Optimization of Project Management Software's and Applications for Tracking and Report Projects in the Engineering Aerospace Industry of Design Services

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Abstract

The aerospace design industry constantly faces numerous challenges. Many of these challenges are related to the process scenario, service provided or product. Most of the designs are made on the Island, but their manufacturing is executed in the United States. This situation compromise project managers and project engineers time to be available and accountable to solve day-to-day problems fast and efficient. This research designed a process to define project requirements to be tracked and, in a spreadsheet, consolidated all functionalities, applications and/or computer software's to make the tracking process simple. Results proved that these systems should track just the information necessary to meet the requirements of the project. Productivity improvements of up to 60% in available time to solve day-today problems and $7,000 in project tracking and monitoring licenses savings were achieved.

Project Statement

The aerospace engineering design services industry in Puerto Rico constantly faces numerous challenges. Some of these challenges are directly related to the product or service that is provided. Many of these products and services are delivered remotely. This means that the design is made in Puerto Rico and the final product is manufactured and used in the United States. This scenario presents a challenge for project managers or project engineers, since the level of attention to the timeline, budget, resources, and product before, during and after delivery is key to its success.

For the management of timeline, budget, resources and product, project managers use automated programs to facilitate project status and tracking. On many occasions, different programs or applications needs to be used to make possible a successful tracking of the project. This forces and compromise the project manager to make additional efforts to feed and keep all the information up to date. Errors within the project tracking can occur due to the number of applications that must be kept up to date and spreadsheets to monitor.

This research seeks to create an efficient alternative within all existing software's and applications to centralize and minimize tracking efforts of the project manager. This solution will provide to the project manager an additional space for the resolution of problems and more accurate planning of each project or task that is desired to be carried out.

Objectives

- Reduce the amount of software's and applications for the track and report of engineering aerospace projects or tasks.
- Optimize design project and task tracking process to avoid escapes during project execution.
- Determine the limits of information that are required to feed the software and applications. for reporting and tracking project status, timeline, budget, and resources.
- Reduce the cost of licenses for project management software's and applications.
- Improve the turn-around-time and touch time of projects.
- Avoid errors caused by additional time and effort by maintaining and feeding the different software and applications with information.

Methodology

This design project seeks to obtain as a result the centralization of all project management software's within one system. This system needs to be a user-friendly system that can generate reports and show the status of a design project. Also, should have the ability of being personalized to reduce the amount of time and money spent within what is relevant within the project.

To achieve the established objectives of this project, all the software's that is currently used by the company will be taken into consideration. Metrics to be met will be selected and put into practice for a period of 5 weeks. It is expected to obtain a productivity improvement within the tracking process of a project to meet the required delivery dates and the assigned budget.

Company actual process

Here is a breakdown of the company's current scenario:

- 5 different software's are used to manage the project.
- The project consists of completing digital 3D designs of tools to assemble, disassemble and fix the plane.
- The team consists of designers and structural analysts.
- The final product consists of a 3D model, a drawing and a structural analysis that shows the quality of the design.
- The client is in Middletown, Connecticut (Mainland).
- The designs are not being delivered when the program requires. Affecting the time to be able to manufacture the tools on time.

Model

The model to be created seeks to unify software qualities that the project engineer must maintain to reduce maintenance time and be able to focus on resolving issues related to late deliveries. The software and trackers to be unified are the following:

Primavera / MS Project / SAP / Scheduling tracker report / Turn-around-time (TAT) and touch time (TT) tracker report / Active tools inventory / Tool status tracker

The unification process will be carried out on the MS Excel platform. This programmable tool will allow you to create macros and formulas that will help simplify the tracking process. For the reports we will use MS Access to automate them. MS Excel and MS Access communicate with each other facilitating the automation process.

Model Implementation

Tracking System Model

A system very similar to a scorecard was built (See Table 1). The purpose of this system is to be able to identify the tracking requirements, their current maintenance time and the final time, using MS excel as a simple tool capable of conglomerating all the requirements in one place. This card should be completed at the beginning of the model execution and at the end. The collected data will be presented in the results chapter.

Project Title:	Tracking Scorecard					
Project Engineer:						
REQUIREMENT	Attention Rate 1 (hours/day)	Attention Rate 2 (hour/day)	Attention Rate 2 (hour/day)	Attention Rate 3 (hour/day)	Attention Rate 4 (hour/day)	Attention Rate 5 (hour/day)
Turnaround time	1					
On time delivery	1					
Budget (Hours)	2					
Resources (Design, Stress, Review)	1					
Status Track	3					
Status Report	2					
Total	10 hrs					

Table 1: Tracking Scorecard

Model Implementation Cont.

Core Information

This section collects all the baseline data or information of the task and the different metrics/requirements that will be used to establish the limits (See Table 2). These limits are the delivery date, the turnaround time and the budget assign to complete all the subtasks. It also contains descriptive information and the identification of resources allocated for design, structure and review.

This section will show us if the tool is on time taking into consideration delivery time, touch time and budget consumed. The construction of a programmed macro is what makes it possible for all these invoices to be translated into a color, blue when we are on time and red when the time is about to end or is over. The SAP platform was synchronized so that MS Excel could receive the information of the resources, budget and status provided by the same resources when the work is assigned, and the hours of their day enter the SAP system.

Execution Summary / Structural Analysis / Design Review

These sections document when the task started and when it went through the different subtasks. Each provides start and end dates, as well as status. The statuses are classified as: in progress, stopped, completed, awaiting information (See Table 3 and Table 4).

	CORE INFORMATION									
#	Tool Number	ON TIME (Yes, No)	Date In	Complexity (1, 2, 3, 4)	Requirements (Design, Stress)	Total Hours	Date Req.	Expected TT (Week)	Designer	Analyst	Reviewer
1	PR234001		1/7/22	2	Design, Stress	50	3/14/22	1.5	A. Ramos	K. Smith	E. Rivera
2	PR234002		1/7/22	3	Design, Stress	75	3/14/22	2	S. Ortega	K. Smith	E. Rivera
3	PR234003		1/7/22	1	Design	25	3/14/22	1	J. Arroyo	K. Smith	E. Rivera
4	PR234004		1/7/22	3	Design, Stress	75	3/14/22	2	D. Lowry	K. Smith	E. Rivera
5	PR234005		1/7/22	3	Design, Stress	75	3/14/22	2	S. Ortega	M. Fitch	E. Rivera
6	PR234006		1/14/22	2	Design, Stress	50	3/14/22	1.5	L. Lewis	M. Fitch	E. Rivera
7	PR234007		1/14/22	2	Design, Stress	50	3/14/22	1.5	A. Ramos	M. Fitch	E. Rivera
8	PR234008		1/14/22	1	Design	25	3/14/22	1	D. Pagán	M. Fitch	E. Rivera
9	PR234009		1/15/22	1	Design	25	3/14/22	1	D. Pagán	K. Smith	E. Rivera
10	PR234010		1/15/22	1	Design	25	3/14/22	1	D. Pagán	K. Smith	E. Rivera
11	PR234011		1/15/22	1	Design	25	3/14/22	1	D. Pagán	K. Smith	E. Rivera
12	PR234012		1/15/22	4	Design, Stress	100	3/14/22	2.5	R. Carrión	K. Smith	E. Rivera
13	PR234013		1/15/22	2	Design, Stress	50	3/14/22	1.5	L. Lewis	M. Fitch	E. Rivera
14	PR234014		1/15/22	2	Design, Stress	50	3/14/22	1.5	A. Ramos	M. Fitch	E. Rivera
15	PR234015		1/15/22	1	Design	25	3/14/22	1	J. Arroyo	M. Fitch	E. Rivera
16	PR234016		1/16/22	1	Design	25	3/14/22	1	J. Arroyo	M. Fitch	E. Rivera
17	PR234017		1/16/22	3	Design, Stress	75	3/14/22	2	D. Lowry	K. Smith	E. Rivera
18	PR234018		1/16/22	3	Design, Stress	75	3/14/22	2	S. Ortega	K. Smith	E. Rivera
19	PR234019		1/16/22	2	Design, Stress	50	3/14/22	1.5	A. Ramos	K. Smith	E. Rivera
20	PR234020		1/16/22	1	Design	25	3/14/22	1	J. Arroyo	K. Smith	E. Rivera

Table 2: Core Information

EXECUTION SUMMARY					
Date Started	Status	Date Completed	Total TAT (Week)	Total Hours	Final State
1/7/22	Completed	1/19/22	1.5	50	Approved
1/7/22	Completed	3/21/22	11	125	Approved
1/7/22	Completed	1/14/22	1	22.5	Approved
1/10/22	Completed	3/21/22	10	110	Approved
1/11/22	Completed	3/21/22	10	118	Approved
1/14/22	Completed	1/28/22	1.5	49	Approved
1/16/22	Completed	1/27/22	1.5	50	Approved
1/14/22	Completed	1/21/22	1	20	Approved
1/16/22	Completed	1/24/22	1	25	Approved
2/7/22	Completed	2/15/22	1	25	Approved
2/14/22	Completed	2/22/22	1	24	Approved
1/18/22	Completed	2/2/22	2.5	99	Approved
1/18/22	Completed	1/28/22	1.5	48	Approved
1/18/22	Completed	3/21/22	9	72	Approved
2/14/22	Completed	2/22/22	1	22.5	Approved
2/16/22	Completed	2/24/22	1	18	Approved
1/16/22	Completed	1/31/22	2	70	Approved
1/16/22	Completed	1/31/22	2	75	Approved
1/17/22	Completed	1/31/22	1.5	50	Approved
2/16/22	Completed	2/24/22	1	18	Approved

Table 3: Execution Summary

STRUCTURAL ANALYSIS			DESIGN REVIEW		
Date Started	Status	Date Completed	Date Started	Status	Date Completed
1/14/22	Completed	1/18/22	1/18/22	Completed	1/19/22
1/20/22	Completed	1/21/22	1/21/22	Completed	1/21/22
1/12/22	Completed	1/13/22	1/14/22	Completed	1/14/22
2/14/22	Completed	2/16/22	3/21/22	Completed	3/21/22
3/14/22	Completed	3/20/22	3/21/22	Completed	3/21/22
1/20/22	Completed	1/24/22	1/24/22	Completed	1/26/22
1/24/22	Completed	1/26/22	1/26/22	Completed	1/27/22
1/19/22	Completed	1/20/22	1/20/22	Completed	1/21/22
1/19/22	Completed	1/21/22	1/21/22	Completed	1/24/22
2/9/22	Completed	2/10/22	2/11/22	Completed	2/15/22
2/16/22	Completed	2/18/22	2/18/22	Completed	2/22/22
1/25/22	Completed	1/28/22	1/28/22	Completed	2/2/22
1/21/22	Completed	1/25/22	1/26/22	Completed	1/28/22
3/14/22	Completed	3/20/22	3/21/22	Completed	3/21/22
2/16/22	Completed	2/18/22	2/18/22	Completed	2/22/22
2/18/22	Completed	2/22/22	2/22/22	Completed	2/24/22
1/26/22	Completed	1/28/22	1/28/22	Completed	1/28/22
1/27/22	Completed	1/28/22	1/28/22	Completed	1/31/22
1/29/22	Completed	1/14/22	1/25/22	Completed	1/31/22
2/16/22	Completed	2/22/22	2/23/22	Completed	2/24/22

Table 4: Structural Analysis and Design Review

Results and Discussion

Tracking Scorecard Results

Attention rates 2 through 6 represent weeks 2 through 6 of project execution (see Table 5). During those 5 weeks the project engineer recorded the hours invested in each metric/requirement and averaged them. Obtaining as a result the total average hours it took to complete the requirement in one day.

We can observe in Table 5 that from week 3 the total time per day was reduced by half (from 10 hrs. to 5 hrs. per day). And if we continue observing the following weeks, we can observe that the time was decreased by 60% (4 hrs. total per day).

Results and Discussion Cont.

Project Title:	Tracking Scorecard					
Project Engineer:	Comercial Spring Tools					
	J. Arbelo					
REQUIREMENT	Attention Rate 1 (hours/day)	Attention Rate 2 (hours/day)	Attention Rate 3 (hours/day)	Attention Rate 4 (hours/day)	Attention Rate 5 (hours/day)	Attention Rate 6 (hours/day)
Turnaround time	1	0.5	0.5	0.5	0.5	0.5
On time delivery	1	0.5	0.5	0.5	0.5	0.5
Budget (Hours)	2	1	1	1	1	1
Resources (Design, Stress, Review)	1	0.5	0.5	0.5	0.5	0.5
Status Track	3	3	2	2	1	1
Status Report	2	1.5	1	0.5	0.5	0.5
Total	10	7	5.5	5	4	4

Table 5: Tracking Scorecard Results

Tracking system results

Four (4) tools of (20) twenty were delivered late due to missing engineering requirements and dimensions to complete the tool. If we compare these results with the baseline of the project (2019, 2020 and 2021 delivery results for the same type of tool), just 5 of 20 tools delivered on time versus 16 of 20 delivered on time using the new tracking system.

Investigation results meet the objective of optimize tool design department tracking system in order to provide more time to resolve day-to-day situations. This time was not only invested resolving issues and problems, but it also allowed and gave the space to create and write work instructions that made easier to complete tasks and avoid any turnback as in the past.

The total yearly savings for the department in project management software and applications licenses costs is approximate $7,000. MS Excel is part of the Office 360 suite that costs $159 one-time purchase.

Conclusion

The aerospace industry is constantly changing. These changes are driven by many economic, social and technological factors. However, every day the evolution of this industry teaches us that the wheel does not have to be re-invented. Within the continuous improvement we must always seek to maintain that all systems are easy and simple to use. Depending on the scope of the task we can decide if we want to track the progress of the projects in a micro way. However, a micromanagement approach on several occasions makes the resources to doble effort based on the detail of attention that the project engineer needs to provide.

Observing the results of the investigation, the objectives were met, reducing the number of applications for tracking 3D design tasks and significant savings in time and money.

References

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