DEVELOP AND STANDARDIZE A DOT&PF STATEWIDE AIRPORT CONSTRUCTION SPECIFICATIONS UPDATING PROCESS

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ABSTRACT

This research study evaluates the operational performance of an experimental process model developed to provide a systematic and repeatable approach to updating the Alaska Department of Transportation and Public Facilities (DOT&PF) Statewide Standard Airport Construction (SSAC) specifications to comply with the Federal Aviation Administration's (FAA's) Advisory Circular (AC) *150/5370-10H – Standard Specifications for Construction of Airports, (10H)*. In order to develop and standardize an effective process within DOT&PF, this study must examine how a large government organization, like DOT&PF, implements change. This study also discusses which key Project Management Institute's (PMI's) knowledge areas provide the framework for initiating, planning, and executing an implementation phase of this experimental process model on two specification sections, *P-401 – Asphalt Mix Pavement* (P-401) and *P-318 – Foamed Asphalt Stabilized Base Course* (P-318). P-401 is also referred to in this study as the "Beta Test case" and P-318 as the "Trial Run case".

Key Words: observational data, process implementation, developing processes, micro-improvements, Nemawashi, Agile methods, Kaizen

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

Page

LIST OF TABLES

Page

1.0 INTRODUCTION

1.1 OBJECTIVES

One of the primary objectives of this research study is to evaluate the performance of a developed process, or experimental process model, through two test cases implementing the model with the first case, referred to as the Beta Test case – preparing a P-401, 10H draft, for the Asphalt Mix Pavement specification, and the second case, referred to as the Trial Run case – preparing a complete rewrite of the previously P-310 to now P-318 draft for the Foamed Asphalt Stabilized Base Course specification. Evaluating both cases using projected versus actual schedule and cost targets will provide a preliminary validation of using the model during actual specifications updates in the future.

Another objective of this study is to discuss the development of a sustainable and repeatable process for updating the DOT&PF SSAC specifications (Appendix A), using the project management principles of stakeholder management, scope management, change management, and cost management. The main consideration in developing a process that can update one set of DOT&PF SSAC specifications, or all one hundred and seventeen DOT&PF SSAC specification sets, is to address how it can handle future DOT&PF SSAC specifications compliance updates to FAA's specifications AC (150/5370-10) when the FAA AC is revised. With a process in place to address future DOT&PF SSAC specifications updates, a more streamlined and deliberate approach provides more efficient product delivery of FAA approved DOT&PF SSAC specifications, as well as offering the regional specifications engineer the potential ability to track progress with separately assigned specs teams preparing drafts concurrently.

1.2 BACKGROUND

To maintain compliance with the FAA specifications AC, DOT&PF has been working to update all one hundred and seventeen sections of the DOT&PF SSAC. This specifications update has become a major undertaking, encompassing regional and statewide specifications teams, design and construction teams, as well as technical engineering working groups across DOT&PF.

Compliance to FAA's construction AC is considered a formal agreement between the State of Alaska and the federal government. The DOT&PF, Central Region (CR) Aviation Section Chief assures that the State of Alaska is in compliance to all warrants of the federal grant funding the airport construction project. As the signatory authority assuring compliance to all warrants of the federal grant for an airport construction project, the CR Aviation Section Chief may be found ultimately responsible for any issues after construction, if it is determined that the project specifications, along with the completed construction project following the specifications, were non-compliant to the FAA AC. The punishment if the CR

Aviation Section Chief was found to be knowingly non-compliant and negligent would be federal imprisonment, along with several thousand dollars in fines.

In addition to DOT&PF staff, design engineering consulting firms have also contributed to this specifications update work. Over the past year, the priority has been elevated to ensure the timely completion after the roll out of FAA's AC 150/5370-10H on December 21, 2018. The DOT&PF SSAC specifications are an essential component of the contract documents for airport construction projects. They support the construction of vital aviation infrastructure across Alaska.

A project management plan (PMP) (Appendix B) was prepared to provide a framework to develop a specifications updating process and a process guidance outline. The PMP supports the specifications work currently underway, as well as the development of a systematic approach to ongoing specifications updates for future DOT&PF SSAC compliance when the FAA specifications AC updates to the next revision, "10I". Having a process and guidance in place will streamline the specifications update-review-approval work in the future.

This project research study will also discuss the project management approach applied during the overall process development, which implemented experimental process changes within DOT&PF similar to Nemawashi in creating a consensus, the Agile methodology in terms of a collaborative approach emphasizing a change response, and key Kiazen principles where incremental changes produced successful micro-improvements in providing tangible deliverables in much shorter timeframes than was previously observed with specifications updates.

1.3 PURPOSE AND NEED

The purpose of this project is to develop a streamlined specifications updating process, and process guidance outline, to implement as a strategically planned workflow on future DOT&PF SSAC updates. This project is needed because no formal DOT&PF SSAC updating process guidance is currently available. Creating a sustainable and repeatable process to address future FAA compliance updates will address the cost, scope, schedule, risk, and quality constraints to the overall work, improving the overall workflow and enhancing each specifications team's ability to collaborate not just within each region, but seamlessly across Alaska. The focus will be on developing strategies, collecting best management practices (BMPs) currently in use, and reviewing lessons learned from construction teams for effective and efficient FAA approval of DOT&PF SSAC specifications. The process guidance will outline and document these strategies and BMPs, along with identifying regional DOT&PF specifications contacts across the state as well as subject matter experts and consulting engineers to support key roles of technical expertise within each specifications team.

2.0 LITERATURE REVIEW

Developing and implementing a process within a large, complex, multi-team, government organization requires, among other things, an understanding of how change occurs within that organization and how people within the organization respond to that change. In order to build a sustainable process, it must not only align with the overall business goals of the organization and provide a solution to an existing problem, but the process must also be a meaningful answer to the people using it.

To build a fundamental understanding of change, and how people react to change, in a large, complex government organization, a few questions arise to add focus to the research:

- How does change occur in this organization?
- Without something in place, how is a process implemented?
- What kind of communication occurs between teams within this organization to effectively develop a successful process, and consequently implement change?

Several articles discuss insights into change and effective communication between multi-team environments. These selected articles (Appendix C) introduce the composition of change within government organizations, the development of a process model, and how introducing change by implementing a process model can be achieved successfully.

2.1 CHANGE MANAGEMENT IN GOVERNMENT

Ostroff (2006) identifies four aspects considered as obstacles unique to government agencies, along with five principles found to characterize successful change efforts. To consider that a government organization does not behave, or function, the same as a private sector corporation may appear obvious on the surface. However, the insight to the nuanced differences between public and private sector organizations offers a means to define the existing environment in which change occurs successfully, unsuccessfully, or not at all, due to unique influences not necessarily affecting other similarly sized, or structured, organizations.

Ostroff (2006) identifies and analyzes three federal organizations based on how effectively each organization handled change management. Occupational Safety and Health Administration (OSHA), the United States Special Operations Command (USSOCOM, or SOCOM), and the Government Accountability Office (GAO) were discussed to provide a basis on how three government agencies dealt with issues within their organizations, but especially, how each, transformed, redefined, and adopted changes, which when implemented with a developed change management system significantly improved each organization's performance. OSHA redefined its organization's missions and goals, while SOCOM

transformed its entire operation to adapt to a new way of approaching their reality of warfare, and the GAO adopted private sector practices that reset their priorities as an organization.

Ostroff (2006) indicates the challenges government agencies face in implementing change includes:

- having the **leadership's priorities elsewhere** and not on change efforts;
- having the **leadership's tenure** on average as **limited**, so policy reforms that can be enacted more quickly tend to be the focus;
- **stricter guidelines** in place to prevent public sector wrongdoing, in such areas as budgeting, personnel, and procurement can also create inertial pressure against change; and
- having **public sector transparency** with which the organization must function, creates a much larger, and more varied, collection of stakeholders to manage.

These challenges affect how the organization, and the people in these organizations face change. In considering efforts to implement a process new to an organization, it is important to address the elements that consciously, or unconsciously, cause leaders of government organizations to pause. A key factor intrinsic to developing a process, or solving a problem to the workflow, is not just defining the problem but defining the existing conditions, and even the much larger environment, or business culture, in which the process will be used. Although these challenges are not insurmountable, there is a delicate balance to achieving change, which may not always be comfortable, but can be managed to at least acceptable.

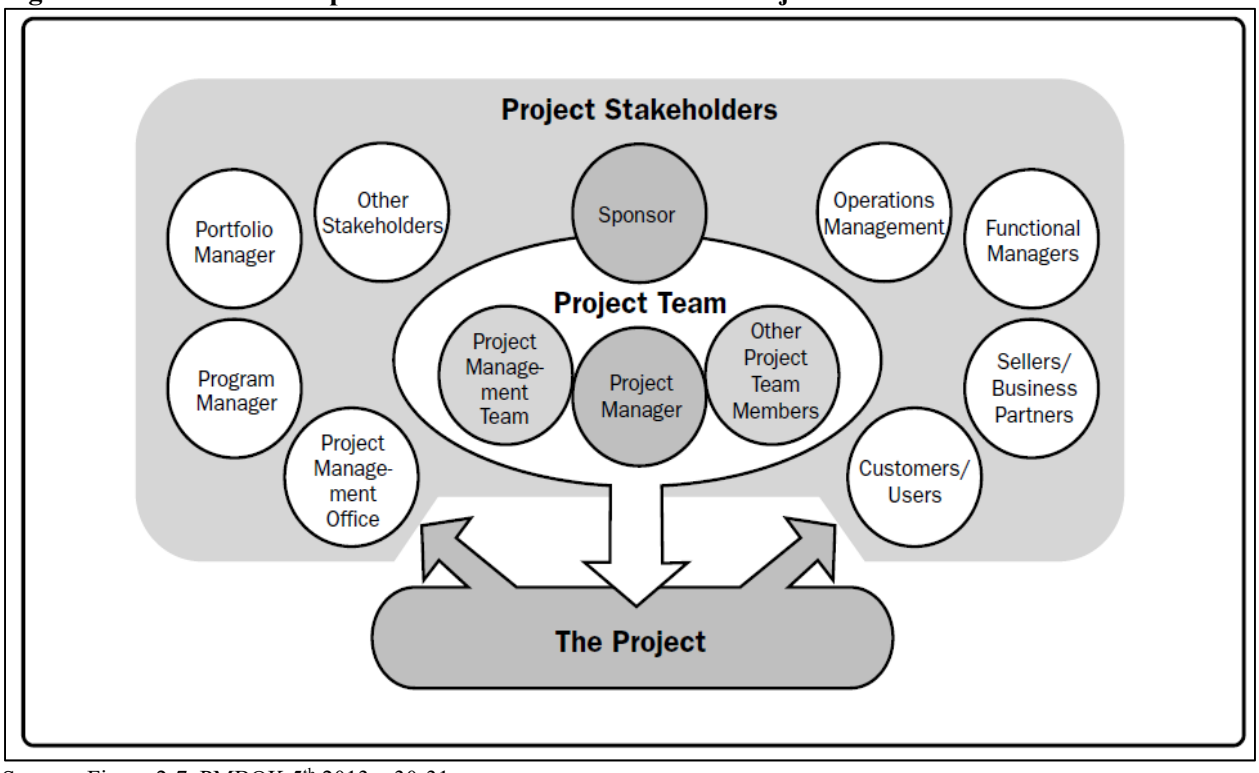
Ostroff (2006) also introduces **five principles of successful public-sector change efforts** that achieve the intended goals for which they were designed. **Principle 1 aligns the performance improvement, or change effort, with the organization's goals and mission.** The change effort must align with the organization's goals and missions in order to anchor itself to the organization's fundamental business needs, and therefore, implementing a change, or process, becomes indisputable. When a change effort, or new process, is identified within the framework of the organization's goals, it also helps develop additional company priorities.

Principle 2 focuses on sustained and effective stakeholder management throughout the entire planning, development, and implementation phases of the process, or change effort (Figure 1). Cultivating internal as well as external stakeholder relationships provides much needed, if not intentional, transparency to the change effort. When the people who will use this process are involved from the beginning, and understand what issues the process, or change effort solves, and how it can help them, then there is a willingness to allow the change to occur. In some cases, stakeholders may even champion the cause, motivated by the enthusiasm of seeing needed change happen, and wanting to be an active part of the solution.

A key factor of successful change and process implementation is actively engaging those employees with technical, or operational, knowledge and eliciting their expertise. In order to maintain inertia in a positive direction, gathering others to help work on the process also helps to support the idea of implementing the process. Providing the idea that change will occur is one thing, but offering people the ability to provide input to help produce the process, or change, allows stakeholders to find agreement with the inevitable change, along with giving them some control over what that change will be. The receptiveness of the group to the new process, or change effort, is directly related with how effective the stakeholder engagement has been.

Ostroff (2006) also suggests, in addition to a having a robust stakeholder management strategy in place as key in many ways to effectively implementing a new process, or change effort, a more subtle consideration is how employees may feel they lack skills to meet the change. People may need incentives, or even training, to feel they can match, or keep up with the new process. When given those options, the stakeholder engagement becomes a more responsive and dynamic tool to discuss concerns, but also new ideas within the change effort.

Figure 1: The Relationship between Stakeholders and the Project



Source: Figure 2-7, PMBOK 5th 2013, p30-31

Principle 3 creates a road map guiding the change effort through the planning, development, and implementation phases introduced in Principle 2. With a guidance to follow the process horizon, a project manager can identify performance objectives, set priorities, and plan a rollout of the process, or change effort. Developing a project management plan (PMP), which incorporates risk and change management as part of this project mapping is essentially the idea.

During this effort in building a road map, Ostroff (2006) also introduces a "2x2" matrix of high-low impacts analysis to identify performance improvement areas, or areas of risk needing attention. Use of a Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis Diagram may also be used. A SWOT diagram is utilized in examining a project to broaden the perspective of identifying additional risks. The SWOT analysis identifies the organization's strengths and weaknesses, focusing on a project, change effort, or one of the organization's departments. Introducing a new process, or change effort, becomes an additional opportunity to capture any areas that either lack a process, or may need support to help align it with the upcoming new process, or change effort.

One strategy Ostroff (2006) highlights in preparing a road map to a new process, or change effort, is also engaging the highest authority in an organization's hierarchy most critical to the decision making of the change effort, in other words "start at the top". When organizational authority understands how the process, or change effort, is anchored to the organization's business goals, there becomes a potential for performance improvement to be realized, and additional support for small, incremental shifts may be made to align with the overall purpose to implement a new process, in a similar way to siting an arrow onto the center of a target.

As the framework of stakeholders is widened to include a broader spectrum of employees within the organization, this becomes an opportunity to engage even more potential resources, which can be a way to enlist support for the change effort early in the development. Although this appears more a part of Principle 2's stakeholder management, having an understanding of which avenues can be added to this road map also ensures a thorough check of available and potential resources during key phases of the change effort.

Principle 4 focuses on taking a comprehensive approach, which Ostroff (2006) suggests is integrating and aligning "a full range of factors", which include "leadership, structure, processes, infrastructure (including technology), people, and performance management." Just as Principle 3's road map provides an opportunity to improve performance in areas that align with the change effort, or new process, this approach suggests the project manager take a peripheral view, identifying lateral processes that could also be improved, or updated, with the implementation of a new process, or change effort. As

discussions with stakeholders begin to build a clearer understanding of what is to come, their input of what could also be redesigned, or adjusted, may offer additional opportunities to align existing processes with the new one to be implemented.

Taking this kind of approach, alignment of existing processes to the change effort, or new process, would also provide an opportunity to introduce "activities across organizational boundaries". Several departments across the whole organization would be able to interact, and provide input to the development of the process. One way for this interaction of departments to be very effective to the overall implementation of a new process, or change effort, would be to provide an open sharing of lessons learned and best management practices across departments.

Principle 5 highlights strong leadership to sustain the vision of the change effort, or new process. Without formulating a clear vision, Ostroff (2006) stresses the difficulty in developing a broad base of support along with setting a clear path. He also indicates that a strong leader respects the complexity of the change he, or she, is attempting and holds people accountable to the commitment to implement the change or new process, as well as providing measurable results.

In addition to having a vision and following through with action and results, Ostroff (2006) also characterizes public sector leadership as naturally respecting the existing obstacles, instead of dismissing them. Public sector leaders, according to Ostroff (2006), feel deeply about their sense of mission and find ways around obstacles, rather than attempting to break them down. It is important to understand the underlying business culture that exists and rather than looking to push through it, move past the obstacles in more constructive ways.

Creating a new process is a small part to the overall success of implementing a change effort. It must also be sustainable. Ostroff (2006) effectively characterizes the existing public sector challenges as well as five key strategies to succeeding in implementing a new process, or change effort. However, an underlying factor a leader must also understand is the people who will choose to carry the effort and implement the new process, or not.

2.2 DEFINING NEMAWASHI

An underlying key PMI principle highlighted by decades of research in business lessons learned and BMPs is the idea of stakeholder management, which builds on effectively engaging key functional groups throughout all the stages of a project. In a public sector organization, stakeholder management must be sensitive to the existing culture with which a change effort, or new process, will be implemented as well as continuously respond to enterprise environmental factors often pressing a project along a backward trajectory.

A fundamental element to successful stakeholder management is a simple approach of continuous and active communication with people important to the project. To understand how a change effort occurs, or how a new process is implemented successfully, it is clear that a majority of the stakeholder management focus must be on the people working on creating the change, and the people who will be affected by the change.

To provide an understanding to different forms of effective communication, Kopp (2012) describes a unique business culture within Japanese organizations, which engages in a practice of decision making known as nemawashi, or in english, a meaning similar to "consensus building", or "getting everyone on the same page." The word nemawashi derives conceptually from the art of Japanese gardening, where a special technique of transplanting trees gives individual care to each portion of the tree's root system prior to relocating the whole tree. This technique pays special attention to the smaller set of a tree's roots to carefully prepare the entire tree from the shock of transplanting. In this way, each individual root system has a chance to adjust to a smaller change, before uprooting and relocating the whole tree.

Kopp (2012) indicates that among Japanese organizations, nemawashi is considered a daily business practice exercised mainly between smaller groups of people prior to larger meetings. It is also practiced at times when meetings to decide on new proposals will take place. Prior to the meetings, high ranking members of an organization expect to be introduced to these new proposals before the formal meeting. In this way, members are introduced to the new proposals, which gives them an opportunity to react or discuss the proposals on a one-on-one basis.

In the context of a business organization, Kopp (2012) offers that the practice of nemawashi allows smaller, and in many cases, more effective communication regarding a change effort, or new process, among each part of that organization that will likely be affected at implementation of the change, or new process. This provides meaningful discussion across departments within the organization, as well as potentially valuable input that might not have been received in a larger, more formal, meeting setting. Candid discussion can serve in many cases to reveal underlying logistical issues or concerns, which might not have been identified in previous risk analyses. In addition to communicating to each key group in a smaller setting to introduce the change effort, or new process to be implemented, a level of trust is built from team members who have a fuller understanding of why the change effort needs to happen.

In many cases, resistance to change occurs because a lack of information or understanding among the people within the organization is not resolved. Having smaller meetings where the team concerns, along with ideas, are discussed and documented provides effective and demonstrable evidence that the leadership

is listening to the people who will either be part of the new process implementation, or be directly affected by it.

The art of nemawashi is essentially the practice of actively listening and effectively communicating to each key group, or person, what change effort is proposed and how it will affect each key group or person. Communicating information to stakeholders is also an opportunity to gain support for the change. In many ways, the people who are affected by the change can also determine the success of a new change effort, or process, by positively or negatively influencing the project.

2.3 THE AGILE METHODOLOGY

Stakeholder management, along with solid communication, are key features to effectively support the development of a new process, or change effort. However, it is also necessary to understand what efficient and reliable process improvement methodologies exist, and how they perform under varying conditions. In Stackify's online article, "What is Agile Methodology? How it Works, Best Practices, Tools" (2017), the Agile methodology is described as a people-focused, results-focused approach to software development.

Stackify (2017) indicates the main benefit of its use is how it "delivers what the customer wants, when the customer wants it". The name of the process itself also suggests a quick, nimble, and flexible approach to process development. The Agile methodology (Agile) crosses the boundaries of software development and adapts effectively as a project management strategy in other business applications. Agile continuously makes iterative improvements to an organization's overall performance quality and customer delivery. It also focuses on constant stakeholder collaboration, adaptive planning, self-organization, and short delivery times.

According to Stackify (2017), Agile's success as a process development/improvement methodology is based on key elements of: faster and smaller incremental deliveries, over waiting longer periods for a larger product delivery; trusting employees and teams to work directly with the customers to understand goals and provide solutions; teams working together on a daily basis and creating better communication opportunities; and an overall adjustability of the process.

Stackify (2017) highlights the benefits of Agile as faster development, with a faster development life cycle, which increases business profitability. The flexibility of the Agile system, offers successful customer solutions, which brings increased customer satisfaction. By involving the customer early in the process, the project stays on task and in-tune with the customer needs, which eliminates reworking. In addition, the Agile model extends to valuing employees and their ideas, which increases team productivity.

Less time is wasted spent on work in the "wrong direction". The entire system under Agile is much quicker to respond to change.

Among other Agile resources, the Manifesto for Agile Software Development (2001), or "Agile Manifesto" (Manifesto), was developed by representatives from a wide spectrum of industry software programming groups. The Manifesto provides many specific ideas, but is founded on a set of values intrinsic to many core organizational models. It focuses on delivering good products, considering the people within an organization as most important, and fundamentally prioritizing values and culture.

The Agile Manifesto focuses on, "individuals and interactions over processes and tools; working software over comprehensive documentation; customer collaboration over contract negotiations, and responding to change over following a plan." In the forefront of these ideals, 12 principles derive the heart of the Agile Manifesto:

- **Satisfy the customer** - through early and continuous delivery of valuable software
- **Welcome changing requirements –** harness change for the customer's competitive advantage
- **Deliver working software frequently –** with a preference to the shorter timescale
- **Business people and developers –** must work together daily throughout the project
- **Build projects around motivated individuals –** give them the environment and support they need, and trust them to get the job done.
- **Face to face conversation –** the most efficient and effective method of conveying information to and within a development team
- **Working software –** is the primary measure of progress
- **Agile processes promote sustainable development -** sponsors, developers, and users should be able to maintain a constant pace indefinitely
- **Continuous attention –** to technical excellence and good design enhances agility
- **Simplicity –** the art of maximizing the amount of work done is essential
- **The best architecture, requirements, and designs –** emerge from self-organizing teams
- **At regular intervals –** the team reflects on how to become more efficient, then tunes and adjusts its behavior accordingly

Additional benefits to Agile transcends software development and becomes universally applicable in business. In Segue Technologies' article, "8 Benefits of Agile Software Development" (2015), stakeholder engagement tops the list. With an emphasis on a high degree of collaboration between the client and the project team, conceptually, Agile is suitable to project-oriented delivery. Transparency, also a

benefit Segue Technologies (2015) identified, provides a unique opportunity for clients to be involved throughout the project.

Early and predictable delivery, along with predictable costs and schedule, supports fixed schedule "sprints" of one to four weeks. This quick-paced delivery method provides an opportunity to release new features, or beta test, the software earlier. Using a fixed duration, "sprint" – a term meant to define a set period of time, or iteration, where specific work has to be completed by the project team for review. It is a burst of work initiated by a planning meeting, which subsequently develops a product deliverable ready for review in a shorter amount of time. Using sprints allows an organization the ability to predict and limit costs based on the amount of work performed by the project team. This benefit supports the client's understanding of the approximate cost of each feature, or project deliverable.

Segue Technologies (2015) discusses a major benefit to Agile is its ability to allow for change. The system creates an environment where there is an opportunity to constantly refine and reprioritize the overall product backlog, or project list. Additional benefits Segue Technologies (2015) highlight come from the Agile's focus on business value and users. By allowing clients to determine feature priorities, project teams can better understand what is important to their clients' business, and can deliver products that feature the most business value to their clients. Product feature delivery focus benefits the stakeholders' real needs, with each feature delivering real incremental value.

Segue Technologies (2015) also describes the end product benefit of Agile's system of consolidating the work into discrete package deliveries as an opportunity to improve quality. By breaking down the project into manageable working units, the project team can focus on high-quality development, testing, and collaboration. With iterative and frequent testing and reviews during each product build sprint, more opportunities arise for finding and fixing defects, as well as clarifying client expectations.

In Segue Technologies' follow-on article, "What Characteristics Make Good Acceptance Criteria?" (2015), development of an acceptance and performance criteria transforms a project deliverable from "it works as coded" to "it works as intended", in other words, working as specified to working as intended. Agile also creates an environment where improvements in quality can be traced to how a product is tested for acceptance and performance. Within Agile, a product must meet the conditions of satisfaction. There is no partial acceptance; either a criterion is met or it is not. Performance criteria is often measured as a response time.

These Agile concepts can translate seamlessly onto many different business models and applications. The Agile methodology is not simply limited only to software development. The refined concepts of stakeholder management and communication focus in large part on the people within an

organization and the results they produce, or projects they deliver. Quality, trust, and confidence become the benefits to an organization utilizing Agile. It is a system that welcomes change, and views the response to change as an opportunity.

2.4 THE ART OF KAIZEN

The ability for an organization to welcome change speaks directly to its ability to respond to that change, as well as how confident an organization is with its response. In an online article by Medium.com, "The Art of Change: Kaizen & Micro-Improvements" (2017), Kaizen is defined as "the art of applying continuous, bite-size changes". The key to Kaizen, the article reflects, is incremental changes, called micro-improvements, which can result in measurable benefits to productivity. Medium.com (2017) describes a micro-improvements process as a step-wise method:

- **Step one:** Identify the problem
- **Step two:** Determine the best outcome of resolving the problem
- **Step three:** Implement a micro-improvement that will lead towards the desired outcome
- **Step four:** Collect the data on the micro-improvement over time

In "The Kaizen Project Manager" (Hailes, 2012), the Kaizen approach is expanded to a business model to include project management. In Japanese, "kaizen" means "continuous improvement." Used in a business context, the Kaizen methodology implements incremental and purposeful steps to yield dramatic change over time. Typically, big changes in an organization are often most difficult to achieve, because people may fear and doubt the impending change. Other barriers to change include inertia and lack of motivation from people within an organization to change. In some cases, there is initial enthusiasm to the change. However, without immediate results, the change efforts, or new process, can be consciously or unconsciously abandoned.

Hailes (2012) also describes the steps to implementing Kaizen as part of a project's standard operations:

- **Develop the mindset –** set a reminder that today is an opportunity to find ways to work better and reinforce this mindset with all the people on the project.
- **Document performance –** in addition to tracking project team's time spent on activities, also look for other performance measures that are relevant to the project team, for example
    - **Number of safety incidents within a construction crew**

    - **Find ways that demonstrate meaningful progress, use them periodically to assess how the team is doing**
- **Reflect on the team's activities –** write down one or two items that could be done differently at the end of the day, for a quick review of relevant tasks, or brainstorm integrating activities beneficial to team improvement.
- **Experiment with new ideas –** find interesting ways to help improve the team's quality or efficiency, and possibly conduct a qualitative assessment.
- **Share with others –** speak to other managers to find ideas helpful to the success of the project team.

A Kaizan approach, which has been used in Lean manufacturing methods at companies such as Toyota, Intel, and Lockheed Martin, incorporates continuous improvement. An article posted to the PMI website, "Agile and lean project management a zen-line approach to find just the "right" degree of formality for your project," (Pitagorsky, 2006) describes Lean project management as a practice derived from manufacturing, where the goal is to maximize value while minimizing waste. Pitagorsky (2006) continues by suggesting the principles of Lean can be applied to any process, focusing on waste reduction, while creating a better workplace, with a concept he presents as "respect for humanity". Eliminating waste, Pitagorsky (2006) indicates improves quality, production time, and cost.

Pitagorsky (2006) presents five core concepts to Lean philosophy, which demonstrates the apparent close partnership with Kaizen principles:

- **Specify value in the eyes of the customer –** doing the right project right means satisfying the customer, more broadly, the needs of all the stakeholders
- **Identify the value stream and eliminate waste –** all the actions that are required to bring a product through the main flows essential to nearly every product
- **Make value flow at the pull of the customer –** don't make the widget until there is a demand for it to minimize inventory costs by manufacturing just-in-time
- **Involve and empower employees –** involve the people who do the work in process planning, and empower them to adapt the process from within
- **Continuously improve in the pursuit of perfection –** the Kaizen continuous improvement approach uses process measurement and review, problem-solving and analysis techniques. Kaizen finds and eliminates waste while promoting increasingly more effective performance.

The concept of continuous improvement reflects strongly in Kaizen, according to Hailes (2012). Use of Kaizen mainly in manufacturing operations focuses on helping small teams, and individuals, become more efficient and effective. Hailes (2012) highlights the main principles of the Kaizen approach to continuous improvement as: thinking of ways to make something happen, rather than reasons why something can't be done; taking the time to understand the root causes of why things went wrong, when something doesn't work as expected; along with taking the wisdom gained when faced with hardship, and looking to apply that knowledge gained to the next task, like lessons learned; and measuring success and failures, so there is real evidence of improvement.

Hailes (2012) emphasizes that the Kaizen approach works in relatively small teams, ideally, so that the people on the team feel like they are an integral part of the process. If there is a larger team, split the team into smaller groups in order to practice Kaizen. At the team level, performing Kaizen is an excellent approach to addressing quickly the issues a project faces. Implementing the Kaizen approach to projects and project management provides opportunities to make small, but purposeful changes over the course of a project, to bring about incredible goal achieving results.

2.5 PROCESS IMPROVEMENT GOALS

For an organization to bring about meaningful change, it is not enough to simply set business objectives and goals. An organization must also consider how those goals will be achieved, and what improvements, or change efforts, will be implemented. An additional consideration, but no less important in goal setting is how the people in the organization will respond to these new objectives and change efforts, or new processes.

The article, "Goal Alignment in Process Improvement" (Lepmets, McBride, Ras, 2012), discusses a study that was conducted on how implementing process assessment impacts process improvement, and how an organization's process goals aligns with its business goals. The article presents a general premise that process improvement goals must align with the organization's business goals in order for the new process, or change effort, to succeed.

Lepmets, McBride, and Ras (2012) indicate that a lack of alignment between the business goals and process improvement goals result in unsuccessful process implementation, and may in general build skepticism towards the new process, or change effort. The article contends that process improvement should improve an organization's ability to achieve its business goals. The study sets out to identify how well a process serves its intended purpose, by way of collecting and analyzing data of processes that have been modelled, deployed, and used. After a process has been in use, a process assessment is conducted to identify and gauge problems and their underlying causes. This research prioritized goal alignment in process

improvement and process assessment, as well as strategic planning and strategic alignment between strategic and operational goals.

The study defines **a process** as "the flow of work that achieves a **single specific purpose**." Process goals, according to the study, are categorized into **two types**: **those processes that relate to product or service attributes**, and **those that relate to the overall system of processes**. The primary goal of each process, the study asserts, is to achieve its stated purpose. The study also notes Six Sigma as a process improvement method directed primarily to specific process problems, while Lean methodology pays attention to different forms of waste reduction in a system. According to the study, business process and workflow modelling are ways to support identifying and redesigning work that produces organizational results. The starting point becomes the absence of a working process, where a new process, or change effort, is needed to establish more effective and efficient processes.

The study, using analyzed survey data compiled from several organizations, attempts to answer the question: "Is process improvement that follows a process assessment positively related to the alignment of process goals and the organization's business goals?" The outcome presented in the data analysis summary indicate: **1) process improvement following process assessment is not significantly related to the alignment of business goals**, and **2) process assessment does not contribute to this goal alignment in practice.** The findings maintain the biggest criticism to process improvement is the inability to clearly articulate the business impact and return on investment. According to the study results, **"no coherent method or guide is available to follow to align an organization's operational goals to its business goals to achieve the practice of process assessment for process improvement, due to little knowledge and experience in practice."** Therefore, the evidence from this study indicates no comprehensive method of process improvement, or change effort, is available to effectively and efficiently meet the organization's business goals. In practice, there was also no correlation between conducting process assessments and goal alignment.

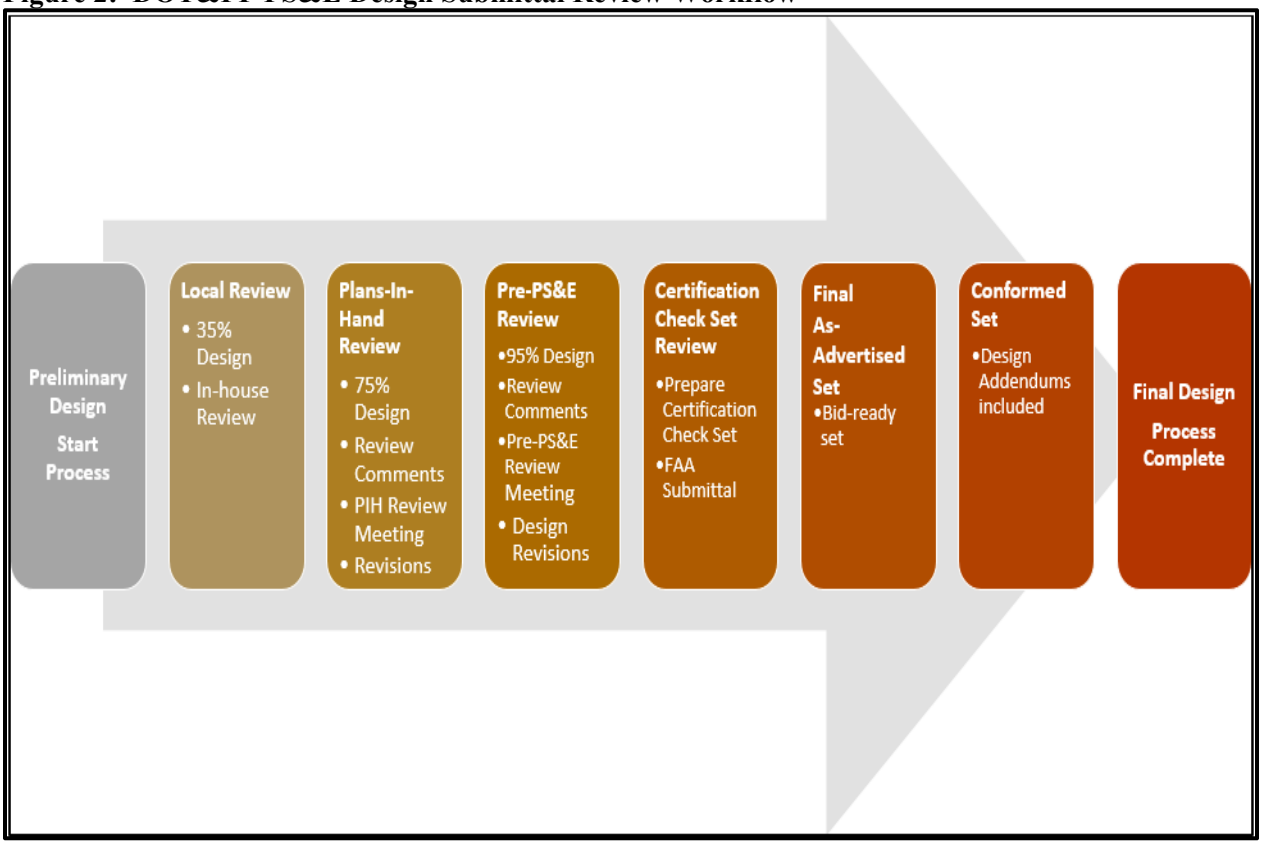
In part, the outcomes of this study spotlights the challenges that Ostroff (2006) also identifies when implementing a change effort, or new process, that performance improvement must align with an organization's mission, or goals, to create a meaningful framework for the people within the organization. The key in successful process improvement may lie in how an organization can respond to the question of how process improvement, or a change effort can be viewed to be part of an organization's business goals.

3.0 METHODOLOGY

This study developed an experimental process model, or new approach, to updating the DOT&PF specifications to comply with the FAA AC. This process model was applied to the P-401 specification update, also referred to as the Beta Test case, and P-318 specification update, also referred to as the Trial Run case, to evaluate the operational performance of this experimental process model. By comparing the estimated project schedule and resource costs for the P-401 Beta Test case and the P-318 Trial Run case against the observed project schedule and resource costs, based on assumed cost ranges, the operational performance of the experimental process model was evaluated.

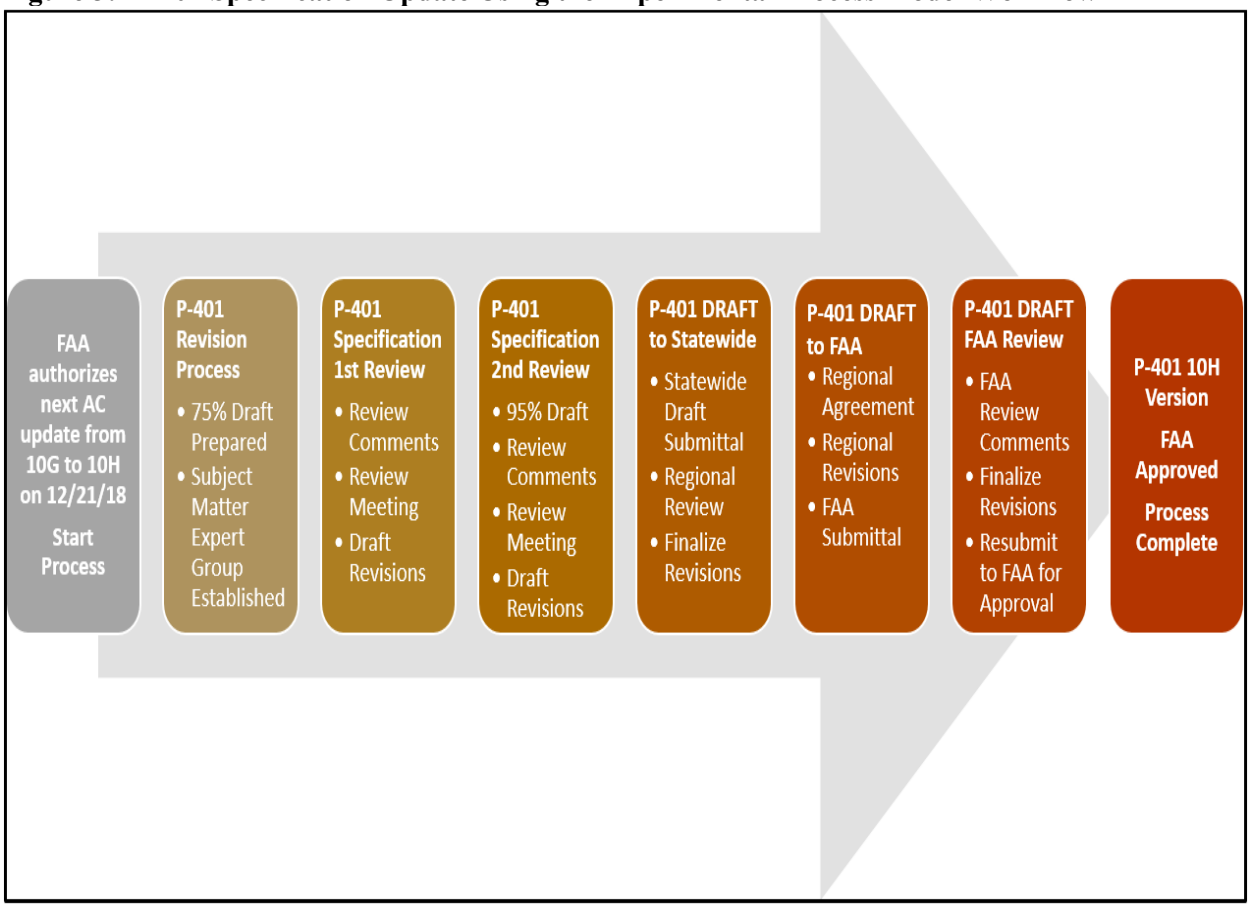
Partially innovated from an existing DOT&PF design review methodology routinely used in the review of design plans, specifications, and engineer's estimate, referred to as the PS&E Submittal Review workflow (Figure 2), the experimental process model uses a workflow similar to the PS&E design review. However, the experimental process model also incorporates BMPs from previous work conducted on the specifications updates, and principles outlined in this study's Section 2.0 Literature Review of nemawashi, Kaizen, Agile, along with stakeholder and change management.

Figure 2: DOT&PF PS&E Design Submittal Review Workflow



The experimental process model builds on a more targeted approach not previously applied to the specifications update. Where there was no process in place before, this model incorporates the incremental micro-improvements found in the Kaizen methodology, the fast-paced and collaborative system found in Agile, along with an emphasis in stakeholder management and a consensus approach like Nemawashi. For this model, the principles outlined by Ostroff (2006), of improving performance aligned with an organization's mission and goals, concentrating on stakeholder and change management, creating a project management plan and schedule, as well as a implementing a comprehensive approach created the framework by which the experimental process model was built. Once outlined, the process model was applied to the Beta Test case, P-401 specification update (Figure 3), and the Trial Run case, P-318 specification update.

Figure 3: P-401 Specification Update Using the Experimental Process Model Workflow



3.1 OBSERVATIONAL FIELD DATA

Data collected by observation over a two year period, from 2017 to 2019, established the initial information of the existing system without a formal specifications update process in place. Observational data collected shows incremental changes, and micro-improvements, were introduced, which built the

initial infrastructure to the early prototype of the experimental process model. Once the FAA AC version updated from 10G to 10H by December 21, 2018, an initial prototype process was implemented and documented using the P-401 Beta Test case, which updated P-401 from FAA AC 10G to 10H draft compliance.

3.2 PROCESS PROJECT SCHEDULE AND COST

An initial project schedule (Appendix D) was developed for P-401 after FAA's AC transition from 10G to 10H on December 21, 2018, when the AC 150/5370-10H was officially recognized. Along with a project schedule, an initial work breakdown structure (WBS) was prepared. Use of a WBS allows the direct link of tasks with overall project deliverables. The WBS is provided in Appendix E. A project management plan (PMP) was also developed to maintain an overall management model structured around sound strategies encompassing stakeholder management, change management, and cost management.

This PMP will support the development of a systematic approach to the ongoing specifications updates, as well as provide a basis to develop a future guidance that streamlines the specifications update-review-approval process. The DOT&PF CR Specifications Engineer will act as project manager (PM) for the specs updating process development, utilizing the PMP to maintain overall coordination and organization of project schedules, along with costs and scope / change management.

For the experimental process model, initial project schedule and cost estimates were prepared. Through the course of implementation, a comparison will be drawn between the estimated cost and schedule against the actual work to-date.

3.3 STAKEHOLDER, SCOPE, AND COST MANAGEMENT KEY KNOWLEDGE AREAS

Key to the development of this experimental process model was a deliberate focus on stakeholder management, scope management, and cost management. In order to consider how a change effort would be received in the organization, a high priority was given to the end-users or the main stakeholders using the P-401 Beta Test case and the P-318 Trial Run case.

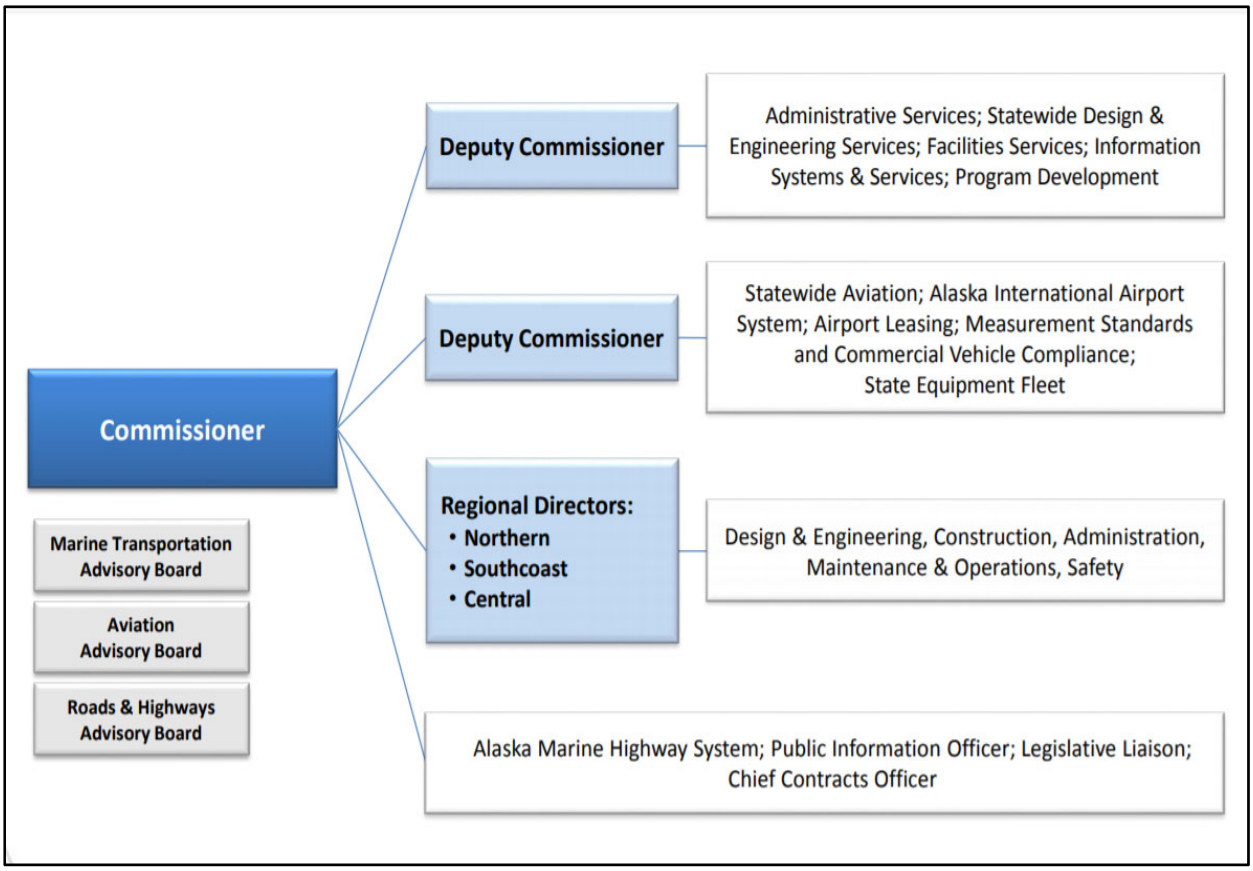
3.3.1 STAKEHOLDER MANAGEMENT

No formal stakeholder management plan (SMP) was developed for this project, except what is outlined in the project PMP. However, strategies built from Nemawashi, Kaizan, and Agile principles of communication, consensus, and smaller groups to move efficiently through the process model development

was implemented to provide better coordination overall. However, an extensive stakeholder register was developed and provided in the project PMP.

For internal DOT&PF stakeholders (Figure 4), regular status meetings and direct communication will continue with senior management, along with specialty teams, as well as CR Aviation Design teams (Figure 5). Providing key information, project progress, and status dashboards for project performance, will depend on how involved stakeholders are to this project.

Figure 4: DOT&PF Organization Chart & Expanded Internal Stakeholder List



Most of the communications will provide briefings, or project progress summaries, to keep stakeholders informed with as much information as is appropriate for their level of engagement. Stakeholder engagement will flex from direct in-person meetings, to extend out to various forms of indirect communication, such as email notifications of specifications updates.

When communicating with other regional specifications teams, the AWP Module Administrators Team (MA/T), and Statewide specifications teams, special project discussions in smaller teams will be

prioritized. MA/T and specifications teams will have direct input as to how impacts to each region can be managed through coordination of the updating process.

For external stakeholders, notifications on an as-needed basis will be the initial mode of communications, unless it is determined through the course of the project that additional information and stakeholder engagement is needed. In cases where specialty external teams are identified, direct and regular communications will be planned. Communication with FAA will be part of the planned review process, and review meetings will be incorporated into the project schedule.

The Stakeholder Register list stakeholders and their information, for the PM to better assess their influence levels on the project, as stated in previous sections. Along with a stakeholders register, another tool to manage communication with stakeholders is a Power Interest Grid (Figure 6). The Power Interest Grid, which is also known as the Power Interest Matrix, helps categorize project stakeholders with increasing "power" and "interest" in the project. This tool will help the PM focus on the key stakeholders who are most critical to the project.

Figure 5: The DOT&PF Central Region Aviation Section Organization Chart

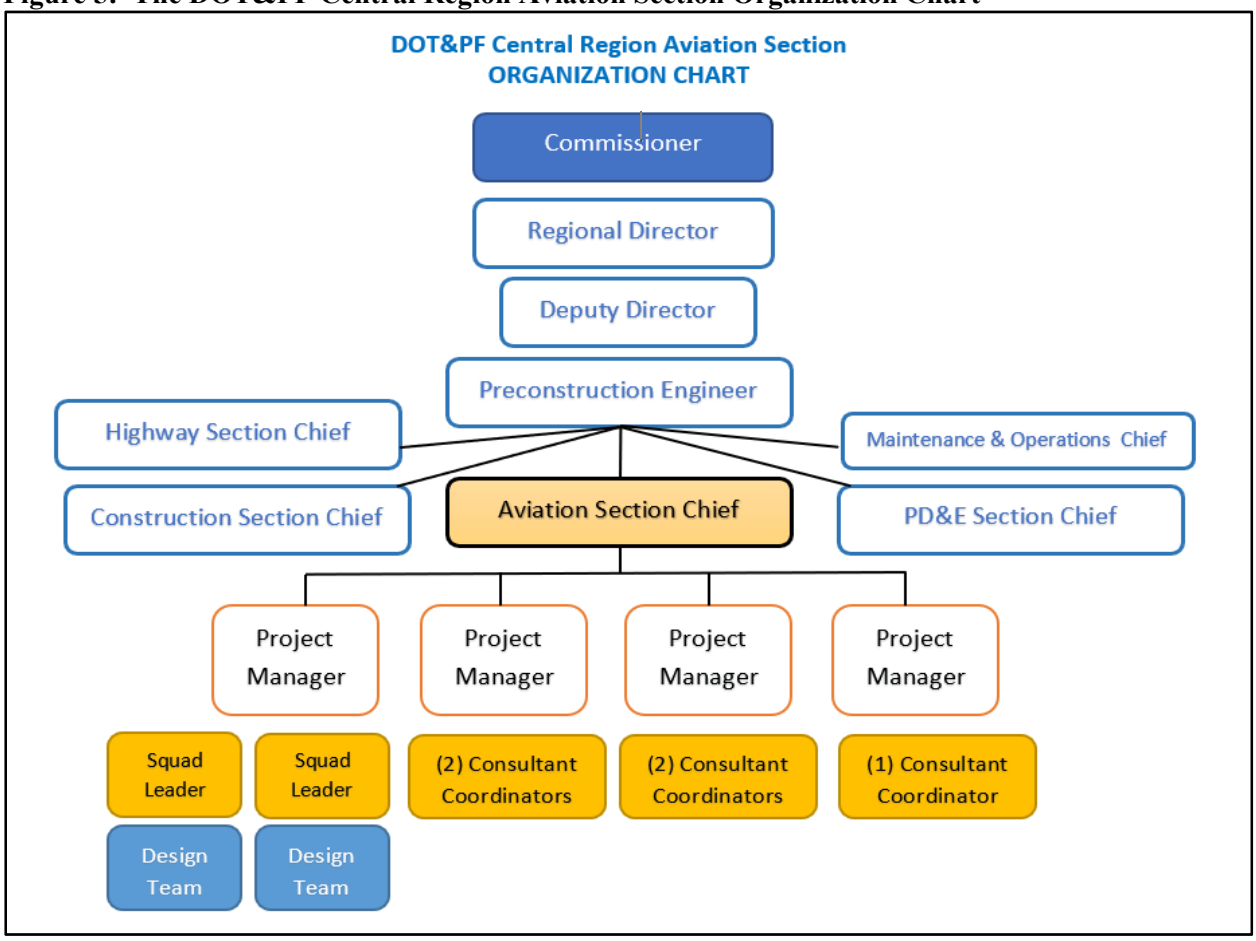
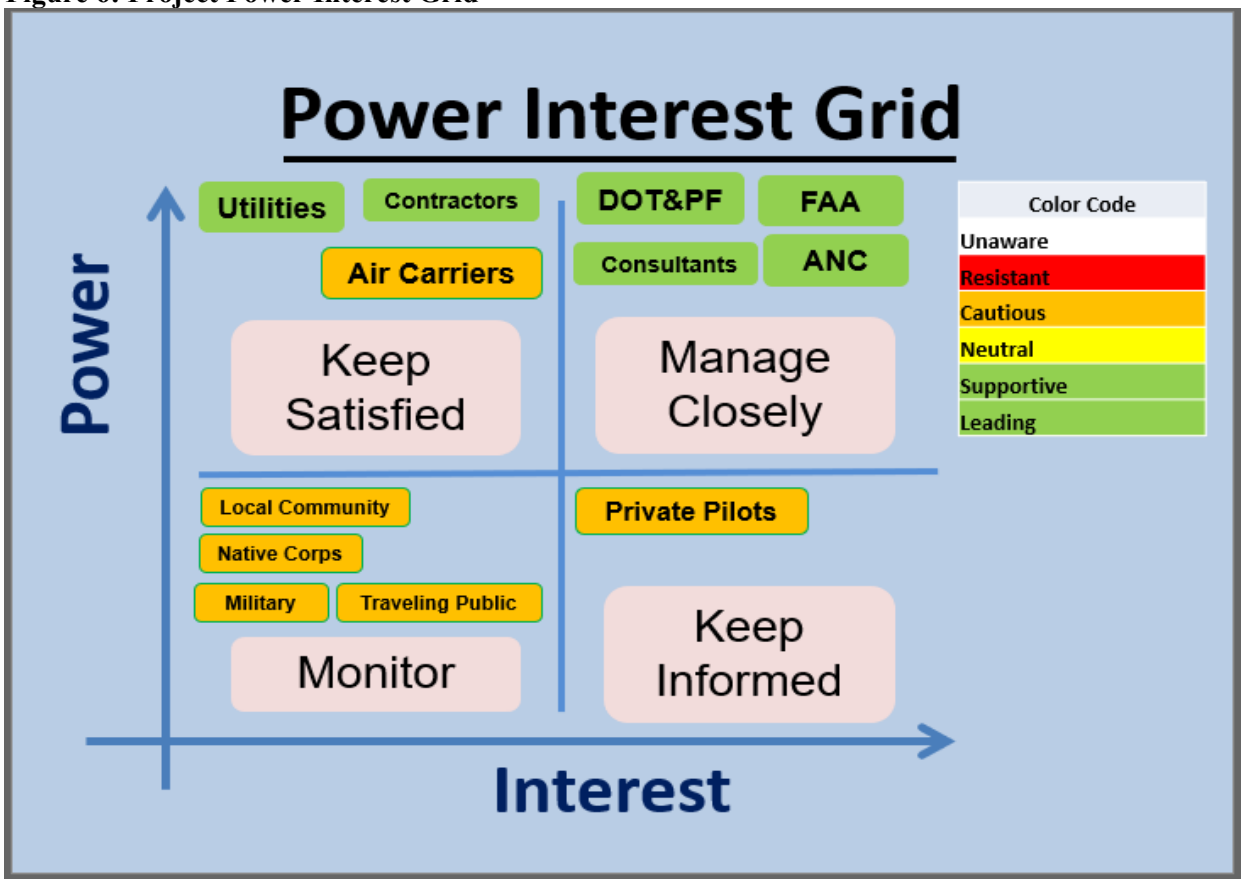


Figure 6: Project Power Interest Grid



Initial development of the experimental process model focused primarily on stakeholder engagement and communication, with a key emphasis on understanding the existing environment and system under which the process model would be developed. This process model considered enterprise environmental factors within the existing DOT&PF organization. Several factors include:

- **When FAA periodically updates their AC 150/5370-10 with errata, DOT&PF aviation specifications must also be updated to maintain compliance**. It is the main reason to have a process in place to handle future major and minor specifications updates.
- **With the launch of AASHTOWare (AWP) software within DOT&PF**, which is used as a contracts and bidding platform, **close coordination with the specifications update is essential in creating AWP pay items** for the Engineer's Estimates (EE). The EE pay items must also be shown in the plans and specifications. Constraints in AWP must be carefully considered prior to creating

any EE pay items, as it could influence the specifications. Potential impacts will be mitigated with additional sub-processes to requesting and creating pay items within AWP. Additional coordination within the AWP Module Administrators Team, which covers all the regions and meets regularly, will also provide an essential communication channel during the specifications update.

- **DOT&PF regions and specifications teams are geographically separated** by water and hundreds of miles land. Effective communication between teams is critical and relies heavily on teleconferencing and web-based teaming software. Tailoring our existing system to meet challenges to reviewing and discussing specifications during distance meetings must be a priority.
- **Updating the aviation specifications for FAA compliance must not delay a project's PS&E delivery schedule**, so coordination with internal/external design teams using the existing aviation specifications must be part of the process. DOT&PF's primary mission is to "Keep Alaska Moving through service and infrastructure", so delivering programs (i.e., advertising projects for construction) is an essential priority. Construction projects rely on plans, specifications, and estimates (PS&E).
- **A major factor affecting DOT&PF SSACs is the physical environment in which construction occurs** for these airports. Arctic conditions are not addressed in FAA's AC, so tailoring the specifications to existing arctic ground and weather conditions does have an impact to construction projects.
- **One significant aspect of DOT&PF Aviation project construction is the remoteness** of many of the project construction site locations. Not only is mobilization of equipment a challenge for the Contractor, but addressing lack of material resources on site, or near the site. These remote conditions directly affect the nature of the specifications, and a primary reason for language deviation from FAA AC 10H.

Consideration for enterprise environmental factors provides a more complete solution, looking at the existing conditions surrounding the need for implementation of a new process, but may not necessary directly affect the specifications update offers insights that informs the solution.

3.3.2 SCOPE MANAGEMENT

Successful completion of this updating process development project will require managing the scope and ensuring all the work, and only the work is included in the scope. An important aspect to scope management is for the PM to define and control what is and is not part of this project. Primary elements in scope management encompass:

- Creating a ***scope management plan*** – documenting how the project scope will be defined, validated, and controlled.
- Collecting ***requirements*** – a process to meet project objectives by determining, documenting, and managing stakeholder needs and requirements.
- Defining ***scope*** – identifying tasks and activities specific to the work and preparing a detailed description of the work.
- Creating a ***work breakdown structure (WBS)*** – subdividing the project deliverables into smaller, manageable segments.
- ***Validating*** scope – a formal acceptance process of the completed project deliverables.
- ***Controlling*** scope – a project status monitoring process, that also manages changes to the scope baseline.

3.3.3 EXPERIMENTAL PROCESS MODEL STEPS

The updating process will model a typical DOT&PF Design Review process. A design review follows these steps (Figure 2):

- Prepare draft plans, specifications, and estimate (PS&E)
- Submit PS&E Draft for internal review, allow for three weeks review time
- Prepare online system to collect and consolidate PS&E review comments
- Collect PS&E review comments and schedule review meeting
- Conduct review meeting to discuss and address comments
- Revise PS&E set based on review comments
- Conduct final PS&E check set review for authorization and signature
- Submit to FAA for concurrence and approval

For the experimental process model workflow (Figure 3) for specifications updates, the modified steps include:

- Identifying subject matter experts and support teams to prepare updated specifications draft
- Preparing draft updated specifications
- Submitting draft specifications for internal regional and statewide review, allow for three weeks review time
- Preparing online system to collect and consolidate review comments
- Collecting review comments and schedule review meeting with core updating team (comprised of CR Aviation Section Chief, Statewide Specifications Engineer, CR Specifications Engineer, subject matter experts, as needed)
- Conducting review meeting to discuss and address comments
- Revising specifications based on internal review comments and coordinate changes with AASHTOWare program (AWP) pay items, as needed
- Conducting final check set review
- Submitting to FAA for concurrence and approval, along with modifications of standards (MOS) justifications
- Collecting FAA review comments and revise specifications with MOS
- Resubmitting to FAA for final approval
- Preparing DOT&PF Chief Engineer's Directive to post FAA approved specifications
- Distributing updated and FAA approved specifications to DOT&PF and consultants

The updating process will also account for ongoing corrections and revisions by using a system of errata sheets similar to FAA use of errata, when providing changes to their ACs. The errata sheets updating sub-process will continue more frequently, collecting corrections/revisions monthly. Once collected, the errata sheets, revised specifications, and MOS will be submitted to FAA for more frequent revision, review, and approval. This additional sub-process provides a

more continuous and collective review of specifications, implementing a more streamlined approach to the overall updating process moving forward.

An update process guidance will support internal coordination for draft reviews, along with providing formal process documentation. In order to track the project scope requirements, a requirements traceability matrix (RTM) was included as a tool in the PMP's Appendix C. The project RTM will support project scope tracking, as well as tracking project deliverables.

3.3.4 COST MANAGEMENT

Cost management for this project is primarily based in hypothetical assumptions of labor cost per hour. However, the resources identified for this study reflect actual resources selected for the subject matter expert (SME) teams. Focus on cost management for this project attempts to step through the process with a perspective of how cost will impact the overall process. Use of hypothetical values allows the analysis of cost as a comparison between resources projected against resources selected for the SME rolls through the project schedule. A cost trend can be determined based on resource capacity and usage and strategies can be developed to control costs. With this hypothetical cost model, this analysis can determine an estimated budget for scaling future modelling purposes. As an experimental process model project, no approved budget was provided.

3.4 DATA ANALYSIS

Data analysis will consist primarily of comparisons between projected schedules and project estimates based on selected resources and target dates. Evaluating the operational performance of the experimental process model with a focus on schedule and cost parameters, through the P-401 Beta Test case and again with the P-318 Trial Run case.

Evaluating the performance of the P-401 Beta Test and P-318 Trial Run cases by comparing schedule and cost outcomes between the projected and assumed/actual schedule, will provide essential data of key efficiencies, as well as, whether the cases provided quality specifications, which address initial concerns brought up by stakeholders within construction and materials departments, along with feedback by external stakeholders, like FAA. A key outcome would be an understanding of whether the final product prepared through the process model, is an appropriate representation of what stakeholders expect. In addition, a review of strategies applied in designing and implementing the experimental process model, like Kaizen (incremental, micro-improvements), Agile (fast, collaborative), with a Nemawashi approach of consensus building and stakeholder management focus, was successful.

4.0 DATA COLLECTION – OBSERVATIONS

4.1 EIGHT MILESTONES OBSERVED USING SIX CONDITIONAL PARAMETERS

Over a two year period, from 2017 to 2019, an update to the P-401 Asphalt Mix Pavement specification was underway in order to prepare a draft for FAA AC 10H review and approval. During that same two year timeframe, observational data collected for this project was categorized into eight milestones exemplifying the work underway at that time for the specifications update, while no formal updating process was actively in place.

Within these milestones, the observational data was further defined using six parameters:

- Date/Year – when milestone was observed
- Description – what type of work was occurring related to specifications updating
- Duration – how long did the milestone observation continue
- Lessons Learned – observable challenges or issues that occurred during the milestone
- Outcomes – was the work completed or delayed
- Key Observations – no process in place to support work

4.1.1 2017 TO 2018

Milestone 1 (2017): The first observational milestone was the design work for the Hooper Bay Airport Improvements project that was underway with an in-house DOT&PF design team. At that time, a specifications update consisted of one project design engineer working independently to prepare the project specifications to **meet FAA 10G compliance on a single project basis**. Work on the P-401 specification was already in progress.

Milestone 2 (2017-2018): In the 2017-2018 timeframe, the second observational milestone was the design work for the Toksook Bay Airport Improvements project that was underway with an in-house DOT&PF design team. At that time, a specifications update also consisted of one project design engineer working independently to prepare project specifications to **meet FAA 10G compliance on a single project basis.** Work on the P-401 specification was in progress.

Milestone 3 (2017-2018): The P-401 specifications update to 10G was underway when **a new DOT&PF-CR aviation specifications engineer was brought into the P-401 updating process work**. Meetings were held intermittently, stretching from one to potentially three hours without notice. Attendees

included regional specifications engineers as well as regional subject matter experts in the field of materials engineering, along with construction personnel

Milestone 4 (2017-2018): P-401 specification revision meetings provided key lessons learned, which shaped how future regional revision meetings would be conducted. In such large group distance meetings, utilizing teleconferencing systems, communication between parties along with the productivity of the meetings proved challenging.

Milestone 5 (2017-2018): The AASHTOWare (AWP) contracting software pre-launch work and launch statewide occurred during this time. Although it appeared that AASHTOWare and the DOT&PF SSAC were only linked peripherally, it became apparent through risk analysis that AWP and the SSAC were more closely interlocked by the nature of the pay items. Both the contract bid schedule and the specification pay items used the same pay items.

Contractors use pay items to track and quantify materials during construction. At the time AWP was launched, DOT&PF had worked to update the previous pay item numbering to a newer system to accommodate AWP. However, the connection with pay items numbers stored in AWP and FAA technical specifications, is if FAA were to change a specification item number, it would require the AWP numbering to change as well.

Using risk analysis, item numbers with a potential to change were identified in the FAA specifications. These pay items were proactively revised by coordination with FAA, to ensure less conflict with FAA and better assimilation with the AWP numbering.

4.1.2 2018 TO 2019

Milestone 6 (2018-2019): On December 21, 2018, **the FAA AC 10G version was replaced with the AC 10H version. The P-401 10G draft version submitted to FAA was rejected**, to be updated to the 10H version. This work would amount to another full rewrite of the P-401 specifications. **Central Region offered to take lead in preparing the 10H draft.** This milestone became the critical opportunity to beta test an experimental process model developed from an innovation to the plans, specifications, and estimate (PS&E) design review process.

4.1.3 2019 TO 2020

Milestone 7 (2019): Refocusing the P-401 subject matter expert (SME) team, preparing a revised schedule for P-401 10H draft completion, and implementing PMI best practices to initiate and plan a refined experimental process model, P-401 10H draft for regional review was completed within a year. **A project**

management plan (PMP) was prepared to structure the development and refinement of an experimental process model implemented with the P-401 Beta Test case.

Milestone 8 (2019-2020): In December of 2019, the Central Region Construction section requested a full rewrite of the P-310 Foamed Asphalt Stabilized Base Course specification due to lessons learned on previous construction projects. P-310, renumbered to P-318, was developed using the experimental process model and named for the purposes of this study, **P-318 Trial Run case**.

Concurrent to P-401, for this case, an even smaller SME team was established, only 2-3 team members to streamline the process. Weekly SME team meetings were held with weekly target revision goals, so every meeting met for a shorter timeframe in comparison to the P-401 Beta Test case, with even shorter revision target dates. The P-318 Trial Run case incorporated Agile assumptions and maintained stakeholder engagement with key construction and materials SMEs. A P-318 draft specification was prepared within two months and submitted to FAA for review and approval within three months.

5.0 DATA ANALYSIS

5.1 PROCESS SCHEDULE: ESTIMATED VS. OBSERVED ACTUAL

To evaluate the performance of the experimental process model, the estimated process schedule was compared against the observed actual schedule (Appendix F). In an effort to determine whether efficiencies and target goals occurred using the structured experimental process model approach, monitoring the schedules closely any project delays, or anticipated long lead activities, provide critical insight to managing the P-401 specification draft final deliverable through this initial trial, or beta test case.

The estimated, or projected P-401 schedule, and the observed actual, or to-date, P-401 schedules were compared beginning in 7/17/19. Ten review meetings were schedule between July and November of 2019. In that timeframe, the P-401 SME team met all scheduled target dates for each working session meeting. This allowed key work to continue, and essential progress to build momentum in completing a draft.

After six months of scheduled meetings, the P-401 SME team remained close to schedule goals, slipping the scheduled target of a P-401 draft review after comments by only 12 days from the original projected schedule. Delays occurred due to the December holidays, which were initially accounted for. However, changes with individual team member work priorities extended the restart of the working sessions an additional 41 days beyond the estimated schedule.

By January 2020, the P-401 SME team maintained a revised schedule until March, 2020. In that time frame, the P-401 draft was submitted to the DOT&PF Statewide office for regional distribution and review. Using change management principles to maintain a continued structure through the experimental process model schedule adjustment, the P-401 draft received review comments from all regions, then review comments were addressed, and the P-401 draft was revised and comments adjudicated. Using additional project management strategies of stakeholder engagement and scope management, the P-401 SME team met their target to submit a P-401 draft package to the DOT&PF Statewide office for regional distribution on May 5, 2020. Following the experimental process model workflow (Figure 3), the next stage of the P-401 Beta Test case will be an FAA submittal, with anticipated approval in mid-June, 2020.

Concurrent to P-401, the P-318 Trial Run case, an even smaller SME team was established, with only 2-3 team members to streamline the process. Weekly SME team meetings were held with weekly target revision goals, so every meeting met for a shorter timeframe in comparison to the P-401 Beta Test case, with even shorter revision target dates. The P-318 Trial Run case incorporated Agile assumptions and maintained stakeholder engagement with key construction and materials SMEs. A P-318 draft specification

was prepared within two months and submitted to FAA for successful review and approval within three months.

5.2 PROCESS COST: ESTIMATED VS. OBSERVED ACTUAL

An initial project budget analysis was conducted during implementation. Initial assumptions provided a basis for a cost comparison. However, budget assumptions in unit labor rates were hypothetical. Use of the cost comparison was to provide a cost analysis against the model. Actual unit labor rates were not available for this study. Table 5.2-1 provides initial process model budget assumptions.

Table 5.2-1: Process Model Project Budget Assumptions

Assumption Description	Assumption Value
Project Start	8/26/2019
Project End	4/13/2020
Project Duration (days)	231
Project Duration (weeks)	33
Project Labor Estimate (hours/day)	2
Project Labor Estimate (hours/week)	10
Project Labor Estimate Total (hours)	330

Based on Table 5.2-1 initial assumptions, the rough order of magnitude (ROM) labor cost estimate for the DOT&PF-CR Specifications Engineer to prepare and execute a process model and guidance, using P-401 as the Beta Test case, was roughly 330 hours within a range of $20,000. Although, the process guidance was de-scoped for the purposes of this study and in the interest of meeting a task priority of FAA approval for P-401. The budget assumption reflects a schedule range that was near the length of time to the actual observed schedule, clearly highlighting how scope management can closely reach projected targets.

For an initial P-401 SME team assignment, resource allocation would come from the technical engineering staff in materials, construction, and design sections. The assumed average working group composite hourly rate of $55/hour (hr) is a blended rate, accounting for a hypothetical range of hourly rates per individual SME (technical group) member. Table 5.2-2 provides a working group assignment, with average utilization rates, or hours per week (wk), over projected work and cost assumptions.

Table 5.2-2: Process Model Initial Working Group Hourly Cost Assumptions

Working Group Assignment (Internal DOT&PF)	Average (hrs / wk)	Projected Work (hrs)	Projected Cost ($)
Central Region Aviation Section Chief	2	184	$11,385
Central Region Construction Chief	2	154	$9,735
Northern Region P-401 Subject Matter Expert	2	108	$6,600
Southcoast Region Specifications Engineer	2	108	$6,600
Southcoast Region PM	2	108	$6,600
Central Region Materials Engineer	4	186	$11,495
Central Region QA/QC 1	4	154	$9,735
Central Region QA/QC 2	4	154	$9,735
Statewide Specifications Engineer	10	108	$6,600
Central Region Specifications Engineer	10	252	$15,345

The P-401 SME team is comprised of the DOT&PF-CR Aviation Section Chief, Construction Chief, Materials Engineer, QA/QC staff, and Aviation Specifications Engineer. Additional working group assignments listed in Table 5.2-2 indicate regional staff who will be allocated to support the regional review and overall completion of the P-401 draft for FAA submittal.

Table 5.2-3 and Figure 7 provide an overall projected cost total of $102,245 over 1,658 labor hours to complete the P-401 Beta Test case scenario by March 17, 2020. For a focused cost management strategy, attention was placed on allocation of hours to personnel with lower labor rates, and minimizing extended periods of inactivity with the working group. Tracking the cumulative and actual costs per task would also provide critical insights into the overall cost model.

Table 5.2-3: Process Model Initial Working Group Project Cost Assumptions

Assumption Description	Assumption Value
Working Group Meeting Start (Milestone)	7/17/2019
FAA Approval (Milestone)	3/17/2020
Duration (months)	8
Labor Estimate (hours/day), minimum	2
Labor Estimate (hours/week), maximum	10
Projected Hours Total:	**1,658**
Projected Labor Cost Total:	**$102,245**

Figure 7: Projected Cost Overview

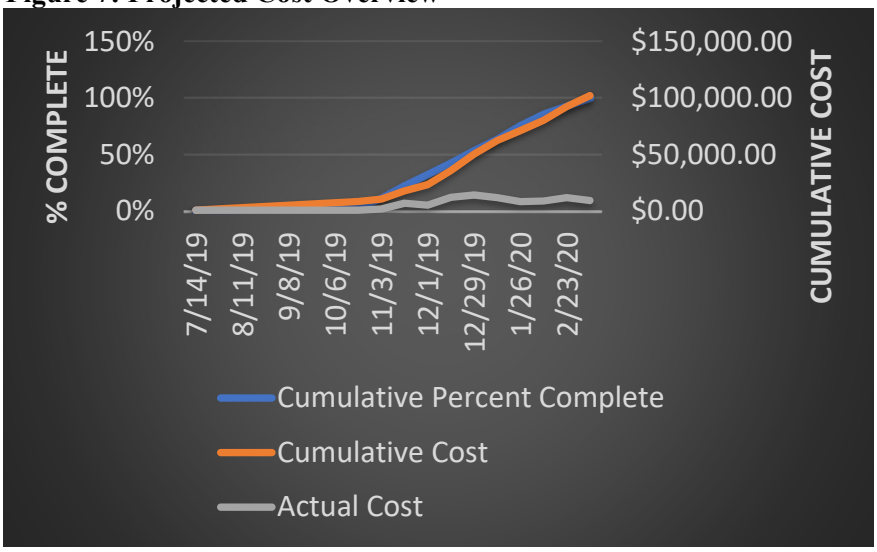
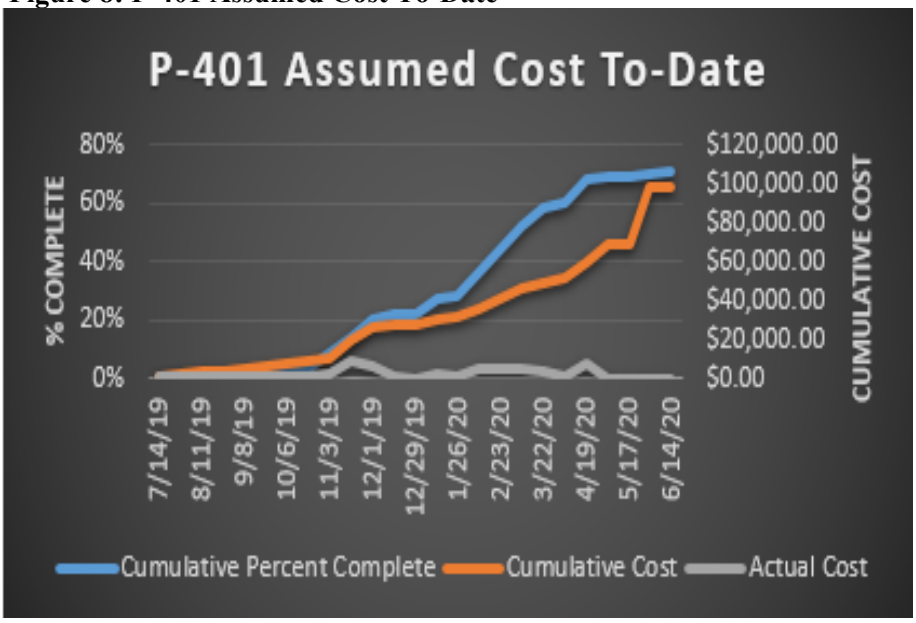


Figure 8 provides a to-date range of cost based on meeting observed actual project target goals. In the case of the assumed cost to-date of $98,720 presented in Figure 8, the project target completion was only at 72% complete. The expected total cost for the process model completion in June, 2020, is $138,620. The indicators for Figure 8 assumes ranges closer to actual targets met during the process model case study of the P-401 draft submittal to Statewide. In this case, the overall cost to complete the work ($138,620) exceeds the initial model estimate ($102,245) by only $36,375.

Figure 8: P-401 Assumed Cost To-Date



No process costs were analyzed for the P-318 Trial Run case. Minimal staffing reduced the overall labor costs. Therefore, with a more streamlined Agile approach, with a key focus on stakeholder engagement, higher efficiency was attained during this case, with project completion in less time.

6.0 RESULTS, RECOMMENDATIONS, AND LESSONS LEARNED

6.1 RESULTS

In a review and analysis of the P-401 Beta Test and the P-318 Trial Run cases, using the parameters of cost and schedule target goal achievement, both P-401 and P-318 cases indicate evidence that use of the experimental process model provides a more structured workflow overall. With a general schedule comparison (Figure 9) of P-401 that was projected in July of 2019, and the to-date schedule, a margin of three months may indicate inefficiencies as yet unaccounted for in the process model. However, in the overall case, against the actual experience revising specifications with no process in place, the experimental model suggests a success rate of completion within one year of an initial full specifications revision. In the case of P-318, completion within three months was a favorable outcome for using the experimental process model.

Figure 9: Schedule Comparison

P-401 Projected Schedule

Assumption Description	Assumption Value
Working Group Meeting Start (Milestone)	7/17/2019
FAA Approval (Milestone)	3/17/2020
Duration (months)	8

P-401 To-Date Schedule

Assumption Description	Assumption Value
Working Group Meeting Start (Milestone)	7/17/2019
FAA Approval (Milestone)	6/18/2020
Duration (months)	11

Ideally, more trial cases may identify additional efficiencies that may reduce the duration of revising specifications even more. In both cases, the process model, or change effort, was aligned with a specific mission key to the organization's goals to comply with FAA AC 10H. Focusing on sustained stakeholder engagement/management, scope management, and cost management, the experimental process model maintained a needed structure to the overall work, missing from past attempts to update specifications.

Evaluating the P-401 and P-318 cases against their projected schedules and cost models provides validation that the experimental process achieved a measured success rate in both cases. In a comparison of the P-401 10G version draft development duration (approximately two years) and the 10H version draft development duration, the experimental process model is tracking to complete full FAA approval within one year. This result is significant in continuing the model development.

6.2 RECOMMENDATIONS

- Continue to refine the specifications updating process model to a final **approved** version.
- Continue to refine the **project management plan (PMP)** prepared with the project to accompany the formal updating process.
- **Implement** the experimental process model on each successive specification that still needs to be approved, for better efficiency and structure overall.
- **Focus** on stakeholder management as a key priority; communication is a fundamental necessity to the overall success of implementing the updating process for future compliance efforts. Stakeholders are key to implementing this change, and implementing this new process.
- **Prepare a project schedule** to maintain a structure to the overall goal of updating specifications to meet FAA compliance today and in the future.
- **Change** in a large government organization, like DOT&PF, must be made incrementally, not a whole change in one leap, but in small degrees. Small micro-improvements will be more successful, such as innovating an existing design process into the specifications revision model, over creating a whole new process without an existing context of trained users.
- **Reach out** to organization leadership early in the process model implementation to identify concerns and pathways forward, and build support from the top.
- **Consideration** how to address SME design consultants for future specifications updates, if a separate procurement strategy may need to be prepared.

6.3 LESSONS LEARNED

Use of risk analysis is an effective strategy to identify potential influences against a project that may negatively impact the overall schedule, and delay completion. However, risk analysis may also identify previously unaccounted for opportunities in the project to streamline efforts, or uncover potential resources. However, in the case of a pandemic, basic elements of project management like discipline and commitment, sometimes make up much more than formulas. Take the time to fully research the scope of work against the projected schedule, and the needed resource capacity to complete the project. When it may appear the resource is overcapacity, learn to reach out for additional support, and ask for help.

Building a capstone project using an existing work project will take a great deal of focus, and additional work to refine the scope to meet a two-semester target schedule for completion.

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APPENDICES

APPENDIX A

DOT&PF SSAC Frontmatter

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

STANDARD SPECIFICATIONS
FOR
AIRPORT CONSTRUCTION

PROJECT NAME
PROJECT NUMBER

(Advisory Circular 150/5370-10H, Standards for Specifying Construction of Airports, as modified, and approved by the Federal Aviation Administration for Airport Improvement Program contracts in Alaska)

Revised 12/21/18

US Customary

NOTE: Special Provisions for each project are marked as changes to the text of the Standard Specifications. Deleted text is identified by strikethrough. Additions are underlined.

CONTENTS

GENERAL PROVISIONS

DRAINAGE

FENCING

CONTRACTOR FURNISHED SERVICES

LIGHTING & ELECTRICAL

EARTHWORK

AGGREGATE BASE & SURFACE COURSES

ASPHALT STABILIZED AND TREATED BASE COURSES

FLEXIBLE SURFACE COURSES

RIGID PAVEMENT

MISCELLANEOUS

STRUCTURES

TURFING

APPENDICES

APPENDIX B

Project Management Plan (PMP)

Alaska Department of
Transportation & Public Facilities

PROJECT MANAGEMENT PLAN

DEVELOP AND STANDARDIZE THE DOT&PF STATEWIDE AVIATION SPECIFICATIONS UPDATING PROCESS

Prepared By

Virginia J. Groeschel, E.I.T.
Specifications Engineer

DOT&PF Central Region, Design & Engineering Services
Aviation Design Section

December 2019

ALASKA DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
(DOT&PF)

PROJECT MANAGEMENT PLAN

DEVELOP AND STANDARDIZE THE DOT&PF STATEWIDE AVIATION SPECIFICATIONS UPDATING PROCESS

In coordination
with:

University of Alaska Anchorage
Master of Science in Project Management Program
Project Management Department
College of Engineering

Alaska Department of
Transportation and Public Facilities

Errata Sheet for the PMP to Develop and Standardize the DOT&PF Statewide Aviation Specifications Updating Process

Last Update: 02/14/2020

This errata sheet logs content errors and required updates identified after the PMP was prepared on December 2, 2019. These errors have been corrected in the current updated PMP.

#	Location in Document	Description of Correction	Rationale	Date Error Corrected
1	Section 1.0	Relocated 3rd paragraph to 1st paragraph and removed reference to 2015 update date.	Moves PMP premise statement at the top and removes incorrect date of start of specs update.	2/14/2020
2	Section 1.5	Added bold text to highlight main enterprise environmental factors	Emphasizes key factors, so reader identifies factors quickly	2/14/2020
3	Section 2.1	Revised to include PS&E design review process, and proposed specifications review and update process	Clarifies steps for updating specifications.	2/14/2020
4	Section 2.1	Revise 2.1.2 scope of work to – Preparing "draft" process guidance "outline"	Descoping work to meet final deliverable target dates, while still providing quality product.	2/14/2020
5	Section 3.2	Revised to add PPMs 5 – 9	Includes final steps to show project completion	2/14/2020
6	Section 4.1	Revised and removed subsection 4.1.1, where cost comparison is discussed between monitored and unmonitored costs.	Removed discussion of unmonitored costs to focus on improvement strategies. Unmonitored costs may not be quantified.	2/14/2020
7	Section 4.2	Removed all hypothetical budget analysis instances of a " future update to the DOT&PF SSAC WITHOUT a planned process"	Removing the budget analysis focuses on a more positive trend of improvement and cost savings, where implementing a process will indicate improved resource and cost management.	2/14/2020

8	Section 4.5	Removed unmonitored cost analysis and discussion.	Removed as costs may not be quantified, and existing discussion focuses on attainable strategy.	2/14/2020
9	Section 5.2	Added the tracking spreadsheet to monitor the status of all 119 specifications.	Describes a newly implemented innovation to the update system plan.	2/14/2020
10	Section 6.3	Corrected reference to Table 6.3-4.	Correction	2/14/2020
11	Section 9.0	Corrected reference to Section 6.4.	Correction	2/14/2020
12	Section 10.1	Added Figure 10.1-5: DOT&PF Statewide Organization Chart and Figure 10.1-6: DOT&PF Central Region Aviation Section Organization Chart	Clarifies the complex government system of internal stakeholders to review and comment on specifications.	2/14/2020
13	Appendix D	Change Management Forms: Removed Decision Log and Issue Log Forms from Appendix D	Key information for PM to track project changes provided on Change Request and Change Log forms.	2/14/2020

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

Project Management Plan

Project Title: **Develop and Standardize a DOT&PF Aviation Specifications Updating Process**

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Date: December 1, 2019
Revision History:

Version	Revision Date	Editor	Revision Description
0.0	September 27, 2019	Virginia J. Groeschel	Initial DRAFT Plan / TOC
1.0	October 18, 2019	Virginia J. Groeschel	Updated DRAFT PMP
2.0	November 9, 2019	Virginia J. Groeschel	Refined DRAFT PMP
3.0	November 22, 2019	Virginia J. Groeschel	FINAL Draft PMP
4.0	December 1, 2019	Virginia J. Groeschel	FINAL PMP
5.0	February 14, 2020	Virginia J. Groeschel	Updated PMP

Concur:

Virginia Groeschel, E.I.T., Specifications Engineer, Central Region Date

Concur:

Luke Bowland, P.E., Aviation Design Section Chief, Central Region Date

Approved:

John Linnell, P.E., Preconstruction Engineer, Central Region Date

1.0 INTRODUCTION

This project management plan (PMP) will provide a framework to develop a specifications updating process, along with a process guidance, for future DOT&PF SSAC compliance updates. The DOT&PF SSAC frontmatter listing all specification sections is provided in Appendix A.

In an effort to maintain compliance with the Federal Aviation Administration (FAA) Advisory Circular (AC) *150/5370-10H – Standard Specifications for Construction of Airports ("10H").* the Alaska Department of Transportation and Public Facilities (DOT&PF) has been working to update all one hundred and seventeen sections of the DOT&PF Standard Specifications for Aviation Construction (SSAC). This specifications update has become a major undertaking, encompassing regional and Statewide specifications teams, design and construction teams, as well as technical engineering working groups across DOT&PF. In addition to DOT&PF staff, design engineering consulting firms have also contributed to this specifications update work.

In the past several months, the priority has been elevated to ensure the timely completion after the roll out of FAA's AC 150/5370-10H on December 21, 2018. Aviation specifications are an essential component of the contract documents for aviation construction projects. They support the construction of vital aviation infrastructure across Alaska.

1.1 PURPOSE AND NEED

The purpose of this project is to develop a streamlined specifications updating process, and process guidance, to implement as a strategically planned workflow on future DOT&PF SSAC updates. This project is needed because no formal DOT&PF SSAC updating process guidance is currently available. Creating a sustainable and repeatable process to address future FAA compliance updates will enhance the cost, scope, schedule, risk, and quality constraints to the overall work. The focus will be on developing strategies and collecting best management practices (BMPs) currently in use, for effective and efficient FAA approval of DOT&PF SSAC. The process guidance will outline and document these strategies and BMPs.

1.2 INTEGRATION MANAGEMENT

For overall project coordination, utilizing integration management will develop these key components:

1) A Project Charter

2) A PMP

3) Project Work Processes (direct, manage, monitor, control)

4) Change Controls

5) Project Closeout Process

1.3 PROJECT CHARTER

The project charter is provided in Appendix B.

1.4 PROJECT MANAGEMENT PLAN

This PMP will support the development of a systematic approach to the ongoing specifications updates, as well as provide a basis to develop a future guidance that streamlines the specifications update-review-approval process. The DOT&PF Central Region (CR) Specifications Engineer will act as project manager (PM) for the specs updating process development, utilizing this PMP to maintain overall coordination and organization.

1.5 ENTERPRISE ENVIRONMENTAL FACTORS

This updating process development project must consider enterprise environmental factors within the existing DOT&PF system. In order to develop a resilient and sustainable framework for updating specifications, consideration must be made to identify these factors. Several factors include:

1) **When FAA periodically updates their AC 150/5370-10 with errata**, **DOT&PF aviation specifications must also be updated to maintain compliance**. It is the main reason to have a process in place to handle future major and minor specifications updates.

2) **With the launch of AASHTOWare (AWP) software within DOT&PF**, which is used as a contracts and bidding platform, **close coordination with the specifications update is essential in creating AWP pay items** for the Engineer's Estimates (EE). The EE pay items must also be shown in the plans and specifications. Constraints in AWP must be carefully considered prior to creating any EE pay items, as it could influence the specifications. Potential impacts will be mitigated with additional sub-processes to requesting and creating pay items within AWP. Additional coordination within the AWP Module Administrators Team, which covers all the regions and meets regularly, will also provide an essential communication channel during the specifications update.

3) **DOT&PF regions and specifications teams are geographically separated** by water and hundreds of miles land. Effective communication between teams is critical and relies heavily on teleconferencing and web-based teaming software. Tailoring our existing system to meet challenges to reviewing and discussing specifications during distance meetings must be a priority.

4) **Updating the aviation specifications for FAA compliance must not delay a project's PS&E delivery schedule**, so coordination with internal/external design teams using the existing aviation specifications must be part of the process. DOT&PF's primary mission is to "Keep Alaska Moving through service and infrastructure", so delivering programs (i.e., advertising projects for construction) is an essential priority. Construction projects rely on plans, specifications, and estimates (PS&E).

5) **A major factor affecting DOT&PF SSACs is the physical environment in which construction occurs** for these airports. Arctic conditions are not addressed in FAA's AC, so tailoring the specifications to existing arctic ground and weather conditions does have an impact to construction projects.

6) **One significant aspect of DOT&PF Aviation project construction is the remoteness** of many of the project construction site locations. Not only is mobilization of equipment a challenge for the Contractor, but addressing lack of material resources on site, or near the site. These remote conditions directly affect the nature of the specifications, and a primary reason for language deviation from FAA AC 10H.

2.0 SCOPE MANAGEMENT

To successfully complete this updating process development project, managing the scope ensures that all the work, and only the work is included in the scope. An important aspect to scope management is for the PM to define and control what is and is not part of this project. Key elements in scope management encompass:

1) Creating a ***scope management plan*** – documenting how the project scope will be defined, validated, and controlled.

2) Collecting ***requirements*** – a process to meet project objectives by determining, documenting, and managing stakeholder needs and requirements.

3) Defining ***scope*** – identifying tasks and activities specific to the work and preparing a detailed description of the work.

4) Creating a ***work breakdown structure (WBS)*** – subdividing the project deliverables into smaller, manageable segments.

5) ***Validating*** scope – a formal acceptance process of the completed project deliverables.

6) ***Controlling*** scope – a project status monitoring process, that also manages changes to the scope baseline.

2.1 SCOPE OF WORK

The preliminary scope of work for developing and standardizing the DOT&PF SSAC updating process project includes:

1) ***Developing a process*** for updating future DOT&PF SSAC for FAA compliance and approval.

2) ***Preparing a draft process guidance outline*** to standardize the DOT&PF SSAC for FAA compliance and approval.

Additional work includes outlining BMPs and strategies used in the DOT&PF Design Review process, along with preparing a tentative draft review schedule, and implementation documents, such as checklists to the overall process and guidance development. A cost basis and benefit analysis will be provided with the PMP to identify efficiencies and added value to implementation of a standardized updating process.

The updating process will model a typical DOT&PF Design Review process. A design review follows these steps:

1) Prepare draft plans, specifications, and estimate (PS&E)

2) Submit PS&E Draft for internal review, allow for three weeks review time

3) Prepare online system to collect and consolidate PS&E review comments

4) Collect PS&E review comments and schedule review meeting

5) Conduct review meeting to discuss and address comments

6) Revise PS&E set based on review comments

7) Conduct final PS&E check set review for authorization and signature

8) Submit to FAA for concurrence and approval

For the specifications updating process:

1) Identify subject matter experts and support teams to prepare updated specifications draft

2) Prepare draft updated specifications

3) Submit draft specifications for internal regional and statewide review, allow for three weeks review time

4) Prepare online system to collect and consolidate review comments

5) Collect review comments and schedule review meeting with core updating team (comprised of CR Aviation Section Chief, Statewide Specifications Engineer, CR Specifications Engineer, subject matter experts, as needed)

6) Conduct review meeting to discuss and address comments

7) Revise specifications based on internal review comments and coordinate changes with AASHTOWare program (AWP) pay items, as needed

8) Conduct final check set review

9) Submit to FAA for concurrence and approval, along with modifications of standards (MOS) justifications

10) Collect FAA review comments and revise specifications with MOS

11) Resubmit to FAA for final approval

12) Prepare DOT&PF Chief Engineer's Directive to post FAA approved specifications

13) Distribute updated and FAA approved specifications to DOT&PF and consultants

The updating process will also account for ongoing corrections and revisions by using errata sheets. The errata sheets updating subprocess will continue more frequently, collecting corrections/revisions monthly. Once collected, the errata sheets, revised specifications, and MOS will be submitted to FAA for more frequent revision, review, and approval. This additional subprocess provides a more continuous and collective review of specifications, implementing a more streamlined approach to the overall updating process moving forward.

The update process guidance will support internal coordination for draft reviews, along with providing formal process documentation. In order to track the project scope requirements, a requirements traceability matrix (RTM) will be part of this PMP. The project RTM will support project scope tracking, as well as tracking project deliverables. An RTM is provided in Appendix C.

2.2 CHANGE MANAGEMENT PLAN

To account for changes in the updating process development project and scope of work, change control strategies will be utilized. The PM will be responsible for tracking and managing changes within the project. However, the project sponsor will have direct oversight to the change process.

2.2.1 CHANGE MANAGEMENT APPROACH

Internal change management will be initiated by the PM when the current plan or methods can be improved. If a change to the project impacts the cost or schedule by 10% or less of the task, no approvals will be required. If a change to the project impacts the cost or schedule by 10% or more, the change management process will be implemented.

Schedule changes will be considered a high risk if they impact the critical path and forces schedule delays. The PM will review and approve any major changes to the schedule, with oversight by the Project Sponsor, or DOT&PF-Central Region (CR) Aviation Section Chief.

2.2.2 CHANGE CONTROL PROCESS

For the change management plan, changes will be identified and formally documented with a change request and change management log. Changes will be evaluated prior to any acceptance

or implementation of change decisions made. In the case of process implementation changes, a different methodology will be utilized, where discussion with development teams will take place prior to process changes. The change control process begins with a change request, evaluation, and decision of accept, defer, or reject change. Changes will be tracked and maintained with a Change Management Log.

When changes to the actual updating process are identified, a discussion with smaller group of key stakeholders will take place. With focused discussions among regional and statewide specifications teams, an agreement will be made prior to implementation of process changes. Change Management Log, Change Form, Decision Log, and Issue Log are provided in Appendix D.

3.0 TIME MANAGEMENT

To manage the project schedule from the initiating-planning phases to implementation-monitoring-closeout phases, a schedule was created using Microsoft (MS) Project. The key components to time management include developing a schedule, defining activities and tasks related to the updating process development, and creation of a process guidance. Once activities are defined, they are sequenced by documenting relationships among the project activities. It is an ongoing and iterative process to analyze the schedule, make changes as necessary, and monitor the schedule, in order to control any deviations to the estimated timeline. Additional analysis of activity/task resources and duration estimates may change depending on the level of detail provided in the scope of work.

3.1 PROJECT SCHEDULE

Use of a project schedule will allow direct oversight of work tasks/activities and can provide efficient resource allocation and asset identification information. Monitoring closely any project delays, or anticipated long lead activities, will provide critical insight to managing the project final deliverables. The proposed project schedule is provided in Appendix E.

3.2 SCHEDULE OF MILESTONES

The schedule of project progress milestones (PPM) is provided in the project schedule. An outline is as follows:

1) PPM 1: All 75% Draft Documents submitted by 9/12/19

2) PPM 2: All 80-90% Draft Documents submitted by 10/7/19

3) PPM 3: All 95% Draft Documents submitted by 10/18/19

4) PPM 4: All Final Documents submitted by 11/22/19

5) PPM 5: Updated documents with data submitted by 1/24/20

6) PPM 6: Updated documents with validated data submitted by 1/28/20

7) PPM 7: Go/No-Go decision for research by 3/20/20

8) PPM 8: Draft presentation due by 4/10/20

9) Final presentation of project deliverables on 4/20/20

3.3 WORK BREAKDOWN STRUCTURE (WBS)

Use of a WBS allows the direct link of tasks with overall project deliverables. Providing a graphic, which shows the information of what tasks are listed to the final deliverables. A WBS is provided in Appendix F.

4.0 COST MANAGEMENT

Cost management involves processes used to control costs, so this project can stay within an approved budget, providing standard procedures and following established policies for project funding. A plan for cost management includes estimating costs, determining a budget, and monitoring/controlling costs.

4.1 PROJECT BUDGET ANALYSIS

A project budget analysis will be conducted during implementation. Initial assumptions to produce an update process and guidance is outlined in Table 4.1.1. The primary work to develop a process and guidance will be conducted by the DOT&PF Central Region Specifications Engineer. The rough order of magnitude (ROM) cost estimate for the work would be about **$20,000**.

Once work begins, additional staffing resources may provide production assistance, and potentially affect cost. Further analysis will be conducted to better identify whether additional personnel could provide an overall budget savings.

Table 4.1-1. DOT&PF SSAC Update Process Development Project Budget Assumptions

Assumption Description	Assumption Value
Project Start	8/26/2019
Project End	4/13/2020
Project Duration (days)	231
Project Duration (weeks)	33
Project Labor Estimate (hours/day)	2
Project Labor Estimate (hours/week)	10
Project Labor Estimate Total (hours)	330

4.2 UPDATE PROCESS BUDGET ANALYSIS

In the case where a cost analysis is conducted:

1) **A future update to the DOT&PF SSAC WITH a planned process**,Using the *P-401 Asphalt Mix Pavements* specification update to 10H as an example, a projection can be made for the work duration, technical working group, and additional parameters (Table 4.2-2).

Table 4.2-2. P-401 Update Initial Working Group Project Assumptions

Assumption Description	Assumption Value
Working Group Meeting Start (Milestone)	7/17/2019
FAA Approval (Milestone)	3/17/2020
Duration (months)	8
Labor Estimate (hours/day), minimum	2
Labor Estimate (hours/week), maximum	10
Projected Hours Total:	**1,658**
Projected Labor Cost Total:	**$102,245**

Assumptions highlighted in Table 4.2-3 account for an initial P-401 Working Group assignment of technical engineering staff and other personnel. The assumed average working group composite hourly rate of $55 / hour (hr) Is a blended rate, accounting for the range of hourly rates per individual technical group member.

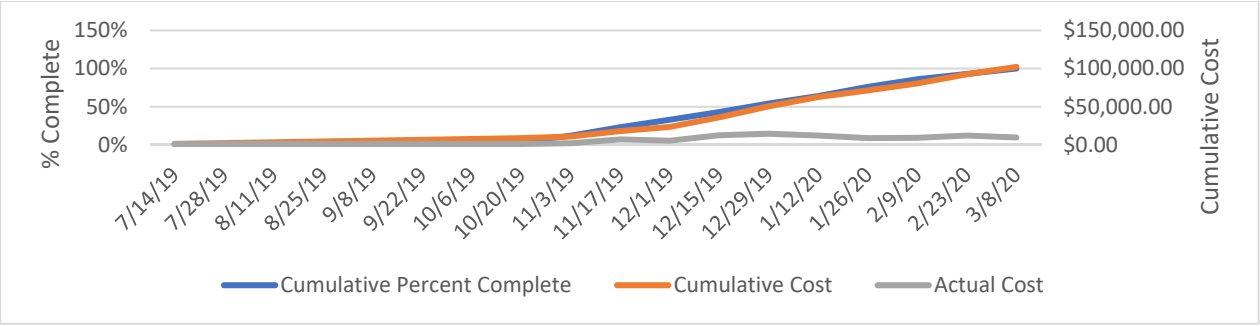
Table 4.2-3. P-401 Update Initial Working Group Hourly / Cost Assumptions

Working Group Assignment (Internal DOT&PF)	Avg (hrs / wk)	Projected Work (hrs)	Projected Cost ($)
Central Region Aviation Section Chief	2	184	$11,385
Central Region Construction Chief	2	154	$9,735
Northern Region P-401 Subject Matter Expert	2	108	$6,600
Southcoast Region Specifications Engineer	2	108	$6,600
Southcoast Region PM	2	108	$6,600
Central Region Materials Engineer	4	186	$11,495
Central Region QA/QC 1	4	154	$9,735
Central Region QA/QC 2	4	154	$9,735
Statewide Specifications Engineer	10	108	$6,600
Central Region Specifications Engineer	10	252	$15,345

Note: Assumed Estimated Average Working Group Composite Hourly Rate = $55/hr.

Figure 4.2-1 illustrates the P-401 Update Cumulative Percent Complete, Cumulative Cost, and Actual Cost. The estimated P-401 approval schedule (Appendix G) sets the baseline for cost by resource allocation, which includes time for review meetings, editing, review, and discussion.

Figure 4.2-1. P-401 Update Projected Cost Overview Graph



Where the graph takes a dramatic shift upwards in cumulative cost, the review process expands to include all the regional and Statewide technical personnel.

The draft process follows a typical design review, with a few additions to include the DOT&PF Northern, and Southcoast Regions, as well as Statewide reviews and comments. Along with a projected schedule, a P-401 approval WBS (Appendix H) is also provided.

4.3 PROJECT ESTIMATE SUMMARY

For a preliminary project estimate, general assumptions identify an initial cost of work to prepare a process and guidance document, as shown in Table 4.1-1.

4.4 PROJECT STAFFING ESTIMATES AND COST SAVINGS ANALYSIS

The primary process and guidance development work will be conducted by the CR Specifications Engineer. For the purpose of a ROM estimate, a composite rate of $55/hr is also used. In cases where additional staff may be needed, or when design consultants provide their expertise, the same hourly rate will apply.

4.5 UPDATE PROCESS STAFFING ESTIMATES AND COST SAVINGS ANALYSIS

Given initial assumptions on hours of work per week as well as hourly rate, a base rate ROM project estimate per person can be initially derived. When more information can be gathered through implementation, a much more refined comparison can be conducted.

In the initial model, a review of the projected work hours identifies a potential opportunity to review tasks assigned to higher level team members (e.g., Aviation and Construction Section Chiefs). In reviewing the Central Region Specifications Engineer projected hours and costs, a potential opportunity may be to adjust the plan to include additional support staff.

Identifying opportunities to redistribute tasks early allows for a strategic planning opportunity to incorporate additional staff for shorter durations, reducing overall costs and delays in waiting on deliverables from the CR Specifications Engineer working alone.

In discussing the updating work, the P-401 case estimates **$102,245 of cost projected over eight months.** Other technical specifications requiring subject matter expert groups drafting and reviewing specifications could be modeled after P-401 both logistically and by cost projection. P-401 is considerably one of the most technical of the Aviation specifications and provides the most demanding cost model to track.

The goal of this project is to ultimately provide a product that reduces overall cost, and accounts for steps and tasks that can be monitored and controlled, which results in value added to the organization, along with realized cost savings. Preparing a cost baseline for both the primary work of developing a process, and the projected work to update specifications will provide better constraints to build a more refined budget for both. It will be important to track both, as a future budget analysis will offer insights to potential risks and opportunities to DOT&PF.

5.0 QUALITY MANAGEMENT

The project's quality management will follow a plan of assurance and control within DOT&PF. The PM will be directly responsible for ensuring quality in preparing final deliverables. Quality standards will meet, or exceed, DOT&PF guidelines. To ensure quality standards are met, a product review process will check the process and guidance deliverables, with scheduled review milestones at 75% complete, 85-95% complete, 100% Draft, and Final.

Project review milestones will be conducted through key internal departments/personnel.

Review comments will be adjudicated to maintain quality control on the final project deliverables.

5.1 QUALITY ASSURANCE

The project will follow DOT&PF's quality assurance standards and will be the responsibility of the PM. Reviews of the deliverables will be conducted, and review comments will be documented, similar to project design reviews.

5.2 QUALITY CONTROL

The project's quality control will be the responsibility of the PM. Review comments will be documented and discussed. Processes will be modeled and tested, with final recommendations to process improvements approved and incorporated into the process guidance. A spreadsheet is currently in use to track the status of all 119 specifications to FAA approval and posting.

6.0 HUMAN RESOURCES MANAGEMENT

6.1 PROJECT STAFFING MANAGEMENT PLAN

The primary staff working on the project will be the CR Specifications Engineer acting as PM for this work. Additional staff may be added, as needed. Acquiring staff familiar with the existing specifications updating work will add efficiencies that may provide a cost savings. However, minimal staff is assumed for this project work. Staffing needs will be assessed first, prior to scheduled work activities.

Additional staffing identified in activities will be planned and coordinated before schedule work begins. Support staff will be coordinated internally within DOT&PF, and CR Aviation Design Section, initially. If additional needs arise, steps to work with Statewide and regional staff will be discussed and coordinated. Existing staff with previous work experience in recent specifications updates will be prioritized first in requesting additional staffing support for the project, so minimal training will be needed. Once assigned to specific work tasks in the project, managing support staff will begin with providing the task scope, schedule, budget, and discussion of task deliverables.

6.2 PROJECT TEAM DEVELOPMENT

Building focused project teams is a real opportunity that is under serious consideration by the PM. Efforts will be made by the PM to identify areas within the project that would benefit from

focused project teaming. Acquiring a team would require coordination of existing staff and workload capacity. Planning future short duration teaming events to work on the project is essential to providing future efficiencies to the process.

Early inclusion of staff by the CR Specifications Engineer, to support the existing specs updating work, has been to essentially train and develop team members for future specifications updating work. Communicating closely with the different staff members, who are currently working on the existing specifications update, allows for discussion of what is working, and what could be improved, to develop BMPs and refine the process into a documented standard practice.

6.3 UPDATE PROCESS STAFFING MANAGEMENT PLAN

In the case where additional staff is already identified for the existing update work, the effort to acquire, develop, and manage staff new to the update process may not be time-intensive. This staffing plan will encompass the need to create subject matter expert teams to review specific technical specs.

Subject Matter Expert Teams, or Technical Working Groups, will comprise of DOT&PF Statewide and Regional staff, along with design consulting engineers (Table 6.3-4). Teams will comprise senior, to mid-level internal staff, and design consultants, who may already be familiar with the DOT&PF SSAC updating work.

Table 6.3-4. DOT&PF SSAC Update Proposed Technical Working Groups

Technical Working Group	DOT&PF Staff	Design Consultant Staff
Electrical Specifications, "L-Specs"	• Statewide Electrical Engineer • Statewide Specifications Engineer • Central Region Specifications Engineer • Central Region Aviation Section Chief	• Electrical Engineers from various design firms with electrical engineering expertise.
P-401 Asphalt Mix Pavements, "P-401"	• Central Region Materials Engineer • Central Region Construction Chief • Central Region Aviation Section Chief • Central Region QA/QC Personnel (2) • Central Region Specifications Engineer	• Open

Additional consideration on how existing aviation design staff can be sourced to work on updating specifications will need to be addressed. In cases when the specifications update workload flexes to require more support, staff will also be identified to handle the need.

Typically, the editing and revision phase of the specifications update work tends take the most effort. There is also the time involved to consider how certain FAA AC language may be applied to Alaska construction conditions, such as permafrost, or remote project locations.

6.4 CONSULTANTS AND PROCUREMENT

The staffing management plan must also address the use of design consulting firms with technical expertise and resources outside of DOT&PF, to work on the updating the electrical specs (i.e. "L-

specs"). Where there is an anticipated need for consultant expertise on the updating process, additional contractual options can be discussed. In cases where consultants are already on contract for design engineering, there may be an opportunity to laterally team with them to support the specifications update effort. It is not anticipated that consultants will be needed for the project of developing and preparing a process guidance. Procurement for consultants to work on this project is addressed in Section 9.1 of this PMP.

7.0 COMMUNICATIONS MANAGEMENT

To ensure all stakeholders are supported with timely information and progress updates to this project, a communications plan will be outlined that provides an appropriate level of attention. The PM is the central figure in communications and will act as the primary point of contact (POC) with stakeholders. The PM will report directly to the Project Sponsor, which is the CR Aviation Section Chief, for regular progress reports.

7.1 COMMUNICATIONS PLAN

Developing an appropriate approach and plan for how project communications will be handled, is based on the information needs and requirements of the project stakeholders. In managing and controlling communications, early identification of stakeholders and their interest in the project is a priority. For this project, a communications plan (Appendix I) will be provided.

The Communications plan will also focus on frequency of contact with stakeholders, and how a group, individuals, prefer to receive information and how they prefer to be contacted. Further clarification on stakeholder communication and management is discussed in Section 10.0 of this PMP.

7.2 MANAGE AND CONTROL COMMUNICATIONS

Managing communications with stakeholders regarding the project involves how the project information will be shared. The PM will meet regularly with the CR Aviation Section Chief to provide status reports on the project work progress. The frequency of status meetings will be every two weeks, initially. With other internal leadership within the CR Aviation Design Section, informal project status checks, or project dashboards, may be offered as requested during the project duration.

Typically, face-to-face briefings will satisfy other internal leadership. However, when a milestone status update needs to be provided to the whole CR Aviation Section, a group email will be used. At certain phases of project completion, a general request for review comments will be sent by email to the CR Aviation Section, other regions, and Statewide contacts.

To control communications, meeting notes, status reports, and emails will be archived in the project folder, with a communications log to be developed. Phone conversations will be documented and archived into the project folder. The PM will make an initial assessment on how frequently to communicate with stakeholders, and what information is appropriate to provide.

Project communications will be monitored and controlled through the project lifecycle, ensuring the PM meets the information needs of the project stakeholders.

8.0 RISK MANAGEMENT

The project risk management involves planning, identification, analysis, response, and monitoring and control of risks on a project. However, these process will be updated as the project progresses. The key elements to risk management include:

1) Identifying risks

2) Assessing risks

3) Planning risk responses

4) Monitoring and controlling risks

The objective of risk management is to increase the probability and impact of positive events and decrease the likelihood the impacts will adversely affect the project. Risk management deals with known and unknown risks. Known risks will be handled using key elements outlined above, while unknown risks will be managed with a general contingency approach.

8.1 PROJECT RISK ASSESSMENT MANAGEMENT (PRAM)

The PRAM model for risk management provides an integrated and systematic approach to risk assessment. This model creates a comprehensive and logical methodology to analyzing and assessing risk. The nine steps to the PRAM model are presented in Table 8.1-5.

Table 8.1-5. The Nine Phases of Project Risk Assessment Management (PRAM)

Risk Assessment Step	Brief Description
1. Define	Ensure project is well-defined.
2. Focus	Plan the risk management process as a project, as well as determine the best methods for addressing project risk, based on the project.
3. Identify	Assess the specific sources of risk at the beginning of the project.
4. Structure	Review and refine how project risk is classified.
5. Clarify ownership of risks	Distinguish between what project risks the organization is willing to accept, and what risks will be conveyed outside the organization.
6. Estimate	Develop a reasonable cost estimate of the impacts on the project of both the identified risks and proposed solutions.
7. Evaluate	Critically evaluate the estimate results and determine risk mitigation.
8. Plan	Produce a project risk management plan.
9. Manage	Monitor actual progress with the project and associated risk management plans.

Source: Project Management, Achieving Competitive Advantage 4th 2016, p261

8.2 RISK MANAGEMENT PLAN

The risk management plan will define how risk management activities are conducted for this project. This plan will ensure the visibility, degree, and type of risks can be handled with an appropriate level of response within DOT&PF. For the plan, the PM will create a risk register to identify risk and triggers.

Once identified, the probability and impacts of the risk will be defined. The PM will determine how and when to perform a quantitative and qualitative risk analysis. Once the analysis is completed, risk responses will be established. Risks and responses will be planned, monitored, and documented for change control within the project. The project risk register is provided in Appendix J.

8.3 RISK IDENTIFICATION

Initial risks were identified in the project risk register. However, as the project progresses, new risks may still be identified. This is an iterative process, and new risks will be included in the risk register for effective risk analysis. For this project, stakeholders will be encouraged to identify risks.

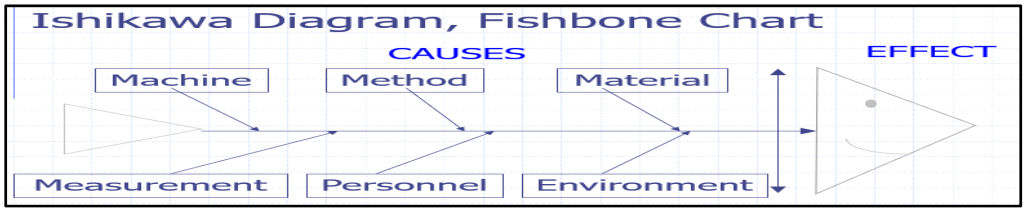
A risk breakdown structure (RBS) typically accompanies a risk register, and is a tool to not only identify, but also categorize various project risks. An RBS groups and organizes risk, defining the overall risk exposure to the project. The project RBS is included in Appendix J.

Some effort will be made to draw out risks by use of risk identification tools & techniques, such as a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis, along with brainstorming, interviewing, and root cause analysis. Diagramming techniques for cause and effect diagrams can be used and include the Ishikawa (or fishbone) diagram (Figure 8.3-2).

Used often in manufacturing and product development, an Ishikawa diagram outlines the different steps in a process, demonstrating where quality control issues might arise and then determining which resources are required. Initially, developing an Ishikawa diagram begins by asking the question of why something happened (e.g., Q: Why was the product launch delayed? A: Because the launch was waiting on a components order before shipping).

This technique of asking one question starts the process of identifying many possible causes to a problem on a project. The Ishikawa diagram is an essential visual tool for solving project problems on product development, and quality improvement.

Figure 8.3-2: Ishikawa, or Fishbone, Cause and Effect Analysis Diagram



Source: MSPM, PM601

For a SWOT analysis (Figure 8.3-3), the project is examined to broaden the perspective of identifying additional internal risks. The analysis identifies the organization's strengths and weaknesses, focusing on the project, DOT&PF, or Aviation Design section.

Based on the analysis, project opportunities arise from the organizational strengths, while project threats arise from organizational weaknesses. The analysis also looks at how strengths offset threats, and how opportunities may overcome weaknesses.

Figure 8.3-3: SWOT Analysis Diagram

	Helpful to achieving the project objective	**Harmful to achieving project objective**
Internal (attributes of organization)	**S**trengths	**W**eaknesses
External (attributes of environment)	**O**pportunities	**T**hreats

8.4 QUALITATIVE RISK ANALYSIS

A qualitative risk analysis may be used as a process of prioritizing risks for further analysis, or action, by assessing and combining the probability of occurrence and impact. This analysis reduces the level of uncertainty and allows the PM to focus on high-priority risks. Risks related to time critical tasks magnifies the risk. Due to the project schedule, addressing more urgent risks will affect risk priorities. The key concept to performing a qualitative risk analysis is assessing the probability of events occurring and the associated impacts. A qualitative risk analysis may be used for this project.

8.5 QUANTITATIVE RISK ANALYSIS

A quantitative risk analysis may follow the qualitative risk analysis. For this quantitative process, the effects of the identified risks on project objectives are analyzed. Techniques that may be used for a quantitative risk analysis include data gathering and representation techniques, which develop a low-medium-high, three-point estimate for each WBS element for various distributions.

Probability distributions can represent uncertainty in the project, such as schedule durations and project cost estimates. This analysis offers an ability to identify stakeholder risk tolerances, which can permit quantifying cost and time contingency reserves. These reserves may be needed to offset the risk of overruns in schedule and budget. The key concept to quantitative risk analysis is to conduct an analysis identifying the probability of achieving cost and time objectives. A quantitative risk analysis may be used for this project.

8.6 PLAN RISK RESPONSES

There are four primary risk responses: avoid, mitigate, transfer, and accept. To avoid a risk, the task / action can be halted, or not started at all. Avoiding a risk closes off any possibility that the risk will pose a threat to the project. To mitigate a risk, an action is taken to reduce the likelihood, or impact, of a loss to the project. Mitigating a risk reduces the impact to an acceptable risk tolerance level by the organization. To transfer a risk, the risk is not eliminated or reduced, but rather delegated to a third party.

Transferring a risk may include some type of insurance policy, or contract language, and ultimately reduces the impact to the organization if the risk is realized. To accept risk, the organization agrees to the risk as-is and does nothing. Accepting risk is often the response when there is a low probability of the risk occurring, or if the impact is low if the risk actually occurs.

Additionally, positive risks in a project translate to opportunities for the project. Four primary positive risks/opportunities are: exploit, share, enhance, and accept. To exploit an opportunity, the strategic response is to ensure the opportunity occurs. Exploiting an opportunity might appear as training the project team with extra skills to prepare for the opportunity, or slightly adjusting the final deliverables to respond better to the opportunity.

To share an opportunity, a strategy would be to partner with other teams, or other firms. Sharing an opportunity may also include seeking partnerships with specialists for product development. To enhance an opportunity, focusing on the how the opportunity was brought on, its causes, can offer insights into the factors that created this opportunity. To accept an opportunity, just as was previously stated, is a “do nothing” response. For this project, the risks, opportunities, and responses are provided in the Risk Register (Appendix J).

9.0 PROCUREMENT MANAGEMENT

Procurement, or acquiring a consultant, to work on the update process project is considered hypothetical. It is unlikely DOT&PF will submit a request for proposal (RFP) to acquire professional services to develop an updating process and guidance. The work will be completed in-house. State funding is not currently available to support this work as a stand-alone project for consultants.

Currently, consultants already on contract for aviation design projects may provide lateral support for updating specifications, as described in Section 6.4. However, in the case of consultants acquired to work on developing the updating process and guidance, it is also unlikely due to lack of federal and state funding.

No procurement plan is in place at this time to acquire a consultant to develop an updating process and guidance. No future plans to pursue a consultant
are discussed. However, gathering information on what may be possible in the future will be conducted by the PM.

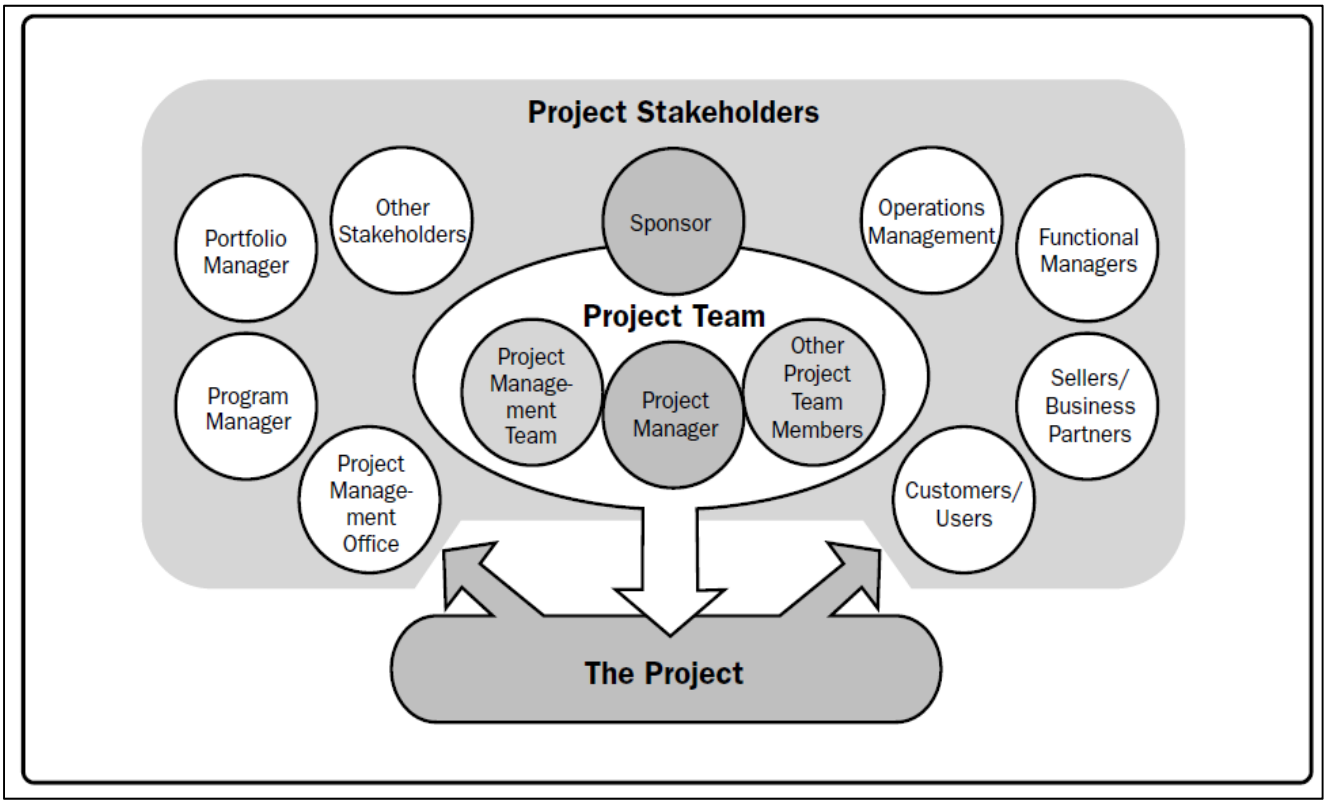
10.0 STAKEHOLDER MANAGEMENT

Stakeholder management involves maintaining good communications and relationships with people, organizations, and groups that could impact, or be impacted by, this project. The processes include identifying stakeholders, planning stakeholder management, managing and controlling stakeholder engagement, which serve to identify key groups and their relationships with the project (Figure 10.0-4).

For this project, a Stakeholder Register (Appendix K) identifies internal and external stakeholders, and provides stakeholder identification, assessment, and communication information. For identification information, the stakeholder's organization, position/title, location, role, and contact information are listed. For the assessment information, the stakeholder's project major requirements, measures of success, expectations, and primary concerns, current/desired level of support, and key influencers/relationships are listed.

For communications information, how the stakeholder would like to be communicated with is listed: mode, frequency, level of detail, format, and other helpful information. The Stakeholder Register tracks as many of the key stakeholders for this project but can be updated when more stakeholders are identified. Early public involvement and engagement of key people and organizations make a critical difference to a project's success.

Figure 10.0-4: The Relationship Between Stakeholders and the Project



Source: Figure 2-7, PMBOK 5th 2013, p30-31

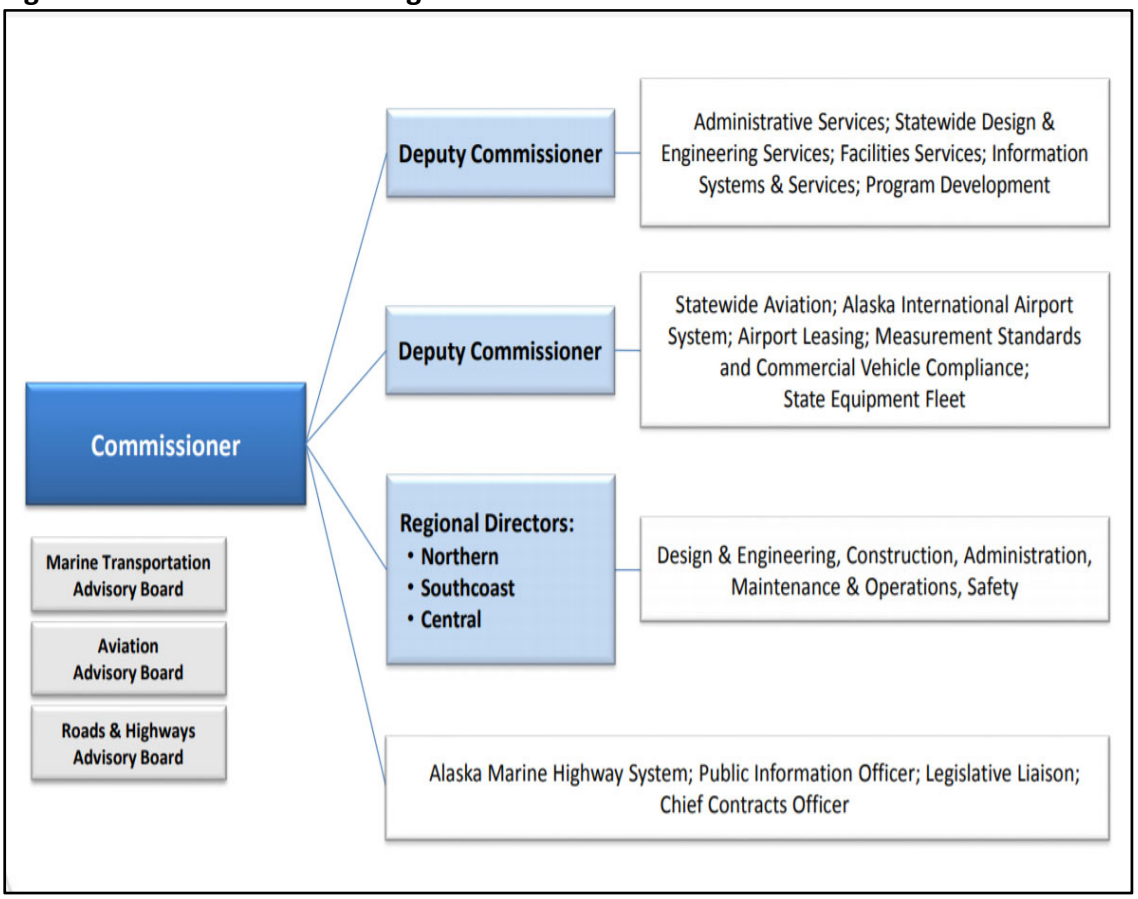
10.1 STAKEHOLDER MANAGEMENT PLAN

The stakeholder management plan will focus on effective stakeholder engagement throughout the project life cycle, based on potential impacts stakeholders have on the success of this project, which is provided in the Stakeholder Register. After gathering information on the stakeholders, additional analysis will inform the PM about stakeholders interest in the project.

For internal stakeholders (Figure 10.1-5), regular status meetings and direct communication will continue with senior management, along with specialty teams, as well as CR Aviation Design teams (Figure 10.1-6). Providing key information, project progress, and status dashboards for project performance, will depend on how involved stakeholders are to this project.

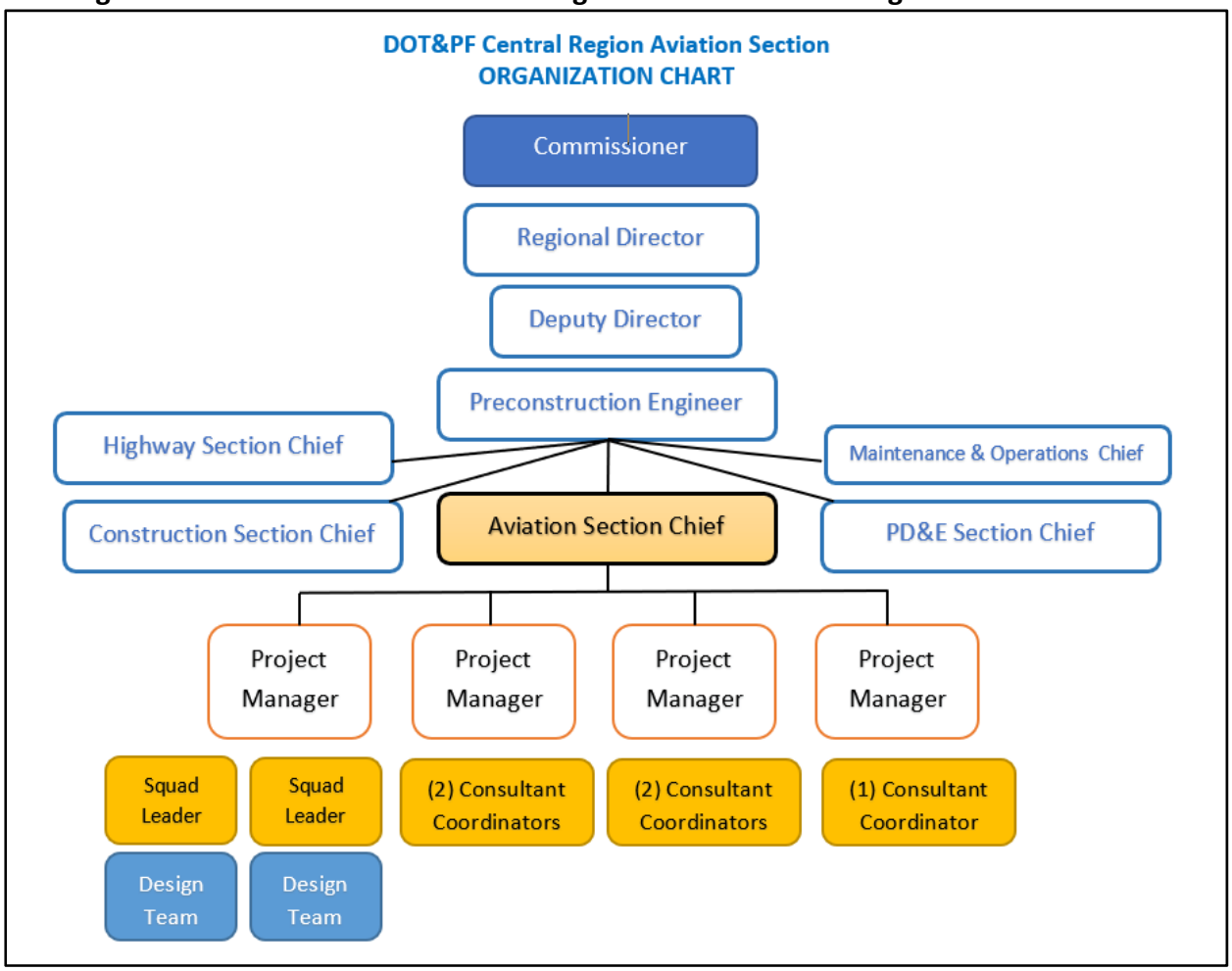
Most of the communications will provide briefings, or project progress summaries, to keep stakeholders informed with as much information as is appropriate for their level of engagement. Stakeholder engagement will flex from direct in-person meetings, to extend out to various forms of indirect communication, such as email notifications of specifications updates.

Figure 10.1-5: The DOT&PF Organization Chart



Source: DOT&PF

Figure 10.1-6: The DOT&PF Central Region Aviation Section Organization Chart



Source: DOT&PF

When communicating with other regional specifications teams, the AWP Module Administrators Team (MA/T), and Statewide specifications teams, special project discussions in smaller teams will be prioritized. MA/T and specifications teams will have direct input as to how impacts to each region can be managed through coordination of the updating process.

For external stakeholders, notifications on an as-needed basis will be the initial mode of communications, unless its determined through the course of the project that additional information and stakeholder engagement is needed. In cases where specialty external teams are identified, direct and regular communications will be planned. Communication with FAA will be part of the planned review process, and review meetings will be incorporated into the project schedule.

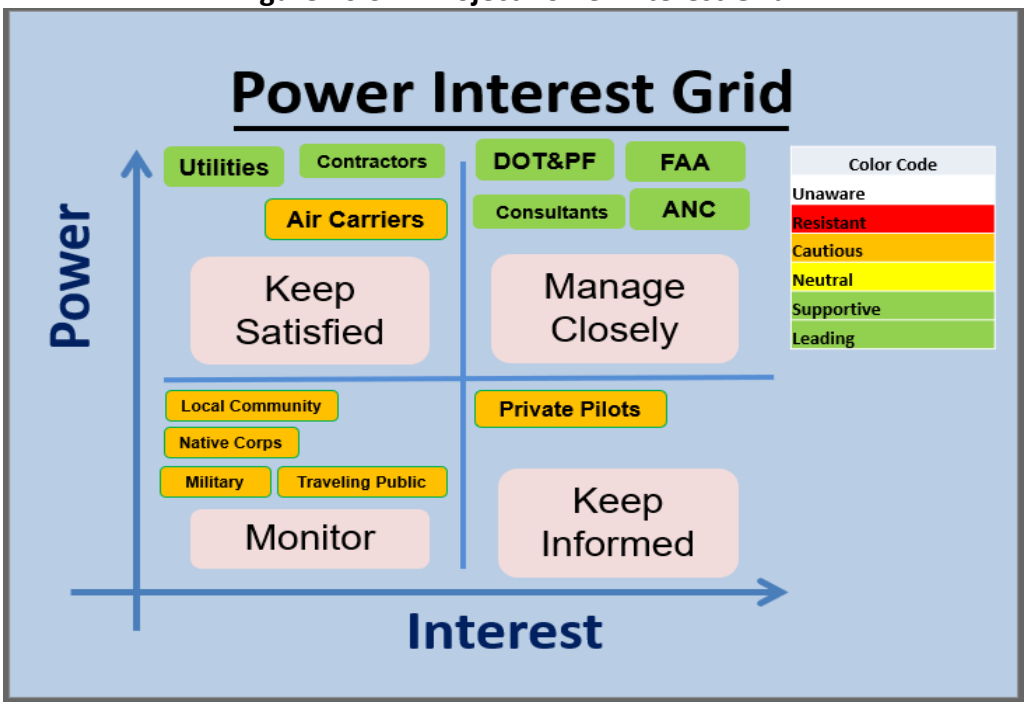
10.2 STAKEHOLDER IDENTIFICATION

For stakeholder identification, specific information will be included to assess the level of engagement needed, as stated in Sections 10.0 and 10.1 of this PMP. The Stakeholder Register provides the initial information.

10.3 POWER INTEREST GRID

The Stakeholder Register will list stakeholders and their information, for the PM to better assess their influence levels on the project, as stated in previous sections. Along with a stakeholders register, another tool to manage communication with stakeholders is a Power Interest Grid (Figure 10.3-5). The Power Interest Grid, which is also known as the Power Interest Matrix, helps categorize project stakeholders with increasing "power" and "interest" in the project. This tool will help the PM focus on the key stakeholders who are most critical to the project.

Figure 10.3-7: Project Power Interest Grid



11.0 PROJECT DOCUMENT CONTROL AND STATUS TRACKING

The existing specifications files follow a logical information system of document control, which provides an organized and orderly set of project materials. The DOT&PF Specifications folder is separated into current specifications and working folders to support the updating process work. In addition, the specifications folder is locked to "read-only" access for users. Only the CR Specifications Engineer has "read-write" access to the specification templates and folders, to ensure quality control against accidental file deletions, or non-approved changes to the specification templates. Along with document control, a status tracking spreadsheet developed by the CR Specifications Engineer keeps track of all specifications, by status and approval. To provide a solid update process, it will be important to track how each specification is handled. The status tracking spreadsheet provides a comprehensive "at-a-glance" status for each of the DOT&PF SSAC.

To understand how to provide an updating process and improve the existing system, the PM must review existing document control and status tracking systems currently in place. A copy of the existing DOT&PF SSAC files and status tracking spreadsheet is provided in Appendix L.

12.0 PROJECT CLOSEOUT AND ARCHIVING

The project closeout process and archiving for this project will follow DOT&PF guidelines. A project closeout guidance, and archiving document are provided in Appendix M.

APPENDIX A

DOT&PF SSAC Frontmatter

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

STANDARD SPECIFICATIONS
FOR
AIRPORT CONSTRUCTION

PROJECT NAME
PROJECT NUMBER

(Advisory Circular 150/5370-10H, Standards for Specifying Construction of Airports, as modified, and approved by the Federal Aviation Administration for Airport Improvement Program contracts in Alaska)

Revised 12/21/18

US Customary

NOTE: Special Provisions for each project are marked as changes to the text of the Standard Specifications. Deleted text is identified by strikethrough. Additions are underlined.

CONTENTS

GENERAL PROVISIONS

DRAINAGE

FENCING

CONTRACTOR FURNISHED SERVICES

LIGHTING & ELECTRICAL

EARTHWORK

AGGREGATE BASE & SURFACE COURSES

ASPHALT STABILIZED AND TREATED BASE COURSES

FLEXIBLE SURFACE COURSES

RIGID PAVEMENT

MISCELLANEOUS

STRUCTURES

TURFING

APPENDICES

APPENDIX B

Project Charter

PROJECT CHARTER

Project Title: Develop and Standardize the DOT&PF Statewide Aviation Specifications Updating Process

Project Sponsor: Luke Bowland, P.E., DOT&PF **Date Prepared:** 11/22/2019

Project Manager: Virginia Groeschel, E.I.T, DOT&PF **Project Customer:** DOT&PF

Project Purpose or Justification:

The purpose of this project is to develop a streamlined specifications updating process, and process guidance, to implement as a strategically planned workflow on future DOT&PF SSAC updates. This project is needed because no formal DOT&PF SSAC updating process guidance is currently available. Creating a sustainable and repeatable process to address future FAA compliance updates will enhance the cost, scope, schedule, risk, and quality constraints to the overall work. The focus will be on developing strategies and collecting best management practices (BMPs) currently in use, for effective and efficient FAA approval. The process guidance will outline and document these strategies and BMPs.

The DOT&PF SSAC update to meet FAA compliance has been underway since 2015. In the past several months, the priority has been elevated to ensure the timely completion after the roll out of FAA's AC 150/5370-10H on December 21, 2018. Aviation specifications are an essential component of the contract documents for aviation construction projects. They support the construction of vital aviation infrastructure across Alaska.

Project Description:

The project will develop a DOT&PF SSAC updating process, as well as prepare a guidance to formally document and standardize DOT&PF SSAC updating process.

This process will follow similarly to a typical DOT&PF Design Review process, where draft specifications will be prepared for FAA compliance. Once prepared, they will be reviewed for concurrence by DOT&PF departmental, regional, and statewide stakeholders, with a final draft specifications set submitted to FAA for review and approval. The update process guidance will support internal coordination for draft reviews, along with providing process documentation.

Outlining BMPs and strategies used in the DOT&PF Design Review process, along with preparing a tentative draft review schedule, and implementation documents, such as checklists, are key elements to the overall process and guidance development. A cost basis and benefit analysis will

be provided with the PMP to identify efficiencies and added value to implementation of a standardized updating process.

High-Level Requirements:

1. DOT&PF SSAC must meet FAA AC 150/5370-10 compliance.

2. DOT&PF SSAC must be FAA reviewed and approved prior to Statewide standardization.

3. A process guidance must provide accurate information and meet DOT&PF level quality for documents.

High-Level Risks:

1. The updating process may miss accounting for a key element, which could negatively impact the efficiency of the process.

2. The process and guidance may miss incorporating a step procedure, and the oversight affects a project in design.

3. Not providing a timely process for updating the DOT&PF SSAC may cause delays in advertising projects.

PROJECT CHARTER

Project Objectives	Success Criteria	Person Approving

Scope:

• Develop a process for updating the DOT&PF SSAC • Prepare a guidance that supports the specs updating process • 3. Prepare a PMP to support the updating and guidance project	• Development of a process and guidance is accepted by DOT&PF authority and all key internal stakeholders. • A guidance is prepared, that sustains and repeats BMPs, making the work more efficient and cost effective. • 2. Preparation of a robust PMP, that addresses key management components, will keep the scope tightly focused and provide close coordination to final deliverables.	• 1st Approval: Project Manager (PM) • 2nd Approval: Aviation Section Chief • Final Approval: Preconstruction Engineer

Time:

One year to prepare a DRAFT process and guidance	Draft process and guidance prepared by April 2020.	1st and 2nd Approval required

Cost:

TBD	Stays within a refined budget to be developed later	1st and 2nd Approval required

Other:

N/A	N/A	N/A

Summary Milestones	**Due Date**
Prepare PMP	11/22/2019
Prepare DRAFT updating process and guidance	4/13/2020
Test Implementation	2/1/2020
Acceptance and Implementation	7/1/2020

PROJECT CHARTER

Estimated Budget:

TBD

Stakeholder(s)	Role
Internal DOT&PF Stakeholders	Deliver the DOT&PF programs; specs end users
External Stakeholders – Consultants	Design engineering support; specs end users
External Stakeholders - FAA	Provide approval to DOT&PF SSAC

Project Manager Authority Level: level to drive process creation and build guidance; approves DRAFT components prior to Project Sponsor review.

Staffing Decisions:

Support staff to be provided, as needed, for additional work, to be determined by PM, with Aviation Section Chief concurrence.

Budget Management and Variance:

Budget will be monitored by PM and Section Chief.

PROJECT CHARTER

Technical Decisions:

TBD by process

Conflict Resolution:

TBD by process

Approvals:

Project Manager Signature	Sponsor or Originator Signature
Virginia J. Groeschel, E.I.T.	Luke Bowland, P.E.
DOT&PF-CR Aviation Design Specifications Engineer	DOT&PF-CR Aviation Design Section Chief
Date	Date

APPENDIX C

Requirements Traceability Matrix (RTM)

REQUIREMENTS TRACEABILITY MATRIX

Project Name	**Develop and Standardize a Guidance for the DOT&PF Statewide Aviation Specifications Updating Process**
Project Type	***Process Guidance***
Project Start Date	August 26, 2019
Project End Date	April 13, 2020
Project Sponsor	DOT&PF / Luke Bowland, P.E.
DOT&PF Region / Section	Central Region / Aviation Design
Project Manager	Virginia Groeschel, E.I.T.

ID	*Priority*	*Goals*	*Solution*	*Functional Requirement*		*Status*	*WBS Activities*	Task Assigned
001	Yes	Have a process in place for the next FAA compliance update to the SSAC	Develop a process using BMPs and successful strategies; then develop a process guidance	Process must update aviation specs to meet FAA compliance	1.10.4.1	In Progress	DOT&PF SSAC Process	Yes
				Process Guidance must be repeatable and sustainable	1.13.3.4	In Progress	Product Deliverables: Guidance	Yes
002	Yes	Have a PMP to create guidance	Prepare a PMP for preparing the process guidance	PMP must document a plan to manage the process guidance	1.1	In Progress	Project Management Plan	Yes
				PMP must have acceptance criteria	1.1, 1.1.1	In Progress	Sponsor Review and Approval for PMP; Project Charter	Yes
003	Yes	Have a research paper discussing approaches to implementing change in complex government systems	Prepare a research paper	Research must cite industry approaches and provide findings; data gathering; analysis	1.2	In Progress	Research Paper (Thesis)	Yes
004	Yes	Present the DRAFT PMP and discuss various researched approaches	Prepare a presentation	Presentation must be in MS Powerpoint, and discuss the DRAFT PMP and potential approach	1.3	In Progress	Presentation	Yes
005								
006								
007								
008								
009								
010								

APPENDIX D

Change Management Log and Change Forms

CHANGE LOG

Project Title: Develop and Standardize the DOT&PF Statewide Aviation Specifications Updating Process **Date Prepared:** 2/28/2020

Change ID	Category	Description of Change	Submitted by	Submission Date	Status	Disposition
1	2.1	Revising scope: Updated scope of work descopes process guidance deliverable to draft process guidance outline.	V. Groeschel	2/14/2020	Approved	Implemented
2	2.1	Not using the DOT&PF Online Review Comment System for specs update	V. Groeschel	2/14/2020	Approved	Implemented
3	2.2.2	Updated Abstract	V. Groeschel	2/28/2020	Approved	Implemented
4	1.4	Update to Appendix D	V. Groeschel	2/28/2020	Approved	Implemented

CHANGE REQUEST

Project Title: Develop and Standardize the DOT&PF Statewide Aviation Specifications Updating Process **Date Prepared:** 2/14/20

Person Requesting Change: Virginia J. Groeschel **Change Number:** 1

Category of Change: 2.1 Scope of Work

- ☐ Scope XXX
- ☐ Quality
- ☐ Requirements
- ☐ Cost
- ☐ Schedule
- ☐ Documents

Detailed Description of Proposed Change

Revise scope to prepare “draft” process guidance “outline” to descope final deliverable to meet target submittal but continue to maintain quality.

Justification for Proposed Change

Work will continue to prepare a final process guidance beyond submittal date. For the purpose of meeting the interim submittal target date, descoping provides the process guidance outline to be prepared, with the final guidance submitted at a later date.

Impacts of Change

Scope	☐ Increase	☐ Decrease	☐ Modify XXX
Description: Reduces scope of work, providing additional resources to be concentrated on other final deliverables as well as the guidance.			

CHANGE REQUEST

Requirements	◻ Increase	◻ Decrease	◻ Modify XXX
Description: Requirements remain the same, except deliverable is scaled back			
Cost	◻ Increase	◻ Decrease	◻ Modify XXX
Description: Cost would be modified from hours on guidance, to be adjusted to other deliverables, so no cost increase, but a reallocation of budget to other tasks			
Schedule	◻ Increase	◻ Decrease	◻ Modify XXX
Description: Schedule will remain the same for target date of deliverables.			
Stakeholder Impact	◻ High risk	◻ Medium risk/opp XXX	◻ Low risk
Description: Medium opportunity to provide stakeholders with an additional key review period for the interim draft guidance. Valuable insights can be gained with additional review comments prior to a final product. **Project Documents:** process guidance modified to draft process guidance outline submitted for final deliverables			

Comments

n/a

CHANGE REQUEST

Disposition ☐ Approve XXX ☐ Defer ☐ Reject

Justification

Keeps tasks moving forward, with an interim draft outline for internal review and potential feedback, more valuable review comments prior to final product.

Change Control Board Acceptance

Name	Role	Acceptance Date
V. Groeschel	*Project Manager*	*Virginia Groeschel, accepted 2/14/20*

Date: 2/14/20

CHANGE REQUEST

Project Title: Develop and Standardize the DOT&PF Statewide Aviation Specifications Updating Process **Date Prepared:** 2/14/20

Person Requesting Change: Virginia J. Groeschel **Change Number:** 2

Category of Change: 2.1 Scope of Work

□ Scope XXX	□ Quality	□ Requirements
□ Cost	□ Schedule	□ Documents

Detailed Description of Proposed Change

Revise scope remove the use of the DOT&PF Online Review Comment System during the specs update review phase

Justification for Proposed Change

The update timeline was accelerated to accommodate FAA's direction, so the DOT&PF Online Review Comment System used for typical PS&E submittal review could not be implemented within this project timeline but will be considered for additional beta-testing in the future.

Impacts of Change

Scope	□ Increase	□ Decrease	□ Modify XXX
Description: Reduces scope of work, providing additional resources to be concentrated on other final deliverables as well as the guidance. However, use of email to provide comments not as organized as the online review comment system, which is a challenge to organization and coordination.			

CHANGE REQUEST

Requirements	☐ Increase	☐ Decrease	☐ Modify XXX
Description: Requirements remain the same, except use of the online review comment system will be beta-tested at a later time.			
Cost	☐ Increase	☐ Decrease	☐ Modify XXX
Description: Cost would be modified from hours on of setting up the online review system to email correspondence. No loss of deliverable quality and cost remains the same.			
Schedule	☐ Increase	☐ Decrease	☐ Modify XXX
Description: Schedule will remain the same for target date of deliverables.			
Stakeholder Impact	☐ High risk	☐ Medium risk XXX	☐ Low risk
Description: Medium risk to provide stakeholders with an additional key review opportunity and ability to review statewide/regional comments by other stakeholders. Transparency of the process is potentially lost by emailing review comments to one point of contact. **Project Documents:** No final adjudicated review comments available through the online review comment system, but will need to be collected manually.			

Comments

n/a

CHANGE REQUEST

Disposition ☐ Approve XXX ☐ Defer ☐ Reject

Justification

Keep tasks moving forward, with valuable review comments emailed rather than collected in the online system. Review comments are still collected, but less transparent and not easily compiled.

Change Control Board Acceptance

Name	Role	Acceptance Date
V. Groeschel	*Project Manager*	*Virginia Groeschel, accepted 2/14/20*

Date: 2/14/20

CHANGE REQUEST

Project Title: Develop and Standardize the DOT&PF Statewide Aviation Specifications Updating Process **Date Prepared:** 2/28/20

Person Requesting Change: Virginia J. Groeschel **Change Number:** 3

Category of Change: 2.2.2 Change Control Process – Updated Abstract

- ☐ Scope
- ☐ Quality
- ☐ Requirements
- ☐ Cost
- ☐ Schedule
- ☐ Documents XXX

Detailed Description of Proposed Change

Revise abstract to include P-401 and P-318 case studies. Revision provides research basis.

Justification for Proposed Change

The update adds the case studies to the research.

Impacts of Change

Scope	☐ Increase	☐ Decrease	☐ Modify XXX
Description: Adds case studies.			

CHANGE REQUEST

Requirements	☐ Increase	☐ Decrease	☐ Modify XXX
Description: Ensure research data (observational data) is compiled and provided to support case studies.			
Cost	☐ Increase	☐ Decrease	☐ Modify
Description: n/a			
Schedule	☐ Increase	☐ Decrease	☐ Modify XXX
Description: Schedule will remain the same for target date of deliverables.			
Stakeholder Impact	☐ High risk	☐ Medium risk	☐ Low risk
Description: n/a **Project Documents:** Updated research paper abstract			

Comments

n/a

CHANGE REQUEST

Disposition ☐ Approve XXX ☐ Defer ☐ Reject

Justification

Keep tasks moving forward, with valuable review comments emailed rather than collected in the online system. Review comments are still collected, but less transparent and not easily compiled.

Change Control Board Acceptance

Name	Role	Acceptance Date
V. Groeschel	*Project Manager*	*Virginia Groeschel, accepted 2/28/20*

Date: 2/28/20

CHANGE REQUEST

Project Title: Develop and Standardize the DOT&PF Statewide Aviation Specifications Updating Process **Date Prepared:** 2/28/20

Person Requesting Change: Virginia J. Groeschel **Change Number:** 4

Category of Change: 1.4 PMP – Updated App D

- ☐ Scope
- ☐ Quality
- ☐ Requirements
- ☐ Cost
- ☐ Schedule
- ☐ Documents XXX

Detailed Description of Proposed Change

Updated Change Log and added Change Request 4

Justification for Proposed Change

Organizes and logs changes

Impacts of Change

Scope	☐ Increase	☐ Decrease	☐ Modify
Description: N/A			

CHANGE REQUEST

Requirements	☐ Increase	☐ Decrease	☐ Modify
Description: N/A			
Cost	☐ Increase	☐ Decrease	☐ Modify
Description: N/A			
Schedule	☐ Increase	☐ Decrease	☐ Modify
Description: N/A			
Stakeholder Impact	☐ High risk	☐ Medium risk	☐ Low risk
Description: N/A **Project Documents:** Added to change log			

Comments

n/a

CHANGE REQUEST

Disposition ☐ Approve XXX ☐ Defer ☐ Reject

Justification

Keep logging changes and updates to project docs. Updated PMP.

Change Control Board Acceptance

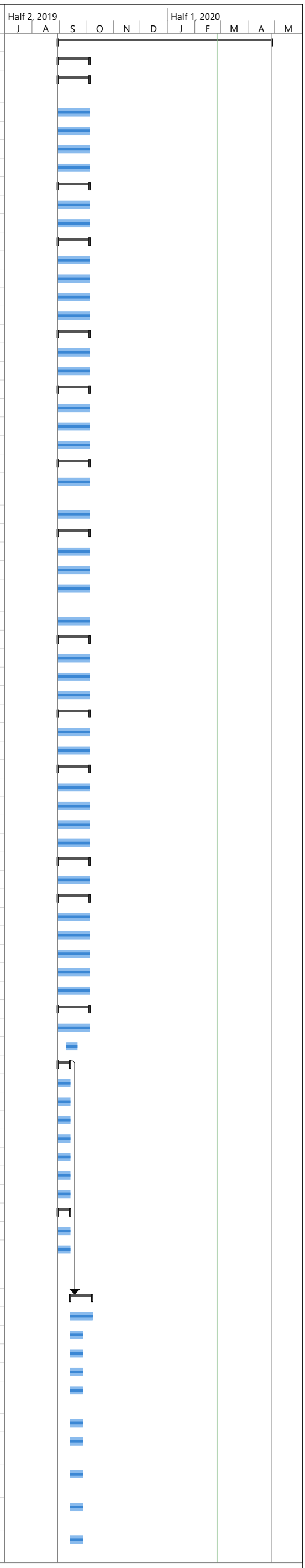
Name	Role	Acceptance Date
V. Groeschel	*Project Manager*	*Virginia Groeschel, accepted 2/28/20*

Date: 2/28/20

APPENDIX E

Project Schedule

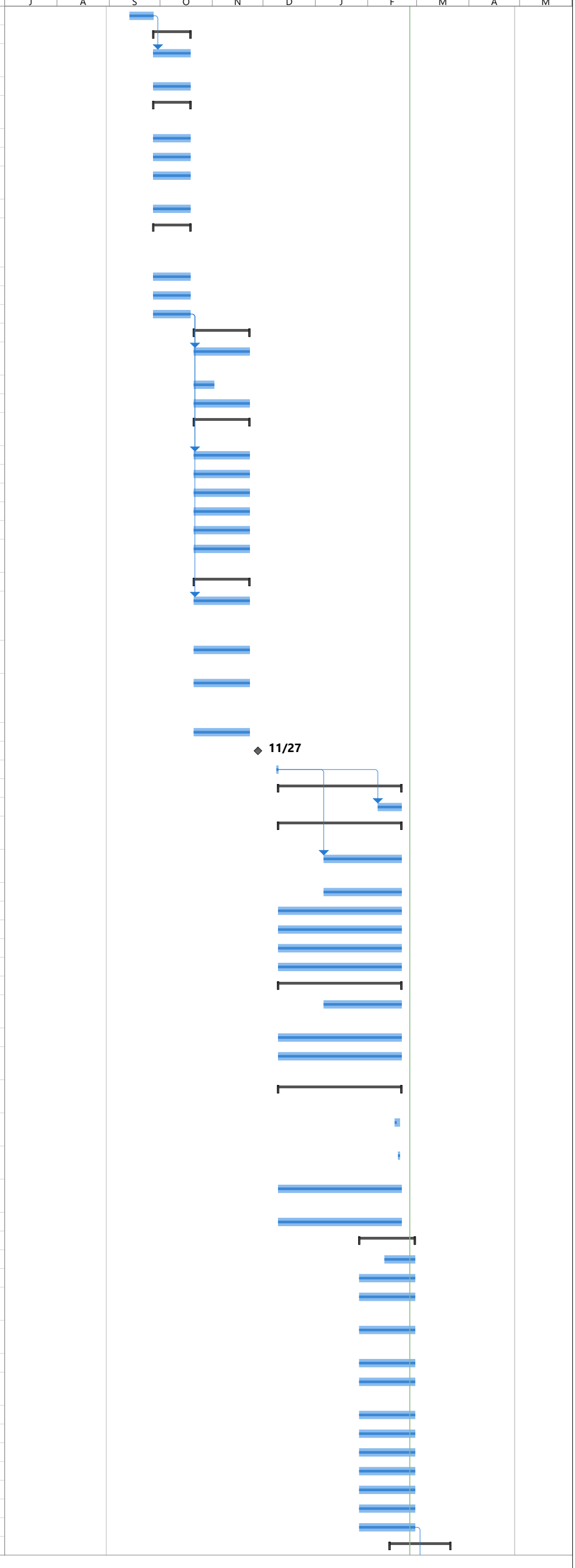
ID	Task Mode	% Complete	Task Name	Duration	Start	Finish	Predecessors
1		**93%**	**MSPM 686A-686B Capstone Project**	**172 days**	**Fri 8/30/19**	**Mon 4/27/20**	
2		**100%**	**1. Project Management Plan**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
3		**100%**	**1.0 Project Charter, History, Purpose, and Need**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
4		100%	Charter	26 days	Fri 8/30/19	Fri 10/4/19	
5		100%	History	26 days	Fri 8/30/19	Fri 10/4/19	
6		100%	Purpose	26 days	Fri 8/30/19	Fri 10/4/19	
7		100%	Need	26 days	Fri 8/30/19	Fri 10/4/19	
8		**100%**	**2.0 Scope of Work**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
9		100%	Preliminary Scope of Work	26 days	Fri 8/30/19	Fri 10/4/19	
10		100%	Scope of Work Elements	26 days	Fri 8/30/19	Fri 10/4/19	
11		**100%**	**3.0 Staffing Management**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
12		100%	Staffing Management Scope of Work	26 days	Fri 8/30/19	Fri 10/4/19	
13		100%	References	26 days	Fri 8/30/19	Fri 10/4/19	
14		100%	Staffing Estimates	26 days	Fri 8/30/19	Fri 10/4/19	
15		100%	Consultant Acquisition	26 days	Fri 8/30/19	Fri 10/4/19	
16		**100%**	**4.0 Change Management Plan**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
17		100%	Change Management Plan Scope of Work	26 days	Fri 8/30/19	Fri 10/4/19	
18		100%	Change of Scope Forms	26 days	Fri 8/30/19	Fri 10/4/19	
19		**100%**	**5.0 Risk Management Plan**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
20		100%	Risk Management Plan Scope of Work	26 days	Fri 8/30/19	Fri 10/4/19	
21		100%	Risk Effects	26 days	Fri 8/30/19	Fri 10/4/19	
22		100%	Risk Register	26 days	Fri 8/30/19	Fri 10/4/19	
23		**100%**	**6.0 Stakeholder Management Plan**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
24		100%	Stakeholder Management Plan Scope of Work	26 days	Fri 8/30/19	Fri 10/4/19	
25		100%	Stakeholder Register	26 days	Fri 8/30/19	Fri 10/4/19	
26		**100%**	**7.0 Resource Cost Overview**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
27		100%	Total Project Estimate Summary	26 days	Fri 8/30/19	Fri 10/4/19	
28		100%	Cumulative Cost Curve	26 days	Fri 8/30/19	Fri 10/4/19	
29		100%	Staffing Estimates and Cost Savings Analysis	26 days	Fri 8/30/19	Fri 10/4/19	
30		100%	Consultants and Procurement	26 days	Fri 8/30/19	Fri 10/4/19	
31		**100%**	**8.0 Schedule**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
32		100%	Schedule of Milestones	26 days	Fri 8/30/19	Fri 10/4/19	
33		100%	Work Breakdown Structure (WBS)	26 days	Fri 8/30/19	Fri 10/4/19	
34		100%	Cumulative Duration Curve	26 days	Fri 8/30/19	Fri 10/4/19	
35		**100%**	**9.0 Closeout Process**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
36		100%	Document Control	26 days	Fri 8/30/19	Fri 10/4/19	
37		100%	Archiving	26 days	Fri 8/30/19	Fri 10/4/19	
38		**100%**	**2. Research Paper (Thesis)**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
39		100%	Abstract	26 days	Fri 8/30/19	Fri 10/4/19	
40		100%	Table of Contents	26 days	Fri 8/30/19	Fri 10/4/19	
41		100%	Methodology	26 days	Fri 8/30/19	Fri 10/4/19	
42		100%	Analysis Overview	26 days	Fri 8/30/19	Fri 10/4/19	
43		**100%**	**3. Presentation**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
44		100%	Introduction	26 days	Fri 8/30/19	Fri 10/4/19	
45		**100%**	**3.1 Agenda**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
46		100%	PMP	26 days	Fri 8/30/19	Fri 10/4/19	
47		100%	Research Considerations	26 days	Fri 8/30/19	Fri 10/4/19	
48		100%	Deliverables Discussion	26 days	Fri 8/30/19	Fri 10/4/19	
49		100%	KSAs Overview Discussion	26 days	Fri 8/30/19	Fri 10/4/19	
50		100%	Research Paper Elements	26 days	Fri 8/30/19	Fri 10/4/19	
51		**100%**	**Final Outcomes**	**26 days**	**Fri 8/30/19**	**Fri 10/4/19**	
52		100%	Implementation Plan	26 days	Fri 8/30/19	Fri 10/4/19	
53		100%	Lessons Learned	10 days	Mon 9/9/19	Fri 9/20/19	
54		**100%**	**MILESTONE: PPM 1 Deliverables**	**10 days**	**Fri 8/30/19**	**Thu 9/12/19**	
55		100%	1. Project Charter	10 days	Fri 8/30/19	Thu 9/12/19	
56		100%	2. Preliminary Project Schedule	10 days	Fri 8/30/19	Thu 9/12/19	
57		100%	3. Project Abstract (200 words)	10 days	Fri 8/30/19	Thu 9/12/19	
58		100%	4. Stakeholder Identification and Analysis	10 days	Fri 8/30/19	Thu 9/12/19	
59		100%	5. Letter of Support from Project Sponsor	10 days	Fri 8/30/19	Thu 9/12/19	
60		100%	6. Preliminary Graduate Studies Plan (GSP)	10 days	Fri 8/30/19	Thu 9/12/19	
61		100%	7. Preliminary Narrative Description	10 days	Fri 8/30/19	Thu 9/12/19	
62		**100%**	**8. Knowledge Area Selection and Measures**	**10 days**	**Fri 8/30/19**	**Thu 9/12/19**	
63		100%	Selection of 3-4 Knowledge Areas	10 days	Fri 8/30/19	Thu 9/12/19	
64		100%	Description - of how they will be applied and performance masured during semester	10 days	Fri 8/30/19	Thu 9/12/19	
65		**100%**	**MILESTONE: PPM 2 Deliverables**	**17 days**	**Fri 9/13/19**	**Mon 10/7/19**	**54**
66		100%	1. Project Scope Statement	17 days	Fri 9/13/19	Mon 10/7/19	
67		100%	2. Requirements Documentation	10 days	Fri 9/13/19	Thu 9/26/19	
68		100%	3. Updated WBS	10 days	Fri 9/13/19	Thu 9/26/19	
69		100%	4. Updated Project Schedule	10 days	Fri 9/13/19	Thu 9/26/19	
70		100%	5. Tables of Contents for PM Plan and Final Project Report	10 days	Fri 9/13/19	Thu 9/26/19	
71		100%	6. Research Sources and Key Words	10 days	Fri 9/13/19	Thu 9/26/19	
72		100%	7. Preliminary Research Methods and Approach to Analysis	10 days	Fri 9/13/19	Thu 9/26/19	
73		100%	8. Signed Student/Advisory Committee "contract"	10 days	Fri 9/13/19	Thu 9/26/19	
74		100%	9. IRB account established (provide screen shot)	10 days	Fri 9/13/19	Thu 9/26/19	
75		100%	10. Knowledge Area Selection description, measured data and lessons learned	10 days	Fri 9/13/19	Thu 9/26/19	



Project: 5.1.3 Updated Project S
Date: Wed 2/26/20

Task	Inactive Task	Manual Summary Rollup	External Milestone
Split	Inactive Milestone	Manual Summary	Deadline
Milestone	Inactive Summary	Start-only	Progress
Summary	Manual Task	Finish-only	Manual Progress
Project Summary	Duration-only	External Tasks	

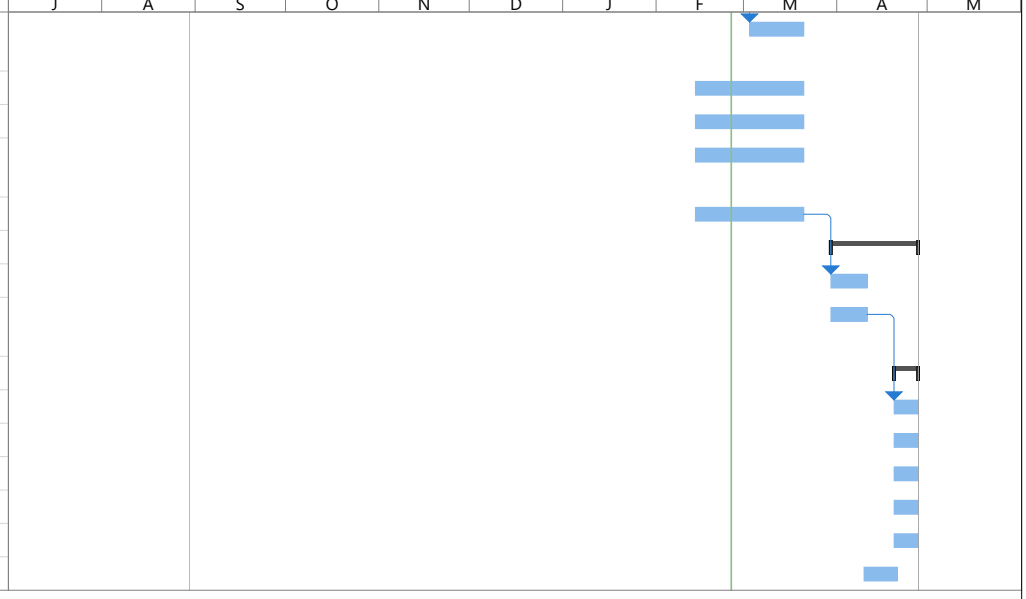
ID	Task Mode	% Complete	Task Name	Duration
76		100%	11. Narrative Description (Fully Elaborated)	10 days
77		**100%**	**MILESTONE: PPM 3 Deliverables**	**16 days**
78		100%	1. Written Draft of PMP (fully developed scope)	16 days
79		100%	2. Revised Abstract	16 days
80		**100%**	**3. Description of expected research methods;**	**16 days**
81		100%	3.1 Instrument Approaches	16 days
82		100%	3.2 How Results will be analyzed	16 days
83		100%	4. Description of expected products/outcomes of the projects	16 days
84		100%	5. Gantt Chart Update	16 days
85		**100%**	**6. Update on 3-4 Knowledge Area processes applied and measured during project to demonstrate mastery**	**16 days**
86		100%	6.1 Measured data for selected areas	16 days
87		100%	6.2 Lessons Learned	16 days
88		100%	7. IRB Request for Determination	16 days
89		**100%**	**MILESTONE: PPM 4 Deliverables**	**25 days**
90		100%	1. Advisor-approved research instruments and analysis methodology	25 days
91		100%	2. UAA IRB Submittal Complete	10 days
92		100%	3. IRB Approval	25 days
93		**100%**	**4. Professional (complete draft) Presentation**	**25 days**
94		100%	4.1 Project Objectives	25 days
95		100%	4.2 Charter	25 days
96		100%	4.3 PMP	25 days
97		100%	4.4 Description of Project Deliverables	25 days
98		100%	5. Final PMP	25 days
99		100%	6. Refined Description of Project's Product Deliverables	25 days
100		**100%**	**7. Update on 3-4 Knowledge Areas**	**25 days**
101		100%	7.1 Processes applied and measured during initiation and planning phase of project to demonstrate mastery	25 days
102		100%	7.2 Measured data for selected areas and lessons learned	25 days
103		100%	8. Description/Update of 3-4 Knowledge Areas (if different) that will be used during project execution	25 days
104		100%	9. Updated Gantt Chart	25 days
105		100%	MILESTONE: Go/No-Go Decision #3	1 day
106		100%	Project Presentation	1 day
107		**99%**	**686B MILESTONE: PPM 1 Deliverables**	**53 days**
108		100%	1. Change Control Process	10 days
109		**100%**	**2. PMP Update (using change control process)**	**53 days**
110		100%	2.1 Updated Requirements Traceablity Matrix	34 days
111		100%	2.2 Updated WBS	34 days
112		100%	2.3 Updated Gantt	53 days
113		100%	2.4 Updated Risk Register	53 days
114		100%	2.5 Other PMP Elements (TBD)	53 days
115		100%	3. Risk Response Implementation	53 days
116		**100%**	**4. Project Deliverables Status Update**	**53 days**
117		100%	4.1 DOT&PF SSAC Update Process Guidance	34 days
118		100%	4.2 Research Paper (Draft)	53 days
119		100%	4.3 Final Presentation (Implementation - Monitoring)	53 days
120		**98%**	**5. Data Collection/Research Update (should have all raw data at this point)**	**53 days**
121		33%	5.1 Additional interviews with subject matter experts, stakeholders	3 days
122		100%	5.2 Develop data measurable parameters	1 day
123		100%	6. Updates (if any) on 3-4 Knowledge Areas processes applied and measured	53 days
124		100%	7. Final Signed GSP	53 days
125		**100%**	**686B MILESTONE: PPM 2 Deliverables**	**25 days**
126		100%	1. Updated Abstract	14 days
127		100%	2. Updated Table of Contents	25 days
128		100%	3. Updated Research Sources and Key Words	25 days
129		100%	4. Validated Research Analysis (needs advisor approval)	25 days
130		100%	5. Project Progress Status (e.g.; EVM, other)	25 days
131		100%	6. PMP Updates (using change control process)	25 days
132		100%	7. Updated Requirements Traceability Matrix	25 days
133		100%	8. Updated WBS Changes	25 days
134		100%	9. Updated Project Schedule	25 days
135		100%	10. Risk Register Updates	25 days
136		100%	11. Other Project Documents (TBD)	25 days
137		100%	12. Risk Responses Implementation	25 days
138		100%	13. Project Deliverables Status Updates	25 days
139		**0%**	**686B MILESTONE: PPM 3 Deliverables**	**26 days**



Project: 5.1.3 Updated Project S
Date: Wed 2/26/20

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

ID	Task Mode	% Complet	Task Name	Duration
140		0%	1. Working Draft (complete and properly formatted paper)	14 days
141		0%	2. Revised Abstract	26 days
142		0%	3. Research Results and Analysis	26 days
143		0%	4. Preliminary Conclusions and Project Deliverables	26 days
144		0%	5. Updated Project Schedule	26 days
145		**0%**	**686B MILESTONE: PPM 4 Deliverables**	**21 days**
146		0%	1. Draft Presentation	10 days
147		0%	2. Final Complete and Properly Formatted Project Report	10 days
148		**0%**	**3. Final Project Deliverables**	**6 days**
149		0%	3.1 Paper	6 days
150		0%	3.2 Research	6 days
151		0%	3.3 Outcomes	6 days
152		0%	3.4 Product Deliverabes (Guidance)	6 days
153		0%	3.5 Updated Project Schedule	6 days
154		0%	Project Presentation (686B)	7 days



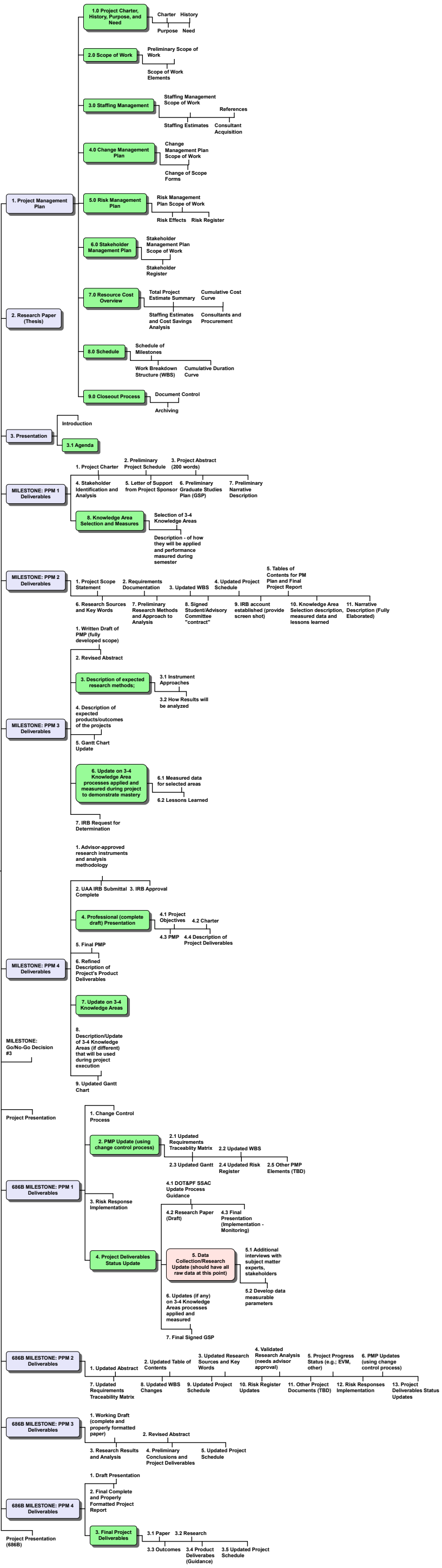
Project: 5.1.3 Updated Project S
Date: Wed 2/26/20

Task	Inactive Task	Manual Summary Rollup	External Milestone
Split	Inactive Milestone	Manual Summary	Deadline
Milestone	Inactive Summary	Start-only	Progress
Summary	Manual Task	Finish-only	Manual Progress
Project Summary	Duration-only	External Tasks	

APPENDIX F

WBS and WBS List

Updated Project Schedule
Work Breakdown Structure - Detailed View



Updated WBS List

	WBS	Name	Duration	Start	Finish
1	**1**	**MSPM 686A-686B Capstone Project**	**172d**	**8/30/2019**	**4/27/2020**
2	**1.1**	**1. Project Management Plan**	**26d**	**8/30/2019**	**10/4/2019**
3	**1.1.1**	**1.0 Project Charter, History, Purpose, and Need**	**26d**	**8/30/2019**	**10/4/2019**
4	1.1.1.1	Charter	26d	8/30/2019	10/4/2019
5	1.1.1.2	History	26d	8/30/2019	10/4/2019
6	1.1.1.3	Purpose	26d	8/30/2019	10/4/2019
7	1.1.1.4	Need	26d	8/30/2019	10/4/2019
8	**1.1.2**	**2.0 Scope of Work**	**26d**	**8/30/2019**	**10/4/2019**
9	1.1.2.1	Preliminary Scope of Work	26d	8/30/2019	10/4/2019
10	1.1.2.2	Scope of Work Elements	26d	8/30/2019	10/4/2019
11	**1.1.3**	**3.0 Staffing Management**	**26d**	**8/30/2019**	**10/4/2019**
12	1.1.3.1	Staffing Management Scope of Work	26d	8/30/2019	10/4/2019
13	1.1.3.2	References	26d	8/30/2019	10/4/2019
14	1.1.3.3	Staffing Estimates	26d	8/30/2019	10/4/2019
15	1.1.3.4	Consultant Acquisition	26d	8/30/2019	10/4/2019
16	**1.1.4**	**4.0 Change Management Plan**	**26d**	**8/30/2019**	**10/4/2019**
17	1.1.4.1	Change Management Plan Scope of Work	26d	8/30/2019	10/4/2019
18	1.1.4.2	Change of Scope Forms	26d	8/30/2019	10/4/2019
19	**1.1.5**	**5.0 Risk Management Plan**	**26d**	**8/30/2019**	**10/4/2019**
20	1.1.5.1	Risk Management Plan Scope of Work	26d	8/30/2019	10/4/2019
21	1.1.5.2	Risk Effects	26d	8/30/2019	10/4/2019
22	1.1.5.3	Risk Register	26d	8/30/2019	10/4/2019
23	**1.1.6**	**6.0 Stakeholder Management Plan**	**26d**	**8/30/2019**	**10/4/2019**
24	1.1.6.1	Stakeholder Management Plan Scope of Work	26d	8/30/2019	10/4/2019
25	1.1.6.2	Stakeholder Register	26d	8/30/2019	10/4/2019
26	**1.1.7**	**7.0 Resource Cost Overview**	**26d**	**8/30/2019**	**10/4/2019**
27	1.1.7.1	Total Project Estimate Summary	26d	8/30/2019	10/4/2019
28	1.1.7.2	Cumulative Cost Curve	26d	8/30/2019	10/4/2019
29	1.1.7.3	Staffing Estimates and Cost Savings Analysis	26d	8/30/2019	10/4/2019
30	1.1.7.4	Consultants and Procurement	26d	8/30/2019	10/4/2019
31	**1.1.8**	**8.0 Schedule**	**26d**	**8/30/2019**	**10/4/2019**
32	1.1.8.1	Schedule of Milestones	26d	8/30/2019	10/4/2019
33	1.1.8.2	Work Breakdown Structure (WBS)	26d	8/30/2019	10/4/2019
34	1.1.8.3	Cumulative Duration Curve	26d	8/30/2019	10/4/2019
35	**1.1.9**	**9.0 Closeout Process**	**26d**	**8/30/2019**	**10/4/2019**
36	1.1.9.1	Document Control	26d	8/30/2019	10/4/2019
37	1.1.9.2	Archiving	26d	8/30/2019	10/4/2019
38	**1.2**	**2. Research Paper (Thesis)**	**26d**	**8/30/2019**	**10/4/2019**
43	**1.3**	**3. Presentation**	**26d**	**8/30/2019**	**10/4/2019**
44	1.3.1	Introduction	26d	8/30/2019	10/4/2019
45	**1.3.2**	**3.1 Agenda**	**26d**	**8/30/2019**	**10/4/2019**
54	**1.4**	**MILESTONE: PPM 1 Deliverables**	**10d**	**8/30/2019**	**9/12/2019**
55	1.4.1	1. Project Charter	10d	8/30/2019	9/12/2019
56	1.4.2	2. Preliminary Project Schedule	10d	8/30/2019	9/12/2019
57	1.4.3	3. Project Abstract (200 words)	10d	8/30/2019	9/12/2019
58	1.4.4	4. Stakeholder Identification and Analysis	10d	8/30/2019	9/12/2019
59	1.4.5	5. Letter of Support from Project Sponsor	10d	8/30/2019	9/12/2019
60	1.4.6	6. Preliminary Graduate Studies Plan (GSP)	10d	8/30/2019	9/12/2019
61	1.4.7	7. Preliminary Narrative Description	10d	8/30/2019	9/12/2019
62	**1.4.8**	**8. Knowledge Area Selection and Measures**	**10d**	**8/30/2019**	**9/12/2019**
63	1.4.8.1	Selection of 3-4 Knowledge Areas	10d	8/30/2019	9/12/2019
64	1.4.8.2	Description - of how they will be applied and perfor	10d	8/30/2019	9/12/2019
65	**1.5**	**MILESTONE: PPM 2 Deliverables**	**17d**	**9/13/2019**	**10/7/2019**
66	1.5.1	1. Project Scope Statement	17d	9/13/2019	10/7/2019
67	1.5.2	2. Requirements Documentation	10d	9/13/2019	9/26/2019
68	1.5.3	3. Updated WBS	10d	9/13/2019	9/26/2019
69	1.5.4	4. Updated Project Schedule	10d	9/13/2019	9/26/2019
70	1.5.5	5. Tables of Contents for PM Plan and Final Project F	10d	9/13/2019	9/26/2019
71	1.5.6	6. Research Sources and Key Words	10d	9/13/2019	9/26/2019
72	1.5.7	7. Preliminary Research Methods and Approach to Ar	10d	9/13/2019	9/26/2019
73	1.5.8	8. Signed Student/Advisory Committee "contract"	10d	9/13/2019	9/26/2019
74	1.5.9	9. IRB account established (provide screen shot)	10d	9/13/2019	9/26/2019
75	1.5.10	10. Knowledge Area Selection description, measured	10d	9/13/2019	9/26/2019
76	1.5.11	11. Narrative Description (Fully Elaborated)	10d	9/13/2019	9/26/2019
77	**1.6**	**MILESTONE: PPM 3 Deliverables**	**16d**	**9/27/2019**	**10/18/2019**
78	1.6.1	1. Written Draft of PMP (fully developed scope)	16d	9/27/2019	10/18/2019
79	1.6.2	2. Revised Abstract	16d	9/27/2019	10/18/2019
80	**1.6.3**	**3. Description of expected research methods;**	**16d**	**9/27/2019**	**10/18/2019**
81	1.6.3.1	3.1 Instrument Approaches	16d	9/27/2019	10/18/2019
82	1.6.3.2	3.2 How Results will be analyzed	16d	9/27/2019	10/18/2019
83	1.6.4	4. Description of expected products/outcomes of the	16d	9/27/2019	10/18/2019
84	1.6.5	5. Gantt Chart Update	16d	9/27/2019	10/18/2019
85	**1.6.6**	**6. Update on 3-4 Knowledge Area processes applie**	**16d**	**9/27/2019**	**10/18/2019**
86	1.6.6.1	6.1 Measured data for selected areas	16d	9/27/2019	10/18/2019
87	1.6.6.2	6.2 Lessons Learned	16d	9/27/2019	10/18/2019
88	1.6.7	7. IRB Request for Determination	16d	9/27/2019	10/18/2019
89	**1.7**	**MILESTONE: PPM 4 Deliverables**	**25d**	**10/21/2019**	**11/22/2019**
90	1.7.1	1. Advisor-approved research instruments and analys	25d	10/21/2019	11/22/2019
91	1.7.2	2. UAA IRB Submittal Complete	10d	10/21/2019	11/1/2019
92	1.7.3	3. IRB Approval	25d	10/21/2019	11/22/2019
93	**1.7.4**	**4. Professional (complete draft) Presentation**	**25d**	**10/21/2019**	**11/22/2019**

Updated WBS List

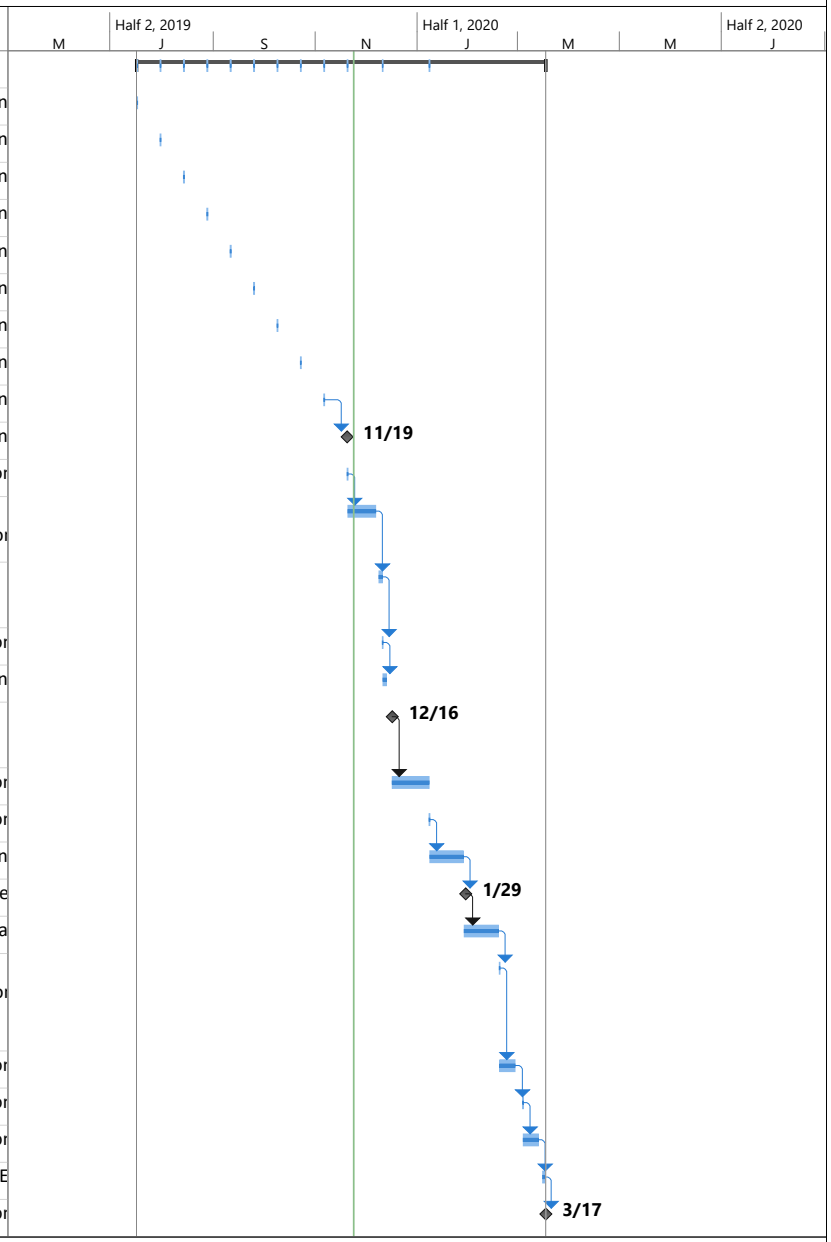
	WBS	Name	Duration	Start	Finish
94	1.7.4.1	4.1 Project Objectives	25d	10/21/2019	11/22/2019
95	1.7.4.2	4.2 Charter	25d	10/21/2019	11/22/2019
96	1.7.4.3	4.3 PMP	25d	10/21/2019	11/22/2019
97	1.7.4.4	4.4 Description of Project Deliverables	25d	10/21/2019	11/22/2019
98	1.7.5	5. Final PMP	25d	10/21/2019	11/22/2019
99	1.7.6	6. Refined Description of Project's Product Deliverabl	25d	10/21/2019	11/22/2019
100	**1.7.7**	**7. Update on 3-4 Knowledge Areas**	**25d**	**10/21/2019**	**11/22/2019**
103	1.7.8	8. Description/Update of 3-4 Knowledge Areas (if diffe	25d	10/21/2019	11/22/2019
104	1.7.9	9. Updated Gantt Chart	25d	10/21/2019	11/22/2019
105	1.8	MILESTONE: Go/No-Go Decision #3	1d	11/27/2019	11/27/2019
106	1.9	Project Presentation	1d	12/9/2019	12/9/2019
107	**1.10**	**686B MILESTONE: PPM 1 Deliverables**	**53d**	**12/10/2019**	**2/20/2020**
108	1.10.1	1. Change Control Process	10d	2/7/2020	2/20/2020
109	**1.10.2**	**2. PMP Update (using change control process)**	**53d**	**12/10/2019**	**2/20/2020**
110	1.10.2.1	2.1 Updated Requirements Traceablity Matrix	34d	1/6/2020	2/20/2020
111	1.10.2.2	2.2 Updated WBS	34d	1/6/2020	2/20/2020
112	1.10.2.3	2.3 Updated Gantt	53d	12/10/2019	2/20/2020
113	1.10.2.4	2.4 Updated Risk Register	53d	12/10/2019	2/20/2020
114	1.10.2.5	2.5 Other PMP Elements (TBD)	53d	12/10/2019	2/20/2020
115	1.10.3	3. Risk Response Implementation	53d	12/10/2019	2/20/2020
116	**1.10.4**	**4. Project Deliverables Status Update**	**53d**	**12/10/2019**	**2/20/2020**
117	1.10.4.1	4.1 DOT&PF SSAC Update Process Guidance	34d	1/6/2020	2/20/2020
118	1.10.4.2	4.2 Research Paper (Draft)	53d	12/10/2019	2/20/2020
119	1.10.4.3	4.3 Final Presentation (Implementation - Monitoring	53d	12/10/2019	2/20/2020
120	**1.10.4.4**	**5. Data Collection/Research Update (should have**	**3d**	**2/17/2020**	**2/19/2020**
121	1.10.4.4.1	5.1 Additional interviews with subject matter expe	3d	2/17/2020	2/19/2020
122	1.10.4.4.2	5.2 Develop data measurable parameters	1d	2/19/2020	2/19/2020
123	1.10.4.5	6. Updates (if any) on 3-4 Knowledge Areas proces	53d	12/10/2019	2/20/2020
124	1.10.4.6	7. Final Signed GSP	53d	12/10/2019	2/20/2020
125	**1.11**	**686B MILESTONE: PPM 2 Deliverables**	**25d**	**1/27/2020**	**2/28/2020**
126	1.11.1	1. Updated Abstract	14d	2/11/2020	2/28/2020
127	1.11.2	2. Updated Table of Contents	25d	1/27/2020	2/28/2020
128	1.11.3	3. Updated Research Sources and Key Words	25d	1/27/2020	2/28/2020
129	1.11.4	4. Validated Research Analysis (needs advisor appro	25d	1/27/2020	2/28/2020
130	1.11.5	5. Project Progress Status (e.g.; EVM, other)	25d	1/27/2020	2/28/2020
131	1.11.6	6. PMP Updates (using change control process)	25d	1/27/2020	2/28/2020
132	1.11.7	7. Updated Requirements Traceability Matrix	25d	1/27/2020	2/28/2020
133	1.11.8	8. Updated WBS Changes	25d	1/27/2020	2/28/2020
134	1.11.9	9. Updated Project Schedule	25d	1/27/2020	2/28/2020
135	1.11.10	10. Risk Register Updates	25d	1/27/2020	2/28/2020
136	1.11.11	11. Other Project Documents (TBD)	25d	1/27/2020	2/28/2020
137	1.11.12	12. Risk Responses Implementation	25d	1/27/2020	2/28/2020
138	1.11.13	13. Project Deliverables Status Updates	25d	1/27/2020	2/28/2020
139	**1.12**	**686B MILESTONE: PPM 3 Deliverables**	**26d**	**2/14/2020**	**3/20/2020**
140	1.12.1	1. Working Draft (complete and properly formatted pa	14d	3/3/2020	3/20/2020
141	1.12.2	2. Revised Abstract	26d	2/14/2020	3/20/2020
142	1.12.3	3. Research Results and Analysis	26d	2/14/2020	3/20/2020
143	1.12.4	4. Preliminary Conclusions and Project Deliverables	26d	2/14/2020	3/20/2020
144	1.12.5	5. Updated Project Schedule	26d	2/14/2020	3/20/2020
145	**1.13**	**686B MILESTONE: PPM 4 Deliverables**	**21d**	**3/30/2020**	**4/27/2020**
146	1.13.1	1. Draft Presentation	10d	3/30/2020	4/10/2020
147	1.13.2	2. Final Complete and Properly Formatted Project Re	10d	3/30/2020	4/10/2020
148	**1.13.3**	**3. Final Project Deliverables**	**6d**	**4/20/2020**	**4/27/2020**
149	1.13.3.1	3.1 Paper	6d	4/20/2020	4/27/2020
150	1.13.3.2	3.2 Research	6d	4/20/2020	4/27/2020
151	1.13.3.3	3.3 Outcomes	6d	4/20/2020	4/27/2020
152	1.13.3.4	3.4 Product Deliverabes (Guidance)	6d	4/20/2020	4/27/2020
153	1.13.3.5	3.5 Updated Project Schedule	6d	4/20/2020	4/27/2020
154	1.14	Project Presentation (686B)	7d	4/10/2020	4/20/2020

APPENDIX G

P-401 Projected Schedule

P-401 Working Group Projected Schedule

ID	Task Mode	% Work Complete	Task Name	Duration	Start	Finish	Predece	Resource Names
1		**100%**	**P-401 10H Working Group**	**175 days**	**Wed 7/17/19**	**Tue 3/17/20**		
2		100%	P-401 Team Review Meetings 1	4 hrs	Wed 7/17/19	Wed 7/17/19		Regional Specs En
3		100%	P-401 Team Review Meetings 2	4 hrs	Wed 7/31/19	Wed 7/31/19		Regional Specs En
4		100%	P-401 Team Review Meetings 3	4 hrs	Wed 8/14/19	Wed 8/14/19		Regional Specs En
5		100%	P-401 Team Review Meetings 4	4 hrs	Wed 8/28/19	Wed 8/28/19		Regional Specs En
6		100%	P-401 Team Review Meetings 5	4 hrs	Wed 9/11/19	Wed 9/11/19		Regional Specs En
7		100%	P-401 Team Review Meetings 6	4 hrs	Wed 9/25/19	Wed 9/25/19		Regional Specs En
8		100%	P-401 Team Review Meetings 7	4 hrs	Wed 10/9/19	Wed 10/9/19		Regional Specs En
9		100%	P-401 Team Review Meetings 8	4 hrs	Wed 10/23/19	Wed 10/23/19		Regional Specs En
10		100%	P-401 Team Review Meetings 9	4 hrs	Wed 11/6/19	Wed 11/6/19		Regional Specs En
11		100%	Prepare P-401 DRAFT Review Set	9 days	Thu 11/7/19	Tue 11/19/19	10	Regional Specs En
12		100%	P-401 Team Review Meetings 10	2 hrs	Wed 11/20/19	Wed 11/20/19		Aviation Chief,Cor
13		100%	P-401 Team Review Comments Period	12.75 days	Wed 11/20/19	Fri 12/6/19	12	Aviation Chief,Constructio Chief,Materials
14		100%	P-401 Update DRAFT after comments	2 days	Mon 12/9/19	Tue 12/10/19	13	Regional Specs Engineer
15		100%	P-401 Team Review Meetings 12	2 hrs	Wed 12/11/19	Wed 12/11/19	14	Aviation Chief,Cor
16		100%	P-401 Update to Final DRAFT	2 days	Wed 12/11/19	Fri 12/13/19	15	Regional Specs En
17		100%	P-401 Submittal to Statewide & Regions	1 day	Mon 12/16/19	Mon 12/16/19		Regional Specs Engineer,NR P-401 SC
18		100%	P-401 Statewide/Regional Review	16 days	Tue 12/17/19	Tue 1/7/20	17	Aviation Chief,Cor
19		100%	P-401 Team Review Meetings 13	2 hrs	Wed 1/8/20	Wed 1/8/20		Aviation Chief,Cor
20		100%	P-401 Prep FINAL DRAFT for FAA	14 days	Wed 1/8/20	Tue 1/28/20	19	Regional Specs En
21		100%	P-401 Statewide DRAFT to FAA	1.75 days	Tue 1/28/20	Wed 1/29/20	20	Materials Enginee
22		100%	P-401 Review by FAA	14.25 days	Wed 1/29/20	Tue 2/18/20	21	Aviation Chief,Ma
23		100%	P-401 FAA Review Responses Mtg to Discuss Review Comments and Prepare Responses	2 hrs	Wed 2/19/20	Wed 2/19/20	22	Aviation Chief,Constructio Chief,Materials Engineer,QA/QC
24		100%	P-401 FINAL to FAA w/Responses	7 days	Wed 2/19/20	Fri 2/28/20	23	Aviation Chief,Cor
25		100%	P-401 FAA Review Meeting	2 hrs	Wed 3/4/20	Wed 3/4/20	24	Aviation Chief,Cor
26		100%	P-401 Final Edits after FAA Mtg	7 days	Wed 3/4/20	Fri 3/13/20	25	Aviation Chief,Cor
27		100%	P-401 Final Submittal to FAA	1 day	Mon 3/16/20	Mon 3/16/20	26	Statewide Specs E
28		100%	P-401 Approval by FAA	1 day	Tue 3/17/20	Tue 3/17/20	27	Aviation Chief,Cor



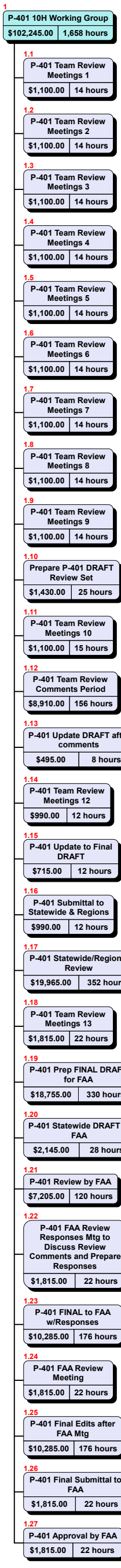
Project: P-401 Projected Appro
Date: Sun 11/24/19

Task	Project Summary	Manual Task	Start-only	Deadline	
Split	Inactive Task	Duration-only	Finish-only	Progress	
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress	
Summary	Inactive Summary	Manual Summary	External Milestone		

APPENDIX H

P-401 Projected Schedule WBS and WBS List

P-401 Project Schedule
Work Breakdown Structure - Detailed View



P-401 Projected Approval Schedule

	WBS	Name	Duration	Start	Finish
1	**1**	**P-401 10H Working Group**	**175d**	**7/17/2019**	**3/17/2020**
2	1.1	P-401 Team Review Meetings 1	4h	7/17/2019	7/17/2019
3	1.2	P-401 Team Review Meetings 2	4h	7/31/2019	7/31/2019
4	1.3	P-401 Team Review Meetings 3	4h	8/14/2019	8/14/2019
5	1.4	P-401 Team Review Meetings 4	4h	8/28/2019	8/28/2019
6	1.5	P-401 Team Review Meetings 5	4h	9/11/2019	9/11/2019
7	1.6	P-401 Team Review Meetings 6	4h	9/25/2019	9/25/2019
8	1.7	P-401 Team Review Meetings 7	4h	10/9/2019	10/9/2019
9	1.8	P-401 Team Review Meetings 8	4h	10/23/2019	10/23/2019
10	1.9	P-401 Team Review Meetings 9	4h	11/6/2019	11/6/2019
11	1.10	Prepare P-401 DRAFT Review Set	9d	11/7/2019	11/19/2019
12	1.11	P-401 Team Review Meetings 10	2h	11/20/2019	11/20/2019
13	1.12	P-401 Team Review Comments Period	12.75d	11/20/2019	12/6/2019
14	1.13	P-401 Update DRAFT after comments	2d	12/9/2019	12/10/2019
15	1.14	P-401 Team Review Meetings 12	2h	12/11/2019	12/11/2019
16	1.15	P-401 Update to Final DRAFT	2d	12/11/2019	12/13/2019
17	1.16	P-401 Submittal to Statewide & Regions	1d	12/16/2019	12/16/2019
18	1.17	P-401 Statewide/Regional Review	16d	12/17/2019	1/7/2020
19	1.18	P-401 Team Review Meetings 13	2h	1/8/2020	1/8/2020
20	1.19	P-401 Prep FINAL DRAFT for FAA	14d	1/8/2020	1/28/2020
21	1.20	P-401 Statewide DRAFT to FAA	1.75d	1/28/2020	1/29/2020
22	1.21	P-401 Review by FAA	14.25d	1/29/2020	2/18/2020
23	1.22	P-401 FAA Review Responses Mtg to Discuss Review Comı	2h	2/19/2020	2/19/2020
24	1.23	P-401 FINAL to FAA w/Responses	7d	2/19/2020	2/28/2020
25	1.24	P-401 FAA Review Meeting	2h	3/4/2020	3/4/2020
26	1.25	P-401 Final Edits after FAA Mtg	7d	3/4/2020	3/13/2020
27	1.26	P-401 Final Submittal to FAA	1d	3/16/2020	3/16/2020
28	1.27	P-401 Approval by FAA	1d	3/17/2020	3/17/2020

APPENDIX I

Communication Management Plan

COMMUNICATIONS MANAGEMENT PLAN

Project Title: Develop and Standardize the DOT&PF Statewide Aviation Specifications Updating Process **Date Prepared:** 2/14/20

Stakeholder	Information	Method	Timing or Frequency	Sender
DOT&PF Central Region Aviation Section, consultants, TSAIA – Anchorage International Airport PM and Project Engineer, Highways Specs Engineer, and Preconstruction Engineer	*Specs Updates*	*Verbal, Email*	*01/07/20 – Send 10H Update of 82 FAA approved specs now available; general frequency – send quarterly, or when new specs are approved*	*Specs Update Project Manager / Central Region Specifications Engineer*
DOT&PF Central Region P-401 Subject Matter Expert Specs Team (CR's Materials Engineer, Construction Section Chief, Aviation Section Chief, Quality Assurance, Construction PM, Specifications Engineer)	*P-401 meetings to review and revise spec; and as-needed materials specs review & revision*	*Outlook Mtg Notification, teleconference, email*	*Every 2 weeks until Central Region Draft complete (completed on 2/10/20)*	*Specs Update Project Manager / Central Region Specifications Engineer*
DOT&PF Statewide Update Mtgs (Statewide Chief Engineer, Statewide Specs Engineer, along with Statewide Materials Engineer, and CR Aviation Section Chief)	*Provide Statewide Chief Engineer & Statewide Specs Engineer, along with Statewide Materials Engineer with draft specs updates, and coordinate efforts between regions and Statewide teams*	*Outlook Mtg Notification, teleconference, email*	*Every 2 weeks until Statewide Standard specs updated and FAA approved.*	*Specs Update Project Manager / Central Region Specifications Engineer*
DOT&PF Module Admin Teams (MA/T) for AASHTOWare (AWP) statewide coordination	*Provide coordination sessions to discuss AWP updates, pay item updates, and specs updates as they impact AWP pay items*	*Outlook Mtg Notification, teleconference, WebEx, email*	*Once a month*	*Specs Update Project Manager / Central Region Specifications Engineer*
DOT&PF P-318 Update Mtgs (CR's Construction Chief, Construction PMs, Aviation Section Chief, Aviation Design Engineer, Quality Assurance, Aviation Section Squad Leader, Aviation Section PM, and Statewide's Materials Engineer and Specifications Engineer)	*Provide coordination to update P-318 Foamed Asphalt Stabilized Base Course*	*Outlook Mtg Notification, teleconference, WebEx, email*	*Once a week with staff engineer working on spec, and with Construction Chief/Aviation Section Chief.*	*Specs Update Project Manager / Central Region Specifications Engineer*

Assumptions	Constraints
DOT&PF SSAC updates to be coordinated with Aviation design teams across all 3 regions and Statewide offices, along with regional & Statewide Materials section, Section Chiefs, Regional Construction Chiefs, regional specs engineers, Aviation design PMs will all need to be informed on all current specs updates.	*DOT&PF offices span across three regions and HQ offices, so face-to-face communications is limited. No video conferencing available. Realtime communication in the form of teleconferencing, and WebEx. Document control to manage different specs versions, along with the current review comment system are challenges.*

APPENDIX J

Risk Register and Risk Breakdown Structure

Updated Risk Register

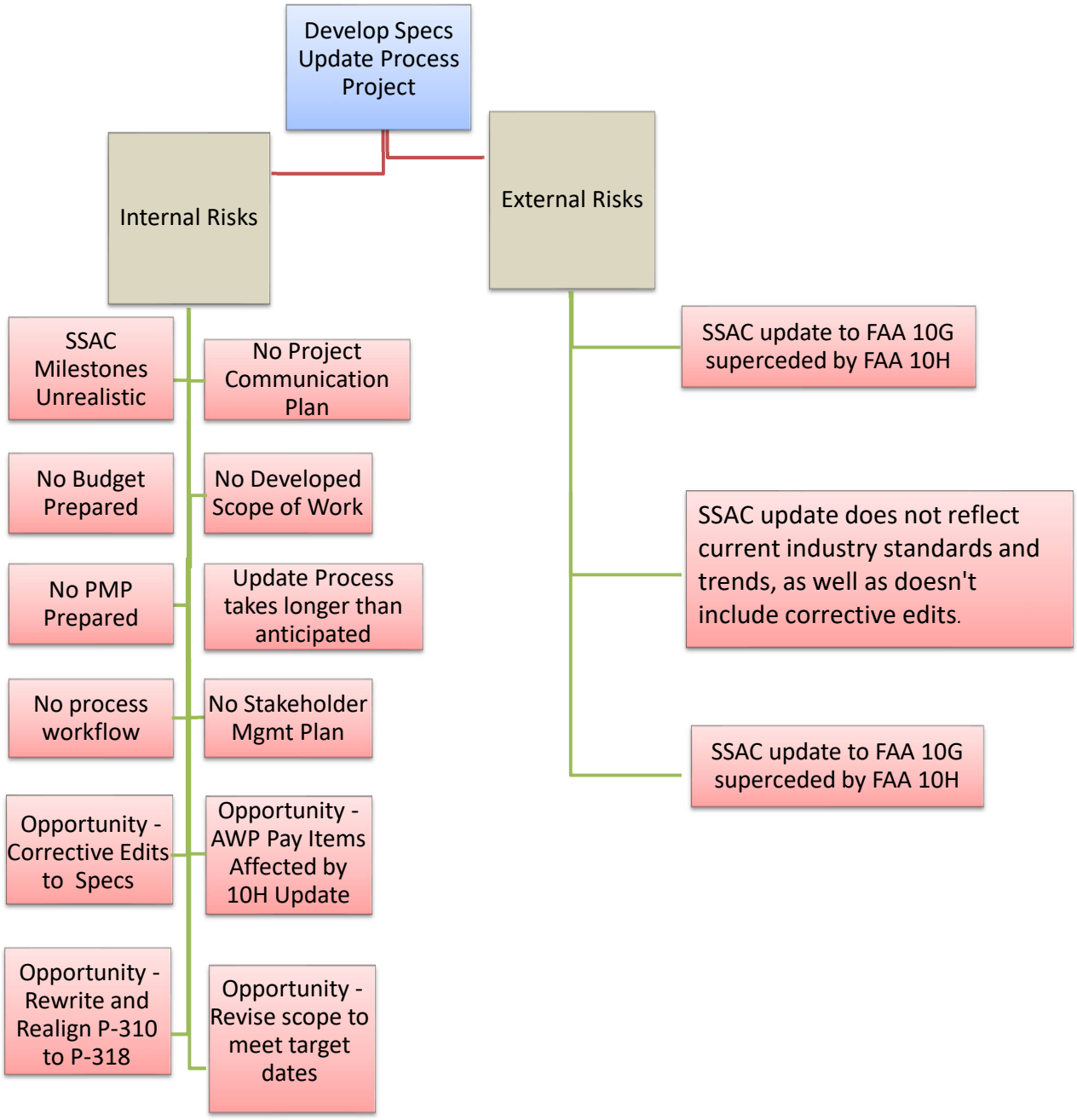
Team Members: Virginia Groeschel

Project Name: Develop and Standardize a DOT&PF Statewide Airport Specifications Updating Process

ID#	Risk Name	Description of Risk	Likelihood (1-not likely, 3- likely, 5-very likely)	Impact (1-negligible, 3-Marginal, 5-Significant)	Risk Level 1-2 = Low, 3-4 = Med, 5 = High	Response Type (e.g. Avoid, Mitigate, Transfer, Accept) and specific actions to be taken.	Owner
External Risks: Conditions outside the control of the project (e.g. Weather, Market conditions, Exchange Rates, etc.)							
ER-1	During statewide efforts to update specs to 10G FAA updates federal specs to 10H and requres compliance	FAA requires state specs for the project adhere to updated federal project specs, impacting aviation design projects and potentially delaying project advertising	1	5	**HIGH**	Accept - Adjust the project process to account for inventory efforts of what specs already approved, focus on what 10G specs need to be updated and transition to 10H specs for compliance	Project Manager
ER-2	Specs edits based on industry trends and general corrections	While updating the state specs to comply with FAA 10H language, industry trends require language edits, along with corrective edits found in general reviews.	5	5	**High**	Mitigate - Include this sub-process in the project to assign teams to work separately on updating language to accommodate industry trends, and to make corrective edits to language. Once edits complete, incorporate with 10H Draft set, to ensure specs are completely current.	Project Manager
ER-3	AASHTOWare (AWP) Obsolete Pay Items	While updating the state specs to comply with FAA 10H language, previously created pay items for P-207 CASC spec need to be replaced with P-299 CASC, because FAA 10H uses P-207 for Full Depth Reclamantion of recycled asphalt. AWP cannot account for revising descriptions, but must obsolete the created P-207 number set.	3	5	**Med**	Mitigate -Account for this change in the process, and account for the adjustment in the guidance - Because AWP can't edit descriptions, but the P-207 set needs to be used with FDR, then discuss with regional AWP Modula Administrators Team (MA/T). Shift P-207 FDR asphalt items to P207.100.0000, so P207.010.0000 items can still remain obsoleted. AWP MA/T group agreement.	Project Manager
Internal Risks: Conditions within the control of the project (customer needs definition, implementation of chosen solution, project management, etc.)							
IR-1	Setting process milestone without adequate evaluation of activity durations	No drilldown or planning evaluations of all tasks, so milestones are unrealistic	5	5	**HIGH**	Mitigate - Include a task in the project process to prepare a schedule with a thorough analysis of task durations	Project Manager
IR-2	No communication plan prepared	Prior to process start, no comm plan set up causing delays in workflow due to missed emails and phone calls, lack of adequate coordination	5	5	**HIGH**	Mitigate - As part of the project, prepare a comm plan to account for coordination among subject matter experts, etc.	Project Manager / Project Engineer
IR-3	No budget prepared	No cost tracking to account for actual labor per task	5	5	**HIGH**	Mitigate - Prepare a budget to track costs	Project Manager / Project Engineer
IR-4	No developed scope of work	Loss of coordination and quality of meetings; delays schedule due to lack of defined work tasks and assignments, schedules	5	5	**HIGH**	Mitigate - Prepare a defined scope of work	Project Manager / Project Engineer
IR-5	No prepared plan or outline	Prior to execution of project, no actions items clearly assigned or defined, causing delays in process completion	5	5	**HIGH**	Mitigate - Prepare a PMP to maintain organization and complete tasks	Project Manager / Project Engineer
IR-6	Process to update statewide specs takes longer than anticipated	Task durations were underestimated and project delays occur	5	5	**HIGH**	Mitigate - Utilize project schedule to get back on track; account for SSB	Project Manager / Project Engineer
IR-7	No process workflow, or configuration management plans	Next steps not clearly defined	5	5	**HIGH**	Mitigate - Drilldown tasks to account for gaps	Project Manager / Project Engineer
IR-8	No Stakeholder Mgmt Plan	Critical elements and next steps missed without a plan to consider end user	5	5	**HIGH**	Mitigate - Prepare SMP to ensure key users valuable insights addressed	Project Manager / Project Engineer

IR-9	Positive Risk/Opportunity: Corrective edits to the specs	Corrective edits need to be conducted on existing specs	5	5	**HIGH**	1. Exploit Opportunity - While the specs are in flux undergoing a major update, take this opportunity to make corrective edits to existing specs, which have been previously identified. Then, include in update process development. 2. Enhance Opportunity - While in-house/consultant design team are working on their design projects, train teams to assist in specs update and have them help with corrective edits, and work on 10H updates. Then include in update process development. 3. Share Opportunity - Create specialized working groups to update specs sections (L-specs, P-401, GCPs, Special Provisions, etc). Then include in update process development.	Project Manager / Project Engineer
IR-10	Positive Risk/Opportunity: 10H update will affect AASHTOWare (AWP) aviation pay items.	While 10H update to specs, AWP pay items need to align with specs, and future updates	5	5	**HIGH**	1. Exploit Opportunity - Create a process to add new pay items in AWP, that aligns with 10H and future. 2. Enhance Opportunity - Build solid communication channels with newly formed MA/T teams statewide, to discuss AWP pay items and how the system will respond to changes in specs. Build agreement. 3. Share Opportunity - Allow teams to review changes to existing specs with 10H language, and create a process for future teaming with other regions on how to work on specs updates. Then include in update process development.	Project Manager / Project Engineer
IR-11	Positive Risk/Opportunity: While undergoing 10H update, Central Region Specials (P-310) requires complete rewrite	While 10H update to AC specs, Construction section identifies Central Region Special, P-310 Foamed Asphalt Base Course for complete rewrite, based on current industry standards and recent project lessons learned	5	5	**HIGH**	1. Exploit Opportunity - Model P-401 draft process to streamline spec revision and adding new pay items in AWP, that aligns with 10H and future. Also, train new staff by delegating revision work; Redraft allows full spec number change to align with highway spec (318), so new spec number is P-318 Foamed Asphalt Base Course - future alignment between Aviation specs & Highway specs incrementally improved 2. Enhance Opportunity - Build solid communication channels with newly formed MA/T teams statewide, to discuss AWP pay items and how the system will respond to changes in specs. Build agreement. 3. Share Opportunity - Allow teams to review changes to existing specs with opportunity to build key subject matter expert relationships, and create a process for future teaming with other regions on how to work on specs updates. Then include in update process development.	Project Manager / Project Engineer
IR-12	Positive Risk/Opportunity: Schedule slips on submitting PPMs	While implementing 10H update draft process, key PPM deliverables slip the schedule	5	5	**HIGH**	1. Exploit Opportunity - Review scope; look for opportunity to descope work 2. Enhance Opportunity - Identify areas to streamline work; target key revisions, as necessary 3. Share Opportunity - Crash the schedule, and revise priorities on specs updates. Then include in update process development.	Project Manager / Project Engineer

Updated Risk Breakdown Structure



APPENDIX K

Stakeholder Register

Project Stakeholder Register

	Identification Information					Assessment Information (Their project requirements and expectations)							Communication (How they like to be communicated with)				
	Organization	Position/Title	Location	Role	Contact Information	Major requirements	Measures of Success	Expectations	Primary Concerns	Current Level of Support	Desired level of support	Key influencers /relationships	Mode	Frequecncy	Level of detail	Format	Other helpful info
Internal Stakeholders (internal to performing organization)																	
Project Managers	DOT&PF	PM	CR, NR, SC	PM, authority	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Project Squad Leaders	DOT&PF	Squad Leader	CR, NR, SC	Design Leads	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Project Engineers /Designers	DOT&PF	Designers	CR, NR, SC	Project Designers	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Student Engineering Interns	DOT&PF	Interns	CR, NR, SC	Design Support	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Contracts Officers	DOT&PF	Contract Officers	CR, NR, SC	Review PS&E Documents	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Aviation Planners	DOT&PF	Planners	CR, NR, SC	Plan aviation projects	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Utilities Section	DOT&PF	Utilities Engineer	CR, NR, SC	Review and coordinate utilities on projects	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Survey Section	DOT&PF	Surveyors	CR, NR, SC	Prepare and review project surveys	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Right-of-Way Section	DOT&PF	ROW Agents	CR, NR, SC	Support project ROW	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a

Environmental Section	DOT&PF	Enviro Analyst	CR, NR, SC	Support project ENV	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Construction Section	DOT&PF	Construction PMs	CR, NR, SC	Construct projects	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Materials Section	DOT&PF	Materials Engineers	CR, NR, SC	Support project GEOTECH	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Maintenance & Operations Section	DOT&PF	M&O	CR, NR, SC	Review and Support Design	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Statewide Electrical Engineer	DOT&PF	Electrical Engineer	Statewide	Technical Reviewer	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Statewide Specifications Engineer	DOT&PF	Statewide Specs Engineer	Statewide	Specs Reviewer; Developer	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Chief Engineer	DOT&PF	Chief Engineer	Statewide	Projects Standards Authority	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
AASHTOWare (AWP) Module Admins	DOT&PF	MAs	CR, NR, SC	AWP Coordinators with Specs/projects	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Regional Specs Engineers provide direct support on projects	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Regional Airport Managers	DOT&PF	Airport Managers	CR, NR, SC	Manage regional airports	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Minor specs expertise support	minor, indirect support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Quality Assurance / Quality Control	DOT&PF	QA/QC	CR, NR, SC	QA/QC construction projects	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	High level of specs expertise support	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a
Regional Specifications Engineers	DOT&PF	Regional Specs Engineer	CR, NR, SC	Manage SSAC, regionally	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	High level of specs expertise support	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Full	Meeting Minutes	n/a

Administrative Staff	DOT&PF	Admin	CR, NR, SC	Support	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Minor specs expertise support	minor, indirect support	No	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Mid-level	Meeting Minutes	n/a
Project Control / Finance Staff	DOT&PF	Finance	CR, NR, SC	Support Funding	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Minor specs expertise support	minor, indirect support	No	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Mid-level	Meeting Minutes	n/a
Attorney General's Office	State of Alaska	AG's LAW	State of Alaska	Support Legal & reviews specs language and contracts	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Mid-level support	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Mid-level	Meeting Minutes	n/a
Statewide Facilities	DOT&PF	Facilities	CR, NR, SC	Support reviewers	DOT&PF	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Mid-level support	minor, indirect support	No	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Mid-level	Meeting Minutes	n/a
External Stakeholders (external to performing organization)																	
FAA Chief Engineer		FAA Chief Engineer	Statewide	FAA project reviewer & authority	FAA	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	High level of specs expertise support	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- Infreq. phone Min-Infreq emails; indirect	Full	Meeting Minutes	n/a
FAA Regional Project Managers		FAA PMs	Statewide	FAA project reviewer & authority	FAA	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	High level of specs expertise support	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- mid-frequent, Direct, email, phon Min-Infreq	Full	Meeting Minutes	n/a
FAA Regional Planners		FAA Planners	Statewide	FAA project reviewer & authority	FAA	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	High level of specs expertise support	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- mid-frequent, Direct, email, phon Min-Infreq	Full	Meeting Minutes	n/a
FAA Federal Reviewers		FAA Reviewers	Statewide	FAA project reviewer & authority	FAA	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	High level of specs expertise support	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- mid-frequent, Direct, email, phon Min-Infreq	Full	Meeting Minutes	n/a
Design Engineering Consultants		Consultants	Statewide	Project Design	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	High level of specs expertise support	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- mid-frequent, Direct, email, phon Min-Infreq	Full	Meeting Minutes	n/a
Design Sub-consultants		Sub-consultants	Statewide	Project Design	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	High level of specs expertise support	High, direct support	Yes, high level of influence	Direct, email, phone, distance software	Max- mid-frequent, Direct, email, phon Min-Infreq	Full	Meeting Minutes	n/a
Construction Contractors		Construction Contractors	Statewide	Project Construction	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Minor specs expertise support	indirect support	Yes, high level of influence	Direct, email, phone, distance software	Max- website; no frequency	Full	Meeting Minutes	n/a
Construction Sub-consultants		Const. Subs	Statewide	Project Construction	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Specs are current and FAA approved for project design	Meets FAA AC Standards	Minor specs expertise support	indirect support	Yes, high level of influence	Direct, email, phone, distance software	Max- website; no frequency	Full	Meeting Minutes	n/a

Traveling Public utilizing State Airport Facilities		Public, Travelers	Statewide	End User	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	No	website & information posts only	Max-website; no frequency	Minimum / website	standard handouts	n/a
Local Utilities		Local Utilities	Local	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	Yes, high level of influence	Direct, email, phone, distance software	Max-website; no frequency	Mid-level	Meeting Minutes	n/a
US Military (IRC)		US Military	Statewide	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	No	Direct, email, phone, distance software	Max-website; no frequency	Mid-level	Meeting Minutes	n/a
Native Corporations		Native Corps.	Statewide	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	No	Direct, email, phone, distance software	Max-website; no frequency	Minimum / website	standard handouts	n/a
Native Village Councils		Native Villages	Local	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	No	Direct, email, phone, distance software	Max-website; no frequency	Minimum / website	standard handouts	n/a
Local residents near airport		Local Residents	Local	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	No	Direct, email, phone, distance software	Max-website; no frequency	Only website availability	standard handouts	n/a
Local Authorities		Local Authorities	Local	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	Yes, high level of influence	Direct, email, phone, distance software	Max-website; no frequency	Full	Mtg Minutes	n/a
Public Lease Lot Holders - Businesses		Public Leasees	Statewide	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	Yes, indirect influence	Direct, email, phone, distance software	Max-website; no frequency	Mid-level	standard handouts	n/a

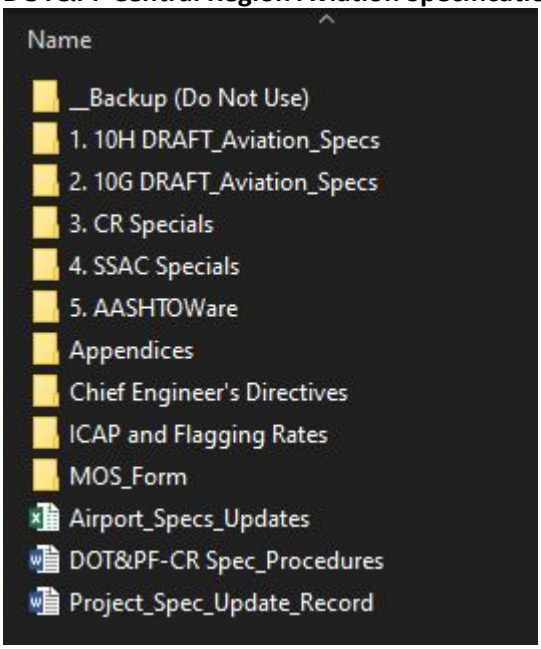
Public Lease Lot Holders - Private Use		Private Leasees	Statewide	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	Yes, indirect influence	Direct, email, phone, distance software	Max- website; no frequency	Mid-level	standard handouts	n/a
Major Airlines		Major Airlines	Statewide	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	Yes, indirect influence	indirect; website	Max- website; no frequency	Minimum / website	Email	n/a
Local Airlines		Local Airlines	Statewide	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	Yes, indirect influence	indirect; website	Max- website; no frequency	Minimum / website	Email	n/a
Pilots, Commercial Major Airlines		Commercial Pilots, Major	Statewide	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	Yes, indirect influence	indirect; website	Max- website; no frequency	Minimum / website	standard handouts	n/a
Pilots, Commercial Local Airlines		Commercial Pilots, Local	Statewide	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	Yes, indirect influence	indirect; website	Max- website; no frequency	Minimum / website	standard handouts	n/a
Pilots, Private		Private Pilots	Statewide	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	Yes, indirect influence	indirect; website	Max- website; no frequency	Minimum / website	standard handouts	n/a
All State Owned and Operated Airports		All DOT&PF Owned & Operated Airports	Statewide	End User; Coordination	Various	Current Standard FAA Approved Specs	Availability of Standard FAA Approved Specs	Airports are designed to FAA approved standards	Airports are safe to operate because construction standards are met	No direct support	indirect support	Yes, indirect influence	Direct, email, phone, distance software	Max- Daily Min - Infreq by Email	Minimum / website	standard handouts	n/a

APPENDIX L

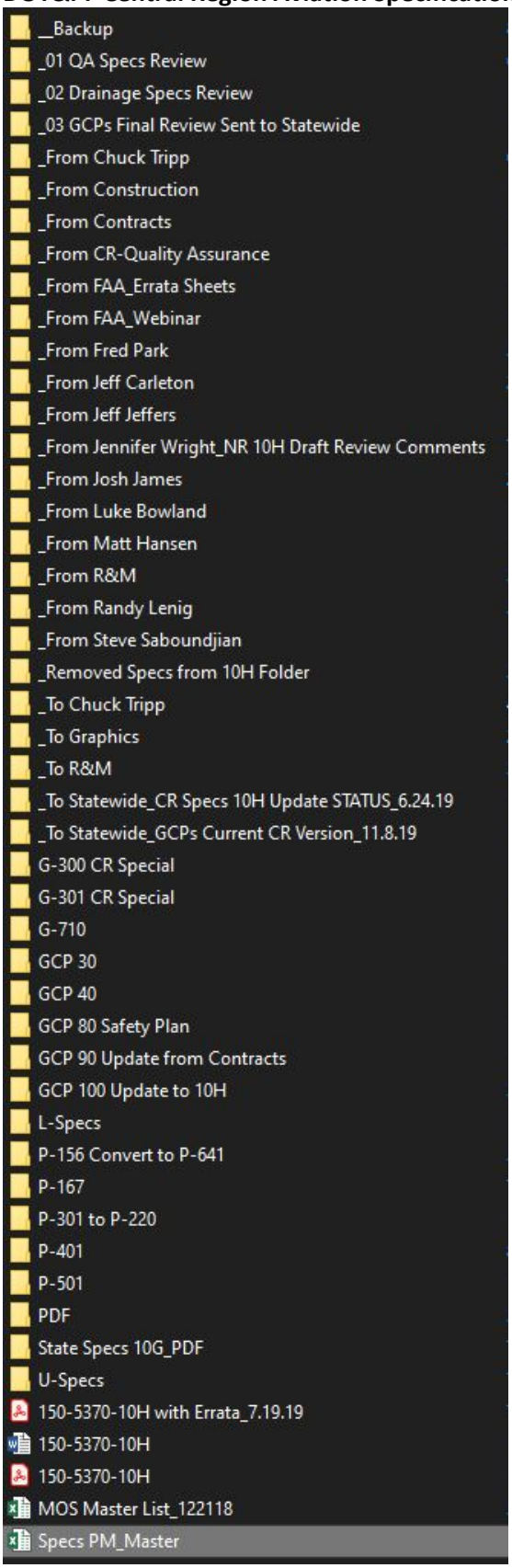
Project Document Control
and
DOT&PF SSAC Status Tracking Spreadsheet

Appendix L – Project Document Control

DOT&PF Central Region Aviation Specifications Folder



DOT&PF Central Region Aviation Specifications Folder



Abreviations: O = Outstanding, A = Addressed,

PART I - GENERAL CONTRACT PROVISIONS	FAA Approved 10G	FAA Approved 10H	FAA Comments	DOT Comments	FAA Concurrence	Regions Concurrence	CR Comments	NR Comments	AWP Comments Only	FAA Errata Corrections	PZ 8/21 sub w/ no change	PZ 8/21 sub w/ minor change	resub. req'd per Jeff J	Stwd Mat Support	FAA 10H Concur (Nov. 2019)	Ready to Issue Std Spec
GENERAL GCP EDITS							1. 7/5/18, All GCPs updated and corrected for AASHTOWare e-bidding language 2. Updated all specs with corrected "DOT&PF" reference GCPs									
Section 10 Definition of Terms	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	1. Updated per Statewide edits (in yellow) and formatted Holiday List									
Section 20 Proposal Requirements and Conditions	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	1. 20-01: Revised content order per Statewide version 2. 20-04, 5th para: Added Statewide edits 3. 20-06.a(4): Replaced with updated language per Chief Engineer's Directive (3/20/18)									
Section 30 Award and Execution of Contract	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	1. 30-02, 5th para.: Added para from Statewide 2. 30-02, 6th para.: Replaced with new paragraph 3. 30-06: Replaced "AS 21" with Title 21 of the Alaska Statutes" 30-06, 11th para. - remove the word "insurance" and update sentence; from AG's office and Contracts adopted.									
Section 40 Scope of Work	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	1. 40-02.d: Added Time Analysis from Statewide 2. 40-03: Replaced 1st paragraph with language from Statewide 3. 40-03: Replaced 4th para, with langauge from Statewide 4. 40-03: Replaced 6th para, with langauge from Statewide 5. 40-03: Added 7th para with language from Statewide 6. 40-08: Removed VECP Section per FAA	Yes	Yes							
Section 50 Control of Work	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	1. 50-01: Revised 2nd sentence from Statewide language. 2. 50-01, 2nd para.: Replaced 2nd para with Statewide language. 3. 50-01, 3rd para.: Revised para with Statewide language 4. 50-02, 2nd para.: Added Statewide language 5. 50-15, 3rd para.: Revised 1st sentence per Statewide edits 6. 50-17, 5th para.: Added Statewide language									
Section 60 Control of Materials	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	1. Added 60-09 Buy American language 2. 60-02.d.(1)(e): Reformatted and added Statewide language 3. 60-05: Replaced 2nd para., with Statewide edits 4. 60-11: Added new subsection from Statewide edits									
Section 70 Legal Regulations and Responsibility to Public	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	1. 70-01, 4th para.: Revised and reformatted from Statewide edits 2. 70-02, 4th para.: Added "s" to "provision"									
Section 80 Execution and Progress	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	1. Revised title to conform with 10H 2. 80-02, 1st para.: Added new 3rd sentence per Statewide edits 3. 80-03e: Remove the CSPP on list 4. 80-04c - Add new last sentence: "The Security Plan for this project is incorporated into the CSPP, Appendix D." 5. 80-05, 3rd para.: Revised per Statewide edits 6. 80-06c.(12): Revised para., per Statewide edits 7. 80-06d.(4): Added (c) & (d) per Statewide edits	Yes								
Section 90 Measurement and Payment	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	1. Revised entire section on 5/30/19, and listed as "12/21/18" version per Contracts request to align with Highways. 2. 2nd paragraph: Deleted "AASHTOWare" 3. Revised Section 90-02.m: "Removed Barge Displacement Method, and added to Note to Designer (use only if applicable) 4. 90-01, 2nd para.: Revised sent. per Statewide edits 5. 90-02.m: Revised based on Contracts & Construction comments 6. 90-02.m.(3): Revised based on Contracts & Construction comments 7. 90-04.a: Revised per Statewide edits 8. 90-04, 2nd para., 1st sent.: Removed "loss" before anticipated per Statewide edits			Yes						
Section 100 Contractor Quality Control Program	N	N	Renumber Spec to C-100; correct references to in G-200, P-401, P-501, etc	Discussed with Pat Zettler and Luke Bowland; FAA accepted retaining Section 100 numbering as-is to keep this section together within DOT GCPs.	Accepted per discussed with Pat Zettler	Y	1. Added Note to Designer 2. Highlighted language indicates 10H language			Yes						
Section 110 Method of Estimating Percentage of Material within Specification Limits (PWL)	N	N	Renumber Spec to C-100; correct references to in G-200, P-401, P-501, etc	Discussed with Pat Zettler and Luke Bowland; FAA accepted retaining Section 110 numbering as-is to keep this section together within DOT GCPs.	Accepted per discussed with Pat Zettler	Y										**Yes?**

PART II – TECHNICAL SPECIFICATIONS

DRAINAGE

Item D-701 Pipe for Storm Drains and Culverts	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	Replaced P-210 with P-220	Yes		Yes	Yes				Yes (11/1/19)	
Item D-702 Slotted Drains	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y		Yes	Yes		Yes				No	
Item D-705 Pipe Underdrains for Airports	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item D-751 Manholes, Catch Basins, Inlets, and Inspection Holes	N	N	Add 10H requirement for precast concrete structures to be furnished by a plant meeting National Precast Concrete Assoc Plant Certification Program, or another RPR approved third party certification program	Updated DRAFT with 10H language	Pending	Provided to Regions; needs coordination	Added Note to Designers at top of Section					Yes			Yes (11/1/19)	
Item D-752 Concrete Culverts, Headwalls, and Miscellaneous Drainage Structures	N	N	Add 10H requirement for precast concrete structures to be furnished by a plant meeting National Precast Concrete Assoc Plant Certification Program, or another RPR approved third party certification program	Updated DRAFT with 10H language	Pending	Provided to Regions; needs coordination	Added Note to Designers at top of Section					Yes			No	
Item D-754 Concrete Gutters, Ditches, And Flumes	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item D-760 Thaw Pipe And Thaw Wires	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/7/19)	
Item D-765 Edge Drains	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/7/19)	

FENCING

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PART I - GENERAL CONTRACT PROVISIONS	FAA Approved 10G	FAA Approved 10H	FAA Comments	DOT Comments	FAA Concurrence	Regions Concurrence	CR Comments	NR Comments	AWP Comments Only	FAA Errata Corrections	PZ 8/21 sub w/ no change	PZ 8/21 sub w/ minor change	resub. req'd per Jeff J	Stwd Mat Support	FAA 10H Concur (Nov. 2019)	Ready to Issue Std Spec
Item F-160 Wire Fence with Wood Posts (Class A And B Fences)	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item F-161 Wire Fence with Steel Posts (Class C And D Fence)	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item F-162 Chain-Link Fence	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item F-170 Steel Bollard	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item F-171 Power Gate Operators	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item F-174 Single and Double Pole Swing Gate	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item F-175 Blast Fence	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y						Yes			Yes (11/7/19)	
Item F-180 Screen Fence	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y		Yes				Yes			Yes (11/7/19)	
CONTRACTOR FURNISHED SERVICES																
Item G-100 Mobilization and Demobilization	N	N	Renumber Spec to C-105; correct references to in G-200, P-401, P-501, etc	Discussed with Pat Zettler and Luke Bowland; FAA accepted retaining G-100 as-is to maintain DOT's priority regarding "Demobilization". Statewide supported update to spec to include 10H language (highlighted section 3.1)	Accepted per discussed with Pat Zettler	Y	QA/QC correction; Section "105" headings replaced with"100". Added Note to Designers at top of Section				Yes				Yes (11/1/19)	
Item G-111 Governor's Workforce Development (Reserved)				REMOVED per Chief Engineers Directive 2.26.19	N/A	Y					Yes				Yes (11/1/19)	
Item G-115 Worker Meals and Lodging, or Per Diem	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y						Yes			Yes (11/1/19)	**Yes?**
Item G-120 Disadvantaged Business Enterprise (DBE) Program	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item G-130 Services to be Furnished by the Contractor	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y						Yes			Yes (11/1/19)	**Yes?**
Item G-131 Engineering Transportation	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item G-135 Construction Surveying and Monuments	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item G-150 Equipment Rental	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item G-200 Contractor Quality Control Program	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item G-300 Critical Path Method Scheduling	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y						Yes			Yes (11/1/19)	**Yes?**
Item G-310 Public Updates	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item G-700 Traffic Control for Airports	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item G-705 Watering for Dust Control	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y		Yes	Yes		Yes				Yes (11/1/19)	
Item G-710 Traffic Control for Roads, Streets, and Highways	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	1. Added Table 710-2 to DRAFT 2. 710-1.4a(2), 3rd bullet: Removed the underline on "support"					Yes			Yes (11/1/19)	
Item G-715 Wildlife Monitoring	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
LIGHTING INSTALLATION																
Item L-100 Runway and Taxiway Lighting	N	N	Align with 10H or submit requisite MOS	**Replaced L-100 with L-125**	**Pending**	**Provided to Regions; needs coordination**										
Item L-101 Airport Rotating Beacons	N	N		**Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.**	**Pending**	**Provided to Regions; needs coordination**	Replaced 101-5.1 reference to L100.170.0000 Spare Parts with L125.170.0000	Yes	Yes							
Item L-103 Airport Beacon Towers	N	N		**Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.**	**Pending**	**Provided to Regions; needs coordination**		Yes								
Item L-107 Airport Wind Cones	N	N		**Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.**	**Pending**	**Provided to Regions; needs coordination**	Replaced 101-5.1 reference to L100.170.0000 Spare Parts with L125.170.0000	Yes	Yes							
Item L-108 Underground Power Cable for Airports	N	N		**Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.**	**Pending**	**Provided to Regions; needs coordination**				Yes						
Item L-109 Airport Transformer Vault and Vault Equipment	N	N		**Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.**	**Pending**	**Provided to Regions; needs coordination**	Revised 109-5.2 reference to L-100 to L-125	Yes								
Item L-110 Airport Underground Electrical Duct Banks and Conduits	N	N		**Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.**	**Pending**	**Provided to Regions; needs coordination**	QA/QC correction; Item P-207 replaced with P-299 in whole document									
Item L-119 Airport Obstruction Lights	N	N		**Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.**	**Pending**	**Provided to Regions; needs coordination**										
Item L-125 Installation of Airport Lighting Systems	N	N		**Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.**	**Pending**	**Provided to Regions; needs coordination**		Yes								
Item L-130 Surface Sensors	N	N		**Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.**	**Pending**	**Provided to Regions; needs coordination**										
Item L-132 Approach Lighting Aids	N	N		**Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.**	**Pending**	**Provided to Regions; needs coordination**										
Item L-135 FAA Equipment	N	N		**Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.**	**Pending**	**Provided to Regions; needs coordination**										

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Item L-145 Standby Generator and Enclosure	N	N		Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.	Pending	Provided to Regions; needs coordination										
Item L-150 Weatherproof Outlets	N	N		Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.	Pending	Provided to Regions; needs coordination										
Item L-155 Flood Lighting	N	N		Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.	Pending	Provided to Regions; needs coordination										
Item L-160 Electrical Load Centers	N	N		Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.	Pending	Provided to Regions; needs coordination										
Item L-161 Electrical Meter Centers	N	N		Prepared 10H complaint DRAFT with electrical sub-consultants and Statewide Electrical Engineer as peer reviewer.	Pending	Provided to Regions; needs coordination		Yes	Yes							
MARINE AVIATION FACILITIES																
(M Series Reserved)			N/A	N/A												
EARTHWORK																
Item P-151 Clearing and Grubbing	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-152 Excavation, Subgrade, and Embankment	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	Deleted 2nd instance of P-152-3.5			Yes	Yes				Yes (11/1/19)	
Item P-153 Controlled Low-Strength Material (CLSM)	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-154 Subbase Course	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y				Yes	Yes				Yes (11/1/19)	
Item P-156 Temporary Air and Water Pollution, Soil Erosion, and Siltation Control	N	N	Renumber to C-105 correct reference in P-401, P-501, etc.	Discussed with Pat Zettler and Luke Bowland; FAA accepted spec to be renumbered to P-641 due to more stringent State guidance for erosion control and to maintain consistency with HWYs section 641.	Accepted per discussed with Pat Zettler	Y										
Item P-160 Excavation of Pavement	N	N	Does 10H P-101 now cover this?	We are keeping P-160 numbering and separate from P-101. Due to the time constraints of the BET project construction schedule, the extensive revisions required and DOT&PF Materials review time exceeds our available time. Will provide MOS as needed for now; pending Statewide/Regions coordination	Pending; no change at this time	Pending; no change at this time	QA/QC correction; Item P160.040.0000 description matches AWP. Added Note to Designers at top of Section		Yes		Yes				Yes (11/1/19)	
Item P-161 Recycled Asphalt Pavement	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-162 Pavement Cold Planing	N	N	Does 10H P-101 now cover this?	We are keeping P-162 numbering and separate from P-101. Due to the time constraints of the BET project construction schedule, the extensive revisions required and DOT&PF Materials review time exceeds our available time. Will provide MOS as needed for now; pending Statewide/Regions coordination	Pending; no change at this time	Pending; no change at this time					Yes				Yes (11/1/19)	
Item P-163 Surface Cleaning	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	Added Note to Designers at top of Section				Yes				Yes (11/1/19)	**Yes?**
Item P-165 Removal of Structures	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-167							Replaced P-167 with updated P-167									
Item P-170 Soil Testing	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-171 Temporary Contaminated Soil Stockpile Area	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-180 Riprap	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-185 Armor Stone	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-186 Sacked Slope Protection	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-189 Gabions	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-190 Insulation Board	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y	Revised Table 190-1, No. 4 Percent Passing by Weight to "15-65"					Yes			Yes (11/1/19)	
AGGREGATE BASE & SURFACE COURSES																
Item P-207 Aggregate Surface Course	N	N	Renumber so it doesn't conflict with new 10H P-207	Discussed with Pat Zettler, Luke Bowland and Statewide; FAA accepted existing doc to be renumbered to P-299	Accepted per discussed with Pat Zettler	Y				Yes			Yes			
Item P-208 Aggregate Base Course										Yes						
Item P-209 Crushed Aggregate Base Course	N	N	Verify any deviations from 10H not already addressed in the existing MOS and submit revised MOS table for review	Updated DRAFT with 10H language	Pending	Provided to Regions; needs coordination		Yes		Yes			Yes	Yes		
Item P-219 Recycled Concrete Aggregate Base Course										Yes						
Item P-299 Aggregate Surface Course							Revised pay item P299.030.0000 to "per CS", and P299.040.0000 to "per cy". Revised reference to Table 1 to "Table 299-1".	Yes	Yes			Yes			Yes (11/7/19)	
Item P-301 Soil-Cement Base Course	N	N	?	FAA didn't have on list provided to CR; updated DRAFT with 10H language	Pending	Provided to Regions; needs coordination										
Item P-304 Cement-Treated Aggregate Base Course (CTB)										Yes						
Item P-306 Lean Concrete Base Course										Yes						
Item P-307 Cement Treated Permeable Base Course (CTPB)										Yes						

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Item P-310 Foamed Asphalt Stabilized Base Course	N	N	10H P-207 appears to cover this. Delete P-310 and replace with P-207 Full Depth Reclamation (FDR) Recycled Asphalt Aggregate Base	**CR isn't using this spec, pending revision per FAA; pending Statewide/Regions revision coordination**	**Pending**	**Pending further coordination**								Yes		
Item P-315 Emulsified Asphalt Treated Base Course	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes		Yes		Yes (11/1/19)	
FLEXIBLE SURFACE COURSE																
Item P-401 Hot Mix Asphalt (HMA) Pavements	N	N	Verify any deviations from 10H not already addressed in the existing MOS and submit revised MOS table for revew	**CR is currently using P-401 10G with FAA approved MOS; P-401 is currently undergoing revision to 10H**	**Pending**	**Pending**		Yes		Yes			Yes			
Item P-403 Asphalt Mix Pavement [Base] [Leveling] [Surface] Course										Yes						
Item P-404 Fuel-Resistant Asphalt Mix Pavement										Yes						
Item P-411 Intelligent Compaction for Hot Mix Asphalt Pavement								Yes								
RIGID PAVEMENT																
Item P-501 Portland Cement Concrete (PCC) Pavement	N	N	Verify any deviations from 10H not already addressed in the existing MOS and submit revised MOS table for revew	**CR currently using P-501 10G with MOS; P-501 10H revision pending Statewide/Regions coordination**	**Pending**	**Pending**				Yes			Yes	Yes		
Item P-560 Pozzolonic Cement Grout											Yes				Yes (11/1/19)	**Yes?**
MISCELLANEOUS																
Item P-560 Pozzolonic Cement Grout	N/A	N/A	No Response - CR Special	**Spec provided by Statewide; previously coordinated by regions**	**N/A**	**Y**										
Item P-602 Bituminous Prime Coat	N	N	Update and rename to match 10H	**Updated DRAFT with 10H language**	**Pending**	**Pending**							Yes	Yes		
Item P-603 Bituminous Tack Coat	N	N	Update and rename to match 10H	**Updated DRAFT with 10H language**	**Pending**	**Pending**							Yes	Yes		
Item P-605 Joint Sealants for Concrete Pavements	N	N	Update and rename to match 10H	**Spec provided by Statewide; previously coordinated by regions**	**Pending**	**Pending**							Yes	Yes		
Item P-606 Adhesive Compounds, Two-Component for Sealing Wire and Lights in Pavement	Y	Y		Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y						Yes		Maybe, compare to 10H and resub	No	
Item P-608 Emulsified Asphalt Seal Coat										Yes						
Item P-609 Bituminous Surface Treatments	N	N	Update and rename to match 10H	**Updated DRAFT with 10H language**	**Pending**	**Pending**							Yes	Yes		
Item P-610 Structural Portland Cement Concrete	N	N	Update and rename to match 10H	**Updated DRAFT with 10H language**	**Pending**	**Pending**				Yes			Yes	Yes		
Item P-620 Runway and Taxiway Marking	N	N	Update to 10H	**Updated DRAFT with 10H language**	**Pending**	**Pending**							Yes	Yes		
Item P-621 Saw-Cut Grooves	Y	Y		Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y							Yes			
Item P-623 Emulsified Asphalt Spray Seal Coat										Yes						
Item P-625 Coal-Tar Pitch Emulsion Seal Coat	N	N	Rename and renumber to match 10H	**CR isn't using this spec, pending revision per FAA and Statewide/Regions revision coordination**	**Pending**	**Pending further coordination**										
Item P-626 Emulsified Asphalt Slurry Seal Surface Treatment	N	N	Update to 10H	**Spec provided by Statewide; previously coordinated by regions**	**Per list from Statewide**	**Y**						Yes		Yes, covered by other items?	No	
Item P-630 Intelligent Compaction for Hot Mix Asphalt Pavement	N/A	N/A	No Response - CR Special	**Spec provided by Statewide; previously coordinated by regions; renumber to P-411 for consistency with HWYs Section 411**	**N/A**	**Y**										
Item P-633 Sand Seal	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-634 Longitudinal Joint Repair	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-635 Pavement Crack Filling	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-636 High Float Surface Treatment	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-640 Segmented Circle	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-641 Erosion, Sediment, and Pollution Control							(4/8/19) QA/QC correction; replace various instances of "102" reference to "641" - (4/11/19) QA/QC correction; replaced various instances of "C" to "P" in Basis of Payment section	Yes				Yes			Yes (11/7/19)	
Item P-648							Created new CR special for Archaeological Monitoring									
Item P-650 Aircraft Tie-Down	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-655 Aircraft Relocation	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-660 Retroreflective Markers And Cones	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-661 Standard Signs	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-670 Hazardous Area Barriers	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y						Yes			Yes (11/1/19)	**Yes?**
Item P-671 Runway and Taxiway Closure Markers	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-675 Guardrail	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y		Yes				Yes			Yes (11/1/19)	
Item P-680 Geotextile for Silt Fence	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-681 Geotextile for Separation and Stabilization	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-682 Geotextile for Drainage and Erosion Control	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-683 Paving Fabric	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y						Yes			Yes (11/1/19)	**Yes?**
Item P-684 Floating Silt Curtain	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item P-686 Fiber Roll	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y		Yes			Yes				Yes (11/1/19)	**Yes?**
Item P-687 Geogrid for Embankment and Roadway Stabilization and Reinforcement	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y						Yes			Yes (11/1/19)	**Yes?**
STRUCTURES																

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Item S-142 Equipment Storage Building	N/A	N/A	No Response - CR Special	Spec provided by Statewide; previously coordinated by regions; will need to update for concurrence with 10H specs, as applicable	Per list from Statewide	Y										
Item S-143 Fuel Tank	N/A	N/A	No Response - CR Special	Spec provided by Statewide; previously coordinated by regions; will need to update for concurrence with 10H specs, as applicable	Per list from Statewide	Y										
Item S-145 Passenger Waiting Shelter	N/A	N/A	No Response - CR Special	Spec provided by Statewide; previously coordinated by regions; will need to update for concurrence with 10H specs, as applicable	Per list from Statewide	Y										
TURFING																
Item T-901 Seeding	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y				Yes	Yes				Yes (11/1/19)	
Item T-903 Sprigging	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y		Maybe - ref'd as P-901-3.1			Yes				Yes (11/1/19)	
Item T-905 Topsoiling	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item T-908 Mulching	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**
Item T-920 Vegetative Mat	Y	Y	Ok, existing MOS good for 10H	Spec provided by Statewide; previously coordinated by regions	Per list from Statewide	Y					Yes				Yes (11/1/19)	**Yes?**

APPENDIX M

Project Closeout – Archiving Process

Aviation Design Archiving

1. **Why Archive?**
2. **Archive Folder Structure**
3. **Archive Process**
4. **ALP Archive Process**
5. **Transfer to Southcoast Region Structure**
6. **Transfer to Southcoast Region Process**
7. **Contacts for Questions**

1. Why Archive?

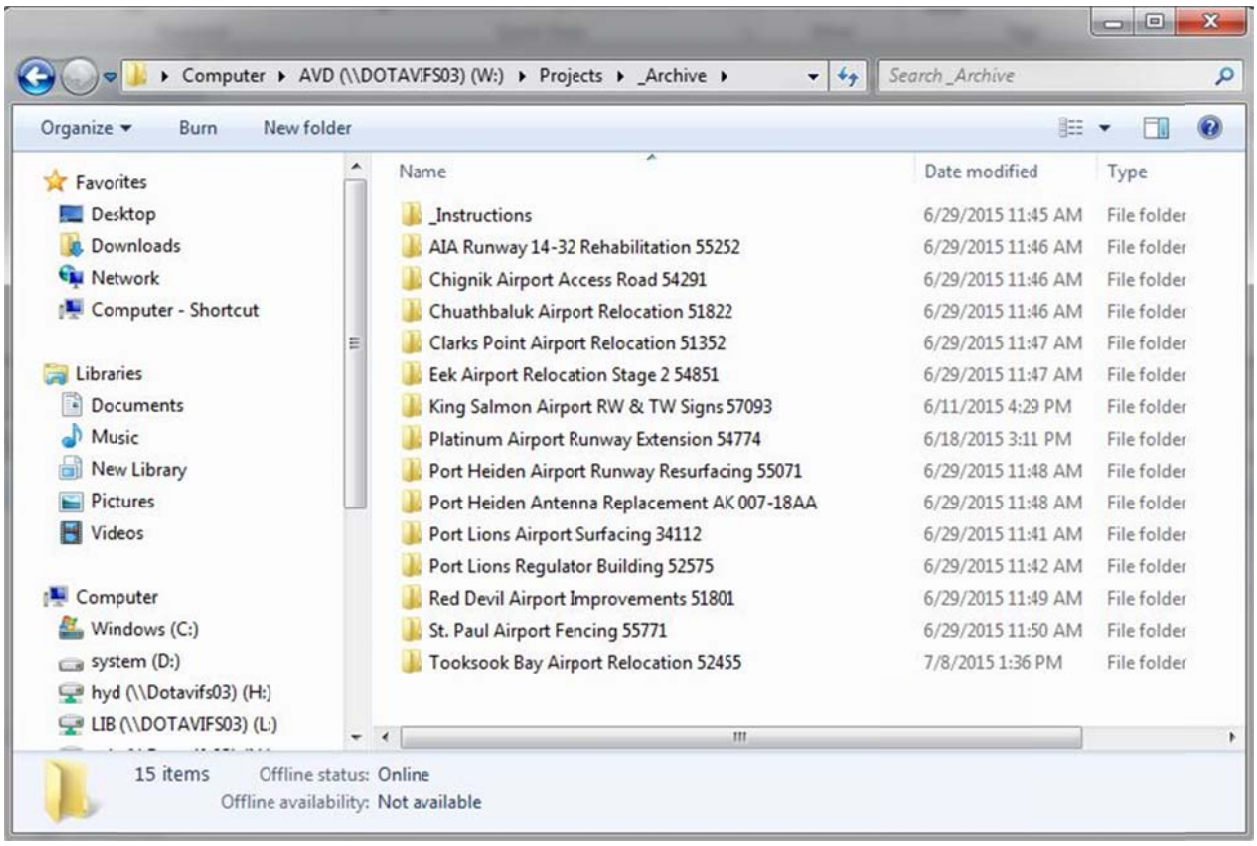
Purpose:
To move data that is no longer actively used to a separate storage area for long-term retention. Data archives consist of older data that is still important and necessary for future reference, as well as data that must be retained for regulatory compliance.

Importance:

a. Regulatory mandate.
b. To easily access the data for future reference.
c. To maintain a clean and organized workspace.
d. To maintain a clean and organized section.

2. Archive Folder Structure

W:\Projects_Archive



This folder will be the archive location for advertised projects, closed projects, and completed ALPs. Project folders will be moved here after the electronic files have been cleaned up following the *Archiving Checklist* and *Central Region Aviation Design Project Data Guide*. Only active projects and projects on hold will be maintained in the W:\Projects drive.

W:\Projects_Archive_Instructions

This folder contains the *Central Region Aviation Design Project Data Guide*, which includes instructions for managing project data throughout the project life as well as archiving the project data at the end of a project. Appendix A includes the Hardcopy Project Archive Template. This should be used for the archiving of all aviation project data. If you have questions, comments, or suggestions please contact Jenelle Brinkman or Rory Bryant.

W:\Library_Templates

This folder will contain the new Request to Advertise Memo (*coming soon!*), which will have the *Archiving Checklist* at the end of it. This will serve as a reminder to begin archiving your project as soon as it has advertised. The details on the archiving process are in the *Central Region Aviation Design Project Data Guide*. Archiving should be completed just after the Transfer to Construction Memo so it can be included in the archiving.

3. Archive Process

Gathering the Project Data:

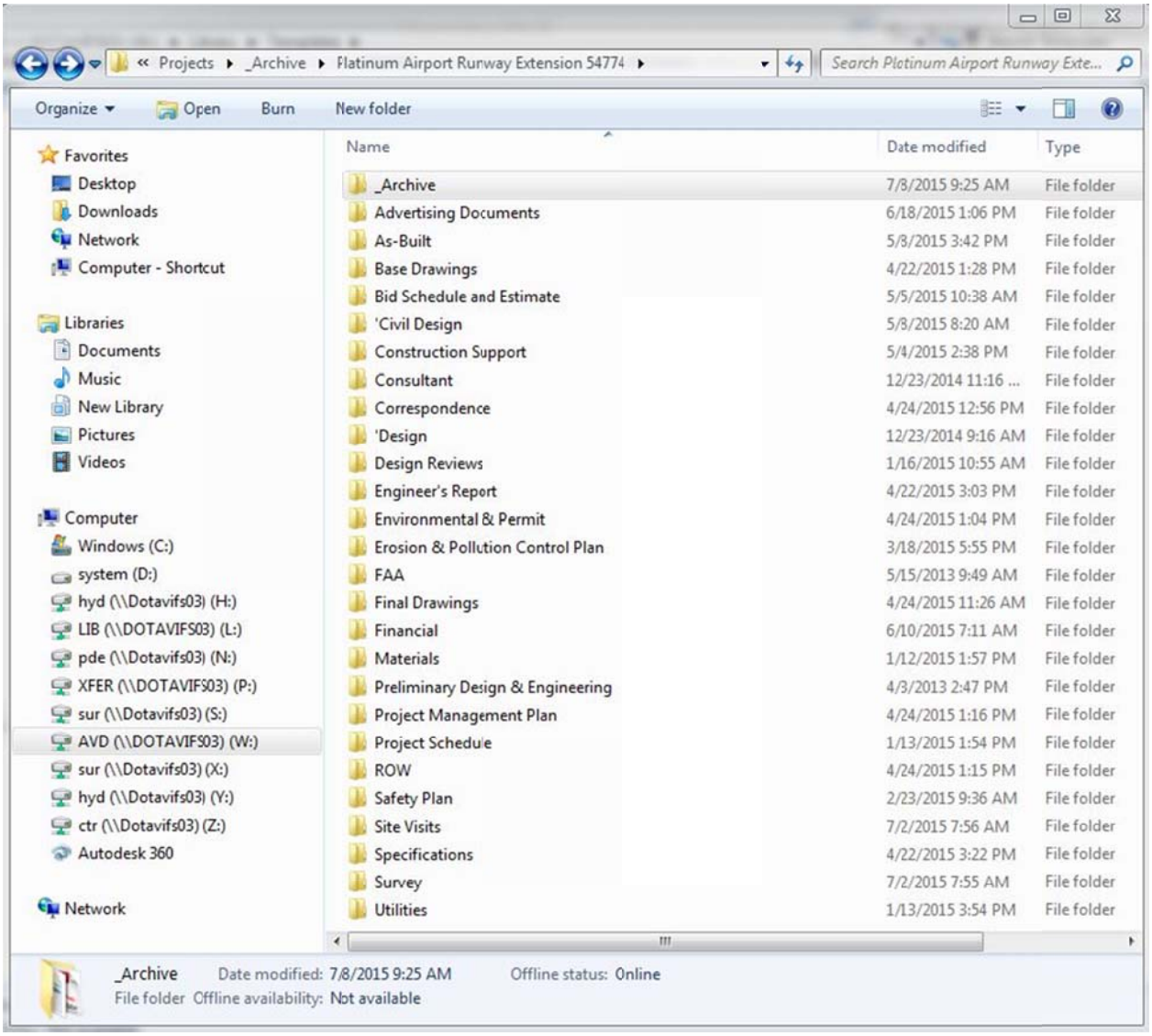
1. Send an email to the Aviation Design Section to call for the project data. Include the project name and number as well as the AIP number and advertising year if applicable. (You've probably seen a lot of these lately, which means we're making progress!)
2. Check ALL the filing cabinets for the project files. This includes the central region filing cabinets, the black filing cabinets in the main hallway, the tan filing cabinets by the break room, the filing cabinets in the aviation hallway, and the filing cabinets in any empty aviation cubicle.
3. Check the CD storage case for any CD submittals. The CDs are located on the aviation bookshelf across the printers in two black 3-ring binders. One binder is labeled Adak-Iliamna and the other is labeled Kalskag-Willow. Confirm that the information from the CD is on the network. If the information is already on the network, throw away the CD. If the information is not on the network, add the information to the network and throw away the CD.
4. Check the electronic files on the network to make sure you have hardcopies of all the project data that needs to be included in the archive.

Archiving the Hardcopy Project Data:

1. Follow the *Archiving Checklist* and the *Central Region Aviation Design Project Data Guide*.
2. Use the Hardcopy Project Archive Template in Appendix A of the *Central Region Aviation Design Project Data Guide.* Place the file in the following location for your use:
   Example: W:\Projects\Adak\Adak RSA 54972_Archive
3. Remove all binders, binding, comb bind, folders, staples, and paper clips. The only acceptable binding method is binder clips or rubber bands for each section of the archive.
4. Place all archived project data in a paper box and label both ends and the top with the project name and the AIP/project number. There shall be no CDs, DVDs, or Hard Drives left in the box. Ensure that all data on the CDs, DVDs, or Hard Drives is on the network and any CDs or DVDs shall be thrown out and any Hard Drives shall be given to the Aviation Drafting Archivist (Rory Bryant).
5. Take the box to graphics for scanning.
6. Once scanned compile into a single PDF with bookmarks that match the Index and archive structure. Make sure everything was scanned in properly, no pages missing, all sections are accounted for, plans sheets scanned in properly, etc.
7. Place the single PDF in a _Archive folder within your project folder.
   Example: W:\Projects\Adak\Adak RSA 54972_Archive
8. Place the box with the hardcopy files on top of the flat files at the entrance to the aviation section to wait to be called by construction for microfilming.

Archiving the Electronic Project Data:

1. Follow the Archiving Checklist and the Central Region Aviation Design Project Data Guide.
2. Clean up electronic project files.
3. Delete temporary working files, old or superseded files, and draft documents (unless they may be used in the future, example: Additive Alternatives that were not bid).
4. Delete any unused folders in the folder structure.
5. Coordinate with the Drafting Technicians for eTransmittal of the AutoCAD files.
6. Notify the Aviation Design Archivist (Jenelle Brinkman) when all electronic files have been cleaned up and the single PDF of the hardcopy files is in the folder. The Aviation Design Archivist will then move the entire folder to the following location for final archiving: W:\Projects_Archive



4. ALP Filing and Archiving

ALP Location:

Active ALP projects: W:/Projects/Airport/General – Non Project/ALP

FAA - approved ALPs and files: W:/Projects/_Archive/

Quick Reference - current ALP: W:/Library/_Reference/ALP

ALP Description:

Active ALPs: Active ALPs (currently in design and not yet approved) will still live in the W/Projects/General-non project/ALP folder. They will be the only ALP files kept in the active project folder. This folder should include all proposed modifications to the ALP that have not yet been approved (for example: survey drawings for as-built ALPs that have not yet been accomplished).

Approved ALPs: After FAA approval, active ALPs will be archived and move to the W/Projects/_Archive/ALP folder. Folders will be named with the original approval date. Ex: "Sample_ALP_20XX." As-builts and updates will be added to this folder as they are completed under revision numbers (Sample_ALP_20XX_R1). When a new ALP is completed (one requiring new FAA signatures), a new folder will be created with the new original approval date.

Reference ALPs: A single pdf copy of the current ALP (most recent revision), narrative/Master Plan, and FAA approval letter will be placed in the W/Library/_Reference/ALP folder for quick reference (Sample_ALP_2014_mm_dd.pdf).

What to include in the ALP folders:

Active ALPs

W:/Projects/Airport/General – Non Project/ALP/Sample ALP_20XX

Follow the general structure of ALP, Correspondence, and Supporting Documents. Use working folders as needed ('Civil Design, Surveys, Base Drawings, etc.), but keep in mind that it will need to be pared down to the archive folder structure at archive. Keep drafts, reviews, redlines, etc. up to FAA approval of the ALP. After approval, remove these files and move all final files to the archive folder.

Approved ALPs

W:/Projects/_Archive/Sample_ALP_20XX

All supporting documentation, CAD files, etc:

Airport Layout Plan

- ALP (11 x 17) – the mylar is on permanent file
- Narrative (or master plan if one is accomplished with the project)
- Approval letter from FAA

Correspondence

- Keep any correspondence pertinent to the ALP design (FAA agreement for certain facilities or depictions, local government maintenance agreements, public comments, etc).

Supporting Documents*

- Mag Dec Calcs
- Threshold Calcs
- Wind Analysis reports
- ALP specific surveys
- Mods to standards approvals (A PDF Copy should also go in W:/Library/_Archive/Agreements/MOSs)
- Other reports and supporting documentation

*Don't keep completed ALP checklists and review comments at archive – this is a review function to deliver the final ALP. If there are significant design decisions or a unique approach to the ALP, they should be captured in Mods to standards, studies and/or reports, or correspondence (FAA/section chiefs/consultants) and documented elsewhere.

Quick Reference ALPs

W:/Library/_Reference/ALP

A single pdf copy of the current ALP (most recent revision), narrative/Master Plan, and FAA approval letter (Sample_ALP_2014_mm_dd.pdf).

How and when to archive an ALP:

When ALPs are created as part of a design project:

Keep an ALP folder per the structure above (Airport/ALP/Sample_ALP_20XX_R1) separate from the project file (for working ALP files).

When the ALP is completed and approved by FAA, archive it as described above.

The design project archive folder should not contain the ALP. It may contain contract information relating to PDAs, costs estimates, etc. that include the ALP.

For example:

> A project entitled "Quickluk Airport Improvements" is created with project number 50002 in 2018. It includes a design project to extend the runway and an update to the ALP.
>
> When the ALP is completed, an ALP folder is created including the final deliverables (ALP pdfs, CAD files, supporting docs) and archived in the W:/Projects/_Archive folder under "Quickluk ALP 2018."
>
> A copy of the reference pdf (ALP, FAA approval letter, and narrative/master plan) is copied to W:/Library/_Reference/.
>
> When the project "Quickluk Airport Improvements" is completed, the project is archived in the W:/Projects/_Archive folder under "Quickluk Airport Improvements - 50002." This includes all of the project specific archive info including the PDAs, grants, plans, contracts, etc., but not the ALP and its supporting docs, as they will be included in the ALP folder.

When ALPs are created under stand-alone projects not associated with construction (like aeronautical surveys project, ALP updates project, etc):

Treat this like any other design project. Keep an ALP folder per the structure above (Airport/ALP/Sample_ALP_20XX_R1) with draft contractor submittals (working ALP files). As ALPs are completed and approved by FAA, archive them in the ALP folders as described above. The project archive for these stand-alone projects should follow the Project Data Guide and include the PSA docs, grant info, etc.

For example:

> A project entitled "Kusilvak area ALP updates 2005" is created with project number 50001. It includes final deliverable ALPs for Hooper Bay, Chevak and Scammon Bay.

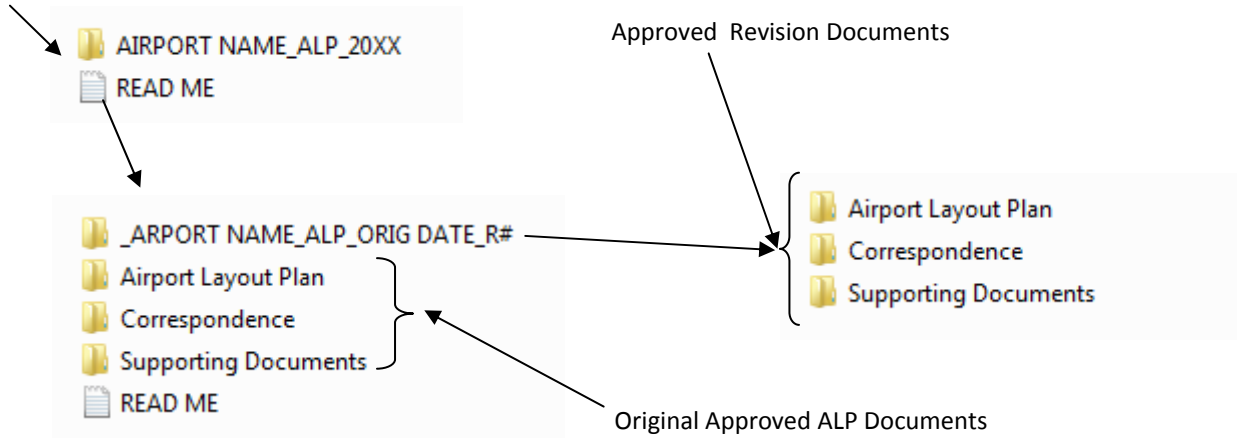
As ALPs are completed, ALP folders for each of the 3 airports are created including the final deliverables (ALP pdfs, CAD files, supporting docs) and archived in the projects/_Archive folder under “Hooper Bay ALP 2005,” “Chevak ALP 2005,” and “Scammon Bay ALP 2005.”

A copy of the reference pdfs (ALP, FAA approval letter, and narrative/master plan) are copied to Libray/_Reference/.

When the project “Kusilvak area ALP updates 2005” is completed, the project is archived in the projects/_Archive folder under “Kusilvak area ALP updates 2005 - 50001.” This includes all of the project specific info including the PDAs, grants, contracts, etc., but not the final deliverables, as they will be included in the other applicable ALP folders.

ALP Archive File Structure

W:/Projects/_Archive/



Airport Layout Plan:

Include FAA approval letter, ALP, and narrative (or master plan).

Name the file (or files): Airport Name_ALP_YEAR_MO_DA <-- date of ALP signature by FAA.

Correnspondence:

Keep any correspondence pertinent to the ALP design

(FAA agreement for certain facilities or depictions, local government maintenance agreements, public comments, etc).

Supporting Documents:

Use this folder to keep final design deliverables and records of major decisions affecting the airport design.

Some items that should be considered:

- Mag Dec Calcs
- Threshold Calcs
- Wind Analysis reports
- Mods to standards approvals (A PDF Copy should also go in W:/Library/_Archive/Agreements/MOSs)
- Other reports and supporting documentation

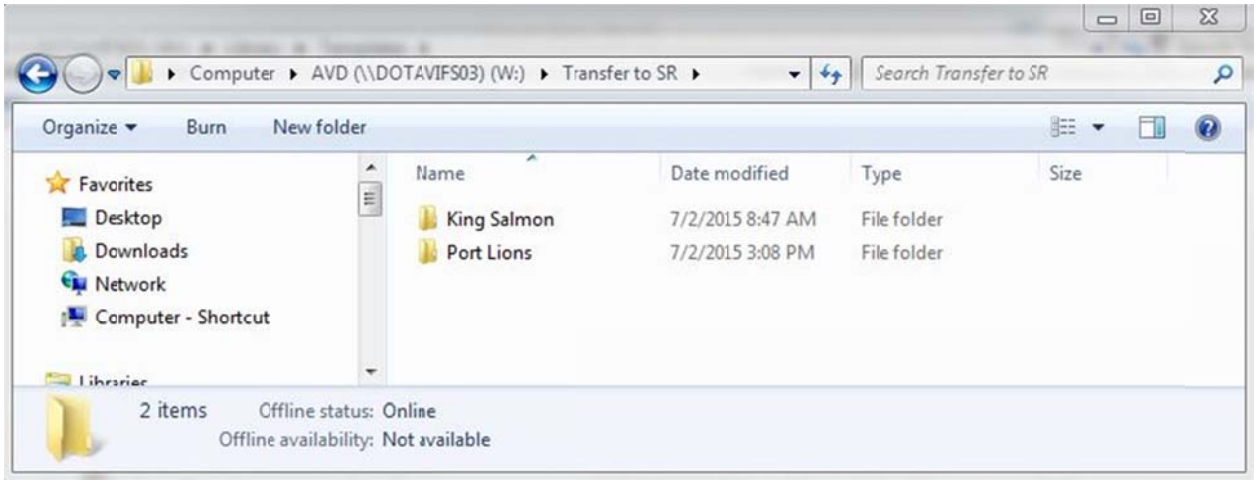
*Do not keep completed ALP checklists and review comments at archive – this is a review function to deliver the final ALP.

If there are significant design decisions or a unique approach to the ALP, they should be captured in Mods to standards,

studies and/or reports, or correspondence (FAA/section chiefs/consultants) and documented elsewhere.

5. Transfer to Southcoast Region Structure

W:\Transfer to SR



This folder will be the location for the data to be transferred to Southcoast Region. Once all projects pertaining to an airport and all airport information is gathered and placed in this location, the airport file will be transferred to the Southcoast Region server. When your airport is ready to transfer notify the Aviation Design Archivist (Jenelle Brinkman).

6. Transfer to Southcoast Region Process

1. Starting with the airports that have active projects:
   Port Lions
   King Salmon
   Unalaska
   St. George
   Cold Bay
   See attached for the full list of airports to be transferred and the associated project manager responsible for the airport transfer. The project managers are responsible for ensuring all of their airports get transfer in a timely manner.
2. The other functional groups are responsible for transferring their airport data. This includes ROW, M&O, Materials, Planning, Utilities, etc. The only time we will transfer their data is when it is directly related to a project.
3. Coordinate with the ALP Coordinator (Phil Cheasebro) on the transfer of the ALP data.
4. Coordinate with Rory Bryant for gathering any imagery, aerial photography, etc.
5. Gather airport information from all electronic locations on the L:\ drive and W:\ drive.
6. Clean up the electronic files in entire airport folder structure according to the archiving process outlined in Section 3. This includes past/current projects, images, miscellaneous, etc.
7. Archive all past airport projects according to the archiving process outlined in Section 3.
8. Place a copy of all the airport information in the following location: W:\Transfer to SR
   Note, this is just a copy as we are still maintaining the airport information on our network. As the transfer of these airports occur the Southcoast Region may need our help in answering questions about a project or airport issue and we will still need access to the files in order to assist with these questions.

7. Contacts for Questions

Questions on:

1. Project Archiving Process
   Contact: Jenelle Brinkman or Rory Bryant

2. ALP Archiving Process
   Contact: Phil Cheasebro

3. Transfer to Southcoast Region – Projects
   Contact: Jenelle Brinkman

4. Transfer to Southcoast Region – ALPs
   Contact: Phil Cheasebro

Airport	Original CR PM
Iliamna (incl SPB)	Beaton
Igiugig	Beaton
Kokhanok	Beaton
Levelock	Beaton
Nondalton	Beaton
Pedro Bay	Beaton
King Salmon (incl SPB)	Bowland
Chignik	Bowland
Chignik Lagoon	Bowland
Chignik Lake	Bowland
Naknek	Bowland
Naknek South	Bowland
Perryville	Bowland
Pilot Point	Bowland
Port Heiden	Bowland
Ugashik	Bowland
Chenga Bay	Bowland
Kodiak	Hughes
Akhiok	Hughes
Karluk	Hughes
Larsen Bay	Hughes
Old Harbor	Hughes
Ouzinkie	Hughes
Port Lions	Hughes
Unalaska	Hughes
Adak	Hughes
Akutan	Hughes
Atka	Hughes
St. George	Hughes
St. Paul	Hughes
Cold Bay	Merritt
False Pass	Merritt
King Cove	Merritt
Nelson Lagoon	Merritt
Sand Point	Merritt

APPENDIX M

Project Closeout
DOT&PF-CR Project Closeout Guide

STATE OF ALASKA

DEPARTMENT OF TRANSPORTATION

& PUBLIC FACILITIES

Central Region Highway Design Project Closeout Guide

Revised August 2016

Highway Design Project Closeout Guide

TABLE OF CONTENTS

SECTION 1. HIGHWAY DESIGN CLOSEOUT INTRODUCTION

Project closeout is the process that closes out the financial award for a local public agency highway project. Supporting documentation must be securely filed and available upon request for audits or reviews by Federal Highway Administration (FHWA), or other government officials. In addition, documents must be retained according to the requirements of the State of Alaska's *Records Retention and Disposition Schedule* for the Alaska Department of Transportation & Public Facilities (DOT&PF), Statewide Design & Engineering Services Division. These documents ensure all engineering, financial, and other requirements are retained, and the records support the overseeing agency's decision to accept a project. Detailed, accurate, and complete documentation of critical and support documents must retained for closeout throughout the life of the project.

The process detailed in this document is a subset of the larger closeout process which is initiated by Project Control and includes all sections including, but not limited to, Highway Design, Construction, and ROW. This guide describes the Highway Design portion of the project closeout process for the DOT&PF Central Region Highway Design projects and formalizes the process to promote efficient data transfer within the Department and between state, federal and local agencies, consultants, and the public. This process will be used for all projects regardless of funding source. Project files include both the hard copies and digital files.

This guide is neither static nor all-inclusive and updates will be made periodically. Please consult this document prior to beginning the design closeout process to ensure that you are using the most current version. Questions, comments and recommendations may be addressed to:

Chris Post, P.E.
Central Region Standards Engineer
Phone: (907) 269-0585
Email: chris.post@alaska.gov

Contact the Department's Highway Design Project Manager (hereafter PM) or or their designated staff to request clarifications on this guide, or to receive approval to deviate from it.

1.1 Intended Use

This guide is intended to provide uniform procedures for project closeout. For Consultant designed projects, this will outline the standards for organization of data transfer to the DOT&PF. The Department's PM shall have final responsibility for the accuracy and completeness of all deliverables.

Project closeout should be completed immediately after bid opening and provided to the PM for review and to be securely filed. Keep in mind that it may be many years before somebody might need to look at these files so complete accurate record retention is paramount.

1.2 Quality Control

High quality is essential. For in-house projects, the PM, with the assistance of the Project Engineer and Designers, is responsible for the quality control of all documentation. For consultant designed projects, the Consultant's PM, with their staff, is responsible for quality control. The DOT&PF will check these

submissions to verify compliance with this guide and reserves the right to reject and require correction of any deliverables that do not meet requirements outlined herein.

1.3 Closeout Index

It is the intent that design plan sets, from Local review (if performed) to final PS&E, will be stored as a hardcopy and digitally. To that end, all digital copies of the AutoCAD plans will be downloaded to a CD-R, DVD-R, or DVD+R and stored with the project files. Original signed drawings are stored as as-built or "record drawings" in hardcopy form with the Contracting Section.

An index template is provided in the appendix. This may be adjusted to suit each project.

SECTION 2. PROJECT DOCUMENTATION

This section describes the hardcopy deliverable of project files for the DOT&PF Central Region Highway Design section for a typical project. This applies to all projects unless otherwise stated. Requirements for various projects can be found in the Alaska Highway Preconstruction Manual (HPCM).

2.1 Preliminary Engineering Report (PER)

If a Preliminary Engineering Report (PER) or Reconnaissance Engineering Study was generated for the project, verify with the PM that it was distributed after final signatures were collected. The original PER should be bound and placed in Central Files. If the PER is not included as an appendix in the Design Study Report, include a copy in the report section of the closeout documents.

2.2 Design Study Report (DSR)

Verify with the PM that the signed Design Study Report (DSR) was distributed and the original, signed DSR has been placed in Central Files. Verify that all Design Memos that occurred after the approval of the DSR have been appended to this DSR. The signed DSR acts as Design Approval and a copy should be retained with the closeout documents. For additional guidance on Design Memos after DSR approval, see the instructions in the DSR Distribution Memo and DSR Templates.

2.3 Project Files – "The Box"

Project closeout shall occur immediately after the project's bid opening. This ensures that any addendum work is included and there are still funds available for the work. The package should be accurate and complete. And yes, we do want printed copies (to meet our retention policy).

All hardcopy project files must be delivered in a format suitable for microfilming. The paper copies shall be printed on 8.5"x11" or 11"x17" paper and be bound with binder clips. Staples, sticky notes, paperclips, and three-ring binders are not permitted. A project index shall be included and paper dividers inserted between sections. See below for information on the typical deliverables.

2.3.1 *Reports*

A copy of all final reports associated with the project should be included. These may include:

- Preliminary Engineering Report
- Design Study Report
- Environmental Document
- 3R Analysis (in DSR)
- Traffic Study Report (in DSR)
- Utility Conflict Report
- ADA Compliance Report (in DSR & provided to CRO/FHWA)
- Geotechnical Recommendations (in DSR)
- Geotechnical Report (in DSR)
- Trip Reports

This should be a complete package. All final reports should be included so other functional groups are not relied upon for finding documentation.

Note: If the report is part of an appendix in another report it does not need to be included. Use engineering judgment and error on the side of caution.

2.3.2 *Design Direction, Meeting Documentation & Correspondence Log*

Correspondence consists of records that document communications created/received by an agency that directly relate to program or administrative functions. All correspondence should be well organized and logged.

Note: Not all correspondence needs to be included but all the main correspondence does. Anything regarding a final decision or a change in direction needs to be included. Use engineering judgment and error on the side of caution.

2.3.3 *Public Involvement*

The public involvement effort should be well documented throughout the project. All public involvement related correspondence should be well organized by date. All responses should be logged. For each public meeting; all the provided documents should be included in the project files. Copies of each meeting debrief should accompany the meeting information.

Note: This is not something that should be thrown together at project closeout; but should be a continuous process throughout the project life. Follow through and documentation of the public involvement process is imperative to the success of a project. Furthermore, if your project has a "project specific" website that is not established and maintained on the DOT&PF main domain, reduce the project website to a graphic showing the as advertised project (from the last open house should be good), a link to navigator (for construction status updates), and contact info for the Construction PM. And work with your PI consultant to completely shut down the site as soon after advertising as you can. Miscellaneous Project Information

Any other information developed by the project, that is deemed important, should be delivered with the package.

2.3.4 *Design Reviews & Comments*

Design reviews (i.e. Local, Plans-In-Hand, PS&E) should be documented by placing a clean, complete review package (Plans, Specifications, Estimate, ESCP, and other provided documents) along with their associated adjudicated comments in the project files.

Note: The responses to the comments should in the past tense and be the same copies that were submitted with the subsequent review.

2.3.5 *Final PS&E Package*

All information for advertisement should be delivered to the Regional Review Engineer (for in-house projects) or to the PM or designated staff (for consultant designed projects). Additional information including addenda should be delivered in the same manor. The blue-ink, signed original half-size prints

of the project will be stored in Contracts. A copy of the as-advertised package should be place in the project files for closeout.

2.3.1 *Final Engineer's Estimate & Computations*

The information used to determine quantities for the project should be organized by item number. Calculations and assumptions should be shown for each item.

2.3.2 *Project Management & Contracts*

This task will be completed by DOT&PF staff and be the responsibility of the PM.

All of the signed contract documents will be stored and kept on file in the Contract or Project Control sections. However; copies of all the information should be with the project for auditing purposes. The following should be included in the Project Files:

- Scope, Schedule, and Budget
- Project Management Plan
- Project Information Documents
- Copies of all PDAs
- Grant or Funding information
- Time Extension Letters
- Signed Certification Form

For consultant designed projects, include all documents required for in-house projects and copies of the following documents pertaining to each contact:

- PSA
- Amendments
- RONs
- NTPs
- Billings
- Progress Reports

SECTION 3. DIGITAL DOCUMENTATION

3.1.1 *Digital Project Documents*

For in-house projects, a digital copy of all the project files shall be kept in the project folder located on the HYD drive. Files should be logically organized and generally follow the accepted folder structure at the time the project was started.

At closeout, the project folder should be "cleaned-up" and moved from the active project folder to the "_Archive" folder. At a minimum, delete empty folders and draft version of documents.

For consultant designed projects, the digital copy of all project related files will be delivered to the PM or their designated staff. Consult with the PM for what deliverables are applicable and provide all support documentation associated with work described in your Statement of Services.

3.1.2 *Specifications*

A digital copy of the final specifications shall be saved as a Word document with all track changes accepted and finalized. This document will be delivered to the Central Region Specification Engineer following the naming convention set forth in the *Specifications Project Provisions Guide*. For consultant designed projects, provide the specifications to the PM or their designated staff.

3.1.3 *Design Study Report (DSR)*

A digital copy of the final DSR shall be saved as a PDF document and delivered to the Central Region Standards Engineer. For consultant designed projects, the DSR will be delivered by the PM or their designated staff. Use the following naming convention:

DSR <IRIS Program #> <Project Title>.pdf

3.1.4 *CAD Deliverables*

The information presented in this guide assumes that the user has a solid understanding of the Department's project development process and common commands and features of ***Autodesk Civil 3D™*** software. CAD files shall be created using ***Autodesk Civil 3D™*** using the available templates, drawings, manuals and materials provided by the Department. Deliverables should be readable by ***Autodesk Civil 3D™***. Check with the PM or Consultant Coordinator for the appropriate release.

- A project specific CD-R, DVD-R, or DVD+R should contain all project related files. CAD files should be:
    - In compliance with Central Region CAD Standards
    - Uncompressed
    - Drawings shall be audited and purged of excess information prior to final submittal
    - All superfluous styles should be purged and subsequent layers purged from the drawing
    - Drawings shall have excess line work and notes deleted
    - Drawings shall be zoomed out to display entire sheet or model
    - All necessary files shall be included with the CAD file, including, but not limited to, xrefs, fonts, hatch, line types, plot styles, and excel files (for AutoCAD tables)

*Note: The Department reserves the right to specify explicit versions of the **Autodesk Civil 3D™** software to use. The file specifications are based on the need to have complete file compatibility across different functional groups as they use CAD files. This facilitates use of automated software, consistent as-built procedures, and organized practices to maximize efficiency within the Department.*

3.1.4.1 *Intermediate Project Records*

Note: This is good practice and is not required. Intermediate "snapshots" should not be included with the final deliverables to reduce potential confusion.

Intermediate storage of digital file should be done at the completion of each design review (i.e. Local, Plans-In-Hand, PS&E, Certification, and As-Advertised). This process will ensure a "snapshot" of the project is taken at each design milestone and is documented sufficiently. It is also advisable to do this at any major change in the scope of the project. This may entail:

- Making a CD-R, DVD-R, or DVD+R of the ACAD folder tree and keeping it with the project files, or
- Copying the files from the main "Planset" folder to a separate review folder,
    - Copying the drawings to the design review folders ensures that the drawings in the "Planset" folder retain their functionality with their respective references and are able to be continually updated.

Note: The Department reserves the right to ask for preliminary electronic deliverables to verify compliance with standards. This should be done at the first review.

3.1.4.2 *Final Design CAD Files*

The project should be delivered in two different folders ("Functional Drawings" and "Planset Drawings") on one disk.

- Project Name C(F or S)HWY#####
    - Functional dwg
        - ACAD
        - Figures
        - Misc
        - Planset *(Files with the data references and xrefs unaltered)*
    - Planset dwg

Functional Drawings

Deliver a copy of the project AutoCAD folder with all the links and references intact. The intent of these files is to allow a future project to use the files as a basis of their design. External references should not be bound and data references should not be promoted. Below, as an example, is one way to organize the files.

- ACAD (Source Drawing) Folder: This folder will contain all source drawings with Civil3D objects such as alignments, profiles, surfaces, pipe networks, and corridors.
- Planset Folder: All drawing in the planset should be contained in this folder. All plan set drawings will follow the naming convention.

- Miscellaneous or Working Folder: All drawings for backup should be contained in this folder (i.e. quantity calculations, environmental area calculations, etc.)
- Figures and Exhibits Folder: All drawings used for the creation of figures should be organized and labeled appropriately.

Note: All "snapshots" should be removed from this submittal. Only final drawings should be included.

All data source objects and images shall be provided upon project completion. These include SHP, SPF, Raster and database information files.

Planset Drawings for As-Builts

CAD files should only be the plan sheets for closeout and as-built purposes. All data references should be promoted and related dependent files such as xrefs, font files, linetypes, CTB files, images, data source files, hatch patterns, and Excel files for AutoCAD tables should be included. This will create a complete package of drawing files.

APPENDIX A:

PROJECT FILE INDEX SAMPLE

Edit the appendix per project requirements.

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
HIGHWAY DESIGN AND ENGINEERING SERVICES – CENTRAL REGION

PROJECT FILES INDEX

For

Project Name

Project No.: Federal/State

Date: Month Day, Year

Modify the list below to reflect project files included in the final project closeout package.

- Project Manager Checklist
- Reports
- Design Direction, Meeting Documentation, & Correspondence Log
    - Design Direction
    - Meeting Documentation
    - Correspondence
        - Bridge
        - Construction
        - Design
        - Environmental
        - Hydrology
        - Geotechnical
        - Materials
        - Right of Way
        - Survey
        - Traffic
        - Utilities
- Public Involvement
- Design Reviews and Comments
- Final PS&E Package (including addendums)
- Engineer's Estimates & Computations
- Project Management & Professional Service Agreements
- Grant Information
- Miscellaneous Project Information

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
HIGHWAY DESIGN AND ENGINEERING SERVICES – CENTRAL REGION

PROJECT FILES CHECKLIST

For

Project Name

Project No.: Federal/State

Date: Month Day, Year

The following items have been provided to the DOT&PF Project Manager for project closeout:

- ☐ Project folders has been moved to "_Archive"
- ☐ Preliminary Engineering Report (PER) & original placed in Central Files
- ☐ Design Study Report (DSR) & original placed in Central Files
- ☐ Hardcopy Project Files
  - Reports
  - Design Direction, Meeting Documentation, & Correspondence Log
  - Public Involvement
  - Design Reviews & Comments
  - Final PS&E Package
  - Final Engineer's Estimate & Computations
  - Project Management & Contracts
  - Miscellaneous Project Information
- ☐ CAD and Digital files
  - Functional Drawings
  - Planset Drawings for Records and As-Builts (given to As-Built Archivist)
  - Specifications (given to Specification Writer)

Reviewed by:

_____

DOT&PF Project Manager Date

Project Name

Project No.: Federal/State

Reports

Include all reports that have not been incorporated into other reports (i.e. 3R Analysis was not included as part of the DSR).

Design Study Report

Preliminary Engineering Report

Geotechnical Report

3R Analysis

Traffic Study Report

Utility Conflict Report

ADA Compliance Report

Geotechnical Recommendations

Trip Reports

Project Name

Project No.: Federal/State

Reports:
Design Study Report

Insert a divider to separate each independent report listed in the index

Project Name

Project No.: Federal/State

Design Direction, Meeting Documentation, & Correspondence Log

Project Name

Project No.: Federal/State

Correspondence:
Bridge

Insert a divider for each Correspondence section listed in the index

Project Name

Project No.: Federal/State

Public Involvement

Additional dividers may be needed for this section.

Project Name

Project No.: Federal/State

Design Reviews & Comments

Project Name

Project No.: Federal/State

Design Review:
Local Review & Comments

Insert a divider for each review.

Project Name

Project No.: Federal/State

Final PS&E Package

(including all addenda)

Project Name

Project No.: Federal/State

Engineer's Estimate & Computations

Project Name

Project No.: Federal/State

Project Management & Contracts

PDAs

Scope, Schedule, and Budget

Project Management Plan

Project Information Documents

Signed Certification Form

Time Extension Letters

Project Name

Project No.: Federal/State

Professional Service Agreements

If you have multiple contracts within a project, keep the contracts and billings together and use a separate divider to delineate begin/end of each contract.

PSA

Amendments

RONs

NTPs

Billings

Progress Reports

Project Name

Project No.: Federal/State

Professional Service Agreements: PSA

Insert a divider for each set of documents.

Project Name

Project No.: Federal/State

Miscellaneous Project Information

APPENDIX C

Literature Review

1. Change Management in Government
2. Defining Nemawashi
3. What is The Agile Methodology?
4. 8 Benefits of Agile Software Development
5. What Characteristics Make a Good Agile Acceptance Criteria?
6. Manifesto for Agile Software Development
7. Agile and Lean Project Management
8. The Kaizen Project Manager
9. The Art of Change: Kaizen & Micro-Improvements
10. Process Improvement Goals

INTERNATIONAL BUSINESS

Change Management in Government

by Frank Ostroff

From the May 2006 Issue

When Hurricane Katrina engulfed New Orleans in the summer of 2005, the deaths, injuries, and damage to property that resulted were stark reminders of the cost to all of us when government at any level—federal, state, or local—does not perform as well as it should. The year before, the 9/11 Commission found that government's failures to anticipate and respond to the terrorist attacks on that date were "symptoms of the government's broader inability to adapt how it manages problems to the new challenges of the twenty-first century." Although many public servants performed heroically, these horrific events and their aftermaths dramatize the need for high performance from government agencies both in dealing with life-and-death situations and in preventing crises from ever reaching that point.

This is a truth easily overlooked when the private sector is making impressive gains in productivity and discovering market solutions to large social needs. In reality, high-performing government agencies do resemble well-run companies. Both have worthy goals; well-designed, rational processes; strict accountability; and effective leaders. But the profound differences in their purposes, their cultures, and the contexts within which they operate conjure up quite different obstacles. The greatest challenge in bringing about successful change and significant, sustained performance improvement in the public sphere is not so much identifying solutions, which are mostly straightforward, as working around four unique obstacles.

First, agency leaders are not ordinarily chosen because of their commitment to spearheading reform or because they have a track record in leading large-scale change efforts. Rather, they are appointed on the basis of their command of policy, technical expertise in the agency's work, or political connections.

Second, once a person is selected to lead an agency, he or she usually has only a limited amount of time to see a change effort through. The nomination process can occupy the first nine months or more of a U.S. president's four-year term, and by the last year of that term, the agency head may already have begun looking for his or her next job. As a result, the average tenure of political appointees is effectively 18 to 24 months, tempting top agency officials to concentrate on policy reforms that can be enacted quickly, instead of on time-consuming organizational revampings whose results they may not still be around to see.

Third, rules governing such areas as procurement, personnel, and budgeting, which were originally adopted to prevent public-sector wrongdoing, have created workplaces that are significantly less flexible than those in the private sector. And legal doctrines intended to keep agencies' activities within the scope of the powers delegated to them by Congress can inhibit initiative. Public-sector managers know, too, that the penalties for failure are almost always greater than the rewards for exceptional performance.

Finally, in a democracy, everyone has a rightful stake in an agency's activities. Important constituencies include not only the president of the United States, cabinet members, members of Congress, and oversight organizations such as the Office of Management and Budget, but public-interest watchdog groups and the media. Most of an agency's operations are conducted in a fishbowl, and almost every initiative is bound to meet with someone's disapproval.

These facts of public life may never go away. But there are agency leaders who have figured out how to court support among key stakeholders, rededicate employees to an agency's true mission, undertake reform so comprehensively that resistant elements are unable to subvert it, and lay the groundwork for next steps so clearly and systematically that progress continues when leadership changes hands.

The transformation of three federal organizations discussed below demonstrates how deep change and significant performance improvement can be achieved at public agencies. The Occupational Safety and Health Administration, or OSHA, which oversees workplace conditions mostly in the private sector, redefined its mission and goals and envisioned a new way to achieve them. The Government Accountability Office, or GAO, which investigates other federal agencies and issues reports on their performance, adopted many of the talent-management practices found in the private sector. And Special Operations transformed itself from an ad hoc arm of the

military into an elite standing force comprising servicemen and servicewomen drawn from several military branches. It also boasts the military's first command responsible for all Special Operations Forces.

Virtually every administration in the past 40 years has launched initiatives to improve government performance, including those of President Bush and President Clinton. On the basis of my experience as a consultant to both public and private sector organizations, I have identified five principles that characterize successful public-sector change efforts and can achieve the desired results.

Principle 1: Improve Performance Against Agency Mission

Public-sector organizations aren't created to maximize shareholder wealth. Rather, they are charged with promoting a particular aspect of the public's welfare. Effective and efficient execution of their mission is what taxpayers pay for. It's also what motivates agency staffers. The reason most OSHA employees get up and go to work in the morning is to protect the safety and health of American workers. But mission can get blurred or lost as political priorities shift and agency leaders come and go. Even in the best of situations, mission is subject to varying interpretations.

When Joseph Dear became the assistant secretary of labor (and head of OSHA) in 1993, OSHA measured success chiefly in terms of the number of inspections conducted and fines imposed. While in certain situations inspections and fines were the appropriate response, they were not the only, and sometimes not the most effective, way of advancing OSHA's mission. Clearly, the agency had become a captive of metrics originally intended to promote workplace safety but that had over time become an end in themselves.

How does drift like that occur? And why don't leaders correct course when it does? In OSHA's case, staffers' exposure over the years to workplace injuries and fatalities that could have been avoided had instilled in some of them a punitive attitude toward business. The agency's emphasis on inspections and fines had reinforced that attitude, preventing many employees from realizing that better alternatives might exist. Understandably, OSHA's disciplinary approach antagonized many employers, who often underestimated the cost of workplace hazards to their employees and themselves. These businesses adopted the attitude, "the less OSHA does, the better." To both groups, enforcement appeared to be a zero-sum game.

Many agency employees, however, don't pick a side. They instead feel estranged from their agency's strategy and mission. They don't see how their individual efforts directly affect the agency's performance, and so they start to focus on producing outputs, which are easy to quantify, rather than on achieving outcomes, to which private-sector measures like return on invested capital, or ROIC, do not apply. As employees lose sight of the overall mission, they may eventually come to care only about those things they can directly control, like protecting their own turf.

Accordingly, OSHA's transformation effort began with a rededicated commitment to mission. That meant helping employees rediscover the reason the agency was created—to reduce the number of injuries, illnesses, and deaths in the workplace—and then reaching beyond it by calling for the elimination of all preventable workplace ills in ten years. Although literally impossible to achieve, this stretch goal was intended to stimulate innovative thinking. It also had the effect of making the agency's reorientation impossible to doubt.

Once a mission has been articulated, agency leaders must put a stake in the ground by establishing improved performance against mission as the fundamental objective of the transformation effort. Doing so entails choosing clear performance-improvement goals and formulating specific initiatives. In the process, performance or skills gaps in the organization will be exposed. When David Walker became the U.S. comptroller general (and GAO's leader) in 1998, the office's ability to perform its mission had been damaged by a downsizing. Shortly after assuming his new position, Walker made addressing personnel and skill gaps a priority. In the case of Special Operations, aligning performance and mission meant adapting to the new reality of "asymmetrical warfare," in which the enemy was symbolized not by a Russian tank and its crew but by terrorists on a commercial jet loaded with passengers and fuel.

In the business world, considerations like ROIC help companies set priorities and evaluate initiatives. Improving performance against mission is a framework for doing the same thing in public-sector organizations. OSHA used performance improvement goals to determine which initiatives should be undertaken. For example, OSHA's Atlanta East office obtained a commitment from a local steel company to provide all its workers with equipment designed to protect them from falls. In the first six months that the agreement was in force, three workers fell from heights of 60 feet or more. Without the equipment they were wearing, all three would have died. Over the same period, workers' compensation claims at the company went from more than $1 million to $13,200; in the first three months, accident costs per person-hour dropped by 96%.

Principle 2: Win Over Stakeholders

Whereas CEOs have to please such constituencies as lenders, securities analysts, and shareholders, the range of stakeholders that agency heads must cultivate is even wider. Broadly speaking, they fall into two groups—external and internal.

External stakeholders.

Special Operations Forces were active during the Vietnam War, operating behind enemy lines and in combination with indigenous forces, but had been nearly put out of business after the war's end. The army reduced Special Forces from seven active groups to three, the navy cut the number of SEALs by half, and the air force deactivated all its Special Operations gunships.

As a result, the United States lost most of its ability to launch and sustain demanding, clandestine operations in support of conventional U.S. forces. The loss was most apparent in the failed 1980 attempt to rescue American hostages in Iran. A group of soldiers, Defense Department officials, and members of Congress and their staffs became very concerned about the United States' lack of preparedness in the face of terrorism, foreign insurgencies, and other unconventional threats to national security. This group launched a campaign to revamp Special Operations to address these dangers, leading to the passage, in 1987, of the Nunn-Cohen Amendment to the Goldwater-Nichols Department of Defense Reorganization Act of 1986, which created the first command responsible for all Special Operations Forces. Headed by a four-star general, the reconstituted SOF now includes Army Rangers, Air Force Special Operations, and Navy SEALs as well as Marine Special Operations Command units.

Even after the joint command was established, the SOF leadership had to convince current stakeholders of the range and value of the forces' capabilities. One way it did this was by inviting senior military officials and political leaders to Fort Bragg to observe the soldiers as they went through their exercises. According to General Wayne Downing, SOF's third commander, soldiers were encouraged to relate the breadth of their experience and expertise, including their mastery of foreign languages and cultures. On one occasion, he recalls, a soldier spoke about the medical care and education she provided to tribes in the hills of Oman.

The SOF leadership also wanted U.S. diplomats to understand how Special Forces could be helpful to them. During a six-week training course, new ambassadors were invited to fly to Fort Bragg. On the flight was a platoon of SEALs, dressed in combat gear. The SEALs held a briefing

and then put on parachutes. As General Downing described it: “We drop the tailgate of the airplane, and then the SEALs go out of the end of the plane. When the ambassadors get off the plane, the SEALs are waiting for them. That grabs their attention. We show them psychological operations, shooting, hostage rescue situations.” Several of the ambassadors, for example, took the role of hostage in a training exercise. An assault team gave participants a demonstration at the firing range. The SEALs also conducted a night mission. “After seeing us,” Downing continues, “[the ambassadors] can understand what we do and how we might be helpful to them.”

GAO takes its own approach to winning over stakeholders. “Theoretically, I have 535 bosses in the Senate and the House,” Walker says. “I respect them all but have to concentrate on the ones with the most interest in an issue. We identify stakeholders and work hard to understand their issues and concerns. If the issue is job classification, for example, I focus on the chairman and ranking member of the congressional committee with jurisdiction over that issue, as well as on members with local [Washington, DC] interests, since 75% of GAO employees are based in DC.” His attention extends beyond supporters. “Since we are a public agency,” Walker explains, “the potential opposition knows what we are trying to do early on. This is why it is so important to get ahead of the curve—to know the issues and then meet them ahead of time.”

Internal stakeholders.

Public-sector employees often stay at their agencies for a long time, typically much longer than their agencies’ leaders. And many have watched change efforts come and go—to little effect. But staffers’ longevity can actually be helpful to a leader seeking change. That is because those employees know a lot about how their agencies run and where they falter. By actively eliciting operational knowledge from them, leaders not only lay the intellectual foundation for the change effort, they also help gain the employee support needed for it to succeed.

In my experience, at any given agency, about a quarter of employees are initially receptive to a change initiative (sometimes out of frustration with how things have been handled in the past), a quarter are resistant, and the remaining half are on the fence. The continuing receptivity of the first group cannot be taken for granted. To keep those employees on board, the goals of the change effort must be consonant with their values—the reasons they came to the agency in the first place. The articulation of a stretch goal like OSHA’s—“eliminate all preventable workplace ills in ten years”—helps demonstrate the sincerity of the new leadership’s commitment, even in the

eyes of the doubters. Goals like "centralize IT" or "reduce management layers," by themselves, will not generate the amount of energy necessary to transform an agency's way of working and view of itself.

> **Goals like "centralize IT" or "reduce management layers," by themselves, will not generate the amount of energy necessary to transform an agency.**

Questionnaires, interviews, and observation can determine who in the organization is amenable to change. Lack of change readiness can usually be attributed to issues of skill and will. Some may doubt their ability to keep up in the new organization. They think, "I've been successful at my job for 20 years, but I'm afraid I don't have the skills to succeed in the organization being proposed." Others may lack the will to engage in yet another change effort: "I don't believe the proposed changes will improve performance." Or, "The proposed changes threaten my turf." Or even, "I just don't have the motivation to cope with so much change."

Well-crafted training programs can allay concerns about skill deficiencies. Their value is both psychological and practical. As employees gain confidence, they become more open to changes in their work or environment. Other tactics address a lack of will. OSHA, for example, convened a "diagonal slice" change team representing all agency functions and reporting levels, as well as both management and union members, to develop employee understanding of the agency's performance challenges and support for recommended changes. The team visited high-performing public agencies and companies to learn from their experience in combating workplace ills. Accompanying the team were some people who had initially opposed the change effort, but were chosen in the hope that what they saw on the visits would help soften their resistance—and it did. The State of Georgia's Environmental Protection Division, the team learned, allocates its limited resources by pinpointing the state's environmental hot spots. And the Argonaut Insurance Company, it found, quantified the cost to businesses of workplace injuries and then helped those businesses implement safety and accountability systems. From this sort of exposure, the team members gained a sophisticated grasp of best practices and, no less important, a newfound belief in their feasibility.

To encourage GAO staffers to embrace new procedures, Walker focused on incentives. GAO had been a place where almost all employees received pay increases largely on the basis of time on the job and job classification or grade, regardless of performance. Now, compensation is structured on market-based salary ranges, and employees are rewarded for expertise, leadership, increased responsibility, and other contributions to performance.

Principle 3: Create a Road Map

In the mid-1980s, MBA graduates seemed to regard manufacturing as a black box: You put some things in and out pops a product at the other end. Many government reformers view the transformation process in similar fashion and hence fail to pay careful attention to the steps necessary to get from "here" (current agency status) to "there" (improved performance).

A change effort road map generally has three major phases: identify performance objectives; set priorities; and roll out the program.

Identify performance objectives.

In any change effort, you need to start at the top and then quickly move to ensure participation and support of a broad cross-section of employees. It is the prerogative of the agency leader and his or her senior managers to define the mission. At GAO, for example, David Walker began by talking with Congress and the agency's two key internal groups—the agency's managing directors and the 25 employee representatives who sit on the Employees' Advisory Council. "We talk about what we need to do. I discuss it with them live so that they can provide input and ask questions."

The agency leader can then commission a change team composed of individuals who are highly respected by agency peers, strongly support the need for change, and represent the various areas of the agency directly affected by the change effort. This team identifies the areas of performance requiring the most urgent attention and outlines the biggest obstacles to reform.

One way for the change team to do these things is to conduct internal fact-finding through interviews with senior managers, headquarters staff, field personnel, and outside experts. The team might also review internal reports, congressional oversight committees' documents, and articles and books by experts who have studied the agency. The team should analyze past change efforts to determine which had positive effects, which were shrugged off, and why.

The change team can then hold redesign workshops to develop recommendations for improving performance. In OSHA's case, strategy, organization, and process redesign workshops were conducted to develop a model for a new, higher-performing field enforcement office. One such workshop concerned the handling of informal complaints—that is, those reported orally. A map of the current complaint process was placed in the front of the room where the workshop was held. A facilitator briefly outlined the current procedure and described steps, based on best practices, that could be taken. The facilitator then asked the group a series of questions such as, "Does the process have any redundant steps?" "Are there handoffs that should be eliminated?" "Are there steps that should be added?" "Which ones should be automated?" For every step of the current process, the workshop participants, which included members of the change team and OSHA employees who had either handled informal complaints or were familiar with the process, came up with suggestions for improvement. In the course of one afternoon, some 150 ideas were generated.

Set priorities.

Once all the suggestions are on the table, the next step is to decide which to adopt and in what sequence. Should an agency concentrate on areas where the potential for improvement is most marked? On areas that external stakeholders, including the general public, care most about? Or on areas where one can get results the fastest, thereby inspiring further efforts?

For most programs, I recommend constructing a 2 x 2 matrix, indicating high and low impact on performance on one axis and high and low difficulty of implementation on the other. One would almost always recommend immediately implementing those ideas likely to have the greatest impact on improving performance against mission while posing the least amount of difficulty.

Of course, there are times when it's clear that an initiative will have such significant impact on performance that the hardship involved in getting there should be discounted. In using a similar matrix to decide which of the workshop's ideas to implement first, OSHA found that implementing certain process redesigns was going to entail five weeks of staff training, which represented time away from inspection and enforcement. But the programs proceeded because both the change-team and agency leadership believed they would have such a significant effect on performance that the cost was justified.

It also helps to pursue tangible results that can be achieved quickly, even if they are not the ones that will have the biggest impact. At every one of OSHA's approximately 65 field offices, frontline compliance officers were given a menu of improvement opportunities and then asked to pick the one they thought was most urgently needed. They then had to commit themselves to achieving extremely precise performance goals within eight weeks. This technique, called "breakthrough," had startlingly good results. At OSHA's Parsippany, New Jersey, office, for example, response time to employee complaints of serious hazards was cut in half after only eight weeks. OSHA's breakthrough initiative demonstrates that meaningful change does not have to happen slowly. Quick wins also help generate faith in change efforts that unavoidably take years.

Roll out the change program.

It's critical that agencies sow the seeds of change in fertile ground. Because Parsippany and Atlanta East were the OSHA offices judged the most receptive to change, they became the first pilot offices. Staff members of those offices were made virtual members of the change team (which was based in Washington), helping to ensure that the ideas the workshops recommended were suited to implementation in the field. An orientation and training plan was then developed, and risk controls were put in place. Representatives of the change team were present for the first month or so to provide guidance, solve problems as they arose, and discover what worked well and what didn't.

Upon completion of the pilot phase, implementation was extended to five more offices, which were given three months to adopt the changes deemed most likely to improve performance against mission. To help keep the rollout on track as it spread to more offices, each successive office would have on the premises a couple of observers from one of the five offices next on the list. These observers would then help lead implementation at their own offices, along with members of the change team and veterans of the previous round. Rollout to all of OSHA's field offices took three years, during which there was a change in agency leadership. Because the rollout had gained broad-based employee support, gathered momentum, and was already showing results, OSHA was able to surmount this usually disruptive event and achieve its goals.

Managing the design and rollout of a change program requires the involvement of a steering committee usually composed of the agency's leader and senior managers of areas particularly affected by the transformation. The committee approves the sequence of steps, imposes milestones (for both process stages and real-world outcomes), specifies deliverables, approves

change-team recommendations, and defines the expected contributions from both work units and individuals. The committee also takes ultimate responsibility for guiding the initiative and intervening to correct course when necessary.

Principle 4: Take a Comprehensive Approach

By now it should be clear that there is more to organizational redesign than moving boxes around a chart. For organizations to perform at a superior level, the full range of factors—leadership, structure, processes, infrastructure (including technology), people, and performance management—must be integrated and aligned. Yet the tendency within government is to seize on whichever organizational element the particular person or group driving the change effort knows best, at the expense of other elements.

The intense demands placed on Special Operations required a holistic approach to change. The transformation of Special Operations encompassed all the broad areas that must be addressed. Introducing a new unified command made up of generals from each military branch and headed by a general reporting directly to the secretary of defense was among the changes in how special operations would be led. Assigning special operations elements from multiple military services to the new organization and having them report to the unified command were among the structural changes. To obtain needed equipment, SOF created a much faster, flexible, and cost-efficient procurement process. Improved technology and weapons systems such as the laser designators used to pinpoint Taliban targets in Afghanistan and remote-controlled Predator UAVs (unmanned aerial vehicles), which conducted valuable surveillance of the Taliban's movements, were adopted.

According to General Richard Potter, the efficacy of these upgraded elements depends entirely on the caliber of the troops themselves. SOF has therefore placed unprecedented emphasis on recruitment standards and training. The general explains, "For Army Special Forces, we carefully prescreen candidates and look for the attributes critical to succeeding as an SOF warrior. One of the goals of the training [that follows] is to strip off the veneer and see the inner man. We put the soldiers through sleep deprivation, intense psychological and physical stress, and demanding intellectual problems. After that, we send the soldiers off for individual skill training—weapons, medical, operations, intelligence, field operations, language and cultural skills, and negotiation. This whole process can [take] 1.5 to two years."

Adopting a comprehensive approach may even require integrating activities across organizational boundaries. General Downing explains why it was necessary in SOF's case: "Let's say there is a camp containing terrorists that have killed Americans that we want to target. The Navy SEALs will provide reconnaissance of who is in the camp and when. The Army Rangers will attack the camp and kill or capture the terrorists. Air Force Special Operations, operating in tight coordination with the mission, can then fly in special planes and extract the terrorists and our Rangers. This requires very tight coordination and integration between these units." The need for integration and improved performance was a lesson taken to heart, and acted upon, after the failed Iran hostage rescue mission. "In the opening days of Operation Enduring Freedom in Afghanistan," recounts General Doug Brown, current SOF Commander, "U.S. Special Operations Forces successfully conducted 23 missions that were longer in duration, over greater distances, and more complex than Operation Eagle Claw [the attempt to rescue American hostages in Iran]."

In some situations, it may be difficult to overhaul all elements affecting performance at once. But even in the course of tackling the most pressing ones, it's important not to neglect addressing the other elements altogether.

Principle 5: Be a Leader, Not a Bureaucrat

We've now established what it takes to lead a change program. Formulate a vision. Be aware of present realities. Develop a broad base of support. Set a clear path. Respect the complexity of what you're attempting. Hold people accountable for both results and commitment to the change effort.

There are, however, two qualities of public-sector leaders that make such work difficult. First, it is in the nature of bureaucrats to respect barriers. Change leaders don't necessarily knock them over; instead they find ways to see over and around them. As Walker puts it, "I find that often you have more flexibility than people believe. Many rules, as well as civil service limitations on what you can and can't do, are good, and they need to be followed. But there is a difference between what you can and can't do and what has been done and not done in the past." As reported by GAO, during Walker's tenure, that agency has roughly doubled savings achieved and resources freed up from $19 billion per year to $40 billion at other agencies as a result of its recommendations.

General Downing provides an illustration of how Special Operations has worked around barriers to obtain the equipment SOF needs. “Bringing complicated equipment online often takes ten to 15 years. We needed a new speed boat. Rather than going through traditional military procurement procedures, we used an innovative approach, having industry vendors build three different prototypes. After a thorough competition, we selected the best one. We had the first Mark V in 37 months.”

The other problem many agency leaders face is the perception that because they are political appointees, their commitment to improving performance against mission may be questionable. Such leaders must convince stakeholders of their sincerity. Agency employees mostly start out believing in the agency’s mission, which, whatever its particular focus, involves serving citizens and taxpayers. Over time, they see change programs come and go without making a dent. Meanwhile, the public interest is neglected. If an agency head can convince the rank and file that this time is different—that he is committed, is willing to invest the personal time and energy that is required, and will commit the necessary people and resources—then its original dedication will be reawakened.• • •

Many corporations have a deeply felt sense of mission over and above pleasing customers and enriching shareholders. Employees of pharmaceutical companies, for instance, are motivated to help cure illnesses. At most government agencies, such larger purposes are their entire purpose. When these objectives are misconceived or unclear, however, the agency’s activities lose their point. The dramatic changes at OSHA, the Government Accountability Office, and Special Operations Forces clearly show that change at public agencies is possible. Attesting to SOF’s successful transformation, Defense Secretary Donald Rumsfeld told the *Wall Street Journal* in February, “Instead of…operating generally only in support of someone else, we would have situations where Special Operations Command might be the one supported by other commanders around the globe.”

Public agencies can be mysterious places. But the solutions to reforming them are not. What’s required is a recognition that successful change is possible and that a proven set of techniques is available to get you there. Agencies with the vision and courage to undertake meaningful change can use these five principles to achieve their highest purpose.

A version of this article appeared in the May 2006 issue of *Harvard Business Review*.

Frank Ostroff is the managing partner of Ostroff & Associates, a management consulting firm that provides services to public sector, private sector, and nonprofit organizations. He can be reached at frank.ostroff@ostroffassociates.com.

This article is about INTERNATIONAL BUSINESS

Articles

Articles of Interest

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RSS

DEFINING NEMAWASHI

Dec 20, 2012

By Rochelle Kopp, Managing Principal, Japan Intercultural Consulting

At one of my clients, the American subsidiary of a major Japanese auto manufacturer, *nemawashi* has become a part of the vocabulary of the American staff. New employees who join the firm are quickly taught that doing *nemawashi* is an important job skill. In this organization, *nemawashi* is a key part of daily life, since the atmosphere in the company is rather Japanese in flavor -- all decisions are made by group consensus, and it's difficult to get something accepted if the organizational higher-ups have not been properly briefed ahead of time. It's interesting to me, however, that they choose to use the Japanese word, rather than choosing a word in English.

In fact, *nemawashi* is not completely unknown in American organizations, and thus there are several phrases in English that have a similar meaning to *nemawashi*, such as "consensus-building", "getting people on the bandwagon", "obtaining buy-in", "sending up a trial balloon", "testing the waters", "getting everyone on the same page", "greasing the skids", "behind the scenes persuasion", and "lobbying".

However, each of these terms has its own implications, and none of them truly captures the nuance of *nemawashi* being an ongoing organizational process rather than a one-time event. This is why I think my client's employees have decided to use the Japanese term as is.

In the cross-cultural seminars I conduct, I often explain the origin of the word *nemawashi* for the benefit of the American participants. It helps make the concept easier to understand. It's been interesting for me to discover that many Japanese do not know the origin of this word either. It derives from the world of Japanese gardening, where a special technique of uncovering the roots is used when transplanting trees. In this process, each portion of the root system is given individual attention, and readied for the impending change. In the corporate context, *nemawashi* works similarly, as each part of the organization is listened to and its needs addressed, through one-on-one discussions and small meetings.

The following are a few examples of good ways to explain *nemawashi* in English:

- In Japan it's typical for small subsets of the participants to get together prior to the meeting. This allows for more frank and vigorous discussion than is possible when everyone is together in the larger meeting. We call it *nemawashi*.

- In Japan, high ranking people expect to be let in on new proposals prior to an official meeting. If they find out about something for the first time during the meeting, they will feel that they have been ignored, and they may reject it for that reason alone. Thus, it's important to approach these people individually before the meeting. This provides an opportunity to introduce the proposal to them and gauge their reaction. This is also a good chance to hear their input. This process is referred to as *nemawashi*.

- In Japanese business, *nemawashi* means building a consensus using one-on-one discussion with each member of a decision-making group. It is usually conducted prior to a formal meeting.

Interestingly, I sometimes hear Japanese use the phrase "spadework" as a way to convey *nemawashi* in English. Unfortunately, this is an example of what can be thought of as a "false friend." On the surface, spadework sounds like a good synonym for *nemawashi*, and it even has a garden tool imagery that matches well the gardening origins of *nemawashi*. However, this term is a rather archaic one, and is not frequently used in current American English. Thus, your American colleagues may more puzzled than enlightened if you use it when talking with them.

This article originally appeared in Global Manager

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What is Agile Methodology? How It Works, Best Practices, Tools

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Agile Methodology is a people-focused, results-focused approach to software development that respects our rapidly changing world. It's centered around adaptive planning, self-organization, and short delivery times. It's flexible, fast, and aims for continuous improvements in quality, using tools like *Scrum* and *eXtreme Programming*.

How It Works

It works by first admitting that the old "waterfall" method of software development leaves a lot to be desired. The process of "plan, design, build, test, deliver," works okay for making cars or buildings but not as well for creating software systems. In a business environment where hardware, demand, and competition are all swiftly-changing variables, **agile works by walking the fine line between too much process and not enough**.

It abandons the risk of spending months or years on a process that ultimately fails because of some small mistake in an early phase. It relies instead on trusting employees and teams to work directly with customers to understand the goals and provide solutions in a **fast and incremental way**.

- **Faster, smaller.** Traditional software development relied on phases like outlining the requirements, planning, design, building, testing, and delivery. Agile methodology, by contrast, looks to deploy the first increment in a couple weeks and the entire piece of software in a couple months.
- **Communication**. Agile teams within the business work together daily at every stage of the project through face-to-face meetings. This collaboration and communication ensure the process stays on track even as conditions change.
- **Feedback**. Rather than waiting until the delivery phase to gauge success, teams leveraging Agile methodology track the success and speed of the development process regularly. Velocity is measured after the delivery of each increment.
- **Trust**. Agile teams and employees are self-organizing. Rather than following a manifesto of rules from management *intended* to produce the desired result, they understand the goals and create their own path to reach them.
- **Adjust**. Participants tune and adjust the process continually, following the KIS or **Keep It Simple** principle.

For training purposes, there's a comprehensive, downloadable overview here (https://www.slideshare.net/hareshkarkar/overview-of-agile-methodology).

Examples of Agile Methodology

The most popular and common examples are Scrum (https://stackify.com/what-is-scrum/), eXtreme Programming (XP), Feature Driven Development (FDD), Dynamic Systems Development Method (DSDM), Adaptive Software Development (ASD), Crystal, and Lean Software Development (LSD). Teams generally pick one or two methods. The most widely used methodologies are Scrum and XP, which dovetail nicely.

Scrum is a hands-on system consisting of simple interlocking steps and components:

- A product owner makes a prioritized wish list known as a product backlog.
- The *scrum team* takes one small piece of the top of the wish list called a *sprint backlog* and plans to implement it.
- The team completes their sprint backlog task in a *sprint* (a 2-4 week period). They assess progress in a meeting called a *daily scrum.*
- The *ScrumMaster* keeps the team focused on the goal.
- At the sprint's end, the work is ready to ship or show. The team closes the sprint with a review, then starts a new sprint.

Here's an example of how Scrum works: Bill meets with a customer to discuss her company's needs. Those needs are the product backlog. Bill chooses the most important tasks to work on in the next two weeks. His team meets in a daily scrum to target work for the day ahead and address roadblocks. At the end of the sprint, Bill delivers the work, reviews the backlog, and sets the goal for the next sprint. The cycle repeats until the software is complete.

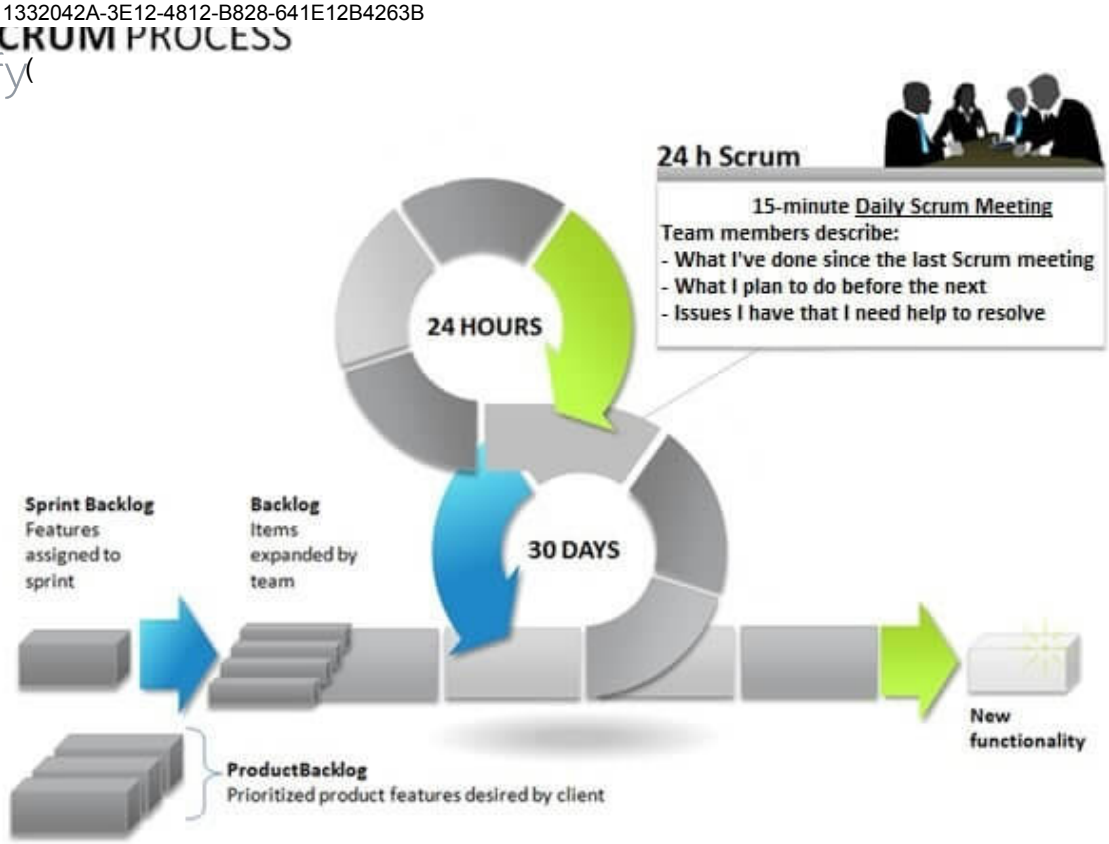

Image via Open-Ware.org (http://www.open-ware.org/eng/methodology/scrum.htm)

eXtreme Programming. Often used with scrum, XP is an example of how Agile can heighten customer satisfaction. Rather than deliver everything the customer could ever want far in the future, it gives them what they need now, fast. XP is centered on frequent releases and short development cycles. It uses code review, pair programming (https://stackify.com/pair-programming-advantages/), unit testing (https://stackify.com/unit-testing-basics-best-practices/), and frequent communication with the customer.

Here's an example of how XP works: Bill builds a list of customer requirements by having the customer tell "user stories" that outline the features. From these, he builds a software release plan. The software will be delivered in iterations, with one delivered every couple weeks. The team works in programmer pairs, using daily meetings to smooth roadblocks. The customer delivers feedback in the form of more user stories. The cycle repeats until the software is delivered.

For more examples, see this article (http://study.com/academy/lesson/agile-methodology-types-examples.html).

Benefits of Agile Methodology

The benefits of Agile are tied directly to its faster, lighter, more engaged mindset. The process, in a nutshell, delivers what the customer wants, when the customer wants it. There's much less wasted time spent developing in the wrong direction, and the entire system is quicker to respond to changes. For a more comprehensive list of benefits, see this post (http://www.seguetech.com/8-benefits-of-agile-software-development/).

- **Faster**. Speed is one of the biggest benefits of Agile Methodology. A faster software development life cycle means less time between paying and getting paid. That, in turn, means a more profitable business.
- **Increased customer satisfaction**. With Agile, customers don't wait for months or years, only to get exactly what they didn't want. Instead, they get iterations of something very close to what they want, very fast. The system adjusts quickly to refine the successful customer solution, adapting as it goes to changes in the overall environment.
- **Values employees**. Employees whose ideas are valued are vastly more productive than those who are ordered to follow a set of rules. The Agile Methodology respects employees by giving them the goal, then trusting them to reach it. Since they're the ones with their hands on the controls and the ones who see the obstacles that crop up every day, employees are in the best position to respond to challenges and meet the goals at hand.
- **Eliminates rework.** By involving the customer at more than just the phases of requirements and delivery, the project remains on-task and in-tune with customer needs at every step. This means less backtracking and less "out on a limb" time between the time we do the work and the time the customer suggests revisions.

Best Practices

The list of best practices is long and involved, with dozens of tools to pick and choose. We've outlined a short list of the main benefits below. For a more comprehensive best practices guide, see this article (https://effectivesoftwaredesign.com/2013/11/20/35-agile-development-best-practices/).

- **Set priorities**. A *product backlog* is a list of prioritized tasks maintained by a *product owner.*
- **Maintain small release cycles.** The product should be released in increments every 2-4 weeks, with stakeholders giving feedback before proceeding.
- **Use pair programming.** Two programmers work side-by-side at a single computer. This technique actually results in an identical degree of productivity to separate programming but delivers higher quality.
- **Refactor.** Rework code regularly to achieve the same result with greater efficiency and clarity.
- **Use test-driven development.** Code the unit test first to keep the project on task throughout. Test-driven development as an Agile best practice also produces greater employee engagement, since it transforms testing from a boring grind to a coding challenge.

Agile Methodology Tools

The list below shows some of the best tools on offer. For a complete list, see this post (http://blog.capterra.com/agile-project-management-software/).

- **ActiveCollab** (https://activecollab.com). An affordable tool for small businesses, ActiveCollab is easy to use. This software development aid requires little training and provides excellent support.
- **Agilo for Scrum** (http://agilosoftware.com/). Stakeholders get updated automatically on the project's progress with Agilo for Scrum. Features sprint reports and burn down charts for better data mining.

- Atlassian Jira + Agile (https://www.atlassian.com/software/jira?a=capterra). This powerful project management tool facilitates development by incorporating Scrum, Kanban, and customizable workflows.
- Pivotal Tracker (http://www.pivotaltracker.com/). This methodology tool is geared specifically for mobile projects. A little jargon-heavy, it's user-friendly after a brief orientation period.
- Prefix (https://stackify.com/prefix/). This free tool from Stackify provides an instant feedback loop to catch and fix bugs before they can deploy.
- Retrace (https://stackify.com/retrace/). For a more robust solution complete with monitoring, errors, logs, and more, Stackify's Retrace provides app performance insights from integration to QA to production, at the code level.

Additional Resources

Make use of the non-product style tools and resources for success below, including the original Agile manifesto and a few downloadable templates for implementation.

- Agile Manifesto (http://agilemanifesto.org). This is the original document that kicked off the Agile movement. It contains all 12 key tenets of the methodology at large.
- Burn Down Charts. These are visual representations of work left vs remaining time. Download an Excel template here (https://d2myx53yhj7u4b.cloudfront.net/file/sprint-backlog-template.xlsx) from SmartSheet.com.
- Agile project plan. This is a tool for tracking the progress of the overall Agile project. This article (http://www.ambysoft.com/essays/agileProjectPlanning.html) from Ambysoft outlines the entire project planning process.
- Agile product backlog. This helps product owners track and prioritize customer requirements. You can download an Excel template here

(https://d2myx53yhj7u4b.cloudfront.net/file/agile-product-backlog-template.xlsx).

Agile is a popular development methodology widely used by development teams who need to ship apps efficiently. But Agile development requires Agile support (https://stackify.com/agile-development-requires-agile-support/), so dev leaders must arm their teams with the tools and resources they need to succeed. Check out this post (https://stackify.com/tips-making-agile-less-fragile/) for some valuable tips for making Agile less fragile. Also, check out our great list of scrum boards (https://stackify.com/top-scrum-boards/).

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Stackify provides developer teams with unparalleled visibility and insight into application health and behavior, both proactively in a monitoring role as well as reactively in a troubleshooting role, while eliminating the need to login to servers and other resources in order to investigate application problems.

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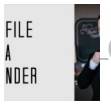

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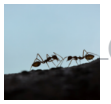

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8 Benefits of Agile Software Development

Written by Segue Technologies on August 25, 2015

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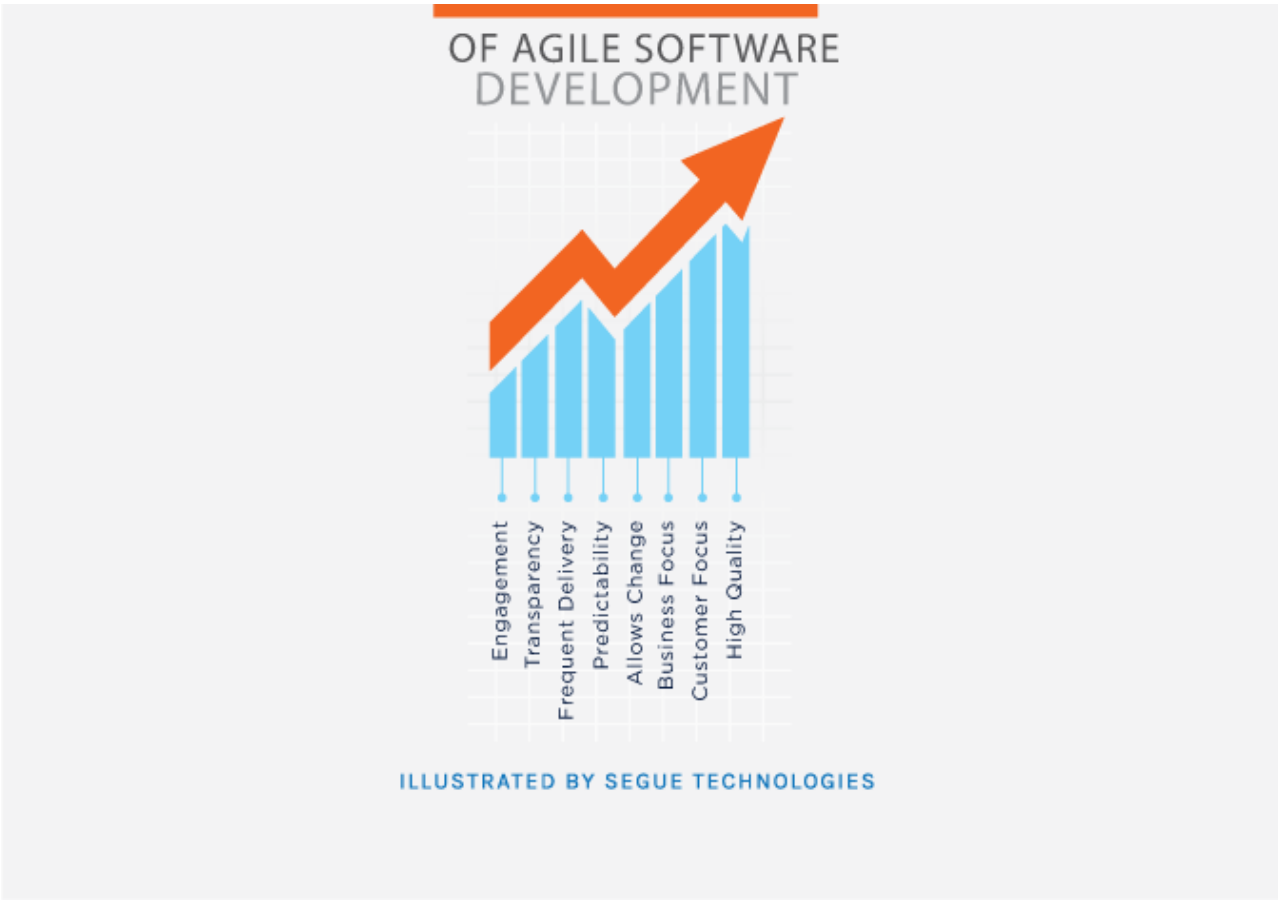
In a previous post, What Is Agile Software Development?, we discussed a number of benefits to using an agile process to manage software development projects. In this post, we'd like to expand upon these benefits and illustrate why they are compelling reasons to consider Agile. These benefits of agile software development include:



Stakeholder Engagement

Agile provides multiple opportunities for stakeholder and team engagement – before, during, and after each Sprint. By involving the client in every step of the project, there is a **high degree of collaboration between the client and project team**, providing more opportunities for the team to truly understand the client's vision. Delivering working software early and frequently increases stakeholders' trust in the team's ability to deliver high-quality working software and encourages them to be more deeply engaged in the project.

Transparency

An Agile approach provides a unique opportunity for clients to be involved throughout the project, from prioritizing features to iteration planning and review sessions to frequent software builds containing new features. However, this also requires clients to understand that they are seeing a work in progress in exchange for this added benefit of transparency.

Early and Predictable Delivery

By using time-boxed, fixed schedule Sprints of 1-4 weeks, new features are delivered quickly and frequently, with a high level of predictability. This also provides the opportunity to release or beta test the software earlier than planned if there is sufficient business value.

be performed by the team in the fixed-schedule time box. Combined with the estimates provided to the client prior to each Sprint, the client can more readily understand the approximate cost of each feature, which improves decision making about the priority of features and the need for additional iterations.

Allows for Change

While the team needs to stay focused on delivering an agreed-to subset of the product's features during each iteration, there is an opportunity to constantly refine and reprioritize the overall product backlog. New or changed backlog items can be planned for the next iteration, providing the opportunity to introduce changes within a few weeks.

Focuses on Business Value

By allowing the client to determine the priority of features, the team understands what's most important to the client's business, and can deliver the features that provide the most business value.

Focuses on Users

Agile commonly uses user stories with business-focused acceptance criteria to define product features. By focusing features on the needs of real users, each feature incrementally delivers value, not just an IT component. This also provides the opportunity to beta test software after each Sprint, gaining valuable feedback early in the project and providing the ability to make changes as needed.

Improves Quality

By breaking down the project into manageable units, the project team can focus on high-quality development, testing, and collaboration. Also, by producing frequent builds and conducting testing and reviews during each iteration, quality is improved by finding and fixing defects quickly and identifying expectation mismatches early.

During Segue's own experience of adopting Agile software development practices, we have seen solutions delivered on time and with a higher degree of client and customer satisfaction. By incorporating the ability to change, we have been able to better incorporate feedback from demos, usability testing, and client and customer feedback.

Agile is a powerful tool for software development, not only providing benefits to the development team, but also providing a number of important business benefits to the client. Agile helps project teams deal with many of the most common project pitfalls (such as cost, schedule predictability and scope creep) in a more controlled manner. By reorganizing and re-envisioning the activities involved in custom software development, Agile achieves those same objectives in a leaner and more business-focused way.

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What Characteristics Make Good Agile Acceptance Criteria?

Written by Segue Technologies on September 3, 2015

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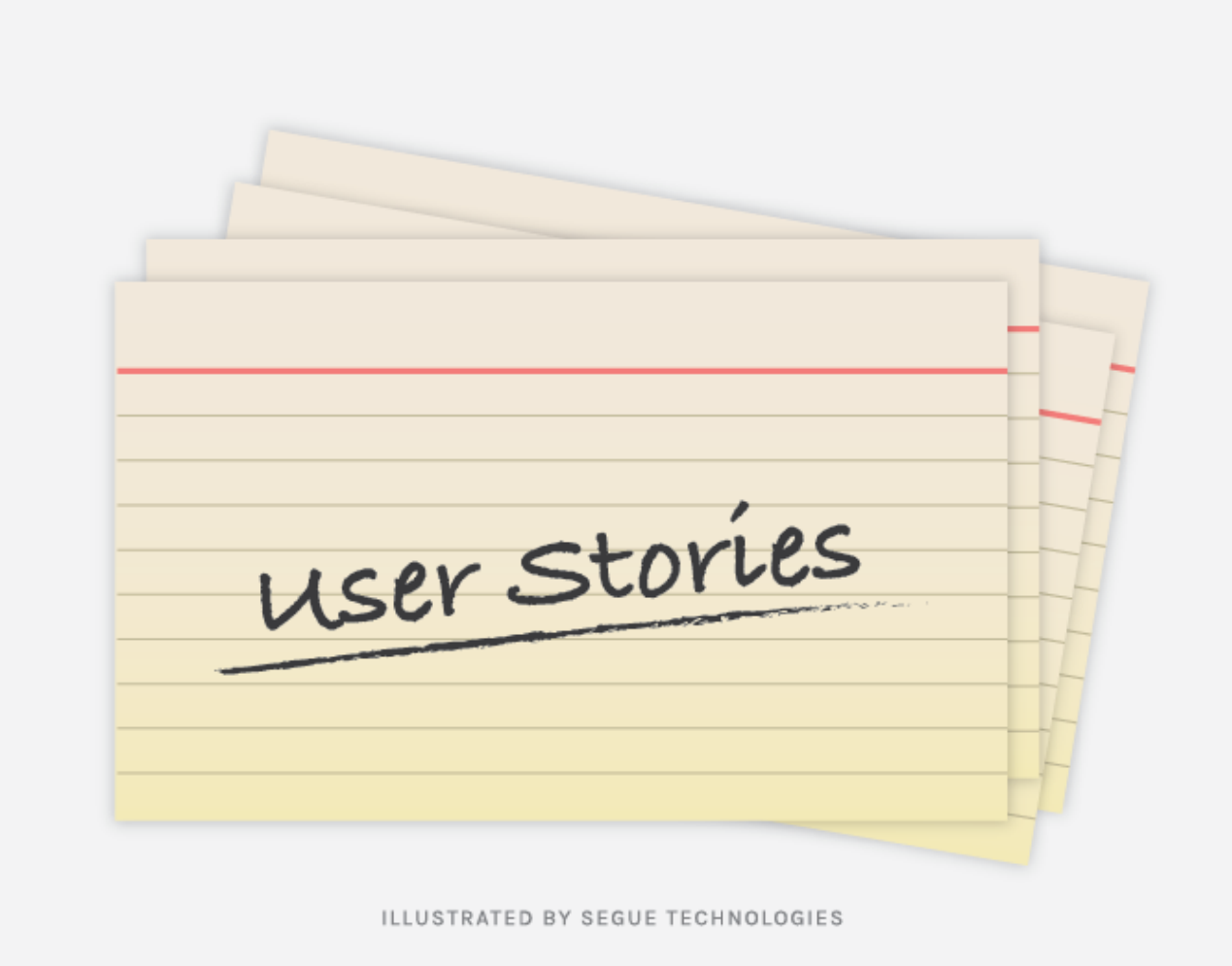

Good Acceptance Criteria will help get your Agile project from “It Works as Coded” to “It Works as Intended.” Read on and see how.

User Stories have been classically written in the following form:

As an I want so that

For example:

As an Administrator, I want to be able to create User Accounts so that I can grant users access to the system.

A User Story cannot stand alone, however. It must be accompanied by "good" Acceptance Criteria to provide a way to clearly demonstrate if the Project Team has indeed made the User Story come true.

What Are These Acceptance Criteria and What Makes a "Good" One?

Microsoft Press defines Acceptance Criteria as "Conditions that a software product must satisfy to be accepted by a user, customer or other stakeholder." Google defines them as "Pre-established standards or requirements a product or project must meet."

Acceptance Criteria are a set of statements, each with a clear pass/fail result, that specify both functional (e.g., minimal marketable functionality) and non-functional (e.g., minimal quality) requirements applicable at the current stage of project integration. These requirements represent "conditions of satisfaction." There is no partial acceptance: either a criterion is met or it is not.

These criteria define the boundaries and parameters of a User Story/feature and determine when a story is completed and working as expected. They add certainty to what the team is building.

Acceptance Criteria must be expressed clearly, in simple language the customer would use, just like the User Story, without ambiguity as to what the expected outcome is: what is acceptable and what is not acceptable. They must be testable: easily translated into one or more manual/automated test cases.

Acceptance Criteria may reference what is in the project's other User Stories or design documents to provide details, but should not be a re-hash of them. They should be relatively high-level while still providing enough detail to be useful. They should include:

- **Functional Criteria:** Identify specific user tasks, functions or business processes that must be in place. A functional criterion might be "A user is able to access a list of available reports." A non-functional criterion might be "Edit buttons and Workflow buttons comply with the Site Button Design."
- **Non-functional Criteria:** Identify specific non-functional conditions the implementation must meet, such as design elements. A non-functional criterion might be "Edit buttons and Workflow buttons comply with the Site Button Design."
- **Performance Criteria:** If specific performance is critical to the acceptance of a user story, it should be included. This is often measured as a response time, and should be spelled out as a threshold

audit form" rather than "A manager can click an 'Approve/Disapprove' radio button to approve an audit form"). The criteria should be independent of the implementation: ideally the phrasing should be the same regardless of target platform.

An Example

Acceptance Criteria for the User Story at the beginning of this article might look like the following:

1. If I am an Administrator, I can create User Accounts.
2. I can create a User Account by entering the following information about the User: a. Name, b. Email address, c. Phone Number d. License Number (Power/Basic/None), e. Account Status (Active/Inactive), f. Reports to (from a list of "Active" Users)
3. I cannot assign a new User to report to an "Inactive" User
4. I cannot assign a new User to report to a User if it creates a cyclical relationship (e.g., User 1 reports to User 2 who reports to User 1
5. The system notifies me that it sent an email to the new User's email address, containing a system-generated initial password and instructions for the person to log in and change their password.
6. I am able to verify with the intended recipient of the email that it was received.

Apply these ideas to your Agile project and you will quickly transform it from "It Works as Coded" to "It Works as Intended."

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Manifesto for Agile Software Development

We are uncovering better ways of developing
software by doing it and helping others do it.
Through this work we have come to value:

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

That is, while there is value in the items on
the right, we value the items on the left more.

Kent Beck
Mike Beedle
Arie van Bennekum
Alistair Cockburn
Ward Cunningham
Martin Fowler
James Grenning
Jim Highsmith
Andrew Hunt
Ron Jeffries
Jon Kern
Brian Marick
Robert C. Martin
Steve Mellor
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Dave Thomas

Twelve Principles of Agile Software

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Agile and lean project management

a Zen-like approach to find just the "right" degree of formality for your project

CONFERENCE PAPER | Agile, Lean | 2006

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Abstract

Waste no energy. Minimize paper work and bureaucracy. Practice PM as a Zen art. Do just right planning and control. Be adaptive. Find the right degrees of interpersonal relations, communication, granularity, and compliance. Balance formality and flexibility. Scale PM based on project attributes and compliance needs to meet essential requirements.

Introduction

Project management seeks to “perform the right projects right” so that customers, sponsors, regulators, portfolio managers and performers are satisfied, if not thrilled. Both a project centric and organizational perspective is needed to create a healthy process.

Picture the most effective project you know. How does it look and feel? Waste no energy. Minimize paper work and bureaucracy. Do just right planning and control. Adapt. Find the right balance among interpersonal relations, communication, granularity, and compliance; formality and flexibility. Scale PM to project needs. Focus on objectives. Question everything, including your own beliefs and resistance to either flexibility or discipline. In short, work lean and agile.

Objectives

Working lean means eliminating waste. Being agile is to be adaptive, resilient, flexible and appropriate to the situation. Combining them we find the “just right” level of formality in our projects so there is no excess and no insufficiency. Like the martial artist, the project team wastes no energy to get the job done.

The right PM approach is different for a large complex project in a highly regulated environment than it is for a small project in an informal environment with a close knit dedicated team. In all cases there is an optimum level of lean agility.

Issues

Project managers, performers, clients, sponsors, regulators and functional managers are challenged to manage projects in complex, dynamic settings to meet both project and organizational objectives. There is conflict between the extremes of under and over documentation, planning and control.

How do we standardize the PM approach without overburdening the staff with unnecessary paper work or bureaucracy while promoting adaptive action?

People resist formality and standardization because they feel the burden is too high. This resistance can result in “throwing the baby” (good formal PM practices) “out with the bath water” (excessive formality). Many stakeholders feel that formal PM wastes time and money, restricts creativity and flexibility and increases the risk of failure. Others argue that formal PM is essential to success.

Note the paradox. Project management has at its heart improving project performance, yet there is a credible belief that it can do the opposite. But, there is no conflict. Formality is not the opposite of agile and lean. In fact, it is a prerequisite for them.

Balance

The key is to find the right balance to enable control on the portfolio program and project levels, maximize project and resource efficiency, increase flexibility, reduce risk and promote ongoing improvement.

This balance is particularly important when regulatory compliance is an issue. For example, where there are regulatory requirements for strict adherence to a defined process the easy way to comply is to create a one-size-fits-all standard and force everyone to follow it. But this is too costly given its impact on effort, customer service and duration.

Even in highly regulated situations there is flexibility. Variance from the standard is permitted if it is justified and properly authorized.

Systems and Processes

A systems approach applies general systems theory to the dynamics of organizations, products, processes, and people. Anything can be described as a system made up of people, organizations, things and their interactions.

Processes are the actions in systems. “A process is a set of activities to accomplish something; a means to an end. Anytime there is a result, a process produced it. It is the key to performance.” (Pitagorsky, 2006, Chapter 9) To influence the result, address the process.

Process consciousness means knowing the process steps and their effects. It is a prerequisite for adaptability and continuous improvement. Albert Einstein defines insanity as “doing the same thing over and over again and expecting different results.” (Brainy Quote, ¶ 78)

The ability to work lean and agile is based on taking a systems and process oriented view.

Lean

“Lean” is a quality improvement and management philosophy that began in manufacturing. Its principles can be applied in any process. Its focus is on waste reduction while creating a better workplace through “respect for humanity.” Quality, production time, and cost are improved by eliminating waste.

In project management there are wastes like excessive documentation, excessive planning and control, unproductive meetings, avoidable rework, excessive definition of detailed requirements, unproductive multi-tasking. Lean PM eliminates these wastes.

The seminal book Lean Thinking introduced five core concepts: 1) Specify value in the eyes of the customer 2) Identify the value stream and eliminate waste 3) Make value flow at the pull of the customer 4) Involve and empower employees 5) Continuously improve in the pursuit of perfection. (Wikipedia, ¶ 5)

1) Specify value in the eyes of the customer –

Clearly identify objectives and requirements and use them as acceptance criteria. Doing the right projects right means satisfying the customer, and, more broadly, the needs of all stakeholders.

2) Identify the value stream and eliminate waste –

“A value stream is all the actions, (both value added and non-value added), that are required to bring a product through the main flows essential to nearly every product.” (Industry Forum, ¶ 82) It is the process.

Identifying the value stream enables analysis to pinpoint unnecessary steps and the ones that overly burden resources, and impact risk, relationships and quality.

3) Make value flow at the pull of the customer

In manufacturing this means don’t make the widget until there is a demand for it to minimize inventory costs by manufacturing just-in-time. But, Theory of Constraints says that the process should pull work as the critical resources (people, work stations or machines) are available to fill them. The message is, moderate the flow of projects to the performance group based on the group’s capacity to perform them. This helps to avoid overloading the resources and to minimize multitasking. At the same time make sure that every project addresses a meaningful need.

4) Involve and empower employees

Since the people who do the work generally know more about doing it then anyone else, involve them in process planning. Empower them to adapt the process, within clearly defined constraints, to the needs of the situation. At Toyota, Lean includes cultivating a human friendly and supportive environment. It is not just about reducing costs at the expense of employees and business partners.

In project work, some of the most egregious errors can be eliminated by involving the team in estimating, scheduling and other aspects of planning. The tendency for project managers and functional managers to commit their teams to schedules leads directly to late delivery, quality shortfalls and morale problems, resulting in customer and sponsor dissatisfaction, avoidable rework and the turnover of the most valuable employees. Avoid short sighted “efficiencies” like minimizing up front consensus building and eliminating administrative support.

Empower team members to critically assess their process and recommend improvements within individual projects and across multiple projects.

5) Continuously improve in the pursuit of perfection

The kaizen continuous improvement approach uses process measurement and review, problem-solving and analysis techniques involving managers, clients and workers. Kaizen relates to finding and eliminating waste while promoting increasingly more effective performance.

Agile

Agile is “moving quickly and lightly; “sleek and agile as a gymnast”; “as nimble as a deer”;…” (Wordnet, ¶ 1); Mentally quick; “nimble wits” (Wordnet, ¶ 2); “Refers to the speed of operations within an organization and speed in responding to customers.” (MIT Sloan, ¶ 10)

Agility has been associated with the Agile software development approach (Agile Alliance ¶ 1), but agility applies to all kinds of projects.

Agile involves minimizing risk by performing project iterations that deliver meaningful results. Communication is real time, quick and informal and preferably face to face. Project participants have significant autonomy. Written communication and documents are minimized, not eliminated. Requirements are allowed to evolve.

Goals of the Lean/Agile Approach

The goals of combining lean and agile are to deliver performance efficiency and effectiveness through free flowing, meaningful communication, self-managed teams, and commitment to success. Managed change, and continuous improvement are integrated into the process.

The Relationship between Lean and Agile

Both Lean and Agile recognize the need for an open-mindedness that appreciates the complex interplay among efficiency, people, communication, and the delivery of meaningful results. But, there is a tendency for people to latch onto good systems as cure-alls. Combining the best parts of multiple approaches requires creativity and works against “process fundamentalism.”

Lean focuses on squeezing out waste to maximize efficiency, reduce costs and increase throughput and quality. Agile has as its primary focus delivering results by minimizing unnecessary documentation and control and maximizing open, organic communications. Lean’s focus on continuous process improvement, based on an analytical systems and process analysis of performance adds significant value to the generally more informal, single project focused intuitive approach of Agile. The informal approach moderates the analytical approach to keep continuous improvement itself lean and agile.

How to cultivate a Lean and Agile approach

Cultivating lean and agile PM requires managed change that applies essential PM principles to fit the needs of diverse projects in diverse settings.

The ‘Must Haves’ of PM

PM essentials are used as a benchmark for evaluating successful performance for individual projects and the organization as a whole.

At the individual project level, the essentials are:

- A common written understanding of project objectives and constraints
- A documented plan with a comprehensive activity list, at an appropriate level of detail, expected deliverables, and realistic schedule and budget
- Common understanding of how the team will communicate and manage information
- Clear understanding of roles and responsibilities
- Performance monitoring and reporting
- Managed expectations
- Quality control
- Post project review.

Risk management, communication and change control are embedded in the scheduling, budgeting, progress monitoring and managed expectations items.

Case Study

Following is a brief case study to provide an example of an agile and lean project and a point of reference for analysis of how best to satisfy the essentials.

The project was performed as a consulting engagement for a large global company to evaluate a high visibility, complex model for the client and provide a report of findings. Estimated completion time was about ten weeks. We would complete the project in twelve.

A senior project management professional with clear authority and in-depth knowledge of the project domain and his organization’s needs led the client team. People representing the critical stakeholders in the project supported him.

The consulting team was made up of a lead consultant who played both the PM role and a key performer role, a senior consultant with significant subject matter knowledge and experience, a senior consultant as project director, a support consultant, an administrative assistant and an account executive. The members of the team were in three countries with different time zones. All were working on multiple projects. Team members were peers.

Planning

A statement of work (SOW) and plan were developed to identify deliverables, major activities, interim deliverables, time frames and the project cost to the client. The client/vendor relationship and the policies of both firms made a formal SOW mandatory.

Virtual Team

Given the reality of a virtual project team and the agile principle of co-location, the team needed to adapt. The goal of co-location is to enable quick meaningful communications with minimal writing and to reinforce the team relationship. Co-location was not an option with a critical resource on another continent and the team members working multiple projects simultaneously.

We adapted to this need by first holding a two day face to face kick-off meeting with the client team. Detailed understandings of the client environment, deliverables, terminology, constraints, milestones at which interim results were to be presented to the client and the project modus operandi were agreed upon. We arranged for a web meeting site where we could work interactively in virtual meetings. We established basic document management and email standards.

In essence we enabled a “distance” environment that simulated the bull-pen environment that is recommended in the Agile approach. The virtual nature of the team and the reliance on both synchronous and asynchronous electronic communications makes good work habits and familiarity with the communication tools necessary. The good work habits must include personal accountability and the ability to schedule dynamically across multiple projects.

Project Control

The essentials here include progress reporting, managing expectations and quality control. In our example, there were no formal written project status reports. Progress was monitored as interim deliverables were shared with the client. A simple email update was sent to the sponsors to give them the sense of progress and the degree to which the client was accepting interim results.

Each member of the consulting team kept track of hours of effort by date and task. The account manager was to monitor cost data against the original budget. This did not happen formally. However, subjective evaluation by the principle performers on the consulting team made it clear that cost overrun was occurring.

Schedule compliance was managed in a very flexible and informal way. Given the fact that performers were multitasking, the choice was to have a very rigid schedule that allowed for definitive scheduling of work time or to leave the detailed schedule fluid and monitor against interim delivery dates. The team realized that definitive work schedules would not work. This led to the need to juggle individual schedules and to change interim delivery dates ad hoc. Because the client was flexible and the account manager and lead consultant managed expectations, this was not a problem.

However, internal to the consulting team, the need for realistic short-term schedules and better personal planning was identified. One team member consistently over estimated his availability and his ability to do complex writing and analysis tasks. This led to missed internal delivery dates and the need for other team members to continuously adjust their schedules and roles.

Note that the absence of a definitive schedule was not a critical issue. Rather, it was the misestimating of short-term tasks resulting in cutting corners.

Change Control

The most controversial aspect of this project was scope change management and its impact on cost and schedule changes. During the project, it became clear that a critique of the plan was not really what the client needed, though it is what they had said they wanted. They needed a revised high-level structure for the model and better descriptions of the high level elements. This required additional effort on the part of the consulting team and a shift in focus from critique to creative. The roles of key consulting team members had to change on the fly to accommodate changed deliverables and the scheduling issues mentioned above.

While the project deadline was not exceptionally tight, it was constrained by an expected senior management review of the model to kick off of the client’s program. Formal change request and external approval of the change(s) would have jeopardized making the deadline and the client/vendor relationship. It was agreed that the project would be allowed to “morph” naturally as the client’s awareness of the real need evolved.

The result was a cost overrun (35 person days vs. a planned 19 days) and internal schedule changes. The client was exceptionally satisfied with the result and with the flexibility of the consulting team. The client’s deadline was met with a result that enabled a much more effective presentation to senior management and a far stronger platform for moving forward with their program.

The cost overrun was significant as a percentage of the estimate but in the context of the overall relationship with the client the overrun was not as significant. It was the account manager’s and her management’s call to address the overrun with the client after the fact.

Quality Control

Internal quality control was integrated into work sessions at which the consulting team interactively created and vetted interim deliverables. It was decided that an assembly line method for handling quality issues was not appropriate given the scheduling challenges and the need to collaborate among the subject matter experts. Internal work sessions were held to simultaneously come

to a consensus about content and to correct defects on the fly. This approach is controversial. Some observers felt that the team spent too much time in synchronous meetings. The team felt that this was the only rational way to operate and that in the end it was what enabled a high quality result given the time frame and the working conditions.

Quality control by the client was handled in a more linear way with client team members individually reviewing deliverables and then working with the lead consultant both individually and in group sessions to address issues.

Lessons Learned

Among the lessons learned in this project were:

- While an initial plan based on an agreed upon statement of work is essential, it is equally essential to be flexible so as to accommodate the evolving needs of the client and team members.
- Informal status monitoring works well when the team is relatively small and there are frequent meaningful interim deliverables. Deliverables and their acceptance are the principle measures of progress.
- Detailed schedules were not only unnecessary but would have frustrated and held up the team. Realistic short term delivery targets and extreme flexibility on the part of performers is needed. A flexible milestone level plan is needed as a frame work.
- Cost control is essential in vendor/client projects. In internal projects, it is very desirable. Regular accounting and projection of the end cost is necessary to manage expectations and support decision making.
- Change control is always necessary, but formality can get in the way of meeting the projects real objective – satisfying the client's business needs. With a degree of cost control, it is possible to manage scope change cost issues after the fact. Agreement regarding the degree of formality among the principle stakeholders is absolutely necessary.
- An assessment of the stability of the scope at the very beginning as part of risk analysis enables better cost estimating. This is difficult when the client's objectives are rational and clearly stated.
- Quality control can be merged into the development of deliverables (e.g., reports, plans, models, designs) using interactive work sessions. External review and acceptance are necessary.
- Merging quality control with development activities and progress reporting with the acceptance of interim deliverables requires a very close relationship between project subject matter and performance team members and the project manager. The more the project manager is an active member the more easily this is done.
- When the project manager is also a key performer, the PM must be constantly aware of the two hats he wears and when to wear one vs. the other. It is easy to lose focus of the project and its management when immersed in the work itself.
- Administrative support and document production and management are very important and economical.

Organization Culture and Maturity

Organizational culture and maturity plus the ability to consciously manage change are critical factors to adapt lean agility. Some environments have dysfunctional lean agility. Without a degree of PM maturity, the Lean part may cut away too much and the agility may get so that all control goes out the window. Maturity brings with it an appreciation for the value of formality and an infrastructure that promotes consistency, ensures effective portfolio management and supports PM capability development.

At the same time maturity without lean agility is not possible. Maturity includes what Dr Harold Kerzner refers to as "informal project management". The mature organization continuously improves its process to minimize paper work and bureaucracy while doing due diligence regarding planning and control. Maturity is founded on the ability to apply the right degree of discipline, rigor and formality to each project according to situational needs.

But there is a tendency towards "maturity" without agility. People may misinterpret maturity and create restrictive, inflexible methodologies in the attempt to promote repeatability. The PMO becomes the compliance police. Project managers find "work arounds" to get their projects done, or, worse, they follow the standard, degrade performance and waste time and money.

Going lean and agile needs a managed change program with a charter, plan and all the other attributes of a well run program.

PMO attitudes must be assessed to make sure that all the attributes of a healthy, highly effective project management environment are valued and considered. The attributes of formality, repeatability, and objective performance evaluation must be balanced with the attributes of lean and agile performance including adaptability to the needs of each situation. The objective of maximizing project level autonomy with post project assessment should be recognized.

Motivation and Empowerment through Communication

Motivating stakeholders to strike the right balance among discipline, planning, control, consistency and flexibility is a critical element. It reduces the need for intrusive compliance monitoring and reduces the risk that people will blindly follow a process that is not right for their project.

Education is needed. Members of the organization at all levels must understand the business case for a lean/agile approach and their personal responsibility for implementing it. It is necessary to continuously reinforce the message through communities of practice, post project reviews and just in time knowledge about best practices, available templates and project examples.

Acknowledge the benefits of "violating" standards when the violation is needed to meet objectives. Provide a variance procedure that is quick, easy and rational.

Hold people accountable for complying with standards. Publish a project management practice policy. This is a statement of how project teams are expected to behave regarding compliance to standards and procedures and the use of common tools and terminology.

Remind project performers that it is not enough to just get the project done. Standards and procedures enable senior management and others to control the environment with its multiple projects and comply with external regulatory requirements. Compliance management, with accountability, is the means to ensure that standards and procedure are not ignored.

Project Type Taxonomy and Adaptability

To manage project diversity the organization needs taxonomy of project types. It categorizes projects based on attributes like domain (e.g., software development, R&D, HR, etc.), criticality, size in terms of cost, effort, number of participants, duration, complexity (e.g., global scope, number of participating groups, vendor involvement, etc.), risk, regulatory involvement, team performance experience, etc.

This sets the stage for conscious decision making regarding just how lean and agile the approach should be for each type of project. A large complex project with regulatory requirements has a different need for formal documentation and reporting than a small unregulated project performed by a highly cohesive team of professionals with good work habits for a single local client.

One approach does not fit all understanding this is an essential starting point for project management effectiveness.

Publish a Methodology

Publish a project management methodology that highlights adaptability. Include criteria for categorizing projects, alternative pathways for each category with templates, checklists, examples, best practice guidelines and easy access to tutorials on PM practices.

Insure that the people who are creating standards and methodologies and monitoring compliance are reminded of the need for flexibility and continuous refinement as well. Periodically have their work evaluated by project managers and performers and evaluate overall organizational performance improvement.

In general, project teams promote flexibility, minimal paper work and external control. They are focused on performing individual projects. The PMO promotes consistency and control for the sake of managing portfolios of projects and programs across time. They balance one another if there are proper checks and balances.

Conclusion

The goal of project management is to improve the probability of project success while minimizing cost and enabling control across multiple projects in the organization. To achieve this it is necessary to eliminate wasted effort and promote flexibility with the right balance between formality and informality, based on the needs of projects and their environment. A lean agile approach enables the organization to achieve this goal.

Achieving a dynamic, continuously improving organization requires managed change.

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The Kaizen Project Manager

Written by Jarett Hailes

Project managers have the difficult task of bringing together a team and delivering something exceptional, often within a tight timeline and budget constraints. In these pressure situations, project teams need to be able to perform together as optimally as possible. While newly formed teams often need time to establish their rhythm and develop efficient processes, even an experienced team with several projects under its belt can probably find ways to make their work get done more efficiently. With the seemingly constant demand to find better ways to do things, how can a project manager properly invest time to get a team to perform better?

One approach is to try and find major inefficiencies and implement big, sweeping changes. These types of changes are often the most difficult to achieve, regardless of whether your project team is two people or a thousand. Big changes are met with fear, doubt, inertia, laziness and many other barriers. Our initial enthusiasm for the change can dwindle if there aren't immediate results, and in the end there may be a conscious or unconscious decision to abandon the change. This is why so many of us fail our New Year's resolutions; often they are big visionary statements that involve a large amount of change.

Instead of trying to make big changes, we can focus on implementing an incremental development process that allows project teams to continually improve with small but meaningful changes. The Japanese term "kaizen" means "continuous improvement," and methodologies have been developed that implement kaizen in small, incremental and purposeful steps to yield dramatic changes over time. Kaizen has been used in lean manufacturing methods at companies such as Toyota, Intel and Lockheed Martin. While this methodology has been used mainly in manufacturing operations, it is focused on helping individuals and small teams become as efficient and effective as possible at the job they do.

Some of the main principles of a kaizen approach to continuous improvement are:

- Thinking of ways to make something happen rather than reasons why something can't be done.
- Do not seek perfection; start change right away and build on that change over time.
- When something doesn't work as expected, take the time to understand the root causes of why things went wrong.

- When faced with hardship, take the wisdom gained and look to apply it to your next task.
- Measure your successes and failures so you actually can tell if you are improving.

Here are some steps to implementing kaizen as part of your project's standard operations:

1. **Develop the mindset:** When you first arrive at work, take 30 seconds to remind yourself that today is an opportunity to find ways to do your work better. Review what you will be doing today and your plan to get things done. When you get your project team together for status report meetings, start off the meeting with a similar statement to reinforce this mindset with everyone in the project.
2. **Document performance:** Project teams often track their time spent on activities and use methods such as earned value to determine how well the project is progressing. See if there are other performance measures that are relevant to your project team. For instance, if you are working on a software project, perhaps the number of rounds of review for a requirements document can be used to assess the performance of a business analyst. In construction, the number of safety incidents can be an important measure. Work with your team to find ways that are meaningful to demonstrate progress, and use those periodically to assess how your team is doing.
3. **Reflect on your activities:** At the end of the day, quickly review the work you and your team has performed. Reflect on what went well and what didn't go as ideally. Make some quick notes and associate them with the relevant tasks to which they belong. For areas that didn't go as well, write down 1-2 things that could have been done differently that would have improved the outcome. Have your team come together every day or two to review what people are thinking is going well and what can be improved. Agree on at least one item that can be implemented immediately, no matter how small. If there are larger items that will require some time to implement, brainstorm how you can integrate those activities into your plans so you can realize the benefits of the improvement.
4. **Experiment with new ideas:** Find interesting things that you think will help improve the quality or efficiency of your team's work and try them out. Bring up those ideas as part of your periodic group assessment. Depending on the size of the team, it may make sense to develop a prioritization method to choose which item(s) to implement, as you likely won't be able to try everything out. Once the idea is in place, track the performance measures that you thought would change and compare them to the previous results. A qualitative assessment may also be warranted (e.g., if everyone on the team is happier with their work because of the change). After trialing the idea for a reasonable amount of time to judge whether it's helpful, have the team decide whether to continue with it or kill it.
5. **Share with others:** Aside from having your team collaborate on kaizen ideas, you can look to other projects within the organization for lessons learned and different ways of doing things. Speaking to other project managers through your local PMI chapter is also a way to find ideas that can help your project teams become even more successful. If there is no chapter in your area, online PM communities with forums give you an excellent chance to collaborate with peers from around the world.

As noted above, this approach ideally works in relatively small teams so that all individuals feel they are an integral part of the process. If you have a larger project team, you can split the team into sub-groups to practice kaizen. Cross-functional kaizen groups can often find inefficiencies across organizational boundaries that

otherwise go unnoticed, so if possible, get your teams to combine various skill sets and backgrounds. If you end up having multiple sub-groups, give representatives from the sub-groups a chance to get together every now and then to share ideas that are proven to increase productivity.

These steps can be performed to help you improve your own processes as a project manager as well. A kaizen approach to personal improvement can take away the fear and risk of big changes to your practices while giving you a chance to regularly review your actions and think about ways to increase your effectiveness as a leader. When combined with performing kaizen at the team level, you have an excellent approach in place to quickly address any issues that your project may face.

Having big goals can be an incredible motivator to help teams achieve success. Sometimes it can be so easy to visualize what we want to accomplish that we attempt to make huge changes in order to reach our goal as fast as possible. However, as an old Chinese proverb reminds us, “It is better to take many small steps in the right direction than to make a great leap forward only to stumble backward.” Having a kaizen approach to improving your projects and your project manager skills provides an opportunity to make small but purposeful changes each day that can bring about incredible results.

Don't forget to leave your comments below.

Jarett Hailes is President of Larimar Consulting Inc. Over the past 10 years, Jarett has worked in a wide variety of industries as a management consultant, business analyst and project manager. Jarett’s passion is to help organizations realize the potential of their staff through efficient processes and an open culture that encourages and rewards innovation at all levels.

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The Art Of Change : Kaizen & Micro-Improvements

JB Follow
Dec 9, 2017 · 3 min read

The art of Kiazen [改善] can help you to fix anything. In short, Kaizen is the art of applying continuous, bite-size changes to your professional and personal life. The key to Kiazen is incremental changes that can result in measurable benifits to productivity, well-being, etc. We call these micro-improvements.

Breaking Bad : Making Good

Micro-improvements allow a human to eliminate negative behavior without breaking will power. In this case, the process starts with the recognition of a single negative behavior.

The process is simple.

1. Identify a problem
2. Determine the best outcome of resolving the problem
3. Implement a micro-improvement that will lead toward the desired outcome
4. Collect data on the micro-improvement over time

Here is an example: you're spending too much time on facebook and would like to reduce the time wasted on pointless content. The simple solution is to say no to scrolling. Now, you'll need to collect some data so find and app that logs your time on websites (like RescueTime). Then, set some reminders to avoid scrolling around the time you usually jump on facebook. Check the data. As you notice that your time on facebook has decreased, wait a few more days to hit steady state.

Congratulations, you have successfully implemented a micro-improvement. Now, pick a new behavior to tackle. This is Kiazen.

Measurement : Data : Analysis

In a perfect world, identifying a problem and moving to resolve it would be enough. This is not a perfect world. We need ways to remind ourselves to not fall back into the negative behaviors. In order to figure out what we need to change, it's best to let the data do the talking. This means measuring our lives and analyzing the data regularly. There are tons of applications that help track,your activity online and off. Download a few. Prosper from your new found self-awareness.

Tracking all your moves may sound overwhelming, this is why we pick off one micro-improvement at a time.

Personal Bots

Setting reminders can be helpful to implementing a micro-improvement. I recommend having a bot involved in your life to help with this. If you're a slack user, spin up a workspace just for you. Learn how to use slackbot. Add more bots as needed.

Between the built in slackbot plus Trello, IFTTT and Howdy.ai integrations, I've created a very nice system of notifications that keeps me on track and out of the doldrums of the web.

Slackbot reminds me to drink more water regularly and spend some time on meditation/yoga daily.

Trello tracks my tasks.

IFTTT sends me articles from my favorite news sources, updates on crypto prices, and let's me know when the international space station is overhead.

Howdy.ai asks me how my day was. It has become my reason to journal and logs all of my responses really nicely. I use Howdy.ai for all of my teams to script daily/weekly standups as well.

Notification Scheme

It seems everyone I know gets berated by 100s or 1000s of notifications daily.

The biggest time saving micro-improvement I have made was probably the easiest. One rainy day I sat down for 2 hours, downloaded a bunch of retro arcade sound bites (wav format) and then set up custom notifications for all of my apps and some of my most important contacts.

The sounds selected were part of the success here. Coin collection sounds for import stuff. Game over sounds for news notifications. Various other bleeps and bloops cover every set of notifications I receive daily.

Go Kaizen

Forget new years resolutions. Making sweeping changes in your life will break your will. Implement Kaizen and let the micro-improvements change you, sustainably.

Let me know what micro-improvements you've implemented or want to in the comments & follow me on some social things. I'm easy to find anywhere online : @ aiBrindley

Resolutions Change Future Bots Self Improvement

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Goal alignment in process improvement

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ABSTRACT

Process improvement should improve an organisation's ability to achieve its business goals. While mapping an organisation's strategic goals through various layers of management is common, such mapping does not seem to continue through to their processes that create value to the organisation. Despite a number of process improvement methods being available, and almost two decades of experience with those methods, many process improvement projects do not end successfully.

We explore the impact process assessment has on process improvement. In particular, we study the alignment of an organisation's process goals to its business goals; and the contribution of process assessment to this goal alignment. This paper illustrates the data gathered through industry survey reflecting the lack of focus on and alignment of organisation's business goals throughout process improvement. The results indicate that there is little knowledge and experience in industry in aligning the process goals and organisation's business goals. This, in turn, could explain the unsuccessful process improvement efforts or perhaps even the skepticism towards process improvement in general.

1. Introduction

Business creates value for its customers and an organisation creates value for its stakeholders through its value-adding work processes (Rummler et al., 2009). However, processes need continuously to undergo changes and refinements in order to increase their ability to deal with the requirements and expectations of the market and of the company stakeholders, leading to the need for continuous process assessment and improvement (Fuggetta, 2000).

Process improvement is an applied academic field with theoretical heritage from the Total Quality Movement (Lepmets, 2007) aiming to increase efficiency (ISO/IEC 15504-1, 2004) and performance of an organisation. Process assessment is related to process improvement as a way to identify the current state of processes, the critical process problems and to establish improvement priorities (Humphrey, 1989). Process improvement has long been troubled by poor alignment between an organisation's business goals and its goals on the operational level. An organisation's processes may end up as a burden rather than advance the business where process improvement goals are not aligned with business goals (Dyba, 2005).

There are a large number of process models (CMMI v1.3, 2010; ISO/IEC 15504-2, 2004) and process improvement methods (Reinertsen, 2009; Schroeder et al., 2008) available, but aside from some studies (Brodman, 1996; Goldenson and Herbsleb, 1995; Goldenson and Gibson, 2003; Herbsleb et al., 1994) there is little recent research available that evaluates the impact of these models and methods on organisational performance in industry. Despite a general agreement that in order to succeed in process improvement, the improvements have to be aligned to and support the achievement of the business goals of the organisation (Gray and Smith, 1998; Rummler et al., 2009; Shaikh et al., 2009; Sterman et al., 1997; Weiss et al., 2002), nowhere is it said how this alignment can be achieved in practice. In this paper, we explore the impact of model-based process assessment on process improvement, more specifically on the alignment of the process goals and the organisation's business goals.

Companies involved in process assessments often become too focused on internal considerations and lose touch with the customer focus (Gray and Smith, 1998). Rummler et al. believe that the root cause for the lack of success in process improvement is that most people still do not recognise and understand that organisations are systems and do not realise the implications of this on how organisations should be planned, designed and managed. This, in turn, means that the value of process concepts continues to be misconstrued and misapplied (Rummler et al., 2009). Processes are part of a larger organisational system and therefore cannot be tinkered with in isolation but should be modelled, improved, and managed in the context of the total value creation system of a business – as a contribution to that total value creation system (Rummler et al., 2009). In this paper, we are not talking about how

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to model a process or the technology for performing a process, nor the tools and techniques for managing projects. We are looking at the processes from the viewpoint of process improvement and process assessment, focusing on the alignment between the work processes and the organisation's business goals.

The motivation for this study is based on the lack of a comprehensive understanding and practice in aligning process goals with the business goals of an organisation. Process improvement has several critical success factors (Arent, 2000; Dyba, 2005; Grover, 1999; Herbsleb et al., 1994; Iversen, 2000; Kinnula, 2001; Lepasaar et al., 2001; O'Hara, 2000; Rainer and Hall, 2002; Varkoi, 2000; Zahran, 1998), and we believe that goal alignment is one of them. Too often are processes assessed in isolation focusing on the improvement of that single process without considering its impact on all the other processes and on the organisation's business goals. We suggest that process assessment presents an opportunity to see the big picture – the organisation as a system and therefore contributes to the goal alignment between process improvement and an organisation's business. The following section describes the background to process thinking and process goals. Research that is closely related to the current study is discussed in greater detail in Section 3. Sections 4 and 5 illustrate the research question, the research method, the research approach, and the limitations of the study presented here. A description of the data obtained from industry and the data analysis for hypotheses testing is provided in Sections 6 and 7. The data analysis results are discussed in Section 8, which leads to various possibilities for future work summarised in Section 9.

2. Background to processes and goals

Rummler describes the essence of process engineering as "identifying and improving the work required to deliver organisational results" as he expressed some frustration with the business process management/process movement that seems to ignore these basics (Rummler et al., 2009). He further argues that "process" should start with the desired results and work backward to identify and redesign the steps that must produce those results. While it easy to envisage that processes which are well aligned to an organisation's goals could be devised, experience with business process re-engineering (Al-Mashari et al., 2001) demonstrates how difficult it can be to design and implement such processes. Further it is unlikely that any organisation could design a well-aligned process at their first attempt, illustrating that some form of goal alignment in process improvement is required.

2.1. Process modelling, process assessment, and process improvement

Process modelling, business process modelling and to some extent workflow modelling are all ways to "identify and redesign the work that produces organisational results" (Rummler et al., 2009). The starting point is an absence of working or workable processes, where a new approach is needed in order to establish more efficient and effective processes. Rummler et al. acknowledge and discuss different initiatives that have arisen since 1990 before concluding that each has contributed something to process modelling but each has also diverted attention to specific aspects. For example, workflow modelling has provided tools with which to document, navigate, change and test processes, but has diverted attention to the extensive and complex functionality of the tools and away from the basic problem of creating, changing and saving process maps as a means of modelling processes, their scope, responsibilities and the interactions between them (Rummler et al., 2009).

CMMI contains a process assessment model as well as a process reference model and process measurement scale whereas the ISO/IEC 15504 series do not include or contain a process reference model but do include separate process measurement scale (ISO/IEC 15504-2), process assessment model (ISO 15504-5 and ISO 15504-6) and a process assessment method (ISO 15504-3). The process assessment method associated with CMMI is the SCAMPI method. For convenience, in this paper we refer to the publication in which the assessment model or improvement method can be found.

Process assessment (CMMI v1.3, 2010; ISO/IEC 15504-3, 2004) and process improvement (ISO/IEC 15504-4, 2004; Oktaba et al., 2007; SCAMPI, 2001), the subject of this research, starts after processes have been modelled, deployed and used. It is only after the processes have been in use that there can be an assessment of how well they serve their purpose. While it is true that a process can be improved without an assessment, the formal process assessment methods try not only to identify and treat the symptoms of process problems but also their underlying causes. Process improvement then builds on the findings of process assessment by determining the process changes that will serve the organisation's best interests at the time.

2.2. What is a process?

Early concepts of process considered how the division of labour would increase production (Smith and Erwin, 2010). Taylor's famous Scientific Management (Taylor, 1911) aimed to increase prosperity for both worker and their employers through increased productivity. Quality, along with improved output, became the focus of processes during the Second World War (Beer, 1968; Heyel, 1982). The focus on quality as a goal of improvement continued with the work of Deming (1986) who observed that reducing the number and severity of defects during the production processes also improved productivity and reduced production costs. Deming observed that improving quality of the product or service had a side effect of improving the productivity and reducing costs. Process goals can therefore be divided into two types: those that relate to product or service attributes, and those that relate to the overall system of processes. The granularity of processes can vary considerably, sometimes encompassing the entirety of software development from problem definition to final deployment as a single process, and at other times used in a finer grained sense as described in ISO/IEC 12207 (2008) or ISO/IEC 15288 (2008) in which processes have to achieve a single specific purpose. In this research, we use the term "process" in the manner of ISO 12207 or ISO 15288.

2.3. Goals of individual processes

The primary goal of each process is to achieve its stated purpose. However, there are also goals of quality, time and cost to consider. The purpose of the process may be to develop an architecture of a system that can be achieved reasonably easily. But to develop an architecture of a system that will be fit for purpose when it is eventually built and to do so with a minimum of errors within a reasonable time for an acceptable cost are also goals of the process. Achieving them is not accidental and, in addition to that, the goals themselves are always changing as industries develop better ways of working. For the most part, improvements in software quality have been achieved, among a number of other innovations, through the Personal Software Process (Humphrey, 1994), adoption of different methods of specifying requirements (Gilb, 1988), different methods of project estimation and planning (Boehm et al., 1995), better tools and languages. These are improvements to or substitutions of activities within an established set of processes. Some domains, e.g. medical software (MediSPICE) or

automotive (AutoSPICE) (Johannessen et al., 2011; Sivakumar et al., 2011) require additional activities and even additional processes to achieve the required goals.

2.4. Goals of systems of processes

Improvements in one of the processes may prove counter-productive for the system of processes as a whole so attention also needs to be paid to those goals that relate to the system of processes as a whole. These may be goals to repeat past successes, to perform faster than the competition or to adapt to different circumstances easily. As an organisation's processes achieve higher levels of capability repeatability improves and variation reduces (Goldenson et al., 2003) but there is no guarantee that improvements in product quality will be accompanied by a reduction in time or cost.

Ferdows and De Meyer (1990) observed that some manufacturers seemed able to achieve several process capabilities simultaneously rather than maximise the achievement of only one as predicted by trade-off theory that prevailed at the time. They proposed a "sand-cone" model of process capability in which an organisation could pursue different process capabilities in a sequence of quality, dependability, speed, and cost efficiency. Subsequent work supported the notion of cumulative capabilities but indicated that there were environmental contingencies in their pattern (Flynn and Flynn, 2004). The differing cumulative capabilities in the examined regions of the world indicate that manufacturing processes, at least, can and are directed toward specific goals of quality, flexibility, time or cost.

2.5. Goals of process improvement

Process improvement methods can be directed at improving specific processes, the system of processes as a whole, or at improving the achievement of the goals of these processes. A process improvement method such as Six Sigma (Schroeder et al., 2008) seems primarily to be directed at specific process problems. By contrast, "Lean", with its highly publicised attention to different forms of waste is more concerned with achieving the purpose of the system of processes as a whole (Reinertsen, 2005). At the lower levels of capability, CMMI and ISO/IEC 15504, largely concentrate on improving the system of processes as a whole whereas the upper levels, levels 4 and 5, provide a specific method with which to detect and remedy process problems but do not restrict the subject or purpose of those methods. None of these process improvement methods deal directly with process goals or goal alignment.

3. Related research on goal alignment

This research focuses on the goal alignment between an organisation's business and its processes, evaluating the impact of process assessment on this goal alignment. Thus, this research is first and foremost related to goal alignment in process improvement and process assessment, and secondly to strategic planning and strategic alignment between strategic and operational goals.

Rummler et al. (2009) describes process management/improvement as the work required to deliver organisational results claiming that the processes are, in fact, the key to an effective performance of an enterprise. Process improvement is the action taken to change the organisation's processes so that they more effectively and efficiently meet the organisation's business goals (ISO/IEC 15504-1, 2004). The purpose of process assessment is to identify areas of the highest priority for improvement and to provide guidance on how to make those improvements (Humphrey, 1989). Process assessment models, such as CMMI and ISO/IEC 15504 provide the basis for an orderly explanation as well as a framework for establishing problem priorities (Zahran, 1998) but they do not provide proper guidance on how organisations should define their processes based on their strategic priorities (Barreto and Rocha, 2010).

Process improvement initiatives should be integrated with the overall strategy of the firm (Sterman et al., 1997) and addressing the organisational needs (Shaikh et al., 2009) where processes are viewed in the context of the development and client organisations (Gray and Smith, 1998). Weiss et al. suggest deriving assessment goals from the goals of the organisation undergoing assessment, thereby providing an understanding of and feedback on a wide variety of issues ranging over product quality, organisational morale, productivity and customer expectations. Taking this wider focus on processes is important in order to reinforce the feeling that the recommended improvements create benefits for the organisation (Weiss et al., 2002).

Strategic planning is the definition of goals, investments and plans based on the analysis of strengths, weaknesses, opportunities and threats related to an organisation that specify the series of concrete steps needed to realise the strategic vision of the organisation (Mintzberg, 1994). Strategic alignment became a popular concern due to the inability of organisations to realise the value of their IT investments. Henderson and Venkatraman (1993) suggested a strategic alignment model that defines strategic choices in four fundamental domains of business strategy, information technology strategy, organisational infrastructure and processes, stressing the need for continuous adaptation of the business and rearrangement of the internal infrastructure according to the trends of the external environment. Kaplan and Norton (2000) argue that especially now in the information age where businesses are increasingly creating and deploying intangible assets, organisations need to show how they convert their initiatives and resources such as corporate culture and employee knowledge into tangible business outcomes, suggesting the use of strategic maps and balanced scorecards. COBIT (Control Objectives for Information Technology) describes a set of generic business goals and a set of IT goals linked to the business goals, illustrating good practices in management, measurement and control of business and IT goals (Fortuna and Mohorcic, 2009). Based on Guzmán et al. (2010) there are only few relevant case studies illustrating the alignment between a company's strategy and its process improvement initiatives that are quantitatively controlled by a measurement programme and the appropriately integrated information needs of senior management. Guzman et al. propose a methodology (Balanced Objective-Quantifiers Methodology) which is based on the principles of the Balanced Scorecard, the Goal-Question-Metrics approach (Basili et al., 1994; van Solingen et al., 2002) and Practical Software and Systems Measurement (2000). It maps each strategic goal to a process improvement goal with quantitative measurement in order to understand the achievement of the strategic goals (Guzmán et al., 2010). Barreto and Rocha (2010) also look at goal alignment and suggest decomposing long-term strategic goals into medium-term tactical goals and short-term operational goals together with automated measurement of goal achievement in software improvement. Although Barreto and Rocha focus on goal alignment in product improvement, and Guzman et al. on the measurement of goal achievement they both conclude that in order to get a clear understanding of how each job links to the overall objectives of the organisation, enabling everyone to work in a coordinated, collaborative fashion towards achieving the company's desired goals (Kaplan and Norton, 2000), realistic strategic goals must first be defined and communicated.

Our study extends on various works describing different approaches for measuring process improvement and innovation (Börjesson et al., 2007; Dyba, 2000; Freeman et al., 2004; Hall et al., 2000; Subramanian et al., 2007), and is also closely related to works

describing strategic planning and alignment of strategic goals to operational goals.

4. Research question and hypotheses

In the current study, we evaluate the impact of process assessment on the success of process improvement. The study focuses on how well an organisation's business goals are identified, communicated, and aligned to the process goals and if process assessment contributes to the goal alignment.

Process assessments are used to determine the capability of a process to reach this goal (Barafort et al., 2002). For that purpose, a process assessment should revisit and communicate the organisation's business goals. It should prioritise the goals of process improvement and increase the alignment between the organisation's process goals and its business goals. Rummler et al. (2009) points out that when process improvement projects are conducted directly with the senior executives of the business units, things will happen quickly, with no resistance, focusing on critical business issues such as total customer satisfaction, value creation and growth of the business. This is only possible when business-critical processes are improved. For the rest of the processes, most of which are enabling processes, process improvement rarely involves managers, management commitment and support is usually sufficient.

Our research question is as follows:

Is process improvement that follows a process assessment positively related to the alignment of process goals and the organisation's business goals?

In order to be able to answer the research question, the following hypotheses were defined:

H1. Process improvement goals are set and met more often when process assessment has been conducted prior to process improvement.

H2. Process assessment is positively related to awareness of an organisation's business goals.

H3. Process assessment is positively related to the alignment between process goals and the organisation's business goals.

H4. Process improvement after process assessment is positively related to the alignment between process goals and an organisation's business goals.

5. Research method and approach

This research is descriptive in nature with characteristics of both analytical and evaluative research. The data were gathered using the survey method. Although different research strategies overlap and case studies could also have been used for this study, Yin (2002) points out that the survey strategy is an advantage when the research goals are predictive regarding their outcomes. In case studies the "how" and "why" are the questions being studied and explanations are the typical outcome, rather than the "what" of "how much" and "how many", which are the typical questions for the predictive survey approach. In this study, we aimed to find out "what" the impact of process assessment is on the success of process improvement, and "how much" process assessment contributes to the alignment between an organisation's business goals and its process goals.

As survey approaches tend to provide for generalisability but lack internal validity we increased internal validity by providing a detailed background description of each respondent and asking additional verification questions.

Our survey questionnaire was targeted at all organisations worldwide as processes (the way one works) are being improved everywhere. The questionnaire was sent to 44 researchers, consultants and quality managers working in process improvement and to the international software and systems standardising subcommittee of the International Standardization Organization (ISO/IEC JTC1 SC7) with the request to submit and distribute the survey further within their respective professional networks.

In order to verify that the survey method fits to the study, a pilot study was conducted. A dozen international experts from industry and research were asked to review the survey and give feedback about the relevance of the survey questions in terms of the hypotheses described above. There were many improvements made to the questions and, more specifically, to the scales used in the survey as a result of the pilot study.

The survey questionnaire is divided into four parts. The first part aims to gather demographic information about the organisation and the respondent. All survey questions were mandatory except for the contact information; thus the survey was anonymous.

The questions in the second part explore the respondents' understanding of process improvement. Process improvement can be either a personal improvement to the way one works or a rigorous improvement programme that the whole organisation is undertaking. We asked when, by whom and how process improvements are initiated and how progress is measured. In order to be successful in process improvement, an organisation needs to address several issues to support process improvement. We address some of these issues described in more detail in (Pries-Heje and Johansen, 2007) that are related to goal identification and alignment, and motivation in our survey questionnaire. This will allow us to recognise the organisational support that is provided to the process improvement and possibly explain its success or failure. This part allows multiple responses from the predetermined list of choices to be selected; "other" could also be selected together with a description in case no suitable option was listed.

The third part targets process assessment. From this part forward, the Likert scale is used with value options ranging from "Strongly agree" to "Strongly disagree" and additional options of "I don't know" and "Not Applicable". The questions in this section are exploring the respondents' understanding of process assessment goals. We also asked empowerment-related questions to find out whether involvement in process assessment (in decision making about which processes to improve, for example) inspires respondents to work towards achieving the improvement goals as well as the organisational business goals.

Finally, we wanted to know how improvements were implemented and how the improvement projects/programmes/initiatives ended. We wanted to find out whether the respondents knew what were the goals of the process improvement and if these goals had been achieved. Many improvement programmes are never completed because implementing improvements after process assessment requires the organisation to invest a lot of work and time. We wanted to find out if improvements had been implemented and at what point (if any) process improvements had ended. Although, process improvements should ideally be continual, there are various organisational reasons for improvements not to be carried out further at some point. The primary aim is to find out how the goal-related variables of process improvement are related to process assessment.

5.1. Limitations

The sampling method used in this study imposes a limitation on the generalisability of the results. As it was impossible to determine the companies interested in process improvement, determining the sample from that population is equally impossible. Non-probability sampling was used instead, more specifically its snowball technique. 44 researchers, consultants and quality managers in our

Table 1
Core business area of the respondents' organisations.

	Frequency	Percentage
Software development	11	17.5
IT service provider	13	20.6
Software developer and IT service provider	16	25.4
Banking and finance	3	4.8
Other, e.g., consultancy, R&D	20	31.7
Total	63	100.0

Table 2
Size of respondents' organisations.

	Frequency	Percentage
Micro (<9)	5	7.9
Small (10–49)	6	9.5
Medium (50–249)	10	15.9
Large (>250)	42	66.7
Total	63	100.0

professional network were contacted and requested to distribute the questionnaire among professionals in their network. Some of them responded to the survey themselves and others distributed it to larger groups of practitioners.

This research looks at companies who have undergone process change or process improvement either with the help of process assessment models or without them. There is a wide variety of international standards, models and methods for process improvement that companies can use today. In our data analyses, we focus only on two of them, CMMI and ISO/IEC 15504. Since we explore the impact of process assessment, we focus on these two widely known and maintained process assessment models. Both ISO/IEC 15504 and CMMI are used extensively in industry for process assessment purposes. ISO/IEC 15504 is the only international standard for process assessment at the moment. CMMI has evolved from the concepts of software maturity frameworks in the 1980s and has therefore enduring underlying ideas behind it. Although an organisation could also use these two models as best practice libraries, in this paper we focus only on their application in process assessments.

6. Data obtained—description of data

An online survey was used to collect data from industry about the goals set, communicated, and aligned in process assessment and process improvement initiatives. After five months, 63 completed responses were received, over half of them from companies developing software or/and providing IT services (Table 1).

Over half of the responses came from large organisations employing more than 250 employees (66.7%), 15.9% from medium-sized organisations employing 50–249 employees and 17.5% from both small (with 9–50 employees) and micro (up to 10 employees) organisations (Table 2). Enterprise size classification used here is based on the European Commission Recommendation 2003/361/EC regarding the definition of SMEs (EC, 2003).

Since cultural aspects play an important role in process improvement initiatives, we also sought information about the location of the respondents' organisational headquarters. The geographical distribution of the responses is: 70% of the responses came from Europe with Finland being the most active respondent, 12.7% of the responses came from USA, 4.8% from India, and 8% from Mexico, Australia, and Peru combined.

In order for us to understand the conditions in which companies support process improvements more, we also sought information about the standards and frameworks implemented by the organisations. Table 3 illustrates the responses about the standards, models, and frameworks used in the respondents' organisations. The survey allowed the respondents to choose as many responses as were relevant in their case. The majority of organisations use their own knowledge and experience in process improvement, followed closely by ITIL, CMMI, ISO 9000 and Lean. The popularity of ITIL (the most popular framework in IT Service Management, itSMF, 2010) and CMMI corresponds to the core business areas of the respondents, the majority being IT service providers and software developers (Table 1).

As Jones (1996) points out, it is not wise to start process improvement if managers do not calculate the return on investment or collect data to demonstrate progress. There are various ways to measure progress (Statz, 2005). Table 4 illustrates how process improvements were measured among the respondents' organisations. In almost half of the cases, process improvements were measured based on the customer and stakeholder satisfaction, followed closely, to our great surprise, by evaluating the achievement of the organisation's goals. Standard or process model based assessments indicate the strengths and weaknesses in processes and suggest how to improve them. Standard or model based process assessments were carried out in 27 cases out of the overall 63 responses, only slightly less than the number of respondents who conducted process assessment prior to process improvement (51%) or the number of respondents who initiated process improvement after conducting a process assessment (46%).

7. Data analysis

Appendix A lists the questions, and their possible responses, that yielded the data used to test the hypotheses. The questions are described using their question label and response sequence number with the question code, the latter being referred to as items in this section. The range of questions and responses used in this analysis includes items J1–J6, L1–L12, M1–M8, N1–N5, P1–P6, S1–S2 and V1–V6.

Out of these items, we were able to compute two factors: the first one is the responses in which process assessment was carried out prior to process improvement (J4) and where the international standard ISO/IEC 15504 was used (L3); and the second one is where process improvement was initiated by process assessment (M8) and where the process model of CMMI was used (L4). These two factors explain 71.5% of variance (Appendix B). We have labelled these factors PA_SPICE and PA_CMMI, respectively. Both factors are comprised of two items. The values for the factors vary from zero to two, representing the presence of neither one of the items (0.0), one of the items (1.0) or both items (2.0) in the composition of the factor in each correlation analysis conducted.

The data in this study have been analysed using nonparametric statistics since they are nominal and ordinal, and central tendency and variability cannot be obtained. In order to measure the strength of association between variables measured at the ordinal level, we

Table 3
Standards, methods and frameworks used ($n = 63$).

Own experience and knowledge	PSP/TSP	ISO/IEC 15504	CMMI	Six Sigma	ITIL	CoBIT	ISO/IEC 20000	ISO 9000	Lean	Theory of constraints	No improvement methods used
41	6	18	31	15	33	9	9	24	23	6	2

Table 4
Measuring process improvements ($n = 63$).

Improvements are not measured	Measuring personal performance and/or productivity	Evaluating the achievement of product or service quality requirements	Evaluating the achievement of project or service performance objectives	Measuring project productivity	Conducting model/standard based process assessments	Evaluating stakeholder/ customer satisfaction	Measuring organisational productivity	Evaluating the achievement of organisational goals	Calculating the return on investment for process improvement
6	25	25	26	21	27	34	16	31	11

Table 5
Correlation matrix of process assessment factors, and setting and meeting process improvement goals.

	PA_SPICE	PA_CMMI
S1	−.152	−.227
S2	−.073	−.135

Note. The correlation matrix illustrates the Spearman rho correlation coefficients obtained from the dependent variables of the study. PA_SPICE is a factor that represents the population that carried out process assessments with ISO/IEC 15504. PA_CMMI is a factor that represents the population that carried out process assessments with CMMI. S1 represents an item of "process improvement goals were set" with lower values describing higher frequencies. S2 represents an item of "process improvement goals were met" with lower values describing higher frequencies. * Correlations are statistically significant when $p < 0.05$. ** Correlations are statistically significant when $p < 0.01$. $N = 63$ responses.

used the Spearman's rho correlation coefficient which is a special case of the Pearson product-moment coefficient where data are converted to ranks before calculating the coefficient. The data analysis was conducted using the IBM SPSS Statistics data analysis tool.

In order to answer the research question, we calculated the Spearman rho correlations between the two factors, which we called PA_SPICE (process assessment with SPICE) and PA_CMMI (process assessment with CMMI), respectively, and the items from the survey necessary for testing the hypotheses.

H1: Process improvement goals are set and met more often when process assessments have been conducted prior to improvements.

In order to support or reject this hypothesis, we looked at the correlations between the two process assessment factors and items S1 and S2, which illustrate the frequency of setting and meeting process improvement goals.

Figs. 1 and 2 illustrate two histograms each, which show the frequency of setting and meeting the process improvement goals among the population of the survey. Three columns are displayed for each point of frequency on the histograms. The vertically striped columns of the histograms stand for the highest values of the factors, i.e. the population where both items were present (the process assessments were conducted and either CMMI or SPICE was used). The white unfilled columns in the histograms represent the population where only one item was present in the factor (either process assessment was conducted or CMMI or SPICE was used), whereas the chequered columns stand for the population that neither conducted any process assessments nor used CMMI or SPICE.

Fig. 1 illustrates the responses regarding the frequency of setting process improvement goals among the survey population that conducted process assessments (high values of PA_SPICE and PA_CMMI factors) and those who did not (0.0 values in both factors). Fig. 2 illustrates the responses regarding the frequency of meeting process improvement goals among the survey population that conducted process assessments (high values of PA_SPICE and PA_CMMI factors) and those who did not (0.0 values in both factors).

In Figs. 1 and 2 we can see that process improvement goals were set and met frequently, in 75% and 73% of the cases, respectively, regardless of whether process assessments were conducted or not (the process assessment factor values). The frequency of setting and meeting the process improvement goals was slightly higher when process assessments were conducted with CMMI than when process assessment was not carried out with CMMI.

Table 5 illustrates that neither of the factors that describe respondents who conducted process assessments (PA_SPICE and PA_CMMI) is significantly correlated to the items of setting and meeting the process improvement goals (S1 and S2).

We can therefore conclude that H1 is not supported based on our data. Process improvement goals are set and met frequently regardless of whether process assessments are conducted before process improvement or not.

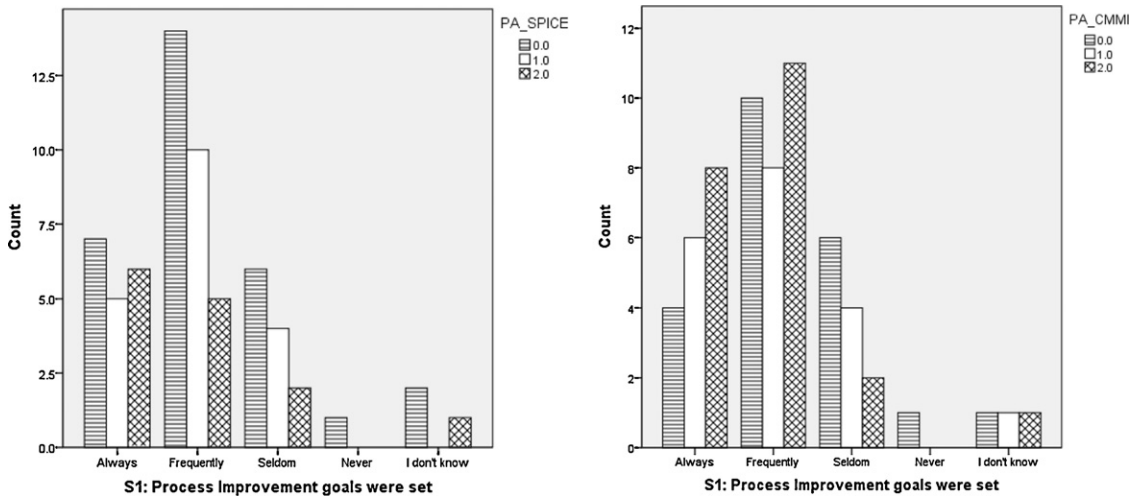

Fig. 1. Frequencies of setting process improvement goals among respondents who conducted process assessments.

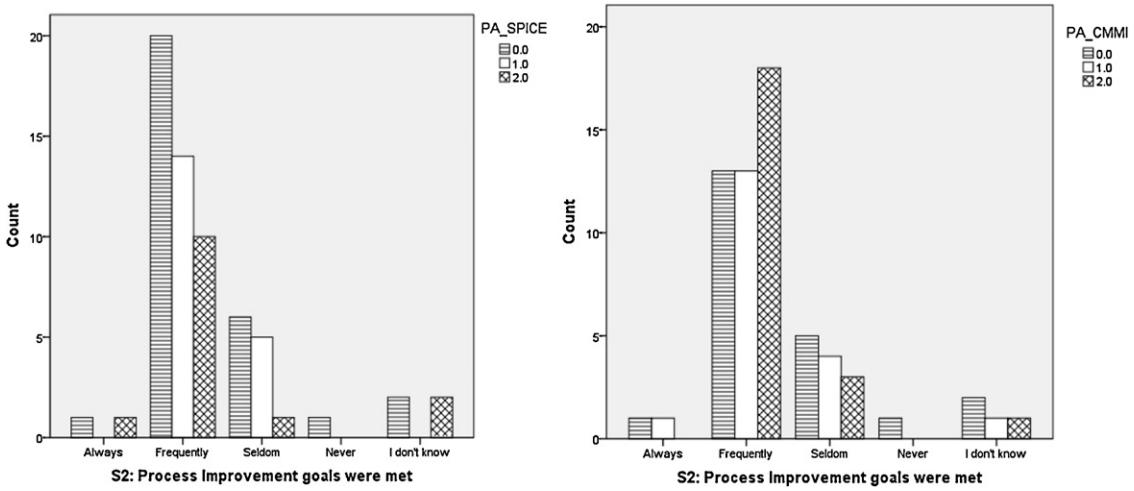

Fig. 2. Frequencies of meeting process improvement goals among respondents who conducted process assessments.

H2: Process assessment is positively related to awareness of an organisation's business goals.

In order to support or reject this hypothesis, we looked for correlations between the two process assessment factors and item P2, which illustrates the responses where the organisation's business goals were known after process assessment.

Fig. 3 illustrates the awareness of the organisation's goals and the factor values of process assessment conducted with SPICE

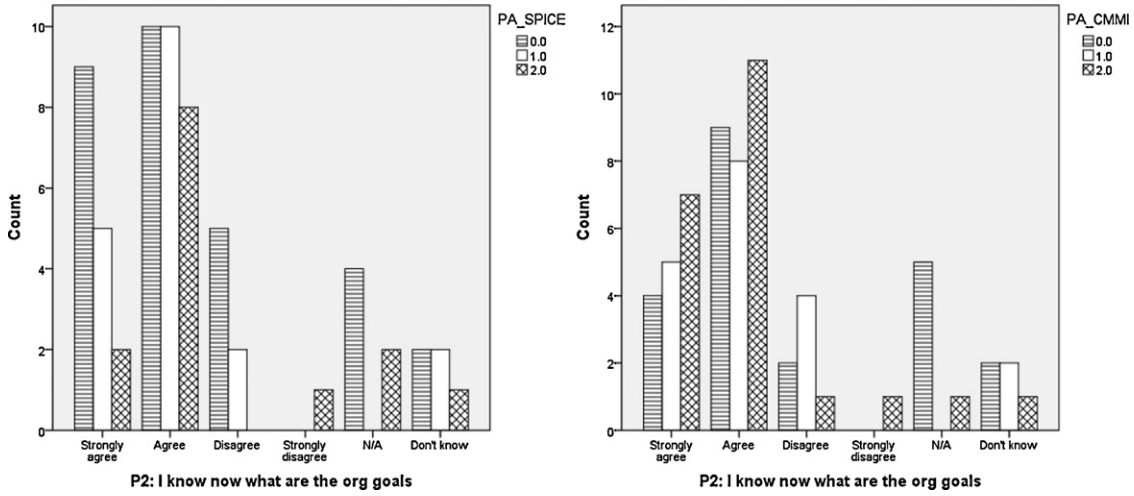

Fig. 3. Frequencies of awareness of an organisation's business goals among respondents who conducted process assessments.

Table 6
Correlation matrix of process assessment factors and awareness of an organisation's business goals.

	PA_SPICE	PA_CMMI
P2	.026	−.213

Note. The correlation matrix illustrates the Spearman rho correlation coefficients from the dependent variables of the study. PA_SPICE is a factor that represents the population that carried out process assessments with ISO/IEC 15504. PA_CMMI is a factor that represents the population that carried out process assessments with CMMI. P2 represents an item of "I know now what the business goals of my organisation are" with lower values describing higher frequencies. * Correlations are statistically significant when $p < 0.05$. ** Correlations are statistically significant when $p < 0.01$. $N = 63$ responses.

and CMMI, respectively. The respondents of the survey believe that awareness of their organisation's business goals will increase after conducting process assessment – the higher columns on the left-hand side correspond to the higher values for item P2. The respondents of the survey believe this regardless of whether they conducted the process assessments themselves or not–the respondents who had conducted process assessments correspond to the chequered columns as the higher factor values in PA_SPICE and PA_CMMI.

Also, the Spearman correlation coefficients between the process assessment factors (PA_SPICE and PA_CMMI) and the item regarding awareness of an organisation's business goals (P2) in Table 6 illustrate that there is no significant correlation between them.

We can conclude that our data does not support Hypothesis H2, i.e. process assessment is not significantly correlated to awareness of an organisation's business goals. Interestingly though, most respondents believe that process assessments should increase awareness of their organisation's business goals.

H3: Process assessment is positively related to the alignment between process and the organisation's business goals.

In order to support or reject this hypothesis, we looked at the relations between the process assessment factors and the items of P1 (I know how my work supports the achievement of my organisation's business goals after conducting a process assessment), N4 (the goal of process assessment is to align my processes to the business goals of the organisation), and N5 (the goal of process assessment is to motivate operators/developers to work towards achieving the organisation's business goals).

Table 7 illustrates that there is a significant correlation between the process assessment factors and the items of the process assessment goals (N4 and N5). The respondents who conducted process assessments believe that the goal of process assessment is to align one's work with the business goals of the organisation (N4)

Table 7
Correlation matrix of process assessment factors and alignment between process goals and organiation's goals.

	PA_SPICE	PA_CMMI
P1	.122	−.112
N4	−.279*	−.473**
N5	−.451**	−.418**

Note. The correlation matrix illustrates the Spearman rho correlation coefficients from the dependent variables of the study. PA_SPICE is a factor that represents the population that carried out process assessments with ISO/IEC 15504. PA_CMMI is a factor that represents the population that carried out process assessments with CMMI. P1 represents an item of "I know now how my work supports the achievement of my organisation's business goals" with lower values describing higher frequencies. N4 represents an item of "The goal of process assessment is to align my processes to the business goals of the organisation", and N5 represents an item of "The goal of process assessment is to motivate operators/developers to work towards achieving the organisation's business goals" with lower values describing higher frequencies. $N = 63$ responses.

* Correlations are statistically significant when $p < 0.05$.

** Correlations are statistically significant when $p < 0.01$.

Table 8
Frequencies of V3 (better understanding of the organisation's business goals after following process improvement).

	Frequency	Percentage	Cumulative percentage
Strongly agree	15	23.8	23.8
Agree	37	58.7	82.5
Disagree	7	11.1	93.7
Strongly disagree	2	3.2	96.8
N/A	1	1.6	98.4
Don't know	1	1.6	100.0
Total	63	100.0	

and to motivate developers/operators to work towards achieving these organisation's goals (N5). Unfortunately, there was no significant correlation between the process assessment factors and the operational activities supporting the achievement of an organisation's business goals (P1), indicating that the respondents have not acquired any knowledge regarding how to align their work with the business goals of the organisation after having conducted process assessment themselves.

We can conclude that our data supports Hypothesis H3 partially, i.e. process assessment is positively related to the alignment between process goals and the organisation's business goals, in theory. The data shows that the respondents believe process assessment should aim for aligning the process and organisation's goals (correlations between factors, and N4, N5) but the respondents who conducted process assessment did not learn how to do it in practice (correlation between factors and P1).

H4: Process improvement after process assessment is positively related to the alignment between process goals and organisation's business goals.

In order to support or reject this hypothesis, we looked for correlations between the process assessment factors and the items of V3 (better understanding of the organisation's business goals after process improvement) and V4 (motivated to align our work with the business goals of the organisation following process improvement).

In Tables 8 and 9, we can see that the respondents of the survey have a better understanding of an organisation's business goals after process improvement (82.5% for V3 values of "Strongly agree" and "Agree" in Table 8) and are also motivated to align their work with the business goals of the organisation after process improvement (79.4% for V4 values of "Strongly agree" and "Agree" in Table 9).

Table 10, indicates the correlation coefficients between the respondents who conducted process assessment prior to process improvement and the items "Better understanding of the organisation's business goals after process improvement" and "Motivation to align process goals and its business goals after process improvement" (V3 and V4, respectively). There is no correlation between the process assessment factors and the understanding of the organisation's business goals and the alignment of the goals.

We can conclude that process improvement increases the understanding of an organisation's business goals and motivates people to work towards these goals regardless of whether or not

Table 9
Frequencies of V4 (we are motivated to align our work with the business goals of the organisation after process improvement).

	Frequency	Percentage	Cumulative percentage
Strongly agree	15	23.8	23.8
Agree	35	55.6	79.4
Disagree	9	14.3	93.7
Strongly disagree	2	3.2	96.8
Don't know	2	3.2	100.0
Total	63	100.0	

Table 10
Correlation matrix of process assessment factors and process improvement goal items.

	PA_SPICE	PA_CMMI
V3	−.109	−.181
V4	−.140	−.137

Note. The correlation matrix illustrates the Spearman rho correlation coefficients from the dependent variables of the study. PA_SPICE is a factor that represents the population that carried out process assessments with ISO/IEC 15504. PA_CMMI is a factor that represents the population that carried out process assessments with CMMI. V3 represents an item of "We have a better understanding of our organisation's business goals after process improvement" with lower values describing higher frequencies. V4 represents an item of "We are more motivated to align our work with the business goals of our organisation after process improvement" with lower values describing higher frequencies. * Correlations are statistically significant when $p < 0.05$. ** Correlations are statistically significant when $p < 0.01$. $N = 63$ responses.

any process assessment was conducted prior to process improvement. Our data does not support Hypothesis H4, i.e. process improvement after process assessment is not significantly related to the alignment of process goals and its business goals. Process improvement can achieve this without any prior process assessment.

To summarise the data analysis, process improvement following process assessment is not significantly related to the alignment of process goals and its business goals. Although the respondents of the survey believed that process assessment should aim at increasing the alignment between business and process goals, process assessment does not contribute to this goal alignment in practice.

8. Discussion

Although process improvement and process assessment are believed to increase the awareness of an organisation's business goals and motivation to align its operational goals to its business goals, there is little knowledge and experience in practice about how to do this. Unfortunately, there is also no coherent method or guide to follow in order to achieve this in practice. The lack of such knowledge might explain unsuccessful process improvement efforts and perhaps even the prevalent scepticism towards process improvement in general.

Several explanations are possible for the very poor to non-existent association between an organisation's business goals and process goals. Although most people agree that process goals and process improvement goals are relevant to an organisation's business goals and would like to see the two aligned, in practice there seems to be little understanding of how to do it or where to start.

Although there has been concern about the predictive validity of software process improvement methods in the SPICE Trials (Jung et al., 2002), any connection between an organisation's business goals and process improvement has relied on coincidental concern rather than on any direct representation of the organisation's business goals within the process improvement method. Given that product quality is a fundamental concern for production processes (Ferdows and De Meyer, 1990; Flynn and Flynn, 2004) this may be quite reasonable until quality is "good enough" to allow an organisation to pay attention to other capabilities such as reliability of the production system. However, the danger is that the assumed goal of product quality will overtake any concern for other business goals. For example, if an organisation relies on innovation and time to market then those process improvements that favour product quality will eventually result in processes that do not support such responsiveness and ability to innovate (Benner and Tushman, 2002). Directing process improvement efforts at an assumed goal of product quality may be an easy choice because so much information is available on quality, the need for quality, and how to achieve quality. But focusing only on quality or risk is not sufficient unless they are related to the overall business goals of the organisation.

More subtle perhaps is the possibility that systems of production, even software production, have become so large, complex and interconnected that it becomes not only difficult to question their purpose and goals but also equally difficult to make substantial changes to them. Many organisations develop software in a particular field and it can be very challenging to adapt their development processes to a radically different field. For example, those who develop telecommunications software become versed in the requirements and goals of telecommunications software to the point where those goals and expectations become embedded in the techniques and everyday activities of software development. Trying to ignore those requirements and goals in order to produce quick demonstration software in such an environment can be fraught with delay and frustration. Similarly, trying to develop life-critical software within an organisation accustomed to developing commercial reporting software can be an exercise in futility. The expectations and goals of a domain become embedded and assumed rather than explicit, able to be negotiated. Those who develop software development process reference models and software development methodologies have the advantage of knowledge and time to consider how the processes should be constructed and how they can be combined to achieve a particular purpose (Brinkkemper, 1996; Karlsson and Ågerfalk, 2004; Kornyshova et al., 2007; McBride and Henderson-Sellers, 2011) whereas those who are responsible for process improvement might have neither any knowledge about how the processes interact with the organisation to achieve specific goals nor the time in which to study the processes. Their priorities may be simply to "improve quality" or "improve time to market" rather than engage in strategic debates about how their organisation can achieve its business goals. The processes become an end in themselves instead of providing the means to achieve business goals.

There is also the strong possibility that goal alignment has been seen as a concern of the organisation's structure, something to be resolved within the management hierarchy and not needing to be extended into the production system. Recently there have been attempts to consider how an organisation's business goals can affect its software development processes and how they might be manifested in the processes (Clarke and O'Connor, 2011; Stallinger et al., 2011). In both cases the underpinning model assumes that the organisation is in full control of its production system, that its business goals can be managed by its management and that they, in turn, can control how the production system achieves those goals. When software is developed entirely within one organisation this might be true. However, software development, like almost any other production, is seldom completely under the control of a single coherent organisation. Organisations have gradually changed their mode of operation from a divisional form to a matrix form. Recently, there has been some indication that further changes to a process-based form are imminent. Each of these changes brings with it the need to change approaches to the governance and management of the production system with which the organisation creates value. In a process-based production system individual processes could be performed by employees, contracted consultants, external specialist organisations or other forms of external suppliers. Setting performance goals and managing those goals with such a diverse collection of participants is unlikely to be achieved through simple means or even using one of the established forms of control (Eisenhardt, 1985; Ouchi, 1979). Rather, some form of alliance may be required in which the various participants share the risk of the project, process or activity. Such risk sharing would need to contain and express the organisation's business goals and their manifestation in the process goals.

9. Summary and future works

Process improvement has been part of the software engineering domain for two decades now and there is still much doubt about the effectiveness and efficiency of this approach. The biggest criticism concerns the inability to clearly articulate the business impact of process improvement and the return on investment of process assessment and process improvement. We believe that process improvements that aim to meet their organisation's business goals are more relevant for their business success. Do organisations that improve their processes align their process goals with their business goals? Does process assessment help raise awareness of the business goals and increase the understanding of how operational processes contribute to achieving business goals? These were some of the questions that motivated us to conduct this study on goal alignment in process improvement.

This study illustrates the theory and provides empirical data about the alignment of process goals and its business goals in process improvement. We focused on the role of process assessment in goal alignment. The data were gathered from industry using a survey approach over a period of five months. Responses were received from 63 respondents. The data analysis indicates that process assessment should, in theory, aim to align operational processes to an organisation's business goals and motivate developers and operators to work towards achieving their organisation's business goals. In practice, there was no correlation between conducting process assessments and such goal alignment. It is therefore painfully evident that there is currently no comprehensive method or guideline in industry that would allow meeting the objective of process improvement, i.e. to change processes in such a way that they can meet the organisation's business goals more efficiently and effectively.

This study points out various research directions that can be pursued to construct a model for achieving goal alignment in process improvement: What role does an organisation's structure and size play in goal alignment? How can process assessment measure the characteristics of processes in terms of their achievement of an organisation's business goals? And how can we improve the process assessment process in order for it to have a positive impact on the success of process improvement? To what degree does the goal of product quality support an organisation's business goals, and how can we relate process improvement to the achievement of product quality requirements? In other words, how can we change the way processes are viewed, from singular/standalone organisational-level processes to the systematic, intertwined set of processes that carry the essence of an organisation's business?

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Appendix A. Data used in the hypotheses testing with survey questions and response choices

J: How do you initiate improvements? (choose all that apply)

J1: Discussing informally with colleagues about the ways to improve
J2: Discussing and planning at a project/operation team meeting
J3: Brainstorming in a department meeting
J4: After processes have been assessed against an international standard or process model
J5: After an organisational audit
J6: Implementing industry best practices or an enterprise architecture framework

L: Which process improvement models/methods are used in your organisation? (choose all that apply)

L1: Our own experience and knowledge
L2: PSP/TSP – personal/team software process
L3: ISO/IEC 15504
L4: CMMI
L5: Six Sigma
L6: ITIL
L7: CoBIT
L8: ISO/IEC 20000
L9: ISO 9000
L10: Lean
L11: Theory of Constraints
L12: No models/methods were used

M: Before improving your processes, did you do the following:

M1: Identify the process improvement goals
M2: Identify the process improvement scope
M3: Identify and communicate the organisation's business goals to the staff
M4: Decide upon the change strategy for the organisation
M5: Get management's support and commitment for the improvement
M6: Allocate roles and responsibilities for the improvements in the organisation
M7: Set the scope of change in the organisation
M8: Conduct a process assessment

N: What do you personally believe is the goal of evaluating processes/process assessment? (Likert scale from "Strongly agree" to "Strongly disagree", "Not Applicable" and "I don't know")

N1: The goal of evaluating processes is to evaluate my work in the organisation
N2: The goal of evaluating processes is to evaluate the current state of the processes
N3: The goal of evaluating processes is to plan more effective ways to work
N4: The goal of evaluating processes is to align my processes to the goals of the organisation
N5: The goal of evaluating processes is to work towards achieving the organisation's goals

P: How well do the following statements describe your overall attitude towards evaluating processes/process assessment? (Likert scale from "Strongly agree" to "Strongly disagree", "Not Applicable" and "I don't know")

P1: I know now how my work supports the achievement of organisation's goals
P2: I know now what are the goals of the organisation
P3: I know now what is the current state of the processes
P4: I know now how to improve the processes I am involved in
P5: It is just the management's way to check how we work
P6: Nothing happened after the assessment was completed

S: What is the frequency of the following statements concerning the process improvement goals? (Likert scale from "Always" to "Never" and "I don't know")

S1: The process improvement goals were set
S2: The process improvement goals were met

V: How well do the following statements describe what you feel about process improvement? (Likert scale from "Strongly agree" to "Strongly disagree", "Not Applicable" and "I don't know")

V1: We improve processes all the time in small steps without a formal improvement method
V2: Improvement should not be based on standards and models because we know best how to improve our own way of working
V3: We now have a better understanding of organisation's goals
V4: We are more motivated now to align our work with the goals of the organisation
V5: We are frustrated because the implementation of improvements is not monitored and impact not measured
V6: We are frustrated because improvements were not implemented after process assessment

Appendix B. Computing factors on process assessment

Tables B.1 and B.2.

Table B.1
Rotated component matrix.[a]

	Component	
	PA_SPICE	PA_CMMI
J4: Process improvement was initiated with process assessment	*.744*	.295
M8: Process assessment was conducted prior to process improvement	.351	*.722*
L3: ISO/IEC 15504	*.880*	−.010
L4: CMMI	−.022	*.895*

Extraction method: principal component analysis.
Rotation method: varimax with Kaiser normalization.
[a] Rotation converged in 3 iterations.
Correlations between the items computed to two factors illustrated in *italics*.

Table B.2
Total variance explained.

Component	Initial Eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	1.875	46.874	46.874	1.875	46.874	46.874	1.452	36.302	36.302
2	.986	24.653	71.528	.986	24.653	71.528	1.409	35.226	*71.528*
3	.599	14.963	86.490						
4	.540	13.510	100.000						

Extraction method: principal component analysis.
The variance explained by the two factors is illustrated in italics.

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Marion Lepmets is a Postdoctoral Fellow of National Research Fund of Luxembourg at Public Research Centre Henri Tudor. Her current research is focusing on evaluating process improvement impact on IT Service quality. She has conducted research in process improvement and process assessment from 2000, graduated from Tampere University of Technology, Finland with Dr. of Technology in 2007 and has been teaching process engineering courses at both Tallinn University of Technology and Tartu University in Estonia. She is involved in software engineering standards' development at International Standardization Organization subcommittee 7 (software and systems) as Luxembourg's delegate, actively participating in process assessment and IT service quality related standards development.

Tom McBride is a senior lecturer at the Faculty of Information Technology at the University of Technology, Sydney. He has been involved in developing and teaching a number of subjects. His research interests include software engineering, software process assessment, and human-centered software development processes. He has worked in the software industry for more than 25 years with most recent experience in both project management and quality assurance. He is involved with software engineering standards development with both Standards Australia and the International Standardization Organization where he has helped to develop several standards and is currently involved in revising process assessment related standards.

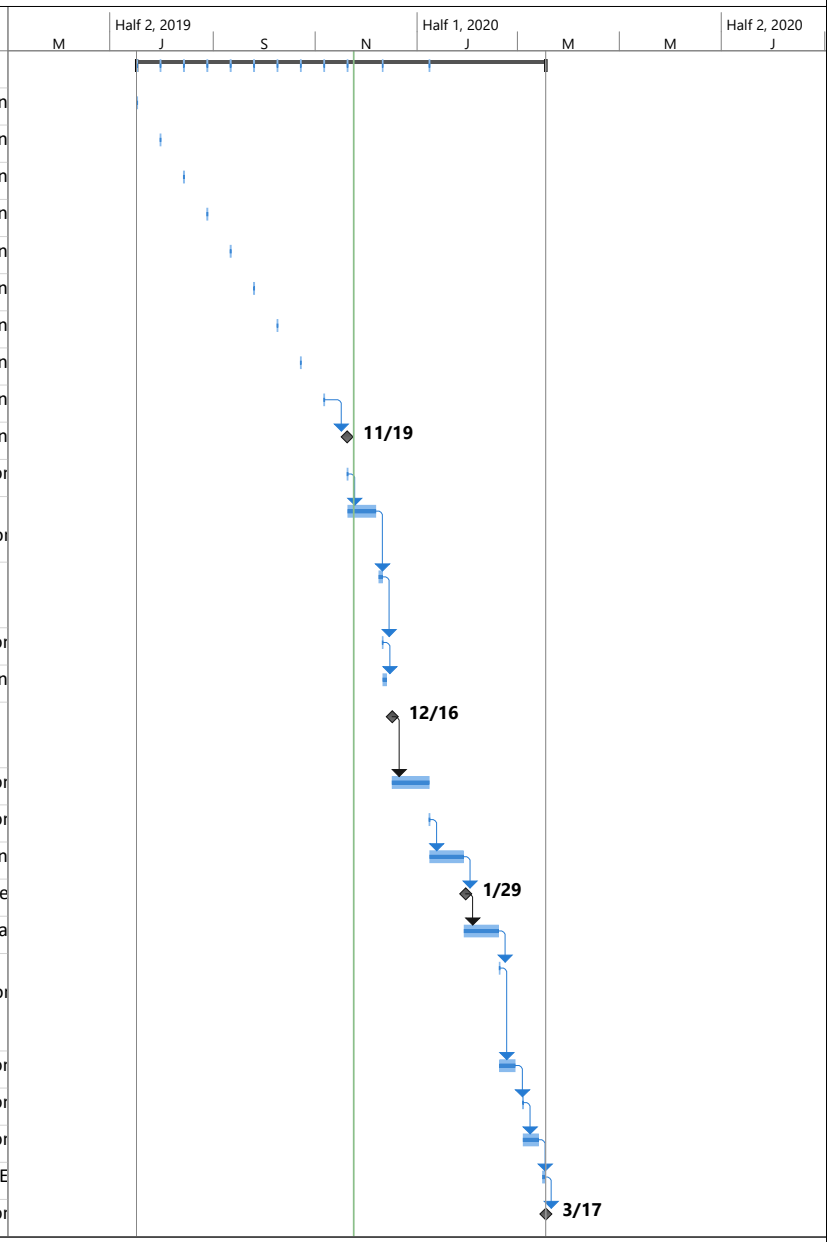
Eric Ras is an R&D Manager at the Public Research Centre Henri Tudor where he is recruiting and supervising researchers and PhD students as well as Postdoctoral Fellows in the fields of service science and innovation in general, and knowledge engineering in particular. He has been teaching empirical software engineering at the University of Luxembourg, Luxembourg, and the University of Applied Sciences in Mannheim, Germany, since 2008. In addition to working on topics related to IT service quality, he works on the design of human–computer interactions in the application field of semantic-based knowledge technologies.

APPENDIX D

P-401 Projected Schedule

P-401 Working Group Projected Schedule

ID	Task Mode	% Work Complete	Task Name	Duration	Start	Finish	Predece	Resource Names
1		**100%**	**P-401 10H Working Group**	**175 days**	**Wed 7/17/19**	**Tue 3/17/20**		
2		100%	P-401 Team Review Meetings 1	4 hrs	Wed 7/17/19	Wed 7/17/19		Regional Specs En
3		100%	P-401 Team Review Meetings 2	4 hrs	Wed 7/31/19	Wed 7/31/19		Regional Specs En
4		100%	P-401 Team Review Meetings 3	4 hrs	Wed 8/14/19	Wed 8/14/19		Regional Specs En
5		100%	P-401 Team Review Meetings 4	4 hrs	Wed 8/28/19	Wed 8/28/19		Regional Specs En
6		100%	P-401 Team Review Meetings 5	4 hrs	Wed 9/11/19	Wed 9/11/19		Regional Specs En
7		100%	P-401 Team Review Meetings 6	4 hrs	Wed 9/25/19	Wed 9/25/19		Regional Specs En
8		100%	P-401 Team Review Meetings 7	4 hrs	Wed 10/9/19	Wed 10/9/19		Regional Specs En
9		100%	P-401 Team Review Meetings 8	4 hrs	Wed 10/23/19	Wed 10/23/19		Regional Specs En
10		100%	P-401 Team Review Meetings 9	4 hrs	Wed 11/6/19	Wed 11/6/19		Regional Specs En
11		100%	Prepare P-401 DRAFT Review Set	9 days	Thu 11/7/19	Tue 11/19/19	10	Regional Specs En
12		100%	P-401 Team Review Meetings 10	2 hrs	Wed 11/20/19	Wed 11/20/19		Aviation Chief,Cor
13		100%	P-401 Team Review Comments Period	12.75 days	Wed 11/20/19	Fri 12/6/19	12	Aviation Chief,Constructio Chief,Materials
14		100%	P-401 Update DRAFT after comments	2 days	Mon 12/9/19	Tue 12/10/19	13	Regional Specs Engineer
15		100%	P-401 Team Review Meetings 12	2 hrs	Wed 12/11/19	Wed 12/11/19	14	Aviation Chief,Cor
16		100%	P-401 Update to Final DRAFT	2 days	Wed 12/11/19	Fri 12/13/19	15	Regional Specs En
17		100%	P-401 Submittal to Statewide & Regions	1 day	Mon 12/16/19	Mon 12/16/19		Regional Specs Engineer,NR P-401 SC
18		100%	P-401 Statewide/Regional Review	16 days	Tue 12/17/19	Tue 1/7/20	17	Aviation Chief,Cor
19		100%	P-401 Team Review Meetings 13	2 hrs	Wed 1/8/20	Wed 1/8/20		Aviation Chief,Cor
20		100%	P-401 Prep FINAL DRAFT for FAA	14 days	Wed 1/8/20	Tue 1/28/20	19	Regional Specs En
21		100%	P-401 Statewide DRAFT to FAA	1.75 days	Tue 1/28/20	Wed 1/29/20	20	Materials Enginee
22		100%	P-401 Review by FAA	14.25 days	Wed 1/29/20	Tue 2/18/20	21	Aviation Chief,Ma
23		100%	P-401 FAA Review Responses Mtg to Discuss Review Comments and Prepare Responses	2 hrs	Wed 2/19/20	Wed 2/19/20	22	Aviation Chief,Constructio Chief,Materials Engineer,QA/QC
24		100%	P-401 FINAL to FAA w/Responses	7 days	Wed 2/19/20	Fri 2/28/20	23	Aviation Chief,Cor
25		100%	P-401 FAA Review Meeting	2 hrs	Wed 3/4/20	Wed 3/4/20	24	Aviation Chief,Cor
26		100%	P-401 Final Edits after FAA Mtg	7 days	Wed 3/4/20	Fri 3/13/20	25	Aviation Chief,Cor
27		100%	P-401 Final Submittal to FAA	1 day	Mon 3/16/20	Mon 3/16/20	26	Statewide Specs E
28		100%	P-401 Approval by FAA	1 day	Tue 3/17/20	Tue 3/17/20	27	Aviation Chief,Cor



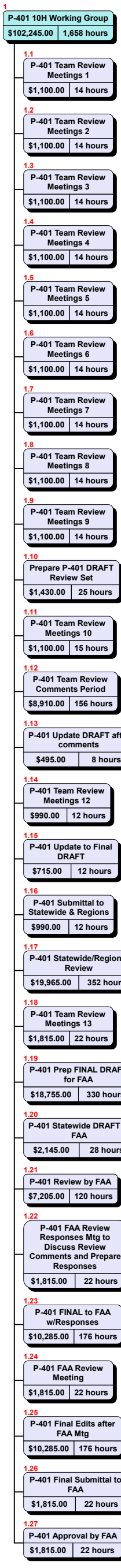
Project: P-401 Projected Appro
Date: Sun 11/24/19

Task	Project Summary	Manual Task	Start-only	Deadline	
Split	Inactive Task	Duration-only	Finish-only	Progress	
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress	
Summary	Inactive Summary	Manual Summary	External Milestone		

APPENDIX E

P-401 Projected Schedule WBS and WBS List

P-401 Project Schedule
Work Breakdown Structure - Detailed View



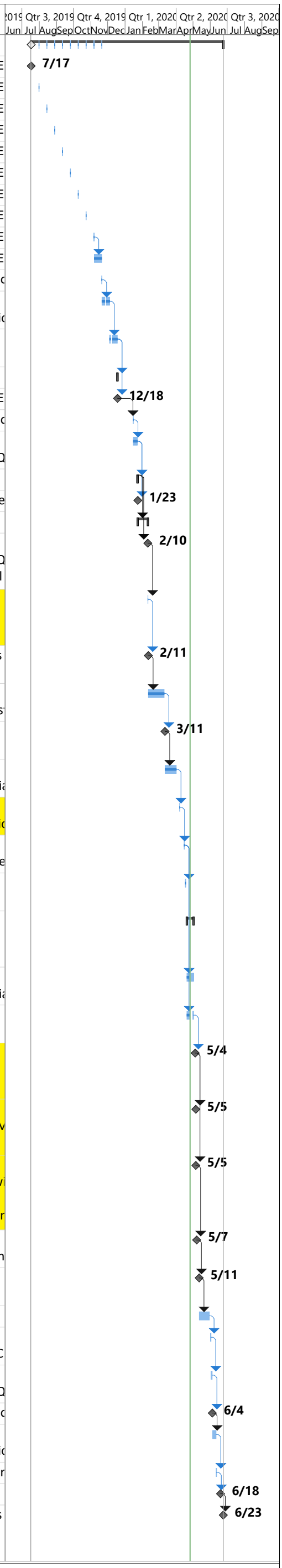
P-401 Projected Approval Schedule

	WBS	Name	Duration	Start	Finish
1	**1**	**P-401 10H Working Group**	**175d**	**7/17/2019**	**3/17/2020**
2	1.1	P-401 Team Review Meetings 1	4h	7/17/2019	7/17/2019
3	1.2	P-401 Team Review Meetings 2	4h	7/31/2019	7/31/2019
4	1.3	P-401 Team Review Meetings 3	4h	8/14/2019	8/14/2019
5	1.4	P-401 Team Review Meetings 4	4h	8/28/2019	8/28/2019
6	1.5	P-401 Team Review Meetings 5	4h	9/11/2019	9/11/2019
7	1.6	P-401 Team Review Meetings 6	4h	9/25/2019	9/25/2019
8	1.7	P-401 Team Review Meetings 7	4h	10/9/2019	10/9/2019
9	1.8	P-401 Team Review Meetings 8	4h	10/23/2019	10/23/2019
10	1.9	P-401 Team Review Meetings 9	4h	11/6/2019	11/6/2019
11	1.10	Prepare P-401 DRAFT Review Set	9d	11/7/2019	11/19/2019
12	1.11	P-401 Team Review Meetings 10	2h	11/20/2019	11/20/2019
13	1.12	P-401 Team Review Comments Period	12.75d	11/20/2019	12/6/2019
14	1.13	P-401 Update DRAFT after comments	2d	12/9/2019	12/10/2019
15	1.14	P-401 Team Review Meetings 12	2h	12/11/2019	12/11/2019
16	1.15	P-401 Update to Final DRAFT	2d	12/11/2019	12/13/2019
17	1.16	P-401 Submittal to Statewide & Regions	1d	12/16/2019	12/16/2019
18	1.17	P-401 Statewide/Regional Review	16d	12/17/2019	1/7/2020
19	1.18	P-401 Team Review Meetings 13	2h	1/8/2020	1/8/2020
20	1.19	P-401 Prep FINAL DRAFT for FAA	14d	1/8/2020	1/28/2020
21	1.20	P-401 Statewide DRAFT to FAA	1.75d	1/28/2020	1/29/2020
22	1.21	P-401 Review by FAA	14.25d	1/29/2020	2/18/2020
23	1.22	P-401 FAA Review Responses Mtg to Discuss Review Comı	2h	2/19/2020	2/19/2020
24	1.23	P-401 FINAL to FAA w/Responses	7d	2/19/2020	2/28/2020
25	1.24	P-401 FAA Review Meeting	2h	3/4/2020	3/4/2020
26	1.25	P-401 Final Edits after FAA Mtg	7d	3/4/2020	3/13/2020
27	1.26	P-401 Final Submittal to FAA	1d	3/16/2020	3/16/2020
28	1.27	P-401 Approval by FAA	1d	3/17/2020	3/17/2020

APPENDIX F

P-401 Actual Schedule

ID	Task Mode	% Work Complete	Task Name	Duration	Start	Finish	Predece	Resource Names
1		**60%**	**P-401 10H Working Group**	**245 days**	**Wed 7/17/19**	**Tue 6/23/20**		
2		100%	P-401 Team Review Meetings 1	4 hrs	Wed 7/17/19	Wed 7/17/19		Regional Specs E
3		100%	P-401 Team Review Meetings 2	4 hrs	Wed 7/31/19	Wed 7/31/19		Regional Specs E
4		100%	P-401 Team Review Meetings 3	4 hrs	Wed 8/14/19	Wed 8/14/19		Regional Specs E
5		100%	P-401 Team Review Meetings 4	4 hrs	Wed 8/28/19	Wed 8/28/19		Regional Specs E
6		100%	P-401 Team Review Meetings 5	4 hrs	Wed 9/11/19	Wed 9/11/19		Regional Specs E
7		100%	P-401 Team Review Meetings 6	4 hrs	Wed 9/25/19	Wed 9/25/19		Regional Specs E
8		100%	P-401 Team Review Meetings 7	4 hrs	Wed 10/9/19	Wed 10/9/19		Regional Specs E
9		100%	P-401 Team Review Meetings 8	4 hrs	Wed 10/23/19	Wed 10/23/19		Regional Specs E
10		100%	P-401 Team Review Meetings 9	4 hrs	Wed 11/6/19	Wed 11/6/19		Regional Specs E
11		100%	Prepare P-401 DRAFT Review Set	9 days	Thu 11/7/19	Tue 11/19/19	10	Regional Specs E
12		100%	P-401 Team Review Meetings 10	2 hrs	Wed 11/20/19	Wed 11/20/19		Aviation Chief,Co
13		100%	P-401 Team Review Comments Period	7 days	Wed 11/20/19	Tue 12/3/19	12	Aviation Chief,Constructi
14		100%	P-401 Update DRAFT after comments	8 days	Wed 12/4/19	Tue 12/17/19	13	Regional Specs Engineer[10%]
15		**100%**	**P-401 Team Review Meetings 11**	**0.38 days**	**Wed 12/18/19**	**Wed 12/18/19**	**14**	
16		100%	Prepared P-401 Interrim DRAFT	3 hrs	Wed 12/18/19	Wed 12/18/19	14	Regional Specs E
17		100%	P-401 Team Review Meeting 12	3 hrs	Wed 1/15/20	Wed 1/15/20	16	Aviation Chief,Co
18		100%	P-401 Update DRAFT after comments	5 days	Wed 1/15/20	Wed 1/22/20	17	Materials Engineer[10%],Q
19		**100%**	**P-401 Team Review Meeting 13**	**0.38 days**	**Thu 1/23/20**	**Thu 1/23/20**	**18**	
20		100%	Prepared P-401 Interim DRAFT	3 hrs	Thu 1/23/20	Thu 1/23/20	18	Materials Engine
21		**100%**	**P-401 Statewide DRAFT Submittal**	**12.13 days**	**Thu 1/23/20**	**Mon 2/10/20**	**19**	
22		100%	Prepare Updated P-401 DRAFT to address FAA AC 10H Errata of Changes	12 days	Thu 1/23/20	Mon 2/10/20	19	Materials Engineer[10%],Q 2[10%],Regional
23		100%	Submit P-401 DRAFT to Statewide for Regional Distribution and Review	1 hr	Mon 2/10/20	Mon 2/10/20	22	Regional Specs Engineer
24		100%	**P-401 DRAFT Statewide Distribution to Regions for Review**	**1 hr**	**Tue 2/11/20**	**Tue 2/11/20**	23	Statewide Specs Engneer,NR
25		100%	P-401 Regional Review Comment Period	20 days	Tue 2/11/20	Tue 3/10/20	24	Aviation Chief[10%],Cons
26		100%	P-401 Regional Review Comments Received	1 day	Wed 3/11/20	Wed 3/11/20	25	Regional Specs Engineer
27		100%	P-401 Revised Review Comments Format	14 days	Thu 3/12/20	Tue 3/31/20	26	Regional Specs Engineer,Materia
28		100%	P-401 Team Review Meeting 14: Respond to Comments	3 hrs	Tue 4/7/20	Tue 4/7/20	27	Aviation Chief,Constructi
29		100%	P-401 Team Review Meeting 15: Continue Responding to Comments	3 hrs	Wed 4/15/20	Wed 4/15/20	28	Construction Chief[10%],Mate
30		100%	P-401 Team Review Complete - Submit to Regional Specs Engineer	1 day	Fri 4/17/20	Fri 4/17/20	29	Regional Specs Engineer
31		**95%**	**P-401 DRAFT, MOS DRAFT, & Adjudicated Review Comments Prepared**	**10 days**	**Mon 4/20/20**	**Fri 5/1/20**		
32		90%	Finalize Adjudicated Review Comments	10 days	Mon 4/20/20	Fri 5/1/20	29	Regional Specs Engineer,Materia
33		99%	Prepare MOS DRAFT with P-401 DRAFT	6.39 days	Mon 4/20/20	Fri 5/1/20	29	QA/QC 1[10%],QA/QC
34		0%	P-401 DRAFT, MOS DRAFT, Statewide Adjudicated Comments Submittal to Working Group	1 day	Mon 5/4/20	Mon 5/4/20	33	Regional Specs Engineer
35		0%	P-401 DRAFT, MOS DRAFT, & Adjudicated Review Comments Package Submittal to Statewide	1 day	Tue 5/5/20	Tue 5/5/20	34	Regional Specs Engineer[25%],M Engineer
36		0%	P-401 DRAFT, MOS DRAFT, & Adjudicated Review Comments Package Submittal for Regional Distribution	1 day	Tue 5/5/20	Tue 5/5/20	34	Regional Specs Engineer,Statewi Specs Engneer,Aviation
37		0%	P-401 DRAFT Mtg with Statewide & Regions	0.5 days	Thu 5/7/20	Thu 5/7/20	36	Aviation Chief[200%],Con
38		0%	P-401 DRAFT Package Submittal to FAA	1 day	Mon 5/11/20	Mon 5/11/20	37	Aviation Chief,Materials
39		0%	P-401 DRAFT Package- FAA Review	14 days	Tue 5/12/20	Fri 5/29/20	38	
40		0%	P-401 DRAFT FAA Review Comments Received	1 day	Mon 6/1/20	Mon 6/1/20	39	Materials Engineer,QA/QC
41		0%	P-401 DRAFT FAA Review Comment Responses by Statewide	2 days	Tue 6/2/20	Wed 6/3/20	40	Materials Engineer[50%],Q
42		0%	P-401 DRAFT Review Mtg with FAA	0.5 days	Thu 6/4/20	Thu 6/4/20	41	Aviation Chief,Co
43		0%	P-401 DRAFT Review Comments FINAL Response Coordination	4 days	Fri 6/5/20	Wed 6/10/20	42	Aviation Chief,Constructi
44		0%	P-401 FINAL EDITS Submittal to FAA	1 day	Thu 6/11/20	Thu 6/11/20	43	Statewide Mater
45		**0%**	**P-401 FAA Approval**	**1 day**	**Thu 6/18/20**	**Thu 6/18/20**	44	
46		**0%**	**P-401 Statewide Chief Engineer's Directive Distribution on FAA Approved Specification**	**1 day**	**Tue 6/23/20**	**Tue 6/23/20**	**45**	Statewide Specs Engneer



Project: P-401 Projected Appro
Date: Sun 4/26/20

Task	Inactive Task	Manual Summary Rollup	External Milestone
Split	Inactive Milestone	Manual Summary	Deadline
Milestone	Inactive Summary	Start-only	Progress
Summary	Manual Task	Finish-only	Manual Progress
Project Summary	Duration-only	External Tasks	