



## **ARCHITECTING PROJECT MANAGEMENT**

for Enterprise Agility...

July 14 to 16, 2016,

NIMHANS Convention Centre, Bengaluru

### **Small projects management in aerospace service industry**

Organisation Design-Simplified strategies

Paper ID: PMIBC\_16\_1\_001

Author: Mr. Suchendra Simha

## CONTENTS

Abstract.....	3
Introduction .....	3
Details of the paper.....	4
Conclusion .....	10
References .....	10

## ABSTRACT

Global aerospace market is projected to grow by 20% in commercial aircraft sales by 2025. With such a growth there comes an increased pressure to improve financial returns, reduce cycle times and increase overall efficiency and hence improve the bottom line. One of the general strategies adopted to achieve this is outsourcing to low cost countries like India and China, for requirements ranging from aerospace engineering services to manufacturing. The companies working on these service requirements are constantly trying to achieve optimal solutions through better project management practices available in the market. These standards comes with their plus and minus to address many types of projects in the mid to large projects segments (1000-10000hrs in most cases). However, there are large numbers of cases in engineering service industry, especially Aerospace, where projects fall in the category of 50-500 hours. The successes of projects in this category are based on speed and agility of execution, which requires a different approach to manage them. This paper has attempted to address this issue of managing small projects, with the available standards in the market. And has proposed two scenarios, a small project with relatively constant scope and other with frequent changes to the scope. The solutions are based on PMBOK® and Agile methodologies.

## INTRODUCTION

Global aerospace market is projected to grow by 20% in commercial aircraft sales by 2025, with such a growth there comes an increase pressure to improve financial returns, reduce cycle times and increase overall efficiency to improve the bottom line. OEMs, increasingly looking at outsourcing engineering services and manufacturing to low cost countries like India and China. The situation expects innovations from the service providers to further optimize the cost of outsource to these OEMs. Innovation is not limited to only engineering designs/services or manufacturing but also towards how these projects are managed. In India most of the engineering services companies are engaged in services ranging from CAD (drafting, detailing and modeling), CAE (finite element analysis, computational fluid dynamics, simulation and flight physics), electrical wiring/harness design, technical publications, manufacturing engineering, avionics design, testing and integration, etc. These services' projects range from mere 50hrs to 5000hrs in most cases, or sometimes even higher. Most of the companies in a bid to provide the optimized management of the projects, have adopted/being in this stage to adopt best practices in the market. It may be PMBOK® framework/Prince/Agile methodology. These standards always come with their advantages and disadvantages mainly addressing large projects. In this context, there is always a need for this industry to innovate or customize based on these framework and methodologies to address different projects of varying complexities, type and size. This paper has attempted to address this issue. The paper looks at different standards with respect to their applicability to small projects management in aerospace service industry. And has proposed two typical scenarios solutions, one in which a small project with relatively constant scope is considered and other with frequent changes to the scope.

## DETAILS OF THE PAPER

### 1. Small projects:

A small project in aerospace service industry in India can be considered as the one with effort duration less than 500 hours and ranging from a week to 3 months, empirically. However, the actual definition is left to individual organizations to define as per their need and complexity of execution.

There are unique challenges in small projects management while trying to follow the standard frameworks of large projects, which usually organizations adopt for the project success and sometimes to comply with customer requirements. These challenges could be a temptation to cut down or casually follow the processes in organization framework, which sometimes leads to the failure of the project or adds no value to the project's success. In another scenario the challenge could be spending long time on the project management, following all the processes of the organizational framework, adding little or no value to the project's success. Both these extremities could be addressed if an organization adopts a customized framework for small projects, without drastically deviating from the existing framework meant for industry specific large projects.

In an article by Elizabeth Larson of watermark learning, there were many differences listed out for small projects. It is worth to note that, because of low risk associated with this sort of projects, mostly there will be less attention from the management to them. Mostly this may lead to casual following of the project management methodology and hence increasing the project success uncertainty.

### 2. Standards of Project Management:

In general, unique requirements of the aerospace service industry small projects management are Speed of execution and Agility to adopt changes. The projects come with short targets in two ways, requiring agile adoptability for the scope changes and other with fixed or minimal work scope change. The following sections discuss different project management methodologies available in the market and their suitability to small projects.

#### 2.1. Project Management Body of Knowledge (PMBOK®) Guide;

PMBOK® based framework is a generic guide for the PM, it does not offer a methodology. The framework is normally meant for large projects execution. Most of the aerospace service industries are inclined towards adopting/have adopted this framework. The PMBOK® guide provides 5 Process groups, 47 processes, 10 knowledge areas, covering best practices of project management.

The intended audiences for this framework are large projects of not less than \$1-2M worth. Having said this, the framework fits to large group of projects seamlessly.

When it comes to its application to small projects, it is considered to be a heavier framework to follow. As there is no clear guidelines on framework tailoring, and projects classifying. This makes it difficult to integrate the framework to small projects management.

## 2.2. Agile Methodology:

This is considered to be an alternative to waterfall or traditional project management, typically adopted in software development. The methodology addresses the uncertainty in the requirements through incremental, iterative work cadences, known as sprints.

Scrum is the most popular way of introducing Agility due to its simplicity and flexibility. Scrum has only three roles: Product Owner, Team, and Scrum Master. The responsibilities of the traditional project manager role are split up among these three Scrum roles. Scrum has five meetings: Backlog Grooming (aka Backlog Refinement), Sprint Planning, Daily Scrum (aka 15-minute stand up), the Sprint Review Meeting, and the Sprint Retrospective Meeting.

Even though it helps in short cycle project management, the challenge lies in adopting this in aerospace service industry with most of them working on PMBOK® based framework.

## 2.3. Rapid Application Development (RAD):

It is a type of incremental model. In RAD model the components or functions are developed in parallel as if they were mini projects. The developments are time boxed, delivered and then assembled into a working prototype. This can quickly give the customer something to see and use and to provide feedback regarding the delivery and their requirements.

This is not much popular when it comes to aerospace service industry, may require lot of tailoring before it can be applied to both large and small projects.

## 2.4. PRINCE2 (Projects In Controlled Environments, version 2)

PRINCE2 has a sophisticated, well-defined methodology that outlines in detail the steps, templates and processes that a project should follow in order to be delivered successfully within a controlled environment.

It is a process-driven project management methodology. Further, it is based on seven principles, seven themes and seven processes. The seven principles are: Continued business justification, learn from experience, defined roles and responsibilities, manage by stages, manage by exception, focus on products and tailored to suit the project environment; The seven themes are: business case, organization, quality, plans, risk, change and progress; The principles and themes come into play in the seven processes:

As the PRINCE2 is a process oriented, a combination of PMBOK® and PRINCE2 customized to small projects management could be of a new idea. As well, the practitioners of PRINCE2 advocates for tailoring it for small projects as needed by practitioner's need.

## 2.5. International Organization for Standardization 21500

ISO 21500:2012, Guidance on Project Management, is an international standard developed by the International Organization for Standardization, or ISO starting in 2007 and released in 2012. It was intended to provide generic guidance, explain core principles and what constitutes good practice in project management. The ISO technical committee dealing with project management, ISO/PC 236 was held by the American National Standards Institute (ANSI) which had approved four standards that used PMI materials. One of which was ANSI/PMI 99-001-2008, A Guide to the Project Management Body of Knowledge - 4th Edition (PMBOK® Guide - 4th Edition) (revision and re-designation of ANSI/PMI 99-001-2004): 11/20/2008. ISO 21500 is close to

PMBOK® framework and discussion on PMBOK® application to small projects management holds well in this context too.

There are few other standards in industry like Six Sigma, DMAIC and other concepts, which are helpful but not considered to be a comprehensive standard for the project management.

### 3. Proposed small projects management solutions

There are many different customizations organization can adopt to manage projects. The following two ways proposed showcases a novel customization that can be used for aerospace service industry or any other industry as suitable.

At the top level it is assumed that the owner of the project will have a privilege to make all the decisions good for the project within the project management framework of an organization.

#### 3.1. Case study-Scenario1: Scope changes are stable.

In this case, to achieve unique requirements of small projects i.e. speed and agility, the proposal is to adopt the PMBOK® guide in a lean manner.

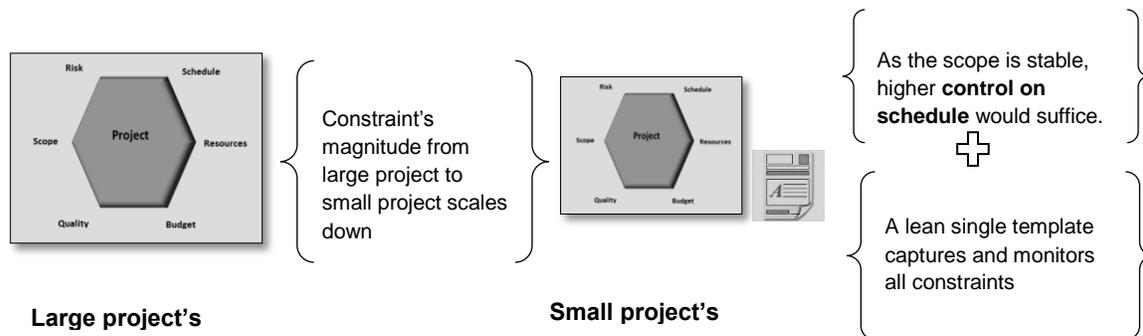


Fig.1

The proposed idea starts with a single template concept - authorization, scope definition; major risk analysis, estimation, scheduling, status reporting and as well closing procedures will be considered in it.

Assumptions made are, the work considered is a project; sponsored; 1-3 resources are allotted, with one being project owner and project manager; majority communication are with customer, and minimal internal sponsor & other communications; most of the communications are informal except for the scope definition and technical details; low priority risks; All the documentable communications getting captured and monitored in a single template.

The single template concept very well works with small projects management as resource with minimal project management knowledge can manage it seamlessly.

The predominant risks in small projects are related to scope changes. In this scenario, as the project scope and resources' requirement are relatively stable from the baseline, risks are considered to be acceptable / managed well. Quality and scope validation are considered to be achievable as the owner of the project himself is executing and managing the project. Cost can't pose as constraint, as again because

of stable scope. Considering this argument, major constraint requiring constant monitoring by the owner of the project is time (Schedule).

The approach will be successful in achieving minimal time for the project management and higher time for the execution, as both these activities gets done by the same person. Hence, meeting the requirements of small projects' success factors, speed and agility

There are many resources available on the web to arrive at a single template needed for the small project management. Based on the requirement of the organization, these can be tailored to a single template. Hence, paper has not attempted to create the specific template, but only suggested what can come in that for the small project management.

### 3.1.1. Details of the scenario1 project:

**Project name;** Standardization of clamp Z1 for Y series engines from X series

**Scope of the work:** A standardization report

**Work requirements;** this type of work requires, coordination of the designer with product definition, Stress, manufacturers and other interfacing systems as required to get the buy offs for the standardization. He will also be referencing design report of Z1 and component requirement of Y series engine.

**Risks and Communication:** There is no major risk with this type of work, except for minor delays in inputs, which could be covered during the course of the project. Major communication happens between designer (project owner) and the customer, which is usually informal except for the technical details.

**Size:** 350 hrs. and 8 weeks

**Resources:** 1 FTE (Full time employee), 2 to 3 part time employees

- **Conventional Method of project management;** A project manager (let's assume portfolio/program manager) is assigned to the project, along with a design resource. This method consumes not less than 5-7% of Project Manager's time(as a thumb rule) along with typical 10%(as a thumb rule) designer time for the customer communications and project updates as required, which is usually the large part of project management communication. If we do a simple math, this will account for 17% of the project time.

Typical Project managers' role involves, reviewing the baseline scope and any further changes to it along with regular change management meetings. In addition, he will also be updating and monitoring trackers.

And typically designer gets involved in all customer meetings, both technical and status reviews and also may provide necessary updates to project manager, as part of his project management support. In addition, he is the either executing or getting it executed.

It is to be noted here that, there will be some project management effort duplication happening due to hierarchical structures.



### 3.2.1. Details of the scenario 2 project:

**Project name;** new product introduction - clamp design for Y type engines

**Scope of the work:** A Design report, validating the design selected along with the design drawing.

**Work requirements;** this type of work involves coordination of the designer with stress, performance, thermals, product definition and other interfacing systems as required. The work also involves fulfilling the different mandatory requirements and standards along with meeting business requirements.

**Size:** 350 hrs. and 8 to 10 weeks

**Risks:** A constant scope creeps happen if the requirement document is not defined in the beginning. In addition there will be scope validation risk, delays because of more number of stakeholders for the small project, constant project managers' micro managing due to scope creeps

**Communication:** Communication usually follows PMBOK® standards, formal where signoff is required and informal in other occasions. Project manager, Designer or owner and customer engage in constant communication to remove any hurdles.

**Resources:** 1 FTE (Full time employee) and 1 to 2 part time employees

**Conventional Method of project management;** A project manager (let's assume portfolio/program manager) is assigned, along with a designer as an owner.

This method consumes not less than 7% of Project Manager's time (as a thumb rule) along with typical 15% designer time for the customer communications and typical project updates as required, because of inevitable scope changes. If we do a simple sum, this will account for 22% of the project time.

Typical project managers' and designers roles will hold the same as discussed for the scenario 1, except for greater communications between designer and the customer.

Other painful aspect in this approach is scope change management, which is usually addressed as per the usual PMBOK® method. And possibility is that, due to constant scope creeps, the final requirement may not be met as desired.

**Customized project management:** A project owner (Designer) will be assigned a project management responsibility also, with a customized template to manage the project. Indeed this adds little more work than usual to the designer, but repetition of same tasks as in conventional method can be avoided. In a typical case the total project management activity will not exceed more than 17 % (current PM time of the owner plus 2% additional project reporting time) of his time.

Scope changes are addressed using a broken down scope milestones and sprinting methodology. This means, instead of scoping entire deliverable at the beginning of the project, it can be scoped

in phases and changes are graciously accepted for the next phase. This not only saves a lot of time managing scope but also provides a fully satisfied deliverable to the customer.

Both these case studies can very well be applied to many engineering projects ranging from design definition conversion from 2D to 3D, small design modifications, stress analysis of components or any other projects where a technical executor can manage a small project.

## CONCLUSION

Small projects, varies both in terms of constraints to juggle as well the technical complexity to manage. The available different frameworks and methodologies may not completely address these issues. However, the best practices from these will indeed help to tailor the framework/combine and align to the business goal of an organization and the needs of small projects management. In line with this, the paper has attempted to showcase how in aerospace service industry a small project can be managed. The paper has showcased, how a simple tailored template along with the ownership of project management by the executioner/ designer, can ease the job of small project management. The paper has also presented how a scenario of constant scope change can be handled with the combination of PMBOK® and Agile methodology along with the single template and executioner ownership of project management. The idea of leaning the project management approach for the stable and changing scope scenarios are worked out around speed and agility requirements of small project management.

## REFERENCES

1. <http://www.projecttimes.com/articles/managing-small-projects-the-critical-steps.html>
2. <http://blog.sukad.com/20151104/what-is-missing-from-the-PMBOK®-guide/>
3. <https://www.projectsart.co.uk/white-papers/quick-guide-to-project-management.pdf>
4. <http://www.acoste.org.uk/uploads/BestPractices.pdf>
5. <http://www.brightbpm.com/monitoring-projects/74705-best-practices-for-cost-control-in-small-projects/>
6. <http://scrumtrainingseries.com/>
7. <http://agilemethodology.org/>
8. <http://scrumreferencecard.com/ScrumReferenceCard.pdf>
9. [http://www.sybena.pl/iso21500PMBOK®\\_ang.htm](http://www.sybena.pl/iso21500PMBOK®_ang.htm)
10. [http://www.tutorialspoint.com/management\\_concepts/project\\_management\\_methodologies.htm](http://www.tutorialspoint.com/management_concepts/project_management_methodologies.htm)
11. <http://istqbexamcertification.com/what-is-rad-model-advantages-disadvantages-and-when-to-use-it/>
12. <http://www.pmi.org/~media/PDF/Publications/PMIEXEC06.ashx>
13. <http://www.hks.harvard.edu/m-rcbg/ethiopia/Publications/Top%2010%20Reasons%20Why%20Systems%20Projects%20Fail.pdf>
14. <https://en.wikipedia.org/wiki/PRINCE2>
15. <http://www.prince2.ca/prince2/tailoring-prince2/>
16. [https://en.wikipedia.org/wiki/Small-scale\\_project\\_management](https://en.wikipedia.org/wiki/Small-scale_project_management)
17. <http://www.deltapartners.ca/blog/prince2-vs-PMBOK®-comparing-apples-and-oranges>
18. <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/manufacturing/us-mfg-2015-global-a-and-d-outlook.pdf>