitoring of the general action plan of the Administrative Secretary. It depended directly on the Administrative Secretary, which made it a key player in the implementation of the strategy.

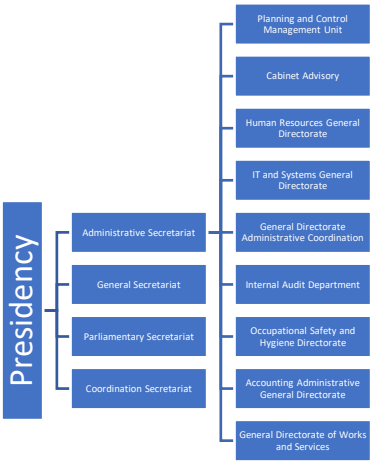

Figure 1: Organization chart of the Administrative Secretary in December 2019

It is the office responsible for monitoring, controlling and assessing the management of the operations and projects carried out by the organizational units that make up the Administrative Secretariat. In this sense, it incorporates a result-oriented management model in an innovative way within a governmental environment, and to that purpose, it makes use of varied tools such as strategic planning and operational planning, project management based on the good practices of the Project Management Book of Knowledge (PMBoK), control and assessment of management indicators, and communication.

Taking as a reference the definition of the PMO Value Ring that establishes that there is no Project Management Office (PMO) with predetermined functions but the functions or services it provides vary according to the needs of the stakeholders of an organization, the Planning and Control Management Unit (UPCG) can be considered as the Project Management Office, from now on the PMO.

The PMO leader was the main interlocutor between the highest authority of the Administrative Secretariat and the heads of the organizational units, reporting the issues related to governance developments directly. The head of the PMO was responsible for the daily actions performed by the organizational units aligned with the governance general plan and their contribution towards reaching their goals, providing, therefore, technical assistance in defining their initiatives. She accounted for the course of the projects, warned about possible detours, and recommended corrections. She was aware of the talent and skills of the human resources available, advising the appointment of project managers and team members.

There PMO had three offices: the Planning and Control Management Office, the Project Office, and the Internal Communication Office.

Planning and Control Management Office

The Planning and Control Management Office was responsible for the **multiannual strategic planning** of the Administrative Secretariat, which had set the governance course for a four-year period. In agreement with it, it led and coordinated the elaboration process of the yearly **operational planning** for each of the organizational units. In this way, it was involved in defining the projects and operations; and together with the head of the PMO set the priority of each project and suggested indicators and goals to the highest authority of each area. In addition, each area's highest authority was committed to two priority projects or initiatives called "commitments" for which they signed an agreement. However, the most relevant function was the coordination of the **control and monitoring tasks**. Cabinet meetings, indicators, control boards were some of the words that began to be heard.

Four types of centralized monitoring were implemented.

i) Compliance with the goals and indicators of the annual operating plan for each of the areas, including the PMO.

ii) Compliance with the priority projects of the Administrative Secretary in terms of budget, scope, and time.

iii) Compliance with the two “commitments” of the annual plan assumed by each organizational unit.

iv) Compliance with initiatives that arose outside the planning process or resolution of unexpected problems.

When time, budget, and scope were not being met and goals were not being achieved, the head of the PMO would intervene to analyze what was hindering progress and make adjustments to overcome the obstacles. These interventions included providing management tools to the sectors, through the collaboration of PMO analysts with the area teams and the organization of meetings between critical stakeholders, project rescue, and project managers' suggestions and removals.

In other to contribute and ease the commitment of goals and projects, several relevant tools were used.

On the one hand, different types of meetings were organized. First, depending on the urgency and importance of the goals and initiatives, bilateral meetings between the authorities of the areas or priority project leaders and the head of the PMO or the Administrative Secretary were organized. At these meetings, compliance with priority projects was analyzed, explanations were provided, possible alternatives to remove bottlenecks were discussed, and corrections were decided upon. New goals or deadlines agreed upon at the meetings were then monitored. Second, the Planning and Control Management Office organized meetings on-demand between areas to unblock issues or resolve urgent matters or tasks. Third, with the assistance of the Communication Office Cabinet meetings between the authorities of the organizational units and the Administrative Secretary were organized every trimester where the Administrative Secretary reinforced the priorities and promoted the team integration.

On the other hand, multiple efforts were made into establishing an efficient monitoring and assessment system. Among the main initiatives, we can find the setting up and development of a management indicator system through a *control panel (SIGER)* that measured and monitored the annual plan and projects of each area to guarantee their effective fulfillment based on quality, time, and cost criteria.

Project Office

The Project Office was responsible for developing and ensuring the execution of the best practices and standards of Project Management (PMbok) within the scope of the Administrative Secretariat. That is, to develop and implement guidelines and training in Project Management, develop and manage procedures, templates, and any other organizational process asset related to projects, provide **methodological support** to project managers and leaders of each organizational unit, manage the resources shared by different programs and projects in order to optimize resources - organizing lessons learned workshops-, design and implement **project management training**, and finally **design and implement projects** that promote administrative innovation to implement the strategy.

The Project Office was formed by two teams: a methodological team that assisted and advised all the directors or project leaders or Project Managers of the Chamber, and was in charge of their training, and a Staffing team dedicated to leading and managing specific and priority projects, which could also be projects rescued from other organizational units.

With the help of an external expert, the Office developed a methodology for project management based on the Project Management Book of Knowledge (PMBok) based on management

processes. The methodology reached a total of 43 projects in 2017, of which 75% submitted an Initiation Act, a management plan, and a Progress Report. In 2018, the methodology reached a total of 32 projects, and in 2019, 36 projects. In terms of processes implemented during 2017, 14 of the processes established in the 5th edition of the PMBoK were implemented, 18 in 2018 and 23 in 2019.

This implementation was largely possible due to training. In 2017, 70 agents from 12 sectorial areas were trained and 14 directors or project leaders received follow-up or individual coaching at their workplaces, which proved to be very effective for the implementation of the projects. During 2018, 128 agents were trained, and during 2019, 30.

Communication Office

The Communication Office was responsible for the development, execution and control of the Internal Communication Strategy of the Administrative Secretary. It gave **visibility and communication support** to the projects of the different organizational units of the Chamber and developed a medium long-term internal communication strategy for the Administrative Secretary to strengthen the institutional identity and work culture of the institution. It was also responsible for the implementation, execution, and development of communication channels of the Administrative Secretary with Support Blocks; Representatives, and trade union associations. Furthermore, the internal communication area of PMO regularly developed teambuilding and integration sessions aimed at organization leaders as well as middle management to foster teamwork and cross-communication in the organization.

As regards financing, it must be considered that since it the Chamber is a governmental body, both availability and management rules of economic and financial resources are ruled by law and are relative to the budget item allocated in the Budget Act valid for the whole State management. In this respect, the PMO promoted a **result-oriented budget allocation**. The procedure designed and implemented implied that each organizational unit of the Administrative Secretary defined its allocation requisites based on operational planning, which provided the highest authority with the necessary information to decide on the initiatives to be financed during the following years. In this sense, far from elaborating the budget by merely adjusting one of the previous years according to the estimated inflation, a process was established that associated the budget to real and concrete needs.

The PMO had in its DNA to **guarantee the continuous improvement** of the result-oriented model and also of the administrative operation by identifying and promoting opportunities for continuous improvement. In this sense, it had an internal consulting function from which it worked on the ideation and promotion of new initiatives.

Finally, although they were not the most usual functions, the PMO was in charge of reviewing proposals that came to the Administrative Secretary, acting as an advisor and at the end of the government it was also in charge of preparing the handover to the new administration.

1.3 Talent Acquisition, Retention and Development

Setting up the PMO team required a careful staff selection to meet the technical and professional demands of the office and the organization's requirements. First, it must be said that a high percentage of the organization employees belonged to its structure as permanent staff.

This means they were full-time staff who kept their position independent of the management change related to the government turnover. Because of this, the PMO team was made up searching for talents that were already part of the organization. The selection was mainly based on workers who had broad experience inside the organization. Many of the chosen agents have previously played a leading role in previous administrations and have wide experience in administration and management. The office was made up of professionals from different areas: accountants, industrial engineers, economists, sociologists, psychologists, communicators, designers, business managers, among others. This great profile variety enormously enriched the work team.

It is important to emphasize that the PMO, apart from methodically searching for skilled personnel, offered a training program based on transmitting the technical skills needed for managing projects. In order to put on the same level the skills of the different members of the PMO as regards project management, courses about project management, change management and evaluation of public policies were organized where the knowledge, material and information necessary for this process were provided. This task was performed with external technical experts and always in agreement with the projects that were in development. Considering the good functioning of the training sessions, it was decided to extend the courses to the rest of the organizational units.

Due to the organizational culture of the Chamber and its diverse staff accustomed to administrative and political variations but not to changes in the work approach, the need to professionalize all agents involved in project management became evident. An institution-wide project management program was launched in 2018. It was designed by the Project Office as part of the training program in charge of the Human Resources Directorate as it was intended to be permanent and sustainable to achieve effectiveness and the expected results. For this to be effective, a specific agreement was signed with PMI Argentina Buenos Aires Chapter, which was in charge of designing the courses that were offered within the organization. The Program consisted of basic and PMP Certification courses. An example of the importance given to this program by the organization can be seen in the significant investment of money that its execution demanded. The objective was to promote the institutionalization and sustainability of the Project Management methodology implemented so far and to acquire the latest trends applicable to Project Management and related topics, which at the same time would contribute to a greater appreciation of the management model by employees. To those ends, in 2019 the basic courses were taught by Project Office staff who had already been sufficiently trained.

As part of a priority project of the Administrative Secretariat aimed at defining human resources roles and positions during 2018, progress was made in the preliminary design of the following roles associated with project management: Strategic Project Coordination, Project Office Management, Project Director (as equivalent to Manager), Project Coordinator, SCRUM Specialist, Project Control Specialist, Junior Project Coordinator, Area Project Support, Junior Area Project Support. These roles existed informally, but were not subject to a fixed salary range, nor did they allow those who held them to be promoted to other ranks with due salary recognition.

2. An analytical look: conclusions of the case study

2.1 What have been the main innovations introduced by the PMO?

As mentioned, the leadership and management model in the 2016-2019 period was characterized by a more decentralized system of power that required greater coordination, which was assumed by the Administrative Secretariat through the PMO. In this sense, the **design and communication of a comprehensive strategic plan under the leadership of the Administrative Secretariat** stands out. The initiatives and projects carried out up to that point had not been the result of a formal strategic planning process[4].

The **implementation of a PMO is in itself an organizational innovation**, since, although there were areas with similar functions in the organization, they did not carry out said function in practice since their roles had been rather political. In addition, although planning and monitoring activities were carried out in the Administrative Secretariat, they were carried out mainly within each organizational unit, and bilaterally between the authority of each unit and the Administrative Secretary. Also, the design of the PMO is innovative in two aspects. On the one hand, it is not a technology project management office that originated in a systems area, but it manages a portfolio of strategic projects for the organization, independent of their nature. On the other hand, it controls the Internal Communication Office, which powers coordination, planning and makes results visible.

Although project management is not pre-existing, the **hierarchy and professionalization through the creation and implementation of its own methodology based on the Project Management Book of Knowledge was an innovation** both for the institution and for public administration in general. The changes introduced by the PMO affected not only the main authorities of the Administrative Secretariat but also the authorities of the organizational units-directors, department heads-, but also certain employees who work directly in support of the provision of internal services, many of which performed the functions of project manager. This idea of projecting the state placed the figure of the **Project Manager** at the center as a person who may not have a formal position in the organization but who can assume responsibilities. As will be seen, although it was one of the main innovations of the model, at the same time it was a source of challenges to be addressed.

2.2 What contextual factors have facilitated the implementation of the PMO?

The management model proposed by the PMO was adopted in a very specific context, described in the introduction, which included several favorable conditions that helped facilitate its implementation.

a. The new government had come to power with the promise of improving transparency in the state. One of the most relevant public policies in this regard was the approval of the Public Information Law, which was used by the Administrative Secretary as an excuse for advancing in the organization, systematization of processes and information, and accountability to the purposes of being able to comply with the publications and responses to requests for public information.

[4] In line with traditional models, planning was established at the time of preparing the budget or if there were subsequent needs, each area agreed on its budget needs based on its individual plan-many times without being in communication with other officials and areas-with the secretary administrative shift to whom the Finance and Budget area depends.

b. A leadership committed to results and familiar with management tools embodied in the Administrative Secretary. The new team of senior officials and senior and junior advisers to the Administrative Secretariat had brought first-hand experience with results-based management tools. They had this expertise from their work in different offices of the Government of the City of Buenos Aires, and in the private sector, which allowed them to conceptualize and guide the adoption of the new tools.
c. The Administrative Secretary had interference in appointing the appropriate officials to key positions in her area and removing those that did not work, and at the same time approving the hiring of specialized advisors and specific services both to guarantee the implementation of the PMO- such as experts in project management, change management, coaching, teambuilding activities, among others- as to make possible the transformation in the organizational culture.
d. A healthy fiscal situation. Even though the budgets approved in the budget law were falling in real terms (approved credit grew by 26% on average between 2016-2019 and inflation always grew higher, reaching 47% in 2019), the organization had a healthy fiscal status. The savings went from 100 million in 2015 to 341 million in 2019. Therefore, the PMO was implemented in a context of increased resources that enabled the expansion in the capacities of the Administrative Secretariat and the PMO (including the formation of the team of planning and control analysts and communication with 18 new officials) and in the areas responsible for the achievement of results.
b. At the same time, it is undeniable that the PMO has also had an influence on saving resources. Many of the savings' measures carried out were given priority and were closely monitored. As for evidence of the resulting improvements, the "Efficient Fleet" project can be mentioned, which, through the planning, monitoring and control of expenses associated with contracting insurance, parking spaces, fuel and the purchase of spare parts for the fleet of cars, saved more than $73,000 a year. Another success story is the development of the Ticket System, which exclusively introduced online management for representatives to obtain bus and plane tickets. This project allowed printing costs to be reduced by around 123,000 USD, in addition to allowing the user/representative to consult and issue their tickets from anywhere in the country. It is estimated that this project, together with the negotiation of rates with the airlines and the regulatory provisions, achieved savings of more than 185 million pesos.

2.3 What aspects and decisions were determinants for the PMO's success?

The leadership of the model was assumed by the highest authority, the Administrative Secretary, who was especially involved in the implementation of the PMO through the exercise of routines related to planning, monitoring and control, participating in follow-up meetings and also those with the entire Cabinet, approving the allocation of resources in the budget, participating in the launch or closure of priority projects, and acting as a sponsor in the presentation of the initiatives to implement the model carried out by the PMO in the organization, among the most outstanding.

"...Florencia (the Secretary) greatly promoted the integration of the team. Before, many directors did not talk to each other, everything was discussed with the Administrative Secretary. Now it is a round table..." Head of Department (CIPPEC, 2019)

The creation of the PMO at a formal level made it possible to implement the model since, being an organizational unit, it had the power to contract and propose new processes in the

organization. Hiring qualified, motivated and fresh-faced employees gave the PMO dynamism and value.

The physical location of the PMO next to the Administrative Secretary's office empowered PMO members who did not have a formal responsibility position in the organization. It allowed them to be heard and carry out their tasks with greater ease and agility. In an organizational culture where the formal position is what grants respectability and power, this was important since it also began to happen with the members of each of the organizational units.

"... anyone on my team has the endorsement to go and speak to another area to ask for help, to ask for advice, and that on the other side they will receive it, they will attend to it." Deputy Director (CIPPEC, 2019)

The PMO also shared a physical space with the Administrative Secretariat's legal advisory team, through which all the documents and administrative acts that required its approval passed - protocols and regulations of processes, contracting of goods and services and personnel - which allowed a fluidity between the two and almost complete access to information by the head of the PMO, which allowed her to be aware of almost all topics.

The diversity and expertise of the team were important since the PMO had former officials from the previous administration committed to the new tools, which helped to legitimize them as technical tools with a less ideological burden. An important aspect was that most of the members of the PMO had a university degree and a higher level of qualification than the average of the organization, which contributed to the areas having a perception of added value by the PMO.

The PMO sought advice when it did not have sufficient expertise, which was key not only to train its members and generate installed capacity but also these experts functioned as external validators of the model that contributed to strengthening the consideration of the organizational units regarding the model of management. In this same line, the choice of the PMBok guide as a body of knowledge validated by an international community of project experts was important to achieve legitimacy.

The functions of the PMO were implemented gradually and through pilot tests. For example, the good practices of the PMBok guide were implemented at the beginning in the transversal projects led by the Project Office. This pilot test demonstrated that it was possible to apply Project Management in a public environment and contributed to the involvement and support of the Secretary who showed interest in all the projects, and not just some, being managed professionally.

"...it was not badly received...the measures were gradual, something that was good for me, and the changes were not abrupt or sharp...I perceive that people are happy...and that they have been taken into account is essential for them." Director (CIPPEC, 2019)

The Project Office functioned as an innovation lab. It was involved in many novel initiatives such as the creation of its own project methodology based on PMBok, the incorporation of the change management methodology, among others, as well as specific projects or strategic initiatives that had to be carried out for the first time, such as the reconstruction of the missions

and functions of the entire organization and the collection of administrative information to be published for compliance with the Law on Access to Public Information, the linking of projects with the traditional budget, the preparation of the preliminary strategic plan. An important aspect was the always open attitude of the head of the PMO and the effort made by the Project Office so that once executed for the first time, these functions would be institutionalized in each responsible organizational unit according to the missions and functions.

Having the internal communication area within the PMO contributed to the generation of strategies to impregnate employees with the benefits of the new tools. It allowed adding value through the design of materials, guides, and other artifacts such as wall calendars of the different organizational units, preparation of support materials for presentations and projects, the creation of the different portals (Project Management Portal, the Accountability of the Administrative Secretary, Gender Portal), and the preparation of speeches and presentations for the Administrative Secretary as well as the organization of accountability events, among the most relevant.

2.4 What were the strengths of the PMO?

Leadership style. The first noteworthy point is that before 2015, the Administrative Secretariat was a position held by men, and between 2016-2019 it was exercised for the first time by a woman. Although the specialized literature on the subject of leadership and gender is not unanimous in maintaining that there are differences between the modality of female and male leadership (Díez Gutiérrez; Terrón Bañuelos; Centeno Suarez; Valle, 2003), it is pertinent to name him since the fact that the process has been led by women in all its lines- the Administrative Secretary, the head of the PMO and the heads of the three offices were also composed it, women- seems to have motivated the members of the organization to look for different ways of working more horizontally, personal and open. In the first place, it produced a significant change in the relationship with the staff of the Administrative Secretariat, accustomed to a "masculine style" of management, associated with attributes such as domination, competitiveness, verticalism, high control, rationality, aggressiveness, among others. Secondly, the new administration driving style characterized by horizontal and transversal work, open communication, availability for dialogue and the search for consensus, the promotion of cooperation and teamwork generated confidence and willingness of workers to incorporate the new proposals (CIPPEC, 2019).

The PMO's diverse, motivated team with a considerable degree of technical expertise was a key factor in the implementation of the new tools.

The implementation of professional project management, strategic planning and the annual plan, follow-up meetings, and Cabinet implied in their processes transversal work which helped employees to get to know each other and interact more with people, which helped to create a better work environment.

Internal communication played a critical role as already mentioned, either as support for the cultural change behind the introduction of the management tools in all its stages (planning, monitoring, and accountability) and with support in concrete activities of initiatives and strategic

projects to each area, beyond giving them greater visibility. The changes introduced in the field of communication reflect the advantages offered by multidirectional communication in terms of the verticality of the transmission of messages. The democratization of information improved synergy and allowed the emergence of new contributions to project innovation.

Although there is no evidence in the literature that monitoring has brought better policies, the fulfillment of projects evidence that coordination and control had been successful. As for the monitoring of projects in 2017, it can be said that in 2017 only about 20% showed a significant deviation and only 3 projects had to be canceled. For the year 2018, 80% compliance with the Annual Operating Plan was recorded.

The most valuable monitoring and control tools promoted by the PMO were:

1. the organization and presence in the follow-up meetings between the authorities of the organizational units, Project managers with the Administrative Secretary, which contributed to unlocking and facilitating the management and appropriation of the minutes as valid documents of the decisions taken in these meetings that contribute to clarify and order the work
2. the generation and development of control boards and a repository of data and information on the operation of the entire Secretariat. In this sense, the quality of the data declared by the sectors seems to have been reliable.
1. the specific monitoring of purchases and contracts as a central aspect of an efficient management mainly detecting deviations in time at each stage of the contracting.
2. The organization and participation in the meetings of the different areas involved in the same project contributed to achieving the fulfillment of goals.
3. The direct messages between the Administrative Secretary and the highest authorities of each organizational unit were used by the Administrative Secretary as a double check to reduce the biases that the PMO could print on them.

The centralized information management in the PMO served for the preparation of presentations, reports, and publication of information in portals that served for the accountability of government management. Also, to the extent that think tanks made requests for information, the status of the draft ordering and systematization were useful in justifying delays in compliance. Much of the information produced for accountability served for the debate and analysis of think tanks.

Beyond engaging in the activities of planning, monitoring, and control of the portfolio, the PMO had functions of ideation and execution leading strategic projects of the plan that at the same time functioned as living examples of professional project management.

2.5 What were the weaknesses of the PMO?

The leadership of the PMO as a coordinating area was often seen as a threat. This was due to different reasons.

1. On the one hand, the organizational units began to feel some stress for feeling that they were being monitored, that they had to meet goals, open the information of what was happening in each unit. The PMO somewhat exposed the inefficiencies that existed in each unit which led to some authorities resigning and others being removed by the Administrative Secretary. Because of this, the supporting role that these offices are suggested to have been overshadowed by this "accusatory function" towards the Administrative Secretary.
2. On the other hand, while the implementation of a more transversal management model has the advantage of being more agile since communication does not necessarily have to go through all the people involved in the chain of command, it redistributes the exercise of power and responsibility. In this sense, the PMO concentrated power as a coordinating office empowered by the Administrative Secretary. The emergence of the PMO generated fear in some areas of losing its power. A reflection of this was the attempt of one of the areas to absorb the Project Office and the subsequent boycott of the PMO initiatives by the highest authority of one of the sectoral areas that were key to the implementation of key technological projects for the fulfillment of the plan and that responded directly to the President of the Chamber. It also created a more blurred boundary as to where the line should be drawn between the responsibilities of the PMO and those of the organizational units. For example, the 2016-2019 strategic plan was developed by the PMO and then validated by the organizational units or because many units encountered difficulties in preparing the annual plan, the PMO prepared them, and then they were validated by them.

The planning activities were among the most complex to carry out. On the one hand, it was not possible to define concrete and measurable goals for the plan strategic objectives, which prevented the monitoring of their progress and subsequent evaluation. On the other hand, as the organization did not have defined positions, roles, and responsibilities for human resources and formal incentives for promotions and sanctions, no one wanted to commit themselves as responsible for the fulfillment of goals and projects for fear that they would not be met. This generated that many projects began to be executed without having completed the planning, which then also conditioned the monitoring and control. In the best case, the highest authorities of the organizational units appointed themselves Project managers, making it difficult to implement the methodology and generating bottlenecks. As time went on, the authorities of the organizational units and employees began to realize that they would not receive sanctions for non-compliance and began to appear employees without charge as Project managers.

The traditional planning process inherent in the budget formulation was not reversed. The integration between budget formulation and planning did not manage to happen completely, which could have been achieved with more time. Although the budget formulation system was improved, projects were distinguished from operations, staff was trained and the budget area was worked on, the formulation was not recovered for the next stages of execution and monitoring. This was partly since both the imputations of budget execution, planning, and monitoring and control were carried out by different systems and partly because the budget area although it did not resist the new initiatives did not find the incentives or benefits of doing so.

There are also indications that the process of defining priorities could have been improved as there was a high degree of change in the degree of priorities. Although the PMO does not collect data on this, it is estimated that approximately 50% of priority goals have to be renegotiated within each year, for example, by extending deadlines to meet them. In addition, almost half of these renegotiations include the provision of additional resources that were not initially contemplated. While this is not an exact science, the relatively high number of renegotiations raises questions about the accuracy of the original formulation of priorities and/or the quality of the implementation trajectories defined for them.[5]

Monitoring and control efforts seem to have been a more useful tool for the Administrative Secretary than for the organizational units themselves. According to the CIPPEC Report carried out at the end of 2019, several officials interviewed emphasized that it was a task that they had to fulfill, but that it was not of much use and took away their time. The low use of the monitoring and control system (SIGER) was partly because it was "unfriendly" and partly because there were difficulties in loading data and understanding goals and indicators. The PMO began working on a simpler, user-friendly, and online dashboard, but its implementation was suspended with the change of management.

"I think that a high percentage understand that it is not very useful, that is, 60% of people understand that it is not useful. And the other percentage doesn't understand the goal well, or the system..., and we have another percentage who understand that it's useful, that understands the system and doesn't have time, or thinks they don't have time, or thinks it's not a function of them loading into the system. They don't consider it their job... They don't see it as a work visibility tool but see it as leaving them exposed. They always take control on the negative side." Head of Department (CIPPEC, 2019)

While the tools provided by the PMBOK are among the few, except for Prince2 and the Logical Framework Approach, which are flexible and applicable to the public sector, many processes were perceived as rigid or inapplicable. For example, it was difficult to measure the total cost of a project since there was a difficulty in measuring the hours that each team member was assigned to a project since with some exceptions there were no full-time allocated resources; there was no historical record of the duration of similar or previous project activities which made it difficult to estimate schedules. Although the Project Office began to work on the incorporation of more agile tools, it was not possible to evaluate their use given the change of government.

One of the biggest difficulties was with Project Managers. On the one hand, not having a formal position in the organization many areas did not respect them as such. On the other hand, as there were no incentives to take a greater responsibility many, being permanent staff, easily left the position which generated a permanent rotation of leaders, except in those who depended on the Project Office. The Project Office worked on a monetary incentive initiative for the Project Manager and project planning analysts (Additional per Project) that was approved by presidential resolution at the end of 2019 prior to the change of administration. However, the incoming

[5] Alessandro, M., M. Lafuente and R. Shostak. 2014. The management model of the state of Pernambuco (Brazil). IDB-TN-638. Washington,DC.p-28.

authorities did not continue with the proposed model and therefore the measure was not implemented to know if it was effective.

The lack of planning routines in the organizational units meant that the authorities always designated the same responsible for the implementation of the tasks of project management, planning, monitoring and control, purchasing, etc. Although the PMO was in charge of training different referents of the areas and also assigned members of the area to support in these tasks, it was not possible to reverse the situation in the short period of implementation.

The Model communication does not appear to have been a weak aspect. According to the report on "Evaluation of the Results Management model" carried out by the UPCG in August 2019, it shows that 89.4% say they know all or part of the model;90% of the participants claim to know, in whole or in part, the advantages of the different instances of the model; and 74.5% said they were totally or partially involved in one or more instances. However, the report also concludes that "... it emerges as necessary to have greater participation of the areas to understand the difficulties they are going through and how it would be possible to overcome them." According to CIPPEC Report (2019), the perception of certain officials interviewed is that the anxiety to implement and quickly produce transformations in administrative management may have hindered the difficulty of adopting the proposed tools. However, this had logical reasoning that was based on the fact that on the one hand the Administrative Secretary is re-elected annually, and on the other hand, the response of the bureaucracy is less as the end of the administration is near to come.

2.6 Institutionalization

The leadership of the Administrative Secretary and her support to the PMO was crucial but also implied that the model was closely associated with her and not with the institution. In fact, there was less response from organizational units to the PMO as the end of management loomed.

The PMO was responsible for developing and approving regulations to document the processes related to the management model. The regulations associated with the 2016-2019 strategic plan, the annual planning procedure, the policies for project management and budget formulation, the official use of good practices of the PMBok, and the Additional or Monetary Incentive per project were approved.

Because in the agency the non-compliance with the regulations is hardly sanctioned, the risk of non-compliance or reversal was high, so the PMO placed special emphasis on anchoring the model in strengthening the competencies of employees so that they incorporated it as a working method. For this, it carried out training in planning, monitoring and created a Project Management Program as part of the training plan of the Human Resource Directorate. Also, and very important, although it was not the desired but the viable and possible option[6], it was possible to approve the additional projects as an incentive scheme for project management and the positions of Project Manager, Project Leader, and Project Analyst. This scheme supported

[6] The proper policy would have been to implement a career plan in the organization, but it was unfeasible due to political and union pressures that would block any evaluation of workers' performance.

the operation of the entire model as it required the accredited training of the project management team, the approval of the projects in the annual plans and budget formulation, and the demonstration of compliance with objectives and results in time and budget, revaluing the monitoring and control functions.

The PMO adopted the change management methodology for all the initiatives carried out, working on all the edges so that the change was effective.

The PMO tried to make the model transcend through the establishment of mutual collaboration agreements with other organizations. Collaboration agreements were signed with the Project Management Institute Buenos Aires and with the Government of the City of Buenos Aires. Also, virtual training in project management was developed and shared with the National Training Institute. In April 2019 the PMO received the visit of the President and CEO of PMI GLOBAL, Sunil Prashara, in recognition of the professional management of projects at the HCDN. Furthermore, it participated in the PMI Professional Award and the PMO of the Year Award (World Project Management Offices), being chosen as the best project office in Argentina in 2018. The Planning and Management Control Unit competed in this event with public teams and private from 64 countries.

The PMO had in its DNA to guarantee the continuous improvement that through a method and an internal team was responsible for guaranteeing. Specifically, satisfaction surveys and workshops were conducted to collect and document the experience of authorities and employees regarding the working methods implemented to facilitate their adoption and ensure that they were adopted beyond the regulations.

3. Lessons Learned

It is possible to implement a PMO that generates results in a political organization; however, its survival is difficult since it depends largely on the leadership styles of each government and the political agreements that are woven at the time of the transition of government.

The experience of implementing a PMO in such a politicized body was epic. Government decisions are generally governed more by political logic, short-termism, and personal gain than by organizational and long-term logic, which makes it difficult to institutionalize efficiency criteria and remuneration by objectives.

The leadership of the Administrative Secretary or whoever holds power is critical, not only through support for the PMO but also through the practical exercise of the model. The fact that resource management depends on its authority is positive for the generation of incentives in organizational units. However, if there were a conviction of the leadership of the highest authority of the agency, in this case, the President of the Chamber, the direct dependence of the PMO on it would facilitate coordination and increase the impact.

The fact that the PMO had interference in the Administrative Secretariat and not in the parliamentary area, which is the core function of the organization, and other secretaries made it difficult for the model to have a better chance of surviving changes in administration.

The implementation of a PMO that guarantees the achievement of results in a legislative body allows the division of labor: that politicians are dedicated to politics and do not have to worry about the management that remains in the hands of the PMO. This seems to be the greatest benefit to rescue at the time of the creations of these structures of coordination, planning, monitoring, and control.

The creation of the PMO generates redistribution of power within organizations which can generate tensions and resistance that hinder its success. Therefore, there must be clear boundaries between the role of this and the rest of the organizational units.

Resistance to change on the part of officials and agents in the various areas existed, but it was not rigid enough to be considered an obstacle to prevent the implementation of the proposed reforms. Although the first impression of the workers was one of skepticism and distrust, as the activities developed and they understood how the new management model worked, resistance subsided.

Gradual implementation seems to be the most successful strategy. Beginning with a diagnosis of needs and based on this shape the missions and functions of the coordinating unit using the PMO Value Ring tool to make it a unit that adds value.

The time window available to a government administration to implement a new management model is quite small since at the beginning it requires a diagnosis, then it begins with implementation and the last year and employees begin to feel that the government has little left and begin to loosen. Therefore, it is important to prioritize deployments.

External advice is recommended at the beginning of the implementation since it also gives legitimacy to the tools by reducing the ideological prejudices that may appear.

The institutionalization of project management processes and practices, effective after implementation, allowed the necessary adjustments to be made for effective execution. This decision of the Administrative Secretary was correct. The proposed management model was an absolutely innovative experience for the Administrative Secretary, therefore, it was not advisable to crystallize the model into a standard before checking its operation. In summary, it was effective and necessary to adapt the methodology to the organizational culture, analyze its development in practice and, based on this, make modifications and adjustments. An example of this is Administrative Act 138, issued in August 2019, which approves the "Project Management Policies of the Administrative Secretariat" and the "Project Management Glossary of the Administrative Secretariat" (CIPPEC, 2019).

The PMO should make an effort to internalize the tools and be useful for the organizational units and not for mere compliance with the PMO or the authorities. To this end, it is effective to provide training, simplify documents and tools that do not lead to duplication of efforts, the specialization of members of the organizational units in this type of tasks, in-situ support to project managers and leaders, and the granting of performance incentives.

The transversal and project-based way of working improve the work environment in the organization, since it allows many workers to leave daily activities and get involved in initiatives that begin and end up being able to change projects, which the younger generations value.

The functions of the PMO should be anchored to processes already installed within organizations or that are not questioned by common sense. An example of this is that internal communication tasks were the only ones that continued to be carried out once the change of government occurred at the end of 2019. Beyond the fact that innumerable initiatives were worked on to institutionalize the tasks of planning and monitoring, and project management by tying them to the budget formulation process and the training plan of the Human Resources Directorate, and regulatory regulations were issued, the exercise of the functions of the Planning and Control Office and the Project Office was dismissed.

It is important that those who lead the PMO value excellence and are enthusiastic. It is difficult to go forward breaking structures if there is no belief in the ideas. While the traditional strategy tells us that the viable must be defined first, then the feasible, and finally the desirable, the PMO proposed a more ambitious strategy that was to go from the desirable to the feasible and then to the viable.

Technicians or management specialists in the public sector are not as valued as other sectoral technicians such as construction engineers, hydraulics, chemists, architects, safety and hygiene technicians, lawyers, among others. Therefore, work must be done to improve its valuation if the public sector is to manage better.

The lack of survival in the exercise of the functions of the PMO, except for the functions carried out by the Office of Internal Communication, reflects a combination of involuntary and voluntary errors, and external factors. Undoubtedly, the institutionalization measures that were carried out were not enough. In general terms, the lack of a political strategy to ensure the survival of the management, the acephalia of the head of the UPCG/PMO at the time of the transition, and the disinterest and undervaluation of the new authorities in this type of work were combined. Although the specialized literature establishes that an adequate measure is related to establishing a body of permanent advisors who do not depend on the change of government, this experience shows that even if these officials exist, this is not possible. Also, the fact of associating the model with an economic incentive seems not to have been enough for other actors - unions and employees to request and support the implementation. In this sense, it may have played against the beginning of the pandemic and the economic and budgetary difficulties that the country faced at the beginning of 2020.

4. Conclusions

Government decisions seem to be governed more by political logic, short-termism, and self-interest than by organizational and long-term logic, which makes it difficult to institutionalize efficiency criteria and remuneration for objectives. However, the experience of implementing a PMO in such a politicized body is epic. The efforts and results achieved in terms of ideation, planning, monitoring and control, and communication carried out in such a short time are very valuable. Even with the efforts that were made to institutionalize the model, the dynamics of the

transition and the leadership of the new administration that dismissed the benefits of the model mortally wounded the transformation that had begun. Surely with a little more time, political agreements, or with an authority that would have valued the planning, monitoring, and control services, although some functions had been modified or prioritized over others according to the needs of the new authorities, the model would not have disappeared. This is because the challenge of delivering results in the short term and at the same time generating transformations is the great challenge of the leaders of our time.

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Role, Challenges and Limitations of Communications in Project Stakeholder Management and Engagement

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Abstract

Communication persistently ranks amongst the top critical success factors identified in practically all of the numerous project surveys undertaken across the globe over time. Considered the life blood of every project, its importance is universally acknowledged by project practitioners. No project can be accomplished successfully in the absence of good communication which is sustained over the entire project life-cycle.

Communication assumes added importance and criticality with increasing project technical, institutional, social and environmental complexity. Yet, communicational deficiencies continue to overshadow and seriously impede many projects resulting for them, inter alia, in cost and schedule overruns, unwanted scope modifications, staff demotivation and reputational damage, and a significantly higher risk of project failure. Consequently, an effort must be made to explore and critically analyze from the perspective of the project stakeholders, both primary and secondary, the specific role communication plays on projects along with the myriad accompanying challenges and limitations it poses as well as ways and means by which these challenges and limitations can be managed.

For this study the authors have reviewed the available literature on over twenty large-scale projects primarily in construction and civil infrastructure development. Several interviews with project practitioners from this project category were also conducted. Projects falling under this project category have the advantage of typically having a comparatively very sizeable and diverse community of primary and especially secondary stakeholders which makes the creation of complex communicational systems necessary and which consequently opens up the opportunity for gaining more interesting insights through multidimensional exploration and analysis.

The authors look in detail at the subject of communication between projects and their stakeholders and the key factors which influence communication effectiveness. Various practical and specific suggestions as to how to the quality of communication on projects can be improved will be discussed in a follow-up study. Projects can benefit through the insights offered by this study into communicational dynamics which can help them

shape their communication systems in a stakeholder-responsive manner and thereby enhance project effectiveness and efficiency.

Introduction

Communication has been termed the “life blood” of projects. It is a universally acknowledged integral component and critical success factor of every project regardless of project location, size, complexity and type. In fact, this has been revealed in numerous project surveys undertaken from time to time across the globe in project categories as diverse as IT and construction, or events and new product or service development, where respondents rank factors in order of their impact and influence on project success. The factor communication, directly or indirectly, almost consistently falls under the most important identified factors, oftentimes more so then the technical or environmental challenges and complexities encountered by projects. Indeed, long is the list of projects that over time failed to achieve the degree of success which was expected of them or were forced into premature termination because of communicational deficiencies or shortcomings which were experienced.

Communication works in tandem with the activities cooperation and coordination. It precedes them both actually since effective and sustained cooperation and coordination between project stakeholders, which are clearly essential for undertaking any project, cannot realistically take place in the absence of communication between them. It can be asserted that the higher the quality of communication is on a project, the higher is the likelihood that the project will be undertaken more efficiently and deliver better results after completion.

Despite its foundational relevance, communication on projects can even at the best of times be fraught with considerable difficulties, hurdles and challenges. Communication has traditionally been considered a ‘soft’ project knowledge area whose undertaking and management is usually perceived as being easy or comparatively much simpler to perform than complex technical tasks and activities. Consequently, on many occasions, inadequate thought, effort and planning goes into project communications with disastrous results.

For projects falling in the category of large construction and civil infrastructure and development communication assumes a special role and significance. Countless billions of Dollars are invested in such projects globally every year. Every nation’s economic development and growth, and social prosperity, depends to a large extent on them. Their enormous technical complexity and high cost notwithstanding, such large or mega undertakings are moreover typically characterized by enormous stakeholder communities, both primary and (especially) secondary, which usually are extremely diverse and heterogenous and possess a broad spectrum of attributes (interests, expectations etc.) in relation to the projects. Communicating with all these stakeholders fairly, ethically and amicably over a time horizon which can often span several years and in pursuit of a win-win situation for both the project and its stakeholders may presents great difficulties and require considerable effort, planning and cost but it is a

basic necessity and the onus lies primarily with the projects to ensure that effective and efficient communication systems with stakeholders are in place at all times. There is evidently no one size fits all approach; communication must be designed in accordance with the respective needs, wants and requirements of stakeholders and must be sufficiently flexible to quickly and fully adapt to situational changes over time.

In analyzing the complex role, challenges and limitations of communication between stakeholders on projects, as in the large construction and civil infrastructure and development project category which are the focus of interest in this research, it is instructive to distinguish between the two main project stakeholder groups, primary and secondary. Communication between them and the project throughout its life-cycle is of fundamental importance but the communication objectives, strategies, content and mechanisms can differ significantly for each group and, therefore, the primary and secondary stakeholders must be considered separately.

Primary Stakeholders: Role, Challenges and Limitations of Communication

Primary stakeholders encompass all entities from individuals to organizations that have a contractual obligation to, or a legal responsibility, towards the project. For large civil infrastructure development projects primary stakeholders typically include entities such as the project manager and team, project client, project sponsor, financers, consultants, contractors and sub-contractors, vendors and a host of other individuals, groups and organizations providing services to the project. All of them have some specified contractual obligation or legal responsibility to the project, the duration of which may extend over the entire project life-cycle or restrict itself to distinct phases of it, and the services they supply may span an array of activities ranging from performing simple manual tasks to provision of complex knowledge-based inputs. Their involvement in the project is normally voluntary, often follows after a competitive selection process, and promises worthwhile benefits to them which typically are monetary but additionally can also include, inter alia, experiential and reputational gain, networking opportunities, and exposure to new or innovative processes, methods and technologies. For the project activities to progress smoothly, all entities must effectively and sincerely communicate, cooperate and coordinate on a continual basis with each other. A chain is only as strong as its weakest link and any deficiencies which arise in one, two or all of these three functions over the course of the project life-cycle can at best cause brief and resolvable conflicts between the affected stakeholders or at worst damage the project by causing cost and schedule overruns or in the most extreme case even endanger its very existence.

With the involvement of more stakeholders in the project the communicational challenges for it tends to increase. This normal considering that the entities in question are independent from each other and thus have their own distinct approach to communication. Some may be comparatively more open, quicker and responsive than others who may need prompting. With globalization and the internationalization of

projects in the past two or three decades, the inter-cultural dimension has assumed great importance on projects. Though a multi-cultural project setting offers considerable benefit, communication across cultural boundaries undeniably presents its own set of complex issues and challenges and needs to be well researched, understood and managed in order to reduce risk and prevent possible occurrence of serious damage to projects.

Because communication constitutes the prerequisite for cooperation and coordination its importance for the project is, as highlighted above, fundamental and crucial. Admittedly, effective communication between primary stakeholders increases the likelihood of effective cooperation and coordination which in turn increases the likelihood of them (hopefully successfully) delivering the project goal within its constraint framework. Hence, projects need to focus very carefully on their communication systems to ensure that they function to both maximum effectiveness and efficiency. For this purpose projects typically develop a comprehensive project communication plan included as part of their project master plan in which, inter alia, the communication objectives, strategies, targets, mediums, channels, and frequency are comprehensively documented. Like the other project subsidiary plans, communication plans are essentially dynamic documents and may undergo several revisions to reflect changing stakeholder communication needs as the project progresses over its life-cycle. It serves as a valuable reference and guidance for primary stakeholders and to which they are expected to closely adhere to. At the same time, even the best conceived project communication plans cannot realistically deliver continuous optimal or even excellent results in the absence of a bundle of performance-influencing conditions which pertain not only to the communication system itself but also to the information which underlies the system.

It makes no sense to discuss communication without concurrently considering information. Both go hand in hand and basically represent the two sides of a coin. Each is essentially useless without the other. Primary stakeholders need a flow of information to fulfill their obligations and responsibilities on the project, especially to perform requisite actions and make necessary decisions, and this information reaches them through communication. Deficiencies present either in the information they receive and/or in the way this information is communicated to them may have potentially serious repercussions for the project as experience shows has occurred on numerous occasions.

Hence, the first prerequisite of effective communication is ‘quality information’. Quality is a complex and multi-dimensional concept which finds broad application in numerous technical and managerial fields and the field of project information offers no exception. To fulfill the requirement of being of high quality – and consequently of high value to project stakeholders - all project information must fully satisfy the following set of seven pre-specified criteria simultaneously which even in the best of circumstances can at times be very difficult to achieve in practice:

- Accuracy (the information’s correctness or factualness)

- Relevance (the information's consistency with the need)
- Specificity (the information's provision of useful details or deep insights)
- Completeness (the information's inclusion of all useful or important details)
- Currentness (the information's condition of being up-to-date)
- Reliability (the information consistency)
- Legality (the information's acquisition through legal and ethical means only)

Any deficiency in the information caused by any one or more of the seven listed criteria will automatically reduce the efficacy of the project's communication system. A further constraining factor is that the acquisition, analysis and assessment, storage, and dissemination of information and creation of a purpose-specific robust infrastructure for it can also be a costly and difficult undertaking on large projects where immense amounts of information are generated on a regular basis.

Deficiencies in the way information is communicated to project stakeholders may seriously diminish its utility. In a large construction and civil infrastructure project environment several transmission issues typically can and in practice do crop up at some point to overshadow communication, namely:

- *Overcommunication* which manifests itself in excessive and too frequent communication between stakeholders resulting in wastage of time and effort spent analyzing or assessing information which partly is not needed and which distracts them from project work.

- *Undercommunication* which is the opposite of overcommunication and which results in needed information not being conveyed to the stakeholders concerned and hence possibly resulting in delayed actions and decision-making.

- *Non-Communication* which is the complete absence of communication and in consequence of which stakeholders may become uncertain, demotivated or hesitant to act.

- *Miscommunication* which represents the difference or mismatch between what the project stakeholder communicating the information actually meant or intended to convey through it and what the stakeholder who received that information actually understood from it.

- *Untimely Communication* which is the communication of information before or after that point in time at which it is needed and which can diminish the quality of actions performed and decisions made.

- *Misdirected Communication* which is the communication of information often mistakenly to the entities who do not need that information instead of communicating it to those who do need and are expecting it.

- *One-Sided Communication* which is the communication of information but without expected reciprocity. It overlaps with non-communication.

The information-communication nexus gives rise to four distinct scenarios. In the best case scenario information of high quality is communicated effectively to project stakeholders, thereby bypassing the communication issues outlined above. Obviously this is immensely beneficial for the project but on large and complex undertakings can be near impossible to sustain throughout their life-cycles. Conversely, in the worst case scenario, information of poor quality is communicated to project stakeholders ineffectively – i.e., some of the communication issues outlined above manifest themselves – and this can seriously damage the project, especially if it goes unnoticed and remedial measures are inadequate or none are adopted. In between these two extreme case scenarios lie two further scenarios, namely, the information may be of high quality but it is communicated ineffectively or, conversely, the information is of poor quality but it is communicated effectively. Both are evidently unsatisfactory and constitute an impediment to project performance. At the same time, and based on discussions on the subject the authors had with project practitioners, they usually appear to be relatively more commonly encountered on projects than the two extreme case scenarios. On large construction and civil infrastructure development projects it is realistic to assume that all four scenarios can and probably will occur, their timing, frequency and intensity contingent on myriad contextual factors and prevailing situation and circumstances. A major challenge for the project is therefore to carefully and continuously monitor and assess its information and communication system and take prompt and decisive corrective action if and when the need should arise.

The causes of communication challenges on large construction and civil infrastructure projects are numerous and can span volumes. Most of them fall in the social, psychological, technical, institutional and cultural categories. Sometimes individuals, groups and organizations working on projects fail to realize and appreciate the criticality of their role as communicators. To a large extent these may be attributed not to a lack of interest but instead to a lack of awareness, encouragement or training. Empirical studies reveal that most people by nature are introverts and some may be hesitant to go the extra mile to interact or communicate with others unless circumstances literally compel them to do so. On occasions, personal antagonism or lack of trust between stakeholders may also serve as a communication impediment. And oftentimes as observed on projects, stakeholders deliberately withhold information in the unrealistic expectation or hope that issues or problems which have cropped up will automatically resolve themselves if left concealed and unaddressed or due to their apprehension they will ultimately be blamed for having caused the issues or problems or for not having prevented them from having arisen. With globalization and the internationalization of projects and their supply chains, it is not uncommon nowadays to encounter stakeholders from several countries participating on larger construction and civil infrastructure development projects. Consequently, the level of cultural interfacing is

also high. Multicultural participation and the multi-dimensional diversity which normally accompanies it can bring some major benefits - along with some daunting challenges – for projects. It is well known that different cultures have particular approaches and attitudes to communication, work and ethics and it is not unreasonable to assume that such differences are carried over to some extent into the project environment. This can on occasions prove to be a source of significant conflict and friction. Furthermore, in a multilingual project environment misunderstandings may arise in communication between stakeholders working together. Left unaddressed or poorly managed, this can pose a serious challenge for projects and can adversely affect their performance.

Projects can adopt many measures to improve the quality of communication ranging from the simple to the highly complex. These measures will be the topic of a future paper by the authors.

Secondary Stakeholders: Role, Challenges and Limitations of Communication

Secondary stakeholders, unlike the primary ones, have no contractual obligation or legal responsibility to projects and hence are not subject to their instructions and formal control. On projects typically involving the development of large tracts of space, as in large construction and civil infrastructure development, the number of secondary stakeholders is numerically manifold larger than the primary stakeholders. They are also much more heterogenous and span a broad range of entities which typically include, inter alia, individuals, families and local communities, associations and civic organizations, businesses, environmentalists, social activists, media, academia, government agencies and, in some cases, even the general public.

Another key distinguishing feature of secondary stakeholders which sets them apart from the primary stakeholders is that whereas the latter can be presumed to be supportive of projects because of their voluntary participation in and their contractual obligations or legal responsibilities towards them, this does not necessarily hold true for the former. Depending on their circumstances secondary stakeholders may or may not be supportive of the project. In many instances some secondary stakeholders may be very actively and persistently hostile towards the project and strive to prevent it from achieving its goal or causing maximum damage for it in pursuit thereof. Long is the list of large construction and civil infrastructure projects across the globe and over time which in varying degree have experienced schedule or cost overruns, unwanted changes to their scope of work, or even premature termination because of the hostile actions of secondary stakeholders. Their power to influence projects comes through the utilization of the various ‘options’ which are available at their disposal and which can range from the very soft at the one end of the option spectrum to the very hard (and downright illegal) at the other end. In a previous UMD project management symposium paper the authors discussed in detail with examples the numerous frequently encountered ‘options’ which these stakeholders can utilize against projects.

Consequently, the responsibility lies with the project to very carefully engage all its secondary stakeholders with a view to eliminate or at least minimize their opposition to the project as well as encourage them to be supportive of it. Doing so is, off course, easier said than done given the heterogeneous nature of the secondary stakeholders and the multiplicity of their entity-specific and collective interests in the project. Engaging secondary stakeholders effectively over the project life-cycle is, at the very least, an enormously complex, testing and potentially resource-intensive task but, if successful, the reward for the project is also immense. Nurturing trust between the project and its secondary stakeholders and building, consolidating and sustaining positive relationships with them is a fundamental prerequisite for effective engagement and this cannot be achieved without an appropriate context-specific system of communication designed with this purpose in mind. Communication with secondary stakeholders is hence as important – and possibly more challenging - as it is for primary stakeholders. The primary difference lies in the objective: whereas communication with primary stakeholders aims at striving to ensure the best possible cooperation and coordination between them so that the project can progress smoothly and efficiently towards achievement of its goal, the communication with secondary stakeholders must aim at generating support, as well as reducing risk, for the project, in particular, by appeasing disgruntled, resentful or angry stakeholders whose consequent actions may seriously impede project progress or even derail the project entirely. However, oftentimes the communication strategy and effort by projects towards secondary stakeholders falls short as is witnessed frequently in practice. To engage secondary stakeholders effectively projects must systematically collect and carefully analyze and assess information about them and adopt a proactive, creative and flexible context-specific communication system capable of quickly adapting to changing circumstances and developments.

In a previous UMD project management symposium paper the authors argued that a set of six attributes common to every stakeholder ultimately determine how stakeholders come to view a project. These six attributes – motivation and concern, expectation and perception, and attitude and behavior - are universal and applicable on every project. They are also applicable as much as to primary stakeholders as they are to secondary ones, regardless of whether the stakeholders are individuals, groups or organizational entities. Understanding where project stakeholders stand in relation to these attributes is the key to managing (i.e., for primary stakeholders) and engaging (i.e., for secondary stakeholders) them effectively. For secondary stakeholders this means that the project has to first research and collect sufficient (quality) information regarding their respective attributes in relation to the project and then apply strategies to influence their behavior, which may be supportive, indifferent or hostile towards it over the project life-cycle. Communication is thereby the basic, but not the sole, behavior-influencing tool in the project arsenal. A good communication system must be designed with secondary stakeholder communication preferences in mind and be bi-directional in that is not only continually disseminates information efficiently from the project to the secondary stakeholders but also continually receives, analyzes and assesses high-quality

information about them (in addition to constructive criticism about the project from them) and utilizes this input in order for project executives to make informed decisions and take necessary action. As a trust- and relationship-builder communication can, if undertaken by the project effectively, in good faith and with sincerity, can go a very long way towards allaying apprehensions and misconceptions secondary stakeholders may have about the project.

At the same time communication with secondary stakeholders has its limitations. It depends heavily on several factors, notably the quality of information the project can access about them, obtainment of some or much of which may be very difficult, costly or time-consuming. Moreover, processing all that information and extracting meaningful insights from it requires considerable analytical skills and experience. And even the best communication sustained indefinitely cannot be expected to completely pacify hostile stakeholders who in consequence of the project will actually experience damage of a financial, material, health, social, psychological or other nature and for whom the overall resultant project-induced losses will exceed the benefits. In practice this often happens to a large number of stakeholders of major construction and civil infrastructure development projects. To compensate for their losses and mitigate stakeholder opposition projects can, and as observed in practice often do, offer secondary stakeholders financial and material incentives. These incentives can take on many forms, for example, the donation of computers and books for local schools and provision of educational stipends and grants for students, provision of crucial medical equipment to local hospitals and clinics, prioritization of local businesses in project procurements and local residents in employment on the project. Sometimes projects go further and grant their secondary stakeholders certain participatory rights in the project pre-initiation, planning, implementation and monitoring phases. In very rare cases, projects even offer secondary stakeholders a partnership opportunity which entitles the latter to a share of the project earnings and profits.

Concluding Remarks

Communication constitutes the fundamental mechanism of interaction between projects and their stakeholders, both primary and secondary. Its importance cannot be overestimated. Communication effectiveness may be reduced by several factors, notably the quality of the information which it conveys and transmission issues which may occur with the communication itself. While communication is critically important for the project in its dealings with its primary and secondary stakeholders, the basic objective of communication differs for both stakeholder categories. For primary stakeholders project communication strives to ensure that all these entities collaborate efficiently and fully towards the systematic accomplishment of the project goal. For secondary stakeholders project communication is based on a careful acquisition of insights about, and a robust understanding of, these entities in order to predict how they will or may behave towards the project over its life-cycle and seeks to influence their

behavior with a view to reducing or eliminating the risk of damage to the project which can result from hostile stakeholder action.

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Scaled Agile Implementation–
Lessons Learned, Path Forward

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ABSTRACT

As with many IT organizations in companies started in the last century, Intel IT had a strong legacy of waterfall Program and Project management practices, small pockets of Agile development teams and emerging DevOps practices with mixed results and limited visibility. Starting in 2019, Intel IT generally, and the Supply Chain IT organization specifically, started our path implementing an industry-standard scaled agile framework amidst a broader Digital Transformation initiative. As we progressed through identifying our development value streams, launching our Agile Release Train teams and then implementation of Lean Portfolio principles, we have observed and learned many benefits, as well as the limitations of leveraging a Scaled Agile Framework. The framework allowed our organization to enhance business transparency, stabilize operations, increase focus on reducing aging infrastructure and reinvigorated disciplined project execution. While those benefits were impactful, we also encountered challenges in executing large, complex initiatives, obtaining a clear portfolio demand prioritization and integrating our operating model with broader corporate processes.

Background

Intel operates a global Supply Chain that is only increasing in complexity due to the more complicated nature of the emerging modular products, our increased reliance on external manufacturers / suppliers and the constraints driven by the pandemic.

The Supplier Chain network is spread across 20 countries, engages greater than 16,000 supplier and sources, builds and distributes more than 50,000 unique products

Figure 1: Intel Global Supply Chain

The Information Technology context

In 2019, the Supply Chain IT organization was facing challenges and looking to support the company's inflight Supply Chain Digital Transformation. The teams have faced reorganizations of the IT department and experienced some workforce reductions that reduced our employee capacity at a time when business demand to the IT demand was increasing.

The Applications and capabilities that support out Supply Chain business are a mix of Enterprise Resource Planning, industry standard platforms and a larger number of custom applications that drive challenges in both IT Operational Support and Project execution velocity and delivery.

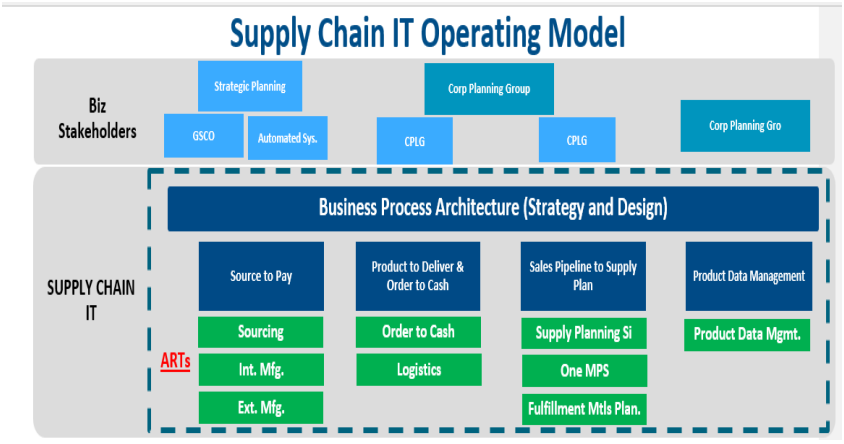
IT Operations was consistently below the overall, aggregate target SLA which were only exacerbated by the capacity reductions. In addition, there was a significant number of major incidents which resulted in a large amount of business downtime and impact.

Project Execution was also seen as lacking with both large and smaller initiatives missing commitments to the stakeholders. In summary, the operational, project issues in a resource constrained environment seemed daunting but a new approach was required.

Strategy & Approach to implement a Scaled Agile model

The IT organization generally, and the Supply Chain IT domain specifically, made the strategic decision to implement a scaled agile framework across the entire organization. The judgment was made to start our journey leveraging an industry-standard scaled agile framework and implementation model.

The organization held a week-long planning session in Q1'19 to model and plan what the Scaled Agile implementation and organize around Development Value Streams. These teams are essentially the IT value-delivery structures or scaled agile teams that deliver solutions to the business.

It was determined that we would have 9 scaled agile release teams that support our various Supply Chain businesses. These scaled agile release teams varied in size from 5-10 Agile Persistent Teams (APTs) and approximately 80-120 resources.	 Figure 2: Intel Supply Chain IT Operating Model

The SC Operating model has improved stakeholder goal alignment and execution delivery although we encountered a significant learning curve for both the Supply Chain business and IT partner organizations.

A fundamental process the scaled agile framework outlines is the integrated quarterly planning process that we execute across the entire portfolio prior to each Program Team does their localized planning. The portfolio level planning includes refreshing the Business Priorities and Business Outcomes and Capabilities they would like to be delivered over the next quarter. The IT teams prepare 't-shirt' sixing of the Features to conduct an initial capacity assessment for their teams. The IT teams ensure that they reserve enough capacity to support Operational support and any End-of-Life or technical debt reduction efforts. This Pre-Program Increment process helps to reinforce the priorities, assess for high-level risk, dependencies, and capacity constraints prior to the Team level planning (Figures 3 and 4).

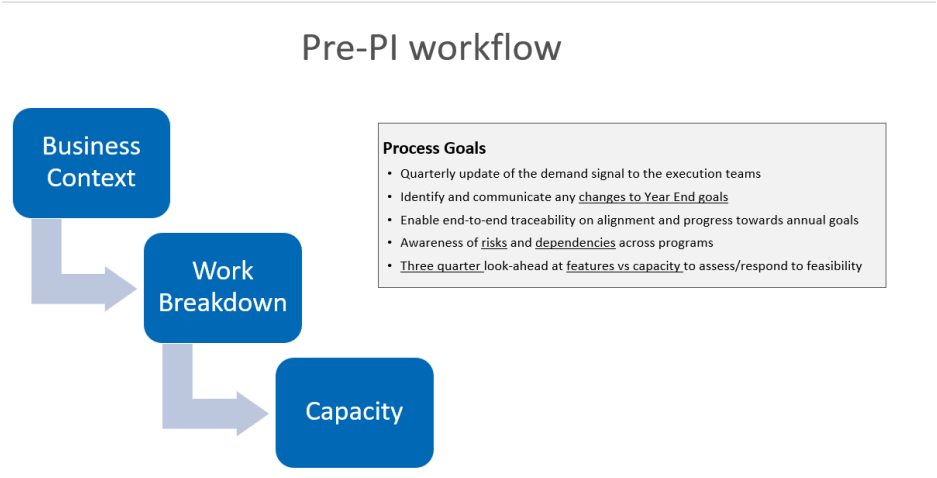


Figure 3: Integrated Portfolio Quarterly Planning

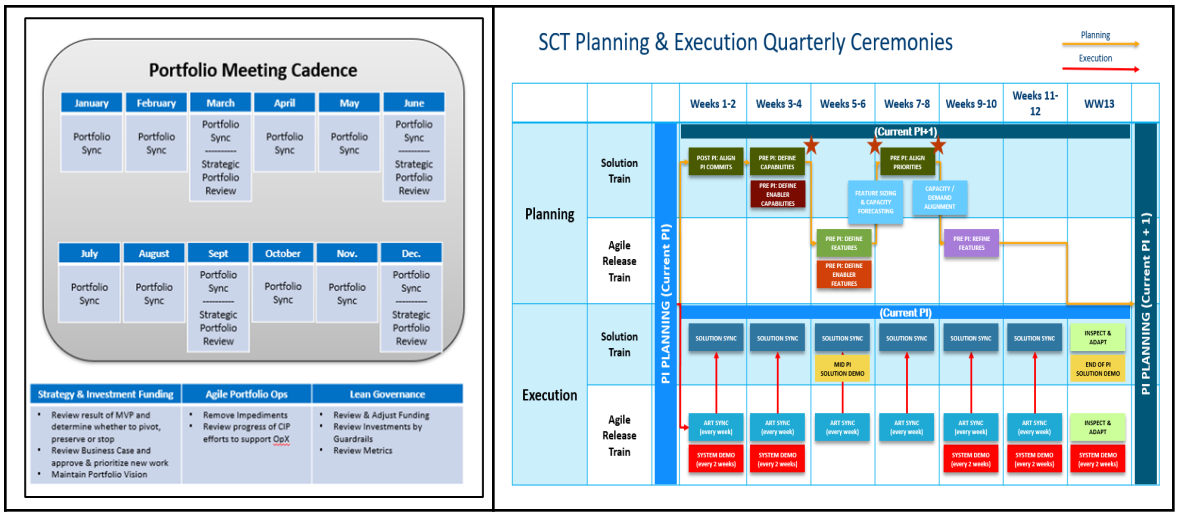


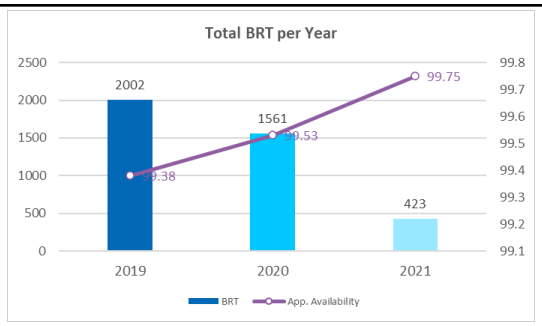
Figure 4: Operating Model Governance

In the PIquarterly Planning events the Business representatives assign subjective Biz value to these items and similarly score the result at the end of quarter when the teams review, consistent with agile principles demonstrations of the capabilities delivered.

Benefits

One of the primary benefits of the Integrated Planning process, and the scaled agile framework generally, is the business transparency, business agility that it provides the IT development teams. Similarly, since the scaled agile teams are focused on the breadth of scope: operational support, EOL-type or tech debt reduction activities as well as new capability, it provides the business teams with significantly improved visibility to the full complement of demand on the IT teams and any associated constraints and potential priority conflicts or trade-offs.

Secondly, with the quarterly planning and prioritization process coupled with the reserved operational support capacity, we saw significant improvement in the support trends over the last 3 years. The Business Recovery time – which represents the amount of time the business is impacted by downtime – decreased by 75% over that period. Not surprisingly, we observed a commensurate increase in the application availability from 99.38% to 99.75%. Finally, we observed a 45% reduction in Major Incidents related to Change management comparing 2020 to 2021 (Figure 5). A significant reason behind the improvement of these trends is related to how the scaled agile model provides continued focus on operational support.



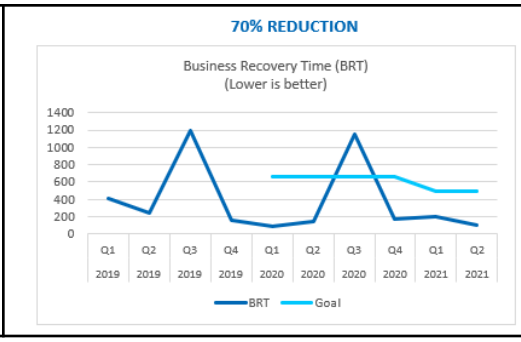


Figure 5: Operational Improvements

The efforts to keep platforms up to date or reduce the application proliferation and complexity is a continual IT challenge. As par of the quarterly planning process and EOL/Tech Debt roadmap activities, the teams set aside 20% of their capacity to keep platforms up to date and modern. The business representatives have visibility to this capacity allotment towards EOL and it becomes a normal part of the prioritization process. As teams worked through the initial heavy backlog of technical debt reduction activities the capacity started to trend down from the initial target of 20%.

As outcomes of this improved focus, we saw improvements in application simplification and security posture across our portfolio and now a continued downward trend in the amount of effort required to maintain updated platforms.

The Portfolio has a consolidated roadmap the exclusively focuses upon the efforts to retire older platforms or technologies (Figure 6)

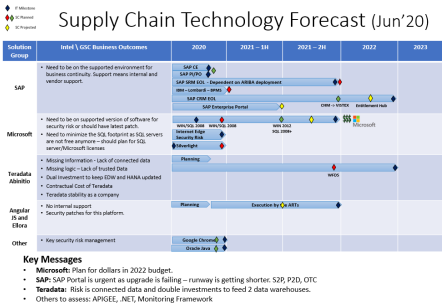


Figure 6: Portfolio EOL Roadmap

Prior to the implementation of scaled agile process, the Supply Chain IT teams were frequently missing key project milestones and deliverables. One of the key metrics used across the Supply Chain portfolio was something termed Program (or Flow) Predictability. Program Predictability measures how well scaled agile teams can plan and meet their PI objectives. Over the course of the 3-year period from 2019 to 2021, the teams improved from high 70% to consistently be slightly higher than 100% on average across the portfolio (Figure 7). The benefits were primarily seen on initiatives that were small to medium in terms of scope and complexity.

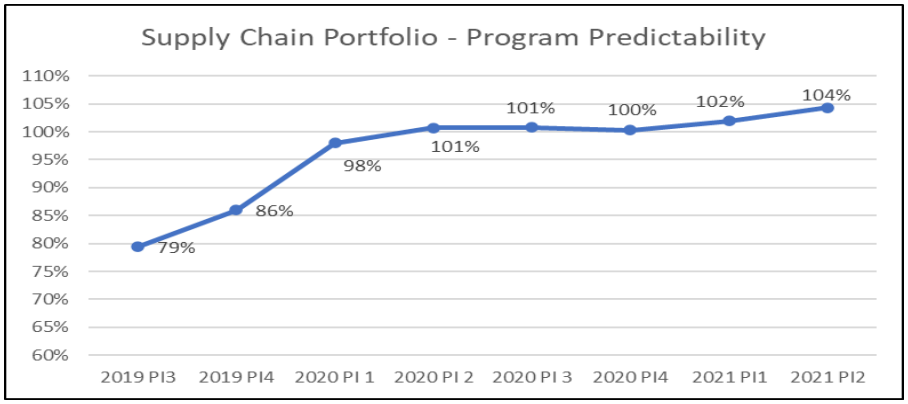


Figure 7: Program Execution Improvements

Finally, the Scaled agile operating model that was implemented ended up serving as a stabilizing construct in the face of 2 significant reorganizations of the IT organization over that period. The amount of organizational and personal churn and angst was minimized because regardless of the organizational structure – the scaled agile operating model largely insulated the employees from the change given that their day-to-day activities were largely not impacted.

Challenges

Prioritized Demand Signals
It is challenging to maintain a true '1 through N' prioritization at the portfolio level. It is more likely during the annual financial planning processes; however, it is much difficult to maintain as part of the integrated quarterly planning. The portfolio evolved into prioritization into larger themes and then had the individual domains request investments and x-cross prioritize within those smaller sub-portfolios.

Business & Investment Agility
The Corporate Financial planning process identified the annual funding level for each initiative for the following year. As a Supply Chain portfolio, we attempted to adjust funding on a quarterly basis based on project performance, emerging demand, key risks and budget status (i.e., over\under). While it is possible to gather and present the opportunities to shift investments to maximize value on a quarterly basis, the ability to execute those changes proved more difficult. The challenges were related to a mixture of corporate processes, lack of information and to a degree human nature. Our corporate internal financial processes, ability to have a holistic view on capacity resource planning and the reality that skillsets across teams are not truly fungible in many cases. It is much more likely to be able to ramp up and wind down external resources than shift work to different teams across the Supply Chain IT organization.

Large/Complex Programs
One area where we found the scaled agile framework did not work in our environment was those large, enterprise-level and complex initiatives in terms of either business or technical complexity. For initiatives of this nature, we evolved into

a Hybrid lifecycle model that proved to be successful. Despite the guidance as part of our quarterly integrated planning process to plan 3 quarters out in time, the teams struggled with ability to align and execute a coordinated plan. The teams needed to invest in an upfront solution design phase that more thoroughly outlined the business, architectural and solution to-be state before driving more detailed designs and send capability demand to the APTs.

Intersection with Corporate Processes
Corporate and Executive communication consistently required to 'translate' the Business Outcomes and Value from the Scaled Agile planning and execution into a view that resonated with Executive management, Financial corporate processes that do not view the world in two-week iterations or quarterly 'buckets. They are much more interested in longer-term value, roadmaps and 'when are you done' in a multi-year view of the portfolio of initiatives.

Summary

In our Supply Chain IT experience, implementing a scaled agile framework proved to be an important step to stabilize, and then steadily improve, our operational and project execution efforts.

We experienced increased stakeholder satisfaction due in large measure to the transparency, visibility and responsive related to demand changes over the last 3 years. The consistency in the usage of the operating model and planning across the Supply Chain IT teams allows for us to enable portfolio-level planning, 'retrospectives and subsequent adjustments relatively quickly across such a large organization.

While we have seen small gains in our ability to improve portfolio-level investment agility – via quarterly investment changes – there continues to be opportunities to determine how we may improve that ability moving forward with a focus on how to maximize business value delivery, maintain our operational excellence.

The most significant challenge encountered during the implementation of the framework required us to adjust to and adopt a hybrid model for the large, complex initiatives that spanned multiple business organizations or where we were landing an entirely new platform. It was critical to fully work through the business transformation and comprehensive and consolidated end state architecture and design to a certain level before sending demand to the execution teams.

In our experience, the benefits of moving towards a scaled agile operating model far outweighed or overshadowed the costs or challenges, however, with an understanding of those limitations, those challenges can be mitigated.

Strategies for Effective Project Time Management

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Abstract

Time is an asset and a constraint. This study adopts an empirical science philosophical approach to capture the views of randomly-selected samples of project stakeholders in the geo-political zones of Nigeria. In all, 200 survey questionnaires were administered out of which 140 completed and usable questionnaires (representing 70% response) were retrieved. Primary data were analysed through SPSS version 25 along with descriptive 'Relative Importance Index' and inferential 'Mann-Whitney-Wilcoxon test' statistical tools. Secondary data were collected through a systematic review of relevant scholarly publications and refereed conference papers. Results of the study uncovered planning and goal setting, managing self, scheduling/prioritisation, and managing interruptions as strategies for effective project time management.

Keywords: Management, Project, Stakeholders, Strategy, Time

1. Introduction

Time is a measure of units, a treasurable possession, a daily allotment, a valuable asset, and an equal opportunity available to every creature. Everybody gets the same amount every day. It is an unusual commodity which is perishable and cannot be saved, stored, borrowed or loaned. Time is like a river flowing steadily into an ocean. It never stops flowing hence, it is impossible to touch the same water twice, because the flow that has passed will never pass again. Time is associated with life, purpose, opportunities and achievements.

Time is more valuable than money because it is priceless (Covey, 2019). While money is a renewable resource, time is a non-recoverable precious asset. Time is the most valuable coin in life (Kuster *et al*, 2015). Every individual determines how that coin is spent. So, time may be a terrible resource to waste.

Every project deliverable is time-bound, hence without effective management of time, a project may head towards a disaster. Therefore, this study sought to establish strategies for effective management of project time. The paper begins by explaining the concept of time, concept of project management, and project time robbers. A description of the methods adopted in the study is given, followed by the presentation of the results and, finally the discussion of findings and conclusion. This paper is an extract from Adetola (2021b).

2. Concept of Project Management

A project may be described as a unique process, consisting of a set of co-ordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including constraints of time, cost and resources (Chartered Institute of Building, CIOB 2014). A project may be simple or complex. It may involve a single individual or multiple individuals, a single organisational unit, or multiple organisational units from multiple organisations. Additionally, project activities may be new

to members of a project team and consequently require more dedicated planning than routine works. Above all, every project creates a unique product, service or result (Project Management Institute, PMI 2017). Examples of projects include:

(a) Developing a new product or service.
(b) Constructing a facility.
(c) Running a campaign for political office.
(d) Effecting a change in structure, staffing or style of an organisation (i.e. organisational change management).
(e) Organising a conference, workshop or seminar.
(f) Acquiring a new equipment, machinery or plant.
(g) Mergers and acquisition.
(h) Implementing a new policy.

Management consists of the interlocking functions of creating corporate policy and planning, organising, controlling, coordinating and directing an organisation's resources in order to achieve the objectives of that policy (Adetola and Goulding, 2016).

Management of project time provides an opportunity to decide on how to spend a valuable resource. It enables project stakeholders to get the most out of the best. It helps to organise and learn how to spend project time productively. Learning project time management methods is a skill similar to learning how to speak another language or figuring out how to word-process (Young, 1996; Rigby, 2013).

2.1. Project Time Robbers

Many activities steal and waste time in construction projects (see Table 2). Construction is the process of using acquired knowledge of science and technology to create and build infrastructure or facilities such as buildings, roads, bridges, petrochemicals, harbour-works, underwater structures, etc. (Egan 1998, Chudley and Greeno 2016). It is an installation and erection activities for procured equipment and materials at the site in accordance with approved construction drawings, documents, procedures and specifications.

3. Research Methodology

This paper adopts an empirical science philosophical approach to capture the views of project stakeholders in the geo-political zones of Nigeria. In all, 200 survey questionnaires were administered to the randomly selected samples of project stakeholders, out of which 140 completed and usable questionnaires (representing 70 percent response) were retrieved. Secondary data were collected through a systematic review of relevant scholarly publications and refereed conference papers. The Statistical Package for Social Sciences (SPSS version 25) was used along with the descriptive 'Relative Importance Index (RII)' and the inferential non-parametric 'Mann-Whitney-Wilcoxon test, (MWW)' statistical tools for data analysis. The ordinal data generated by the research instrument informed the use of MWW to test the research hypothesis postulated for the study (Adetola, 2017).

Table 1: Respondents' characteristics

Characteristics	Frequency	Percentage
Project Manager	30	21.40
Project Client/User	25	17.90
Project Designer	30	21.40
Project Constructor	34	24.30
Public Authority and Agency	21	15.00
Total	**140**	**100**

Results from Table 1 indicate that the respondents to this study are relevant stakeholders in project initiation, planning, design, execution, monitoring, control and closure. Project stakeholders are individuals and organisations that are actively involved in projects, or whose interests may be affected as a result of project execution or completion (PMI, 2021). They may also exert influence over a project, impact or be impacted by a project and its results. About 90% of the respondents have more than 10years post-qualification experience in employment and practice. These respondents are samples randomly selected and representatives of the stakeholders in project management process. The underlying assumption that they are competent, experienced and capable of exercising sound judgement is met. Consequently, the conclusions which would be derived from the results of this study will apply to the entire stakeholders in project management process (Adetola, 2017).

4. Results of the Study

Table 2: Relative Importance Index results for the time robbers in construction projects

Time robbers in construction projects.	SA 4	A 3	D 2	SD 1	NO 0	RII	Rank
Lateness to construction site.	100	30	10	0	0	0.910	19
Unnecessary discussion eating into project time.	90	25	20	5	0	0.857	26
Distraction from project activities.	80	50	5	5	0	0.866	24
Rework/ defective work/ repeating project activities.	120	20	0	0	0	0.964	9
Industrial strikes and lockouts.	130	10	0	0	0	0.982	2
Discrepancies or lack of proper understanding of project drawings and specifications.	119	21	0	0	0	0.962	12
Lack of expertise or technical-know-how.	125	15	0	0	0	0.973	7
Accident causing injury to operator/ operative.	110	30	0	0	0	0.946	13
Poor purchasing schedule.	120	15	5	0	0	0.901	22
Equipment breakdown.	100	35	5	0	0	0.919	17
Poor housekeeping or improper project management.	120	20	0	0	0	0.964	9
Ineffective or poor communication between project stakeholders.	130	8	2	0	0	0.978	5
Global pandemic	134	6	0	0	0	0.989	1
Lack of welfare facilities (toilet, canteen, first aid, etc.)	85	55	0	0	0	0.901	22
Poor or improper project planning.	128	12	0	0	0	0.978	5
Procrastination.	80	50	5	5	0	0.866	24
Inclement weather.	100	30	10	0	0	0.910	19
Delay in release of project fund	130	10	0	0	0	0.982	2
Poor working relationship between project stakeholders.	124	16	0	0	0	0.971	8
Engagement of workers in assignments not related to project activities.	95	45	0	0	0	0.919	17
Delay in receiving project instructions.	120	20	0	0	0	0.964	9
Bad project leadership.	130	10	0	0	0	0.982	2
Poor transportation system.	90	50	0	0	0	0.910	19
Shortage of materials.	100	40	0	0	0	0.928	16
Absenteeism or excuse from duties.	115	20	5	0	0	0.946	13
High labour turnover.	102	38	0	0	0	0.932	15

Key: RII = Relative Importance Index, NO = No Opinion, SD = Strongly Disagree, D = Disagree, A = Agree, SA = Strongly Agree.

$$\text{RII} = \frac{1}{4n}\left[\sum_{i=0}^{i=4} Wixfi\right]$$

Where Wi is weight given to i^{th} rating; i = 0, 1, 2, 3 or 4, fi = response frequency of the i^{th} rating; and n = total number of responses.

Results from Table 2 show that all the time robber variables in construction project rank high. Empirical results from this study (Table 2) reveal that 'global pandemic' has the highest ranking (RII = 0.989). This attests to the impact of the global lockdown (Covid-19) of economic activities on projects in year 2020. It is closely followed by 'industrial strikes and lockouts', 'delay in release of project fund', and 'bad project leadership' (RII = 0.982 each). Other time robbers in construction project include 'poor or improper project planning', 'ineffective or poor communication between project stakeholders' (RII = 0.978 each), 'lack of expertise or technical-know-how' (RII = 0.973) and 'poor working relationship between project stakeholders' (RII = 0.971).

The construction industry is that sector of the economy which plans, designs, constructs, alters, maintains, repairs and eventually demolishes facilities (Ofori, 1990). Given that it is the engine of every national economy (Adetola, 2014; Maree, Rotimi and Rotimi 2021), yet the construction industry has many features which set it apart from other process industries and which emphasise the need for effective time management. Each order in the construction industry leads to a one-off client made product. The team for each project is assembled from a different collection of professionals, sub-contractors, craftsmen, artisans, labourers, and suppliers within and outside the industry. For example, the team set up to produce a building is in existence only for the duration of that particular project run.

Aside from the uniqueness of the construction development process, the design and production of a building differs significantly in many ways from the design and manufacture of other products. Adetola (2019) identified the essential differences between product-manufacturing process and construction development process.

Test of Hypothesis

The hypotheses postulated for the investigation are as follows:

H_o: There is no significant strategy for effective project time management using a 5% level of significance ($p \leq 0.05$).

H_A: There are significant strategies for effective project time management.

Table 3: Mann-Whitney-Wilcoxon (MWW) test results for Effective Project Time Management

Variables	MWW P value	Significance	Decision
Do you apply goal setting to decide what tasks and activities you should work on?	0.009	S	Reject H_o
Are you stressed about deadlines and commitments?	0.025	S	Reject H_o
Do you regularly confirm your priorities with your boss/ line manager?	0.275	NS	Accept H_o
Before you take on a task, do you check that the results will be worth the time put in?	0.048	S	Reject H_o
Are the tasks you work on during the day the ones with the highest priority?	0.004	S	Reject H_o
Do you know how much time you are spending on the various jobs that you do?	0.038	S	Reject H_o
Do you know whether the tasks you are working on are high, medium or low value type?	0.016	S	Reject H_o
When you are given a new assignment, do you analyse it for importance and prioritise it accordingly?	0.042	S	Reject H_o
Do you prioritise your 'To Do' list or 'Action Programme'?	0.020	S	Reject H_o
Do you set aside time for planning and scheduling?	0.034	S	Reject H_o
Do you leave contingency time in your schedule to deal with 'the unexpected'?	0.010	S	Reject H_o
Do you always have to take work home in order to get it done?	0.046	S	Reject H_o

How often do you find yourself dealing with interruptions?	0.018	S	Reject H_o
Do distractions often keep you from working on critical tasks?	0.042	S	Reject H_o
Do you find yourself completing tasks at the last minute?	0.002	S	Reject H_o
Do you always ask for extra time in order to complete tasks?	0.186	NS	Accept H_o

Key: S = Significant, NS = Not Significant

5. Discussion

The result for the test of the hypothesis is presented in Table 3. It shows that the Mann-Whitney-Wilcoxon (MWW) probability values for most of the variables tested were less than the null hypothesis of $p \leq 0.05$. Therefore, there is indeed sufficient and satisfactory information to reject the null hypothesis and declare categorically that there are significant strategies for effective project time management.

There is a great opportunity to improve effectiveness at work and achieve long term success. However, this requires fundamental improvement in time management skills. Everyone is good at some things, but there is room for improvement elsewhere. For example, when attention is focused on serious or important issues, then it would be discovered that work becomes much less stressful. Results from Table 3 show that time can be managed very effectively through goal setting, treasure mapping and prioritisation.

People tend to neglect goal setting because it requires time and effort. However, what people fail to consider is that a little time and effort invested in setting goals now saves an enormous amount of time, effort and frustration in the future. In order to manage time effectively, there is need to set goals. When a person's destination is determined, then, the person can figure out what exactly needs to be done and in what order (Adetola, 2021a). Without proper goal setting, time will be frittered away on a confusion of conflicting priorities.

Treasure mapping is concerned with visualising goals for greater achievement. It is a powerful and important technique for self-motivation and building the self-confidence needed to achieve established goals (Kuster *et al,* 2015). Treasure mapping is a very simple but effective idea. It involves creating a physical representation or collage of what is to be achieved. Treasure mapping acts as a constant reminder and representation of set-goals. And so, it intensifies the effect of visualisation, which acts on the subconscious mind to motivate and encourage an individual towards achieving established objectives.

Most people have a 'To Do' list of some sort. The problem with many of these lists is that they are just a collection of things that need to get done. There is no rhyme or reason to do the list hence the work done could be described as 'unstructured'. So, the question is how should 'To Do list' tasks be executed? Top down? Bottom up? or Easiest to hardest?.

Prioritising what needs to be done in the order of importance is very essential. Without it, an individual may work very hard without achieving the desired results, because what is being worked on may not be of strategic importance. Therefore, in order to work efficiently, an individual needs to work on the most important, highest value tasks. This will prevent being caught scrambling to get something critical done as the deadline approaches.

The findings of this study revealed that managers get very little uninterrupted time to work on their priority tasks. For instance, there are phone calls, information requests, questions from employees, and a whole lot of events that crop up unexpectedly. Some do need to be dealt with immediately while others need to be managed. Therefore, having a plan and knowing

how to prioritise it is one thing. Another issue is knowing what to do to minimise daily interruptions.

Much of time management comes down to effective scheduling (Weber, 2005; Covey 2019; Adetola and Goulding, 2016). After goals and priorities have been established, then, there is a need to know how to go about creating a schedule that keeps an individual on track and protects from stress. This means understanding the factors that affect available time for work. Aside from scheduling priority tasks, project managers should leave room for interruptions, and contingency time for unexpected events that may otherwise wreak chaos with schedule. A robust schedule that reflects priorities and as well supports personal goals has a winning combination. Such a schedule will allow time control and ensure a balanced life. Scheduling is best done on a regular basis, for example at the start of every project, week or month.

Thus, the important steps identified by this study for managers to take in order to effectively manage project time are:

(i) Specify and plan appropriate goals to be achieved, visualise the end result, break large goals into weekly and daily priorities, and be prepared to handle interruptions calmly.
(ii) Organise activities that would help to achieve desired goals, use project boards and organise work space.
(iii) Direct positive reinforcement to motivate self and others.
(iv) Evaluate and monitor attitude and behaviour, track accomplishments, and take control of time and life.

6. Conclusion

This paper investigated the strategies for effective project time management. Time management is the art of planning, arranging, organising, scheduling, and budgeting time for the purpose of generating more effective work and productivity. It is the act or process of exercising conscious control over the amount of period spent on specific activities, especially to increase efficiency and/or productivity. Time management may be aided by a range of skills, tools, and techniques in order to accomplish specific tasks, projects and goals. This set encompasses a wide scope of activities, and includes allocating, setting goals, delegating, analysis of time spent, monitoring, controlling, and scheduling/prioritising.

The thrust of time management does not seek to control time itself, but human activities within each window of time. In other words, an individual cannot control how time moves in order to accommodate all tasks. Rather, an individual can control how activities move within a time frame. There is a satisfaction that comes from being in control of activities and a desperation that comes from being out of control.

The contribution of this research to knowledge impacts on ‘theory’ and ‘practice’. In theory, this study has identified five key strategies for effective project time management. They are planning and goal setting, managing self, scheduling/ prioritisation, dealing with people/interruptions, and getting results. The first four strategies all interconnect and interact to generate the fifth result.

A plan is a road-map set in real-time to reach an objective or set of objectives through the use of defined resources. The findings of this study have shown that people who set goals for themselves are more successful and prosperous. However, the people who write down their goals are the most successful of all. Writing down what is to be done and where to go helps to make good choices in life. It helps to say ‘No’ to choices that do not align with direction, and

to recognise and say 'Yes' to choices that will help to get to predetermined destination. An individual without goals is likely to spend time working to help others achieve their goals.

Effective time management starts with goal-setting. A goal is a dream with a deadline. Goals may be strategic, tactical or operational. Strategic goals are long term goals spanning up to five years, tactical goals are medium term goals from 3-12 months, while operational goals are short term goals (covering hours or days) defining the exact action to be taken. Before goals can be set for any business, an individual needs to set personal goals. What is it that is required? This must be figured out and written down in a notebook. Committing goals to writing makes them real. Written goals should be kept where they can be easily seen and reviewed. For goals to be effective, they need to be *specific, measurable, achievable, realistic, and time-bound* (SMART).

There are different ways to use time. However, a manager must spend time *planning*, *setting goals* and *communicating* with stakeholders. Furthermore, time must be spent *directing* project activities in order to ensure that specified project goals and objectives are accomplished. Challenging goals and objectives need to be formulated in a realistic manner taking heed of resource availability. Set-goals must relate to project performance and conform to SMART criteria in order to improve productivity.

The benefits of effective project time management include:

- Improved productivity through improved use of time.
- Better performance in terms of on-time delivery to customers/clients.
- Increased profitability through better use of the human and non-human resources.
- Improved planning and control of projects/business systems through time-based management.
- Better alignment of activities by incorporating a time-bound system for co-ordination of tasks and projects in any business.
- Reduction of stress that arises due to crisis management by reducing the incidence of crises through better planning.

Research findings from this study provide opportunities for critique and further reflection. Whilst empirical data is drawn from the Nigerian context, the data constructs were developed from extant literature. Given the probability sampling technique employed, the results of this study are relevant and practically useful for managers in leadership roles related to projects, programmes, portfolios and businesses.

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UMD Project Management Symposium

The Intersection of Risk Mitigation and Innovation:

The planning and development of the data management system for Nancy Grace Roman in a hybrid project management environment

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ABSTRACT

This paper focuses on the intersection of traditional project management and agile development methodologies to satisfy both NASA's risk mitigation and reporting needs for a "Class A" mission and the Space Telescope Science Institute development team's needs to explore and develop innovative solutions for ingest, processing, and distribution of data from the future Nancy Grace Roman Space Telescope. This paper will focus on how traditional project management rigor and the agile mindset coexist within the project. It will show how we have been successful in both involving and insulating our development teams from external project management requirements through the use of processes, tools, and automation, while still allowing for regular NASA and Institute tracking of Earned Value Management and Risk Management. The tools used are off-the-shelf and the methods used need not be unique to the Institute. Both can provide a similar framework for other projects facing similar situations.

INTRODUCTION

The Space Telescope Science Institute (STScI) has been tasked with leading the Science Operations Center (SOC) for the Nancy Grace Roman Space Telescope (Roman). By contract, STScI is required to work within the constraints of NASA's project management processes and systems engineering methodology. Because of the nature of the mission, NASA's processes and methodologies follow a strictly-sequenced process. The mission has significant cost and time goals, thus preventing the slow evolution of the ground system as occurred for two other space-based telescopes STScI supports, the Hubble Space Telescope (Hubble) and the James Webb Space Telescope (Webb).

In order to accommodate NASA's constraints and still allow for both significant innovation and rapid delivery of working products, STScI has adopted a hybrid methodology, with a more sequential process for overall/high level project management activities, while subsystems are able to adopt an agile mindset and follow the Scrum framework to develop necessary components. This paper is an exploration of how STScI implements a hybrid methodology while allowing freedom to development systems to follow a Scrum framework. The paper then focuses in on how two necessary components of traditional project management, risk management, and Earned Value Management are implemented, and how subsystems provide the data that upper management needs to satisfy NASA's reporting requirements without burdening the development teams.

ROMAN MISSION AND MANAGEMENT

Roman Mission

The Nancy Grace Roman Space Telescope, formerly known as the Wide Field Infrared Survey Telescope (WFIRST), was the top large space priority in the Astro2010 Decadal Survey.[1] Roman is a NASA flagship science mission scheduled to be ready to launch in 2026. Roman is considered a Class A mission according to the "Risk Classifications for NASA Payloads"[2]. NASA uses a variety of criteria to identify a Class A mission including priority (including national significance), primary mission lifetime, complexity and challenges, and lifecycle cost. Other examples of Class A science missions are the Hubble Space Telescope, Cassini, and the James Webb Space Telescope.

Roman Science

NASA is implementing the telescope on a donated 2.4 meter mirror, and will produce large-scale maps of the sky with Hubble-like resolution and sensitivity, but with 100 times the field of view. Roman is designed to be a complement to Webb. Roman has three key science themes: measuring dark energy, investigating exoplanets, and great observatory astrophysics and planetary science. Central to Roman's science mission is the availability of data. All Roman data will be generally available through the Mikulski Archive for Space Telescopes (MAST) as soon as it has been processed and archived. There will be no proprietary or embargo period for primary investigators.

Roman Management

The Roman mission is managed by NASA's Goddard Space Flight Center. NASA has partnered with the Jet Propulsion Laboratory (JPL), STScI, the Infrared Processing and Analysis Center (IPAC) at Caltech, as well as industrial and international partners. NASA is also working with science teams from research institutions across the United States. NASA will develop and operate the Mission Operations Center (MOC) for Roman, while STScI is responsible for developing and operating the SOC. The Science Support Center (SSC) at IPAC is responsible for proposal selection and grants management. Responsibility for observing program definition and science data processing is split between the SOC and SSC and the SOC is responsible for housing and distributing the data.

NASA

NASA follows the systems engineering (SE) project lifecycle and phases as outlined in the NASA Systems Engineering Handbook, originally published in 1995, revised in 2007, and most recently revised again in 2020.[3] Each of the phases has prescribed processes, defined purposes, and typical outcomes.

Science Operations Center (SOC) and the Data Management Subsystem (DMS)

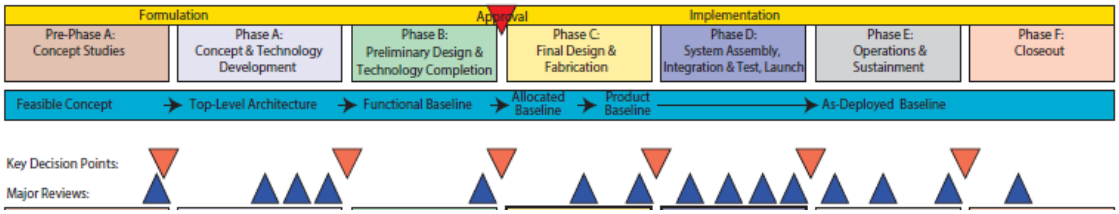
The SOC at STScI works with NASA and the Science Support Center (SSC) at IPAC. The SOC is responsible for the planning and scheduling for observations and shares data processing and production of data products with the SSC. Additional responsibilities include community engagement, user support and outreach, and hosting the petabyte-scale mission data archive, which holds all science data products and provides search capabilities to all mission stakeholders, and the public.

Within the SOC there are three primary subsystems. These include Data Management, Planning and Scheduling, and the Project Reference Database. These three subsystems comprise the technology components of the SOC.

- Data Management Subsystem: receives mission data from sources both internal and external, processes the data as necessary, stores data in the archive, and distributes data on request to partners and the community.
- Planning and Scheduling Subsystem: provides planning and scheduling functions to help manage the science program and generate the Roman science observing timeline, which is provided to the MOC for onboard execution.
- Project Reference Database Subsystem: contains tools to manage the repository of configured data used by the PSS and DMS.

MODELS AND METHODOLOGIES

At NASA, the concept of a sequential model is evidenced in the Systems Engineering Handbook, where the software lifecycle is divided into seven phases with key decision points (gates) to move between phases (See *Figure 1*). NASA's primary concerns in following a detailed lifecycle are obvious. The concern for the safety of the mission creates the need for quality controls and the management of risks.



Ignoring manned missions, where life is of paramount concern, most launched items cannot be repaired as Hubble was. This gives NASA an obvious desire to get it right, since there is often no ability to correct mistakes after the fact.

At STScI, there is a need to meet contractual obligations levied by NASA, as well as maintain the confidence of our partners. Since STScI is so tightly coupled with NASA, implementing the NASA Systems Engineering processes rather than developing home-grown ones makes logical sense. Roman is one of the projects that must fit within this larger framework, the NASA systems engineering framework, focused on managing risk while controlling budget, schedule, and quality. These project management, lifecycle management, and contract management obligations fall outside the standard implementation of agile development. However, the Institute recognizes that the systems they are asked to build for each successive mission are not cookie cutter repeats from one to the other. Each mission has unique challenges and requires innovative solutions. Thus, there is a desire to provide flexibility within the traditional sequencing.

At STScI, within the Data Management Division (DMD), the home for development of telescope pipelines and other operational elements, an agile mindset and framework allows the Institute to implement lessons learned during the development of the James Webb Space Telescope Science and Operations Center, allowing the ability to be flexible, innovate, and "fail early, fail fast." This latter concept allows the detection of errors or failures early in a process, as well as facilitates innovation by encouraging experimentation without significant investment of time. The DMD

has adopted the Scrum framework as an agile implementation methodology.

ROMAN – CREATING A WORKABLE HYBRID ENVIRONMENT

STScI has created a hybrid environment that accommodates both STScI and NASA needs while allowing the development/Scrum teams to develop leading-edge systems that will support Roman data processing in the years to come.

STScI has a traditional management structure for overall control of the Roman SOC project. A Roman Mission Office provides centralized support for and overview of all aspects of the project, and has both project management and engineering leads. The Mission Office works closely with STScI's Systems Engineering and Testing teams. These teams provide requirements, interface control documentation, testing processes, verification and validation, and quality assurance. The project manager works closely with STScI's Project Management Office to manage the Integrated Master Schedule (IMS) and Earned Value Management (EVM) reporting. Note: this is by no means all of the tasks performed by any of these elements.

The overall schedule for Roman is set by NASA, with launch readiness currently scheduled for November 2026. The Roman ground system must also have a long-term, fairly stable release plan in order to ensure that all elements are available by launch readiness. There are five releases planned on the schedule, three primary development releases, a pre-launch update and modification release, and a post launch release that leverages on-orbit data to confirm functionality. All of the major dates are set by NASA and adhered to by NASA's partners.

DMD uses its agile software development framework for all missions, including Roman. The Roman DMS currently has two dedicated Scrum teams, and the ability to leverage the work of other teams who are responsible for common components that are shared across missions (e.g. MAST). Each of these teams has a product owner who is responsible for ensuring that there is a well-documented backlog of work. That backlog is built with the support of a DMS project engineer and a technical lead who provide a roadmap for the teams.

HYBRID IMPLEMENTATION

The hybrid nature of combining traditional and agile development approaches is implemented by involving agile team members in the planning processes as early as possible; giving them autonomy over development; and buffering them as much as possible from EVM and other reporting requirements.

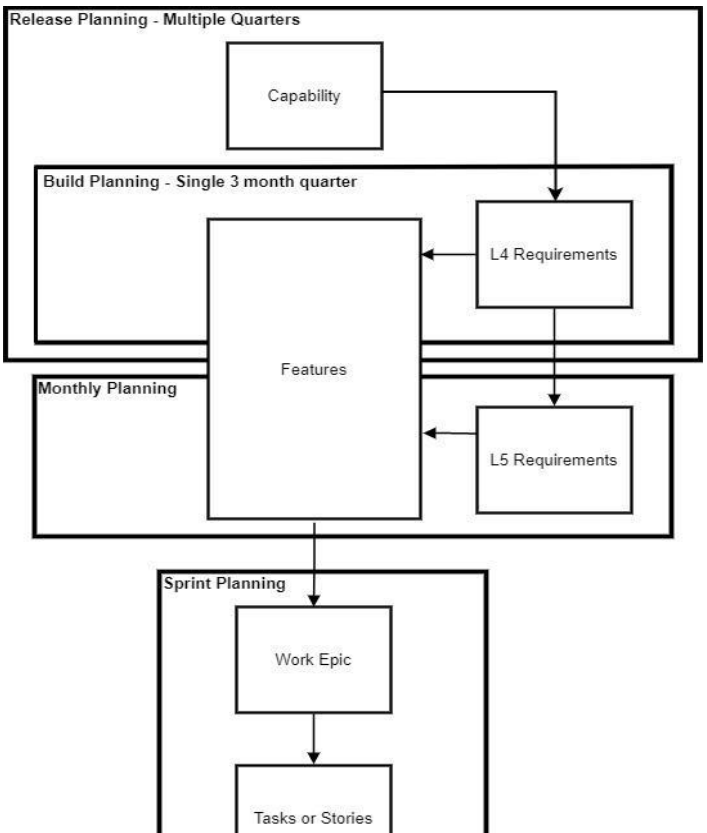
Requirements and Planning

High-level requirements are inherited from NASA, and have previously been decomposed and baselined as SOC Level requirements. These serve as the roadmap for all planning within the SOC. At the release level, work to implement DMS has been divided into Capabilities. Capabilities are assigned to specific releases and L4 requirements are assigned to Capabilities. Builds are roughly aligned with fiscal year quarters, and there are at least four builds to a release. The build plan maps the L4

requirements that will be delivered in a build and the release plan maps the Capabilities that will be delivered in a release. See Figure 2 for a visual representation. DMS defines Features that will be implemented within (and occasionally across) builds. These Features are tracked on the IMS and used for reporting EVM. While Features encompass the SOC-Level requirements, there is often not a direct one-to-one mapping, since requirements may be developed over multiple builds. Assigning a Feature to a build means that all the work to satisfy the Feature must be completed in the build. For requirements delivered in a build, all work to satisfy the requirement must be finished so that STScI Integration and Test can verify the completeness of the SOC-Level requirement. Changing the implementation of a Capability from one release to another requires NASA concurrence. Changing the implementation of a requirement from one build to another requires STScI Mission Office approval. What is contained in the Features is at the discretion of the subsystem development teams.

Decomposition of SOC-Level requirement into Subsystem-Level requirements is built into the agile cadence. This is a collaborative effort between systems engineering, subsystem leads, and Scrum teams, and is performed "just in time"; that is, requirements decomposition occurs as close as possible to when the decomposed requirements are needed by the development team. SOC-Level requirements are maintained and baselined in IBM DOORS and require control board approval to change. Subsystem-Level requirements are baselined in DOORS once they have been approved by the subsystem teams and have a simpler change path, unless the change affects scope or cost.

Planning occurs within DMS on both quarterly and monthly schedules, with the involvement of management and Scrum teams. Scrum teams perform planning at both monthly and two-week sprint cadences. This gradual decomposition allows work to be broken down into sprint-consumable work packages and gives Scrum team ownership of the work as early as possible. During quarterly planning, product owners and Scrum masters work with DMS leads to set a roadmap for the quarter and develop the Features that will be tracked on the IMS. At the same time they ensure that all work is identified for the planned SOC-Level requirements, and that at a high level, all planned work covers all Subsystem-Level requirements. Each SOC-Level and Subsystem-Level requirement has a "definition of done" (how the requirement will be satisfied) that may be further decomposed during later stages. Within quarterly, monthly, and sprint



planning, teams are free to identify lower-level tasks needed to implement requirements and ensure full coverage of the same Subsystem-Level requirements.

Leveraging Tools

DMD and DMS have leveraged tools to facilitate the planning cycles and to track work completed during development. As noted above, requirements are maintained in DOORS. STScI uses Atlassian's Jira® for ticket management and leverages the capabilities of Jira Portfolio to provide the necessary hierarchy needed. Both SOC-Level and Subsystem-Level requirements baselined in DOORS are automatically copied into separate requirements projects in Jira using a specialized connection tool (ConnectALL) that works with both systems. Updates to requirements as a result of the change management process are also automatically copied into Jira by ConnectALL. Jira users with appropriate permissions can connect the requirement tickets to work tickets as needed for tracking and traceability. The use of a standardized tool for ticket management facilitates collaboration between different elements, assists with communication and reporting, and allows for streamling of the EVM reporting process.

Jira is used for more than tracking requirements and development tasks. Within reason, all tasks associated with the DMS project are tracked in Jira, including document development and reviews, working group activities, and the development of trade studies. Individual Scrum teams may also choose to track non-work activities, including mandatory and voluntary training and other events, for example conference attendance and participation.

STScI also uses an additional Atlassian product, Confluence, to facilitate collaboration, communication, and reporting for ticket and non-ticket related items. Since it is easy to link custom Jira queries to Confluence pages. Finally Box is used to store and collaborate on documents in other formats including MS Word, PowerPoint, and Excel.

Development

Scrum teams own the monthly and sprint planning used to identify the work that will be accomplished during the two-week sprint cadence. Product owners develop and prioritize the backlog and work with Scrum masters and the team to groom the backlog. The sprint cadence begins with a planning meeting and ends two weeks later with a review meeting. Stakeholders are included in the review meetings, where all work accomplished during the sprint is discussed and in sprint planning, where goals are set for the upcoming sprint. Work items are "pulled" into the sprint and further decomposed as necessary. As part of the decomposition of work, "definitions of done" are documented at these lower levels, and testing runs in parallel with development. Teams have the ability to reorganize work within the full build cycle, and across months. This allows them to respond to changes and remain flexible while ensuring that work is accomplished to meet the build goals.

IMS AND EVM

STScI is committed to both maintaining an effective IMS and enabling an EVM system that supports an agile methodology for development. STScI is also not the first organization to face these challenges. There have been numerous studies and guides on how this integration can be successfully accomplished. Two sources were used to drive STScI's implementation. The National Defense Industry Association (NDIA) developed "An Industry Practice Guide for Agile on Earned Value Management Programs" in 2016 and revised it most recently in 2019.[4] Authors from three commercial firms working in the professional services and government contractor space published a white paper "On Your Toes: Measuring Earned Value in an Agile World."[5] These two sources helped to frame the recommended process for managing EVM on the Roman mission at STScI.

Capabilities and Features feed into the IMS and support EVM reporting. Capabilities and Features are automatically part of the IMS, as these are part of the planning roadmap. This means that the primary measure of work is a maximum three-month block called a Feature. In order to provide evidence that work is being accomplished and progress is being made, all work performed below that Feature is considered Quantifiable Backup Data (QBD) and is used to determine a percent complete for a Feature on a monthly basis. Tasks below the Feature level are omitted from the IMS, but still contribute to EVM reporting via the QBD. This practice, as recommended in the NDIA specification, provides objective performance reporting measurements in support of the EVM process while limiting the volatility of IMS activities and minimizing the overhead of IMS maintenance.

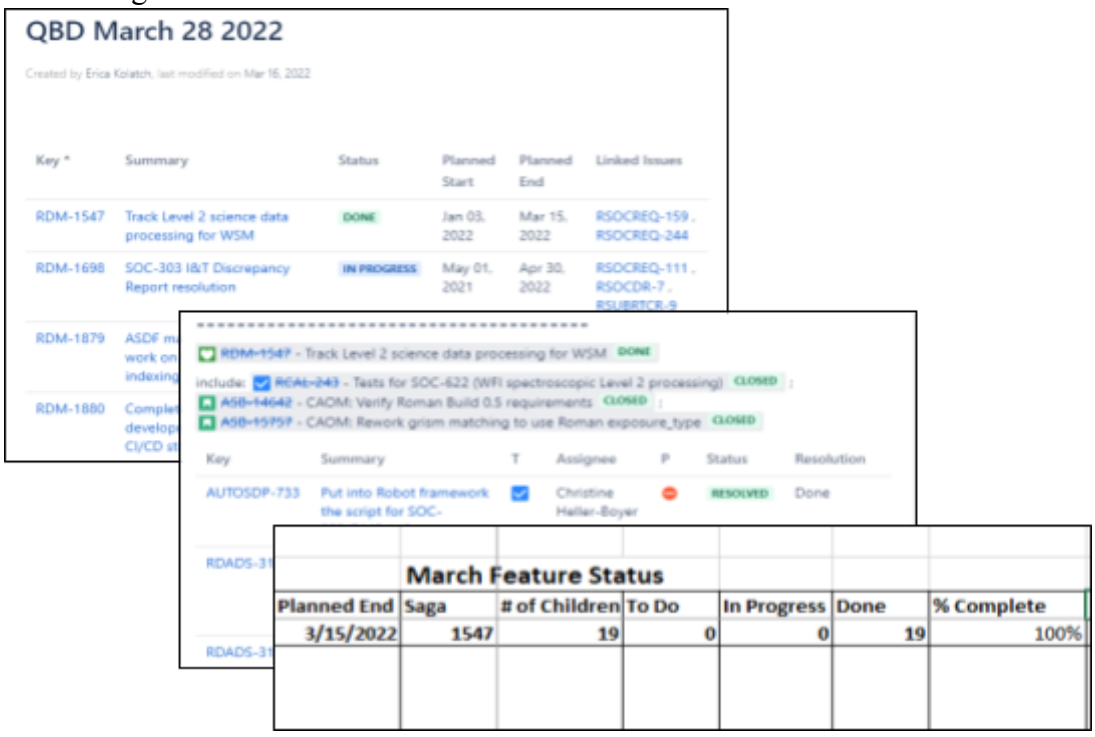


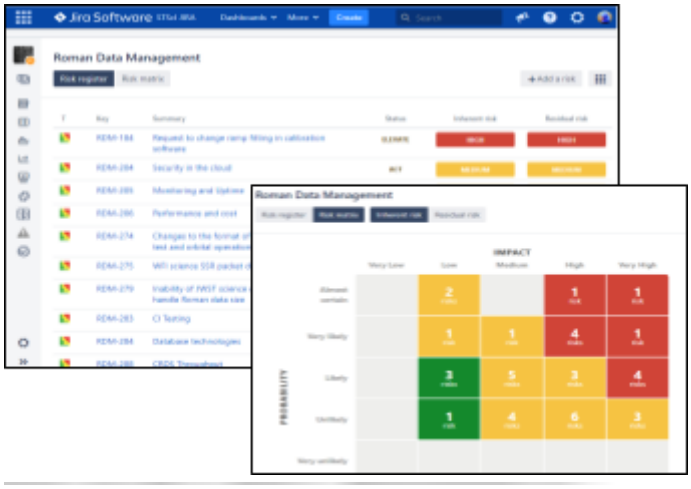
Figure 3: Quantifiable Backup Data for Feature RDM-1547

Scrum teams are responsible for recommending work buckets that should become Features, and developing the related tickets that will become QBD. Teams are also responsible for ensuring that appropriate linkages to Feature tickets are created within

Jira so that the bottom level work tickets can be tracked to the Features on the IMS.
For each month's EVM reporting, for each Feature, the number of work tickets completed is compared with the number of work tickets planned to generate a percent complete. (See *Figure 3*) This makes the calculation resilient to the identification of new work within a quarterly cadence, as long as the new work is associated with the completion of the Feature. Confluence is leveraged to track the connected tickets, and automated Jira reporting identifies the tickets that should be included. Tickets labeled as Roman, with a correct Build identified, and with appropriate start and/or end dates are included in the count. While some automated reporting is in use by other subsystems, because DMS work has been divided into multiple separate Jira projects, some of which are not exclusive to Roman, a slightly more manual process is used for the final calculation.

RISK MANAGEMENT

A comprehensive risk management plan was developed and delivered as part of the documentation provided in an early review. This risk management plan follows best practices for risk management including identification, analysis, mitigation, and monitoring on a monthly cadence.
Risks can be created at the subsystem level, by anyone working on the subsystem, and accepted and managed at that level. Should a risk rise to a level where subsystem management is not appropriate, a risk can be escalated to the Roman Mission Office at STScI where similar processes are followed. The STScI risk management process feeds the NASA risk management process. When the Mission Office requires NASA support to mitigate or resolve a risk, the risk can be escalated to NASA, and if accepted, will be managed by the NASA process.
The Roman Mission Office at STScI, and the subsystems below the Mission Office, also leverage Jira to perform risk management. A risk module and risk type within Jira allows for ease in creating, analyzing, reviewing, and managing risks on a monthly cadence. Jira also facilitates ease in risk reporting, providing easy heatmap views and risk registers.



CONCLUSION

This paper starts with a brief discussion of the Nancy Grace Roman Space Telescope and its place within NASA's suite of current projects. As a Class A "flagship" mission, it is important that NASA manages the risks inherent in building something

new and innovative, both for the telescope itself and the associated ground systems. For NASA, this means a controlled development process with clear gates before allowing the project to proceed. At the same time, a very short development period for the ground system prior to launch means that it is important that development teams have the ability to develop innovative solutions quickly and embrace change. This sets up the tension between the classic systems engineering model of NASA and the agile mindset of STScI developers.

The paper discusses how the Roman ground system project fits within a hybrid model, and how STScI is implementing its version of that hybrid model. The paper looks at the primary planning and requirements; development and internal testing; and SOC testing and delivery components and how they are combined by leveraging tools, including Jira and Confluence, to allow for successful agile development. We have also described how Earned Value Management and Risk Management are accomplished without forcing additional process on development teams by leveraging the structures already in place. Change management processes at various levels will help to keep these processes and the results they produce robust and responsive to evolving mission needs.

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UMD Project Management Symposium
Your project failed, what now?

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ABSTRACT

Projects fail for many different reasons. This paper will focus on how to use project failure as valuable lessons learned to improve future project work. There are many valuable lessons to obtain when a project fails. A critical step is to review the time spent planning the project work. Once the planning review is complete, collect and document the lessons, focus on improving communication and learn from your mistakes. This work will be useful to course correct future projects.

INTRODUCTION

The Project Management Institute (PMI) projects that employers will need 88 million individuals in project management-oriented roles by 2027, leading to an estimated 2.2 million new project management jobs (Harris, 2021). The economy is becoming more project oriented, industries such as manufacturing, construction, and finance are now relying on project management principles to keep processes on track and ensure stakeholders work together cohesively.

Even more, disruptions such as the COVID-19 pandemic have led to an even greater and more immediate need for the skill set of project managers to drive change and innovation in the organizations they serve. In other words, companies are investing in ways to manage change and depend on project managers to lead projects focused on change strategies. However, many of these projects fail. According to TeamStage 70% of all projects fail, and 42% of companies don't understand the need or importance of project management (TeamStage, 2021). So why do projects fail? This paper will focus on several key reasons why projects fail, and successful tactics to assist with managing project failure.

WHY PROJECTS FAIL

There are many reasons projects fail. Several reasons for project failure include lack of or a poorly defined project charter, poor resource planning, unclear goals and objectives, lack of project visibility, communication gaps, scope creep and unrealistic expectations.

Projects have high failure rates and there is even some debate about projects and their

value in the organization. Is it a needed function? Should it be outsourced? Our view is that projects hold the key to an organization's productive future and done poorly can lead to the failure of a business. Done well, projects can give a firm a significant competitive advantage (Discenza & Forman, 2007). The goal of project management is to produce a successful product or service. Often this goal is hindered by the errors of omission as well as commission by management, project managers, team members and others associated with the projects.

Projects most commonly fail because there is a lack of attention and efforts applied to seven performance factors:

Focus on business value, not technical detail. This involves establishing a clear link between the project and the organizations key strategic practices. The project plan needs to cover the planned delivery, the business change required and the means of benefits realization.

Establish clear accountability for measured results. There must be clear view of the interdependencies between the projects, the benefits, and the criteria against which success will be judged. It is necessary to establish a reasonably stable requirement baseline before any other work goes forward. Requirements may continue to creep. In virtually all projects there will be some degree of "learning what the requirements really are" while building the project product.

Have consistent processes for managing unambiguous checkpoints. Successful large projects typically have software measurement programs for capturing productivity and quality historical data that can be sued to compare it against similar projects in order to judge the validity of schedules, costs, quality, and other project related factors. The lack of effective quality centered mechanisms can be a major contributor to both cost and schedule overruns.

Have a consistent methodology for planning and executing projects. There should be a detailed plan developed before any release date of a project is announced. Inadequate planning is one of the major reasons why projects spin out of control.

Include the customer at the beginning of the project and continually involve the customer as things change so that the required adjustments can be made together. It has been observed that successful projects occur when end users (customers) and the project members work as teams in the same cubicle, although this is not always possible. Projects are less likely to fail if there are informed customers giving meaningful input during every phase of requirements elicitation, product description and implementation. The customer needs to be asking, "how are the project result used over time and what do I get out of the results?

Manage and motivate people so that project efforts will experience a zone of optimal performance throughout its life. This involves managing and retaining the most highly skilled and productive people. Knowledge is money. A project team made up of higher paid people with the right specialized skills is worth more per dollar than a group of lower cost people who need weeks or months of training before they can start to be productive.

Provide the project team members the tools and techniques the need to produce consistently successful projects. The project team must be skilled and experienced

with clearly defined roles and responsibilities. If not, there must be access to expertise which can benefit those fulfilling the requisite roles (Discenza & Forman, 2007).

HOW MUCH TO PLAN

Project planning is one of the most important responsibilities of a project manager. This process is vital because without a clear vision the team will not be able to properly execute tasks and reach the project goal. The most effective team cannot overcome a poor project plan, and projects started down the wrong path can lead to the most spectacular project failures (Thomas, et. Al, 2008).

"Plans are a cornerstone of any project; consequently, planning is a dominant activity within a project context." (Blomquist, et. Al. 2010, p.11)

Planning is inherently important to project success, or one could argue project management would not exist. In summary, do not skip the planning phase of any project!

Surprisingly little research has been done on how much planning should be done in projects. There are several studies that support how much time is spent on the project planning process. The key lies in how complex your project is, and how many stakeholders are involved. Is the project new? Newer projects will require more planning. How uncertain are the outcomes? Instead of worrying about the details and whether you've spent enough time planning, focus on proper project planning and the eight elements of effective project planning.

1. Stakeholder needs
2. Smart project objectives
3. Deliverable and deadlines
4. A detailed project schedule
5. Defined roles and responsibilities
6. The costs and budget
7. A communication plan
8. The systems and processes you will use

Most importantly, instead of worrying about how much time to spend on planning, focus on quality planning or streamlining the planning process (Darlington, 2013).

YOUR PROJECT FAILED WHAT NOW

First, the project manager must determine if a project is off course and determine how or if a project can be saved, postponed, corrected, or abandoned. The best answer is to spend time planning the project properly, and use metrics, tools, and communication to inspect the project often for issues. As soon as you see the project failing, act quickly to mitigate the damage. If you cannot see the big picture, consider

bringing in an RPM (recovery project manager). These consultants can offer a fresh perspective on the failing project.

Once you have determined the project failed, prepare your team to handle the consequences all of them, then review all the project data. Figure out what specifically happened to cause the project to fail. Conduct lessons learned with every stakeholder on the project team. Determine what components of the project worked and can be salvaged for a future project.

Do not give up. Project failure is disappointing, but not the end. For every success, there are usually a necessary aspect of failure that accompanies it as well. Failure is familiar to many great leaders, who still succeeded. Examples include Nelson Mandela, George Washington Carver, Thomas Edison, Steve Jobs, Steven Spielberg, and many other innovators. If failure is managed well; you can come back stronger and better. Always identify what you learned after a failed project. Nelson Mandela said I never lose. I either win or I learn. All project managers should adopt this mantra.

LESSONS LEARNED IDENTIFIED

Capturing lessons learned should be an on-going effort throughout the life of the project. This mindset should be strongly encouraged by the project manager from day one. Whether we are using lessons learned to prepare for current projects or for identifying project management process improvements, we learn from project failures as well as project successes. By not learning from project failures, we are doomed to repeat similar situations. By not maximizing on project successes, we miss opportunities to implement good processes and practices to successfully complete existing and future work.

Learning occurs on every project. Lessons learned is the learning gained from the process of performing the project (Rowe, et. Al, 2006). We learn from our own project experiences as well as the experiences of others. Project managers, team members and leadership can all participate in the lessons learned sessions, review the lessons learned reports and make decisions on how to use the knowledge gained. Sharing lessons learned among project team members prevents an organization from repeating the same mistakes and allows them to take advantage of organizational best practices. Innovative approaches and good work practices can be shared with others. Lessons learned can be used to improve future projects and future stages of current projects**.**

There are several steps to the lessons learned process. They include identifying, document, analyze, store and retrieve.

Step 1 of the lessons learned process is to identify comments and recommendations that could be valuable for future projects. The two activities for identifying lessons learned are: 1) prepare for lessons learned session and conduct lessons learned

session. If possible, the project manager should not lead the lessons learned session. The facilitator should prepare in advance by using metrics gathered in a survey and summarizing for the lessons learned participants. The project survey will help the participants to be better prepared to respond during the lessons learned session and will also give them the opportunity to provide input if they are unable to attend. When conducting the lessons learned sessions the following questions should be asked by the facilitator:

- What went right
- What went wrong
- What needs to be improved

Step two of the lessons learned process is to document and share findings. After lessons learned are captured, they should be reported to project stakeholders. Different types of reports can be produced based on the audience. The detailed lessons learned report consists of the data captured during the lessons learned session and any additional input from participants who were not able to attend. The facilitator should distribute the detailed lessons learned report to all participants and participants should be given time to respond to the accuracy of the report. After the report is finalized, the entire project team should receive a copy even if they did not participate in the lessons learned session. The final report should be stored with the other project documentation (Rowe, et. Al, 2006).

Step three of the lessons learned process is to analyze and organize the lessons learned for application of results. At level 1 analysis is more informal as the team decides what can be done with the lessons learned. Information is shared with other teams during organizational meetings. Project management process improvements or training needs are often identified because of lessons learned recommendations (Rowe, et. Al, 2006)**.**

Step four of the lessons learned process is to store in a repository. At level 1, organizations do not have a dedicated lessons learned repository in place. Lessons learned documents are stored along with other project documents, normally on a shared drive or in some form of project library. There is no easy means of retrieving the lessons. Organizations often set up a lessons learned folder on the shared drive to make the lessons learned reports available to other project teams (Rowe, et. Al, 2006).

Step five of the lessons learned process is to retrieve for use on current projects. This is step is rarely used at level 1. Although lessons learned reports are stored on a shared drive, without key word search capability, it is difficult to retrieve the appropriate lesson (Rowe, et. Al, 2006).

The final important step to ensure a successful lessons learned program is a commitment from senior level management. That commitment is visible through regular repository metrics review, action taken to implement best practices, and

support to improve negative or re-occurring project trends. To keep the value of lessons learned in front of executives, it is critical to keep executive level reporting brief and concise (Rowe, et. Al, 2006).

SUMMARY

Barack Obama said you can't let your failures define you. You must let your failures teach you. Assessing and recovering a failing project can be among the most challenging work for a project manager to perform for an organization.

The best project managers are not the ones who succeed the most, but the ones who are best at handling failure (Patel, 2017). The payoff can be huge, since a project brought out of failure can provide significant value to any organization. The seven factors outlined in this paper are critical for assessing a failing project's performance and planning corrective action to make the project successful. All seven factors are needed for success. When one factor turns negative and is not corrected disaster is unavoidable (Discenza & Forman, 2007).

Winston Churchill was clear when he said to let our advance worrying become advance thinking and planning. Even when we plan and plan again, projects can still fail. Therefore, we should learn from our mistakes by documenting what we learn. Lessons learned should be ongoing and completed for every project, whether the project fails or not. Capturing lessons learned should be a continuous effort throughout the life cycle of the project. Adopting a culture of capturing lessons learned should be supported by executive leadership and the culture of the organization. In summary, we cannot predict how projects will conclude and some projects will fail. As project managers we should plan, review, and finalize the plan with stakeholders, collect the lessons we learn and learn from our mistakes. Project failure can be good when use the lessons learned to improve future project work. Project Managers will benefit from documenting lessons learned because failure teaches wisdom and growth.

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