

Change Control Process of the Planning Control Documents

Michelle Vega Rodriguez
Engineering Management Graduate Program
Dr. Héctor J. Cruzado
Graduate School
Polytechnic University of Puerto Rico

Abstract — *The Change Control Process of the Planning Control Documents (PCDs) for a manufacturing organization was manually coordinated and involved multiple entities with different change mechanisms. Therefore, the process was not standardized and was dependent on interpretation. With the objectives of simplifying and standardizing the Change Control Process, boosting effective communication in the Manufacturing Organization, and stimulating Change Management Best Practices, the Change Control Process for PCDs Project offered the clarity, standardization, and visibility that Executive Leaders pursued. The Lean Six Sigma Methodology application confirmed that roles, responsibilities, and processes documentation were unclear as revealed in three different processes defined by the Project Managers. A redesign of the Change Control Process combined with three proposed Technology Solutions brought the visibility that Executes Leadership claimed, and the investigation's lessons learned.*

Key Terms — *Agile, effective communication, Project Management Office, Waterfall*

INTRODUCTION

Any project's evolution through time is inevitable, making it imperative to have the ability to change the control mechanism and then identify and quantify its implications. Planning a Change Control Process that provides the visibility that any organization needs its essential to maintain a robust control within the project scope, budget, and schedule. In addition, it evaluates Change Control Process to understand cost implications and define ways to provide visibility and transparency to its Executive leadership. This investigation intended to assess and optimize the Change Control Process of

the Planning Control Documents for the equipment assembly line of a manufacturing organization.

The objectives of the Change Control Process Project were simplifying and standardizing the process, boosting effective communication, and stimulating Change Management Best Practices. Determining the right path to achieve these objectives required a deeper analysis of multiple areas, holistic view, and stakeholders' commitment.

The article provides the methodology used to capture information, methods performed to obtain valuable insights and recommended actions that helped the manufacturing organization embrace the challenges.

LITERATURE REVIEW

A Project Management Office (PMO) is instrumental in establishing a robust governance process with a forward-thinking vision [1]. Governance's purpose is to maintain a top-down and down-top approach that includes transparency, stakeholder commitment, and a customer service catalog that contributes to achieve the desired business goals [1]. The service catalog includes best practices for Project Management, communication tools, training, and methodologies that helps project managers, stakeholders, and leadership interact, continuously track the progress, and manage challenges through the project life cycle [1].

Within the governance process, change control management provides a set of tools to Project Managers that enables them to identify, inform, obtain approval, and implement any changes needed to complete a project through the life of a project. Any change involves people interaction, commitment, and cohesion within the team to embrace the effectiveness of the change [2].

Outcomes can vary if these factors are not adequately managed.

Change Management is the cooperative approach from stakeholders, change agents, and executive sponsors. The change agent will provide a set of tools that will facilitate the process of adaptation all the way through sustainment [3]. That is not limited there; training and effective communication are critical parts of the process that will need to be included along with the life of the change [3].

It is imperative to mention why a project fail is due poor requirements, scope creep, unstructured project management framework, and is missing a change control management [4]. When project management methodology is not clearly defined, the project will be at the mercy of the project manager's interpretation. There are two standard methodologies: Waterfall and Agile [5]. Waterfall is more rigid framework, depending on requirements; any change on requirements needs to be documented and confirmed with stakeholders [5].

Besides, Agile is a framework managed by several iterations called sprints composed of user stories that need to be completed as a working product by the end of the sprint [5]. Agile allows a more accelerated adoption to change, accepting those during the sprint and involving the customer to confirm the end and evolution of the working product during the sprint completion [5]. It is fair to say that methodology can influence how change control is managed. It is critical to identify the difference early in the process stage. For the Waterfall, not having an integrated change control management can end in uncontrolled changes that can burn the budget and kill the schedule [5].

Over time, a business process can evolve to the point that complexity makes it difficult for people to perform at their best. For this reason, it is recommended to evaluate the process for the business processes that cause confusion and unclarity. In this case, the Lean Six Sigma methodology can be beneficial to analyze the process and to assess the steps as value-added, non-

value-added, or business value and eliminate those non-value-added steps from the process [6]. Lean Six Sigma helps practitioners solve problems by evaluating the entire process and using deep analysis to find the root cause.

METHODOLOGY

With the Lean Six Sigma methodology guidelines, the first step was to draft a plan with concepts to gather information from multiple sources: people, documents, data, and examples from stakeholders related to the Change Control Process for PCD. Figure 1 shows the plan conducted through the project. A list of primary stakeholders was used for the stakeholder analysis through a brainstorming session based on the documents available and recommendations provided by leadership.



Figure 1
Roadmap

Then, the approach was to coordinate and schedule interviews across the organization with the people involved in the Change Control Process at different roles and levels, followed by collecting information from multiple areas in the process. These interviews covered the same questions maintain consistency; however, through the project's life, questions and interest evolved and were more about confirming finding and then making a comparison within departments. All the personnel interviewed were asked to provide referrals of stakeholders that may contribute to the assessment of the Change Control Process.

Another significant action taken was conducting a deeper evaluation of the Change Control Process for PCD. It allowed developing a holistic view of the processes using documentation

and stakeholder's perspective. The creation of an As-Is Process Diagram in Figure 2 allowed having a holistic view based on the information collected through interviews and documents. Once all the steps were documented, it was ready for the next stage of assessing value per step.

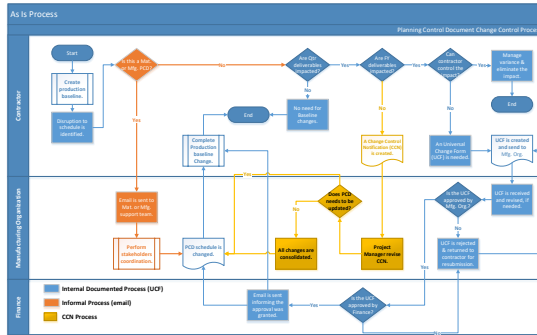


Figure 2
As-Is Process

A Value Stream Map Analysis helped to display the areas that might not be as tangible. Figure 3 aided to identify direct customer impact steps. Therefore, areas that cause this problem were identified and defined in the mitigation plan. Tools like Five Whys facilitated the Root Cause Analysis (RCA) in Figure 4. This analysis allowed to not only detect the real problem but also was able to prioritize it.

The design of a To-be State in Figure 5 simplified the Change Control Process and allowed an increased optimism while it encouraged viable possibilities by having an optimized process. Figure 5 focused only on processes owned by the Manufacturing Organization, thus eliminating Change Control Notification (CCN) process.

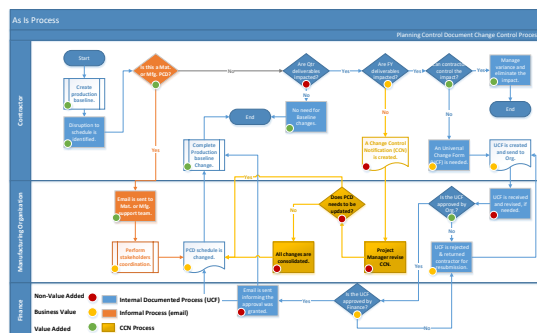


Figure 3
Value Stream Map

- Exist three different processes used to document changes, only one is a Manufacturing Organization process.**
- **Why three different process exist?**
 - Because people found it challenging to understand current expectations and steps.
 - **Why people found challenging to understand current expectations and steps?**
 - Because instructions are unclear, ambiguous, and not concise.
 - **Why are instructions being unclear, ambiguous, and not concise?**
 - Because instructions come from multiple sources like a PCD, Template Tool, and Program Execution Instruction Manual.
 - **Why do instructions come from multiple sources like a PCD, UCF Template, and Program Execution Instruction Manual?**
 - Because there is not a single source of truth that explains concise, clear steps, applicability, and expectations of the change control process for PCDs.

Figure 4
Five Why's Analysis

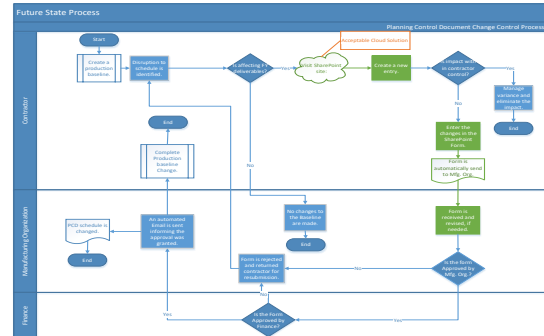


Figure 5
To-be Process

RESULTS & DISCUSSION

The evaluation of qualitative information provided a subjective information with opportunities to glean insights. Thirty-four (34) stakeholder's interviews notes were analyzed, and its significant findings were emphasized. The method used was by developing a list of facts found during the interviews which allowed to classify common approaches taken by the Project Managers during the Change Control Management. Figure 6 displays the categories used and major findings.

- Nobody knows better where the great opportunities are than the people who do the work**
- **Process Perspective**
 - Three (3) processes used for PCD changes (UCF, CCN, email)
 - Only Universal Change Control Form (UCF) is a Manufacturing Organization documented process, although it is an optional tool for changes
 - **Informal Processes**
 - Change Control Notification (CCN) is an internal Contractor process
 - Utilization of CCN varies by Program Manager (PM)
 - Material & Manufacturing Change Control Processes are managed via email
 - **Process Challenges**
 - PM-driven changes are incorporated in the PCD without a UCF
 - No cross-site UCF repository
 - Limited cross-site impact validation
 - Inconsistent interpretation of expectations and requirements
 - Unclear definition of roles & responsibilities in the process

Figure 6
Discovery Spotlights from Interviews

Tables 1 and 2 were comparative analysis performed among the three Change Control Processes used in the organization. With that been said, not only processes were compared although possible technologies for the To-Be State.

Table 3 includes the Analysis of Alternative (AoA) executed to evaluate technologies considered for the To-Be State. The intent was exploring desired capabilities across technologies. Multiple constraints were captured in a list of challenges in Figure 7 found during the AoA.

Table 1
Process Operation Preference

| Process | UCF | CCN | Informal (email) |
|--------------------------|-----|-----|------------------|
| Maintenance PCD change | Yes | Yes | No |
| Sustainment change | Yes | No | No |
| Production change | Yes | No | No |
| Materials or Mfg. change | No | No | Yes |

Table 2
Process Structures Comparison

| Process Characteristics | UCF | CCN | Informal (email) |
|----------------------------|------|-----|------------------|
| Formal Process (Mfg. Org.) | Yes | No | No |
| Required by Doc. Mgmt. | No | No | No |
| Understood by PM | No | No | Yes |
| Form is Record | Yes* | No | No |
| Approved by Finance | Yes* | No | No |

*Finance

Table 3
Technology Capability Matrix

| Technology/ Capability | MS TEAMS | JIRA/ Confluence | MAX Site | Mfg. Org. SharePoint | Adobe | DocuSign |
|--------------------------------|-----------------------|------------------|----------------------|----------------------|-------|----------|
| Hosted by Mfg. Org. | YES | NO | YES | YES | YES | NO |
| Cross-site Access | NO | YES | YES | NO | NO | NO |
| Act as main repository | YES | YES | YES | YES | NO | NO |
| Workflow Functionality | YES | YES | NO, manual intensive | YES | YES | YES |
| Automated reports included | YES | YES | NO, manual intensive | NO | NO | NO |
| Security Compliance | YES | YES | YES | YES | UNK | UNK |
| Need admin rights to prototype | To turn "ON" Workflow | YES | YES | YES | UNK | NO |

Challenges

- People are afraid to try new technologies & methodologies.
- Access to data & applications is not clearly defined, ambiguous, and rigorous, making the process very difficult to follow.
- There is no integration between people, team members, offices, and the organization.
- No cross-team knowledge transfer.
- There is no central repository of approved tools that can function as a cross-site collaboration space.
- Innovation & Design Thinking are not part of the living culture.
- Mfg. Org. is losing money and resources in repetitive processes conducted individually per office, when can be an integrated multi-Office effort, as One Mfg. Org.
- Integration starts by allowing people to communicate effectively. (e.g., creating collaborative environments physical and remote)

Figure 7
Open Challenges

CONCLUSIONS

In summary, this project revealed that simplifying and standardizing a process, boosting effective communication, stimulating Change Management Best Practices is achievable by applying Lean Six Sigma Methodologies, which provided a higher understanding of the problem. In addition, it aided in visualizing the holistic view of the Change Control Process for PCD.

Through this deep analysis was discovered that confusion about roles and responsibilities in the Change Control Process resulted from multiple processes created by Project Managers based on their understanding, was causing scope creep at the process.

Multiple steps and duplicity of Change Control process was increasing complexity. Not having a central repository was growing impediments for streamlining cross-site knowledge exchange about similar problems, resulting in duplication of efforts.

This investigation revealed that establishing a list of technology capabilities that met organization standards facilitates the launching of functional solutions. Three prospective technologies in Figure 8 were further evaluated with subject matter experts and proposed to the primary decision-makers of the Manufacturing Organization for further consideration.

Proposed Technologies Solutions

Option A: Jira (outsourcing)

- Change request entries can be created by originator at Contractors.
- An autogenerated Workflow can be trigger to Man. Org. approvers.
- Multi-approvals can occur in parallel, saving time in the process.
- Once approvals are completed, record will be stored as completed in the Kanban.
- Reports can be created by an admin.
- Records can be exported.

Option B: MS TEAMS (in house)

- Works like a SharePoint site but empowered with visual Kanban boards that allows cross collaborations sharing information.
- Multi-approvals can occur in parallel, saving time in the process.
- Can be connected to Internal SharePoint but permissions will depend on the SharePoint location.
- Not cross site accessibility now.

Option C: MAX Site(in house)

- Workflows are created in VBA (Macros) extensive
- Need a VBA expert to create the automated workflow solution and there is no warranties that be working as expected.
- Is an active cross-site collaboration tool.

Figure 8
Proposed Technologies Solutions

The definition of simple process expectations permitted the development of Training materials

that enhanced standardization of process improvements while accelerating adoption.

Finally, Lessons Learned in Figure 9 were captured to maintain a vital knowledge exchange and transparency across the organization and future generations.

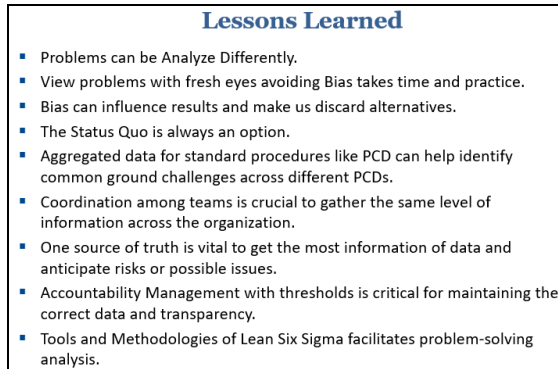


Figure 9
Lessons Learned

REFERENCES

- [1] ProjectManager.com, Inc. (2021, August 16). ProjectManager.com. Retrieved 2022, from <https://www.projectmanager.com/>: <https://www.projectmanager.com/pmo>
- [2] Walker, L. W. (2006). Is there a new definition for "change control" in project management? PMI® Global Congress 2006—North America. Seattle, WA: Project Management Institute. Retrieved from <https://www.pmi.org/learning/library/definition-change-control-project-management-8030>
- [3] Wanner, M. F. (2013). Integrated change management. PMI® Global Congress 2013—North America. New Orleans, LA: Project Management Institute. Retrieved from <https://www.pmi.org/learning/library/integrated-change-management-5954>
- [4] Millhollan, C. (2008). Scope change control, control your projects or your projects will control you! PMI® Global Congress 2008—North America. Denver, CO: Project Management Institute. Retrieved from <https://www.pmi.org/learning/library/scope-control-projects-you-6972>
- [5] Nazarenko, O. (n.d.). MindK. Retrieved December 11, 2021, from: <https://www.mindk.com/blog/change-control-process/>
- [6] Rastogi, A. (2020, December 30). Grey Campus. Retrieved December 11, 2021, from: <https://www.greycampus.com/blog/quality-management/a->