Increase the Maturity Level of a Process Under ACE Operating System

Danny J. Faica Valentín
Master in Engineering Management
Dr. Héctor J. Cruzado
Civil and Environmental Engineering and Land Surveying
Polytechnic University of Puerto Rico

Abstract *— This paper will guide the reader to understand the documents and procedures used to ensure a robust process under the ACE operating system. It describes how the preparation of SIPOC, work instructions, workflow maps, risk assessments and quality criteria are created and used.*

Key Terms *— ACE, Continuous Improvement, Project Management, Service Robustness*

INTRODUCTION

This paper focuses on the methodology needed to increase the robustness and maturity of a process using the ACE operating system tools. Under an ACE operating system a robust process has zero non-conformances on files delivered to client and a high customer satisfaction rating. Its aim is to describe the documents needed for achieving a robust process.

BACKGROUND

Continuous Improvement Philosophies can be defined, in a simple matter, as a company's overall mindset to constantly seek improved performance by reducing losses and increasing effective and efficient production. On his article, Bhuiyan, N describes CI philosophies as "as a culture of sustained improvement targeting the elimination of waste in all systems and processes of an organization" [1] He continues by describing that CI philosophies involve everyone working together to make improvements without necessarily making huge capital investments [1].

Achieving Competitive Excellence (ACE)

UTC, P&W and IAS are all guided by a continuous improvement philosophy they use as their operating system. This philosophy or operating system is called Achieving Competitive Excellence (ACE). UTC describes ACE as their tool for achieving the goals they have set for quality and productivity improvement. [2] They believe ACE helps them to better meet their customer's expectations, create employee opportunities and achieve superior business results [2]. When asked about ACE George David, UTC's CEO from 1994-2008, stated that ACE is the basis of more than half the shareholder value increase in UTC at the time [3].

As part of this company wide operating system, individual processes are divided into well-defined maturity levels. These levels are an indicator of the degree of robustness the process has achieved. This robustness is measured by the consistency in quality of the products produced. To establish this robustness, the company utilizes management tools to assure the product created by the process consistently meets quality requirements. This maturity level also includes employees' attitudes and organizational culture [3]. After applying these measures the next step is to document the progress of these steps. This information need to be organized and analyzed to find patterns.

To reach the level of maturity expected of the process, the management in charge of this process needs to actively promote the ACE philosophy. For this to happen, they first need to understand it themselves. Emiliani suggests that lean management is similar to activities requiring highly developed skills acquired through long-term capability building, such as music. [4] He recommends daily practice by managers to study and understand lean management and to recognize and correct problems and possible problems using CI oriented thinking and support these practices with colleagues [4].

METHODOLOGY

In order to accomplish the objectives, the process' tasks need to be aligned with the ACE philosophy. The use of their tools and their approach is necessary to fulfill these tasks. ACE has established a standard methodology to improve the maturity of underdeveloped process such as this project's process. This methodology is the following:

- Develop the SIPOC
- Gather and organize the work instructions
- Develop the service process or workflow map
- Establish functional and practical risk assessment procedures
- Establish and apply quality inspection regiment
- Create a client feedback rating
- Establish a procedure to revise the document's and procedure's validity

This article describes the steps in more detail and explains how they were used for the project. It also explains the importance and impact of these steps for the achievement of the objectives. The short-term effects of the application of these steps are discussed in the final paragraphs of this article.

SIPOC

The SIPOC is a document that is responsible for detailing the suppliers, inputs, process, outputs, and customers of the process. It is usually written as a table where the suppliers, inputs, process, outputs, and customers of the process are listed as the columns and the major steps of the procedures are listed as the rows. This document was successfully created for the project and it helps in creating all of the additional maturity related documents. Its main purpose is to identify the most important aspects of the process. These may seem obvious sometimes, but it's best to have a detailed document to refer to when the process needs to be understood. The most important objective for this project is to ensure a high quality level, and for this, the process, can be reproduced by using well documented guides. To have a good process it is critical to document every detail needed to successfully accomplish the task, the first things that need to be detailed about any work process are suppliers, inputs, process, outputs, and customers.

Work Instructions & Workflow map

The next step in documenting a process is to actually describe the day-to-day work needed to complete the task. There are two ACE tools that are used for this: Work Instructions and the Workflow map.

The Work instructions are the most important documents that will be produced for the assurance of good quality in the process. To describe in detail each of the tasks in a process, is key to ensure that the practitioners successfully accomplish this task with very little room for errors or divergences. This document needs to be created in collaboration with the practitioners and the clients to align the needs and capabilities of the two. It is also important to include a level of detail that allows no assumptions to be made while at the same time making a simple and easy to understand document that all can follow easily. A work instruction gap analysis needs to be completed where the work instructions are revised to check that they cover all of the possible tasks that are part of the process. This is very important, if there aren't work instructions that cover all of the tasks that are done; it leaves room for uncertainty and assumption that can lead to outputs of inferior quality.

The workflow map is a tool similar to the work instructions in that they are a guide for the practitioner to produce the process outputs. The major difference is that the work instructions detail the task being done and the workflow map illustrates the relationship between the tasks. The workflow maps serve as a visual tool for practitioners to follow the tasks throughout the process. These maps are essential for the analysis of the process in order to optimize its completion. A good example is analyzing parallel tasks and learning how to distribute them between resources to reduce the total time of the process.

Risk Assessment

Following ACE philosophy, companies need to be prepared for issues that can compromise their processes. The document created to comply with this is the risk assessment plan.

The risk assessment plan consists of a list of possible issues that could adversely affect the process completion or progress and information about these issues or risks. The risks are rated based on possibility of occurrence and the impact of its occurrence. For example, if the risk is very likely to occur, it increases its rating but if its impact is low this reduces the rating. And so the purpose of the rating is to indicate which issues present higher risk for the process. These ratings can help identify which risks need to be dealt with and with what priority.

On the risk assessment plan there also needs to be plans for the avoidance, mitigation and resolution of each issue. This means that for each issue, there needs to be a detailed plan on how to avoid it happening, how to deal with it happening to reduce its impact and how to resolve any problems it may cause. This aspect of the risk assessment is very important. Detailed plans for each of these possibilities need to be established so that practitioners can refer to these documents in order to attach any of the issues that come up. It is also important that the practitioners keep the list updated, it is nearly impossible to write all of the possible issues that can come up. A good process is a process that works to stay well documented as issues come up and practitioners learn how to solve them.

Quality Inspection Regiment

In order to maintain quality on a process an important step is to establish a quality inspection regiment. This translates to established checkpoints where the progress and quality of the tasks is measured. First a well-defined quality criteria document needs to be created. In this document there needs to be a comprehensive checklist of the criteria that the tasks needs to comply with in order to meet the established quality standards. Once the criteria is created, there needs to be steps in the workflow map where an inspection will make sure that the work products from the tasks meet the criteria and comply with the quality standards.

It is critical that the inspection process is well documented, with all of the findings logged and classified for statistical analysis. Recurring findings should be analyzed and actions taken to prevent them.

Client Feedback

Clear and effective communication is crucial for achieving high client satisfaction. It needs to be clear so that there aren't any misunderstandings that can lead to different expectations of the process. It also needs to be effective because it cannot be overly time consuming and needlessly convoluted so that the client can feel that he is not overwhelmed with his involvement in your tasks. A simple tool to help with this effective communication is a type of questionnaire where the client rates the product and the overall services provided. This feedback helps align the customer's needs with the process. The questionnaire needs to be short and simple but it also needs to cover all of the important issues that affect the process.

Validity Revision

A very important part of any continuous improvement philosophy is the aspect of revising the validity of their documents and procedures constantly. Every business evolves and changes gradually with time. The documents and processes must adapt to these changes to stay current. The documents and processes must be "alive" in the sense that they must respond to changes actively. To ensure this a company must establish a period where the documents must be revised by the practitioners. It should also encourage their practitioners to update the documents as they work on the tasks. This is the last step to accomplish the goal of improving the robustness and maturity of a process. It is the final one that assures the process will continually comply with the quality standards that will please the clients.

RESULTS

All of the quality methodology steps were applied to the process. Before completing the documents all of them have to be reviewed by the practitioners of the process. They give the important feedback to make sure that the documents represent the tasks that will really make up the process. Involving them in the creation of these documents and instructions gives them the opportunity to contribute and feel as an integral part of the process. Once the practitioners are in agreement with the content of the documents, and therefore in agreement with the additional quality-related tasks that come with them, the client is involved to validate the new process. One of the major objectives is to bring customer satisfaction, making their involvement vital for the successful completion of the project.

The usage of the quality steps in the process has already yielded positive, quantitative impacts. The SIPOC helped identify one additional customer. This additional customer was an indirect customer. This new client received the process outputs through another customer of the process. Having this new client as a direct customer favors the process' ability to adjust the outputs to their needs. This additional customer increases the clientele by 10%. The work instructions, workflow map & risk assessment have received praise by the practitioners for helping them stay organized and provide them with an easy step-by-step guide of their tasks. These documents have helped them deliver consistently good outputs for each different task. These improved outputs result in better employee reviews for them and an easier workplace environment. Since this process was improved the incidence in defects found in-house has reduced 40% to 5%, a significant 35% drop.

Quality inspections were applied on each major task of the process and a thorough final inspection before any deliverable is made. Since the quality inspections are being done the non-conformances in outputs given to customers has dropped to zero. No deliverables have been given to clients with defects, compared to the previous quarter this signifies a 15% drop. This alone is one of the objectives of the project, it is being accomplished.

The other objective is measured by the client feedback rating created as part of the methodology. The first projects that received client's feedback were rated below the standard implemented. The project's objective is to maintain an average score higher than 6 out of 7 and out the first 4 feedbacks, 3 were lower than 6. This was expected mainly because the effects of the process robustness weren't yet seen by the clients. Out of that first batch of client feedback the average rating was 5.5. Including the latest feedback scores that average has increased to 6.125 and the objective has been met. Still, the feedback comments need to be processed and applied diligently into the process.

As part of the project and the ACE requirements a procedure to revise the document's and procedure's validity was established. The results from all of the inspections and client feedback are being documented and will be analyzed on a quarterly basis. Each of the documents needs to be verified for validity no longer than 18 months.

REFERENCES

[1] Hall, S. W., "Achieving competitive excellence.", ASQ World Conference on Quality and Improvement Proceedings. American Society for Quality, 1998, pp. 637

[2] Bhuiyan, N., et al. "An overview of continuous improvement: from the past to the present." Management Decision, 43.5, 2005. Pp.761-771.

[3] Roth, G. "United Technologies Corporation: Achieving Competitive Excellence (ACE): Operating System Case Study.", 2010.

[4] Emiliani, M. L., "Music as a framework to better understand Lean leadership." Leadership & Organization Development Journal, 34.5, 2013, pp. 407-426.