Authorized Medical Allowance Lists (AMAL) and the Authorized Dental Allowance List (ADAL) Review Process in the Department of the NAVY

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***Abstract* —** *The AMAL and ADAL are clinically driven documents that specify the minimum quantity of equipment and consumable items required by the U.S. Navy's operating forces Health Services Departments. These lists ensure that the necessary medical capability and capacity are met based on Required Operational Capabilities (ROC) and Projected Operating Environment (POE).*

To enhance the AMAL/ADAL Review process, the study employed the Define Measure Analyze Improve Control (DMAIC) methodology. Process Mapping was used to visualize the steps in the current process, identify areas with limited value, and understand the flow of materials and information. The goal is to create an improved process flow, establish roles and responsibilities, and align with the National Defense Authorization Act (NDAA) requirements.

In summary, DMAIC provides a structured approach to optimize and stabilize business processes, ultimately enhancing medical and dental readiness for Navy forces.

Key Terms *— Department of Defense Instruction (DODINST); Distributed Maritime Operations (DMO); Joint Capability and Integration Development System (JCIDS); Required Operational Capability and Projected Operational Environment (ROC/POE)*

INTRODUCTION

The Department of the Navy (DON) and Expeditionary Medical (ExMED) faces numerous challenges in today's acquisition and sustainment landscape. DoN has gone through some changes due to the release of the Secretary of the Navy (SECNAV) priorities and recent National Security Strategy changes to protect maritime supremacy in a contested environment. These recent strategic changes have led to new requirements development to sustain a resilient medical logistics independent of any restriction's places on it by foreign countries. This new requirement will be governed by Department of Defense Instructions (DODINTS) 5000s, and through the Joint Capability Integration and Development System (JCIDS). that help define acquisition requirements to meet the warfighter demand signal. ExMed in the NAVY hasn't gone through an acquisition phase in the past 20 years, hence the need to define new requirements and processes that help different stakeholders support the mission in an expedited and cost-efficient way.

This research project will focus on improving and defining the AMAL/ADAL review process, which is one of many challenges we face.

PROBLEM STATEMENT

Navy Medicine, led by the Surgeon General of the Navy and headquartered at the Bureau of Medicine and Surgery (BUMED) has gone through substantial organization changes in the past 3 years. Moving away from the standard Medical Treatment Facility (MTF) to the Expeditionary Medical (ExMed) environment. These organizational changes bring challenges in the workforce as new and different organizations come up speed to the changes and new processes. To support ExMed acquisition and life cycle development, the Department of the Navy, has brought Naval Sea Systems Command, Program Executive Office (PEO) for Unmanned and Small Combatant (USC) Program Office (PMS 408) to develop an Authorized Medical Allowance Lists (AMAL) and the

Authorized Dental Allowance List (ADAL) used for expeditionary operations per OPNAV Instruction 6700.3

As there are different challenges across the acquisition portfolio for AMAL/ADAL in the Department of the Navy, this project will focus on some areas as explain in below sections. In order to achieve this goal, a DMAIC project methodology is going to be used.

Research Description

This study works with the improvement and workflow definition process of AMAL/ADAL Review in medical acquisition. As new organizations were stood up to support this new demand, and old processes hasn't been revised in expeditionary medicine after several years, this study will yield an updated process to meet current and future Fiscal Years (FYs) demand.

Research Objectives

This project aims to define a process workflow for AMAL/ADAL review to achieve an inform process via visual aids across stakeholders. This will reduce uncertainty, in the process across different government organizations.

Research Contributions

This project seeks to understand current AMAL/ADAL reviews process on the DoN and across the DoD services to increase work-flow efficiency within new emergent requirements. This improves the coordination across different government stakeholders within DoN. If the agencies reduce the uncertainty within this process will reduce rework and the cost associated with the uncertainty on how to execute the requirements stipulated in DODINST 6700.3. [1] This could represent approximately over $250kk cost reduction in the system's life cycle.

Literature Review

DODINST 6700.3 establishes policies that direct effective practice, continuous evaluation, and incremental improvement of medical materiel readiness by defining roles and responsibilities within the assemblage management process. Medical and dental assemblage lists, also known as Authorized Medical Allowance Lists (AMAL) and Authorized Dental Allowance Lists (ADAL), are clinically driven documents that identify the minimum quantity of equipment and consumable items that the U.S. Navy's operating forces Health Services Departments will carry in order to meet the required medical capability and capacity per their Required Operational Capabilities (ROC) and Projected Operating Environment (POE). To assure high levels of timely requirement compliance, government organizations need to produce, and continually improve, current and future processes that meet or exceed the new warfighter requirements and DOD/DON instructions.

PMS 408 performed extensive research across the DOD to review current AMAL/ADAL review requirements. With the purpose of this, to verify and help inform the process to assure DODINST 6700.13 compliance within the DON

General Concepts of DMAIC Methodology

DMAIC is an abbreviation of five improvements steps: Define, Measure, Analyze, Improve and Control. DMAIC refers to a data-driven improvement cycle used for improving, optimizing and stabilizing business processes and designs [2], [3], [4]. The DMAIC cycle is the core tool that is used to manage the Six Sigma projects. All of the DMAIC process steps are required and always proceed in the given order. DMAIC can be used for any improvement project or application. (See Figure 1).

- **Define**: Define who the customer is, what the requirements for the product or the service are and what their expectations are. In this phase, the project boundaries are defined and mapping the process to understand the flow.
- **Measure**: Create and develop a data collection plan for the process, you shall collect data from many sources to determine types of defects and metrics.

- **Analyze**: The data is collected to be analyzed and determine root causes of defects and opportunities for improvement. In this Phase, gaps are identified between current performance and goal performance, also help identify the sources of variation and prioritize opportunities to improve.
- **Improve**: The target process by designing creative solutions to fix the problem and prevent future occurrences. In the Improve phase, innovative solutions are created to develop and deploy the implementation plan.
- **Control**: The phase of Control helps to maintain and improve the new process implemented. This help to prevent reverting back to the "old way". This phase requires the development, documentation, and implementation of an ongoing monitoring plan.

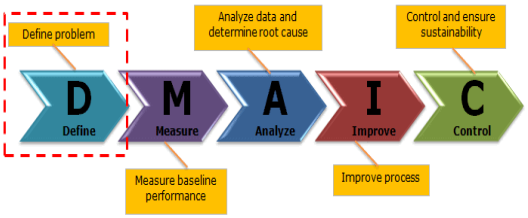

Figure 1
DMAIC

PROJECT METHODOLOGY

A systematic approach needs to be used as a methodology to achieve the goals of the project. Since the purpose of the project is to define and improve AMAL/ADAL review process, the DMAIC tools will be used. In order to achieve an inform process flow, reduce uncertainly across different organizations.

At the **Define** steps the following tools will be used: Project Charter is a statement of the scope, objectives, and participants in a project. It provides a preliminary delineation of roles and responsibilities, outlines the project objectives, identifies the main stakeholders, and defines the authority of the project manager. It serves as a reference of authority for the future of the project.

At the **Measure** steps the following tools will be used: SIPOC is a tool that summarizes the inputs and outputs of one or more processes. The acronym SIPOC stands for Suppliers, Inputs, Process, Outputs, and Customers. is a valuable tool within the DMAIC (Define, Measure, Analyze, Improve, Control) process of Six Sigma. It helps in understanding and mapping the process by identifying key elements such as suppliers, inputs, process steps, outputs, and customers.

For the following steps (**Analyze, Improvements and Control**) tools to be used will be determined during the project process according to the previous steps results.

RESULTS AND DISCUSSION

The results obtained through the five phases of the DMAIC methodology follows.

Define – As part of the define phase the Project Charter tool was performed in order to determine the problem statement, the goal of the project and the metrics that will be defined. See Table 1.

Table 1
Project Charter

Project Charter
Problem Statement: A change in SECNAV priorities and new organizations increased uncertaintly in how work exection was going to take place during the system lifecycle per new DODINSTs causing a negative impact in requirement execution.
Goal: Increase awarness or AMAL/ADAL review process across organization and define roles and responsibilities due to the newly release DODINST.
Metric Definition: AMAL/ADAL Review Process

The most important benefits of using the TMAP in the project is it ensures that nothing is left out or missed. It is an effective tool for ensuring all potential questions and issues of the project. This tool helps us to provide a visual map that tracks the development of ideas and issues. As seen on Figure 2, we utilized this tool to layout the ideas and framework to define this project even further

Through this process the team identified the questions that we had for the project and help us to answer those questions and determined some of the actions, as seen on Table 2, that we need to follow to

complete the improvement of the process. The team wants to know which are the missing gaps in the AMAL/ADAL review we need to address, be in compliance with newly release DODINST, and also identify which are the stakeholders' requirements that we need to improve within the process.

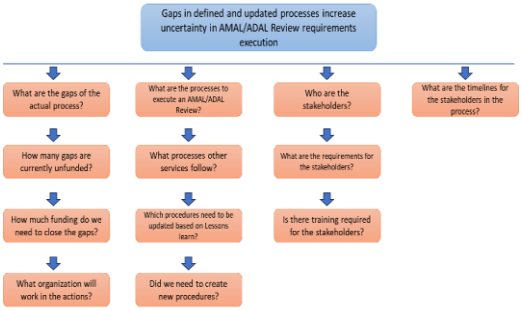

Figure 2
TMAP

Table 2
Action Log

Action	Description	Completion Date
What are the gaps of the actual process?	Review existing processes within the DON to identify gaps in th process	April-30-24
How many gaps are currently unfunded?	Review the results to identify how many gaps we had in the process	April-30-24
How much funding do we need to close the gaps?	Verify stakeholders involved submitted budget request to close gap	April-30-24
What organization will work in the actions?	Identify the organization or stakeholders that will work in the process	April-30-24
What are the processes to execute an AMAL/ADAL Review?	Review and define the processes	April-30-24
What processes other services follow?	Meet with other DoD services to understand similar processes	April-30-24
Which procedures need to be updated based on Lessons learn?	define the task that are needed to execute the process	April-30-24
Who are the stakeholders?	which stakeholders need to be involves	April-30-24
Is there training required for the stakeholders?	verify which organization could provide training for the process	April-30-24
What are the timelines for the stakeholders in the process?	define the AMAL/ADAL Review Timeline	April-30-24

Measure - As part of this Measure phase the SIPOC and the VOC tool was performed in order to determine what the customer wants and needs and also to determine the inputs and outputs of the processes using the SIPOC tool.

Every AMAL/ADAL review should be standardized and documented into a standard operating procedure and be available in DOD databases for distribution. All missing steps or processes were identified and.

The results of the SIPOC and the VOC were showed below in Figure 3 and Table 3 respectively.

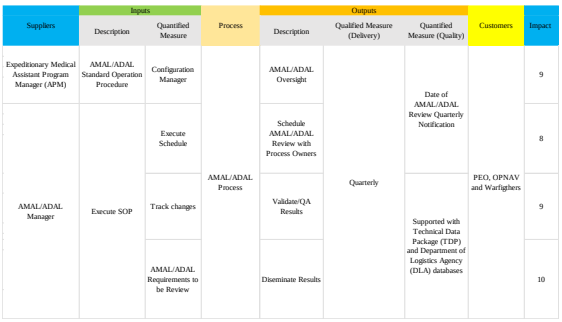

Figure 3
SIPOC

Table 3
VOC

Voice of the Customer	Key Custemer Issues	Critical Customer Requirements
What does the OPNAV want from us	We need to identify the issues that prevent us from satisfyring our customers	We should summarize key issues and translate them into specific and measurable requirements
OPNAV wants to create an AMAL/ADAL Review process	Process Owner does not understand what AMAL/ADAL process to follow for ExMED	Training/Manpower
OPNAV wants to standarize the process		
OPNAV wants a formal SOP	Understand other DoD services process, analyze and standarize the results	Develop an SOP

In the VOC it was noted that the greatest concern was to reduce the uncertainty of the AMAL/ADAL process and improve the understanding via training and an inform standardized process. The customers understand the importance of followed process and the manpower it takes to meet the requirement of the process. This improvement will be very beneficial not only for the ExMed portfolio but also it also could be emulated across other portfolios. It provides the opportunity to inform manpower gaps and task related to the same process.

The area to be focused will be the development of the AMAL/ADAL Review SOP for the DoN [5]-[6] and the definition of Roles and responsibilities of the individuals in the process.

Analyze Phase – A Five Why's technique was used in this project with the intention of understanding the root cause of the problem. This analysis was performed with a diverse team of the Navy that have worked in similar processes or have not worked in the process at all. Developing the five why's will help to identify those requirements that

are causing problems and will help to identified which sub-process needs to be worked to achieve an inform process and schedule.

It is observed that AMAL/ADAL review planning and scheduling for ExMed have been working with no formal management process. As seen in Figure 4, when performing a Five Why's root cause analysis, it is evident that not only process and scheduling are not the only factors missing; staffing is also another gap that was identified during this analysis. These inefficiencies in the program have led to inaccurate demand forecasting, inefficient scheduling, lack of collaboration and communication.

The analysis of the data collected shows that the Project Management, Communication, Resources, Reports, Work Instructions are the major offenders that have affected the AMAL/ADAL review process. If we understand the underline processes, we can define and improve how these requirements will be work for ExMed. All those underlined processes will help identify missing steps from the AMAL/ADAL Review process, schedule requirements and owners of this process.

To define these new processes a cause-and-effect diagram was generated to determine the potential contributors to the requirement SOPs and use it as a foundation for further actions outside of the scope of this article.

Since all the major gaps are related to requirements to the AMAL/ADAL process the cause and effects diagram was created to determine which contributors are affecting this process.

From the Cause-and-effect diagram (see Figure 5) it was determined that the most potential contributors that affect the Product Realization process are: definition of requirements, training and documentation. The team met different DoD branches to understand how they execute AMAL/ADAL requirements. The team concluded that there were a lot of requirements needed to be developed in order manage this process and meet the timeline set through the NDAA.

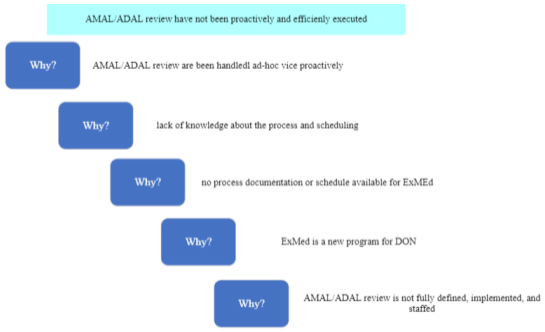

Figure 4
Five Why's Root Cause

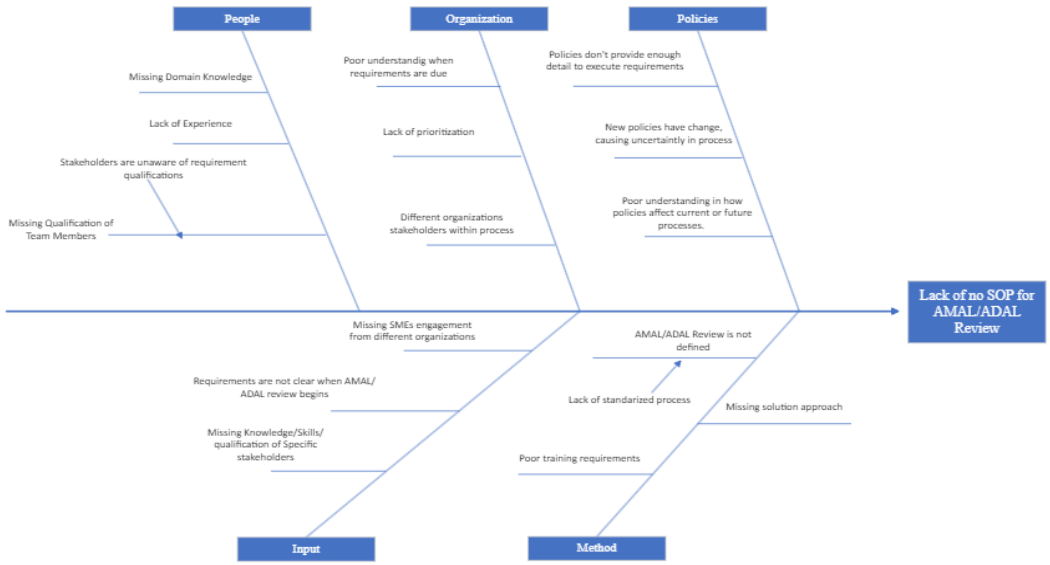

Figure 5
Fish Bone Diagram or Cause and Effect Diagram

The team can conclude:

1. Process owners have not been properly identified.
2. No current schedule has been developed informing us when these requirements will be executed.
3. No formal process has been defined, hence causing uncertainly of what will be executed.
4. Not adequate training is available.

Improve Phase – 5 Whys is an iterative interrogative technique used to explore the cause-and-effect relationships underlying a particular problem. The primary goal of the technique is to determine the root cause of a defect or problem by repeating the question "Why?" Each question forms the basis of the next question. The "5" in the name derives from an empirical observation on the number of iterations typically required to resolve the problem.

The technique was formally developed by Sakichi Toyoda and was used within the Toyota Motor Corporation during the evolution of its manufacturing methodologies. In other companies, it appears in other forms. Under Ricardo Semler, Semco practices "three whys" and broadens the practice to cover goal setting and decision making. Not all problems have a single root cause. If one wishes to uncover multiple root causes, the method must be repeated asking a different sequence of questions each time.

The method provides no hard and fast rules about what lines of questions to explore, or how long to continue the search for additional root causes. Thus, even when the method is closely followed, the outcome still depends upon the knowledge and persistence of the people involved.

In the improve phase the team will use the 5'why tool to determine the root cause for the gap in requirement execution for AMAL/ADAL review and will help us to determine why the uncertainly in executing this process.

As seen on Figure 4, the team can determine that the problem is that the stakeholders, and personnel responsible for the execution of the requirement, do not have the appropriate SOP to follow, the training, and also a schedule to determine when task are due. As we identified during the research is that this process is time sensitive and requires a lot of personnel to meet the rigorous schedule and process to be in compliant with DODINST 6700.13.

During the improvement phase we determined that we need to establish the process for the ExMED portfolio and improve the procedure to provide a better understanding of the requirements of the responsible parties. Also, a training/SOP for all the process owners will be created in order to provide them a better understanding of the process and some templates and tools will be created to help the process owner to document the evidence and requirements that they need.

Another tool that was used during the improvement phase was the Failure Mode and Effect Analysis.

A successful FMEA activity helps to identify potential failure modes based on experience with similar products and processes or based on common physics of failure logic. It is widely used in product development, manufacturing industries, and Department of Defense in various phases of the product life cycle. Effects analysis refers to studying the consequences of those failures on different system levels.

Functional analyses are needed as an input to determine correct failure modes, at all system levels. An FMEA is used to structure Mitigation for Risk reduction based on either failure effect severity reduction or based on lowering the probability of failure or both. The FMEA is in principle a full inductive analysis; however, the failure probability can only be estimated or reduced by understanding the failure mechanism. Ideally this probability shall be lowered to "impossible to occur" by eliminating the root causes. Figure 6 shows the FMEA for this project, using this tool we can determine that we need to work with the following risk in order to avoid potential failures; lack of training, lack of ExMEd Procedures, Schedule and SME to execute new requirements.

Control Phase – Expeditionary Medical AMAL/ADAL procedures from other DoD services were evaluated and based on final evaluations, the new procedures were developed and updated for each of the requirements that were identify as necessary to execute these requirements in compliance with DOSINST 6700.13. A new quarterly tracker was created to help the AMAL/ADAL Managers track their requirements execution on time and also work in the milestone needed before the formal review happens, i.e. gather technical data, prepare documentation before review, work with list of SMEs to attend event, among others. This SOP will help them to understand better the requirements execution. The roles and responsibilities have been identified for each personnel, trained in each of the requirements and explained the DODINST 6700.13 in details to get a better understanding of how execution will happen between DOD agencies to complete the AMAL/ADAL review.

Process Step/Input	Potential Failure Mode	Potential Effect of Failure	SEV	Potential Causes	OCC	Current Conrols	Detection	Risk Priority Number (RPN)	Recommended Mitigation	Action Taken	SEV	OCC	DET	RPN
Logistics	Not able to provide training	Training not available to execute requirement'	10	No requirement establish to determine training needs	10	None	10	1000	Establish formal SOP, Train personel about Role and Responsibilities	Wrote SOP	10	6	2	120
Logistics/ Schedule	Not able to process AMAL/ADAL Reviews	AMAL/ADALs would not be updated per latest requirements	10	No schedule available to show when process start and or finish	10	None	8	800	Establish schedule baseline in AMAL/ADAL process so personnel know when the process start en finish.	Included notional schedule within SOP	8	6	2	96
Technical	Lack fof Knowledge	AMAL/ADAL Review processes are not in place	10	Lack of Knowledge about how to execute the requirement	10	None	9	900	Establish AMAL'ADAL Review process for ExMED	Program Office to work on a formalized approved process	10	5	6	300
Medical	Lack of consistent Medical Expertise for AMAL/ADAL review	Inadequate alignment of consistent expertise across reviews	10	May result in requirement gap	8	None	5	400	Assign a collateral duty to SMEs to rotate in a 3 year basis (or permanent if civilian employee)	Program office initiated discussion to establis	8	8	6	384

Figure 6
FMEA

CONCLUSION

The AMAL/ADAL process has been improved since SOP implementation, stakeholders are informed of requirements, schedule, training and manpower needed to execute work on time. The first goal of the project was achieved by developing an SOP with a detail process flow for work execution increase the AMAL/ADAL review detail requirements. The implementation of the SOP demonstrates that we have achieved these goals. Also, a customer survey will be created to gather feedback from the users in a bi-annual phase, to keep improving the reviews.

The secondary goal of the project was to identify any requirement gap, and documented them to be included in the Planning, Programming, Budgeting, and Execution (PPBE) from the government. This risk was eliminated with the implementation of the before mention objectives.

REFERENCES

[1] *MANAGEMENT OF MEDICAL AND DENTAL ASSEMBLAGE MATERIEL FOR NAVAL EXPEDITIONARY HEALTH SERVICE SUPPORT*, Chief of Naval Operations, OPNAVINST 6700.3 (2024, Apr 2), retrieved April 10, 2024, [Online] Available: https://www.secnav.navy.mil/doni/Directives/06000%20Medical%20and%20Dental%20Services/06-700%20Medical%20Equipment%20and%20Supplies%20Management/6700.3.pdf

[2] T. McCarty, L. Daniels, M. Bremer and P. Gupta, "DMAIC Summary" in *Six Sigma Black Belt Handbook* (Six SIGMA Operational Methods), McGraw-Hill Professional, Access Engineering, 2005.

[3] Six Sigma Resources, [Online] https://www.isixsigma.com/ , retrieved March 20, 2024

[4] Six SIGMA Institute, [Online] https://www.sixsigma-institute.org/ , retrieved on April 2, 2024

[5] Blanchard, B. S. (2004). Logistics engineering and management (6th ed.). Saddle River, NJ: Pearson Education.

[6] Dumond, J., Brauner, M., Eden, R., Folkenson, J. R., Girardini, K. J., Keyser, D., Pint, E. M., & Wang, M. Y. D. (2001). *Velocity management: The Business Paradigm That Has Transformed US Army Logistics*. RAND Corporation. [Online] Retrieved March 7, 2024, from http://www.rand.org/publications/MR/MR1108/